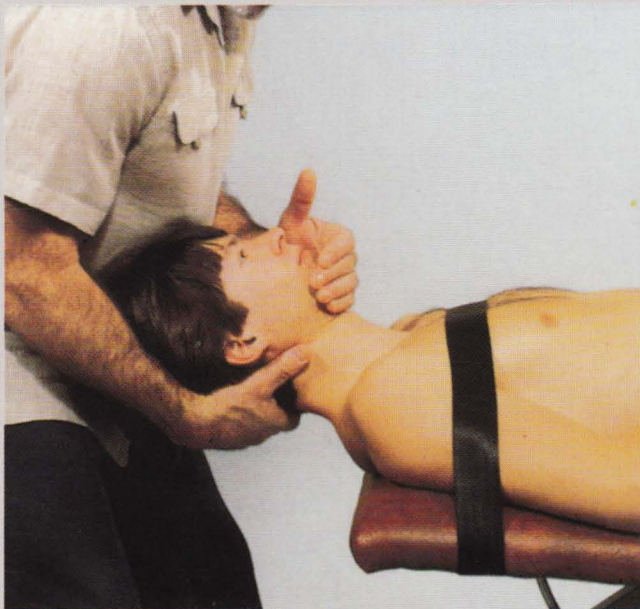


MUSCLE STRETCHING IN MANUAL THERAPY A CLINICAL MANUAL



The Spinal Column
and the TM - Joint

Volume II



Olaf Evjenth & Jern Hamberg

ALFTA REHAB

Olaf Evjenth & Jern Hamberg

MUSCLE STRETCHING IN MANUAL THERAPY

A Clinical Manual



Muscle stretching 2000 years ago. Statue from Bangkok.

Volume II The Spinal Column
and the Temporo-Mandibular Joint

ALFTA REHAB

MUSCLE STRETCHING IN MANUAL THERAPY, A CLINICAL MANUAL, TWO VOLUMES

by

Olaf Evjenth, M.S.
Lecturer in Manual Therapy,
Hans & Olaf Institute,
Oslo, Norway

and

Jern Hamberg, M.D.
Alfta Rehab Center AB
Alfta, Sweden

Original title: Töjning av Muskler, Varför och Hur?
Copyright © Alfta Rehab Center Promotion AB, Alfta, Sweden

No part of this publication may be reproduced, stored in retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the publisher.

Translated from Swedish by M. Michael Brady
Photos by Björn Hamberg
Drawings by Elna Jonsson

6th Edition
Printed by Istituto Grafico Silvio Basile, Italy, 2003

Distributor: Alfta Rehab Center Promotion AB, Box 94, S-822 22 Alfta, Sweden
Webb Site: www.alftarehab.se
E-mail: info@alftarehab.se

ISBN 91-85934-03-8

PREFACE

Today, one patient in four seeking medical aid does so solely with a locomotor system complaint. Many of the remaining three-quarters of all patients seeking medical aid primarily for other reasons also complain of stiffness, aches, and painful movement. The muscular-skeletal disorders of patients in these two categories comprise the greatest single cause of sick leave. The persons affected dominate the group of those who retire early on disability pensions. The socio-economic problems resulting from muscular-skeletal disorders are undoubtedly greater and more widespread than indicated by any single statistic.

Years of research and experience in studying and treating locomotor system maladies have clearly proven the effectiveness of treatment through relaxation and stretching of shortened muscles and other related structures. The techniques involved are basically therapeutic, but they may also be applied in preventative exercise at all levels of physical training programs, for persons of all ages.

Our research has been pragmatically oriented towards attaining results for a greater number of patients over longer periods of time. Hence we have not conducted double-blind tests, but instead have allowed our patients to function as their own controls. Prolonged dysfunction, which diminishes dramatically after relaxation and stretching treatment, is more than ample proof of treatment effectiveness, both for the therapist and for the patients involved.

This book is a compendium of therapeutic techniques that we have used to successfully treat patients with reduced mobility caused by shortened structures. Treatments for the extremities and their associated joints are covered in **Volume I**. Treatments for the spine and the temporo-mandibular joint are covered in **Volume II**. Although the temporo-mandibular joint is anatomically removed from the spine, it is therapeutically recognized as being closely connected to the cervical spine and therefore is included in **Volume II**. Each of the two Volumes is arranged to be used as an independent clinical reference.

In this **Volume II**:

The general principles of manual therapy are outlined in **Part 1**, along with a guide to the organization of the therapy techniques.

The movement pattern of the spine, including the movements involved in *locking* techniques for the cervical, thoracic and lumbar spine are covered in **Part 2**.

The therapy techniques are fully described in **Part 3**, one to a page. Each description consists of a drawing showing the muscles involved, two photos showing the starting and final positions of the technique, and an explicit text giving positions, grips and procedures.

The Movement Restriction Tables and Index of Muscles of **Part 4** list the muscles which may restrict movement and reference them to pages.

The two volumes of this book are intended primarily to be used as ready-reference clinical manuals and as texts on muscle stretching in manual therapy. However, we hope that they will also provide physiotherapists and medical doctors with a fresh, comprehensive approach to the entire subject of muscle stretching in manual therapy. Our underlying goal has been to contribute to improving the quality of the treatment of muscular-skeletal disorders, both for patients and for therapists. We will be pleased if the users of this manual find it useful in realizing that goal.

Oslo, Norway and Alfta, Sweden

August 1984

Olaf Evjenth and Jern Hamberg

TABLE OF CONTENTS

PREFACE

PART 1	GENERAL PRINCIPLES OF RELAXATION AND STRETCHING OF MUSCLES AND OTHER STRUCTURES	7
1.1	INTRODUCTION	7
1.2	INDICATIONS	7
1.3	CONTRAINDICATIONS	7
1.4	GUIDELINES FOR THE THERAPIST	7
1.5	DYSFUNCTION	8
1.6	MANUAL THERAPY METHODS	8
1.7	RECOMMENDED THERAPY PROCEDURE	10
1.8	THERAPY TECHNIQUES - PART 3	11
1.9	REFERENCES	13
PART 2	THERAPEUTIC VIEW OF THE SPINE	13
2.1	IMPORTANCE OF MOVEMENT PATTERN IN THERAPY	14
2.2	BASIC MOVEMENTS	14
2.3	PHYSIOLOGIC MOVEMENT	15
2.4	PHYSIOLOGICAL AND UNPHYSIOLOGICAL/ <i>LOCKING</i> POSITIONS	18
2.5	<i>LOCKING</i> TECHNIQUES	20
PART 3	THERAPY TECHNIQUES	26
3	THE CERVICAL SPINE	26
4	THE TEMPORO-MANDIBULAR JOINT	86
5	THE THORACIC SPINE AND RIBS	94
6	THE LUMBAR SPINE	118
7	THE COCCYX	140
PART 4	TABLES AND INDEX	141
8	MOVEMENT RESTRICTION TABLES	142
9	INDEX OF MUSCLES	147

PART 1

GENERAL PRINCIPLES OF RELAXATION AND STRETCHING OF MUSCLES AND OTHER STRUCTURES

1.1 INTRODUCTION

1.2 INDICATIONS

1.3 CONTRAINDICATIONS

1.4 GUIDELINES FOR THE THERAPIST

1.5 DYSFUNCTION

1.6 MANUAL THERAPY METHODS

1.7 RECOMMENDED THERAPY PROCEDURE

1.8 THERAPY TECHNIQUES - PART 3

1.9 REFERENCES

1. GENERAL PRINCIPLES OF RELAXATION AND STRETCHING OF MUSCLES AND OTHER STRUCTURES

1.1. INTRODUCTION

Humans have always been physically active for reasons other than pure necessity. Nonessential activities, which now classify physiologically as exercise or stretching, evolved for reasons long forgotten or never recorded. Although dance and ritual were obvious progenitors, non-productive physical activity undoubtedly had utilitarian origins: Its early practitioners felt better after stretching. Historical confirmation of the origins of exercise and stretching is lacking. But there's ample evidence that stretching, such as that depicted by the 2000 year old statue shown in the frontispiece of this book, has been practiced since the dawn of history.

Stretching now divides into *therapeutic stretching*, the topic of this Manual and *self-stretching*, as used in exercise, athletic training, dance, and certain ritual exercises. The two categories of stretching may supplement each other. For instance, therapists may teach their patients self-stretching to speed recovery, and sports teams may employ therapists to treat athletes. Yet there is good reason to differentiate. Controlled, proper stretching is beneficial. But uncontrolled stretching of muscles and other structures may damage, such as through causing instability or pathological hypermobility. In most such cases, self-stretching is involved.

Unwary athletes and other persons exercising often self-stretch with great force at long lever arms, which easily injures. Some competitive athletic events, such as gymnastics in general and women's gymnastics in particular, require extreme movement and therefore frequently injure participants. Other extreme activities, such as group exercises to music ("jazzercise" and "aerobic dance" are two) also pose high hazard of stretching damage. Some exercises are faulted, but lack of knowledge is the leading underlying cause of self-stretching damage. Most people know little of the normal ranges of movement of the joints of their bodies. The result is that when they stretch, normal structures are often overstretched, while shortened structures are seldom adequately stretched.

An understanding of why, when and how muscles or other structures should be stretched is prerequisite to stretching to benefit rather than degrade body function. The role of the therapist in stretching is then not just to understand and treat, but also to guide and teach patients self-stretching (see references 6 and 7).

1.2. INDICATIONS

Every patient with symptoms involving the locomotor system, particularly symptoms of pain and/or constrained movement, should be examined to assess joint and muscle function. If examination shows joint play to be normal, but reveals shortened muscles or muscle spasm, then treatment by stretching is indicated. With a view towards preventive medicine, all younger children should be examined and, if necessary, treated for any disturbed muscle function before symptoms appear.

1.3. CONTRAINDICATIONS

Any dysfunction and/or pain of suspected pathological origin contraindicates manual therapy. Affected patients should be advised to seek medical diagnosis, and return to therapy if their doctors negate the suspected pathology and recommend return.

1.4. GUIDELINES FOR THE THERAPIST

The only reliable way to become proficient in detecting and treating muscle dysfunction is through experience gained by *thoroughly examining every patient*. Unfortunately there are no exact rules for examination. Normal ranges of movement referenced in texts, though typical of large populations, are seldom directly applicable in individual cases and therefore do not always indicate if muscles and/or other structures need stretching. So patient examinations should start with *preliminary biomechanical analyses*.

If the preliminary analysis identifies shortened muscles, then a provisional trial treatment is performed. If the provisional treatment reduces pain and improves the affected movement pattern, the preliminary analysis is confirmed, and treatment may proceed. The restoration of the muscles' *normal pattern of movement*, with *freedom from pain*, is the *only real measure* by which the treatment may be judged to have been successful. With experience, examiners can detect particular shortened muscles that constrain movement in their surrounding structures. Sometimes movement patterns and/or ranges of movements cannot be fully restored because of irreversible damage or changes in locomotive structures. Nonetheless, stretching can still be valuable in treatment.

The starting positions, Fig. a, of the techniques of Part 3, correspond to positions imposed by shortening, while the final positions, Fig. b, correspond to extent of maximum range of movement.

1.5. DYSFUNCTION

1.5.1. Causes and Mechanisms

When functioning normally, a muscle has optimum circulation and innervation, is able to move freely, is unimpaired in contracting and relaxing, and has normal elasticity and strength. All movements should be free of pain. Muscle function may depart from this norm in many ways, primarily because muscles are among the most susceptible of body structures. They must continually readjust to their use, disuse, or misuse. Muscle shortening frequently results. Stiff or shortened muscles are often activated in movements in which they otherwise would not take part. This overuse in turn leads to injury and/or to excess inhibition of their antagonists. In general, the shorter the muscle, the more it may inhibit its antagonists. Therefore, stimulating and strengthening a muscle's antagonists always aids treatment. However, note that *the shortened muscle being treated should always be stretched before its antagonists are strengthened*.

Shortened muscles may cause pain from the periosteum, tendons, or muscle belly, including referred pain to other structures or segments. In a synergistic group, no one muscle should be shorter than the others of the group. A stiff, shortened muscle will be subjected to greater stress when contracted suddenly and forcefully, thus damaging itself and/or its associated tendon. This can be prevented by stretching the relevant muscle or muscle group.

Normal range of movement is determined by several structures: skin, subcutaneous tissue, muscles, ligaments, joint capsules, joint surfaces, and intraarticular structures. Changes in any of these structures alter ranges of movement. Conditions such as septic or aseptic inflammations may cause restricted movements when acute, and pathological instability when chronic. The structures most affected are the fascia, joint capsules, ligaments, and joint cartilages. An example is the development of *ankylosing spondylarthritis* (Morbus Bechterew). An initial instability becomes hypomobility through degenerative change. Subsequent development may further restrict movement ranges, and occasionally lead to ankylosis. If a reduced range of movement is caused by shortened muscles, then treatment by stretching increases and may restore the range of movement to normal.

1.5.2. Symptoms

Dysfunction due to shortened structures can be detected by observing one or more of the following changes it may cause:

1. Pattern of movement,

2. Volume and swelling and/or distention of a muscle,
3. Elasticity of a muscle,
4. Range of movement at a joint,
5. Joint play (section 1.6.3, p. 9),
6. Quality of the passive stop, end feel (section 1.6.3, p. 9); *most important*.

In addition to these indicators, a patient may experience fatigue, pain radiating to other muscles and structures, and a feeling of stiffness in the shortened muscle(s). Shortened muscles may also irritate and damage peripheral nerves and blood vessels; examples include sports injuries, and the scalenus, the supinator, the pronator and piriformis syndromes. Poor physical condition, inadequate coordination, or unaccustomed movement often cause altered circulation and faulty muscle movement patterns. According to Vladimir Janda(1), this leads to constant *micro-traumata*, which, in turn, subsequently effects alterations in patterns of movement with chronic muscle spasm, contractures and pain. In an advanced case, joint function is altered and degenerative changes at the joints result. Stretching of the relevant muscle(s) is one way of *preventing* this chain of events.

1.6. MANUAL THERAPY METHODS

1.6.1. The Basics of Stretching

All therapy techniques including stretching should be based on thorough examination. Stretching techniques differ primarily by the type and degree of patient involvement in procedures administered by the therapist. Common to all procedures is a basic, safest sequence of events based on the principle that a muscle is most relaxed and therefore may be maximally stretched immediately after an isometric contraction. According to Sherrington(2), the stronger the contraction (without pain), the greater the subsequent relaxation.

So all procedures start with a static *contraction* of the shortened muscle(s). Then the muscles are relaxed, which makes them more easily stretched for a period of a fraction of a second up to 10 or 12 seconds in pathological cases. During this period, the muscles can be safely stretched. Often patients cannot contract from an extreme position, so treatment procedure cannot begin there. In these cases, it is best to move back to a position in the range of movement where the patient can easily contract, and begin the procedure there.

Muscles are most amenable to stretching when they are *warmed up* in the physiological sense, by preliminary exercise rather than by the application of passive, external heat. Thus all treatment should start with some form of warmup. The best and most specific warmup exercise is contraction

against resistance. The stronger the contraction, the greater the warmup effect.

Unwanted external stimuli, such as noise or discomfort, can impair treatment, particularly treatments requiring combined efforts of patient and therapist. So the patient should always be made as comfortable as possible. The treatment surroundings should be quiet, and other distracting influences should be eliminated whenever possible.

1.6.2. Therapy Procedures

In all therapy procedures, the therapist works to counteract some restriction of movement about a joint. Three different therapeutic approaches are possible, depending on whether the patient is completely passive, participates by offering resistance, or participates both by offering resistance and by working with the therapist.

1. Patient passive: This technique is used in treating more serious contractures to produce lasting lengthening of shortened tissue. The patient relaxes while the therapist moves the joint further in the direction of restriction, and then holds the extreme position as long as necessary, even up to two minutes or more, to lengthen the shortened structures.

2. Patient resists: In this gentle technique, the therapist applies moderate force to move a joint as far as possible in the direction of restriction. The shortened structures then press the joint surfaces together. Then the therapist applies traction at the joint, and thus tries to separate the joint surfaces as the patient resists. Thereafter, the patient relaxes and the therapist maintains traction as long as necessary, until the joint surfaces are felt to separate. The procedure is repeated until movement is appreciably improved.

3. Patient resists and aids: This is the *recommended technique* of this Manual. It starts as does the "Patient resists" technique above, but differs thereafter. First, the therapist moves a joint as far as possible in the direction of restriction. Then the therapist holds the position and asks the patient to isometrically resist it. Patient and therapist should resist each other equally, with the patient contracting one or all of the muscles which are to be stretched; this ensures negligible joint movement. The patient then relaxes while the therapist moves the joint further in the direction of restriction. The process is repeated until improvement is attained. In some cases when the therapist moves a joint, the patient either feels pain or fears pain to an extent that blocks relaxation. The therapist can then apply traction and aid or even offer slight resistance as the patient actively moves the joint in the direction of restriction. Thus the patient controls movement and therefore can relax. In all cases, the therapist holds the extreme position as

long as necessary, even up to two minutes or more, to lengthen the shortened structures.

1.6.3. Character of Joint Movement

In treating joints, the therapist should continually assess the quality and quantity of joint movement and the manner in which movement stops. These evaluations then guide the course of further therapy. For instance, some joint movement abnormalities may contraindicate stretching therapy.

1. Joint Play

Joint play is the gliding and/or separation of joint surfaces without angular movement about a joint. All joints have a characteristic joint play, with which the therapist should be familiar. Normally joint play is greatest in the maximally loose-packed position and diminishes to minima at the extremes of the joint range of movement. The therapist must always examine a joint for joint play before using any of the treatment procedures described above. If joint play is less than normal, it must be restored to normal before other therapy is begun or continued.

2. End Feel

The therapist must be able to sense the extremes of the various possible ranges of movements about body joints, that is, the points at which passive movement stops (3,4). **End feel** is the sensation imparted to the therapist at these points. There are several different types of end feel; the therapist must be able to differentiate between them:

Normal end feel may be *soft, firm or hard*:

Soft: Soft tissue approximation and/or stretching, such as knee or elbow flexion with normally-developed muscles.

Firm: Capsule and/or ligament stretching, such as medial rotation of the humerus or femur.

Hard: Bone-to-bone stop, such as elbow extension.

Abnormal end feel: Abnormalities may produce varying end feels; six are differentiated:

Less-elastic: Such as due to scar tissue or shortened connective tissue.

More-elastic: Such as due to increased muscle tonus, shortened muscles.

Springy block: Internal derangement where the rebound is seen and felt, such as due to torn meniscus.

"Empty": The patient feels severe pain, such as due to acute bursitis, extraarticular abscess or neoplasm, and will not permit the movement to go further; no physical stop felt by the therapist.

Premature: Occurs *before* normal stop, such as in rheumatoid arthritis or osteoarthritis, or contracted ligaments or capsules.

Extended: Occurs *after* normal stop, such as in cases of instability or hypermobility.

1.7. RECOMMENDED THERAPY PROCEDURE

The therapy techniques of Section 3 involve the patient resisting and aiding, the third of the three approaches to procedure described in 1.6.2, p. 9. In these techniques:

- * The therapist moves a patient's joint(s), in the direction of restriction, to positions progressively approaching, but never exceeding the normal range of joint motion, as determined by end feel.

- * The patient actively participates in the treatment procedure, alternately resisting or aiding motion as directed by the therapist.

- * Successive sequences of isometric contraction, relaxation and stretching are used to attain the desired improvement in joint movement range, followed by stimulation of the antagonists. Descriptions of these treatment phases follow.

1.7.1. Isometric Contraction

First, the therapist moves the joint(s) to a position in the line of movement to less than that which might cause pain. It may be possible to start in a position with the shortened structures relatively stretched. However, it is often necessary to start in a position where the patient can easily resist the movement.

Then, in this position, the patient is instructed to resist movement by isometrically contracting the shortened muscle(s). In this **phase, the therapist and the patient apply forces that counterbalance so there is no movement in the joint itself.** The therapist's grip and resistance applied must be comfortable, painless, and secure for the patient.

If isometric contraction causes the patient no pain, the therapist can readily and rapidly tire the muscle(s) involved by applying sufficient resistance (relative to the contracting muscular force) for a few seconds or longer. If the isometric contraction is painful for the patient, then the therapist should decrease resistance and increase the period of force counterbalance, up to 10 to 30 seconds.

1.7.2. Relaxation

When the therapist feels that the patient has sufficiently contracted the shortened muscle(s), the patient is instructed to relax. As the patient relaxes, the therapist releases resistance accordingly, so as not to cause pain or unwanted movement(s).

1.7.3. Stretching to Counteract and Reduce Restriction

After the preceding isometric contraction and relaxation, movement may be improved in four ways:

1. The therapist moves the joint in the direction of restriction.
2. If this movement is painful or if the patient fears pain, then the therapist may be more passive and let the patient actively move at the joint.
3. Pain experienced often may be lessened considerably if the therapist applies gentle traction while the patient actively moves at the joint.
4. Sometimes pain may be further reduced if, in addition to applying gentle traction, the therapist also simultaneously either:
 - a) aids the patient's movement at the joint, or
 - b) provides *gentle resistance* while the patient moves at the joint.

Once an initial new position is attained, the sequence of contraction, relaxation and stretching is successively repeated to progressively attain the desired improvement in movement range. Thereafter, the antagonist(s) should be stimulated.

1.7.4. Stimulation of Antagonists

The antagonists to the muscle(s) treated always should be stimulated immediately after the sequence of treatment to increase movement in the direction of restriction.

To stimulate the antagonists, the therapist reverses the direction of force or resistance applied, and counteracts movement. To reverse the direction of force applied, the therapist may either retain grip or change grip, depending on the treatment technique involved. Once the therapist is prepared to apply a reverse force, the patient is asked to move in the direction just stretched in the treatment, and the therapist opposes that movement to evaluate the ability and the force with which the antagonists contract.

Inhibition of antagonists can be reduced through vigorous stimulation, such as rapid vibrating movements, pinching and shaking/stretching muscles, slapping the skin, or traction or compression (approximation) of the joint(s).

Restricted joint mobility or pain may inhibit and thus lead to weakening of the antagonists. Therefore it may be necessary to strengthen these muscles throughout their full range of movement. The muscles should be able to control movement through the full range and should also be able to lock the joint in any position in that range. Stimulation of the antagonists is always a vital part of successful treatment.

Neurological dysfunction may block or mask a patient's perception of stimuli. In these cases, stimulation must be confined to localized areas. For instance, in stimulating the finger flexor muscles (antagonists to the finger extensors), the

therapist should apply pressure only to the volar sides of the fingers.

1.7.5. Stretching of Other Structures

Whenever successive contraction and relaxation treatments fail to increase movement at a joint, the joint should be reexamined to ascertain if the restriction is caused by structures other than muscle(s), such as by ligaments or joint capsules. If joint play is noticeably diminished or absent, it may be restored using joint mobilization techniques, such as those described by Kaltenborn(3) and Stoddard(5). However, if joint glide is normal but movement is restricted, the following procedure may be used. The therapist stretches the shortened structures by applying an *optimal intensity* force. *Intensity* is the combination of force magnitude and duration of application, with duration being the more important in stretching. *Optimal* means as small as possible, yet adequate for results: a small force for a few seconds to two minutes or more.

The patient should feel the stretching, possibly even as pain, though not to the point of serious discomfort. **Elsewhere the treatment should cause no pain.** If the procedure produces no improvement, the force applied may have been of insufficient intensity. If so, stretching should be repeated at greater intensity, preferably for longer periods of time, and then if necessary, with greater force.

Physiotherapists or doctors may administer these therapeutic stretching techniques. However, therapy is more effective if it is supplemented by more frequent self stretching, preferably daily or several times a day. Therefore, patients should be taught self stretching (6,7). In general, the more frequent the stretching, the more moderate the intensity. Less frequent stretching, such as that done every other day, may be at greater intensity.

1.8. THERAPY TECHNIQUES - PART 3

1.8.1. Therapeutic Relation Between the Spine and the Temporo-Mandibular Joint

The commonplace view of the human body places the head on top of but separate from the back, and anatomical classification separates the jaw from the spine. Such conceptual lack of connection can deceive. Acrobats thrill circus spectators by hanging in midair from bars clenched in their teeth, and strongmen stunts often include impressively gigantic humans moving trucks or railroad cars by pulling on towropes with their teeth. These extraordinary performances underscore that there actually is a very strong connection between the jaw and the spine.

Jaw misalignment, habitually clenched teeth, or

other mastication abnormalities can asymmetricaly load and thus lead to dysfunction in the temporo-mandibular joints. This dysfunction may result in referred muscular stress, which, in turn, can hinder treatment of or even worsen existing dysfunction in the neck. Whenever therapeutic treatment of the cervical spine fails (and there is no underlying neurological or pathological abnormality), dysfunction in the temporo-mandibular joints often is the barrier to improvement. Therefore, from a therapeutic viewpoint, the temporo-mandibular joints are closely connected to the cervical spine. Thorough therapeutic examination of the cervical spine should always include examination of the temporo-mandibular joints, and vice versa. For these reasons, the therapies for restrictions at the temporo-mandibular joints are regarded as being part of the treatments of the spinal column rather than part of the treatments of the extremities (**Volume I**).

1.8.2. Caveat

In treating all joints, and particularly in treating the cervical spine, the therapist should strive to avoid compression. Compression may hinder desired movement at the various articulations, can stress nerve tissue, or can otherwise damage the spinal column. Therefore, traction is used in all procedures as a means of counteracting any compression which may result from the movement induced in treatment.

Therapeutic treatment of the spine and the temporo-mandibular joints builds on the same general principles as does the corresponding treatment of the extremities described in **Volume I**. However, the nature and function of the spinal column dictate a more cautious approach, which demands greater experience and skill on the part of the therapist.

In particular, complex spinal movements, involving ventral/dorsal flexion, lateral flexion, and rotation, must be made in sequential small increments. First ventral/dorsal flexion is increased slightly, then rotation is increased slightly, and finally lateral flexion is increased slightly. Thereafter, the sequence of slight increases of each of the three component movements is repeated successively until the final position is attained. Specifically, **a final position should not be approached through maximum movements.** That is, the therapist **does not** maximally ventral/dorsal flex, then maximally rotate, and finally maximally laterally flex to attain a final position.

The success of any therapeutic technique used is contingent upon the cooperation of the patient and upon a careful examination and appropriate treatment. The therapist must continuously aim, through practice, to increase the sensitivity of

mind, fingers and hands to “receive signals” from the patient. The character of these “signals” often makes verbal communication superfluous. The development of the requisite skills to “feel” what lies below the surface and to register the events there, and then to interpret this information along with the patient’s reactions, may take years of practice, even for a skilled and gifted therapist.

1.8.3. Key to Therapy Techniques

Detailed descriptions of the techniques used to stretch restricting structures are arranged in five sections in **Part 3**: cervical spine, temporomandibular joints, thoracic spine and ribs, lumbar spine and coccyx. Each of these sections starts with a Therapy Guide, the first four of which contain two tables. The tables list the possible restrictions at the articulation group, the muscles which may cause each of the restrictions, the corresponding techniques (indexed by number and page), and the relevant muscle actions.

Alternative therapies for any particular restriction are indicated by suffix letters. For instance, there are three specific techniques for increasing ventral flexion of the occiput on the atlas listed in section 3.2.2:

3.2.2.C (see Notes!)

Section 3 on the cervical spine

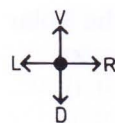
Subsection 2 on restricted ventral flexion

Specific techniques 2 for the occiput on the atlas

Technique C, patient supine

For uniformity, all technique descriptions are similar. In dealing with movements symmetrical with respect to the mid-sagittal plane where the choice of right versus left is arbitrary for the therapist, techniques are explained primarily assuming a right-handed therapist. In these cases, the therapist may interchange right and left if more convenient. In all cases where movements are asymmetrical with respect to the mid-sagittal plane, the treatment for movement to the right is shown and discussed. The therapist then reads right for left and vice versa in the equivalent therapy for movement to the patient’s left.

Each therapy is illustrated with a muscle drawing and starting and final position photos.



Drawings show directions in all planes.



in illustrations indicates **locking**

X in illustrations indicates points of stabilization by hands, belts etc. **Arrows** in illustrations indicate directions of stretching movements and also patient movement in the antagonist muscle stimulation phase. **P** in texts denotes the patient, **T** the therapist.

All instructions are for you, the Therapist, and are divided into four parts: **Starting Position, Grip, Procedure and Stimulation of Antagonists**. When needed, **Notes** clarify or supplement these four parts.

The **Starting Position** instructions consist of short statements on how to arrange the patient and yourself to start treatment. They may easily be remembered if you view them as brief descriptions of a scene, or as notes you might take upon first seeing the technique performed by another therapist. The other three instructions, **Grip, Procedure and Stimulation of Antagonists** are direct instructions on how to perform the treatment.

Instructions for the patient also require monitoring by the therapist. For instance, some **Procedure** instructions require the patient to exhale. You must then ask the patient to exhale, and must check that he/she exhales and does not immediately inhale again as the treatment is performed.

Note that most stretching should be performed gradually and fully, so as to approach but not go beyond the normal range of movement.

As in anatomy texts, the descriptions of *muscle action* of this Manual assume starting in the anatomical position. However, muscle action may change at an extreme joint position, sometimes to the opposite of that described. For instance, the **sternocleidomastoid** muscle in the neck acts as a ventral flexor of the cervical spine when it is ventrally flexed, but acts as a dorsal flexor of the upper cervical spine when the cervical spine is dorsally flexed.

1.8.4. Terminology

Standard anatomic terminology is used throughout this Manual. However, whenever two or more synonymous anatomical terms are in accepted current use, the terms most pertinent to the physiotherapy situation are used.

Because manual therapy is concerned with joints and muscles and related structures, all

descriptions of therapy procedures and of muscle actions are in terms of joint movements. For instance, the action the **rectus capitis dorsalis major** muscle of the neck is described as "dorsally flexes the occiput on the atlas" while a medical anatomy text author might prefer "extends head."

In summary, the terminology of this Manual may be viewed as chosen to suit an *active situation*, in which the therapist promotes, directs, or elicits motion, as opposed to some surgical or medical choices of terms, which may be viewed as more *passive*, intended primarily for identification or description.

1.8.5. Using the Ready Reference Features

The ready reference features of this Manual can best be explained by example. Assume an adult whose complaint is that they cannot turn their head and look to the rear when backing a car. The restricted movements involve various degrees of ventral flexion with lateral flexion and rotation to the same side of the cervical spine. First, Section 3 on the Cervical Spine is found either by page number from the Contents or by flipping through the pages to find The Cervical Spine at the top of the pages involved. **Table 3-1** lists the techniques for treating the restricted movement as part of section 3.3, pp.38-43. All primary and secondary

restricting muscles are listed in **Muscle Restriction Table 8-1**, pp. 142-143.

1.9. REFERENCES

1. Janda, Vladimir, "Die Bedeutung der muskulären Fehlhaltung als pathogenetischer Faktor vertebrangener Störungen," **Arch. physikal. Therapie**, **20** (1968), 113-116.
2. Sherrington, C.S., "On plastic tonus and proprioceptive reflexes," **Quart. J. Exp. Physiol.**, **2** (1909), 109-156.
3. Kaltenborn, Freddy M., **Manual Mobilization of the Extremity Joints, Vol II**, Olaf Norlis Bokhandel, 1988.
4. Cyriax, James, **Textbook of Orthopedic Medicine**, London, Hutchinson, 1969.
5. Stoddard, Alan, **Manual of Osteopathic Technique**, London, Hutchinson, 1980.
6. Gunnari, Hans, and Evjenth, Olaf, **Sequence Exercise**, Oslo, Dreyers Forlag, Norwegian edition 1983, English edition 1984 (Chapter 7 on self-stretching)
7. Evjenth, Olaf and Hamberg, Jern, **Autostretching. The Complete Manual of Specific Stretching**, Alfta Rehab Förlag, Alfta, Sweden, 1989.

PART 2

THERAPEUTIC VIEW OF THE SPINE

2.1. IMPORTANCE OF MOVEMENT PATTERN IN THERAPY

2.2. BASIC MOVEMENTS

2.3. PHYSIOLOGIC MOVEMENT

2.4. PHYSIOLOGICAL AND UNPHYSIOLOGICAL/LOCKING POSITIONS

2.5. LOCKING TECHNIQUES

2. THERAPEUTIC VIEW OF THE SPINE

2.1. Importance of the Movement Pattern in Therapy

The structure and function of the vertebral column dictate that therapy techniques for the spine differ from therapy techniques for other joints in the body in two respects. First, because the vertebral column consists of many articulating segments, movements are complex and usually involve several segments. This also means that restrictions may be complex. For instance, if a single segment is restricted, the adjacent segments may assume part of its normal tasks in executing movement. Thus hypomobility and forced hypermobility may both exist in a relatively short section of the spine. Second, because the spinal cord runs along the channel formed by the vertebral column, damage to or excessive movement of the column is potentially hazardous to the central nervous system.

The therapist may exploit the movement pattern of the spine to therapeutic advantage. For instance, through controlling movement, segments may be positioned such that they are either maximally free or maximally constrained. Exercising such control increases the precision and efficiency of both non-specific and specific treatments.

For these reasons, a thorough familiarity with the movement pattern of the spine is prerequisite to all therapy techniques for the spine.

The movement pattern of the spine delineates the movements attainable by the unrestricted, normal spine. It should not and normally cannot be exceeded without injury. It is described in terms of *quantity* and *quality* of the various movements involved. The quantity of a spinal movement is described in terms of the basic component movements and can be measured in degrees. The *quality* of a spinal movement describes the manner in which it is made. A *high quality* movement is made throughout its range without pain or obvious mechanical difficulty. Both the *quantity* and the *quality* of a spinal movement and of its basic component movements are determined by the physiology of the spine and its surrounding structures.

2.2. Basic Movements

Almost all self-propelled human motion is produced and controlled by movements of the appendicular portion of the body. Much of the science of kinesiology is devoted to studies of how the limbs move in executing various tasks and in propelling the body. In comparison to the relatively large normal ranges of movements at the joints of the extremities, the movements of the articulat-

ing segments of the vertebral column are small, and sometimes almost imperceptible. Nonetheless they are extremely important. And they profoundly affect movements of other parts of the body, as anyone who has ever tried to walk with a "stiff back" can attest. Movement, however subtle, is a vital part of the function of the spine. Therefore, the movements of the spine are precisely defined:

All movements of the spine are referenced to the neutral position in which the spine appears:

- * As a straight, vertical column in the *frontal plane*.

- * As a double S-curved column (post-infancy spine) in the *sagittal plane*, with normal cervical, thoracic, lumbar and sacral curves.

And all complex movements are described in terms of three constituent component movements. In their most customary order, the components are:

- * *Sagittal plane*: Ventral or dorsal flexion: Movements changing curvature of the spine in the mid sagittal plane.

- * *Frontal (coronal) plane*: Lateral flexion: Movements inducing curvature of the spine in the frontal (coronal) plane, to the right or to the left.

- * *Transverse plane*: *Rotation* about a midline in the vertebral column, defined when viewed from above the head as right (clockwise) or left (counterclockwise).

Theoretically, these three components may be considered in any order. But in practice, flexion in the sagittal plane is always first, because ventral

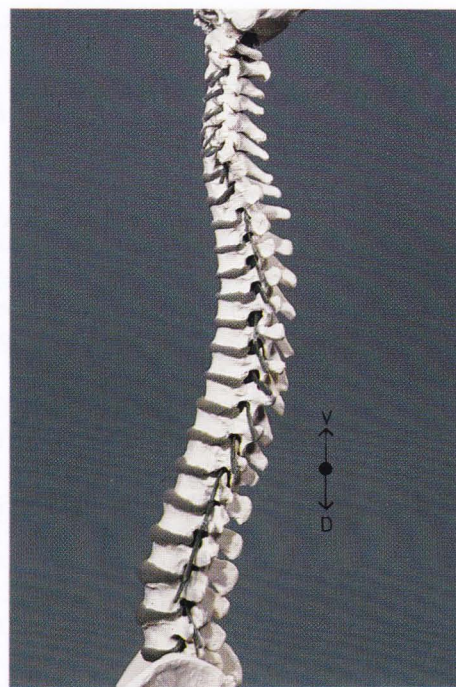


Fig. 1. Normal vertebral column in sagittal plane; left lateral view.

and dorsal flexion differ in magnitude throughout most of the spine and because together they comprise the greatest range of movement of the spine. Thereafter, there are two possible orders. The order most commonly used in physiotherapy is as above: ventral/dorsal flexion, followed by lateral flexion, followed by rotation. However, in treating, particularly in treating the cervical spine, therapists will rotate before laterally flexing. So the order of ventral/dorsal flexion, followed by rotation, followed by lateral flexion is also valid.

The three basic component movements are not independent, but interact in various ways depending on where movement occurs in the spine. Because the spine is not a completely symmetrical articulating unit, as is, say, a chain of beads, ventral and dorsal flexion may have differing effects on the two other basic movements, depending on position in the spine. In the cervical spine, ventral and dorsal flexion have similar effects on lateral flexion and on rotation. But in the thoracic and lumbar spine, where the position of the articular facets relative to the body of the vertebrae differs from that in the cervical vertebrae, ventral and dorsal flexion have differing effects on the two other basic movements. The differences are discussed in the following section.

Lateral flexion and rotation interdepend throughout the spine. Normally, one cannot occur without the other. The single exception is the rotation of the atlas on the axis, which produces only negligible lateral flexion at the segment itself.

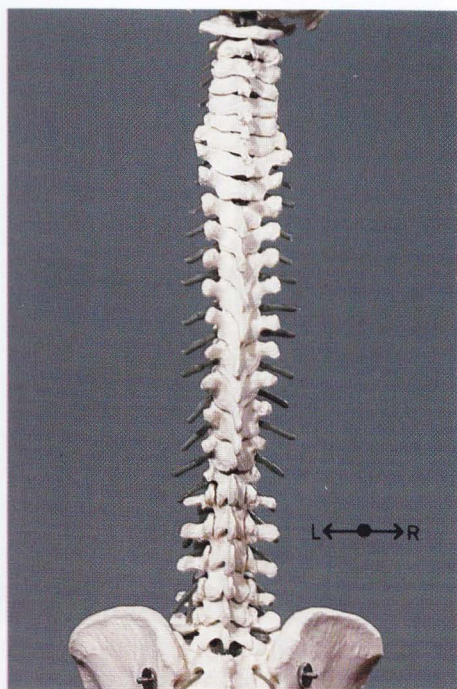


Fig. 2. Normal vertebral column in coronal (frontal) plane; dorsal view.

However, there is still a degree of movement interdependence, as rotation of the atlas on the axis causes lateral flexion of the occiput on the atlas to the opposite side. In general, full lateral flexion is contingent upon rotation.

The theoretically perfect spine can ventrally or dorsally flex throughout without involving lateral flexion or rotation. However, in almost all practical situations, apparently pure ventral or dorsal flexion actually involves some lateral flexion and some rotation.

2.3. Physiologic Movement

In addition to consisting of three component movements, all complex spinal movements are characterized by the relative ease with which the physiology of the vertebral column permits them to be made. In either ventral or dorsal flexion, the normal, unrestricted spine laterally flexes equally well to the right and to the left. However, for each of the four combinations of ventral/dorsal flexion and right/left lateral flexion, there is a difference in the magnitude and the ease with which right and left rotation may be made. One direction of rotation is as free as physiologically possible, while the other is constrained.

The same situation arises if rotation is considered (or induced in treatment) before lateral flexion. In ventral/dorsal flexion, the normal, unrestricted spine rotates equally well to the right and to the left. However, for each of the four combinations of ventral/dorsal flexion and right/left rotation, there is a difference in the ease with which right and left lateral flexion may be made. One lateral flexion is as free as physiologically possible, while the other is constrained. In both of these cases, the relative ease of movement depends on the direction chosen for the last of the three component movements. So the terms describing ease of movement are referenced to that last component movement, and the first two component movements are regarded as attaining a position:

* A position where a final component movement is maximally free is termed the **"physiological" position for movement, which stops with a soft end feel; i. e. coupled movements.**

* A position where the final component movement is constrained is termed the **"unphysiological" position for movement, which stops with a hard end feel; i. e. combined movements.**

The range of movement ease, from maximum freedom in the physiological position for a movement to constraint in the unphysiological position for movement is best illustrated by examples in everyday life. Consider, for instance, the normal sequence of movements a sitting person uses to glance to the left, such as to speak

to someone in the seat to the left in a theater. The chin tucks in and the head inclines and rotates to the left. The sequence of movements involve ventral flexion followed by left lateral flexion followed by left rotation in the cervical spine. The movement is accomplished with ease and without discomfort, as it has been made from the *physiological position for left rotation*. Now consider a similar movement as it is often made by busy office workers at their desks. The typical right-handed office worker places the telephone on the left of his/her desk to leave the right hand free for writing. When talking on the phone, the head is bent to the left to cradle the telephone receiver between the head and the left shoulder, and notes are taken with the right hand, on a pad held stable on the desk with the left hand. Now, if the call requires some information filed on the worker's shelf, typically located behind the chair, most workers will crane their heads to the right to locate the desired item, without putting the telephone receiver down. But head movement to the right is difficult, because the sequence of movements has involved ventral flexion followed by left lateral flexion (which is held) followed by right rotation in the cervical spine. This is the *unphysiological position for right rotation*. The first two component movements, ventral flexion and lateral flexion to the left, are the same in both cases, and the position attained by them may even be identical. The position is physiological for left rotation, but unphysiological for right rotation.

In therapy, the segment(s) treated is/are placed in the physiological position for the movement involved. Therapy techniques are most effective if the segments not being treated do not move in the procedure, or "follow" the movement the therapist induces in the treated segments. They are then placed in an unphysiological position for that movement. This use of unphysiological positions to deliberately constrain movement is termed *locking*. *Locking* is written in *italics* to indicate that it does not mean becoming locked, as a door locks, but rather considerable constraint to movement.

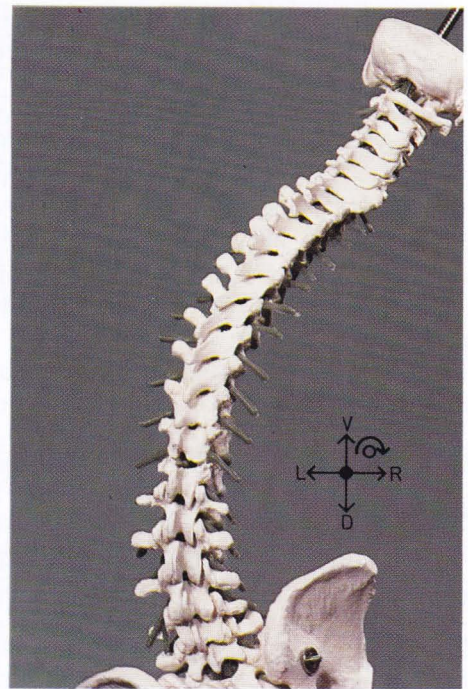


Fig. 3. Vertebral column in ventral flexion lateral flexion and rotation to the right; dorsal view.

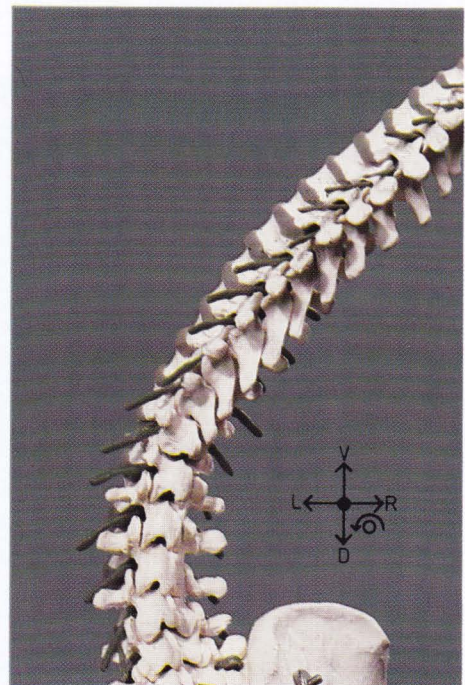
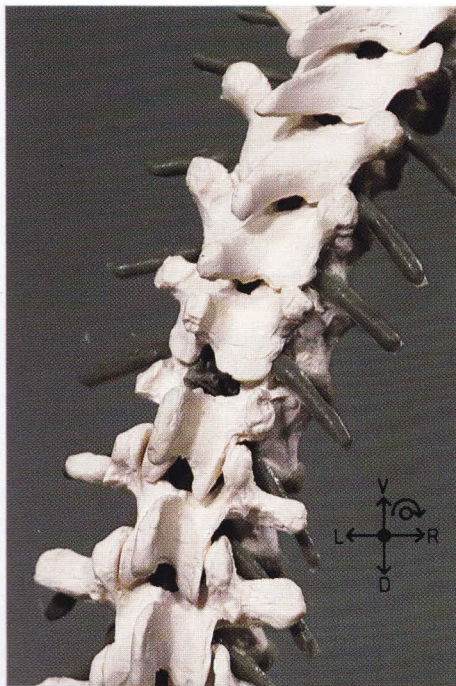


Fig. 4. Vertebral column in dorsal flexion, lateral flexion to the right and rotation to the left; dorsal view.



A

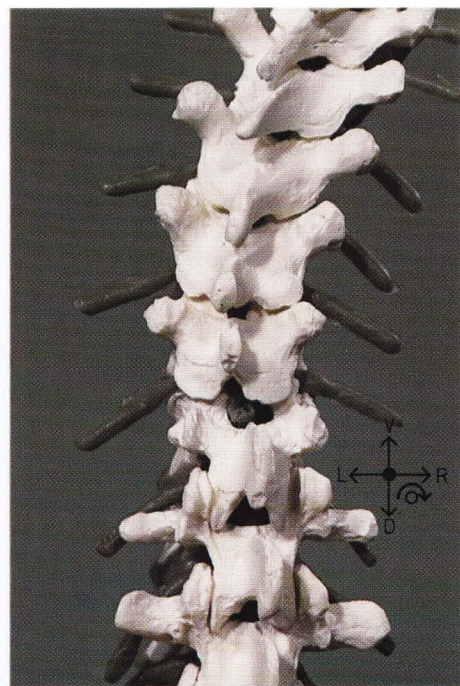


B

Fig.5. Lower thoracic and upper lumbar vertebrae in ventral flexion, lateral flexion and rotation to the right (A, above figure) and in dorsal flexion, lateral flexion to the right and rotation to the left (B, below figure), both physiological positions for movement involved; dorsal view.



A



B

Fig.6. Lower thoracic and upper lumbar vertebrae in dorsal flexion and lateral flexion to the right. Rotation to the left (A, above figure) is physiological, while rotate to the right, (B, below figure) is unphysiological; dorsal view.

2.4. Physiological and Unphysiological/Locking Positions

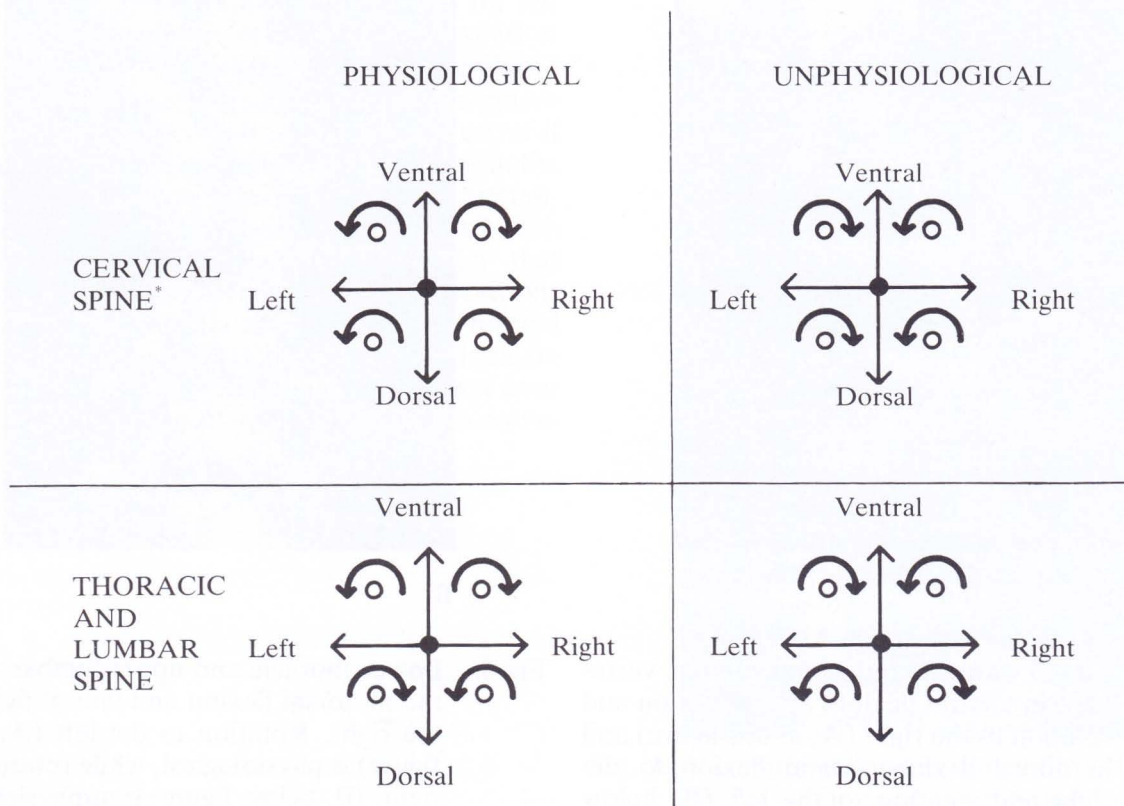
The spine is, so to speak, well designed for its purpose. The physiological positions are those involved in natural human movement. Therefore, they differ from the cervical spine to the thoracic and lumbar spines, as suits the differences in neck/head and trunk movements. The physiological and unphysiological positions are listed in Table 2-1 and shown schematically in Fig. 7.

Table 2-1 Physiological and Unphysiological Positions of the Spine.

Part of Spine	Sagittal Plane Flexion	Lateral Flexion	Physiological Rotation	Unphysiological Position for Rotation to
Cervical ¹	Ventral	Right	Right	Left
	Ventral	Left	Left	Right
Thoracic and Lumbar	Dorsal	Right	Right	Left
	Dorsal	Left	Left	Right

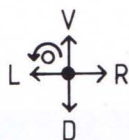
Note 1 May include part of the upper thoracic spine

Fig. 7.



The differences in cervical spine behavior and thoracic and lumbar spine behavior are seen most clearly in the schematic drawing of Fig. 7. In ventral flexion, the *physiological* and *unphysiological positions* are alike throughout the spine. But in dorsal flexion, there is a right-to-left reverse between the cervical spine and the lumbar and thoracic spine, as best suits overall body biomechanics. The differences between the behaviors of the cervical spine and the lumbar spine is clearly noticeable in normal body movement. However, the difference between the behaviors of the lower cervical spine and the upper thoracic spine may be less obvious. The transition from typical cervical spine behavior to typical thoracic spine behavior is not always abrupt at the C7-T1 segment. It may be gradual. In other words, cervical spine behavior may extend slightly caudally into the thoracic spine. So in Table 2-1 and Fig. 7, *Cervical* may in some cases be extended to mean *Cervical and possibly part of the upper Thoracic*.

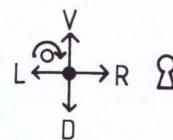
The example of the previous section can be easily explained using Fig. 7. Both the theater-goer and the office worker attain positions of the cervical spine falling into the ventral-left quadrants of the diagrams. The theater-goer's left rotation is physiological:



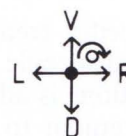
- Segment(s) in neutral position.
- Segment(s) displaced.

Fig.7. Schematic representation of the physiological and unphysiological positions of spinal segments. Drawings show directions in transverse planes through the spine: ventral and dorsal sagittal-plane flexion, and right and left lateral flexion. Arrows circling displaced spine positions indicate directions of rotation. Note the right-left symmetry of movement in the cervical spine. The corresponding symmetry in the thoracic and lumbar spines is by sectors in the above drawings, or mirror symmetric about a coronal plane. **Note 1:** May include part of the upper thoracic spine.

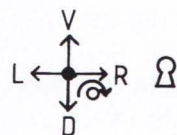
However, the office worker's right rotation is unphysiological, or *locked* (indicated by keyhole symbol in schematic drawing below):



Other everyday movements may be analyzed using the figure. Consider, for instance, the case of the theater-goer whispering to the person in the seat to the right and the office worker trying to find papers filed on the shelf behind his/her chair while talking on the telephone. The theater-goer most likely will bend forward slightly and then rotate his/her shoulders to the right to come closer to the next person's ear to whisper. The sequence of movements involve ventral flexion followed by right rotation and right lateral flexion. The movement falls in the ventral-right quadrant of the physiological diagram for the thoracic and lumbar spine:



It is easy, as it has been made from the physiological position. On the other hand, the stressed office worker, who finds that he/she cannot see the desired item on the shelf behind because head rotation to the right is blocked, will often bend backwards to come closer to the shelf, and then turn shoulders and the chair back to the right for a better view. The sequence of movements involve dorsal flexion followed by right rotation and right lateral flexion of the thoracic and lumbar spine. The movement falls in the dorsal-right quadrant of the unphysiological diagram:



It is difficult as it has been made from the unphysiological position. The office worker has compounded the original error, and has strained to move against *locking* in the thoracic/lumbar spine as well as *locking* in the cervical spine.

Table 2-1 and Fig. 7 may be used to analyze difficulties due to unintentional *locking* brought about by improper movement. But their major utility to the therapist is as a reference of *locking* positions used intentionally in various spinal therapy techniques.

2.5. Locking Techniques

Locking in therapy involves intentionally placing segments in positions to constrain their movement, so adjacent segments may be more effectively treated. Usually cranial/superior segments or caudal/inferior segments to the treated segment are *locked*. But in some instances, *locking* may be used both caudal to and cranial to the treated segment.

The basics of therapeutic *locking* are easily derived from Table 2-1 and Fig. 7. Consider, for instance, a treatment technique to enhance lateral flexion to the left and rotation to the right of a segment of the lower thoracic spine in dorsal flexion, as shown in Fig. 8. The segment itself is placed in the physiological position, and the adjacent segments are placed in the unphysiological position for rotation to the right. There are two options for *locking* against right rotation:

1. Retain dorsal flexion and induce lateral flexion to the right, or
2. Induce ventral flexion and retain lateral flexion to the left.

For most non-specific treatments and some more easily performed specific treatments, one of these two *locking* options is adequate. Because it is usually more convenient to position a patient with the spine completely in dorsal flexion or completely in ventral flexion, the first of the two options is the most frequently used. The sagittal plane flexion (ventral/dorsal) in which the treated segment is placed is retained caudal to the segment, because of the convenience of stabilizing

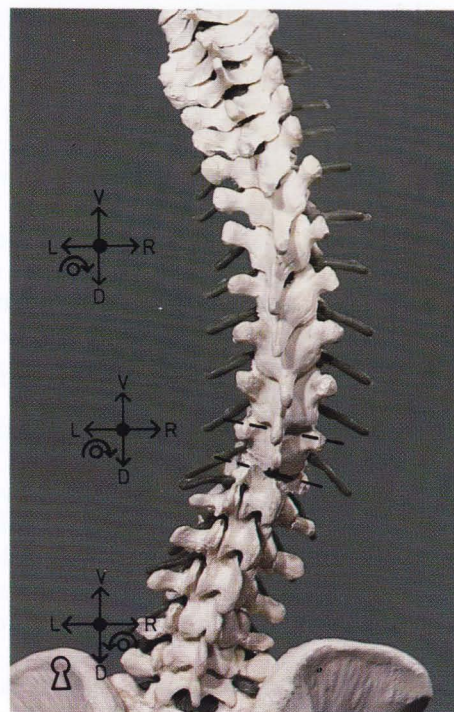


Fig. 8 a.

Fig.8. Typical treatment of lower thoracic spine: T11-T12 segment in physiological position: Dorsal flexion, lateral flexion to the left, and rotation to the right.

A: *Locking* retaining dorsal flexion throughout. Segments caudal to segment treated laterally flexed to the right and rotated to the left, *thus locking for rotation to the right*. Segments cranial to segment treated retain the lateral flexion to the left and rotation to the right and therefore do not *lock*.

B: *Locking* with change of flexion in sagittal plane: Segments caudal to segment treated positioned as in A: Dorsal flexion, lateral flexion to the right and rotation to the left, *thus locking for rotation to the right*. Segments cranial to segment treated placed in ventral flexion, lateral flexion and rotation to the left, *thus locking for rotation to the right*. This is double locking, with segments both caudal to and cranial to the segment treated *locked* for rotation to the right.

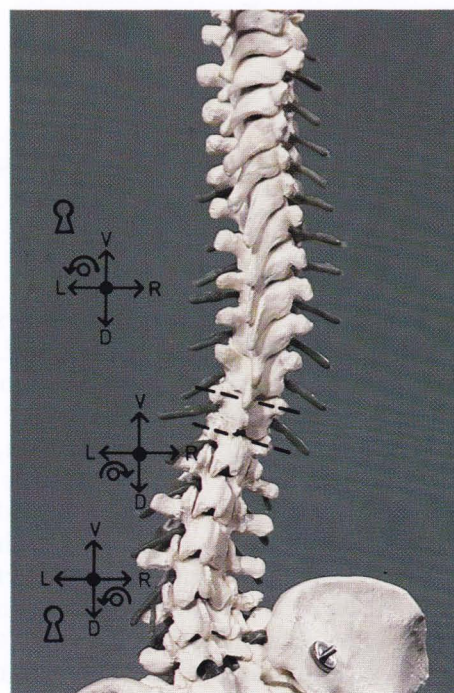


Fig. 8 b.

the relatively larger mass of the hips. In the example above, this means that dorsal flexion will be retained caudal to the treated segment. Theoretically, specific treatments, with *locking* both caudal and cranial to the segment treated, can be conducted by placing the entire vertebral column in dorsal flexion and lateral flexion to the right (so it *locks*) and inducing left lateral flexion in the treated segment. But in practice this is impossible to induce. Therefore, flexion is changed in both the frontal and the sagittal planes. In the example above, dorsal flexion is retained but lateral flexion changes from left to right to *lock* caudal to the segment treated, while lateral flexion to the left is retained while sagittal plane flexion changes from dorsal to ventral to *lock* cranial to the segment treated. As illustrated in Fig. 9, *locking* both caudal to and cranial to the segment treated can be achieved by changing sagittal plane flexion either caudal to or cranial to the segment treated. The choice between these two approaches is largely a matter of convenience for the therapist and for the patient.

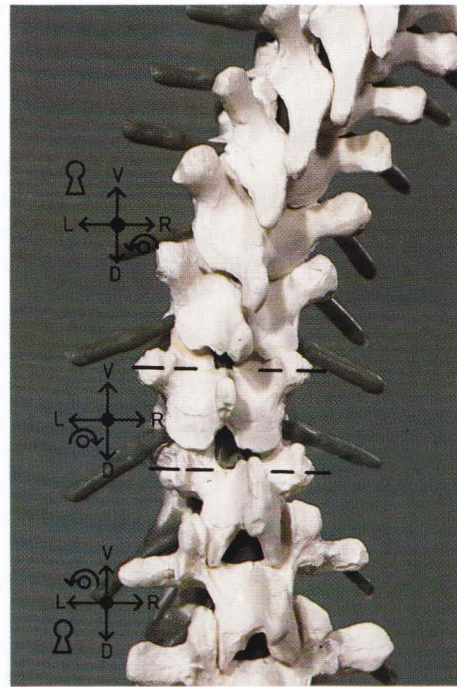


Fig. 9 a.

Fig.9. Two alternative double *locking* methods for a typical specific treatment of lower thoracic spine; segment T11-T12 in physiological position in dorsal flexion, lateral flexion to the left and rotation to the right.

A: Segments caudal to the segment treated are in ventral flexion, lateral flexion and rotation to the left, and *thus lock for rotation to the right*. Segments cranial to the segment treated are in dorsal flexion, lateral flexion to the right and rotation to the left, and *thus lock for rotation to the right*.

B: Opposite *locking* alternative: Segments caudal to the segment treated in dorsal flexion, lateral flexion to the right and rotation to the left, *thus locking for rotation to the right*. Segments cranial to the segment treated are in ventral flexion, lateral flexion and rotation to the left, and *thus lock for rotation to the right*.

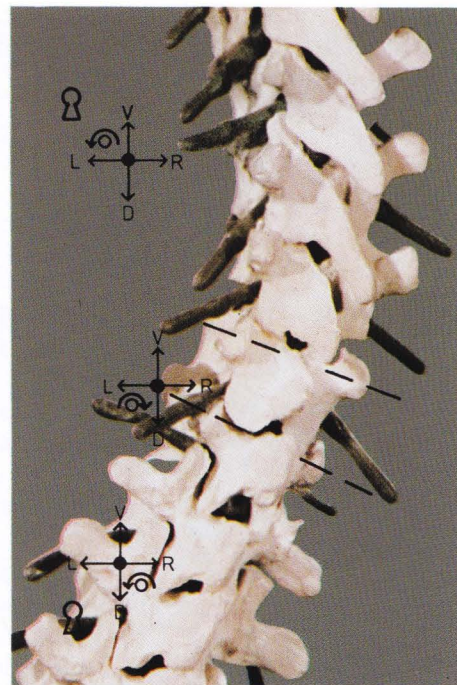
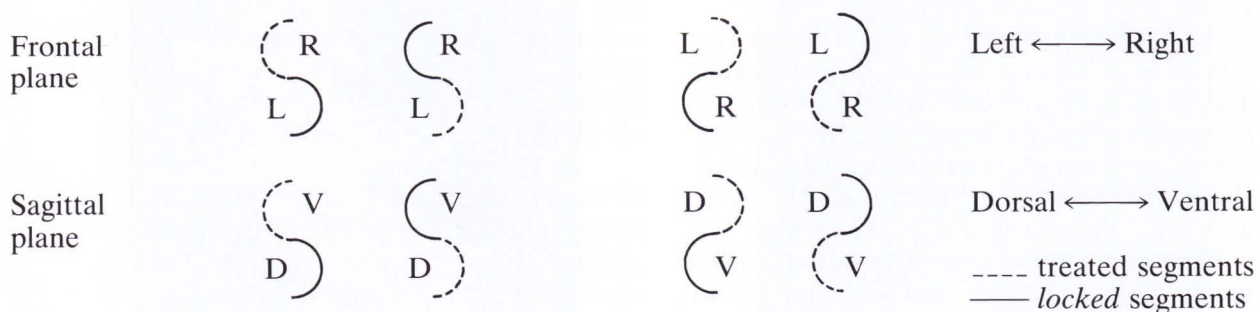


Fig. 9 b.

Three simple rules for *locking* may be derived from these examples.

1. **Locking is always relative:** Segments to be *locked* are themselves physiologically positioned. For instance, in the first option of the example above, the segments to be *locked* caudal to the treated segment are placed in dorsal flexion and lateral flexion to the right. That position involves slight left rotation, and therefore is physiological for the segments themselves. So for the normal, unrestricted spine, the position easily attained. But rotation to the right is constrained, which effects the desired *locking*. *Locking* is always relative to a particular final movement, in this case rotation to the right, from a position attained by normal physiological movement.
2. **Locking always involves inflection (changes of flexion):** Changes of flexion, either in the sagittal or the frontal planes, or sometimes in both planes, effect *locking*. In the first option of the example above, the flexion change is from left to right lateral flexion. In the second option, the change is from dorsal to ventral flexion. Inflection is depicted schematically in Fig. 10.

Fig.10. Schematic representation of inflections used in *locking*. Curves shown are for illustration only, and indicate flexion deviations from the neutral position of the spine shown in Figures 1 and 2.

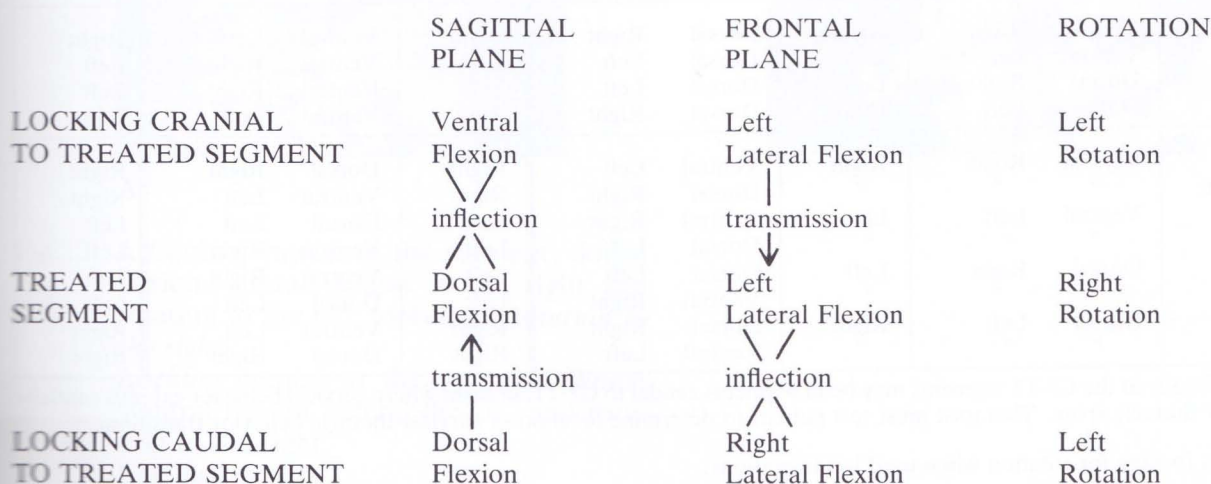


3. **Only one inflection per locking:** The spine is not rubbery; it has an inescapable rigidity (otherwise it could not fulfill its support function). So two changes of flexion from a treated to an adjacent *locked* segment are not possible. One cannot, for instance, induce both a change from dorsal to ventral flexion and a change from left to right lateral flexion for a single *locking*. This is equivalent to requiring that at least one of the flexions of the treated segment be the same as that of the adjacent *locked* segment. The relationship is shown schematically in Fig. 11. The single exception is the case of *double locking* for treatment of the C2-C3 segment, where the occiput, atlas and axis must be moved as a unit.

The simplest inflections to constrain adjacent segment movement involve changes of flexion in the sagittal plane alone, and are used in treatments for pure ventral or pure dorsal flexion.

In general, inflection in the frontal plane (lateral flexion) is adequate for *locking* caudal to or cranial to the segment treated in non-specific treatments. However, for specific treatments, *locking* both caudal to and cranial to the treated segment, as shown in Figures 8 and 9, is frequently used.

Fig.11. Diagram of inflections and "transmitted" flexions that "go into" segment treated, with *locking* both cranial to and caudal to the segment treated. Case shown is that of Fig. 9B.





Theoretically, there may be as many as four ways to achieve *double locking*, with segments cranial to and caudal to the treated segment *locked*. However, the requirement that the treated segment "receive" flexions from the adjacent *locked* segments limits the number of possible combinations for *locking*.

For instance, *double locking* is extremely difficult in the cervical spine itself, except for the C2-C3 segment, where the mechanical convenience provided by the occiput, atlas, and axis moving as a unit permits cranial *locking*. Cervical segment treatment is also facilitated by the relatively exposed positions of the segments which makes direct manipulation possible. So the advantage offered by *double locking* may also be achieved through a single cranial/caudal *locking*. In this case, the Therapist can *lock* caudally to the segment treated and achieve segment treatment by holding and moving the cranial vertebrae involved. The opposite procedure may also be used: *locking* cranial to the segment, and holding and moving the caudal vertebrae involved. *Double locking* is possible in the thoracic and lumbar spines.

The possible combinations for *double locking* are listed in Table 2-2.

Table 2-2. Combinations possible for *double locking*

Part of Spine	Segment Treated In			Locking Caudal to Segment Treated			Locking Cranial to Segment Treated		
	Flexions		Rotation	Flexions		Locked for rotation to 	Flexions		Locked for rotation to 
	Ventral/Dorsal	Lateral		Ventral/Dorsal	Lateral		Ventral/Dorsal	Lateral	
Cervical C2-C3 only	Ventral	Right	Right	Either	Left	Right	Either	Left	Right
	Ventral	Left	Left	Either	Right	Left	Either	Right	Left
	Dorsal	Right	Right	Either	Left	Right	Either	Left	Right
Cervical-thoracic ¹	Dorsal	Left	Left	Either	Right	Left	Either	Right	Left
	Dorsal	Right	Right	Either	Left	Right	Either	Left	Right
	Dorsal	Left	Left	Either	Right	Left	Either	Right	Left
Thoracic & Lumbar	Ventral	Right	Right	Dorsal	Right	Right	Ventral	Left	Right
	"	"	"	Dorsal	Left	Left	Ventral	Right	Left
	Ventral	Left	Left	Dorsal	Left	Left	Ventral	Right	Left
	"	"	"	Dorsal	Right	Right	Ventral	Left	Right
	Dorsal	Right	Left	Dorsal	Left	Left	Ventral	Right	Left
	"	"	"	Ventral	Right	Left	Dorsal	Left	Right
	Dorsal	Left	Right	Dorsal	Right	Right	Ventral	Left	Right
	"	"	"	Ventral	Left	Right	Dorsal	Right	Left

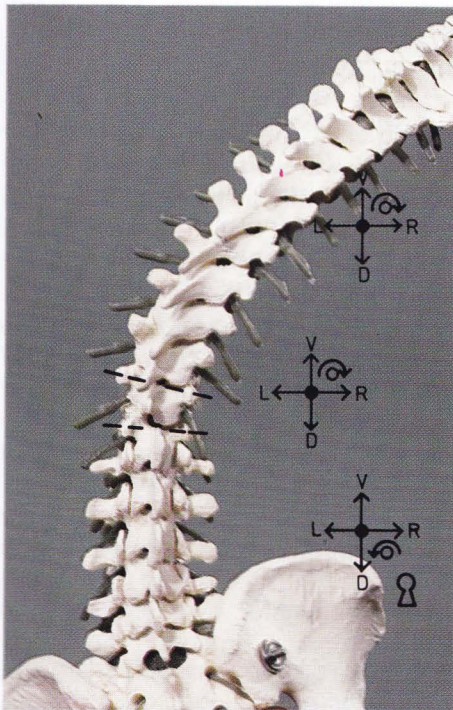
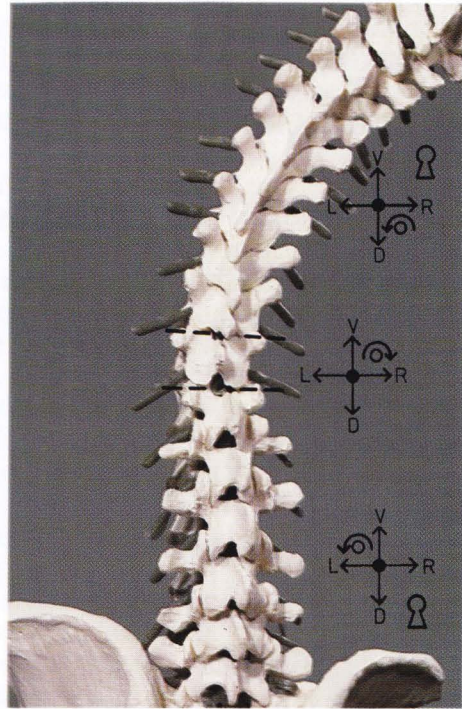
Note: 1) Usually at the C7-T1 segment; may be in segments caudal to C7-T1, in cases where cervical behavior extends caudally into upper thoracic spine. Therapist must test patient to determine location of cervical-thoracic behavior transition.

 indicates *locking* for rotation when used in illustrations.

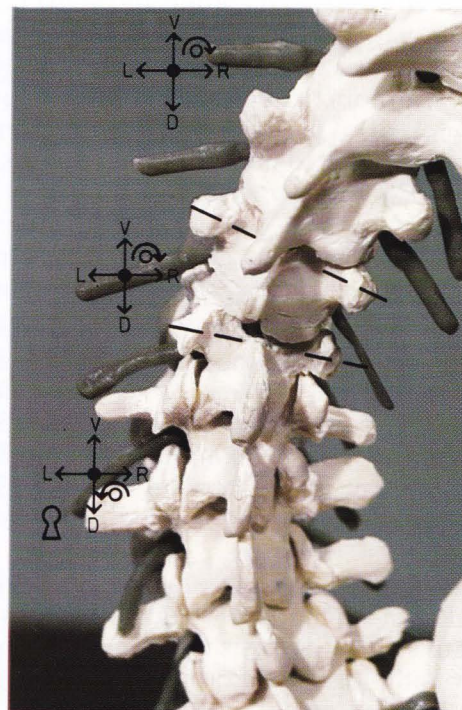
EXAMPLE OF *LOCKING*

T11-T12 SEGMENT TREATED IN VENTRAL FLEXION, LATERAL FLEXION AND ROTATION TO THE RIGHT

Fig.12. *Locking* caudal to the segment: ventral flexion, lateral flexion and rotation to the left; *locked for rotation to the right*.
Locking cranial to the segment: dorsal flexion, lateral flexion to the right and rotation to the left; *locked for rotation to the right*.



A



B

Fig.13. A: *Locking* caudal to the segment: dorsal flexion, lateral flexion to the right and rotation to the left; *locked for rotation to the right*.
Locking cranial to the segment: None: Ventral flexion, lateral flexion, and rotation to the right.
 B: Closeup of A.

PART 3

THERAPY TECHNIQUES FOR THE SPINE AND TEMPORO-MANDIBULAR JOINT

3. THE CERVICAL SPINE
4. THE TEMPORO-MANDIBULAR JOINT
5. THE THORACIC SPINE AND RIBS
6. THE LUMBAR SPINE
7. THE COCCYX

3. THE CERVICAL SPINE (*Occiput on C1 to C7 on T1*)

3.1. Therapy Guide

3.1.1. Mandatory Examination

Restrictions of the cervical spine of pathologic etiology contraindicate manual therapy; patients affected should be referred to relevant medical specialists. Therefore, all patients must be examined prior to and continuously monitored during treatment of the cervical spine, least any existing pathological condition be worsened, increasing the risk of injury.

Prior to treatment: Assure, by test or test report, that De Kleyn's, Hautand's and Romberg's tests are negative. Positive tests contraindicate manual therapy. Pathological hypermobility in a segment contraindicates stretching of that segment.

During treatment: Patient dizziness, nausea, radiating pain, or other severe discomfort during treatment may be signs of vascular spasm, anomalous blood vessels, fractures, ruptured ligaments, instability, herniated discs, or other pathological conditions that contraindicate manual therapy. The patient should be continuously monitored for these signs: If they appear, therapy should be stopped immediately.

3.1.2. Treatment Guidelines

Caution is the watchword in treating the spine. Therefore, in treating any restriction, *perform the non-specific techniques first*. Perform specific techniques only if the non-specific techniques elicit no contraindications to further therapy.

All manual therapy techniques for the cervical spine involve traction, basically to prevent potentially hazardous compression. The therapist applies traction through a firm grip on the patient's head. The grip should be adequate for the traction needed, and should be positioned to avoid discomfort in sensitive areas, such as the ears, nose, eyes, mandible and larynx. This is most easily done if the therapist fixes the patient's head and then moves his/her own body to induce the movement required. Controlled movement of the therapist's body and the patient's head as a unit also helps prevent unwanted movements.

The therapist may instruct or direct patient eye movements and respiration to aid therapy. *Eye movements* evoke reflex responses, such as "leading" movements of the head. Directing eye movement then gives the therapist control over patient head movement. *Respiration:* Normal breathing, particularly exhaling, promotes relaxation, while inhaling or holding the breath are often naturally evoked when producing muscular force. Therefore, instructing the patient to *exhale* aids

relaxation during stretching, while *breathing normally* promotes relaxation during sustained stretching (two minutes or more). *Inhaling* helps the patient contract against the therapist's resistance, such as during the stimulation of antagonists phase of treatment.

Lateral flexion and rotation interdepend throughout the spine. Normally, one cannot occur without the other. The single exception is the rotation of the atlas on the axis, which produces only negligible lateral flexion at the segment itself. However, there is still a degree of movement interdependence, as rotation of the atlas on the axis does cause lateral flexion of the occiput on the atlas to the opposite side.

Of the two mutually dependent movements, rotation is the more crucial. Full lateral flexion is contingent upon rotation. In all procedures involving both movements, **rotation must be increased before lateral flexion is increased**. Reversing the sequence by laterally flexing the spine to initiate rotation usually causes compression at the facet articulations and is therefore potentially hazardous.

In cases when the patient's deep, ventral flexors are inhibited, they should be stimulated. Therefore, treatment should be arranged to prevent contraction of the superficial ventral flexors. The therapist must monitor patient head position throughout treatment to assure that the superficial ventral flexors are not activated when the movement involved is intended to either stretch or stimulate the deep ventral flexors.

Many of the following therapy techniques for treating the cervical spine may be performed with the patient either sitting or lying down. The choice between alternative treatment positions depends both on comfort and convenience for both the patient and the therapist. For example, some patients may not be able to tolerate a sitting position when being treated, and therefore must be treated lying down. Likewise, a smaller therapist may find treatment of a large patient in a prone or supine position to be far easier than the equivalent treatment of a sitting patient.

3.1.3. Movement Patterns and *Locking*

Movement patterns and *locking* are discussed in Part 2, pp. 14-25. The following is a short summary review for the cervical spine.

First, although the cervical spine and its mobile segments are anatomically well defined (in the cranial to caudal direction, as starting at the occiput on C1 and ending with the C7-T1 segment), the therapeutic definition is not so rigid. In many cases, the transition from typical cervical spine segment behavior to typical thoracic spine segment behavior is not abrupt at the C7-T1

segment, but rather more gradual. This means that cervical spine behavior may extend caudally into the thoracic spine. So therapeutically the *cervical* spine should always be regarded as the *cervical and possibly part of the upper thoracic spine*.

Segments adjacent to those treated should be stabilized so they do not follow the movement induced to effect treatment. Stabilization always requires *inflection*, or changes of flexion, either in the sagittal or the frontal plane. Basic stabilization of the cervical spine involves changing flexion from ventral to dorsal or vice versa. For instance, treatment of a segment in ventral flexion is most effective if segments adjacent cranial to or caudal to it are placed in dorsal flexion.

The movement pattern of the cervical spine is **symmetric about the mid-sagittal plane**. As shown in Fig. 7 (p. 18), for both ventral and dorsal flexion, lateral flexion and rotation to the same side are "physiological" movements, while lateral flexion and rotation to opposite sides are "unphysiological." This means that segments to be treated in lateral flexion and/or rotation should be placed either in *right* lateral flexion *and right* rotation (the convention chosen for the technique illustrations of this book) or in *left* lateral flexion *and left* rotation. A right-left direction difference between lateral flexion and rotation produces the "unphysiological" position used for *locking*. *Locking* is a more secure method of stabilization than a single change of ventral or dorsal flexion. However, it obviously can be used only when the treatment involves lateral flexion and/or rotation.

Double locking, both cranial to and caudal to the segment treated is possible in the cervical spine *itself* only for the C2-C3 segment (see discussion, p. 24). Otherwise, *double locking* in cervical spine treatments is possible only when the "lower," or caudal *lock* is effected in the upper thoracic spine.

3.1.4. Restrictions, Muscles and Therapies

The non-specific and specific therapy techniques for treating restrictions of the cervical spine and its segments are listed in Table 3-1. The actions of the muscles which may cause those restrictions are listed in Table 3-2. The various restrictions possible are listed in Movement Restriction Table 8-1, pp. 142-143.

Table 3-1. Restrictions of the Cervical Spine

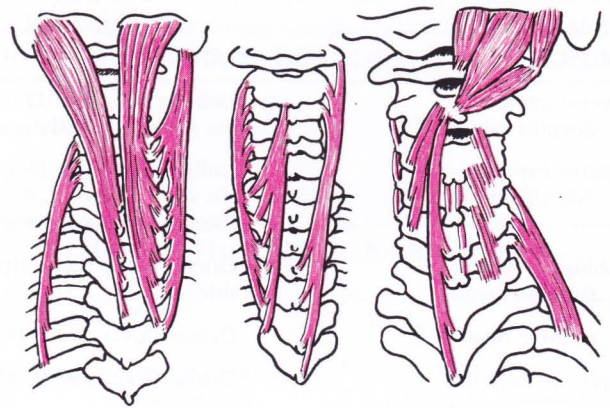
SECTION	MOVEMENT RESTRICTED	MUSCLES WHICH MAY RESTRICT MOTION	TECHNIQUE/THERAPY	Number, Page
3.2.	<i>Ventral flexion</i>	Most on dorsal side	non-specific	3.2.1, 30
		rectus capitis dorsalis major & minor, obliquus capitis superior, splenius capitis, semispinalis capitis, trapezius	specific, occiput on atlas atlas on axis C2 on C3	3.2.2, 31-33 3.2.3, 34-35 3.2.4, 36-37
3.3.	<i>Ventral flexion with lateral flexion and rotation to same side</i>	Most around cervical spine	non-specific specific, C2 on C3	3.3.1, 38-40 3.3.2, 41-43
3.4.	<i>Ventral flexion with lateral flexion and rotation to opposite sides</i>	Most around cervical spine	non-specific	3.4.1, 44
3.5.	<i>Dorsal flexion</i>	Most on ventral side	non-specific	3.5.1, 45
		rectus capitis anterior, longus capitis, suprahyoidales, infrahyoidales, platysma	specific, occiput on atlas	3.5.2, 46-48
		Most on ventral side platysma, suprahyoidales, infrahyoidales, suprathyreoidales, infrathyreoidales ¹ ; longus colli, longus capitis ²	specific, atlas on axis non-specific, for superficial ventral muscles non-specific, for deep ventral muscles	3.5.3, 49-51 3.5.4, 52-53 3.5.5, 54-57
3.6.	<i>Dorsal flexion with lateral flexion and rotation to same side</i>	Most around cervical spine	non-specific specific, C2 on C3	3.6.1, 58-59 3.6.2, 60-63
3.7.	<i>Dorsal flexion with lateral flexion and rotation to opposite sides</i>	Most around cervical spine	non-specific specific, C2 on C3	3.7.1, 64-66 3.7.2, 67-71
3.8.	<i>Lateral flexion and rotation to opposite sides</i>	Most between occiput and atlas	specific, occiput on atlas	3.8.1, 72-75
3.9.	<i>Rotation</i>	Most around atlas and axis	specific, atlas on axis	3.9.1, 76-77
3.10.	<i>MUSCLES</i>	Sternocleidomastoideus Scaleni Subclavius		3.10.1, 78-80 3.10.2&3, 81-83 3.10.4, 84-85

Notes: 1. With mouth closed. 2. With mouth open.

Table 3-2. Actions of muscles which may restrict movement of cervical spine

MUSCLE	ACTION
rectus capitis dorsalis major	Unilateral Action: Dorsal flexes, rotates and laterally flexes the occiput and the atlas to the same side. Bilateral Action: Dorsal flex the occiput and the atlas.
rectus capitis dorsalis minor	Unilateral Action: Dorsal flexes, rotates and laterally flexes the occiput to the same side. (In ventral flexion, it may laterally flex to the same side and rotates to the opposite side). Bilateral Action: Dorsal flex occiput.
obliquus capitis superior head	Dorsal flexes the occiput while rotating to one side and laterally flexing to the opposite side.
inferior head	Dorsal flexes and rotates the atlas on the axis to the same side.
splenius capitis	Dorsal flexes and rotates the occiput to the same side.
splenius cervicis	Dorsal flexes, laterally flexes and rotates to the same side.
spinalis cervicis	Dorsal flexes, laterally flexes and rotates to the same side.
iliocostalis cervicis, longissimus cervicis, longissimus capitis	Dorsal flex, laterally flex and rotate cervical spine to same side.
semispinalis capitis	Dorsal flexes and slightly rotates the occiput to the opposite side.
trapezius descending part	Elevates the shoulder with the head and neck stabilized. Laterally flexes to one side and rotates the head and neck to the opposite side with the shoulder stabilized. Dorsal flexes the head when acting bilaterally.
interspinales	Dorsal flex the cervical spine
intertransversarii	Unilateral Action: Laterally flexes and rotates the cervical spine to the same side. Bilateral Action: Dorsal flex the cervical spine.
rotatores cervicis	Unilateral Action: Laterally flexes to one side; rotates to opposite side; dorsal flexes the cervical spine. Bilateral Action: Dorsal flex the cervical spine.
multifidi	Dorsal flex, laterally flex and rotate to the opposite side.
rectus capitis anterior	Ventral flexes the occiput on the atlas.
lateralis	Laterally flexes the occiput to the same side.
longus capitis	Ventral flexes, laterally flexes and rotates to the same side.
longus colli	Ventral flexes, laterally flexes and rotates to the same side.
suprahyoidales infrahyoidales platysma	Ventral flex while rotating and laterally flexing the occiput on the atlas to the same side (with the mouth closed).
sternocleidomastoideus	Unilateral Action: Ventral flexes the cervical spine while laterally flexing and rotating to opposite sides. Bilateral Action: (a) Dorsal flex the occiput on the atlas with the cervical spine stabilized in the mid-position. (b) Ventral flex the cervical spine with the cervical spine stabilized in the mid-position and with the occiput and the atlas ventrally flexed. (c) Act as an accessory muscle of respiration with the head and cervical spine stabilized.
scalenus anterior	Unilateral Action: Ventral flexes the cervical spine while laterally flexing and rotating to opposite sides. Bilateral Action: Ventral flex the cervical spine. Act as accessory muscles of respiration when the cervical spine is stabilized.
medius	
posterior	Unilateral Action: Rotates and laterally flexes to the same side. Bilateral Action: Dorsal flex the cervical spine.
subclavius	Depresses and stabilizes the clavicle during movements of the shoulder. Lifts the first rib when the shoulder is stabilized.

3.2.1. Non-specific technique to increase ventral flexion.



Starting Position: P: Supine; head and neck beyond end of couch, shoulders and thorax stabilized with a belt. T: Standing at head of couch.

Grip: T's right hand grips P's occiput, with wrist and forearm supporting P's head. T's left hand grips P's chin (without pressing on the larynx).

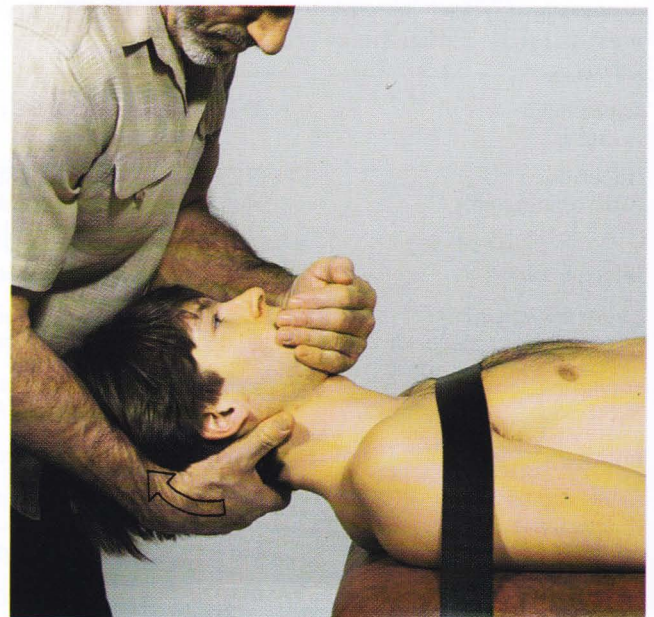


Fig. 14 a. Starting Position.

Procedure: Using this grip, T applies traction with both hands, and then maintaining this traction, moves his/her body in an upward arc to gradually and fully *ventrally flex* P's cervical spine.

Stimulation of Antagonists: T retains grip. T then asks P to look downward and move his/her head further in the direction of stretching. T resists that movement to stimulate P's antagonists.

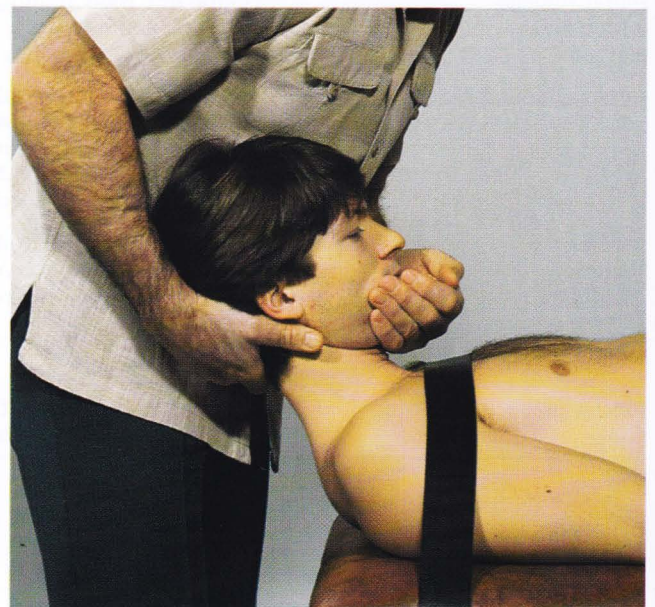
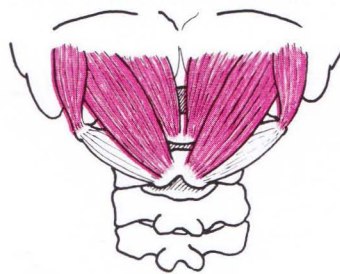


Fig. 14 b. Final Position.

3.2.2A. Specific technique to increase ventral flexion of the occiput on the atlas.
P sitting.



Starting Position: P: Sitting; left side of head supported against T's left shoulder and chest. T: Standing facing P's left side.

Grip: T's right index finger and thumb stabilize the posterior arch of P's atlas. P's head is held firmly between T's left hand and T's chest. For comfort, T's left palm cups over P's ear, with hand and forearm positioned to avoid pressure on P's mandible.

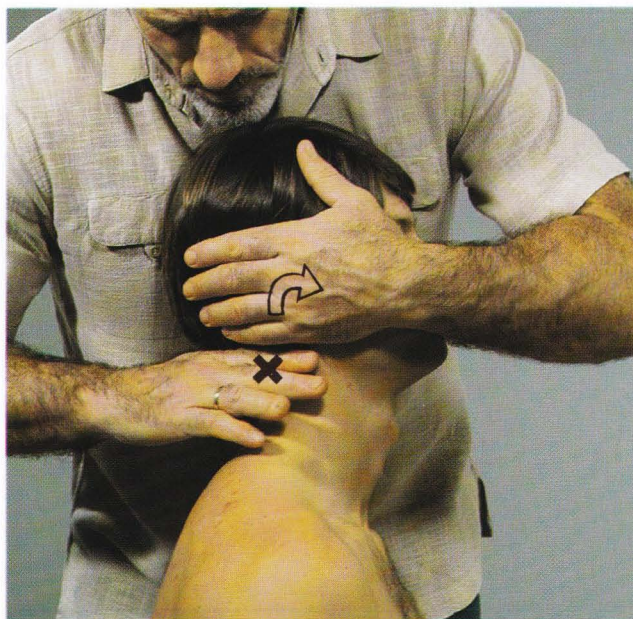


Fig. 15 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction moves his/her body with P's head to gradually and fully *ventrally flex* P's occiput on the atlas. T also uses right hand to push P's atlas in a ventral direction.

Stimulation of Antagonists: T retains grip. T then asks P to look downward, tuck chin in, and move head further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Note: This technique is more easily performed if P's chin is in crook of T's elbow; see alternative technique 3.2.2B, p. 32. Treatment accuracy and force T can apply are greatest with P supine, see 3.2.2C, p. 33.

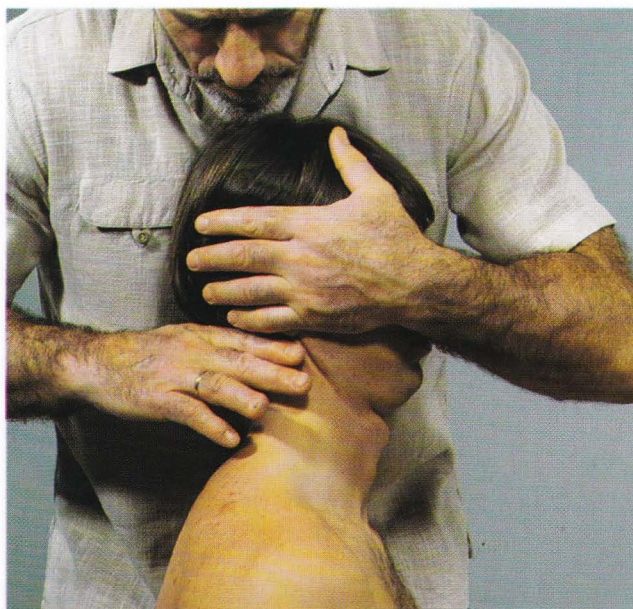
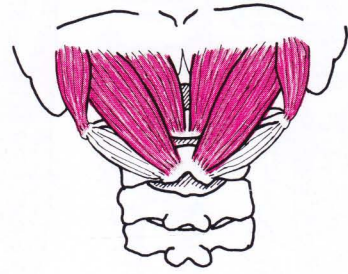


Fig. 15 b. Final Position.

3.2.2B. Specific technique to increase ventral flexion of the occiput on the atlas.

P sitting. Alternative grip.



Starting Position: P: Sitting; left side of head supported against T's left shoulder and chest. T: Standing facing P's left side.

Grip: T's right index finger and thumb stabilize the posterior arch of P's atlas. P's head is held firmly between T's left hand and T's chest, chin in the crook of T's elbow. For comfort, T's left palm cups over P's ear, with the hand and forearm positioned to avoid pressure on P's mandible.

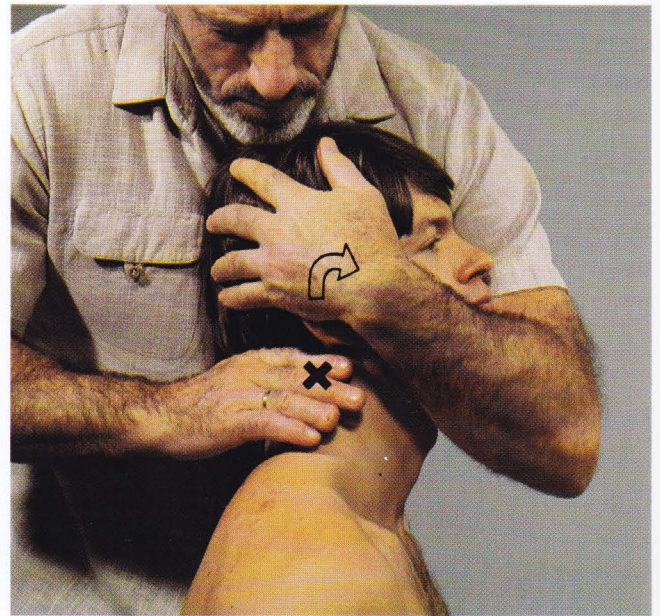


Fig. 16 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction moves his/her body with P's head to gradually and fully *ventrally flex* P's occiput on the atlas. T also uses right hand to push P's atlas in a ventral direction.

Stimulation of Antagonists: T retains grip. T then asks P to look downward, tuck chin in, and move the head further in the direction of stretching. T resists that movement to stimulate P's antagonists.

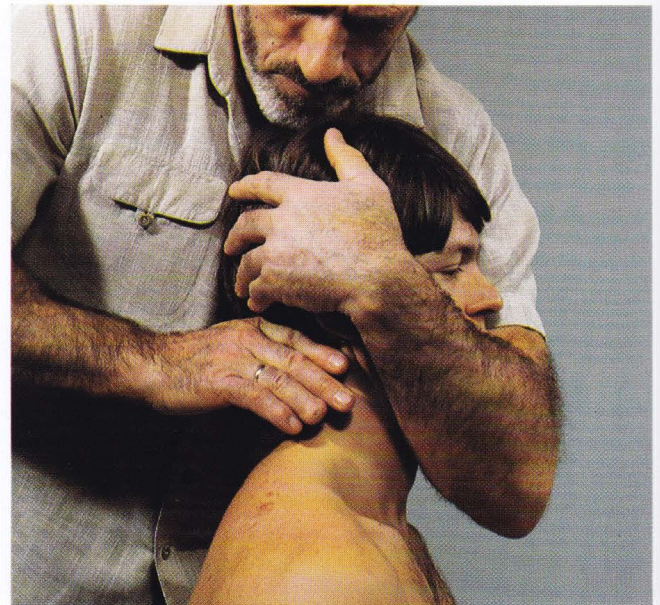
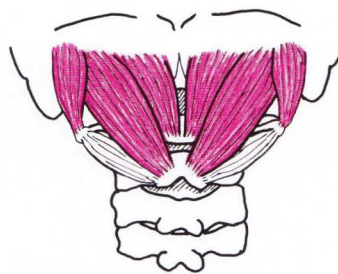


Fig. 16 b. Final Position.

3.2.2C. Specific technique to increase ventral flexion of the occiput on the atlas.

P supine.



Starting Position: P: Supine; head beyond end of couch with atlas at the edge.

T: Standing at head of couch.

Grip: T's right hand grips P's occiput with wrist and forearm supporting P's head. T's right shoulder presses against P's forehead, without pressing on P's nose or eyes. (If P finds this grip uncomfortable, a small cushion may be placed between T's right shoulder and P's forehead). T's left hand rests, vertical and stable, against the couch, firmly and rigidly under P's neck, with the posterior arch of P's atlas lying against the radial aspect of T's 2nd metacarpal bone and index finger.

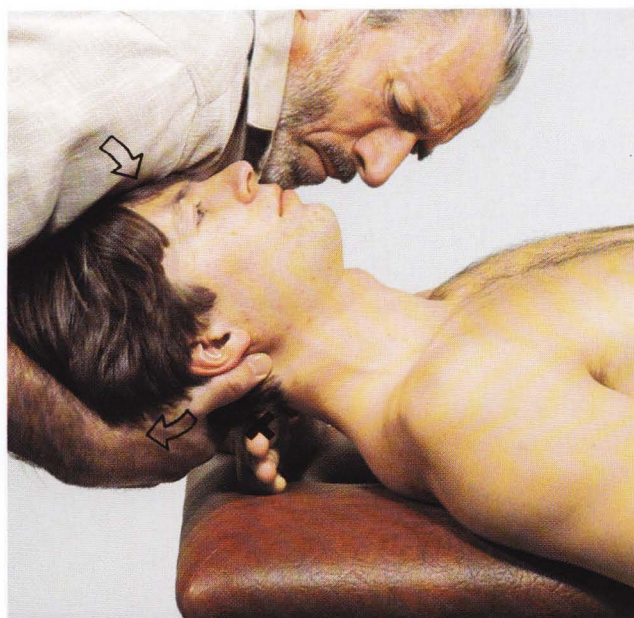


Fig. 17 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body with P's head to gradually and fully *ventrally flex* P's occiput on the atlas. T also uses right shoulder to push against P's forehead to produce a dorsal glide of the occipital condyles on the atlas, thus moving P's atlas ventrally.

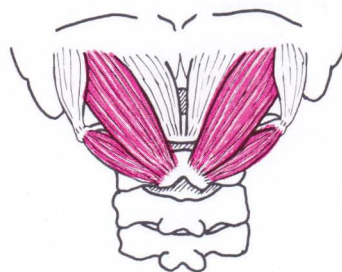
Stimulation of Antagonists: T retains grip. T then asks P to look downward, tuck chin in, and move the head further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Note: If P cannot tolerate supine position, treat in a sitting position, see the preceding two therapies, 3.2.2A and 3.2.2B, pp. 31 and 32.



Fig. 17 b. Final Position.

3.2.3A. Specific technique to increase ventral flexion of the atlas on the axis.
P sitting.



Starting Position: P: Sitting; left side of head supported against T's left shoulder and chest. T: Standing facing P's left side.

Grip: T's right index finger and thumb stabilize P's axis. T's left hand grips around the right side of P's head with the little finger along the posterior arch of P's atlas. P's head is held firmly between T's left hand and T's chest, chin in crook of T's elbow. For comfort, T's left palm cups over P's ear, with the hand positioned to avoid pressure on P's mandible.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body with P's head to gradually and fully *ventrally flex* P's atlas on the axis. T's right hand also pushes P's axis ventrally and caudally.

Stimulation of Antagonists: T retains grip. T then asks P to look downward, tuck chin in, and move his/her head further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Note: The transverse ligament of the atlas may be pathologically weakened. If so, it must not be strained by the procedure. T avoids strain by simultaneously moving P's head dorsally while ventrally flexing, which causes P's occiput and atlas to dorsally glide on the axis. The odontoid process (dens) is then pressed against the anterior arch of the atlas, which prevents pressure on the transverse ligament.



Fig. 18 a. Starting Position.

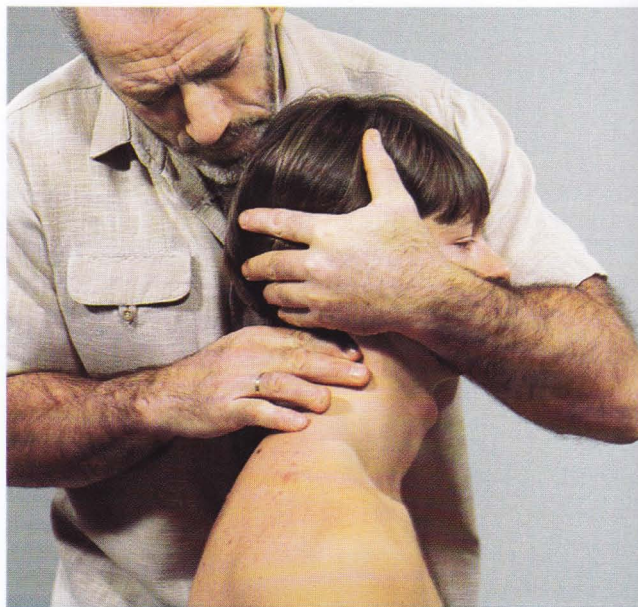
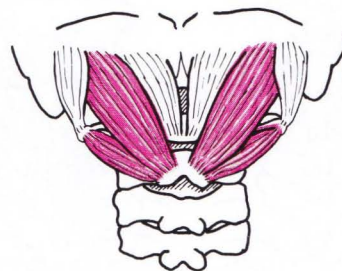


Fig. 18 b. Final Position.

3.2.3B. Specific technique to increase ventral flexion of the atlas on the axis.
P supine.



Starting Position: P: Supine; head beyond end of couch with the axis at the couch edge. T: Standing at head of couch.

Grip: T's right index finger and thumb grip P's atlas. T's right wrist and forearm support P's head. T's right shoulder presses against P's forehead, without pressing on P's nose or eyes. If P finds this grip uncomfortable, a small cushion may be placed between T's right shoulder and P's forehead. T's left hand rests, vertical and stable, against the couch, held firmly and rigidly under P's neck, stabilizing the spinous process of P's axis against the radial aspect of T's 2nd metacarpal bone and index finger. (Or T's left index finger and thumb may grip P's axis).

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body with P's head, to gradually and fully *ventrally flex* P's atlas on the axis. Simultaneously T's right shoulder presses against P's forehead to hold anterior arch of atlas in contact with the dens, which prevents stretching of the transverse ligament of the atlas.

Stimulation of Antagonists: T retains grip. T then asks P to look downward, tuck chin in, and move his/her head further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Note: The transverse ligament of the atlas may be pathologically weakened. If so, it must not be strained by the procedure. T avoids strain by simultaneously moving P's head dorsally while ventrally flexing, which causes P's occiput and atlas to dorsally glide on the axis. The odontoid process (dens) is then pressed against the anterior arch of the atlas, which prevents pressure on the transverse ligament.

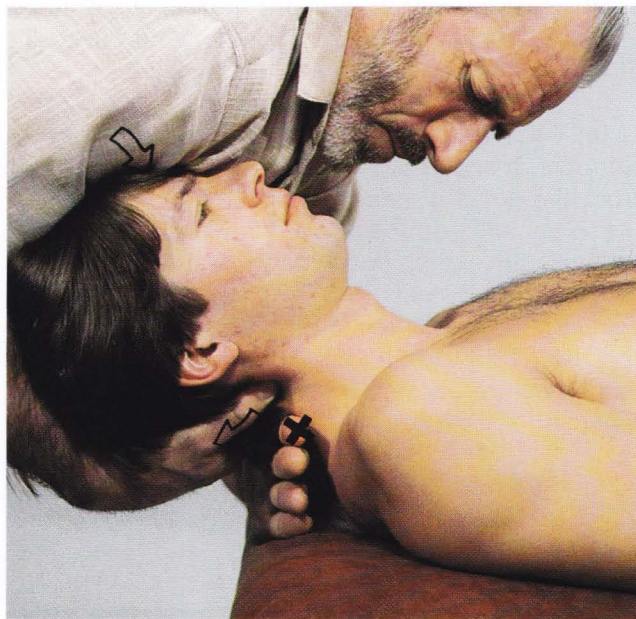


Fig. 19 a. Starting Position.

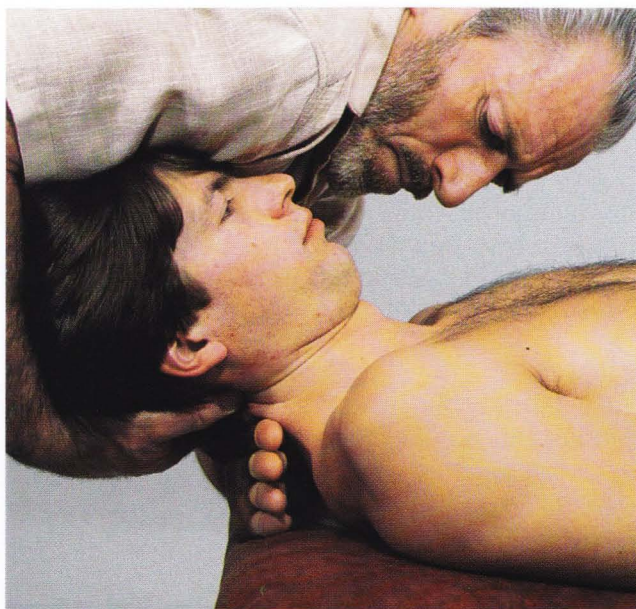
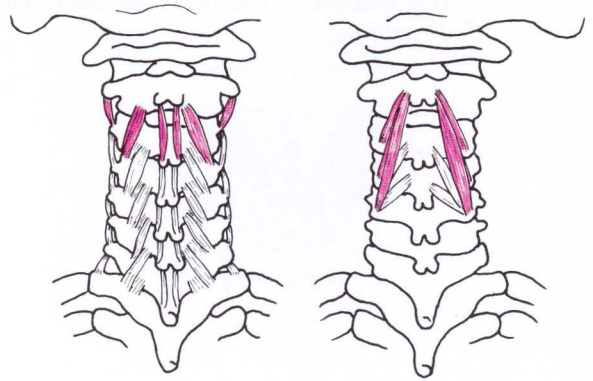


Fig. 19 b. Final Position.

3.2.4A. Specific technique to increase ventral flexion of C2 on C3.
P sitting.



Starting Position: P: Sitting; left side of head supported against T's left shoulder and chest. T: Standing facing P's left side.

Grip: T's right index finger and thumb stabilize the spinous, articular and transverse processes of C3 from the dorsal aspect. T's left hand grips around the right side of P's head with the little finger around the spinous, articular and transverse processes of P's axis (C2). P's head is held firmly between T's left forearm and T's chest. For comfort, T's left palm cups over P's ear, with the hand positioned to avoid pressure on P's mandible.

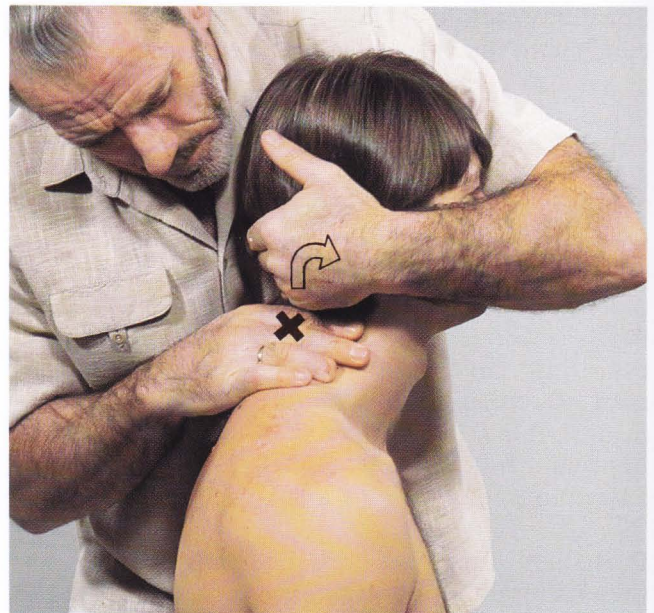


Fig. 20 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body with P's head to gradually and fully *ventrally flex* C2 on C3. T's right hand stabilizes C3 by pushing it ventrally and caudally.

Stimulation of Antagonists: T retains grip. T then asks P to look downwards, tuck chin in, and move his/her head further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Note: During the procedure, T should draw the spinous and articular processes of C2 in a cranial and ventral direction along C3 so the articular facets glide parallel to each other.

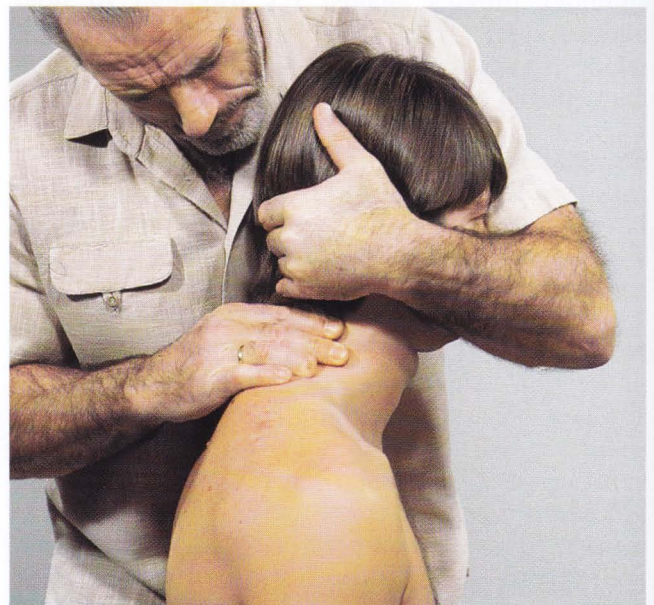
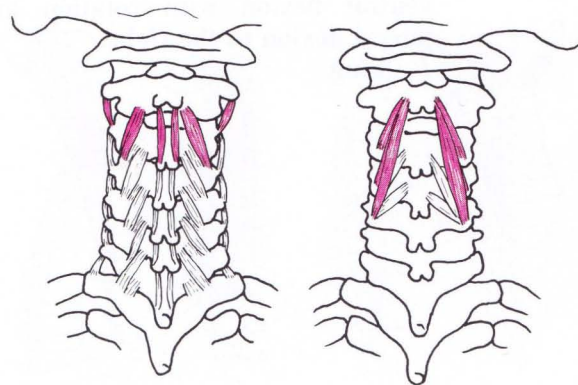


Fig. 20 b. Final Position.

3.2.4B. Specific technique to increase ventral flexion of C2 on C3.
P supine.



Starting Position: P: Supine; head beyond end of couch with C3 positioned at the edge. T: Standing at head of couch.

Grip: T's right index finger and thumb grip the spinous, articular and transverse processes of P's axis (C2) from the dorsal aspect. T's right wrist and forearm support P's head. T's right shoulder presses against P's forehead, without pressing on P's nose or eyes. (If P finds this grip uncomfortable, a small cushion may be placed between T's right shoulder and P's forehead). The dorsal side of T's left hand rests on the couch, and the index finger and thumb stabilize the spinous, articular and transverse processes of C3 from the dorsal aspect.



Fig. 21 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body with P's head to gradually and fully *ventrally flex* C2 on C3. T's left hand stabilizes C3 by pushing it ventrally and caudally.

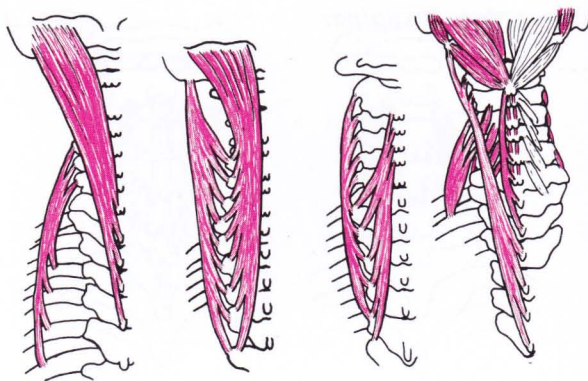
Stimulation of Antagonists: T retains grip. T then asks P to look downward, tuck chin in, and move his/her head further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Note: During the procedure, T should draw the spinous and articular processes of C2 in a cranial and ventral direction along C3 so the articular facets glide parallel to each other.



Fig. 21 b. Final Position.

3.3.1A. Non-specific technique to increase ventral flexion with rotation and lateral flexion to the right.
P sitting.



Starting Position: P: Sitting; right side of head supported against T's right shoulder and chest. T: Standing oblique facing P's right side.

Grip: T's right hand grips the left side of P's occiput, and fixes it against T's shoulder and chest. T's left hand and forearm grip around P to the left shoulder, stabilizing it from the dorsal aspect, and applying pressure to stabilize P's right shoulder against T's trunk.

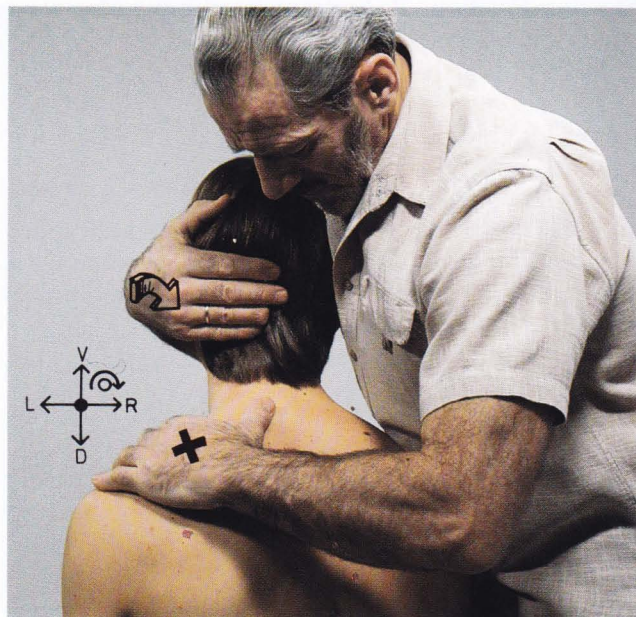


Fig. 22 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *ventrally flex* and simultaneously *rotate* and *laterally flex* P's cervical spine *to the right*.

Stimulation of Antagonists: T retains grip. T then asks P to look and then move this/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

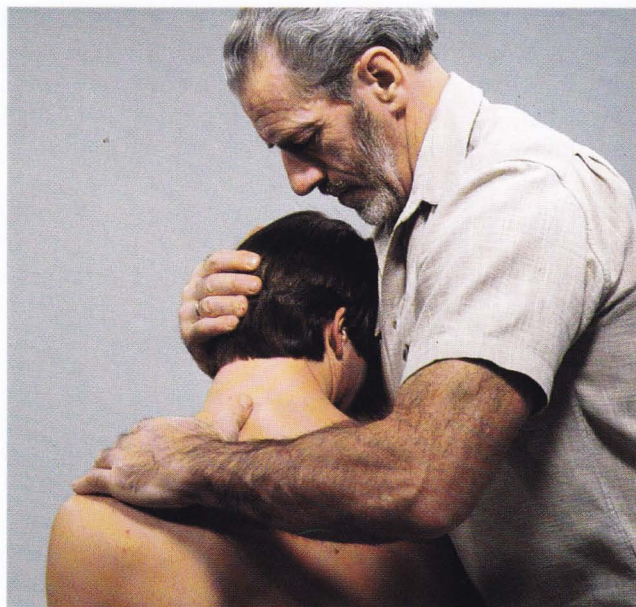
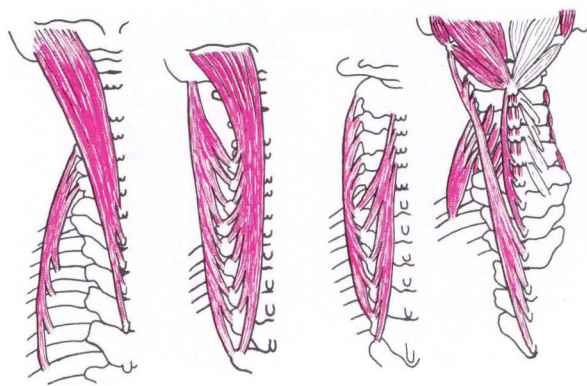


Fig. 22 b. Final Position.

3.3.1B. **Non-specific technique to increase ventral flexion with rotation and lateral flexion to the right.**
P supine.



Starting Position: P: Supine; head and neck beyond end of couch; cervical spine in ventral flexion; shoulders and thorax may be stabilized with a belt.

T: Standing at head of couch, facing oblique to P's right side.

Grip: T's left hand grips the left side of P's occiput, and stabilizes it against T's trunk. T's right forearm lies across P's chest, with the right hand gripping P's left shoulder to stabilize it against the couch.

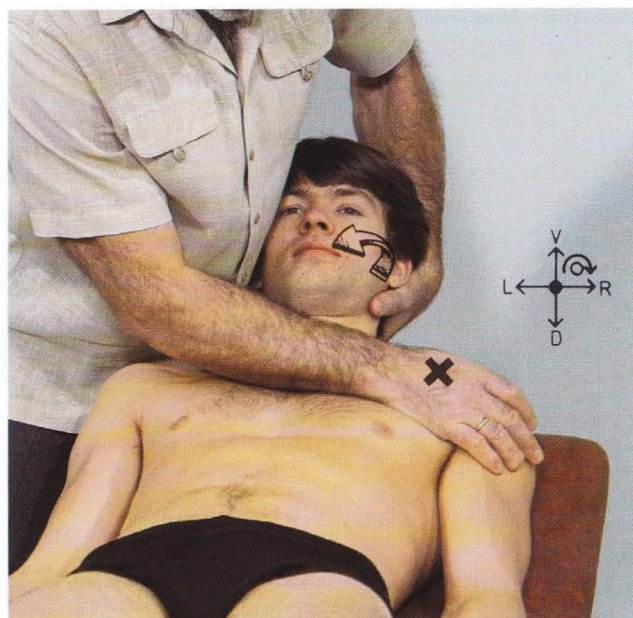


Fig. 23 a. Starting Position.

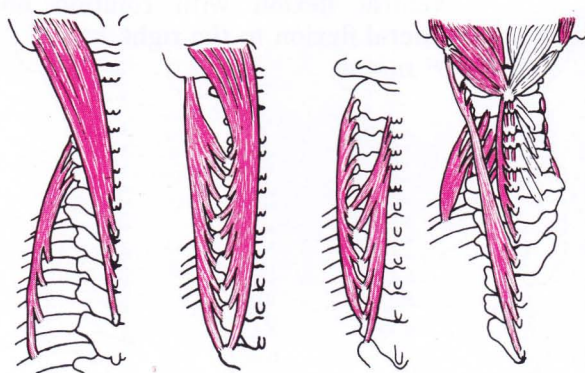
Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his /her body with P's head to gradually and fully *ventrally flex* and simultaneously *rotate* and *laterally flex* P's cervical spine *to the right*.

Stimulation of Antagonists: T retains grip. T then asks P to look and move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.



Fig. 23 b. Final Position.

3.3.1C. Non-specific technique to increase ventral flexion with rotation and lateral flexion to the right.
P supine. Alternative grip.



Starting Position: P: Supine; head and neck beyond end of couch; shoulders and thorax stabilized with a belt. T: Standing at head of couch.

Grip: T's right hand grips P's occiput, with wrist and forearm supporting P's head. T's left hand grips P's chin (without pressing on the larynx).

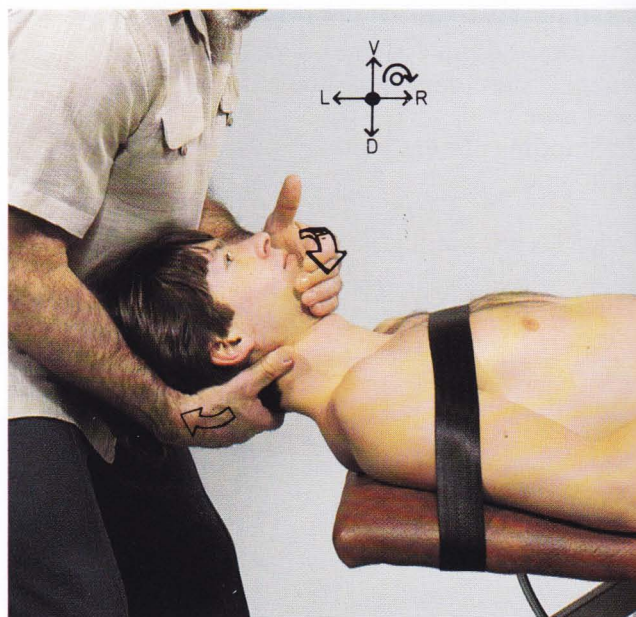


Fig. 24 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body and P's head to gradually and fully *ventrally flex* and simultaneously *rotate* and *laterally flex* P's cervical spine *to the right*.

Stimulation of Antagonists: T retains grip, and pulls against the right side of P's chin. T then asks P to look and move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

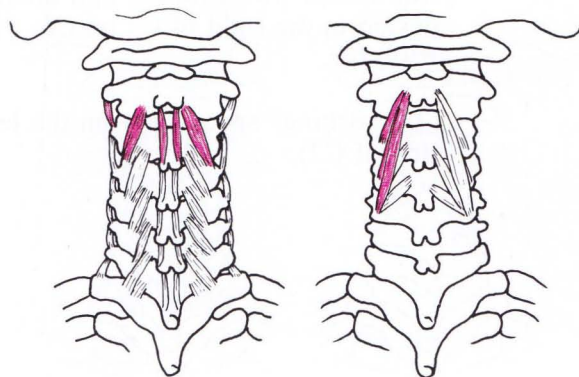
Note: This starting position and grip may be used for all **non-specific** techniques for stretching the muscles around the cervical spine.



Fig. 24 b. Final Position.

3.3.2A. Specific technique to increase **ventral flexion with rotation and lateral flexion to the right of C2 on C3.**
P sitting.

(T “working” specifically on the **left side of C2**).



Starting Position: P: Sitting; right side of head supported against T's right shoulder and chest. T: Standing facing P's right side.

Grip: T's right hand grips the left side of P's occiput, with P's head fixed against T's chest and shoulder. T's right little finger lies along the spinous and left articular processes of P's axis (C2), parallel to the articular facets between C2 and C3. T's left index finger stabilizes the spinous and articular processes on the left side of C3. T's left thumb stabilizes the inferior articular process on the right side of C3 (positioned so as not to hinder the dorsal caudal glide of the right C2 facet).

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body with P's head to gradually and fully *ventrally flex* while *rotating* and *laterally flexing* C2 on C3 *to the right*. T's right little finger, “working” on the left side of C2, pulls the left articular process of C2 cranially and ventrally.

Stimulation of Antagonists: T retains grip. T then asks P to look downward to the right, and then move his/her head further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Notes: When moving the left articular facet of C2 cranially and ventrally (as in ventral flexion), the right articular facet moves caudally and dorsally (as in dorsal flexion).

To prevent compression of the right articular facets, lateral flexion to the right should always be preceded by rotation to the right with the articular facets gliding parallel to each other.

P is best positioned supine for “working” on right side (see following therapy, 3.3.2B, p. 42.)

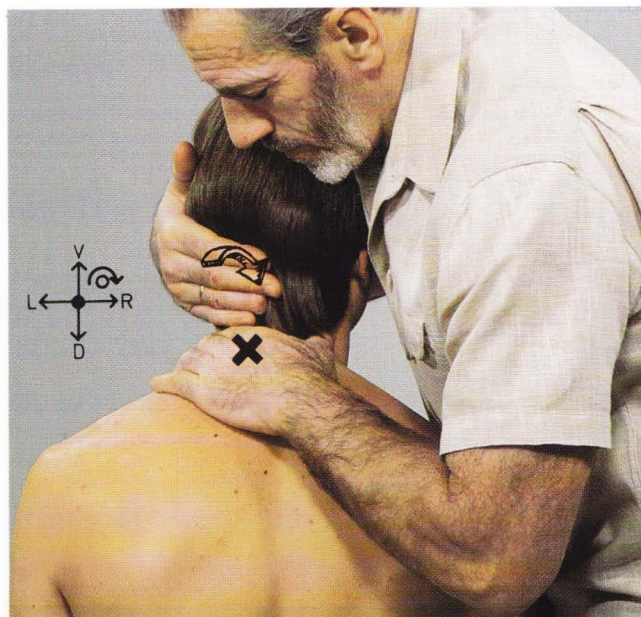


Fig. 25 a. Starting Position.

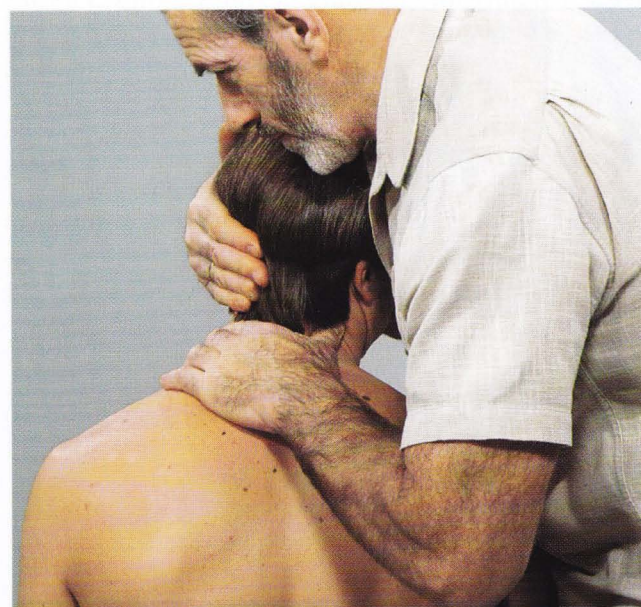
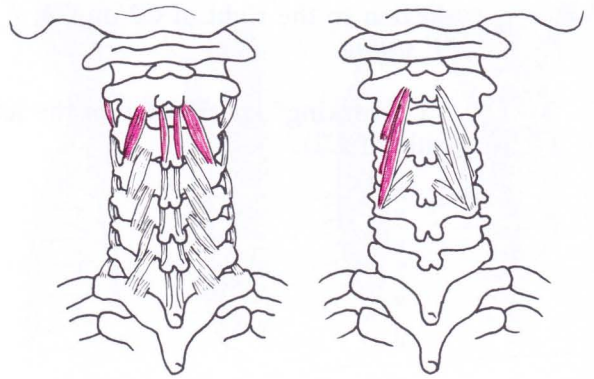


Fig. 25 b. Final Position.

3.3.2B. Specific technique to increase ventral flexion with rotation and lateral flexion to the right of C2 on C3.
P supine.

(T “working” specifically on the left side of C2).



Starting Position: P: Supine; head beyond end of couch with C3 positioned at couch edge; shoulders and thorax may be stabilized with a belt. T: Standing at head of couch, to the right of P's head.

Grip: T's left index finger lies along the spinous, articular and transverse processes on the left side of P's axis (C2). P's head is supported between T's wrist/forearm and trunk. T's right index finger stabilizes the spinous and articular processes on the left side of C3. T's right thumb stabilizes the inferior articular process on the right side of C3 (so as not to hinder the dorsal-caudal glide of the right C2 facet).

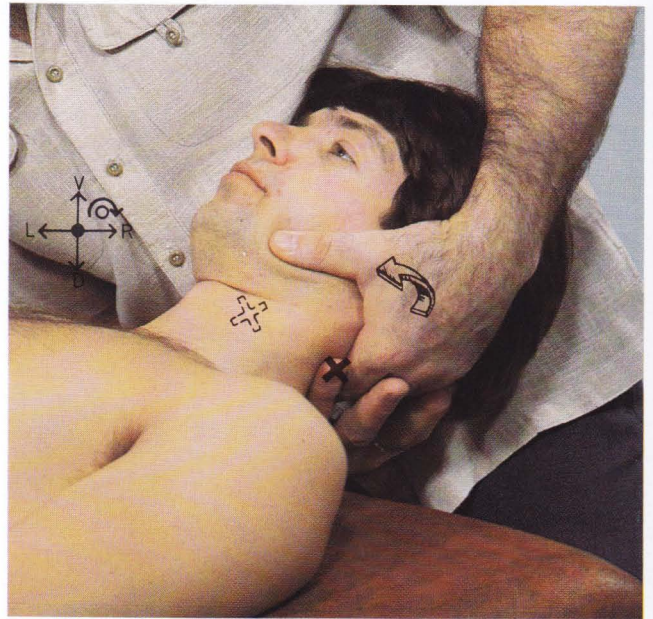


Fig. 26 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body with P's head to gradually and fully *ventrally flex* while *rotating* and *laterally flexing* C2 on C3 *to the right*. T's left index finger, “working” on the left side of C2, pulls the left articular process of C2 cranially and ventrally.

Stimulation of Antagonists: T retains grip. T then asks P to look downward to the right and then move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: When moving the left articular facet of C2 cranially and ventrally (as in ventral flexion), the right articular facet moves caudally and dorsally (as in dorsal flexion).

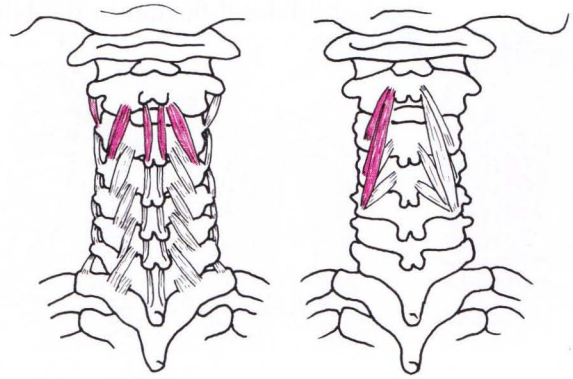
To prevent compression of the right articular facets, lateral flexion to the right should always be preceded by rotation to the right such that the articular facets glide parallel to each other.



Fig. 26 b. Final Position.

3.3.2C. Specific technique to increase **ventral flexion** with **rotation** and **lateral flexion** to the **right** of C2 on C3.
P supine.

(T “working” specifically on the **right** side of C2).



Starting Position: P: Supine; head beyond end of couch with C3 positioned at couch edge; shoulders and thorax may be stabilized with a belt. T: Standing at head of couch, to the left of P's head.

Grip: T's right index finger lies along the spinous and articular processes on the right side of P's axis (C2). P's head is supported between T's right forearm and chest. T's left index finger stabilizes the spinous and articular processes on the left side of C3.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body with P's head to gradually and fully **ventrally flex** while **rotating** and **laterally flexing** C2 on C3 **to the right**. T's right index finger, “working” on the right side of C2, pushes the right articular process of C2 caudally and dorsally.

Stimulation of Antagonists: T retains grip. T then asks P to look downward and to the right, and move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: When moving the right articular facet of C2 caudally and dorsally (as in dorsal flexion), the left articular facet moves cranially and ventrally (as in ventral flexion).

To prevent compression of the right articular facets, lateral flexion to the right should always be preceded by rotation to the right with the articular facets gliding parallel to each other.

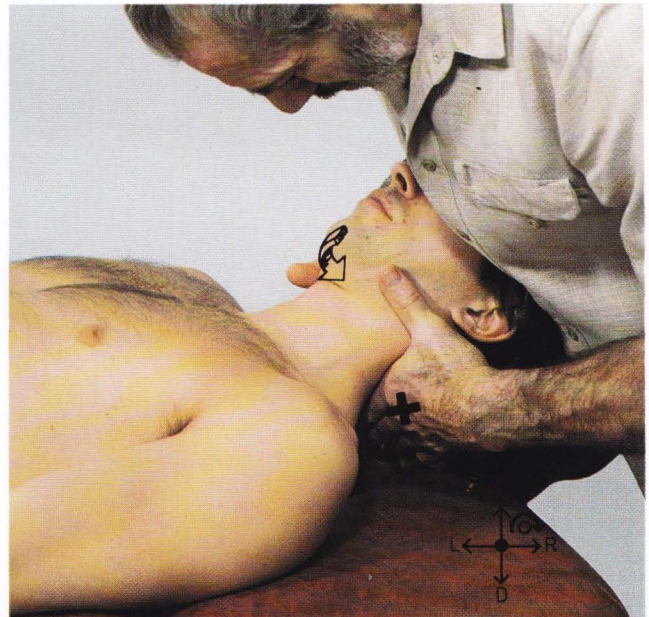


Fig. 27 a. Starting Position.

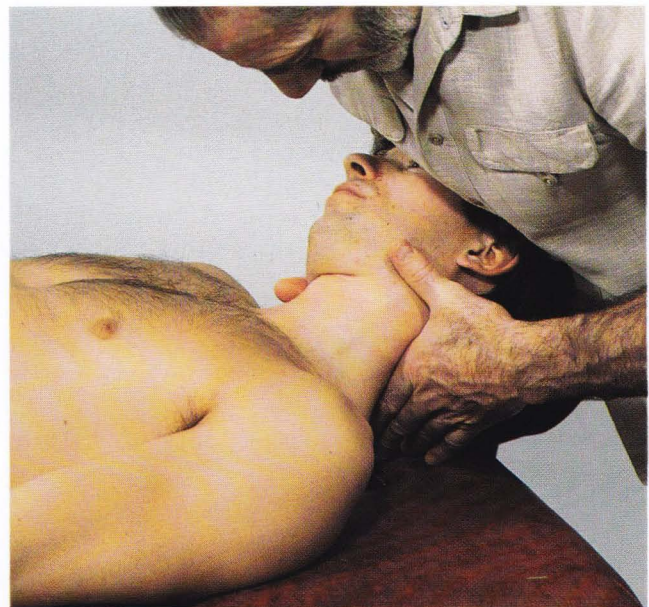
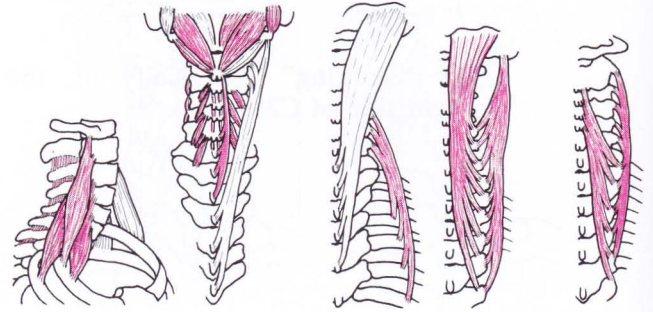


Fig. 27 b. Final Position.

3.4.1. Non-specific technique to increase ventral flexion with rotation to the right and lateral flexion to the left.
P supine.



Starting Position: P: Supine; head and neck beyond end of couch; shoulders and thorax stabilized with a belt. T: Standing at head of couch.

Grip: T's right hand grips P's occiput, wrist and forearm supporting P's head. T's left hand grips P's chin (without pressing on the larynx).

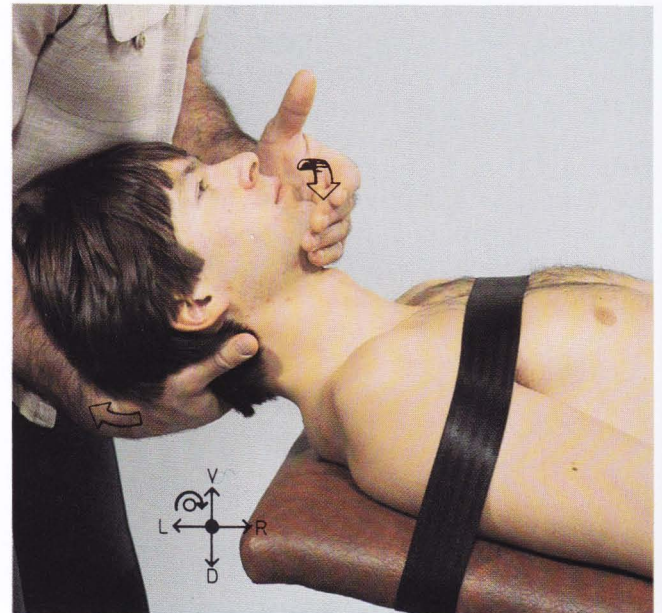


Fig. 28 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body with P's head to gradually and fully *ventrally flex*, *rotate to the right* and *laterally flex to the left* P's cervical spine.

Stimulation of Antagonists: T retains grip, and pulls against the right side of P's chin. T then asks P to look and move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: The final position may move the vertebrae into a *locked* position.

Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

This starting position and grip may be used for all non-specific techniques for stretching muscles around the cervical spine.

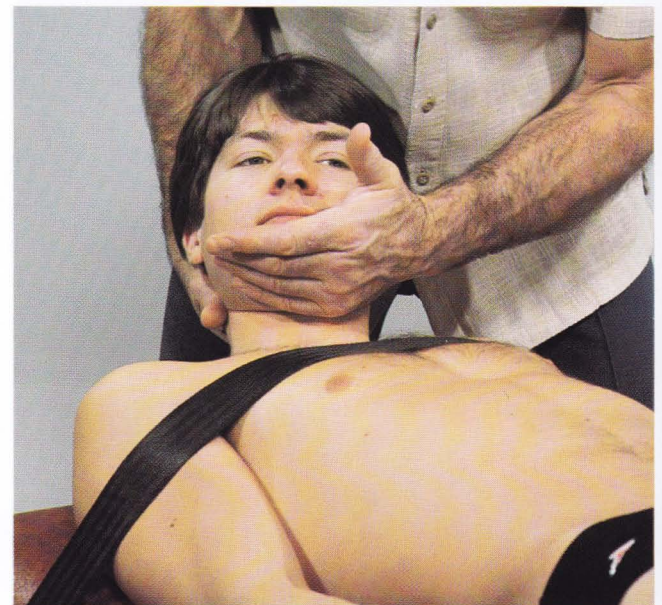
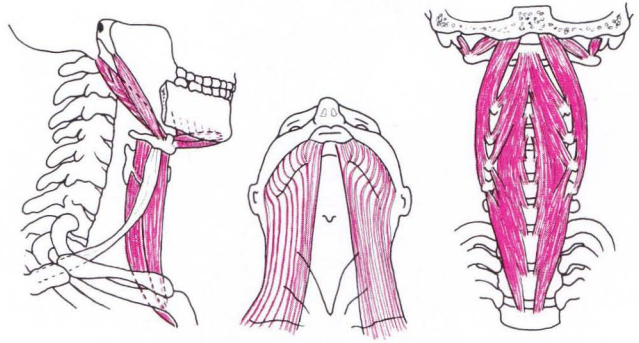
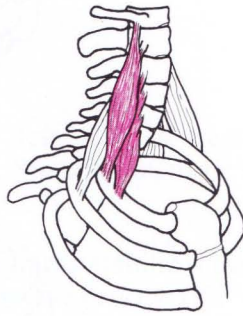


Fig. 28 b. Final Position.

3.5.1. Non-specific technique to increase dorsal flexion.
P supine.



Starting Position: P: Supine; head and neck beyond end of couch; shoulders and thorax stabilized with a belt. T: Standing at head of couch.

Grip: T's right hand grips P's occiput, with wrist and forearm supporting P's head. T's left hand grips P's chin (without pressing on the larynx).

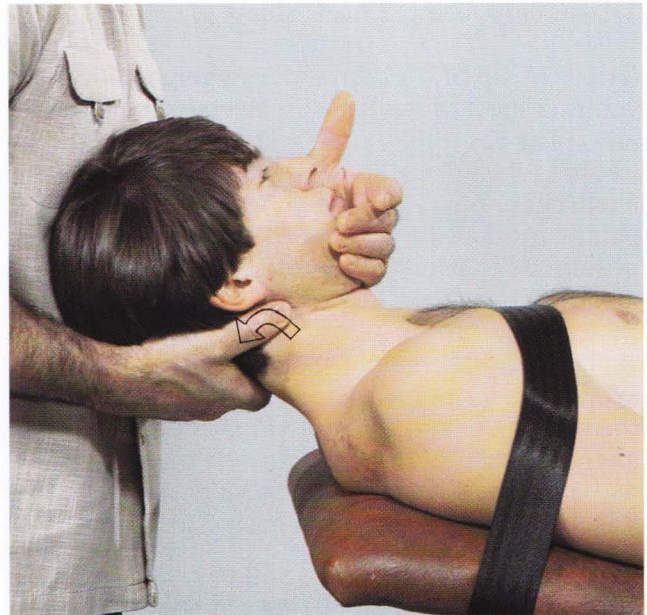


Fig. 29 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body with P's head to gradually and fully *dorsally flex* P's cervical spine.

Stimulation of Antagonists: T retains grip and asks P to look upwards and rearwards, and then *dorsally flex* to move his/her head. T then resists that movement to stimulate P's antagonists.

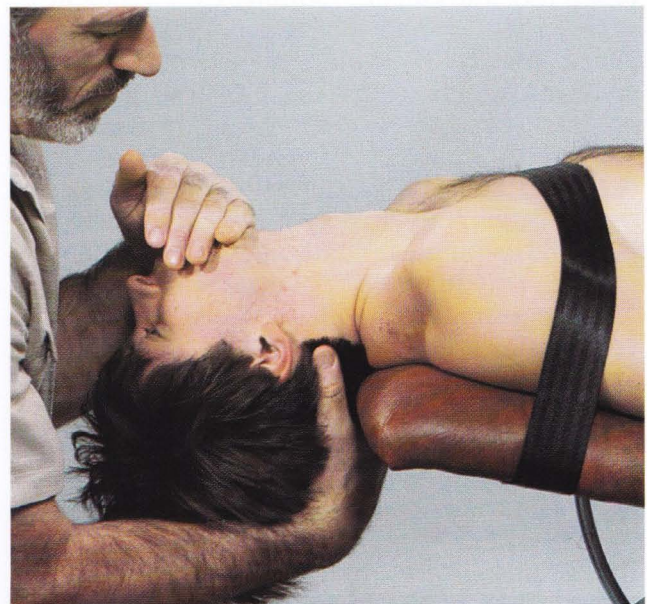
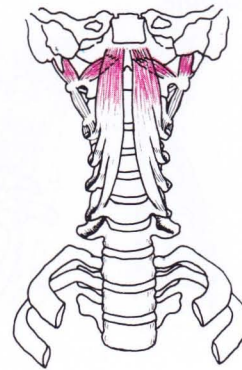


Fig. 29 b. Final Position.

3.5.2A. Specific technique to increase dorsal flexion of the occiput on the atlas.
P sitting.



Starting Position: P: Sitting; left side of head supported against T's chest.
T: Standing facing P's left side.

Grip: The tip of T's right index finger stabilizes the ventral aspect of the right transverse process of P's atlas. The rest of T's right index finger and thumb lie along the posterior arch of P's atlas. P's head is fixed between T's left hand and chest. T's left palm cups comfortably over P's ear, with the arm positioned to avoid uncomfortable pressure on P's mandible.

Procedure: Using this grip, T applies traction, and then maintaining this traction, induces ventral glide of P's occipital condyles on the atlas while moving his/her body to gradually and fully *dorsally flex* occiput on the atlas.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, thrust chin out, and dorsally flex in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: Ideally, T should induce dorsal flexion involving simultaneous and equal right and left occipital condyle ventral glide on the atlas. However, in practice this is possible with P sitting only if T's hands are large enough to permit simultaneous stabilization of both transverse processes of the atlas. In most cases, T will be able to stabilize only one side of the atlas at a time.

So to promote the desired occipital condyle ventral glide, T must treat in two stages, first on P's right (as shown here), and then on P's left. The procedure for P's left is the mirror image of that shown here; T stands facing P's right side, stabilizes P's atlas with left hand, and fixes P's head with right hand.

If T is unable to firmly grip P's head, the supine technique of 3.5.2C, p. 48 may be used.

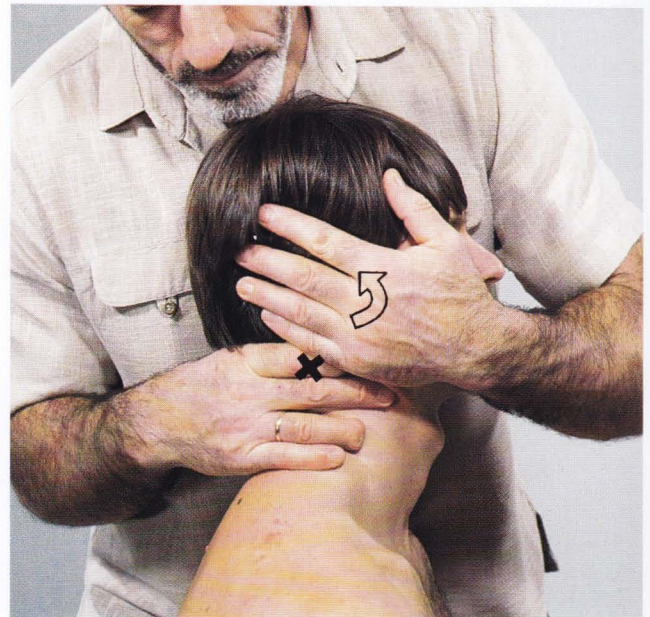


Fig. 30 a. Starting Position.

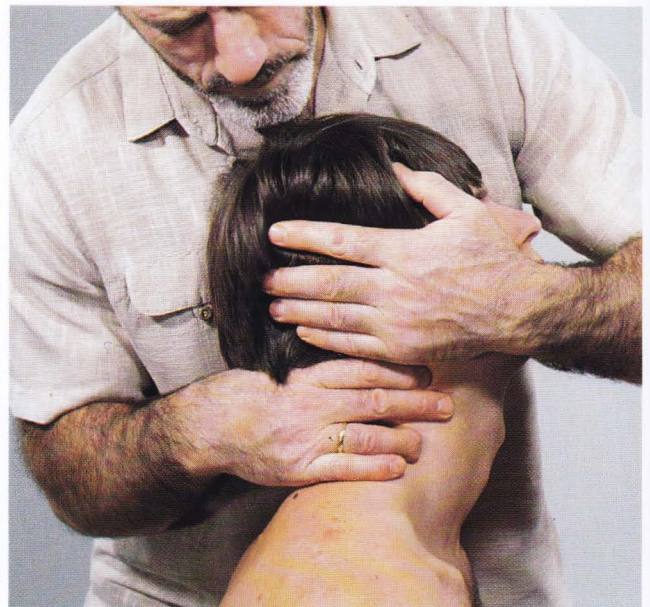


Fig. 30 b. Final Position.

3.5.2B. Specific technique to increase dorsal flexion of the occiput on the atlas.
P sitting. Alternative grip.

Starting Position: P: Sitting; left side of head supported against T's chest. T: Standing facing P's left side.

Grip: The tip of T's right index finger stabilizes the ventral aspect of the right transverse process of P's atlas. The rest of T's right index finger and thumb lie along the posterior arch of P's atlas. T's left hand grips the right side of P's head with P's chin fixed in the crook of T's left elbow. P's head is fixed against T's chest. T's left palm is comfortably cupped over P's ear, with hand and arm positioned to avoid uncomfortable pressure on P's mandible.

Procedure: Using this grip, T applies traction, and then maintaining this traction, induces ventral glide of P's occipital condyles on the atlas while moving his/her body to gradually and fully *dorsally flex* P's occiput on the atlas. T moves the condyles of P's occiput on the atlas in the ventral direction.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, thrust chin out, and dorsally flex in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: Ideally, T should induce dorsal flexion involving simultaneous and equal right and left occipital condyle ventral glide on the atlas. However, in practice this is possible with P sitting only if T's hands are large enough to permit simultaneous stabilization of both transverse processes of the atlas. In most cases, T will be able to stabilize only one side of the atlas at a time.

So to promote the desired occipital condyle ventral glide, T must then treat in two stages, first on P's right (as shown here), and then on P's left. The procedure for P's left is the mirror image of that shown here.

This technique may be performed only if mandible, teeth and temporo-mandibular joint can tolerate the force applied.

If T is unable to firmly grip P's head, the supine technique of 3.5.2C, p. 48 may be used.

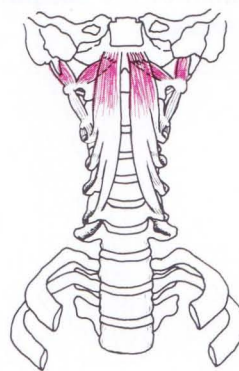
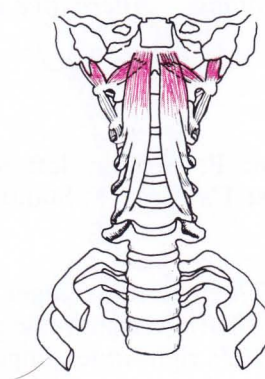


Fig. 31 a. Starting Position.



Fig. 31 b. Final Position.

3.5.2C. **Specific technique to increase dorsal flexion of the occiput on the atlas.**
P supine.



Starting Position: P: Supine; head beyond couch end with the atlas positioned at couch edge. T: Standing at head of couch.

Grip: T's right hand grips P's occiput, thumb stabilizing the ventral aspect of the right transverse process of P's atlas, and wrist and forearm supporting P's head. T's right shoulder presses against P's forehead, without pressing on P's nose or eyes. (If P finds this grip uncomfortable, a small cushion may be placed between T's right shoulder and P's forehead). T's left hand rests on the couch under P's neck, thumb stabilizing the ventral aspect of the left transverse process of P's atlas.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body (see **Notes**) to gradually and fully *dorsally flex* P's occiput on the atlas. T's thumbs stabilize P's atlas to prevent it from following the ventral movement of the occipital condyles.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, thrust chin out, and dorsally flex in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: This procedure is most easily performed if T starts with slight knee flex, and then "sinks," bending knees more to induce the desired dorsal flexion.

T may also control knee flex to supply or vary resistance in the Stimulation of Antagonists phase.

T may find traction more easily applied with P sitting, see the preceding two techniques, 3.5.2A and 3.5.2B, pp. 46 and 47.

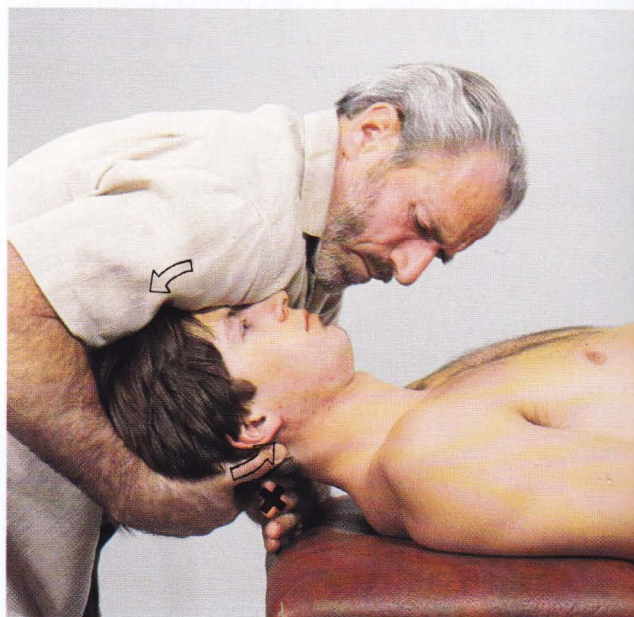


Fig. 32 a. Starting Position.

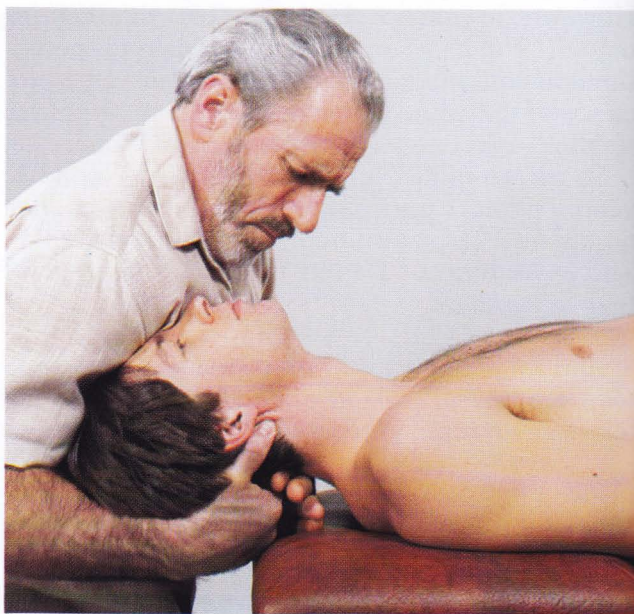
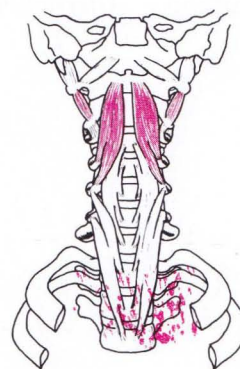


Fig. 32 b. Final Position.

3.5.3A. Specific technique to increase **dorsal flexion** of the atlas on the axis.
P. sitting.



Starting Position: P: Sitting; left side of head supported against T's left shoulder and chest. T: Standing facing P's left side.

Grip: T's right index finger and thumb stabilize P's axis from the dorsal aspect. T's left hand grips around the right side of P's head with the little finger along the posterior arch of P's atlas. P's head is fixed between T's left hand and chest. T's left palm cups comfortably over P's ear, with the hand and arm positioned to avoid uncomfortable pressure on P's mandible.

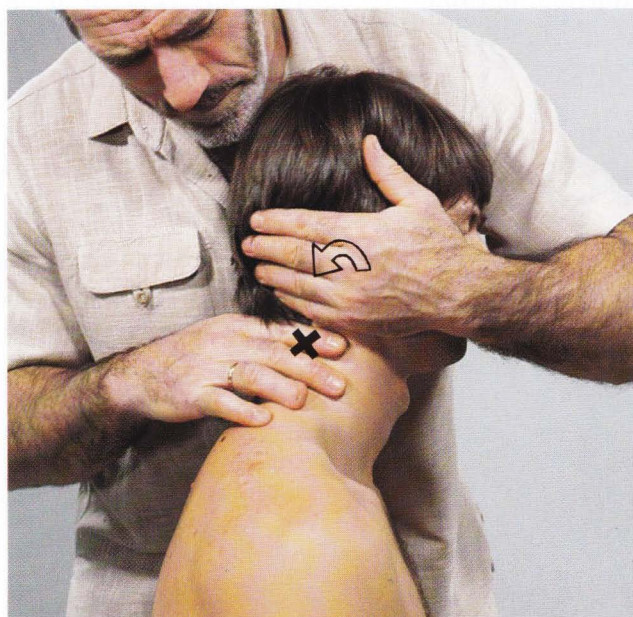


Fig. 33 a. Starting Position.

Procedure: Using this grip, T applies traction at P's head, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* P's occiput and atlas on the stabilized axis. In this movement, P's occiput presses the posterior arch of the atlas caudally against the spinous process of the axis, achieving the desired dorsal flexion.

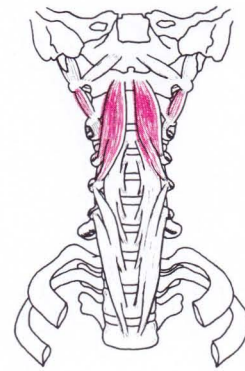
Stimulation of Antagonists: T retains grip and asks P to look upwards, thrust chin out, and dorsally flex in the direction just stretched. T resists that movement to stimulate P's antagonists.

Note: T may increase traction, if necessary, by altering grip, see therapy 3.5.3B, p. 50.



Fig. 33 b. Final Position.

3.5.3B. Specific technique to increase dorsal flexion of the atlas on the axis.
P sitting. Alternative grip.



Starting Position: P: Sitting; left side of head supported against T's left shoulder and chest. T: Standing facing P's left side.

Grip: T's right index finger and thumb stabilize P's axis from the dorsal aspect. T's left hand grips around the right side of P's head with the little finger along the posterior arch of P's atlas, and hand positioned to avoid uncomfortable pressure on P's mandible, palm cupped over P's ear. P's head is fixed between T's left hand and chest, and P's chin is fixed in the crook of T's left elbow.

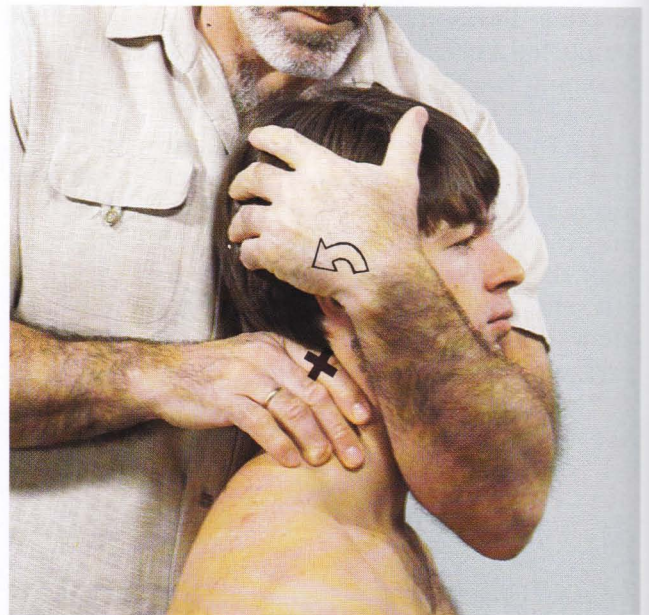


Fig. 34 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* P's atlas on the stabilized axis. In this movement, P's occiput presses the posterior arch of the atlas caudally against the spinous process of the axis, achieving the desired dorsal flexion.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, thrust chin out, and dorsally flex in the direction just stretched. T resists that movement to stimulate P's antagonists.

Note: This technique may be performed only if the mandible, teeth and temporo-mandibular joint can tolerate the force applied.

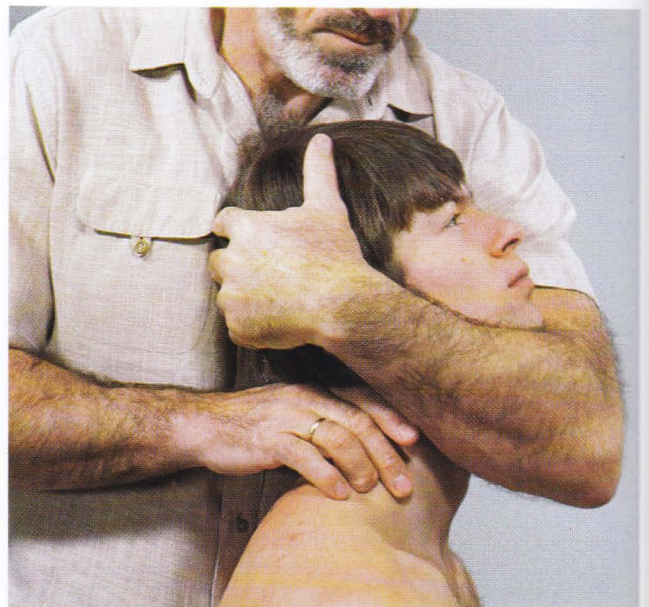
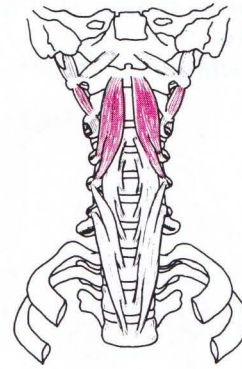


Fig. 34 b. Final Position.

3.5.3C. Specific technique to increase dorsal flexion of the atlas on the axis.
P supine.



Starting Position: P: Supine; head beyond end of couch with the axis at couch edge. T: Standing at head of couch.

Grip: T's right hand grips P's occiput and atlas, thumb stabilizing the ventral aspect of the right transverse process of P's atlas, wrist and forearm supporting P's head. T's right shoulder presses against P's forehead, without pressing on P's nose or eyes. (If P finds this grip uncomfortable, a small cushion may be placed between T's right shoulder and P's forehead). T's left hand rests vertically on the couch, rigidly under P's neck, to stabilize the spinous process of P's axis against the radial aspect of T's left 2nd metacarpal bone and index finger, thumb stabilizing the ventral aspect of the left transverse process of P's atlas.

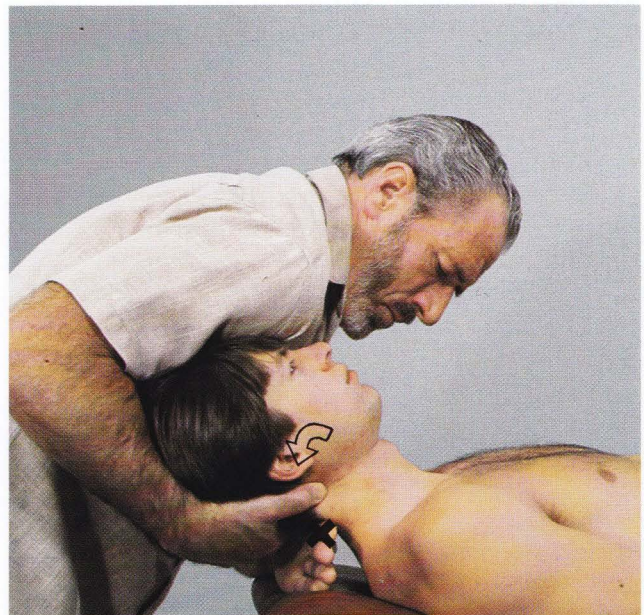


Fig. 35 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* P's atlas on the axis. T's thumbs also pull dorsally against the transverse processes of P's atlas to produce a dorsal-cranial glide of the atlas along the odontoid process (dens) of the axis.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, thrust chin out, and dorsally flex in the direction just stretched. T resists that movement to stimulate P's antagonists.

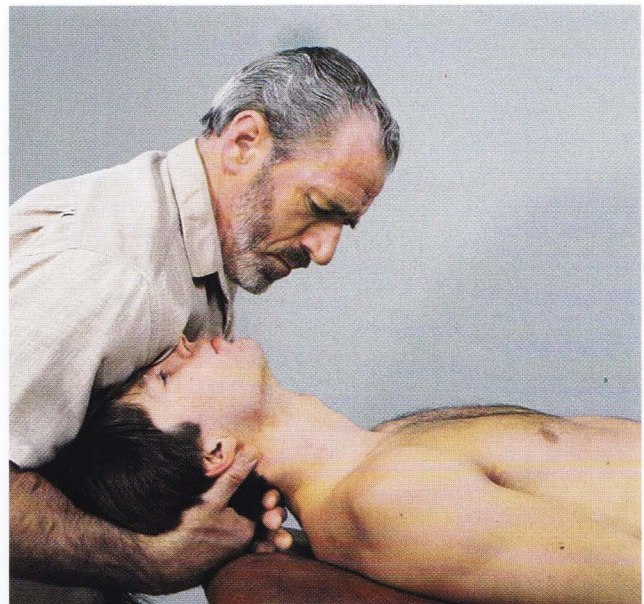
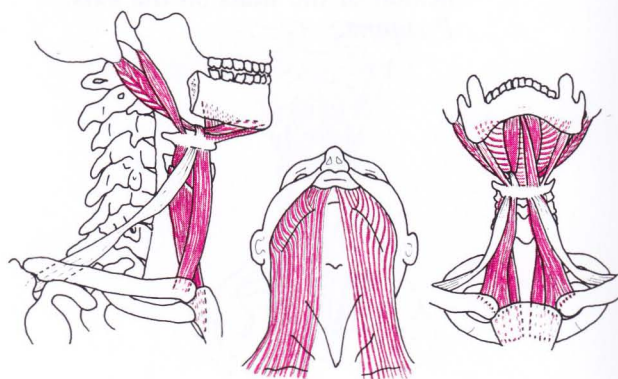


Fig. 35 b. Final Position.

**3.5.4A. Non-specific technique for the superficial ventral muscles to increase dorsal flexion (C2 and caudal vertebrae).
P sitting.**



Starting Position: P: Sitting; upper thoracic region well supported. T: Standing facing P's left side.

Grip: T's left hand grips the right side of P's head with P's chin fixed in crook of T's left elbow. P's head is fixed firmly between T's left hand and chest. T's left palm cups comfortably over P's right ear, with hand and arm positioned to avoid uncomfortable pressure on P's mandible. T's right hand stabilizes the upper thoracic region of P's back.



Fig. 36 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* P's cervical spine.

Stimulation of Antagonists: T retains grip, and asks P to look upwards and rearwards, and then move head and cervical spine in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: P's thoracic spine can be more easily stabilized by using a chair as a back support, which also stabilizes the sternum, clavicles and the first ribs.

Test for necessity of stretching the superficial ventral muscles: See if P has less cervical spine dorsal flexion with his/her mouth closed than with it open.

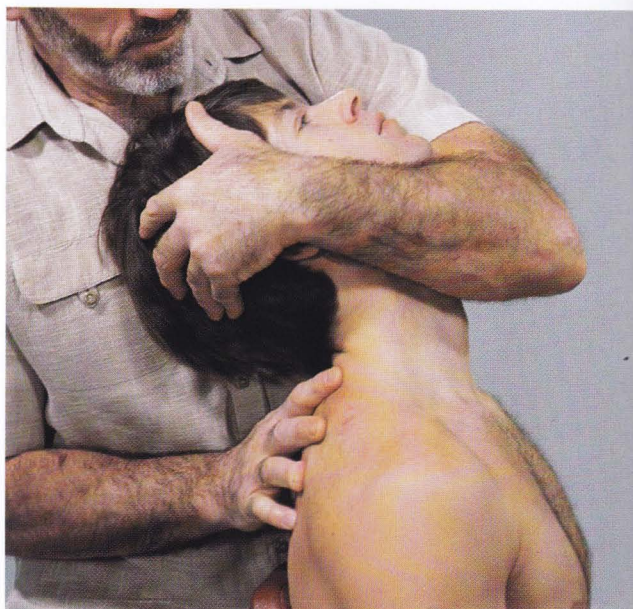
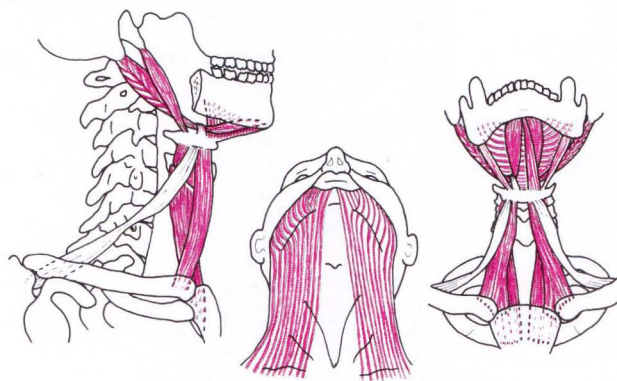


Fig. 36 b. Final Position.

- 3.5.4B. **Non-specific technique for the superficial ventral muscles to increase dorsal flexion (C2 and caudal vertebrae).**
P supine.



Starting Position: P: Supine; head and neck (cranial to T1) beyond end of the couch; shoulders and thorax stabilized with a belt. T: Standing or sitting at head of couch.

Grip: T's right hand grips P's occiput. T's right wrist and forearm support P's head. T's left hand grips under P's chin (without pressing on the larynx).

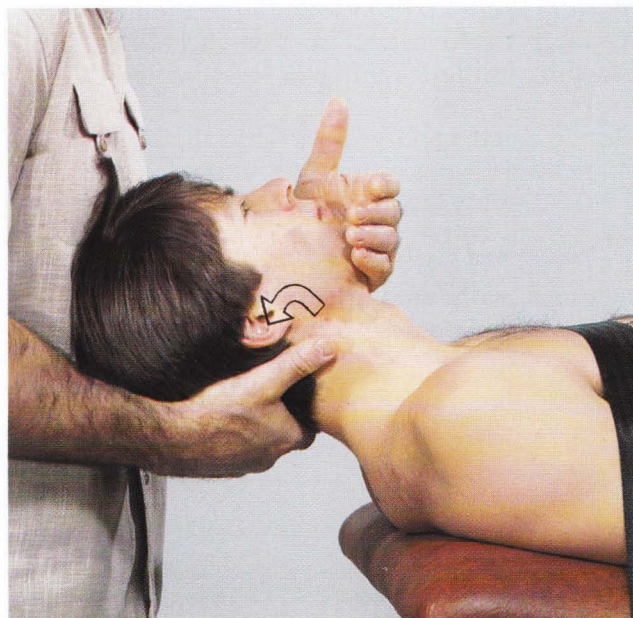


Fig. 37 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* P's cervical spine.

Stimulation of Antagonists: T retains grip and asks P to look upwards and rearwards, and then move head and cervical spine in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: Stabilization of P's thoracic spine can be improved by slightly raising the head of the couch.

Test for necessity of stretching the superficial ventral muscles: See if P has less cervical spine dorsal flexion with his/her mouth closed than with it open.

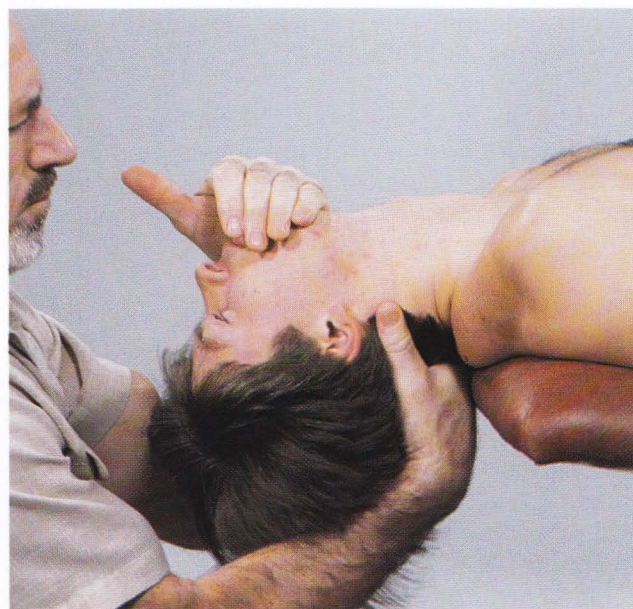
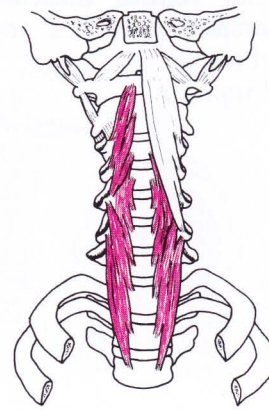


Fig. 37 b. Final Position.

3.5.5A. Non-specific technique for the deep ventral muscles to increase dorsal flexion
(mainly the **longus colli** at C2 on C3).
P sitting.



Starting Position: P: Sitting; upper thoracic region well supported caudal to and including T3. T: Standing facing P's left side.

Grip: T's left hand grips around the right side of P's head with the little finger along P's axis (C2). T's right index finger and thumb stabilize C3 from the dorsal aspect. P's head is held firmly against T's chest. T's left palm cups comfortably over P's right ear, with hand and arm positioned to avoid uncomfortable pressure on P's mandible.

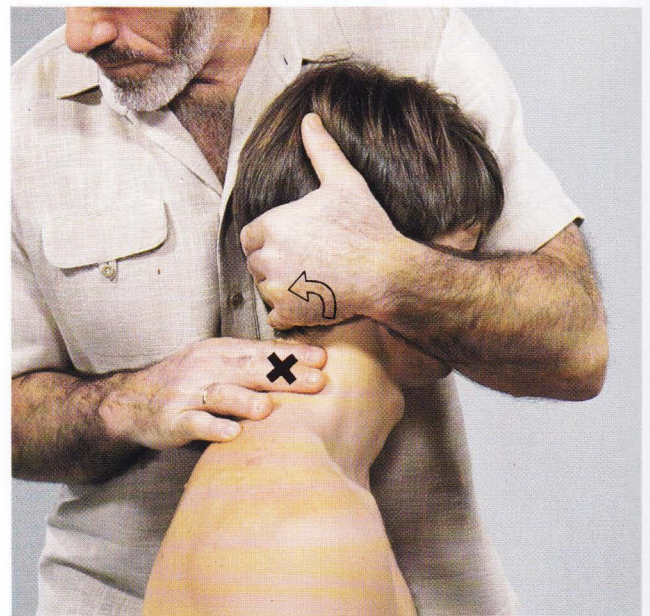


Fig. 38 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* C2 on C3.

Stimulation of Antagonists: T retains grip, and asks P to look upwards and backwards, and then move head and cervical spine in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: The longus colli originates at T3. Therefore P's thoracic spine should be supported at and caudal to this level.

When treating the segments caudal to C3, T's left hand grips the cranial vertebra of the segment treated, and T's right hand stabilizes the caudal vertebra. For ease of grip and efficiency of treatment, T may position the segments cranial to C3 in ventral flexion.

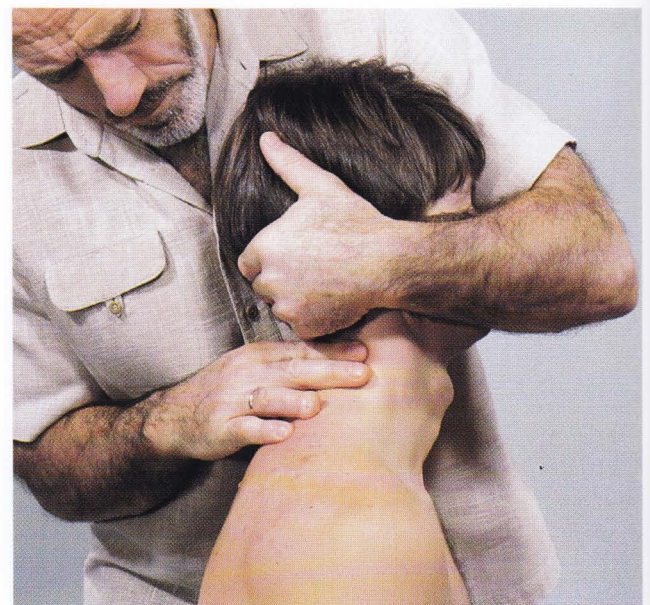
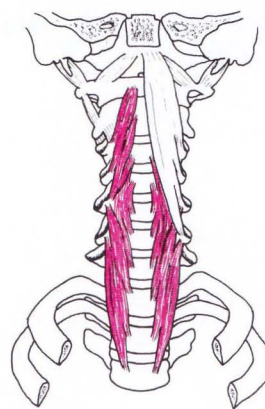


Fig. 38 b. Final Position.

- 3.5.5B. **Non-specific technique for the deep ventral muscles to increase dorsal flexion**
(mainly the **longus colli** at C2 on C3).
P supine.



Starting Position: P: Supine; head and neck beyond end of couch; shoulders and thorax may be stabilized with a belt. T: Standing or sitting at head of couch.

Grip: T's right index finger and thumb grip P's axis (C2). T's right wrist and forearm support P's head. T's left hand grips under P's chin (without pressing on the larynx).

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* P's cervical spine.

Stimulation of Antagonists: T retains grip and asks P to look upwards and backwards, and then move head and cervical spine in the direction just stretched. T resists that movement to stimulate P's antagonists.

Note: To obtain a more specific effect, P's occiput, atlas and axis (C2) are firmly held between T's right hand and shoulder with T's left hand stabilizing C3 (see grip of therapy 3.2.4B, p. 37).

When treating the segments caudal to C3, T's right hand grips the cranial vertebra of the segment treated, and T's left hand stabilizes the caudal vertebra. For ease of grip and efficiency of treatment, T may position the segments cranial to C3 in ventral flexion.

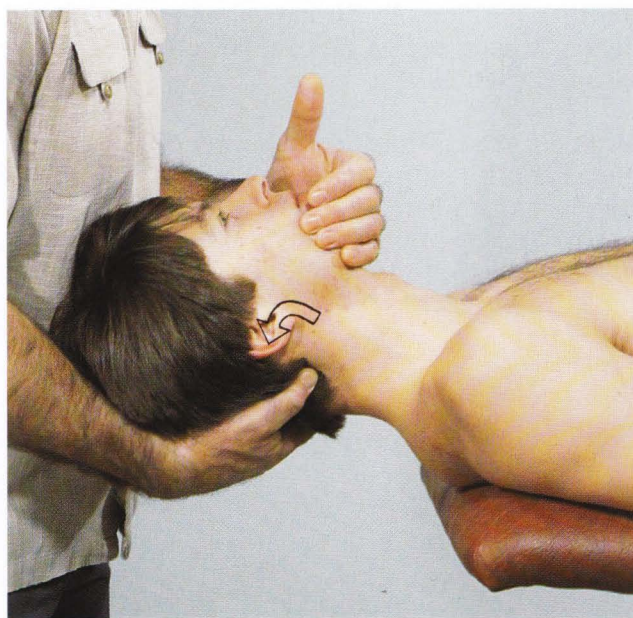


Fig. 39 a. Starting Position.

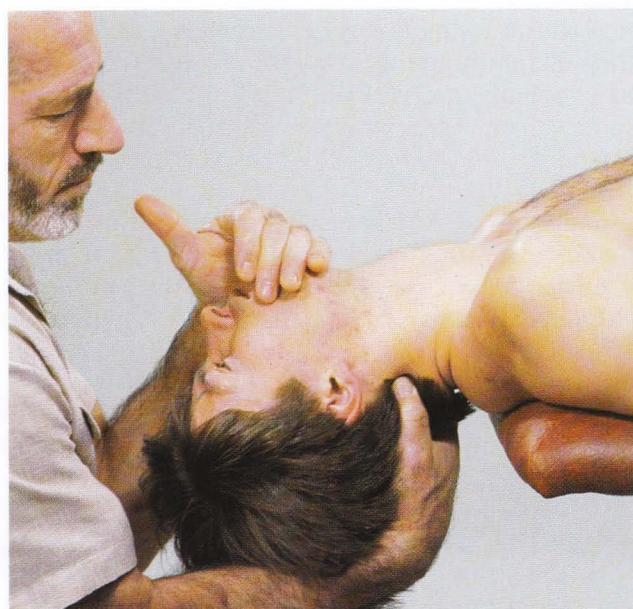
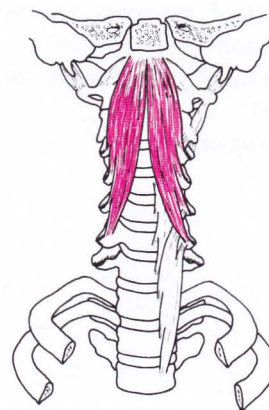


Fig. 39 b. Final Position.

3.5.5C. Non-specific technique for the deep ventral muscles to increase dorsal flexion (mainly the longus capitis).
P sitting.



Starting Position: P: Sitting; mouth opened and upper thoracic region well supported. T: Standing facing P's left side.

Grip: P's head is firmly fixed between T's left hand and chest. T's left palm cups comfortably over P's right ear, with hand and arm positioned to avoid uncomfortable pressure on P's mandible. T's right hand stabilizes P's C6 and caudal vertebrae, from the dorsal aspect.



Fig. 40 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* P's cervical spine, from the occiput through the C5-C6 segment.

Stimulation of Antagonists: T retains grip, asks P to look upwards and rearwards, and then move head and cervical spine in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: The longus capitis inserts at C6, so P's cervical spine should be stabilized at and caudal to C6.

During treatment, P's mouth should be kept open, with the lower jaw relaxed, to prevent interference from the superficial ventral muscles.

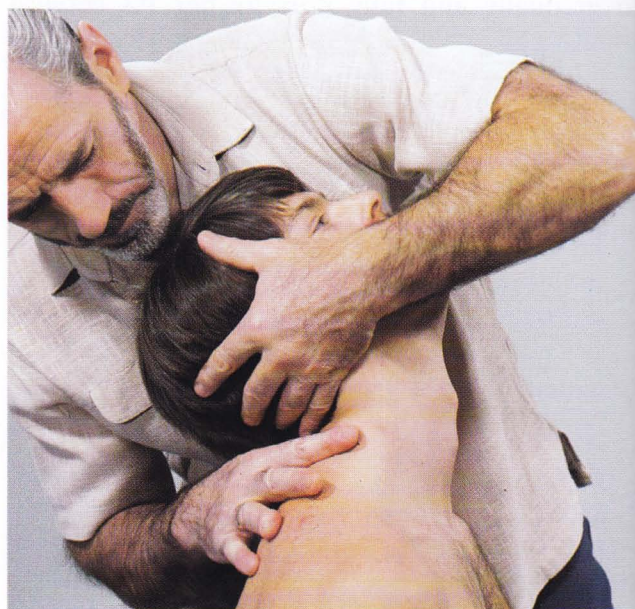
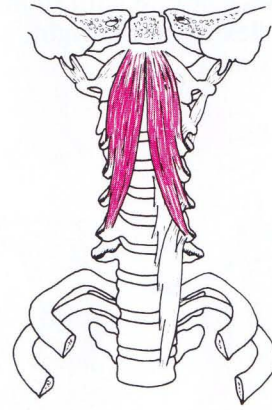


Fig. 40 b. Final Position.

3.5.5D. Non-specific technique for the deep ventral muscles to increase dorsal flexion (mainly the longus capitis). P supine.



Starting Position: P: Supine; mouth open; head and neck (cranial to C6) beyond end of couch; a firm cushion may be used to stabilize the C6 and caudal vertebrae; shoulders and thorax may be stabilized with a belt. T: Standing or sitting at head of couch.

Grip: T's right hand grips P's occiput. T's right wrist and forearm support P's head. T's left hand grips P's forehead.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* P's cervical spine, from the occiput through the C5-C6 segment.

Stimulation of Antagonists: T retains grip, and asks P to look upwards and backwards, and then move his/her head and cervical spine in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: For a more specific effect, T can hold P's head and vertebrae cranial to the one treated with the right hand. T's left hand stabilizes the caudal vertebrae (see grip of therapy 3.2.4B, p. 37). For ease of grip and efficiency of treatment, T may position the segments cranial to the one treated in ventral flexion.

The **longus capitis** inserts at C6, so P's cervical spine should be stabilized at and caudal to C6.

During treatment, P's mouth should be kept open, with the lower jaw relaxed, to prevent interference from the superficial ventral muscles.

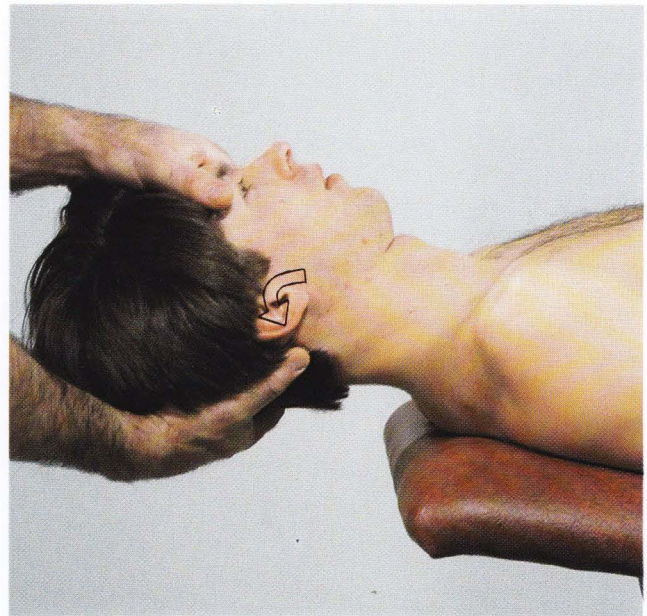


Fig. 41 a. Starting Position.

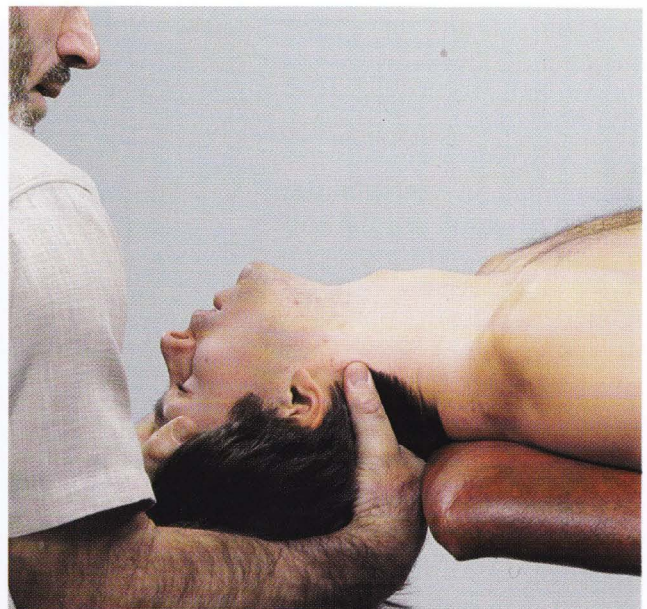
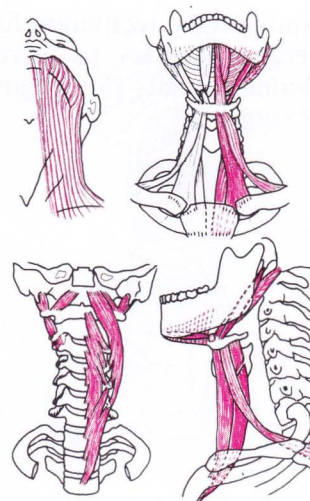


Fig. 41 b. Final Position.

3.6.1A. Non-specific technique to increase dorsal flexion with rotation and lateral flexion to the right.
P sitting.



Starting Position: P: Sitting; left side of head supported against T's left shoulder and chest. T: Standing facing P's left side.

Grip: T's left hand grips the right side of P's occiput and fixes it against his/her shoulder and chest. T's right hand and forearm stabilize P's right shoulder from the dorsal aspect. P's left shoulder is stabilized against T's trunk.

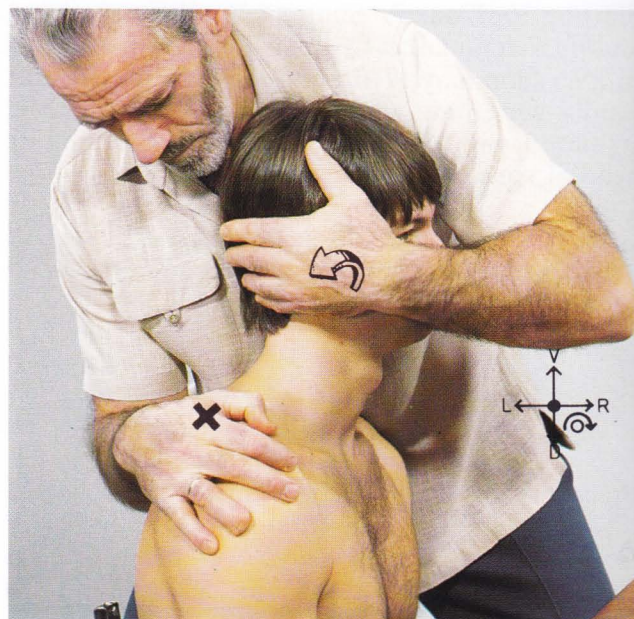


Fig. 42 a. Starting Position.

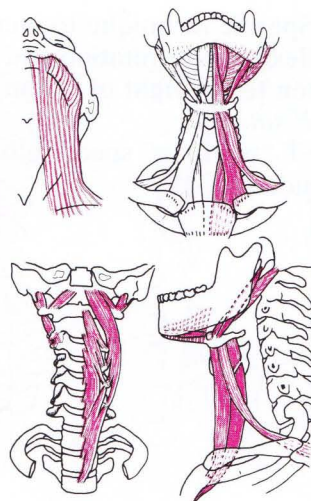
Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* while *rotating* and *laterally flexing* P's cervical spine *to the right*.

Stimulation of Antagonists: T retains grip, and asks P to look to the right, to the rear, and downwards, as if looking over shoulder, and then move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.



Fig. 42 b. Final Position.

3.6.1B. Non-specific technique to increase dorsal flexion with rotation and lateral flexion to the right
P supine.



Starting Position: P: Supine; head and neck beyond end of couch; shoulders and thorax stabilized with a belt. T: Standing at head of couch.

Grip: T's right hand grips P's occiput; T's right wrist and forearm and right side of chest support P's head. T's left hand grips P's chin (without pressing on the larynx).

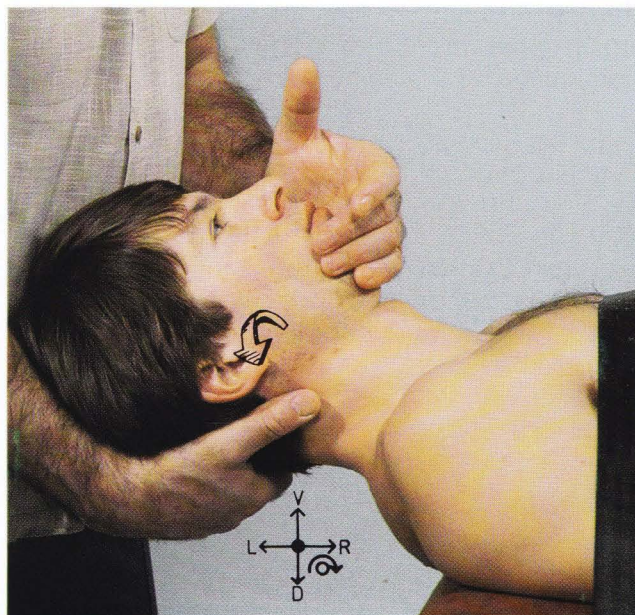


Fig. 43 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* while *rotating* and *laterally flexing* P's cervical spine *to the right*.

Stimulation of Antagonists: T retains grip, and asks P to look to the right, to the rear, and downwards, as if looking over shoulder, and move further in the direction just stretched. T resists that movement to stimulate P's antagonists.

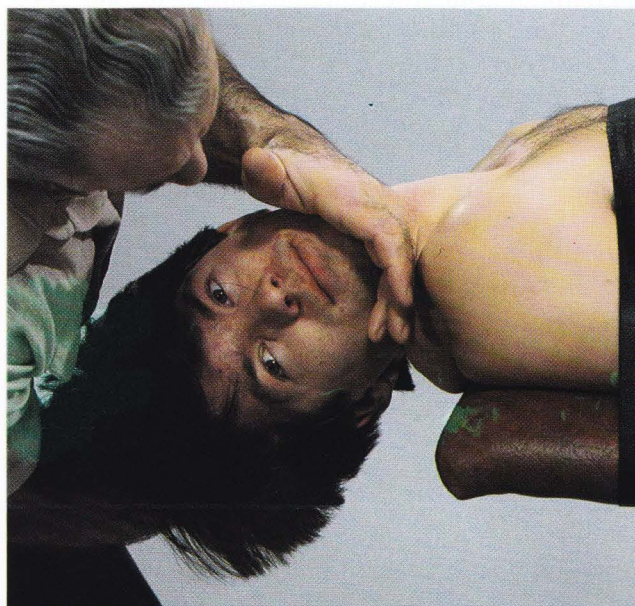
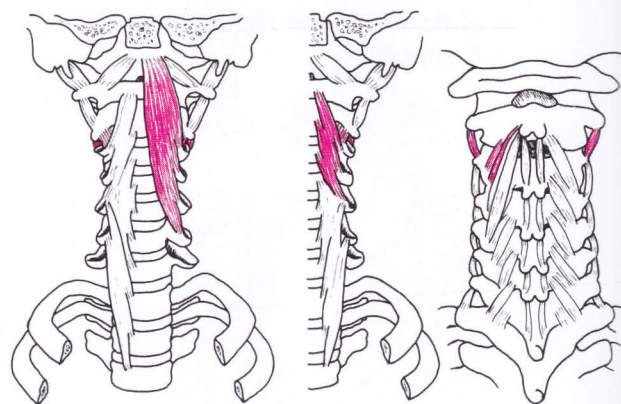


Fig. 43 b. Final Position.

3.6.2A. Specific technique to increase dorsal flexion with rotation and lateral flexion to the right of C2 on C3.

P sitting.

(T “working” specifically on the left side of C2).



Starting Position: P: Sitting; right side of head supported against T's right shoulder and chest. T: Standing facing P's right side.

Grip: P's occiput is stabilized between T's right hand and chest and shoulder. T's right little finger lies along the spinous and left articular processes of P's axis (C2), parallel to the articular facets between C2 and C3. T's left index finger stabilizes the spinous and articular processes on the **left** side of C3. T's left thumb stabilizes the **inferior** articular process on the **right** side of C3 (so that the thumb does not hinder the dorsal/caudal glide of the right C2 facet).

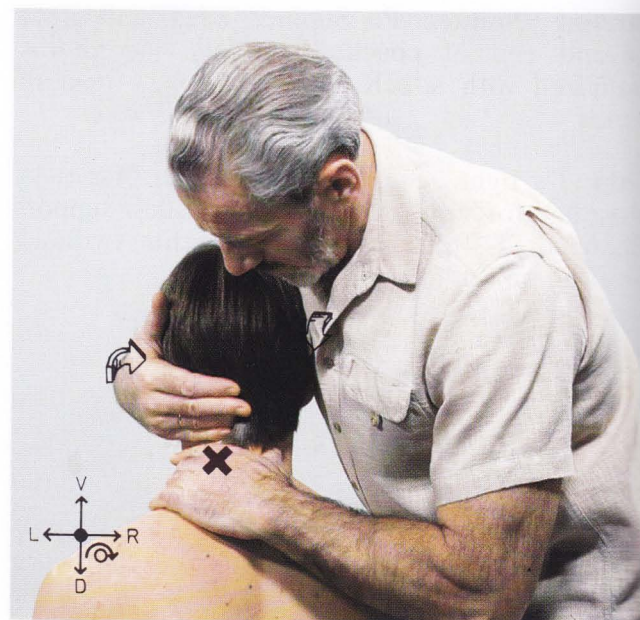


Fig. 44 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* while *rotating* and *laterally flexing* C2 on C3 to the right. T's right little finger, “working” on the left side of C2, pulls the left articular process of C2 slightly ventrally.

Stimulation of Antagonists: T retains grip, and asks P to look to the right, rearwards and downwards, and to move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: When moving the **left** articular facet of C2 slightly ventrally, the right articular facet moves slightly dorsally.

To avoid compressing the right articular facets, lateral flexion to the right should always be preceded by rotation to the right such that the articular facets glide parallel to one another.

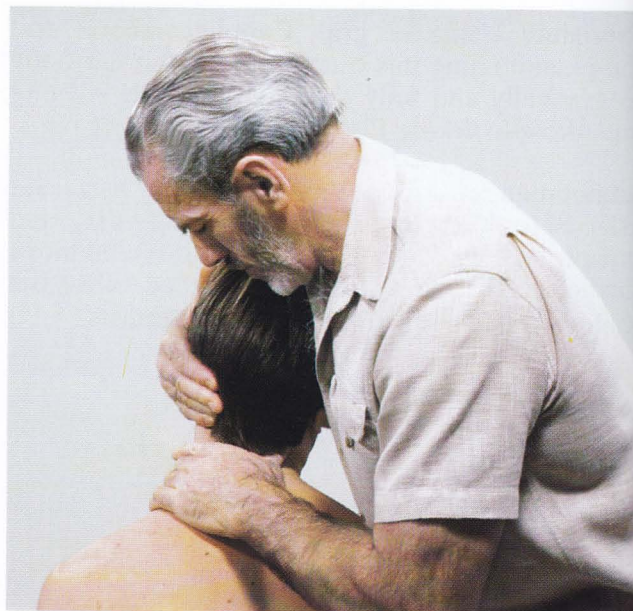
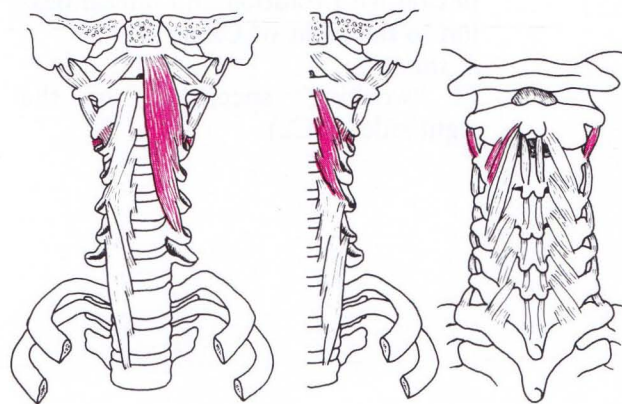


Fig. 44 b. Final Position.

- 3.6.2B. **Specific technique to increase dorsal flexion with rotation and lateral flexion to the right of C2 on C3.**
P supine.
 (T "working" specifically on the right side of C2).



Starting Position: P: Supine; head beyond end of couch with C3 positioned at couch edge; P's shoulders and thorax may be stabilized with a belt. T: Standing at head of couch, to the left of P's head.

Grip: T's right index finger lies along the spinous and articular processes on the right side of P's axis (C2). T's right wrist and forearm support P's head against the right side of T's abdomen. T's left index finger stabilizes the spinous and articular processes on the left side of C3.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body and P's head to gradually and fully *dorsally flex* while *rotating* and *laterally flexing* C2 on C3 to the right. T's right index finger, "working" on the right side of C2, pushes the right articular process of C2 slightly dorsally.

Stimulation of Antagonists: T retains grip, and asks P to look to the right, rearwards and downwards, and move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: When moving the right articular facet of C2 slightly dorsally, the left articular facet moves slightly ventrally.

To avoid compressing the right articular facets, lateral flexion to the right should always be preceded by rotation to the right such that the articular facets glide parallel to one another.

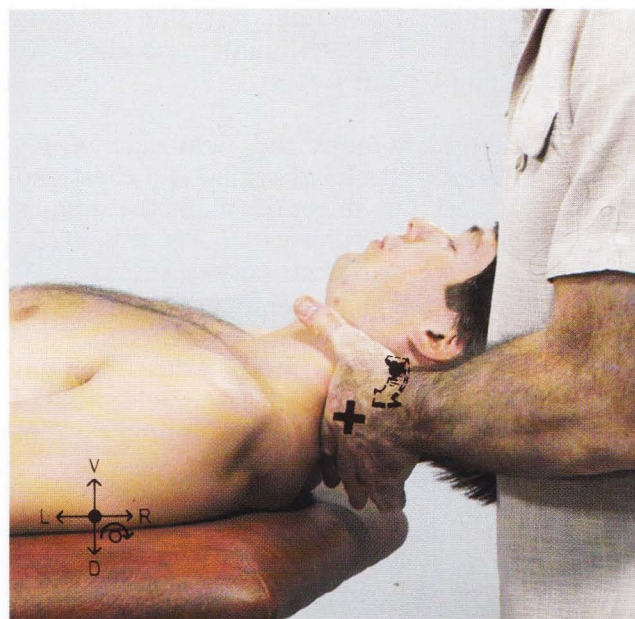


Fig. 45 a. Starting Position.

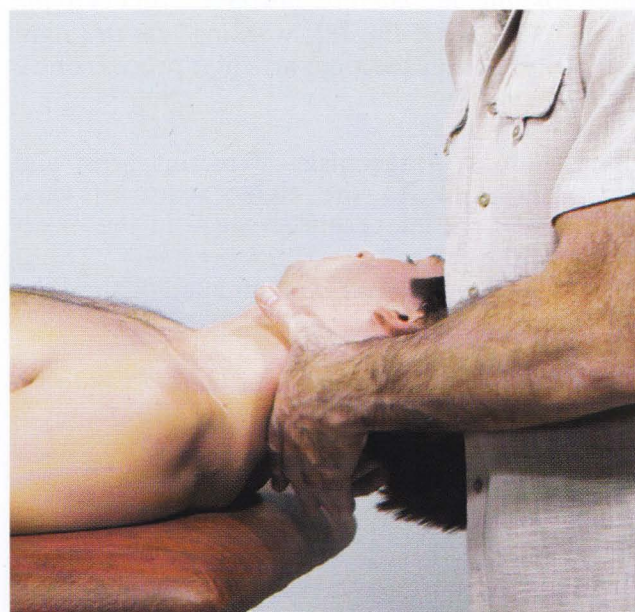
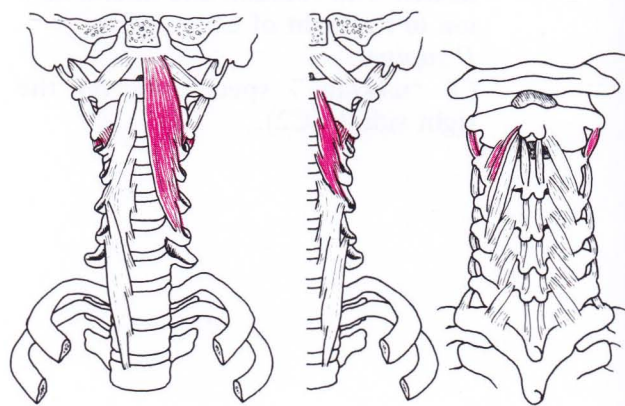


Fig. 45 b. Final Position.

- 3.6.2C. **Specific technique to increase dorsal flexion with rotation and lateral flexion to the right of C2 on C3.**
P sitting.
 (T “working” specifically on the right side of C2).



Starting Position: P: Sitting; left side of head supported against T's left shoulder and chest. T: Standing facing P's left side.

Grip: T's left hand grips the right side of P's occiput, stabilizing P's head against T's chest and shoulder. T's left little finger lies along the spinous and right articular processes of P's axis (C2), parallel to the articular facets between C2 and C3. T's right index finger stabilizes the inferior articular process on the right side of C3 (so that it does not hinder the dorsal-caudal glide of the right C2 facet). T's right thumb stabilizes the left side of the spinous process of C3, preventing it from rotating to the right.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body and P's head to gradually and fully *dorsally flex* while *rotating* and *laterally flexing* C2 on C3 to the right. T's left little finger, “working” on the right side of C2, pushes the right articular process of C2 slightly dorsally.

Stimulation of Antagonists: T retains grip, and asks P to look to the right, rearwards and downwards, and move his/her head in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: When moving the right articular facet of C2 slightly dorsally, the left articular facet moves slightly ventrally.

To avoid compressing the right articular facets, lateral flexion to the right should always be preceded by rotation to the right with the articular facets gliding parallel to one another.

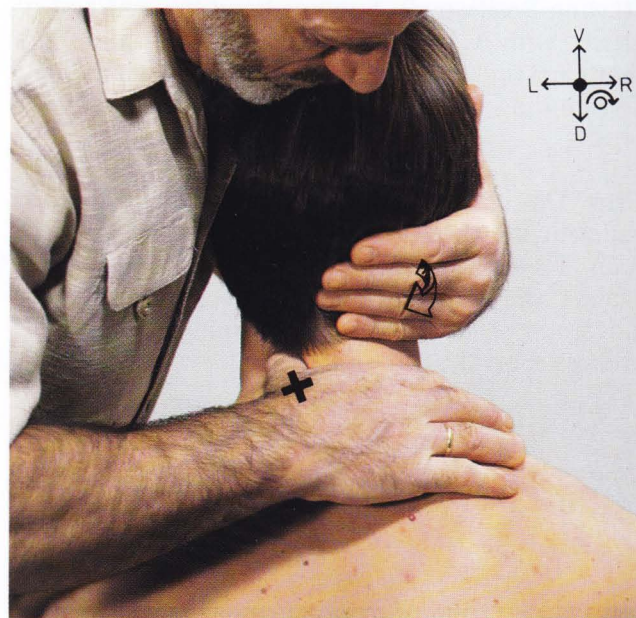


Fig. 46 a. Starting Position.

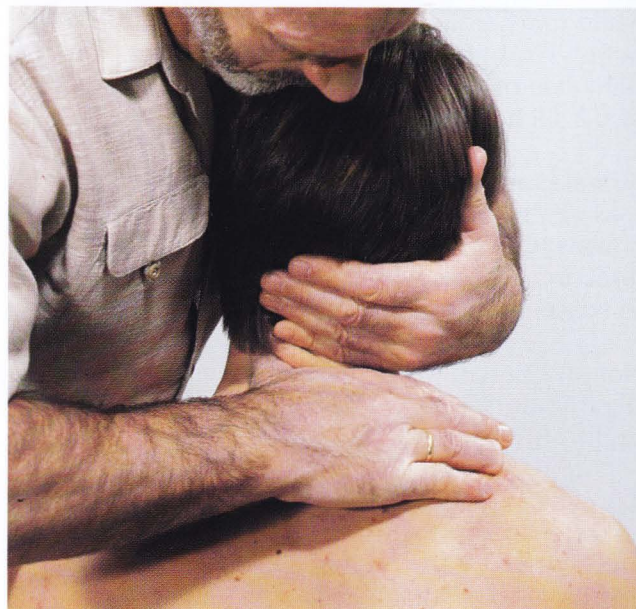
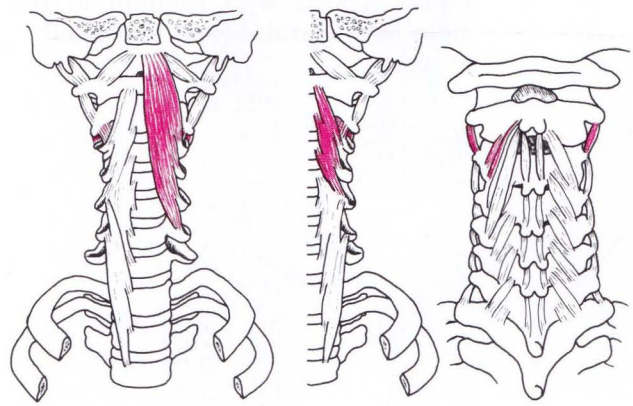


Fig. 46 b. Final Position.

- 3.6.2D. Specific technique to increase **dorsal flexion** with **rotation** and **lateral flexion to the right** of C2 on C3.
P supine.
 (T “working” specifically on the **left** side of C2).



Starting Position: P: Supine; head beyond end of couch with C3 positioned at couch edge; shoulders and thorax may be stabilized with a belt. T: Standing at head of couch, to the right of P’s head.

Grip: T’s left index finger lies along the spinous and articular processes on the left side of P’s axis (C2). T’s left wrist and forearm support P’s head against the left side of T’s abdomen. T’s right index finger stabilizes the spinous and articular processes on the left side of C3. T’s right thumb stabilizes the inferior articular process on the right side of C3 (so the thumb does not hinder the dorsal-caudal glide of the right C2 facet).

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body and P’s head to gradually and fully *dorsally flex* while *rotating* and *laterally flexing* C2 on C3 to the right. T’s left index finger, “working” on the left side of C2, pulls the left articular process of C2 slightly ventrally.

Stimulation of Antagonists: T retains grip, and asks P to look to the right, rearwards and downwards, and to move his/her head in the direction just stretched. T resists that movement to stimulate P’s antagonists.

Notes: When moving the left articular facet of C2 slightly ventrally, the right articular facet moves slightly dorsally.

To avoid compressing the right articular facets, lateral flexion to the right should always be preceded by rotation to the right with the articular facets gliding parallel to one another.

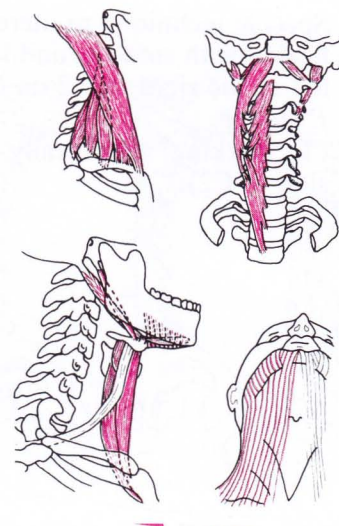


Fig. 47 a. Starting Position.



Fig. 47 b. Final Position.

3.7.1A. Non-specific technique to increase dorsal flexion with rotation to the right and lateral flexion to the left.
P sitting.



Starting Position: P: Sitting; right side of head supported against T's right shoulder and chest. T: Standing facing P's right side.

Grip: P's occiput is fixed between T's right hand, shoulder and chest. T's left hand and forearm stabilize P's left shoulder from the dorsal aspect. P's right shoulder is stabilized against T's abdomen.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* while *rotating to the right* and *laterally flexing* P's cervical spine to the left.

Stimulation of Antagonists: T retains grip, and asks P to look upwards and to the rear and then move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Note: The final position may move the vertebrae into a *locked* position. Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

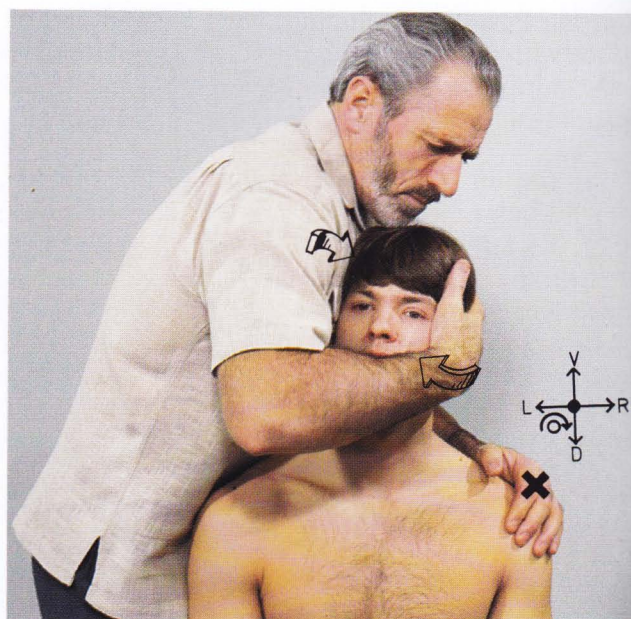


Fig. 48 a. Starting Position.

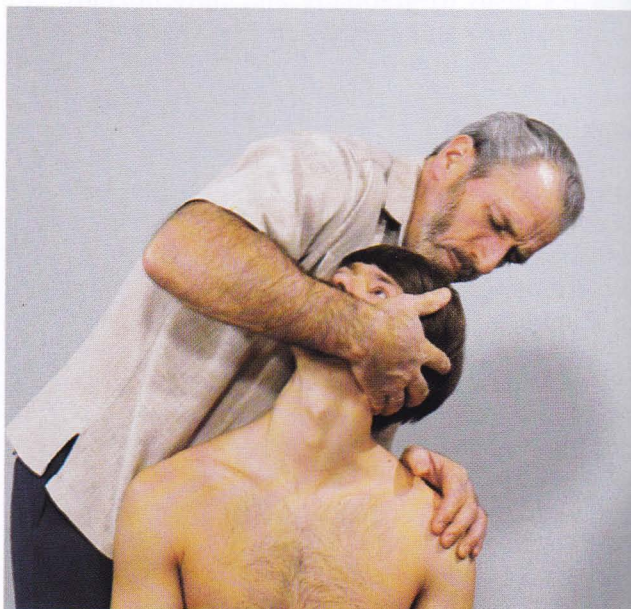
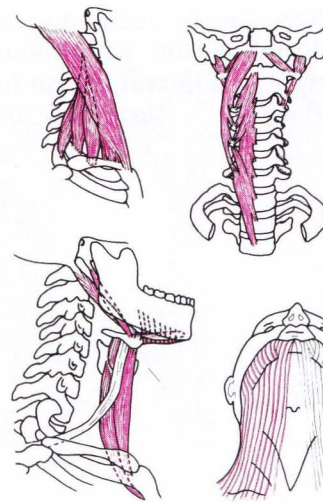


Fig. 48 b. Final Position.

3.7.1B. Non-specific technique to increase dorsal flexion with rotation to the right and lateral flexion to the left.
P supine.



Starting Position: P: Supine; head beyond end of couch with shoulders at couch edge; shoulders and thorax may be stabilized with a belt. T: Standing at head of couch, to the left of P's head.

Grip: T's right hand grips the right side of P's occiput to fix P's head between T's right forearm and chest. T's left hand stabilizes P's left shoulder against the couch.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* while *rotating to the right* and *laterally flexing* P's cervical spine to the left.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the rear, and as much as possible to the right, and then move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: T may find the complex movement of this technique more easily performed using both hands to guide motion; see technique 3.7.1C, p. 66.

The final position may move the vertebrae into a *locked* position.

Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

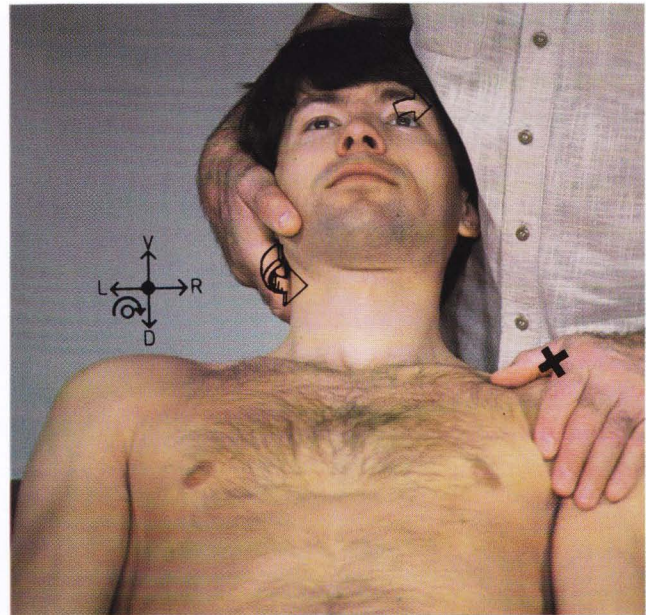
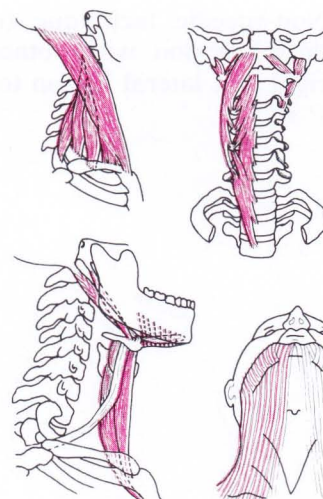


Fig. 49 a. Starting Position.



Fig. 49 b. Final Position.

3.7.1C. Non-specific technique to increase dorsal flexion with rotation to the right and lateral flexion to the left.
P supine. Alternative grip.



Starting Position: P: Supine; head and neck beyond end of couch with shoulders at couch edge; shoulders and thorax stabilized with a belt. T: Standing at head of couch.

Grip: T's right hand grips P's occiput, with wrist and forearm supporting P's head against T's chest. T's left hand grips P's chin (without pressing on the larynx).

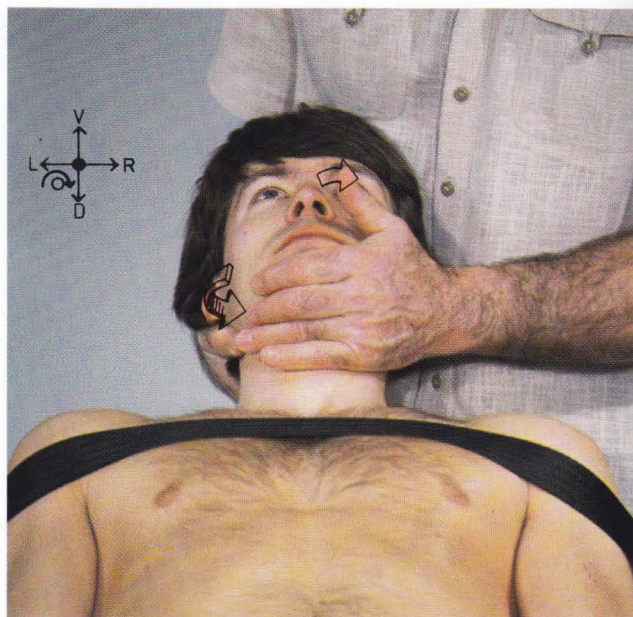


Fig. 50 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *dorsally flex* while *rotating to the right* and *laterally flexing* P's cervical spine *to the left*.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the rear, and as much as possible to the right, and then move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Note: The final position may move the vertebrae into a *locked* position.

Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

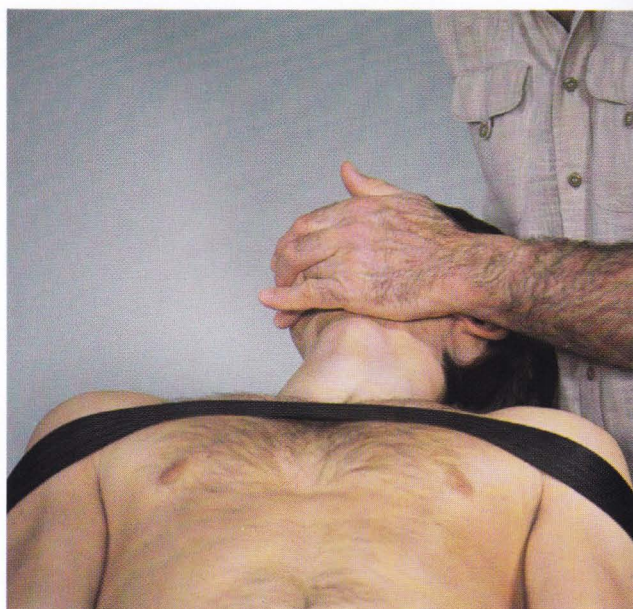


Fig. 50 b. Final Position.

3.7.2A1. Specific technique to increase **dorsal flexion** with **rotation to the right** and **lateral flexion to the left** of C2 on C3.
P sitting. Ventral view; see 3.7.2A2 for dorsal view.
 (T “working” specifically on the left side of C2).

Starting Position: P: Sitting; right side of head supported against T’s right shoulder and chest. T: Standing facing P’s right side.

Grip: T’s right hand grips the left side of P’s occiput, stabilizing P’s head against T’s chest and shoulder. T’s right little finger lies along the spinous and left articular and transverse processes of P’s axis (C2) from the dorsal aspect, parallel to the articular facets between C2 and C3. T’s left index finger stabilizes the spinous and articular processes on the left side of C3. T’s left thumb stabilizes the **inferior** articular process on the right side of C3 (so the thumb does not hinder the dorsal glide of the right articular facet of C2 on C3).

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually but **not fully dorsally flex** while fully *rotating to the right* and *laterally flexing C2 on C3 to the left*. T’s right little finger, “working” on the left side of C2, pulls the left articular process of C2 slightly ventrally.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the right, and rearwards, and then move his/her head in the direction just stretched. T resists that movement to stimulate P’s antagonists.

Notes: When moving the **left** articular facet of C2 slightly ventrally, the **right** articular facet moves slightly dorsally.

When the cervical spine is dorsally flexed, rotated to the right and laterally flexed to the left, **locking** results. Therefore, T must be able to interpret the various types of end feel, see section 1.6.3, p. 9.

The final position may move the vertebrae into a **locked** position.

Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

The following technique, 3.7.2A2, p. 68 is a dorsal view of the same procedure.

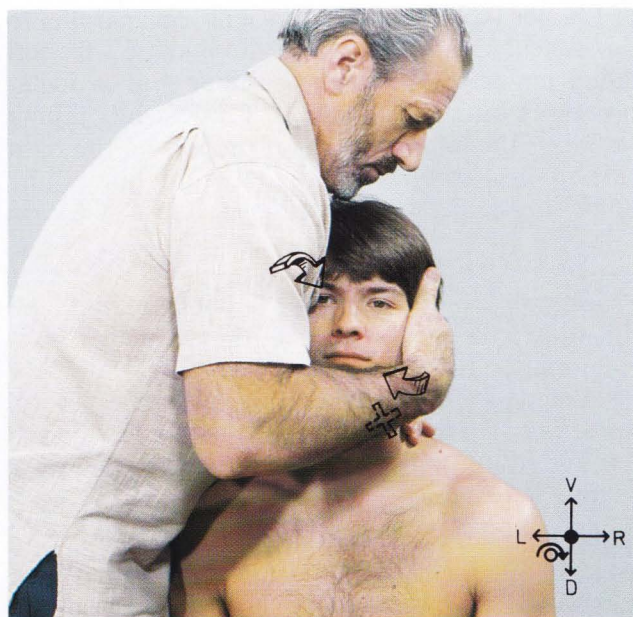
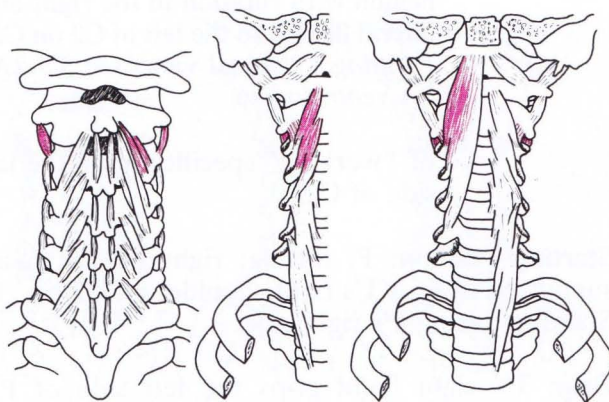


Fig. 51 a. Starting Position.

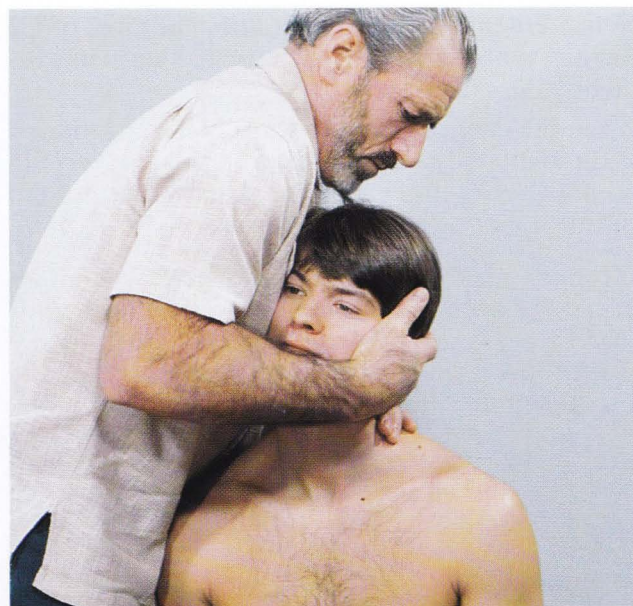


Fig. 51 b. Final Position.

3.7.2A2. Specific technique to increase **dorsal flexion** with **rotation to the right** and **lateral flexion to the left** of C2 on C3. *P sitting. Dorsal view; see 3.7.2A1 for ventral view.*

(T “working” specifically on the **left** side of C2).

Starting Position: P: Sitting; right side of head supported against T’s right shoulder and chest. T: Standing facing P’s right side.

Grip: T’s right hand grips the left side of P’s occiput, stabilizing P’s head against T’s chest and shoulder. T’s right little finger lies along the spinous and left articular and transverse processes of P’s axis (C2) from the dorsal aspect, parallel to the articular facets between C2 and C3. T’s left index finger stabilizes the spinous and articular processes on the left side of C3. T’s left thumb stabilizes the **inferior** articular process on the right side of C3 (so the thumb does not hinder the dorsal glide of the right articular facet of C2 on C3).

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually but **not** fully *dorsally flex* while fully *rotating to the right* and *laterally flexing C2 on C3 to the left*. T’s right little finger, “working” on the left side of C2, pulls the left articular process of C2 slightly ventrally.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the right, and rearwards, and then move his/her head in the direction just stretched. T resists that movement to stimulate P’s antagonists.

Notes: When moving the **left** articular facet of C2 slightly ventrally, the right articular facet moves slightly dorsally.

When the cervical spine is dorsally flexed, rotated to the right and laterally flexed to the left, *locking* results. Therefore, T must be able to interpret the various types of end feel, see section 1.6.3, p. 9.

The final position may move the vertebrae into a *locked* position.

Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

The previous technique, 3.7.2A1, p. 67 is a ventral view of the same procedure.

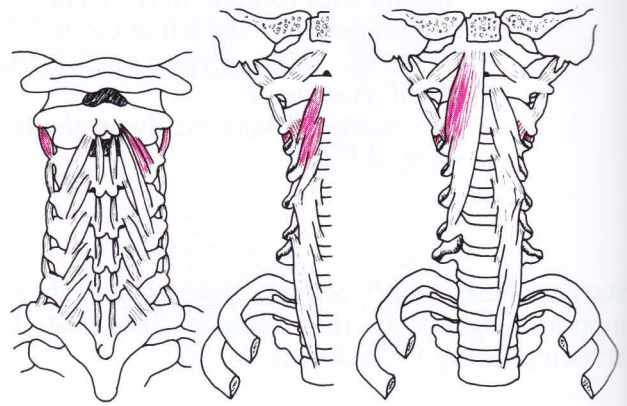


Fig. 52 a. Starting Position.



Fig. 52 b. Final Position.

3.7.2B. Specific technique to increase **dorsal flexion** with **rotation to the right** and **lateral flexion to the left** of C2 on C3. *P supine.*

(T “working” specifically on the **left** side of C2).

Starting Position: P: Supine; head beyond end of couch with C3 at couch edge; shoulders and thorax may be stabilized with a belt. T: Standing at head of couch to the right of P’s head.

Grip: T’s left index finger lies along the spinous, articular and transverse processes on the left side of P’s axis (C2) from the dorsal aspect. T’s left wrist and forearm support P’s head against the left side of T’s abdomen. The radial aspect of T’s right index finger stabilizes the right transverse process and the right inferior articular processes of C3. Or, for greater stability and ease of grip, T’s right index finger stabilizes the left side of the spinous process and the left inferior articular processes of C3, and T’s right thumb stabilizes the right inferior articular process and the right transverse process of C3. T’s right index finger or right thumb should not hinder the dorsal glide of the right C2 facet on C3.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually, but **not fully dorsally flex** while fully *rotating to the right* and *laterally flexing C2 on C3 to the left*. T’s left index finger, “working” on the left side of C2, pulls the left articular process of C2 slightly ventrally.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the right, and rearwards, and then move his/her head further in the direction just stretched. T resists that movement to stimulate P’s antagonists.

Notes: When moving the **left** articular facet of C2 slightly ventrally, the **right** articular facet moves slightly dorsally.

The final position may move the vertebrae into a *locked* position.

Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

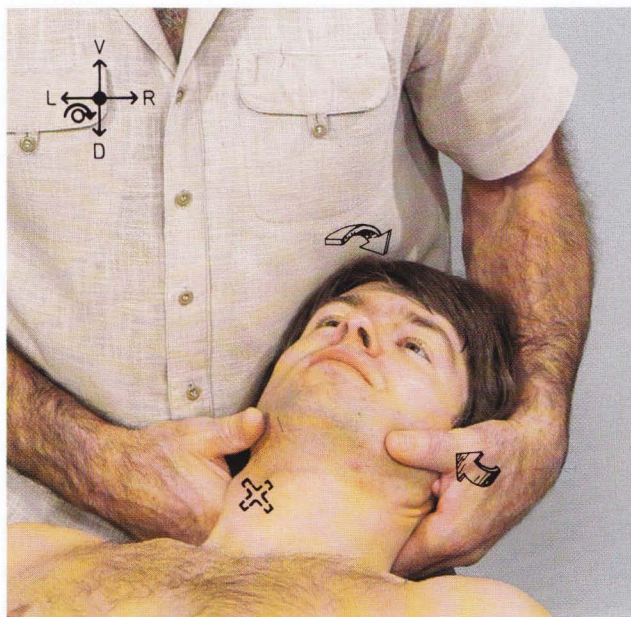
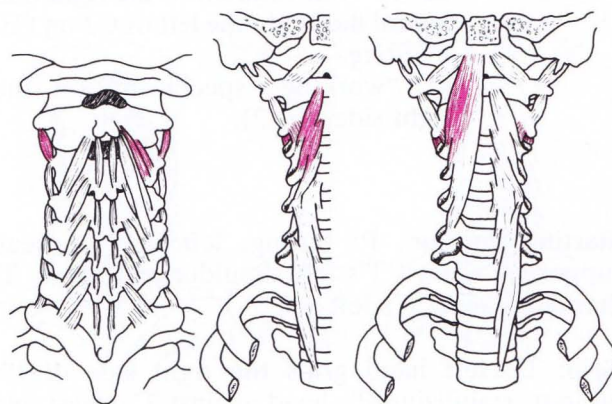


Fig. 53 a. Starting Position.

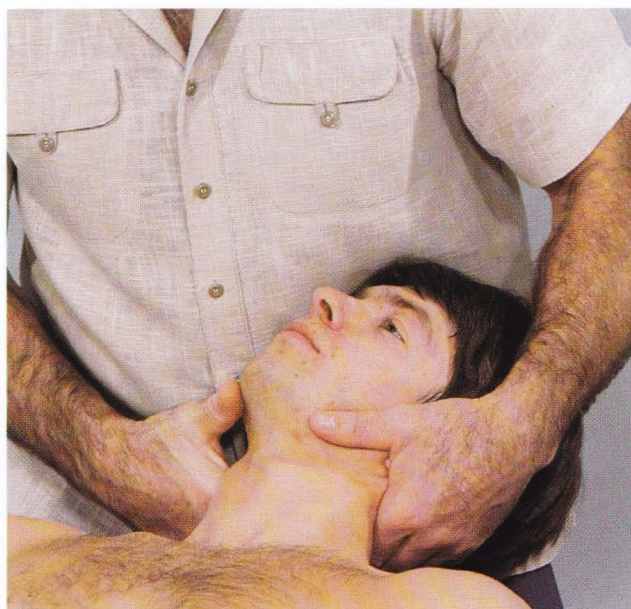


Fig. 53 b. Final Position.

3.7.2C. Specific technique to increase dorsal flexion with rotation to the right and lateral flexion to the left of C2 on C3.
P sitting.
 (T “working” specifically on the right side of C2).

Starting Position: P: Sitting; left side of head supported against T’s left shoulder and chest. T: Standing facing P’s left side.

Grip: T’s left hand grips the right side of P’s occiput, stabilizing P’s head against T’s chest and shoulder. T’s left little finger lies along the spinous and right articular processes of P’s axis (C2), parallel to the articular facets between C2 and C3. To prevent C3 from rotating to the right, T’s right index finger stabilizes the right inferior articular process of C3 from the dorsal aspect (so that it does not hinder the dorsal glide of the right C2 facet). For the same reason, T’s right thumb stabilizes the left side of the spinous process of C3, thus also preventing it from rotating to the right.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually but **not** fully dorsally flex while fully rotating to the right and laterally flexing C2 on C3 to the left. T’s left little finger, “working” on the right side of C2, pushes the right articular process of C2 slightly dorsally.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the right, and rearwards, and then move his/her head further in the direction just stretched. T resists that movement to stimulate P’s antagonists.

Notes: When moving the **right** articular facet of C2 slightly dorsally, the **left** articular facet moves slightly ventrally.

When the cervical spine is dorsally flexed, rotated to the right and laterally flexed to the left, *locking* results. Therefore, T must be able to interpret the various types of end feel, see section 1.6.3, p. 9.

The final position may move the vertebrae into a *locked* position.

Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

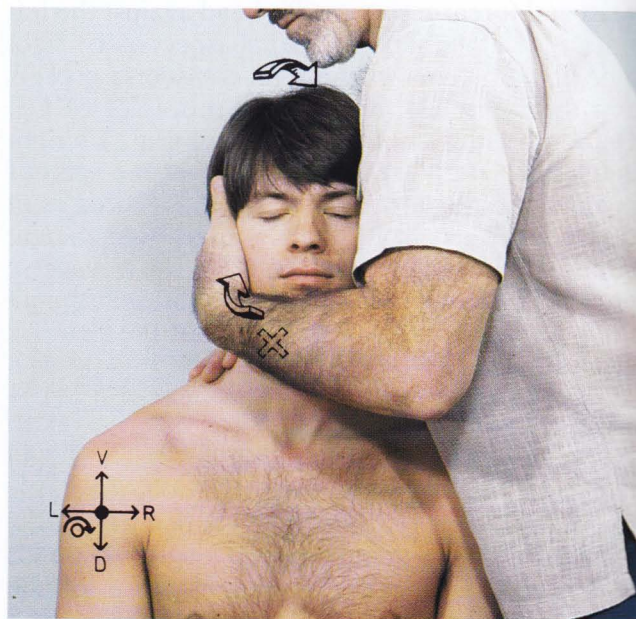
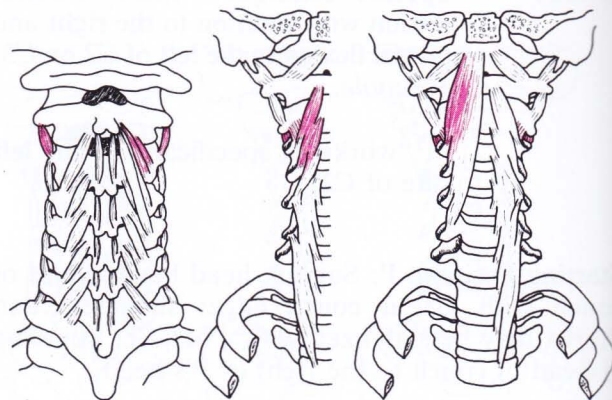


Fig. 54 a. Starting Position.

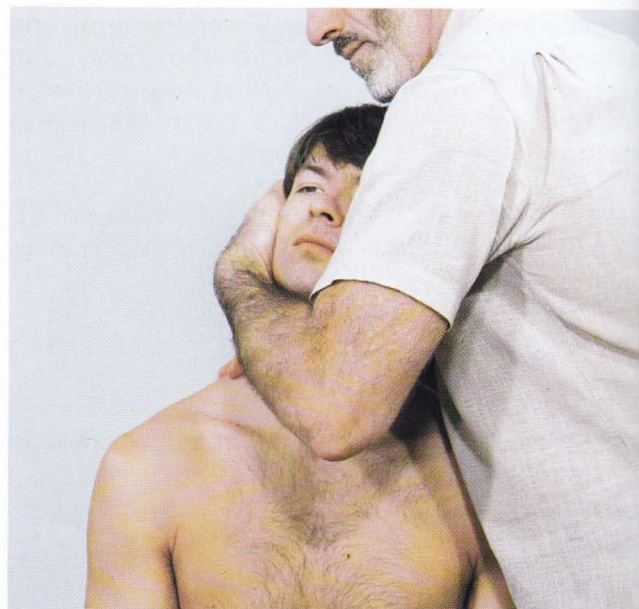
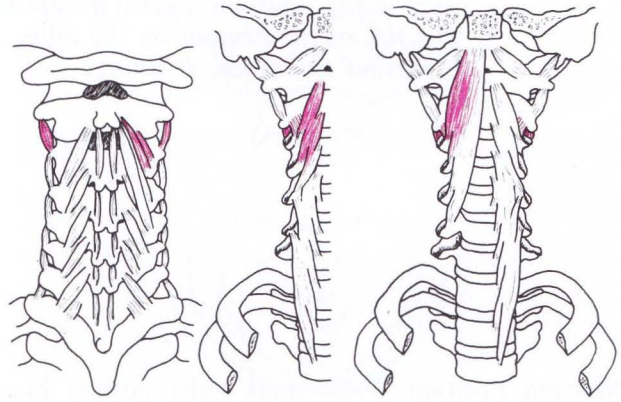


Fig. 54 b. Final Position.

3.7.2D. Specific technique to increase **dorsal flexion** with **rotation to the right** and **lateral flexion to the left** of C2 on C3. *P supine.*

(T “working” specifically on the **right side** of C2).



Starting Position: P: Supine; head beyond end of couch with C3 positioned at couch edge; shoulders and thorax may be stabilized with a belt. T: Standing at head of couch, to the left of P’s head.

Grip: T’s right index finger lies along the spinous and articular processes on the right side of P’s axis (C2) from the dorsal aspect. T’s right wrist and forearm support P’s head against the right side of T’s abdomen. The radial aspect of T’s left index finger stabilizes the spinous and articular processes on the left side of C3, preventing it from rotating to the right.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually but **not** fully *dorsally flex* while fully *rotating to the right* and *laterally flexing C2 on C3 to the left*. T’s right index finger, “working” on the right side of C2, pushes the right articular process of C2 slightly dorsally.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the right, and rearwards, and then move his/her head further in the direction just stretched. T resists that movement to stimulate P’s antagonists.

Notes: When moving the **right** articular facet of C2 slightly dorsally, the **left** articular facet moves slightly ventrally.

The final position may move the vertebrae into a *locked* position.

Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

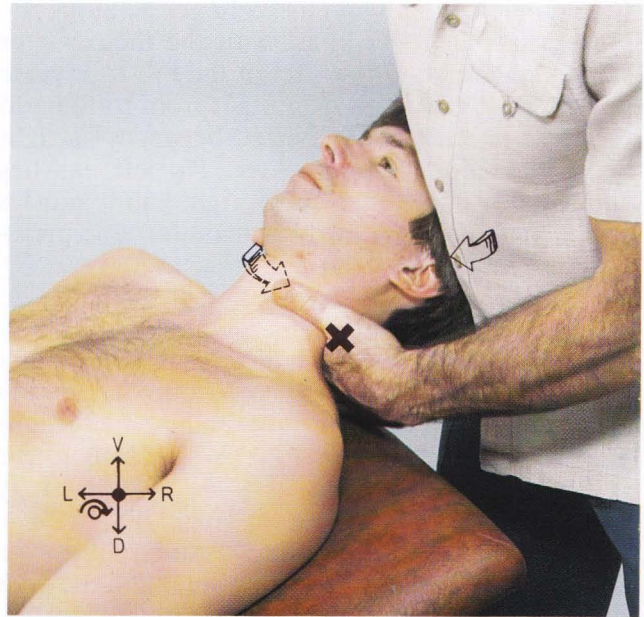


Fig. 55 a. Starting Position.

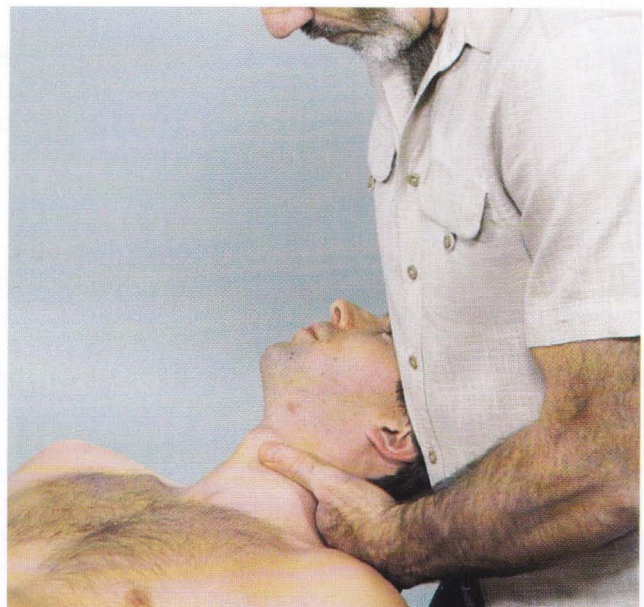
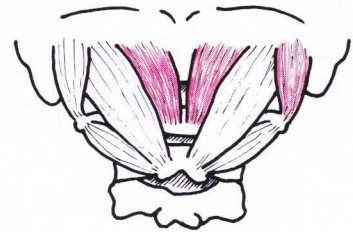
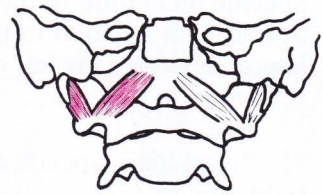


Fig. 55 b. Final Position.

3.8.1A. Specific technique to increase rotation to the right and lateral flexion to the left of the occiput on the atlas
Traction technique. P sitting.



Starting Position: P: Sitting; right side of head supported against T's right shoulder and chest. T: Standing facing P's right side.

Grip: T's left thumb and index finger lie along the posterior arch of P's atlas, with the index finger stabilizing the ventral aspect of the left transverse process of P's atlas, preventing it from rotating to the right. P's head is stabilized between T's right hand and chest and shoulder. P's left ear lies comfortably in the palm of T's right hand, and T's arm is positioned to prevent uncomfortable pressure on P's mandible.

Procedure: (Traction is the only treatment modality of this technique. The procedure comprises two steps.) **Step one:** Using this grip, T positions P's occiput on the atlas into full *rotation to the right* and *lateral flexion to the left* by fully stretching the tissues.

Step two: Maintaining this position, T applies maximal *traction* between the occiput and the atlas by moving his/her body together with P's head. These steps are repeated until considerable improvement is attained.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the right, and rearwards, and then move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: Step two is the key part of the procedure, as further rotation to the right and lateral flexion to the left depend on traction.

This technique is the gentlest and safest of the Section 3.8.1 techniques.

Biomechanically, restricted rotation of the atlas on the axis or of the axis (C2) on C3 may also restrict rotation and lateral flexion between the occiput and the atlas. If so, then these restricted movements must be treated first.

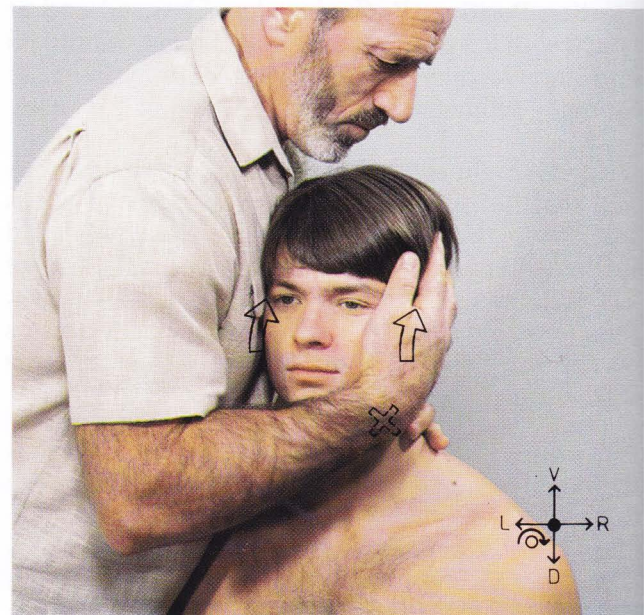


Fig. 56 a. Starting Position.

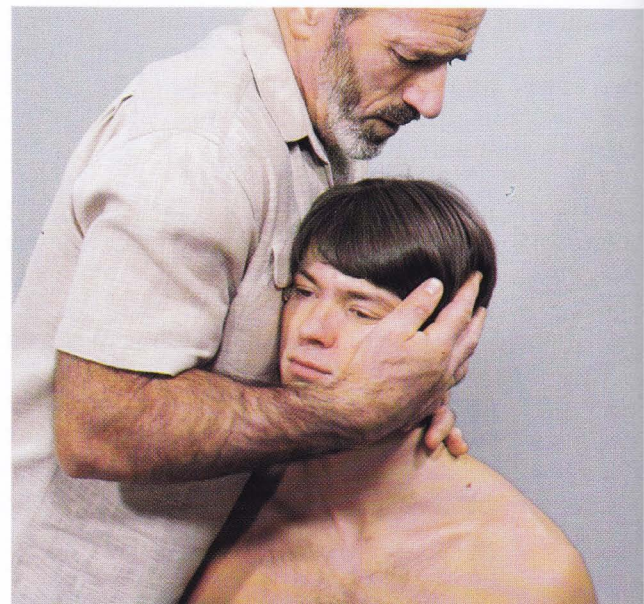
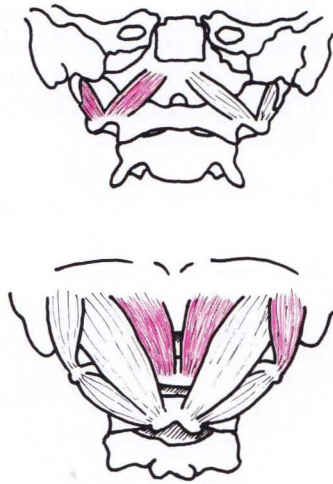


Fig. 56 b. Final Position.

3.8.1B1. Specific technique to increase rotation to the right and lateral flexion to the left of the occiput on the atlas.
P sitting. Ventral view; see 3.8.1B2 for dorsal view.



Starting Position: P: Sitting; right side of head supported against T's right shoulder and chest. T: Standing facing P's right side.

Grip: The tip of T's left index finger stabilizes the ventral aspect of the left transverse process of P's atlas, preventing it from rotating to the right. The rest of T's left index finger and thumb lie along the posterior arch of P's atlas. T's right hand grips the left side of P's occiput, stabilizing P's head against T's chest and right shoulder. P's left ear should lie comfortably in the palm of T's right hand, and T's arm should be positioned to prevent uncomfortable pressure on P's mandible.

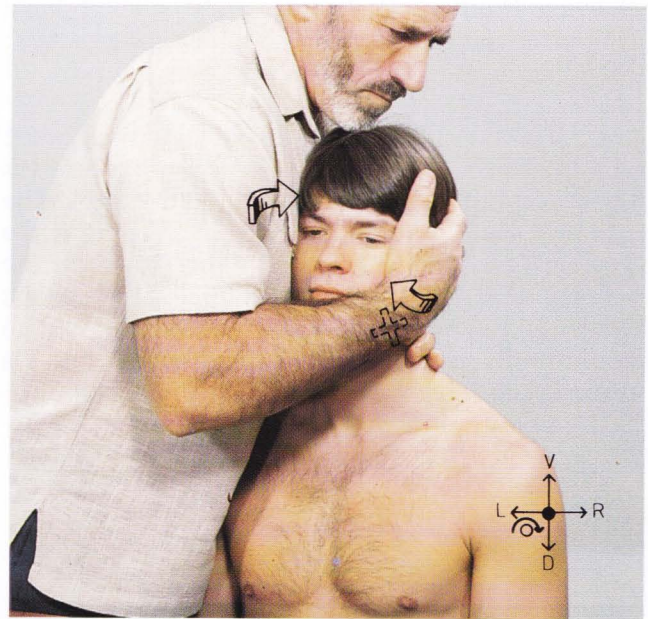


Fig. 57 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully rotate to the right and laterally flex P's occiput on the atlas to the left. T stabilizes P's atlas from the ventral aspect with the left index finger and from the dorsal aspect with the left thumb, thus allowing the occipital condyles to glide and rotate to the right on the atlas.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the right, and rearwards, and then move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Note: The following technique, 3.8.1B2, p. 74 is a dorsal view of the same procedure.

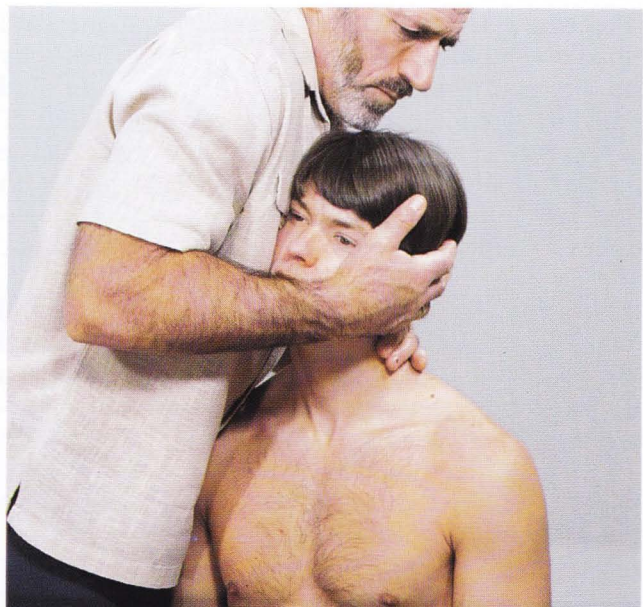
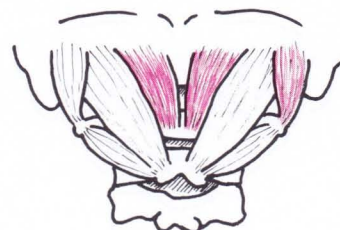
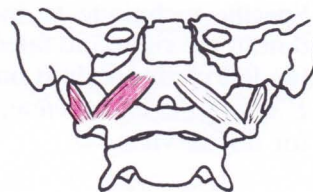


Fig. 57 b. Final Position.

3.8.1B2. Specific technique to increase rotation to the right and lateral flexion to the left of the occiput on the atlas.
P sitting. Dorsal view; see 3.8.1B1 for ventral view.



Starting Position: P: Sitting; right side of head supported against T's right shoulder and chest. T: Standing facing P's right side.

Grip: The tip of T's left index finger stabilizes the ventral aspect of the left transverse process of P's atlas, preventing it from rotating to the right. The rest of T's left index finger and thumb lie along the posterior arch of P's atlas. T's right hand grips the left side of P's occiput, stabilizing P's head against T's chest and right shoulder. P's left ear should lie comfortably in the palm of T's right hand, and T's arm should be positioned to prevent uncomfortable pressure on P's mandible.

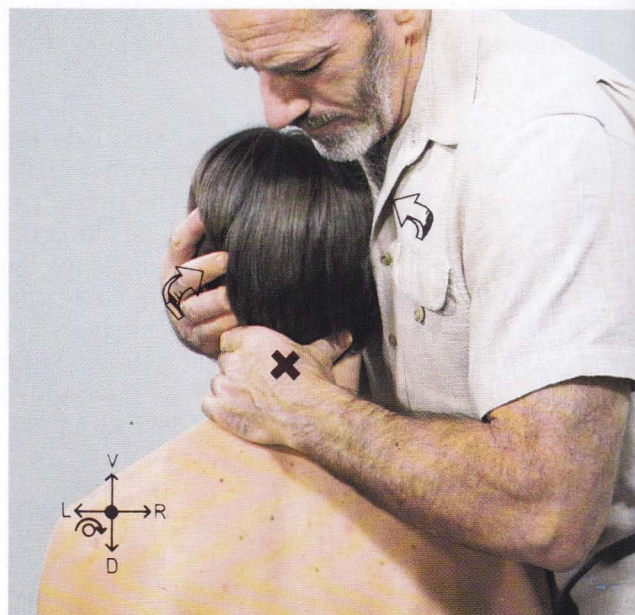


Fig. 58 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully rotate to the right and laterally flex P's occiput on the atlas to the left. T stabilizes P's atlas from the ventral aspect with the left index finger and from the dorsal aspect with the left thumb, thus allowing the occipital condyles to glide and rotate to the right on the atlas.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the right, and rearwards, and then move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Note: The previous technique, 3.8.1B1, p. 73 is a ventral view of the same procedure.

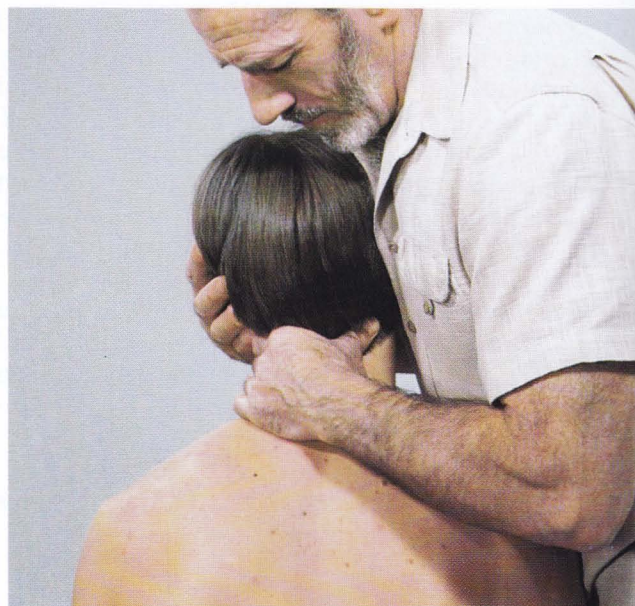
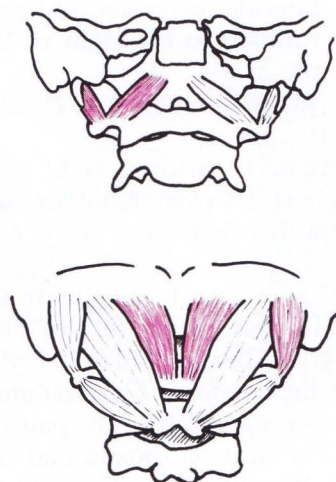


Fig. 58 b. Final Position.

3.8.1C. Specific technique to increase rotation to the right and lateral flexion to the left of the occiput on the atlas.
P supine.



Starting Position: P: Supine; head beyond end of couch with the atlas positioned at couch edge; shoulders and thorax may be stabilized with a belt. T: Standing at head of couch, to the right of P's head.

Grip: The tip of T's right index finger stabilizes the ventral aspect of the left transverse process of P's atlas, preventing it from rotating to the right. The rest of T's right index finger and thumb lie along the posterior arch of P's atlas. T's left hand grips the left side of P's occiput, stabilizing P's head against T's chest and left shoulder. P's left ear should lie comfortably in the palm of T's left hand, and T's arm should be positioned to prevent uncomfortable pressure on P's mandible.

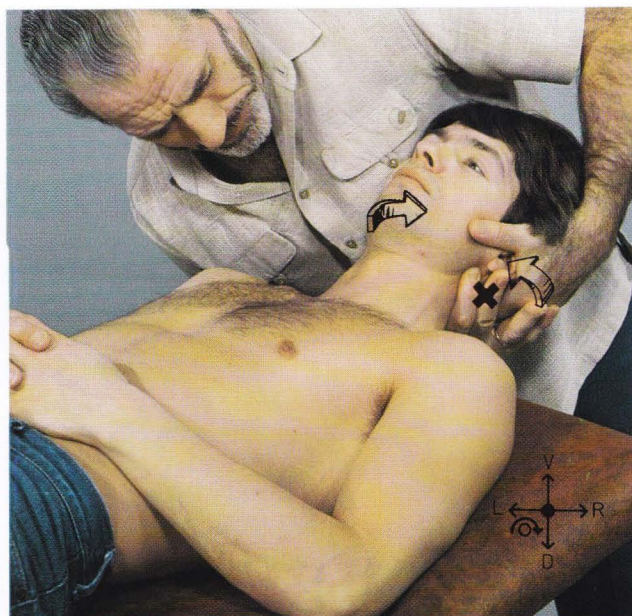


Fig. 59 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, gradually and fully *rotates to the right and laterally flexes* P's occiput on the atlas *to the left*. T stabilizes P's atlas from the ventral aspect with the right index finger and from the dorsal aspect with the right thumb, thus allowing the occipital condyles to glide and rotate to the right on the atlas.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the right, and rearwards, and then move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Note: This technique (with P supine) is among the more difficult for therapists to master. Therefore, it is best to use the previous techniques, 3.8.1A and 3.8.1B, pp. 73 and 74, with P sitting, whenever possible, because of their simplicity and effectiveness.

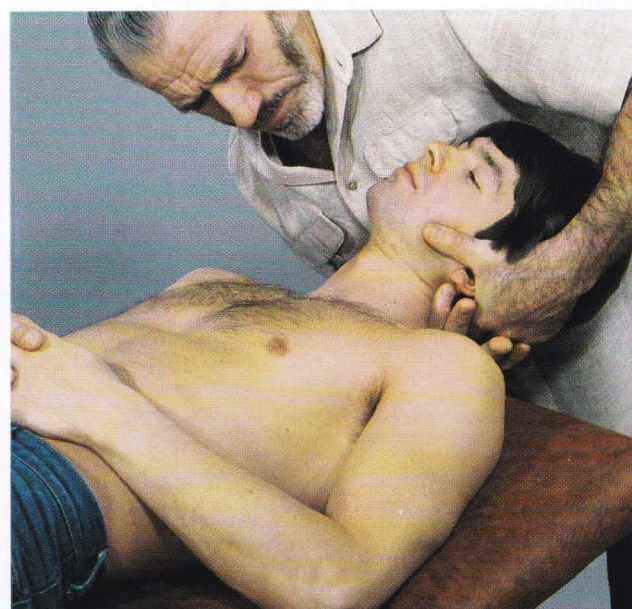


Fig. 59 b. Final Position.

3.9.1A. Specific technique to increase rotation to the right of the atlas on the axis
Traction technique; *P* sitting.

Starting Position: *P*: Sitting; right side of head supported against *T*'s right shoulder and chest. *T*: Standing facing *P*'s right side.

Grip: *T*'s left index finger and thumb stabilize *P*'s axis, preventing it from rotating to the right. *T*'s right hand grips the left side of *P*'s occiput, stabilizing *P*'s head against *T*'s chest and shoulder. *P*'s left ear lies comfortably in the palm of *T*'s right hand, and *T*'s arm is positioned to prevent discomfort to *P*'s mandible. *T*'s right little finger lies along the posterior arch of *P*'s atlas.

Procedure: (*Traction* is the *only* treatment modality of this technique. The procedure comprises two steps.) **Step one:** Using this grip, *T* positions *P*'s occiput and the atlas in full *rotation to the right* (and a slight lateral flexion to the left), thus fully stretching the tissues.

Step two: Maintaining this position, *T* applies *traction* between *P*'s atlas and the axis by moving his/her body together with *P*'s head. These steps are repeated until considerable improvement is attained.

Stimulation of Antagonists: *T* retains grip, and asks *P* to look upwards, to the right, and rearwards, and then move his/her head further in the direction just stretched. *T* resists that movement to stimulate *P*'s antagonists.

Notes: The transverse ligament of the atlas may be pathologically weakened. If so, it must not be strained in treating. *T* prevents strain by using right shoulder to push *P*'s head dorsally, applying more force than when rotating with the right hand. This moves *P*'s atlas dorsally. By simultaneously pressing C2 ventrally, *T* can press the odontoid process (dens) against the anterior arch of the atlas, preventing pressure on the transverse ligament.

Step two is the key part of the procedure, as further rotation to the right depends on **traction**. With slight lateral flexion to the left, the rotation to the right also increases, which prevents the joints from being compressed.

The atlas on the axis is the most vulnerable segment of the cervical spine. Using this safe, gentle technique and slight, gentle forces when rotating, minimizes the risk of therapist error.

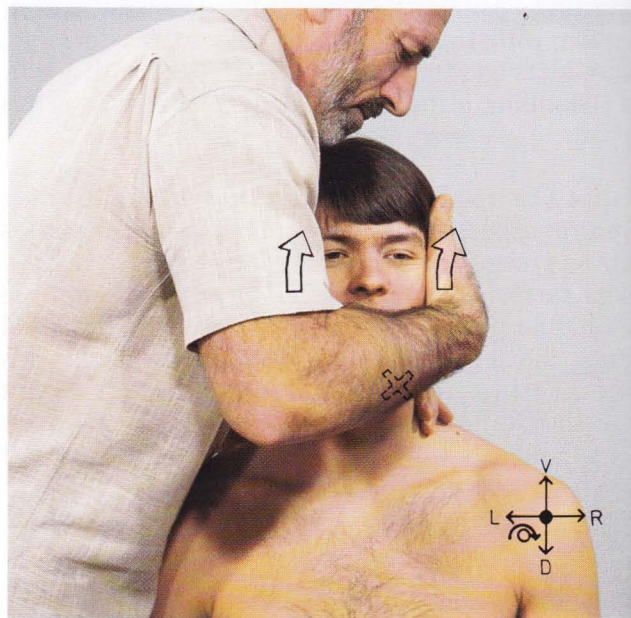
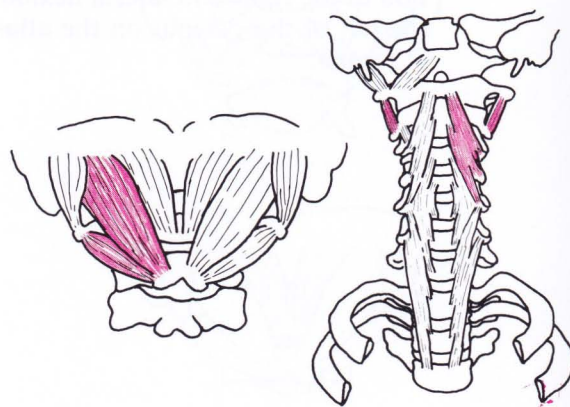


Fig. 60 a. Starting Position.



Fig. 60 b. Final Position.

3.9.1B. Specific technique to increase rotation to the right of the atlas on the axis.

Traction technique; P supine.

Starting Position: P: Supine; head beyond end of couch with the axis positioned at couch edge; shoulders and thorax may be stabilized with a belt. T: Standing at head of couch to the right of P's head.

Grip: T's right index finger and thumb stabilize P's axis, preventing it from rotating to the right. T's left hand grips the left side of P's occiput, stabilizing P's head against T's chest and abdomen. P's left ear should lie comfortably in the palm of T's left hand, with T's arm positioned to avoid discomfort to P's mandible. The radial side of T's left index finger lies along the posterior arch and transverse process on the left side of P's atlas.

Procedure: (*Traction is the only treatment modality of this technique. The procedure comprises two steps.*) **Step one:** Using this grip, T positions P's occiput and the atlas in full rotation to the right (and a slight lateral flexion to the left), thus fully stretching the tissues.

Step two: Maintaining this position, T applies traction between P's atlas and the axis by moving his/her body together with P's head. These steps are repeated until considerable improvement is attained.

Stimulation of Antagonists: T retains grip, and asks P to look upwards, to the right, and rearwards, and then move his/her head further in the direction just stretched. T resists that movement to stimulate P's antagonists.

Notes: The transverse ligament of the atlas may be pathologically weakened. If so, it must not be strained in treating. T prevents strain by using left shoulder to push P's head dorsally, applying more force than when rotating with left hand. This moves P's atlas dorsally. By simultaneously pressing C2 ventrally, T can press the odontoid process (dens) against the anterior arch of the atlas, preventing pressure on the transverse ligament.

Step two is the key part of the procedure, as further rotation to the right depends on **traction**. With slight lateral flexion to the left, the rotation to the right also increases, which prevents the joints from being compressed.

The atlas on the axis is the most vulnerable segment of the cervical spine. Using this safe, gentle technique and slight, gentle forces when rotating, minimizes the risk of therapist error.

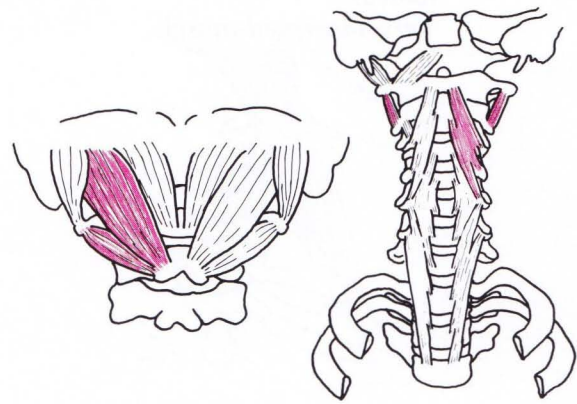
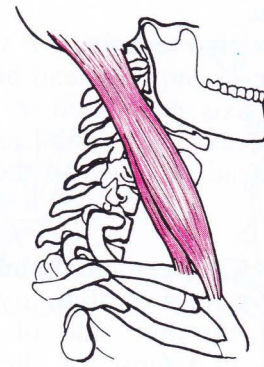


Fig. 61 a. Starting Position.



Fig. 61 b. Final Position.

3.10.1A. Therapy for the **sternocleidomastoideus**.
Very shortened muscle.



Starting Position: P: Supine; head and neck beyond end of couch; shoulders positioned at couch edge; shoulders and thorax stabilized with a belt.

T: Standing at head of couch.

Grip: T's hands grip P's head, so that P's ears lie comfortably against T's palms with T's fingers gripping P's mastoid processes.

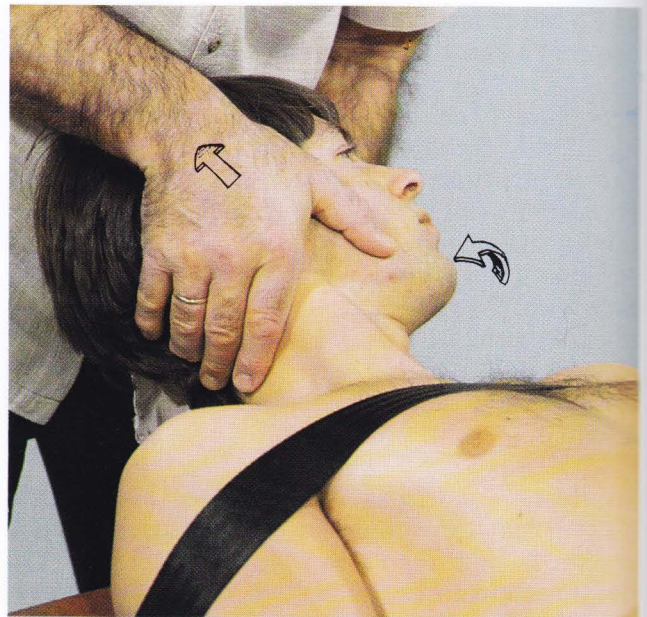


Fig. 62 a. Starting Position.

Procedure: Step one: Using this grip, T positions P's head in full ventral flexion, rotation to the left and lateral flexion to the right (or the position where P can easily feel the tension in the shortened muscle).

Step two: T applies **traction** while gradually moving P's head and neck to the neutral position.

Stimulation of Antagonists: T retains grip, and asks P to look to the right, and then move his/her head in the direction just stretched. T resists that movement to stimulate P's antagonists.

Note: T should "work" primarily with right hand.

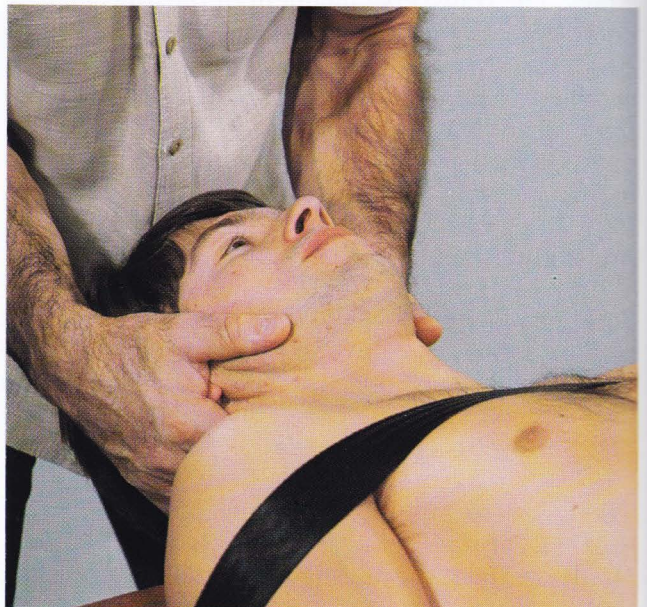
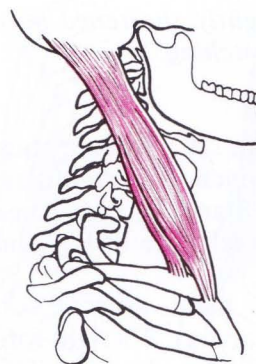


Fig. 62 b. Final Position.

3.10.1B. Therapy for the **sternocleidomastoideus**.
Moderately shortened muscle.



Starting Position: P: Supine; head and neck beyond end of couch with the shoulders positioned at couch edge; shoulders and thorax stabilized with a belt; head and neck held in the position where P can easily feel the tension in the shortened muscle. T: Standing at head of couch.

Grip: T's hands grip P's head, so that P's ears lie comfortably against T's palms with T's fingers gripping P's mastoid processes.

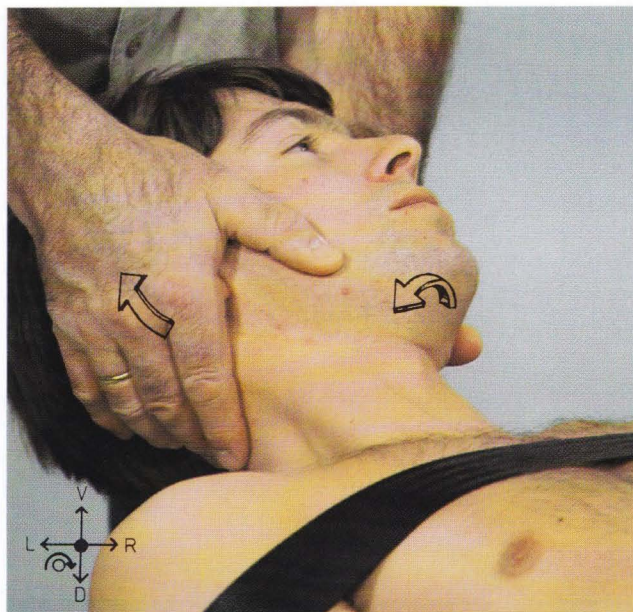


Fig. 63 a. Starting Position.

Procedure: Using this grip, T gradually *rotates to the right* and *laterally flexes P's head to the left* while simultaneously applying traction. (Not to the extreme position).

Stimulation of Antagonists: T retains grip, and asks P to look to the right, and then move his/her head in the direction just stretched. T resists that movement to stimulate P's antagonists.

Note: T should "work" primarily with the right hand.

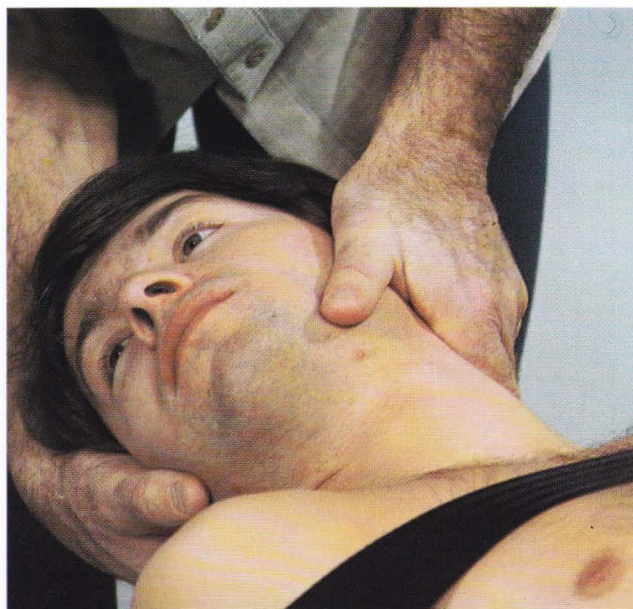


Fig. 63 b. Final Position.

3.10.1C. Therapy for the **sternocleidomastoideus**.

Slightly shortened muscle. Maximal stretching.

Starting Position: P: Supine; head and neck beyond end of couch with shoulders positioned at couch edge. T: Standing at the head end of the couch facing the left side of P's head.

Grip: T's right hand grips P's chin (without pressing on the larynx). T's right forearm supports the right side of P's head against T's chest. T's left hand is placed over P's right sternoclavicular joint and manubrium sterni.

Procedure: Step one: Using this grip, T positions P's occiput and atlas in ventral and lateral flexion to the left. The rest of P's cervical spine is then positioned in dorsal flexion, lateral flexion to the left and rotation to the right.

Step two: T then asks P to exhale while he/she presses P's sternum and right clavicle caudally and dorsally. T then applies *traction* to P's cervical spine, and moves his/her body together with P's head. Step two is repeated until considerable improvement is achieved.

Stimulation of Antagonists: T moves left hand to the left side of P's occiput, with the index finger hooked on P's mastoid process. T then asks P to look to the right, rearwards, and upwards, and then move his/her head further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Notes: It is important with this technique that P exhales as T stretches and inhales while resisting.

The final position may move the vertebrae into a *locked* position.

Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

Therapy for the **sternocleidomastoideus** should start with technique 3.10.1A, p. 78, because P can easily feel which muscle is being treated. Even if P's sternocleidomastoideus is only moderately shortened, it is advisable to proceed gradually from the technique of 3.10.1A to this procedure, 3.10.1C.

The techniques of 3.10.1 are well suited to treating congenital torticollis.

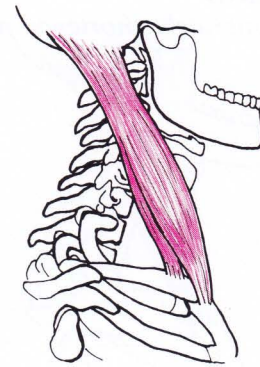


Fig. 64 a. Starting Position.



Fig. 64 b. Final Position.

3.10.2A. Therapy for the scalenus anterior and medius.

Starting Position: P: Supine; head and neck beyond end of couch with shoulders positioned at couch edge. T: Standing at head of couch facing the left side of P's head.

Grip: T's right hand grips the right side of P's head and atlas. T's right forearm supports P's head against the right side of T's chest. T's left thumb is placed just below P's clavicle with the thenar and hypothenar over P's 1st and 2nd ribs.

Procedure: Step one: Using this grip, T positions P's cervical spine in full rotation to the right while also laterally flexed to the left and slightly dorsally flexed.

Step two: T then asks P to exhale while he/she presses P's 1st and 2nd ribs caudally and dorsally. T simultaneously applies *traction* to P's cervical spine, and moves his/her body together with P's head. Step two is repeated until considerable improvement is achieved.

Stimulation of Antagonists: T moves left hand to occiput, with the index finger hooked on P's mastoid process. T then asks P to look to the right, rearwards and upwards, and press head and neck in dorsal flexion. T resists that movement to stimulate P's antagonists.

Notes: It is important that P exhales as T stretches and inhales when resisting.

The final position may move the vertebrae into a *locked* position.

Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

If the movements at the costotransverse and/or costovertebral joints are restricted, T must begin treatment by mobilizing P's 1st rib.

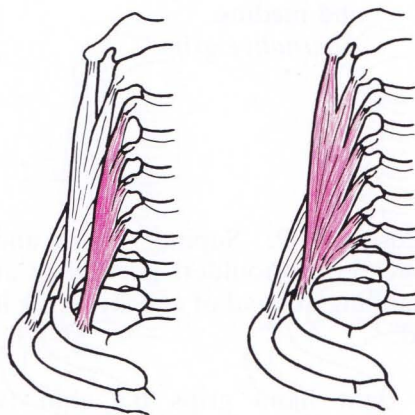


Fig. 65 a. Starting Position.



Fig. 65 b. Final Position.

3.10.2B. Therapy for the scalenus anterior and medius.
Alternative grip.

Starting Position: P: Supine; head and neck beyond couch end; shoulders positioned at couch edge. T: Standing at head of couch, facing left side of P's head.

Grip: T's right hand grips P's chin (without pressing on the larynx). T's right forearm supports the right side of P's head against T's chest. T's left thumb is placed just below P's clavicle with the thenar and hypothenar over P's 1st and 2nd ribs.

Procedure: Step one: Using this grip, T positions P's cervical spine in full rotation to the right while also laterally flexed to the left and slightly dorsally flexed.

Step two: T then asks P to exhale while he/she presses P's 1st and 2nd ribs caudally and dorsally. T simultaneously applies *traction* to P's cervical spine, and moves his/her body together with P's head. Step two is repeated until considerable improvement is attained.

Stimulation of Antagonists: T moves left hand to occiput, with the index finger hooked on P's mastoid process. T then asks P to look to the right, rearwards and upwards, and press head and neck in dorsal flexion. T resists that movement to stimulate P's antagonists.

Notes: It is important that P exhales as T stretches and inhales when resisting.

The final position may move the vertebrae into a *locked* position.

Therefore, T must cautiously use successively smaller forces and movements in approaching the final position.

If the movements at the costotransverse and/or costovertebral joints are restricted, T must begin treatment by mobilizing P's first rib.

The **sternocleidomastoideus** will also be fully stretched if P's occiput is positioned in ventral flexion and laterally flexed to the left.

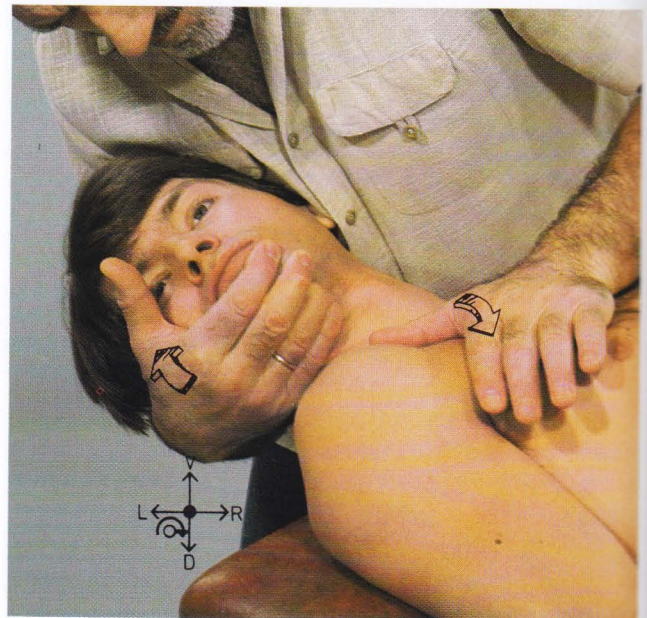
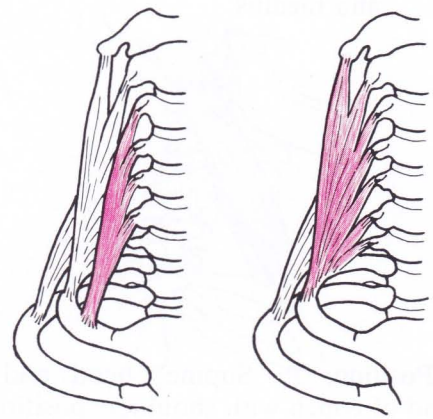


Fig. 66 a. Starting Position.

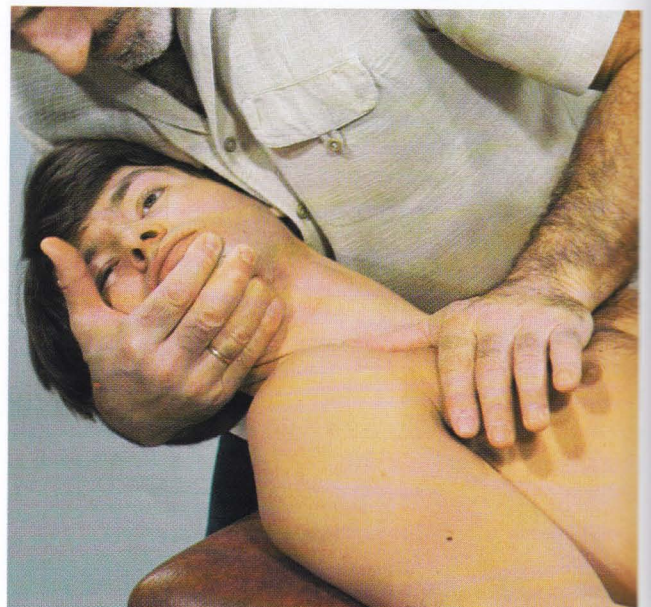
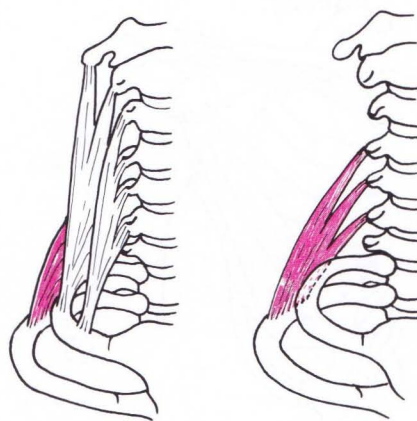


Fig. 66 b. Final Position.

3.10.3. Therapy for the scalenus posterior.



Starting Position: P: Supine; head and neck beyond end of the couch; shoulders and thorax stabilized with a belt. T: Standing at head of couch.

Grip: T's right hand grips P's occiput and upper cervical spine (including the C3 vertebra), with the right wrist and forearm supporting P's head. T's left hand grips P's chin (without pressing on the larynx).

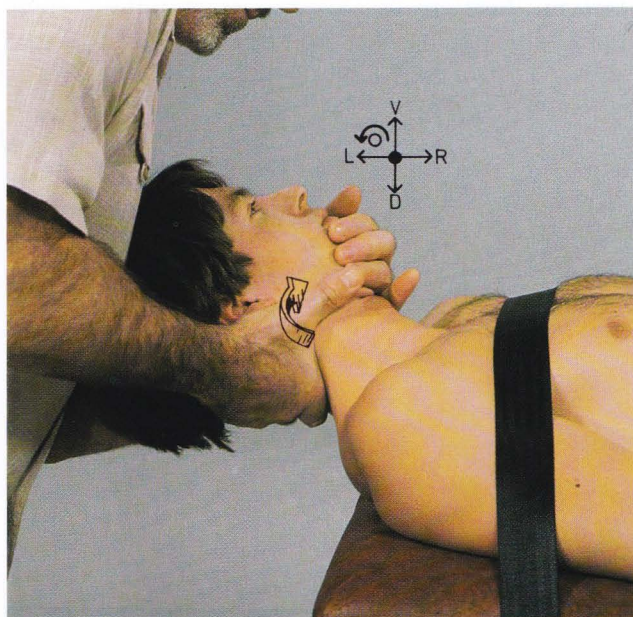


Fig. 67 a. Starting Position.

Procedure: Using this grip, T applies traction, and then maintaining this traction, moves his/her body to gradually and fully *ventrally flex* while *rotating* and *laterally flexing* P's cervical spine *to the left*.

Stimulation of Antagonists: T retains grip, and asks P to look downwards and to the left, and then to move head and neck in the direction just stretched. T resists that movement to stimulate P's antagonists.

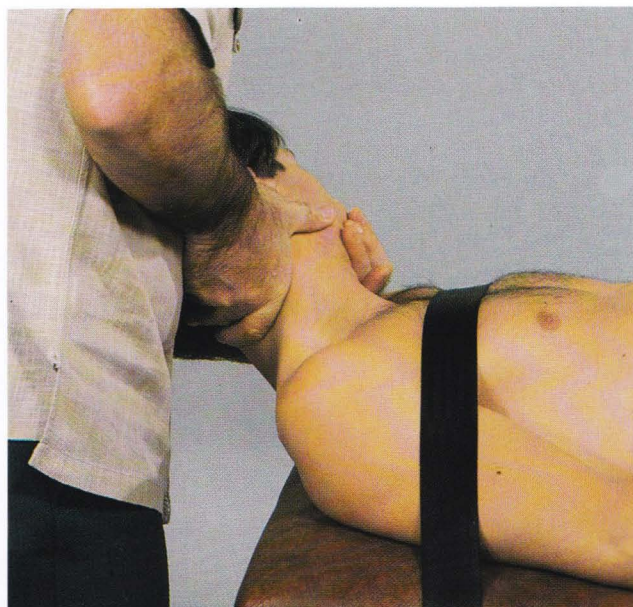
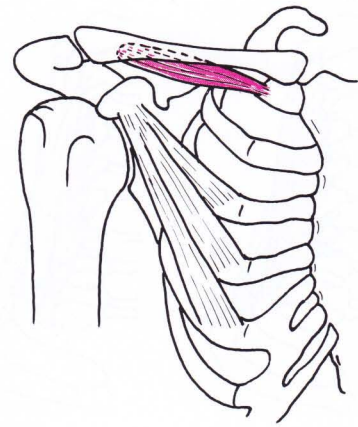


Fig. 67 b. Final Position.

3.10.4A. Therapy for the *subclavius*.
P sitting.



Starting Position: P: Sitting or standing; right upper arm held against side of thorax with elbow flexed. T: Standing slightly behind P, facing P's right side.

Grip: T's right hand grips P's right forearm just below the elbow. T's left hand and forearm support P's left shoulder. P's left side may also be supported against a wall with T using both hands to grip P's right elbow.

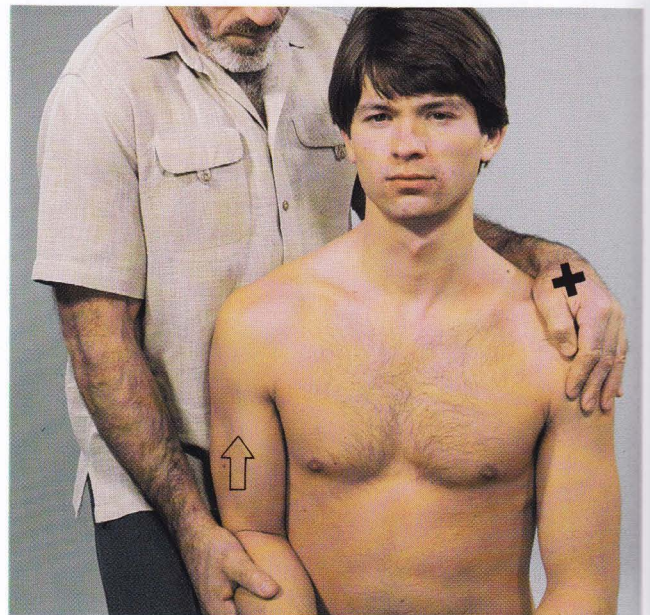


Fig. 68 a. Starting Position.

Procedure: Using this grip, T then asks P to exhale (which lowers the ribs) while gradually and fully *elevating* P's shoulder girdle *cranially* by pulling up against the right elbow.

Stimulation of Antagonists: T moves left hand to P's right shoulder and asks P to lift the shoulder maximally. T resists P's lifting of the shoulder to stimulate the antagonists.

Note: For alternative technique, see **Volume I** (therapy 2.2.7, p. 28).

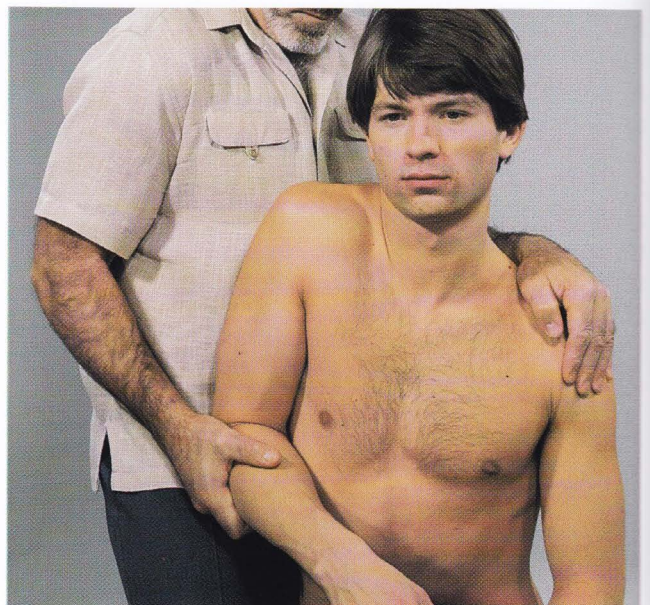
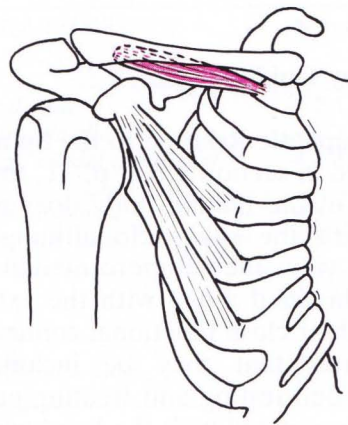


Fig. 68 b. Final Position.

3.10.4B. Therapy for the **subclavius**.
P lying on side.



Starting Position: P: lying on left side; right upper arm held against side of thorax with elbow flexed. T: Standing behind P, facing oblique towards P's head.

Grip: T's right hand grips P's right elbow. T's left hand grips P's right shoulder with the left forearm supporting the dorsal aspect of P's thorax.

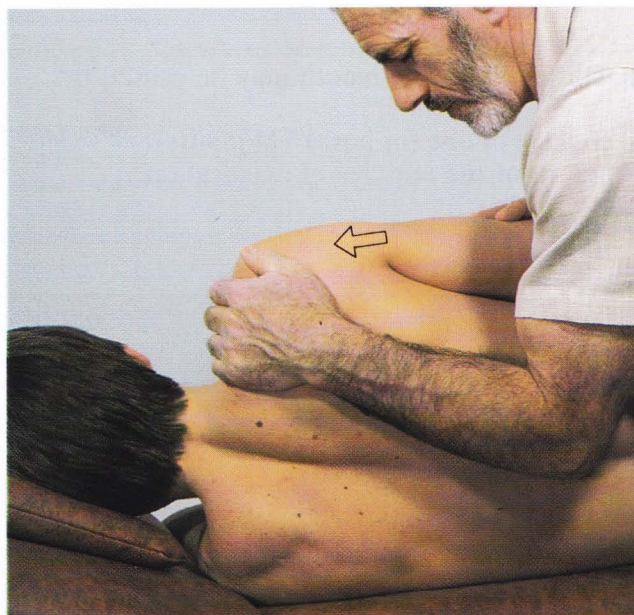


Fig. 69 a. Starting Position.

Procedure: Using this grip, T then asks P to exhale (thus lowering the ribs) while he/she gradually and fully *pushes* P's shoulder girdle *cranially* at the elbow.

Stimulation of Antagonists: T retains grip and asks P to lift the shoulder maximally in the direction just stretched. T resists that movement to stimulate P's antagonists.

Note: For alternative technique, see **Volume I** (therapy 2.2.7, p. 28).

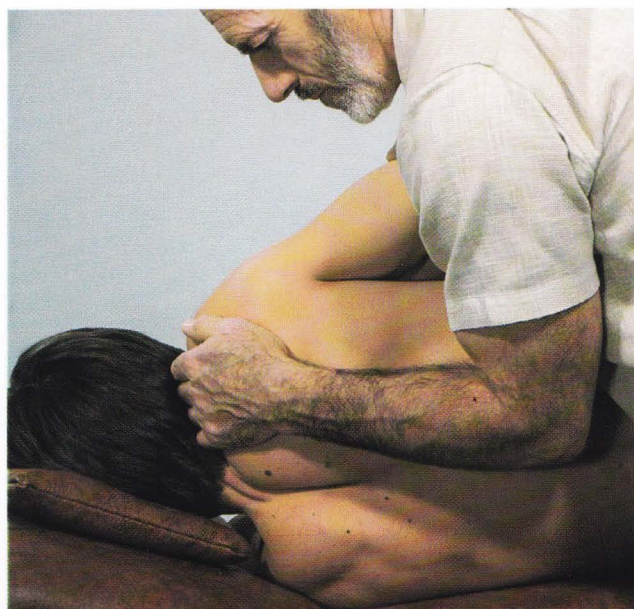


Fig. 69 b. Final Position.

4. THE TEMPORO-MANDIBULAR (TM) JOINTS

4.1. Therapy Guide

4.1.1. Therapeutic Relation to the Spine

As discussed in section 1.8.1, p. 11, the common-place view of the human body does not connect the jaw with the spine. So although from an anatomical view the temporo-mandibular joints might be classified along with the extremities in **Volume I**, their close functional connection to the spine dictates that they be included in this Volume. When testing and treating patients with symptoms associated with the head and neck, the temporo-mandibular joints and the spine should be regarded as therapeutically closely related.

4.1.2. Dysfunction

Inability to open the mouth may be caused by:

1. *Locking* of one (or both) TM-joint(s).
2. Spasm of the muscles of mastication.

Deviation to one side of the mandible on opening the mouth may have several causes, such as:

1. Reduced glide on the side of deviation due to joint hypomobility or shortened structures.
2. Paralysis of the muscles responsible for opening and protruding the mandible on the same side.
3. Hypermobility of the opposite side.

If examination shows that the restriction of movement is due to shortened muscles (or other structures), then the therapeutic treatments of this Section may be used.

4.1.3. Restrictions, Muscles and Therapies

The therapy techniques for treating restrictions of the temporo-mandibular joints are listed in Table 4-1. The actions of the muscles which may cause those restrictions are listed in Table 4-2. The various restrictions possible are listed in Movement Restriction Table 8-2, p. 144.

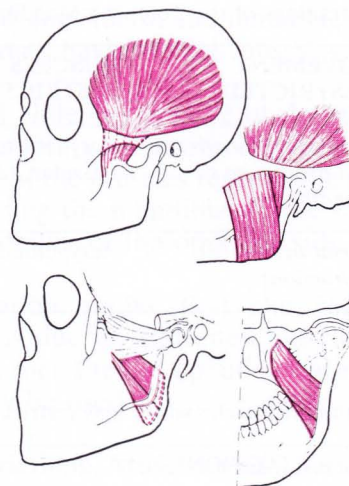
Table 4-1. Restrictions of the Temporo-Mandibular Joint

SECTION	MOVEMENT RESTRICTED	MUSCLES WHICH MAY RESTRICT MOTION	TECHNIQUE/THERAPY	Number, Page
4.2.	<i>opening of mouth and protrusion of mandible</i>	pterygoideus medialis, masseter, temporalis	for <i>ventral glide</i> for <i>side-to-side glide</i> for <i>ventral, caudal movement</i>	4.2.1, 88 4.2.2, 89 4.2.3, 90-91
4.3.	<i>dorsal movement (retraction)</i>	pterygoideus lateralis	for <i>dorsal movement</i> for <i>dorsal and caudal movement</i>	4.3.1, 92 4.3.2, 93

Table 4-2. Actions of muscles which may restrict movement of the temporo-mandibular joints.

MUSCLE	ACTION
masseter	Lifts mandible so mouth closes and teeth press together. Has a very minor effect on lateral glide, protraction and retraction.
temporalis	Lifts mandible so mouth closes and teeth press together. Aids side-to-side movements of mastication. Anterior fibres: Pull cranially. Posterior fibres: Pull dorsally (from a protruded position).
pterygoideus lateralis	Assists in opening the mouth by pulling the mandible and the articular disc ventrally.
pterygoideus medialis	Assists in closing the mouth by lifting the mandible and pulling it dorsally.

- 4.2.1. Specific technique to increase **ventral glide** of the **mandible** (*protrusion*). *Inability to open the mouth.*



Starting Position: P: Sitting or supine. T: Standing facing P's left side.

Grip: T's right forearm and hand grip P's head from behind, fingers against P's forehead. T stabilizes P's head between his/her right hand, arm and chest. T's left hand lies along P's mandible from the right side with fingers behind the angle of the jaw (ramus mandibulae).

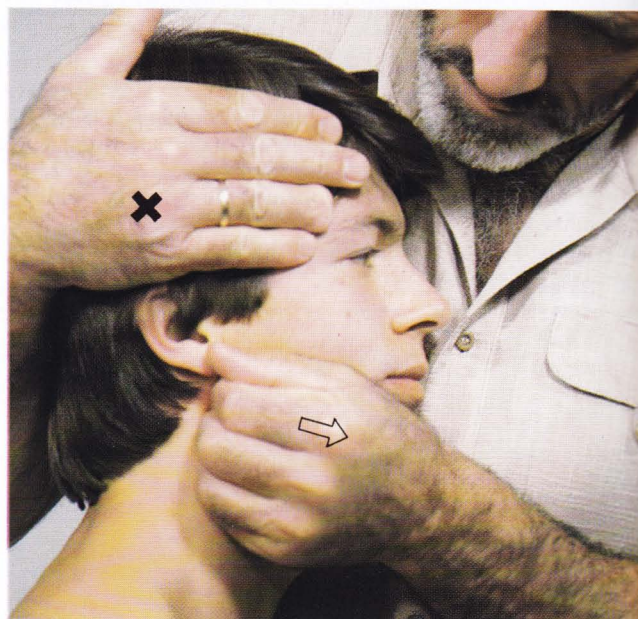


Fig. 70 a. Starting Position.

Procedure: Using this grip, T gradually and maximally *pulls ventrally* against P's mandible to produce a ventral glide at the TM-joint.

Stimulation of Antagonists: T retains right-hand grip and reverses left-hand grip (to left side of P's chin). T then asks P to look to the left and then move his/her mandible further in the direction just stretched. T resists that movement to stimulate P's antagonists.

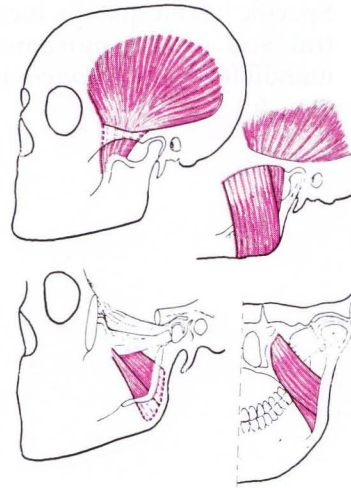
Notes: During this procedure P's mandible should be completely relaxed and P should not attempt to open mouth.

If the restriction of movement is bilateral, the same treatment may be performed on P's opposite side.



Fig. 70 b. Final Position.

- 4.2.2. Specific technique to increase **side-to-side glide** of the **mandible**. *Inability to open the mouth.*



Starting Position: P: Sitting or supine. T: Standing oblique behind P to P's right.

Grip: T's left forearm and hand grip P's head, hand against P's forehead. T stabilizes P's head between his/her left hand, arm and chest. T's right hand is under P's right zygomatic arch with T's thenar eminence on the ramus of P's mandible.

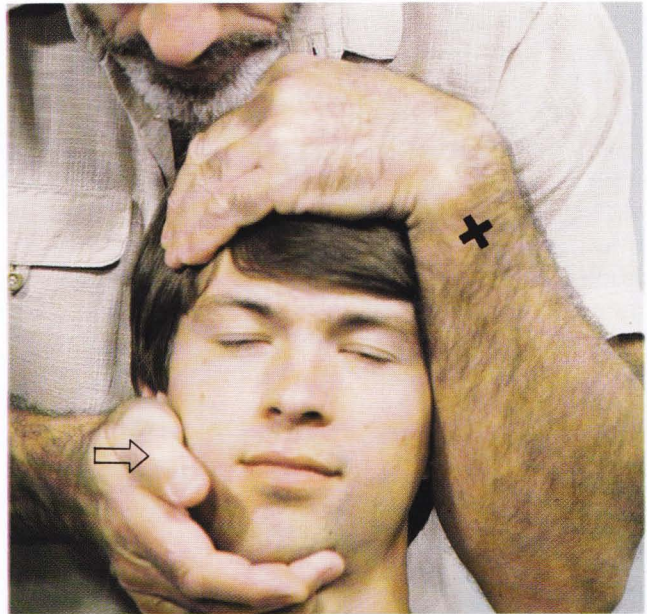


Fig. 71 a. Starting Position.

Procedure: Using this grip, T gradually and fully pushes medially to move the right head of P's mandible medially (inwards) at the TM joint.

Stimulation of Antagonists: T reverses grip, interchanging relative positions of right and left hands, and then asks P to look to the left and move the mandible to the left. T resists that movement to stimulate P's antagonists.

Notes: During this procedure, the **left head** of P's mandible is moved laterally (outwards).

To mobilize the mandible in the opposite direction, this treatment may be repeated on P's opposite side.

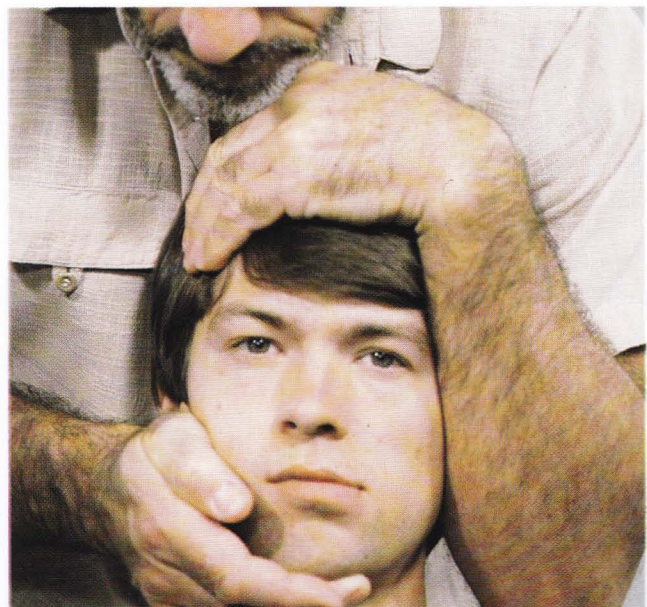
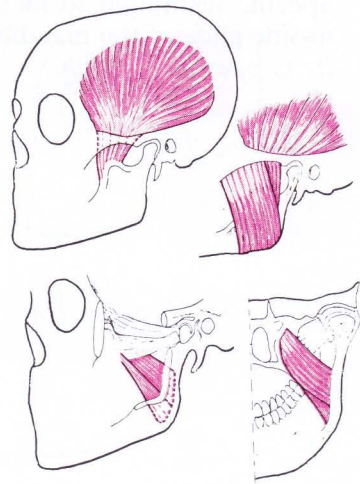


Fig. 71 b. Final Position.

- 4.2.3 A. Specific technique to increase **ventral and caudal** movement of the **mandible**. *Slight opening of the mouth.*



Starting Position: P: Sitting or supine. T: Standing facing P's left side.

Grip: T's right forearm and hand grip P's head from behind, fingers against P's forehead. T stabilizes P's head between his/her right hand, arm and chest. With medical gloved hand, T's left thumb is placed on P's lower molars on the right side, as far back in the mouth as possible. T's index and middle fingers grip the angle of P's mandible on the right side with the ring and/or little fingers held under P's mandible (depending on the size of T's hand and P's mandible).

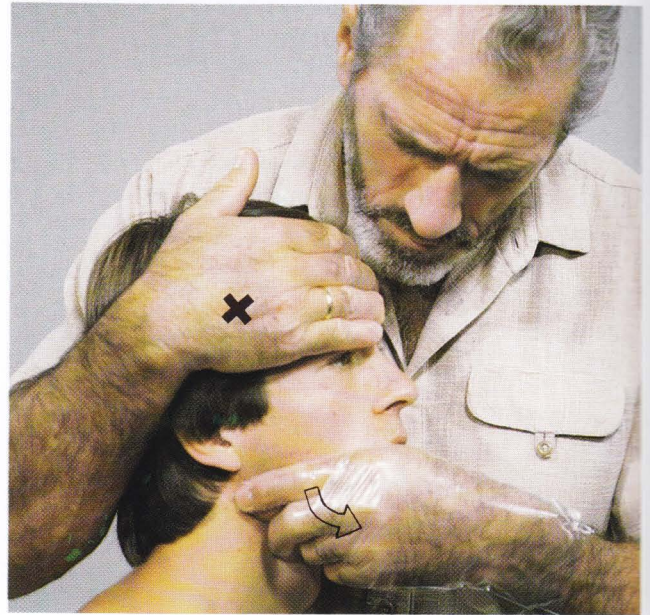


Fig. 72 a. Starting Position.

Procedure: Using this grip, T applies light traction *caudally* to P's right TM-joint by pressing his/her thumb caudally against the lower molars while gradually and maximally *pulling ventrally* to produce a ventral glide of the right head of the mandible at the TM joint.

Stimulation of Antagonists: T retains grip with right hand and places left hand on the left side of P's chin and asks P to look to the left and downwards and then move his/her mandible caudally and to the left (in the direction of stretching). T resists that movement to stimulate P's antagonists.

Note: If the restriction of movement is bilateral, the same treatment may be performed on P's opposite side.

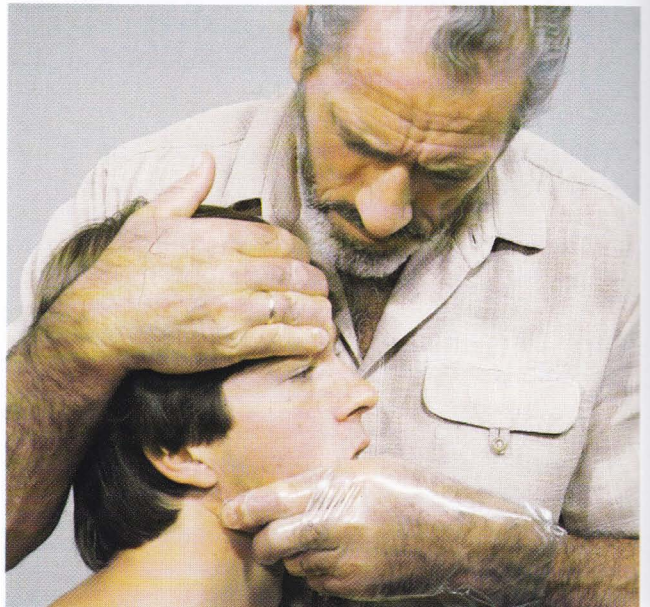
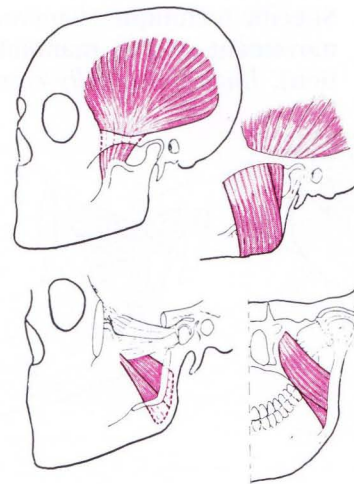


Fig. 72 b. Final Position.

- 4.2.3B. Specific technique to increase **ventral and caudal** movement of the **mandible**. *Inability to fully open the mouth.*



Starting Position: P: Sitting or supine. T: Standing facing P's left side.

Grip: T's right forearm and hand grip P's head from behind, fingers against P's forehead. T stabilizes P's head between his/her right hand, arm and chest. With medical gloved hand, T's left thumb is placed on P's lower molars on the right side, as far back in the mouth as possible. T's index and middle fingers grip the angle of P's mandible on the right side with the ring and little fingers held under P's mandible (depending on the size of T's hand and P's mandible).

Procedure: Using this grip, P opens his/her mouth as much as possible and relaxes. With P's mandible in this position, T applies light traction *caudally* to P's right TM-joint by pressing his/her thumb caudally against the lower molars while gradually and maximally *pulling ventrally* to produce ventral glide of the right head of the mandible at the TM joint.

Stimulation of Antagonists: T retains grip with right hand and places left hand on the left side of P's chin and asks P to look to the left and downwards and then move his/her mandible caudally and to the left (in the direction of stretching). T resists that movement to stimulate P's antagonists.

Note: The procedure must be performed gradually. T combines caudal traction with a ventral glide. When T, in this position, produces ventral glide of P's mandible, P is again asked to open his/her mouth as much as possible. The procedure is then repeated until P is able to fully open his/her mouth or considerable improvement is attained.

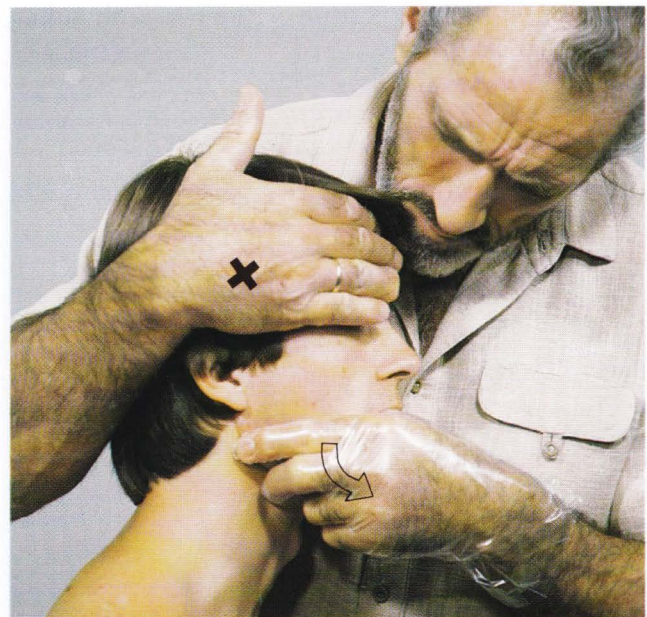


Fig. 73 a. Starting Position.

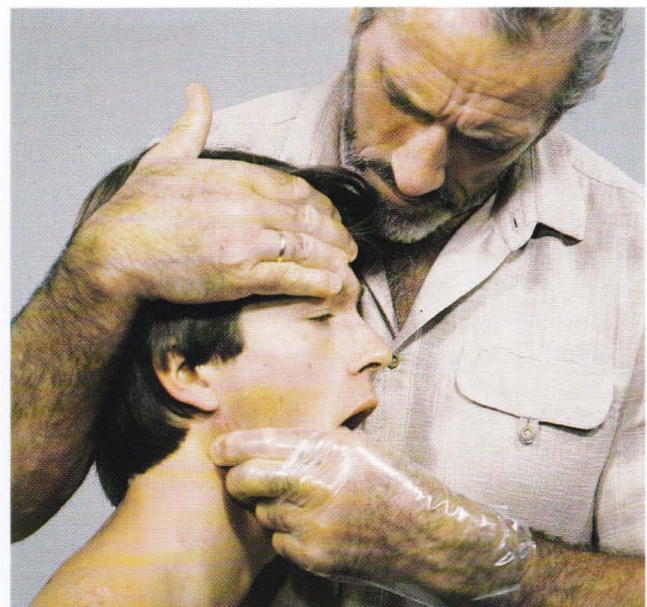
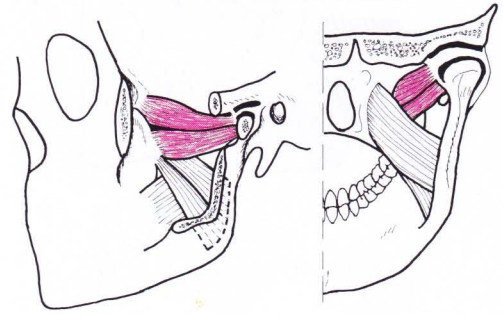


Fig. 73 b. Final Position.

4.3.1. Specific technique to increase dorsal movement of the mandible (retraction). Inability to fully close mouth.



Starting Position: P: Sitting or supine. T: Standing facing P's left side.

Grip: T's right forearm and hand grip P's head from behind, fingers against P's forehead. T stabilizes P's head between his/her right hand, arm and chest. T's left hand holds P's chin.

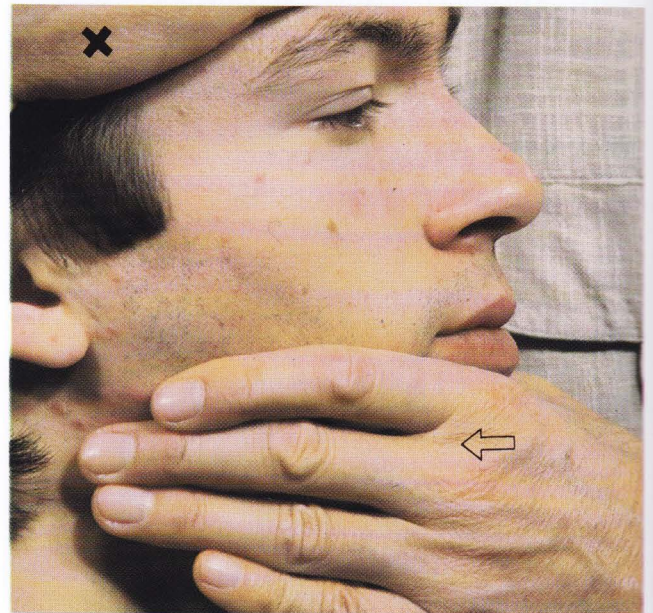


Fig. 74 a. Starting Position.

Procedure: Using this grip, T gradually and maximally *pushes dorsally* against P's mandible to produce a dorsal glide of the head of the mandible at the TM-joint.

Stimulation of Antagonists: If P cannot fully close his/her mouth, T's left hand is placed over P's right mandible, fingers behind the angle. T then asks P to look to the right and move mandible to the right (in the direction of stretching). T resists that movement to stimulate P's antagonists.

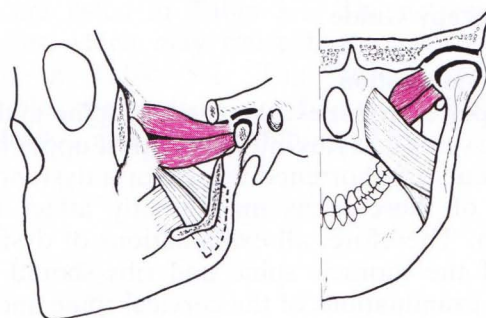
Notes: During the procedure, P's mandible should be completely relaxed and P should not attempt to open his/her mouth.

If the restriction of movement is bilateral, the same treatment may be performed on P's opposite side.



Fig. 74 b. Final Position.

4.3.2. Specific technique to increase **dorsal and caudal movement** of the **mandible**. *Inability to close the mouth.*



Starting Position: P: Sitting or supine. T: Standing facing P's left side.

Grip: T's right forearm and hand grip P's head from behind, fingers against P's forehead. T stabilizes P's head between his/her right hand, arm and chest. With medical gloved hand, T's left thumb is placed on P's lower molars on the right side, as far back in the mouth as possible. T's index and middle fingers grip the angle of P's mandible on the right side with the ring and/or little fingers held under P's mandible (depending on the size of T's hand and P's mandible).

Procedure: Using this grip, P closes his/her mouth almost as much as possible and relaxes. With P's mandible in this position, T gradually and maximally *pushes caudally and dorsally* by pressing his/her thumb caudally and dorsally against the lower molars of P's mandible on the right side to produce a dorsal glide of the head of the mandible at the TM joint.

Stimulation of Antagonists: T retains grip and asks P to look to the right and then move the mandible to the right and rearwards. T resists that movement to stimulate P's antagonists.

Notes: If the restriction of movement is bilateral, the same treatment may be performed on P's opposite side.

The procedure is used when P cannot close his/her mouth. It may also be tried when P cannot fully open his/her mouth, and when the previous technique, 4.3.1, p.92, is ineffective.

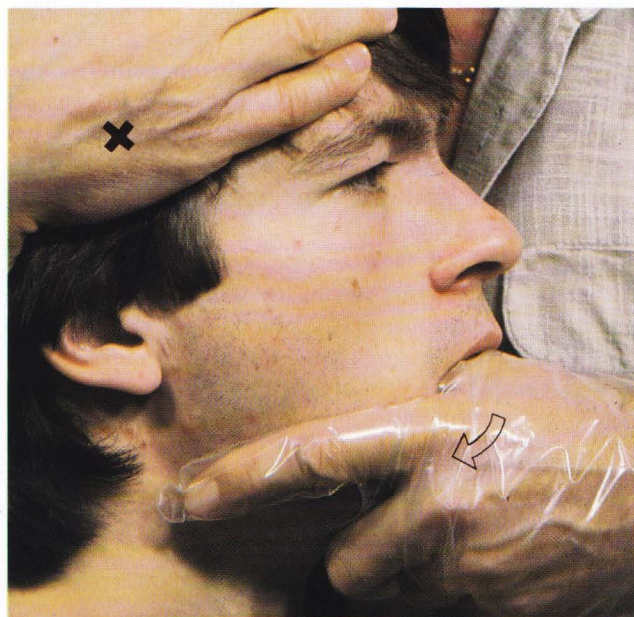


Fig. 75 a. Starting Position.



Fig. 75 b. Final Position.

5. THE THORACIC SPINE AND RIBS (T1 on T2 through T12 on L1)

5.1. Therapy Guide

5.1.1. Examination

The upper extremities, the cervical spine and the thoracic spine and ribs interact in most upper body movements. A shortened muscle or a dysfunction in any of these areas may greatly affect total function. Therefore, all examinations of dysfunctions of the thoracic spine and ribs should also include examinations of the cervical spine and the upper extremities.

Pain and/or reduced mobility in the thoracic spine may be a **secondary** symptom of internal organ pathology or malfunction, which may cause changes in the skin, subcutaneous tissue, fasciae, muscles and tendons or joints. For example, a healed pleurisy may cause residual pain in the thorax or thoracic spine with hyperaesthesia and reduced mobility in the relevant segments. This pain may disappear when the mobility of the thoracic spine and ribs is normalized.

5.1.2. Treatment Guidelines

Caution is the watchword in treating the spine. Therefore, in treating any restriction, *perform the non-specific techniques first*. Perform specific techniques only if the non-specific techniques elicit no contraindications to further therapy.

The therapist may instruct or direct patient eye movements and respiration to aid therapy.

Eye movements evoke reflex responses, such as "leading" movements of the head. Directing eye movement then gives the therapist control over patient head movement.

Respiration: Normal breathing, particularly exhaling, promotes relaxation, while inhaling or holding the breath are often naturally evoked when producing muscular force. Therefore, instructing the patient to *exhale* aids relaxation during stretching, while *breathing normally* promotes relaxation during sustained stretching (two minutes or more). *Inhaling* helps the patient contract against the therapist's resistance, such as during the stimulation of antagonists phase of treatment.

Many of the following therapy techniques for treating the thoracic spine and ribs may be performed with the patient either sitting or lying on the couch. The choice between the two alternative treatment positions depends both on comfort and convenience for both the patient and the therapist.

For example, some patients may not be able to tolerate a sitting position when being treated, and therefore must be treated lying down. Likewise, a

smaller therapist may find treatment of a large patient in a prone or supine position to be far easier than the equivalent treatment of a sitting patient.

5.1.3. Movement Patterns and Locking

Movement patterns and *locking* are discussed in Part 2, pp. 14-25. The following is a short summary review for the thoracic spine and ribs.

First, although the thoracic spine and its mobile segments are anatomically well defined (in the cranial to caudal direction, as starting at T1 on T2 and ending with the T12 on L1 segment), the therapeutic definition is not so rigid. In many cases, the transition from typical cervical spine segment behavior to typical thoracic spine segment behavior is not abrupt at the C7-T1 segment, but rather more gradual. This means that cervical spine may extend caudally into the upper thoracic spine. So therapeutically the *upper thoracic spine* should always be regarded as possibly behaving as if it were a part of the *cervical spine*. Whenever "cervical behavior" is noted in the upper thoracic spine, it must be treated accordingly.

As can be seen from the schematic representation of Fig. 7, p. 18, in ventral flexion the cervical and thoracic spines behave similarly. However, in dorsal flexion, they differ. The movement pattern of the thoracic spine is mirror symmetric with respect to a coronal plane. That is, in ventral flexion, lateral flexion and rotation to the *same* side are "physiological" movements, while in dorsal flexion, lateral flexion and rotation to *opposite* sides are "physiological." The pattern for "physiological" movement in dorsal flexion appears to be the mirror image of the pattern in ventral flexion.

Segments adjacent to those treated should be stabilized so they do not follow the movement induced to effect treatment. Stabilization always requires *inflection*, or changes of flexion, either in the sagittal or the frontal planes. Basic stabilization of the thoracic spine involves changing flexion from ventral to dorsal or vice versa. For instance, treatment of a segment in ventral flexion is most effective if its adjacent (superior or inferior) segments are placed in dorsal flexion.

However, when rotation and/or lateral flexion are restricted in ventral or dorsal flexion, it is possible and necessary to *lock* the segments above and/or below more securely than is possible by inflection in the sagittal plane alone. *Locking* is then attained by changing flexion and/or rotation in the frontal plane. This type of *locking*, most often used in non-specific techniques, involves retaining ventral/dorsal flexion but changing to the *opposite* lateral flexion and rotation to effect the *lock*. End feel indicates when *locking* is

attained. It may be necessary to stretch the muscles and other structures in order to *lock* the segments. *Movement must not be forced beyond that necessary to attain the desired fixation by locking.*

Double locking, cranial to and caudal to the segment treated is possible throughout the thoracic spine, and always involves inflections in both the sagittal and frontal planes. As discussed in Part 2, p. 23, there must be only *one inflection per locking*. So one of the two inflections required for *double locking* will involve a change from ventral to dorsal flexion, and the other inflection will involve a change from right to left lateral flexion. This is equivalent to the requirement that the segment treated must "receive" the flexions of the treatment from its adjacent *locked* segments, ventral/dorsal flexion from one direction and right/left lateral flexion from the other direction.

5.1.4. Restrictions, Muscles and Therapies

The non-specific and specific therapy techniques for treating restrictions of the thoracic spine and ribs are listed in Table 5-1. The actions of the muscles which may cause those restrictions are listed in Table 5-2. The various restrictions possible are listed in Movement Restriction Tables 8-3 and 8-4, pp. 145 and 146.

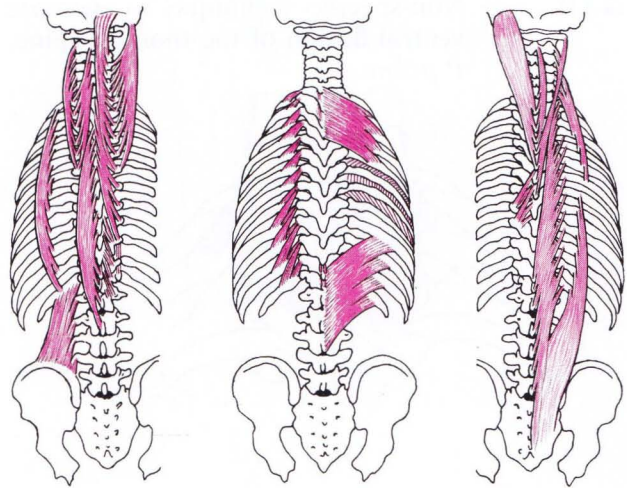
Table 5-1. Restrictions of the Thoracic Spine and Ribs

SECTION	MOVEMENT RESTRICTED	MUSCLES WHICH MAY RESTRICT MOTION	TECHNIQUE/THERAPY	Number, Page
5.2.	<i>Ventral Flexion</i>	Most on dorsal side of thoracic spine, as well as stiffness in rib cage and spine itself	non-specific	5.2.1, 97-98
			specific, T1 on T2	5.2.2, 99-100
5.3.	<i>Ventral flexion with lateral flexion and rotation to same side</i>	Most of torso, as well as stiffness in rib cage and spine itself	nonspecific	5.3.1, 101-102
			specific, T1-T2 to T12-L1	5.3.2, 103-104
5.4.	<i>Dorsal Flexion</i>	Most on ventral side of thoracic spine, as well as stiffness in rib cage and spine itself	non-specific	5.4.1, 105-108
			specific, T1-T2 to T12-L1	5.4.2, 109-110
5.5.	<i>Dorsal flexion with lateral flexion and rotation to opposite sides</i>	Most of torso, as well as stiffness in rib cage and spine itself	non-specific	5.5.1, 111-112
			specific, T1-T2 to T12-L1	5.5.2, 113-115
5.6.	<i>Rib mobility</i>	Most between ribs and around thorax, and those associated with upper arm, as well as stiffness in rib cage and spine itself	specific, 2nd to 5th ribs	5.6.1, 116
			specific, 5th to 12th ribs	5.6.2, 117

Table 5-2. Actions of muscles which may restrict movement of the thoracic spine and ribs

MUSCLE	ACTION
Abdominals; external & internal oblique	Move upper body with respect to pelvis and vice versa; tense abdominal wall; compress abdominal viscera.
iliocostalis thoracis longissimus thoracis spinalis thoracis semispinalis thoracis	} } } } Dorsal flex, laterally flex, rotate, and stabilize the spine.
intertransversarii	Laterally flex and rotate spine to the same side.
interspinales	Dorsal flex spine.
rotatores	Dorsal flex and rotate spine to opposite side.
multifidi	Dorsal flex and rotate spine to opposite side.
diaphragma	Principal muscle of respiration; increases thoracic cavity volume.
scalenus anterior, medius	Raise 1st rib; ventral flex and laterally flex to same side, rotate neck to opposite side.
scalenus posterior	Raises 2nd rib; laterally flexes neck to same side.
subclavius	Depresses and stabilizes clavicle during movements of shoulder; lifts 1st rib.
intercostales interni	Draw ribs together.
intercostales externi	Draw ribs together; elevate rib cage; increase thoracic cavity size.
sternocleidomastoideus	Ventral flexes, laterally flexes to same side, rotates cervical spine to opposite side, elevates chin.
levator costarum	Raise ribs to increase thoracic capacity.
serratus posterior superior	Raises ribs in inspiration.
serratus posterior inferior	Lowers ribs in expiration.
transversus abdominis	Supports and compresses abdominal viscera.
rectus abdominis	Flexes thoracic and lumbar spine; supports abdominal wall.
quadratus lumborum	Laterally flexes to the same side, aids forced expiration.
latissimus dorsi	Extends, adducts and medially rotates at shoulder; depresses shoulder girdle.
longus colli	Ventral flexes, laterally flexes and rotates to the same side.

5.2.1A. Non-specific technique increase ventral flexion. *P* sitting.



Starting Position: *P*: Sitting; lumbar spine and abdomen (up to ribs) stabilized against a support; hands clasped on nape of neck, reaching as far down the thorax as possible (In some cases it may be more convenient for *P* not to clasp hands, but rather place his/her fingers parallel to the spine to obtain a better grip and avoid straining the neck). *T*: Standing facing *P*'s right side.

Grip: *T*'s right hand is placed over *P*'s elbows and forearms. *T*'s left hand stabilizes *P*'s L1-L2 segment.

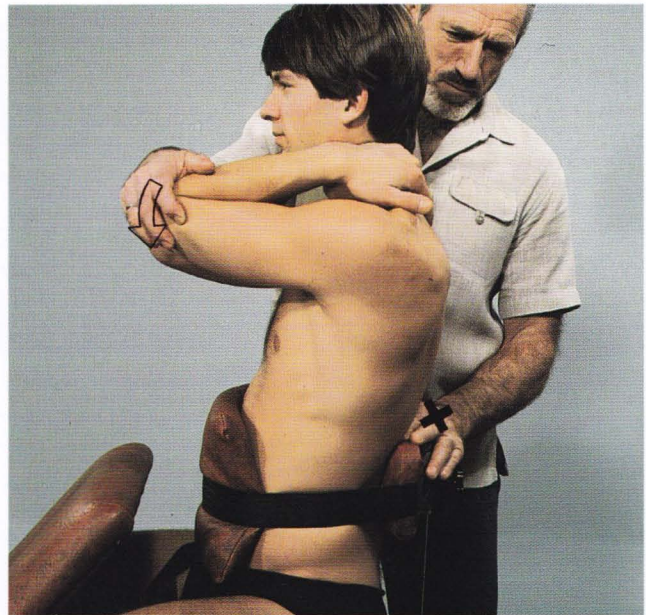


Fig. 76 a. Starting Position.

Procedure: Using this grip, *T* asks *P* to exhale and gradually and fully *ventrally flexes* *P*'s thoracic spine.

Stimulation of Antagonists: *T* reverses (or if strong enough, maintains) grip and asks *P* to look down and bend forward in the direction of stretching. *T* resists that movement to stimulate *P*'s antagonists.

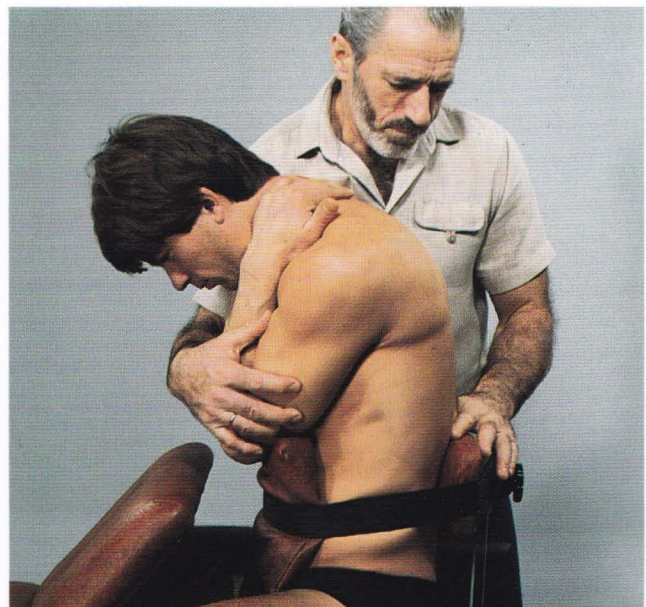
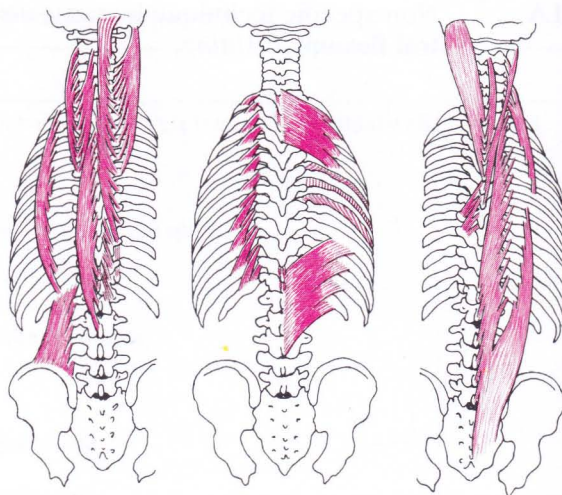


Fig. 76 b. Final Position.

5.2.1B. Non-specific technique to increase **ventral flexion** of the **thoracic spine**.
P prone.



Starting Position: P: Prone; head of couch lowered (if couch is not articulated, P's head and shoulders may be positioned over the couch end); arms along sides; cushion under abdomen; lumbar region stabilized with a belt. T: Standing facing P's right side.

Grip: T's right hand is placed over P's T1 and T2 vertebrae. T's left hand stabilizes P's L1-L2 segment.

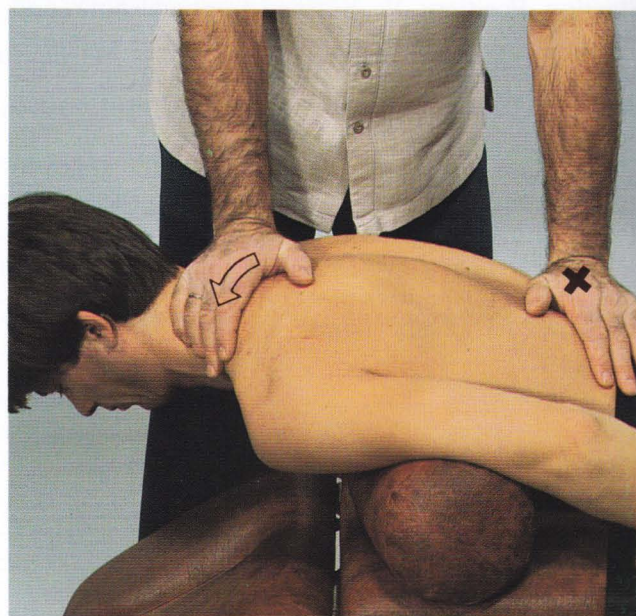


Fig. 77 a. Starting Position.

Procedure: Using this grip, T asks P to exhale and gradually and fully *ventrally flexes* P's thoracic spine by pressing ventrally and cranially with his/her right hand.

Stimulation of Antagonists: T moves right hand to under P's sternum and asks P to look down and bend forward in the direction of stretching. T resists that movement to stimulate P's antagonists.

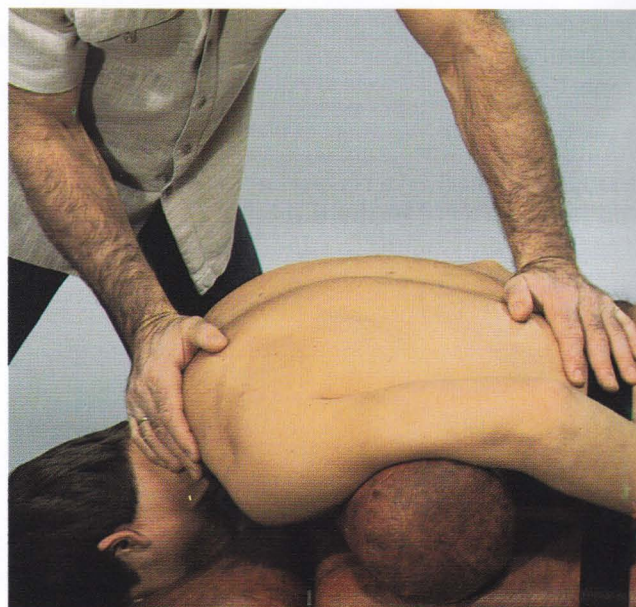
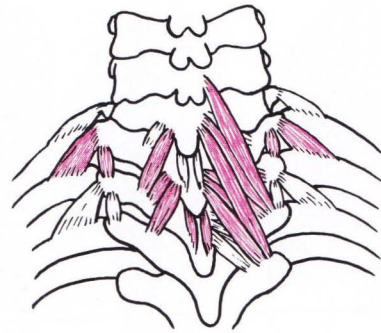


Fig. 77 b. Final Position.

5.2.2A. Specific technique to increase **ventral flexion** of T1 on T2. *P supine.*



Starting Position: P: Supine; hips and knees flexed; right heel resting on left knee with left foot against the raised foot of the couch; (this position flattens P's lumbar lordosis); hands clasped on nape of neck (or folded across chest) to stabilize cervical spine; wedge-shaped support stabilizes the caudal vertebrae of the segment treated (here T2). T: Standing facing P's left side.

Grip: T's left hand grips P's elbows and adjusts the specific segment with small "rocking" movements (moving P's elbows cranially and caudally) so that the force is directed at the cranial vertebra (here T1). T's right index finger palpates the movement between the spinous processes. (If necessary, T's index and ring fingers may then stabilize the transverse processes with T's middle finger against the spinous process of P's upper vertebra). P's head and neck are supported by T's right hand and forearm.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *ventrally flexes* T1 on T2. As P exhales, T uses left hand to push P's elbows in a cranial and dorsal direction and right hand to simultaneously pull in a cranial and ventral direction.

Stimulation of Antagonists: T retains grip and asks P to exhale, look down, and then move further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Notes: If the treatment, using ventral (or dorsal) flexion, is of a lower thoracic segment, P may need to be in a more upright position to prevent upper body from excessively weighting at the segment treated (see technique 5.4.1A, p. 105).

If P has shoulder or elbow pain, he/she may fold arms across chest while T uses the alternative grip of technique 5.4.1B, p. 106.

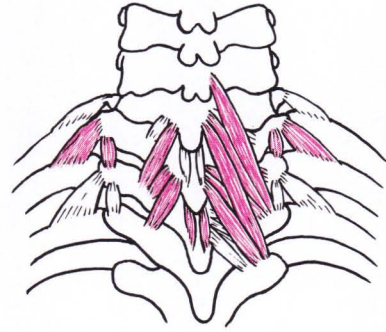


Fig. 78 a. Starting Position.



Fig. 78 b. Final Position.

5.2.2 B. Specific technique to increase ventral flexion of T1 on T2. *P prone.*



Starting Position: P: Prone; head of couch lowered; arms along sides; cushion under chest just caudal to the ribs corresponding to the segment treated; lumbar region may be stabilized with a belt. T: Standing facing P's right side.

Grip: T's left hand stabilizes T2. T's right thenar and hypothenar are placed on the transverse processes of P's T1 vertebra. Or, if T's hands are small, his/her right thenar may be held against the spinous process of T1.

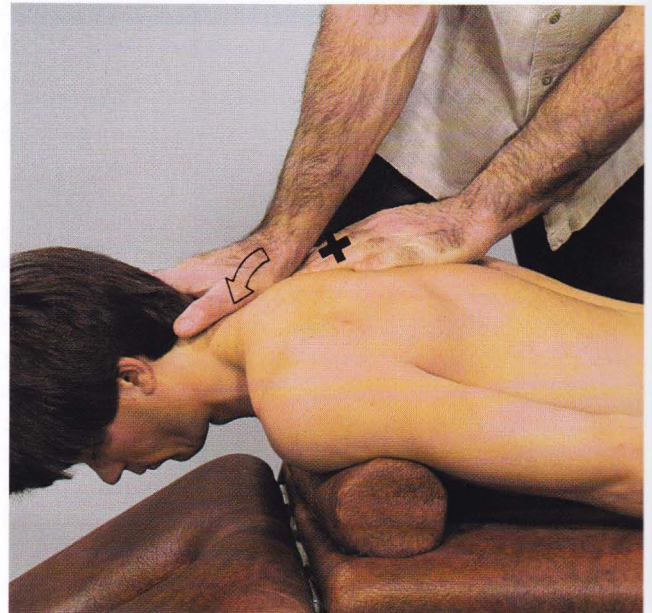


Fig. 79 a. Starting Position.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *ventrally flexes* T1 on T2 by pressing ventrally and cranially with his/her right hand.

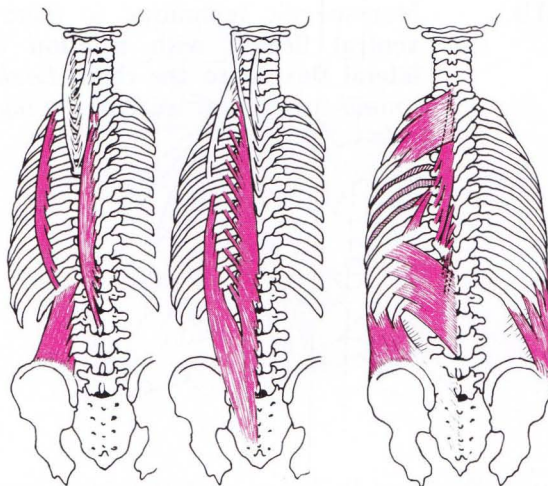
Stimulation of Antagonists: T retains grip with left hand and moves right hand to P's manubrium, and then asks P to exhale, look down, and move further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Note: This technique is the same for all the segments in the thoracic spine. T needs only to reposition the cushion and his/her hands. However, it may then be necessary to lower the head of the couch.



Fig. 79 b. Final Position.

5.3.1A. Non-specific technique to increase **ventral flexion** with **rotation** and **lateral flexion to the right**. *Locking* caudal to segment treated. *P* sitting.



Starting Position: *P*: Sitting; spine ventrally flexed; when using a 3-D stool, *P*'s lumbar spine is laterally flexed to the left by tilting the right side of the pelvis downwards, which also produces a rotation to the left of the lumbar spine; otherwise, a cushion under the left buttock and thigh produces the same lateral flexion and rotation; pelvis stabilized with a belt (in this position, *P*'s lumbar spine is prevented from rotating to the right); arms should be folded across chest with hands gripping shoulders. *T*: Standing facing *P*'s right side.

Grip: *T*'s right hand grips *P*'s left shoulder from the ventral aspect. *P*'s right shoulder is supported against *T*'s chest. *T*'s left hand and thumb are placed on the left side of the spinous processes at *P*'s L1- L2 segment to monitor *locking* of the lumbar spine.

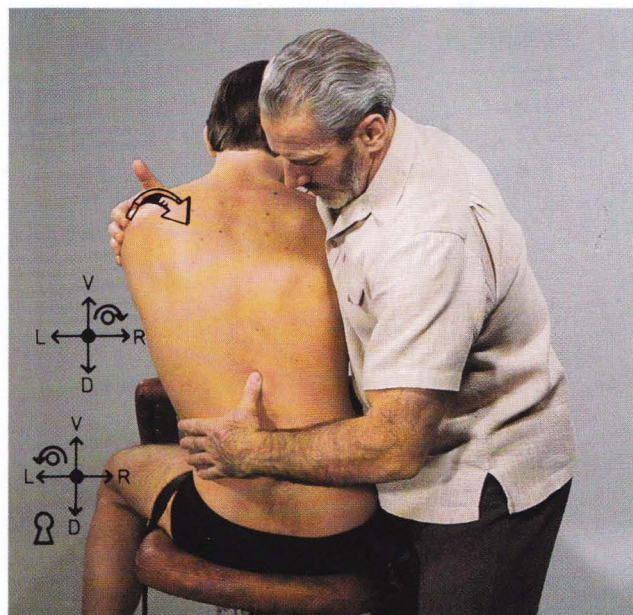


Fig. 80 a. Starting Position.

Procedure: Using this grip, *T* asks *P* to exhale while he/she gradually and fully *ventrally flexes* and *rotates and laterally flexes P's thoracic spine to the right* by pulling *P*'s left shoulder ventrally and caudally. *P*'s right shoulder simultaneously moves dorsally and caudally.

Stimulation of Antagonists: *T* retains grip and asks *P* to exhale, look down to the right and move further in the direction of stretching. *T* resists that movement to stimulate *P*'s antagonists.

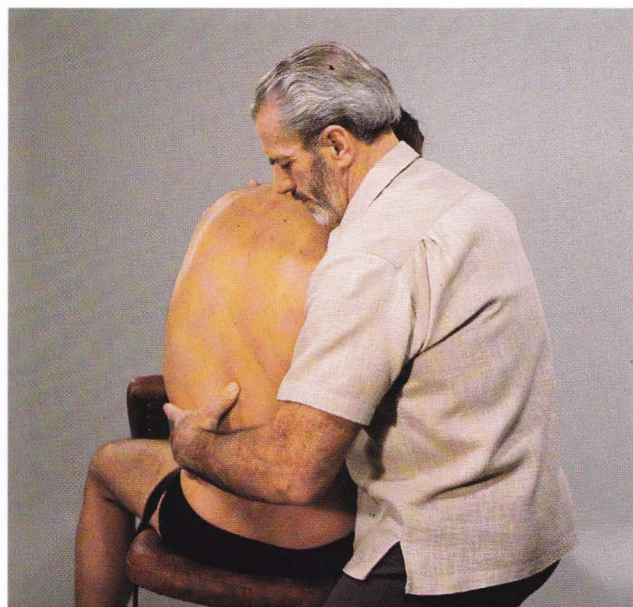
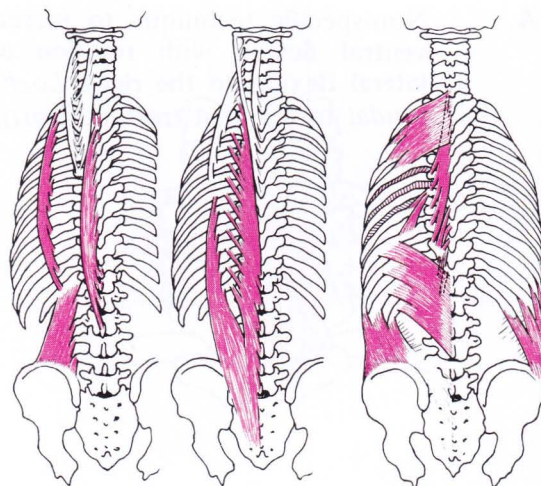


Fig. 80 b. Final Position.

5.3.1B. Non-specific technique to increase ventral flexion with rotation and lateral flexion to the right. Locking caudal to segment treated. P lying on side.



Starting Position: P: Lying on left side; hips and knees flexed; spine in ventral flexion; firm cushion under waist to laterally flex the lumbar spine to the left (this also produces a rotation to the left, which prevents the lumbar spine from rotating to the right); head of couch raised to laterally flex thoracic spine to the right; left arm and shoulder girdle pulled ventrally to rotate thoracic spine to the right; left hand grips right shoulder. T: Standing facing P's trunk.

Grip: T's right hand grips P's right shoulder (over P's left hand). T's left hand and thumb are placed on the left side of the spinous processes at P's L1-L2 segment to monitor *locking* of the lumbar spine.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *rotates* P's thoracic spine *to the right* by pushing P's right shoulder dorsally and caudally.

Stimulation of Antagonists: T retains left-hand grip and moves right hand to dorsal side of P's right shoulder. T then asks P to exhale, look down to the right, and move thorax in the direction of stretching. T resists that movement to stimulate P's antagonists.

Note: The above procedure is performed in steps by successively repositioning P in the following manner. To increase:

Lateral flexion and rotation to the right, raise the head of the couch

Ventral flexion and rotation to the right, reposition P's left arm and shoulder girdle by pulling them ventrally and possibly increasing hip flexion.

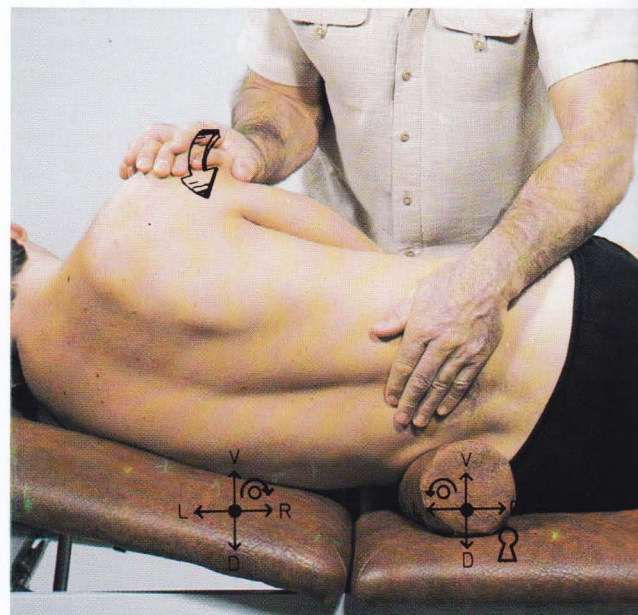
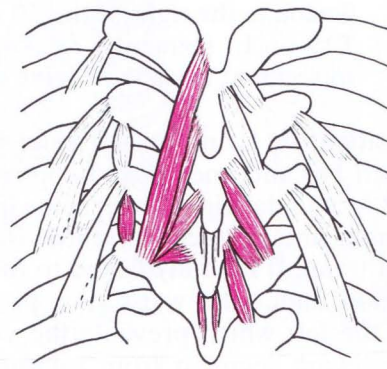


Fig. 81 a. Starting Position.



Fig. 81 b. Final Position.

5.3.2A. Specific technique to increase **ventral flexion with rotation and lateral flexion to the right** of the T1 on T2 to T12 on L1 segments. *Locking caudal to segment treated. P sitting.*



Starting Position: P: Sitting; spine in ventral flexion; when using a 3-D stool, P's lumbar and thoracic vertebrae (up to, but not including, the segment treated), positioned in lateral flexion to the left by tilting P's pelvis downwards on the right side; this produces a rotation to the left of the vertebrae up to the relevant segment; (cushion under the left buttock and thigh will produce the same lateral flexion and rotation); pelvis stabilized with a belt (in this position, the vertebrae up to the relevant segment are prevented from rotating to the right); arms folded across chest. T: Standing facing P's right side.

Grip: T's right hand grips under P's left arm with his forearm across P's chest. T's right little finger lies along P's rib belonging to the **cranial** vertebra of the segment treated (in this case the 7th rib on the left side). T supports P's right shoulder against his/her chest. T's left thumb is placed on the left side of the spinous process on the **caudal** vertebra of the segment treated (in this case T8). T can then monitor the *locking* caudal to the segment treated while also simultaneously controlling its movement. **Note:** T's thumb must be in contact with **both** spinous processes, or T's left hand can be placed against P's transverse processes of T8.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *ventrally flexes* P's upper vertebra (here T7 on T8) while also fully *rotating* and *laterally flexing to the right* by pulling P's left shoulder ventrally and cranially. P's right shoulder simultaneously moves dorsally and caudally.

Stimulation of Antagonists: T retains his grip and asks P to exhale, look down to the right, and move further in the direction of stretching. T resists that movement to stimulate P's antagonists.

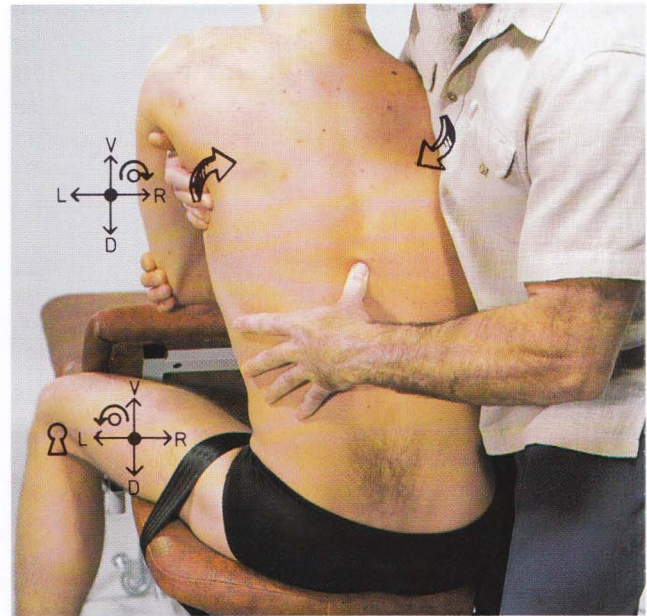


Fig. 82 a. Starting Position.



Fig. 82 b. Final Position.

5.3.2B. Specific technique to increase **ventral flexion** with **rotation** and **lateral flexion to the right** of the T1 on T2 to T12 on L1 segments. *Locking* caudal to segment treated. *P* lying on side.

Starting Position: *P*: Lying on left side; right leg extended; left hip and knee flexed approximately 90° with left foot under right knee; spine in ventral flexion; lumbar and thoracic vertebrae (caudal to the segment treated) laterally flexed to the left by a firm cushion under the waist (this produces a rotation to the left which prevents the vertebrae up to the relevant segment from rotating to the right); head of couch raised to laterally flex thoracic spine (cranial to the segment treated) to the right (in this position, *locking* is attained caudal to the specific segment treated. If *locking* cranial to the segment is also desired, the *locking* of technique 6.3.3, p. 129, may be used); left arm and shoulder girdle pulled ventrally to rotate the thoracic spine to the right (cranial to the segment treated); left hand may grip right shoulder. *T*: Standing facing *P*.

Grip: *T*'s left hand and wrist support *P*'s thorax (up to the segment to be treated); fingers stabilizing the lower vertebra (here T9) and thumb stabilizing the adjoining right rib with his thumb. *T*'s left index finger palpates the spinous processes to verify that the movement occurs in the correct segment (here T8 on T9). *T*'s right hand is threaded under *P*'s right arm with the forearm and wrist against the right side of *P*'s thorax.

Procedure: Using this grip, *T* asks *P* to exhale while he/she gradually and fully *rotates* *P*'s upper vertebra (here T8 on T9) *to the right* by pushing *P*'s thorax dorsally and caudally.

Stimulation of Antagonists: *T* retains grip with left hand and moves right hand to dorsal side of *P*'s shoulder. *T* then asks *P* to exhale, look down to the right and move further in the direction of stretching. *T* resists that movement to stimulate *P*'s antagonists.

Note: The above procedure is performed in successive steps by repositioning *P* in the following manner. To increase:

Lateral flexion and rotation to the right, raise the head of the couch.

Ventral flexion and rotation to the right, reposition *P*'s left arm and shoulder girdle by pulling them ventrally.

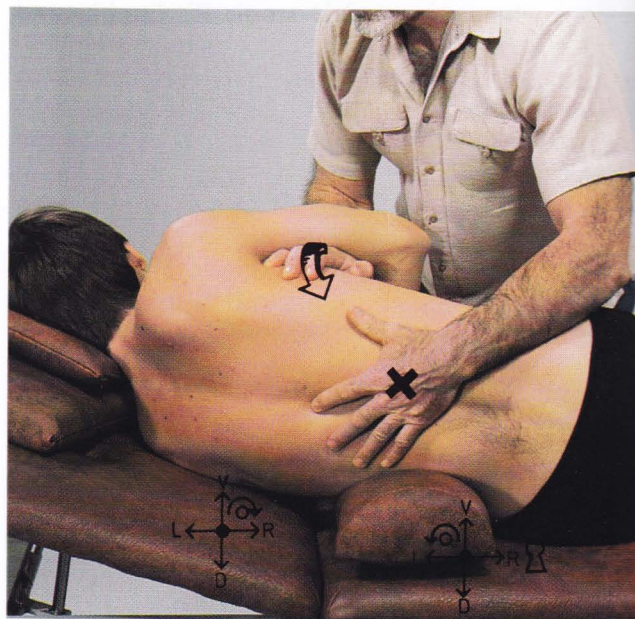
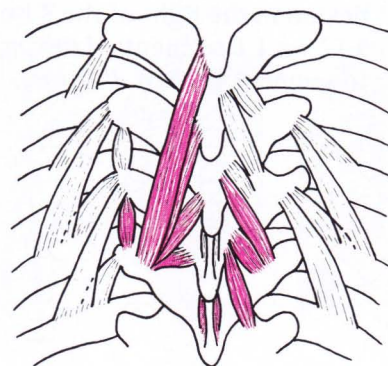


Fig. 83 a. Starting Position.

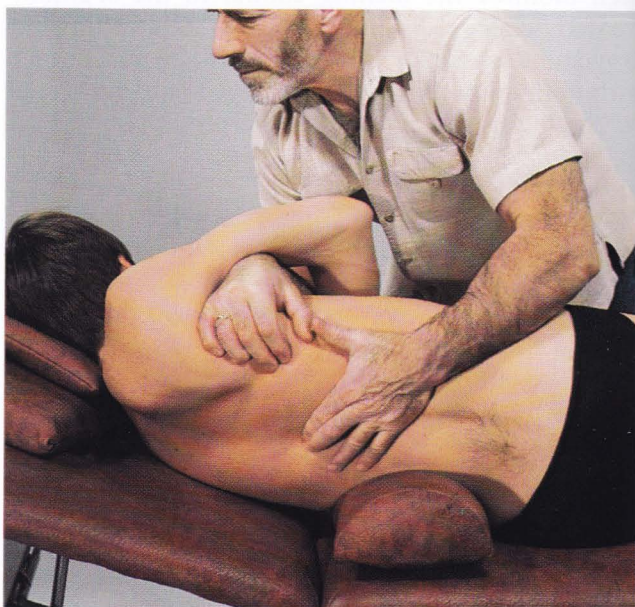
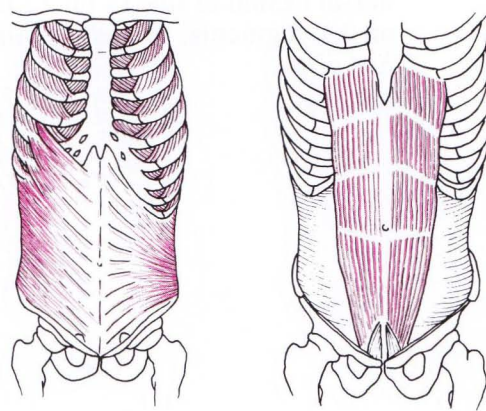


Fig. 83 b. Final Position.

5.4.1A. Non-specific technique to increase dorsal flexion of the T1 on T2 to T12 on L1 segments. *P* sitting.



Starting Position: *P*: Sitting; lumbar spine supported with pelvis stabilized with a belt; knee and hip joints flexed to flatten lumbar lordosis; hands clasped on nape of neck supporting cervical spine. *T*: Standing facing *P*'s right side.

Grip: *T*'s right hand and forearm grip under *P*'s elbows. *T*'s left hand supports *P*'s lower thoracic region.

Procedure: Using this grip, *T* asks *P* to exhale while he/she gradually and fully *dorsally flexes* *P*'s thoracic spine by pushing his/her arms dorsally and cranially.

Stimulation of Antagonists: *T* retains grip with left hand and moves right hand and forearm to over *P*'s elbows. *T* then asks *P* to exhale, look upwards, and bend backwards. *T* resists that movement to stimulate *P*'s antagonists.

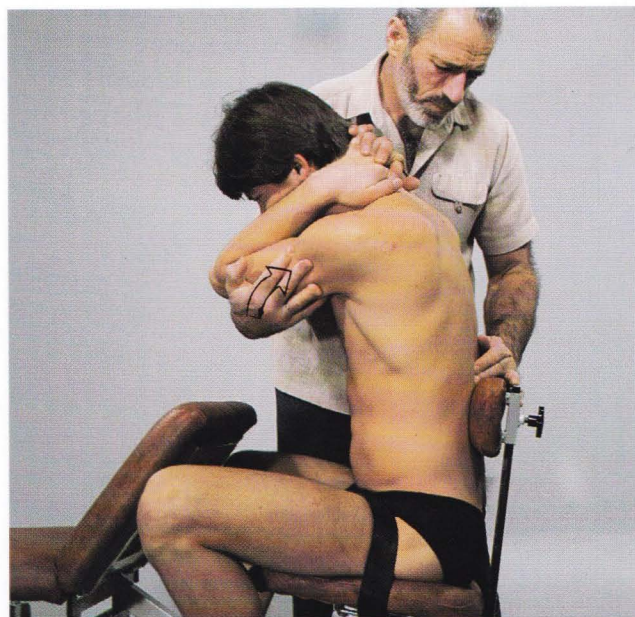
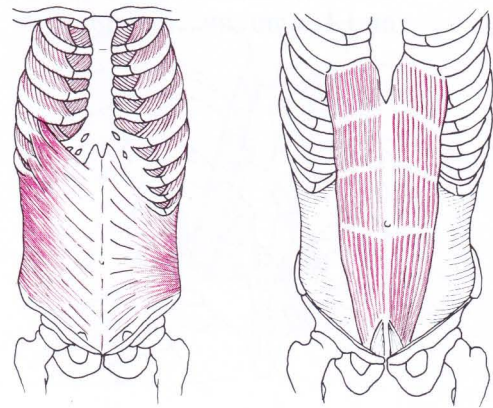


Fig. 84 a. Starting Position.



Fig. 84 b. Final Position.

5.4.1B. Non-specific technique to increase dorsal flexion of the T1 on T2 to T12 on L1 segments. *P* sitting. *Alternative grip.*



Starting Position: *P*: Sitting; lumbar spine supported with pelvis stabilized with a belt; knee and hip joints flexed to flatten lumbar lordosis; arms crossed in front with hands supporting lower cervical-upper thoracic region. *T*: Standing facing *P*'s right side.

Grip: *T* places right forearm and hand under *P*'s elbows, with fingers on *P*'s left shoulder. *T*'s left hand supports *P*'s lower thoracic region.



Fig. 85 a. Starting Position.

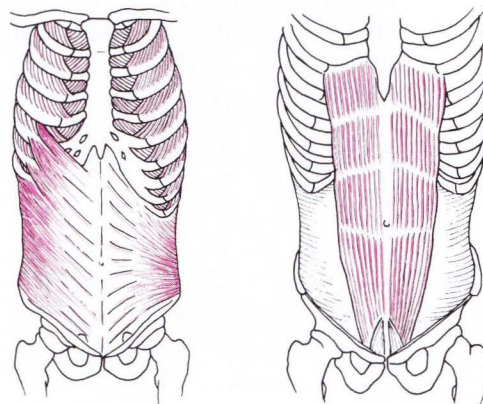
Procedure: Using this grip, *T* asks *P* to exhale while he/she gradually and fully *dorsally flexes* *P*'s thoracic spine by pushing his/her arms dorsally and cranially.

Stimulation of Antagonists: *T* retains grip with left hand, and moves right hand and forearm to over *P*'s elbows. *T* then asks *P* to exhale, look upwards and rearwards while bending backwards. *T* resists that movement to stimulate *P*'s antagonists.



Fig. 85 b. Final Position.

5.4.1C. Non-specific technique to increase dorsal flexion of the T1 on T2 to T12 on L1 segments. *P supine.*



Starting Position: P: Supine; firm cushion under thorax; hips and knees fully flexed to flatten lumbar lordosis; position stabilized with a belt across thighs; it may be necessary to lower the head end of the couch; hands clasped on nape of neck supporting the cervical spine. T: Standing facing P's left side.

Grip: T's right hand grips P's hands and supports the thorax. T's left hand grips P's elbows.



Fig. 86 a. Starting Position.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *dorsally flexes* P's thoracic spine by pushing his/her arms dorsally and cranially. T's right hand helps to control and regulate the movement in P's thoracic spine.

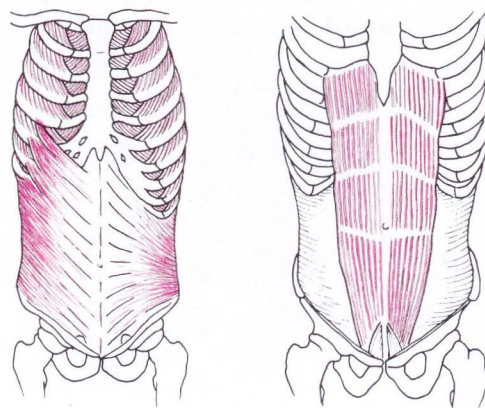
Stimulation of Antagonists: T retains grip and asks P to exhale, and look upwards while bending backwards. T resists that movement to stimulate P's antagonists.

Note: The force in this procedure comes primarily from the weight of P's upper body moving the thoracic spine dorsally. However, if P finds this painful, more body weight must be supported by T's right hand, or by raising P's upper body.



Fig. 86 b. Final Position.

5.4.1B. Non-specific technique to increase dorsal flexion of the T1 on T2 to T12 on L1 segments. *P* sitting. *Alternative grip.*



Starting Position: *P*: Sitting; lumbar spine supported with pelvis stabilized with a belt; knee and hip joints flexed to flatten lumbar lordosis; arms crossed in front with hands supporting lower cervical-upper thoracic region. *T*: Standing facing *P*'s right side.

Grip: *T* places right forearm and hand under *P*'s elbows, with fingers on *P*'s left shoulder. *T*'s left hand supports *P*'s lower thoracic region.



Fig. 85 a. Starting Position.

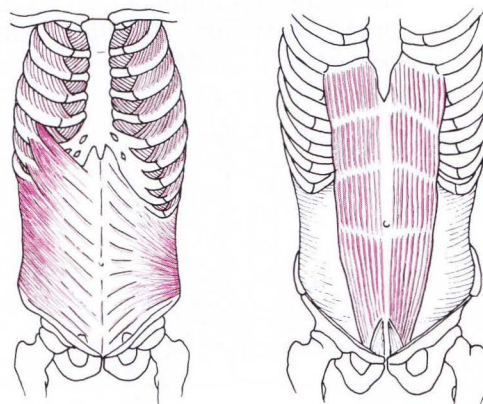
Procedure: Using this grip, *T* asks *P* to exhale while he/she gradually and fully *dorsally flexes* *P*'s thoracic spine by pushing his/her arms dorsally and cranially.

Stimulation of Antagonists: *T* retains grip with left hand, and moves right hand and forearm to over *P*'s elbows. *T* then asks *P* to exhale, look upwards and rearwards while bending backwards. *T* resists that movement to stimulate *P*'s antagonists.



Fig. 85 b. Final Position.

5.4.1C. Non-specific technique to increase dorsal flexion of the T1 on T2 to T12 on L1 segments. *P* supine.



Starting Position: *P*: Supine; firm cushion under thorax; hips and knees fully flexed to flatten lumbar lordosis; position stabilized with a belt across thighs; it may be necessary to lower the head end of the couch; hands clasped on nape of neck supporting the cervical spine. *T*: Standing facing *P*'s left side.

Grip: *T*'s right hand grips *P*'s hands and supports the thorax. *T*'s left hand grips *P*'s elbows.



Fig. 86 a. Starting Position.

Procedure: Using this grip, *T* asks *P* to exhale while he/she gradually and fully *dorsally flexes* *P*'s thoracic spine by pushing his/her arms dorsally and cranially. *T*'s right hand helps to control and regulate the movement in *P*'s thoracic spine.

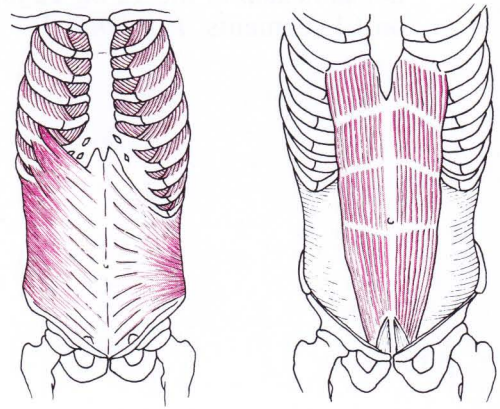
Stimulation of Antagonists: *T* retains grip and asks *P* to exhale, and look upwards while bending backwards. *T* resists that movement to stimulate *P*'s antagonists.

Note: The force in this procedure comes primarily from the weight of *P*'s upper body moving the thoracic spine dorsally. However, if *P* finds this painful, more body weight must be supported by *T*'s right hand, or by raising *P*'s upper body.



Fig. 86 b. Final Position.

5.4.1D. Non-specific technique to increase dorsal flexion of the T1 on T2 to T12 on L1 segments. *P* supine. *Alternative grip.*



Starting Position: *P*: Supine; firm cushion under thorax; hips and knees fully flexed to flatten lumbar lordosis; position stabilized with a belt across thighs; to attain reasonable range of dorsal flexion, it may be necessary to lower the head of the couch; arms crossed in front with hands supporting lower cervical-upper thoracic region. *T*: Standing facing *P*'s left side.

Grip: *T*'s right hand grips the upper part of *P*'s thoracic spine from the dorsal aspect. *T*'s right forearm supports *P*'s head. *T*'s left hand grips *P*'s elbows.



Fig. 87 a. Starting Position.

Procedure: Using this grip, *T* asks *P* to exhale while he/s gradually and fully *dorsally flexes* *P*'s thoracic spine by pushing his/her arms dorsally and cranially. *T*'s right hand helps to monitor and regulate the thoracic spine movement.

Stimulation of Antagonists: *T* retains grip and asks *P* to exhale, and look upwards while bending backwards. *T* resists that movement to stimulate *P*'s antagonists.

Note: The force in this procedure comes primarily from the weight of *P*'s upper body moving the thoracic spine dorsally. However, if *P* finds this painful, some of his/her body weight must be supported by *T*'s right hand, or reduced by raising the head end of the couch.



Fig. 87 b. Final Position.

5.4.2A. Specific technique to increase **dorsal flexion** of the T1 on T2 to T12 on L1 segments. *P supine with upper body raised.*

Starting Position: P: Supine; upper body raised; hips and knees flexed to flatten lumbar lordosis; head of couch raised to ventrally flex lumbar and thoracic vertebrae (caudal to the segment treated); wedge-shaped support against thoracic spine supporting the transverse processes of the caudal vertebra of the segment treated (here T3); hands clasped on nape of neck. T: Standing facing P's left side.

Grip: T's left hand grips P's elbows and adjusts the specific segment with small "rocking" movements (moving P's elbows cranially and caudally) so that the force is directed at the cranial vertebra (in this case T2). T's right index finger palpates the movement between the spinous processes. P's head and neck are supported by T's right wrist and forearm.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *dorsally flexes* the segment treated (in this case T2 on T3) by pushing P's elbows in a cranial and dorsal direction. (If necessary, T can apply slight traction to P's cranial vertebra in a cranial-dorsal direction using both hands).

Stimulation of Antagonists: T retains grip and asks P to exhale, and look upwards while bending backwards. T resists that movement to stimulate P's antagonists.

Notes: In treating lower thoracic segments in dorsal or ventral flexion, P may need to be in a more upright position to prevent upper body weight from excessively loading the segment treated and/or prevent uncomfortable pressure against the edge of the support wedge. The angle of the raised couch section is adjusted to suit the force required at each segment. The less the angle, the greater the force.

If P has shoulder or elbow pain, the following Alternative Grip may be used. P may also fold his/her arms across chest if he/she finds the above technique uncomfortable.

Alternative Grip: T's left hand grips P's right shoulder from the ventral aspect. T's left arm supports P's arms. T's right index and ring fingers may then stabilize the transverse processes with the middle finger against the spinous process of P's cranial vertebra. P's head and neck are supported by T's right wrist and forearm.

Alternative Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *dorsally flexes* the relevant segment by lifting P's arms in a cranial and dorsal direction. T's right fingers palpate to verify that the movement occurs at the correct segment.

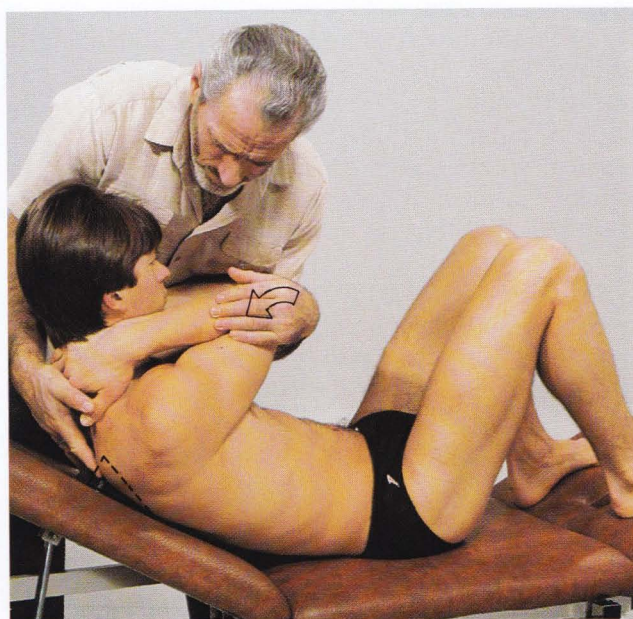
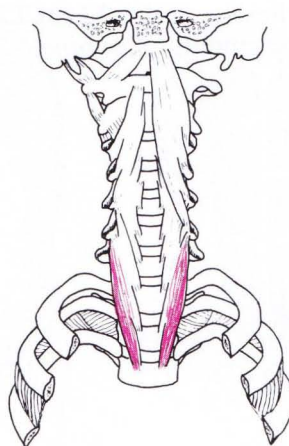
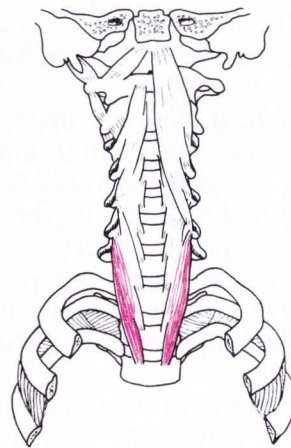


Fig. 88 a. Starting Position.



Fig. 88 b. Final Position.

5.4.2B. Specific technique to increase **dorsal flexion** of the T1 on T2 to T12 on L1 segments. *P supine.*



Starting Position: P: Supine; hips and knees flexed; right heel resting on left knee with left foot against the raised lower couch end; in this position, lumbar lordosis is flattened; hands on nape of neck (or folded across chest) to stabilize cervical spine; wedge-shaped block stabilizes the caudal vertebrae of the segment treated (in this case T3). T: Standing facing P's left side.

Grip: T's left hand grips P's elbows and adjusts the specific segment with small "rocking" movements (moving P's elbows cranially and caudally) so that the force is directed at the cranial vertebra (in this case T2). T's right index finger palpates the movement between the spinous processes. T's head and neck are supported by T's right hand and forearm.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *dorsally flexes* the relevant segment (in this case T2 on T3) by pushing P's elbows in a cranial and dorsal direction. (If necessary, T can apply slight traction to P's cranial vertebra in a cranial/dorsal direction using both hands).

Stimulation of Antagonists: T retains grip and asks P to exhale, and look upwards while bending backwards. T resists that movement to stimulate P's antagonists.

Notes: If P has shoulder or elbow pain, he/she may fold his/her arms across the chest while T uses the alternative grip of the preceding technique, 5.4.2A, p. 109

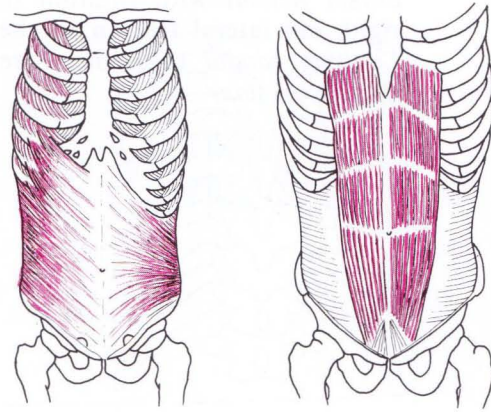


Fig. 89 a. Starting Position.



Fig. 89 b. Final Position.

5.5.1A. Non-specific technique to increase dorsal flexion with rotation to the right and lateral flexion to the left. *Locking caudal to segment treated. P sitting.*



Starting Position: P: Sitting; spine dorsally flexed; when using a 3-D stool, the lumbar spine is laterally flexed to the right by tilting the pelvis downwards on the left side, which also produces a rotation to the left of the lumbar spine (a cushion under the right buttock and thigh produces the same lateral flexion and rotation); pelvis stabilized with a belt (in this position, P's lumbar spine is prevented from rotating to the right); arms folded across chest with hands gripping shoulders. T: Standing facing P's right side.

Grip: T's right hand grips P's left shoulder from the ventral aspect. P's right shoulder is supported against T's right shoulder and chest. T's left thumb is placed on the left side of the spinous processes at P's T 12 segment. This enables T to control the *locking* of the spine up to the segments to be treated. (Or T can place his/her left hand against P's transverse processes of L1).

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *dorsally flexes* P's thoracic spine while also fully *rotating to the right* and *laterally flexing to the left* by pulling P's left shoulder ventrally and caudally. P's right shoulder simultaneously moves dorsally and cranially.

Stimulation of Antagonists: T retains grip and asks P to exhale, look upwards to the right and rearwards, and move further in the direction of stretching. T resists that movement to stimulate P's antagonists.

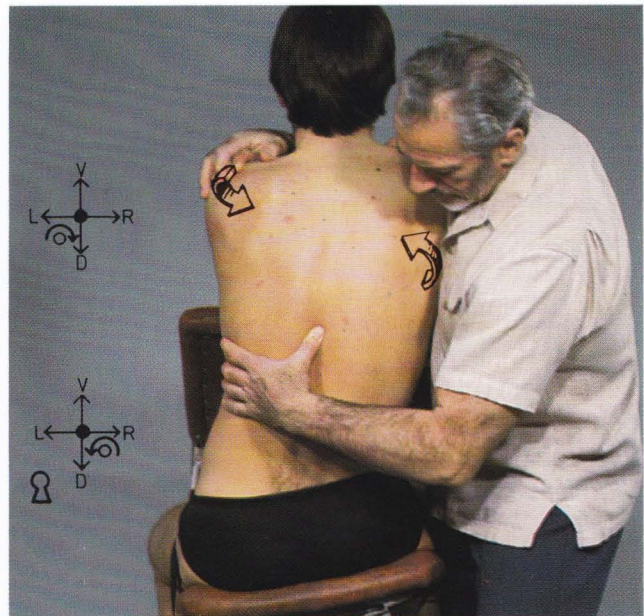


Fig. 90 a. Starting Position.

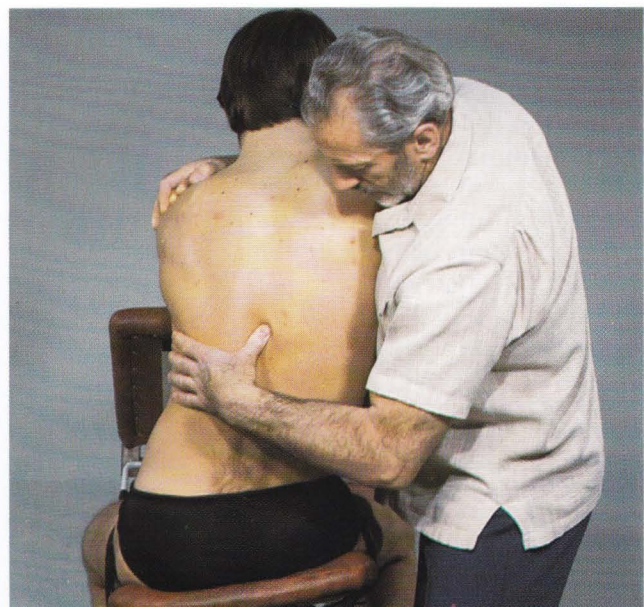
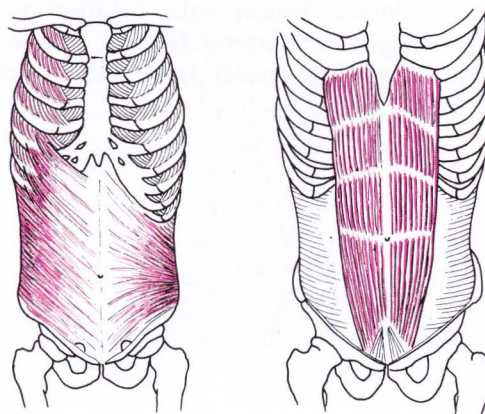


Fig. 90 b. Final Position.

5.5.1B. Non-specific technique to increase dorsal flexion with rotation to the right and lateral flexion to the left. *Locking caudal to segment treated. P lying on side.*



Starting Position: P: Lying on left side; pillow supporting head and neck; left leg extended with right hip and knee flexed approximately 90° and right foot hooked behind left knee; spine in dorsal flexion; lower end of couch raised to laterally flex lumbar spine to the right (this produces a rotation to the left of the lumbar vertebrae, which prevents them from rotating to the right during the procedure); firm cushion under torso to laterally flex thoracic spine to the left; left hand grips right shoulder. T: Standing facing P.

Grip: T's right hand grips P's right shoulder (over P's left hand). T's left index finger monitors P's T 12 segment.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *rotates* P's thoracic spine *to the right* by pushing P's right shoulder dorsally and cranially.

Stimulation of Antagonists: T retains grip and asks P to exhale, look upwards to the right and rearwards, and move further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Note: The above procedure is performed in successive steps by repositioning P in the following manner. To increase:

Lateral flexion to the left,	lower the head of the couch and/or use a larger cushion under P's torso.
Dorsal flexion,	T pulls ventrally with his left hand and/or pushes P's right shoulder dorsally.

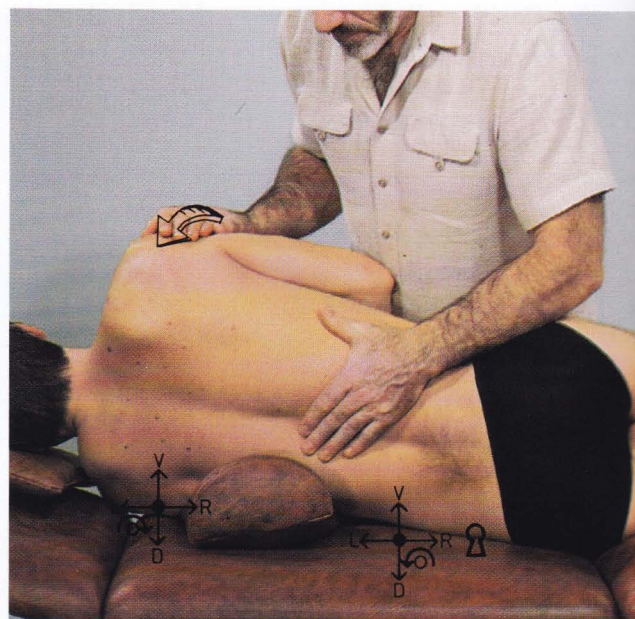


Fig. 91 a. Starting Position.



Fig. 91 b. Final Position.

5.5.2A. Specific technique to increase **dorsal flexion** with **rotation to the right** and **lateral flexion to the left** of the T1 on T2 to T12 on L1 segments. *P sitting. Locking caudal* to segment treated.

Starting Position: P: Sitting; spine dorsally flexed; when using a 3-D stool, P's lumbar and thoracic vertebrae (up to, but not including, the segment treated) are laterally flexed to the right by tilting left side of pelvis downward (this produces a rotation to the left of the vertebrae up to segment treated); a cushion under the right buttock and thigh produces the same lateral flexion and rotation; pelvis stabilized with a belt (in this position, the vertebrae up to the segment treated are prevented from rotating to the right); arms folded across chest with hands gripping shoulders. T: Standing facing P's right side.

Grip: T's right hand grips under P's left arm, forearm across P's chest. T's right little finger lies along P's rib corresponding to the **cranial** vertebra of the segment to be treated (in this case the 8th rib on the left side). T supports P's right shoulder against his/her chest. T's left thumb is placed on the left side of the spinous process of the **caudal** vertebra of the segment to be treated (in this case T9). This enables T to monitor *locking* of the vertebrae caudal to it and the movement in the specific segment to be treated. (Or T can place his/her left hand against P's transverse processes). T's right hand, arm and shoulder maintain the dorsal flexion, lateral flexion to the left and rotation to the right of P's thoracic spine (from the relevant cranial vertebra, in this case T8, and cranial to it). T's left hand helps to maintain the dorsal flexion, lateral flexion to the right and rotation to the left of P's lumbar and thoracic vertebrae (from the relevant caudal vertebra, in this case T9, and caudal to it). In this position, locking is attained below the specific segment to be treated. It is easier to maintain and monitor dorsal flexion by using the back support of the 3-D stool.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *dorsally flexes* P's thoracic spine while also fully *rotating to the right* and *laterally flexing to the left* by pulling P's left shoulder ventrally and caudally. P's right shoulder simultaneously moves dorsally and cranially.

Stimulation of Antagonists: T retains grip and asks P to move further in the direction of stretching. T resists that movement to stimulate P's antagonists.

Note: See following technique, 5.5.2B, p. 114, for *locking* cranial to and caudal to the segment treated.

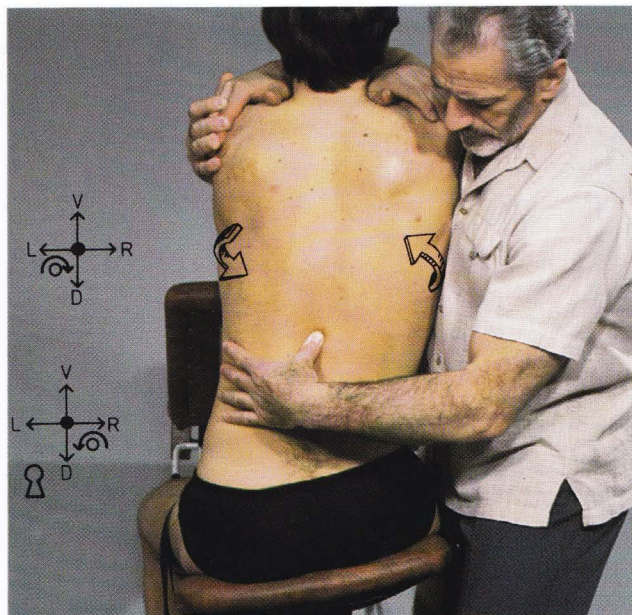
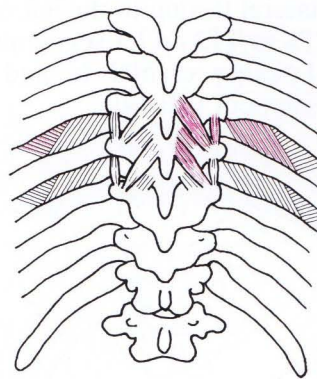


Fig. 92 a. Starting Position.

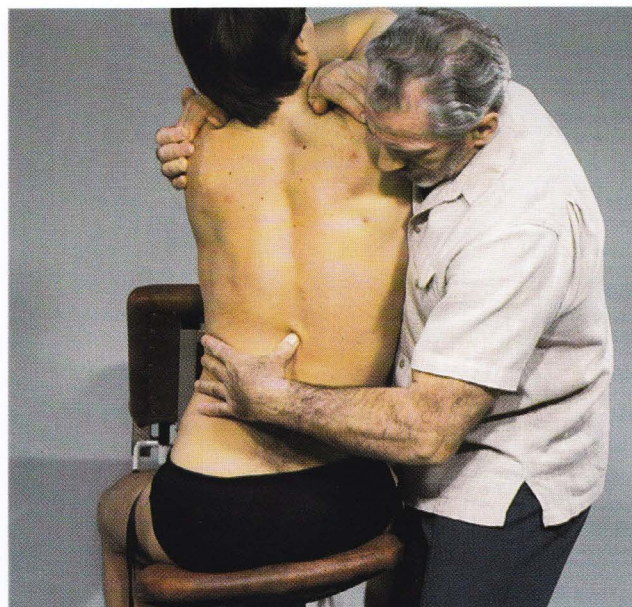
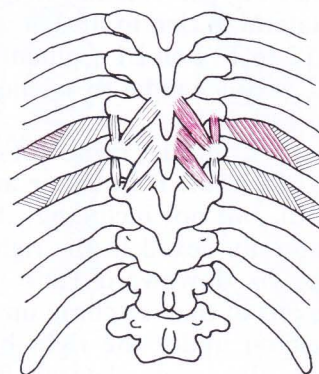


Fig. 92 b. Final Position.

5.5.2B. Specific technique to increase **dorsal flexion** with **rotation to the right** and **lateral flexion to the left** of the T1 on T2 to T12 on L1 segments. *P sitting.* *Locking cranial to and caudal to segment treated.*



If *locking cranial* to the specific segment to be treated is also desired, the following procedure may be used:

The restricted function is dorsal flexion, rotation to the right and lateral flexion to the left of T8 on T9. Maintain the same grip as described in technique 5.5.2A. The segments from T8 and cranial to it are positioned in ventral flexion and lateral flexion to the left.

The segments caudal to that treated are locked in dorsal flexion. The segment to be treated must be gradually and maximally moved into dorsal flexion. The dorsal flexion, coming from the caudal direction, must therefore “go into” the segment to be treated.

The segments cranial to that treated are locked in lateral flexion to the left. The segment to be treated must also be gradually and maximally moved into left lateral flexion, in addition to the movement into dorsal flexion described above. Therefore, the lateral flexion to the left, coming from above, must also “go into” the segment to be treated.

To achieve this *double locking*, it is important that:

- 1) The **segments caudal to that treated** be held in **dorsal flexion** and **lateral flexion to the right**.
- 2) The **segments cranial to that treated** be held in **ventral flexion** and **lateral flexion to the left**.
- 3) The **segment to be treated** be gradually and maximally moved into **dorsal flexion** and **lateral flexion to the left**.

If this procedure is not followed closely, *locking* (stabilization) is lost.

A back support caudal to the segment treated makes treatment easier and more precise.

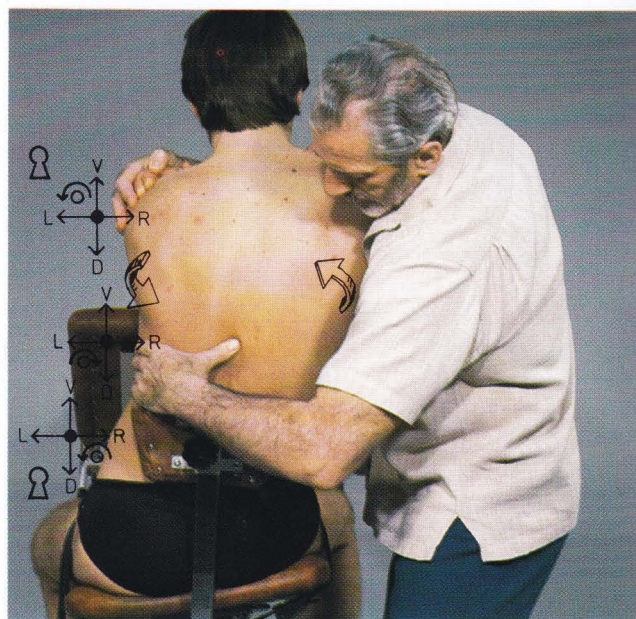


Fig. 92 c. Starting Position.

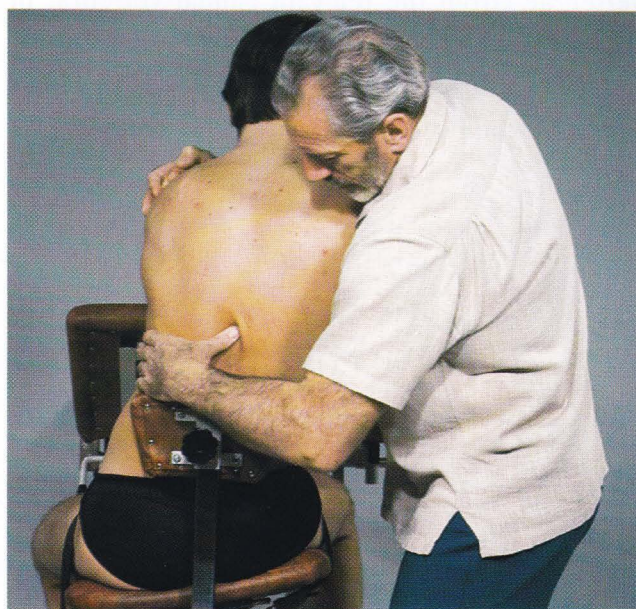
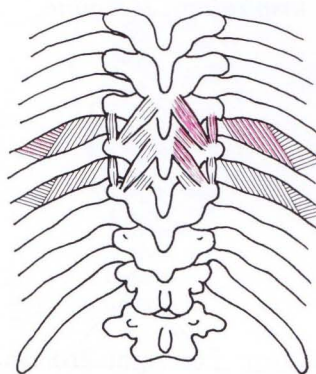


Fig. 92 d. Final Position.

5.5.2 C.

Specific technique to increase **dorsal flexion** with **rotation to the right** and **lateral flexion to the left** of the T1 on T2 to T12 on L1 segments. *Locking caudal* to segment treated. *P lying on side.*



Starting Position: P: Lying on left side; pillow supporting head and neck; left leg extended; his/her right hip and knee flexed approximately 90°; right foot hooked behind left knee; spine in dorsal flexion; lower end of couch raised to laterally flex lumbar and thoracic vertebrae to the right (up to, but not including, the segment treated); this produces a rotation to the left, which prevents the vertebrae up to the segment treated from rotating to the right; thoracic spine (cranial to the segment treated) laterally flexed to the left by a firm cushion under the torso; left hand may grip right shoulder. T: Standing facing P.

Grip: T's right hand is threaded under P's right arm, forearm and wrist against the right side of P's thorax. T's left hand and wrist support P's thorax (up to the segment to be treated), fingers stabilizing the caudal vertebra (in this case T10), and thumb stabilizing the right rib. T's left index finger palpates the spinous processes to verify that the movement occurs in the correct segment (in this case T9 on T10).

Procedure: Using this grip, T asks P to exhale while he gradually and fully rotates P's upper vertebra (here T9 on T10) *to the right* by pushing P's thorax dorsally and cranially.

Stimulation of Antagonists: T retains grip and asks P to exhale, look to the right, and move his/her thorax to the right. T resists that movement to stimulate P's antagonists.

Note: The above procedure can be performed in steps. *Dorsal flexion* is increased by T pushing P's left shoulder dorsally. T can increase the *lateral flexion to the left* by either gradually lowering the head end of the couch and/or by using a larger cushion under P's side.

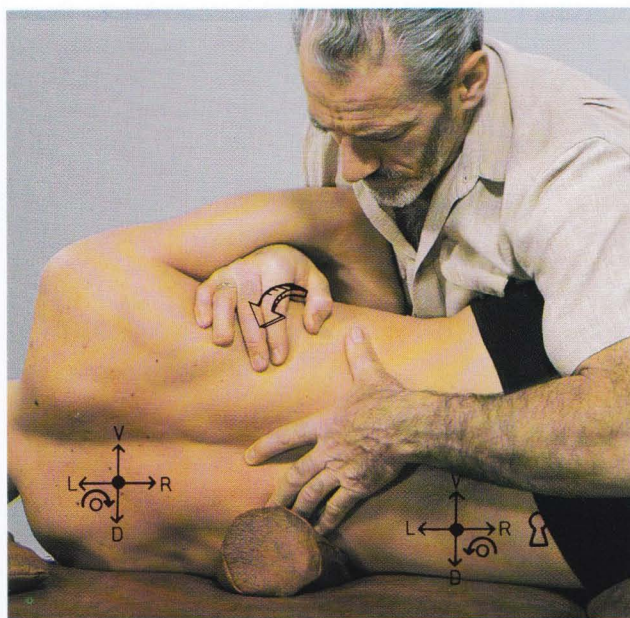


Fig. 93 a. Starting Position.

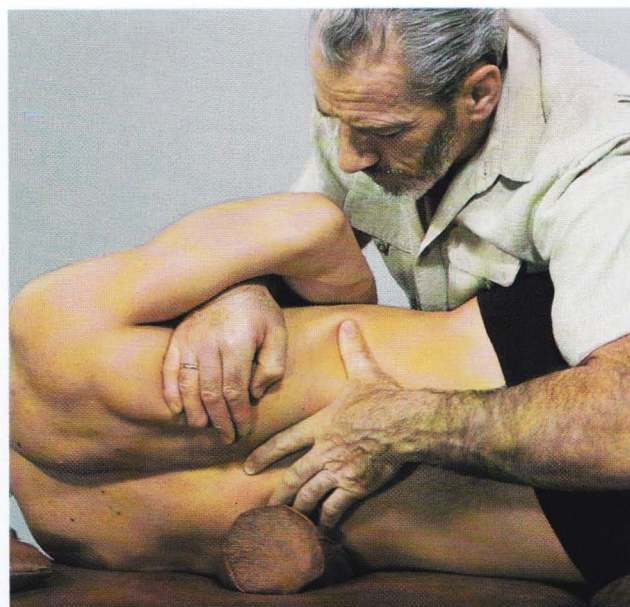
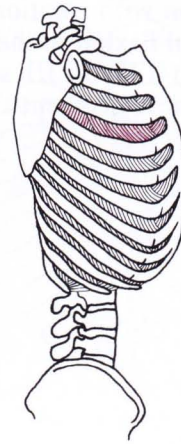


Fig. 93 b. Final Position.

5.6.1. Specific technique to increase mobility between the 2nd to 5th ribs during inspiration. *P* supine.



(Treatment shown: For right 3rd rib which does not move during inspiration but “adheres” to the 4th rib.)

Starting Position: *P*: Supine; hips and knees flexed to stabilize and protect lumbar spine; small, firm cushion under thorax to fully dorsally flex thoracic spine; right arm fully flexed and laterally rotated. *T*: Standing at head of couch, facing *P*’s right side.

Grip: *T*’s left hand grips the dorsal aspect of *P*’s upper arm just above the elbow. *P*’s right hand and forearm are supported between *T*’s left forearm and chest. *T*’s right thumb and thenar eminence are placed between *P*’s 3rd and 4th rib on the ventral aspect of the right side.

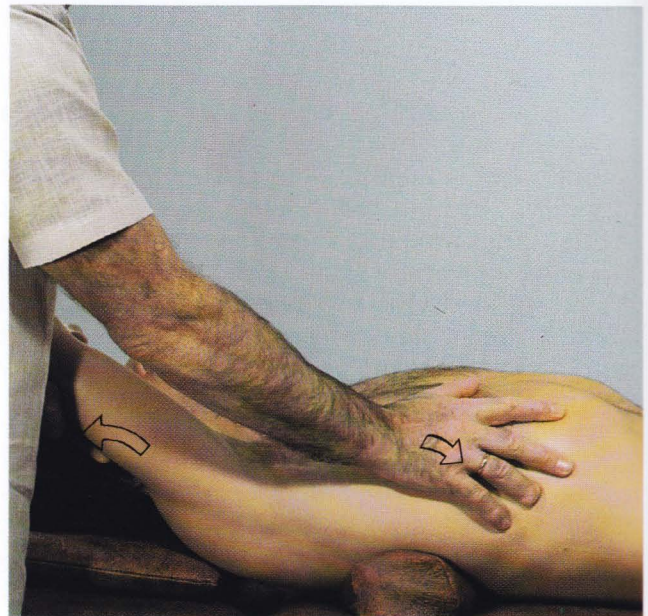


Fig. 94 a. Starting Position.

Procedure: Step one: Using this grip, *T* asks *P* to exhale. *T* resists the caudal movement of the rib by pressing cranially with his/her thumb and thenar against the caudal aspect of the 3rd rib,

Step two: *T* then asks *P* to relax and inhale while he/she gradually and fully draws right arm, shoulder girdle and 3rd rib *cranially* and *dorsally* and simultaneously pushes the 4th rib caudally and dorsally.

Stimulation of Antagonists: *T* places his/her right thumb and thenar on the ventral-cranial aspect of *P*’s 3rd rib on the right side. *T* then asks *P* to inhale while *T* resists that movement to stimulate *P*’s antagonists.

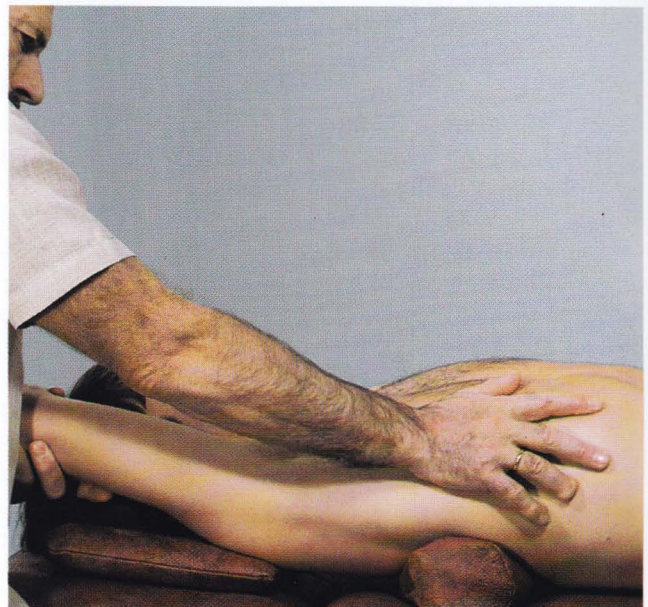


Fig. 94 b. Final Position.

5.6.2. Specific technique to increase mobility between the 5th and 12th ribs during expiration. P lying on side.

(Treatment shown: For the right 8th rib which does not move during expiration but “adheres” to the 7th rib.

Starting Position: P: Lying on left side; cushion under torso to laterally flex thoracic spine; right arm fully flexed and laterally rotated. T: Standing at head of couch, facing P’s head.

Grip: T’s left hand grips P’s upper arm just above the elbow. P’s right hand and forearm are supported between T’s left forearm and chest. T places the radial side of his/her index finger and extended thumb against P’s 8th rib from the ventral-cranial aspect. (T can also place right thumb and thenar at the same place).

Procedure: Step one: Using this grip, T asks P to inhale. T resists against the cranial movement of the 8th rib by pushing caudally.

Step two: T then asks P to exhale and relax while he/she gradually and fully *pushes* P’s 8th rib *caudally*. During expiration T stabilizes P’s right arm, shoulder girdle and 7th rib.

Stimulation of Antagonists: T retains grip with left hand, and grips with right index finger and thumb the 8th rib from the ventral-caudal aspect and asks P to exhale. During expiration T resists the caudal movement of the 8th rib to stimulate P’s antagonists.

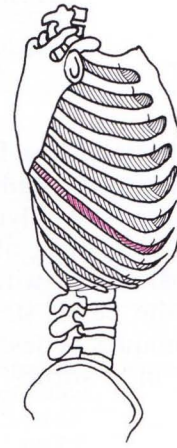


Fig. 95 a. Starting Position.

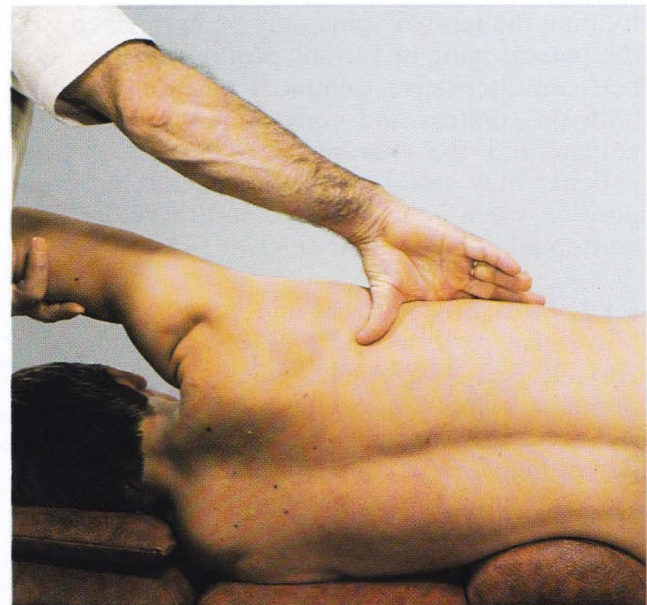


Fig. 95 b. Final Position.

6. THE LUMBAR SPINE (L1 on L2 to L5 on S1)

6.1. Therapy Guide

6.1.1. Examination

To minimize the pressure on P's intervertebral discs during treatment, the only techniques described here are those with P lying either supine, prone or on his/her side. It is, of course, possible to treat the lumbar spine with P in a sitting position and with the pelvis stabilized, in which cases the same techniques as described for treating the thoracic spine in a sitting position may be used.

6.1.2. Treatment Guidelines

Caution is the watchword in treating the spine. Therefore, in treating any restriction, *perform the non-specific techniques first*. Perform specific techniques only if the non-specific techniques elicit no contraindications to further therapy.

The therapist may instruct or direct patient eye movements and respiration to aid therapy.

Eye movements evoke reflex responses, such as "leading" movements of the head. Directing eye movement then gives the therapist control over patient head movement.

Respiration: Normal breathing, particularly exhaling, promotes relaxation, while inhaling or holding the breath are often naturally evoked when producing muscular force. Therefore, instructing the patient to *exhale* aids relaxation during stretching, while *breathing normally* promotes relaxation during sustained stretching (two minutes or more). *Inhaling* helps the patient contract against the therapist's resistance, such as during the stimulation of antagonists phase of treatment.

Many of the following therapy techniques for treating the lumbar spine may be performed with the patient lying in various positions. The choice between alternative treatment positions depends both on comfort and convenience for both the patient and the therapist. For example, some patients may not be able to tolerate a prone position when being treated, and therefore must be treated lying on their sides.

6.1.3. Movement Patterns and Locking

Movement patterns and *locking* are discussed in Part 2, pp. 14-25. The following is a short summary review for the lumbar spine.

As can be seen from the schematic representation of Fig. 7, p. 18, in ventral flexion the cervical, thoracic and lumbar spines behave similarly. However, in dorsal flexion, they differ. The movement pattern of the thoracic and lumbar spines are mirror symmetric with respect to a

coronal plane. That is, in ventral flexion, lateral flexion and rotation to the *same* side are "physiological" movements, while in dorsal flexion, lateral flexion and rotation to *opposite* sides are "physiological." The pattern for "physiological" movement in dorsal flexion appears to be the mirror image of the pattern in ventral flexion.

Segments adjacent to those treated should be stabilized so they do not follow the movement induced to effect treatment. Stabilization always requires *inflection*, or changes of flexion, either in the sagittal or the frontal planes. Basic stabilization of the thoracic spine involves changing flexion from ventral to dorsal or vice versa. For instance, treatment of a segment in ventral flexion is most effective if its adjacent (superior and inferior) segments are placed in dorsal flexion.

However, when rotation and/or lateral flexion are restricted in ventral or dorsal flexion, it is possible and necessary to *lock* the segments above and/or below more securely than is possible by inflection in the sagittal plane alone. *Locking* is then attained by changing flexion and/or rotation in the frontal plane. This type of *locking*, most often used in non-specific techniques, involves retaining ventral/dorsal flexion but changing to the *opposite* lateral flexion and rotation to effect the *lock*. End feel indicates when *locking* is attained. It may be necessary to stretch the muscles and other structures in order to *lock* the segments. *Movement must not be forced beyond that necessary to attain the desired fixation by locking.*

Double locking ("above" and "below" the segment treated) is possible throughout the lumbar spine, and always involves inflections in both the sagittal and frontal planes. As discussed in Part 2, p. 23, there must be only *one inflection per locking*. So one of the two inflections required for *double locking* will involve a change from ventral to dorsal flexion, and the other inflection will involve a change from right to left lateral flexion. This is equivalent to the requirement that the segment treated must "receive" the flexions of the treatment from its adjacent *locked* segments, ventral/dorsal flexion from one direction and right/left lateral flexion from the other direction.

6.1.4. Restrictions, Muscles and Therapies

The non-specific and specific therapy techniques for treating restrictions of the lumbar spine are listed in Table 6-1. The actions of the muscles which may cause those restrictions are listed in Table 6-2. The various restrictions possible are listed in Movement Restriction Table 8.3, p. 145. and 146.

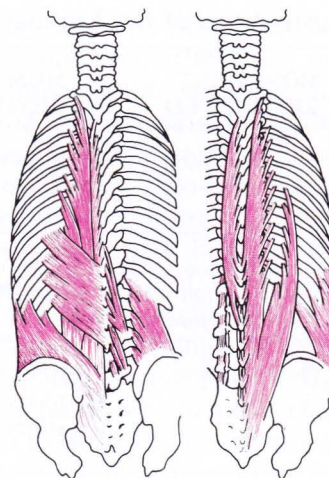
Table 6-1. Restrictions of the Lumbar Spine

SECTION	MOVEMENT RESTRICTED	MUSCLES WHICH MAY RESTRICT MOTION	TECHNIQUE/ THERAPY	Number, Page
6.2.	<i>Ventral Flexion</i>	Most on dorsal side of torso, as well as stiffness of spine itself	non-specific specific, L5 on S1 specific, L5 on S1	6.2.1, 120-122 6.2.2, 123 6.2.3, 124
6.3.	<i>Ventral flexion with lateral flexion and rotation to same side</i>	Most of torso, as well as stiffness of spine	non-specific specific, L5 on S1 specific, L1 on L2	6.3.1, 125-127 6.3.2, 128 6.3.3, 129
6.4.	<i>Dorsal flexion</i>	Most on ventral side of torso, as well as stiffness of spine	non-specific relatively specific, thoraco-lumbar transition specific, L5 on S1 specific, L1 on L2	6.4.1, 130-131 6.4.2, 132 6.4.3, 133 6.4.4, 134
6.5.	<i>Dorsal flexion with lateral flexion and rotation to opposite sides</i>	Most of torso, as well as stiffness of spine	non-specific specific, L5 on S1 specific, L1 on L2	6.5.1, 135-137 6.5.2, 138 6.5.3, 139

Table 6-2. Actions of muscles which may restrict movement of the lumbar spine

MUSCLE	ACTION
rectus abdominis	Ventral flexes thoracic and lumbar spine; supports abdominal wall.
external and internal oblique	Move upper body with respect to pelvis and vice versa; tense abdominal wall; compress abdominal viscera.
iliopsoas	Ventral and laterally flexes lumbar spine, flexes and laterally rotates at hip, abducts or adducts (depending on which extreme position hip is in).
psoas major	Ventral and laterally flexes lumbar spine, flexes and laterally rotates at hip, abducts or adducts (depending on which extreme position hip is in).
psoas minor	Ventral and laterally flexes trunk on pelvis.
quadratus lumborum	Laterally flexes lumbar spine to the same side, aids forced expiration.
iliocostalis lumborum	Dorsal and laterally flexes spine to the same side.
intertransversarii	Laterally flex spine to the same side.
interspinales	Dorsal flex spine.
rotatores	Dorsal flex and rotate to opposite side.
multifidi	Dorsal flex and rotate to opposite side.

6.2.1A. Non-specific technique to increase **ventral flexion**. *P* lying on side.



Starting Position: *P*: Lying on left side; hips and knees flexed approximately 90°; cushion may be placed under waist to prevent lumbar spine scoliosis. *T*: Standing facing *P*'s trunk.

Grip: *P*'s knees supported against *T*'s abdomen and left thigh. *T*'s right hand stabilizes *P*'s T12-L1 segment. *T*'s left hand presses against *P*'s sacrum and pelvis.

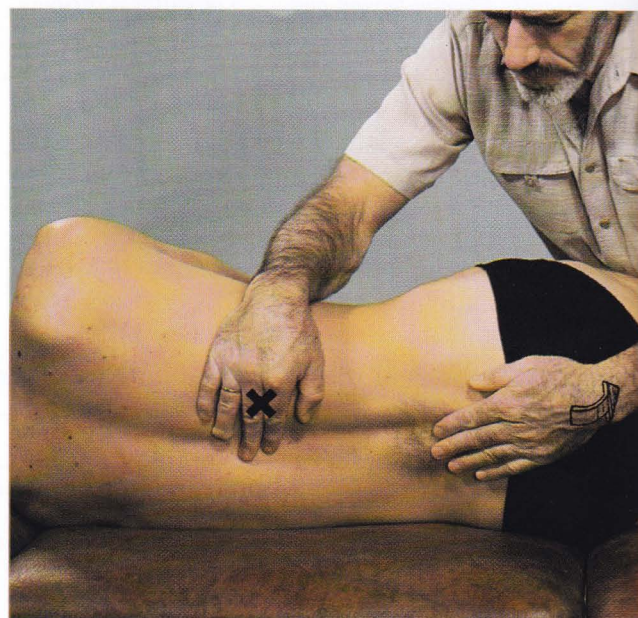


Fig. 96 a. Starting Position.

Procedure: Using this grip, *T* asks *P* to exhale while he/she gradually and fully *ventrally flexes* *P*'s lumbar spine by moving his/her body to the right.

Stimulation of Antagonists: *T* retains grip and asks *P* to exhale and maximally ventrally flex lumbar spine. *T* resists that flexion to stimulate *P*'s antagonists.

Note: In the final position *P*'s hips and knees should be fully flexed, so that the pelvis is involved in the ventral flexion.

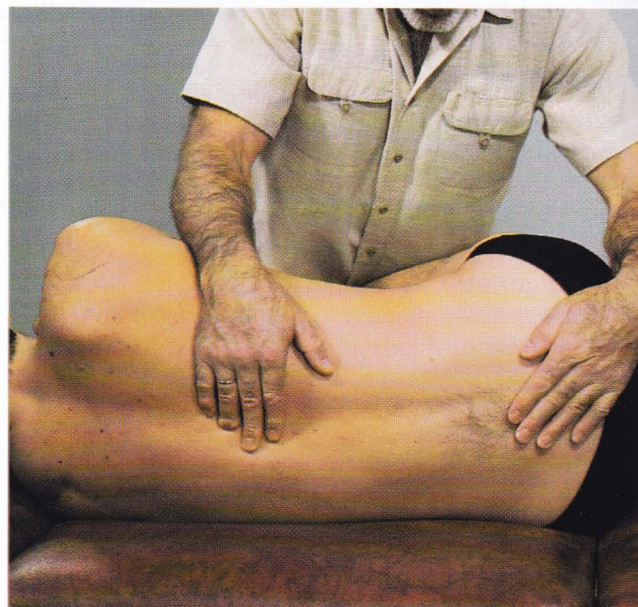
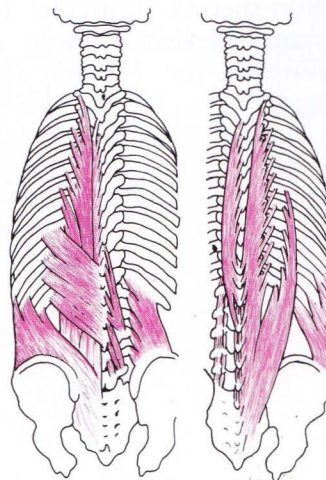


Fig. 96 b. Final Position.

6.2.1B. Non-specific technique to increase ventral flexion. *P* prone.



Starting Position: *P*: Prone; legs and pelvis over couch end; cushion under abdomen; feet resting lightly against floor; hands holding on to the sides of the couch. *T*: Standing facing *P*'s left side.

Grip: *T*'s left hand stabilizes *P*'s T12-L1 segment. *T*'s right hand is placed on *P*'s sacrum and pelvis.

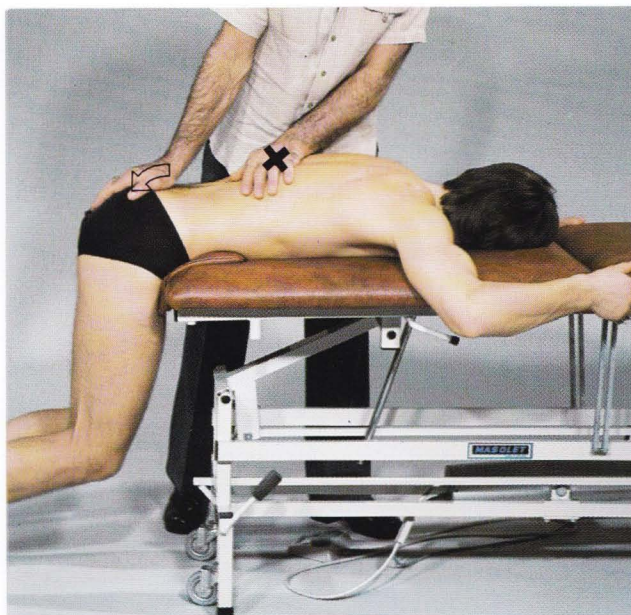


Fig. 97 a. Starting Position.

Procedure: Using this grip, *T* asks *P* to exhale while he/she gradually and fully *ventrally flexes* *P*'s lumbar spine by pressing against *P*'s sacrum and pelvis.

Stimulation of Antagonists: *T* retains grip with left hand (supporting it with the right hand), and asks *P* to maximally ventrally flex lumbar spine. *T* resists that flexion to stimulate *P*'s antagonists.

Note: If *P*'s back muscles are especially strong, then the following alternative technique, 6.2.1C, p. 122 may be used. Here *P*'s hips and knees are extended (off the floor) to increase loading; *P* then needs only to relax his/her lower back muscles during the procedure.

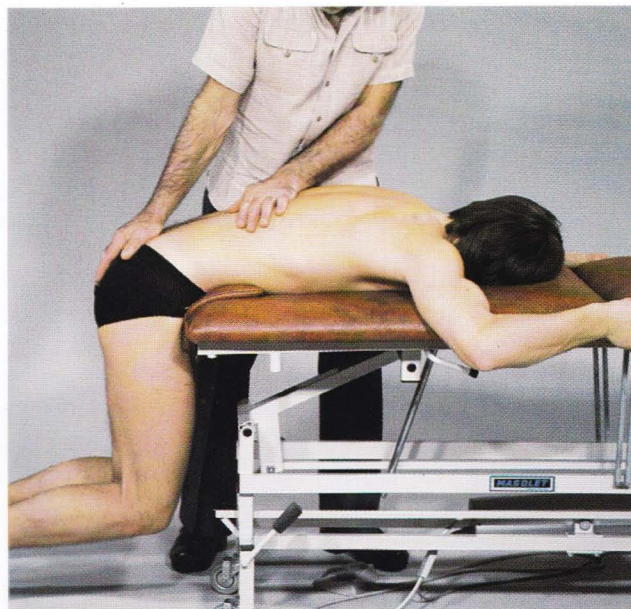
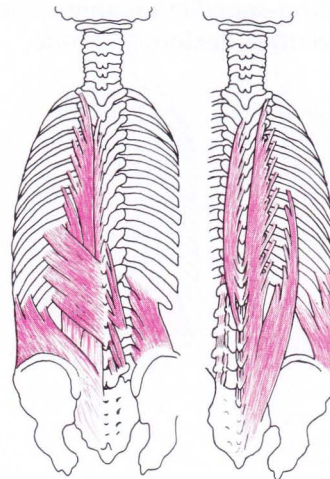


Fig. 97 b. Final Position.

- 6.2.1C. Non-specific technique to increase **ventral flexion** *P* prone. Alternative position for *P* with strong back muscles.



Starting Position: *P*: Prone; legs and pelvis over couch end; cushion under abdomen; hips and knees extended with legs horizontal or above horizontal; hands holding on to the sides of the couch. *T*: Standing facing *P*'s left side.

Grip: *T*'s left hand stabilizes *P*'s T12-L1 segment. *T*'s right hand is placed on *P*'s sacrum and pelvis.

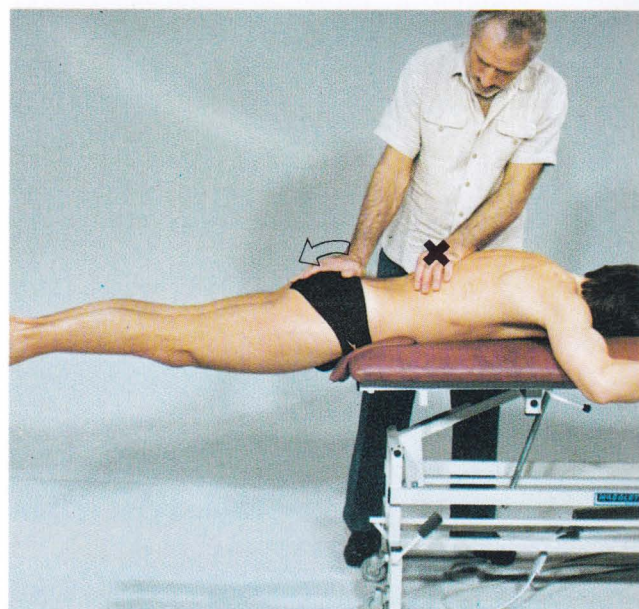


Fig. 97 c. Starting Position.

Procedure: Using this grip, *T* asks *P* to exhale and relax back muscles to gradually sink both legs *and* pelvis down towards floor, keeping knees extended. The movement should only *ventrally flex* *P*'s lumbar spine; there should be no movement at the hip joints. *T* guides and may aid the movement by pressing against *P*'s sacrum and pelvis.

Stimulation of Antagonists: *T* retains grip with left hand (supporting it with the right hand), and asks *P* to drop legs and pelvis towards floor, by flexing in lumbar spine (*not* the hip joints). *T* resists lumbar spine flexion to stimulate *P*'s antagonists.

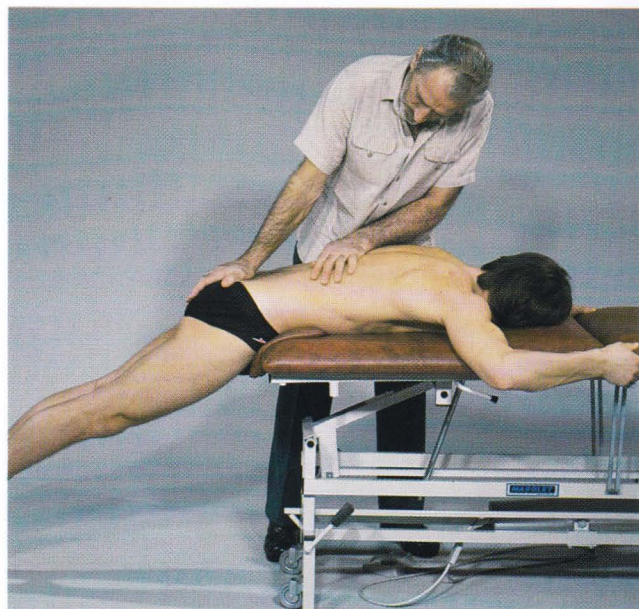
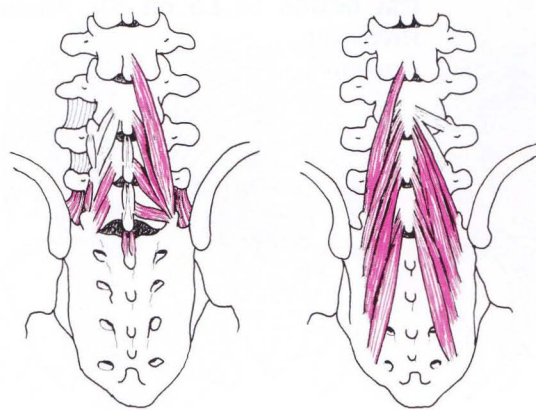


Fig. 97 d. Final Position.

6.2.2. Specific technique to increase **ventral flexion** of L5 on S1.
P prone.



Starting Position: P: Prone; lumbar spine ventrally flexed with a firm cushion under the abdomen at the cranial vertebra of the segment treated (in this case L5 on S1); if possible, the middle of the couch should also be raised. T: Standing facing P's left side.

Grip: T's right hypothenar is placed over P's spinous process of L5 with the rest of his hand stabilizing the segments cranial to it. T's left thenar/hypothenar is placed on P's sacrum.

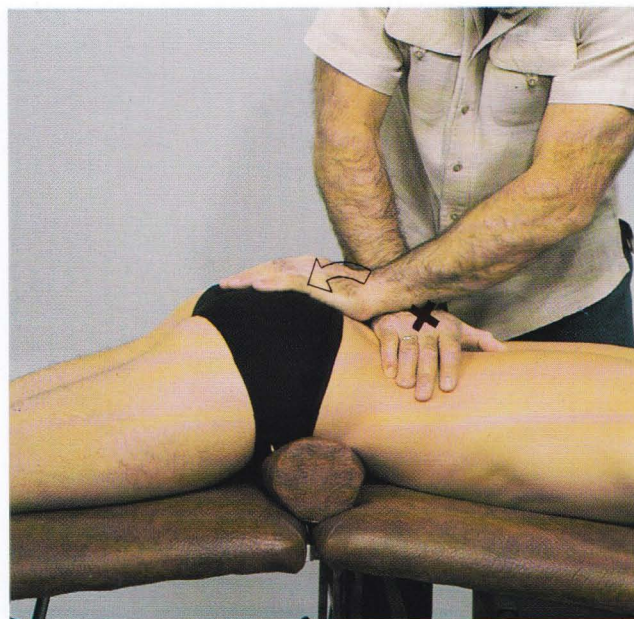


Fig. 98 a. Starting Position.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *ventrally flexes* L5 on S1 by pushing P's sacrum caudally and ventrally.

Stimulation of Antagonists: T places left hand on top of right and asks P to exhale while rotating pelvis backwards (pulling symphysis towards thorax). T resists that backwards rotation to stimulate P's antagonists.

Note: When treating a lumbar segment cranial to L5, T's left thenar or hypothenar should be placed against the spinous process of the **caudal** vertebra in the segment to be treated. T's right hypothenar then stabilizes the spinous process of the **cranial** vertebra in the same segment. Otherwise the technique is performed as above.

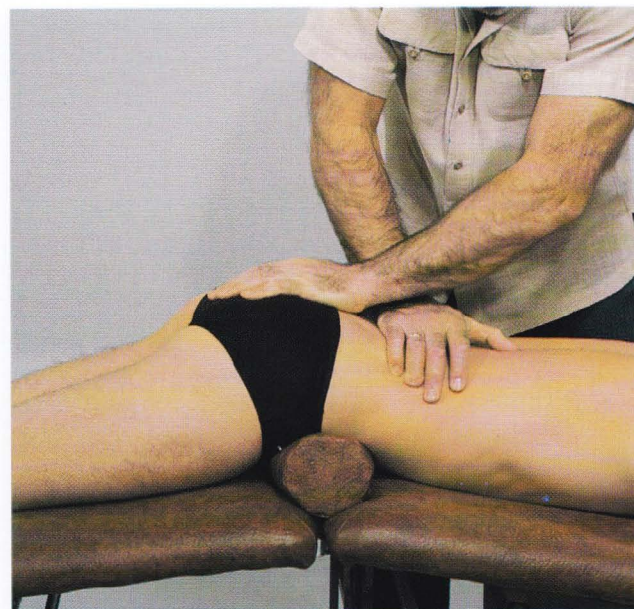
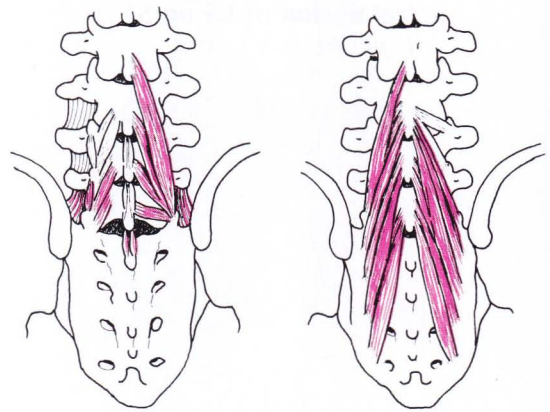


Fig. 98 b. Final Position.

6.2.3. Specific technique to increase **ventral flexion** of L5 on S1. *Maximal stretching.*
P prone.



Starting Position: P: Prone; legs and pelvis over couch end; lumbar spine ventrally flexed using a firm cushion under the abdomen at the cranial vertebra of the segment treated (in this case L5 on S1); feet resting lightly on the floor; hands holding on to sides of couch. T: Standing facing P's left side.

Grip: T's right hypothenar is placed over P's spinous process of L5 with the rest of the hand stabilizing the segments cranial to it. T's left thenar/hypothenar is placed against P's sacrum.

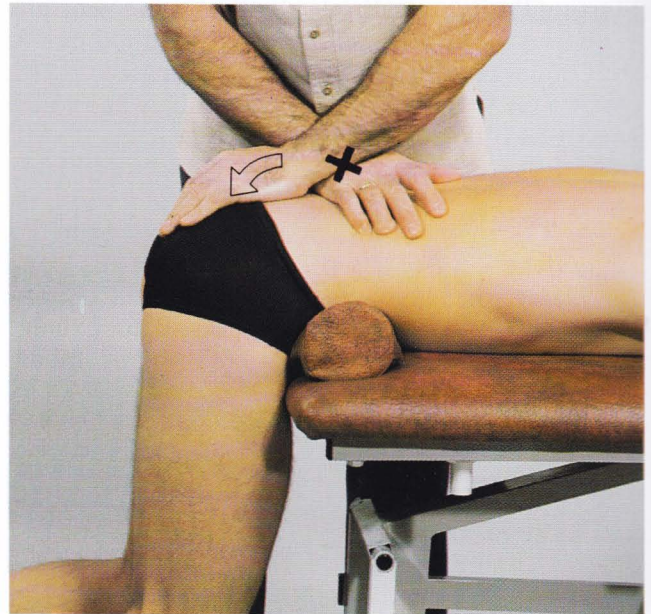


Fig. 99 a. Starting Position.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *ventrally flexes* L5 on S1 by pushing P's sacrum caudally and ventrally.

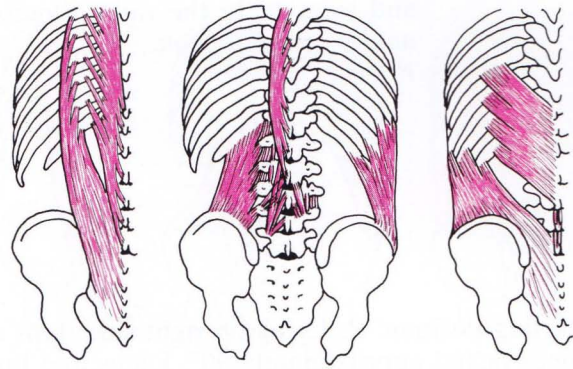
Stimulation of Antagonists: T places left hand on top of right and asks P to exhale while rotating pelvis backwards (pulling symphysis towards thorax). T resists that backwards rotation to stimulate P's antagonists.

Note: This technique should be used to obtain **maximal ventral flexion** of L5 on S1, but only if P's physical condition permits.



Fig. 99 b. Final Position.

6.3.1A. Non-specific technique to increase **ventral flexion** with **rotation** and **lateral flexion to the right**. *Predominantly rotation.*
P lying on side.



Starting Position: P: Lying on left side; hips and knees flexed approximately 90°; spine ventrally flexed; head of couch raised to laterally flex lumbar spine to the right; pelvis may be stabilized with a belt. T: Standing facing P.

Grip: T's right hand is threaded under P's right arm, with forearm and wrist against the right side of P's thorax. To maintain ventral flexion and stabilize P's pelvis, T's left hand grips P's right iliac crest and sacrum, and P's knees are supported against T's abdomen and left thigh.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully rotates P's lumbar spine *to the right* by pushing P's thorax dorsally and caudally. T also gradually and fully *laterally flexes* P's lumbar spine to the right by raising couch section to elevate P's upper body.

Stimulation of Antagonists: T retains grip and asks P to exhale, look to the right, and rotate to the right. T resists that rotation to stimulate P's antagonists.

Notes: This procedure is performed in successive steps by repositioning P in the following manner. To increase:

Lateral flexion to the right,	raise the head end of the couch.
Rotation to the right,	pull P's left arm and shoulder ventrally.
Ventral flexion,	flex P's hip further.

To obtain **maximal rotation** to the right of P's lumbar spine:

- 1) P's pelvis must be fully rotated to the left by pulling it further ventrally.
- 2) Left side of P's pelvis must be tilted caudally, which increases lateral flexion to the right.

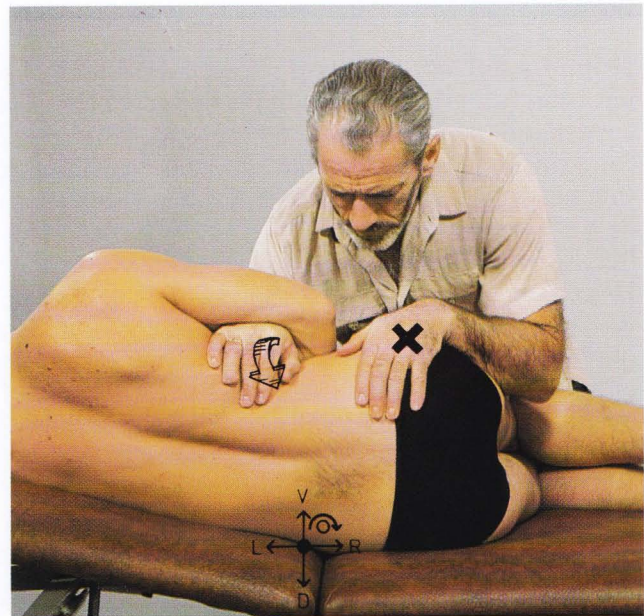


Fig. 100 a. Starting Position.

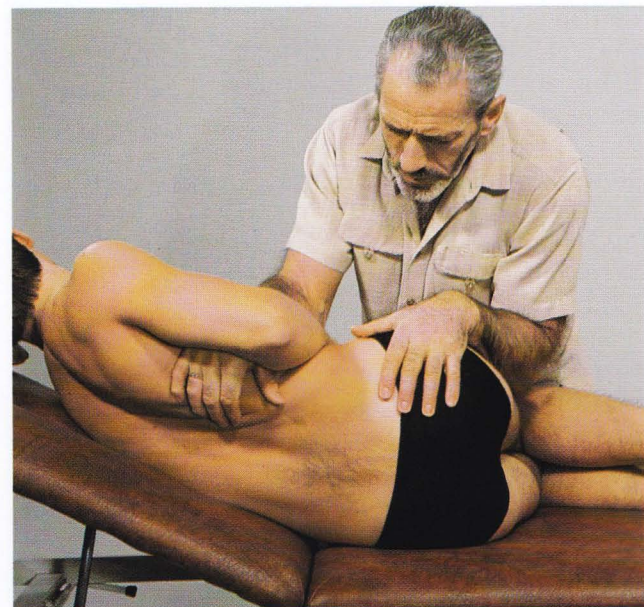
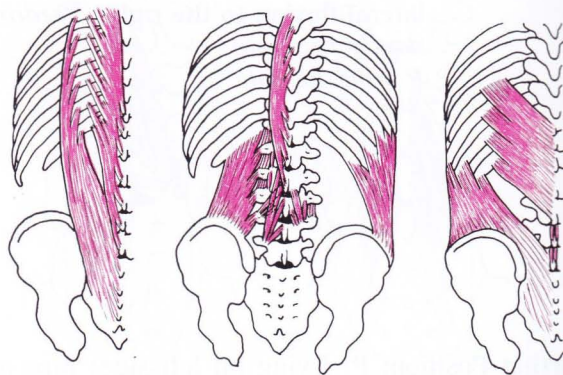


Fig. 100 b. Final Position.

6.3.1B. Non-specific technique to increase **ventral flexion** with **lateral flexion** and **rotation to the right**. *Predominantly lateral flexion.*
P lying on side.



Starting Position: P: Lying on right side; hips and knees flexed approximately 90°; knees and lower legs over side of the couch; spine ventrally flexed; firm cushion under waist to laterally flex and rotate lumbar spine to the right. T: Standing facing P.

Grip: T's left hand grips P's lower thorax on the left side, forearm lying along P's upper thorax. T's right hand grips P's left iliac crest with the right forearm lying along the lateral aspect of P's left thigh.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *laterally flexes* P's lumbar spine *to the right* by both pushing P's pelvis and left thigh caudally with right forearm and pushing P's thorax cranially with left forearm. P aids T during the procedure by gradually lowering his/her legs below the level of the couch. T simultaneously *rotates* P's lumbar spine *to the right* by both pushing P's left iliac crest dorsally with right hand and pulling P's thorax ventrally with left hand.

Stimulation of Antagonists: T retains grip with left, and moves right hand to right side of P's right lower leg. T then asks P to move feet towards floor, and resists that movement to stimulate P's antagonists.

Note: To increase the ventral flexion, flex P's hips further.

To obtain **maximal lateral flexion** to the right of P's lumbar spine:

- 1) Place a larger cushion under P's waist (this also increases rotation to the right).
- 2) P's pelvis must be rotated as fully as possible to the left by pushing it further dorsally and caudally.
- 3) P's thorax must be rotated as fully as possible to the right by positioning it further ventrally and cranially.

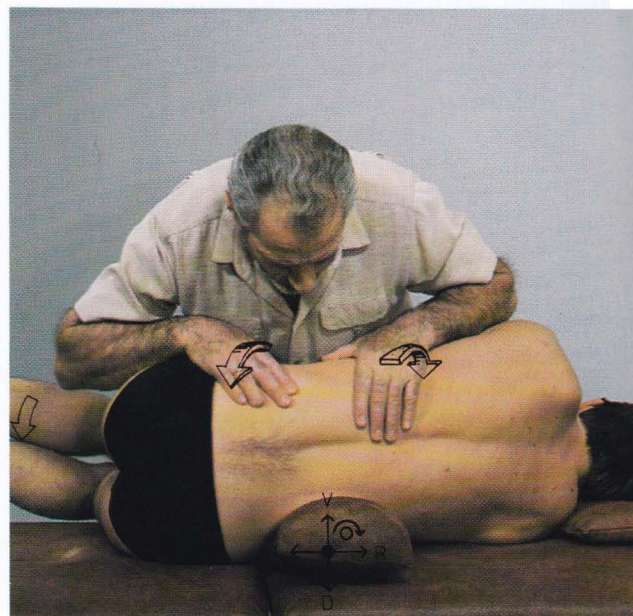
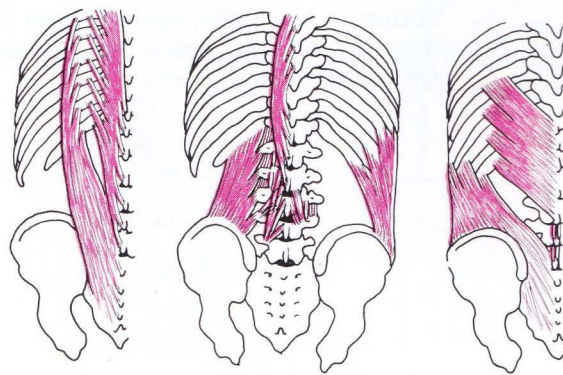


Fig. 101 a. Starting Position.



Fig. 101 b. Final Position.

- 6.3.1C. Non-specific technique to increase **ventral flexion** with **lateral flexion** and **rotation to the right**. *Maximal stretching.*
P lying on side.



Starting Position: P: Lying on right side; head of couch raised slightly; upper body over couch end at head (the higher the area in P's lumbar spine to be treated, the less P's upper body extends beyond couch end); it may be necessary to place a cushion under P's right side to prevent any pain caused by pressure against couch edge; hips and left knee extended with his/her right knee flexed approximately 90°; legs stabilized with a belt across the lower legs; lumbar spine ventrally flexed; arms folded across chest. T: Standing facing P.

Grip: T's left hand grips P's right shoulder, arm supporting P's shoulder and chest. T's right hand stabilizes P's pelvis. (If necessary, T's right forearm may be used to stabilize P's pelvis while T's right fingers monitor the movement of the lumbar spine).

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *laterally flexes* and rotates P's lumbar spine *to the right* by slowly lowering P's upper body below the level of the couch and pushing P's left shoulder ventrally and towards the floor.

Stimulation of Antagonists: T retains grip and asks P to exhale, while ventrally flexing and rotating to the right. T resists that movement to stimulate P's antagonists.

Notes: If P is not sufficiently strong and/or T finds this technique difficult, then P may support own weight by placing his/her right hand against the floor (or a chair). Alternatively, T can stabilize P's pelvis with a belt and support P's upper body with both arms.

This technique should be used to obtain **maximal lateral flexion** and **rotation** to the right of P's lumbar spine, but only if P's physical condition permits.

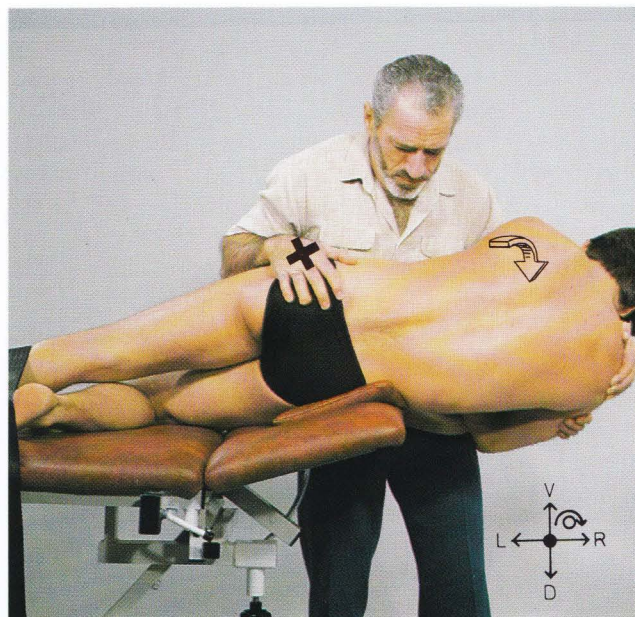


Fig. 102 a. Starting Position.

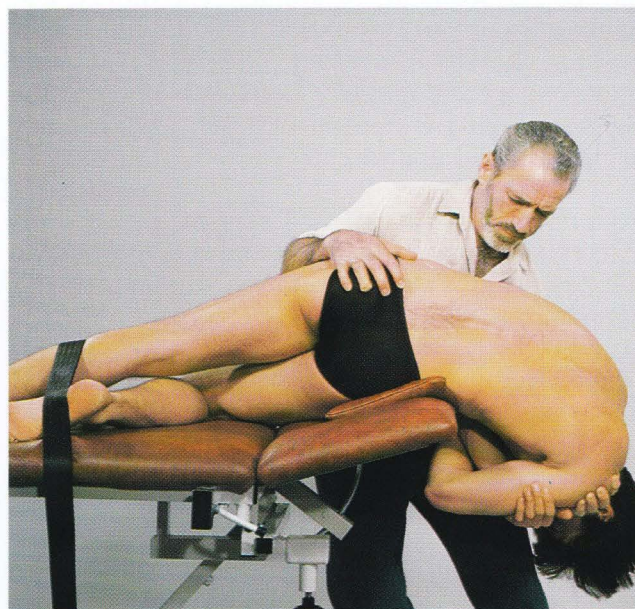
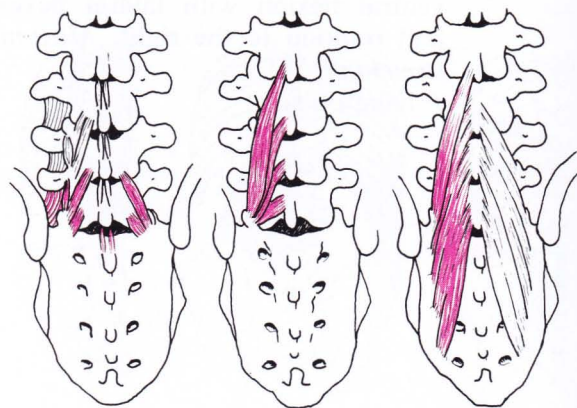


Fig. 102 b. Final Position.

- 6.3.2. Specific technique to increase **ventral flexion** with **rotation** and **lateral flexion to the right** of the **L5 on S1** segment. *Locking cranial to segment treated. P lying on side.*



Starting Position: P: Lying on left side; left leg extended; right hip and knee flexed approximately 90°; right foot hooked behind left knee; spine ventrally flexed; vertebrae cranial to L5 laterally flexed to the left by a firm cushion under the waist; this produces a rotation to the left, which *locks* segments cranial to L5 from rotating to the right; the L5-S1 segment must be in the neutral position; left hand grips right wrist. T: Standing facing P's trunk.

Grip: T's right hand is threaded under P's right arm, with thumb on the right side of the spinous process of P's L5 vertebra (the tip also palpating the spinous process of S1 to monitor the movement). T's right forearm lies along P's right thorax. T's left hand and wrist are placed against P's right iliac crest with left forearm lying along the lateral aspect of P's right thigh.

Procedure: To stabilize the lumbar spine including the L4-L5 segment, T rotates P's thorax and lumbar spine to the right. Maintaining this position, T asks P to exhale while gradually and fully *rotating* and *laterally flexing* L5 on S1 to the *right* by pulling P's pelvis ventrally and cranially using left hand and forearm.

Stimulation of Antagonists: T retains grip and asks P to exhale, look to the right and rotate thorax to the right. T resists that rotation to stimulate P's antagonists.

Note: To obtain **maximal rotation** to the right of L5 on S1:

- 1) P's pelvis must be fully rotated to the left by pulling it further ventrally and cranially.
- 2) P's pelvis must be tilted caudally to the left and/or a larger cushion placed at the waist to increase lateral flexion to the right.



Fig. 103 a. Starting Position.



Fig. 103 b. Final Position.

6.3.3. Specific technique to increase **ventral flexion with rotation and lateral flexion to the right of the L1 on L2 segment**. *Locking cranial to and caudal to segment treated. P lying on side.*

Starting Position: P: Lying on left side; left hip and knee fully flexed to ventrally flex lumbar spine; right leg extended to tilt right side of pelvis caudally, which laterally flexes and rotates the lumbar spine (up to L2) to the left; to obtain adequate lateral flexion and rotation to the left, it may be necessary to place the right leg over the side of the couch (towards T), with perhaps a cushion under the waist (if P has a small pelvis); The thoracic spine cranial to L1 dorsally flexed and the head of couch raised to obtain lateral flexion to the right. (This produces a rotation to the left, which *locks* segments cranial to L1 from rotating to the right.) left hand grips right forearm. T: Standing facing P.

Grip: T's right hand threads under P's right arm, thumb against the right side of the spinous process at P's L1 vertebra (tip palpating the L2 spinous process to monitor movement). T's right forearm lies along P's right thorax. T's left fingers are on the left side of the spinous process of L2 and caudal to it to monitor *locking* of the vertebrae. T's left forearm lies against P's right pelvis.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *rotates* L1 on L2 to the right and laterally flexes to the right by pushing P's thorax dorsally and caudally. T's left hand and forearm support P's pelvis and lumbar spine (including L2) from the caudal direction.

Stimulation of Antagonists: T retains grip (reversing its force) and asks P to exhale, look to the right, and rotate thorax to the right. T resists that rotation to stimulate P's antagonists.

Notes: The right rotation of L1 relative to L2 may be produced by: 1) T's left hand and forearm stabilizing L2 caudally, and right hand rotating L1 to the right, or 2) T's right hand and forearm stabilizing L1 cranially, and left hand rotating L2 to the left. T's right hand and forearm control rotation and lateral flexion to the right and the dorsal flexion of P's thoracic spine cranial to L1. The right lateral flexion is "transmitted" caudally to the L1-L2 segment. T's left hand and forearm control rotation and lateral flexion to the left and the ventral flexion of P's lumbar spine caudal to L2. The ventral flexion is "transmitted" cranially to the L1-L2 segment. In this manner, T produces full ventral flexion with rotation and lateral flexion to the right at the L1-L2 segment, as well as *locking* both caudal to and cranial to the segment. This treatment is therefore *specific* to one segment.

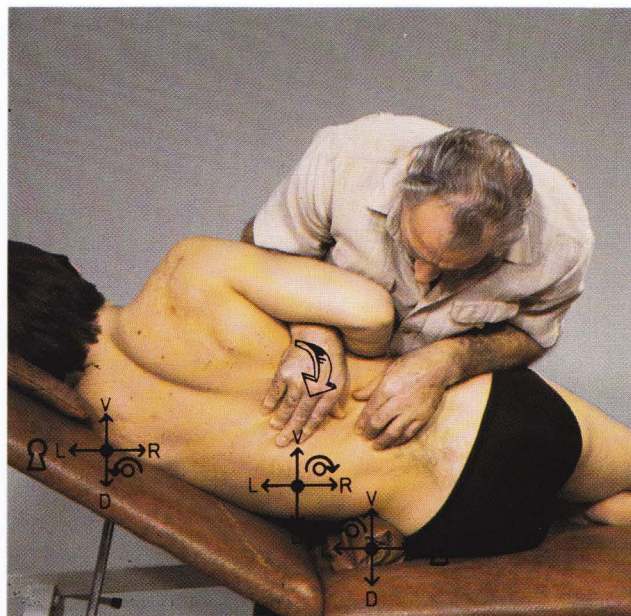
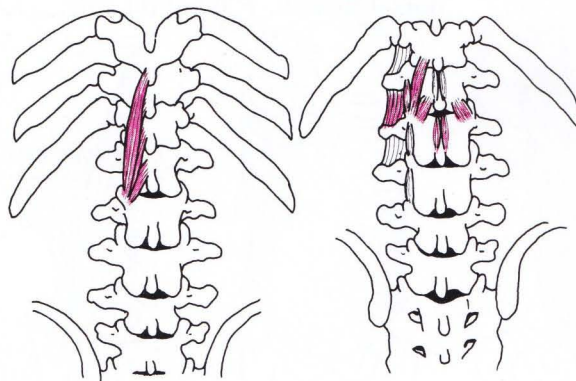


Fig. 104 a. Starting Position.

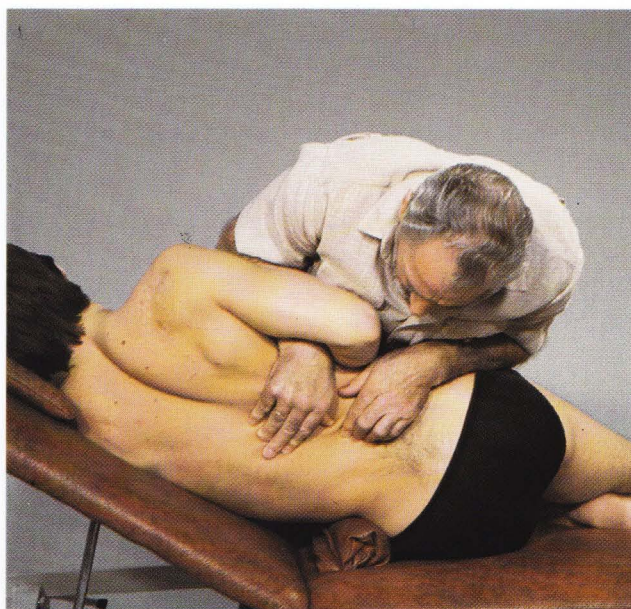


Fig. 104 b. Final Position.

8. MOVEMENT RESTRICTION TABLES

The following tables list the various movements which may be restricted, indexed to the muscles which, when shortened, cause the restrictions.

The tables may be used *diagnostically*, to identify the muscles which may be involved in restricting particular movements. Or they may be used *analytically*, to identify the movements which may be restricted by the shortening of particular muscles.

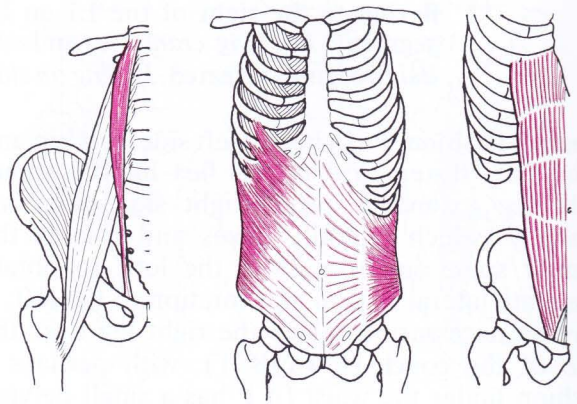
In most, but not all cases, a shortened muscle causes restriction to motion in an opposite manner to its main action. In some cases, actions and/or restricting effects may change when muscles are in extreme positions. For the spine and TM joint and associated structures, these effects are not as pronounced as they are for the muscles associated with movements of the extremities (see Volume I). They are nonetheless present to some degree in all extreme movements.

8.1. Table of HEAD AND NECK (CERVICAL SPINE) MOVEMENTS RESTRICTED BY SHORTENED MUSCLES

●● = Primary restrictor ● = Secondary restrictor

SHORTENED MUSCLE	RESTRICTED MOVEMENT					
	Ventral flexion	Dorsal flexion	Lateral flexion to the same side	Lateral flexion to the opposite side	Rotation to the same side	Rotation to the opposite side
sternocleido-mastoideus				●●	●●	
scalenus anterior		●		●●	●●	
scalenus medius		●		●●	●●	
scalenus posterior	●			●		●
trapezius, descending part	●			●	●	
longus colli		●		●		●
longus capitis		●		●		●
rectus capitis anterior		●		●		●

6.4.1A. Non-specific technique to increase dorsal flexion. *P* lying on side.



Starting Position: *P*: Lying on left side; hips and knees flexed approximately 90°; cushion under waist to prevent lumbar spine scoliosis. *T*: Standing facing *P*.

Grip: *P*'s knees are supported against *T*'s abdomen and thighs. *T*'s hands are on top of one another pressing *P*'s lumbar segments to increase dorsal flexion.

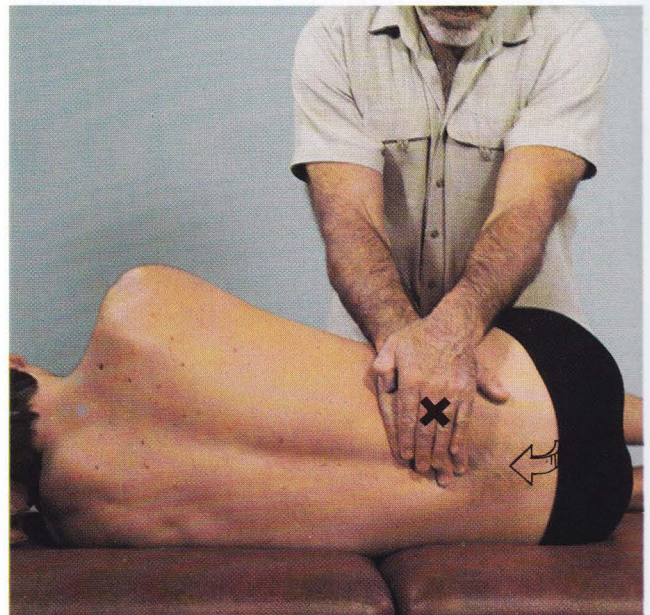


Fig. 105 a. Starting Position.

Procedure: Using this grip, *T* asks *P* to exhale while he/she gradually and fully *dorsally flexes* *P*'s lumbar spine by moving his/her body to the left, thus pushing *P*'s pelvis and sacrum dorsally and cranially.

Stimulation of Antagonists: *T* moves right hand to *P*'s upper thorax, and asks *P* to increase lordosis, pressing knees against *T*'s thigh (by contracting hip extensors). *T* resists that movement to stimulate *P*'s antagonists.

Note: *P*'s hips should remain in 90° flexion throughout the procedure. Therefore, *T* must step sideways when moving towards the foot of the couch to dorsally flex *P*'s lumbar spine.

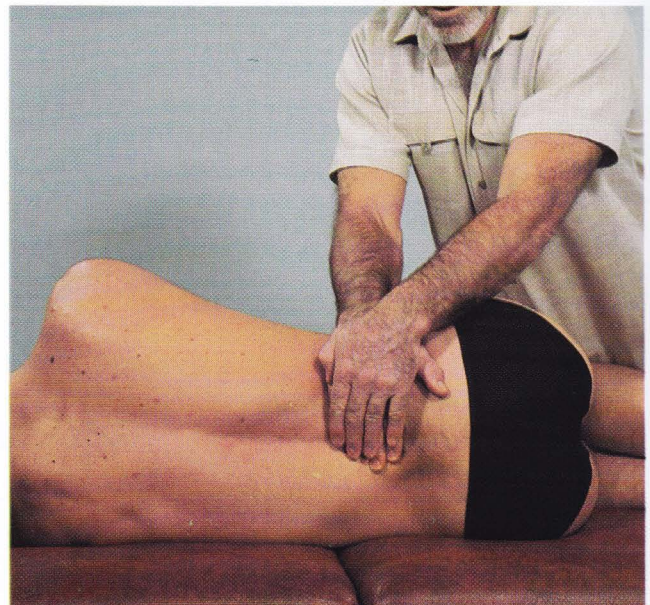
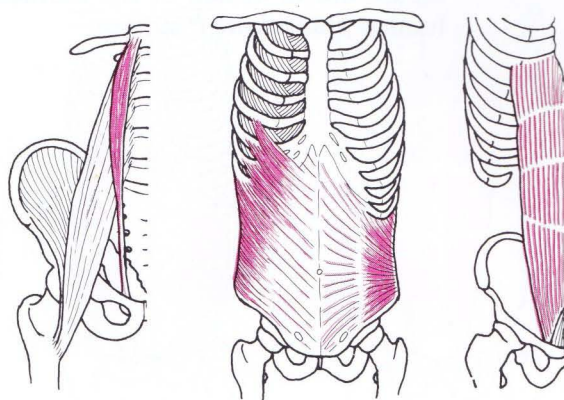


Fig. 105 b. Final Position.

6.4.1B. Non-specific technique to increase dorsal flexion *P supine*.



Starting Position: P: Supine; firm cushion under lower back to dorsally flex lumbar spine (cushion should be large enough to hold P's buttocks up off couch even when dorsal flexion is maximum); hips and knees flexed; feet against the raised foot of couch. T: Standing facing P's left side.

Grip: T's right hand and forearm stabilize P's thorax just below the sternum. T's left wrist and forearm are placed over P's pelvis.

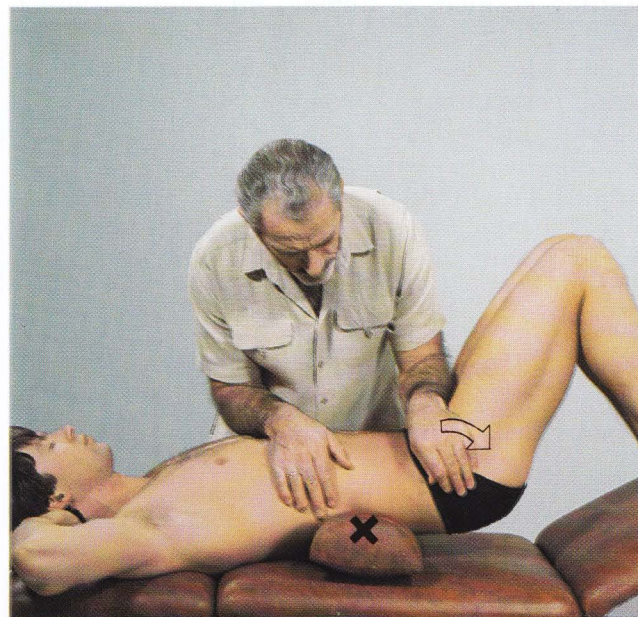


Fig. 106 a. Starting Position.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *dorsally flexes* P's lumbar spine by pressing the pelvis dorsally.

Stimulation of Antagonists: T retains right hand grip and places left hand under P's buttocks, and then asks P to press pelvis against couch to increase lordosis. T resists that movement to stimulate P's antagonists.

Note: This technique is best used when T wishes to treat P's lumbar spine while also avoiding full dorsal flexion of the segments caudal to the one treated (as when P has low back pain and/or hypermobility).

The stretching effect will be greater (but without protection of the lower lumbar segments) if a larger cushion is placed under P's lower back with the foot of the couch lowered and P's legs extended.

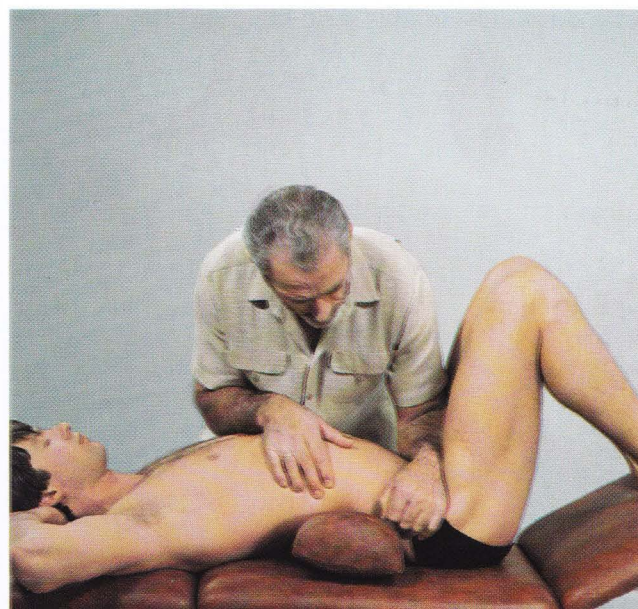
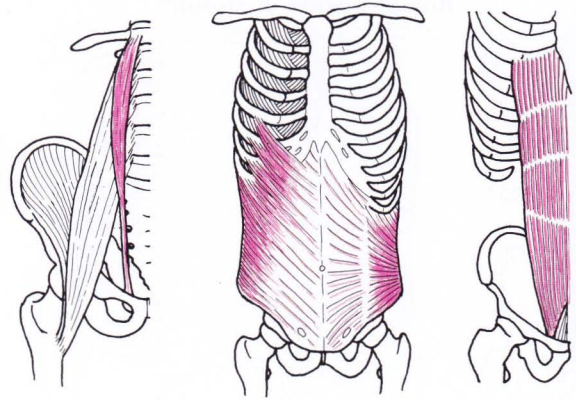


Fig. 106 b. Final Position.

- 6.4.2. Relatively specific technique to increase **dorsal flexion** of the **thoraco-lumbar transition**. *P supine*.



Starting Position: P: Supine; firm cushion under T12- L1 segment; hips and knees flexed; feet against the fully raised foot of the couch, to produce a **ventral** flexion in lower lumbar spine. T: Standing facing P's left side.

Grip: T's right hand and forearm stabilize P's thorax below the sternum. T's left forearm is placed against the upper part of P's iliac crests.

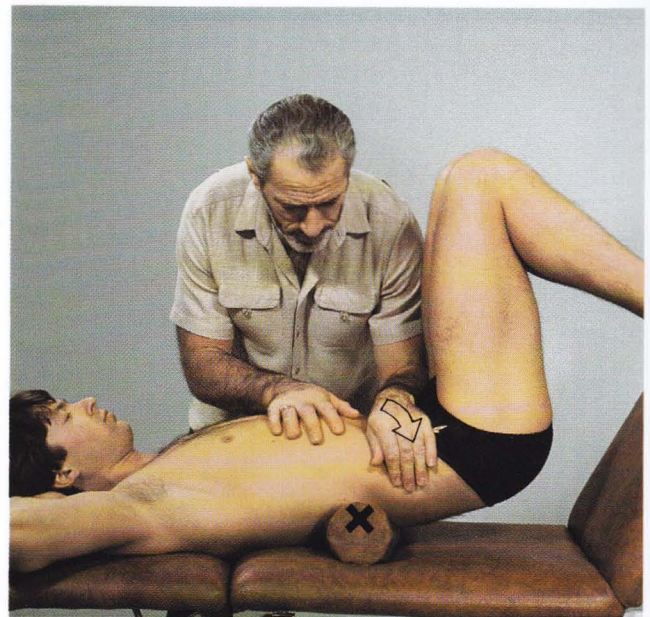


Fig. 107 a. Starting Position.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *dorsally flexes* P's thoraco-lumbar transition by pressing the pelvis and lower lumbar spine dorsally, keeping the lower lumbar spine flexed ventrally.

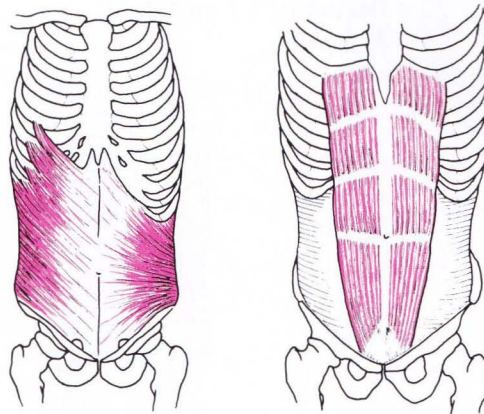
Stimulation of Antagonists: T retains right hand grip and places left hand under P's lower lumbar spine. While assuring that ventral flexion of lumbar spine is retained, T asks P to press lower back against couch to increase lordosis. T resists that movement to stimulate P's antagonists.

Note: This technique is best used when T wishes to treat P's lumbar spine at a higher level while also avoiding full dorsal flexion of the segments caudal to the one treated (as when P has low back pain and/or hypermobility).



Fig. 107 b. Final Position.

6.4.3. Specific technique to increase **dorsal flexion** of L5 on S1.
P supine.



Starting Position: P: Supine; hips and knees flexed; feet against the raised foot of couch to lift pelvis ventrally; wedge-shaped block against the transverse processes of L5 to stabilize it and cranial vertebrae.

T: Standing facing P's right side.

Grip: T's left hand and forearm stabilizes P's thorax below the sternum. T's right forearm is placed against P's pelvis.

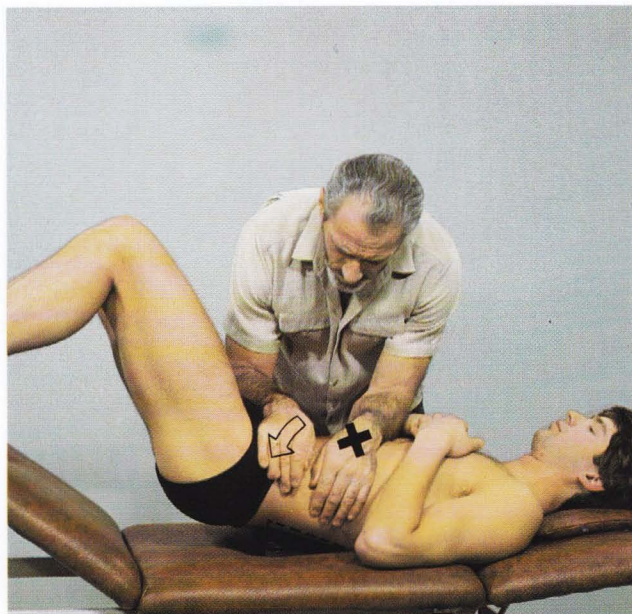


Fig. 108 a. Starting Position.

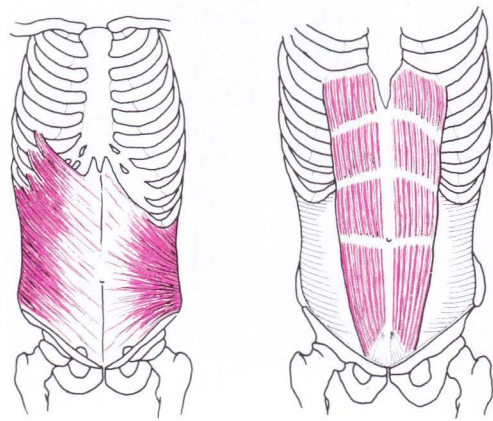
Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *dorsally flexes* L5 on S1 by pressing P's pelvis dorsally.

Stimulation of Antagonists: T retains left-hand grip, moves right hand to under P's sacrum, and asks P to press pelvis towards the couch. T resists that movement to stimulate P's antagonists.



Fig. 108 b. Final Position.

6.4.4. Specific technique to increase **dorsal flexion of L1 on L2**.
P supine.



Starting Position: P: Supine; hips and knees flexed; feet against fully raised foot of couch, which ventrally flexes lower lumbar spine; wedge-shaped support against the transverse processes of L1 to stabilize it and the cranial vertebrae. T: Standing facing P's right side.

Grip: T's right hand palpates P's spinous processes of L1 and L2 to monitor movement. T's right forearm may support P's pelvis. T's left hand and forearm are placed over P's abdomen and lower thorax.



Fig. 109 a. Starting Position.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *dorsally flexes* L1 on L2 by lowering the pelvis and lumbar spine.

Stimulation of Antagonists: T retains hand positions, and asks P to press lower lumbar spine towards couch, keeping lower lumbar spine ventrally flexed. T resists that movement to stimulate P's antagonists.

Notes: This technique is best used when T wishes to treat P's upper lumbar spine while also avoiding full dorsal flexion of the segments caudal to the one treated (as when P has pain and/or instability in his lower lumbar spine). P's knees can be either flexed or extended with the foot of the couch raised, which produces sufficient ventral flexion to protect the lower lumbar segments.

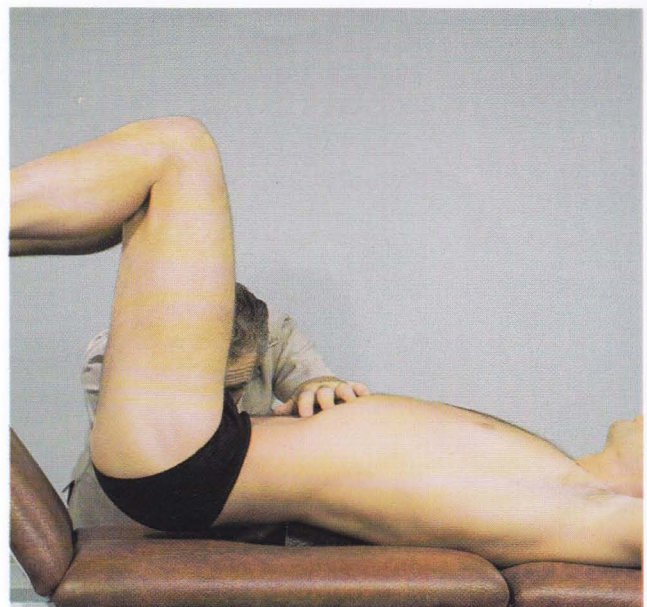
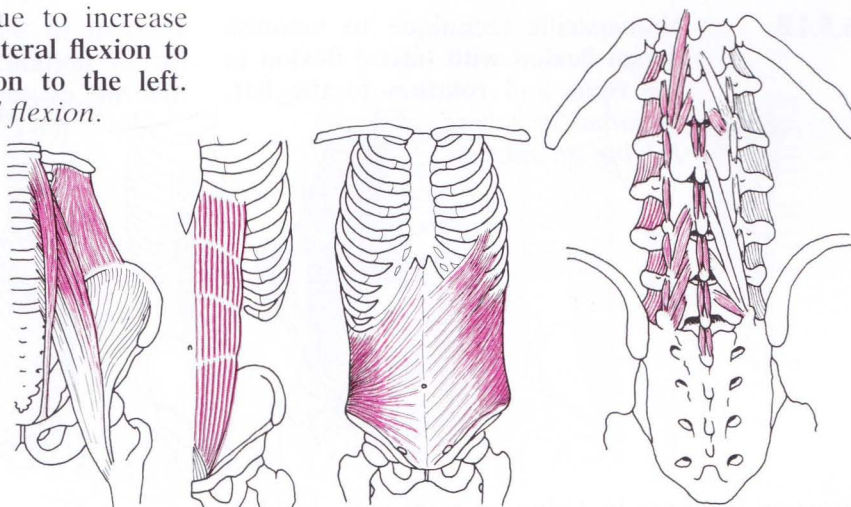


Fig. 109 b. Final Position.

6.5.1A. Non-specific technique to increase dorsal flexion with lateral flexion to the right and rotation to the left. Predominantly lateral flexion. P lying on side.



Starting Position: P: Lying on right side; hips and knees flexed approximately 90°; knees and lower legs over side of couch; spine dorsally flexed; firm cushion under waist to laterally flex lumbar spine to the right, which rotates lumbar vertebrae to the left. T: Standing facing P.

Grip: T's left hand stabilizes P's lower thorax on the left side, forearm lying along P's upper thorax. T's right hand grips P's left iliac crest with right forearm lying along the lateral side of P's left thigh.

Procedure: Using this grip, T asks P to exhale and gradually and fully *increases rotation to the left, laterally flexes to the right and dorsally flexes* P's lumbar spine, using right hand and forearm to pull P's pelvis and left thigh caudally and ventrally, and left hand and forearm to push P's thorax cranially and dorsally. This movement is aided by P gradually lowering his/her legs below the level of the couch.

Stimulation of Antagonists: T retains grip with left hand and moves right hand to lateral side of P's lower leg, and asks P to press feet towards floor. T resists that movement to stimulate P's antagonists.

Note: To increase the dorsal flexion, move P's upper torso dorsally along the couch.

To attain **maximal lateral flexion** to the right of P's lumbar spine:

- 1) Place a larger cushion under P's waist (which also increases rotation to the left).
- 2) P's pelvis must be fully rotated to the right by pulling it further ventrally and caudally.

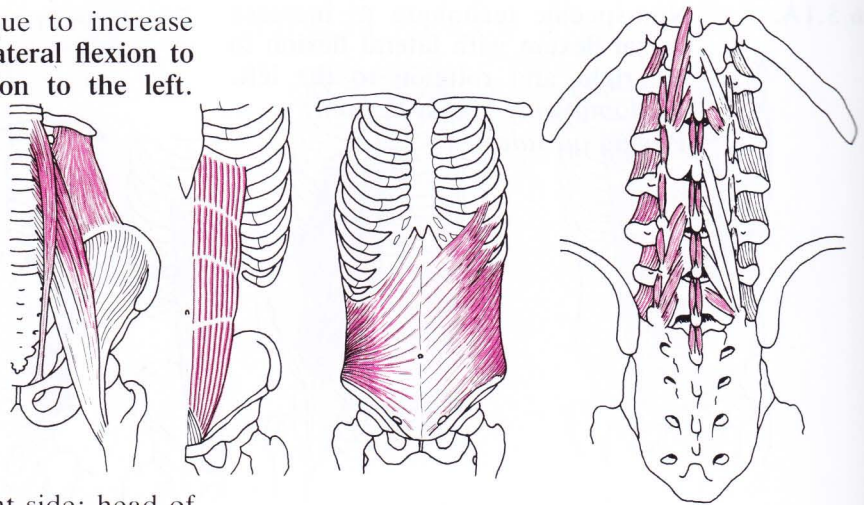


Fig. 110 a. Starting Position.



Fig. 110 b. Final Position.

6.5.1B. Non-specific technique to increase **dorsal flexion** with **lateral flexion to the right** and **rotation to the left**. *Maximal stretching.*
P lying on side.



Starting Position: P: Lying on right side; head of couch raised slightly; upper body extends beyond couch head. (The higher the area in P's lumbar spine to be treated, the less P's upper body extends beyond couch end); it may be necessary to place a cushion under right side to avoid any pain caused by pressure against couch edge; left hip and knee extended; right knee flexed approximately 90°; left leg stabilized with a belt; lumbar spine dorsally flexed; arms folded across chest. T: Standing facing P.

Grip: T's left hand grips P's right shoulder, arm supporting P's shoulder and chest. T's right hand stabilizes P's pelvis. (If necessary, T's right forearm may be used to stabilize P's pelvis, with fingers monitoring the movement of the lumbar spine).

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *laterally flexes to the right* and *rotates P's lumbar spine to the left* by slowly lowering P's upper body below the level of the couch and pulling the right shoulder ventrally.

Stimulation of Antagonists: T retains grip with left hand and moves right hand to dorsal side of P's left shoulder. T then asks P to exhale, look upwards to ceiling, bend backwards, and rotate thorax to the left. T then resists that movement to stimulate P's antagonists.

Notes: If P is not sufficiently strong and/or T finds this technique difficult, then P may support own weight by placing his/her right hand against the floor (or a chair). Alternatively, T can stabilize P's pelvis with a belt and support P's upper body with both arms. It is also possible to perform this technique using an articulated couch (see technique 6.5.1C, p. 137).

This technique should be used to obtain **maximal lateral flexion** and **rotation** of P's lumbar segments, but only if P's physical condition permits.

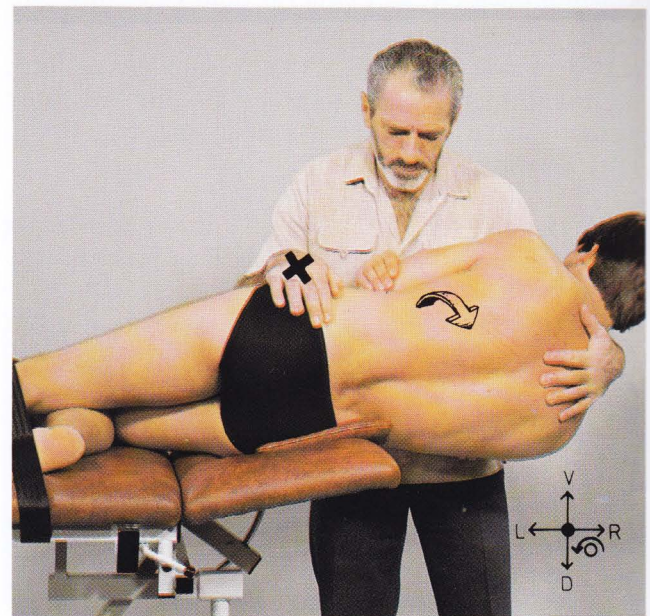


Fig. 111 a. Starting Position.

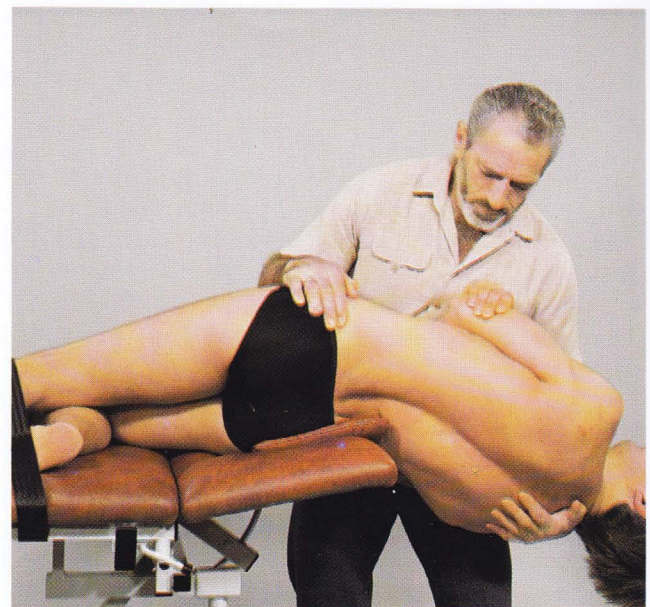
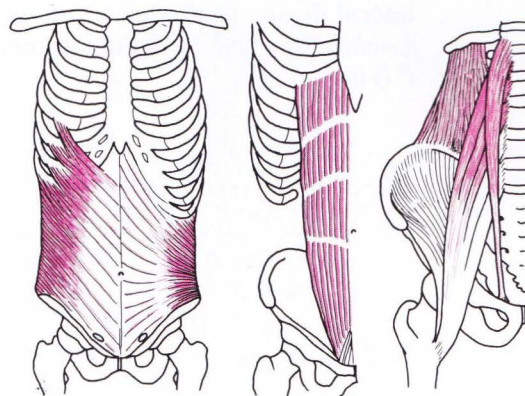


Fig. 111 b. Final Position.

- 6.5.1C. Non-specific technique to increase **dorsal flexion** with **rotation to the right** and **lateral flexion to the left**. *Predominantly rotation.*
P lying on side.



Starting Position: P: Lying on left side; right hip and knee extended; left hip and knee flexed; left foot under right knee; lumbar spine dorsally flexed; lumbar segments over raised middle section of couch, which tilts pelvis to the right and produces lateral flexion to the left of the lumbar spine (a large cushion may be placed at P's left waist if the couch is not articulated); left hand grips right forearm. T: Standing facing P.

Grip: T's right hand is threaded under P's right arm, forearm and wrist against the right side of P's thorax. T's left hand stabilizes P's right iliac crest and sacrum with his/her left forearm against P's pelvis and thigh.

Procedure: Using this grip, T asks P to exhale while he/she gradually and fully *rotates to the right* and *laterally flexes* P's lumbar spine to the left by pushing P's thorax dorsally and cranially and pulling P's right iliac crest ventrally and caudally.

Stimulation of Antagonists: T retains grip (reversing its force) and asks P to exhale, look to the right, and rotate thorax to the right. T resists that movement to stimulate P's antagonists.

Note: To obtain **maximal rotation** to the right of P's lumbar spine:

- 1) P's pelvis must be fully rotated to the left by positioning it further ventrally and caudally.
- 2) P's pelvis must be tilted caudally on the right side and/or the middle section of the couch must be raised which will increase the lateral flexion to the right.

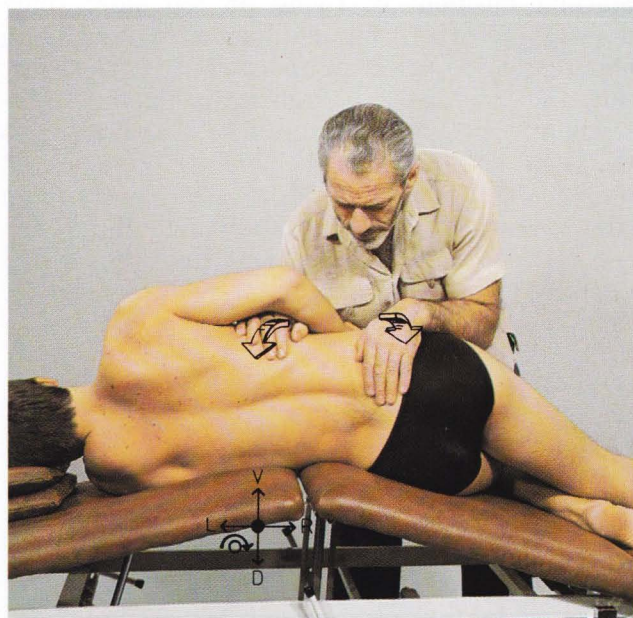


Fig. 112 a. Starting Position.

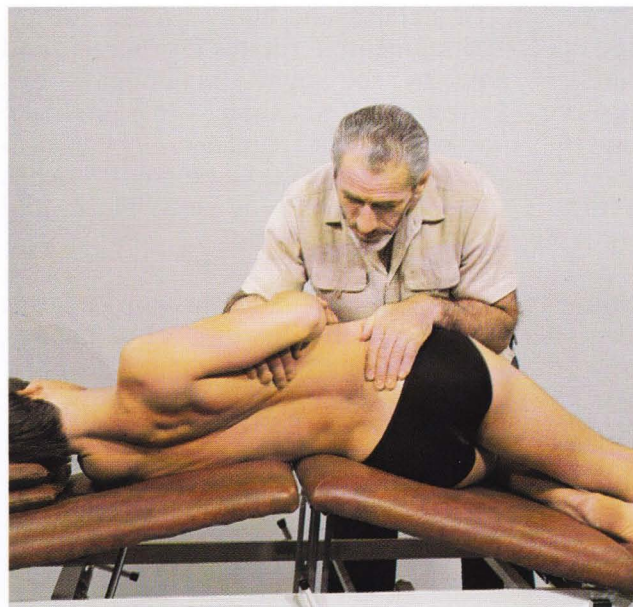
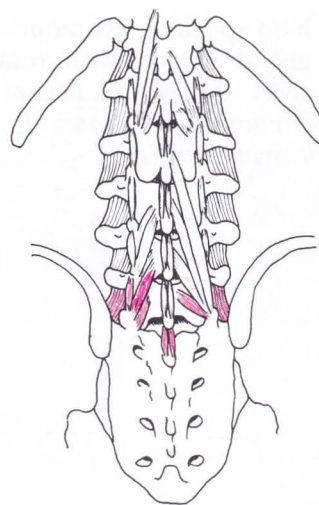


Fig. 112 b. Final Position.

- 6.5.2. Specific technique to increase **dorsal flexion** with **rotation to the right** and **lateral flexion to the left** of L5 on S1. *Locking cranial to segment treated. P lying on side.*



Starting Position: P: Lying on left side; spine dorsally flexed; left hip and knee flexed; right leg hyperextended to tilt pelvis caudally to the right side and permit left lateral flexion of the L5-S1 segment; head of couch raised to laterally flex to the right and rotate to the left the thoracic and lumbar segments cranial to L5, which *locks* them from following the rotation to the right during the procedure; the L5-S1 segment must be in the neutral position; left hand grips right forearm. T: Standing facing P.

Grip: T's right hand is threaded under P's right arm, thumb against the right side of P's L5 spinous process (the tip also palpating the spinous process of S1 to monitor the movement). T's right forearm lies along P's right thorax. T's left hand and fingers are placed on P's right ilium and sacrum. T's left forearm lies against P's right pelvis and thigh.



Fig. 113 a. Starting Position.

Procedure: To stabilize the lumbar spine, including the L4-L5 segment, T rotates P's thoracic and lumbar spine to the right. Maintaining this position, T then asks P to exhale, while gradually and fully *rotating to the right* and *laterally flexing to the left* the L5 on S1 segment by pulling P's pelvis ventrally and caudally using left hand and forearm.

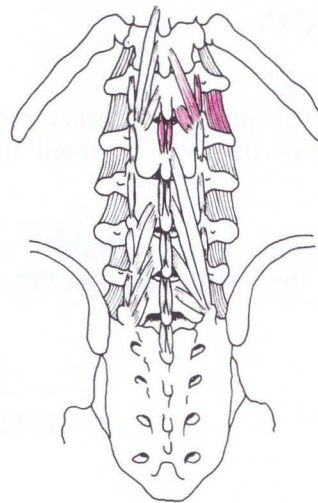
Stimulation of Antagonists: T retains grip and asks P to move further in the direction of stretching, and resists that movement to stimulate P's antagonists.



Fig. 113 b. Final Position.

6.5.3.

Specific technique to increase **dorsal flexion** with **rotation to the right** and **lateral flexion to the left** of L1 on L2. *Locking cranial to and caudal to segment treated. P lying on side.*



Starting Position: P: Lying on left side; thoracic spine dorsally flexed; head of couch raised (or large cushion placed under left upper body) to laterally flex thoracic segments to the right (which also rotates them to the left) to *lock* them from following the rotation to the right during the procedure; hips and knees flexed approximately 90° to ventrally flex lumbar spine (caudal to L2); a cushion under the waist will laterally flex the lumbar segments caudal to L2 to the left; the L1-L2 segment is in the neutral position; left hand grips right forearm. T: Standing facing P.

Grip: T's right hand is threaded under P's right arm, thumb against the right side of P's L1 spinous process (the tip also palpating the spinous process of L2 to monitor the movement). T's right forearm lies along P's right thorax. T's left hand fingers hold the left side of P's lumbar spinous processes caudal to and including L2. T's left hand and forearm lie against P's right pelvis and thigh.

Procedure: Using this grip, T asks P to exhale as he/she gradually and fully *dorsally flexes* while *rotating L1 on L2 to the right* and *laterally flexing to the left* by pushing dorsally and caudally against P's right forearm and thorax with T's chest, right forearm and hand. T's left hand and forearm stabilize P's pelvis and lumbar spine up to and including L2.

Stimulation of Antagonists: T retains grip (reversing its force) and asks P to exhale, look to the right, and rotate thorax to the right. T resists that movement to stimulate P's antagonists.

Note: The **dorsal flexion** from cranial to L1-L2 and the **lateral flexion** to the left caudal to it must "go into" the segment to be treated in rotation to the right and lateral flexion to the left in dorsal flexion.

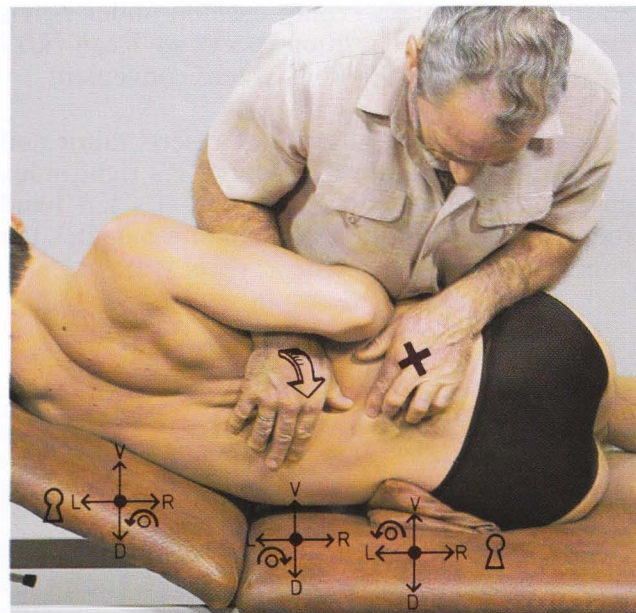


Fig. 114 a. Starting Position.

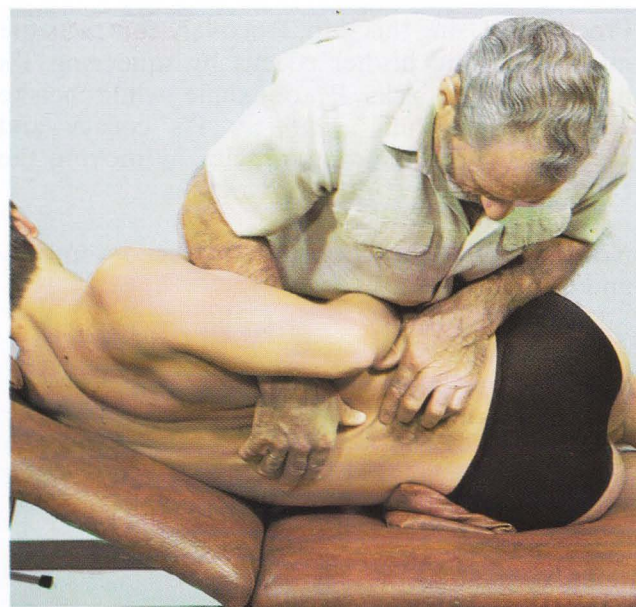


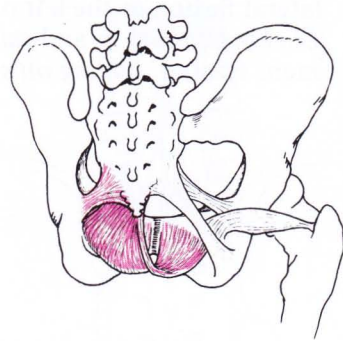
Fig. 114 b. Final Position.

7. THE COCCYX

7.1. Restrictions

All the muscles and other structures associated with the coccyx may be involved in restricting movement.

7.2. Mobilization of the coccyx and specific technique for the levator ani and the coccygeus.



Starting Position: P: Prone; cushion under pelvis for comfort and to position coccyx so T can carry out procedure. T: Standing where convenient.

Grip: Using a medical glove, T inserts lubricated right index finger into P's rectum. P's right index finger and thumb grip P's coccyx. T's left hand stabilizes P's sacrum. T's left thumb palpates the dorsal aspect of the sacrococcygeal joint.

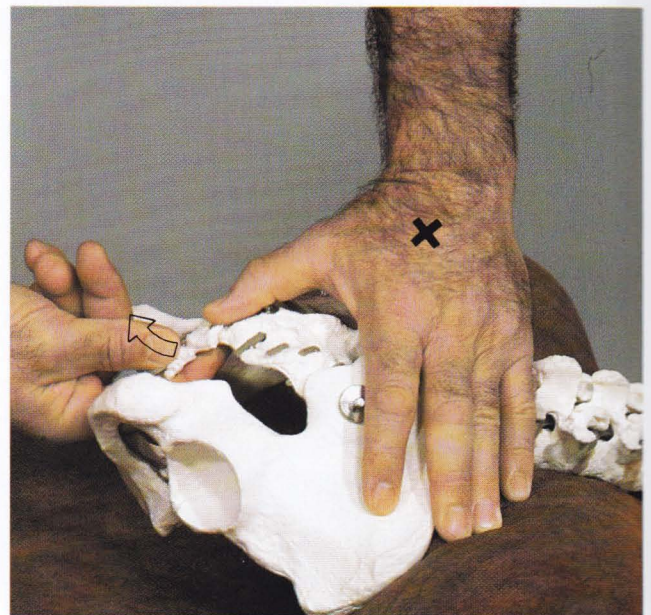


Fig. 115 a. Starting Position.

Procedure: Using this grip, P actively contracts the muscles around his/her coccyx by squeezing T's finger. T then asks P to exhale while he/she gradually and fully *mobilizes* P's coccyx and *stretches* the surrounding muscles by moving the coccyx in the direction of restriction.

Note: Usually, the coccyx is displaced ventrally and/or laterally.



Fig. 115 b. Final Position.

PART 4

TABLES AND INDEX

8. MOVEMENT RESTRICTION TABLES

8.1. HEAD AND NECK (CERVICAL SPINE)

8.2. MANDIBLE (T-M JOINTS)

8.3. THORACIC AND LUMBAR SPINE

8.4. RIB CAGE

INDEX OF MUSCLES

8.1. Table 8.1. (Continued)

●● = Primary restrictor

● = Secondary restrictor

RESTRICTED MOVEMENT						
SHORTENED MUSCLE	Ventral flexion	Dorsal flexion	Lateral flexion to the same side	Lateral flexion to the opposite side	Rotation to the same side	Rotation to the opposite side
rectus capitis lateralis		●		●		●
splenius capitis	●●			●		●
splenius cervicis	●●			●		●
iliocostalis cervicis	●●			●●		●●
longissimus cervicis	●●			●●		●●
longissimus capitis	●●			●●		●●
spinalis cervicis	●●			●●		●●
semispinalis capitis	●●			●●		●●
intertransversarii	●●			●●	●	●
interspinales	●●				●	●
rotatores	●●				●●	
multifidi	●●				●●	
rectus capitis dorsalis major	●		●			●
rectus capitis dorsalis minor	●			●	●	
obliquus capitis inferior	●		●			●
obliquus capitis superior	●			●	●	
platysma		●●		●		●
suprahyoidales and infrahyoidales		●●		●		●
suprathyreoidales and infrathyreoidales		●●		●		

8.2. Table of
MANDIBLE (TEMPORO-MANDIBULAR JOINT) MOVEMENTS RESTRICTED BY SHORTENED MUSCLES

●● = Primary restrictor

● = Secondary restrictor

RESTRICTED MOVEMENT			
SHORTENED MUSCLE	Protrusion	Retraction	Opening the mouth
pterygoideus medialis	●	●	●
masseter	●●		●
temporalis	●●		●
pterygoideus lateralis		●	

8.3. Table of
THORACIC AND LUMBAR SPINE MOVEMENTS RESTRICTED BY SHORTENED MUSCLES

●● = Primary restrictor ● = Secondary restrictor

SHORTENED MUSCLE	RESTRICTED MOVEMENT					
	Ventral flexion	Dorsal flexion	Lateral flexion to the same side	Lateral flexion to the opposite side	Rotation to the same side	Rotation to the opposite side
rectus abdominis		●●				
obliquus abdominis externus		●●		●	●●	
obliquus abdominis internus		●●		(●)		●●
iliopsoas	●	●		●●	●	
quadratus lumborum	●			●●	●	●
iliocostalis thoracis	●●			●		●
iliocostalis lumborum	●●			●		●
longissimus thoracis	●●			●		●
spinalis thoracis	●●			●		●
semispinalis thoracis	●●			●	●	
intertrans- versarii	●●			●	●	●
interspinales	●●				●	●
rotatores	●●				●●	
multifidi	●●				●●	

8.4. Table of
RIB CAGE MOVEMENTS RESTRICTED BY SHORTENED MUSCLES

●● = Primary restrictor ● = Secondary restrictor

RESTRICTED MOVEMENT				
SHORTENED MUSCLE	Inspiration		Expiration	
	at rest	forced	at rest	forced
diaphragma			●●	●●
scalenus anterior			●	●●
scalenus medius			●	●●
scalenus posterior			●	●●
subclavius			●	●
intercostales interni		●	●	●
intercostales externi		●	●	●
sternocleido-mastoideus				●
levatores costarum			●	●
serratus posterior superior			●	●
erector spinae				●
transversus abdominis		●●		
rectus abdominis		●●		
obliquus abdominis externus		●●		
obliquus abdominis internus		●●		
serratus posterior inferior		●		
quadratus lumborum		●		
latissimus dorsi		●		

INDEX OF MUSCLES

coccygeus 140

diaphragma 96 146

erector spinae:

iliocostalis cervicis 29, 30, 38-40, 44, 97-98, 143

longissimus capitis 29, 30, 38-40, 44, 97-98, 143

longissimus cervicis 29, 30, 38-40, 44, 97-98, 143

spinalis cervicis 29, 30, 38-40, 44, 97-98, 143

spinalis capitis 28, 29, 30, 38-40, 44, 97-98, 143

iliocostalis thoracis 96, 97-98, 101-102, 145

longissimus thoracis 96, 97-98, 101-102, 120-122, 125-127, 145

spinalis thoracis 96, 97-98, 101-102, 120-122, 125-127, 145

iliocostalis lumborum 97-98, 101-102, 119, 120-122, 125-127, 145

iliocostalis cervicis 29, 30, 38-40, 44, 97-98, 143 ,

iliocostalis lumborum 97-98, 101-102, 119, 120-122, 125-127, 145

iliocostalis thoracis 96, 97-98, 101-102, 145

infrahyoidales 28, 29, 45, 52-53, 58-59, 64-66, 143

infrahyreoidales 28, 29, 45, 52-53, 58-59, 64-66, 143

intercostales externi 96, 97-98, 101-102, 105-108, 111-117, 146

intercostales interni 96, 97-98, 101-102, 105-108, 111-117, 146

interspinales 29, 30, 36-44, 96-104, 119-129, 135-136, 138-139, 143, 145

intertransversarii 29, 30, 36-44, 49-51, 58-71, 76-77, 96, 97-104, 113-115, 119, 120-129, 135-136, 138-139, 143, 145

levator ani 140

levatores costarum 96, 97-102, 146

longissimus capitis 29, 30, 38-40, 44, 97-98, 143

longissimus cervicis 29, 30, 38-40, 44, 97-98, 143

longissimus thoracis 96, 97-98, 101-102, 120-122, 125-127, 145

longus capitis 28, 29, 45-48, 56-71, 142

longus colli 28, 29, 45, 49-51, 54-55, 58-71, 76-77, 96, 109-110, 142

masseter 87, 88-91, 144

multifidi 29, 30, 36-44, 60-63, 96, 97-104, 113-115, 119, 120-129, 135-136, 138-139, 143, 145

obliquus abdominis externus 96, 101-102, 105-108, 111-112, 119, 120-122, 125-127, 130-137, 145, 146

obliquus abdominis internus 96, 101-102, 105-108, 111-112, 119, 120-122, 125-127, 130-137, 145, 146

obliquus capitis inferior 29, 30, 34-35, 38-40, 44, 76-77, 143

obliquus capitis superior 28, 29, 30-33, 38-40, 44, 72-75, 143

platysma 28, 29, 45, 52-53, 58-59, 64-66, 143

psoas major 119, 135-137, 145

psoas minor 119, 130-132, 135-137, 145

pterygoideus lateralis 87, 92-93, 144

pterygoideus medialis 87, 88-91, 144

quadratus lumborum 96, 97-98, 101-102, 119, 120-122, 125-127, 135-137, 145, 146

rectus abdominis 96, 105-108, 111-112, 119, 130-137, 145 146

rectus capitis anterior 28, 29, 45-48, 58-59, 64-66, 72-75, 142

rectus capitis dorsalis major 28, 29, 30-35, 38-40, 44, 76-77, 143

rectus capitis dorsalis minor 28, 29, 30-33, 38-40, 44, 72-75, 143

rectus capitis lateralis 29, 45-48, 58-59, 64-66, 72-75, 143

rotatores cervicis 29, 30, 36-44, 60-63, 67-71, 143

rotatores thoracis 96, 97-104, 113-115, 145

rotatores lumborum 119, 120-129, 135-136, 138-139, 145

scalenus anterior 28, 29, 44-45, 64-66, 81-82, 142, 146

scalenus medius 28, 29, 44-45, 64-66, 81-82, 142, 146

scalenus posterior 28, 29, 30, 38-40, 44, 64-66, 83, 142, 146

semispinalis capitis 28, 29, 30, 38-40, 44, 97-98, 143

semispinalis thoracis 96, 97-98, 101-102, 145

serratus posterior inferior 96, 97-98, 101-102, 120-122, 125-127, 146

serratus posterior superior 96, 97-98, 101-102, 146

spinalis cervicis 29, 30, 38-40, 44, 97-98, 101-102, 143

spinalis thoracis 96, 97-98, 101-102, 120-122, 125-127, 145

splenius capitis 28, 29, 30, 38-40, 97-98, 143

splenius cervicis 29, 30, 38-40, 97-98, 101-102, 143

sternocleidomastoideus 28, 29, 64-66, 78-80, 142, 146

subclavius 28, 29, 84-85, 146

suprahyoidales 28, 29, 45, 52-53, 58-59, 64-66, 143

suprahyreoidales 28, 29, 45, 52-53, 58-59, 64-66, 143

temporalis 87, 88-91, 144

transversus abdominis 96, 146

trapezius 28, 29, 142