An Educational Tool for Spinal Manual Therapy

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AN EDUCATIONAL TOOL FOR SPINAL MANUAL THERAPY

by

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Bachelor of Science in Physical Therapy
University of North Dakota, 1997

An Independent Study
Submitted to the Graduate Faculty of the
Department of Physical Therapy
School of Medicine
University of North Dakota
in partial fulfillment of the requirements
for the degree of
Master of Physical Therapy

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1997
This Independent Study, submitted by Jennifer N. Brandt in partial fulfillment of the requirements for the Degree of Master of Physical Therapy from the University of North Dakota, has been read by the Faculty Preceptor, Advisor, and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

(Faculty Preceptor)

(Graduate School Advisor)

(Chairperson, Physical Therapy)
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<thead>
<tr>
<th>Title</th>
<th>An Educational Tool for Spinal Manual Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department</td>
<td>Physical Therapy</td>
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<tr>
<td>Degree</td>
<td>Master of Physical Therapy</td>
</tr>
</tbody>
</table>

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iii
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>v</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>vi</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>I INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>II HISTORY</td>
<td>6</td>
</tr>
<tr>
<td>TECHNIQUES MANUAL</td>
<td>13</td>
</tr>
<tr>
<td>APPENDIX</td>
<td>40</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>42</td>
</tr>
</tbody>
</table>
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ABSTRACT

Spinal manual therapy is a broad term used in physical therapy. Its applications include evaluation, pain relief, relaxation, and restoration of normal joint motion. Unfortunately, there is a lack of scientific research supporting the therapeutic effects of spinal manual therapy. Despite its questionable effectiveness, spinal manual therapy has become a widely used and integral practice for physical therapists. To a physical therapist, spinal manual therapy can include a vast array of procedures including: soft tissue mobilization, passive muscle stretching, muscle energy techniques, and joint manipulation. The purpose of this project is to provide the student with a brief summary on the scientific research of the efficacy of spinal manual therapy and the history of spinal manual therapy. Also included in this project is a video demonstrating specific spinal manual therapy techniques to assist the student in becoming more proficient with manual therapy of the spine.
CHAPTER 1

INTRODUCTION

Approximately 80% of the population will suffer from back pain at some time in their life. Traditional treatment for back pain has included such elements as heat, massage, ultrasound, exercise, patient education, and posture improvements.\(^1\) Although these forms of treatment can be effective, there continues to be a high recurrence of back pain complaints.

Spinal manual therapy, defined as “all procedures in which the hands are utilized to massage, immobilize, adjust or manipulate spinal tissues for therapeutic reasons,”\(^2\) has become the most recently utilized treatment for back pain and dysfunction by physical therapists. Today physical therapists are employing spinal manual therapy techniques for not only pain relief, but also for evaluation procedures, relaxation, and restoration of normal motion. Manual therapy of the spine includes a vast array of techniques such as: soft tissue techniques, muscle stretching, muscle energy techniques, and joint manipulation. Despite its widespread use, spinal manual therapy has had conflicting results in scientific literature. There is little evidence suggesting therapeutic benefits from spinal manual therapy.\(^1\)\(^-\)\(^5\)

Much of the literature claiming that spinal manual therapy does produce therapeutic benefits (pain relief and restoration of normal joint motion) is greatly
unreliable due to a variety of reasons. First, the studies do not have a strong control component or lack a control or comparison group altogether. Second, a wide range of spinal manual therapy techniques exist. Most studies do not describe the specific procedures utilized. Finally, many researchers believe the pain scale is unreliable. In addition, many patients tend to have spontaneous remission of their back pain; therefore, differentiation between a successful treatment regime and spontaneous recovery is difficult to ascertain.

One specific technique of spinal manual therapy, termed joint manipulation by some manual therapists, involves a passive movement of a particular spinal segment by a trained clinician. Ottenbacher and DiFabio conducted a quantitative review for the purpose of combining existing evidence of joint manipulation efficacy. They found 57 relevant articles. Of these, only 9 met the specific criteria for inclusion in the study. The 3 criteria necessary were as follows: the study had to compare the effects of manipulation to some control or comparison group; the dependent variables employed had to evaluate the efficacy of pain, flexibility, or physical activity measure; and the study had to report the statistical results in sufficient detail that effect size could be computed or estimated and the quantitative review completed. At the close of the review, they concluded that there was only "limited empirical evidence" to support the claim that joint manipulation assisted in relieving pain, limitations in flexibility, and impairments in physical activity. However, their review did indicate that when joint manipulation was used in conjunction with more traditional therapies, such as exercise and posturing, it produced considerable improvement compared to those subjects solely receiving manual therapy. Spinal manual
therapy was also found to be more effective if the results were measured immediately after the treatment.

Another study by Koes et al compared the effectiveness of manual therapy, physiotherapy, placebo therapy, and treatment by a general practitioner in patients with nonspecific back and neck complaints. Manual therapy treatment consisted of manual techniques in accordance with the Dutch Society for Manual Therapy. Physiotherapy treatment included exercise, massage and modalities (heat and/or electrotherapy). Treatment by the general practitioner consisted of prescription medications, posture advice, home exercises, participation in activities, bed rest, and other treatment modalities. The placebo group received detuned short wave diathermy and detuned ultrasound. The efficacy of each type of treatment was measured by 1) severity of main complaint, 2) global perceived effect, 3) pain, and 4) functional status. Follow-ups were done at 3, 6, and 12 weeks. The results indicated that both physiotherapy and manual therapy “decreased the severity of complaints more and had a higher global perceived effect compared to continued treatment by the general practitioner.”

There were no remarkable differences between the effectiveness of physiotherapy and manual therapy. Although physiotherapy and manual therapy appeared to have equal effectiveness, these investigators discovered that the group receiving manual therapy had “considerably less” treatments than the group receiving physiotherapy.

Two other studies by Jayson et al and Sims-Williams et al found that spinal manual therapy “hastened” the reduction in patients’ complaints of pain. However, at
one year follow-ups, the group which had received manual therapy treatment were no better than the placebo group.

Many other studies have found spinal manual therapy to be ineffective. For example, Godfrey conducted a study involving four groups of patients. The first group received soft tissue massage and rotational thrusts. The second group was administered manipulation and electrical stimulation. Group three received massage only, and group four was administered only electrical stimulation. Conclusions were based on both subjective (patient’s pain and ability to perform activities of daily living) and objective measurements (anterior and posterior spinal range of motion). No significant differences were found among any of the groups.

Along with the lack of research available on the efficacy of spinal manual therapy, there also arises the question of which techniques, if any, produce better results. Only one of the studies previously discussed defined or described the exact procedures employed. As a result, even if significant differences would have been found between the effects of spinal manual therapy, other forms of treatment, or a control group, repeated reproducibility of these therapeutic effects would be difficult to attain without knowledge of the specific technique utilized.

In conclusion, there has been very little evidence/literature available to date which supports the claims that spinal manual therapy yields therapeutic benefits. From a professional standpoint, physical therapists need to be aware of this fact. Many therapists use spinal manual therapy techniques daily for the purpose of reducing pain and restoring
motion. Unfortunately, future denials for reimbursement of their services is entirely possible secondary to the lack of positive results in research.

Future research needs to include the following elements: 1) a control or “placebo” group unsuspecting of their treatment status, 2) a “double blind” examination in which neither the patient or examiner is aware of the type of treatment being used, and 3) a complete description of the methodology carried out by trained professionals. In addition, there are other questions which have been discussed in previous studies which need further examination in future research. For example, is spinal manual therapy more effective for treating certain diagnoses, when should treatment begin, how long should it last, and how long do the treatment effects (if any) persist? If these questions can be answered, along with the attainment of more conclusive evidence of the benefits from spinal manual therapy, physical therapists will become more effectual in treating patients with back pain and dysfunction.
CHAPTER 2
HISTORY

Spinal manual therapy is a modern inclusive term involving many different spinal techniques. Prior to the acknowledgment of this term, such expressions as joint manipulation and joint mobilization were used for describing some similar procedures. Because spinal manual therapy is the more accepted term by physical therapy at this date, this is the expression that will be used more often throughout this chapter. Keeping this in mind, the history of spinal manual therapy thus begins with the history of spinal manipulation and/or mobilization.

The beginning of manipulation dates back to the years 460-355 B.C. This was the era of Hippocrates, the “Father of Medicine.” He was the first person in written history to utilize joint manipulation in order to reduce a posterior “hump” of the back. His techniques included extension and pressure exerted on a patient lying prone on a wooden bed. He was even known to have used a wooden board as a lever arm at times for his manipulative techniques. He taught his students to apply a vertical manipulative thrust on a prominent vertebra and give exercises afterward. Hippocrates is quoted as saying the following in regards to his treatment:

Such extension would do no great harm, if well arranged, unless one deliberately wanted to do harm. The physician, or an assistant who is strong and not untrained, should put the palm of his hand on the hump, and
the palm of the other on that, to reduce it forcibly, taking into consideration whether the reduction should naturally be made straight downwards, or towards the head, or towards the hip. This reduction method is also very harmless; indeed, it will do no harm even if one sits on the hump while extension in applied, and makes succussion [shaking] by raising himself; nay, there is nothing against putting one’s foot on the hump, and making gentle succussion by bringing one’s weight upon it.  

During the 6th century, although the extension method continued to be used, spinal curvature was being treated by other means. In 1579, Ambroise Pare, a French barber-surgeon known for his suggestions that poor/faulty posture during childhood led to ‘chronic deformity,’ implemented the use of a steel corset for support after spinal manipulation. Pare wrote that . . .

when the vertebra are dislocated outwards, forming a prominence, the patient should be tied down prone to a board with ropes under the armpits, the waist, and the thighs. He is then pulled and stretched as much as possible from above and from below, but not violently. If traction is not applied, cure is not to be expected. The operator then places his hand on the kyphosis and presses the prominent vertebra in.  

The 1700’s brought about the time of the bone-setters. These individuals were unschooled countrymen who had learned spinal manipulative techniques from their forefathers. The practice was passed on from generation to generation. The rationale behind bone-setting was that there was a little bone out of place causing pain in the spine. This could be relieved by manipulating the spine back into place.
In 1821 Dr. Edward Harrison openly challenged the previous views of childhood postures causing all spinal complaints. He believed the cause could be found “in the connecting ligaments ‘which seem to have lost part of their power of holding the bones the bones together.’” This theory implied that as the ligaments become lax, they are no longer strong enough to hold the vertebra in place, and the vertebra becomes dislocated. Unfortunately, Dr. Harrison never actually gave a clear description of a general treatment plan. On one account, he spoke of a patient lying on a couch and being stretched by a machine for more than 1 hour. The prominent vertebra and ribs were then pressed, and “driven in the direction of their natural situations”, with an instrument held in the right hand. Afterwards, a firm bandage was fastened around the chest to prevent the bones from returning to their dislocated position. However, his ideas of vertebral subluxation and manipulation were met with great disapproval in the professional realm.

The year 1824 produced a different claim regarding spinal deformity. This was made by the British physician Andrew Dods. His published article concerning spinal deformity stated that it was the result of a “peculiar affection of the muscles of the back.” If left untreated, these muscles would cause rotational deformities of the spine. His treatment prescription consisted of exercise, friction, and manipulation.

Despite all of the advocates for spinal manipulation it was not fully accepted, let alone deemed as an appropriate treatment. This “rejection” lasted from the 17th century up until the latter part of the 19th century. Within the last 100 years, 2 major schools have developed which advocate the practice of manipulative therapy: the American School of Osteopathy and the Chiropractic School.
Osteopathy

Because manipulation was not recognized as effective medical treatment, patients who wished to receive this type of therapy were forced to look elsewhere for pain relief; fenceforth, the osteopathic field evolved. The American School of Osteopathy was founded in 1892 and, finally, in 1928 osteopathic medicine gained equal rights with allopathic medicine. The founder of osteopathic medicine, Andrew Taylor Still (1827-1917), believed that the entire body must be looked at as a unit in health and disease. In other words, if there arose a disorder of the musculoskeletal system, other systems of the body would also be affected. The school of osteopathy has developed 5 components to the musculoskeletal system. These are: 1) unity of the body -- all systems function together within the body and influence each other; 2) healing power of nature -- substances within the body aid in protection and healing; 3) somatic component of disease -- communication between the musculoskeletal system and other systems of the body is important in medical care; 4) structure-function concept -- structure and function are interdependent; and 5) manipulative therapy -- used for maintenance and restoration of normal musculoskeletal function. Modern day osteopaths tend to use not only manipulative techniques, but also appropriate modalities and scientifically based medical and surgical techniques.

Chiropractic

The art of chiropractic is characterized by a direct thrust of high velocity. Daniel David Palmer (1845-1913), the founder of chiropractic, believed disease could be cured
by relieving a subluxed vertebra. This was postulated by the idea that “the nerve impulse originated in the brain and traveled as a vibrational wave and could be influenced by intervertebral derangements causing facilitation or inhibition.”\(^7\) In the presence of an intervertebral derangement, the patient was more prone to infection and disease. The theory behind chiropractic in a step-by-step manner is as follows: 1) a vertebra may become subluxed; 2) this tends to impinge on such structures as nerves, blood vessels, and lymphatics; 3) this causes interferences in and decreased conduction of the nerve impulses at the level of impingement; 4) those parts innervated by this segment become diseased or predisposed to disease; and 5) by reducing the subluxation, function returns to normal.\(^8\)

Recent Spinal Manual Therapy

Many medical doctors and physical therapists have been integral in the development of recent spinal manual therapy theories and techniques. The main controversy among manual therapists is in regard to the actual source of pain, i.e. disc, dura, joint, ligaments, or muscles. In the late 1940's and early 1950's, James Mennell stated that in the absence of other causes of musculoskeletal pain, the joint was to blame.\(^7\) He hypothesized that there exists an involuntary range of movement (accessory motion) within the joints that, when lost, results in pain and decreased function.

In 1957 an orthopedic surgeon by the name of James Cyriax brought the usefulness of manipulation to medical attention.\(^6\) He blamed a disc protrusion for back pain of gradual onset and a crack and displacement of the annulus for a sudden bout of
back pain. Treatment consisted of manipulations of high velocity performed with traction. He was also the first person to coin the term “end feel” in relation to the sensation felt in joints at their anatomical end range.\textsuperscript{10}

James Mennell’s son, John, believed manipulation only moved the synovial joints, not the discs. He emphasized the use of manipulative techniques for evaluating clients with musculoskeletal pain, particularly joint pain. He stated that it is “immaterial. . ., how one manipulates so long as the movements used in therapy are normal and confined to the restoration of lost joint play movements.”\textsuperscript{6} His techniques, although unspecific, were not of the high velocity thrust-type as those of Cyriax.

Another individual who emphasized using manipulative techniques for evaluating was Kaltenborn, a Scandinavian physical therapist, chiropractor, and osteopath.\textsuperscript{11} He utilized his manipulative skills to test intervertebral joint motion passively. His basis of joint pathology was strain. The edema secondary to injury causes decreased range of motion (ROM), resulting in pain with movement, creating a cycle of inflammation, pain, and decreased ROM. He felt that by breaking this cycle of pain and spasm, via manipulation, pain would be decreased and normal ROM would be restored to the joint.

Another proposed cause of back pain was the facet. Stanley Paris believed facet injuries were more likely responsible for this pain. Appointed the first manual therapy lecturer at the New Zealand School of Physiotherapy in 1963, Paris taught his students the importance of focusing on treating the dysfunction, not the pain.\textsuperscript{9,10} Paris divided the term “accessory motion” which is defined at “those aspects of movement that are peculiar to active motion,”\textsuperscript{9} into two terms, component motion and joint play motion. Component
motion is the combination of joint movements resulting in active motion. Joint play motion is motion resulting from an outside force. Paris said joint play motion was necessary “in order to tolerate outside forces without sustaining an injury.”

In 1964, Geoffrey Maitland published “Vertebral Manipulation.” He proposed using oscillatory movements within the range of motion to release a fixed synovial joint and thus treat the physical “reproducible” signs. His techniques were altered for each individual patient, depending on the presentation of symptoms. He felt that the “techniques should be varied, modified, reversed, new ones invented, until they achieve the intention of their selection.” Upon examining and treating patients, he continually reassessed them, believing this to be the most important aspect of all manipulative treatment. Communication and listening to everything the patient says in regard to their dysfunction is a vital component of Maitland’s treatment regime. Maitland was one of the first known manipulators who actually graded his manipulations. Grades I-IV are low-velocity motions and grade V is a high velocity thrust at the end or beyond the end range.

More recently, in the late 1970’s, came the idea of spinal extension for treating a protruding disc, another proposed culprit of back pain. McKenzie, an Australian physical therapist, theorized that extension of the spine, in the case of a protruding disc would centralize radicular pain (“centralization phenomenon”). By repetitive spinal extension, McKenzie believes that a reduction of the bulging disc takes place, relieving pain on the tissues it was contacting and ultimately relieving pain. He progresses his extension program from prone lying, to prone-on-elbows, to prone press ups. Along with
his specific treatment regime, he also has a classification of low back problems, including postural, dysfunction, and derangement syndromes. McKenzie's protocol has "been so effective that other alternatives are not often necessary."
I. SOFT TISSUE TECHNIQUES

A. Skin Rolling
   Patient position: prone
   Therapist position: standing beside patient
   Technique: Gently, but firmly pinch a roll of skin between thumbs and
              long fingers and move either caudad or cephalad along the
              spine.
   Purpose: 1) Provides the PT with an opportunity to assess for skin possibly
           bound to the underlying soft tissue
            2) Relaxation

B. Paraspinal Circles
   Patient position: prone
   Therapist position: standing beside patient
   Technique: Using both thumbs on either side of the spine, move thumbs in
              circular motions (opposite to each other).
   Purpose: Relaxation

C. Strumming
   Patient position: sidelying or prone
   Therapist position: standing beside patient
   Technique: Using index and long fingers, apply pressure transversely
              across paraspinal musculature.
   Purpose: Relaxation

D. Fascial Snap
   Patient position: prone
   Therapist position: standing beside patient
   Technique: Grasp skin between thumbs and long fingers. Apply a rapid
              lift and gently return to resting position.
   Purpose: Increase mobility between skin and underlying tissues
II. CERVICAL TECHNIQUES

A. Suboccipital Release
   Patient position: supine
   Therapist position: at head of patient
   Technique: Grasp base of occiput with tips of fingers of both hands. Two methods can be utilized:
   1) allow patient’s head to rest in this position until the tone decreases
   2) distract in this position, feeling for relaxation of musculature
   Purpose: Relaxation of cervical paraspinals and suboccipital muscles

B. Lateral Column Release
   Patient position: supine
   Therapist position: seated above and slightly lateral to patient’s head
   Technique: Place one hand on temporal area of side not being treated (stabilization hand). Use fingers of the other hand near spinous processes on side to be treated, starting at C2 level. With this hand, rotate patient’s head away from injured side, return head to neutral, repeat. Move down cervical spine as muscle releases.
   Purpose: 1) Relaxation of cervical paraspinals and suboccipital musculature
            2) Increase ROM

C. Upper Trapezius Pump Massage
   Patient position: prone
   Therapist position: at head of patient
   Technique: With one hand, apply pressure to upper trapezius. Once this pressure is applied, depress the same side shoulder with other hand. Let off pressure from trapezius, then off the shoulder. Repeat in a rhythmic motion.
   Purpose: Relaxation of upper trapezius
   NOTE: When C1 level is reached, stabilization hand moves from temporal area to anterior shoulder of the side being treated.
D. **Upper Trapezius Stretch**  
Patient position: supine  
Therapist position: standing above patient’s head  
Technique: Support patient’s head under occiput with one hand. Sidebend head away from side to be stretched until tension is felt, then rotate towards the side to be stretched. Hold this position. Place other hand on superior AC joint of side to be stretched. Ask patient to “lift” shoulder into this hand. Hold isometrically for 5 seconds, then release. As releasing, push the shoulder inferiorly until tension is felt. Repeat.  
Purpose: Stretch the upper trapezius

E. **Sternocleidomastoid Stretch**  
Patient position: supine  
Therapist position: standing above patient’s head  
Technique: Support patient’s head under occiput with one hand. Rotate as far toward side to be stretched as possible. Bend head back until tension is felt. Hold this position. Place other hand on zygomatic arch. Lift with bottom hand; have patient attempt to rotate head in opposite direction. Hold contraction for 5 seconds, release. As releasing, rotate and backbend head until tension is felt. Repeat.  
Purpose: Stretch the sternocleidomastoid

F. **Atlantoaxial Rotation (C₁, C₂)**  
Patient position: prone, forehead resting in palms of interlaced hands with head turned 30°  
Therapist position: at head of patient  
Technique: Place thumb tips on articular pillar (transverse process) of C₂ on opposite side of spine to which head is rotated. Apply a PA mobilization slightly medially.  
Purpose: Increase rotation to the same direction as the head is turned

G. **Occipital Translation (Occiput, C₁)**  
Patient position: sitting with erect posture  
Therapist position: standing at patient’s side  
Technique: With index finger and thumb, grasp C₁, supporting spine with web space of this hand. With other hand, grasps occiput with thumb and index finger. (May use mastoid processes for better grip.) Laterally shift/translate the occiput on C₁. Return to neutral and repeat to other side.  
Purpose: To assess the integrity of the alar ligament and the suboccipital muscles
III. LUMBAR TECHNIQUES

A. Transverse Erector Spinae
   Patient position: prone
   Therapist position: standing at patient’s side
   Technique: Place heel of hand just lateral to spinous processes on opposite side of the one standing on. Apply pressure laterally across musculature.
   Purpose: Relaxation of transverse erector spinae musculature

B. Quadratus Lumborum Pump Massage
   Patient position: sidelying with hips flexed at 90°
   Therapist position: standing, facing patient
   Technique: Place one forearm on lateral rib cage, and the other on pelvis. Place fingers of both hands on table side of spinous processes in lumbar area. Pull up with fingers, pushing down with elbows in a flaring manner, using ribs and pelvis as fulcrums.
   Purpose: Relaxation

C. Maitland Lumbar Rotations
   Grade I:
   Patient position: sidelying with hips and knees flexed to 45°, patient’s top hand should be resting in front of patient
   Therapist position: standing, facing patient
   Technique: With hands on iliac crest, gently oscillate pelvis by pushing and pulling it away from and towards therapist.

   Grade II:
   Patient position: sidelying with hips and knees at 45°, patient’s top hand on lateral rib cage
   Therapist position: standing, facing patient
   Technique: Similar to Grade I, only slightly more motion

   Grade III:
   Patient position: sidelying with hips and knees at 60°, upper foot positioned in posterior space of bottom leg
   Therapist position: standing, facing patient
   Technique: Place one hand on patient’s upper shoulder and the other on pelvis. Apply mobilizing force towards and away from therapist (shoulder and hip will be moving in opposite directions). Pelvis should have 3 times as much rotation than the shoulder.
Grade IV:
Patient position: similar to Grade III, with upper leg hanging off table
Therapist position: standing, facing patient
Technique: Similar to Grade III, only with slightly more motion
Purpose: Increase rotational ROM in lumbar spine.

IV. MANUAL TRACTION

Definition: A distractive force applied manually on joint surfaces.
Advantage over mechanical traction: 1) the therapist can feel patient’s reaction to treatment
2) can be segment specific
Disadvantage over mechanical traction: cannot measure the exact amount of force being applied
Purpose: 1) Used as an evaluation tool to determine if mechanical traction would be appropriate
2) To separate intervertebral levels
Note: The distractive force is generally held for 7-10 seconds for a gradual onset.

A. Lumbar Manual Traction
(the greater the flexion of L/E’s, the greater the traction on the lower L-spine; the less flexed position of the L/E’s, the greater the traction on the upper L-spine)

1. Patient position: hooklying
   Therapist position: standing at foot of patient
   Stabilizing force: patient’s body (can use belt over trunk or have another person stabilize patient at the chest or shoulders)
   Technique: Place patient’s legs over one shoulder, grasp femurs and distract.
   (Can also use traction belt around PT’s pelvis and patient’s thighs to assist with obtaining a firmer hold and enhancing body mechanics.)

2. Patient position: hooklying
   Therapist position: standing at the foot of patient
   Stabilizing force: patient’s body
   Technique: Sit on patient’s feet to secure them, grasp just proximal to both knees with hands and pull toward foot of table.
3. Patient position: standing with arms crossed to opposite shoulder
   Therapist position: standing behind patient with arms under patient’s
   axillas, grasping forearms of patient
   Stabilizing force: patient’s body
   Technique: Lean backward, unweighting patient. (May need to stand
   on stool.)

B. Thoracic Manual Traction
   Patient position: sitting, hands clasped behind neck, slumping
   Therapist position: behind patient, hands under axilla and grasping
   forearms.
   Stabilizing force: patient’s body
   Technique: Lean back while holding onto patient’s forearms.
   Note: Can use a towel at spine to stabilize the lower T-spine below the
   level at which traction is desired.

C. Cervical Manual Traction
   Purposes for all techniques: relax musculature, increase ROM, reduce a disc
   protrusion, decrease nerve impingement
   Note: For distraction at C₂-C₃, position head in neutral.
       For distraction at C₄-C₅ and C₅-C₆, position head in slight flexion.
       For distraction at C₆-C₇ and C₇-T₁, position head in full flexion.

   1. Patient position: supine with head off table
      Therapist position: at head of patient, supporting head
      Stabilizing force: patient’s body
      Technique: Support patient’s head with one hand (behind occiput).
                  Place other hand (hypothenar eminence) on patient’s chin
                  and gently distract.

   2. Patient position: supine as above
      Therapist position: at head of patient, supporting head
      Stabilizing force: patient’s body
      Technique: Grasp occiput with one or both hands and distract.
      Note: Best to use this technique rather than #1 if the patient has TMJ
           complaints.

   3. Patient position: sitting
      Therapist position: behind patient
      Stabilizing force: patient’s body
      Technique: Place hands on either side of patient’s head at zygomas
                 with elbows horizontal to floor. Apply an upward force.
V. OVERPRESSURE

Purpose: 1) Used as an evaluation tool to assess ROM and end range
       2) To try reproducing signs and symptoms of patient’s dysfunction

Note: Prior to performing these techniques, the patient is asked to actively perform
       ROM. Watch for any excess motion, substitution, or deviations from normal.
       Also note any complaints of pain from the patient and the quality of movement.
       If the patient can actively perform movements without symptoms, overpressure
       is applied.

A. Lumbar Overpressure

Patient position: standing, relaxed
Therapist position: standing at patient’s side

1. Flexion
   Patient is asked to bend forward. Facing patient’s side, place one
   hand on sacrum and the other at about T7 with fingers of opposite
   hands pointing toward each other. While patient is in flexed
   position, approximate hands, with elbows pointing out.

2. Extension
   With hands on hips, have patient bend backward. Facing patient’s
   side, place one arm across patient’s upper chest to opposite
   shoulder. Place other with hand palm up along lumbar spinous
   processes. Apply pressure forward with bottom hand and back
   with top hand for overpressure in extension.

3. Lateral Flexion
   Have patient bend toward one side, letting arm on that side
   approximate the knee. Facing patient on the side to which
   sidebending is occurring, place one arm across patient’s chest to
   the opposite shoulder and the other hand -palm up- with web
   space over lateral trunk. Gently pull with the hand on patient’s
   shoulder away with the other hand, creating an
   overpressure

If none of the preceding overpressure tests reproduce any
signs and symptoms. Hand placements are the same as in lateral
flexion. Have the patient (with assistance) come into extension,
lateral flexion, and rotation towards the side therapist is on. Apply
overpressure if patient is pain free in this position, pulling with
hand on shoulder and pushing with other hand.
Alternate position: Therapist’s hands on patient’s shoulders.
Assist patient into extension, lateral flexion, and rotation, applying overpressure if appropriate.

B. Thoracic Overpressure

Patient position: sitting, with erect posture
Therapist position: at patient’s side

1. Flexion
   With patient’s fingers interlaced and hands behind occiput, elbows close to face, have patient bend forward from above waist. Place heel of one hand at T_{12}-L_{1} and the other heel of hand at C_{7}-T_{1}. With fingers of opposite hands pointing each other, apply a pressure in opposite directions with hands, causing the upper and lower thoracic segments to separate.

2. Extension
   With patient’s fingers interlaced and hands behind occiput, elbows close to face, have patient bend backward as far as possible. Using one arm across the chest, under axillae and the other with palm up and heel of hand along thoracic spine, apply pressure to spinous processes at varying levels.

3. Lateral Flexion
   With patient’s hands behind occiput (fingers interlaced and elbows pointing out to sides), have patient bend to one side. Place one arm in front of patient, on far deltoid and the other with palm up and web space along lateral rib cage of the side that’s bending. Apply overpressure with hand on lateral rib cage, moving up and down at varying levels. Repeat for other side.

4. Rotation
   With patient’s arms crossed, hands on top of opposite shoulders, have patient rotate to one side. Place one hand on far shoulder (posterior aspect) and the other on the anterior aspect of the near shoulder. Apply overpressure by pulling with far hand and pushing with near hand. Repeat for other side.
C. **Cervical Overpressure**

Patient position: sitting at the end of table  
Therapist position: at patient’s side

1. **Flexion**  
   Have patient flex neck and look down. Stabilize posterior shoulders with one arm. Place other hand on occiput with elbow pointing to ceiling and apply pressure down across occiput.

2. **Extension**  
   Have patient extend neck and look up. Stabilize thoracic spine with one elbow. Apply overpressure with other hand on patient’s chin, elbow pointing out. Use fingers of stabilizing hand to apply a force couple on patient’s forehead.

3. **Lateral Flexion**  
   Therapist position: standing, facing patient  
   Have patient side bend left or right. Using ulnar border of one hand on patient’s lateral neck of the side that’s flexing and the other hand on the temporal area of the opposite side, apply overpressure by pushing into lateral flexion. Repeat for other side.

4. **Rotation**  
   Have patient rotate head to one side. Place hands on temporal areas bilaterally with elbows pointing out. Apply overpressure for rotation. Repeat for other side.  
   Note: Do not allow patient’s shoulders to turn with head. May need to stabilize with therapist’s shoulder.
VI. PASSIVE ACCESSORY INTERVERTEBRAL MOVEMENTS (PAIVM's)

A. Lumbar PAIVM's

Patient position: prone with pillow under abdomen to support lumbar area
Therapist position: standing at patient's side

1. Central P-A Glide
   Technique: Three methods can be utilized to apply central, anterior pressure to vertebral body.
   a) Use both thumb tips on spinous processes and apply pressure.
   b) Use pisiform of one hand over spinous process with heel of other hand on top of this, applying anterior pressure.
   c) Use index and middle finger of one hand on the transverse processes at one level with the hypothenar eminence of the other hand over the fingers. Apply pressure downward with top hand.
   Purpose: Increase lumbar extension, opening superior articular facets of the segment being mobilized

2. Unilateral P-A Glide
   Technique: Two methods can be utilized.
   a) Use both thumbs on a transverse processes and apply anterior pressure. (Opens superior articular facets of segment on the same side; opens inferior articular facets of segment on opposite side.)
   b) Place index finger on a transverse process and the middle finger of same hand on a transverse process on opposite side of vertebral column one level higher or lower than the index finger. Place hypothenar eminence of other hand on top of fingers and apply an anterior pressure. (Opens superior articular facets of segment on side of finger relative to transverse process.)
   Purpose: Increase lumbar rotation and lateral flexion

3. Transverse Glide
   Technique: Using both thumbs, apply pressure on lateral aspect of spinous precesses transversely towards the opposite side.
   Purpose: Increase rotation
B. Thoracic PAIVM’s

Patient position: prone with forehead resting in palms of interlaced hands and pillow under abdomen for support

Therapist position: standing at patient’s side

1. Central P-A Glide
   Technique: Three methods can be utilized to apply central, anterior pressure to vertebral body.
   a) Use both thumb tips on spinous processes and apply pressure.
   b) Use pisiform of one hand over spinous process with heel of other hand on top of this, applying anterior pressure.
   c) Use index and middle finger of one hand on the transverse processes of one level with the hypothenar eminence of the other hand over the fingers. Apply pressure downward.
   Purpose: Increase thoracic extension, opening superior facets of segment being mobilized

2. Unilateral P-A Glide
   Technique: Two methods can be utilized.
   a) Use both thumbs on a transverse processes and apply anterior pressure. (Opens superior articular facets of segment on the same side; opens inferior articular facets of segment on opposite side.)
   b) Place index finger on a transverse process and the middle finger of same hand on a transverse process on opposite side of vertebral column one level higher or lower than the index finger. Place hypothenar eminence of other hand on top of fingers and apply an anterior pressure. (Opens superior articular facets of segment on side of finger relative to transverse process.)
   Purpose: Increase thoracic rotation and lateral flexion

3. Transverse Glide
   Technique: Using both thumbs, apply pressure on lateral aspect of spinous processes transversely towards the opposite side.
   Purpose: Increase rotation
C. Cervical PAIVM’s

1. Central P-A Glide
   Patient position: prone with forehead in palms of interlaced hands with head in neutral
   Therapist position: at patient’s head
   Technique: Use both thumb tips on spinous process, applying anterior pressure.
   Purpose: Increase cervical extension, opening superior facets of segment mobilized

2. Unilateral P-A Glide
   Patient position: prone with forehead in palms of interlaced hands and head in neutral
   Therapist position: at patient’s head
   Technique: Use thumb tips on transverse process. Pressure can be applied in the directions as follows:
   a) straight anteriorly
   b) in plane of facet orientation
   c) combination of a and b
   Purpose: Increase cervical rotation, opening superior facets on contralateral side and inferior facets on ipsilateral side.

3. Side Bending (medial) Glide
   Patient position: supine, with head off table and arms relaxed
   Therapist position: at patient’s head
   Technique: Place both hands on temporal areas and radiopalmar surface of one index finger on lateral aspect of transverse process to be mobilized. Apply pressure medially and slightly inferior. Purpose: Increase sidebending towards the same side. (The segment below the transverse processes mobilized will sidebend towards mobilized side. The facet on the opposite will be opened.)
VII. KALTENBORN TECHNIQUES

The general purpose for all of the tests is to evaluate the quantity, quality, and end feel of motion, observing to see if motion produces any symptoms.

A. Sacro-Iliac Techniques

Patient position: supine
Therapist position: standing at patient’s side

1. ASIS Medial
   Technique: use hands or forearms on lateral ASIS and apply a medial force with both hands
   Purpose: Open the posterior aspect of the SI joint

2. ASIS Lateral
   Technique: place hands on medial ASIS, with arms crossed, and apply a lateral force with both hands
   Purpose: Open the anterior aspect of the SI joint
   Note: Patient symptoms are a result of joint hypermobility.

B. Lumbar Techniques

1. Lumbar segmental test and mobilization for flexion
   Patient position: sidelying, knees and hips flexed, knees off edge of table
   Therapist position: standing, facing patient
   
   a) Test
      Stabilizing (proximal) hand: palpating between 2 spinous processes
      Moving (distal) hand: grasping dorsal surface of patient’s calves, patient’s knees should come in contact with therapist’s body
      Technique: Bend patient’s knees and hips with distal hand and body, causing trunk flexion.
   
   b) Mobilization
      Stabilizing (proximal) hand: fixating segment with fingers
      Mobilizing (distal) hand: on sacrum with fingers over transverse or spinous processes of segment below stabilizing hand, patient’s knees should be in contact with therapist’s body
      Technique: Bend patient’s knees and hips with distal hand and body, causing trunk flexion
      Purpose: Increase lumbar flexion
2. Lumbar segmental test and mobilization for extension
   Patient position: sidelying, knees and hips flexed
   Therapist position: standing, facing patient

   a) Test
      Stabilizing (proximal) hand: palpating between 2 spinous processes
      Moving (distal) hand: grasping anterior aspects of patient’s lower legs, patient’s knees should be in contact with therapist’s body
      Technique: Move patient’s femurs posteriorly by pushing body against patient’s knees.

   b) Mobilization
      Stabilizing (proximal) hand: fixating spinous process with index finger
      Moving (distal) hand: grasping dorsal aspect of patient’s calves with patient’s knees in contact with therapist’s body
      Technique: same as the test
      Purpose: Increase lumbar extension

3. Lumbar segmental test and mobilization of rotation in flexion initiated caudally
   Patient position: sidelying with bottom leg extended and top leg flexed (L-spine in flexion)
   Therapist position: standing, facing patient

   a) Test
      Stabilizing (proximal) hand: on L-spine, index finger palpating on lateral edge, between spinous processes
      Mobilizing (distal) hand: index and middle fingers on lateral side of spinous process below the palpating finger with the rest of hand and forearm on patient’s posterior pelvis
      Technique: Rotate patient’s ASIS anteriorly toward table, palpating for motion between spinous processes.
28

b) Mobilization
Stabilizing (proximal) hand: on lateral rib cage with thumb or first two fingers laterally fixating spinous process (PT’s body should be in contact with patient’s upper trunk.)
Mobilizing (distal) hand: on pelvis with fingers on spinous process one segment below stabilizing hand
Technique: same as test
Purpose: Increase rotation in flexion

4. Lumbar segmental test and mobilization of rotation in flexion initiated cranially
Patient position: sidelying with hips and knees flexed (L-spine in flexion)
Therapist position: standing, facing patient

a) Test
Stabilizing (distal) hand: on posterior lumbar spine/pelvis with fingers palpating between spinous processes, allow rest of hand to stabilize patient’s pelvis (PT’s body should contact patient’s pelvis.)
Mobilizing (proximal) hand: forearm over lateral rib cage with thumb or first two fingers on the lateral side of spinous process above the stabilized segment
Technique: Rotate the upper half of trunk posteriorly towards table with proximal hand.

b) Mobilization
Stabilizing (distal) hand: on posterior aspect of pelvis with fingers fixating segment desired
Mobilizing (proximal) hand: over lateral rib cage with thumb or first two fingers laterally fixating spinous process above the stabilized segment
Technique: same as test
Purpose: Increase rotation in flexion
5. Lumbar segmental test and mobilization for rotation in extension initiated caudally

Patient position: sidelying, bottom leg extended, top leg flexed (L-spine in extension)
Therapist position: standing, facing patient

a) Test
Stabilizing (proximal) hand: on lumbar spine with index finger palpating laterally between spinous processes with rest of hand stabilizing upper L/lower T-spine
(PT’s body in contact with patient)
Mobilizing (distal) hand: index and middle fingers on lateral side of spinous process below the palpating finger with rest of hand on posterior pelvis
Technique: Rotate patient’s ASIS anteriorly toward table, palpating for motion between spinous processes.
b) Mobilization
Stabilizing (proximal) hand: on lateral rib cage with thumb or first two fingers laterally fixating spinous process (PT’s body in contact with patient’s trunk)
Mobilizing (distal) hand: on pelvis with fingers on lateral aspect of spinous process one segment below stabilizing hand
Technique: same as test
Purpose: Increase rotation in extension

6. Lumbar segmental test and mobilization for rotation in extension initiated cranially

a) Test
Patient position: sidelying, hips and knees flexed
Therapist position: standing, facing patient
Stabilizing (distal) hand: on posterior lumbar spine/pelvis with fingers palpating laterally between spinous processes (PT’s body in contact with patient’s pelvis)
Mobilizing (proximal) hand: forearm over lateral rib cage with thumb of first 2 fingers on the lateral side of spinous process above the stabilized segment
Technique: Rotate the upper half of trunk posteriorly towards table with proximal hand.

b) Mobilization
Patient position: sidelying, bottom leg flexed, top leg extended (L-spine in extension)
Therapist position: standing, facing patient

Stabilizing (distal) hand: on posterior aspect of pelvis with fingers fixating spinous process laterally (PT's body in contact with patient's pelvis)

Mobilizing (proximal) hand: over lateral rib cage with thumb or first two fingers laterally fixating spinous process above the stabilized segment

Technique: same as test
Purpose: Increase rotation in extension

B. Cervical Techniques
Patient position: sitting
Therapist position: standing, facing one side of patient

1. Cervical segmental test and mobilization for flexion
   a) Test
      Stabilizing hand: palpate between spinous processes with one finger, stabilizing C-spine with the rest of the hand
      Mobilizing hand: on top of patient’s head
      Technique: Passively bend patient’s head forward until flexion occurs at the segment being palpated.
   
   b) Mobilization
      Stabilizing hand: on posterior neck with thumb and index fingers stabilizing spinous process
      Mobilizing hand: crossed to opposite side of head with therapist’s chest against patient's head; position 5th finger on segment above the one being stabilized
      Technique: Bend head forward with mobilizing hand and body.
      Purpose: Increase flexion
2. Cervical segmental test and mobilization for extension
   a) Test
      Stabilizing hand: supporting C-spine with finger
      palpating between spinous processes
      Mobilizing hand: on top of patient’s head
      Technique: Bend head and neck back until extension occurs at
      segment being palpated.
   b) Mobilization
      Stabilizing hand: same as for flexion mobilization
      Mobilizing hand: crossed to opposite side of patient’s head
      with little finger positioned over the spinous process being
      mobilized and body in contact with patient’s head
      Technique: With mobilizing hand on patient’s head, bend head
      and C-spine backwards until extension occurs at the desired segment.
      Purpose: Increase extension

3. Cervical segmental test and mobilization for flexion with sidebending and rotation
   a) Test
      Stabilizing hand: on posterior neck below segment being tested with one
      finger palpating facets on opposite side of therapist
      Mobilizing hand: on top of patient’s head
      Technique: Flex patient’s head and C-spine along with sidebending and rotating it toward therapist’s side.
      Repeat on both sides and compare.
   b) Mobilization
      Stabilizing hand: fixating spinous process with thumb and index finger
      Mobilizing hand: on opposite side of patient’s head
      with little finger on vertebra one segment above the stabilized one
      and therapist’s chest against patient’s head
      Technique: With mobilizing hand and body, flex, sidebend, and rotate patient’s head toward therapist. Repeat on both sides.
      Purpose: Increase flexion, sidebending, and rotation
4. Cervical segmental test and mobilization for extension with sidebending and rotation
   a) Test
      Stabilizing hand: palpating with one finger on facet opposite the side of therapist and stabilizing below this segment with the rest of hand
      Mobilizing hand: on top of patient’s head
      Technique: Bend patient’s head and C-spine back while sidebending and rotating away from therapist. Repeat on both sides and compare.
   b) Mobilization
      Stabilizing hand: fixating spinous process with thumb and index finger and rest of hand stabilizing C-spine
      Mobilizing hand: on opposite side of patient’s head with little finger on vertebra one segment above the stabilized one and therapist’s chest against patient’s head
      Technique: With mobilizing hand and body, extend, sidebend, and rotate patient’s head and C-spine away from therapist. Repeat on both sides.
      Purpose: Increase extension, sidebending, and rotation

C. Cervicothoracic Techniques
   Patient position: sidelying
   Therapist position: standing, facing patient

1. Cervicothoracic segmental test and mobilization for flexion
   a) Test
      Stabilizing (distal) hand: palpating between spinous processes or facets with one finger and the rest of hand stabilizing distal to finger
      Mobilizing (proximal) hand: under patient’s head and C-spine with little finger on vertebra above stabilized segment and arm supporting patient’s forehead
      Technique: Flexed patient’s head with mobilizing head until movement is felt at the palpated segment.
b) Mobilization
   Stabilizing (distal) hand: fixating vertebra with two fingers
   Mobilizing (proximal) hand: same as test
   Technique: same as test
   Purpose: Increase flexion

2. Cervicothoracic segmental test and mobilization for extension
   a) Test
      Stabilizing (distal) hand: palpating between spinous processes
      or facets with one finger and the rest of hand stabilizing distal to finger
      Mobilizing (proximal) hand: under patient’s head and C-spine
      with little finger on vertebra above stabilized segment and arm
      supporting patient’s forehead
      Technique: Extend patient’s head with mobilizing hand until movement is felt at the palpated segment.
   b) Mobilization
      Stabilizing (distal) hand: fixating vertebra with two fingers
      Mobilizing (proximal) hand: same as test
      Technique: same as test
      Purpose: Increase extension

3. Cervicothoracic segmental test and mobilization for flexion with sidebending and rotation
   a) Test
      Stabilizing (distal) hand: palpating between spinous processes
      or facets with one finger and the rest of hand stabilizing distal to finger
      Mobilizing (proximal) hand: under patient’s head and C-spine
      with little finger on vertebra above stabilized segment and arm
      supporting patient’s forehead
      Technique: Flex, sidebend, and rotate patient’s head with mobilizing hand until movement is felt at the palpated segment. (Can sidebend and rotate to same or opposite sides.) Repeat for other direction.
   b) Mobilization
      Stabilizing (distal) hand: laterally fixating spinous processes at one segment with thumb
      Mobilizing (proximal) hand: under patient’s head and C-spine
      with little finger on vertebra above stabilized segment and arm
      supporting patient’s forehead
Technique: Flex, sidebend, and rotate patient’s head with mobilizing hand until movement is felt at the palpated segment. (Can sidebend and rotate to same or opposite sides.) Repeat for other direction.

Purpose: Increase coupled motion in flexion with sidebending and rotation to the same side

4. Cervicothoracic segmental test and mobilization for extension with sidebending and rotation
   a) Test
      Stabilizing (distal) hand: palpating between spinous processes or facets with one finger and the rest of hand stabilizing distal to finger
      Mobilizing (proximal) hand: under patient’s head and C-spine with little finger on vertebra above stabilized segment and arm supporting patient’s forehead
      Technique: Extend, sidebend, and rotate patient’s head with mobilizing head until movement is felt at the palpated segment. (Can sidebend and rotate to same or opposite sides.) Repeat for opposite direction.
   b) Mobilization
      Stabilizing (distal) hand: laterally fixating spinous processes at one segment with thumb
      Mobilizing (proximal) hand: under patient’s head and C-spine with little finger on vertebra above stabilized segment and arm supporting patient’s forehead
      Technique: Extend, sidebend, and rotate patient’s head with mobilizing hand until movement is felt at the palpated segment. (Can sidebend and rotate to same or opposite side of therapist.) Repeat for other direction.
      Purpose: Increase coupled motion in extension with sidebending and rotation to the same side
VIII. PASSIVE PHYSIOLOGIC INTERVERTEBRAL MOVEMENT TESTING (PPIVM’s)

Definition: Motion testing of joints, used to obtain PROM in the spine segmentally
Note: Therapist needs to assess the quantity, quality, end feel, and symptoms. The patient must be relaxed to achieve PROM. The motion should be palpable with one finger.

A. Lumbar PPIVM’s

1. Flexion
   Patient position: sidelying, top leg slightly flexed
   Therapist position: facing patient
   Technique: Support patient’s top knee with therapist’s abdomen, or one arm, allowing freedom of both hands to palpate.
   Bring the top leg into flexion. Initially, the motion will first be observed in the lower L-spine, but as flexion of the hip increases, higher segments of the L-spine will begin moving.
   Repeat on other side, or can do both legs at one time.

2. Extension
   Patient position: sidelying, top leg flexed to 90°
   Therapist position: facing patient
   Technique: Support patient’s knees with pelvis. Palpate L-spine while applying a posterior pressure to the femurs, causing extension of the L-spine.

3. Lateral Flexion
   a) Patient position: sidelying, both hips at 90°
      Therapist position: facing patient
      Technique: Palpate L-spine with one hand, supporting patient’s feet with other. Raise feet towards ceiling.
      Note: Can lower feet to floor for sidebending to the other direction.
      May need to support patient’s thighs with therapist’s thighs.
   b) Patient position: prone
      Therapist position: at patient’s side
      Technique: Flex one knee to 90°, pull femur toward therapist or away from therapist. Palpate L-spinous processes for movement.
4. Rotation
   a) Patient position: prone, knees at 90°
      Therapist position: at patient’s side
      Technique: Pull feet towards therapist or rotate away from therapist, palpating L-spinous processes.
   b) Patient position: prone
      Therapist position: at patient’s side
      Technique: Palpating L-spinous processes with one hand, grasp the opposite ASIS and pull upward, causing rotation.
   c) “Setting the Level”
      Patient position: sidelying, hips and knees flexed with free arm on lower rib cage
      Therapist position: standing, facing patient
      Technique: Place one forearm on patient’s lateral pelvis and the other on lateral rib cage. Passively flex patient’s L/E’s until motion occurs at the desired segment. Rotate patient’s upper trunk posteriorly until the spinous process at this same level begins to move laterally. Let legs lower towards the floor and exert pressure against patient’s rib cage posteriorly for a rotation mobilizing force.

B. Cervicothoracic PPIVM’S
   1. Flexion and Extension (T₄-T₁₂)
      Patient position: short sitting on table with fingers interlaced behind head, elbows at side of patient’s face
      Therapist position: at patient’s side
      Technique: With one arm, reach across patient’s chest and place hand under far axilla. Let patient rest in therapist grasp, giving support with body. Place other hand along spinous processes (start at T₄). Move thoracic spine into flexion, working towards chest to knees. With increased flexion, gradually move down the spine, ending at T₁₂-L₁.
      Note: Do same positioning for extension, with therapist passively extending thoracic spine.

   2. Flexion and Extension (C₇-T₄)
      Patient position: short sitting
      Therapist position: at patient’s side
      Technique: Palpate spinous processes along upper T-spine. Grasp top of patient’s head with other hand and flex or extend patient’s head and C-spine.
3. Sidebending (T₁₂-T₄)
   Patient position: short sitting, fingers interlaced and behind head with elbow relaxed beside face
   Therapist position: at patient’s side
   Technique: Palpating over spinous processes along T-spine, reach across patient’s chest with other hand, grasping onto the far deltoid. Push your chest against patient’s near shoulder to cause sidebending to the opposite side. Repeat on other side.

4. Sidebending (C₇-T₄)
   a) Patient position: short sitting
      Therapist position: at patient’s side
      Technique: Palpating over spinous processes along upper T-spine, use other hand to hold onto the top patient’s head. Sidebend head and upper T-spine in one direction. Repeat in the other direction.
   b) Patient position: sidelying with fingers interlaced behind head and elbows relaxed by face
      Therapist position: facing patient
      Technique: Palpating over spinous processes along upper T-spine, reach the other hand under patient’s bottom arm in their axilla region. Lift patient’s upper body in a sidebending manner. Repeat for opposite side.

5. Rotation
   a) Patient position: sidelying, top hip flexed to 90°
      Therapist position: facing patient
      Technique: With one hand under upper arm in axilla region and other hand palpating between spinous processes, move T-spine into rotation. Work patient’s shoulder towards table, away from therapist.
   b) Patient position: sitting, fingers interlaced behind head with elbows relaxed at patient’s face
      Therapist position: standing, facing patient
      Technique: Reach one hand across patient’s chest, grasping onto far deltoid. Palpate between spinous processes in T-spine. Rotate patient’s mid and lower T-spine towards therapist. Repeat for other side.
C. **Cervical PPIVM's**

Patient position: supine, head off table  
Therapist position: at end of table, supporting patient’s head with hip and one hand over occipital protuberance  
Technique: With other hand, palpate on one side of a transverse process or between spinous processes (Start at C1-2, moving to C7-T1.)  
Begin to move C-spine into flexion, bring chin to chest.  
Repeat for extension, sidebending, and rotation. Repeat sidebending and rotation on both sides.  
Note: Can also perform these with patient sitting and the therapist at the patient’s side. Therapist will place on hand on top of head with the other palpating cervical spinous processes.

IX. **MUSCLE ENERGY TECHNIQUES**

A. **Superior or Inferior Pubic Symphysis**

Indication: 1) if pubic tubercles are offset in frontal plane  
2) if tension/tenderness of medial attachment of inguinal ligament is noted  
Patient position: hooklying, hips and knees flexed to 60°  
Therapist position: standing at patient's side  
Technique: Manually resist abduction 2-3 times, holding each contraction for 3-5 seconds. Follow this with resisted adduction for 2-3 times, holding for 3-5 seconds.  
Purpose: Restore normal alignment at pubic symphysis

B. **Left Posterior Innominale**

Left innominate bone is tilted posteriorly, causing the ASIS on that side to be higher than the right and the PSIS on the left to be lower than the right.  
Patient position: supine with involved leg over the table edge  
uninvolved leg should be flexed at hip and knee  
Therapist position: standing at patient’s side  
Technique: With one hand on involved anterior thigh and the other on the uninvolved tibia, manually resist flexion of involved L/E and extension of uninvolved L/E. Hold for 7-10 seconds. Relax. Assist patient to pull uninvolved leg up and involved leg down. Repeat 3 times.  
Purpose: Strengthen hip flexors on involved side and pull left innomininate anteriorly
C. **Right Anterior Innominate**

Right innominate will be tilted anteriorly. ASIS on this side will be lower that on the left, and the PSIS on this side will be higher than the left.

Patient position: supine with uninvolved leg hanging over table edge
involved leg should be flexed as much as possible

Therapist position: standing at patient’s side

Technique: Therapist’s axilla holds involved leg at the proximal tibia.

Have patient push involved leg into therapist’s axillary region, and hold the uninvolved leg s the other attempts to flex. Hold 7-10 seconds. Relax. Assist patient to flex hip further. Repeat 3 times.

Purpose: Strengthen hip extensors on the involved side, causing them to posteriorly rotate the involved innominate

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**X. RIB MOBILIZATIONS**

A. **Rib Mobilization**

Patient position: prone

Therapist position: standing on opposite side to be mobilized

Technique: Place ulnar border of hand on rib to be mobilized. The ulnar half of the other hand is placed over transverse processes of vertebra on opposite side of rib being mobilized. As you apply downward pressure through both hands, have patient exhale. May head a “pop” as ribs are manipulated.

Note: To get to the ribs at scapular level, allow patient’s arms to hang over table causing abduction of the scapula.

B. **Rib Screw**

Patient position: prone

Therapist position: standing on opposite side to be mobilized

Technique: Cross forearms and place ulnar borders of hands on ribs at same level. Apply downward pressure as hands move away from each other.

C. **Alternate Rib Mobilization**

Patient position: prone

Therapist position: standing at head of patient

Technique: Place ulnar borders of hands over ribs at same level. Apply downward pressure over hands with body.
D. **First rib test and mobilization: ventral-caudal**

1. **Test**
   - Patient position: sitting, with C-spine rotated to the right
   - Therapist position: standing behind patient
   - Stabilizing force: Rest left elbow above patient’s right clavicle with forearm vertically and hand stabilizing patient’s head and neck.
   - Mobilizing force: Place the radial aspect of right index finger on dorsal side of patient’s first rib (on the right).
   - Technique: Apply pressure anteriorly and slightly inferior with right finger on the first rib. Repeat on opposite side with head turned to left, using opposite hands described to compare motion bilaterally.

2. **Mobilization**
   - Patient position: supine with C-spine rotated to the right
   - Therapist position: standing at the head of patient, facing patient
   - Stabilizing force: Use left arm to support and stabilize patient’s head and C-spine on left side.
   - Mobilizing force: Use radial aspect of right index finger on patient’s first rib, with elbow of this hand in contact with ASIS of therapist for support.
   - Technique: Move rib anteriorly and slightly inferior with finger. Repeat on opposite side with head turned to left, using opposite hands described.
   - Purpose: To attain traction in the costotransverse joint

**REFERENCES**
DEPARTMENT OF PHYSICAL THERAPY
SCHOOL OF MEDICINE
UNIVERSITY OF NORTH DAKOTA

AUDIO-VISUAL STANDARD RELEASE FORM

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