

## Directional Preference Protocol: Centralizing Neck, Shoulder and Arm Pain

*This protocol is performed after the regional orthopedic and neurological examinations. In cases of severe pain, it may be performed earlier, as part of acute pain management.*

This protocol, primarily based on work pioneered by Robin McKenzie, presents a system of analysis and treatment in which the spine is loaded dynamically or statically at end range with the goal of identifying specific exercises and procedures that a patient can use in a self-care program, as well as help guide appropriate manual therapy. Successful intervention results in changes in pain, resolution of antalgia, and improved range of motion.

More specifically, joints are repetitively loaded at end range or held sustained at end range for a period of time in a variety of positions. Any changes in the quality, distribution or persistence of the patient's pain and any improvement in global range of motion are carefully monitored. In this fashion, a therapeutic loading strategy is discovered and becomes the basis for intervention. In low back studies, McKenzie, Donelson and Long, found that this analysis can help determine the centralization potential of conservative therapies. (Donelson 1990, Donelson 1997, Long 1995, McKenzie 1990) It should be unsurprising that similar directional preferences exist with symptomatic cervical spines. (Abdulwahab 2000, Donelson 1995)

McKenzie (1990) speculates that neck, shoulder and arm conditions can be divided into *postural syndromes*, *adaptive tissue shortening ("dysfunction") syndromes*, and *disc derangement syndromes*.

**Postural syndromes** are caused by a patient "hanging" on relatively healthy ligaments and other connective tissue for prolonged periods of time, loading them at end range to the point of becoming symptomatic. Postural syndromes have the following characteristics:

the pain is intermittent; sustained static end-range loading often brings on the pain over a period of time (e.g., 15-20 minutes); change of position relieves the pain; there is no loss of movement; and there are no symptoms during specific movements or with repeated movements. (See Pages 14-16 for treatment recommendations.)

**Adaptive tissue shortening (dysfunction) syndromes\*** are due to contractures, scarring, adherent nerve root causing radiculopathy, myofascial changes and fibrosis. Pain is *immediately* elicited with movement at end range of shortened tissue.

**Disc derangement syndromes** are thought to be due to intradiscal mass displacement, whether the displacement 1) is into the spinal canal/neuroforamen and associated with radiculopathy (relatively uncommon) or 2) remains an *internal* derangement, associated with local pain and somatic referred pain into an extremity (common). In either case, the symptoms are aggravated during some motions, but movement in another direction, often the opposite, reduces the disc blockage and provides symptom relief, as well as a significant increase in range of motion. The discal material is thought to be repositioned, resulting in a rapid reduction of radicular/referred pain and overall improved mechanics. (Donelson 1990, McKenzie 1990)

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\* The term dysfunction as used here is not explicitly linked to the concept of joint dysfunction or subluxation syndrome.

This protocol will focus on the disc derangement syndrome. However, the approach can be used empirically with other acute or chronic conditions, **with or without radiating pain**, (Long 1995) even when the exact diagnosis is in doubt.

If the practitioner is unable to identify a directional movement that brings about centralization, decreased symptoms, or improved movement, the treatment procedures in this protocol will be ineffective at that time. The cause of the patient's pain may be a noncontained disc herniation, a treatable disc temporally complicated by significant inflammation, or may not be of discal origin at all. (McKenzie 1990)

## CURRENT EVIDENCE

There is some experimental evidence suggesting that neck retraction may increase cervical range of motion, improve resting posture, relieve neck and radicular pain, and possibly move the nucleous pulposis into a more anterior position.

In one study, repetitive cervical retraction (20x) decreased radicular symptoms and improved the H-reflex amplitude of the flexor carpi radialis in 13 patients with C7 radiculopathy. Symptoms included neck and arm pain for six months, paraesthesia, weakness in the triceps muscles, numbness in the middle finger, and decreased triceps reflex. (Abdulwahab 2000)

In another study (Abdulwahab 2002), exercises based on "optimum head posture" resulted in improved H-reflex, decreased pain, and increased function (as measured with an NDI). Sixteen patients with confirmed C7 radiculopathy were evaluated by finding an end-range neck position (using 30-second holds in neutral, flexion, extension, rotation, lateral flexion, retraction and protraction) that improved the patient's H-reflex. Ten out of 16 patients had good therapeutic results using repetitive exercises based on this therapeutic bias.

In another study of 50 healthy, asymptomatic volunteers from the University of Wisconsin,

repeated retractions resulted in a significant decrease in forward head carriage and an increase in active cervical flexion, extension, lateral flexion and rotation. (Goebel 2002)

## CENTRALIZATION, PAIN REDUCTION AND MECHANICAL IMPROVEMENT

The major goal is to identify directional movement(s) and loading strategies that improve the patient's symptoms and mechanics either immediately or over time. According to McKenzie, end-range loading is attempted first through patient-generated movements either of a repetitive or static nature. If this does not achieve the desired loading outcome, a graduated increase in loading pressure should be attempted in the following sequence: patient overpressure, doctor-assisted overpressure, mobilization, adjustment and traction. If a therapeutic direction is discovered, the chiropractic adjustment may be employed earlier on in this sequence if there are no contraindications to its use.

Once a direction of movement shows promise, this direction is known as that patient's "therapeutic bias" (AKA, *directional preference, preferred loading strategy*) and becomes part of the management program, which includes self-treatment. The results of this analysis can be useful in selecting home exercises and identifying vectors for manual therapy. It is important to emphasize that active involvement by the patient is considered essential for a successful outcome. (Jacobs 1991, McKenzie 1990)

## EVALUATION

Improvement may take the form of any of the following:

- **Change in distribution of upper extremity symptoms.** Peripheral symptoms are reduced and centralize toward the spine.
- **Change in distribution of neck pain.** In patients who present only with neck pain, the area of pain shrinks and moves closer to midline.

- **Change in pain intensity or frequency.** The intensity of arm symptoms may decrease, chronic pain may become intermittent, or the frequency of the intermittent pain may lessen.
- **Improved range of motion.** Patients who have a disc blockage resulting in decreased movement in a particular direction (e.g., extension) respond with improved ROM.
- **Improved function.** Patients experience immediate improvement in a comparative baseline activity which has been identified as particularly aggravating (e.g., reduced pain while dressing). *This activity can then serve as an outcome measure.*

## PATIENT RESPONSE

Patient response to the evaluation can be categorized in the following ways: (Werneke 1999)

- 1) **Symptoms clearly centralize.** Symptoms noticeably retreat from more distal locations toward the spine. For patients who have only central or midline pain, the territory *further* shrinks toward midline and/or the intensity reduces to zero. This improvement is maintained and continues to centralize on subsequent visits. If this process begins on the very first visit, complete symptom recovery is expected and should occur rapidly.
- 2) **Symptoms partially centralize.** Improvement is limited or questionable. For example, the location of the pain only partially centralizes during the evaluation and although it continues to improve over time, it never achieves a midline location during any one treatment; or the patient shows no centralization at all during any treatment, although symptoms appear to be slowly improving over time. Prognosis may still be good, but for slower recovery. However, if the patient's most distal pain does not significantly improve by the 7<sup>th</sup> treatment, further treatment with this type of therapy is not likely to be effective. (Werneke 1999)
- 3) **Symptoms do not centralize.** There is either no improvement during the evaluation or the symptoms get worse (e.g., the pain actually peripheralizes throughout subsequent visits). Prognosis is poor for this type of therapy for this patient. However, re-evaluation using this protocol may eventually identify a therapeutic bias.

## REPETITIVE MOVEMENTS

The evaluation protocol is based on the patient loading the spine through a variety of movements and repeating each movement up to ten times.

As the patient starts experiencing centralization, the practitioner records at which repetition this happened. Without breaking rhythm, the patient continues the remaining repetitions.

Movements that decrease peripheral pain but seem to increase pain over the cervical spine are not to be avoided. Repetitions are permitted within pain tolerance under supervision of the practitioner.

If the patient experiences an increase in upper extremity symptoms during these repetitions, the practitioner should, with caution, have the patient *do at least one more repetition* in the same direction and monitor the response. Although rare, the patient's symptoms may peripheralize at first and then centralize.

## DIFFERENTIATING NERVE ROOT ADHESION (NRA) VS. POSTERIOR DISC DERANGEMENT

The practitioner will need to differentiate nerve root adhesions from disc derangement.

- Root adhesions tend to produce intermittent arm pain. According to McKenzie, disc derangement symptoms can be intermittent or constant. When the pain is constant, an accompanying chemical component (i.e., inflammatory radiculitis) should be suspected.
- With adhesions, increased arm pain with forward flexion is generally brief (resolving rapidly after the tension is released). This also happens at times with side bending, rotation and extension.
- Patients with root adhesions may exhibit deviation toward the arm pain during forward flexion of the neck. This also happens at times with extension.
- In a patient with disc derangement, neck flexion usually aggravates the symptoms until extension or some other pain-relieving

directional movement is introduced.

- Differences: NRA has no significant change in ROM with repetitive movements; NRA symptoms are produced at end range of nerve root stretch.

**NOTE:** Patients who experience an increase in pain from the stretching of fibrotic tissues need to be told that this pain is associated with the desired therapeutic outcome.

## EVALUATION STEPS

The following steps should be taken when evaluating the patient.

### SUMMARY

- Step 1: Anticipate loading strategies based on clues from history. For example, a potential loss of cervical ROM in people who do computer work or read a lot.
- Step 2: Correct antalgia (if present).
- Step 3: If there is no antalgia, evaluate gross range of motion in the standing or seated position for protrusion, flexion, retraction, extension, lateral bending and rotation to establish a baseline of movement.
- Step 4: Evaluate symptomatic response to a single repetition in each of the movement directions.
- Step 5: Observe symptomatic and movement responses to repetitive end-range loading in each of the movement directions.

## **STEP 1: Anticipate loading strategies based on clues from history.**

Identifying postures or movements that relieve and/or aggravate the patient's symptoms may alert the practitioner as to the nature of the condition as well as to potential therapeutic loading strategies.

- *If pain is not relieved lying down...* consider the possibility of a disease process (e.g., cancer, infection) or chemical pain associated with significant inflammation.
- *If pain is made worse when sitting (which may introduce an increased flexion from anterior head carriage)...* consider that the patient may have an underlying postural syndrome.

## **STEP 2: Try to correct any fixed or antalgic head posture.**

### SUMMARY of Fixed Postures

- fixed lateral shift
- fixed lordosis
- fixed kyphosis

**Fixed lateral shift** (for example wry neck, torticollis or any antalgic position). The practitioner should see if the patient has a fixed lateral shift. (Refer to Fig. 1.) If so, this shift needs to be corrected first. Once corrected, extension therapy should begin.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

Correction consists of either the patient or the practitioner gently and steadily pushing the neck back toward neutral into the painful barrier, then gently backing off a few millimeters, and returning to the new barrier. This process allows the patient to slowly return to a neutral head position. Continue this procedure by overcorrecting the lateral shift into the opposite direction. If the correction is proceeding successfully, try introducing chin retraction followed by a few degrees of extension. If the patient is having great difficulty, continue to work with only the lateral component of the procedure. The acute patients may have to lie down with their head and neck on (1-3) pillows (Figs. 2, 3) or an occipital float (Fig. 4). Work from this flexed unloaded position until progress is accomplished. As a central head position is achieved, a pillow is removed and the lateral correction is repeated until the neutral position can be arrived at without the aide of a pillow.

In some rare cases, the patient's condition may require manual traction while in the flexed position. These are cases that have not responded to the normal sequence of patient- or doctor-generated end-range loading pressures. This can be accomplished by using the hands or a traction belt in office and a commercial traction device at home. (Refer to Figs. 47, 48 and 49.)

As soon as this traction has provided a degree of relief, the practitioner should return to normal procedural steps as previously outlined to complete the correction. A fixed or antalgic head posture, when accompanied with radicular signs, especially below the elbow, can be very difficult to treat. Be patient, go slowly and encourage the patient.

There may be occasions in which active patient- or practitioner-assisted efforts to center the head have no effect or produce only partial recovery. In these cases, the practitioner should try mobilizing the neck into the desired direction or explore repetitive rotational movements in an attempt to identify a therapeutic bias directional movement.

As soon as a significant degree of centralizing has been achieved, the

practitioner needs to attempt to get the patient into retraction followed by extension. Initially, this probably will be performed in the supine position, but as soon as possible the patient should progress to end-range loading in the upright position.

There may be some patients that respond to chin retraction and neck extension in the prone position. Rotation bias can be added in this position if needed. (Refer to Figs. 30, 31.)

The maneuver described above, for a fixed or antalgic head and neck position, may take anywhere from a few minutes to over 15 minutes to successfully complete. When the overcorrection has been completed and the neck is being returned to neutral, it is important that it be moved very slowly to prevent a sudden, uncomfortable rebound effect. The change may only be temporary, but will allow an opportunity to see if the patient can now tolerate retraction and extension. If the shift cannot be corrected, send the patient home to continue this supine procedure to reduce the lateral shift.

**NOTE:** A lateral shift would be recorded as "left" or "right" lateral tilt.

**Fixed lordosis.** The patient has an antalgic lordosis and has a blockage that prevents flexion (Fig. 5). In this case, proceed directly to therapeutic loading in flexion. Note in the photo below the slight fixed lordosis with a back tilting head position. *This is quite uncommon.*



Fig. 5

**Fixed kyphosis.** The patient has an antalgic kyphosis and has a blockage that prevents extension. Start by giving the patient retractions and extension. If patients have trouble performing this in the seated or standing position, lay them down in the supine position, use a pillow or occipital float if needed (Fig. 4). Note in Fig. 6 the slight fixed kyphosis with a forward tilted head position.



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11

### **STEP 3: Evaluate gross ROM.**

In patients without a fixed antalgia (Step 2), explore the gross range of motion to establish a baseline of movement and screen for any obvious catches or deviations. This can be done seated or standing, but the practitioner should be consistent. The purpose of this first movement in each direction is to observe (or measure) any limitations in gross range or quality of motion and thereby establish a baseline.

#### **Test Movements**

- (Fig. 7) neutral (starting point used as the baseline)
- (Fig. 8) protrusion
- (Fig. 9) flexion
- (Fig. 10) retraction
- (Fig. 11) extension

**Charting.** It is important to record the following: degree of movement (was there a normal range of motion or a blockage?) and the quality of movement (smooth or aberrant?). There is always a blockage to movement with disc derangements and one should expect an improvement in movement and pain reduction as the correct therapeutic end-range loading is applied. Often times the direction in which there is a decrease in movement due to disc blockage is in the same direction in which loading should be applied.

Once the range and quality of movement has been documented, it is time to investigate how end-range loading affects the patient's symptoms (pain, tingling, etc.).

**STEP 4: Evaluate symptomatic response to a single repetition in each of the movement directions.**

In patients without a fixed antalgia, the symptomatic response to a single repetition of end-range loading is explored in a variety of directions. (Refer to Figs. 7-13.) Some practitioners may be able to combine Steps 3 and 4. However, usually motion restrictions and patient response to loading are evaluated separately to help ensure accuracy of the evaluation.

**Start with these four movement directions.**

- (Fig. 8) protrusion
- (Fig. 9) flexion
- (Fig. 10) retraction
- (Fig. 11) extension

**Charting.** The purpose of this pass is to record patient response to the end-range loading. Patients should report 1) whether pain has increased or decreased, 2) when they feel the change in pain (e.g., during the movement or only at end range), 3) whether the pain distribution has changed, and 4) whether they feel any obstruction to movement.

Sometimes a therapeutic bias may be immediately obvious (e.g., a patient's arm pain is aggravated by a single flexion and centralizes with a single extension). In such a case, repetitive testing in this or other directions would not be necessary, and this particular patient would do repetitive extensions.

**STEP 5: Observe symptomatic and movement responses to repetitive end-range loading in each of the movement directions.**

Once again, chin protrusion, neck flexion, chin retraction, and neck extension is tested, but this time up to a maximum of 10 repetitions.

**Charting.** Record at which repetition the pain occurred, how the quality, location or persistence changed, and how many total repetitions were performed. The record should show that a total of ten repetitions

were performed in each of the directions tested except in those cases where the movement caused a significant increase in the most peripheral pain, further reduction in gross range of motion, or other baseline indicators of radiculopathy.

**Optional Testing Directions.** If the above procedures neither centralize the pain nor improve biomechanics, proceed to the following.

- (Fig. 12) lateral bending L/R
- (Fig. 13) rotation L/R
- (Fig. 14) supine sustained traction
- (Fig. 14) supine manual traction



Fig. 12

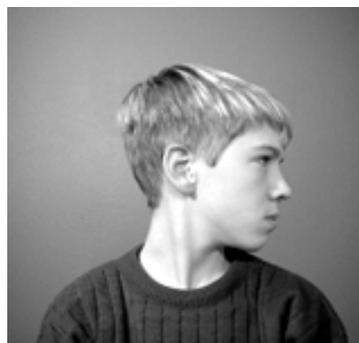


Fig. 13



Fig. 14

# SPECIAL PROCEDURES

The following section will explain each of the testing maneuvers in more detail.

## SEATED PROTRUSION

Have patients sit up straight and stick their chin forward as far as they can, (Fig. 15) pause and hold the position for a moment (count “one thousand one”), and then return to their starting point. If necessary, they may hold their heads between their hands for support. Unless the symptoms peripheralize, repeat this movement ten times, resting for a moment between each repetition.

**Charting.** The practitioner should observe the degree of movement and record the findings (this may be recorded as none, mild, moderate or marked). Range of motion should increase as the symptoms improve.



Fig. 15

**Methods to ensure appropriate end-range loading:** Encourage the patient to stick the chin out “further...further...further” even if it causes some increase in neck pain as long as the symptoms do not peripheralize.

## SEATED FLEXION

Have patients flex their neck as far as possible, attempting to place chin on chest, (Fig. 16) within pain tolerance. This same movement is repeated ten times and the findings are recorded. In many cases of disc derangement, patients will have reduced range of motion and feel a “blockage” to

movement, which increases local neck pain but reduces arm symptoms. Eventually during the ten testing repetitions, or later as they are getting better, the sense of blockage should disappear.



Fig. 16

**Methods to ensure appropriate end-range loading:** Besides encouraging the patient to go “further...further...further,” the practitioner may ask patients to apply overpressure by having them contact the back of their head with the finger tips and push gently forward. (Fig. 17)



Fig. 17

## SEATED RETRACTION

Have the patient retract (pull) the chin straight posterior and hold (count “one thousand one”). (See Fig. 18.) Make sure the patient does not flex or extend the neck. The chin should not move up or down. The practitioner should stand alongside and observe the quality and degree of retraction. The patient should be seated using good posture. Repeat this movement ten times and record the findings.

Some patients may not achieve a deep retraction without applying self-overpressure. This is accomplished by having them contact their chin with their thumb and second/third fingers and push straight posterior during the retraction. (Fig 20)



neutral  
Fig. 18



retraction  
Fig. 19



patient overpressure  
Fig. 20



doctor overpressure  
Fig. 21

A few cases may require practitioner assistance. (See Fig. 21) In these cases, the practitioner (with patient permission) would contact the jaw and help guide the neck and head posterior. TMD patients may require an alternative contact that does not apply

pressure to the jaw. Repeat until patients are able to perform the movement on their own using proper form. In symptomatic necks, any increase in the retraction range may be due to changes in neck pathology. (Pearson 1995)

Some patients may be more comfortable doing retractions supine into a pillow. (Figs. 22, 23)



Fig. 22



Fig. 23

The patient may progress to having the head off the head of the table, (Fig. 24) which may achieve a deeper retraction, one with more travel from anterior to posterior. The patient supports the head throughout this movement.



Fig. 24

**Methods to ensure appropriate end-range loading:** The practitioner may assist the patient during retraction in any of the three positions. (See Figs. 25-27)



Fig. 25



Fig. 26

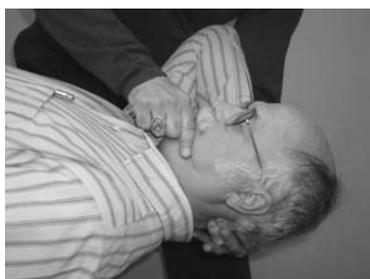


Fig. 27

**NOTE:** Radiographic segmental analysis has demonstrated that there is a greater range of flexion and extension at CO-C1 and C1-C2 in protrusion and retraction than there is in cervical flexion and extension on cervical x-rays. (Ordway 1999)

## CERVICAL EXTENSION

Cervical extension may be performed in a seated posture, supine or prone.

**Seated extension.** While maintaining the retracted position, the patient is asked to extend the head and neck backward slowly as far as possible within tolerance. (See Fig. 28.) Usually a greater range is accomplished if the patient starts from a good erect sitting posture. Hold the extended position for a “one thousand one” count, repeat this extension ten times, and record the findings.



Fig. 28

**Supine extension.** Perform with patient supine if seated extension is inconclusive or progress limited. With the head and neck off the end of the table, the patient can perform a chin retraction and neck extension (Fig. 29). This unloaded position may allow more extension and be easier for some patients. The head is supported in the hand going through the whole movement.



Fig. 29

**Prone Extension.** There may be some patients who get better results doing extension in the prone position. This is performed with patients up on their elbows, chin supported on the finger tips. (See Fig. 30.)



Fig. 30

## ADDITIONAL TEST MOVEMENTS (IF NEEDED)

### SUMMARY of Additional Test Movements

- prone extension with rotation
- lateral flexion
- rotation
- supine retraction and extension (with traction and rotation)

### PRONE EXTENSION WITH ROTATION

Perform extension as described above. While maintaining the neck in end-range extension, rotate the neck slightly left and right (moving the nose about one inch from midline and back again). Repeat this rotation four to five times without moving the neck from its extended position. (See Fig. 31.) Then return to neutral and come out of extension. Repeat this entire procedure ten times and record the findings.

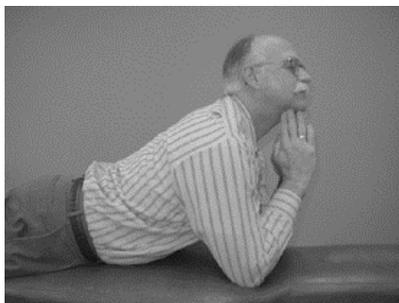


Fig. 31

### LATERAL FLEXION

Starting from a good erect posture, laterally flex the neck to the right to tolerance and return to the starting point. (See Fig. 32.) Repeat this movement ten times and record the findings. Then perform this repeated movement to the left and record the findings.



Fig. 32

### ROTATION

Starting from a good erect posture, rotate the head and neck to the right to tolerance and return to the starting point repeating this movement ten times and record the findings. (See Fig. 33.) Then perform this repeated movement to the left and record the findings.



Fig. 33

**NOTE:** If the desired end-range loading is not reached in lateral flexion and rotation, the patient may apply overpressure in each of these movements. (See Figs. 34 and 35.)



Fig. 34



Fig. 35

## **SUPINE RETRACTION AND EXTENSION (WITH TRACTION AND ROTATION)**

This practitioner-assisted maneuver is called *Traction, Retraction, Extension* or TRE. It is a powerful procedure and should be performed cautiously.

**NOTE: A supervising clinician must be present while performing this maneuver.**

In cases where other procedures for extension were inconclusive, provided only partial relief, or when symptoms have plateaued without further improvement, traction may be helpful.

Start with the head and neck off the table with the T3 spinous at the edge of the table. The practitioner supports the head by contacting the occipital area. Then long axis traction is applied by contacting the chin with both hands (placing the 2<sup>nd</sup> and 3<sup>rd</sup> fingers under the chin for adults). (See Fig. 36.) Next the head is put into retraction (Fig. 37) and brought into full extension (Fig. 38) or to tolerance, slowly, getting feedback about patient comfort before proceeding. While at the end of the attainable extension, the traction force is slowly but not completely reduced, and four or five rotational movements (nose moves one-half inch side to side from midline) (Figs. 39, 40) are performed while trying to further increase the extension. This practitioner-assisted procedure can be repeated five or six times a session and done for two or three sessions. The patient is instructed to perform supine or prone extensions for homework. (Refer to Figs. 29, 30's)



Fig. 36



Fig. 37



Fig. 38



Fig. 39



Fig. 40

## OTHER METHODS FOR MANUAL THERAPY & SUSTAINED TRACTION

McKenzie suggests mobilization, adjusting and sustained traction in situations where the testing evaluation is non-conclusive or the therapeutic effect has plateaued, and only after patient-generated end-range loading or overpressure and practitioner overpressure have not produced the desired effect. **Note:** Make use of Maitland's levels of mobilization according to patient tolerance. (See CSPE protocol, [Grades of Mobilization](#).)



extension mobilization  
Fig. 41



flexion mobilization  
Fig. 42



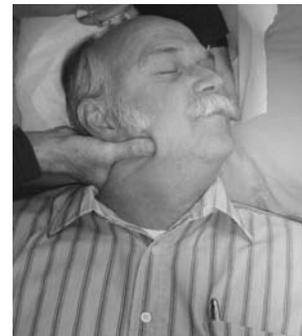
lateral flexion  
mobilization or adjustment  
Fig. 43



rotation  
mobilization or adjustment  
Fig. 44



lateral flexion  
mobilization or adjustment  
Fig. 45



rotation  
mobilization or adjustment  
Fig. 46

### Methods of Sustained Traction



Method 1  
Fig. 47



Method 2  
Fig. 48



Method 3  
Fig. 49

## TROUBLESHOOTING

If the practitioner is unable to identify a therapeutic bias, consider the following:

- The joints may not have been loaded far enough into end range or *with sufficient repetitions*. Since this sometimes increases the patient's neck pain, practitioners may be overly cautious.
- Individual joints may need to be over-pressured during the various testing procedures, perhaps in a variety of directions. It is usually better to have the patient apply overpressure before the practitioner applies overpressure.
- Overpressure strategies include posterior pressure on the chin during retraction, anterior pressure on the head during flexion, doctor traction-retraction-extension and rotation in supine position, and head pressure during rotational or lateral head movements.
- Mobilization procedures can be added to lateral flexion and rotation movements if the patient and then practitioner generated over-pressures are non-conclusive or if a plateauing has occurred.
- Adjustive procedures can be added to restrictions in lateral flexion and rotation after mobilization has been tried.
- Movements that cause centralization also indicate the direction in which any mobilizing or manipulative procedures should be applied in those cases of patient's self-treatment failure. (McKenzie 1990)
- When the above troubleshooting steps have not produced the desired outcome, sustained positions can be attempted, starting with retraction, for up to three minutes if this is tolerated by the patient.

**NOTE:** The patient may have so much chemical pain from local inflammation that this entire protocol will need to wait until anti-inflammatory therapy has been successful.

## THERAPEUTIC CONCLUSIONS

Upon completion of these movements, the practitioner should have a clearer idea of how to proceed with treatment.

- The practitioner should be able to determine the patient's therapeutic bias—the directions of movement that help centralize the patient's pain, decrease symptoms, or improve mechanics.
- Movements that help centralize pain are incorporated into pain management protocols and given as homework.
- The practitioner should be able to determine which directions of movement make the pain worse (*what to avoid*) and those that have little or no significant effect on the pain (*what is safe*).
- Activity modification recommendations can be based on specific information regarding movement and direction that cause the least pain.
- The practitioner should be able to tell the patient how rapidly the pain will respond to bias movements: quickly (first visit) or over a longer period of time (2 to 4 weeks). If the patient has not experienced some degree of centralization by the 7<sup>th</sup> visit, the McKenzie approach may not be the appropriate one at this time.
- The patient's bias should help determine which other therapeutic interventions may be warranted, such as traction, mobilization therapy or manipulation along a specific vector.

## TREATMENT

Keep in mind a patient's therapeutic bias may change with time and therapy; therefore, recheck the patient the *next day* after the initial evaluation and periodically after that as the situation warrants. In some situations, it may be necessary to check the bias daily to ensure that therapy is appropriate. (Liebenson 1996) Check radiculopathy patients daily, especially if they are acute, until 50% improvement is seen and then change to a 2 or 3 times a week schedule.

If patients' conditions worsen (peripheralize, increase in pain or other findings) tell them to

contact their physician immediately.

Most patients with disc derangement will have an extension bias. There is usually a significant lateral component in the following situations: for patients with a fixed lateral shift seen at presentation, when discovered to be beneficial during repeated testing in cases where extension alone fails, or as a therapeutic trial for patients with an extension bias and arm pain.

Patients should perform 5-15 repetitions of the exercises hourly or every other hour at first. As symptoms resolve, they can perform them 2 to 3 times a day or more often if symptoms begin to return. The patient is taught to remain in their therapeutic posture and avoid stressful postures and movements until the physician and patient determine the condition is stable.

In the [McKenzie](#) protocol, when progressive forces appear to be warranted, go through the following degrees of force application: patient-generated forces, patient over-pressure, practitioner-assisted overpressure, mobilization and adjustments.

All postural faults are evaluated and corrected as soon as possible, the ergonomics of lifestyle and work activities are discussed, and palliative procedures are taught.

Practitioner assistance is used only in cases where patient-generated forces are non-conclusive, patients do not know how to perform the movement correctly, or the condition has plateaued with patient-generated forces. It is stopped as soon as patients can continue on their own.

Treatment failure in cases of patients with an extension bias may be linked to insufficient attention paid to the importance of maintaining their cervical lordosis during sitting, transitional movements and standing. Teaching the patient to maintain a partial cervical retraction or the more extensive Brügger's Relief Position may help to maintain cervical lordosis while seated. (See CSPE care pathway: [Shoulder Impingement Syndrome](#), Figure VI in the appendix.) A lumbar postural support may help some

patients bring the neck out of protrusion, thus encouraging more cervical lordosis, and also serve as a postural reminder.

Sometimes after a disc derangement has been successfully treated, the patient is left with adaptive shortening (a "dysfunction" syndrome). For example, a patient who has been avoiding neck flexion and doing exclusively extension exercises may have lost some ability to flex forward due to shortening of tissue or contraction of a scar. This can often be addressed with appropriate flexion stretching exercises. It is important to finish the flexion exercises with some repeated extension.

## MANAGING SEVERELY ACUTE PATIENTS

In some cases, patients may need to be introduced very slowly to their exercises.

1. Supine, patients lie on the table using a pillow for 1-3 minutes in a relaxed position (see Fig. 2). The supine position is maintained until directed otherwise. Some patients may need to start with multiple pillows under their head and neck.
2. Special attention will need to be applied to patients with a lateral deformity (see Fig. 2) when positioning their heads on the pillows.
3. Patients with a lateral deformity which needs to be reduced and most acute cases involving muscle spasm may both take a prolonged time.
4. Start with gradual patient-generated attempts to move the neck towards center, into the painful direction, and then back-off pressure and repeat.
5. End-range loading will only come with time and gradual attempts.
6. In some cases, where patient-generated forces are not adequate, doctor-generated forces may be needed (see Fig. 3).
7. The sequence of procedures will be the same for the acute patient as it is for the non-acute: addressing the lateral deformity, moving towards retraction and extension when possible; repeating retraction and extension in the upright position when possible and giving the patient palliative and preventive measures in the appropriate time. (Liebenson 1996) (Refer to CSPE protocol, [Physical Therapy Modalities](#).)

**NOTE:** There may be the occasional patient whose condition requires sustained manual, belt or traction-device application during the acute phase of care. (Refer to Figs. 47-49.)

Alternatively, the patient may do better in a standing or seated position. With these patients, the basic approach will have to be modified accordingly.

**NOTE:** Be prepared to help patients protect themselves during movement. The practitioner should be close enough to quickly assist. Patients should be taught how to support the back of their heads with their hand when attempting to lie down or sit up.

For patients who need neck flexion and who are not acute, a sitting position may be a good starting choice. When head and neck support is necessary, patients may use their hands for support until the practitioner has determined the best way to support them.

## POSTURE TRAINING

Problems in posture may slow down recovery in those with neck pain. The following simple drill may help train patients in proper, and thus symptom relieving, posture.

1. Sitting or standing, have patients slump to experience what that inefficient posture feels like. (See Figs. 50, 53)
2. Sitting or standing, have patients assume a military-like posture, the opposite of the slumped pose. (See Figs. 51, 54) Have them compare the look and feel of the two positions.
3. Patients alternate between slumped and military posture 4-5 times, finishing in the military pose.
4. Patients then back away from the military pose about 10%, and the practitioner may tell them just to relax in the military pose. (See Figs. 52, 55)
5. After repeated retraction movements, there may be no increase in retraction range but a better resting cervical posture and increased active cervical flexion, extension, rotation and lateral bending. (Goebel 2002, Pearson 1995)



Fig. 50



Fig. 51



Fig. 52



Fig. 53



Fig. 54



Fig. 55

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