Self-treatment of mid-thoracic dysfunction: a key link in the body axis

Part Two: Treatment

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Received September 2000
Revised October 2000
Accepted November 2000

Journal of Bodywork and Movement Therapies (2001)
5(3), 191–195

doi: 10.1054/jbmt.2000.0226, available online at
http://www.idealibrary.com on IDEAL®

Introduction

Part one of this series addressed evaluation of dysfunction involving T4-T8 kyphosis. This dysfunction was presented as being responsible for various secondary functional adaptations and resultant areas of symptomatic biomechanical overload such as in the neck, jaw, upper extremity, or even lower back. It is crucial to understand that treatment of common pain syndromes should not be limited to the site of symptoms, but should address the key functional adaptions and other sources of biomechanical overload even if found in asymptomatic areas.

Treatment

Mid-thoracic dysfunction is often the key functional pathology responsible for biomechanical overload of other tissues which are generating a patient's pain. As described in the first part of this series, myofascial pains arising from sternocleidomastoid, upper trapezius or masticatory muscles are common sources of pain often perpetuated by or secondary to increased thoracic kyphosis. Shoulder disorders such as rotator cuff tendinosis or anterior labrum instability are also examples of presenting complaints and specific diagnosis which may require rehabilitation of mid-thoracic function (Kibler et al. 1998; Kibler 1998; Liebenson 1996; Liebenson et al. 1998a; Murphy 1999). In each of these examples the symptoms and injured tissues may be at a distance from the source of biomechanical overload in the kinetic chain (Kibler et al. 1998). Treatment should aim at both the pain generating tissues plus the functional–biomechanical deficit responsible for the overload in the first place.

Treatment of mid-thoracic kyphosis involves mobilization and strengthening of the mid-thoracic extensor joints and muscles. Advice, manipulation (joint and soft tissue) and exercise make up a continuum of care which should be followed in a systematic way (see Table 1; Liebenson 1996). Additional perpetuating factors which can lead to recurrence should also be identified and addressed for prevention of recurrence.

Specific dorsal extensor exercises are needed both to mobilize the spine in extension and facilitate,

Table 1 Continuum of care

- Advice
  ⇒ Sitting/standing postural advice
- Manipulation
  ⇒ T4-T8 joints in extension
- Exercise
  ⇒ Flexibility: pectorals, latissumus dorsi, psoas
  ⇒ Facilitation: dorsal extension training with lumbar and cervical spines neutral
- Perpetuating factors
  ⇒ Poor respiration
  ⇒ Faulty sitting or workstation ergonomics

Table 2 T4-T8 Extension Exercises

- Brügger relief position
- Lewit wall mobilization with post-isometric relaxation (PIR)
- Upper back cat
- Back stretch on the ball & foam rolls
- Active prayer stretch
- Wall slide with arm elevation

Fig. 1 Brügger relief position.

reeducate and build endurance in the muscles necessary to maintain the spine more vertical. Table 2 lists some of the most important of these exercises.

The **Brügger relief position** is an excellent exercise for addressing the sternal-symphyseal syndrome and faulty sitting postures related to increased thoracic kyphosis (Fig. 1; Liebenson 1999a; Liebenson et al. 1998b; Lewit 1999a). The keys to its successful performance are perching at the edge of the chair with legs slightly abducted and externally rotated, supinating the forearms while abducting and extending the fingers, and then performing a sternal lift while actively exhaling. Two or three repetitions as a 'micro-break' during periods of prolonged sitting (over 20 min) are advised.

Active exhalation will be used in a number of exercises that follow and is important because it helps to 'centrate' the lumbar spine and thus prevent extension from localizing there instead of in the mid-thoracic region. Active exhalation recruits the abdominal wall muscles and thus stabilizes the lumbar spine. By stabilizing the lumbar spine mobilization can be isolated to the most stiff area (T4–8) rather than following the 'path of least resistance' (lower lumbar) and causing hypermobility. Forearm supination, finger abduction and extension are also used both here and in other exercises because of their reflex connection to the chain of muscles responsible for the upright posture (Lewit 1999b; Liebenson 2001). Upper quarter flexors, pronators and adductors tend to be coupled with the slump position and can be similarly inhibited by reflex means (Liebenson 2001).

Lewit designed an excellent mid-thoracic extension mobilization technique by having the patient lean against a wall (Lewit 1996; 1999a, Liebenson 1999a). This is called **Lewit's wall mobilization with PIR**. Post-isometric relaxation (PIR) via respiratory synkinesis is a key to this exercises effectiveness. The patient should perch at the edge of a chair with legs abducted and externally rotated as in the Brügger relief position. The patient leans forward and supports the head on folded arms propped against the wall. The chair should be positioned at a distance from the wall which creates a fulcrum permitting the thoracic spine to extend while leaning forward. If the lumbar spine is hyperextending the chair is probably too close to the wall. If the lumbo-pelvic junction is too flexed the chair is probably too far from the wall. The clinician should test the fulcrum by placing one arm under the patient's arms while giving passive overpressure to the mid-thoracic region. If a hinge can be localized to the targeted joints then the patient is positioned correctly.

It is also important to check that the cervico-cranial junction is not hyperextended and that the upper trapezius is not overactivated. Varying the head position on the folded arms and encouraging relaxation of the 'shoulder shruggers' can also help.

Once in the proper position the patient is instructed to breathe in (the clinician will observe an increase in kyphosis). Then the patient is instructed to let their breath go and let their sternum

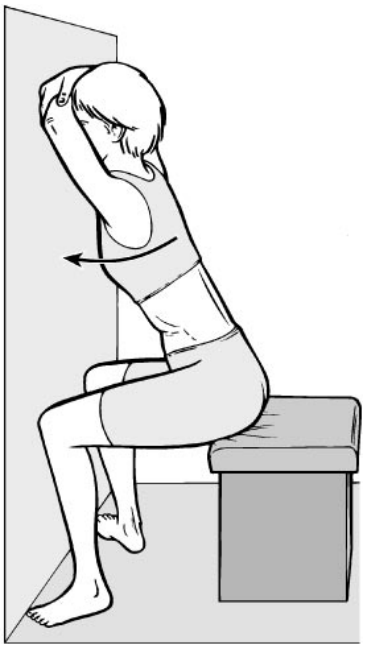

Fig. 2 Wall lean.

collapse towards the wall. When almost out of breath they should actively exhale or cough to achieve maximal mobilization of the mid-thoracic joints into extension (Fig. 2). The breath is a crucial component of this exercise as it enhances the mobilization by respiratory synkinesis. Thoracic extension and exhalation are linked automatically. Interestingly if active exhalation does not increase extension it is likely that respiratory dysfunction is present which should be addressed for troubleshooting.

Another excellent mobilization for the mid back is the **upper back cat** exercise (Liebenson 1996). This is very similar to Lewit's wall mobilization. It is perhaps not as powerful, but it places less strain on the cervico-cranial junction and does not involve the upper trapezius as much. However, it can be tricky for patients to 'get' at first.

The patient should be positioned on all fours facing a chair or gym ball. The patient should then place the forearms on the chair. It is essential for the hips to be over the

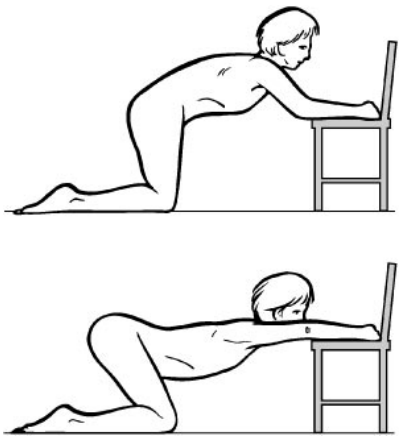

Fig. 3 Upper back cat.

knees, their elbows slightly flexed so that the arms do not push into the chair. The patient is then asked to round their back up and then let it fall towards the floor (Fig. 3). Generally the head and neck just follow the movement. As compared to the cat/camel exercise the fulcrum is shifted cephalad. Sometimes if the kinaesthetic awareness of this movement is difficult the patient can begin with the cat/camel on all fours until they can 'feel' the different pivot points.

A very potent and simple mid-thoracic extension mobilization can be achieved with the **back stretch on the ball** or over **foam** rolls (Figs. 4 and 5) (Liebenson 1996; Oslance & Liebenson 1996; Craeger 1996). These are relatively simple, although stretching on the ball requires some balance control and should be introduced under strict supervision. The foam rolls can be placed singly (stronger) or doubly (gentler) horizontally across the mid-back. An easier stretch is to use a half roll. Another even easier stretch is to place a half (gentler) or full foam roll (stronger) vertically along the length of the spine.

Two more advanced exercises are the **active prayer stretch** and **wall slide with arm elevation** (Lewit 1999a, Kolár 1999). In the active prayer stretch the patient kneels on a bed with knees slightly apart and sits

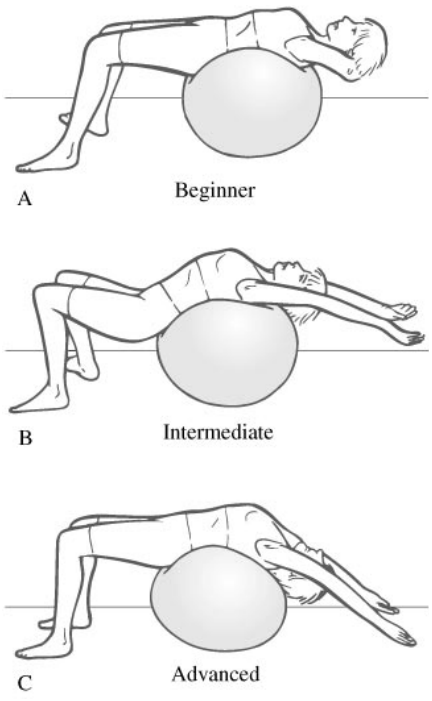

Fig. 4 Back stretch on the ball.

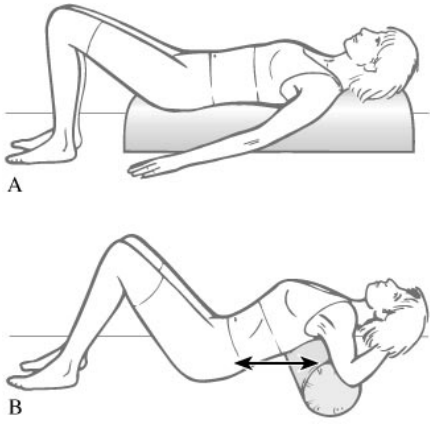

Fig. 5 Foam roll stretches; (A) vertical; (B) horizontal.

back on the heels. The ankles should be off the bed. Then similar to the Lewit wall-lean the patient should place their arms overhead, folding them to support their head. Also, similar to the wall-lean the cervico-cranial should be 'centrated' with the trapezius muscles relaxed. The patient is then instructed to breathe in — at which time the back will automatically kyphose due to

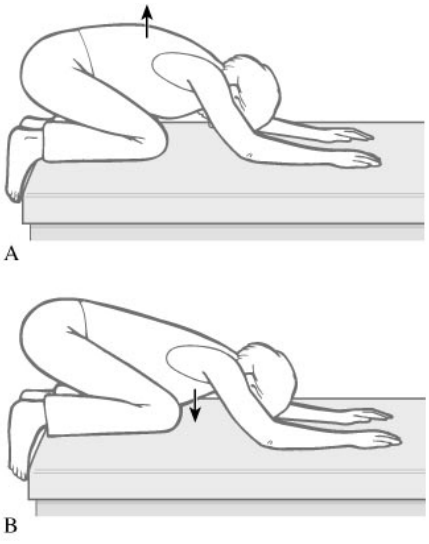

Fig. 6 Active prayer stretch (after Kolár 1999).

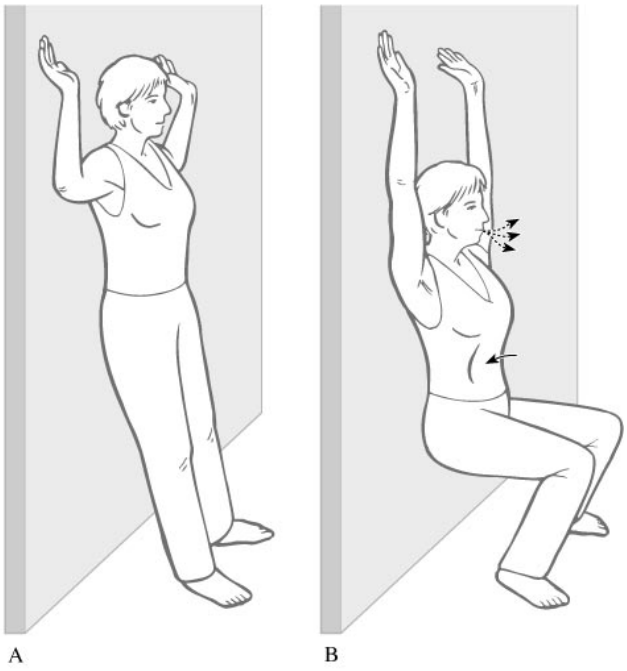

Fig. 7 Wall slide with arm elevation (after Kolár 1999).

respiratory synkinesis. Then passively exhale allowing the sternum to fall towards the floor and the back to extend (Fig. 6). When the breathe is nearly out the patient should then actively exhale to promote further forward movement of the sternum towards the bed.

The clinician should note if the patient either pokes the chin, or shrugs the shoulders during exhalation. If they do they should be given verbal and prioprioceptives cues to help them find the 'neutral' positions for both the cervico-cranial junction and scapulo-thoracic joints.

The wall slide with arm elevation is a standing exercise which involves squatting down while raising arms overhead. The key is to start with the feet a few inches forward and the arms elevated overhead in a cactus or 'under arrest' position. The forearms should be supinated and fingers abducted and extended. Then the patient is instructed to keep the arms elevated while squatting down slowly (Fig. 7). The squat down should be timed with active exhalation to stabilize the lumbar spine in a 'neutral' range and focus the mobilization into the mid-thoracic area. This stretch also can be felt in the latissmus dorsi muscle.

It is sometimes necessary to manipulate or mobilize tissues which limit passive mobility of the mid-thoracic region. Joint, muscle and facial restrictions should each be addressed. The latissumus dorsi and pectoralis major are key targets which should be differentiated from one another (Chaitow 1996).

Balancing muscles and mobilizing joints will be insufficient if the mid-thoracic dysfunction is being perpetuated by other factors. The most obvious is poor sitting or workstation ergonomics (Grant et al. 1997). Faulty respiratory is another due to the fact that chest breathers fail to regularly mobilize their mid and lower rib cage in the horizontal plane (Lewit 1999a; Liebenson et al. 1998a). Poor balance due to disturbed foot, cervico-vestibular, or neuro-opthamologic function can alter the equilibrium of the vertical posture over a stable base of support and thus can perpetuate thoracic kyhposis (Lewit 1988; Janda 1986; Murphy 1999; Gagey 1986, 1996; Odkvist 1988; Wenberg 2000, 2001).

Conclusion

Kyphosis of the mid-thoracic region is a common functional-biomechanical deficit seen in patients presenting with a wide variety of musculoskeletal symptoms. It can cause repetitive biomechanical overload without acute trauma being necessary. While symptoms may occur in other regions such as the cervical spine, shoulder joint, or scapular region unless the source of the biomechanical overload in the kinetic chain is addressed recovery will likely be incomplete.

T4-8 dysfunction is simple to identify, but unfortunately complicated to treat. Many factors can perpetuate it thus making regular self-treatment with the exercises described essential. Loss of the normal upright, vertical posture is unfortunately a very common sight even in young people. It's identification as a problem and

successful management deserve our attention.

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