

Case report

Acute locked thoracic spine: treatment with a modified SNAG

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INTRODUCTION

Pain in the thoracic region of the spine is a common complaint, which can be as disabling as cervical and lumbar pain (Edmonston & Singer 1997). There are reports in the literature of presentations involving acute cervical 'locked facet joints' as well as acute lumbar 'locked facet joints' (Maitland 1978; Exelby 2001). Although there are a multitude of conditions that can arise from the thoracic spine and ribs (Grieve 1994), the acute locked thoracic facet joint is not widely described.

The cervical and lumbar presentations have implicated intra-articular meniscoids within the synovial joints (Bogduk & Engel 1984; Bogduk & Jull 1984; Mercer & Bogduk 1993). These problems are frequently associated with acute deformity. The torticollis in the cervical spine and the kyphosis and scoliosis in the lumbar spine are typical examples (McKenzie 1990). McKenzie (1990) also comments that sudden locking or the appearance of deformity does not occur in the thoracic spine due to reduced mobility compared with the cervical and lumbar regions. The presence of the rib cage has been stated as the major cause for enhancing stability of the thoracic spine (Edmonston & Singer 1997).

There is work in the literature describing the presence of menisci in the lumbar and cervical zygapophyseal joints (Bogduk & Engel 1984; Mercer & Bogduk 1993), but little reviewing the presence of menisci in the thoracic spine. Singer et al. (1990) investigated meniscoid structures in the thoracolumbar junction (T10-L2). However, the structure and biomechanical function of meniscoids in this region may be different from the upper-mid thoracic region.

Another source of acute thoracic pain may be the intervertebral disc where painful though minor disc lesions amounting to a localized joint derangement may occur (Grieve 1988). Thoracic disc prolapse can occur but is thought to be infrequent in comparison with the incidence in the cervical and lumbar regions (McKenzie 1990).

There are a wide variety of manual therapy procedures available to the physiotherapist to treat benign thoracic pain. It is claimed that more often than not these problems respond to mobilization or manipulation procedures. Sustained natural apophyseal glides (SNAGs) are described by Mulligan (1999) as useful techniques for treatment of the spinal column. However, the understanding of how or why the procedures are able to benefit patients has not been widely researched. The following case report describes a patient with acute thoracic pain and deformity, who responded dramatically to a SNAG, as well as a discussion on the possible mechanism of how the technique may have worked.

PATIENT PRESENTATION

History

A 20-year-old male university student presented with acute left-sided back pain adjacent to the level of the T8/9 intervertebral joint. He had been picked up and shaken in a 'bear hug' by a friend the previous evening, reporting a twinge and ache in his back afterwards. On waking the next morning he was in significant distress, unable to straighten up, with worsening pain on attempted movement as the day progressed. He had presented to a medical practitioner immediately prior to attending physiotherapy, who had attempted a postero-anterior thrust manipulation in supine without success. The patient reported that there had been no 'click' and that he was feeling 'very sore'.

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Physical examination

Owing to the acute nature of this injury, the severity of pain, and the marked restriction of functional limitation, this patient was assessed as highly irritable resulting in the need to substantially modify the physical examination. It was limited to observation of his adapted posture and gentle attempts to correct this posture by active movement.

The patient was stooped in a position of flexion and right-side flexion such that he needed to support himself with his right hand on his right knee when standing. In sitting, the patient needed his right hand on the plinth to support his trunk (Fig. 1). In this position, a constant dull ache was present. Any attempt to extend, left-side flex or rotate into an upright position produced acute severe pain.

The patient was able to position himself in right side lying on the plinth where the pain present was a dull ache. In this position, a gentle modified passive accessory intervertebral movement (PAIVM) palpation assessment was carried out. This revealed moderate pain and resistance over the left T8/9 zygapophyseal joint with a unilateral postero-anterior pressure. Passive physiological intervertebral movement (PPIVM) into left rotation was also assessed and found to have moderate pain and resistance at the same level.

Treatment

Initial treatment was attempted by performing a left rotation mobilization in side lying to T8/9 for 1 min to the onset of pain. This was a comfortable procedure for the patient. However, on reassessment no improvement of pain, posture or movement was noted.

Therefore, it was apparent that active movement towards postural correction as well as passive physiological mobilization was either provocative or

ineffectual. On further reflection of the physical signs of both the adaptive posture and movement restriction, it was thought that further refinement of treatment procedure might be of use. Innovative and non-provocative mobilization with movement (SNAGs) as described by Mulligan (1999) is one such approach. Furthermore, it was accepted that the palpation findings at T8/9 were associated with an articular structural problem resulting in a painful postural deformity.

In an attempt to correct this, a central SNAG procedure was applied in a cephalad direction to the spinous process of T8 with the ulnar border of the physiotherapist's hand, while supporting the patient's trunk and assisting movement into the upright posture (Figs. 2 and 3). The SNAG was sustained in the corrected position for several seconds and then released. The patient reported no pain during the procedure. On release of the SNAG, the pain returned although at a reduced level but he was unable to remain upright. This procedure was repeated another three times gaining improvement each time, following which the patient was able to remain upright with only a mild ache present. Another attempt to overcorrect into further extension or left side flexion was too painful, therefore the technique was not pursued.

Two strips of 2.5 cm zinc oxide strapping tape were applied diagonally across the T8/9 segment in an attempt to provide support as well as remind the patient not to flex into the position of deformity (Fig. 4).

Day 2

On return to the clinic 24 hours later, the patient reported a 95% improvement, having maintained the upright posture. He had slept well and had only an intermittent mild ache present. Reassessment of all active movements in sitting revealed only slight end



Fig. 1—Patient presentation with acute locking in flexion/right-side flexion.



Fig. 2—Starting position and application of modified SNAG technique.



Fig. 3—Corrected position of acute postural deformity with modified SNAG.



Fig. 4—Taping applied across the thoracic spine for support.

range pain with left-side flexion. A PAIVM examination in prone showed mild tenderness over the left T8/9 area. Clinical reasoning at this point, indicated that an articular component of T8/9 on the left had been 'locked' or structurally compromised. It was accepted that the previous procedure (SNAG) had been effective in resolving this articular compromise and reducing the postural deformity. With the resolution of both movement and posture, a 'locked' joint was no longer clinically evident and it was felt that passive mobilization to clear the remaining joint signs would be appropriate. Therefore, a large amplitude unilateral PAIVM, with the patient in prone, was applied over the left T8/9 zygapophyseal joint. On reassessment, left-side flexion was now full range and pain free. At this point, the patient was discharged from further treatment.

DISCUSSION

An intervertebral segment consists of two adjacent vertebrae and the intervening soft tissues including

the intervertebral disc, ligaments, muscles and joint capsules. In the thoracic spine, the ribs constitute another component of the vertebral segment in the form of costovertebral and costotransverse joints (Valencia 1994). All of these structures are innervated and therefore pain may be the result of disruption to any of them.

Disc

Only a small proportion of all disc disease occurs in the thoracic spine, generally estimated at about 1–2% with peak incidence noted in the fourth decade. For the majority of presentations onset is insidious, with trauma being a causative factor in a minority. Many will often report a long history of months or years (Arce & Dohrmann 1985).

Grieve (1988) mentions that the aetiology of the thoracic disc lesion is primarily degenerative and affects, in particular, the lower thoracic spine. Edmonston and Singer (1997) comment that disc space narrowing at multiple levels is a common finding from the third decade of life and is associated with disc degeneration, decreased disc height and osteophyte formation particularly in the mid-thoracic segments.

McKenzie (1981) uses disc mechanics as the basis for his conceptual model in understanding the mechanism of pain production in the derangement syndrome. This is the situation in which the normal resting position of the articular surfaces of two adjacent vertebrae is disturbed as a result of a change in the position of the fluid nucleus between these surfaces. In the lumbar spine, it has been shown that once the annulus fibrosis has been weakened by degenerative change, fissures and ruptures develop which allow the degenerated nucleus to migrate, creating an internal 'derangement' situation (Moore et al. 1996). Although this model has been challenged in the cervical spine (Mercer & Jull 1996), the same process has not been investigated in the thoracic spine.

Based on this discussion of thoracic disc lesions, it was felt that the main features of this patient's clinical presentation were not consistent with discogenic pathology. In particular, his age, speed of onset, and rapid resolution were significant factors.

Zygapophyseal joints and meniscoids

Consistent with most synovial joints, small intra-articular synovial folds (IASFs) also known as meniscoids, may be found within the thoracic zygapophyseal joints (Singer et al. 1990). Grieve (1988) comments that the facet joints of the thoracic spine contain meniscoid structures as in the cervical spine. Bogduk and Engel (1984) cite the European

literature, which describes fibrous annular menisci as being well developed in the thoracic spine.

In the thoracic zygapophyseal joints, the IASFs originate medially from the ligamentum flavum, or laterally from the fibrous joint capsule and extend varying distances into the medial joint cavity. It is thought that these structures may act as passive space fillers during axial rotation (Bogduk & Engel 1984; Singer et al. 1990).

Also noted are larger fibro-adipose synovial folds, which project between the articular surfaces (Singer et al. 1990). Bogduk and Engel (1984) also describe these structures in the lumbar zygapophyseal joints. It is these fibro-adipose IASFs that are implicated by Bogduk and Jull (1984) in their meniscus extrapment theory of acute locked back in the lumbar spine. Given the evidence that these structures also exist in the thoracic spine it is reasonable to suggest that meniscus extrapment can occur in the thoracic spine.

Explanation of treatment intervention

The technique used with substantial effect in this case was a SNAG (Mulligan 1999). The thoracic spine is ideally suited to the use of SNAGs as they can be performed under normal conditions of physiological loadbearing (Edmonston & Singer 1997). Mulligan (1999) recommends that a SNAG should be maintained until the joint returns to the starting position, and that they are always carried out at end range of joint movement. In this case, these criteria were altered. The SNAG was used to restore the patient to a neutral resting position from a position of acute postural deformity, where the segment was possibly distorted at end range. As it would not have been desirable to return to the starting position, the technique is best described as a modified SNAG.

On attempting active extension from a flexed position, the meniscoid may fail to re-enter the joint space, buckling and distending the joint capsule causing pain. In this case, the patient position of flexion and right-side flexion is maintained to avoid aggravating the pain. Bogduk and Jull (1984) suggest that the treatment of meniscus extrapment in the lumbar spine should consist of longitudinal distraction coupled with rotation of the affected motion segment. The longitudinal distraction is required to reduce the meniscoid from the subcapsular pocket into its normal position in a flexed joint.

According to Mulligan (1999) applying a SNAG may reposition the superior vertebra, which in this case was T8. Special consideration needs to be given to the variation in zygapophyseal joint orientation, as the slope of the facets varies according to the level. The cephalad accessory glide applied to the spinous process in the flexed position may effect the necessary longitudinal distraction movement to the posterior compartment of the vertebral segment bilaterally.

This movement may be sufficient to alter the position of the trapped meniscoid allowing it to re-enter the joint space. This mechanism has been proposed by Hearn (1999) in discussion of a cervical SNAG effect on meniscoid extrapment.

The patient presented in a position of flexion and right-side flexion with no obvious rotation component. According to the clinical model proposed by Lee (1993) in the mid-thorax (T3–T9) side flexion is coupled with contralateral rotation and ipsilateral horizontal translation. As the T8 vertebra is coupled into left rotation, this would further enhance the widening of the left T8/9 zygapophyseal joint. The advantage of the sustained distraction glide is then the facilitation of the correct physiological motion in weightbearing, unlike perpendicular postero-anterior manipulative procedures to the spine in prone or supine which may minimize translation and saggital moments producing non-physiological motion and compression (Edmonston & Singer 1997).

The PPIVM of left rotation in side lying was attempted initially to create maximal opening of the zygapophyseal joint which has been advocated for acute locked joints (Maitland 1978; Sprague 1983). However, without any longitudinal distraction this was presumably insufficient to reposition the meniscoid.

Costovertebral and costotransverse joints

It has been reported that degeneration and osteophyte formation can be seen in these joints by the third and fourth decades of life (Edmonston & Singer 1997). Grieve (1988) describes acute fixations of the rib joints which show all the characteristics of synovial joint locking and records that articular discs or little 'menisci' of synovial tissue are found in these costal joints, as in almost all other synovial articulations of the spinal column. Erwin et al. (2000) have also reported the presence of large intra-articular inclusions or 'meniscoids' in the costovertebral joint complexes.

Although it is possible that costovertebral or costotransverse joints and meniscoids may be involved, it is difficult to directly implicate them in this presentation, as there is insufficient literature to provide evidence of the patho-anatomy and biomechanics of them.

CONCLUSION

The presence of IASFs, or meniscoids, in thoracic zygapophyseal joints has been recorded in the literature but their involvement in thoracic pain syndromes is unclear. Additionally, there is no empirical evidence for the use of SNAGs in spinal pain syndromes. This case is an example of an

unusual presentation of a locked thoracic segment, most likely the result of zygapophyseal joint meniscoid extrapment, which responded rapidly to a modified SNAG technique.

The relevant anatomy has been discussed as well as a possible biomechanical hypothesis for the SNAG. It may well be that the thoracic spine is ideally suited to SNAGs, and therefore may be the treatment of choice in acute presentations of thoracic pain when the zygapophyseal joints are implicated. Rather than just using SNAGs to improve end range of motion, they may also have a role in correcting acute postural deformity. However, further investigations into anatomy and biomechanics of meniscoids would be needed to support clinical efficacy.

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