Case report

Shoulder pain: Differential diagnosis with mechanical diagnosis and therapy — A case report

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1. Introduction

Shoulder pain is reported to be the most common musculoskeletal disorder after spinal pain (Eltayeb et al., 2007). There is evidence that shoulder pain is often recurrent and persistent (Croft et al., 1996; Van der Windt et al., 1996; Van der Windt and Croft, 1999; Winters et al., 1999; Kuipers et al., 2006, 2007). Accurate differentiation between shoulder and cervical disorders causing shoulder pain is important not only for epidemiological studies, but also to improve targeted treatment and prognosis (Mannifold and McCann, 1999).

The pathoanatomic model in shoulder pain is of questionable value given that the clinical tests for making a diagnosis do not have good levels of reliability (May et al., 2010) or validity (Dinnes et al., 2003; Mircovic et al., 2005; Dessaur and Magarey, 2008; Hegedus et al., 2008; Hughes et al., 2008). Furthermore the value of imaging is questionable as rotator cuff tears are seen commonly in asymptomatic subjects (Tempelheof et al., 1999; Schibany et al., 2004; Yamaguchi et al., 2006). Therefore, it has been recommended that these diagnostic labels be abandoned, and instead patients are classified based on treatment response and common clinical characteristics (Schellingerhout et al., 2008). There is evidence that sub-grouping of patients with spinal problems and directing treatments in this way aids better outcomes, predicts prognosis and facilitates research (Long et al., 2004; Cook et al., 2005).

The McKenzie Method of Mechanical Diagnosis and Therapy (MDT) (McKenzie and May, 2000, 2003, 2006) uses posture and end range repeated movements whilst monitoring symptom and mechanical response to classify patients into one of three mechanical syndromes: derangement, dysfunction or postural syndrome, or ‘other’ if it does not fit the operational definitions of one of the mechanical syndromes. In extremity problems, dysfunction is further sub-classified as either contractile or articular dysfunction based on responses to resisted tests and end-range repeated testing. Treatments directed at these homogeneously exclusive subgroups are specific to each subgroup (McKenzie and May, 2000, 2003, 2006). Reliability between therapists trained in the McKenzie system has been shown to be moderate to good for spinal problems (Razmjou et al., 2000; Kilpikoski et al., 2002; Clare et al., 2004, 2005; Dionne et al., 2006), and prognostic validity has been previously demonstrated in spinal disorders (Long, 1995; Wernke and Hart, 1999; Wernke and Hart, 2001). There is evidence for high levels of reliability between trained MDT therapists evaluating completed assessment forms, with kappa values of 0.7 (Kelly et al., 2008), and 0.83 (May and Ross, 2009).

The purpose of this case report was to demonstrate how a patient presenting with an apparent shoulder problem, when assessed using an MDT examination, ultimately responded to repeated movements at the cervical spine. The patient gave permission for the case report to be presented if this was done anonymously.

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2. History

A 47-year old male patient was referred by his family physician with shoulder pain. The patient worked as an air-conditioning technician, which involved working with arms overhead and neck extended for prolonged periods, and occasionally lifting heavy weights. His only leisure activity was watching television, which he watched for at least 4 h every night ‘relaxed’ on a sofa. His only functional limitation was lifting moderate to heavy weights due to shoulder pain. At this point he was on annual leave back in India from working abroad, but not on sick leave (Fig. 1).

The following outcome measures were obtained at baseline: the Shoulder Disability Score (Croft et al., 1994) – 4/22; the Oxford Shoulder function score (Dawson et al., 1996) – 45/60; numeric pain score – 5/10 (Sim and Waterfield, 1997).

He had a 4 month history of intermittent left shoulder pain which was improving, but there was consistent pain on elevation of the shoulder more than 90°, with abduction worse than flexion. This was the first episode and the symptoms started for no apparent reason. He was never off work, but he had avoided lifting heavy weights. His symptoms were absent in the morning, not worse as the day progressed, but were worse in the evening. Consistently lifting weights made him worse, which would stop with rest, analgesic spray and hot packs. Continuous use of his left arm did not affect his symptoms as long as he did not lift weights or raise his shoulder above 90°.

He slept on his sides and his sleep was not disturbed. Initially he had taken non-steroidal anti-inflammatory drugs, but as these had not helped he had discontinued them. His general health was good and he had had no previous shoulder or spinal history or any concurrent symptoms.

A recent MRI reported a complete tear of the subscapularis tendon, a type 2 SLAP tear, hypertrophy and cystic changes in the lesser tuberosity, soft tissue thickening with synovitis in the rotator cuff interval, tendinosis in the infraspinatus and supraspinatus with fatty atrophic changes in the infraspinatus.

3. Physical examination

As factors from the history were suggestive of a shoulder disorder, a McKenzie extremity assessment was undertaken. The patient had a poor posture in sitting and standing with a flexed lumbar spine, protruded head posture and protracted shoulders. Single movements were first examined for a baseline understanding of pain, range and the functional activity. He had full active and passive range of shoulder flexion, abduction and medial and lateral rotation. Abduction and flexion had pain during movement beyond 90° and medial and lateral rotation had minimal end-range pain. Active abduction was the most symptomatic movement. Resisted abduction and flexion provoked concordant shoulder pain, but there was good strength on both.

Fig. 1. Body chart illustrating area of symptoms.
Repeated movements in upright standing were tested to ascertain the possibility of a reducible or consistent pattern to the symptoms. Active abduction being most symptomatic was tested first. Two sets of 10 repetitions produced pain which remained worse after testing. Repeated flexion increased the symptoms further, and remained worse. No movement was found to decrease the symptoms, neither was there any change in pain pattern. It was now clear that symptoms were being affected with loading the arm, but no clear pattern was emerging and the pain pattern could not be classified to any mechanical syndrome of the extremity at this stage. The cervical spine was tested next in sitting. To enable the best range of movement the patient was shown how to restore the lumbar lordosis and retract the head. This position abolished the symptoms made worse by the repeated movement testing during the shoulder assessment. The initial single baseline movement testing showed a moderate loss of retraction and extension, but no loss to any other cervical movements. In the MDT system movement loss is defined as nil, minor, moderate, or major, which although suffering from imprecision is meaningful to MDT clinicians and relevant to individual cases.

There were no baseline symptoms at rest prior to repeated movement testing. There was still pain during movement beyond 90° abduction. During the last 10 movements the patient overpressure the shoulder pain at rest, which remained worse afterwards. There were no mechanical changes at either the cervical spine or the shoulder. Repeated retraction abolished the baseline shoulder pain, and further repetitions abolished the baseline pain during abduction.

To further re-confirm the directional preference and differentiate the cervical spine as the symptom creator at the shoulder, the patient was asked to carry out the movements of the shoulder in static protrusion. The pain during movement in abduction was produced, but this was abolished when the movement was carried out with the neck in retraction. Thus sustained and repeated movement testing of the cervical spine affected the symptoms of the shoulder, demonstrating a directional preference at the cervical spine. Hence no further examination was deemed necessary.

The provisional classification was cervical derangement. The patient was educated on maintenance of posture, use of a lumbar roll, and was asked to perform 10–12 repetitions of retractions every hour with the avoidance of provocative postures.

4. Reviews

Twenty-four hours later the patient reported compliance with carrying out the exercises. He reported that he had not felt the pain with shoulder movement beyond 90°, but still felt it with movement beyond 120°, with a pain score of five, but this was no worse afterwards. After repeated retraction with patient overpressure the pain on abduction beyond 120° was two. The classification of cervical derangement was confirmed.

Forty-eight hours later at baseline examination there was minimal end-range pain on abduction. In order to achieve further symptomatic responses at the shoulder and reach an end range at the cervical spine, retraction and cervical extension was introduced.

At 10 days outcomes were assessed by another therapist who had not been involved in treatment: Shoulder Disability score — 0/22; Shoulder Function assessment score — 55/60; numeric pain score was 0/10. The patient self-reported excellent satisfaction. During the last 10 days the patient had lifted heavy weights without pain. There were no symptoms at rest, nor pain during movement. The intermittent pain with lifting weights or moving the shoulder beyond 90° remained abolished. Repeated movements of the cervical spine in protrusion or flexion did not produce any symptoms at the shoulder nor cause any mechanical responses to the shoulder or cervical spine. Maintaining a static protruded neck, active shoulder movements were asymptomatic. Maintaining static protrusion, resisted abduction produced pain during movement beyond 150°, with a pain score 0.5 which was not worse afterwards. With a retracted neck resisted abduction produced no pain during movement. The cause and effect of the shoulder pain was demonstrated to the patient.

The patient was advised to carry on with repeated retraction, extension and end-range extension, which involves a slight rotation of the head at end-range in both directions to obtain full end-range. Since resisted abduction in static neck protrusion had still produced some pain during movement at the shoulder, it was reasoned that this over-pressure would be useful to fully abolish symptoms.

The next follow up was done by telephone after one month as the patient had returned to his job overseas. The patient was asymptomatic at that point in time. A further long-term follow-up was done at one year. The patient remained asymptomatic, but had continued to use the exercises if ever he felt stiffness or discomfort. The telephone follow-ups were done by another therapist blinded to the treatment and outcomes.

5. Discussion

This patient’s symptom being intermittent, improving, worse in the evening, and affected by loading, pointed to its mechanical nature. Factors from the history and from the physical examination suggested a shoulder disorder. However, posture in the evening, when he was worse, while watching the television could point to the cervical spine. Interestingly the MRI findings were not relevant to the patient’s symptom.

Cervical disorders can often cause symptoms at the shoulder (Wells, 1982; Schneider, 1989; Van der Windt et al., 1996; Mannifold and McCann, 1999; McKenzie and May, 2000; Bogduk, 2002). Despite all the factors that suggested the symptoms originated from the shoulder when reductive mechanical forces were applied to the cervical spine, these abolished the symptoms. Opposite movement produced the symptoms, providing further evidence of the source of symptoms, giving a classification of derangement of the cervical spine, and providing a directional preference in exercise to guide the treatment (Donelson et al., 1991; McKenzie and May, 2000, 2003; Long et al., 2004; McKenzie and May, 2006; Kolber and Hanney, 2009; Scannell and McGill, 2009).

The exact source of pathology is less clear. The cervical discs are largely fibrocartilagenous and without a mobile nucleus make any explanation of this within a conceptual mechanical model rather challenging (Taylor et al., 2000). However, the source of pathology is academic and ultimately it is best to use clinical reasoning principles based on symptomatic and mechanical responses to assessment and treatment.

Limitations of this case report are that both long-term follow-ups were done by telephone, and the patient was improving when he first sought treatment. But it could be argued that the outcome could be distinguished from the natural history as it was clinically induced.

6. Conclusion

The case report highlights the importance of differentiating shoulder pain that is from the shoulder from cervical referred pain, despite many factors suggesting the opposite. It also supports the clinical utility of the McKenzie assessment as one approach in making this differential diagnosis. The McKenzie assessment is a low technology, effective mechanical assessment that helps in the differential diagnosis between shoulder and cervical sources of symptoms.