1. Introduction

The McKenzie method of Mechanical Diagnosis and Therapy (McKenzie 1981, 1990; McKenzie and May, 2000, 2003) is well known and commonly applied in the management of spinal disorders (Foster et al., 1999; Gracey et al., 2002; Jackson, 2001). The system uses a mechanical evaluation involving end-range repeated movements performed whilst symptom and mechanical responses are monitored. The effect of the repeated movements is then used to classify patients in one of three mechanical syndromes: derangement, dysfunction, and postural syndrome. According to the classification different exercises and postural concepts are then used to reduce derangement, remodel dysfunction or correct adverse postural loads. The mechanical evaluation when used with spinal patients has demonstrated reliability amongst trained clinicians (Razmjou et al., 2000; Fritz et al., 2000; Kilpikoski et al., 2002), and prognostic validity (Long, 1995; Sufka et al., 1998; Werneke et al., 1999; Werneke and Hart, 2001).

When McKenzie (1981) described his original concept he maintained that the system could equally well be applied to extremity problems. However there remained little evidence of clinicians using the system with non-spinal musculoskeletal problems, and more recently an explicit description of how the same principles could be applied to extremity problems was published (McKenzie and May, 2000). The purpose of this case report is to describe a new method of assessment and management, using the principles of Mechanical Diagnosis and Therapy, as applied to a patient with a non-specific shoulder problem. This patient was classified and treated as having a derangement (Table 1) according to Mechanical Diagnosis and Therapy principles.

2. Case report

2.1. History

A 38-year-old female physiotherapist attended the physiotherapy clinic with a complaint of right anterior shoulder pain, which had been present for 2 months. The condition had worsened in the last 2 weeks, when pain had radiated to her elbow and wrist (Fig. 1). Symptoms had started for no apparent reason with no trauma or overuse to the shoulder, and this was her first episode of a shoulder problem. Symptoms were intermittent and produced or aggravated by all movements of the shoulder, including movements at early range, and by sleeping on her right side. The shoulder and elbow were tender to the touch. Symptoms were made better or were absent when the shoulder was at rest and not moving. Functionally she was not aware of any limitations, although symptoms tended to get worse during the course of the day with normal work and domestic activities. She had had no previous or concurrent cervical symptoms.

2.2. Physical examination

As a screening examination of the cervical spine revealed no restrictions of movement and no symptomatic or mechanical responses, involvement of the
cervical spine was thought to be unlikely. Equally as movements of the shoulder so easily influenced symptoms involvement of the elbow or wrist was excluded and the examination focussed on shoulder movements and responses. An examination of single movements was conducted first to gain a baseline understanding of her shoulder’s symptomatic and mechanical presentations. She reported a dull ache around her anterior shoulder at rest. Flexion, extension, and adduction were full range and had no effect on her symptoms. Abduction was full range, but pain increased in her shoulder from 150° to end-range. External rotation was limited to 70° and increased pain at end-range. The hand-behind-back position was limited at the buttock, also increased pain at end-range, and was the most symptomatic movement. Passive movements replicated active movements except range was somewhat larger, movement was prevented by the patient’s pain rather than a physical limitation; and hand-behind-back was again the most symptomatic movement. Resisted tests were equivocal, some being mildly uncomfortable, but no single test reproducing concordant symptoms.

As hand-behind-back was the movement that most strongly affected the patient’s symptoms it was decided to explore this further in the repeated movement section of the examination. It was demonstrated to her how to perform this passively with assistance from the other hand, her baseline symptoms were recorded, and then she was asked to perform 10–15 repetitions. During the repetition of hand-behind-back she reported the movement to get easier and easier, and on observation the range increased. She was encouraged to push her right hand further up her back as it got easier and towards the end apply overpressure (Fig. 2). On completion of two sets of repetitions the patient reported no pain at rest; all symptoms had been abolished. On re-checking her baseline mechanical response abduction, external rotation and hand-behind-back were all full range and asymptomatic on movement.
2.3. Conclusions

Provisional diagnosis from the assessment was derangement of the shoulder. The self-treatment strategies for the next 24 h were 10–15 repetitions of hand-behind-back with overpressure every 2 h, and to avoid sleeping on the right side, if possible. The patient was instructed to put the affected arm behind their back, reach up as far as possible, and then with the other hand apply overpressure to push the hand further up the back (Fig. 2).

2.4. Day 2

The patient was seen again the following day. She reported she had performed her exercises regularly every 2 h, and demonstrated that she had been doing these accurately. She reported that she had had no pain in the last 24 h either on performing the exercise, at rest or with work or domestic activities. The shoulder and elbow were still slightly tender to the touch. On examination all shoulder movements were full range and pain free.

Often in derangement one direction of movement, called the directional preference, decreases, abolishes or centralizes symptoms, whilst the opposite movement frequently exacerbates the symptomatic and mechanical presentations. The pathophysiological reason behind this clinical phenomenon is unknown. So to help confirm the diagnosis of derangement at the shoulder the patient was asked to perform repeated external rotation, which was the movement opposite to her directional preference. Pre-test she had no symptoms and no limitation of any movements. She then performed 10–15 end-range external rotation movements. These produced pain at her shoulder, elbow and wrist, which remained after cessation of the exercises, as well as producing limitation to her movements. Abduction was limited to 150°, external rotation 70° and hand-behind-back limited at the waist. The patient was then asked to perform 10–15 repetitions of hand-behind-back, following which all symptoms were abolished and all movements were once again full and pain free.

The mechanical diagnosis of derangement was confirmed. The patient was advised to do 10–15 repetitions every 2–3 h for the next 5 days or if symptoms returned.

2.5. Follow-up

Staff at the physiotherapy clinic contacted the patient 2 weeks later. She reported no further symptoms and full pain free movements and activities. However sleeping on the right shoulder was still uncomfortable. At a further telephone call 10 weeks later she remained pain free, with normal activity, and was now able to sleep on her right side with no problems.

3. Discussion

Shoulder problems are frequently encountered in primary health care settings (Van der Windt et al., 1995; May, 2003). The long-term outcome is not always favourable and persisting symptoms or limitation of function is commonly reported (Croft et al., 1996). Various patho-anatomical mechanisms may give rise to shoulder symptoms, but the reliability of the examination process by which a diagnosis is reached has been shown to be weak (Liesdek et al., 1997; de Winter et al., 1999), and the diagnostic validity of certain tests to be only moderate (Calis et al., 2000).

When treating patients with shoulder problems specific patho-anatomical diagnoses are frequently used (Van der Windt et al., 1995; Liesdek et al., 1997; de Winter et al., 1999), but the prevalence of non-specific symptoms at the shoulder has not been explored. The concept of non-specific musculoskeletal symptoms is well established in the field of low back pain (CSAG, 1994). McKenzie and May (2000) proposed the application of non-specific mechanical syndromes to extremity musculoskeletal problems. Although it was hypothesised that derangement related to internal disturbance of articular tissue, identification was not dependent on naming a specific patho-anatomical tissue. Identification instead depended upon symptomatic and mechanical responses to repeated end-range movements. In the derangement syndrome repeated end-range loading in the appropriate direction, termed directional preference, progressively decreases pain, with a simultaneous improvement in the range of motion (McKenzie and May, 2000). Likewise movements in the opposite direction may increase symptoms and limitations in the range of movement. The case report gives an example of such a response.

The hypothetical model of derangement may assist in the education of the patient to obtain collaboration for self-management. Internal disturbance of articular tissue may be reduced by movements in one direction (in this instance hand-behind-back), and increased by opposite movements. The self-management advice to the patient comes directly from the findings at assessment: avoid the provocative movement and move repeatedly in the direction of preference.

Clinical reasoning is the process by which the clinician, in discussion with the patient, proposes health management strategies based on clinical data, client choices and professional judgement and knowledge (Jones and Rivett, 2004). Hopefully it results in the best-judged action for individual patients and ‘wise’ action in the clinic (Jones and Rivett, 2004). Pattern recognition is part of this process, available to the expert in any field, when previous experience allows identification of a familiar phenomenon. In this instance the clinician recognised a favourable response to repeated
movements with the abolition of symptoms and an increase in range of movement—a response that fits the operational definition of derangement (Table 1).

Pattern recognition in this instance rapidly provided an appropriate self-management strategy. The neck, an unlikely source of the patient’s symptoms as she reported the aggravating factor to be shoulder movements, was further discounted by a brief and uneventful examination. The obstructed shoulder movements and site of pain during the examination confirmed that the source of symptoms was the shoulder. Finally, repeated shoulder movements abolished the symptoms and increased the range of movement. Further examination was unnecessary at this point as the ‘best-judged action’ had been determined for this individual patient. Upon returning for review the patient reported a sustained improvement in symptoms and range. Furthermore, movements demonstrated an aggravation of the condition when repeated in the opposite direction to the directional preference. Derangement syndrome and directional preference was confirmed; thus discounting the need for further differential diagnosis or testing.

From a theoretical perspective many structures could have been the source of this patient’s symptoms, including, but not only the intervertebral discs and zygapophyseal joints of the cervical spine, local somatic structures at the shoulder and elbow, and neurogenic structures, such as the radial nerve. The examination of this patient could have been elongated by an extended ‘search’ for the source of symptoms; notwithstanding that the battery of tests that might be used are of unproven validity and uncertain reliability (Liesdek et al., 1997; de Winter et al., 1999; Calis et al., 2000; Seffinger et al., 2004). Protracted examination with multiple tests of unproven worth does not signify expert clinical reasoning. Rather the reverse as more tests will generate more false-positive responses. It is not satisfactory simply to identify structures involved, as this alone does not provide sufficient information to understand the problem and its effect on the patient, nor is it sufficient to justify the course of management chosen…Of more concern is that solely tissue-based reasoning tends to promote inflexibility of management strategies. (Jones and Rivett, 2004, pp. 16–17) If the best ‘wise action’ for the patient has been determined by the physical examination, no further testing is needed to improve the management strategy, unless the presentation changes.

The application of Mechanical Diagnosis and Therapy in the extremities is in its infancy. There are now numerous reports of the reliability and prognostic validity of the application of the McKenzie principles for spinal problems (McKenzie and May, 2003); the same evidence base needs to be created for non-spinal problems.

4. Conclusion

This case report details the history and assessment of a woman who presented with non-specific shoulder pain. During the physical examination repeated movements were able to abolish her symptoms and restore a full range of pain free movement. Movements in the opposite direction reproduced symptoms and caused a painful restriction in her range. Such a symptom response is classified as a derangement under Mechanical Diagnosis and Therapy principles. The self-management strategy arose directly from the mechanical evaluation. This is the first documented evidence of the application of these principles to extremity problems.

References


Jackson DA. How is low back pain managed? Retrospective study of the first 200 patients with low back pain referred to a newly established community-based physiotherapy department physiotherapy 2001;87:573–81.


