

Manual therapy treatment of lumbar radiculopathy: A single case report

ABSTRACT: *Patients with lumbar radiculopathy are often managed with manual therapy. The aim of this single case study was to describe the outcome of manual therapy treatment of a patient with lumbar radiculopathy. A 47-year-old female presented with acute, severe left buttock and postero-lateral thigh pain. Symptom provocation occurred during lumbar flexion, coughing, sneezing, driving and prolonged sitting. Her left straight leg raise neurodynamic test was limited and reproduced her pain, as did trigger points in the left lumbar and Gluteal muscles. Clinical neuro-conduction testing revealed weakness of the big and other toe extensors, as well as eversion and plantar flexion of the left ankle, and a diminished left ankle reflex. This indicated possible involvement of both the L5 and S1 nerve roots. A manual therapy treatment approach including lumbar rotation mobilisations (Maitland approach), massage, trigger point pressure release and Transversus Abdominus muscle activation was used. The patient was symptom free, had full pain-free range of all lumbar movements, a full pain-free left straight leg raise neurodynamic test and normal neurological conduction six weeks after onset, following seven manual therapy treatments. Although the results of this case report cannot be generalised, it describes the successful outcome of a patient with severe radicular pain and neurological deficits, whose signs and symptoms had completely resolved following manual therapy treatment.*

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KEYWORDS: LUMBAR RADICULOPATHY, LUMBAR ROTATION MOBILISATION, TRIGGER POINT PRESSURE RELEASE.

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INTRODUCTION

Radiculopathy is a disorder involving compression, impingement, irritation or inflammation of a spinal nerve root, which may be due to a disc protrusion or any local degenerative disorder compromising the intervertebral foramen (Maitland et al 2005). It is characterised by the presence of true neurological signs and symptoms (Saunders and Saunders 2004) and associated with radicular pain. In the lumbar spine, radicular leg pain is often a result of lumbar intervertebral disc pathology (Hall and Elvey 1999).

Conservative (non-operative) treatment of lumbar disc herniation is indicated in the absence of worsening neurological signs or the development of Cauda Equina Syndrome, which would necessitate an urgent surgical referral (Rhee et al 2006). Although several questions remain for the best evaluation and treatment of lumbar radiculopathy with disc herniation, it has been suggested that a course of conservative treatment should be completed before

the consideration of surgery (Rothoerl et al 2002). One approach of conservative treatment is spinal manipulative treatment which has been proposed to have a beneficial effect on pain, straight leg raise, range of motion, size of disc herniation and neurological symptoms in lumbar radiculopathy (Maitland et al 2005 & Oliphant 2004). Manipulative treatment is used to describe both manipulation and mobilisation (Koutoulas 2002). It is advisable to exclude forceful manipulation and use only gentle intervertebral joint mobilisation where there are neurological changes (Maitland et al 2005). There is strong support for the use of manual therapy for patients with cervical radiculopathy (Young et al 2009; Waldrop 2006), however only moderate data support the role of manual therapy in the conservative treatment of lumbar radiculopathy patients (Schäffer et al 2007; Rhee et al 2006; Santilli et al 2006).

The aim of this case report was to demonstrate the positive effect of conservative management of lumbar

radiculopathy with a manual therapy intervention.

PATIENT DESCRIPTION

A 47-year-old female receptionist presented for physiotherapy treatment with a deep, intermittent pain in her left buttock (P1). She described this pain as sharp and stabbing and rated it 9 on the 10-point Numeric Pain Scale (NPS). When this pain was severe she occasionally experienced an additional deep pain down the postero-lateral aspect of her left leg to above her knee (P2). This created the sensation of her leg 'collapsing'. She described it as sharp and shooting and rated it 10 out of 10 on the NPS. No associated numbness, paraesthesia, weakness, cord or Cauda Equina symptoms were reported.

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The patient was only able to sleep on her back and awoke with left buttock pain (P1) whenever she turned. She reported a worsening of buttock pain (P1) when getting out of bed. This continued to worsen as the day progressed. Leaning forward exacerbated her buttock pain (P1) and caused postero-lateral thigh pain (P2). This took between two and forty minutes respectively to settle, indicating a very high level of irritability. Other aggravating factors included leaning to the left, prolonged sitting, driving, standing up from sitting, coughing and sneezing.

The patient reported first experiencing her buttock pain (P1) when getting out of bed five days prior to her initial physiotherapy consultation. It was worsened by leaning forward to make her bed and she had difficulty straightening up from a flexed position. Three days later she experienced severe left buttock (P1) and postero-lateral thigh (P2) pain while leaning forward putting a heavy object into her car. X-rays taken on the day of consultation revealed significant spondylotic narrowing of the L5/S1 disc space. The patient had experienced a similar episode of severe back and leg pain when she was 22-years-old and was advised to have surgery by an orthopaedic surgeon. Her pain, however, settled with conservative treatment and she had no further severe episodes.

The current episode of pain prevented her from driving, sitting at work and performing her receptionist duties. She was unable to clean her house and felt that she could not fulfil her roles as housewife and receptionist. She was anxious about a prolonged period off work and the financial implications thereof. She was frightened about the condition itself and the perceived need for surgery. She obtained a score of 35 out of a possible 92 on the Standard McGill Pain Questionnaire and demonstrated definite affective and evaluative components. Her expectations of physiotherapy were to relieve her pain and prevent the need for surgery, allowing her to resume all previously described duties required for receptionist work and housework.

Physical examination of the patient was limited by her high pain severity and irritability. She was observed to

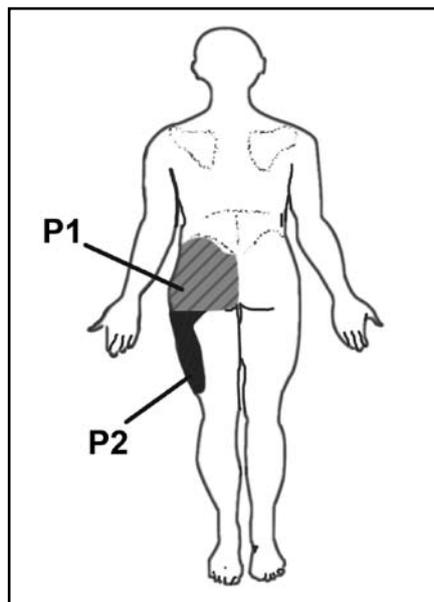


Figure 1: Body Chart of Case Report Patient

have a lower lumbar kyphosis and reduced abdominal tone. Lumbar flexion increased her buttock pain (P1) when her fingers reached the middle of her thighs. Her left straight leg raise neurodynamic test was severely limited and reproduced her buttock pain (P1) at 20 degrees hip flexion. It was worsened by the addition of ankle dorsiflexion. Her lumbar neurological conduction examination revealed no sensory abnormalities. There was weakness of extension of her left big toe and other toes, as well as eversion and plantar flexion of her left ankle. Her left ankle reflex was diminished. This indicated possible involvement of both the L5 and S1 nerve roots. Central and left unilateral postero-anterior passive movements of the fifth lumbar (L5) and first sacral (S1) vertebrae reproduced her buttock pain (P1). Palpation of trigger points of the left Quadratus Lumborum and Piriformis muscles also reproduced her buttock pain (P1). Likewise, palpation of her left Gluteus Medius and Gluteus Minimus muscles reproduced both her buttock (P1) and postero-lateral thigh (P2) pain.

CLINICAL REASONING

The patient described was likely to have compromise of one or both of her L5 and S1 nerve roots. A disc disorder was suspected due to the mechanism of her injury, a forward flexion movement, and her difficulty straightening from a

flexed position. This was further supported by the fact that leaning forward was her most painful movement and that pain was reproduced by sitting, coughing and sneezing, which all increase the intradiscal pressure. The patient's lumbar kyphosis is also a common finding in disc disorders. (Maitland et al 2005 & Brodke and Ritter 2004). The patient's X-rays indicated possible compromise of the L5 nerve root due to the spondylotic narrowing of the L5/S1 disc space. (Benneker et al 2005 & Sehgal and Fortin 2000) although some evidence suggests that there is no correlation between disc degeneration and radiological findings (Lebkowski et al 2004).

The patient experienced unilateral, sharp, severe pain, together with a neurological deficit (motor weakness and a decreased ankle reflex), which is indicative of nerve root compression. Her positive straight leg raise neurodynamic test was indicative of a disc disorder which was compressing a nerve root (Maitland et al 2005 & Brodke and Ritter 2004). Although the area of the patient's pain initially indicated the L5 dermatome, the neurological examination revealed motor weakness corresponding with both the L5 and S1 nerve roots, leading to the conclusion that she had irritation of both the L5 and S1 nerve roots (Maitland et al 2005).

The S1 radiculopathy was likely to be caused by a disorder of the L5/S1 intervertebral disc (Maitland et al 2005) and an L5 radiculopathy could be caused by a space occupying disorder from either the L4/5 or L5/S1 intervertebral levels (Maitland et al 2005; Hall and Elvey 1999). Although it does not exclude the possibility of one existing (Lebkowski et al 2004), there was no evidence of an L4/5 disc disorder on X-ray. The spondylitic changes at the L5/S1 intervertebral level could have affected both the S1 and L5 nerve roots, as two nerve roots may be affected by an intervertebral disc in the lumbar spine (Bartynski and Petropoulou 2007; Maitland et al 2005). This hypothesis is supported by the fact that only the L5 and S1 vertebrae were tender on mobilisation, which indicated a movement disorder of that specific movement segment (Hall and Elvey 1999).

Referred pain from trigger points in the Quadratus Lumborum muscle is projected posteriorly to the buttock and can mimic radicular pain (Travel and Simons 1993). Referred pain from Gluteus Minimus muscle trigger points extends over the buttock and posterolateral aspect of the leg (Bennett 2007 & Travel and Simons 1993). Gluteus Medius muscle trigger points may refer pain to the posterior and lateral aspects of the buttock and Piriformis muscle trigger points to the buttock region (Travel and Simons 1993). Due to the area of the patient's pain, the aforementioned muscles were examined for trigger points. The reproduction of the patient's referred pain identified active trigger points in these muscles which could be considered a source that was contributing partially to her pain (Huguenin 2004 & Simons et al 1999). Trigger points are often protective in nature and may be associated with underlying causes. Trigger points in the Quadratus Lumborum muscle may be associated with an irritated lumbar disc (Huguenin 2004) and activation of certain trigger points, particularly in the Gluteus Minimus, may be caused by nerve root irritation (Travel and Simons 1993).

It was therefore decided to mobilise the movement segments of the lower lumbar spine and treat the trigger points that reproduced the patient's pain by massage, trigger point pressure release and gentle stretches (Simons et al 1999). Gentle mobilising techniques of the spine were initially chosen because the patient had a neurological deficit and had high pain severity and irritability (Maitland et al 2005). Maitland advises using rotation mobilisation for this type of patient with severe disabling pain, neurological changes and unilateral lumbar and leg pain (Maitland et al 2005). The patient's anxiety about her condition was a risk factor for chronicity and disability (Jensen et al 2010; Kendall et al 1997). This would also therefore need to be addressed in treatment. Creating the expectation that a person will improve following spinal manipulative therapy has been shown to have a positive effect on spinal manipulative therapy induced hypalgesia (Bialosky et al 2008).

MANAGEMENT

The patient was positioned with the L5/S1 intervertebral joint in its mid position as it was the spinal segment that was tender on palpation and therefore the suspected level of intervertebral joint disorder. Maitland Grade I L5/S1 rotation mobilisation to the right was performed three times, thirty seconds (Maitland et al 2005). On retesting her comparable sign, lumbar flexion, her pain free range had increased to a level where her fingers reached ten centimetres above her patella before the onset of left buttock pain. Gentle massage of her left Quadratus Lumborum, Gluteus Medius, Gluteus Minimus and Piriformis muscles improved her lumbar flexion range further, to a level where her fingers reached five centimetres above her patella before the onset of left buttock pain (P1). She was counselled regarding the mostly favourable prognosis with conservative care and the importance of a positive attitude in an attempt to address her anxiety.

At the second consultation the following day the patient reported feeling slightly better and rated her buttock pain (P1) at 6 out of 10 on the NPS. This increased during lumbar flexion when her fingers reached ten centimetres above her patella. Her neurological signs remained unchanged. The identical rotation mobilisation routine was repeated. Massage and gentle trigger point pressure release was applied to the aforementioned muscles (Simons et al 1999). Thereafter, lumbar flexion had improved to a level where her fingers reached the inferior level of her patella before the onset of her left buttock pain (P1).

The following day her buttock pain (P1) was significantly less (4/10 intensity) and she had not experienced any leg pain (P2) since her previous treatment. Lumbar flexion increased her buttock pain when her fingers reached the middle of her patella. Her neurological signs had improved and there was less weakness of her left toe extension (L5 and S1), and ankle eversion (S1). There was, however, still no change in strength of her left plantar flexion (S1) or her diminished ankle reflex. The treatment was repeated. This improved her lumbar flexion range to a level where

her fingers again reached the inferior level of her patella.

On review four days later she again reported improvement in her pain intensity. She had commenced household chores and had resumed her reception duties. Her neurological evaluation revealed further improvement with normal strength of all her myotome weaknesses. Her left ankle reflex had improved, but was still weaker when compared to the right. Lumbar flexion again reproduced her buttock pain (P1) when her fingers reached the inferior level of her patella. L5/S1 grade II right rotation mobilisations were performed three times for thirty seconds and massage and trigger point pressure release was performed as previously. This improved her lumbar flexion to a level where her fingers reached five centimetres below her patella before buttock pain (P1) was reproduced. The patient was taught gentle lumbar flexion and gluteal stretches. She was advised to continue to avoid sustained lumbar flexion activities, and was taught to bend her knees and keep her back in neutral lordosis when picking up light objects. The patient was advised to place a lumbar roll, at the level of her lumbar lordosis, in her chair at work and to avoid prolonged sitting.

The patient had three further treatment sessions consisting of massage and trigger point pressure release, as previously described, and lumbar right L5/S1 rotation mobilisations. These were gradually progressed to grade III mobilisations (Maitland et al 2005). The treatment remained cautious and assessments of the neurological signs were made at each treatment (Maitland et al 2005). She was instructed on how to recruit her Transversus Abdominus muscle (Richardson et al 1999). Referral of the patient to a neurosurgeon was not considered necessary due to the improvement of neurological signs (Rhee et al 2006).

OUTCOME

At a review one and a half months after her initial consultation the patient reported to be pain free having resumed all work and household activities. All lumbar movements were pain free,

even with the application of overpressure. Her left straight leg raise neurodynamic test was full range and pain free. Her motor and reflex deficits had resolved, resulting in a normal neurological evaluation. She was advised Pilates training to improve core strength and reduce the risk of re-occurrence of lumbar injury. A telephonic follow-up three months thereafter revealed that although the patient had not attended Pilates or continued with her prescribed exercises, she had not experienced any further pain.

DISCUSSION

A lumbar intervertebral disc disorder may result in lumbar radiculopathy by mechanical compression or inflammation by biochemical substances released by the Nucleus Pulposus (Schäfer et al 2007). Radicular pain in itself is a poor prognostic factor, especially with conservative care (Long et al 2008; Schäfer et al 2007). Intensity of back and leg pain at baseline is an important predictor for chronicity and disability (Jensen et al 2010). Anxiety as also been shown to be a poor prognostic factor (Jensen et al 2010; Kendall et al 1997).

This case study describes a patient with poor prognostic factors, including high pain severity, neurological deficit and anxiety, who had a successful outcome in only seven sessions of appropriate manual therapy. The natural history of lumbar disc disorders is favourable in most cases (Cribb et al 2007 & Oliphant 2004). Case reports do not control for the effects of natural history or placebo effect which could account for the improvement demonstrated. These effects have been minimised by the testing of the patient's comparable sign (lumbar flexion) after each treatment technique to establish the value of the technique.

Spinal manipulation has been shown to provide some reduction in pain and disability in acute low back pain, although there is conflicting evidence. Some international guidelines advocate the use of spinal manipulative therapy for acute low back pain (Hancock et al 2005). There is some evidence that suggests that spinal manipulation may be safe and effective in the treatment of acute

low back and referred leg pain (Jewell and Riddle 2005; Koes et al 1996).

Lumbar disc disorders resulting in radiculopathy are mostly discussed in the terms of surgery, but other cases of conservative intervention have been described (Rhee et al 2006; Rotherl et al 2002). There is insufficient data supporting the role of manual therapy in the treatment of these patients (Rhee et al 2006), but there is support for its use in the treatment of patients with cervical radiculopathy (Young et al 2009; Waldrop et al 2006). If a disc lesion where the annulus fibrosus is still intact can be established, the McKenzie mechanical diagnoses and treatment has been proven to have positive results (Aina et al 2004). There is also some evidence that spinal manipulation may be safe and effective for disc protrusion /herniation (Santilli et al 2006; Burton et al 2000; Stern et al 1995; Cassidy et al 1993) and disc herniation with neurological deficit (Bergmann and Jongeward 1998). Maitland advises using rotation mobilisation for lumbar radiculopathy resulting from a disc protrusion (Maitland et al 2005).

Spinal manipulative therapy has been shown to have a hypoalgesic effect (Bialosky et al 2008; Potter et al 2005). This may be due to stimulating mechanisms at the dorsal horn, descending pain pathway or the release of neurotransmitters (Potter et al 2005).

Addressing the mechanical interface around the sensitive neural tissue has been advocated (Shacklock et al 2005; Butler et al 2000; Hall and Elvey et al 1999). It has been suggested that techniques that open the interface, reduce pressure on the nervous system and reduce tension on the neural structures should be performed (Shacklock et al 2005) and that lumbar rotations may be beneficial to encourage nerve root mobility (Butler et al 2000). It is possible that the rotation mobilisations performed in this patient served to move the mechanical interface around the L5 and S1 nerves and thereby reduce the inflammation on/around these nerves (Butler 2000). Reducing anxiety and providing a positive expectation that the patient would improve may have had a positive effect on the patient's pain

(Jensen et al 2010; Bialosky et al 2008). It is possible that this may have lessened the amount of stress chemicals and production of receptors for excitatory neurotransmitters (Butler et al, 2000).

CONCLUSION

Lumbar disc disorder and resultant radiculopathy is often treated conservatively. There is scarce evidence to support the use of manual therapy treatment in the conservative treatment of lumbar radiculopathy. Although the results of this case report cannot be generalised, it describes the successful outcome of one patient with severe radicular pain and neurological deficit, whose signs and symptoms had completely resolved following manual therapy treatment.

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