

# A Pediatric Cervical Derangement

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## Introduction

In 1981 Robin McKenzie introduced Mechanical Diagnosis & Therapy (MDT) to the world (McKenzie 1981). The concepts of centralization, peripheralization, directional preference and tissue response to loading strategies have been well documented (Donelson et al. 1990; Sufka et al. 1998; Long 1995; Rath and Rath 1996). Further, Inter-rater reliability has been demonstrated to be excellent with rates of agreement of about 90% and kappa scores of 0.92-1.0 (Sulfka et al. 1998; Werneke et al. 1999). MDT uses three mutually exclusive categories to classify patients: derangement, dysfunction, and postural syndrome.

McKenzie and May (2003) defined centralization as the abolition of distal and spinal pain in response to repeated motions or sustained postures. They further define directional preference as repeated movements in the direction that decreases, centralizes or abolishes symptoms, and/or produces a positive mechanical response, such as an increase in range of movement.

The purpose of this case study is to demonstrate the effectiveness of MDT as an assessment and management strategy in the examination of a pediatric patient that sustained a left shoulder football blocking injury. Subsequently, the patient was given a provisional classification of cervical derangement and treated according to MDT principles.

## History

A 15 year old male, Abel Ramirez, presented with complaints of intermittent left shoulder pain secondary to a football blocking injury (a “burner” or “stinger”) sustained two years prior. Two to three months later his pain completely resolved. Seven months later his left shoulder began hurting again. He was unsure what made his shoulder better or worse, as he was unable to consistently reproduce the pain. Abel also admits to a history of neck pain.

He was subsequently, unsuccessfully treated by an athletic trainer then referred to an orthopedic surgeon. The surgeon diagnosed him with tendonitis and restricted him from weight lifting. His left

shoulder pain persisted so Abel presented to his PCP for an MRI referral of the left shoulder which was inconclusive. He was then referred to a second orthopedic surgeon undergoing a battery of clinical tests and was diagnosed with left shoulder anterior and posterior instability (multidirectional laxity or MDL), possible labral tear and possible brachial plexus injury. He was then referred to physical therapy and underwent an MDT examination.

## Examination

At intake, Abel completed the Disability of the Arm, Shoulder and Hand (DASH), (Solway et al. 2002; Beaton et al. 2001), scoring 20%. Initial observation revealed poor sitting posture with a protruded head and resting pain in the superior and posterior aspect of the left shoulder, VAS 2/10. Minor mechanical restrictions were observed in left cervical rotation and cervical extension. No mechanical restrictions were observed in the left shoulder. Postural correction of the cervical spine decreased left shoulder pain, which remained better. As a result we initiated a repeated motions examination of the cervical spine. Repeated retraction of the cervical spine further reduced left shoulder pain. Repeated retraction and extension of the cervical spine abolished left shoulder pain and produced left sided cervical end range pain, which did not remain. Further repeated retraction and extension of the cervical spine increased left cervical rotation and abolished all pain. At this point the patient was given a provisional classification of cervical derangement

## Treatment

The patient proceeded to perform five sets of ten repetitions with further improvements in cervical extension, left rotation and decreased end range pain. He was instructed to perform this reductive procedure at a frequency of two to three sets of ten repetitions five times per day. He was further educated in maintenance of reduction, given a lumbar roll, and excerpts from the book *Treat Your Own Neck* (McKenzie 2006) to assist with compliance. His treatment goals were to restore full functional range of motion to the cervical spine, abolish all neck and left shoulder pain, and become independent in self management.

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## Discussion

In this case, centralization and directional preference were used to guide the examination and subsequent treatment. Centralization has been demonstrated to be more prevalent in acute patients (Sulfka et al. 1998), with rates as high as 87%. Although Werneke (2008) found the prevalence rate mean age in cervical cases to be 55.2 years old, he also found limited data on the prevalence and prognostic validity of centralization for patients with cervical impairments and patients younger than 18 years old indicating further research was needed. Werneke (2008) reported prevalence rates for centralization were higher in younger patients between 18 and 45 years of age and for patients with acute symptoms (<21 days) for cervical syndromes. Even though centralization may be less common in pediatric and chronic patients, prevalence rates are not well understood.

Another concept used to guide classification and treatment in this case was directional preference. May and Aina (2012) in a systematic review, found three studies where patients with a directional preference responded significantly better to treatment when compared to other treatments (Delitto et al., 1993; Long et al., 2004, 2008), however, overall found limited evidence for directional preference as a prognostic indicator. They also found evidence for directional preference as a treatment effect modifier in a study by Snook et al. (1998), patients that were restricted from morning flexion, which applied for directional preference for extension, showed a significant reduction in pain severity.

Our present case study of a 15 year old male with chronic left shoulder pain demonstrates the usefulness of MDT during the examination process as well as its effectiveness as a management strategy. Initially, this patient demonstrated a directional preference to cervical retraction, through postural correction, which decreased his left shoulder symptoms, giving further clues, guiding the examination process towards cervical extension. Repeated retraction with extension further reduced, and ultimately abolished his symptoms all together. Once the patients' directional preference was discovered and explored with repeated motions, the centralization phenomenon ensued.

Furthermore, the patients history of complete resolution of left shoulder symptoms (three months after the initial injury) for seven months, gave pattern recognition clues to the classification, establishing a direction for the examination. The neck was chosen as the start point of the examination because if the shoulder were to be examined in the presence of a neck disorder (causing shoulder symptoms), false positives could distort the clinical picture. This clinical reasoning and a prior history of neck pain led to the inclusion of the cervical spine in the examination as a possible source of pathology to be ruled in or out first.

Cervical disorders can be a common source of shoulder symptoms (Wells, 1982; Schneider, 1989; Van der Windt et al., 1996; Mannifold and McCann, 1999; McKenzie and May, 2000; Bogduk, 2002; Menon and May, 2012). High prevalence rates of centralization have been found in patients with back and neck pain. May and Aina (2012) reviewed 29 studies that included 4745 patients with back and neck pain and found the average prevalence rate of centralization to be 44.4%. May and Aina (2012) also found evidence for the use of directional preference as a treatment effect modifier, this further validates the use of maintenance of reduction as an educational tool in this patients overall management strategy.

## Conclusion

Werneke et al. (2008) demonstrated the highest prevalence rates for centralization were found to be between 18-45 years old. Being 15 years old, Abel is not typical, and prevalence rates for centralization associated with pediatric patients are poorly understood. Overall, prevalence rates for centralization are not as well understood in the neck when compared to the low back and even less so in teenagers. This case study demonstrates that directional preference and centralization do occur in pediatric patients, and the rapid response can be just as dramatic as witnessed in the young adults age group of 18-45 years old. Clearly further investigation is needed in pediatric patients to document the prevalence rates of centralization in the cervical spine, as well as the overall role that directional preference may play.

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