The application of mechanical diagnosis and therapy in lateral epicondylalgia

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Abstract

Recent literature has shown poor levels of reliability and validity of diagnostic methods when relying on patho-anatomical diagnoses. Classification based diagnosis and treatment, such as Mechanical Diagnosis and Therapy (MDT), has shown to be more reliable in spinal disorders, and with some indication for reliability in the assessment of patients with peripheral problems. There has been research of elbow disorders with patho-anatomical diagnosis, but none on classification based diagnosis. This case series demonstrates the efficacy of MDT in seven consecutive patients with elbow disorders. Outcomes demonstrated an averaged 87 percent perceived improvement [PPI] in pain and function, using Upper Extremity Functional Scale [UEFS] with a reduction in numerical pain rating scale [NPRS] pain scores from 4.7 to 0.6. Averaged duration of treatment was 3.4 visits in 13.6 days. Mean three month outcomes were PPI of 95%, NPRS of 0/10, and UEFS of 79/80. None of the patients sought further medical care for elbow pain. This indicates there may be similar efficacy of classification based treatment on peripheral musculo-skeletal disorders as seen in the spine. It also demonstrates that patho-anatomical diagnosis and classification based diagnosis are not mutually exclusive.

Keywords: Mechanical Diagnosis and Therapy, Lateral Epicondylalgia, McKenzie classification

Introduction

Musculoskeletal disorders of the elbow are prevalent in an estimated 3-6% of the general population. [1-3] This percentage is higher in populations requiring repetitive manual tasks of the upper extremity. [4-6] From 1995-2002 in the USA, work related elbow disorders accounted for $111.5 million in expenses and an average of 52 lost workdays per case. [7]

The cost of healthcare in the United States is increasing at a rate that is incongruous with economic growth, particularly in orthopedics. [8,9] Not only are orthopedic costs increasing at a disproportionate rate to economic growth, long-term outcomes of orthopedic methods currently demonstrate minimal benefit. [10-12] Thus, currently practiced and traditionally accepted methods of orthopedic management are becoming no longer economically viable.

There is currently no general consensus on the best conservative management of the common elbow condition known as Lateral Epicondylalgia [LE] [13], a disorder that was recently redefined from Lateral Epicondylitis, upon the discovery of a lack of inflammatory cells via histological dissections. [14-18] For instance, a recent randomized controlled trial [RCT] investigated the effects of corticosteroid injections and physiotherapy, both separately and in conjunction, in cases of chronic LE, a patho -anatomical diagnosis. Results demonstrated corticosteroid injections provided worse one-year outcomes as compared with placebo injections, and physiotherapy resulted in no significant change. [12]

With the high prevalence of pathological abnormality on diagnostic imaging in the asymptomatic population [19-22], low reliability of physical examination [23-25] and lack of standardized definition, it is not surprising that the current literature displays both inconsistency and ineffective outcomes.

When compared with patho-anatomical treatments, classification based methods have shown both better efficacy and reliability with regard to spinal conditions. [27-33] Research utilizing classification systems in the extremities is currently limited, although there have been a growing number of publications related to MDT. [34-44]

MDT is an evaluation and treatment system that uses symptomatic and mechanical responses to classify musculoskeletal disorders into the syndromes: Derangement [DER], Dysfunction [DYS], Posture [POS] and Other. [34-35] Directional preference is used to guide an optimal loading strategy for Derangements for each individual. [34-35] Current MDT extremity literature includes a survey of 388 patients with a prevalence rate of 64% classified into a MDT syndrome. [36] Reliability of MDT extremity classification between skilled clinicians has shown 92% agreement with 0.84 kappa. [37] Seven case reports of the Temporal-mandible, shoulder, thumb and knee joints have been published and one RCT finding high prevalence of Derangement in osteoarthritic knees awaiting surgical replacement. [38-45] This is the first case series to exclusively observe MDT prevalence and outcomes of the human elbow.

Methods

Seven consecutive patients were evaluated and treated using the principles of MDT. The only exclusion criteria used was refusal to participate and pain referred from the cervical or thoracic spine. Three examiners were used for data collection, evaluation and treatment. Ages of examiners ranged from 23-30 years. The lead examiner possessed a Doctorate in Physical Therapy, a Diploma in MDT and four years of Orthopedic experience. The remaining examiners were third year Doctoral students of Physical Therapy. Both students completed MDT course part A and were in the process of completing a MDT specific clinical affiliation. Patients were recruited through the normal operations of Maccio Physical Therapy [MPT] clinic, invitation through the MPT monthly newsletter and recruitment from the community's local Crossfit gym.

Average patient age was 44.7 with an average chronicity of 38.9 months. The inclusion criteria were those recommended by a previous study. [12] Outcomes measures were collected at initial evaluation [IE], discharge [DC] and three months after DC. The outcome measures were Numeric Pain Rating Scale [NPRS], perceived percent improvement [PPI], upper extremity functional scale [UEFS], goniometric range of motion, and grip strength. Three month outcomes were collected via phone interview. Patients were asked to answer questions related to functional limitation, compliance, exacerbation rate, and reentry into the healthcare system.

Evaluation and treatment was established through repeated movement testing as described by MDT.[34] Each patient was given a specific loading strategy to either provoke or reduce symptoms. All prescribed loading was ten repetitions every one to two hours or if symptoms were present. Discharge instruction included the prescribed home exercise program 10 repetitions twice daily or as needed. No other treatment modalities were used other than prescribed reductive loading strategies.

Results

Table 1 demonstrates the loading strategies matched with patient characteristics. Of the seven consecutive elbows evaluated, five were classified as DER on initial examination and discharge. One classified as DER on initial examination, was re-classified at visit four with an underlying contractile DYS. One classified as mechanically inconclusive [MI] at initial examination was re-classified with DER at discharge. Three patients required a change in loading strategy for full reduction of symptoms. No articular Dysfunction, Postural syndrome or Other was identified. Elbow pain with symptoms with central symmetrical location showed directional preference in the sagittal plane with varying degrees of load. Symptom of medial and lateral origin had directional preference of sagittal and/or frontal planes with varying degrees of load. Figures 1-5 demonstrate loading techniques used.

Table 2 demonstrates outcome measures of PPI, NPRS and UEFS for initial evaluation, discharge, and three month follow up (six of the seven cases responded). Elbow extension and flexion range of motion increased by an average 2.7° and 6.7° respectively. Grip strength increased by an average of 6.4 pounds per pressure. Five of six inclusionary criteria became negative. PPI increased from 0% to 87% at DC and 95% at three month follow up. NPRS was reduced from 4.7 to 0.6 at both DC and three month follow up, which exceeds the MDC value of three points and considered true change. [46] UEFS increased from 75/80 to 79/80 at DC and three month follow up, not exceeding the MDC value of 9 points.[47] Average treatment duration was 3.4 visits in 13.6 days.

Five out of the six cases reported discontinuing the prescribed loading after DC despite instruction to continue. Two cases reported an exacerbation of their symptoms after DC. They both were able to self-reduce symptoms with the corrective loading strategy within 2 days. One patient refused further treatment once she reached 80% PPI secondary to satisfaction with functional deficits and reduction in pain scores. She was able to begin high intensity exercise again using the exercise for pain modulation and was the only case with continued compliance.

Discussion

This study showed an 85% DER prevalence, significantly higher than the 37% reported in current literature. [36] The most recent MDT survey of classification prevalence found a 90% increase in DER between 2006 and 2013. This increase was theorized to be the result of a potential learning curve. The learning curve can be attributed to the relative newness of MDT extremity evaluation, lack of MDT extremity curriculum in Diplomats receiving training 15 years prior, and the historical bias of MDT clinicians treating predominantly spinal conditions. [36] This finding is significant because the classification of DER is associated with good prognosis.[48] It appears as MDT extremity assessment matures, DER prevalence continues to increase.

The aforementioned Coombes et al. RCT which utilized corticosteroid injection, physiotherapy and the two treatments in conjuncture, had an inclusion criteria of greater than 30mm on a 100mm NPRS scale and pain provoked by two of the following: gripping, palpation, resisted wrist or middle finger extension or stretching of forearm extensor muscles. [12] Three of our cases met both the RCT inclusion criteria and classification criteria of an MDT syndrome. This indicates there is no mutual exclusivity between the criteria for making a patho-anatomical diagnosis or an MDT classification. Similar data has been published by Werneke et al. with regards to spinal classification. [33] The three cases with positive LE criteria were treated under the principles of MDT and showed excellent short-term outcomes, low number of visits and short duration of treatment. With the lack of mutual exclusivity between patho-anatomical diagnosis and MDT classification, both efficacy and reliability become the best measures of treatment. The conservative treatment described in the Coombes et al. RCT was suggested as best current evidence-based treatment. [12] The conclusions stated that physiotherapy did not result in significant differences and that there was a worse one year outcomes with corticosteroid injection verse placebo. [12] This suggests that MDT may be a more effective short-term management strategy in a population with positive inclusion criteria of the patho - anatomical diagnosis LE and/or the MDT classification of DER.

In a clinical commentary regarding the use of joint manipulation in the management of LE, Vincenzo et al. state that “the underlying pathology of LE remains to be fully elucidated”. [50]

Elbows fitting LE inclusion criteria in this series were classified as DER under MDT. DER is an abnormal resting position of the intra-articular space. Characteristics are movement loss and rapid symptom change upon repeated movement testing. [34] Mercer and Bogduk, and Duparc provide an anatomical explanation of varying innervated and mobile anatomy that have the ability to become entrapped or extrapped. [51-52] This type of displacement could theoretically mimic the presentation of LE and other elbow pathology. All elbows in this case series had an observable and goniometric loss of elbow extension (movement loss). This characteristic has not been mentioned in any of the previously referenced literature involving LE diagnosis. Extension loss was also a common finding of Dr Mills 1937 publication. After manipulation under anesthetic, restoration of extension was obtained and a reported immediate cure in 2/3 of cases and a slightly delayed cure in 1/6. Mills' theorized the rapid symptom reduction was due to reduction of joint displacement. [53] The results of this case study, as seen in the reduction of all elbow DER, mimic Mills' rapid change of motion and symptom. Given the coinciding rapid improvement in symptoms and movement, reduction of joint displacement seems a more likely pathological cause for the positive effects of joint mobilization than the previously hypothesized hypoalgesic and sympathoexitatory effects. [50]

The dissection findings of Mercer and Bogduk have influenced the author's belief that displaced joint material can become extrapped, outside the joint space, under contractile tissue. [51] Wrist flexion and extension were incorporated in loading strategies when the author suspected joint extrapment was present. The most reductive movement would then require an external force to reposition joint displacement to its origin. End-range wrist flexion/pronation and extension/supination were used to create lateral and medial external compression while extending the humero-ulnar joint to end-range. Interestingly the three cases requiring this loading also had a temporary abolishment of symptoms while applying Mulligans lateral glide mobilization with movement. [54] There was lasting reduction or abolishment after MDT repeated end-range loading techniques.

The three month outcomes revealed that five of six cases discontinued the reductive loading strategies immediately after DC. The low compliance rate after DC can be explained by low or non-existent pain scores with high satisfaction and functional ratings. Two of the three cases that had an exacerbation of pain after DC were able to independently abolish pain within two days keeping them from seeking further healthcare.

A limitation of the study was use of the UEFS as an outcome measure. Initial averaged scores were 75/80 creating a ceiling effect incapable of reaching or exceed the MDC. A more sensitive measure would have been more appropriate for this patient population.

Previous limitations of MDT have stated low generalizability to clinicians without extensive training. [55] Studies involving MDT reliability and efficacy has predominantly involved certified and diploma clinicians. [37] However, two examiners in this case study were Physical Therapy students with very limited formal training in MDT. Both examiners were able to evaluate and treat with minimal to no supervision of an MDT Diplomat. This may indicate either MDT is more generalizable in peripheral assessment or a MDT specific clinical affiliation of eight to twelve week duration is an effective means to become a reliable and efficient MDT clinician. Further research involving inter/intra-rater reliability and reproducible outcomes between Diplomat and student specific clinical affiliations should be explored.

Conclusion

The application of MDT on a limited elbow sample size has shown excellent outcomes at discharge and three month follow up. It has shown clinicians of varying MDT education are capable of effectively performing a mechanical evaluation, accurately finding classification and direction preference in a short period of time with low treatment visits. If these results are generalizable to a larger sample of clinicians and patients, the need for diagnostic imaging, ineffective physical examination and treatments would be significantly reduced making MDT a potential strategy to minimize current national orthopedic costs.

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