Clinical Case Report Competition

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Third Place Winner

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The effects of myofascial and craniosacral based techniques in massage therapy intervention of temporomandibular joint dysfunction linked headaches
ABSTRACT

PURPOSE: The objective of this case study was to observe the effects of myofascial and craniosacral based techniques on a male subject with temporomandibular joint dysfunction referral headaches.

PARTICIPANT: The 50 year male subject experienced unilateral temporal throbbing headaches along with crepitus, clicking and slightly restricted range of motion of the temporomandibular joint.

INTERVENTION: Ten 75 minute massage therapy sessions were held over a period of 8 weeks. Orthopedic tests and measurements along with the headache pain questionnaire were recorded prior to the first treatment, midway through the intervention, at the final treatment and 1 week post treatment.

RESULTS: Slight changes in joint dysfunction, a bilateral decrease in masseter hypertonicity by 1 cm, an increase in maximal opening of 0.4 cm and a reduction of headache incidence were recorded.

OUTCOME: The participant experienced positive results from the massage intervention. However, further research with better scientific controls is needed to investigate the effects of myofascial techniques on TMD linked headaches.

KEYWORDS: Massage, TMD, Myofascial, Headache

INTRODUCTION

Temporomandibular joint dysfunction (TMD) is a disorder of the temporomandibular joints and the associated muscles and structures resulting in abnormal movement of the articular surfaces and disc (Rattray and Ludwig, 2005). In normal
populations, 75% of people experience a range of TMD symptoms (Galani, Iliou, Kanavaros, Kitsoulis, Marini, Paraskevas, Zimpis, 2011). One study noted TMD individuals medical costs are 1.6% times higher than average for all health services (White, Williams, Leben, 2001). The mean age of persons with TMD in the USA is 40, 80% of whom are female (White et al., 2001). TMD dysfunction classically presents as head, jaw and ear pain or a combination thereof. The muscles of mastication implicated in the disorder are the temporalis, the masseter (appendix A, fig.1.1) and the pterygoids (appendix A, fig.1.2, 1.3). The hyoid muscle group may also be considered to a lesser degree in TMD (Rattray and Ludwig, 2005).

The temporomandibular joint is a synovial, condylar, hinge like joint which is divided in two spaces by an articular disc (Magee, 2008). The joint is an articulation of the condyle of the mandible and the articular fossa of the temporal bone (Magee, 2008). Gliding or translation of the joint occurs in the upper joint, while rotation takes place in the lower articular cavity (Magee, 2008). The combined movements allows for opening and closing of the mouth (Magee, 2008). When the mouth is held in a neutral (slightly open) position, the articular disc lies immediately above the condyle (Magee, 2008). Contraction of the lateral pterygoid muscle (appendix A, fig.1.3) moves the mandibular condyle and articular disc down the articular fossa into an anterior position resulting in depression and protrusion of the mandible or opening of the mouth (Rattray, 2005). The masseter (appendix A, fig.1.1) and medial pterygoid (appendix A, fig.1.2) close the mouth by elevating the angle of the mandible (Magee, 2008). When contracting unilaterally the medial and lateral pterygoids move the jaw contralaterally (Magee, 2008). The temporalis muscle (appendix A, fig.1.1) also elevates and retracts the mandible via the coronoid process attachment (Rattray, 2005). The digastric muscle elevates and
depresses the mandible (Rattray, 2005). Mylohyoid, geniohyoid and the infrahyoids depress the mandible (Magee, 2008).

Malocclusion of the teeth, tooth loss, traumatic injury, postural dysfunction, stress and injury are predisposing factors of TMD (Rattray, 2005). Muscular and ligamentous imbalances alter joint motion (Rattray, 2005). A well known symptom is a persistent clicking or popping of the joint upon opening or closing of the jaw (Rattray, 2005). Clicking can be caused by displacement of the disc which must be overcome by the mandibular condyle during movement (Rattray, 2005). Adhesions formed by bruxism or clenching of the teeth may also cause clicking of the joint (Rattray, 2005). Osteoarthritic degeneration of the TMJ may result in a ‘hard click’ crepitus (Magee, 2008). Jaw pain and tenderness in the joint capsule occur after movement or episodes of jaw clenching (Magee, 2008). Range of motion of the joint becomes decreased and may lock upon elevation or depression (Magee, 2008). Often headaches are experienced in the frontal and temporal regions (Rattray, 2005).

Treatment approaches to TMD include management of symptoms through medication such as NSAIDS (Vizniak, N., Carnes, M., 2009). Dental treatments include occlusion splints to correct malocclusions and night guards to prevent bruxism (Vizniak, 2009). Severe disc damage may indicate dental surgery and if necessary a soft food diet. Behavioural modification through biofeedback can alter habits such as jaw clenching, unilateral mastication or gum chewing (Vizniak, 2009). Joint mobilizations, acupuncture, electrotherapy are used in the management of TMD symptoms (Vizniak, 2009). Self care includes postural education, stretching of hypertoned muscles and cold application to the joint (Vizniak, 2009).
Research indicates that recurrent tension headaches may be directly linked to jaw dysfunction (Baker, 2006). The muscles of mastication, primarily the temporalis muscle are often ignored with common headache assessment and treatment. Hypertonicity and trigger points of the temporalis muscle can also cause disc displacement (Rattray, 2005). A study performed by Associate Professor Richard Ohrbach (2006) of the Department of Oral Diagnostic Sciences of the University of Buffalo demonstrated that examiners could replicate tension-headache symptoms in 82 percent of subjects by performing a clinical examination of the temporalis muscle. Professor Ohrbach concluded that jaw dysfunction should be considered as a differential diagnosis when evaluating a headache (Baker, 2006). Another study (2009) observed the incidence of primary headaches rose by 24.6% in subjects experiencing 1 TMD symptom, 28.7% in subjects with 2 TMD symptoms and 34.9% in those with 3 TMD symptoms (Gonçalves, Bigal, Jales, Camparis, Speciali, 2009).

A pilot study (2006) at the State University of Sao Paulo recorded a significant decrease in the Visual Analog Scale (VAS) of pain measurement after 15, 30 minute massage sessions on the face and neck of 6 experimental group subjects (Capellini V., De Souza, G., De Faria, C., 2006). A case study published by M.J. Pierson MT (2011), concluded positive results with the implementation of myofascial massage techniques, including muscle stripping and trigger point therapy along with complementary massage, homecare stretching/strengthening and hydrotherapy in the treatment of a 26 year old woman with jaw pain, clicking and crepitus (Pierson, 2011). Interrupting the pain tension stress cycle was a primary goal in the case study intervention. Dr John Upledger (2002) considers the use of stress management techniques
such as therapeutic massage, helpful in relaxation and muscular release along with craniosacral therapy to decrease sympathetic nervous response (Upledger, 2002). He states craniosacral therapy (CST), “aims at releasing temporal bones to restore normal function, regardless of the primary cause of the TMJ dysfunction.”, (Upledger, 2002, para. 10). He further elaborates that CST, “uses techniques to release and balance the joints at both ends of the mandible. It also releases undue muscle and ligament tensions upon this lower jawbone.”, (Upledger, 2002, para. 11).

There is limited research available supporting the efficacy of massage as treatment for temporomandibular dysfunction headaches. Further investigation is warranted due to the prevalence of TMD (Galani, 2011) and possible misdiagnoses of primary headaches (Baker, 2006). The objective if this case study is to observe the changes in headaches linked to dysfunction of the temporomandibular joint throughout a 10 treatment massage intervention. Based on the correlations between primary headaches and joint pathology, the study seeks to reduce headache pain by improving joint function with the application of myofascial and craniosacral based techniques.

CASE STUDY SUBJECT

The subject X, is a healthy 50 year old male with no history of illness or underlying health concerns. Activities of daily life include shift work as an airline agent and cycling 10 kilometers, three times a week. For the past several years, X has been experiencing unilateral left temporal headaches 2-3 times a month. The headaches may last several hours to an entire day and may linger until the next morning. Rarely, dizziness may accompany the headache. The ‘throbbing’ quality of the pain causes a
decrease in X’s energy and motivation. X also reports soreness in his left
temporomandibular joint. X was diagnosed with TMD referral headaches by a
chiropractor in December of 2011. Occasional chiropractic treatments, ibuprofen, self-
massage of the temples and ear pulling aid X in managing the pain.

METHODS

Safety of the treatment protocol involving the face and neck was assessed
with the Chvostek test for the facial nerve, jaw reflex test for the trigeminal nerve, the
vertebral artery test, alar ligament stress test and the transverse ligament stress test
(Magee, 2008).

The orthopedic measurements of the mandible included; acoustic meatus
to the jaw midline and full opening of the jaw from the dental borders (Magee, 2008).
Temporomandibular joint observation and palpation of active range of motion in
depression, elevation, retrusion, protrusion and lateral deviation of the mandible were
recorded along with a clicking and crepitus test (Magee, 2008).

Due to the correlation of cervical dysfunction to TMJ dysfunction, a
cervical assessment was recorded (Magee, 2008). Cervical range of motion; active,
passive over pressure and resisted of extension, flexion, lateral flexion and rotation were
tested and graded with slight, moderate or severe ratings (Rattray, 2005).

The short form McGill pain questionnaire was used to measure sensory,
affective and evaluative experienced pain (Melzack, 1987). The evaluative experienced
pain was rated on the visual analog scale (VAG) which allows the subject to visually
gauge headache pain on a 10 cm scale (Magee, 2008).

The baseline measurements were assessed prior to the first session and
reassessed at the fifth, tenth sessions and 1 week post intervention.

The massage intervention of 10 treatments was performed over the course
of 8 weeks. The participant agreed to refrain from medical or alternative treatment during
the intervention period. Treatment sessions were held 4 to 7 days apart. The participant
was supine for the duration of each treatment. Each 75 minute session of the case study
included the following myofascial techniques held for three releases to tissue resistance
(Sleeper, 2012) in the described order; hair pull of galea apoeneurotica, ear pull of
temporalis, release of platysma (Ruitenbeek, 2011), neuromuscular treatment of
sternocleidomastoid and digastric, skin rolling from the zygomatic arch to the angle of
mouth and from TMJ to the ramus of mandible, external neuromuscular treatment of the
masseter (with active range of motion) and buccinator, intra oral neuromuscular treatment
of the masseter and pterygoids (Rattray, 2005) and a myofascial release of the erector
spinae from thoracic spinal level 4 to the nuchal line of the cranium (Sleeper, 2012).
Trigger point therapy (alternating ischemic compressions) of sternocleidomastoid,
masseter and temporalis were performed as indicated (Rattray, 2005).

The first five sessions included the following craniosacral based
techniques performed after the aforementioned myofascial techniques; frontal bone lift
appendix A. fig. 2.1), parietal bone lift (appendix B. fig. 2.2), mandibular
compression/decompression and a cranial based release (Ruitenbeek, 2012).
In lieu of the craniosacral based techniques, the final five sessions ended with a passive cervical posterior fascial stretch, a lateral release of the pectoral muscle and clavipectoral fascia with active resistance (Sleeper, 2012) and a cervical distraction.

RESULTS

Prior to intervention, the subject exhibited a “C” curve throughout depression. The convexity of the “C” curve was on the right and the concavity to the left. The mandible deviated to the right upon full depression. The ‘C” curve remained unchanged but was observed to begin slightly later in the active motion of depression. The deviation of the mandible to the right at end range of depression remained unchanged. Pre-intervention the left joint exhibited both a click at the beginning of depression, followed by pop. Upon elevation, the right joint displayed crepitus with a grinding noise and a clunk upon return to neutral. The grinding crepitus slightly decreased upon elevation after intervention. The clunk was no longer palpated or audible. The pop upon depression in the left joint was no longer present, however the click remained. The subject was able to use three phalanges for the knuckle test, but reported pain and discomfort bilaterally. Post intervention, the subject reported mild discomfort but no pain with three phalanges when performing the knuckle test. Cervical range of motion pre-intervention was normal in all planes except for a slight restriction in left rotation during active range of motion. Post-intervention, cervical range of motion exhibited a slight restriction in active left lateral flexion and slight pain local to levator scapula in resisted right lateral flexion.
Prior to intervention the maximal opening of the jaw measured was 4.4 cm. Post intervention the maximal opening was 4.8 cm. The measurements of the mandible prior to intervention, intervention period and post intervention are recorded in figure 1.

![ACOUSTIC MEATUS TO JAW MIDLINE](chart)

*fig. 1*

The results of the short form McGill Pain Questionnaire are recorded in figure 2. The pie chart (fig. 3) is based on the occurrence of an average of 2.5 headaches every 30 days \([\frac{2.5 \times 100}{30} = 8.3]\) prior to intervention compared to 2 headaches over the intervention period plus 1 week \([\frac{2 \times 100}{70} = 2.9]\), a time period of 10 weeks.
**fig. 2**

Short Form McGill Questionnaire

**fig. 3**

Headache Incidence (%)
DISCUSSION

The increase observed in depression of the TMJ after the massage intervention is consistent with previous research (Bell, J, 2008). Research supported the application of myofascial techniques to improve muscle balance and range of motion of the temporomandibular joint by breaking down collagenous cross links which decrease tissue mobility (Wurn & Wurn, Roscow, 2004). During treatment, the subject experienced referral pain which created brief headache like pain with skin rolling over the left superior TMJ and pressure on the pterygoids. Thus, it would be logical to note a possible correlation between treatment of trigger points along with reduction of fibrous adhesions and the decrease of both masseter hypertonicity (fig. 1) and headache occurrence (fig.3) along with an increase in mobility.

Crepitus and joint clicking along with the ‘c’ curve deviation of the subject’s jaw remained relatively unchanged. Slight improvements of internal derangements of the TMJ are made by the application of physical therapy (William, 2010). The minimal changes are consistent with irreversible osteoarthritic degeneration causing joint crepitus (Lowe, W., 2006). Auscultation of the jaw movements would provide more detailed qualitative data of joint noises. Precise measurement techniques, such as the use of a goniometer and a graded scale for muscle hypertonicity (i.e. Wendy Nikel Scale) would have increased reliability but were not used.

It is of interest the first headache reported during the study occurred after the 6th session which did not include the craniosacral-based therapy of the previous 5 treatments. The irregular shift work of the subject may be suspect as a stressor which was
reduced by massage (Rattray, 2005) and craniosacral techniques (Upledger, 2002). The level of expertise (craniosacral treatment introductory course) of the craniosacral techniques is a drawback of the methods applied. However, the case study’s validity was not influenced by outside treatments such as chiropractic or dentist visits and the intervention methods were applied in a systematic, reproducible manner.

CONCLUSION

The improvements observed throughout the study are impetus for massage therapists to consider temporomandibular dysfunction as implicated in temporal unilateral headaches. The case study, although inconclusive, suggests that massage intervention of myofascial techniques does merit further research as a non-invasive effective treatment which has potential to benefit 75% of the population (Galani et al., 2011). The application of craniosacral therapy in the study was not adequately proficient to provide insight into the potential benefits of CST. Due to the multifactorial causes and complex nature of headaches and jaw dysfunctions, a case study series assessing the benefits of myofascial tissue release through orthopedic, pain and quality of life data of the most common individuals affected; females aged 35 to 45 years, experiencing three TMD symptoms and unilateral headaches would be valuable to the public as a possible economical and effective treatment.
APPENDIX A

Figure 1.1

Figure 1.2

Figure 1.3

**Figure 2.1**

*Frontal release.* The hands are placed so that the third (and/or fourth) finger touches the client's eyebrows. The thumbs are held above the sagittal suture and the direction of pressure is anterior.

**Figure 2.2**

*Parietal release.* The hands are cradling the sides of the client's head with the thumbs resting on the sagittal suture. The direction of pressure has three steps. Step 1: Medial pressure. Step 2: Pause. Step 3: Pull superiorly (i.e., toward the head of the table) with 5 g or less pressure.

Source: Myofascial Massage, M.W. Dixon, 2007 LWW p.182
References


Ruitenbeek, A. (2011, November), Spinal Treatment TMJ, *Level 500*, Conducted from Utopia Academy, Vancouver, BC.

Ruitenbeek, A. (2012, January). Introduction to Craniosacral Therapy, Level 500, Conducted from Utopia Academy, Vancouver, BC.


Research article links:

Changes in Temporomandibular Joint Dysfunction Symptoms Following Massage Therapy: A Case Report by Melissa Joan Pierson

Massage therapy in the management of myogenic TMD: a pilot study by Capellini et al.
http://www.scielo.br/pdf/jaos/v14n1/28232.pdf

Headache and Symptoms of Temporomandibular Disorder: An Epidemiological Study by Goncalves et al.