Journal of Bodywork & Movement Therapies 21 (2017) 541–548

Contents lists available at ScienceDirect

Journal of Bodywork & Movement Therapies

journal homepage: www.elsevier.com/jbmt

NARRATIVE REVIEW

Conservative management of temporomandibular dysfunction: A literature review with implications for clinical practice guidelines (Narrative review part 2)

Raymond Butts, DPT, PhD, MSc Faculty, Senior Instructor [a, b, *],
James Dunning, DPT, MSc, FAAOMPT Director, President [a, b],
Ron Pavkovich, DPT, OCS, FAAOMPT Faculty, Senior Instructor [a, b],
Jersey Mettille, BS Medical Student [c],
Firas Mourad, DPT, OCS, FAAOMPT Faculty, Senior Instructor [a, b]

[a] American Academy of Manipulative Therapy Fellowship in Orthopaedic Manual Physical Therapy, Montgomery, AL, United States
[b] Spinal Manipulation Institute, Dry Needling Institute, Montgomery, AL, United States
[c] Philadelphia College of Osteopathic Medicine, Suwanee, GA, United States

ARTICLE INFO

Article history:
Received 19 January 2017
Received in revised form
22 May 2017
Accepted 26 May 2017

ABSTRACT

The effective management of temporomandibular dysfunction (TMD) requires a thorough understanding of the pathoanatomic factors that drive the underlying condition. After reviewing the etiology associated with TMD in Part 1 of this narrative review, the temporomandibular joint capsule, articular disc and muscles of mastication emerged as key players. (http://dx.doi.org/10.1016/j.jbmt.2017.05.017) Part 2 focuses on conservative treatment strategies best able to reduce the pain and disability associated with TMD. A review of the literature revealed limited support of strengthening exercises targeting the muscles of mastication. There was also limited evidence for manual soft tissue work targeting muscles of mastication, which may be specifically related to the limited accessibility of the pterygoid muscles to palpation. For the reduction of pain, there was little to no evidence supporting splint therapy and electrophysical modalities, including laser therapy, ultrasound, TENs and iontophoresis. However, for the reduction of pain and disability, non-thrust mobilization and high-velocity, low amplitude thrust manipulation techniques to the TMJ and/or upper cervical articulations that directly and indirectly target the TMJ joint capsule were generally supported in the literature. Studies that used dry needling or acupuncture of the lateral pterygoid and posterior, peri-articular connective tissue also led to significant improvements in pain and disability in patients with TMD. Thus, the most effective conservative management of TMD seems to be techniques best able to impact anatomic structures directly related to the etiology of TMD, to include the joint capsule, articular disc and muscles of mastication, specifically the superior and inferior head of the lateral pterygoid.

1. Introduction

According to Shaffer et al., physical therapy is the preferred conservative approach for treating TMD (Shaffer et al., 2014), as it facilitates multi-modal treatment that addresses patient specific impairments (Guarda-Nardini et al., 2016). However, successful management requires treatment of anatomical structures that are consistent with the underlying condition. In this context, the muscles of mastication (Ariji et al., 2015; Hiraba et al., 2000; Murray and Peck, 2007; Murray et al., 2004; Peck et al., 2008; Pihut et al., 2016), joint capsule (Friedman, 1997; Mapelli et al., 2016; Saghafi and Curl, 1995) and cervical spine (Fernandez-de-Las-Penas et al., 2010; Guarda-Nardini et al., 2016; Jayaseelan and Tow, 2016; Mansilla-Ferragut et al., 2009) are high-value targets that likely require further consideration.

* Corresponding author. American Academy of Manipulative Therapy, 1036 Old Breckenridge, Ln, Montgomery 36117, AL, United States.
E-mail address: buttsraymond@yahoo.com (R. Butts).

http://dx.doi.org/10.1016/j.jbmt.2017.05.021
1360-8592/

2. Temporomandibular dysfunction and exercise

Given the reciprocal actions of the superior and inferior head of the lateral pterygoid (Desmons et al., 2007; Hiraba et al., 2000; Mahan et al., 1983; McNamara, 1973; Murray et al., 2004), it is plausible that decreased activity of the superior head agonist results in increased activity in the inferior head antagonist, a theory consistent with pain adaptation. Similarly, the decreased activity of the superior head could result in overuse of the inferior head, resulting in an energy deficit and setting the stage for muscle hypertonicity via the Vicious Cycle Model. Notably, both models result in overactive muscles of mastication, a problem further propagated by psychosocial factors (Peck et al., 2008). Perhaps this explains the limited evidence for strengthening muscles of mastication to treat TMD. That is, the purposeful activation of muscles that are already overactive (Lauriti et al., 2014; Tosato Jde et al., 2015) may not be advantageous and does not seem to be strongly supported by the literature (Mulet et al., 2007). Notably, a recent RCT by Bae et al. found masticatory relaxation exercises to be more effective for decreasing the pain and limited ROM associated with TMD than active exercises (Bae and Park, 2013).

The Rocabado exercise routine (Rocabado and Iglarsh, 1991), which addresses the rest position of the tongue, control of TMJ rotation during mouth opening, rhythmic stabilization of the mandible, head flexion stabilization, lower cervical retraction and shoulder girdle retraction is the most widely used exercise routine used by physical therapists to treat TMD (Shaffer et al., 2014). However, the only study that has examined its effectiveness concluded that that the exercise routine provided no additional therapeutic benefit to the rehabilitation process (Mulet et al., 2007; Shaffer et al., 2014). Kraus (Kraus, 1988, 2004) also proposed a 3-prong approach to TMD, including inhibition of excessive activity of muscles of mastication, mandibular neuromuscular control and isometric exercises to counter joint clicking, muscle asymmetry and spasms, but the regiment has never been studied or validated (Shaffer et al., 2014). According to a systematic review by Shaffer et al., '…no evidence exists to direct clinicians toward which exercises, if any, may be useful in the conservative management of TMD. Additionally, because many, if not most, patients with TMD over-recruit their muscles of mastication, it may be more advantageous to focus on relaxation techniques and patient education than therapeutic exercise' (Shaffer et al., 2014).

In a systematic review of 7 studies that investigated therapeutic exercises for TMD, which included stretching, relaxation, coordination, strengthening and endurance, Moraes et al. found exercises to be effective for the treatment of 'muscular TMD' (Moraes, 2013). However, the authors noted significant issues with internal validity and an over reliance on clinical experience (Moraes, 2013). Notably, all 7 studies included by Moraes et al. (Moraes, 2013) combined therapeutic exercise with other conservative procedures, making it difficult, if not impossible, to draw any firm conclusions about the usefulness of exercise for TMD. Therefore, it is not surprising that the most recent systematic review on TMD by Armijo-Olivo et al. reported 'great uncertainty' for the effectiveness of exercises in treating TMD (Armijo-Olivo et al., 2016). Although the investigators found 'promising' effects for manual therapy and manual therapy combined with exercise, the use of exercise alone was not superior to other conservative treatments for TMD (Armijo-Olivo et al., 2016). Perhaps the masticatory muscle weakness identified by many physical therapists is more likely the product of pain inhibition instead of true weakness. Given that both TMD pain and experimental jaw-muscle pain have been shown to result in decreased EMG activity during clenching, pain inhibition seems to play a role (Castroflorio et al., 2012; Pinho et al., 2000). As such, perhaps physical therapy outcomes would improve if more attention were placed on the pain associated with TMD instead of muscle weakness, the product of pain (Bae and Park, 2013; Moller et al., 1984).

3. Temporomandibular dysfunction and soft tissue release

A systematic review by Turp & Minagi reported a lack of validity and poor inter-examiner reliability for manual palpation of the lateral pterygoid muscle intra-orally and recommended that the procedure be abandoned (Turp and Minagi, 2001). However, with the exception of one lateral head radiograph on a single subject (Johnstone and Templeton, 1980), the 5 RCTs included by Turp & Minagi used cadavers, and the results may not be generalizable to live patients. Notably, a recent study by Stelzenmueller et al. found that palpation of the lateral pterygoid is 'basically feasible' in both live patients and cadavers with 'exact knowledge of muscle topography and the intraoral palpation pathway' (Stelzenmueller et al., 2016). However, the reliability of clinicians to follow the complex series of instructions required to negotiate the intraoral palpation pathway and bypass the medial pterygoid is unknown (Stelzenmueller et al., 2016). Moreover, while Stelzenmueller and colleagues demonstrate an ability to contact the lateral pterygoid with the tip of either digit three of five (Stelzenmueller et al., 2016), it is doubtful whether such limited contact would translate into meaningful clinical outcomes. Given the lack of inter-examiner reliability of localizing trigger points in the upper trapezius (Sciotti et al., 2001), a fully accessible muscle, it also seems highly unlikely that clinicians are able to reliably locate trigger points in the lateral pterygoid and needle them consistently, as a number of authors have claimed (Gonzalez-Perez et al., 2012, 2015).

The inaccessibility of the lateral pterygoid to palpation may also account for the limited evidence in the treatment of TMD with soft tissue mobilization (Miernik et al., 2012). The most recent systematic review and meta-analysis by Calixtre et al. reported a limited number of studies and low to moderate evidence that myofascial release and massage are better than control and moderate evidence that they are as effective as Botox injections in the masseter and temporalis muscle (Calixtre et al., 2015; Guarda-Nardini et al., 2012). However, given that a clinically relevant level of pain in the masseter muscles has only a minor impact in the performance of the masseter and temporalis (Manfredini et al., 2013; Shimada et al., 2015), manual soft tissue techniques targeting those muscles may not be useful for more than symptom relief. That is, manual soft tissue techniques may have a positive effect on more accessible muscles such as the temporalis and masseter, thereby improving symptoms associated with TMD, but they are unlikely to reach the pterygoid muscles that are not only more intimately related with the joint itself, but also more likely one of the primarily etiologic factors in TMD (Gauer and Semidey, 2015; Lafreniere et al., 1997; Liu et al., 1989; Scully, 2008, 2013).

4. Temporomandibular dysfunction and electrophysical modalities

Interestingly, McNeely et al. (2006) found no evidence to support the use of any electrophysical modalities commonly used by physical therapists such as pulsed radio frequency energy, biofeedback, laser therapy and TENS to reduce pain associated with TMD (McNeely et al., 2006). Since the ultrasound penetration half depth into a perpendicular muscle at 1 MHz and 3 MHz is 0.9 and 0.3 cm, respectively (Cameron, 2003), and laser intensity is reduced by 90% at a tissue depth of 1 cm (Ayyildiz et al., 2015), very little of the sound waves or energy likely reaches the TMJ or pterygoids. Notably, a number of systematic reviews have reported little to no evidence to support using ultrasound for musculoskeletal