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Clinical Paper
TMJ Disorders

Effects of four treatment strategies for temporomandibular joint closed lock

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Abstract. A previous randomized controlled trial (RCT) by Schiffman et al. (2007)[15] compared four treatments strategies for temporomandibular joint (TMJ) disc displacement without reduction with limited mouth opening (closed lock). In this parallel group RCT, 106 patients with magnetic resonance imaging (MRI)-confirmed TMJ closed lock were randomized between medical management, non-surgical rehabilitation, arthroscopic surgery, and arthroplasty. Surgical groups also received rehabilitation post-surgically. The current paper reassesses the effectiveness of these four treatment strategies using outcome measures recommended by the International Association of Oral and Maxillofacial Surgeons (IAOMS). Clinical assessments at baseline and at follow-up (3, 6, 12, 18, 24, and 60 months) included intensity and frequency of TMJ pain, mandibular range of motion, TMJ sounds, and impairment of chewing. TMJ MRIs were performed at baseline and 24 months, and TMJ tomograms at baseline, 24 and 60 months. Most IAOMS recommended outcome measures improved significantly over time ($P \leq 0.0003$). There was no difference between treatment strategies relative to any treatment outcome at any follow-up ($P \geq 0.16$). Patient self-assessment of treatment success correlated with their ability to eat, with pain-free opening $\geq$35 mm, and with reduced pain intensity. Given no difference between treatment strategies, non-surgical treatment should be employed for TMJ closed lock before considering surgery.

Key words: temporomandibular joint; closed lock; surgery; randomized effectiveness study; treatment success criteria.

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Dentists routinely provide patients with initial medical management for their temporomandibular disorders (TMD). When patients are refractory to medical management, triaging them for further care is challenging due to the lack of evidence-based guidelines. This is particularly true for patients with temporomandibular joint (TMJ) disc displacement without reduction and with limited opening (*i.e.*, closed lock), a chronic, persistent disorder[1–3] that can cause significant jaw pain, limited jaw movement, and functional impairment, affecting among other capacities, the ability to eat. This condition has been

postulated to lead to TMJ degenerative joint disease[2,4–6] (DJD).

Although case series involving surgical treatment of closed lock[7–9] suggest that surgery could have better outcomes than non-surgical rehabilitation therapy, clinical trials[3] to confirm such claims are limited. Reviews[10–13] of the literature, including one meta-analysis, have not demonstrated any differences between physical therapy, arthrocentesis, arthroscopic surgery, and disc repair/repositioning surgery relative to outcomes such as maximum mouth opening, jaw pain, and jaw function. A more recent randomized clinical trial (RCT) comparing arthroscopy to open-joint surgery[14] showed that both treatments were effective for symptomatic closed lock patients. Our 5-year RCT for patients with closed lock[15] demonstrated that medical management and non-surgical rehabilitation improved pain and dysfunction as effectively as either arthroscopic surgery with rehabilitation, or arthroplasty (open joint surgery) with rehabilitation. Finally, the conclusion of the 2011 Cochrane Collaboration review on arthroscopy[16] is that arthroscopy is less effective than open surgery for pain reduction at 12 months postoperatively. Arthroscopy is associated with greater improvement than arthrocentesis for maximum mouth opening at 12 months, and both arthroscopy and non-surgical treatments reduce pain at 6 months. This review states also that the study by Schiffman et al.[15] is one of the best RCTs assessing the treatment for TMJ closed lock.

The current paper complements the 2007 report by Schiffman et al.[15] in which treatment success was defined by two primary outcome study measures: the Symptom Severity Index (SSI)[17–19] to assess TMJ pain, and the Craniomandibular Index (CMI)[20,21] to assess jaw dysfunction. For this study, we used the International Association of Oral and Maxillofacial Surgeons (IAOMS) recommended criteria for success[22] to assess the relative effectiveness of medical management, rehabilitation, arthroscopic surgery, and arthroplasty. This will allow for comparisons of the study outcomes with those of other studies using IAOMS recommended outcomes. In addition, this report compares these treatment strategies for a closed lock disorder relative to patient satisfaction, treatment costs, and selected radiographic outcomes, including TMJ disc status observed at 24 months and TMJ hard tissue status observed at 60 months post-treatment.

Inclusion criteria

1. Age 18 to 65 years
2. Daily pain in affected joint aggravated by jaw movement and function
3. Replication of familiar pain with palpation of the affected joint
4. Magnetic resonance imaging (MRI) diagnosis of stage III or IV closed lock
5. Report of limited mouth opening
6. Availability for at least 2 years for follow-up

Exclusion criteria

1. Concurrent use of steroids, muscle relaxants, or narcotics
2. Systemic rheumatic, neurologic/neuropathic, endocrine, or immune/autoimmune diseases, and generalized joint pain or swelling
3. Presence of non-TMD orofacial pain disorders
4. Pregnancy
5. Major psychiatric disease
6. Drinking more than three alcoholic drinks daily
7. Unwillingness to accept any randomly assigned treatment
8. Medical contraindication to the treatment
9. Pathologic processes found on imaging including neoplasm (exception: disc displacements and osteoarthritis/osteoarthrosis)
10. Contraindications for imaging
11. Radiation treatment to head and neck
12. Prior TMJ surgery
13. Unable or unwilling to give informed consent
14. Unable to participate due to language barrier or mental/intellectual incompetence

Fig. 1. Inclusion and exclusion criteria.

Patients and methods

Study design and study population

This parallel group RCT was conducted from June 1992 to June 2004. The sources of the study subjects, informed consent procedures, institutional review board (IRB) approval for conducting the study, the potential limitations of such a scientific inquiry, and the CONSORT checklist and flow-chart have been reported previously.[15] We also received approval for this ongoing data analysis. The authors have read the Declaration of Helsinki and followed the guidelines for this investigation. Inclusion and exclusion criteria are summarized in Fig. 1. The diagnosis of TMJ disc displacement without reduction (*i.e.*, closed lock)[9] was confirmed using TMJ magnetic resonance imaging (MRI). Other inclusion criteria included daily joint pain (arthralgia) affected by jaw function, replication of joint pain with palpation, and limited mouth opening. A concurrent diagnosis of masticatory myofascial pain was also allowed for these study patients.

Randomization and treatments

This RCT assessed four treatment strategies with each strategy labelled in terms of its initial treatment modality: (1) medical management, (2) rehabilitation, (3) arthroscopy with rehabilitation, and (4) arthroplasty with rehabilitation. These treatment strategies were designed to represent