

# TEMPOROMANDIBULAR JOINT TOTAL REPLACEMENT-REVIEW OF LITERATURE

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## ABSTRACT

*Patients with ankylosis, post-traumatic condylar destruction, advanced degenerative disease and multi-operated patients are those who require joint replacement. Rise in development of biocompatible materials, improved designs for patient-fitted prostheses have been made with emerging advances. These devices can be used to treat internal derangement cases with history of multiple surgical and nonsurgical treatment failures, as well as restoring form and function following the removal of failed Vittek Proplast-Teflon containing temporomandibular joint implants. This paper will provide an insight related to treatment modality in debilitated, functionless temporomandibular joint (TMJ) patients.*

**KEY WORDS:** *Temporomandibular joint, TM Joint surgery, Alloplastic reconstruction, Alloplastic prosthesis*

## 1. INTRODUCTION

The temporomandibular joint (TMJ) is the only joint in the body that has both hinge and a sliding action. The disorders of the temporomandibular joint are part of a heterogeneous group of pathologies called temporomandibular disorders (TMD)<sup>27</sup>. TMD are considered the most frequent chronic orofacial pain condition. TMD are classified into articular disorders and muscular disorders, articular disorders are those which includes pathologic entities occurring within the intra-articular structures of the TMJ and the muscular disorders includes conditions with masticatory muscle pain and dysfunction<sup>28</sup>. Common presentation of combination of articular and muscular symptoms, are seen<sup>23</sup>. The prevalence of TMD signs is noted to be higher in female population representing (female to male ratio is about 3:1). The age predilection is 20–40 years, and signs and symptoms regress with age<sup>10,19</sup>. Various conservative approaches have been recommended to treat both articular and muscular TMD which includes occlusal splint therapy, physiotherapy, complimentary medicine<sup>5,12</sup>, pharmacotherapy<sup>7,24</sup> and occlusal treatments<sup>18</sup>. In some cases such as intra-articular disorders not responding to traditional conservative therapies a surgical approach to the TMJ may be needed to treat <sup>6,15</sup>.

## 2. MATERIALS AND METHODS

An electronic Medline search was performed to identify English-language, peer-reviewed articles published from which relevant citations were identified. The selected citations were then analyzed on basis of their usefulness in providing data on the success rate of total TMJ prostheses and indications for prosthetic replacement of the TMJ.

### 3. TMJ PROSTHETIC SYSTEMS

The currently available prosthetic systems includes (TMJ Concepts, TMJ Implants, Biomet/Lorenz), the overall TMJ replacement system is of a “ball and socket” type prosthetic joint which resembles a hip implant. It has three components:

**The condylar (or mandibular) implant**, made from metal cobalt-chromium molybdenum (Co–Cr–Mo) alloy or titanium alloy. In either cases the implants must have a roughened titanium porous coating on the implant surface that contacts bone to increase the bone implant contact and increase surface area. Co–Cr–Mo alloy contains nickel;

**The fossa implant**, fabricated from a tough, plastic polyethylene or a Co–Cr–Mo alloy;

**The screws**, made from titanium alloy and serves to attach both the condylar and also the fossa implants to bone.

The three prosthetic systems are provided in a very different number of sizes, starting from the three condylar/mandibular and three fossa sizes and shapes of the Biomet/ Lorenz prosthesis to the three condylar/mandibular and 30 fossa sizes and shapes for the TMJ Implants prosthesis, and also the customized sizes and shapes of the TMJ Concepts prosthesis.

#### **Indications for total replacement of the temporomandibular joint**

- (i) Prerequisite: Failed conservative management (including arthroscopy if possible).
- (ii) Diseases involving condylar bone loss
- (iii) Degenerative joint disease (osteoarthritis)
- (iv) Inflammatory joint disease (e.g. rheumatoid, ankylosing spondylitis, psoriatic)
- (v) Ankylosis
- (vi) Post-traumatic condylar loss or damage
- (vii) Postoperative condylar loss (including neoplastic ablation) Previous prosthetic reconstruction
- (viii) Previous costochondral graft Serious congenital deformity Multiple previous procedures

*Indications (usually a combination of the following)*

- Dietary score of <5/10 (liquid scores 0, full diet scores 10)
- Restricted mouth opening (<35 mm)
- Occlusal collapse (anterior open bite or retrusion)
- Excessive condylar resorption and loss of height of vertical ramus
- Pain score >5 out of 10 on visual analogue scale (combined with any of the others)
- Other quality of life issues

These give an idea of pain and functional disability, and permit some assessment of outcome.

#### *Contraindications*

- Local infective process Severe immunocompromise
- Severe coexistent diseases (American Society of Anesthesiologists Grade III)

## **Surgical indications for hemiarthroplasty of the temporomandibular joint (fossa-eminence prosthesis)**

### *Indications*

- Painful or dysfunctional internal derangements after failed conservative and surgical treatment, and a healthy condyle on computed tomogram or magnetic resonance scan.
- Associated quality of life issues as with total prosthetic replacement.

### *Contraindications*

- Disruption of the condylar surface Avascular necrosis
- Presence of osteophytes

## **4. DISCUSSION**

From a clinical viewpoint, it appears that the presence of a severely damaged or mutilated joint is an absolute indication for total joint replacement, in which multiple operated patients are expected to realize the best rate of improvement, because of their lower pre-intervention of jaw function levels. In fact, the multiple operated patients seem to possess a decent objective response, indicating that the biomechanical function of the replaced joint is suitable, but they need a poorer subjective improvement. This observation may have a twofold explanation. It's going to be the individual psychosocial factors that will play a crucial role in patient perception of treatment efficacy within in the surgical approach to the TMJ, psychosocial impairment is more disabling in those patients with a history of numerous failed previous surgeries. This aspect has not been assessed in the available literature, which represents a limitation to the generalization of findings upto now, and becomes even more important if one considers the quantity of works demonstrating the influence of psychosocial factors within the onset of TMD symptoms and their treatment outcome<sup>11,14,21,22</sup>. It's also likely that neurophysiological aspects of chronic centrally mediated pain are at the premise of the poorer subjective response of multiply operated patients. Patients who had undergone prior multiple surgeries typically stated to a chronic burning pain within the TMJ area that will be the consequence of repeated surgical trauma or a manifestation of pre-existing undiagnosed conditions. In both cases, pain could also be the expression of neurosensitization mechanisms typically related to chronic painful stimuli, and be further maintained by a reflex masticatory muscle spasm/pain. Another consideration regards the epidemiology of TMD. It's generalized belief that such disorders, because of the uncertainties about their etiology, should be managed by means of non-invasive treatments and that surgery is not requested<sup>6,10,23</sup>. This has led clinicians and TMD specialists to use a high-prudence, low-technology approach to TMD treatment, which is widely accepted from primary level to tertiary clinics<sup>27</sup>. The high success rate of the different management techniques contributed to minimize the interest with the development of high-tech surgical solutions to unravel problems of that minority of patients who have gained no benefit of traditional therapies. Such an approach is in contrast to what has occurred in other fields of orthopaedic surgery, whose progress has made hip and knee total joint replacements predictable and well-accepted interventions. Only within the last decade has there been a growing clinical and academic interest observed in the study and application of total alloplastic TMJs, which has made possible the adoption of the foremost suitable materials and realization of custom-fitted prosthetic systems.

## **5. CONCLUSION**

Total alloplastic TMJ replacement interventions have showed promising treatment outcomes, and reported improvements are good for both subjective (pain level) and objective (jaw function) clinical parameters. Such treatments are worthy of further evaluation.

Generalization of results is limited by the low number of available studies, involving only a few surgeons and manufacturers. In the case that future large sample studies confirm the currently available literature data and demonstrate the superiority of total TMJ replacement over less invasive treatment methods, prosthetic replacement of the TMJ will definitively become a widely accepted and diffused therapeutic option for the more complex TMD.

Better integration of clinical and research settings should allow an improvement in knowledge of the indications for the intervention, possibly enlarging them. This should make the total joint replacement a concrete alternative to long-lasting management therapies, and contribute to change the approach to TMD, in accordance with the literature data on larger joints.

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