ECRONICON OPEN ACCESS

EC DENTAL SCIENCE
Review Article

Overview of Management of Temporomandibular Joint Ankylosis

Yagoub Dhafer Alyami*, Hani Abdulaziz Taher Al Qataberi, Rayana Mahmoud Ramadan, Jumana Hassan Subahi, Meaad Haroon Al Shareef, Waad Haroon Al Shareef and Aya Talat Bin Yousef

Alfarabi Private College, Saudi Arabia

***Corresponding Author**: Yagoub Dhafer Alyami, Alfarabi Private College, Saudi Arabia.

Received: January 03, 2020; **Published:** January 22, 2020

Abstract

Introduction: Temporomandibular joint ankylosis is a bony or fibrous union of the joint components resulting in limitations in mouth opening, difficulties in mastication, speech, and oral hygiene, which can, in turn, influence mandibular growth. Conservative and invasive surgical procedures can be used to treat the condition depending upon the severity of the ankylosis and the age of the patient.

Aim of the Work: The review summarizes various methods to manage TMJ ankylosis.

Methodology: This article is a comprehensive review of PUBMED from the year 1856 to 2019.

Conclusion: A durable and effective treatment can be attained satisfactorily with the individualized approach in each case. Treatments ranging from arthroplasty of the joint cavity with or without coronoidectomy and joint reconstruction with either a costochondral rib graft or alloplastic material, distraction osteogenesis and intensive mouth-opening exercise, corrective orthognathic surgery, and conservative management have been seen in the literature. No single procedure can be concluded as the standard treatment of the condition.

Keywords: *Surgical Treatment; Condylar Injury; TMJ; Ankylosis*

Introduction

An intracapsular union of the condyle-disc complex to the articular surface on the temporal bone by fibrous adhesions, osseous fusion, or fibro-osseous union between the condyle disc, glenoid fossa or articular eminence can restrict mandibular movement. This is commonly known as ankylosis of the temporomandibular joint [1].

Several causes can contribute to TMJ ankylosis such as trauma, local or systemic infections, systemic conditions, ankylosing spondylitis, rheumatoid arthritis, or psoriasis. TMJ ankylosis could be congenital, secondary to severe rheumatoid arthritis, tumors near the TMJ, or secondary to TMJ surgery [2]. The condition can be severe and disabling and can interfere with facial growth and esthetics, functions like swallowing, mastication and speech, and inability to maintain oral hygiene, which may lead to rampant caries [3].

If just a single side of TMJ is affected, facial asymmetry is seen. Disturbances with the mandibular and facial growth can result in an airway compromise, which could further lead to physical and psychological disability [2]. If both sides are equally affected, then a characteristic 'bird face' may be seen because of the deficient mandible. Prolonged ankylosis eventually leads to atrophic musculature. The eruption and position of the teeth can be affected by the deformities seen in the alveolar bone [3].

Diagnostic aids like X-rays, CT scans, or MRI tests can evaluate the degree of abnormalities present in the joint bone and or soft tissues. To treat TMJ, ankylosis can be very challenging as there are a lot of technical difficulties encountered. Also, the recurrence rates are high. A team effort to treat the aesthetic, social, psychological, and functional problems should be advocated [4].

Treatment modalities for TMJ ankylosis

The treatment goal of ankylosis is centered around to restore the masticatory function, improve speech, facial aesthetics, and quality of life and to prevent re-ankylosis. Techniques and methods used to reconstruct the joint after surgery has been controversial. Broadly surgical interventions are classified into condylectomy, gap arthroplasty, and interpositional arthroplasty. Autogenous, alloplastic, and xenogenic bovine bone grafts are the commonly used materials for reconstruction seen in literature [5].

In 1851, the steps toward using surgical interventions were begun. The years between 1850 - 1860 saw the usage of the myofascial flap for condylectomy and arthroplasty [6].

Surgical techniques can either be via a preauricular approach where assess to the condylar head and neck is achieved by an incision made through the preauricular skin crease. A modification of the preauricular approach begins about a pinna's length away from the ear, anterosuperior just within the hairline, and curves backward and downwards well posterior of the main branches of the temporal vessels till it meets the upper attachment of the ear [7].

Figure 1: *The incision in a question mark shape [7].*

Gap and interpositional arthroplasty

Gap arthroplasty is a procedure where an ankylotic mass is resected, and pseudarthrosis is allowed to form between the separated ends of the bones. It is one of the oldest surgical technique which has shorter operation time and can be less demanding. The overall cost of the operation is cheaper, as well. However, it is associated with a higher risk of reankylosis.

Insertion of interpositional materials after resection of the ankylosis can reduce the risk of reankylosis; hence, it is preferred over gap arthroplasty. The barrier placed between the gaps can help maintain the vertical height of the ramus, reducing the risk of reankylosis [8].

Over the years the following modalities of the above surgical procedures are widely used [6]:

1. Arthroplasty of the joint cavity;
2. Arthroplasty and a free costochondral graft;
3. Arthroplasty with the insertion of temporalis myofascial flap in the newly created joint cavity supplemented by a simultaneous unilateral coronoidectomy on the affected side or a bilateral coronoidectomy;
4. The distraction of the ramus and body of the mandible on the affected side;
5. Reconstruction of the joint using an alloplastic prosthesis;
6. Arthroscopic laser-assisted preparation of the articular surfaces;
7. Postoperative radiotherapy;
8. Bilateral arthrotomy.

Autogenous grafts

The use of non-vascularized free autogenous bone grafts from the tibia or clavicle, sternoclavicular joint, iliac crest, ribs, metatarsal bone, or metatarsophalangeal articulation are popularly used as autogenous bone grafts [4]. Temporalis muscle, dermis-fat graft, auricular cartilage, and buccal pad fat can be used as autogenous interpositional materials. Few authors suggest the usage of the remaining TMJ disc, after its repositioning. Autologous bone grafts like costochondral, clavicular bone grafts, resected elongated coronoid process and excised ankylotic mass can be used to reconstruct the ramus-joint complex [9].

Distraction osteogenesis

Distraction osteogenesis is a procedure that can be done before or after the ankylosis has been released to correct any secondary facial asymmetry. In this method, a reconstruction method is applied to those structures which are damaged by ankylosis. After an osteotomy cut, segments are transported, advancing through the defect. New bone is created between the osteotomy cuts. The transport segment is distracted by 0.5 mm twice/day until contact with glenoid fossa is attained. Advancements are carried out till the vertical mandibular deficiency is corrected. The post-operative results show good improvement provided it is followed by regular physiotherapy sessions [3]. Distraction osteogenesis can also be performed along with interposition arthroplasty [10].

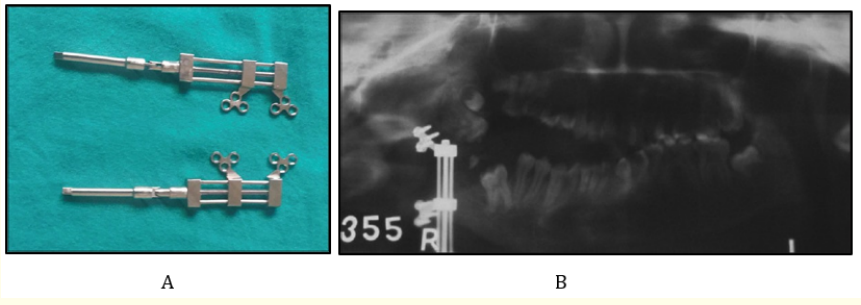

Figure 2: *A. Distractor B. OPG During the distraction process [10].*

Alloplastic materials

Alloplastic reconstruction of the joint is primarily done in adults. Since it is a mechanical device, the quality of life is improved, but the durability is uncertain. It is not suggestive to use these materials on growing patients. In 1976 Bilsa., *et al.* suggested after careful considerations alloplastic materials can be used on growing patients if the condition is very serious [3,11]. There is a noticeable improvement in the quality of family and social life by using alloplastic prostheses. While doing the implantation of TMJ replacement it is observed that alloplasty of both articulating structures i.e. the condyle and glenoid fossa needs to be done. Alloplastic materials can be custom made or stock prosthesis. Few circumstances for the use of this approach [11]:

1. Severe TMJ inflammation, involving damage of its structures and lack of response to other treatment methods.
2. Recurrent fibrous or bony ankylosis not responsive to the modalities of treatment.
3. Failed bone and soft tissue grafts.
4. Loss of vertical mandibular height and occlusal relationship due to bone resorption, trauma, developmental abnormalities, or pathological lesions.

The presence of a foreign body can scar the tissues surrounding the TMJ, can cause loss of attachment of the lateral pterygoid muscle, compromising mobility of the joint, and loss of the mechanical properties of the prosthesis. These are complications associated with the usage of alloplastic materials [3].

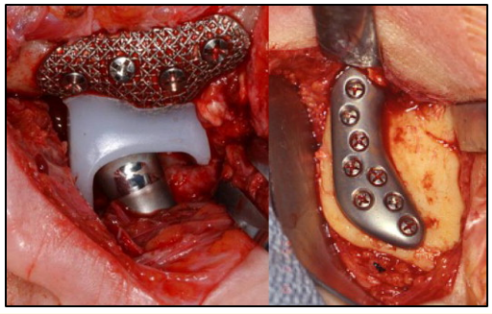

Figure 3: *Custom made Fossa implant (Pure Titanium), ramal implant (wrought alloyed titanium) [12].*

Technological advancements in the field of CAD/CAM has allowed the construction of individualized prosthesis specific to patients because of detailed imaging and preparation of 3D stereolithographic models [13].

Postoperative care

Following any surgical procedure, it is important to have active physiotherapy sessions (intensive mouth-opening activities/exercises). Interocclusal splints Electric stimulation followed by facial exercise also help in improving the mouth opening and facial movement in patients after surgery. Stretching and relaxing exercises to improve the local circulation helps to reduce pain and improve the flexibility of the joint [14,15].

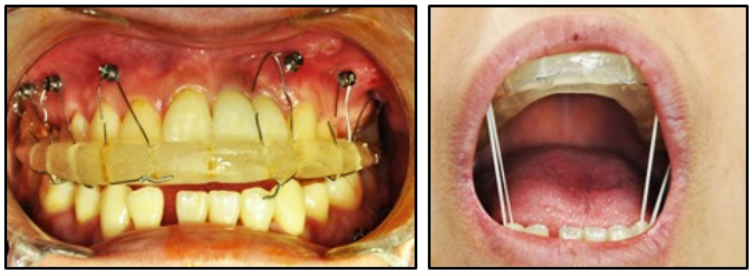

Figure 4: *A. Maxillary splint with active screws B. Active muscle opening exercises.*

Conclusion

Ankylosis is a common disorder of the temporomandibular joint. A variety of techniques have been described in literature about the management of ankylosis. The time of operation, modality of treatment, and type of operation can vary from region to region. Satisfactory resection of the ankylotic segment, use of an interpositional spacer whenever required, and early and aggressive physiotherapy are the main principles of the treatment. Early diagnosis and treatment are key to avoid complications. Post-operative physical therapy plays and crucial role in the success of the surgical intervention. A good surgery and satisfactory reconstruction can be negated by inadequate physiotherapy routine or poor patient compliance. It is preferable to delay the surgery than risk these complications.

TMJ ankylosis and its complications pose a significant challenge to clinicians due to the great technical difficulty of treatment and recurrence rates. Out of the many techniques described in the literature, no single one can uniformly produce successful results. The most difficult goal to achieve is the restoration of function and motion.

Gap arthroplasty, interpositional arthroplasty, excision, and joint reconstruction with autogenous or alloplastic materials are the frequently used operations, and they should be rightly chosen after correct diagnosis of the condition in each patient [14].

To guide the moth to a comfortable mouth opening and for adequate interdigitation, the use of an intraoral splint can be also used [14]. It is important to assess the pros and cons of the procedure chosen for each case so as to achieve the maximum benefit of the procedure for every patient.

Bibliography

1. Long X., *et al*. "Preservation of disc for treatment of traumatic temporomandibular joint ankylosis". *Journal of Oral and Maxillofacial Surgery* 63.7 (2005): 897-902.

2. Vibhute PJ., *et al*. "TMJ ankylosis: multidisciplinary approach of treatment for dentofacial enhancement-a case report". *Case Reports in Dentistry* (2011).

3. Sporniak-Tutak K., *et al*. "Management of temporomandibular ankylosis–compromise or individualization–a literature review". *Medical Science Monitor* 17.5 (2011): RA111.

4. Kaban LB and Bertolami CN. "The role of CT scan in diagnosis of TMJ ankylosis: report of case". *Journal of Oral Surgery* 39.5 (1981): 370-372.

5. Elgazzar RF., *et al*. "Treatment modalities of TMJ ankylosis: experience in Delta Nile, Egypt". *International Journal of Oral and Maxillofacial Surgery* 39.4 (2010): 333-342.

6. Humphry GM. "Addenbrooke's Hospital, Cambridge. Excision of the Condyle of the Lower Jaw". *Association Medical Journal* 4.160 (1856): 61.

7. Al-Kayat A and Bramley P. "A modified pre-auricular approach to the temporomandibular joint and malar arch". *British Journal of Oral Surgery* 17.2 (1979): 91-103.

8. Ma J., *et al*. "Gap arthroplasty versus interpositional arthroplasty for temporomandibular joint ankylosis: a meta-analysis". *PloS one* 10.5 (2015): e0127652.

9. Nitzan DW., *et al*. "Surgical management of temporomandibular joint ankylosis type III by retaining the displaced condyle and disc". *Journal of Oral and Maxillofacial Surgery* 56.10 (1998): 1133-1138.

10. Giraddi GB., *et al*. "Distraction osteogenesis in the treatment of temporomandibular joint ankylosis with mandibular micrognathia". *Annals of Maxillofacial Surgery* 6.1 (2016): 68.

11. Bsila RS., *et al*. "Joint replacement surgery in patients under thirty". *The Journal of Bone and Joint Surgery American Volume* 58.8 (1976): 1098-1104.

12. Mercuri LG. "The role of custom-made prosthesis for temporomandibular joint replacement". *Revista Española de Cirugía Oral y Maxilofacial* 35.1 (2013): 1-10.

13. Edibam NR. "14-Year Follow-Up of a Patient Fitted Total Temporomandibular Joint Reconstruction System". *Journal of Oral and Maxillofacial Surgery* 64.9 (2006): 55.

14. Nouman D and Hassan K. "Post operative physiotherapy management of temporo-mandibular joint ankylosis". *International Journal of Physiotherapy and Research* 5.5 (2017): 2320-2324.

15. Park MW., *et al*. "Gap arthroplasty with active mouth opening exercises using an interocclusal splint in temporomandibular joint ankylosis patients". *Maxillofacial Plastic and Reconstructive Surgery* 41.1 (2019): 18.

Volume 19 Issue 2 February 2020