



## CASE REPORT

# Temporomandibular Joint (TMJ) Ankylosis Resection to Total Joint replacement – 30 Years Journey

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### Abstract

Temporomandibular joint (TMJ) ankylosis is an intracapsular union of the disc–condyle complex to the temporal articular surface that confines the mandibular drive, including the fibrous adhesions/ bony fusion between condyle, disc, glenoid fossa, and eminence. It is a severe and incapacitating ailment that can cause mastication, digestion, speech, appearance, and hygiene concerns. This is an unusual case of a 42-year-old adult patient, who suffered from bilateral recurrent TMJ ankylosis and reported following trauma to the face. The patient had a history of mandibular condyle fracture at ten years of age. Excision of existing ankylotic mass followed by reconstruction with patient-specific total joint replacement (TJR) was carried out. Postoperative physiotherapy exercises in the presented case improved patient's mouth opening, and mandibular movement. Patient-specific TJR procedures and postoperative physiotherapy will be helpful in cases with TMJ ankylosis.

**Keywords:** Genioplasty; Mandibular Condyle; Mandibular fractures; Temporomandibular Ankylosis; Temporomandibular Joint

### Introduction

Trauma is the primary root of temporomandibular joint (TMJ) ankylosis, and due to the great incidence of relapse, treatment of this disorder poses a significant challenge. It may impact the mandibular development in pediatric cases, resulting in secondary facial deformity, malocclusion, impaired airway, and psychological stress. Many operating practises have been described, including gap arthroplasty, inter-positional arthroplasty, and TMJ restoration by autogenous or alloplastic materials. They did yield various and unsatisfactory results. However, the most frequently reported complication is re-ankylosis.

TMJ ankylosis involves the fusion of the mandibular condyle to the skull base. It is a debilitating condition, usually affecting children and young adults. It mainly causes serious complications in mastication, digestion, speech, appearance, and oral hygiene. In growing individuals, it may result in deformities of the mandible and maxilla, causing malocclusion. Due to the growth malformation, the child may become nervous and lose confidence. Earlier in 1938, Kazanjian categorized TMJ ankylosis into two types as intra and extra-articular ankylosis.<sup>1</sup> The present classification includes bony, fibrous, fibro-osseous, complete, and incomplete.<sup>2,3</sup> Effective

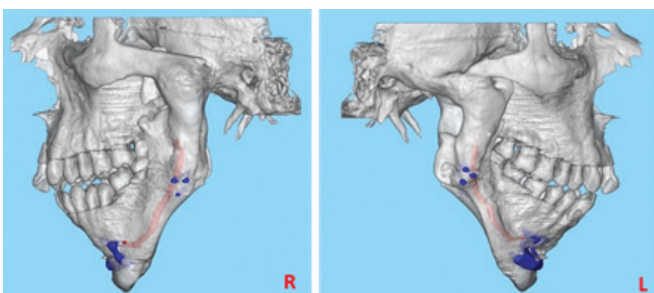
treatment of TMJ ankylosis is based on an extensive pre-operative radiological evaluation of the type and/or extent of ankylosis.

## Case Description and Results

### *Patient history and diagnosis:*

A male patient (42 years) was diagnosed with bilateral TMJ ankylosis, which resulted following trauma to the face. The patient presented with a history of mandibular condyle fracture at ten years of age, which was managed conservatively. The patient started developing progressive difficulty in mouth opening and had undergone multiple open-joint procedures, including Costochondral grafting and genioplasty. The patient underwent several unsatisfactory procedures in Bahrain and overseas by Maxillofacial Surgeons. At the age of 10, the patient underwent an open-joint surgery abroad with unclear and insignificant functional improvements. Surgical procedures were performed twice in Bahrain, at the age of 20, with unsatisfactory outcomes.

Further, at the age of 22, the patient was operated with bilateral costochondral grafts from ribs and genioplasty in Bahrain. All of the above options caused the 'jaws' to gradually close and rendered the patient immobile for the next 20 years. This impacted the patient's personal life (no marriage/children). Dental status, namely, teeth and periodontium, was deplorable and needed immediate attention and rehabilitation. Pre-treatment images are shown in Figures 1 and 2.



**Figure 1: Pre-operative CT Image: Showing right (R) and (L) bilateral TMJ ankylosis.**



**Figure 2: Pre-operative Intra-oral Image: Limited mouth opening and range of motion.**

### *Case Management*

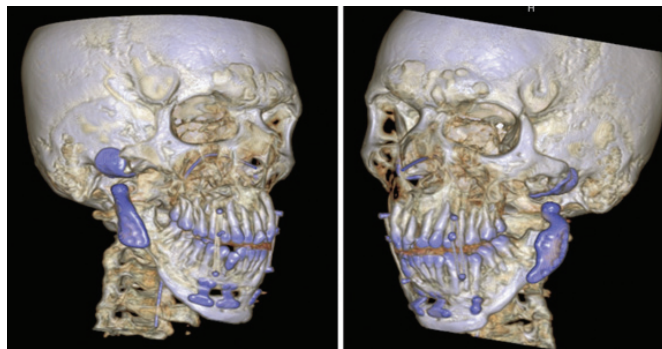
Surgical planning with the TMJ concepts team in the United States of America, worked with the patients for the excision of existing ankylosis followed by patient-specific total joint replacement (TJR). Surgery was carried out in two stages, as detailed below.

#### Stage 1: Surgical Procedure (27 March 2018)

Ankylosis of TMJ was resected, and a 1.5 cm gap was created. Heterotopic bone, fibrosis, remnants of coronoid were removed. Maxillomandibular fixation (MMF)/Intermaxillary fixation (IMF) done with IMF screws/plates. As the patient's periodontal health was poor, arch-bars were avoided, and alginate impressions were taken before placing into IMF.

Old screw fixation hardware at the angle region was removed. An antibiotic-impregnated spacer was placed to prevent bone-on-bone contact and soft tissue contraction. Antibiotic-loaded (gentamicin and clindamycin) bone cement was explicitly developed for one and two-stage revision surgeries. The spacer was smoothed, and undercuts were removed to facilitate a more comfortable removal while performing Stage 2 surgical procedure. Postoperative Computed Tomography (CT) evaluation was done. Dental stone models were

scanned, and data was uploaded, prostheses were fabricated (Figure 3).



**Figure 3: Postoperative CT Image: Showing implants *in-situ*.**

Stage 2: Surgical Procedure (29 May 2018)

The spacer was removed, and an alloplastic device was inserted (bilateral placement of total joint alloplastic TMJ replacement prosthesis). Fat graft around the joint was placed (from temporalis fascia or fat graft harvested from the abdomen or buttock packed around prosthesis).

#### ***Postoperative Treatment***

The patient was followed-up weekly for three consecutive months, and subsequently once per month, till complete recovery.

#### ***Outcomes***

Mouth opening of the patient was 15 mm within the first week of post-operative period. Hence, the patient was referred to physiotherapy using TheraBite<sup>®</sup>, an exercise within one week of the postoperative period, and dental rehabilitation within two weeks of postoperative period. Within two weeks postoperative period, the patient's mouth opening was 20-25 mm, and was referred for dental rehabilitation. The patient's first dental visit started with bilateral selective grinding to improve occlusion. Therefore, the patient was treated with supragingival scaling and subgingival scaling, multiple extractions, multiple restorations, root canal treatments, and prosthodontic treatment. All the treatments were carried out under intravenous (IV) sedation in different sessions. Within six months, post-operative mouth opening increased to 35-38 mm (Figure 4).



**Figure 4: Post-operative Intra-oral Image: Showing mouth opening 35-38 mm.**

#### ***Patient's quality of life***

Following reconstruction with the individualized alloplastic TMJ prosthesis procedure, the patient's mouth opening, and mandibular movement improved. The patient's diet augmented from a soft diet to a mechanical diet and improved quality of life. Serial radiographic examination revealed no bone resorption around the fixation screw or ectopic bone development around artificial condyles.

#### ***Discussion***

The primary causes for ankylosis of TMJ and its treatment have been well established.<sup>4</sup> Trauma and infection are the major causes.<sup>5</sup> Trauma is typically the most prevalent etiology of TMJ ankylosis. In cases of trauma, it is presumed that the intra-articular hematoma, along with scarring and excessive bone formation, contributes to hypomobility. Raveh et al, (1989) reported in their study findings of the use of destructive bone removal in cases (n=26) of full bony TMJ ankylosis. Aggressive resection, early mobilization, and extensive postoperative physiotherapy procedures can achieve satisfactory movement. This approach will have some implications as anterior open chew malformation due to the removal of a large extent of bone from the ramus and the menace of injury to the internal maxillary artery. Among the rewards of the approach, it is with the lower risk of relapse.<sup>6</sup>

The principle of interpolating material between

joint surfaces is attributed to Carnochan, a surgeon in New York. He tried to mobilise the ankylosed jaw of a patient by putting a small mass of wood at the condylar neck between the raw bony surfaces post-resection.<sup>7</sup> Mercuri et al, (1995) reported on the use of a patient-fitted or custom computer-aided design (CAD) and computer-aided manufacturing (CAM), total TMJ replacement system (TMJ Concepts, Ventura, CA).<sup>8</sup> Furthermore, literature reports evidenced that long-term follow-up studies confirm the clinical embedding of both stock and custom TMJ replacement systems.<sup>9,10</sup> Furthermore, these studies showed that TMJ replacements are safe and effective, aids in pain management, improves mandibular function and patients' life quality. Consequently, replacement of TMJ represents a feasible and stable long-term resolution for craniomandibular reconstruction among patients with irreversible end-stage TMJ.

This case report presents a patient who reported with complete, bony, bilateral ankylosis, caused by trauma. Limited mouth opening, and range of motion (ROM) were the chief complaints with a history of multiple surgery failures. Immediate total joint replacement surgical intervention was performed, which improved opening of mouth from no ROM to around 20-25 mm within two weeks after surgery. It is of utmost importance that intensive physiotherapy enhanced the patient's mouth opening, primarily to avoid reankylosis. In this case, the patient was referred to physiotherapy using TheraBite® since the dental condition was deplorable.

### Conclusion

Excision of existing ankylosis followed by total joint replacement surgical procedures and postoperative physiotherapy exercises in the presented case resulted in improved patient mouth opening and mandibular movement. The patient's diet improved from a soft diet to a mechanical diet, and hence patient was delighted. A maxillofacial surgeon should be aware of the clinical and/or symptomatic of TMJ ankylosis to enable early diagnosis and management of the patient condition.

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