

Gap Arthroplasty in the Treatment of Temporomandibular Joint Ankylosis: Case Report

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Temporo-mandibular joint (TMJ) ankylosis is an extremely disabling affliction that causes problems in mastication, digestion, speech, appearance and hygiene. Trauma and infection are the leading causes of ankylosis. However, in a young patient, a joint injury may not be noticed immediately. The first sign of a significant problem may be increasing limitation of jaw opening, usually noticed by the dentist. Pain is uncommon. Early diagnosis and treatment are crucial if the worst sequelae of this condition are to be avoided. Surgery of TMJ ankylosis needs careful evaluation and planning to yield predictable results. Ankylosis may be corrected surgically by an array of procedures like gap arthroplasty, joint reconstruction and interpositional arthroplasty.

Key words: Gap, Arthroplasty, Temporomandibular, Ankylosis

Introduction

Ankylosis may be defined as the fusion of joint surfaces by bone or fibrous tissue (ANKYLOSIS = stiff joint, Greek word). Ankylosis of temporomandibular joint (TMJ) is an intracapsular union of the disc-condyle complex to temporal articular surface that restricts mandibular movement, including the fibrous adhesions or bony fusion between condyle, disc, glenoid fossa, and articular eminence. TMJ ankylosis is more commonly associated with trauma (13–100%), local or systemic infection (10–49%), or systemic diseases (100%), such as ankylosing spondylitis, rheumatoid arthritis, and psoriasis. However, it can also occur congenitally or secondary to severe rheumatoid arthritis or to tumors in the area of TMJ. Ankylosis can also occur as a result of TMJ surgery. Temporo-mandibular joint ankylosis may be classified by a combination of location (intra or extra articular), type of tissue involved (bony, fibrous, or fibroosseous) and extent of fusion (complete or incomplete). Classified ankylosis as true and false¹. Any condition that gives rise to osseous or fibrous adhesion between the surfaces of the temporomandibular joint is a true ankylosis. False ankylosis results from pathological conditions not directly related to the joint. Various factors can cause TMJ ankylosis, including trauma, systemic and local infections, and neoplasm in the area. Laskin (1976) reported a higher incidence of post-traumatic ankylosis in children².

TMJ ankylosis is a condition leading to mastication, digestive, speech, facial, and oral hygiene problems. When verified at childhood, devastating effects are observed during growing and development of teeth and jaws. Besides, in many cases, it can negatively influence the psychosocial behavior of the patient due to the inherent facial deformity aggravated on growing³⁻⁴. Management of TMJ ankylosis is through surgical intervention as soon as the condition is recognized. Early surgery can minimize the severity of the restriction of facial growth. The basic techniques for surgical correction of ankylosis include the *gap arthroplasty* (resection of the bony mass without interpositional material); *joint reconstruction* (resection of the bony mass with reconstruction by bone grafts or joint prosthesis); or *interpositional arthroplasty* (resection of the bony mass with interposition of a biological material or non-biological material). Costochondral graft as the preferred biological material in children because it may allow additional mandibular growth⁵. The interpositional arthroplasty with a temporalis muscle flap is advocated for TMJ ankylosis⁶⁻⁸.

Case report

A 31 years-old male patient attended at the Yekatit 12 Hospital Medical College department of oral and maxillofacial surgery complaining of severe mouth opening limitation, dysphagia, dysphonia, and difficulties in oral hygiene procedures for the last 25 years. He had history of otitis media at age of 5 years with pus discharge from left ear. On extra oral examination revealed mandible is symmetrical but

micrognathic. The patient develops typical 'bird face' deformity with receding chin. Restricted oral opening and protrusive movement are not possible. No pain on palpating the joint and no joint movement on both sides. On palpation prominent antegenial notch near angle of mandible bilaterally. Radiographic investigation included Panorex imaging. These images confirmed bony ankylosis of the right and left TMJ with bilateral elongation of the coronoid processes. In this way, a Type IV TMJ ankylosis was diagnosed on the both side, according to the Sawhney's classification (1986). The proposed treatment was gap arthroplasty under general anesthesia along with tracheostomy, intubation, sessions of physiotherapy and intense mandibular movements.

Surgery was initiated by placing a preauricular incision on the left side and plane divulsion to expose the anquilotic mass. Then, gap arthroplasty was performed by resection of ankylosed bone with hammer and chile and ronger forceps to trim rough surface without interpositioning of any material or graft. The surgical access was closed with a 4.0 vycril suture in the internal planes and 5.0 nylon at the skin surface. The space remaining between the mandibular recontoured fosse and the condyle was of 15mm, as seen in the postoperative panoramic radiograph. On the first day after surgery, the patient underwent physiotherapy for mouth opening in order to prevent recurrence of ankylosis. The tracheal cannula was removed under general anesthesia two days after surgery. Facial expression and mouth opening were evaluated five and 30 days later. The patient has attended to postoperative sessions showing good mouth opening of 32mm and wound healing.

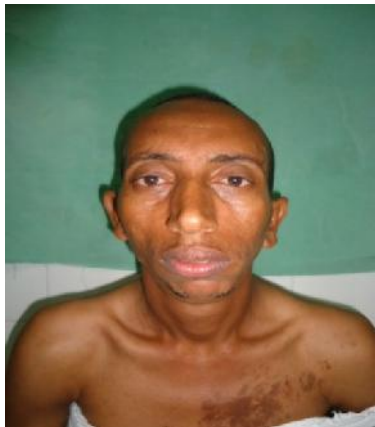


Figure 1. Pre treatment frontal view shows 'Bird face'



Figure 2. Pre treatment lateral view shows chin neck angle absent



Figure 3. Intra operative view ankylosed TMJ.



Figure 4. Immediate post op view of 15 wooden tongue depressor b/n jaws



Figure 5. Maximum inter incisal length of 32mm

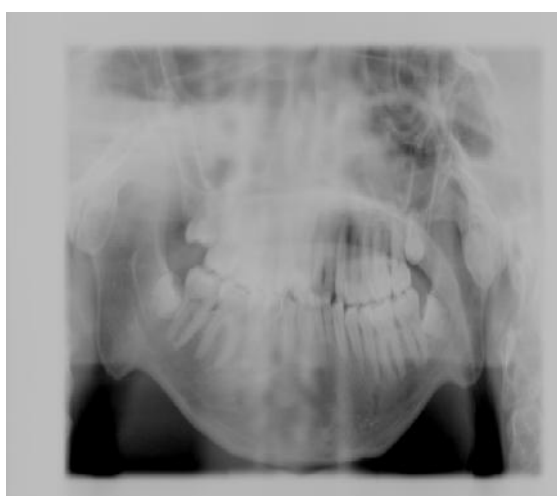


Figure 6. Pretreatment — panoramic radiograph.

Discussion

Mandibular hypomobility resulting from TMJ ankylosis is classified according to location (intracapsular or extracapsular), type of tissue involved (bony, fibrous or fibroosseous) and extent of fusion (complete or incomplete)⁹. If the cause is trauma, it is hypothesized that intra-articular hematoma, along with scarring and formation of excessive bone, leads to the hypomobility. Infection of the TMJ most commonly occurs secondary to contiguous spread from otitis media or mastoiditis, but it may also result from hematogenous spread of infectious conditions such as tuberculosis, gonorrhea or scarlet fever. Systemic causes of TMJ ankylosis include ankylosing spondylitis, rheumatoid arthritis and psoriasis¹⁰.

In children, not only can trauma to the TMJ result in ankylosis, but it may also impair mandibular growth and result in mandibular retrognathism. These problems have functional and esthetic implications, as well as causing difficulties pertaining to nutrition and oral hygiene¹¹. A variety of techniques for the treatment of TMJ ankylosis have been described, including intraoral coronoidectomy, ramus osteotomy, high condylectomy, forceful opening of the jaw under general anesthesia, lysis of adhesions of the pterygoid space during exploration for a foreign body¹², autogenous CCG¹³ and free vascularized wholejoint transplants¹⁴. In addition, several prosthetic options for TMJ reconstruction exist, including Silastic sheeting material (Vitek Inc., Houston,

Texas), the TMJ condylar prosthesis, custom glenoid fossa implants, articular eminence implants and mandibular reconstruction plates with condylar heads¹⁵.

Various techniques for the management of TMJ ankylosis have been described. However, no single technique has proved entirely satisfactory. Gap arthroplasty is based on resection of ankylosed bone without intervening grafts or materials. According to the literature, it is recommended to create 15mm of space peripherally between the mandibular fosses, after physiotherapy to improve mouth opening in order to prevent recurrence of ankylosis^{16,17}. Advantages of this technique are simplicity and short surgical time. However, there are some drawbacks such as creation of a pseudoarticulation and a short mandibular ramus, with anterior open bite in bilateral cases and posterior open bite in unilateral cases, failure during removal of pathologic bone tissue and the risk of recurrence.

An aggressive resection is recommended, along with physiotherapy and anticipated immobilization, ipsilateral coronoidectomy and, when necessary, coronoidectomy at the opposite side. The use of temporal fascia and cartilage to the arthroplasty zone and ramus reconstruction with costochondral grafts are methods advocated by the authors. Several researchers have highlighted the importance of early immobilization and aggressive physiotherapy for a well-succeeded treatment¹⁷. In a recent study, the efficacy of gap arthroplasty was evaluated in 11 patients with micrognathia and TMJ unilateral ankylosis. All patients presented satisfactory mouth opening on the range of 32.4mm (28-37mm), corrected facial asymmetry and satisfactory occlusion after orthodontic treatment. The drawback of gap arthroplasty is the generation of a pseudoarticulation with a short ramus. In addition, the risk of recurrence is increased. Studies with animal models demonstrated functional and anatomic alterations after gap arthroplasty for TMJ ankylosis and the lack of functional and histological restoration to the pre-existing condition. No recurrences were observed in eight cases after 24 months¹⁸.

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