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# Management of Temporomandibular Joint Ankylosis Using a Pedicled Temporalis-Muscle-Periosteal Flap

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## ABSTRACT

This study was conducted on post traumatic 20 ankylotic temporomandibular joint in 16 patients 4 of them the ankylosis was bilaterally affecting T.M.J. admitted from April 2004 to March 2006, in Plastic and Reconstructive Surgery Unit and Oral & Maxillo-Facial Department, Tanta University Hospital. All cases were treated by interposition arthroplasty using the temporalis fascioperiosteal flap. Majority of the patients were males. The duration of ankylosis varied from 7 months to more than 3 years. Preoperative mouth opening was between 2-4mm in 10 patients (62.5%) and between 5-8mm in 6 patients (37.5%). Following temporalis fascia flap interposition arthroplasty, the mouth opening achieved was between 30-40mm in 10 patients (62.5%) and more than 40mm in 6 patients. All patients achieved and maintained good opening of the mouth during the follow-up period which ranged from 1 to 1.5 year. No recurrence was observed during the follow-up period in all patients. Interposition arthroplasty using vascularized temporalis fascia flap is a reliable method to prevent recurrence of ankylosis, and to achieve adequate mouth opening.

## INTRODUCTION

The temporomandibular joint is one of the most complicated joints in the body: It opens and closes like a hinge and slides forward, backward, and from side to side. During chewing, it sustains an enormous amount of pressure **[1]**. Temporomandibular joint (TMJ) ankylosis is loss of joint movement resulting from fusion of bones within the joint. It is either true or false. True ankylosis is a condition that results in osseous or fibrous adhesion between the surfaces of the TMJ, within the limits of the articular capsule. False ankylosis results from diseases not directly related to the joint, the common causes being trauma and infection. Younger patients have a greater tendency towards post-traumatic ankylosis, mostly before 10 years of age **[2]**.

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 **[3,4]**. 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) **[5-8]**. Costochondral grafts is the preferred biological material for TMJ reconstruction in children because it may allow additional mandibular growth **[9]**. The interpositional dermis-fat graft in the management of temporomandibular joint ankylosis **[10]**. The interpositional arthroplasty with the temporalis muscle and fascia flap is indicated by several authors in growing patients, to replace the condylar growth center; and maintain a post-operative program of active jaw exercises **[11,12]**.

## MATERIAL AND METHODS

This study was carried out on 20 ankylotic temporomandibular joint in 16 patients 4 of them the ankylosis was bilaterally affecting T.M.J., admitted from April 2004 to March 2006 in Plastic and Reconstructive Surgery Unit and Oral & Maxillo-Facial Department, Tanta University Hospital. All patients had the compliant of inability to open the mouth following trauma. Diagnosis was based on clinical assessment supplemented by the lateral oblique views of temporomandibular joint with mouth open and closed in all patients. C.T. Scan was used to differentiate bony ankylosis from coronoid zygomatic arch problems in 5 patients only. All the patients were treated by Interposition arthroplasty using the temporalis fascioperiosteal flap.

*Operative technique:*

We used an incision which is a modification of classical preauricular incision. It starts in the hairline and extends in front of helix and following the curvature of helix goes behind the tragus. The operative site is infiltrated with a solution of 1% lidocaine with 1/200000 epinephrine, time is allowed for the vaso-constrictive effect of the infiltrative solution. Dissection is done in the scalp, directly down to temporalis fascia, i.e., the thickened white layer of fascia that lies directly on the temporal muscle. The deep layer lies below the superficial fascia and superficial temporal vessels. The dissection is continued downward exactly on top of the temporalis fascia. The periosteal elevator is used to clear the tissues from this layer which continues inferiorly over the arch to the parotid-massetric fascia. After the fascioperiosteal layer is bared over the arch to the level of articular eminence, a transverse incision is made at mid arch with a posteriorvertical extension inferiorly. The tissues are reflected subperiosteally in an inferior direction until the underside of the arch is reached. The mandible is moved and the upper joint space identified. The joint capsule is divided, a curved retractor is inserted medial to the condylar neck to protect the maxillary artery lying medial to the neck. The bony mass causing the ankylosis is now removed using an osteotome and burr. Once the bony mass has been removed, trial opening of the mouth is done and any fibrous tissue causing restriction of mouth opening is divided. If mouth opening is inadequate at this stage, the opposite side is also explored in bilateral ankylosis. An inferiorly based temporal fascia flap approximately 2cm x 6cm in size is raised with the base of the flap lying above the zygomatic arch from where the vascular supply to the flap from the middle temporal branch of superficial temporal artery is maintained. The flap is transposed inferiorly to reach the glenoid fossa. The distal end of flap is folded/plicated to fill the glenoid cavity after removal of the bony mass. The flap margins are stitched to the residual surrounding tissue to prevent dislodgement of the flap. The mandible is then manipulated through vertical and lateral excursions, so that the function of the flap can be observed. After achieving hemostasis, the wound is closed with a suction drain. The mandible is mobilized passively for the first postoperative week, after which physiotherapy is started to achieve complete mouth opening and continued for at least 6 months. Pre and postoperative mouth opening is compared by measuring the inter incisor distance.

## RESULTS

Interposition arthroplasty was on 16 patients of post-traumatic temporomandibular joint ankylosis using the temporalis fascioperiosteal flap. 12 patients (75%) had unilateral T.M.J. ankylosis, while 4 patients (25%) had bilateral ankylosis. Majority of the patients were males and in the age group of 7-20 years (Table 1). The duration of ankylosis varied from 7 months to more than 3 years. Preoperative mouth opening (inter incisor distance measured with maximum mouth opening) was between 2-4mm in 10 patients (62.5%) and between 5-8mm in 6 patients (37.5%).

Following temporalis fascia flap interposition arthroplasty the mouth opening achieved was between 30-40mm in 10 (62.5%) patients and more than 40mm in 6 patients. All patients achieved and maintained good opening of the mouth during the follow-up period which ranged from 1 to 1.5 year. No recurrence was observed during the follow-up period in all patients.

Table (1): Age and sex of the patients.

| Age | Male | Female | No. of patients | % |
|---|---|---|---|---|
| 7-10 years | 4 | 1 | 5 | 31.25 |
| 11-20 years | 3 | – | 3 | 18.75 |
| 21-40 years | 5 | 3 | 8 | 50 |
| Total | | 4 | 16 | 100 |

Table (2): Duration and extent of ankylosis.

| Duration | Unilateral | Bilateral | No. of patients | % |
|---|---|---|---|---|
| 7-10 years | 2 | – | 2 | 12.5 |
| 11-24 years | 4 | 2 | 6 | 37.5 |
| 25-36 years | 6 | 2 | 8 | 50 |
| Total | 12 | 4 | 16 | 100 |

Table (3): Preoperative and postoperative mouth opening.

| Mouth opening in mm | Preoperative No. of patients | Postoperative No. of patients | Follow-up 18 months No. of pt. |
|---|---|---|---|
| 2-4 | 10 | – | – |
| 5-8 | 6 | – | – |
| 9-12 | – | – | – |
| 13-16 | – | – | – |
| 20-30 | – | – | – |
| 30-40 | – | 10 | 12 |
| >40 | – | 6 | 4 |
| Total | 16 | 16 | 16 |

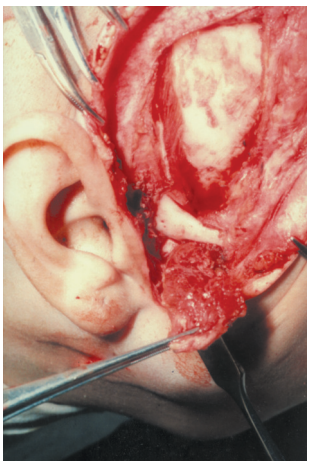

Fig. (1): The temporalis muscle-periosteal flap elevation.

Fig. (2): The flap is rotated inferior and anterior to the zygomatic arch before suturing to the retrodiscal tissue.

Fig. (3): 35 years old patient presented by bilateral T.M.J. ankylosis with 6mm vertical mouth opening.

Fig. (4): Post-operative photograph of the same patient with 38mm vertical mouth opening.

Fig. (5): 32 years old patients presented with left T.M.J. ankylosis with 5mm vertical mouth opening.

Fig. (6): Postoperative photograph of the same patient with 40mm vertical mouth opening.

Fig. (7): The same patient with good mouth opening one year after surgery.

Fig. (8): Lateral view one year after surgery with good and maintained mouth opening.

Fig. (9): 17 years old patient presented by left T.M.J. ankylosis with 8mm vertical mouth opening.

Fig. (10): Postoperative of the same patient with 41mm vertical mouth opening.

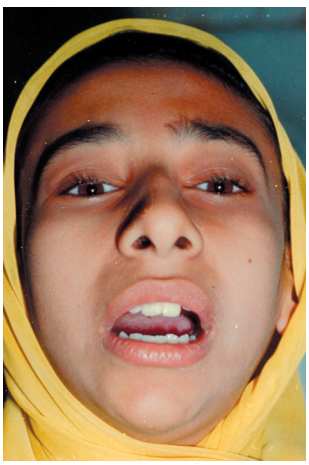

Fig. (11): 17 years old girl presented with right T.M.J. ankylosis with 11m vertical mouth opening.

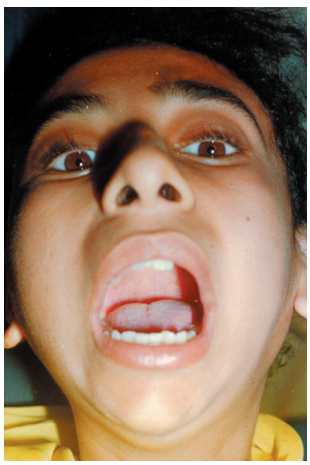

Fig. (12): Post operative photograph of the same patient with 42mm vertical mouth opening 6 months after surgery.

## DISCUSSION

The treatment of temporomandibular joint ankylosis to pose a significant challenge to maxillofacial surgeon because its technical difficulty and high incidence of recurrence **[13]**.

Opinions concerning the method of reconstruction of the T.M.J. are very controversial. Bone or combined chondro-osseous grafts are often susceptible to resorption, infection or recurrence and thus do not fulfill the requirements of function and correct guidance **[14,15]**. A further disadvantage is that an immobilized period is usually necessary until consolidation and functional stability of the graft has been taken place **[16]**. The Alloplastic materials have the problems associated with the use of foreign body as well as those of displacement and extrusion **[17,18]**. Smith and associates **[19]** have reported implant erosion into the middle cranial fossa the histology of these implants demonstrates that there is an exuberant giant cell inflammation that erodes bone. Such erosions can be treated with an insert of temporalis fascia over the glenoid fossa **[20]**. On the other side, Demir et al. **[21]** have used preserved costal cartilage homo graft for the treatment of temporomandibular joint ankylosis with good functional results and without donor site morbidity and no recurrence over a 4 years follow-up. Burt Brent **[22]** have quoted the results of studies that suggest that grafted cartilage does evoke transplantation antigens and that the rejection response is merely delayed by the physical barrier that the matrix interposes between the chondrocytes and the cells of immune surveillance system of the recipient host. The use of autogenous temporal muscle fascio-periosteal flap satisfies the criteria of an ideal graft material and it also fulfills the physiological function of the disc. It lacks antigenicity and toxicity, exhibits a low grade of friction and has positional stability and it can be easily elevated and rotated into place **[23,24,25]**. In our study after interposition arthroplasty using the temporalis fascioperiosteal flap, all patients had achieved and maintained good opening of the mouth during the follow-up period as well as no recurrence was observed. However, the temporalis fascia flap is an axial flap, which is available at the operative site and is easy to raise and quick to excute. This vascularized flap shows fewer chances of subsequent absorption and fibrosis.

*Conclusion:*

Interposition arthroplasty using the locally available vascularized temporalis fascia flap is a reliable method to prevent recurrence of ankylosis, and to achieve adequate mouth opening. It obviates the disadvantages of Alloplastic materials as well as non-vascularized autogenous tissues.

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