

A Single Institutional Experience of Management of TMJ Ankylosis

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ABSTRACT

Background: Temporomandibular joint (TMJ) ankylosis produces a restricted mouth opening, which may be the partial reduction or complete immobility of jaw. Trauma, systemic disease, e.g. ankylosing spondylitis, local or systemic infections and rheumatoid arthritis are most commonly associated with TMJ ankylosis^{1,2}. Surgical interventions are made for the management of TMJ ankylosis.

Aim: The main treatment option is considered as gap arthroplasty with or without the interposition material.

Method: This study retrospectively reviews 102 patients of TMJ ankylosis, these patients were managed in the oral and maxillofacial surgery department, Mayo Hospital Lahore from January 2012 to December 2016. Out of 102 patients 59 were male and 43 were females. 69(70%) patients were less than 14 years of age and 33(30%) patients were more than 24 years of age. The etiology of TMJ ankylosis was trauma in 99(98.5%) patients, congenital in 2(1%) patients and due to infection in 1(0.5%) patient and unilateral ankylosis was seen in 73(73%) patients while, 29(29%) patients were bilaterally ankylosed. 102 patients(100%), patients were presented with limited mouth opening. Facial deformity in 41(41%) patients, night snoring in 27(28%) patients, obstructive sleep apnoea in 8(8%) patients. Gap arthroplasty with interposition of the temporalis fascia/muscle was done in all patients.

Results: Postoperatively, 93 patients could be followed up during the period of one to five years. In 69(62%) cases, mouth opening was achieved 30mm while 26(24%) cases achieved less than 30mm. Respiratory symptoms were improved in all patients who had ankylosis of TMJ.

Conclusion: The patients with TMJ ankylosis are frequently presented and treated in the Oral and maxillofacial surgery department of Mayo Hospital by gap arthroplasty with interpositional temporalis fascia/muscle flap followed by strict physiotherapy. According to results of our study, this protocol was demonstrated as an effective treatment of TMJ ankylosis.

Keywords: TMJ ankylosis, spondylitis, arthroplasty

INTRODUCTION

Temporomandibular joint (TMJ) ankylosis produces a restricted mouth opening, which may result as partial reduction or complete immobility of jaw. Trauma, systemic disease, e.g. ankylosing spondylitis, local or systemic infections and rheumatoid arthritis are most commonly associated with TMJ ankylosis^{1,2}. The severity of TMJ ankylosis can be classified by a combination of location (bony, fibrous, or fibro-osseus), extent of fusion (complete, incomplete) or type of tissue involved.³ according to previous studies, ankylosis is classified into true and false. True ankylosis of the temporomandibular joint is defined as bony or fibrous union between the joint surfaces. False ankylosis is not directly related to the joint, it results from pathologic conditions^{1,4}. TMJ ankylosis is known as extremely disabling disorder which causes problems in, mastication, speech, digestion, hygiene and appearance⁵. Malocclusion and deformities of mandible and maxilla can be seen

together in growing patients^{6,7}. The high incidence of ankylosis of the TMJ in Pakistan is explained by the fact that the medical and dental specialties are concentrated in the big cities. The prominent majority of TMJ ankylosis patients are mostly referred from rural areas, where the early diagnosis and primary care of fractures of the mandibular condyle are either missed or treated inappropriately. Usually, this condition is identified accidentally and late by the parents when there is some deformity of face or when child is unable to eat^{2,3,6}. Mandibular asymmetry or bird face deformities will be the outcome according to whether the case is unilateral or bilateral. Maxillary deformity is followed by the mandible, which results in canting of occlusal plane in unilateral cases while, posterior maxillary height is shortened in bird face deformity resulting in steep mandibular and occlusal planes. Short rami and narrow bigonal distance of retrognathic mandible severely affects the dimensions of the oropharynx which causes the obstruction of airway at that level. Chronic isometric contractions of the masticatory muscles are caused by long-lasting ankylosed joints.

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It causes thickening and elongation of coronoid process (temporalis muscle), recession of the chin and its cephalocaudal elongation (suprahyoid depressor muscle), shortening of mandibular ramus/rami (pterygomasseteric muscle sling), and antegonial notch development, owing to the antagonistic actions of the pterygomasseteric sling and the depressor muscle.

Regarding best treatment of the TMJ ankylosis, there is no concurrence in the previous studies. Different techniques were studied and developed by several authors, but still recurrence has been the considerable problem in the treatment of TMJ ankylosis^{1,2,5,8-11}.

Recurrence of the problem is often caused by insufficient exposure of TMJ region due to close proximity of the adjacent vital structures (jugular, carotid and maxillary vessels, facial nerve) most of times leads to insufficient removal of ankylotic bone.

TMJ ankylosis is mainly managed through surgical intervention. Gap arthroplasty with or without the interposition material is the main treatment option. In children, in addition to the release of ankylosis, the primary concern is to keep the growth potential of the facial skeleton. Thus, reconstruction of the condyles using costochondral graft, followed by active mouth opening exercises, is mandatory. In adults, the patient may be satisfied by an operation to provide adequate mouth opening and to resume normal mastication.

To prevent from TMJ re ankylosis after arthroplasty, the use of interpositional material is very important. This aspect of treatment has been discussed in various researches. Temporalis muscle & fascia, articular cartilage, dermis, silastic, fat, silicone and many others metals are used for interposition materials but temporalis fascial/muscle flap is most common among them¹¹.

Re-ankylosis the most distressing complication of such type of surgery. According to our experience, over the last many years, we have distinguished two aetiological factors:(1) iatrogenic, such as (a) incomplete resection of the ankylosing mass leaving residual parts attached to the skull base, (b) leaving the coronoid process, (c) a 'gap arthroplasty' was carried out with or without an interpositional material. Overemphasis is laid by many authors on the use of nonosteogenic interposition materials, whether autogenous or alloplastic, to fill the gap in order to prevent re-ankylosis. This was not found to be valid, as re-ankylosis occurred around these materials in many cases of this series². The second and more common aetiological factor is the poor compliance of the patient. The percentage of re-ankylosis was found to be higher in the young age group, in those

mentally or socially handicapped, or in those living far away where follow up was difficult or irregular.

The present study was formulated to share the experience of management of patients with TMJ ankylosis in terms of their demographics, presenting symptoms and treatment outcome.

MATERIAL AND METHODS

Patients: The retrospective study reviews were done in the oral and maxillofacial surgery department Mayo Hospital Lahore. One hundred and two patients were managed with TMJ ankylosis during the period of January 2012 to December 2016. The aetiology of the disease, age and sex of patients are shown in Table I. The presenting symptoms, whether the case is uni or bilateral and if the condition is primary or recurrent are shown in Table II.

Table I.

	n	%age
Aetiology		
Trauma	99	98.5
Congenital	2	1
Infection	1	0.5
Age		
Children<14years	69	70
Children>14years	33	30
Gender		
Male	59	60
Female	43	40

Table II: Clinical data of 102 patients with TMJ ankylosis

	n	%age
Presenting symptoms		
Limited mouth opening	102	100
Facial deformity	41	42
Respiratory problems		
Night snoring	27	28
Obstructive sleep apnea	8	8
Unilateral	71	72
Bilateral	29	29
Primary	87	88
Recurrent ankylosis	13	12

Surgical procedure: Treatment consists of release of the ankylosis with interposition of temporalis fascia or muscle.

Release of ankylosis: A preauricular incision with temporal extension is performed, its lower part in a skin crease in front of the auricle. Dissection is performed either superficial to the deep temporal fascia (4) or deep to it with temporalis muscle splitting (5). The anterior fasciocutaneous flap is raised and reflected forward in the subperiosteal plane along the zygomatic arch, to reach the zygomatic bone. Full exposure of the ankylosed TMJ and the coronoid process (CP) is made. Every effort is made to save

the frontal and zygomatic branches of the facial nerve. By dissecting in a subperiosteal plane, one can identify the posterior border of the condylar neck, the anterior border of the CP and the lower extent of the ankylosed mass. Using carbide rose-head burs No. 2, 3 and 4, the ankylosed mass and the CP can easily be resected and removed. To prevent from injury of maxillary artery or any of its branches, care is taken. An attempt is then made to mobilize the mandible. If any resistance is encountered, the other joint being normal, the cause lies in the contralateral CP. This needs resecting via an intraoral approach. Trimming and fashioning of the glenoid fossa is an important part of resecting the ankylosed mass. At this point care is taken not to perforate the skull base or injure the dura. A hinged flap of the temporalis muscle or its fascia is now fashioned and made to fill the gap left after resection of the bony mass. Any residual disc material can be used for the same purpose. Bilateral cases are also treated with the same procedure.

Postop care: When postop pain resides, immediately mouth opening exercises are started. However, for patients who have undergone IMF, exercises are started soon after release of fixation. Patients are encouraged to start gentle, active and gradually increasing mouth opening exercises using their own fingers as a monitor to start with, in order to gain self-confidence, and they are allowed to take a soft diet. Wooden tongue blades are used thereafter with a gradually increasing number, according to tolerance of patient, avoiding any passive force or pain. This is performed under strict supervision for 15 min five times a day. Regular weekly visits are arranged during the first month, biweekly for the next 3 months, then monthly for 1 year.

RESULTS

Table III: Overall results of treatment of 93 patients with TMJ ankylosis (follow-up 1.5-7 years)

	n	%age
Degree of mouth opening		
Interincisal distance		
Preoperative range		
0 -12mm	102	
Post operative mouth opening		
>30mm	67/93	62
<30mm	26/93	24
Airway improvement		
Night snoring	27/27	100
Sleep apnea	8/8	100
Reankylosis	8/93	7

Patients were recalled annually for evaluation and recording of the degree of mouth opening and improvement of airway embarrassment.

Orthopantomography and lateral cephalometry were carried out routinely. Nine patients (8.8%) were lost to follow-up. The overall results obtained from 93 patients (91.2%) are summarised in Table III.

DISCUSSION

There are two types of TMJ ankylosis i.e., true (intercapsular) ankylosis and pseudo (extracapsular) ankylosis. Any condition that produces bony or fibrous union between the joint surfaces known as true ankylosis. It is caused by enlargement of the coronoid process, depressed fracture of the zygomatic arch, or scarring resulting from surgery, irradiation, or infection, chemical burns and rheumatoid arthritis^{2,10,11,12}. Muscular, osseous, neurological, or psychiatric disorders are the reasons of Pseudo-ankylosis. Trauma or infection are most common indication of True ankylosis. Surgical interventions is the consequence of management of TMJ ankylosis. To prevent from re-ankylosis after arthroplasty, the use of inter positional material has been widely discussed^{3,7,11}.

Temporalis muscle and fascia, dermis, fascia lata, auricular cartilage, fat, lyodura, silastic, silicone, and various metals are used as interpositional materials. The most commonly used interposition material at present is temporalis fascial flap. According to the previous research of Chandra and Dave², 258 cases were discussed from which 67.8% cases were associated with trauma and 17% infectious cases. In this study the trauma was responsible for TMJ ankylosis in 98.5% of the patients.

According to Chossegross et al⁴, in 25 patients with 3 years of follow up, results of inter positional materials were evaluated in 92% of cases, the procedure of full-thickness skin grafting while temporal muscle flap in 83% of cases presented good results but poor results of homologous cartilage. To prevent recurrence, early physiotherapy and choice of inter positional materials are considered important according to Chossegross et al. Immediate postoperative period is considered the most critical time for the successful treatment of ankylosis. For the maintenance of the mobility and prevention of the postsurgical hypomobility, postoperative pain medications and intense physiotherapy are commonly used³¹. During follow ups, tongue blades were counted used for exercise. Physiotherapy was advised to all patients for active and passive ranges of movement and in the first two months, three times a day exercise was recommended while, once every day in following months. Intake of very soft food is advised to the patient at this time. Patient is then guided to not

overuse their jaw when diet plan is advanced from soft to regular diet. Postoperative adhesions can be prevented by active postoperative physiotherapy, strict follow ups and early postoperative exercise.

Effectiveness of a composite (muscle, fascia and periosteum) temporalis pedicle flap as an interpositional disc replacement was evaluated in the study of Herbosa and Rotskoff¹³ in 15 pre and postoperated patients. Significant clinical improvement in range of motion of mandible ($p < 0.05$) was seen after eighteen months of surgery. But notable reduction in translation ($p < 0.01$) was seen, designating that compensatory rotational movement resulted in increased mandibular opening. According to this study, for gap arthroplasty, composite temporalis pedicle flap is considered as a good autogenous tissue.

A case series was reported by Kaban et al, at Massachusetts General Hospital and ankylosis treated children were selected in this study⁶. Results showed that inadequate resection of ankylosed mass and inadequate maximal opening in the operating room are the two most common causes of treatment failure. There were 7 following steps of protocol (1) aggressive excision of fibrous/bony ankylosed mass, (2) coronoidectomy on affected side, (3) coronoidectomy on the contralateral side, if maximal incisal opening greater than 35mm or to the point of dislocation of unaffected TMJ is not achieved by step 1 and 2 (4) TMJ lining with a temporalis myofascial flap/native disc, if it can be retrieved, (5) ramus condyle's unit reconstruction by distraction osteogenesis or costochondral graft and rigid fixation, (6) an early jaw mobilization. If ramus condyle unit is reconstructed by distraction osteogenesis, mobilization begins the day of surgery. Mobilization begins after 10 days of maxillomandibular fixation, in these patients who undergo costochondral graft reconstruction. (7) aggressive physiotherapy of all patients. This study results that above protocol is effective in the treatment of TMJ ankylosis.

CONCLUSION

In conclusion, one must consider five cardinal objectives necessary for the successful treatment of temporomandibular ankylosis:

1. The radical resection of the ankylosed mass via wide surgical exposure with resection of the CPs.
2. Use of interpositioning material preferably autogenous to prevent reankylosis.

3. Restoration of the vertical ramal height and condylar head by a CCG or condylar prosthesis.
4. Careful selection of the patients who are expected to comply with postoperative functional rehabilitation and regular follow-up for at least 1 year.

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