MANAGEMENT OF TEMPOROMANDIBULAR JOINT ANKYLOSIS BY TEMPORALIS MUSCLE INTERPOSITIONAL ARTHROPLASTY

AYESHA MAQSOOD
NADIA AMAN
SHAZIA NAWABI

ABSTRACT

The aim of the study was to assess temporalis muscle flap as an interpositional material for arthroplasty in patients with temporomandibular joint ankylosis and to identify the most common cause of temporomandibular joint ankylosis. Fifty patients of different age groups, reporting to Oral and Maxillofacial Surgery Department of Armed forces Institute of Dentistry were enrolled in study. Surgical procedure involved condylectomy followed by temporalis muscle flap interpositioning. First postoperative maximal incisal opening (MIO) was recorded on 5th post-op day. Patients were regularly followed up for a period of 18 months and their maximal incisal opening (MIO) was finally recorded. Trauma was found to be the main etiologic factor in TMJ ankylosis (n=46, 92%), followed by infections (n=3). No case of relapse of limited mouth opening was seen during 18 months followup. Temporalis muscle proved to be a successful interpositional material with low morbidity and complications for the treatment of temporomandibular joint ankylosis.

Key Words: temporomandibular joint, temporalis muscle flap, trauma.

INTRODUCTION

Temporomandibular joint (TMJ) ankylosis is defined as a situation in which the condyle is fused to the glenoid fossa by bone or fibrous tissue. Conditions such as trauma, infections, congenital anomalies and systemic diseases all predispose to TMJ ankylosis.1,2 TMJ ankylosis presents as an extreme physical and psychological disability affecting patients mastication, speech, dental hygiene, appearance and may compromise his airway as well.3,4

The clinical manifestation of this condition depends to a large extent on the age at the time of onset, anatomical location and involvement of one or both joints. It may present in mild forms as limitation in mouth opening and in severe forms it may cause incapacitating anatomical alterations in the facial appearance of the affected individual.5

The management of TMJ ankylosis is a difficult task and a challenge for the maxillofacial surgeon because of the technical difficulties and high incidence of recurrence. Different treatment modalities have been used for the surgical correction of this disorder. This includes gap arthroplasty in which condylectomy is done creating a gap of 1-1.5cm.2 Costochondral graft is also being used as a successful graft material in children, though it has shown in some cases to have an unpredictable growth pattern.6,7 Chossegros et al have reported good results with full thickness skin grafts and temporalis muscle and poor results with alloplastic materials.8 Over the past few years temporalis muscle is successfully being used as an interpositional flap. It has enjoyed a good reputation as a simple reliable procedure with low morbidity.9,10 Many international and local comparative studies have been done. These studies have mostly compared different treatment options for the management of TMJ ankylosis, only few studies have focused on temporalis muscle interposition flap and most of these studies were done on a very small sample of patients.11,12

The aim of this study was to study etiology of TMJ ankylosis and outcome of temporalis muscle interpositioning in management of TMJ ankylosis in a bigger sample size.

METHODOLOGY

This prospective study was conducted in Department of Oral and Maxillofacial Surgery at Armed Forces Institute of Dentistry with hospital education approval from the IRB committee. Informed consent was obtained from all patients. Fifty patients were enrolled in the study. The criteria for patient inclusion were: age of 10 years or above, a clinical diagnosis of temporomandibular joint ankylosis, with a post-condylectomy gap of 1-1.5 cm. Exclusion criteria were: patients less than 10 years of age, patients with previous TMJ surgery, patients with evidence of osteoarthritis or rheumatoid arthritis, patients who were mentally unable to complete the follow up period of 18 months.

The surgical procedure involved condylectomy followed by temporalis muscle flap interpositioning. First postoperative maximal incisal opening (MIO) was recorded on 5th post-op day. Patients were regularly followed up for a period of 18 months and their maximal incisal opening (MIO) was finally recorded. Trauma was found to be the main etiologic factor in TMJ ankylosis (n=46, 92%), followed by infections (n=3). No case of relapse of limited mouth opening was seen during 18 months followup. Temporalis muscle proved to be a successful interpositional material with low morbidity and complications for the treatment of temporomandibular joint ankylosis.

Key Words: temporomandibular joint, temporalis muscle flap, trauma.
Institute of Dentistry, Rawalpindi. Fifty consecutive patients with unilateral or bilateral TMJ ankylosis with MIO < 10 mm were included in this study. The patients with pseudoankylosis were not included. Patients with fibrous ankylosis whose MIO improved after mouth stretching were also excluded from this study.

A detailed medical history of the patients who had to undergo TMJ surgery was taken. Physical examination of the patients was done to determine the cause, extent and type of ankylosis. Patient’s maximal incisal opening (MIO) was measured with the help of vernier caliper (Triangelz International). Lateral and frontal view photographs of the patient were taken for facial profile assessment. The radiographic examination included standard orthopentomogram (OPG) for every patient. Data was collected on a structured proforma.

All the patients who were to undergo surgery were via an extended preauricular incision as described by Al Kayat and Bramley. The incision was deepened by blunt dissection up to the zygomatic arch and upper extent of the TMJ capsule. A ‘T’ shaped incision was made through the capsule to completely expose the ankylosed joint. Condylectomy was done to create a gap of 10-15mm. A temporalis muscle flap inferiorly based was rotated downwards and over the zygomatic arch, interposed and then was fixed to the medial aspect of the capsule. The wound was closed in layers and a Redivac vacuum drain was inserted for drainage.

Jaw exercises were started as early as 24 hours postoperatively. Initially the exercises were started with chewing gums and fingers. Later when the patient was more stable and cooperative, exercises with wooden spatulas were started. Each patient was given a pack of wooden spatulas and the exercises were demonstrated to the patients and to their parents in case of younger patients. In the first post-operative week patient has to insert wooden spatulas on each side 5 times daily for minimum of 3 minutes. For the next 3 weeks patient was asked to perform the exercises 7 times daily by slowly increasing the number of spatulas. After 1 month when the mouth opening was stable the patient was asked to do this exercise 3-4 times daily on each side for the same time period. This routine was strictly followed for the next 6 months. After that the patient was allowed to do the exercises according to his or her preference.

Patients were discharged from the hospital on the 5th post-operative day after recording first postoperative maximum incisal opening (MIO). After that they were recalled weekly for the first month and then monthly for the next 6 months. The patients who needed orthodontic treatment were referred to the orthodontist for further management. Patients were followed for a period of 18 months to look for any signs of relapse.

The data were analyzed with SPSS version 10. Mean and Standard deviation was calculated for age of patient, inter incisal opening in mm, whereas percentage were reported for categorical variables like gender distribution, presentation of Ankylosis and etiology. For comparison of pre and post-operative interincisal opening paired sample t test was used.

RESULTS

Out of the 50 patients having TMJ ankylosis, 27 patients (54%) were females and 23 (46%) were males (male to female ratio was 1:1.17). The age of the patients ranged between 4 years to 35 years with a mean age of 14.5 years. The mean duration of ankylosis was 6.5 years. (ranging from 2 years to 19 years). Unilateral ankylosis was observed in 42 patients (84%) whereas bilateral ankylosis was observed in 8 patients.

The pre-operative MIO was a mean of 2.6 mm ± 1.4. The mean postoperative MIO on 5th post op day was 31.3 mm ± 2.03 (Table 1) a statistically significant difference was seen (p value <0.001). Trauma was the commonest etiologic factor and was reported in 92% (n=46) of patients (Fig 2). This was verified in 76% (n=38) by presence of scar mark on the chin. Osteoma formed as the result of ankylosis can be palpated anterior to the auricle in 6.5% of the cases.

Surgical outcome showed facial nerve paresis in 4 patients (Table 2) who recovered over a period of 4 to 12 weeks. Tracheostomy was carried out for one of the patients who developed postoperative respiratory distress. Orthodontic treatment and further surgical procedure was recommended for two patients with open bite and few other patients with dentofacial abnormalities.

<table>
<thead>
<tr>
<th>Etiology</th>
<th>n (%)</th>
</tr>
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<tbody>
<tr>
<td>Trauma</td>
<td>46(92)</td>
</tr>
<tr>
<td>Chronic infection</td>
<td>3(6)</td>
</tr>
<tr>
<td>TMJ dislocation</td>
<td>1(2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean ± SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>0</td>
<td>6</td>
<td>2.60 ± 1.41</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>5th Post-operative</td>
<td>29</td>
<td>36</td>
<td>31.26 ± 2.03</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 1: ETIOLOGY OF TMJ ANKYLOSIS (n=50)

TABLE 2: COMPARISON OF PRE AND POSTOPERATIVE MAXIMAL INCISAL OPENING (n=50)
TABLE 3: SURGICAL OUTCOMES OF INTERPOSITIONAL ARTHROPLASTY (n=50)

<table>
<thead>
<tr>
<th>Surgical outcomes</th>
<th>n (%)</th>
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<tbody>
<tr>
<td>Temporary facial nerve palsy</td>
<td>4(8%)</td>
</tr>
<tr>
<td>Anterior open bite</td>
<td>2(4%)</td>
</tr>
<tr>
<td>Recurrence</td>
<td>0(0%)</td>
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</table>

DISCUSSION

Trauma is proven to be a predominant cause of TMJ ankylosis. Abbas et al in their study reported that 91.7% had trauma as the cause of ankylosis. Guruprasad et al in their study reported 77.7% of cases due to trauma. In our series of 50 cases, 45 were documented with trauma. This high frequency is predominantly because of improper treatment of condylar fractures. In sub-continent this high frequency may be attributed to poor utilization of dental services, distance to referral centers as well as due to non-availability of surgical expertise in remote areas. Moreover, lack of awareness and low-socio economic status of the people prevents them from seeking treatment in the early stage of the disease when the problem is not so grave.

Izumi et al suggested based on experimental studies on sheep model that the presence of intra articular hematoma as a result of intra articular damage leads to haemarthrosis, fibrosis and bone formation with resultant hypomobility and ankylosis. The kind of trauma that usually results in ankylosis of TMJ is predominantly experienced in childhood, and if no treatment is undertaken for a fracture of the condyle, the ankylotic mass grows in the juxta-articular tissue; this results in a bone mass of variable size. This bony mass was palpated in 6.5% of our cases in the pre-auricular region indicating excessive growth of bone lateral to the joint.

Several surgical techniques have been described in the literature, showing variable results. Gap arthroplasty was the foremost technique used and some surgeons still advocate it to be the treatment of choice as they have achieved good results with it. On the contrary, a study by Elgazzar et al has reported least satisfactory results with gap arthroplasty when compared with other techniques.

Currently the most popular surgical technique is interpositional arthroplasty using different autogenous or alloplastic materials. With alloplastic materials problem like infection, giant cell reaction, and abrasion of the implant may be encountered. This may favour reankylosis and hinder rehabilitation. This led to a wide use of autogenous grafts like dermis fat, subcutaneous fat, auricular cartilage, and temporalis muscle and fascia. Out of the different autogenous materials, temporalis muscle has proved to be a reliable muscle flap with predictable blood supply. Moreover it is a local flap associated with less surgical morbidity and thus less hospital stay. Kaban et al used it as a favoured lining of TMJ in joint reconstruction in children.

Reankylosis is a major concern in TMJ surgery. With temporalis muscle interpositional arthroplasty the recurrence rate is very low as compared with gap arthroplasty. In our study as well, we found no case of reankylosis by the end of 18 months of followup. Further longitudinal studies are required to compare temporalis interpositional flap with other methods of TMJ ankylosis management.

CONCLUSION

Temporalis muscle can be used as an effective interpositional material, with very low surgical morbidity for the treatment of temporomandibular joint ankylosis, as there was significant improvement in mouth opening of the patients immediately after surgery, and none of the patients showed any signs of relapse by the end of 18 months followup. Trauma was the major etiologic factor for TMJ ankylosis in patients treated a tertiary care hospital.

Early diagnosis and management of condylar fractures can prevent the patient from the dire consequence of TMJ ankylosis. There is a need for more maxillofacial surgeons in Pakistan.

REFERENCES

Management of temporomandibular joint ankylosis


