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COMBINED TEMPOROPARIETAL FASCIA AND THIN SILICON SHEET AS INTERPOSTIONAL ARTHROPLASTY FOR THE MANAGEMENT OF TMJ ANKYLOSIS- AN EXPERIENCE BASED ON SINGLE INSTITUTIONAL STUDY

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Abstract

Introduction: Temporomandibular joint ankylosis is a debilitating condition leading to problems in mastication, speech, digestion, oral hygiene and even facial appearance. The basic techniques for surgical correction of ankylosis include the gap arthroplasty, joint reconstruction or interpositional arthroplasty. The treatment of TMJ ankylosis poses a significant challenge because of technical difficulties and a high incidence of recurrence.

Material and Methods: 21 patients of temporomandibular joint ankylosis admitted from 2015 to 2018 in the Department of Plastic Surgery, SMS Hospital, Jaipur. . Diagnosis was based on history and clinical assessment supplemented with orthopantomogram (OPG) and computer tomographic scans. Mouth opening is measured as interincisoral distance using a scale. Intraoperatively, silicon sheet is sutured with the distal part of flap using non absorbable suture in half overlapped fashion with an overlapped portion across the joint space. Preoperative photograph is taken in all patients and serial post operative photograph were taken during their regular follow up

Results: 21 patients were part of the study (14 males and 7 females). 16 of our patients were post traumatic. Their age ranged from 7 to 55 years. The disease was unilateral in 19 cases and bilateral in 2 cases. The pre-op interincisal mouth opening ranged from 0 to 9 mm. The intra-operative interincisal mouth opening ranged from 28 to 46 mm. There was no immediate complication and no incidence of facial nerve injury. One patient with bilateral congenital TMJ ankylosis had recurrence. Five patients were lost after the initial 1-year follow-up.

Conclusion: Use of combined temporoparietal fascia with thin silicon sheet as interpositional arthroplasty provides extra protection in cases of TMJ ankylosis and thereby decreasing the incidence of its recurrence

Keyword: Ankylosis, TMJ, Interpositional arthroplasty

Introduction

Ankylosis of temporomandibular joint (TMJ) refers to adhesion of bones or fibrosis of Joint anatomical components which may finally lead to loss of function in the joint [1]. This condition leads to reduction of mouth opening and is associated with problems in mastication, speech, digestion, oral hygiene and even facial appearance (2)

TMJ ankylosis is classified into different categories, based on the position (intra or extra capsular), involvement of tissues (bony, fibrous or fibro osseous) and the extent of adhesion and rigidity of bones (complete or partial) [3].

It is believed that trauma as the most common cause of TMJ ankylosis can reduce the mobility of the joint by formation of intra-articular hematoma, scar, and extra bone at the site of injury [4]. The goal of treating patients with TMJ ankylosis is prevention of recurrence, achieving normal growth and occlusion, improving the appearance, restoring function, and motion of mandible which is a tough challenge especially in children. Hence, complete removal of fibrous or bony mass is an important step in the treatment of patients with joint ankylosis [5]. 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).

The treatment of TMJ ankylosis poses a significant challenge because of technical difficulties and a high incidence of recurrence. Excessive/ heterotopic bone formation, inadequate removal of ankylosed bone

medially, or leaving the medially displaced fractured condyle coupled with non compliance to the post release exercise regimen is the major cause for recurrence

Material and Methods

This is a prospective study carried out on 21 patients of temporomandibular joint ankylosis admitted from 2015 to 2018 in the Department of Plastic Surgery, SMS Hospital, Jaipur. All patients had the compliant of inability to open the mouth following trauma. Diagnosis was based on history and clinical assessment supplemented with orthopantomogram (OPG) and computer tomographic scans (Fig 1). Mouth opening is measured as interincisoral distance using a scale (Fig 6). Preoperative photograph is taken in all patients and serial post operative photograph were taken during there regular follow up. Patient with history of comorbidities(diabeties and hypertention), previous surgery and pregnancy were excluded from study. All patients were operated upon under general anesthesia with nasal endotracheal intubation.

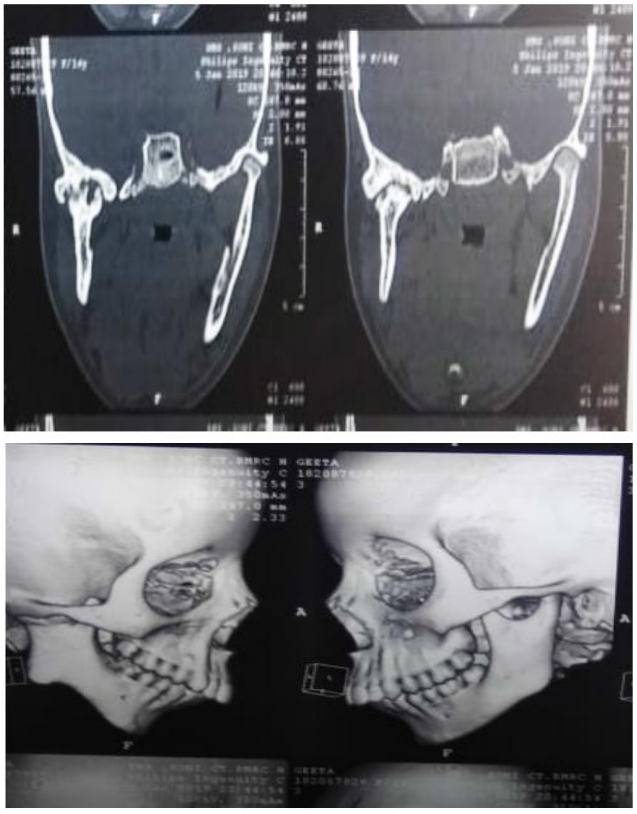

Figure 1: CT scan showing post traumatic right side TM joint ankylosis in a 14 years old child

Operative procedure

A written, informed and verbal consent was taken for the procedure. A course of the STA was marked with a handheld Doppler probe. Patient was operated under general anesthesia with a secure nasal endotracheal tube using fiber-optic bronchoscopy. Additional local infiltration done with epinephrine solution (1 : 100,000) over the scalp to limit blood loss during the flap harvest.

Incision we used was Al-kayat & Bramely's preauricular facelift incision, which is carried through hairline into the scalp in a semicircular fashion (question mark pattern)(fig 2). Dissection was carried out through the superficial temporal fascia, which was retracted anteriorly to protect the superficial temporal artery/vein and superficial temporal branch of facial nerve, and further the periosteum over the zygomatic arch was incised.

After exposing the joint and identification of the site of the ankylosis, excision of the fibrous and/or bony mass was done initially with drills and completed with a chisel. Care was taken to avoid injury to the internal maxillary artery underneath the condyle. It was followed by burring of the glenoid fossa creating a gap of approximately 10mm between the roof of the fossa and the mandible.

Deep TPF flap of sufficient length was marked on the temporal fascia and raised so that after rotation it would reach the joint site easily without any undue stretching. Thin silicon sheet of 1"x1" size is sutured with the distal part of flap using non absorbable suture in half overlapped fashion with an overlapped portion across the joint space. Distal part of flap with silicon sheet anchored at the base,medially and laterally with the available tissue. After achieving hemostasis, closed suction drain was placed andthe wound is closed in layers (fig 5).

Post op care- The drain was removed 48 hours post operatively and skin stitches are removed on the sixth postoperative day. Both active and passive physiotherapy using Heister mouth prop is started in the postoperative period to achieve complete mouth opening from the sixth post-operative day and continued for at least 6 months. Pre and postoperative mouth opening is compared by measuring the inter incisor distance and again at two yearly.

Figure 2: modification of classical pre-auricular incision

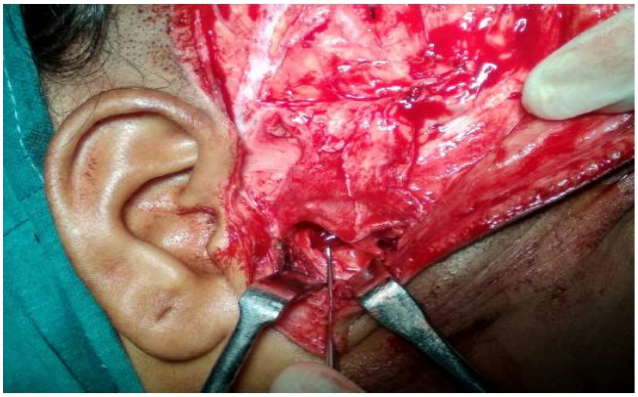

Figure 3: After removal of the ankylotic mass

Figure 4: Insertion of temporal fascial flap and thin silicon sheet stitched to prevent dislodgement

Figure 5: Wound closure with suction drain

Results

A total of 21 patients were part of the study (14 males and 7 females). 16 of our patients were post traumatic - 3 due to fall, 10 had road traffic accident, and in the remaining 3, the cause was blow over chin leading to condylar fracture and subsequently ankylosis. Their age ranged from 7 to 55 years [Table 1]. The disease was unilateral in 19 cases and bilateral in 2 cases. The pre-op interincisal mouth opening ranged from 0 to 9 mm. The intra-operative interincisal mouth opening ranged from 22 to 40 mm(Fig 6). Coronoidectomy was added in 4 of these cases. There was no immediate complication and no incidence of facial nerve injury. One patient with bilateral congenital TMJ ankylosis had recurrence. There was no extrusion of the implant in immediate and follow-up period. Five patients were lost after the initial 1-year follow-up.

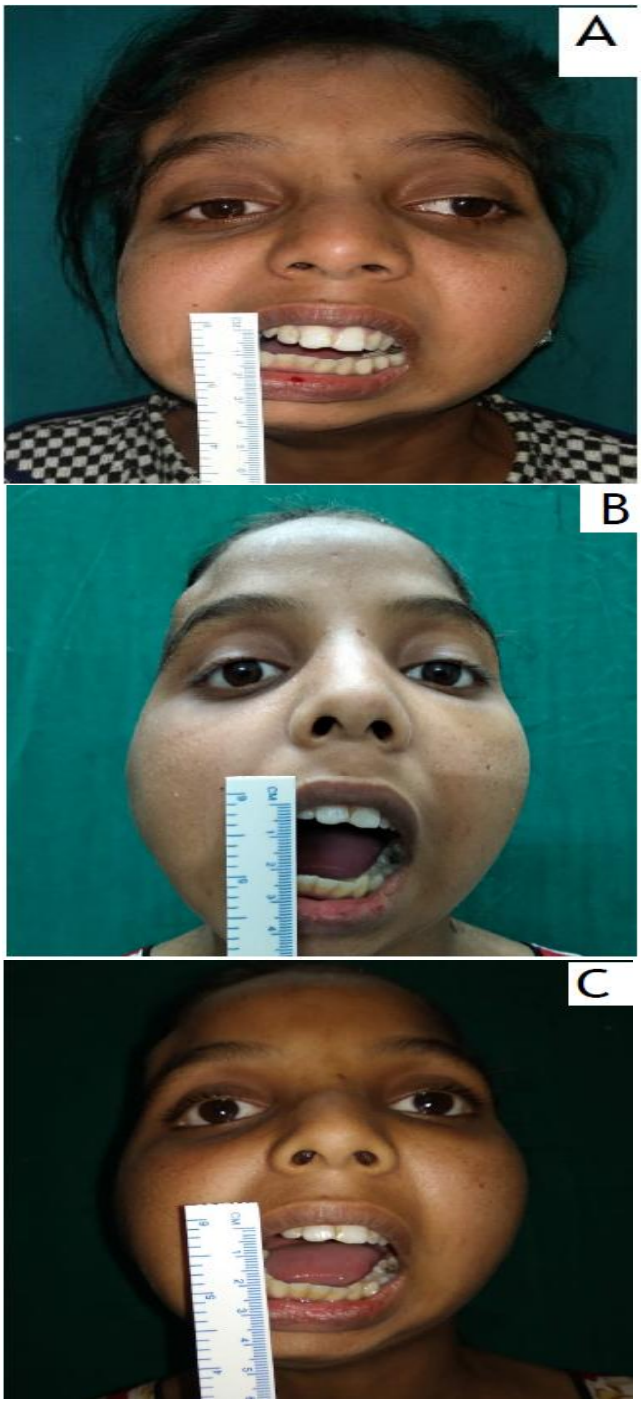

Figure 6: (A) pre-operative mouth opening, **(B)** post-operative mouth opening **(C)** 6 month follow up mouth opening

Table 1:

S.No.	Age (yrs)	Sex	Cause	Type	Unilateral(U) /Bilateral(B)	Duration (months)	Pre op mouth openig (mm)	Intra op mouth opening (mm)	Post op follow up maximum mouth opening (mm)
1	32	M	Trauma	Bony	U	12	1	28	27
2	12	M	Trauma	Fibrous	U	6	1.5	32	30
3	21	F	Trauma	Fibrous	U	5	Nil	34	35
4	48	M	Trauma	Bony	U	36	7	30	32
5	37	M	Trauma	Bony	U	144	Nil	38	33
6	7	M	Congenital	Bony	B	Since birth	Nil	22	8
7	30	F	Trauma	Bony	U	12	6	33	33
8	50	F	Trauma	Bony	U	120	Nil	40	36
9	14	M	Sepsis	Bony	U	48	Nil	29	30
10	35	M	Trauma	Bony	U	60	11	42	40
11	28	F	Trauma	Fibrous	U	3	9	36	35
12	9	M	Congenital	Bony	U	Since birth	5	26	27
13	26	M	Trauma	Bony	U	18	Nil	31	33
14	11	M	Trauma	Bony	U	24	8	30	30
15	6	F	Sepsis	Fibrous	U	3	10	35	34
16	55	F	Trauma	Bony	U	36	Nil	39	36
17	48	M	Trauma	Bony	U	24	Nil	37	36
18	7	M	Sepsis	Bony	B	8	4	25	26
19	33	M	Trauma	Fibrous	U	12	9	38	3
20	45	M	Trauma	Bony	U	60	Nil	31	30
21	17	F	Trauma	Bony	U	12	7	30	27

Discussion

The normal mouth opening in adults (measured as the interincisor distance) is between 40 and 56 mm. This distance in children varies, depending upon the age and stature of the child.

In post-traumatic ankylosis of TMJ, there is displacement or destruction of the meniscal cartilage.[6] As a result, there is bone to bone contact either directly or via blood clot which has a potential for osteogenesis, resulting in extensive fusion at the level of joint.[7]

Roychoudhury et al. have stated that in their series consisting of 50 cases of TMJ ankylosis, trauma was the aetiological factor in 86% of cases.[2] The aetiological factor in all cases in the present study was joint trauma. The treatment of TMJ ankylosis continues to be a topic of current interest because of difficulties encountered in surgical techniques and a high incidence of recurrence.

The fundamental aim in the treatment of TMJ ankylosis is the successful surgical resectioning of ankylotic bone, the prevention of recurrence, and aesthetic improvement by ensuring functional occlusion.[8] The techniques employed to that end are joint reconstructions performed with costochondral grafts or alloplastic joint prostheses, gap arthroplasty and interpositional arthroplasty.

At present, there is no ideal interpositional graft.[9] The problems encountered with the present grafts are: muscle shrinks and fibroses, fascia lacks bulk, cartilage tends to fibrose and calcify while alloplastic implants under functional loads disintegrate and cause foreign body giant cell reactions.[9-12] Although temporalis flaps are still the most popular choice of grafts, dissecting temporalis muscle leads to scar contracture of the donor site which may further exacerbate the trismus unless an ipsilateral coronoidectomy is performed.[10,13] The use of autogenous full thickness skin or dermis grafts as interpositional materials has also been published.[14] The advantages of the alloplastic material are: they are easy to use, have a short operating time and low cost; however, the disadvantages are foreign body reaction, dislodgement, and infection. Usually, silicone is used as a rectangle or a disc, but these must be rigidly fixed. In spite of this, dislodgement or extrusion may occur. It is recommended that the TMJ ankylosis should be dealt with aggressive surgical approach with minimal resection of bone in vertical height and using silastic interpositional material followed by early mobilisation of the joint. It not only results in satisfactory mouth opening and jaw function, but also ensures in reduction of subsequent re-ankylosis

Idea of using combined use of combined temporoparietal fascia with thin silicon sheet as interpositional arthroplasty is to provide extra protection in cases of TMJ ankylosis and thereby decreasing the incidence of its recurrence.

Conclusion

Use of combined temporoparietal fascia with thin silicon sheet as interpositional arthroplasty provides extra protection in cases of TMJ ankylosis and thereby decreasing the incidence of its recurrence.

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