

Treatment of temporomandibular joint ankylosis by gap arthroplasty and interpositional arthroplasty: A Retrospective study of 25 cases

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Abstract :

Aim : To study the etiology, occurrence in relation to age, sex, side and severity & choice of management of Temporomandibular joint Ankylosis and their outcome.

Material & Methods: This is a study of the cases, which numbered about 25 cases, had been operated by the Department of Plastic Surgery at Osmania General Hospital between January 2009 to March 2012 in association with department of Radiology & Dentistry. The Epidemiology, Causes and Management of Temporomandibular Joint Ankylosis and Outcome are studied in all patients. All these patients had clinical and radiological evidence of bony ankylosis with minimal inter incisor distance pre-operatively. The presence of bony ankylosis had been confirmed at surgery in all cases. The preoperative & post operative maximal inter incisor opening & complications were carefully examined in all patients.

Inclusion criteria: All cases, which have been diagnosed as true TMJ ankylosis.

Exclusion criteria: Those who have hemi facial microsomia and all other causes of false ankylosis.

Results: The patients who presented to us, were found to range from 3- 38 years of age, with most of them falling in the age group between 11 & 20 years. Most of our patients were females (18/25) and the main etiological factor was trauma (14/25). The results were analyzed based on comparison between pre and post operative inter incisor distance. In our study, most of the patients were attained 3.5-4cm of inter incisor distance after a period of 2-3 months with proper post operative molar bite blocks and chewing exercises which is very much satisfactory.

Conclusion: The main goal of treating temporomandibular joint ankylosis is to achieve adequate mouth opening with minimal chance of recurrence in long term follow up. This goal is achieved in our series with Early postoperative physiotherapy by using molar bite blocks, active chewing exercises and proper follow-up which is mandatory to prevent recurrence.

Keywords: Temporomandibular joint ankylosis, Interpositional arthroplasty.

I. Introduction

Ankylosis is a Greek word meaning “stiff joint”. A more complete definition of the TMJ ankylosis is “Restricted mobility and consolidation of at Temporomandibular joint”. Temporomandibular joint Ankylosis is a disorder that leads to restriction of mouth opening from partial reduction to complete immobility of jaw. TMJ ankylosis is an extremely disabling affliction that causes problems in mastication, digestion, speech, appearance and oral hygiene². In growing children with TMJ ankylosis deformities of mandible may occur together with malocclusion. It is most commonly associated with **trauma** and other causes being local infection or systemic disease such as Ankylosing Spondylosis, Rheumatoid Arthritis or Psoriasis. TMJ Ankylosis is essentially a condition afflicting the population of the “Developing countries” where the medical facilities are still not adequate. Despite the developments in Oral & Maxillofacial surgery, treatment of patients with ankylosis of the Temporomandibular joint still remains challenging. There is no consensus in existing literature of the best treatment for TMJ ankylosis. Several authors studied & developed different techniques but recurrence still remains the major problem. Currently three basic techniques commonly employed are Gap Arthroplasty, Interpositional Arthroplasty & Joint Reconstruction.

- Gap Arthroplasty : resection of bony mass without interposition material
- Joint Reconstruction: by bone grafts or microvascular reconstruction by transfer of second metatarsophalangeal joint³, distraction osteogenesis⁴, or joint prosthesis).
- Interpositional Arthroplasty: resection of bony mass with interposition of biological or non biological material

Several materials have been used for interpositional arthroplasty- temporal fascia, temporalis or masseter muscle, fascia lata, dermis, full thickness skin, autologous costochondral cartilage. Non-biological options comprise insertion of silastic materials and T-plates insertion among the non biological material options.

II. Material & Methods

This is a study of the cases, which numbered about 31 cases, had been operated by the Department of Plastic Surgery at Osmania General Hospital between January 2008 to February 2013 in association with department of Radiology & Dentistry. The Epidemiology, Causes and Management of Temporomandibular Joint Ankylosis and Outcome are studied in all patients. All these patients had clinical and radiological evidence of bony ankylosis with minimal inter incisor distance pre-operatively. The presence of bony ankylosis had been confirmed at surgery in all cases. The preoperative & post operative maximal inter incisor opening & complications were carefully examined in all patients. **Inclusion criteria:** All cases, which have been diagnosed as true TMJ ankylosis. **Exclusion criteria:** Those who have hemi facial microsomia and all other causes of false ankylosis.

Operative Technique:

All the patients were intubated successfully with awake blind nasal intubation and in one patient tracheostomy was done postoperatively as the child developed respiratory distress after immediate extubation. All the patients were routinely extubated next day when patient is stable. We, in Osmania General Hospital have been doing Gap Arthroplasty & Interpositional arthroplasty with Costo-chondral graft or Acrylic ball or Temporalis fascia. Any patient coming with restricted mouth opening is evaluated thoroughly before making the diagnosis of TMJ ankylosis. After preparation we approach the TMJ using inverted hockey stick incision. After making the incision we reach the bony mass, perform osteotomy & ostectomy and the adequate mouth opening is achieved. If mouth opening is adequate and if patient is in growing age costochondral graft would be the preferred and in an adult acrylic ball. If mouth opening is not achieved, we contemplate coronoidectomy, & subperiosteal stripping of vertical ramus done. In spite of this if mouth opening is not achieved the same will be tried on the opposite side in doubtful cases of ankylosis other side. Procedures like Sagittal split osteotomy, Genioplasty, Onlay bone grafting, are done only as secondary procedures.

Postoperative treatment: A pressure dressing is applied, which is laid directly over the wound. The patient is kept on antibiotic therapy for 7 to 10 days. After 24 hours the dressing is changed.

Aftercare: The patient who has undergone arthroplasty, especially gap arthroplasty, requires first of all an immediate splint inserted at the time of operation to prevent scar contraction. Scar formation has the tendency to pull the ramus up, which causes malocclusion and openbite. In addition the abnormal functional stress in the normal joint produces discomfort and pain during mastication. In bilateral cases an anterior open bite is likely to result, so that in these cases also scar contraction must be prevented. So, Early mobilization and aggressive physiotherapy initiated. The use of a splint to raise the bite increases the gap between the bone edges so that after the healing is complete there is slack which allows the patient to bring the teeth into occlusion when the splint is removed and permits free opening of the jaw. Increasing sizes of molar bite blocks atleast for 6 months prevents open bite and reankylosis. Bite blocks continuously for day & night for 3months. Next 3months for night time advised.

III. Results

This is a clinical study of 25 cases of TM joint ankylosis operated in the department of Plastic surgery, Osmania General Hospital during the period January 2009 to March 2012. The patients who presented to us, were found to range from 3- 38 years of age, with most of them falling in the age group between 11 & 20 years. Most of the patients were females (18) with M:F ratio of 1:2.57. In our series, 21 patients had unilateral involvement out of which 18 are left side, 3 are right side and bilateral involvement was seen in 4 patients. Most of the patients were presented with history of trauma (14) and remaining patients with infective (7) and unknown (4) etiology.

Age group	No. of males	No. of females	Total no.	%
1-10	2	3	5	20
11-20	4	13	17	68
>20	1	2	3	12

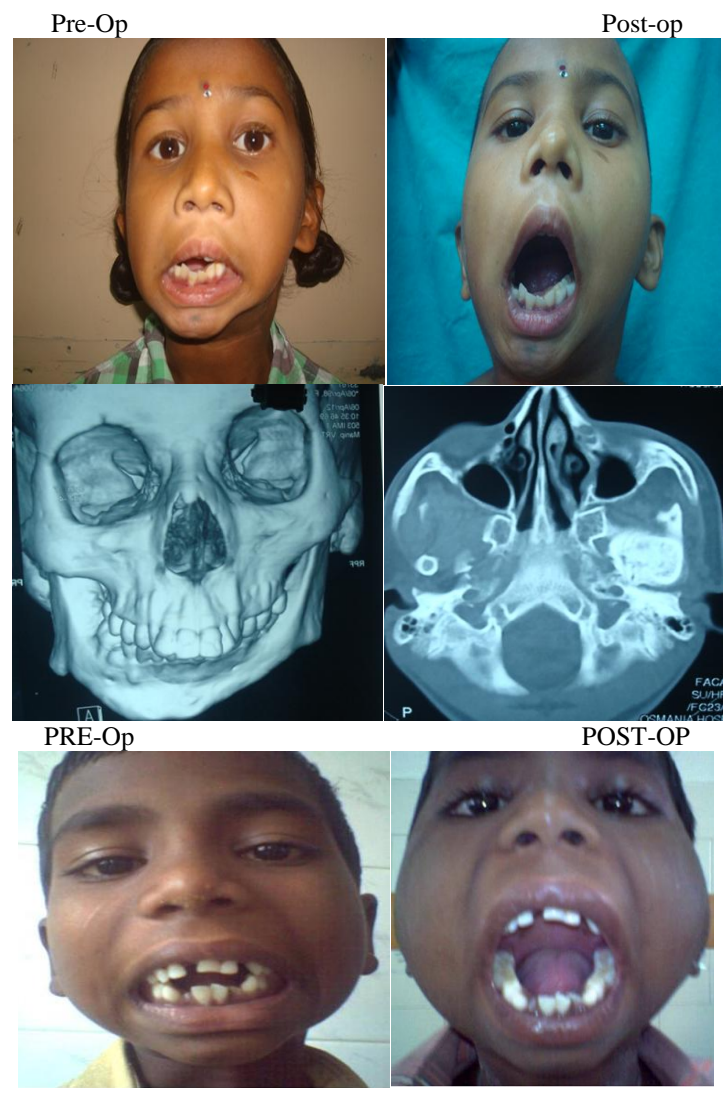
Among unilateral cases 14 cases underwent interpositional arthroplasty, 7 patients underwent gap arthroplasty. Out of 14 interpositional arthroplasty, Acrylic ball interposition was done in 10 patients, Costochondral graft in 4 patients. Among 4 bilateral cases, 2 cases underwent one side gap, one side acrylic

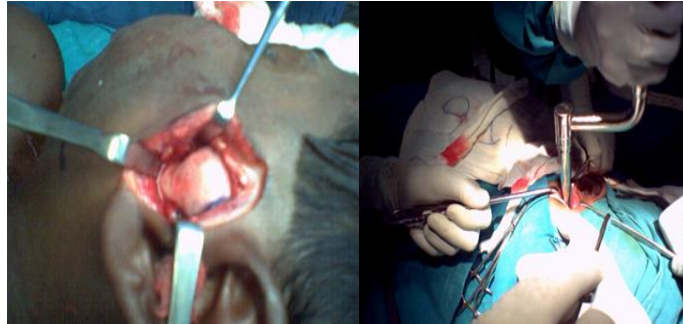
interpositional arthroplasty, 1 case:one side gap,one side costochondral interpositional arthroplasty and 1 case - one side costochondral interposition & other side Acrylic Ball interposition arthroplasty.

In our study, the results were analyzed based on pre-op and post-op inter incisor distance and the values were tabulated below:

Unilateral cases(21)	Gap arthroplasty(7)	Pre-op IID	No.of patients	Post-op IID	No.of patients
		0-0.5mm	5	3.5-4mm	5
		0.5-1mm	2	4-4.5mm	2
	Interpositional arthroplasty with costochondral cartilage(4)	0-0.5mm	3	3.5-4mm	2
		0.5-1mm	1	4-4.5mm	2
	Interpositional arthroplasty with Acrylic ball(10)	0-0.5mm	7	3.5-4mm	8
		0.5-1mm	3	4-4.5mm	2
Bilateral cases(4)	Gap arthroplasty and acrylic ball arthroplasty(2)	0-0.5mm	1	3.5-4mm	1
		0.5-1mm	1	4-4.5mm	1
	Gap&costo chondral cartilage arthroplasty(1)	0-0.5mm	1	3.5-4mm	1
	Cartilage interpositional arthroplasty&acrylic ball arthroplasty(1)	0.5-1mm	1	3.5-4mm	1

No recurrence was noticed in this study group over 2 years average follow up and also there were no complications observed in our study.





IV. Discussion

Normal mouth opening in adults is between 40-56 mm. This distance varies in children depending upon the age and stature of the child. Temporomandibular joint ankylosis not only affects mouth opening but also the normal growth pattern of the mandible⁵.

This is a study of 25 cases done between January 2009- March 2012 in the Department of Plastic Surgery at Osmania General Hospital, Hyderabad. Temporomandibular joint ankylosis is a common condition, seen mostly in younger age groups.

Factors, which were studied in the patients, were

1. Age group
2. Sex involved
3. History involved
4. Side involved.
5. Facial asymmetry.
6. Pre operative mouth opening.
7. Postoperative mouth opening.
8. Procedure done.
9. Complications.

All these patients had clinical and radiological evidence of bony ankylosis with an average inter incisor distance less than 5mm pre-operatively. The presence of bony ankylosis had been confirmed at surgery in all cases. The medical history, follow up period, pre operative & post operative maximal inter incisor opening & complications were carefully examined in all patients. OPG (orthopantomogram) and mastoid view radiographs were taken in all patients. CT scans are done to assess type, severity of ankylosis and to plan osteotomy at highest level as possible. Majority of our patients were between 11 and 20 years old and the overall age distribution was similar to patients treated by Borkbakan⁶ & Sawhney.

Trauma either noticed or incipient is the major cause. The absence of proper facilities for treating subcondyle fractures, common in young age groups, the fear of pain and consequent prolonged immobilization in the immediate post traumatic period lead eventually to ankylosis in such cases. Restriction in opening of mouth following trauma in children should always be suspected to be sub condylar fracture/intra capsular crushing of condyle which may eventually lead to TMJ ankylosis. The number of our cases resulting from infection was less than those of Borkbakan's in the same population. The widespread use of antibiotics at the earliest sign of infection, a common practice, may explain the less incidence infection.

The acrylic marble as interpositional material is a very simple, safe and cheap, can be fabricated locally. The operation is quick and does not require an additional surgical site, besides it maintains the gap along with the vertical length of ramus and allows the movements in all directions simulating a normal joint. There is no report of acrylic causing a foreign body reaction in our series when used as the interpositional material in the management of TMJ ankylosis. The type of the acrylic spacers we used were spherical. The spherical spacers enabled the patients for all jaw movements including lateral movements as well compared with the spacer applied by Sawhney who reported limited movement. Acrylic does not produce any long-term complications and is well tolerated.

In our series, interpositional arthroplasty using costo chondral graft was done in 6 patients. Mouth opening was satisfactory in all cases with a mean inter incisor distance of 3.6cms postoperatively. In all these cases normal molar occlusion was achieved by interposition with C.C. graft joint arthroplasty in children with no major complications.

In children with ankylosis condylar head can be reconstructed preferably with Costochondral graft as it got an additional advantage of growth potential so it minimizes the asymmetry in addition to preventing ankylosis in a well motivated child .Disadvantages include potential overgrowth of the graft, sub optimal postoperative range of motion, increased operating time and complications like donor site morbidity, pneumothorax and pleuritic pain.

V. Conclusion

The main goal of treating temporomandibular joint ankylosis is to achieve adequate mouth opening with minimal chance of recurrence in long term follow up. In our experience, Acrylic ball interpositional arthroplasty in adults was the procedure of choice with no major complications. Costochondral graft interpositional arthroplasty was choice of operation in children (potential for growth). Early postoperative physiotherapy with molar bite blocks & active chewing exercises and follow-up is mandatory to prevent recurrence. No recurrence was noticed in this study group over 2 years average follow up. The primary objective of adequate mouth opening which is long lasting is achieved in our series.

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