



## A Clinical Case Series of 20 Patients with Tmj Ankylosis Treated by Two Different Approaches

### KEYWORDS

Temporo-mandibular joint, Ankylosis, Interpositional arthroplasty, Gap arthroplasty

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**ABSTRACT** Ankylosis of temporo-mandibular joint causes many problems like mastication, digestion, speech, appearance and hygiene. So this study evaluated the results of ankylosis treated with interpositional arthroplasty using temporalis fascia flap and gap arthroplasty. Twenty cases of unilateral temporomandibular joint ankylosis were evaluated in this study with a follow-up of 2 years. All the patients were divided into two groups. Group A consisted of 10 patients in whom interpositional arthroplasty using temporalis fascia flap was done & Group B consisted of 10 patients in whom gap arthroplasty was done. Alkayat & bramley incision was given and ankylosed bone was removed by giving a cut on the mandibular side. An interincisal distance of 3.5 to 4 cm was achieved intraoperatively, and a 2 year follow up mean range was 4 to 4.4 cm. Those patients who underwent gap arthroplasty revealed no bony reunion after 2 years, and none of the patients showed recurrence. The follow up revealed no signs of deviation in any of the patients. Patient responses to follow-up inquiries suggested that there was 98% satisfaction with the range of mouth opening achieved.

### INTRODUCTION

The temporomandibular joint is a synovial joint formed between the mandibular condyle below and the articular fossa of the temporal bone above.<sup>1</sup> It 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.<sup>2</sup>

The joint is liable to suffer from a number of diseases, (commonly fractures of the mandible), some of which predispose to TMJ ankylosis. Ankylosis is defined as loss of joint movement resulting from fusion of bones within the joint or calcification of the ligaments around it.<sup>1</sup>



TMJ ankylosis can be classified anatomically as: intra-capsular or extra-capsular; functionally as complete or incomplete; according to the type of tissue involved as fibrous, fibro-osseous or osseous ankylosis.<sup>3</sup> Kazanjian (1955) classified ankylosis as true and false. Any condition that gives rise to osseous or fibrous adhesion between the surfaces of the temporo-mandibular joint is a true ankylosis. False ankylosis results from pathological conditions not directly related to the joint.<sup>4</sup>

TMJ ankylosis partially or totally prevents the patient from opening his or her mouth. This disabling condition causes speech impairment, difficulty with mastication, poor oral hygiene, and abnormalities of facial growth, generating significant psychological stress. It is most frequently associated with trauma, but local or systemic infection, tumors, degenerative diseases, intra-articular injection of corticoid, forceps delivery, and complication of previous TMJ surgery have also been implicated.<sup>5</sup>

The definitive treatment of ankylosis is surgery, which sometimes is followed by relapse. One of the primary surgical approaches was "condylectomy" through which the condyle is removed in accordance with the ankylosed bony callus. But there is a high incidence of relapse (reankylosis) with this approach.<sup>6</sup>

A number of surgical approaches have been devised to restore normal joint functioning and prevent reankylosis. Three basic techniques are used: (a) gap arthroplasty, where a resection of bone between the articular cavity and mandibular ramus is created without any interposition material; (b) interpositional arthroplasty, which adds interpositional material between the new sculptured glenoid fossa and condyle; and (c) joint reconstruction, when the TMJ is reconstructed with an autogenous bone graft or total joint prosthesis.<sup>5</sup>

### METHODS

In this study, 20 patients with unilateral TMJ ankylosis were included, who visited the Department of Oral & Maxillofacial Surgery, Indira Gandhi Government Dental College, Jammu, India. Preoperative assessment included a thorough history and physical examination to determine the side of affected condyle, duration of involvement and the assessment of preoperative, intraoperative and postoperative maximum interincisal opening measured with calipers. The radiographic examination included panoramic radiographs to determine the extent of ankylosis and rule out any other cause of limited mouth opening.





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Under general anesthesia, Alkayat & Bramley incision was given followed by exposure of the joint by inverted L-shaped incision. Ankylosed bone was removed by giving a cut on the mandibular side using a micromotor & then on the superior end, bone removal was completed using osteotome.



In group A after creating a gap between mandible & glenoid fossa, temporalis fascia was rotated & sutured in the gap between two bony ends, where as in Group B nothing was put between two bony ends. After putting a corrugated rubber drain, the wound was sutured in layers.



Patients were advised antibiotics. Mouth opening exercises with wooden spatulas were started from third day postoperatively - 5 times a day initially for 15 days followed by three times a day for 1 year. Sutures were removed after 7 days & patients were discharged from the hospital. Follow up assessment was performed at one month, 3 months, 6 months, 9 months, 1 year and 2 years. Interincisal distance, facial nerve deficit, TMJ movements, and deviation of mouth was recorded in every follow up appointment.

## RESULTS

A total of 20 patients were included in the study, out of which 12 were females and 8 were males. All the patients were in the age range of 6 to 25 years. The range of duration of ankylosis was from 2.5 to 7.4 years.

The mean range of pre-operative interincisal opening was 0.8 to 1.5 cm. An interincisal distance of 3.5 to 4 cm was achieved intraoperatively, and a 2 year follow up mean range was 4 to 4.4 cm. Patient responses to follow-up inquiries suggested that there was 98% satisfaction with the range of mouth opening achieved.

The follow up revealed no sign of paralysis in any of the five branches of the facial nerve and no signs of deviation in any of the patients. Those patients who underwent gap arthroplasty revealed no bony reunion after 2 years, and none of the patients showed recurrence.

## DISCUSSION

The treatment of temporomandibular joint ankylosis poses a significant challenge to maxillofacial surgeon because of its technical difficulty and high incidence of recurrence.<sup>7</sup> 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.<sup>8</sup>

According to Laskin, the principles of treatment of TMJ ankylosis are:

- Operate as early as possible;
- Keep the ramus high;
- Prevent recurrence by using an interpositional material in growing patients, to replace the condylar growth center; and
- maintain a post-operative program of active physiotherapy.<sup>9</sup>

However, there is still no agreed treatment, and results have been variable and often less than satisfactory. The most frequently reported operations include gap arthroplasty, interpositional arthroplasty and joint reconstruction with autogenous or alloplastic materials.<sup>10</sup>

Historically Esmarch was said to be the first one to perform

osteotomy for TMJ ankylosis in 1851 whilst Humphrey performed the first condylectomy in 1854. Gap arthroplasty was first advocated by Abbe in 1880 and interpositional material was first used by Risdon in 1934.<sup>3</sup>

Gap arthroplasty creates a gap between the articular cavity and the mandibular ramus, allowing pseudoarthrosis to develop in between the two ends of bone.<sup>3</sup> According to Kaban et al. the advantages of gap arthroplasty are its simplicity and short operating time and the disadvantages include creation of a pseudoarticulation and a short ramus, failure to remove all the bony pathology, and increased risk of reankylosis. A careful surgical technique, and subsequent meticulous attention to long-term physiotherapy are both considered essential to achieve a satisfactory result.<sup>11</sup>

Roychoudhury et al. recommended a gap of at least 15 mm between the recountoured glenoid fossa and the mandible and subjected this gap to extensive active jaw opening exercises to prevent re-ankylosis when using gap arthroplasty.<sup>12</sup>

Another study found that the functional and anatomic changes after gap arthroplasty by using animal models and showed that this procedure for TMJ ankylosis did not restore TMJ functionally and histologically to its preexisting state. Complications such as the development of an open-bite in bilateral cases, premature occlusion on the affected side with contralateral open bite in unilateral cases, and limited mouth opening post-operatively are possible.<sup>13</sup>

Various materials have been used such as skin, dermis, flaps of the temporal muscle/fascia, silicone and cartilage.<sup>10</sup> The first use of temporalis fascia and muscle as interpositional materials for treatment of TMJ ankylosis was done by Verneuil in 1872 [14]. Umeda et al. used temporalis fascia and muscle in 81 patients (115 TMJ) with post-traumatic TMJ ankylosis and suggested that inferiorly based myofascial temporalis flap, if carefully dissected, will remain stable. Cluster et al used myofascial temporalis flap in 182 cases of maxillofacial reconstruction resulting from trauma, anomalies, tumors, and ankylosis of TMJ. No complications were observed, therefore, they concluded that the method can be implemented with minimal morbidity.<sup>15</sup>

The advantage of the temporalis muscle and fascia flap is that, the donor site is close to the primary transfer site, vascularity is rich, donor site morbidity is minimal and less chance of damaging the facial nerve. The temporalis muscle and fascia flap produce bulk to fill the defect sufficiently. As the flap is rotated over the arch, zygomatic arch osteotomy is prevented. The estimated blood loss in the harvesting procedure is very minimal.<sup>16</sup>

Although this procedure is effective in preventing recurrence, some of the disadvantages of interpositional arthroplasty performed with the application of autogenous or alloplastic materials to the osteotomy region, as stressed in the literature, are the possible occurrence of donor site morbidity and resorptions, muscle shrinkage, atrophy and fibroses, fascia lacking bulk, cartilage tending to fibrose and calcify, and alloplastic implants under functional loads disintegrating and causing foreign body giant cell reactions.<sup>17</sup>

Various studies using different treatment approaches have been summarized in Table 1<sup>18,19,20</sup>

Irrespective of the surgical technique chosen, aggressive resection of the bony or fibrous ankylotic segment is crucial to avoid recurrence. A contralateral intraoral coronoidectomy is indicated if a 35 mm opening without force is not achieved intraoperatively, followed by reconstruction of the TMJ. After that, aggressive physiotherapy should be recommended in order to disrupt and prevent adhesions, prevent soft-tissue contractions and redevelop normal muscle function. Other complications include a risk for the facial nerve damage and loss of function of the frontalis and orbicularis oculi muscles. The preauricular approach modified by Alkayat and Bramley and the preauricular approach described by Ellis & Zide, when properly performed, may decrease the risk of damaging this nerve.<sup>20</sup>

#### CONCLUSION:

TMJ ankylosis remains relatively common in the third world countries. The current recommendation is to treat it as soon as recognized. Although there are some studies in the literature, which suggest equal success rate with gap arthroplasty alone, there is overwhelming evidence that interpositional arthroplasty has shown better results. Since the majority of the published studies on humans are case series, it is necessary to conduct studies with the same type of ankylosis and operative technique containing a larger sample in order to permit comparisons of the various forms of treatment.

**Table 1. Summary of some experimental studies using different treatment approaches**

Sr. no	Author, year	Technique	No. of cases	Range of preoperative inter-incisal opening (mm)	Range of postoperative inter-incisal opening (mm)	Recurrence rate (%)
1.	Lello; 1990	Interpositional arthroplasty (auricular cartilage)	13	-	30-48	7.6
2.	Posnik and Goldstein; 1993	Interpositional arthroplasty (costochondral)	9	3-13	12-30	0
3.	Ramezani et al; 2006	Gap arthroplasty Interpositional arthroplasty	22 26	8.7 ± 4.9 10.3 ± 3.9	32.1 ± 7.8 33.9 ± 5.2	20.8 12.5
4.	Abd El-Hamid et al; 2008	Interpositional arthroplasty (temporalis fascioperiosteal)	10 6	2-4 5-8	30-40 >40	0
5.	PRE-SENT CASE	Gap arthroplasty Interpositional arthroplasty (temporalis fascia)	10 10	8-15	40-44	0

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