# COMPARISON OF SILASTIC AND ACRYLIC INTERPOSITIONING FOR THE TREATMENT OF TEMPOROMANDIBULAR JOINT ANKYLOSIS

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#### ABSTRACT

The aim of this study was to compare the treatment outcome of thirty unilateral temporomandibular joint (TMJ) ankylosis cases treated in Pakistan Institute of Medical Sciences (PIMS), Islamabad within four years by either silastic or acrylic interpositional arthoplasty. Patients having bilateral TMJ ankylosis, age less than 16 years, coronoidectomy required during procedure, already operated cases and medically compromised patients were excluded from the study. Pre and post-operative assessment was done by thorough history, physical examination and radiographic evaluation (OPG and CT scan) to determine the cause of ankylosis, the maximal inter-incisal opening, complications including infection, presence of facial nerve paralysis and recurrence rate. The maximal inter-incisal opening in the pre-operative period ranged from 0-11mm and was recorded at a mean of  $32.7\pm5.8mm$  for cases treated with silastic interposition and  $29.5\pm6.8mm$  for the ones treated with acrylic one year after surgery. Infections, swelling, pain and nerve injuries were reported in both the groups post-operatively. Both silastic and acrylic were found to be statistically similar in terms of maximal inter-incisal opening, complications and recurrence rates. Recurrence was observed in only one patient treated by acrylic inter-positioning. Silastic however demonstrated itself to be a better choice in terms of handling and patient tolerability.

Key Words: TMJ ankylosis, interpositional graft, comparison of arthroplasty.

## **INTRODUCTION**

Ankylosis is a Greek term which means 'stiff joint'. Temporo-mandibular joint (TMJ) ankylosis is inability to open the mouth due to a fibrous or bony union between the mandibular condyle and the glenoid fossa, which replaces the articulation, resulting in restriction of movement.<sup>1</sup> The incidence of TMJ ankylosis is less in developed countries due to better understanding of condylar fractures and their complications. In developing countries like Pakistan lack of access to medical facilities and dearth of qualified professionals, the incidence of TMJ ankylosis is still comparatively high.<sup>2</sup>

The etiology of true TMJ ankylosis remains mainly inappropriately treated joint fractures due to trauma especially in childhood leading to facial deformity with restriction in oral functions which has devastating psychological repercussions.<sup>3,4</sup>

TMJ ankylosis is best managed through surgical intervention followed by physiotherapy.<sup>5</sup> Three basic surgical techniques are currently employed namely, gap arthroplasty, interpositional arthroplasty, and joint reconstruction. Several authors have researched and developed different techniques for the management of TMJ ankylosis but tarnished by the problem of recurrence.<sup>6</sup>

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Received for Publication: December 02, 2013
Revision Received: December 09, 2013
Revision Accepted: December 12, 2013

In recent years interpositional arthroplasty has gained popularity because of satisfactory long-term results and low recurrence rate but choice of interpositional materials is still controversial. Various autogenous tissues such as temporal muscle and fascia, fascia lata, cartilage, dermis, full thickness skin, perichondrium, rib, metatarsal, sternoclavicular and ulnar heads have been used as interpositional materials. The operative time and sophistication of procedure along with morbidity at the donor and recipient site have been reported after autogenous interpositional grafting.<sup>7</sup>

The alloplastic materials like vitallium, tantalum, teflon, acrylic and silastic or silicone rubber have also been used from time to time. In 1958 Walker<sup>8</sup> described the use of silicone as an alloplastic interpositional material in TMJ ankylosis surgery. Many further studies demonstrating the use of medical grade silicone showed successful long-term results but infection, extrusion and displacement were also reported as complications of silicone implants.<sup>9,10</sup>

Acrylic is another alloplastic material used as interpositional material with encouraging results. It is a biocompatible and inexpensive material that can be fabricated locally. In 1968 Borcbakan<sup>11</sup> used acrylic in the treatment of TMJ ankylosis. Acrylic was used in many studies after that in different shapes but infection, extrusion, foreign body reaction and problems of securing the graft in place were noted along with an additional procedure to prepare the acrylic graft.<sup>12,13,14</sup>

This study was designed to compare the results of silastic and acrylic as interpositional materials in the management of TMJ ankylosis. The core aim was to minimize postoperative morbidity and recurrence of TMJ ankylosis so that the sufferings of patients may be marginalized.

## METHODOLOGY

Study was carried out in Oral and Maxillofacial Surgery Department, Pakistan Institute of Medical Sciences (PIMS), Islamabad, Pakistan. Thirty patients with a clinical and radiographic diagnosis of unilateral TMJ ankylosis were included. Patients having bilateral TMJ ankylosis, age less than 16 years, coronoidectomy required during procedure, already operated cases and medically compromised patients were excluded from the study.

Patients were randomly distributed into two groups of fifteen patients each. Demographic data as well as clinical observations were documented. The degree of mouth opening was assessed by measuring the inter-incisal distance. A standard OPG was advised to every patient but in a few cases CT scan was also advised to accurately assess the medio-lateral extent of ankylotic mass. All patients were operated under general anesthesia by blind nasal or fiberoptic assisted nasal intubation in an elective list. The surgical approach to the joint was by A1- Kayat and Bramley modified pre-auricular approach.<sup>15</sup> Bony mass causing the ankylosis was removed creating space of 5-6mm with trial opening of the mouth using the gag.

In group A silastic (3-4mm thickness) was shaped and fitted into the gap and secured with a surgical soft stainless steel 25-gauge wire and titanium micro plate to the lateral surface of the joint eminence (Fig 1). In group B prefabricated, heat cured acrylic (3-4mm thickness) was shaped, trimmed and fitted into the gap and secured with wire (Fig 2). After achieving homeostasis, suction drain was placed and the wound closed in layers with tight mastoid dressing.

Immediate inter-incisal distance was noted at the operating table following completion of the procedure. Passive physiotherapy using chewing gum was advised from the  $2^{nd}$  post-operative day and active physiotherapy using wooden spatulas from the  $6^{th}$  which continued for at least 6 months. Patients were recalled for follow-up visits on  $1^{st}$ ,  $3^{rd}$  and  $6^{th}$  week then  $3^{rd}$ ,  $6^{th}$  and  $12^{th}$  month. Inter-incisal opening less than 15mm was considered as re-ankylosis. Complications like swelling, pain, interpositional material displacement and any nerve damage was documented. The collected data were analyzed by SPSS.

## RESULTS

Most of the patients were in the third decade of life. There were 56.7% (n-17) male and 43.3% (n-13) female patients (Table 1). The main etiological factor was trauma either due to road traffic accident (RTA) or fall especially at childhood during kite flying (Fig 3). 66.7% (n-20) patients reported with ankylosis of the right side and 33.3% (n-10) with left. Pre-operative inter-incisal distance (I<sub>1</sub>) ranged from 0-11mm (Table 2).

Post-operative inter-incisal ( $I_2$ ) opening was recorded at different follow-up visits (Table 2). In initial visit mouth opening of both groups was almost same but after one year follow-up post-operative mouth opening was found somewhat better in group "A"  $32.74\pm5.86$ mm as compared to group "B"  $29.54\pm6.89$ mm. When both groups were compared statistically with independent t test, p value was not significant ( $p \ge 0.05$ ).

However, when preoperative mouth opening was compared with postoperative mouth opening after one year a significant increase was found. p value was significant ( $p \le 0.05$ ). The net mean increase in inter-incisal distance was  $28.87\pm2.87$ mm in patients treated with silastic and  $26.17\pm4.13$ mm in the patients treated with acrylic.



Fig 1: Case Photographs: Silastic Interpositioning Arthroplasty



Fig 2: Case Photographs: Acrylic Interpositioning Arthroplasty

Post-operative complications, swelling, midline deviation, occlusal derangement, were negligible and statistically similar in both groups. More discomfort and pain was experienced during mouth opening exercises by the patients treated with acrylic interpositioning. Transient facial nerve injury was found in six (20%) patients (two from group "A" and four from group "B") and permanent injury to temporal branch of facial nerve was found in one patient from group "B". Graft was removed in one patient from group "A" and two patients from group "B" due to infection and displacement. Recurrence was observed in only one patient from group "B" in this study.



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		Frequency	Percent
Group A	Male	8	53.3
	Female	7	46.7
	Total	15	100.0
Group B	Male	9	60.0
	Female	6	40.0
	Total	15	100.0

## DISCUSSION

The treatment of TMJ ankylosis poses a significant challenge because of technical difficulties and a high incidence of recurrence. Interpositional arthroplasty with alloplastic materials was found to be superior to the other techniques because it has a shorter operative time, ease of application, minimized facial asymmetry and low recurrence rate. Additionally no donor site morbidity occurs with alloplastic use.<sup>16</sup> Silicon and acrylic are easily available, economical, biocompatible and friendly to implant at resected ankylosed space.<sup>2,17</sup> Silastic and acrylic were compared as interpositional materials in the treatment of TMJ ankylosis. Improvement in the inter-incisal distance/ mouth opening and reduction in post-operative complications are the main aims of any surgical techniques in the treatment of TMJ ankylosis.

The predominant age in this study was third decade of life. Higher incidence of TMJ ankylosis in this age group was also reported by Akhtar et al.,<sup>2</sup> Huang et al.,<sup>18</sup> He et al.<sup>19</sup> Limited mouth opening and difficulty in eating were the most common complaints of the patients however dyspnea and difficulty of speaking were also noted in some patients.

Post-operative inter-incisal mouth opening  $(I_{o})$ was evaluated and compared in both groups at different post-operative follow-ups. A gradual reduction in mouth opening was recorded in both groups in the initial visits (Table 2). The reason of this reduction may be difficulty in exercise due to pain or discomfort which is also reported by Huang et al.<sup>20</sup> During the later visits, mouth opening remained stable in both groups due probably to better compliance and motivation for mouth opening exercises. At the last follow-up visit reduced inter-incisal distance (I<sub>a</sub>) was found in both groups but less in group "A". This may be because silastic is soft rubber like material which allows more compressibility as compared to acrylic which virtually is non-compressible. Recurrence was observed in only one patient from group "B" who had mouth opening of 11mm post-operatively in this study. These findings were consistent with similar local and international studies.<sup>2,21,22,23</sup>

Swelling was observed in majority of the patients 93.3% (n-28) on the first week follow-up visit. Infection

Time of Analysis	Group A		Group B				
-	Mean	Std. Devi- ation	Std. Error Mean	Mean	Std. Devi- ation	Std. Error Mean	p val- ue
I <sub>1</sub>	3.8667	2.99682	.77378	3.3667	2.75465	.71125	
Immediately on Oper- ation Table	38.2667	2.15362	.55606	38.3333	2.16025	.55777	≥0.05
1week $I_2$	35.9333	4.63630	1.19709	34.7333	4.30061	1.11041	$\geq 0.05$
3 weeks $I_2$	34.0000	5.11301	1.32017	31.8667	4.38938	1.13333	
6 weeks $I_2$	34.1333	5.24904	1.35530	31.6000	4.91063	1.26792	
3 Months $I_2$	34.1333	5.44933	1.40701	31.1333	5.98649	1.54571	
6 Months $I_2$	33.2667	5.96977	1.54139	30.3333	5.92412	1.52960	
1 year $I_2$	32.7333	5.86109	1.51333	29.5333	6.88546	1.77782	
Net Increase	28.8666	2.86427	0.73955	26.1666	4.13081	1.06657	

TABLE 2: COMPARISON OF INTER-INCISAL DISTANCE AMONG STUDY GROUPS

occurred in a total of four (13.3%) patients to which specific antibiotics were prescribed after culture and sensitivity. In one patient (group A) infection subsided with antibiotics and in three patients (one from group Aand two from group B) infection resolved after removal of the interpositional material. Infection occurred due to breakage of wire and non-compliance of antibiotic therapy by patients. Swelling and infection were also reported with silastic and acrylic interpositioning in some other studies.<sup>2,13,17</sup>

Surgery is not the endpoint of TMJ ankylosis treatment. Postoperative care, as in every surgery is very important and non-compliance often results in failure. TMJ ankylosis in this regard needs more care and attention as post-operative mouth opening exercises are important for the successful outcome of arthroplasty. Chidzonga<sup>24</sup> reviewed 32 patients and reached to the final conclusion that failing to do jaw exercises was the main cause of relapse. The single most concern in the post-operative rehabilitation i.e. mouth opening exercises were found in almost every study regarding the treatment and management of TMJ ankylosis.<sup>25</sup>

### CONCLUSION

It is concluded that the TMJ ankylosis should be dealt with aggressive surgical approach using interpositional material followed by early mobilization of the joint in the form of aggressive physiotherapy. It results not only in satisfactory mouth opening and jaw function, but also ensures in reduction of subsequent recurrence rate. Silastic is an excellent interpositional material in handling and ease of use. However, acrylic is a good alternative if silastic is not available.

#### ACKNOWLEDGEMENT

Special thanks to Dr. Qaim-ud-din, Dr. Usman Qadir, and Prof. Iqbal Memon (Head, Anesthesia Department, PIMS, Islamabad) for their help and support. I am also thankful to Mr. Abdul Hafeez Mughal (IDL-Lab Technician) for helping to prepare acrylic grafts.

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