

**How to Cite:**

Patil, T., Kalsi, H. S., Kolte, D., Kharkar, V., Shinde, A., & Aaglawe, K. (2022). Functional restoration of TMJ ankylosis using temporalis muscle flap with post-operative physiotherapy: Review of five cases. *International Journal of Health Sciences*, 6(S6), 2944–2951. <https://doi.org/10.53730/ijhs.v6nS6.10524>

## **Functional restoration of TMJ ankylosis using temporalis muscle flap with post-operative physiotherapy: Review of five cases**

**Dr. Tejal Patil**

Assistant Professor, Oral & Maxillofacial Surgery, Bharati Vidyapeeth (Deemed to be University) Dental College & Hospital Navi Mumbai

\*Corresponding author email: [drtejalsankhe@gmail.com](mailto:drtejalsankhe@gmail.com)

**Dr. Harjit Singh Kalsi**

Professor & Head, Oral & Maxillofacial Surgery, Bharati Vidyapeeth (Deemed to be University) Dental College & Hospital Navi Mumbai

Email: [harjitkalsi.hsk@gmail.com](mailto:harjitkalsi.hsk@gmail.com)

**Dr. Deepak Kolte**

Assistant Professor, Oral & Maxillofacial Surgery, Bharati Vidyapeeth (Deemed to be University) Dental College & Hospital Navi Mumbai

Email: [deepakolte79@gmail.com](mailto:deepakolte79@gmail.com)

**Dr. Viraj Kharkar**

Associate Professor, Oral & Maxillofacial Surgery, Bharati Vidyapeeth (Deemed to be University) Dental College & Hospital Navi Mumbai

Email: [virajkharkar@gmail.com](mailto:virajkharkar@gmail.com)

**Dr. Anamika Shinde**

Assistant Professor, Oral and maxillofacial Surgery, Bharati Vidyapeeth (Deemed to be University) Dental College & Hospital Navi Mumbai

Email: [dranamicashinde@gmail.com](mailto:dranamicashinde@gmail.com)

**Dr. Khanderao Aaglawe**

Assistant Professor, Oral and maxillofacial Surgery, Bharati Vidyapeeth (Deemed to be University) Dental College & Hospital Navi Mumbai

Email: [aaglawekhaderao@gmail.com](mailto:aaglawekhaderao@gmail.com)

**Abstract**--Temporomandibular joint ankylosis is a highly distressing condition which involves the fusion of mandibular condyle with the base of skull causing dysphonia, dysphagia, facial deformity, impairment of upper airway and psychological stress. Because of the complex anatomy of the TMJ region, it becomes a challenging task for the surgeons to resect and restore the normal function of TMJ. Several

treatment modalities have been tried to treat the ankylosis to restore the normal joint function, such as gap arthroplasty, interpositional arthroplasty, and reconstruction of TMJ, among this interpositional arthroplasty with temporalis muscle flap is most commonly used as it prevents the reankylosis. We report a series of five cases of TMJ ankylosis which has treated with resection of ankylotic mass with Interpositional arthroplasty using temporalis muscle flap.

**Keywords**---active Physiotherapy, Heister Jaw Opener, Interpositional arthroplasty, Maximum mouth opening (MMO), Scissor Exercises, TMJ ankylosis, TMJ reankylosis, Temporalis muscle flap.

## **Introduction**

The temporomandibular joint is the joint that allows mastication and speech. It is a synovial joint formed between the mandibular condyle below and above by articular fossa of the temporal bone. The joint is liable to suffer from the number of diseases (commonly Fractures of mandible), some of which predisposes to TMJ ankylosis. Ankylosis is Greek terminology meaning 'stiff joint'. Ankylosis is defined as loss of joint movement resulting from fusion of bones within the joint or calcification of the ligaments around it [1] As compared to the western countries India has higher incidences of TMJ ankylosis, and the onset is believed to be before the age of 10years. Several etiological such has trauma, systemic diseases, infections (like otitis media, parotitis, tonsillitis, furuncle, etc.), tumors, degenerative diseases, intraarticular steroidal injections, forceps, delivery and complications of previous TMJ surgery have also been implicated. [2,3,4,5] Among this trauma is the most common cause of ankylosis [6, 7]. The TMJ ankylosis can be classified using a combination of location (intraarticular and extraarticular); type of tissue involved (bone, fibrous and fibroosseous); and extent of fusion (complete or incomplete). A variety of treatment modalities have been described in the literature.[8] Considering these premises, the present article is intended to present a series of five cases of TMJ ankylosis along with a brief discussion of interpositional arthroplasty and review of literature. The purpose of this article is to present our experience in the use of temporalis muscle flap in the reconstructive procedures in oro-maxillofacial region.

## **Review of five cases**

**Case1-** A 19 year old patient reported to our Department of Oral and Maxillofacial Surgery of the Bharati Vidyapeeth Deemed to be University Dental college and Hospital Navi Mumbai with the chief complaint of limitation in mouth opening and facial deformity [fig.1]. Patient gave history of otitis media at age of 5 years since then she noticed restricted mouth opening which progress gradually. On physical examination the mouth opening of patient was 15mm. CT scan revealed that the total bony union between the ramus and zygomatic arch. According to Sawhney (1986) classification [9], Type IV TMJ ankylosis was diagnosed bilaterally.

**Case2-** A 4 year old patient reported to our department with chief complaint of limitation mouth opening, difficulty in mastication, speech and facial deformity. Patient gave history of trauma at the age of 3 year, since then he noticed restricted mouth opening which progress gradually. On physical examination mouth opening of patient was 4mm. CT scan revealed that the total bony fusion with the condyle. According to Sawhney (1986) classification [9], type II TMJ ankylosis was diagnosed bilaterally.

**Case3-** A 6 year old patient reported to our department with the chief complaint of limitation in mouth opening and facial deformity. Patient gave history of trauma the age of 5 year and since then she noticed restricted mouth opening which progress gradually. On physical examination the mouth opening of patient was 3mm. CT scan revealed that the total bony union between the ramus and zygomatic arch on left side and fibrous adhesion on right side. According to Sawhney (1986) classification [9], Type I TMJ ankylosis was diagnosed on right side and Type IV on left side.

**Case4-** A 7 year old patient reported to our department with chief complaint of limitation of mouth opening, difficulty in swallowing, and facial deformity. This patient also had history of trauma at the age of 5 year then he noticed restricted mouth opening. On examination mouth opening of patient was 2mm. Bony union between the ramus and zygomatic arch with medial pole intact was appreciated on CT scan. According to Sawhney classification [9], Type III TMJ ankylosis was diagnosed bilaterally

**Case5-** A 5 year old patient reported to our department with chief complaint of limitation mouth opening, difficulty in speech, mastication, and facial deformity. Patient gave history of fall at the age of 4 years since then she noticed a restricted mouth opening. Preoperative mouth opening of patient was 4mm. CT scan revealed that the total bony union between the ramus and zygomatic arch. According to Sawhney (1986) classification [9], Type III TMJ ankylosis was diagnosed bilaterally.

The proposed treatment was for all the five cases resection of ankylotic mass and interpositional arthroplasty using temporalis muscle flap. All the patients were operated under general anesthesia. Alkayat-Bramley incision was planned to expose the ankylotic mass [fig.4]. Facial nerve surface marking was done to prevent injury to the temporal and zygomatic branch of facial nerve. [fig.2]. The ankylotic mass was removed using burs and chisel and mallet. 15mm gap was created at level of sigmoid notch [fig2] and special care was taken to resect the mass from medial side. A thin layer of temporal deep fascia and muscle was harvested from an area posterior and superior to the ear in order to avoid injury to the facial nerve branches, and deep temporal vessels and inserted over glenoid fossa and sutured with zygomatic periosteum. Forceful mouth opening of about 25 mm was done using Heister's jaw opener at the time of surgery. The wound was then closed in layers [fig3]. Post operatively aggressive physiotherapy was initiated in order to prevent reankylosis. On follow-up no signs of reankylosis were observed, mouth opening between the range of 35-38mm was present in all the five cases and which was clinically acceptable. [fig3].

### **Physiotherapy Post Surgery**

Phase 1 (7-14 days after surgery): mobilization—gentle opening of the jaw; forced opening 3 times/day with scissor exercises (3 to 5 reps with 10-second holding); oral education, pain relief. Phase 2 (14-21 days after surgery): previous exercises; mobilization—forced lateral movement exercises (1 to 5 reps with 10-second holding, 3 times/day); opening contractions with 10-second holding, 3 times/day); oral education, pain relief. Phase 3 (21-28 days after surgery): previous exercises; mobilization—lateral, and anterior; forced opening exercises (2-3 minutes, 3 times/day) oral education. [17] The post-operative course was uneventful. A mouth opening of 12 mm was noted 2 days after surgery. Vigorous post-operative physiotherapy was started to maintain the mobility of the joint. After 5 days with physiotherapy using wooden spatula, mouth opening was noted to be 16 mm. Later mouth opening exercises was started. The patient was instructed to continue with exercises for at least a period of 1 year. The post-operative mouth opening of 35-38mm was noted 2 days after surgery. The patient was instructed to continue with exercises for at least a period of 1 year.

### **Discussion**

Treatment of TMJ ankylosis requires surgical intervention several treatment modalities have been described in the literature. Moorthy and Finch [8] have broadly classified the treatment of ankylosis of the TMJ in three groups:

- Condylectomy
- Gap arthroplasty
- Interpositional arthroplasty

Condylectomy is rarely performed now because of the disadvantages such as reankylosis shortening of the ramus height. Topazian's review of gap arthroplasty without interposition reported a recurrence rate as high as 53% [10]. Gap Arthroplasty was developed by ABBE (1880) and revised by RISDON (1934)[11] Most surgeons tend to agree, however that the recurrent ankylosis is less likely if material is interposed between the divided bone ends. So, we opted for an interpositional arthroplasty with temporalis muscle flap. Controversy arises over whether to place alloplastic materials (Proplast, Teflon, Silastic Methyl methacrylate etc.) or autogenous tissues (Fascia lata, muscle, full thickness skin or cartilage) into the defect. Among this temporalis muscle flap is most commonly used. Temporalis muscle flap was first used by GOLOVINE [12]. The muscle is described as fan shaped, thin peripherally and thick centrally. Temporalis muscle is in close vicinity to TMJ and is supplied by deep temporal arteries. Temporalis muscle has been used for about 100 years for restoration of the craniofacial area. We have used this temporalis muscle flap in this patient and found this layer to be substantial with robust blood supply and satisfactory arc of rotation to fill in the defect of ostectomy, the temporal muscle flap has many advantages in TMJ surgery over other technique and tissues are [13]; only one surgical site is required, flap is vascularized and maintain its viability, ease of handling, proximity to the TMJ, good functional results and minimal complication.

Regardless of any surgical modalities to be used, it is necessary to achieve following goals in treatment of TMJ ankylosis surgery; [11]

- release of ankylosed mass and creation of gap to mobilize the joint.
- creation of functional joint.
- to reconstruct the joint and restore the vertical height of the ramus.
- to prevent recurrence.
- to restore normal facial growth pattern.
- to improve esthetics and rehabilitate the patient.

Alkayat-Bramley incision was planned for our case. Alkayat and Bramley [14] in 1979 described a modified preauricular approach to TMJ and zygomatic arch considering the main branches of the vessels and nerves in the vicinity. The facial nerve divides at a point between 1.5 and 2.8cm below the lowest concavity of the bony external auditory canal, according to Alkayat and Bramley. But in some cases the nerve is found as near as 0.8cm and as far anteriorly as 3.5cm [14]. Advantages of incision over the others are: better access and visibility, wider exposure and to prevent injury to the branches of facial nerve Kaban et al [15] described a protocol for the TMJ ankylosis in 14 patients with a one year follow up. According to the paper, this protocol is ideal for treating this condition, it consists of: aggressive resection of ankylotic mass, ipsilateral coronoidectomy, contralateral coronoidectomy if needed with interposition with temporal fascia or cartilage, reconstruction of ramus with a costochondral graft, rigid fixation movement as soon as possible and a physiotherapy in shortest time possible. Paul C Salins [16] described a protocol for TMJ ankylosis in 14 patients with a one year follow up.

According to the paper, Salins protocol states that the bony mass represents the pathology responsible for the ankylosis; it is not a neoplastic process capable of continued growth. For this reason, excision of this mass is not necessary for the release of ankylosis. An osteotomy performed inferior to the base of the ankylotic mass converts this into situation akin to that of a subcondylar fracture. It is of prime importance that Active physiotherapy is undertaken to further improve mouth opening and mainly to prevent re-ankylosis. The most important and significant finding in our cases is the importance of early and active physiotherapy. We started this from the very first post-operative day. It consisted of active mouth opening exercises with Heister's jaw opener, stretching with fingers, by wooden sticks, moist heat application etc. The same was continued for a period of six months and followed upto 1 year. Hence with the findings & experience gained by the review articles, we can confidently say that early and active physiotherapy following TMJ ankylosis surgery will prevent postoperative adhesions and reankylosis.[17] In the immediate post-operative phase, physical therapy is provided primarily to reduce the traumatizing effects of surgery.[18] The most frequent complications of surgery for the treatment of ankylosis are: limited mouth opening, reankylosis, occlusal defects, facial nerve injury. But in our case during the follow up no reankylosis, no damage to facial nerve was observed.

## Conclusion

Regardless of surgical treatment used the basic aim of treatment should be to achieve the adequate mouth opening and to prevent reankylosis. Careful surgical technique and meticulous physical therapy of long duration are essential to avoid reankylosis and attain satisfactory results. Interpositional arthroplasty using temporalis muscle flap is a best available and reliable method to prevent reankylosis. Complete and adequate resection of the ankylosed mass and postoperative active mouth opening exercises are essential in the treatment of TMJ ankylosis. Moreover, a more comfortable mouth opening guide can be achieved using a proper physiotherapy. The physiotherapy with Hiester jaw opener from 1<sup>st</sup> day to 6th day in MMO which shows that mouth opening exercise are effective in patients with reduced mouth opening. Based on current literature it can be concluded that physiotherapy plays important role in achieving good postoperative results after TMJ surgery.

## References

1. Iram Abbas, Muhammad Jamil, Muhammad Jehanzeb, Shah M Ghous. TMJ ankylosis: Experiment with interpositional gap arthroplasty. J. Ayub Medical College Abbottabad. 2005; v.17 (4).
2. Balaji, 2003; Andrade; Cavalcante; Raymundo et al; 2009 and Vsconcelos; PORTO; BESSA- Nogueira et al, 2009
3. Kobayashi R, Utsonomiya T, Yamamoto H, Nagura Ankylosis of TMJ caused by Rheumatoid arthritis; a pathological study and review .J. Oral Sci 2001;43(2);97-101.
4. Baykul T, Aydin Ma, Nasir S. Avascular necrosis of the mandibular condyle causing Fibrous ankylosis of the temporomandibular joint in sickle cell anaemia. J Craniofacial Surgery 2004; 15(6):1052-6.
5. Herford AS, Boyne PJ. Ankylosis of the jaw in a patient with Fibrodysplasia ossificans progressiva. Oral Surg Oral Med Oral Pathol Oral Endod 2003;96(6);680-4.
6. Su-Gwan Treatment of TMJ ankylosis with temporalis muscle and fascia flap. Int J Oral Maxillofacial Surg 2001; 30(3):189-93.
7. Roychoudhury, A. Prakash , H. Trikha A. Functional restoration by gap arthroplasty in TMJ ankylosis. Oral Surg Oral Med Oral Pathol Oral Endod, v.87, n.2, p.166-9, 1999.
8. Moorthy, A.P, and Finch L.D (1983). Interposition arthroplasty for ankylosis of TMJ. Oral Surgery, Oral Medicine, Oral Pathology. 55:545.
9. SAWHNEY, C.P. Bony ankylosis of TMJ: follow-up of 70 patients treated with arthroplasty and acrylic spacer interposition. Plast. Reconstructive Surg, v.77, p.29-40, 1986.
10. Topazian, R.G (1964): Etiology of ankylosis of TMJ analysis of 44 cases Journal Oral Surgery. 22: 227.
11. RISDON, F. Ankylosis of the TMJ. J. Am. dent. Assoc., v. 21, p. 1933-7, 1934.
12. Chosegros C, Guyat L, Cheynet F, Blanc JL, Gola R, Bourezak Z, Conarth J, Comparison of different materials for interposition arthroplasty in treatment of TMJ ankylosis surgery; long term follow up in 25 cases. Br J Oral Maxillofacial Surgery 1997;35:157-60.

13. YU, B. H.; SHEN, F. G.; ZHANG, L. S. et al., Navigation-guided gap arthroplasty in the treatment of TMJ ankylosis. *Int. J. Oral Maxillofacial Surg.*, 2009.
14. Al-Kayat A, Bramley PA modified preauricular approach to TMJ and malar arch. *Br.J. Oral and Maxillofacial Surg* 1979; 17:91-103.
15. Kaban LB, Perrot DH, fisher K. a protocol for management of TMJ ankylosis. *J. Oral Maxillofacial Surgery* 1990; 48: 1145-51; discussion 1152.
16. P.C.Salins: New perspectives in the management of cranio-mandibular ankylosis. *Int. J.Oral Maxillofac.Surg.*2000; 29:337-340.
17. De Meurechy NKG, Loos PJ, Mommaerts MY. Postoperative Physiotherapy After Open Temporomandibular Joint Surgery: A 3-Step Program.*J Oral Maxillofac Surg.* 2019 May;77(5):932-950. doi: 10.1016/j.joms.2018.12.027. Oh D.W.
18. Kim K.S.Lee G.W.The effect of physiotherapy on post-temporomandibular joint surgery patients.*J Oral Rehabil.* 2002; 29: 441
19. Suryasa, I.W., Sudipa, I.N., Puspani, I.A.M., Netra, I.M. (2019). Translation procedure of happy emotion of english into indonesian in kṛṣṇa text. *Journal of Language Teaching and Research*, 10(4), 738–746
20. Suryasa, W. (2019). Historical Religion Dynamics: Phenomenon in Bali Island. *Journal of Advanced Research in Dynamical and Control Systems*, 11(6), 1679-1685.
21. Gandamayu, I. B. M., Antari, N. W. S., & Strisanti, I. A. S. (2022). The level of community compliance in implementing health protocols to prevent the spread of COVID-19. *International Journal of Health & Medical Sciences*, 5(2), 177-182. <https://doi.org/10.21744/ijhms.v5n2.1897>

### Legends for Figures



Fig 1. Preoperative photograph



Fig 2. Exposure of TMJ Ankylosis



Fig 3. Wound Closure and Postoperative mouth opening