Interpositional Arthroplasty with Temporomyofascial Flap to Correct TMJ Reankylosis in Child: A Case Report

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Temporomandibular joint ankylosis (TMA) is a highly distressing condition in which the temporomandibular joint (TMJ) is replaced by scar tissue. Most frequently reported complications after surgical treatment are limited mouth opening and re-ankylosis. Reankylosis happens due to inadequate bone removal, lack of sufficient interpositional material, fibrous tissue adhesions and elongation of coronoid process and regrowth of bone in the sigmoid notch area. In gap arthroplasty treatment chances to recurrence is 53% than interpositional arthroplasty. We treated a case of right sided TMJ reankylosis by interpositional arthroplasty with temporomyofacial flap and physiotherapy was started 3 days after surgery and maintained for 6 months. In 2 years follow-up, no signs of recurrence and maximum mouth opening 45 mm were observed. The success in preventing reankylosis after TMJ interpositional arthroplasty with temporomyofacial flap is relatively better than gap arthroplasty alone.

Keywords: Interpositional arthroplasty, Physiotherapy, Temporomyofacial flap, TMJ reankylosis

INTRODUCTION

Temporomandibular joint ankylosis (TMJA) is a highly distressing condition in which the TMJ is replaced by scar tissue.¹ TMA involves fusion of the mandibular condyle to the base of the skull.² Laskin (1976) reported a higher incidence of post-traumatic ankylosis in children.³ This disabling condition can cause speech impairment, difficulty with mastication, poor oral hygiene facial and mandibular growth problems, compromised airway.¹,³,⁵ TMJA is most frequently associated with trauma and local or systemic infections, but also other causes like tumors, degenerative diseases, intra-articular injection of corticoid, forceps delivery, and complication of previous TMJ surgery are reported in literature.¹,³,⁵ Rarely it is congenital.⁵

According to the literature, surgical treatment is mandatory for TMJA correction. Early detection and immediate intervention by resection and reconstruction can improve patient’s comfort and functional rehabilitation.² Surgical approach causes immediate and delayed complications like vascular injury and hemorrhage, facial nerve paralysis or transient injury to nerve, infection, otologic complications due to injury of external acoustic canal, malocclusion, recurrence of ankylosis, trismus, and pain in temporal region. However, the most frequently reported complications after surgical treatment are limited mouth opening and re-ankylosis.⁶,⁷

Reankylosis happens due to inadequate bone removal, lack of sufficient interpositional material, fibrous tissue adhesions, and elongation of the coronoid process and regrowth of bone in the sigmoid notch area. Various surgical treatment modalities have different recurrence rate. High recurrence rate was reported with the treatment of gap arthroplasty than others.

This case showed signs of TMJ reankylosis, were reported within 4 months of gap arthroplasty treatment which is the short time period. Routinely recurrence of TMJA is reported after 6 months of surgical intervention. Hence, this case was operated immediately after diagnosis with interpositional arthroplasty with temporomyofacial flap successfully. Other reason is very less literature available for reankylosis of TMJ and its treatment.
**CASE REPORT**

A 9-year-old boy reported to the department of oral maxillofacial surgery at Narsinhbhai Patel Dental College and hospital, Visnagar with complaint of difficulty in mouth opening since last 4 months of his TMJA surgery which was done 8 months back. He had a history of right TMJ trauma before 3 years and limited mouth opening for 2 years after the trauma. Then he was undergone gap arthroplasty before 8 months. After 2 months of surgery his parents noticed reduced mouth opening and severe pain while physiotherapy exercises. Patient had a history of malocclusion for 1 month and deviation for 3 months postoperative period after 1st operation which was resolved by itself. Patient had preoperative maximum mouth opening of 15 mm (Figure 1) and also had flattened and elongated left side face and fullness present on the right face (Figure 2). The 3D computed analysis showed a gross bone mass of 7 mm on the medial side of TMJ and absence of condyle. Coronal and axial slides showed an only medial side of TMJ bone mass was present which suggested Type-III TMJA (Figure 3).

A written, informed consent was taken prior to the procedure. Patient was operated under general anesthesia with the use of fiberoptic intubation. The left temporal region was shaved preoperatively. Cotton soaked in antibiotic ointment placed into the external auditory meatus. Approach to the TMJ region was gained using Al-Kayat and Bramely’s (1979) modified pre-auricular incision (Figure 4). The incision was made through the skin and subcutaneous connective tissues (including temporoparietal fascia) to the depth of the temporalis fascia (superficial layer). Blunt dissection with periosteal elevators undermined the superior portion of the incision (above the zygomatic arch) so that a flap can be retracted anteriorly for approximately 1-1.5 cm. The superficial temporal vessels and auriculotemporal nerve were retracted anteriorly in the flap. An incision was made through the superficial (outer) layer of temporalis fascia beginning from the root of the zygomatic arch just in front of the tragus anteroposteriorly toward the upper corner of the retracted flap. A periosteal elevator inserted beneath the superficial layer of the temporalis muscle was used to strip...
periosteum off the lateral portion of the zygomatic arch, and continued the dissection below the arch just superficial to the capsule of the TMJ. The lateral capsular was cut to expose the joint space and bony ankylosis. Subperiosteal dissection was continued for maximum exposure of the bony components of the residual condyle, fossa, and neck of the condyle. Excision of the fibrous tissue and ankylosic bony mass was carried out using a round bur until a thin layer of bone remained on the most medial aspect of the bony union (Figure 5). To avoid injuring the internal maxillary artery or pterygoid plexus of veins, the osteotomy was completed very carefully with a curved chisel. The condylar fragment was then removed and the condylar stump and glenoid fossa were recontoured with surgical shaving burs (Figure 6). A thin layer of temporal deep fascia and muscle was harvested from an area posterior and superior to the ear in order to avoid any branches of the facial nerve, taking care not to harm the deep temporal muscle blood vessels (Figures 7 and 8). Patient had 45 mm intraoperative mouth opening (Figure 9). The flap was inserted over the glenoid fossa and sutured with the zygomatic periosteum. The wound was then closed in layers, and the negative mini drain was put (Figure 10).

Patient was put on physiotherapy from the 4th post-op day as immediate mobilization may provoke bleeding and create a large hematoma with delayed healing and an increased

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**Figure 5:** Bony ankylosed mass on medial side

**Figure 6:** Gap arthroplasty minimum 1 cm

**Figure 7:** Intraoperative mouth opening was 44 mm

**Figure 8:** Temporomyofacial flap

**Figure 9:** Interposition of Temporomyofacial flap
likelihood of wound breakdown, disorganization, and ossification. He had post-operative 44 mm mouth opening (Figure 11). No signs and symptoms of ankylosis with 1 year follow-up.

**DISCUSSION**

Various treatment methods of TMJA have been described in the literature and three basic techniques have been developed for surgical correction of disease: (1) Gap arthroplasty: Aggressive resection; (2) Interpositional arthroplasty: Various materials are interposed between glenoid fossa and ramus. Autogenic materials included temporalis muscle, temporomyofascial flap, temporalis fascia, costal cartilage, auricular cartilage, masseter muscle, buccal fat pad graft, skin graft, allografts included human amniotic membrane, fresh disc allograft, and alloplastic materials included silicone plates are used. (3) Total joint reconstruction: Autogenous material included costochondral graft, iliac crest, fibular, sternoclavicular, metatarsal, coronoid, posterior border of ramus for reconstruction, and alloplastic devices for TMJ reconstruction included Kent-Vitek total prosthesis, christensen prosthesis, lorenz prosthesis, TMJ concepts/techmedica custom made total joint prosthesis. Recently new techniques have been introduced and in practice like distraction osteogenesis/transport distraction and tissue engineering and role of stem cells.

Reankylosis is the most commonly reported post-operative complication. Arthroplasty without using any interpositional material requires minimum 1 cm of the gap to prevent pseudoarthrosis. According to malik and topazian 53% recurrence rate occurred in gap arthroplasty than interpositional arthroplasty. Gap arthroplasty alone has disadvantages of pain, crepitus, degenerative changes, limited movement, and reankylosis. However, Roychoudhury reported the long-term functional results of gap arthroplasty were satisfactory and comparable to those obtained through use of other treatments.

Brusati et al. and Smith et al. concluded that temporalis muscle has good functional results, replaces absent or damaged disc, and anatomical location of the muscle flap makes the harvesting of the graft very easy. Balaji evaluated the long-term results of temporalis muscle flap and costochondral graft as interpositional material and concluded that temporalis muscle is an ideal interpositional material due to its close proximity to the site, good vascular supply and minimal risk of nerve damage and lesser disadvantages than costochondral graft. Bayat reported that the gap arthroplasty with the temporalis muscle flap as an interpositional material was an effective method in the treatment of TMJ ankylosis with 6 months post-operative physiotherapy. In 2010 Yazdani et al. had done comparison between temporalis myofascial flap and dermal graft during a short-time follow-up. They found no statistically significant mouth opening results between the two procedures, but advantages were more in temporalis myofascial flap. Erol et al. and Zhi et al. compared costochondral graft reconstruction in gap arthroplasty and interpositional arthroplasty procedure in two different studies. And concluded that reankylosis was noted in 3 cases (5%) in whom gap arthroplasty had been used. Tripathy have used costochondral graft in 7, temporalis fascia in 9 and alloplastic material in 11 patients. The postoperative period was uneventful in all cases and none required reoperation for recurrence. They obtained the mouth opening more than 50 mm in 5 patients of the 7 patients used costochondral graft. In the temporalis fascia group, the same value was achieved in all patients. They suggested interpositional arthroplasty, especially with the pedicled temporal fascia flap was the best method to prevent recurrence and establish enough mouth opening.
Disadvantages of costochondral graft are the poor quality of medullar and cortical bone, the possibility of resorption or infection, bone flexibility, elasticity that may cause the graft to be deformed, possible separation of the cartilage from the bone, and occasional fractures. Other methods including dermis, skin-fat, muscle, and auricular cartilage grafting and suggested that these methods could not obtain ramus height sufficiently and although they may protect against reankylosis, there might be a risk of restricted mouth opening. Auricular cartilage has disadvantages like low risk of donor-site morbidity, the graft may tear or perforate under pressure from the condyle postoperative period and may show some degree of cartilage proliferation and may not maintain ramus height well when the wide resection of ankylosis mass require. Karaca have used custom made inverted T-shaped silicone implants for 10 years and obtained good results of mouth opening. Total joint replacement with alloplastic materials has disadvantages of hypersensitivity and severe infections.3 Other newer reconstructive materials like masseter muscle, full thickness skin graft, dermis fat pad graft have the good functional ability, but the disadvantage of donor site morbidity. Transport distraction is a lengthy procedure and patient cooperation is a must. Tissue engineering has the disadvantage of single tissue regeneration, long-term follow-up and too expensive.12 Hence, we chose treatment of interpositional arthroplasty with temporaay myofascial flap because its autogenous nature, close proximity to the TMJ, adequate blood supply, maintenance of attachment to coronoid process, which provide movement of flap during function, simulating physiologic action of disc, and hidden scar in the scalp.9,10

The immediate postoperative period is the most critical time for the successful treatment of TMJA. Post-operative pain medications, vigorous physiotherapy, and diet are used to maintain the mobility obtained during surgery and to prevent post-surgical hypomobility secondary to fibrous adhesions. Literature suggests, the main cause of recurrence was failure to carry out jaw-opening exercises. Therefore, postoperative exercises play a crucial role in ensuring lasting success. Physiotherapy must consist of active and passive ranges of motion exercise at least 3-4 times per day for 6 months. The patient’s diet gradually advanced from soft to a solid consistency in the post-operative period. Strict follow-up are essential to prevent postoperative adhesions.

CONCLUSION

Success rate of the temporomyooral fascial flap as the interpositional material is higher. The main advantages of this approach are its autogenous nature, close proximity to the TMJ, adequate blood supply, maintenance of attachment to coronoid process, which provide movement of flap during function, simulating physiologic action of disc, and hidden scar in the scalp. It also avoids pain, crepitus, degenerative changes, limited movement, and reankylosis.

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