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Case Report

Post traumatic TMJ ankylosis release - A case report

Kanchan Shah, Sunny Singh[1]*, Jayant S Landge[1], Ashlesha Ghormade[1]

[1]Dept. of Oral and Maxillofacial Surgery, Govt. Dental Hospital & College, Chhatrapati Sambhaji Nagar, Maharashtra, India.

Abstract

Temporomandibular joint (TMJ) ankylosis is a rare and debilitating condition characterized by the fusion of the mandibular condyle with the glenoid fossa, disc, and/or eminence. This case report presents a 17-year-old male who developed TMJ ankylosis following a traumatic injury to the jaw. The patient presented with severely restricted mouth opening, limited mandibular movements, and significant facial asymmetry. A comprehensive diagnostic workup, including radiographic and clinical evaluations, confirmed the diagnosis of TMJ ankylosis. The patient underwent surgical treatment, including interpositional gap arthroplasty, followed by aggressive physical therapy and rehabilitation. Post-operative follow-up revealed significant improvement in mouth opening, mandibular movements, and facial symmetry. This case report highlights the importance of prompt diagnosis and treatment of TMJ ankylosis, as well as the need for a multidisciplinary approach to management.

Keywords: Mandibular condyle, Ankylosis, Glenoid cavity, Ankylosis, Mandibular injuries, Temporomandibular joint, Mouth.

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1. Introduction

The term "ankylosis" originates from the Greek word "ankylosis," which refers to the stiffening of joints. Temporomandibular joint (TMJ) ankylosis is the condition where the mandibular condyle fuses with the glenoid fossa, disc, and/or eminence.[1] This fusion greatly restricts the movement of the mandible, leading to clinical symptoms such as the inability to open the mouth more than 5mm, limited or no ability to move the jaw forward or sideways, impaired chewing, and difficulties with breathing, speaking, eating, and maintaining oral hygiene.[2-3] In addition, childhood TMJ ankylosis frequently hampers facial growth, leading to facial asymmetry, mandibular micrognathia, bird-face deformity, and/or class II skeletal malocclusion with posterior or anterior open bite.[4] Males have a slightly higher prevalence of the condition compared to females, and the ratio of Unilateral to Bilateral ankylosis is approximately 1.5:[5]

TMJ ankylosis is primarily caused by trauma, although it can also arise from local or systemic infections, as well as systemic diseases like ankylosing spondylitis, rheumatoid arthritis, psoriasis, or previous TMJ surgery.[6] The typical approach to treating TMJ ankylosis involves surgical intervention, which is tailored based on the patient's age and the presence of any accompanying facial deformities.

TMJ ankylosis is quite a rare condition as the overall prevalence of TMJ ankylosis was 0.46 per 1000 in the 3-18 years' age group. Definitive treatment is generally not undertaken by a surgeon even at a District-level hospital Referral practice and knowledge of surgeons in cities to refer these patients was poor.[13]

Available surgical options encompass the following:

Gap arthroplasty refers to the surgical removal of a bony mass without the use of any interposition material.

1. Interpositional arthroplasty refers to the surgical procedure that involves removing a bony mass and placing a biological or non-biological material in its place.
2. Joint reconstruction can be achieved through the use of bone grafts or microvascular reconstruction, which

*Corresponding author: Sunny Singh
Email: dr.sunny007singh@gmail.com

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involves transferring the second metatarsophalangeal joint distraction osteogenesis or using a joint prosthesis.

A variety of interpositional materials have been employed to prevent the recurrence of TMJ ankylosis. Nevertheless, there is no perfect interpositional graft. The typical issues related to various grafts include muscle atrophy and fibrosis, insufficient volume in the fascia, fibrosis and calcification in cartilage, and disintegration of alloplastic implants due to functional stress, leading to foreign body giant cell reactions. The temporalis myofascial flap is still the most common interpositional graft used in TMJ ankylosis because it has adequate blood supply, is viable, comes from a local donor site, has enough volume, and doesn't have any of the problems that come with using grafts from distant sites. Nevertheless, patients frequently report feeling pain while opening their mouth, which may be the result of nerve compression and non-aesthetic bulging in the temporal region. In addition, the scar contracture of the muscle can exacerbate trismus during the postoperative period.

Dermis-fat grafts are frequently used for cosmetic reconstruction in cases of anophthalmic sockets, augmentation rhinoplasties, and post-parotidectomy procedures. Their purpose is to correct concave deformities and to prevent the occurrence of Frey's syndrome during the postoperative period. In 2004, Dimitroulis reported the use of dermis-fat grafts as an interpositional material to treat TMJ ankylosis. The dermis-fat graft has many benefits because it can be easily shaped, sufficiently available, strong against impact, compatible with many different types of tissue, and keeps the fat's integrity & thus stopping it from breaking down. Additionally, it promotes the formation of new fat cells and is successful in preventing the development of excessive scar tissue and abnormal calcification around othe bnes.[7-8]

2. Case Report

A 17-year-old boy reported to the department with the chief complaint of reduced mouth opening since 1 year. He also complained about missing upper front teeth. Upon asking, he gave a history of facial trauma subsequent to a road traffic accident a year ago, for which he underwent Open Reduction and Internal Fixation of Right Parasymphysis of Mandible Fracture.

Extra-oral examination revealed facial asymmetry with fullness of cheek, reduced ramal height, and increased gonial angle on the left side. Also, left TMJ movement was comparatively less palpable on the left side. Reduced mouth opening was present (maximum = 15mm) (**Figure 1**), along with a deviation of the mandible towards the affected side. Furthermore, limited lateral excursion and protrusive movement were present.

Intraoral examination revealed missing teeth WRT. 12, 41, and 42.

Radiological examination with CBCT full face was done, showing narrowed temporomandibular joint space and new bone formation laterally around the left TMJ. (**Figure 2** a, b).

Eventually, the patient was diagnosed with left Type II TMJ ankylosis secondary to trauma and planned for a gap arthroplasty using Kaban's protocol with interpositional dermis fat graft under general anesthesia.

The surgery was performed under general anesthesia, following all aseptic protocols. The TMJ was accessed via an Alkayat Bramley preauricular approach with incision taken through the skin, superficial fascia & temporal fascia. (**Figure 3** a, b) The flap was raised up to the zygomatic arch, and subsequently, the periosteum was incised on the most posterior aspect of the zygomatic arch after identifying the superficial temporal artery. A subperiosteal dissection was performed to reach the sclerotic mass.

Upon reaching the ankylosed mass and identifying the zygomatic arch, an osteotomy cut was placed 1.5cm below the lower border of the zygomatic arch, followed by the upper cut using a bur. (**Figure 4**) Osteotomy cuts were directed at 45° to prevent an inadvertent fracture of the middle cranial fossa.

Upon successful complete removal of the ankylosed mass, the TMJ was manipulated by manually guiding the mouth opening, and approximately 35mm of inter-incisal distance was achieved. (**Figure 5**) The irregular margins of the segment were smoothed using bur. Coronoidectomy was not performed as sufficient release of restricted mouth opening was done.

Subsequently, to harvest the dermis fat graft, the abdomen was prepared from the umbilicus to the pubic region. A 4–5 cm transverse incision 2 finger width below the umbilicus was made in the midline through skin and subcutaneous tissue. (**Figure 6**) The harvested dermis with a fat graft was inserted into the gap created post-resection. (**Figure 7**).

Layer wise closure was done. (**Figure 8** a, b) And the patient was discharged after 3 days of intravenous medications. .The patient was kept on a soft diet. The patient started jaw physiotherapy exercises from 3rd post-op day and continued till 3 weeks. A post-OP radiograph (OPG) was taken on the 7th day of follow-up. (**Figure 9**) One month postoperative mouth opening recorded was 35 mm. (**Figure 10**) The patient was kept on follow-up for 1 year. And mouth opening was recorded on a 1-year follow-up. (**Figure 11**)

Figure 1: Pre operative mouth opening

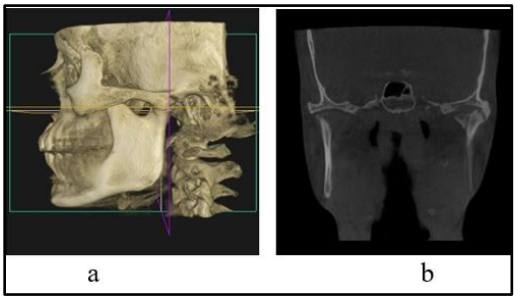

Figure 2: a: Pre CBCT radiograph **b:** Pre operative CBCT radiograph

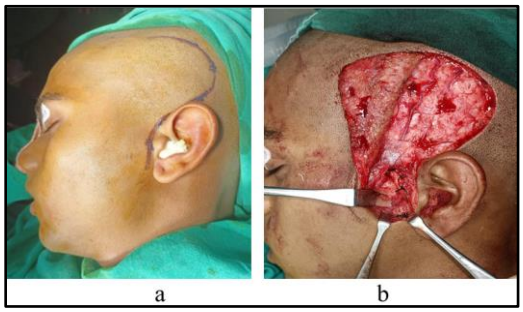

Figure 3: a: Alkayat bramley incision marking b: Exposed TMJ ankylotic mass

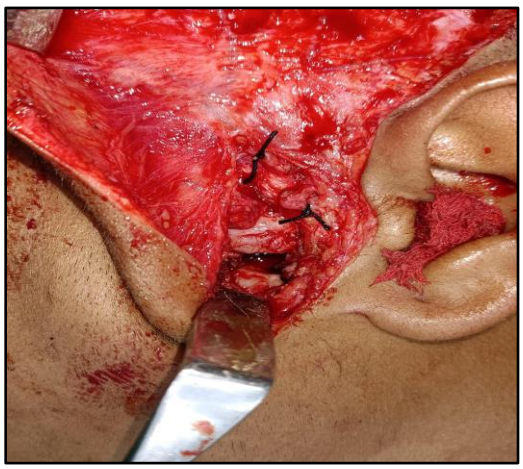

Figure 4: Osteotomy cut created

Figure 5: Immediate intra op mouth opening

Figure 6: Transverse incision for obtaining dermis fat graft

Figure 7: Dermis fat graft interposed in the osteotomy gap created

Figure 8: a: Layerwise closure **b;** Layerwise closure

Figure 9: 1 week post-operative radiograph (OPG)

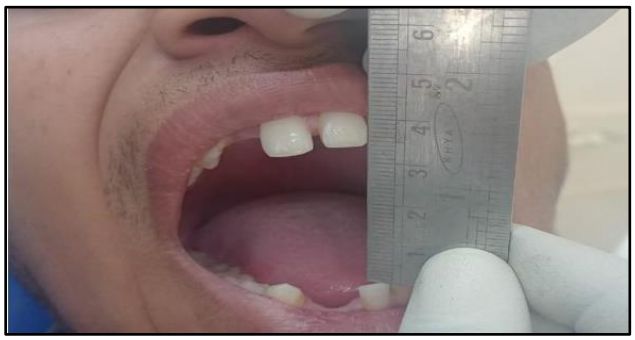

Figure 10: 1 Month post-operative mouth opening

Figure 11: 1 year post-operative mouth opening

3. Discussion

The etiological factors of TMJ ankylosis include trauma, systemic and local inflammatory diseases, and tumours in the TMJ region".[7] Upon investigation, it was discovered that the patient had experienced a road traffic accident a year ago, following which he started experiencing reduced mouth opening. Furthermore, he disclosed that he had undergone treatment for a right parasymphysis fracture.

In order to avoid the potential recurrence of ankylosis, the operation involved the complete removal of the ankylotic bone. The present case did not require a coronoidectomy as a 35-mm mouth opening was achieved. Additional factors that can contribute to re-ankylosis include wound infection and a foreign body reaction triggered by interpositional materials.[4] No instances of wound infection or foreign body reactions related to the autogenous dermis-fat graft were detected in this particular patient.

The treatment process involves a surgical procedure to release and repair ankylosis. The three primary surgical procedures done are gap arthroplasty, interpositional arthroplasty, and total joint replacement (TJR).[8] The use of interpositional materials, such as skin, dermis, flap of the temporalis muscle or fascia, silicone, and cartilage, has been extensively debated for the treatment of TMJ ankylosis through arthroplasty. Currently, there is no universally accepted benchmark for interpositional graft.

Chossegros et al. in 2021 conducted a comparative analysis of several interpositional materials, including skin, temporal muscle, and homologous cartilage and found that using a full-thickness skin graft and temporal muscle flap yielded favorable outc**o**mes.

Alloplasts offer several benefits, including the avoidance of complications at the donor site, decreased surgical duration, reduced risk of recurring joint stiffness, and improved ability to replicate the natural joint structure. Additionally, there are certain drawbacks associated with them, including displacement, prosthesis failure and fracture, infection, and extrusion.[9]

Heterotopic calcification frequently occurs following the utilization of alloplastic materials in the temporomandibular joint (TMJ).[10]

Consequently, no alloplastic substance was selected for the current case.

Posnick in 1993 and Kaban in 2009 employed costochondral grafting, but utilizing distinct incision and rigid fixation techniques. Both parties have documented positive outcomes. The high prevalence of recommending costochondral grafts as an autogenous bone for reconstruction is due to their anatomical similarity to the mandibular condyle and their growing potential in juveniles. However, the use of a costochondral graft was not feasible in our circumstances due to the patient being an adult Also costochondral grafts have and unpredictable growth.[11]

The use of customized prostheses for the treatment of ankylosis offers numerous benefits. There are several advantages including a shorter operation time, no necessity for vascularization around the prosthesis, and a quicker

recovery period for chewing. However, due to the patient's unfavorable socioeconomic circumstances, we were unable to consider the expensive alternative of a custom-made prosthesis for TMJ joint replacement. Consequently, dermis-fat grafts was used as an interpositional material following the removal of the ankylosed bone mass.

Movahed in 2015 and Mercuri in 2012 stated that the use of fat grafts creates a physical barrier that inhibits the development of fibrosis and heterotopic calcification.[12]

Dimitroulis in 2004 also described the practical use of dermis-fat interpositional grafts in the surgical treatment of TMJ ankylosis in adult patients. An autogenous dermis-fat interpositional graft was used to manage eleven individuals with TMJ ankylosis. This study provided evidence that utilising the autogenous dermis-fat interpositional graft was a successful method in preventing re-ankylosis for a period of up to 6 years after the surgical release of TMJ ankylosis.

Potential problems associated with the retrieval of abdominal fat grafts include hematoma, seroma, infection, ileus, and unintentional perforation of the peritoneum. Wolford in 2016 recommended the insertion of a suction drain and advised leaving it in place for roughly 3 days to prevent the formation of a hematoma or seroma. In this particular instance, there were no complications at the abdominal site, and we chose not to place a drain as adequate hemostasis was achiveed.

4. Conclusion

Arthroplasty, along with interpositional fat grafting is an effective technique for restoring jaw functionalities and preventing relapse.

5. Source of Funding

None.

6. Conflict of Interest

None.

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