International Journal of Otorhinolaryngology and Head and Neck Surgery
Jangra M et al. Int J Otorhinolaryngol Head Neck Surg. 2024 Oct;10(5):562-565
http://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937

DOI: https://dx.doi.org/10.18203/issn.2454-5929.ijohns20242285

Case Report

Surgical resection of a bilateral temporomandibular joint ankylosis and interposition gap arthroplasty using bilateral temporo-parietal fascial flap in a 5 years old child: treatment challenges and literature review

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Received: 19 July 2024
Accepted: 09 August 2024

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ABSTRACT

Temporomandibular joint (TMJ) ankylosis is a debilitating state that involves fusion of glenoid fossa and condyle of mandible. This can lead to restriction in mouth opening and mandibular movements. Subsequently, patient develops difficulty in chewing, speech, breathing as well as poor dental hygiene. All of these have detrimental effects on patient's wellbeing and their quality of life. TMJ ankylosis can also have secondary effects on facial growth like asymmetry of face, retro or micrognathia, malocclusion, anterior or posterior open bite and overcrowding of teeth specially if it presents at early age. Main event that leads to TMJ ankylosis is trauma but this can occur as a secondary insult to surgery, local and systemic infections or diseases like chronic otitis media, tuberculosis, juvenile rheumatoid arthritis and septic arthritis. The management of TMJ ankylosis poses a significant challenge because of technical difficulties and a high incidence of recurrence. It is mainly managed by surgery with different options like gap and interpositional arthroplasty, reconstruction arthroplasty or distraction osteogenesis and aggressive post op physiotherapy. Here, we present a case five years old girl child with post traumatic TMJ ankylosis who was managed with excision of ankylotic mass and interpositional arthroplasty by using bilateral temporo-parietal fascial flap. She was followed for a 1 year and had adequate mouth opening and no recurrence.

Keywords: TMJ ankylosis, Temporo-parietal fascial flap, Gap arthroplasty, Interposition gap arthroplasty

INTRODUCTION

Temporomandibular joint (TMJ) is a type of "ginglymo-arthrodial" joint as it has both a ginglymus (hinging joint) and an arthrodial (sliding) joint. It consists of articular surface of temporal bone, mandibular condyles, articular disc, capsule, ligaments and lateral pterygoid muscle. Mandibular condyle articulates with the temporal bone in the mandibular fossa. Articular disc divides this joint into two different compartments. Inferior compartment first initiates rotational movement which induces mouth opening by 20 mm or so. Superior compartment then involves in translatory movement which leads to sliding motion of jaw when mouth opened more widely.[1,2]

TMJ ankylosis leads to fusion of glenoid fossa and condyle of mandible which subsequently affects the mandibular mobility. Patient clinically manifest in terms of restricted mouth opening, difficulty in chewing, speaking, nutritional problems, poor dental hygiene, dental caries and threatened airway. It can affect facial growth in case of children which lead to asymmetry of face, mandibular retro or micrognathia, bird like faces with class II malocclusion. Males are slightly more affected than females with unilateral to bilateral ratio of 1.5:1. Trauma is the most common associated factor followed by previous surgery, infections like chronic otitis media, tuberculosis, obstetric trauma in form of forceps delivery.

Systemic diseases like juvenile rheumatoid arthritis, psoriasis, septic arthritis and ankylosing spondylitis may involve TMJ. Any trauma leads to intra articular hematoma formation followed by scarring and fibrosis further leading to bony replacement of joint space.[3-5] Different classifications have been given for TMJ ankylosis as shown in Table 1.

Computed tomography (CT) scan is usually investigation of choice as one can interpretates the extent and severity of disease, relation to nearby vascular structures and middle cranial fossa, grading and planning of resection. Treatment can be technically challenging and a team approach is usually necessary to counteract functional, cosmetic and psychosocial problems associated with TMJ ankylosis. Mainstay of management is surgery with usually approaches involve gap arthroplasty, inter-positional gap arthroplasty, joint reconstruction and distraction osteogenesis.[9]

Table 1: Different classifications for TMJ ankylosis.

Kazanjian classification[6]	Turlington and Durr classification[7]	Sawhney's classification[8]
Based on site of pathology	Based on heterotopic bone formation within the ankylotic mass	Based on restriction in the joint mobility
True- which affect the joint	Grade 0: No bone islands visible	Type I: The head of the condylar process is visible but significantly deformed, with the fibro adhesions leads to joint restriction
False- joint has extra articular pathology	Grade 1: Islands of bone visible within the soft tissue around the joint	Type II: Consolidation of the deformed head of the condylar process and articular surface at the edges and in the antero-posterior parts of the structures and the medial part condylar head remain normal
	Grade 2: Periarticular bone formation	Type III: The ankylotic mass involves the mandibular ramus and zygomatic arch, medial location of an atrophic fragment of the anterior part of the condylar head
	Grade 3: Apparent bony ankylosis	Type IV: TMJ is completely obliterated by bony ankylotic mass growing between the mandibular ramus and cranial base

CASE REPORT

A 5 years old female child came to our outpatient department with chief complaints of severely restricted (almost nil) mouth opening and chewing difficulties for about 2 years duration. She gave a history of trivial trauma to her chin while playing and fell down from a height. She did not consult this trauma and was managed conservatively at home only. Mouth opening was progressively decreased since last 6 months. There was no history of any infection, ear discharge or any previous surgery. Her systemic examination was unremarkable. On extraoral examination, face was symmetrical and had bird face like appearance. Chin was not deviated. There was severe mandibular retrognathia and micrognathia (Figure 1). A small scar was noted on her chin. On intraoral examination, dental hygiene was poor and dental caries were present. Inter-incisal gap was 5 mm only (severely restricted). Class II malocclusion was present along with proclination of incisors.

She was investigated with NCCT scan of face along with 3D reconstruction which showed bilateral deformed condylar head with complete bony obliteration of joint space (Sawhney type 4) and associated with prominent antegonial notch with elongation of coronoid process (Figure 2). As patient's mouth opening was severely restricted, she was planned for fibre optic assisted nasotracheal intubation which was not successful and she had fall in her oxygen saturation eventually leading to tracheostomy. Surgical site was painted and draped. Modified Al-Kayat and Bramley incision was given and through the sub follicular dissection, temporoparietal fascia was harvested on bilateral side. TMJ ankylotic mass were exposed by making subperiosteal dissection and 1 cm of ankylotic mass were removed between roof of glenoid fossa and ramus by making osteotomies with the help of side cutting burr. Intraoperatively 40 mm of mouth opening was achieved.

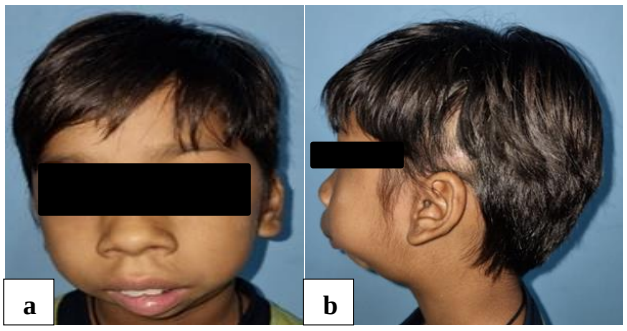

Figure 1 (a and b): Patient profiles showing minimal mouth opening, symmetrical bird face appearance with retrognathia.

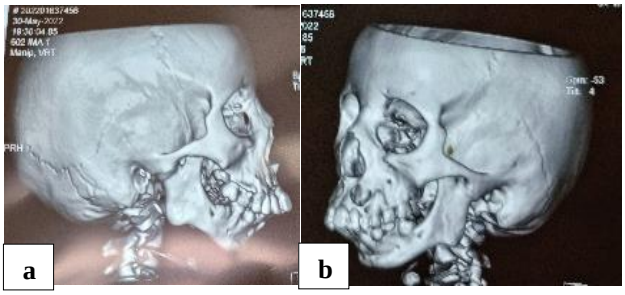

Figure 2 (a and b): 3D CT scan shows complete true bony ankylosis on bilateral side (Sawhney type 4) as TMJ was completely replaced by bone.

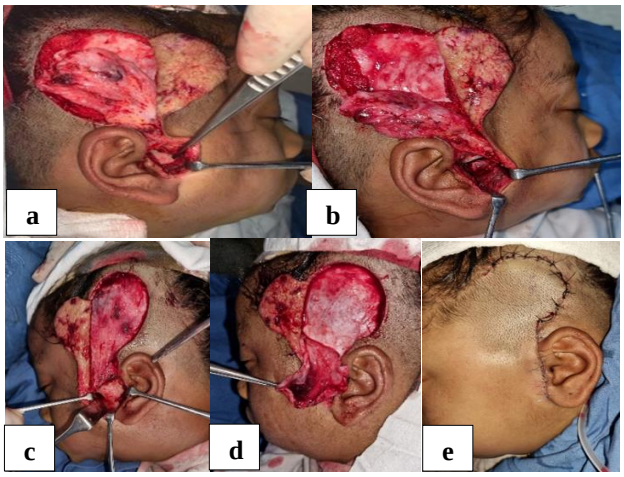

Figure 3 (a-e): Bilateral TMJ ankylotic mass exposed and excised along with the coronoid process and interpositional arthroplasty was done by temporo-parietal fascial flap. Incision was closed in layers.

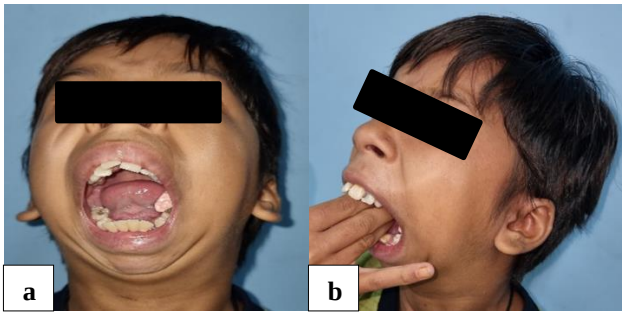

Figure 4 (a and b): Post-operative pictures at 1 year follow up showing adequate mouth opening of 3 fingers breadth.

Medially placed vascular structures were preserved carefully and haemostasis was achieved completely. Bilaterally inter-positional arthroplasty was done using temporoparietal fascial flaps and it was fixed to retrodiscal ligaments and lateral pterygoid muscle at 3 sites (Figure 3). Post-operative period was uneventful. Gradual physiotherapy and mouth opening exercises were started by using the Heister's mouth gag and dental sticks on post-operative day 1. Patient was discharged after one week and tracheostomy tube was removed at 3 weeks. She was followed up for 1 year with adequate mouth opening (3 fingers breadth) and currently on regular physiotherapy (Figure 4).

DISCUSSION

Bony or fibrous adhesions between skull base and mandibular condyle is the main pathology behind the development of ankylosis in TMJ. This can lead to various functional limitations in form of restricted mouth opening, asymmetry of face, retro or micrognathia, class II malocclusion, feeding difficulties, poor dental hygiene, airway obstruction, obstructive sleep apnoea, anterior open bite and posterior cross bite. Patient's age is an important factor for assessing the development of facial deformities in TMJ ankylosis. CT scan is most important investigation which provides a 3-D view of TMJ and coronal section helps in assessing the severity and nature of ankylosis. Treatment should be commenced as soon as the condition identified. Surgery is the mainstay and should be conducted under general anaesthesia. In childrens where mouth opening is very limited, fiber-optic intubation is usually the technique of choice. Blind nasal intubation has its own risks and tracheostomy should be done as last resort. Main surgical aim is to make a pseudo joint which subsequently improves mandibular movements and airway obstruction. Other benefits include deformity correction and normal growth, prevent re-ankylosis, improves oral hygiene and facial appearance. Different types of incisions have been proposed for exposure of TMJ. Modified Al-Kayat and Bramley incision provide better exposure to TMJ, zygomatic-temporal region which helps to preserve the branches of facial nerve.[10] It also gives assess to the interpositional tissues like temporoparietal fascia and temporalis muscle.

Kaban et al gave management protocol for TMJ ankylosis in children which states - early and aggressive surgical resection of the fibrous or bony ankylotic mass (a gap of at least 1-1.5 cm should be created), coronoidectomy on the involved side and temporalis myotomy, contralateral coronoidectomy and temporalis myotomy, if maximal incisal opening less than 35 mm, TMJ lining replacement with a temporalis myofascial flap or articular disc interposition, ramus reconstruction with either distraction osteogenesis or costochondral graft, early jaw mobilization and post-operative aggressive physiotherapy, regular long term follow-up, and to carry out aesthetic surgery later on when growth of child is completed.[11]

Various surgical modalities for TMJ ankylosis include gap arthroplasty, inter-positional arthroplasty, joint replacement and distraction osteogenesis. Inter-positional arthroplasty is always considered better than gap arthroplasty as it reduces the recurrence chances because of inter-positional material insertion after resection. Chossegros et al predicted that the type of interposition material has a role to prevent reanykylosis.[12] Different autogenous and alloplastic interposition materials are available to replace TMJ like costochondral grafts, muscle and myofascial flaps, fascial grafts and flaps, ear cartilage,

dermis, fat, acrylic and silicon. Alloplastic materials can have immune reactions, infection and displacement. Costochondral grafts have growth potential and functional adjustment but can have unpredictable growth and unacceptable results. Fat graft is nonvascular tissue so does not survive for a longer duration. A negative aspect of the distraction osteogenesis is the amount of bone left after the removal of affected tissues, limiting the possibility of creating a segment for the transporting distraction osteogenesis. Temporalis fascia has adequate blood supply, less risk of injury to facial nerve branches and both fascia and muscle can be used. Mokal et al used temporoparietal fascia in 29 patients and reported no recurrence and adequate mouth opening after 2 years follow up.[13] Crawley et al used TPFF and costochondral rib graft for reconstruction of TMJ ankylosis in 11 patients and reported no recurrence.[14] Surgical failure may be due to insufficient gap creation, inadequate inter-positional material, fibrous adhesions, less reconstructive material bulk, foreign body reactions and cartilage calcification.

In the present case, we performed inter-positional gap arthroplasty by using autogenous soft tissue material in form of temporo-parietal fascial flap. This is an axial flap based on superficial temporal vessels. Advantages of this flap includes being autogenous, least immunoreactive, better mobility and coverage, close proximity to the joint, minimal donor site morbidity, extremely pliable so can be moulded easily to fit the defect, less injury to temporal branch of the facial nerve, robust blood supply, less blood loss, less likely to resorb, lower degree of friction and less chances of recurrence. Meticulous surgical dissection in the appropriate plane, judicious use of electrocautery and the use of loupe magnification allow excellent flap elevation without much risk of complications. It can provide satisfactory results in terms of mouth opening, jaw function and aesthetics with low chances of recurrence.

CONCLUSION

Early surgical intervention is required regardless of the aetiology of TMJ ankylosis to facilitate speech, feeding and faciomaxillary growth. Long term aggressive physiotherapy is a must to prevent re-ankylosis. Airway management should also be done cautiously. Temporoparietal fascial flap is a reliable autogenous inter-transposition material because of adequate vascular supply, vicinity to joint, ease of access and arc of rotation, less injury to facial nerve branches and has less chances of re-ankylosis. Adequate resection, early mobilization and regular follow up are important keys for successful treatment.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Bath-Balogh M, Fehrenbach MJ. Illustrated Dental Embryology, Histology, and Anatomy. Saunders. 3rd Edition. Saunders. 2011;266.
2. Alomar X, Medrano J, Cabratosa J, Clavero JA, Lorente M, Serra I, et al. Anatomy of the temporomandibular joint. Semin Ultrasound CT MR. 2007;28(3):170-83.
3. Mittal N, Goyal M, Sardana D, Dua JS. Outcomes of surgical management of TMJ ankylosis: A systematic review and meta-analysis. J Craniomaxillofac Surg. 2019;47(7):1120-33.
4. Rozanski C, Wood K, Sanati-Mehrizy P, Xu H, Taub PJ. Ankylosis of the temporomandibular joint in pediatric patients. J Craniofac Surg. 2019;30(4):1033-8.
5. Shashikiran ND, Reddy SV, Patil R, Yavagal C. Management of temporo-mandibular joint ankylosis in growing children. J Indian Soc Pedod Prev Dent. 2005;23(1):35-7.
6. Kazanijan VH. Ankylosis of the temporomandibular joint. Surg Gyncol Obstet. 1938;67:333-48.
7. Durr ED, Turlington EG, Foote RL. Radiation treatment of heterotopic bone formation in the temporomandibular joint articulation. Int J Radiat Oncol Biol Phys. 1993;27:863-9.
8. Sawhney CP. Bony ankylosis of the temporomandibular joint: follow-up of 70 patients treated with arthroplasty and acrylic spacer interposition. Plast Reconstr Surg. 1986;77:29-38.
9. De Roo N, Van Doorne L, Troch A, Vermeersch H, Brusselaers N. Quantifying the outcome of surgical treatment of temporomandibular joint ankylosis: A systematic review and meta-analysis. J Craniomaxillofac Surg. 2016;44(1):6-15.
10. Al-Kayat A, Bramley P. A modified pre-auricular approach to the temporomandibular joint and malar arch. Br J Oral Surg. 1979;17(2):91-103.
11. Kaban LB, Bouchard C, Troulis MJ. A protocol for management of temporomandibular joint ankylosis in children. J Oral Maxillofac Surg. 2009;67(9):1966-78.
12. Chossegros C, Guyot L, Cheynet F, Blanc JL, Cannoni P. Full-thickness skin graft interposition after temporomandibular joint ankylosis surgery. A study of 31 cases. Int J Oral Maxillofac Surg. 1999;28(5):330-4.
13. Mokal NJ, Ghalme AN, Kothari DS, Desai M. The use of the temporoparietal fascia flap in various clinical scenarios: A review of 71 cases. Indian J Plast Surg. 2013;46(3):493-501.
14. Crawley WA, Serletti JM, Manson PN. Autogenous reconstruction of the temporomandibular joint. J Craniofac Surg. 1993;4(1):28-34.

Cite this article as: Jangra M, Chapa UK, Kumari K, Gupta T. Surgical resection of a bilateral temporomandibular joint ankylosis and interposition gap arthroplasty using bilateral temporo-parietal fascial flap in a 5 years old child: treatment challenges and literature review. Int J Otorhinolaryngol Head Neck Surg 2024;10:562-5.