

Temporomandibular Joint Ankylosis and Mandibular Hypoplasia due to Neglected Pediatric Mandibular Condyle Fracture: A Case Report

Gede Janardana¹, Agus Roy Rusly Hariantana Hamid², I Gusti Putu Hendra Sanjaya², Gede Wara Samsarga², Shita Diwyani Sudarsa², Astrinita Lestari Suyata²

¹Plastic, Reconstructive and Aesthetic Surgery Resident, Faculty of Medicine, Udayana University / RS Ngoerah, Denpasar, Bali, Indonesia

²Plastic, Reconstructive and Aesthetic Surgery Division, Surgery Department, Faculty of Medicine, Udayana University / RS Ngoerah, Denpasar, Bali, Indonesia

*Corresponding author: janardanagd@gmail.com

ABSTRACT

Introduction: The clinical importance of ankylosis in children is concerning with its massive effect and disturbance on the mandibular growth causing deformity apart from the limited mouth opening. Trauma (neglected or abandoned condylar or subcondylar fracture) is the most common cause of bony and fibrous ankylosis. History, physical examination and radiographical examination of each patient with ankylosis of temporomandibular joint is mandatory in arriving to a final diagnosis, severity, involvement of adjacent structures and ultimately to plan the treatment. **Case:** A 17-year-old male presented with severe limitation of mouth opening. At 8 years of age, he had fallen from a height and subsequently developed swelling and pain around the ear. He was treated with analgesics, and the symptoms gradually subsided without further evaluation. The persistent limitation progressively interfered with feeding and affected his overall health. Clinical and radiographic examinations were performed to assess the ankylosis and plan treatment. Ethical approval and informed consent were obtained from the patient and his parents. **Conclusion:** TMJ ankylosis in children may disrupt mandibular growth and cause significant functional and facial deformities. Successful management requires careful surgical planning, an experienced anesthesiologist, and adequate removal of the ankylosed bone. Prevention of re-ankylosis is essential, with early and long-term postoperative physiotherapy playing a key role in maintaining mouth opening and improving functional outcomes.

Keywords: *temporomandibular joint, condylectomy, mandibular hypoplasia*

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INTRODUCTION

Temporomandibular joint (TMJ) is a complex skeletal structure. It is important for normal functioning of the jaw and also considered as the most active functioning joint of the body. Essentially it has two joints with bilateral synovial articulation that are connecting below with mandibular bone to the temporal bone of skull from above. Although of this bilateral articulation, these two joints work as one unit so they are dependent of each other. TMJ is considered a unique type of joints in the body. It is formed from the joint capsule, articular disc, mandibular condyles, and articular surface of the temporal bone,

three ligaments, and lateral pterygoid muscles.¹

The growth center is located at the head of each mandibular condyle. Mandibular joint is unlike typical long bone. It is a multidirectional in its growth capacity. By time, the cartilage is replaced by bone. This growth center allows the increased length of the mandible needed for the larger permanent teeth, as well as affecting on all shape of the face. The growth center of bone within the condyle will disappear with full maturity.²

Ankylosis can be defined as a stiffness of a joint due to abnormal adhesion and rigidity in bones of the joint. It means that the movement

of condyle is limited which might lead to partial or complete inability to open the mouth. In most cases it is due to fusion (bony or fibrous) of the condyle of the mandible to the base of the skull.³

The clinical importance of ankylosis in children is concerning with its massive effect and disturbance on the mandibular future growth causing gross deformity apart from the limited mouth opening. Many classifications had been proposed for the ankylosis of the temporomandibular joint. It is based on location, type of tissue involved in the extent of fusion. True complete bilateral intracapsular ankylosis was a bony fusion from the condyle to base of the skull reflects the most severe form. According to a study by Al-Rawee et-al, a variety of factors can cause temporomandibular joint ankylosis like trauma (13%), local or systemic infection (53%)⁴, systemic diseases such as enclosing spondylitis, rheumatoid arthritis and psoriasis (28%).

Trauma is the most common cause of bony and fibrous ankylosis.⁶ Formation of intra-articular hematoma is followed by scarring with osseous replacement. It is believed to be the process of ankylosis following injury to the joint. This leads to narrowing of temporomandibular joint space.⁷ Sometimes extension of fusion to the cranial base, sigmoid notch, zygomatic arch, coronoid process is seen in advanced cases.⁶ History, physical examination also radiographical examination of each patient with ankylosis of TMJ is mandatory in arriving to a final diagnosis, severity, involvement of adjacent structures and ultimately to plan the treatment. Computed Tomography (CT) had become the top imaging modality.³ Relationship of the ankylotic mass with the middle cranial fossa, anteroposterior and mediolateral dimensions, and glenoid fossa can be assessed reliably and clearly in a series of very thin sections. For this

reason it gives a very accurate and descriptive explanation in all three planes.^{5,6} Creation of pseudoarthrosis aims to surgical intervention of the ankylosis. This will improve function or improving movement of the mandible^{7,8}, relieve airway obstruction if present^{9,10} achieve normal growth and correction of deformity in children. It will restore appearance and occlusion in adults, prevent relapse and facilitate maintenance of good oral hygiene.⁷

Surgical intervention is the main way to treat ankylosis. No single option for surgery has been shown entirely successful. Different surgeries had been described in the literature including condylectomy⁷, simple arthroplasty¹¹, interposition arthroplasty¹² using temporal muscle, deep temporal fascia, fascia lata, ear cartilage or alloplastic material and reconstruction of the joint using costochondral graft (CCG), fibula, iliac, clavicle crest, metatarsal head or alloplastic material like acrylic or titanium prosthesis.¹³ Relapse of ankylosis postoperatively is the most common complications. Its rate is as high as 50%.

Many investigations believe that the choice of interpositional material is important in preventing recurrence.¹⁴ A temporalis myofascial flap is used in maxillofacial reconstructive surgery.¹⁵ The benefits of temporalis myofascial flap include close proximity to the joint which removes needing for additional surgery. It has adequate blood supply as an autogenous source. Inferiorly based temporalis myofascial flap is supplied with deep temporal artery (anterior and posterior branches), the terminal branches of the maxillary artery, as the main source of perfusion.¹⁶ In comparison to costochondral graft is liable to fracture with over or under growth of the graft. Thus the temporalis muscle flap is the best choice to avoid recurrence. Most reported causes of

reankylosis are inadequate removal of ankylotic mass^{5,17} also, lack of compliance to post-operative exercises.¹⁸ Anterior open bite occurred in patients treated with gap arthroplasty. Lastly all the work has been reported in the SCARE Guideline Checklist.¹⁰

OBJECTIVE

To review the unexpected bad complications of trauma in children.

CASE REPORT

A 17 years old child came with chief complaint of limited mouth opening since 9 years ago, after fall from 3 meter height when he was 8 years old. He also complained at that time he had a wound in his chin and pain in his left ear. No radiological examination was done and the wound was treated by suturing the wound. No medication was taken after that time. He said this complaint is getting worse over time and start affecting his eating habit.

Until today, he eats only a little amount of food with hard consistency. The patient said that he will took The Police Academy test which required him to repair his teeth but he couldn't do the procedure because of the complaint he had. There are no congenital defect, his growth and development were normal and no family history with the same complaint. History of past illness, drug allergy and surgeries are denied by the patient.

Clinical examination extraorally looks good with stable hemodynamic. Intraoral examination showed trismus with maximum interincisal opening 1 cm, and the occlusion were good. The patient was diagnosed with left ankylosis temporomandibular joint with history of neglected fracture on left condylus mandibula and mandibular hypoplasia. Planning of management for the patient is to do left condylectomy.



Fig. 1 Clinical view of the retarded mandible



Fig. 2 CT Showing left side ankylosis and temporomandibular joint adhesion to cranial base



Fig. 3 Pre auricular incision

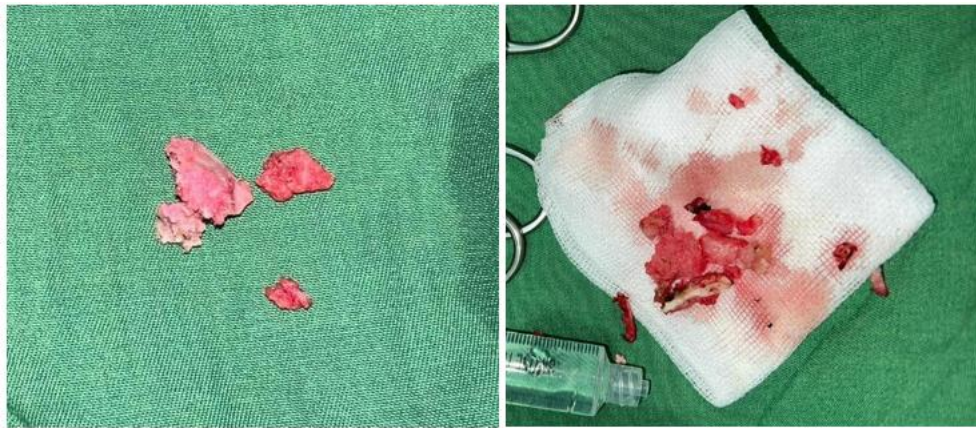


Fig. 4 Ankylosis bone after dissection

During operation, left preauricular and left retromandibular incision design was made, with preservation of the danger zone. The incision was done layer by layer to the bone denture, with preservation of the parotid gland. After the bone has been exposed, we found type IV left temporomandibular joint ankylosis. Osteotomy of the left mandibular condyle to the left subcondyle with osteotome and rosen burr was performed. At re-evaluation, we found left zygomatic arch gap 0.8 mm (maximum open mouth position), 0.5 mm (close mouth position). With the help of mouth retractor, maximal interincisal opening was 30 mm. Then the operation was continued with incision design on the left temporal. The

incision was done until fascia was found, then the temporal fascia graft was harvested. Next, we performed fixation of the temporal fascia to the condylar surface with absorbable multifilament 4.0 suture + spongostan. Then we sutured the left retromandibular region layer by layer with absorbable multifilament 4.0 watertight suture and non absorbable monofilament 5.0 suture. Next we continue with suturing the left preauricular region layer by layer with absorbable multifilament 5.0 suture and non absorbable monofilament 6.0 suture. Finally the left temporal region was sutured with absorbable 4.0 suture, and the skin with non-absorbable 5.0 suture.



Fig. 5 Pre operative (left) and Post Operative (Right) Mouth Opening



Fig 6. 1 week post operative clinical picture

DISCUSSION

Maxillofacial surgeon knows that temporomandibular joint ankylosis is a rare condition¹⁹⁻²¹, but its importance concerning with its massive effect especially in children. It affects the mastication, feeding, growth, articulation, and oral hygiene as well as general health. Trauma considers the most common etiological factor. It is hypothesized that intraarticular hematoma accompanied with scarring. Formation of excessive bone, end with hypomobility.²² In children, different clinical scenarios are seen depending on the age at which ankylosis occurs, duration and on whether ankylosis is unilateral or bilateral.

Computerized tomography (CT) has become the gold standard radiological investigation for managing patients with ankylosed TMJ.³ Detect type, severity, extension, and relation is best showed by computerized tomographical slices. It is a mandatory examination. Retrognathic mandible has specialized appearance in bilateral cases, both attenuated functional and aesthetic deficit; the condition has interference on speech, mastication and oral hygiene maintenance.²³ All cases of ankylosis should be managed surgically.

Three clinical points most keep in mind. The first is general anesthesia. Well experienced anesthetist is important. Limited

mouth opening makes oral intubation missed. So, blind nasal intubation must be performed otherwise tracheostomy should be done before starting surgery. Blind nasal intubation was done here by well experienced anesthetist avoiding the child all the unpleasant complications of tracheostomy that may follow. Second critical point is extension of the ankylosed bone with amount of cutting done. In simple to moderate unilateral bony types condylectomy only can be beneficial to open the mouth. Bilateral true bony ankylosis needs condylectomy and coronoidectomy with good gap making to prevent reankylosis.²⁴ The interposition gap arthroplasty is the third critical point as reankylosis. It is the most common complication faced by the surgeon with post operative period. Many materials have been used to fill the gap.⁴ Appropriate interpositional material includes: 1) Autogenous tissue: meniscus, muscle, fascia (temporalis muscle) 2) Allogeneic tissues; cartilage and dura. 3) Alloplastic: silastic materials like acrylic, proplast, and silicon. Temporomandibular joint reconstruction materials are withdrawn because of many reasons²⁵ such as: Fascia lacks in volume, Chondral graft shows resorption, infection and calcification Alloplastic implants have downside of corrode, break-up and cause foreign body giant cell reaction under functional loads. As a result reankylosis,

resorption, overgrowth, fracture, and pain are common complications with various autogenous and alloplastic materials reconstruction. Add to that the surgical site morbidity complications must keep in mind with temporomandibular joint reconstruction.⁴ The temporalis muscle flap has been used for many years for restorations of the gap. It is popularly used by surgeons because of its ease of handling, proximity to the temporal joint, good functional results, successful clinical results, with minimal complications⁴, reliability, versatility, autogenous nature, resilience, adequate blood supply, ease of access to the condyle area, and ability to alter the arch of rotation by basing the flap inferiorly or posteriorly, allowing for a pedicle transfer of vascularized tissue into joint area. A satisfactory surgical outcome was obtained in the present case with the above method. Patients with possible trauma to temporomandibular joint should be evaluated carefully by the clinicians. The surgeon needs to make an accurate early diagnosis. Unnoticed trauma to the TMJ can cause potential complications concerning with the ankylosis even after several years later similar to the present case.

Recurrence is the most common disappointing complication as shown in literatures. For examples Lello 1 case from 13 was reankylosed²⁵, Guyuron and Lasa reported abnormal behavior of costochondral graft.²⁶ Recurrence percent were (7.1%) in Manganello-Souza and Miri-ani.²⁷ Ten percent (10%) In El-Mofty (1974).²⁸ Rajgopal et al. achieved 100% success with gap arthroplasty.²⁹ Roychoudury et al., also reported good results of 50 cases treated with gap arthroplasty where reankylosis occurred in one patient (2%).¹⁴ The treatment of temporomandibular joint ankylosis through

creating an adequate gap is of paramount importance in preventing any future recurrence and this can be achieved only when good access is gained to this complex anatomical joint.^{15,17} Even in unilateral bony ankylosis, lateral arthroplasty improved the facial pattern and MIO significantly when temporalis myofascial flap used as interpositional material.¹⁴ These studies show that reankylosis is a common complication irrespective of surgical technique which is used treating the TMJ ankylosis. Reiaadh K. Al-Kamali in his original article concluded that the postoperative measurement of interincisal opening of ≥ 35 mm with lateral and protrusive movement was criteria for success of surgery.³⁰ Reankylosis occurred in 7 unilateral and 12 bilateral cases from a total of 118 ankylosed joints. Postoperative jaw opening exercises are crucial for lasting success and failure of patient compliance is the cause of reankylosis. Jaw opening exercises must be done for months to years to maintain the surgical correction. At last, a good surgery even cooperation of family with the child is mandatory for avoiding recurrence. Added to those physiotherapeutic exercises with good bone gap creation and long follow up. These factors can play a role avoiding recurrence.

CONCLUSION

Success in the preventing reankylosis after condylectomy with early postoperative physiotherapy, maintained on a long term. This describing technique is adequate bone removal and excellent intraoperative joint mobilization. The temporalis fascia graft is effective in treating TMJ ankylosis due to its reliability, versatility, autogenous nature, resilience, proximity to the joint, ease of access to the condyle area, and minimal risk of nerve damage.

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