

RECURRENT TEMPOROMANDIBULAR JOINT ANKYLOSIS CAUSED BY OLD FRACTURE: A CASE REPORT

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ARTICLE INFO	ABSTRACT
<p>Keywords: Good Health and Well-Being, Mandibular condyle fracture, Pediatric TMJ disorder, Temporomandibular joint ankylosis.</p> <hr/> <p>*Corresponding author: Siti Isya Wahdini Email address: siti.isya.wahdini@ugm.ac.id</p> <hr/> <p>History: Received: July 7, 2025 Revised: October 14, 2025 Accepted: November 22, 2025 Published: December 1, 2025</p> <hr/> <p>JRE : Jurnal Rekonstruksi dan Estetik e-ISSN:2774-6062; p-ISSN: 2301-7937 DOI: 10.20473/jre.v10i2.66548 Open access : Creative Commons Attribution-ShareAlike 4.0 International License (CC-BY-SA) Available at: https://e-journal.unair.ac.id/JRE/</p> <hr/> <p>How to cite: Wahdini SI & Idamatussilmi F. RECURRENT ANKYLOSIS TEMPOROMANDIBULAR JOINT OF THE LEFT CONDYLE MANDIBLE CAUSED BY OLD FRACTURE: A CASE REPORT. Jurnal Rekonstruksi Dan Estetik, 2025; 10(2): 80-89.</p>	<p>Introduction: Temporomandibular joint (TMJ) ankylosis can greatly impact a child's nutrition, mental health, and craniofacial development. Trauma is the main cause. Early and proper treatment is crucial to avoid long-term issues and reoccurrence.</p> <p>Case Illustration:An 11-year-old girl presented with limited mouth opening and lower jaw pain three years after falling down the stairs. She underwent gradual TMJ distraction using bite blocks under general anesthesia followed by weekly physiotherapy, but her symptoms recurred after four months. A CT scan revealed left TMJ synarthrosis and condylar deformity. With improved adherence to physiotherapy, she achieved significant mouth opening and remained recurrence-free for six months..</p> <p>Discussion: Gradual distraction with bite blocks, combined with regular physiotherapy, can improve joint mobility and muscle function while lowering the chances of re-ankylosis. This approach offers a less invasive option than surgery, which is especially valuable for children whose growth must be preserved. Closed procedures with structured rehabilitation are preferred because they result in fewer complications and require fewer follow-up appointments.</p> <p>Conclusion: The effectiveness of a non-invasive approach combining gradual distraction and physiotherapy in managing TMJ ankylosis is presented. The success of this treatment relies heavily on the patient's motivation and commitment. Early conservative treatment could be the main strategy for pediatric cases, potentially delaying or avoiding surgery. Continuous education and monitoring are key to achieving long-term success and preventing relapse.</p>

Highlights:

1. Adequate physiotherapy is essential to prevent the recurrence of temporomandibular joint ankylosis.
2. Surgical treatment alone is insufficient without proper postoperative physiotherapy and patient compliance.

INTRODUCTION

Temporomandibular joint (TMJ) ankylosis is a joint disorder that refers to the bony or fibrous adhesion of the joint components, which can cause limitation of mouth opening from partial reduction to total jaw immobility, or is often referred to as trismus. Some distinguish mild trismus as a range of maximum mouth opening (MMO) 20-30 mm, moderate 10-20 mm, and severe, below 10 mm. TMJ ankylosis is most commonly associated with trauma (77.9%), infection (16.8%), and systemic diseases, e.g., ankylosis spondylitis, rheumatoid arthritis, psoriasis, and ankylosis can also occur as a result of previous TMJ surgery.¹

TMJ ankylosis can impact a child's growth in nutrition, psychology, and growth of the teeth and jaws. The most frequently seen complications are poor treatment, limited range of motion, and re-ankylosis. Multi-modality therapy must be used to prevent them from happening and recurrence.¹

Surgical management remains the treatment of choice, postoperative recurrence and limited mouth opening continue to pose significant challenge.² In this context, non-surgical and adjunctive therapies aimed at improving functional outcomes and preventing recurrence of ankylosis have gained increasing attention. Gradual distraction with bite blocks is one such conservative method that provides incremental, controlled pressure to obtain mobilization of the joint and adjacent soft tissues. Along with physiotherapy, directed towards active and passive jaw-opening, this technique has the potential to enhance the opening of the mouth, re-establish joint mobility, and reduce relapse risk.³ Despite its significance, evidence for combined effectiveness of physiotherapy and bite block treatment in treating TMJ ankylosis is still limited and requires systematic investigation.

Although surgical approaches have been extensively studied, there is no definite agreement on standard conservative regimens, particularly in children when mandibular growth needs to be preserved. Additionally, little has been written on the long-term functional results of managing recurrent TMJ ankylosis with initial treatment of gradual distraction and structured physiotherapy.

This study aims to present a case of recurrence of temporomandibular joint (TMJ) ankylosis due to inadequate therapy, and to determine the effectiveness of gradual distraction with bite blocks and appropriate physiotherapy in improving mouth opening and functional outcomes in TMJ ankylosis patients. The findings can be utilized to streamline conservative management protocols and encourage long-term rehabilitation planning for such patients.

CASE ILLUSTRATION

An 11-year-old female came to our hospital complaining of difficulty opening her mouth. The complaint is accompanied by pain that increases every time the patient tries to open her mouth and trismus in the lower jaw. She had a history of falling down the stairs three years ago and was not examined by a doctor. The history of infection was denied. She was referred our department for further treatment. The surgeon decided to perform TMJ gradual distraction under general anesthesia and incorporated it with short progressive distraction using bite blocks. After gradual distraction, the patient can open her mouth about 30 mm. Furthermore, the patient was advised to undergo routine check-ups and physiotherapy once a week to strengthen her mandibular joints and muscles, thereby avoiding stiffness. Four months later, she complained of difficulty and pain in opening her mouth and could only open her mouth as much as 5 mm (Figure 1).



Figure 1. Clinical Presentation: Trismus (MMO range: 5 mm)

After searching for the cause of this recurrence, we found that the patient's routine follow-up was challenging because she was a student in boarding school, so she couldn't control and perform physiotherapy as previously advised. We performed a CT scan, and the results showed left temporomandibular joint synarthrosis, anatomical change of the left mandible condyle, and left ethmoiditis (Figure 2).



Figure 2. 3D CT-Scan of Facial Bone Frontal & Lateral View

After the examination, the patient was scheduled for TMJ re-gradual distraction using gradual bite blocks under general

anesthesia. The patient's mouth is gradually opened by slowly releasing the ankylotic condyle and then bite blocks of the smallest size are progressively inserted into the mouth. The bite blocks are left in the mouth for 5 minutes, and then they are replaced gradually with a larger size (Figure 3).



Figure 3. Gradual Distraction Using Bite Blocks

After the treatment, she finally opened her mouth to 30 mm. Furthermore, the patient was again advised to undergo routine check-ups and participate in physiotherapy once a week. Education is provided to the patient so that they understand the importance of regular control and physiotherapy in preventing the recurrence of TMJ ankylosis. A significant improvement was noticed after six months of weekly physiotherapy; the patient could finally open her mouth normally (Figure 4) without pain, and there were no other complaints.



Figure 4. 3 Months Follow-up After Gradual Distraction & Six Months of Weekly Physiotherapy

DISCUSSION

Temporomandibular joint (TMJ) ankylosis is a condition where the mandibular condyle fuses with the glenoid fossa. This fusion leads to limited jaw movement over time. The underlying causes involve fibrous or bony adhesions between the joint surfaces. These often occur after trauma, infection, or inflammatory conditions like rheumatoid arthritis. In cases of trauma, intra-articular hematoma and the resulting fibrosis or bone formation cause the joint to become less mobile. Chronic inflammation leads to pannus formation and damage to the joint surfaces, encouraging the growth of fibrous tissue and eventually causing calcification or bone fusion.⁴

TMJ ankylosis can be classified in several ways: by location (intra-articular or extra-articular), type of tissue involved (bony, fibrous, or fibro-osseous), extent of ankylosis (complete or incomplete), and whether one side or both sides are affected.⁵ Sawhney also offers a classification system that divides TMJ ankylosis into four types: Type I, Type II, Type III, and Type IV, based on imaging findings. In Type I, the condylar head is present without much deformation, but TMJ movement cannot be achieved due to fibrous adhesions; Type II, where there is bony union of the deformed condylar head and the

articular surfaces, sigmoid notch, and coronoid process remain intact; Type III, where there is a bony block bridging the mandibular ramus and the zygomatic arch, the medial pole remains intact, the coronoid process is seen to be elongated; and Type IV, where a bony block completely replaces the TMJ.⁶

Ankylosis of the TMJ in children can lead to significant problems. Facial asymmetry increases because of the lack of movement and irregular muscle function. The longer the duration of hypomobility, the more severe the muscle atrophy and facial asymmetry. Additionally, secondary elongation and hypertrophy of the coronoid process occur, further restricting jaw movement. It can impact nutritional status, problems with mastication, digestion, speech, growth of the child's jaw and teeth, appearance, and psychological development. Inadequate treatment of Ankylosis TMJ can lead to complications such as re-ankylosis, which is frequently reported.^{4, 7-10}

Various treatments exist to manage ankylosis effectively, including both non-surgical and surgical options. Surgical procedures involve condylectomy, gap arthroplasty, and interposition arthroplasty. These surgeries aim to fix structural or anatomical problems in the TMJ. However, the surgeon must consider the height of the ramus, any differences in height between the two sides, and the patient's age. Surgical treatment can reduce the vertical height of the mandibular ramus if it removes the ankylosed joint without rebuilding the condyle. This reduction may worsen functional issues like malocclusion and limited mouth opening, as well as facial asymmetry. Re-ankylosis may further worsen the joint's function and affect the ramus height.^{11,12}

Non-surgical treatments for TMJ ankylosis often include conservative methods. These may involve gradual distraction with bite blocks, stretching, and active or passive mouth-opening exercises. Such approaches can help improve or

maintain jaw mobility and prevent further restrictions. These are typically recommended in cases of early-stage fibrous ankylosis or following surgery to avoid re-ankylosis. The use of jaw-stretching devices, such as Therabite, can lengthen the joint by applying steady, gentle pressure. Pharmacotherapy, for example, Corticosteroids or NSAIDs, can be used to treat pain and inflammation, particularly in fibrous ankylosis. Occasionally, a muscle relaxant is also used as a supplement. Bite Guards/Occlusal Splints Also effective, but there was a limited advantage in cases of ankylosis involving anatomical fusion.^{3,4}

Gradual distraction using bite blocks has been explored as a non-surgical approach to manage temporomandibular joint (TMJ) ankylosis, particularly in cases where surgical intervention is not immediately feasible or as an adjunct to surgical procedures. This method uses gradual force on the mandible to stretch the ankylosed joint and surrounding tissues, improving mouth opening and function. A systematic review and meta-analysis highlighted the importance of physiotherapy techniques, including bite blocks, in improving postoperative results for patients with temporomandibular joint (TMJ) ankylosis.³ The study pointed out that these interventions, when paired with early and intensive physiotherapy, can promote mouth opening and lower the risk of re-ankylosis. However, patient compliance and the gradual approach of these techniques are vital for their success. While gradual distraction with bite blocks offers a non-invasive option, it depends on consistent use and patient adherence to the recommended protocols. Therefore, it is recommended that this method be considered as part of a comprehensive treatment plan, tailored to the individual needs and circumstances of each patient.

Physiotherapy is essential for treating TMJ ankylosis, according to a systematic study and meta-analysis. A variety of physiotherapy techniques, such as manual

methods, therapeutic exercises, and treatments like electrical, heat, or cold stimulation, can improve muscle strength, reduce pain, and increase jaw mobility. These therapies are crucial for improving oral function and lessening the restrictions caused by TMJ ankylosis.³

A research study comparing surgical and non-surgical treatments for ankylosis of the temporomandibular joint (TMJ) demonstrated significant improvements in pain relief and TMJ function. High rates of patient satisfaction were observed in both groups, with 95% of patients undergoing surgical intervention and 92% of those undergoing non-surgical intervention reporting satisfaction with their treatment outcomes at the 1-year follow-up. These satisfaction rates highlight the overall success of both approaches in addressing patients' needs and expectations. Patient satisfaction is a vital indicator of treatment success, underscoring the importance of patient-centered care in managing ankylosis.¹³

No surgical procedure has yet been shown to be completely effective; varying results have been reported with procedures, and a postoperative MMO range greater than 35 mm is rarely achieved. Moreover, the sequence of postoperative ankylosis due to surgical treatment only, such as pain and the re-ankylosis recurrence rate, is still high.^{2,3}

Re-ankylosis following TMJ surgery is a multifactorial complication commonly associated with surgical, patient-related, and biological factors. Inadequate surgical technique is a major issue. An insufficient gap between the osteotomized segments, especially at the back and upper part of the ramus, can lead to early bone contact during postoperative exercises. Pain during physiotherapy often discourages patients from participating regularly. The use of poor-quality or poorly integrated grafts, especially those prone to necrosis or displacement, can also be a factor. Autogenous bone grafts are helpful but need a critical healing period in the first two weeks, which may limit early

mobilization. Patient non-compliance with physiotherapy protocols makes the risk worse. Biologically, re-ankylosis can happen from weak soft tissue barriers after arthroplasty, increased bone growth (often called the osteoblastic "jumping" phenomenon), and high bone turnover, especially in children. Additionally, fibrosis of long-inactive masticatory muscles may limit the effectiveness of rehabilitation, and dislodgement of the cartilaginous portion of grafts, followed by osseous remodeling, can also play a significant role in recurrence. Effective prevention requires meticulous surgical technique, robust grafting strategies, and strict adherence to a structured physiotherapy regimen.¹⁴

Preventing recurrence of temporomandibular joint (TMJ) ankylosis requires a comprehensive strategy that integrates meticulous surgical technique, appropriate interpositional materials, rigorous postoperative rehabilitation, and consideration of biological factors. Surgically, complete removal of the ankylotic mass, especially on the medial side, is essential, as inadequate excision may leave residual bone contact, promoting re-ankylosis. Performing a well-planned osteotomy with instruments ensures clean cuts with minimal trauma, while copious irrigation eliminates bone debris that could contribute to re-fusion.¹⁵ A parallel, inferior osteotomy at the narrowest part of the condylar neck helps minimize the risk of recurrence. Additionally, coronoidectomy is indicated in cases where mouth opening is less than 30 mm to eliminate impingement and improve jaw mobility. The choice of interpositional material is also crucial.¹⁴ Autologous fat grafts are effective in preventing hematoma formation and heterotopic ossification. At the same time, vascularized temporalis fascia flaps provide long-term separation of bone surfaces without the complications associated with alloplastic materials. Although costochondral grafts are used in reconstruction, they are associated with a higher recurrence rate.¹⁴ Postoperative

rehabilitation is equally critical; early and aggressive physiotherapy promotes joint mobility and prevents fibrosis of the masticatory muscles.

Patient compliance with exercise regimens is vital, as non-compliance significantly increases the risk of joint stiffness and re-ankylosis. Regular follow-up enables early detection of complications.¹⁶

Previous studies have highlighted the importance of early identification and grading of maxillofacial trauma severity using structured tools to predict long-term complications, particularly in pediatric populations. Trauma to the mandibular condyle, if left untreated or inadequately rehabilitated has been shown to result in joint ankylosis or post-traumatic deformity, often requiring complex secondary interventions.¹⁷

Pediatric mandibular fractures, particularly condylar injuries in younger children, are often managed conservatively due to skeletal immaturity and low complication rates. This aligns with our approach, where early non-surgical management was selected based on age and fracture characteristics. However, poor compliance with physiotherapy may compromise outcomes, as seen in this case.¹⁸

In the management of mandibular fractures, especially those involving occlusal instability, the use of intraoral stabilization techniques has been reported to reduce the incidence of functional disorders, including malocclusion and temporomandibular joint dysfunction.^{19,20} These findings support the current case outcome, where initial conservative management without sustained compliance led to recurrent ankylosis.

Furthermore, reconstructive methods for craniofacial deformities from trauma highlight the long-term effects of untreated structural injury. Restoring both form and function is essential, not just for appearance but also to keep joint mobility and symmetry in growing patients.²¹ These insights stress the importance of ongoing, teamwork-based

care to prevent recurrence and maintain function in TMJ-related disorders.

In our case, we decided to perform a nonsurgical procedure using gradual distraction with bite blocks, accompanied by adequate physiotherapy. This approach is more suitable for this patient because it is less invasive and requires fewer follow-ups, considering her condition and difficulty with routine controls. The main goal of treating temporomandibular joint ankylosis is not only to achieve adequate mouth opening but also to prevent the recurrence of the ankylosis.

After considering the risks of surgery and the potential benefit of preserving condylar growth at the age of 12, we decided to begin with a non-surgical approach. We also consider her ramus growth phase, the patient came at 12 years old, and theoretically women's maximum condylar growth rate is 2.3 mm/year until 12.2 years old, and the growth rate will decline rapidly after that.²² The growth period phase is also influenced by a history of trauma and invasive procedures on the bone.^{10,22} So we considered non-invasive measures first, as surgical procedures and trauma are hypothesized to affect the growth of the condyles and lead to asymmetric ramus height and a high risk of re-ankylosis. The patient's clinical situation directly relates to the best treatment selection, emphasizing the patient's stage of growth.

Since physiotherapy is also important in treating TMJ ankylosis to reduce the risk of recurrence,³ surgical treatment will be ineffective if postoperative physiotherapy is inadequate or patient compliance is poor.^{3, 23, 24} We started physiotherapy right after gradual distraction. It consists of an active hinge opening, a lateral excursion, and manual finger stretching in front of a mirror. The patient can do finger or ice cream stick stretching exercise at home four times daily for 3 to 5 minutes per hour. At six weeks postoperatively, the diet can be increased to solid foods. Physical therapy programs can be monitored closely for at least one year to

prevent recurrence.³ Patient adherence to prescribed physiotherapy is essential in the management of temporomandibular joint (TMJ) ankylosis. Comprehensive patient and family education is crucial to ensure understanding of therapy objectives, maintain motivation, and support consistent participation, all of which significantly influence treatment outcomes and recurrence risk. A retrospective study involving 98 patients demonstrated that those who diligently followed a two-phase physiotherapy protocol, including the use of a bite block, showed significant improvements in mouth opening and maintained ramus height over a mean follow-up period of 6.38 years. Notably, no cases of re-ankylosis were observed among compliant patients, underscoring the critical role of consistent rehabilitation in preventing recurrence and ensuring long-term functional outcomes.²⁵

In conclusion, the combined approach of gradual distraction using bite blocks alongside adequate physiotherapy demonstrates promising effectiveness in the management of temporomandibular joint (TMJ) ankylosis, particularly in enhancing mouth opening and maintaining postoperative joint mobility. This non-invasive or adjunctive method provides a valuable alternative or supplement to surgical treatment, especially in early-stage or postoperative cases. The gradual mechanical stimulation delivered by bite blocks, when paired with structured and patient-compliant physiotherapy, contributes to improved functional outcomes and helps reduce the risk of re-ankylosis. However, the success of this approach depends heavily on patient adherence, the timing and consistency of therapy, and individual anatomical and physiological factors. Further longitudinal studies with larger sample sizes are needed to validate these findings and to standardize protocols for broader clinical application.

This case highlights that in pediatric patients with TMJ ankylosis, a conservative

strategy, such as gradual distraction combined with intensive physiotherapy may serve as a primary treatment option prior to surgical intervention, particularly when condylar growth is still ongoing. The outcomes from this study may help inform the development of clinical protocols in pediatric care that prioritize conservative methods as the first line of treatment for TMJ ankylosis. This case emphasizes the clinical value of a conservative, growth-phase sensitive approach in the management of pediatric TMJ ankylosis, demonstrating that non-invasive strategies can preserve mandibular development while achieving long-term functional improvement.

CONCLUSION

This case shows that in pediatric patients with temporomandibular joint (TMJ) ankylosis, a conservative approach that combines gradual distraction with bite blocks and intensive physiotherapy can be an effective first treatment option. This non-invasive method has shown that it can improve mouth opening and joint mobility while allowing for proper mandibular growth during important developmental stages.

Successful management depends on the chosen treatment, early mobilization, strict patient adherence to physiotherapy, and long-term follow-up. Surgical treatment alone does not ensure recovery, especially without sufficient postoperative rehab, and may increase the chance of reankylosis.

Thus, this case highlights the importance of a growth-sensitive and patient-focused approach in treating TMJ ankylosis. Future treatment plans should favor conservative methods, particularly in children, and aim to improve patient commitment to physiotherapy. More long-term studies with larger groups are needed to confirm these findings and help develop standard clinical practices.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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The authors declare that they have no funding sources.

AUTHOR CONTRIBUTION

SIW conceived the study. SIW and FI drafted the manuscript. SIW critically revised the manuscript for valuable intellectual content. The authors have read and approved the manuscript and agreed to be accountable for all aspects of the work.

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