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CONSERVATIVE MANAGEMENT OF PEDIATRIC MANDIBULAR CONDYLAR FRACTURE WITH MRI EVALUATION OF DISC STATUS – A CASE REPORT

Oral & Maxillofacial Surgery

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ABSTRACT

Mandibular condylar fractures are among the most common facial fractures in pediatric patients, accounting for 26–62% of all pediatric mandibular fractures. [1] [2]Management remains controversial due to the growth potential of the mandible and the remodeling capacity of the temporomandibular joint (TMJ). While surgical intervention is occasionally indicated for severely displaced or bilateral fractures with functional impairment, this case report describes an 8-year-old boy who sustained a mandibular condylar fracture following a fall while playing. Clinical examination revealed restricted mouth opening and deviation of the mandible. CT imaging confirmed a left mandibular condylar fracture. The fracture was classified as a subcondylar fracture with moderate displacement, without dislocation of the condylar head from the glenoid fossa. Considering the patient's age and remodeling potential, conservative management was planned along with functional therapy. A structured physiotherapy protocol including guided jaw exercises and interincisal opening training was implemented. MRI was used to evaluate the TMJ disc status. The patient showed satisfactory functional improvement during follow-up. At 6-month follow-up, mouth opening improved to 38 mm with complete resolution of mandibular deviation and no evidence of condylar growth disturbance on imaging. This case highlights the importance of conservative treatment and MRI evaluation of disc status in pediatric condylar fractures.

KEYWORDS

Pediatric Condylar Fracture, Temporomandibular Joint, Conservative Management, MRI, Mandible Fracture, Disc Displacement, Functional Therapy, Jaw Physiotherapy, Mandibular Remodeling

1. INTRODUCTION

Pediatric mandibular fractures account for approximately 20–50% of maxillofacial fractures, with condylar fractures representing a significant proportion. The incidence of condylar fractures is higher in children due to the relatively larger condylar head, the thin cortical bone, and the prominent condylar neck, which acts as a mechanical weak point during trauma. Falls and motor vehicle accidents represent the leading etiological factors in this age group.

The temporomandibular joint (TMJ) is a ginglymoarthrodial joint, allowing both hinge and gliding movements. It is unique in that both joints function simultaneously as a bilateral articulation, making unilateral condylar trauma capable of producing bilateral functional consequences including contralateral TMJ overloading and adaptive occlusal changes[6].The articular disc plays an important role in preventing adhesion between the condyle and glenoid fossa and thus prevents TMJ ankylosis. Disc displacement, whether anterior with or without reduction, has been associated with post-traumatic condylar fracture outcomes and can contribute to long-term joint dysfunction if undetected. Conventional radiographs are often insufficient to assess the disc and soft tissue structures of the TMJ. Panoramic radiographs (OPG) and CT scans provide excellent bony detail but cannot visualize the disc, retrodiscal tissue, or joint effusion with adequate resolution. Magnetic Resonance Imaging (MRI) is considered the gold standard for evaluating disc position, disc morphology, and joint effusion.[5]

Due to the high remodeling potential in children, many condylar fractures can be successfully managed conservatively. The craniofacial skeleton in children under 12 years demonstrates remarkable adaptive capacity, with documented evidence of condylar regeneration, neo-condyle formation, and normalization of ramal height following conservative management. However, the quality and extent of remodeling are influenced by the severity and type of fracture, the patient's age, compliance with functional therapy, and early intervention. This case report aims to contribute to the existing literature on conservative management strategies and to highlight the critical role of MRI in monitoring soft tissue responses in growing patients.[4] [7]

2. Case Report

2.1 Patient Presentation

An 8-year-old male child presented to the Department of Oral and Maxillofacial Surgery with a history of accidental fall while playing. The patient fell from a height of approximately 1.5 meters, sustaining direct impact to the chin region (point-of-chin trauma). There was no history of loss of consciousness, vomiting, seizures, or oral bleeding. Systemic history was non-contributory and the patient had no prior history of TMJ complaints or previous facial trauma.

The patient's parents provided written informed consent for clinical evaluation, imaging, and publication of de-identified case data.

2.2 Clinical Examination

Clinical examination revealed mild tenderness over the left preauricular region with restricted mouth opening of approximately 15 mm. The mandible showed deviation toward the left side during mouth opening. Intraoral examination revealed a posterior open bite on the left side, consistent with shortening of the left mandibular ramus due to the overlapping condylar fracture. No lacerations, hematoma, or ecchymosis was observed intraorally. Facial symmetry was grossly

maintained. Cranial nerve examination revealed no deficits. Cervical spine tenderness was absent and neck movements were within normal limits, ruling out associated cervical injury.after four month follow up with isovolumetric exercise mouth opening improved to 40mm

Midline Shift

2.3 Radiographic Evaluation

A CT scan of the facial bones revealed a fracture of the left mandibular condyle. The fracture was identified as a subcondylar (high condylar neck) fracture with approximately 20–25 degrees of medial angulation and mild overlap, without complete dislocation of the condylar head from the glenoid fossa. No evidence of intracranial injury was noted on brain CT. Baseline MRI of the TMJ was performed at initial presentation using a 1.5T MRI system with a dedicated surface coil. Proton density-weighted and T2-weighted sequences in both sagittal oblique and coronal oblique planes were acquired. Initial MRI findings revealed anterior disc displacement with reduction (ADDWR) on the left side, with mild joint effusion noted in the superior joint space. The right TMJ disc was in normal position with no effusion

CT Showing High Condyle Fracture on Left Side

MRI Shows Anterior Disc Displacement and Mild Joint Effusion

2.4 Treatment Protocol

Considering the young age of the patient and high remodeling potential, conservative management was planned. The decision to manage conservatively was supported by: (1) age under 12 years with significant remaining growth potential, (2) fracture displacement less than 30 degrees, (3) absence of complete condylar dislocation, and (4) no associated dentoskeletal malocclusion requiring immediate correction.

The patient was advised on the following functional therapy protocol:

- Mouth opening exercises with progressive resistance
- Wooden stick exercises for gradual mouth opening (3–5 stacked sticks, progressed weekly)
- Lateral excursion exercises to the contralateral (right) side to promote condylar remodeling [1]
- Protrusive jaw exercises to stimulate anterior condylar translation
- Soft diet for the first 4 weeks, transitioning to a regular diet by week 6
- Non-steroidal anti-inflammatory drugs (NSAIDs) — Ibuprofen 10 mg/kg/dose TID for 7 days for pain and inflammation management
- Physiotherapy referral for supervised jaw mobilization sessions twice weekly for the first 8 weeks

2.5 Follow-Up and Outcomes

The patient was followed up every two months and clinical parameters including mouth opening, mandibular deviation, and midline shift were evaluated. Table 1 summarizes the clinical follow-up data across the observation period

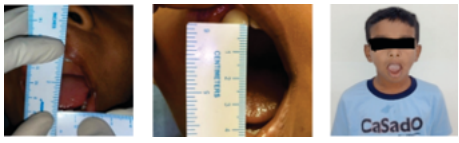

Table 1: Summary of Clinical Follow-Up Findings

Time Interval	Mouth Opening (mm)	Mandibular Deviation	Pain / Functional Status
2month	22mm	Reduced deviation	Not specified
4month	31mm	Trace midline shift	Not specified
6month	38	Fully resolved	No pain, no functional limitation

At the 2-month follow-up, mouth opening had improved to 22 mm with reduced mandibular deviation. By 4 months, interincisal opening reached 31 mm with trace midline shift. At 6-month review, mouth opening was 38 mm, midline deviation had fully resolved, and the patient reported no pain or functional limitations.[2][8]

A second MRI was taken after six months to assess improvement in disc position and joint status. The 6-month MRI demonstrated resolution of the anterior disc displacement with reduction on the left side; the disc had returned to a normal anterosuperior position relative to the condylar head in both open and closed mouth positions. Joint effusion had resolved completely. CT comparison at 6 months showed evidence of progressive condylar remodeling with rounding of the fracture fragment edges and early neo-condyle formation at the fracture site.

3. DISCUSSION

The condylar cartilage is considered secondary cartilage influenced by functional stimuli rather than a primary growth center. This distinction is clinically important: unlike primary growth cartilages such as the epiphyseal plate, the condylar cartilage retains greater plasticity and regenerative capacity in response to mechanical loading and functional demands. According to Moss and Copray, damage to the condylar region may not necessarily affect the articular disc directly but may lead to functional disturbances in mandibular movement.

Management of condylar fractures in children remains controversial. The debate centers on the long-term effects of conservative versus surgical management on facial growth, occlusion, and condylar morphology. Proponents of surgical management argue that anatomic reduction restores condylar height and prevents growth disturbance, particularly in displaced and dislocated fractures. However, the risks of scarring, facial nerve injury, and anesthesia in young children must be weighed carefully. Due to the high remodeling potential of the

craniofacial skeleton before the age of 12 years, conservative treatment is often preferred.

Lindqvist and Santavirta, as well as subsequent systematic reviews, have demonstrated that conservative management yields favorable long-term outcomes in pediatric condylar fractures, particularly for intracapsular and subcondylar fractures with angulation less than 45 degrees. The current case falls within these parameters, supporting the appropriateness of the conservative approach employed.[1]

Functional therapy allows restoration of mandibular movement, prevention of ankylosis, and proper remodeling of the condyle. Early mobilization is particularly critical in pediatric patients, as prolonged immobilization can lead to fibrous ankylosis and permanent restriction of mandibular movement. In children, the periosteum is thicker and more vascular, facilitating rapid callus formation and bony remodeling, which is why early physiotherapy combined with guided jaw exercises can accelerate functional recovery.

MRI plays an important role in evaluating disc position and joint changes during follow-up. The identification of ADDWR on baseline MRI in this case allowed targeted management to prevent the progression to anterior disc displacement without reduction (ADDWOR), which carries a significantly worse prognosis for joint function. Serial MRI imaging enabled objective documentation of disc repositioning and resolution of joint effusion over the 6-month observation period — findings that would not have been detectable on CT or plain radiograph alone. This supports the recommendation of routine MRI evaluation in pediatric condylar fractures, particularly when clinical examination suggests TMJ soft tissue involvement.

The resolution of mandibular deviation and near-complete normalization of mouth opening observed in this case are consistent with the well-documented remodeling capacity of the pediatric TMJ. However, long-term follow-up beyond the active growth period (i.e., through adolescence) is essential to monitor for late-onset facial asymmetry, condylar shortening, or occlusal disturbances, which may not be clinically apparent in the short term.[3] [4]

4. CONCLUSION

This case report demonstrates that conservative management combined with functional therapy can achieve satisfactory outcomes in pediatric condylar fractures. Early initiation of structured jaw physiotherapy, patient and caregiver compliance, and regular clinical monitoring are key determinants of successful functional recovery. [1] [2]MRI evaluation of the temporomandibular joint helps in assessing disc status and monitoring joint recovery. Its use should be integrated as a standard component of the diagnostic and follow-up protocol in pediatric condylar fractures to detect and address disc-related pathology proactively. Early diagnosis and appropriate conservative management can result in good functional recovery in growing children. Multicenter prospective studies with longer follow-up are needed to establish standardized evidence-based guidelines for pediatric condylar fracture management.

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