

CASE REPORT

Conservative management and follow-up of bilateral condylar fractures in pediatric patients: A case report

Ibrahim Nourwali | Marwan Aljohani 

Department of Oral and Maxillofacial Surgery, College of Dentistry, Taibah University, Madinah, Saudi Arabia

Correspondence

Marwan Aljohani, Department of Oral and Maxillofacial Surgery, College of Dentistry, Taibah University, Madinah, Saudi Arabia.

Email: al-marwan-y@hotmail.com

Key Clinical Message

Conservative treatment of bilateral condylar fractures, including intermaxillary fixation using arch bars and elastic bands, yields satisfactory results in pediatric patients. Therefore, the conservative approach should be considered the first line of treatment for bilateral condylar mandibular fractures in pediatric patients.

Abstract

Road traffic accidents (RTAs) are considered the leading cause of mortality and morbidity of children and adults in Saudi Arabia. Head injuries and fractures are the most common form of injuries resulting from RTAs, with mandibular fractures being the most common head injury; condylar fractures are the most frequent type of mandibular fracture. A review of the literature reveals diverse opinions about the best approach for treating bilateral condylar fractures in pediatric patients. The findings of the literature review are reported in this study. The case presented here shows the result of adopting a conservative approach to treating a bilateral extracapsular displaced condylar fracture. An elastic band was fixed onto intermaxillary fixation (IMF) screws at the midline upper and lower jaws; the patient was followed up for almost 3 years. The conservative approach yielded excellent results, as both condyles were fully repositioned and healed, without causing any deviation or limitation of the mouth opening. The results of this case support considering the conservative approach as the first line of treatment for bilateral condylar mandibular fractures in pediatric patients.

KEYWORDS

bilateral condylar fractures, case report, conservative treatment, pediatric

1 | INTRODUCTION

Of all head and neck injuries or fractures, mandibular fractures were reported as the most common frequent form of maxillofacial fractures in children.^{1,2} Moreover, the literature demonstrates that mandibular condylar fractures are

the most frequent of all mandibular fractures, accounting for more than 70% of all mandibular fractures in children and adolescents.^{3,4} The reason behind this phenomenon could be that as most fractures arise from blunt trauma forces to the anterior of the mandible, these forces are transmitted to the condylar area. The movement of this

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2023 The Authors. *Clinical Case Reports* published by John Wiley & Sons Ltd.

area is limited posteriorly by the temporomandibular joint (TMJ) capsule, the lateral pterygoid muscles, and the glenoid fossa.⁵⁻⁷

Condylar fractures can clinically present as limited ability to open the mouth, malocclusion, facial deformity, and TMJ disorders. In conjunction with these clinical signs and symptoms, a diagnosis can be confirmed by X-ray. Leaving condylar fractures untreated can result in persistent disorders, affecting the patient's physical and mental health.^{8,9}

Many articles have shown good long-term results of condylar fractures in children treated by conservative procedures. However, there are few long-term results regarding bilateral condylar fractures (BCFs) in children in the literature.¹⁰ This case report describes a pediatric patient with severe bilateral displaced condyle head fractures (extracapsular fractures). The patient was treated conservatively with the aid of an elastic band fixed to intermaxillary fixation (IMF) screws at the midline of the upper and lower jaws and followed up for almost 3 years.

2 | CASE PRESENTATION

An 11-year-old female patient was admitted to the Pediatric Intensive Care Unit (PICU) suffering from severe head and facial trauma and loss of consciousness in September 2020 immediately after a road traffic accident (RTA). Once the critical condition of the patient was stable,

various specialist care teams from different departments, including neurosurgery were involved in her treatment and rehabilitation.

Clinical examination of the patient revealed bruising of the soft tissue in the chin area, an anterior open bite with minimal deviation of the mandible from the left side, and restricted mouth opening. Computed tomography (CT) findings supported a diagnosis of severe bilateral displaced condyle fractures (extracapsular fractures): the right side was completely displaced medially and the condyle on the left was displaced by 90°. Additionally, the left mandibular body was fractured (Figures 1 and 2).

Treatment was administered under general anesthesia and nasal intubation. It included placing midline IMF screws into the upper and lower jaws, open reduction, and internal fixation (ORIF) of the left body mandibular fracture with two miniplates and eight screws (Figure 3). Due to the severity of the injury and the difficulty in reaching the fracture areas, as well as the fact that the patient was a child, the decision was made to make a functional close reduction of the BCFs by fixing an elastic band to the IMF screws. The elastic band was in situ for a month as the patient was still in the PICU and not fully conscious; she was also feeding through a nasogastric tube. ORIF was also used to treat the left body fracture of the mandible.

Although the patient was in the PICU, she was followed up every week until she was fully conscious and orientated. She was then followed up every month for the next 3 months until she was discharged from the hospital.

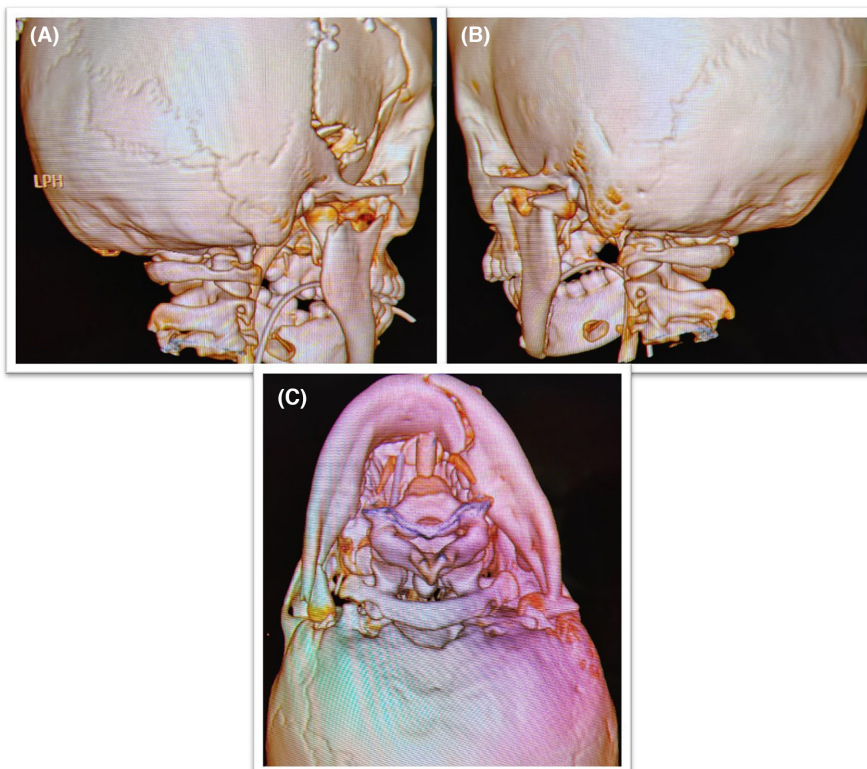


FIGURE 1 CBCT with 3D-imaging shows preoperative of (A) the right condylar fracture where the condyle was totally displaced, (B) the left condyle was displaced by a 90-degree angle, and (C) the left mandibular body was fractured.

FIGURE 2 CBCT with 3D imaging shows the right and left condylar fractures in 2020 and 2023. Successful treatment is demonstrated by complete healing of the condyle bilaterally and normal jaw growth.

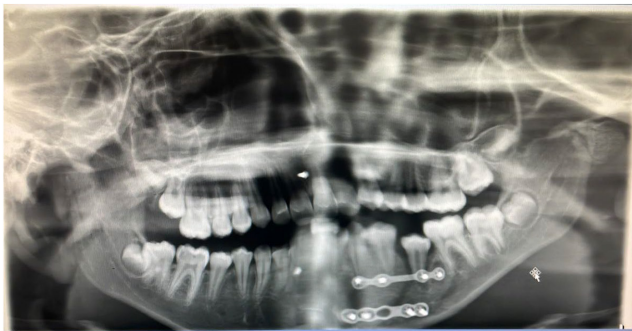
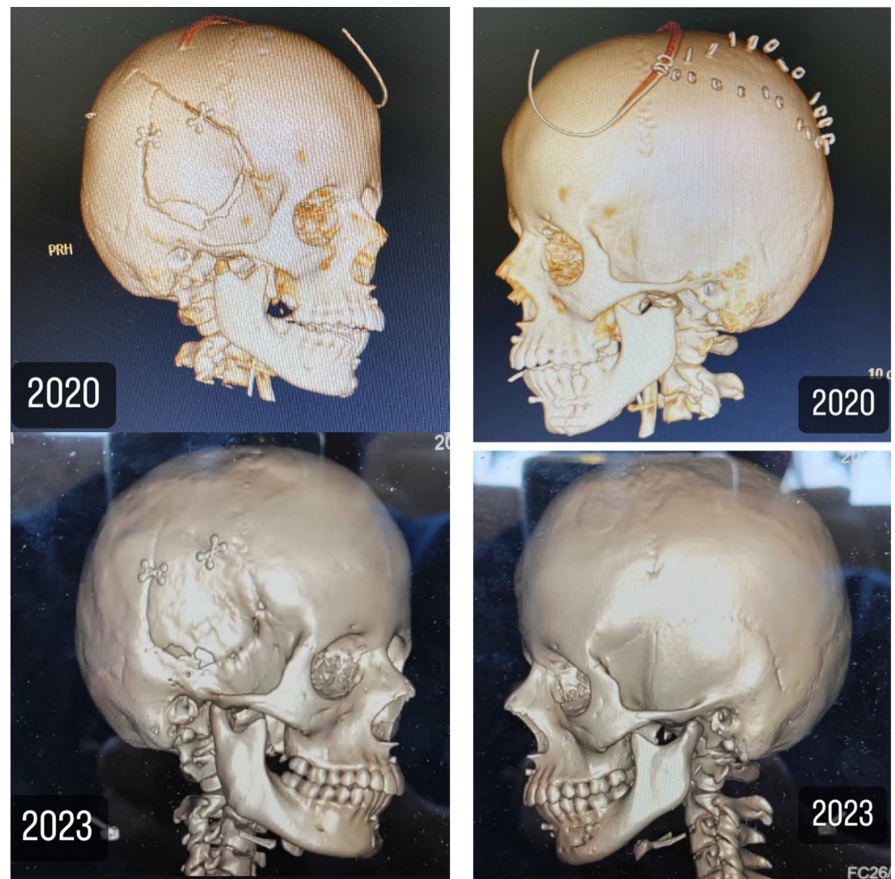


FIGURE 3 This orthopantomogram image was taken 1 month after the RTA and shows the right and left displaced condylar fractures. The two miniplates held by four screws each fixed the left mandibular body fracture, and the IMF midline screws in the upper and lower jaws are visible.

After the full course of treatment, the patient, who was from another city, was not seen again until June 2023, approximately 3 years after the procedures. The patient's guardian was contacted for a follow-up visit, in which cone-beam CT (CBCT) and clinical examinations were performed (Figure 4). CBCT confirmed that the BCFs were fully repositioned and healed, with no deviation or limitation of mouth opening (mouth opening >30mm). The left-body fracture of the mandible also healed, with

bone overgrowth evident over the miniplates. The treatment plan was to remove the miniplates from the body of the mandible as soon as possible; however, the patient's guardian decided to have this done at another hospital outside the city because they resided nearby.

3 | DISCUSSION

Several studies have investigated different aspects of mandibular condyle fractures, including etiology, radiographic evaluation, management options for BCF, and follow-up.^{3,4} However, few have examined the most appropriate treatment for pediatric patients and long-term follow-up outcomes.

Powers¹¹ studied the classification of condylar fractures and reported that there is no universal gold standard classification for mandibular condylar fractures. To date, the most comprehensive classification was published by Lindahl¹² in 1977. It categorizes fractures according to anatomical fracture level, which is either a condylar head, condyle neck, or subcondylar fracture, deviation and displacement, and the relative position of the condylar head and fossa.

The literature indicates that there is no consensus regarding the best method(s) for managing BCFs in



FIGURE 4 Clinical photos taken after almost 1 year after the first procedure. T (A) shows the patient in centric occlusion and (B) the patient was able to open her mouth normally (>30 mm).

children. By virtue of their age, this patient population is in an active growth phase with mixed dentition and is undergoing significant bone remodeling.^{13,14} The aim of treating such patients is to restore normal function of the TMJ and to facilitate normal occlusion and growth of the mandible.¹⁵ Many factors will influence treatment decisions, including the child's age and general state of health, level of the fracture, degree of displacement or dislocation, and the presence of associated facial fractures. Overall, treatment options fall under surgical or nonsurgical approaches.¹³ However, the general preference for treating pediatric and adolescent patients is to adopt conservative (i.e., nonsurgical) approaches.^{16,17} In a review of 35 published case reports and retrospective studies, Khattak et al¹³ analyzed and compared conservative and surgical approaches. The authors reported that many studies demonstrated that, for pediatric BCFs, a composite approach, in which ORIF was performed on one side and intermaxillary fixation on the other. This was effective in improving and restoring normal function of the TMJ and minimizing long-term complications. Furthermore, the same authors found that conservative treatment was preferred in the majority of cases and that early immobilization to facilitate lymphatic and vascular circulation is critical for treating pediatric BCFs.

Lekven, Neppelberg, and Tornes⁴ conducted a prospective study that aimed to assess the long-term clinical and radiographic results of nonsurgical approaches for pediatric condylar fracture. The study included 54 patients, of whom 24 had BCFs, and the mean follow-up was 4 years. Treatments included either observation or intermaxillary fixation (guided elastics and/or rigid fixation). Those with BCFs demonstrated a statistically significant increase in favorable clinical outcomes compared to those with unilateral fractures ($p=0.018$). The authors concluded that nonsurgical treatment of condylar fractures led to acceptable healing of the condylar process, excellent long-term

clinical results, and elimination of clinical signs or symptoms in all cases of BCFs. The present clinical case confirms that a conservative approach, including the use of arch bars and elastic bands, can yield satisfactory results in pediatric patients with BCFs.

One factor determining the treatment approach is the presence of unilateral or BCFs. There is some evidence in the literature that pediatric patients with unilateral condylar fractures experience relatively fewer developmental deficits of the mandible due to the usual compensatory function of the contralateral side. In contrast, pediatric patients should receive more attention for the treatment of BCFs, particularly those 5 and 7 years, and 12 and 15 years of age. BCFs in children who are misdiagnosed, or in whom treatment is unsuccessful, are prone to facial growth problems such as mandibular hypoplasia or micrognathia.¹⁸ This may result in the need for TMJ or orthognathic surgery in the future and potential chronic joint problems.¹⁹

Another factor that can determine/influence the treatment approach is the patient age. As the literature suggests, the relationship between remodeling capacity and age in pediatric patients remains unclear. According to Dimitroulis et al.,²⁰ pediatric patients <10 years of age exhibit the greatest potential for remodeling, whereas older children have less capacity for growth and remodeling on the side of the fractured condyle. According to Norholt et al.,²¹ younger children experience fewer long-term problems than those who are older. However, according to Rowe,¹⁹ injuries that occurred before 3 years of age resulted in severe asymmetric deformity, those that occurred between six and 12 years of age resulted in a moderate deformity, and those that occurred >12 years resulted in a small(er) deformity. Young children are particularly vulnerable to long-term harm.¹⁹ However, according to other authors, remodeling is strongly influenced by the type of fracture and not by patient age.¹⁹ Based on evidence from the literature, Zhou, Han, and Li¹⁹ reported that the impact of the

child's age at the time of injury on remodeling outcome remains controversial.

Although many studies have suggested ORIF for BCF in adult patients, this was not the case for children, as cases reported in the literature suggest that conservative treatment should be the first-line choice for pediatric patients.²² The result of the present case is consistent with those reported in the literature, in which the conservative approach was chosen for many reasons, including patient age and medical condition as mentioned above. The result after almost 3-year follow-up was satisfactory as the patient had normal function restored and both condyles healed normally with no other signs or symptoms. One point that should be emphasized is the close follow-up of children treated for BCF until the end of growth period, as suggested by Zhou, Han, and Li,¹⁹ to reduce the risk of remodeling deformity and dysfunction.

4 | CONCLUSION

It is important to enrich the scientific content by publishing the results of these cases, especially after a follow-up that lasted for 3 years, to help increase the evidence and favor one treatment method over the other. The pediatric case presented in this study supports the literature that argues nonsurgical approaches should be the first-line choice for pediatric BCFs. The conservative approach yielded an excellent result in this patient, as her mandible function, bone formation, and aesthetic appearance were all normal.

AUTHOR CONTRIBUTIONS

Ibrahim Nourwali: Data curation; formal analysis; writing – original draft. **Marwan Aljohani:** Conceptualization; data curation; writing – original draft.

ACKNOWLEDGMENTS

Our heartfelt gratitude goes to the patient and her family for their consent, support, and cooperation during treatment.

FUNDING INFORMATION

None.

CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest relevant to this article.

DATA AVAILABILITY STATEMENT

All data sets collected during this study are available upon reasonable request from the corresponding author.

CONSENT

The individuals involved signed informed consent forms to use the photos. A copy of each of the signed informed consent forms is available upon request.

ORCID

Marwan Aljohani  <https://orcid.org/0000-0001-9829-901X>

REFERENCES

- Iida S, Matsuya T. Paediatric maxillofacial fractures: their aetiological characters and fracture patterns. *J Craniomaxillofac Surg.* 2002;30(4):237-241.
- Güven O. Fractures of the maxillofacial region in children. *J Craniomaxillofac Surg.* 1992;20(6):244-247.
- Zhou HH, Lv K, Yang RT, Li Z, Yang XW, Li ZB. Mandibular condylar fractures in children and adolescents: 5-year retrospective cohort study. *Int J Pediatr Otorhinolaryngol.* 2019;119:113-117.
- Lekven N, Neppelberg E, Tornes K. Long-term follow-up of mandibular condylar fractures in children. *J Oral Maxillofac Surg.* 2011;69(11):2853-2859.
- Wilkie G, Al-Ani Z. Temporomandibular joint anatomy, function and clinical relevance. *Br Dent J.* 2022;233(7):539-546.
- Iturriaga V, Bornhardt T, Velasquez N. Temporomandibular Joint. *Dent Clin N Am.* 2023;67(2):199-209.
- Mooney S, Gulati RD, Yusupov S, Butts SC. Mandibular condylar fractures. *Facial Plast Surg Clin North Am.* 2022;30(1):85-98.
- Shakya S, Zhang X, Liu L. Key points in surgical management of mandibular condylar fractures. *Chin J Traumatol.* 2020;23(2):63-70.
- Xiang G, Long X, Deng M, Han Q, Meng Q, Li B. A retrospective study of temporomandibular joint ankylosis secondary to surgical treatment of mandibular condylar fractures. *Br J Oral Maxillofac Surg.* 2014;52(3):270-274.
- D'Andrea AV, Medina AC, Martinez MG, Silva LD. Conservative treatment of mandibular condyle fractures in children: case series. *Revista de Odontopediatria Latinoamericana.* 2020;7(2):127-143.
- Powers DB. Classification of mandibular condylar fractures. *Atlas Oral Maxillofac Surg Clin North Am.* 2017;25(1):1-10.
- Lindahl L. Condylar fractures of the mandible. *Int J Oral Surg.* 1977;6(1):12-21.
- Khattak YR, Sardar T, Iqbal A, et al. Treatment of pediatric bilateral condylar fractures: a comprehensive analysis. *J Stomatol Oral Maxillofac Surg.* 2022;124(1):101339.
- Cooney M, O'Connell JE, Vesey JA, Van Eeden S. Non-surgical management of paediatric and adolescent mandibular condyles: a retrospective review of 49 consecutive cases treated at a tertiary referral Centre. *J Craniomaxillofac Surg.* 2020;48(7):666-671.
- Muñante-Cárdenas JL, Asprino L, De Moraes M, Albergaria-Barbosa JR, Moreira RWF. Mandibular fractures in a group of Brazilian subjects under 18 years of age: an epidemiological analysis. *Int J Pediatr Otorhinolaryngol.* 2010;74(11):1276-1280.
- Vesnaver A. Dislocated pediatric condyle fractures — should conservative treatment always be the rule? *J Craniomaxillofac Surg.* 2020;48(10):933-941.

17. Zhao Y, Yang J, Bai R, Ge L, Zhang Y. A retrospective study of using removable occlusal splint in the treatment of condylar fracture in children. *J Craniomaxillofac Surg*. 2014;42(7):1078-1082.
18. Choi J, Oh N, Kim IK. A follow-up study of condyle fracture in children. *Int J Oral Maxillofac Surg*. 2005;34(8):851-858.
19. Zhou HH, Han J, Li ZB. Conservative treatment of bilateral condylar fractures in children: case report and review of the literature. *Int J Pediatr Otorhinolaryngol*. 2014;78(9):1557-1562.
20. Dimitroulis G. Condylar injuries in growing patients. *Aust Dent J*. 1997;42(6):367-371.
21. Norholt SE, Krishnan V, Sindet-Pedersen S, Jensen I. Pediatric condylar fractures: a long-term follow-up study of 55 patients. *J Oral Maxillofac Surg*. 1993;51(12):1302-1310.
22. Seshappa K, Rangaswamy S. Bilateral mandibular condyle fractures: should we open both? *Natl J Maxillofac Surg*. 2020;11(2):285-288.

How to cite this article: Nourwali I, Aljohani M. Conservative management and follow-up of bilateral condylar fractures in pediatric patients: A case report. *Clin Case Rep*. 2023;11:e7842. doi:[10.1002/ccr3.7842](https://doi.org/10.1002/ccr3.7842)