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Traumatic Intracranial Intrusion of the Mandibular Condyle in the Middle Fossa: A Rare Case Report

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Abstract

The displacement of the condyle into the middle cranial fossa after a high kinetic trauma represents a rare and low prevalence situation in the clinical routine of the maxillofacial surgeon. After a motorcycle accident, a 19-year-old male patient evolves with displacement of the left mandibular condyle to the middle cranial fossa, requiring surgical management in association with the neurosurgical team for repositioning and reconstruction of the glenoid fossa. After craniotomy, the condyle was visualized in the middle fossa. After bone disimpaction with a driller, the condyle was repositioned and the glenoid fossa was reconstructed with a titanium mesh. After 12 months of follow-up, no neurological or functional sequela was observed. The displacement of the mandibular condyle to the cranial fossa is rarely reported in the literature. It requires a multidisciplinary team for its management. Long-term follow-up is also necessary, especially in young patients.

Keywords
- condylar dislocation
- middle cranial fossa
- glenoid fossa reconstruction
- temporomandibular joint
- brain injuries

Introduction

The displacement of the mandibular condyle through the glenoid fossa invading the middle cranial fossa is a rare occurrence with a low incidence in clinical practice, with 59 cases reported in the literature until 2018.[1] The structures of the condyle and the base of the skull, in addition to the force generated in the chin at the moment of impact, represent important factors for the displacement of the condyle to the glenoid fossa.[2] The diagnosis of this condition must be considered when there is mandibular asymmetry, limited mouth opening, and occlusal disorders, characteristics that may resemble unilateral condylar fracture.[3,4]

From a neurosurgical point of view, due to the invasion of the middle cranial fossa after fracture of the glenoid cavity and displacement of the mandibular condyle, there is a risk of dural injury and subsequent formation of cerebrospinal fluid, whose early diagnosis and treatment are important to minimize brain complications and hemorrhage.[5] Computed tomography (CT), in the coronal and sagittal views, provides better assistance in the diagnosis of displacement of the condyle to the middle fossa.[6] There are reports in the literature of a variety of surgical treatments, such as closed reduction, graft interposition, and reconstruction of the glenoid fossa, reinforcing the need to perform a multidisciplinary treatment approach, with special attention to the neurosurgery team.[7] This article reports a case of displacement without fracture of the mandibular condyle to the cranial fossa and the treatment method used.

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Case Report

An 18-year-old male patient, victim of a high kinetic motorcycle accident in November 2020, evolved with facial trauma. The patient was conscious and oriented, without report of loss of consciousness and with painful complaints in the face, receiving attendance by a multidisciplinary team.

Initial clinical examination revealed an anterior open bite, opening restriction, edema in the temporomandibular joint region bilaterally, laceration in the submental region, and coronary fracture of all upper incisors. CT scan of the face showed incomplete fracture of the right mandibular condyle, fracture of the right mandibular angle, fracture of the left articular fossa with displacement of the left condyle into the middle cranial fossa and foci of pneumocephalus (►**Fig. 1**).

In view of the complexity of the case, surgery was planned in two stages for the management of trauma, the first approach being jointly performed with the neurosurgery team for disimpaction of the condyle of the cranial fossa and the second approach for the management of angle fracture. Due to the risk of dural injury and cerebrospinal fluid leak, we opted, in conjunction with the neurosurgery team, to perform access to the impacted condyle through the middle fossa.

The Al-Kayat access was performed with the patient under general anesthesia and nasotracheal intubation, followed by temporo-basal craniotomy and careful retraction of the lateral portion of the temporal lobe. The retraction allowed visualization of the fracture at the base of the middle fossa, the impacted mandibular condyle, and the articular disk (►**Fig. 2A**). Due to the risk of compression of the midbrain by the mesial portion of the temporal lobe, the entire retraction process was performed carefully using the least possible force by the neurosurgery team. To reduce the condyle back to the temporomandibular joint space, drilling of the skull base around the mandibular condyle was made with a spherical diamond drill, followed by realization of axial force in the craniocaudal direction. Then, a titanium mesh was installed on the floor of the fossa and fixed with five 5-mm screws to the zygomatic arch to restore the glenoid fossa (►**Fig. 2B**). Duraplasty was performed with a fascia lata graft previously taken from the patient's thigh, aiming to prevent the occurrence of liquor fistula, followed by reconstruction of the skull base with a 2.0-mm osteosynthesis system. A Portovac drain was installed, and the flaps were closed by planes with absorbable thread and nonabsorbable monofilament thread on the skin. At the same surgical time, Erich bars were installed to stabilize fractures of the maxillomandibular complex.

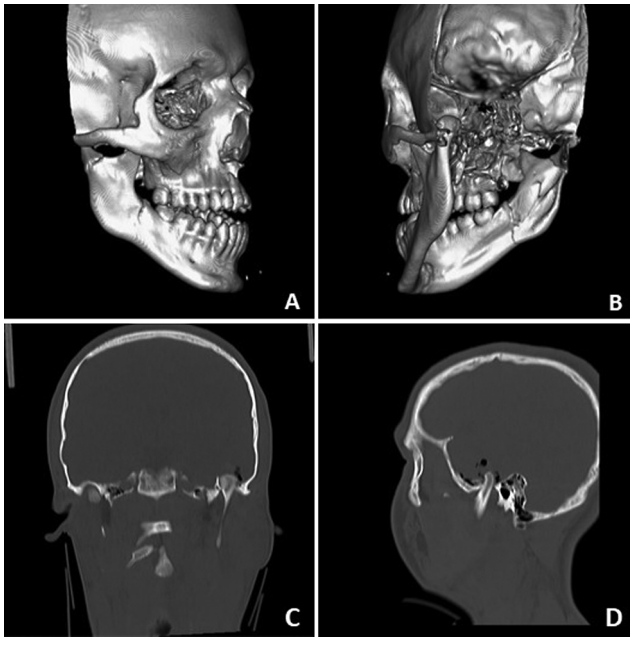

Fig. 1 Computed tomography (CT) in the three-dimensional (3D) reconstruction (**A, B**) showing incomplete fracture of the right condyle, right angle fracture, and left condyle displaced into the cranial fossa, in the sagittal and coronal views. (**C, D**) Visualization of the foci of pneumocephalus and fracture of the glenoid fossa.

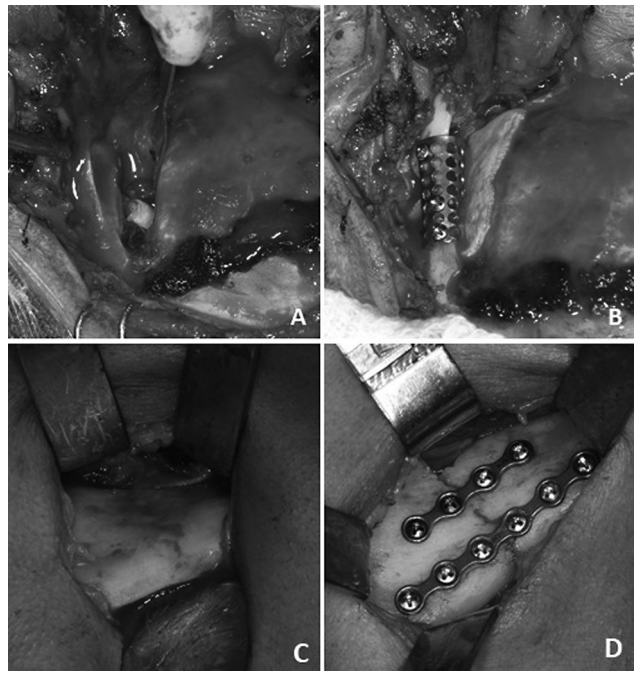

Fig. 2 Intraoperative visualization. (**A**) After craniotomy and careful retraction of the lateral portion of the temporal lobe, localization of the impacted mandibular condyle and the articular disk. (**B**) Reconstruction of the cranial fossa with titanium mesh and fascia lata. (**C**) Management of the right mandibular angle fracture, followed by (**D**) osteosynthesis.

The patient maintained a rigid block with steel wires for 8 days. Then, reduction and fixation were performed under general anesthesia and extraoral access of the fracture of the right mandibular angle (►**Fig. 2C, D**). Extraction by intraoral access of lower right third molar involved in the fracture line was performed at the same surgical time. The patient was discharged from the hospital after 24 hours, with prescriptions for amoxicillin 500 mg for 7 days every 8 hours, dipyrone sodium 500 mg for 2 days every 4 hours, and ibuprofen 300 mg for 3 days every 8 hours. A new maxillomandibular block was placed to continue the conservative condyle treatment, which was removed after 7 days, and light elastic therapy was started.

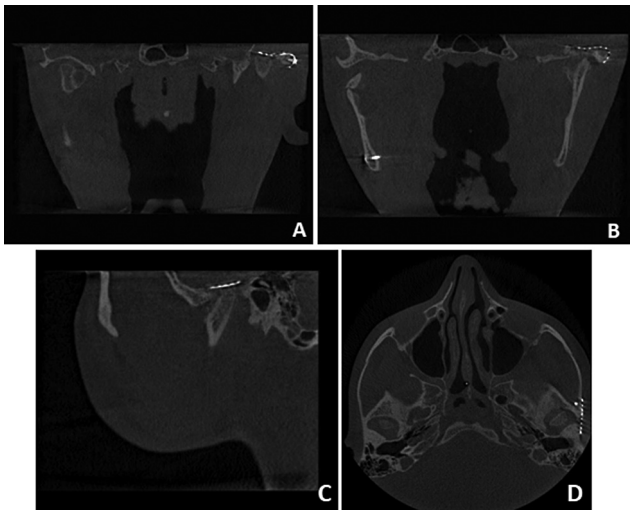

Fig. 3 Computed tomography (CT) at 60 days of follow-up. (**A**, **B**) Coronal, (**C**) sagittal, and (**D**) axial views demonstrating titanium mesh in position with absence of foci of pneumocephalus.

Weekly outpatient follow-up was performed, where no signs of infection and dehiscence of sutures were observed. Control CT scan was performed after 60 days of the procedure, and adequate healing and osteosynthesis material without displacement were observed (►**Fig. 3**). In clinical evaluation at 12 months, we observed satisfactory mouth opening of 30 mm and absence of pain complaints and joint disorders, and the patient reported normal functions.

Discussion

The first reported case of a fracture of the glenoid fossa with displacement of the condyle to the cranial middle fossa was in 1960 by Heldsieck.[8] This event can be explained by anatomical characteristics of the condyle,[2] the trauma mechanism,[2] the degree of pneumatization of the temporal bone, and open mouth at the moment of impact resulting in condyle invasion in the middle fossa,[9] which may be associated with condyle fracture[2,3] or its intact displacement.[10,11]

The most commonly associated etiologies are falls from the standing position[12] and traffic accidents.[11] There is a well-documented predilection for females and younger age groups.[3,11,12] A review of 51 cases showed that 69% of cases occurred in females and 35% of cases in patients younger than 15 years.[6] In the case at hand, the patient was a young man, which is unusual within literary references.

The difficulty in diagnosing this condition is justified by the lack of specific symptoms, because the clinical signs seen are similar to those found in isolated condyle fractures, such as facial asymmetry and limited mouth opening, pain in the temporal and preauricular region, malocclusion, anterior open bite, and midline deviation.[3,4,10] Due to communication with the cranial cavity, neurological signs such as neurological deficits, laceration of the dura mater and formation of cerebrospinal fluid,[2] decreased,[3] contusion, hemorrhage and pneumoencephalus,[12] and otorrhagia[11] may be present. In our case, the patient did not have any level of sequelae or neurological deficit.

CT aids in the diagnosis of fracture of the glenoid fossa and displacement of the condyle to the middle fossa.[11] Conventional radiographs can lead to diagnostic errors due to the overlap of adjacent structures.[13] De Mol et al[14] reported a case of a patient diagnosed after 54 years, due to failure in diagnosis and absence of imaging tests. In the case reported, the use of CT was essential for the correct diagnosis and choice of treatment.

Treatment options to reduce this type of fracture are vast. The adoption of closed reduction may fail, requiring a subsequent surgical approach, as highlighted by Chen et al.[4] Among the modalities of surgical treatment, we can mention condylectomy and coronoidectomy through intraoral means,[4] craniotomy of the middle cranial fossa through preauricular,[2,12] hemicoronal access,[12] and modified Al-Kayat.[3] Bone graft from the skullcap[2] and titanium mesh can be used in the reconstruction of the glenoid fossa.[7] In case of laceration of the dura mater, it can be repaired with a synthetic substitute for airtight duroplasty and avoid the formation of liquor fistula.[2,12] Inspection of the articular disk should be performed.[3] For the reconstruction of the temporomandibular joint, the temporal muscle fascia can be used.[12] In the present case, the fascia lata fat flap was used, preventing the formation of liquor fistula, associated with reconstruction of the cranial fossa with titanium mesh. This technique proved to be effective and represents an alternative treatment with low cost and good prognosis.

In the postoperative period, a light diet and mandibular physiotherapy are recommended.[3] In long-term follow-up, patients may experience temporomandibular joint dysfunction associated with disk injury[2] and a deviation in the maximum mouth opening.[4,10]

Patients must remain under clinical and radiographic monitoring over the years, especially children, in whom mandibular growth can be compromised. Representing a clinical challenge, the displacement of the condyle into the cranial fossa requires a rapid diagnosis to avoid neurological damage. The treatment of these cases must be conducted by a multidisciplinary team. The closure of the cranial communication can be done with a fascia lata graft and titanium mesh, representing an approach of easy access in face trauma care services, having a satisfactory and favorable prognosis.

Conclusion

In summary, the displacement of the mandibular condyle to the cranial fossa is rarely reported in the literature. It requires a multidisciplinary team for its management, and long-term follow-up is necessary, especially in young patients.

Authors' Contributions

D.M-S. contributed to the conceptualization, data curation, investigation, and writing of the original draft. I.S. was involved in the conceptualization as well as the writing, reviewing, and editing of the manuscript. C.M.d. C.R. contributed to the conceptualization and writing of

the original draft, while R.E.P.d.O. played a key role in the methodology, supervision, and writing, reviewing, and editing of the manuscript. C.J.S. also contributed to the methodology and supervision, along with writing, reviewing, and editing the manuscript. M.C.P.d.S. contributed to the conceptualization, methodology, project administration, and supervision, and took part in writing, reviewing, and editing the manuscript.

Ethical Approval

The work was not submitted to the ethics and research committee for being a clinical case report. This article does not contain studies with human participants performed by any of the authors and was conducted according to the code of ethics.

Patients' Consent

Written informed consent was obtained from the patient for publication of this case report and the accompanying images. A copy of the written consent is available for review upon request.

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None.

Conflict of Interest

None declared.

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