



Cross-sectional Imaging of Bifid Mandibular Condyle – A Rare Condition

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Abstract

Mandibular condyles constitute a major part of the temporomandibular joint. Bifid mandibular condyle (BMC) is a rare morphological variant of the condyle that is asymptomatic in most cases and can be diagnosed incidentally on a orthopantomogram during routine radiographic examination. But orthopantomography is a 2-dimensional imaging modality with various structures superimposed over the temporomandibular region causing practical difficulty in the diagnosis of BMC. The exact morphological architecture of the condyles can be more accurately visualized in advanced imaging techniques like computed tomography (CT) and cone beam computed tomography (CBMT), helping in the diagnosis of the bifid condyles. The radiological appearance of BMC varies depending on direction and depth of the separating groove. The typical radiographic presentation in most cases is a complete or incomplete split of the condylar heads, separated by a groove. This paper presents a case of a unilateral BMC on the right side which was diagnosed CBMT.

Keywords: Cone beam computed tomography, Mandibular condyle, Radiography, Temporomandibular joint

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Introduction

Temporomandibular joint (TMJ) is a complex ginglymo-diarthrodial joint comprising of the mandibular condyle and articular eminence of the temporal fossa. Various congenital and growth abnormalities can affect the condyle and related structures (1). Hrdlicka first reported a case of bifid mandibular condyle (BMC) in 1941 (2). BMC appears as a morphological alteration of the condyle with the alteration being a minor notch on the condylar head or a deep indentation with a groove dividing the condylar head into two (3). The morphological appearance of the condyle varies depending on the depth of the groove. Most cases of BMC are asymptomatic and gets detected incidentally during routine radiographic examination (4). With the advent of 3-Dimensional imaging modalities like computed tomography (CT), cone beam computed tomography (CBCT) and magnetic resonance imaging (MRI) the cross-sectional anatomy of the TMJ can be explored and the diagnosis of morphological variations such as BMC has become easy.

Case Report

A 21-year-old male reported to the Department of Oral Medicine and Radiology, A B Shetty Memorial Institute of Dental Sciences, Nitte Deemed to be University, with

a complaint of pain in the right TMJ area for 2 months. The pain was intermittent and dull aching which aggravated on opening the mouth. The patient's medical history was unremarkable and no adverse oral habits were reported by the patient. History of trauma was also ruled out. Extra oral examination revealed no gross facial asymmetry (Figure 1). On clinical examination of TMJ, no deviation, deflection or clicking was observed. On palpation, tenderness in the right TMJ region, medial and lateral pterygoid muscles were elicited. The maximum inter-incisal mouth opening was found to be 38 mm, protrusion of mandible measured from the incisal tip of maxillary central incisor to mandibular central incisor was 6 mm, lateral right and left excursion were 6 and 4 mm respectively, with pain on left lateral excursion. On evaluation of Helkimo dysfunctional index for TMJ disorder (5), a score of three was recorded. Intra oral examination revealed dental findings such as deep carious right maxillary and mandibular first molars, root stump with respect to left maxillary first molar. The mandibular left first molar was missing and the edentulous space was occupied by the mesially inclined second molar. There was no tenderness reported on examination of the carious teeth and in the region of unerupted mandibular right third molar. Based on the clinical findings, an



interim diagnosis of myospasm of right medial and lateral pterygoid was made. A scout radiograph was made which consisted of a orthopantomogram (Figure 2), that revealed altered condylar morphology on the right side when compared to the left side. The altered morphology was characterized by the presence of a condylar head like structure seen superior to the actual condylar head which led to the suspicion of bifid condyle. Since panoramic radiograph is a 2D imaging modality with lot of superimpositions of surrounding structures a CBCT was planned. A CBCT Scan (ProMax® 3D Mid; Planmeca Oy, Helsinki, Finland) with medium field of view (FOV) of size of 16 x 8 cm was made under standard protocol (Figure 3-5). Sections were studied in Planmeca Romexis Viewer Version 5.1. Coronal and sagittal planes revealed a shallow groove on the superior aspect of mid condylar region dividing the condylar head into two as medio-lateral heads giving a heart shaped appearance of the right condyle. Hence, a radiographic diagnosis of bifid right mandibular condyle was made.

Discussion

BMC is a rare entity affecting the TMJ with indistinct etiology. Genetic and developmental causes have been attributed to the development of BMC (6). Various theories have been postulated for the development of



Figure 1. Facial view demonstrating with no gross facial asymmetry



Figure 2. Orthopantomogram demonstrating the presence of a condylar head like structure superior to the actual condylar head on the right side (white arrow). [The radiograph was taken using Planmeca ProMax S2-2D radiographic unit].

bifid condyles. Hrdlicka postulated that obstruction in the vascular supply to the developing condyle in-utero can cause bifurcation of the condylar head. According to Blackwood, the exaggerated persistence of the fibrous septa within the condyle can lead to the formation of a groove resulting in BMC (7).

Experiments by Gundlach et al on rats proved that teratogenic drugs can cause double headed condyles. Various other causes like trauma during childhood, changes in the discal position, unusual muscle insertions on the condyle, endocrine disorders and infections are also believed to be the causes of BMC (8). TMJ ankylosis is also known to cause BMC, Rehman et al. have reported the association of BMC and ankylosis (9). Neves et al reported a prevalence of 1.1% in asymptomatic patients diagnosed by CT and orthopantomograms (10). The case reported here was also asymptomatic and was diagnosed

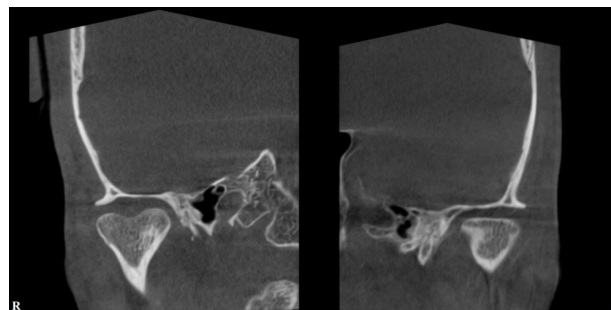


Figure 3. Coronal section showing bifid appearance of the Right condyle. Increased joint space is seen in the right condylar head in the region of bifurcation, when compared to the left side

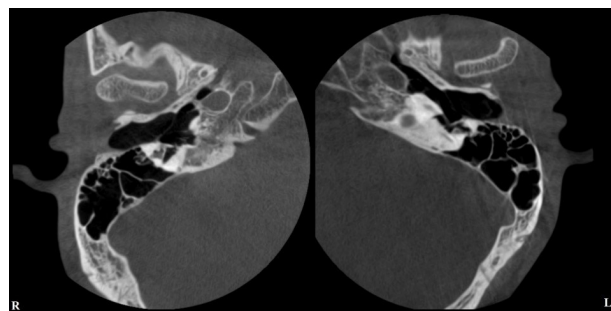


Figure 4. Axial section showing altered condylar morphology on the right side when compared to the left side

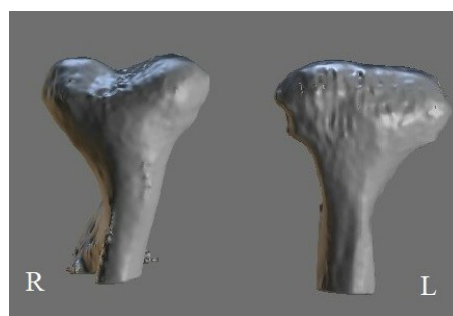


Figure 5. 3 D Reconstructions of the right and left Condyle obtained using Blue Sky Plan Software (Version 4.7)

using 3D imaging modality. Though most cases of BMC are asymptomatic, some can present with facial asymmetry, swelling, trismus, pain and TMJ clicking (11). BMC usually exists as unilateral occurrence, more common on the left side. But in our case the right condyle was bifid (12).

Among bifid condyles, the anteroposterior orientation of the condyle has been observed in cases secondary to trauma and the mediolateral orientation is believed to be developmental in origin. The typical radiographic presentation is a complete or incomplete split of the condylar heads, separated by a shallow groove (6,12). Here in our case, the condylar head was split by a shallow groove separating into medial and lateral heads, and there was no reported history of trauma thus confirming the developmental origin. The medio-laterally oriented condylar heads were best visualized in the coronal plane. The patient was treated conservatively with muscle relaxants and analgesics for a course of 5 days. On follow up after 1 week, the patient was completely asymptomatic. Other conservative symptomatic management options in BMC cases include occlusal splints and physical therapy. Surgical management of the bifid condyle is warranted only when associated with ankylosis. In our case, the patient was also advised for endodontic management of the deep carious tooth and has been kept on a long term follow up.

Conclusion

BMC is a rare morphologic variation of the mandibular condyles that manifests in different forms. Though a congenital origin is said to be the most common cause, it is always important to rule out history of trauma in such patients. A three-dimensional evaluation of bifid condyles using advanced imaging modalities provide a better understanding of the condition.

Authors' Contribution

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Competing Interests

The authors declare that they have no conflict of interests to disclose.

Ethical Approval

Informed consent was obtained from the patient for publication of this report.

References

1. Kaneyama K, Segami N, Hatta T. Congenital deformities and developmental abnormalities of the mandibular condyle in the temporomandibular joint. *Congenit Anom (Kyoto)*. 2008;48(3):118-25. doi: [10.1111/j.1741-4520.2008.00191.x](https://doi.org/10.1111/j.1741-4520.2008.00191.x).
2. Faisal M, Ali I, Pal US, Bannerjee K. Bifid mandibular condyle: report of two cases of varied etiology. *Natl J Maxillofac Surg*. 2010;1(1):78-80. doi: [10.4103/0975-5950.69156](https://doi.org/10.4103/0975-5950.69156).
3. Haghnegahdar AA, Bronoosh P, Khojastepour L, Tahmassebi P. Prevalence of bifid mandibular condyle in a selected population in south of Iran. *J Dent (Shiraz)*. 2014;15(4):156-60.
4. Katti G, Najmuddin M, Fatima S, Unnithan J. Bifid mandibular condyle. *BMJ Case Rep*. 2012;2012. doi: [10.1136/bcr-2012-007051](https://doi.org/10.1136/bcr-2012-007051).
5. Alonso-Royo R, Sánchez-Torrelo CM, Ibáñez-Vera AJ, Zagalaz-Anula N, Castellote-Caballero Y, Obrero-Gaitán E, et al. Validity and reliability of the Helkimo clinical dysfunction index for the diagnosis of temporomandibular disorders. *Diagnostics (Basel)*. 2021;11(3):472. doi: [10.3390/diagnostics11030472](https://doi.org/10.3390/diagnostics11030472).
6. Miranda K, Carneiro AS, Gerber JT, Weiss SG, Klüppel LE, Scariot R. Treatment of atypical bifid mandibular condyle associated with ankylosis of the temporomandibular joint. *Case Rep Surg*. 2019;2019:6372897. doi: [10.1155/2019/6372897](https://doi.org/10.1155/2019/6372897).
7. Shriki J, Lev R, Wong BF, Sundine MJ, Hasso AN. Bifid mandibular condyle: CT and MR imaging appearance in two patients: case report and review of the literature. *AJNR Am J Neuroradiol*. 2005;26(7):1865-8.
8. Gundlach KK, Fuhrmann A, Beckmann-Van der Ven G. The double-headed mandibular condyle. *Oral Surg Oral Med Oral Pathol*. 1987;64(2):249-253. doi: [10.1016/0030-4220\(87\)90098-3](https://doi.org/10.1016/0030-4220(87)90098-3).
9. Rehman TA, Gibikote S, Ilango N, Thaj J, Sarawagi R, Gupta A. Bifid mandibular condyle with associated temporomandibular joint ankylosis: a computed tomography study of the patterns and morphological variations. *Dentomaxillofac Radiol*. 2009;38(4):239-44. doi: [10.1259/dmfr/12945701](https://doi.org/10.1259/dmfr/12945701).
10. Neves FS, Ramírez-Sotelo LR, Roque-Torres G, Barbosa GL, Haiter-Neto F, de Freitas DQ. Detection of bifid mandibular condyle by panoramic radiography and cone beam computed tomography. *Braz J Oral Sci*. 2013;12(1):16-29.
11. de Moraes Ramos FM, de Vasconcelos Filho JO, Manzi FR, Bóscolo FN, de Almeida SM. Bifid mandibular condyle: a case report. *J Oral Sci*. 2006;48(1):35-7. doi: [10.2334/josnusd.48.35](https://doi.org/10.2334/josnusd.48.35).
12. Miloglu O, Yalcin E, Buyukkurt M, Yilmaz A, Harorli A. The frequency of bifid mandibular condyle in a Turkish patient population. *Dentomaxillofac Radiol*. 2010;39(1):42-6. doi: [10.1259/dmfr/38196548](https://doi.org/10.1259/dmfr/38196548).