Bifid mandibular condyle: Report of two cases of varied etiology

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ABSTRACT

Bifid condyle is a rare anatomic variation of mandibular condyle. It can be symptomatic or diagnosed incidentally on routine radiographic examination. No definite etiologic factor has been identified. It is suggested that bifid condyle could be a developmental anomaly or secondary to trauma. We are reporting two cases of bifid mandibular condyle. Both were diagnosed using computed tomography scan, which additionally revealed the associated pathosis in the angle of the mandible in first patient and the ankylosis of temporomandibular joint in the second patient.

Key words: Anatomic variation, bifid condyle, condylar duplication, orthopentomograph, reformatted computed tomography, temporomandibular joint ankylosis

INTRODUCTION

Bifid mandibular condyle (BMC) is an uncommon entity with a controversial etiology. It can be developmental or acquired and rarely may be associated with temporomandibular joint (TMJ) ankylosis. It was first reported in skeletal specimens in 1941 by Hrdlicka. [1] It has been only occasionally reported since then, probably due to its usually asymptomatic nature. In 1941, Hrdlicka reported the first cases of BMC in 21 specimens from an unspecified number of dried skulls, and in 1948, Sicher [2] first reported this anomaly in a living person. Honee and Bloem described a case of bifid condyle in the cadaver of a 71-year-old patient. [3]

Although this type of morphologic change is generally associated with trauma, conditions such as teratogenic drug use, genetic inheritance, infection and exposure to radiation can also cause the development of this anomaly.

CASE REPORT

Case 1
The first patient was a 14-year-old female with a history of extraction of lower decayed and painful left first molar done about 3 months earlier. The patient continued to have pain and recurrent swelling on and off after extraction and was managed by her treating dentist with medications. The patient presented to the department with dull pain and facial swelling in relation to lower left molar region extending to the angle of mandible. Limited mouth opening had persisted since extraction and was getting worst. Intraorally, she had multiple discharging sinuses in third molar region. Orthopentomograph (OPG) picture was suggestive of chronic osteomyelitis with sequestrating bone. Axial and coronal computed tomography (CT) images of bilateral TMJ and mandible with multiplanar reformatting (MPR) were done for evaluating any pathologic fracture and TMJ pathosis. They showed deformity involving the left angle of the mandible. There was a bifid condyle with condylar heads located anteroposteriorly. These findings are best seen on the axial and sagittal images [Figure 1].

Case 2
The second patient was a 12-year-old female patient, referred for CT examination for evaluation of mild facial asymmetry and suspected TMJ ankylosis. There was a history of trauma. She had a reduced degree of jaw opening since childhood, and subsequently developed midline deviation to the left along with difficulty in mastication. Axial CT of the mandible with coronal and sagittal reformation was done. These images demonstrated sagittal splitting of the left mandibular condyle into medial and lateral condylar head. There
was reduced joint space involving the normal side temporomandibular joint. Axial Images showed bifid mandibular condyle on the left side. There was BMC with the condylar heads oriented mediolaterally [Figure 2].

**Discussion**

Bifid condyle is a rare anomaly with an unclear etiology. Szentpetery et al., in their study of 1882 cadaveric skulls, found the incidence of BMC to be 0.48%. A report of four cases of bifid condyles presented by Loh and Yeo[4] included one involving an edentulous cadaver. In a literature review of reported cases in living patients, Cowan and Ferguson[5] (1997) found 36 patients with bifid condyles. Subsequently, four cases by Stefanou et al and two other cases[6,7] have been reported. Recently, Artvinli and Kansu[8] (2003) and Antoniades et al (2004)[9] have reported the first two cases of trifid condyle in patients who also had bifid condyles on the other side. Bilateral bifid condyles are even rarer. Shaber[10] (1987) described the first case of bilateral bifid condyles in a living patient. Since then 10 more cases have been reported.[5,8,11,12] Current literature review in living patients revealed a total of 45 cases of bifid condyle, out of which 11 cases are bilateral, giving a ratio of approximately 3:1. However, if the survey of the dry skulls[1,13] and cadaveric reports[4,5] are included, then the total number is 84 cases, of which 15 are bilateral. This raises the ratio of unilateral to bilateral cases to 4.6:1.

There is no definite predilection for either sex or for any race. They appear to be more common on the left side in unilateral cases by a ratio of 2:1.[10] Most cases (67%) are asymptomatic and are found on routine dental radiographic examination.[4,8] However, some have been reported in patients presenting with TMJ symptoms,[14,15] swelling,[16] trauma,[17] or ankylosis.[18,19] This is in addition to the cases of bifid condyles associated with ankylosis.

Etiology of bifid condyle is unknown. Two major etiologies of bifid condyle have been postulated. The embryologic theory suggests that it is due to the obstruction of the blood supply to the condyle or the persistence of the vascularized fibrous septa. Another theory postulates trauma as the cause with disruption or dislocation of joint integrity due to birth trauma, condylar fractures or surgical condylectomy.[20] In separate studies conducted by Loh and Yeo[4] and Antoniades et al.[8] it was found that most cases of bifid condyle were asymptomatic and not associated with any history of trauma. The site of fracture of the mandibular condyle and its relation to the insertion of the lateral pterygoid muscles are factors determining the future development of bifid condyle.

Other causes that have been proposed include genetics, endocrine disturbances, infection, radiation, nutritional deficiencies, and exposure to teratogenic substances. Support for the latter suggestion comes from the work of Gundlach et al.[21] who experimentally induced bifid condyles in rats by injecting teratogenic substances such as N-methyl-N-nitrosourea and formhydroxamic acid in different concentrations, at various stages of pregnancy. The extent of bifid condyle may range from a shallow groove to discrete condylar heads and the orientation may be anteroposterior or mediolateral. It has been postulated that anteroposterior splitting usually occurs in patients with identifiable antecedent trauma, while mediolateral splitting is usually developmental in origin. But here in our patient we have seen that there was a history of trauma for the mediolaterally splitted condyle and the
anteroposterior splitting was because of osteomyelitis and the patient denied any previous trauma in all her life.

Szentpetery $et al.$\cite{13} have suggested that when two condylar parts lie in the sagittal plane, trauma is indicated as the cause, and when the parts lie in the coronal plane, the persistence of the fibrous septa at the condylar cartilage is likely to be the cause. While this may be true for the majority of cases, some medially bifid condyles have been reported following sagittal fracture through the condylar head.

According to Blackwood,$^{22}$ two articulating surfaces of the BMC were divided by a groove and could be orientated mediolaterally or anteroposteriorly, characterizing a specific entity. In this case report, as postulated above, groove formation and presence of medial and lateral head of both condyles clearly demonstrated the formation of the BMC.

Majority of the cases are detected during routine radiographic examination. In most of the cases, patients have no symptoms. However, BMC is reported to be associated with pain, swelling, restricted mouth opening and most commonly TMJ clicking. In our case due to the lack of clinical symptoms, diagnosis is made by radiographic findings.

CT scan is the best radiograph for detection of BMC because it allows for detailed evaluation of condylar morphology. However, BMC can also be seen on OPG, but sometimes the overlapping of the anatomic structures can hide the bifidity.

In summary, BMC, an anatomic variation of condyle is a rare anomaly whose etiology is unknown. In the present case, diagnosis is confirmed using CT scan. The association of bidual condyle with TMJ ankylosis is rare and needs careful evaluation.$^{25}$ TMJ ankylosis can be either bony or fibrous. It may be a consequence of trauma, infection or degenerative disease. Literature says that it is most commonly due to facial trauma in the early stages of development. The radiologic appearance of TMJ ankylosis is widely variable. Appropriate treatment for BMC depends on the symptoms. Patients with internal articular derangement should be treated with occlusal splints and arthroscopic surgery, while patients with associated articular ankylosis may need surgical condylectomy or arthroplasty. Awareness of this abnormality will help to avoid mistaking it for a fracture or a tumor. Our first case also illustrates the point that BMC may be associated with TMJ ankylosis. Such a case requires detailed clinical examination and evaluation by CT for further management and for prognosticating the outcome.

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