INCIDENTAL DETECTION OF A BIFID MANDIBULAR CONDYLE ON CONE-BEAM COMPUTED TOMOGRAPHY: A CASE REPORT.

Abstract:

One of the rare anatomical variations of the temporomandibular joint is the bifid mandibular condyle. Although this anomaly may remain asymptomatic, it can, in some cases, lead to symptoms such as functional impairment. In the present case report, an incidentally detected bifid mandibular condyle identified during cone-beam computed tomography examination in a 22-year-old male patient who presented to our clinic with pain in the left mandibular posterior region is described. In addition to the bifid mandibular condyle, several dental and maxillofacial pathologies of clinical significance were identified. Cone-beam computed tomography enabled a detailed evaluation of the hard tissue components of the temporomandibular joint.

Key words: Bifid mandibular condyle, Cone-beam computed tomography, Temporomandibular joint.

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Introduction: The temporomandibular joint is a ginglymoarthrodial synovial joint that connects the mandible to the temporal bone. The temporomandibular joint consists of hard and soft tissue components. The articular disc, joint capsule, and surrounding connective tissues constitute the soft tissue components, whereas the mandibular condyle, glenoid fossa, and articular eminence constitute the hard tissue components. This joint plays a crucial role in mandibular movements such as mastication, swallowing, and speech and is also responsible for maintaining occlusal relationships, distributing masticatory forces evenly, and contributing to the growth and development of the mandible. The proper performance of these functions depends on the morphology of the structures that comprise the joint. The mandibular condyle is the posterosuperior extension of the mandibular ramus and consists of two parts: the condylar head and the condylar neck. The morphology of the mandibular condyle varies among individuals and may occasionally present as an anatomical variation known as a bifid mandibular condyle. Because a bifid mandibular condyle may cause functional limitations in some individuals, its identification is of considerable clinical importance .

Ultrasonography and magnetic resonance imaging are generally used to evaluate the soft tissue components of the temporomandibular joint, whereas panoramic radiography, cone-beam computed tomography, and computed tomography are used to evaluate its hard tissue components. Panoramic radiography allows the detection of major temporomandibular joint abnormalities, such as condylar neck fractures; however, it does not permit detailed evaluation of the hard tissue components of the joint. Compared with cone-beam computed tomography, computed tomography is associated with a higher radiation dose, higher cost, and lower geometric resolution. Therefore, when a detailed three-dimensional evaluation of the hard tissue components of the temporomandibular joint is required in dentistry, cone-beam computed

tomography is the preferred imaging modality . In this case report, an incidentally detected bifid mandibular condyle identified during cone-beam computed tomography examination is presented, and its clinical significance is highlighted.

Case Presentation: A 22-year-old Turkish male patient presented to our clinic with a complaint of pain in the left mandibular posterior region. According to the medical history obtained from the patient, there was no history of systemic disease, drug use, allergies, previous surgical procedures, or trauma.

Clinical Findings: No facial asymmetry was observed. Temporomandibular joint examination revealed a clicking sound on the left side. No pain or limitation in mouth opening was detected during mandibular opening and closing movements. However, the chin deviated toward the left during mouth opening and returned to the midline at maximum mouth opening. Tooth 37 had mesially drifted and tipped into the edentulous space of tooth 36, which had been extracted seven years earlier. A periodontal pocket was present on the mesial aspect of tooth 37, and a deep carious lesion was observed on its distal aspect. Severe coronal tooth structure loss was observed in tooth 46, and the presence of root canal filling material was identified by clinical inspection. Calculus deposits were detected on the lingual surfaces of the mandibular anterior teeth, and generalized gingivitis was observed in the gingiva of both jaws. Based on the clinical findings, panoramic radiography was recommended.

Radiographic Examination: A panoramic radiograph was initially obtained, and cone-beam computed tomography was subsequently requested based on the panoramic radiographic findings. All clinical examinations and radiographic evaluations were performed by the author of this case report.

Panoramic Radiographic Evaluation: A deep carious lesion extending to the root level was detected in tooth 37. Tooth 37 had mesially drifted toward the extraction site of tooth 36, and alveolar bone loss was observed on its mesial aspect. A well-defined radiolucent area was identified between the roots of teeth 35 and 37. Cone-beam computed tomography was recommended for further evaluation of this region. Severe coronal tooth structure loss was observed in the root canal-treated tooth 46. A radiolucent lesion was detected at the apex of tooth 46. Interproximal carious lesions were identified on the distal surface of tooth 15 and the mesial surface of tooth 25.

Cone-Beam Computed Tomography Evaluation: Cone-beam computed tomography images were acquired using a slice thickness of 0.3 mm with imaging parameters of 110 kilovoltage peak and 7.06 milliampere-seconds. The images were evaluated using NNT Viewer version 16.9 software on a 15.6-inch monitor with a maximum resolution of 1920 × 1080 pixels. Severe coronal tooth structure loss and periodontal hard tissue loss associated with tooth 37 were confirmed. A well-defined hypodense lesion measuring approximately 9.0 × 9.3 × 6.5 mm at its greatest dimensions was observed between teeth 35 and 37. Although the provisional diagnosis

was focal osteoporotic bone marrow defect, the patient was referred to the Department of Oral and Maxillofacial Surgery for biopsy. A well-defined periapical lesion consistent with apical periodontitis was observed at the apex of tooth 46. Air-fluid levels were detected in both maxillary sinuses. A bifid mandibular condyle was observed on the left side (Figure 1). The patient was referred to the Departments of Restorative Dentistry, Periodontology, Oral and Maxillofacial Surgery, and Otorhinolaryngology for further treatment.

Figure 1. Coronal cone-beam computed tomography image demonstrating a bifid mandibular condyle.

Discussion: The temporomandibular joint is a complex anatomical structure composed of the mandibular condyle, glenoid fossa, articular eminence, retrodiscal tissue, joint capsule, and synovial membrane. The articular disc divides the temporomandibular joint into superior and inferior compartments. Movements of the temporomandibular joint are always bilateral, with both joints functioning as a single unit through the mandible. Structural and morphological alterations affecting the components of the temporomandibular joint may result in impaired joint function. Various imaging modalities have been used in dentistry to evaluate the temporomandibular joint . These imaging modalities can generally be classified as two-dimensional and three-dimensional imaging techniques. The soft tissue components of the temporomandibular joint can be evaluated using magnetic resonance imaging and ultrasonography. In dentistry, both two-dimensional and three-dimensional imaging modalities can be used to evaluate the hard tissue components of the temporomandibular joint. Although several imaging techniques, including transcranial projection, transmaxillary projection, submentovertex projection, transpharyngeal projection, posteroanterior skull projection, and Reverse Towne projection, have been described, panoramic radiography remains the most commonly used two-dimensional imaging modality . Panoramic radiography provides a general overview of the jaws and may be useful in differentiating odontogenic pain from pain originating from the temporomandibular joint. Although this imaging modality provides general information regarding prominent abnormalities of the temporomandibular joint, such as extensive lesions,

fractures, and asymmetry, it does not provide sufficient detail for the evaluation of subtle morphological changes affecting the temporomandibular joint . In contrast, computed tomography and cone-beam computed tomography are three-dimensional imaging modalities that enable the evaluation of hard tissues with sufficient spatial resolution. Owing to its higher geometric resolution and lower radiation exposure compared with computed tomography, cone-beam computed tomography has become a widely used imaging modality for the evaluation of hard tissues in dentistry . Therefore, cone-beam computed tomography is an appropriate imaging modality for the detailed evaluation of the temporomandibular joint.

One of the anatomical variations observed in the temporomandibular joint is the bifid mandibular condyle. This variation is characterized by a heart-shaped condylar head with a double-curved configuration. Its reported prevalence in the literature ranges from 0.018% to 3.5%. Although the bifid mandibular condyle is most commonly considered a developmental variation, it has also been suggested to result from factors such as trauma and infection. A bifid mandibular condyle may remain asymptomatic or may be associated with ankylosis, pain, joint sounds, limitation of mandibular movements, and swelling. Therefore, this anatomical variation should be considered in patients presenting with symptoms involving the temporomandibular joint region. It is important for dental practitioners to be familiar with this anomaly .

Conclusion: Bifid mandibular condyle is a rare anatomical variation that is often detected incidentally during radiographic examination. Cone-beam computed tomography enables detailed three-dimensional evaluation of the hard tissue components of the temporomandibular joint, allowing accurate assessment of condylar morphology. Dental practitioners should be familiar with this anatomical variation, and it should be considered in patients presenting with symptoms involving the temporomandibular joint region.

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