Olgu Sunumu/ Case Report

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THE IMPORTANCE OF CONE BEAM CT IN THE RADIOLOGICAL DETECTION OF CONDYLAR FRACTURE

KONDİL KIRIĞININ RADYOLOJİK TESPİTİNDE KONİK IŞINLI BİLGİSAYARLI TOMOGRAFİNİN ÖNEMİ

Yrd. Doç. Dr. Binali ÇAKUR * **Dr. Muhammed Akif SÜMBÜLLÜ****
Yrd. Doc. Dr. Ümmühan TOZOĞLU *

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ABSTRACT

The incidence of condylar fractures is high and the condylar fractures can be seen different types. Cone beam computed tomography (CBCT), conventional radiographic techniques such as orthopantomography (OPG) can be used in diagnosis of the fracture. CBCT is relatively a new imaging modality and uses commonly in dental implantology. In our study, it is aimed to present detailed the imaging of condylar fracture that were detected by cone beam computed tomography.

Key words: Mandible; fracture; conventional radiographs; cone beam computed tomography; imaging

ÖZET

Kondil kırıklarının görülme sıklığı yüksektir ve farklı şekillerde görülebilir. Konik ışınlı bilgisayarlı tomografi, ortopantomografi gibi konvansiyonel radyolojik teknikler kırık teşhisinde kullanılabilir. Konik Işınlı Bilgisayarlı Tomografi, nispeten yeni bir görüntüleme cihazıdır ve yaygın bir şekilde dental implantolojide kullanılır. Çalışmamızda, konik ışınlı bilgisayarlı tomografi ile tespit edilen kondil kırığının ayrıntılı görüntülemesini sunmayı amaçladık.

Anahtar kelimeler: Mandibula; kırık; konvansiyonel radyografiler; konik ışınlı bilgisayarlı tomografi; görüntüleme

INTRODUCTION

The proportion of condylar fractures among all mandibular fractures is between 17.5% and 52%. Condylar fractures are caused by indirect or direct impact.[1] Although condylar fractures are not common with direct trauma, it is generally is caused unilateral fracture.[1,2] Displacement may be occurred and is determined by the direction, degree, magnitude and precise point of application of the force, as well as the state of dentition and the occlusial position.[3]

Condylar fractures can lead to severe functional impairment, including poor occlusion, reduced opening associated with deviation and limited lateral mandibular movement due to muscle spasm, oedema and haemarthros.[4,5] These factors also predispose to mandibular deviation to the injured side on opening.[4]

CBCT, CT imaging and other conventional extraoral radiographic techniques as OPG, posteroanterior skull projection (PASP), lateral skull projection (LSP) has been used in oral and maxillofacial radiology and surgery, in preoperative diagnosis and postoperatively follow-up of maxillofacial fracture.[6] CBCT is a recently introduced imaging technique that uses a cone beam that moves around the part of the body under examination.[7]

Surgical and non surgical treatment is chosen in treatment of fractures of the mandibular condyle.[8] Non-surgical treatment is performed for fractures without functional disturbances, for non-displaced condylar fractures and in intracapsular and condylar head fractures.[9]

The aim of this paper is to present detailed the imaging of unilateral condylar neck fractures that were detected by cone beam computed tomography.

* Atatürk Üniversitesi Diş Hekimliği Fakültesi Oral Diagnoz ve Radyoloji Anabilim Dalı
** Atatürk Üniversitesi Diş Hekimliği Fakültesi Oral Diagnoz ve Radyoloji Anabilim Dalı

CASE REPORT

A 12-year-old male patient was visited to our clinic for a facial trauma. There were no problems her general medical history. The facial examination revealed an asymmetric range of mandibular movement. Clinical examination showed limitation of her mandibular mobility. The patient had a significant decrease in mouth opening with pain. He was sensitived palpation in TMJ region. We thought that the patient had a condylar fracture in the clinical examination and then decided to perform a CBCT scan for obtaining more detailed location and definition of the fracture. The images were obtained by using CBCT (NewTom-FP; Quantitative Radiology, Verona, Italy) scans with 0.2 mm slices in the axial planes, 2 mm slices in the coronal planes and 2 mm slices in the sagittal planes and three-dimensional images (Fig. 1-6). The cone beam computed tomography scanning was done on patients positioned supinely and the head position of the patient was adjusted in such a way that the hard palate was parallel to the floor, while the occlusal plane was perpendicular to the floor. CBCT unit has an automatic exposure control system (AEC). Imaging parameters were 110 KVP, 3.5 mA, and 130 x 170 mm FOV. CBCT imaging demonstrated a horizontal condylar collum fracture in left condyl (Figures 1-6). Then, the patient was referred department of oral and maxillofacial surgery.

Figure 1. On the axial slice; a horizontal condylar collum fracture and displacement of the condyle in left condyle (white arrow).

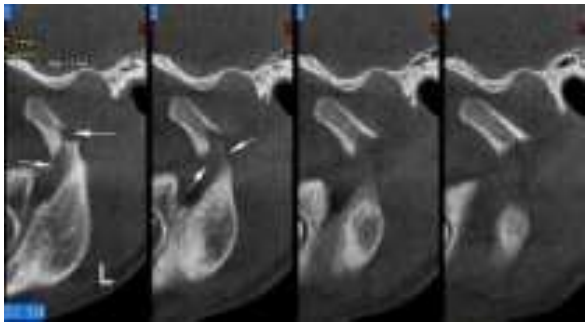


Figure 2. On the sagittal cross-sectional slices; a horizontal condylar collum fracture with displacement in left condyle (white arrow).

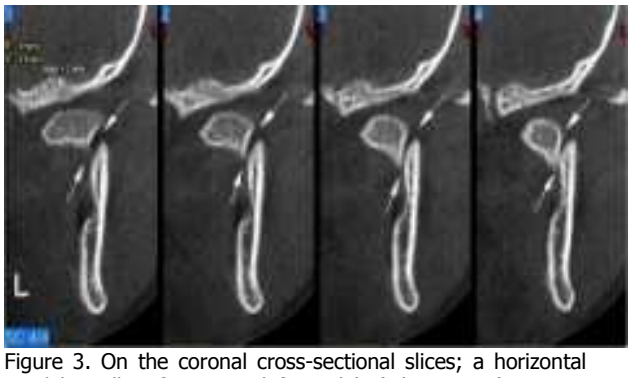


Figure 3. On the coronal cross-sectional slices; a horizontal condylar collum fracture in left condyle (white arrow).

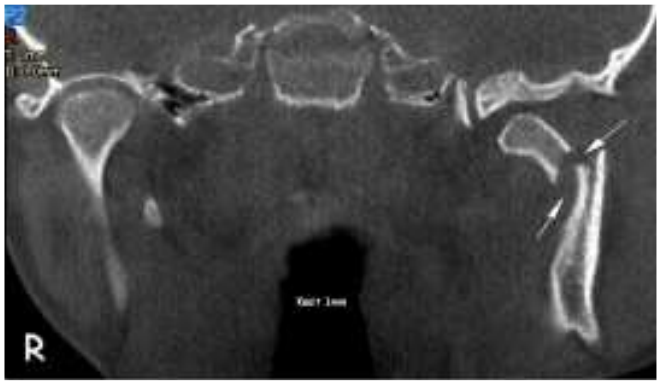


Figure 4. On the panoramic view of TMJ; a horizontal condylar collum fracture in left condyle (white arrow).

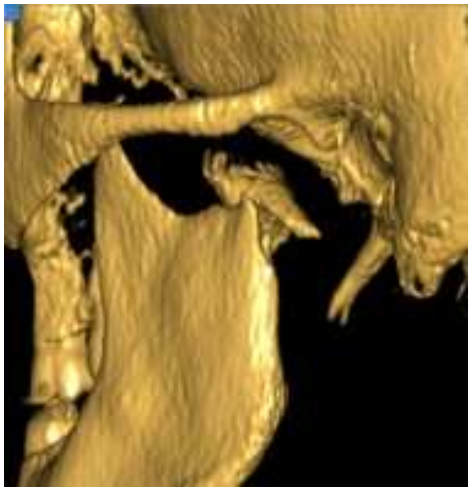
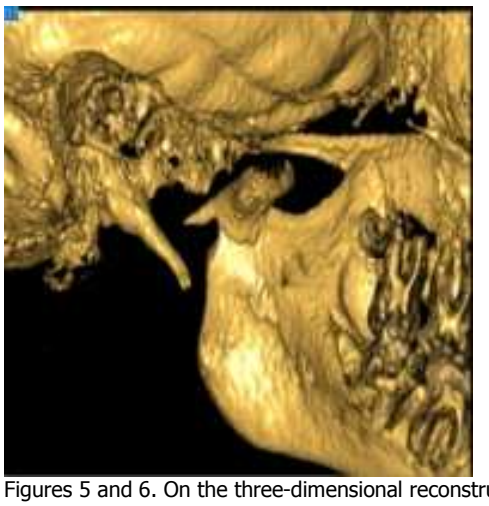


Figure 5.



Figures 5 and 6. On the three-dimensional reconstruction; a horizontal condylar collum fracture with medial displacement in left condyle.

DISCUSSION

For convenience, the anatomical level of the fracture may be divided into three sites: (A) the condylar head (intracapsular), (B) the condylar neck (extracapsular) and (C) the subcondylar region.[1] In fact, there are two types of fracture fundamentally, intracapsular and extracapsular.[1] There are a number of studies that describe in detail mandibular fracture.[1,5,8-12] The focus of this report is on the presentation unilateral extracapsular condylar fracture.[7] The fracture is classified as: undisplaced, deviated, displaced (with medial or lateral overlap, or complete separation), and dislocated (outside the glenoid fossa) also classifies condylar head fractures into horizontal, vertical, and compression types. Our case is dislocated and condylar neck fractures into horizontal.[1,2,4,13-15] According to Silvennoinen et al.[2] isolated unilateral condylar fractures are often more severe than those associated with other fractures and there was no significant difference between men and women. But Zachariades et al.[1] reported that unilateral condylar fractures comprise approximately two-thirds of the total both in men and in women. Silvennoinen et al.[2] reported that among unilateral fractures there is a high proportion of undisplaced fractures. Zachariades et al.[2] reported that nineteen per cent of the condylar fractures are undisplaced.

Complications depend on the different types of fractures, displacement or dislocation, force of impact in mandibular.[1,16] Condyl fractures can cause malocclusion, deviation of the mandible to the affected side, anterior open bite or contralateral open bite and pain due to overload.[1,17,18] Clinical examination showed limitation of his mandibular mobility and there was sensitived palpation in Temporo Mandibular Joint (TMJ) region in our patient. Diagnosis is made by a variety radiological techniques such as posteroanteror, lateral views of the skull, orthopantomography, cone-beam computerized tomography and computerized tomography.[6,7,9,10] Roentgenologic examination is probably the most effective and definitive method in solving many of the diagnostic problems arising from disorders and fractures of the TMJ. Advantages and limitations of the conventional roentgenographic view of the TMJ are well known. Among these, the lateral and posteroanteror view, OPG will provide the essential preliminary information, but these will not be sufficient for critical evaluation of the TMJ itself because of the superimpositions of surrounding structures on the roentgenogram. [6,7,9,10] When radiographs do not show clearly the degree of displacement, type of fracture or degree of comminution, for example, in suspected fractures of the condylar head and neck, CT or cone-beam CT is indicated.[9] Both CT and CBCT provide data sets that can be converted into DICOM (Digital Imaging and Communications in Medicine) format using appropriate software. It is thus possible to produce three-dimensional reformations and slice images that are useful in planning surgery and identifying adjacent anatomical structures. These imaging modalities offer the possibility of using navigation in surgery. Within the last few years a new method called cone beam computed tomography (CBCT) may prove to be more efficient and

economical than either conventional tomography or CT for oral diagnostics[19] and is a modern imaging technique that has the advantage of being associated with a low level of metal artefacts.[7] We used flat panel detector- based cone beam computed tomography (FPD-CBCT) for diagnosis, location and follow-up.

In conclusion, for a complete evaluation of the TMJ, the routine TMJ roentgenographic series is not sufficient. If a disorder or fracture of the TMJ is suspected, unless the disorder or fracture is quite obvious on routine roentgenograms, cone beam computed tomography should always be obtained. Cone beam computed tomography is useful for diagnosis, location of the maxillofacial fractures with TMJ trauma.

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Yazışma Adresi
Yrd. Doç. Dr. Binali ÇAKUR
Atatürk Üniversitesi, Diş Hekimliği Fakültesi,
Ağız, Diş Ve Çene Radyolojisi Anabilim Dalı,
25240 Kampüs/ERZURUM
Tel: 0.442.2311765
Fax: 0.442.2360945
E-posta: bcakur@atauni.edu.tr