

Cone Beam Computed Tomography evaluation of bifid mandibular condyle in a Turkish population

Bir Türk popülasyonunda bifid mandibular kondilin Konik Işınli Bilgisayar Tomografi ile değerlendirilmesi

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SUMMARY

Aim: The aim of the study was to investigate the prevalence of bifid mandibular condyle (BMC), by using cone-beam computed tomography (CBCT).

Material and Methods: The CBCT images of 350 untreated patients (178 male, 172 female ranging in age between 18 and 65) were included in this study. The presence or absence of BMC was assessed in axial, sagittal, and coronal planes by considering gender and side.

Results: BMCs were observed in 9 out of 350 patients (2.57%), of which, 3 were in males and 6 in females. Regardless of gender, the right side was more affected (1.42%). Female patients showed higher prevalence (1.71%) than the male patients (0.85%).

Conclusions: BMC was observed in 2.57% of studied Turkish population and was detected more frequently in females and on the right side.

Keywords: cone beam computed tomography, bifid mandibular condyle, CBCT.

ÖZET

Amaç: Bu çalışmada bifid mandibular kondil (BMC) prevalansının konik ışınli bilgisayarlı tomografi (CBCT) kullanılarak araştırılması amaçlanmıştır.

Gereç ve Yöntem: Bu çalışmaya 350 adet tedavi edilmemiş hastanın (Yaşları 18 ile 65 arasında değişen 178 erkek, 172 kadın) CBCT görüntüleri dahil edildi. BMC' nin varlığı veya yokluğu, cinsiyet ve bulunduğu taraf göz önünde bulundurularak aksiyel, sagittal ve koronal pdüzlemlerde değerlendirildi.

Bulgular: BMC' ler 350 hastanın 9'unda (% 2,57) görüldü; bunların 3'ü erkeklerde ve 6'sı kadınlarda idi. Cinsiyete bakılmaksızın, sağ tarafın daha fazla etkilendiği (% 1,42) tespit edildi. Kadın hastalarda erkeklere göre (% 0,85) daha yüksek prevalans (% 1,71) görüldü.

Sonuç(lar): BMC, çalışılan Türk popülasyonunun% 2,57' sinde görülmüş olup kadınlarda ve sağ tarafta daha sık saptanmıştır.

Anahtar kelimeler: konik ışınli bilgisayarlı tomografi, bifid mandibular kondil, CBCT.

INTRODUCTION

The bifid mandibular condyle (BMC) which was first described by Hrdlicka,¹ is a rare anatomic disorder characterized by duplicated or lobulated head of the mandibular condyle.² Several etiologies have been suggested for BMC, but there is no consensus about the main causative factor. Although trauma has been considered as the most common factor, studies have reported that most patients had no previous trauma or temporomandibular joint (TMJ) symptoms.³⁻⁵ However; developmental anomalies,⁶ nutritional disorders, infection, irradiation, endocrine disorders, and genetic factors⁷ may all be causal factors.

BMC is usually diagnosed as an accidental finding during radiographic examination since this condition is not related with any clinical symptoms.⁸ Cho and Jung⁹ performed a

study to investigate the prevalence of BMCs in asymptomatic and symptomatic TMJ patients, and to identify their effect on clinical and radiographic appearance of TMJ. They concluded that BMCs tended to be diagnosed as an accidental finding and their presence would not cause any TMJ symptoms or osseous changes. Moreover, radiographic appearance of BMC may mimic tumors and/or vertical condylar fractures,¹⁰ which confuses the physicians in cases of trauma to the face.

Currently, three-dimensional (3D) imaging techniques give more detailed and specific diagnosis of mandibular condyle conditions.¹¹ Cone beam computed tomography (CBCT) typically imposes a lower dose to patients compared to computed tomography (CT).¹² Neves et al.¹¹ compared panoramic radiography and CBCT in the diagnosis of BMC and concluded that panoramic radiography can be used for the initial screening of BMC; however, CBCT images can disclose morphological changes and the exact position of the condyle heads.

Many studies have been published on BMCs. However, there is not enough information about the prevalence of this morphological condition due to the lack of epidemiological data. Therefore, the goal of this study was to assess the prevalence of BMC using CBCT in a Turkish population.

MATERIAL and METHODS

In the present retrospective study, CBCT scans of 350 patients who visited İzmir Katip Çelebi University Faculty of Dentistry between January 2012 and December 2017 were evaluated following the approval of the Ethics Committee (No:231).

Patients consisted of 177 (50.57%) male and 173 (49.42%) female patients, with a mean age of 40.38 ± 18.34 years (range: 18-79 years). The presence or absence of BMC was determined on CBCT scans. The CBCT scans had been taken for diagnostic purposes as a part of comprehensive evaluation for implant surgery, orthognathic surgery, impacted tooth surgery or orthodontic treatment. As a routine protocol, informed consents were obtained from all patients before exposure. None of our patients had any history of trauma or symptomatic joints. All scans were obtained in supine position with the patients' Frankfort horizontal planes perpendicular to the floor, using a New-Tom 5G CBCT machine (QR srl, Verona, Italy), operating at 110 kVp, 1-20 mA with a 15×12 cm field of view (FOV) and standard resolution mode (0.2 mm voxel size). Lack of demographic information, radiographic evidence of intraosseous lesions within the TMJ area, images of low quality, images without 15×12 cm FOV were considered as the exclusion criteria. The left and right condylar heads were evaluated separately in the axial, coronal and sagittal planes in NNT station (QR srl, Verona, Italy) using the "zoom" tool and manipulation of brightness and contrast

on a computer monitor (The RadiForce MX270W features a 27-inch large screen size and a 2560 x 1440 high-resolution) under dim lighting conditions by an experienced oral and maxillofacial radiologist (EA). The presence of a shallow groove up to two distinct condyle heads was determined as BMC.² The BMCs were analyzed by considering gender and side.

Statistical analysis

All data analyses were carried out using IBM SPSS Statistics for Windows, (Version 21.0. Armonk, NY: IBM Corp.). The recorded data was analyzed using chi-square test (χ^2) to compare the prevalence of BMC between genders and sides and crosstabs were employed to find the number of BMCs among gender and side. A probability value of 0.05 or less was set as the significance level.

RESULTS

The occurrence of BMCs was noticed in a total of 9 (2.57%) patients (Table 1). Table 2 shows the incidence of BMCs between sides regardless of gender. Out of 9 patients having BMCs, 8 patients had unilateral and 1 patient had bilateral BMCs. Of 8 patients, 5 BMCs (4 female and 1 male) were observed on the right side (1.42%) and 3 BMCs (2 female and 1 male) on the left side (0.85). The prevalence of BMC was 0.85% in males and 1.71% in females.

Table 1. Prevalance of bifid mandibular condyle according to gender and size.

GENDER		LEFT		
		Absent	Present	Total
MALE	Absent	174 (98.3%)	1 (0.6%)	175 (98.9%)
	Present	1 (0.6%)	1 (0.6%)	2 (1.1%)
	Total	175 (98.9%)	2 (1.1%)	177 (100%)
FEMALE	Absent	167 (96.5%)	2 (1.2%)	169 (97.7%)
	Present	4 (2.3%)	0 (0%)	4 (2.3%)
	Total	171 (98.8%)	2 (1.2%)	173 (100%)

Table 2. Prevalance of bifid mandibular condyle in total sample regardless of gender.

LEFT	RIGHT		Total
	Absent	Present	
Absent	310 (88.57%)	15 (1.42%)	325 (92.9%)
Present	14 (4%)	11 (0.28%)	25 (7.1%)
Total	324 (92.6%)	26 (7.4%)	350

Chi-square: 46.793, P<0.0001

DISCUSSION

Many epidemiologic studies have been conducted to estimate the real incidence of BMC all over the world. The incidence of BMCs has been reported to be in the range of 0.018%-1.82% with no agreement in literature. This study aimed to investigate the BMCs in a group of Turkish patients, using CBCT since there are few epidemiologic studies that investigated the prevalence.

Most studies on BMC prevalence were performed on panoramic radiographs, since it is a low cost, and easy to ac-

cess radiographic technique, which visualizes dental and supporting structures, including the rami and condyles. Cho and Jung⁹ reported that panoramic views under- or over-estimated the incidence of bifidity. Although BMC was reported to be a uncommon condition, the incidence of BMC is increasing due to the use of advanced imaging techniques, particularly magnetic resonance imaging, CT and CBCT.¹³⁻¹⁵ Miloglu et al.³ investigated the frequency of BMCs using panoramic radiographs and reported that BMC is a more frequent condition than is commonly perceived. They also concluded that BMC would remain an accidental finding upon routine radiographic examination due to minimal symptoms associated with this condition. Sahman et al.¹⁶ determined the frequency of BMC using panoramic radiographs supported by different radiographic techniques and concluded that the exact orientation of the condyles can only be determined using 3D imaging techniques. In the present study, prevalence of BMC was assessed with CBCT.

Although BMC usually affects only one condyle, bilateral cases have also been reported.¹⁷⁻²¹ Reddy et al.² conducted a study to evaluate the characteristics of BMC pattern in 8100 CBCT images. They detected BMC in 14 images and 11 patients had unilateral and 3 patients had bilateral BMCs. In cases of unilateral bifidity, right side (9 patients) was more commonly involved than left side (8 patients) as well as in our study (5 right side, 3 left side).

Neves et al.¹¹ investigated the presence or absence of BMC in 350 individuals who underwent panoramic radiography and CBCT and detected BMC in 4 cases (1.1%). Menezes et al.²² investigated 50,080 panoramic radiographs and found only 9 (0.018%) cases of BMC. Sahman et al.¹⁶ investigated the prevalence of BMC in 18,798 Turkish patients from Central Anatolia region and reported 125 BMCs in 98 patients (0.52%). Of 98 patients, 51 were females and 47 were males. Also, 71 patients had unilateral and 27 patients had bilateral BMCs. They also reported no statistically significant differences between sides or between female and male patients. Miloglu et al.³ evaluated 10,200 panoramic radiographs of the Turkish population and found 32 cases (0.3%) of BMC, 24 cases unilateral and 8 cases bilateral. Also, Çaglayan and Tozoglu²³ evaluated the CBCT images of 207 Turkish patients and found that 2.9% of patients had a BMC as an incidental TMJ finding. In the current study, the prevalence of BMC was found to be 2.57%. This difference could be attributed to the different sample size and regions (Central and Eastern Anatolia) in the studies.

In literature, any particular age group was not taken into consideration for the assessment of BMCs. Also the occurrence of BMC does not appear to show gender differences. Khojastepour et al.²⁴ observed no significant difference in the prevalence of BMC between males and

females or sides. Sahman et al.¹⁶ reported a female-male ratio of 1.1:1 and Miloglu et al.³ found female-male ratio of 1.13:1. On the other hand, Menezes et al.²² showed a higher female-male ratio (3.5:1). Different from the studies held in Turkey, female-male ratio in our study was found to be 2:1. This difference could also be attributed to the different regions included in the studies.

CONCLUSION

Since differential diagnosis of BMC plays a role in TMJ dysfunctions and joint symptoms, our results provide a significant information to the clinicians. Unilateral BMC was more common than the bilateral BMC, with the overall incidence of 2.57% in the studied population. In cases of unilateral bifidity, right side of the condyle was more commonly affected than left side.

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