Research Article

Prevalence of morphological variation of condyle in patients undergoing routine dental treatment – A retrospective orthopantomographic study

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ABSTRACT

Aim: The present study aims to assess the various shapes of the condylar heads using orthopantomography (OPG). **Introduction:** An OPG is taken when the clinician suggests some type of bone pathology; therefore, a thorough knowledge of the anatomy of the temporomandibular joint (TMJ) is necessary to conclude at a proper diagnosis. It is often assumed that the normal condylar head should have a convex shape throughout and that symmetry should exist in the contralateral side. There are different shapes of the condyles such as oval, bird beak, diamond, and crooked finger. As the early diagnosis and treatment of TMJ disorders are essential, the present study was conducted to investigate various shapes of condyle based on OPG. **Materials and Methods:** The present study comprised radiographic evaluation of 400 condylar heads after visualizing 200 digital OPGs taken from a routine investigation. The study includes condylar heads that are visualized clearly of radiographs taken in population ranging from age 18 to 45 years old. Patients with TMJ problem and those patients undergoing orthodontic treatment are excluded from the study. **Results:** The most common shape seen among the subjects were oval followed by bird beak, diamond, and crooked finger: (1) Oval (63%), (2) bird beak (22%), (3) diamond (12%), and (4) crooked finger (3%). The most common shape observed among both male and female was found to be oval where the former had 67% and latter had 33%. **Conclusion:** Cost-effectiveness and low radiation exposure make OPG a common option of the imaging prescription. Condylar evaluation is been a keen interest to the dentists all over the world to make fine observations. This can gain more interest in the field of forensics.

KEY WORDS: Condyle, Cost effective, Low radiation, Orthopantomography, Oval

INTRODUCTION

Numata was the first one to describe panoramic radiography.[1] Orthopantamograph (OPG) is an imaging modality routinely used by dentists worldwide for obtaining general information about the oral and its surrounding structures.[2] OPG is highly economical and exposes the patient with a low dose of radiation as compared to other imaging modalities.[3] OPG is used to establish various problems in the temporomandibular joint (TMJ).

An OPG is taken when the clinician suggests some type of bone pathology; therefore, a thorough knowledge of the anatomy of the TMJ is necessary to conclude at a proper diagnosis.[4] A condyle is a knob-like structure with various shapes in the mandible and it rests in the glenoid fossa in the base of the skull.[5] The condyle slides forward during opening and closing of the mandible during mastication with the help of muscles of mastication.[6] The mandibular condyle is generally positioned slightly anteroinferior to its normal closed position because the patient has to open and protrude the mandible slightly to engage the positioning device in most panoramic machines.[7] The TMJ can be assessed for gross anatomic changes of the condylar head and the glenoid fossa with OPG while the soft tissues such as articular disc and posterior ligamentous attachment cannot be visualized.[8]

It is often assumed that the normal condylar head should have a convex shape throughout and that symmetry should exist in the contralateral side.[9] It is rarely seen that one side of the condyle takes a

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different shape from the other side. There are different shapes of the condyles such as oval, bird beak, diamond, and crooked finger.[10] Superior view of the radiograph shows convex, concave, and flat condylar heads. Cross-sectionally, the condyle is ovoid in shape with 15-20mm mediolaterally and 8-10 mm posteroanteriorly.[11]

However, to differentiate from pathology, normal morphological variations should be understood. Thus, the present study aims to assess the various shapes of the condylar heads using OPG in patients undergoing routine dental treatment.

MATERIALS AND METHODS

The present study comprised the radiographic evaluation of 400 condylar heads after visualizing 200 OPGs taken from a routine investigation. The OPG was taken from Papaya plus Extor-c X-ray machine with exposure of 68 Kvp, 9 Ma 12 s. The OPGs were collected only when the condylar heads are visualized clearly. The study included radiographs of males and females ranging from age 18 to 45 years. Patients with TMJ problem and those patients undergoing orthodontic treatment are excluded from the study.

Digital radiographs with a full condylar view on either side of the mandible with optimal density were selected in the study. The OPGs of patients with TMJ dysfunction/fracture were excluded from the study to avoid discrepancies.

The radiographs were evaluated for different shapes of the condyles. The morphology of the condylar heads was identified for the following shapes as given by Sonal *et al.*[12]
Type I: Oval shape
Type II: Bird beak shape
Type III: Diamond shape
Type IV: Crooked finger shape

RESULTS

A total of 400 condyles were evaluated from the 200 subjects with the age ranging from 16 to 45 years.

a. Types of shapes seen among the subjects were, namely, (1) oval (63%) [Figure 1], (2) bird beak (22%) [Figure 2], (3) diamond (12%) [Figure 3], and (4) crooked finger (3%) [Figure 4]
b. The most common shape observed among both male and female was found to be oval where the former had 67% and latter had 33% [Figure 5 and 6].

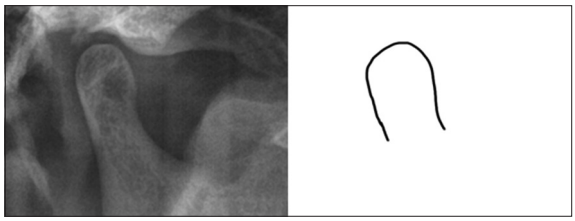

Figure 1: Oval shape

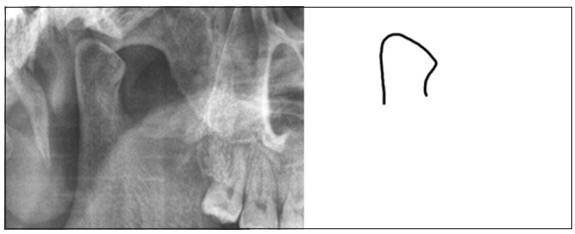

Figure 2: Bird beak shape

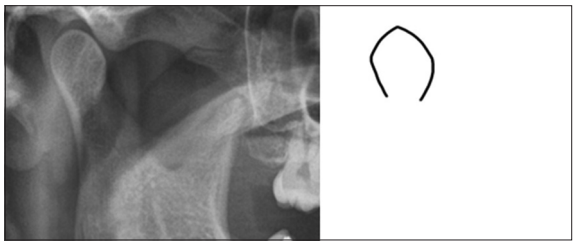

Figure 3: Diamond shape

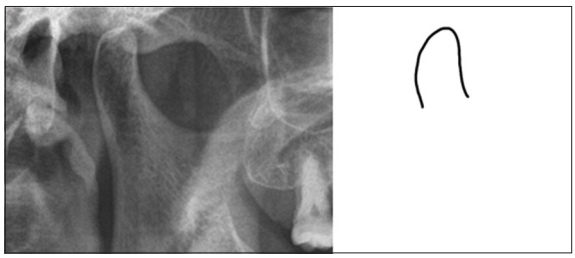

Figure 4: Crooked finger shape

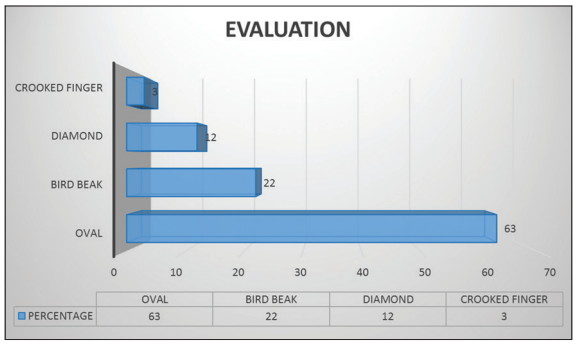

Figure 5: Percentage of different shapes of condyles

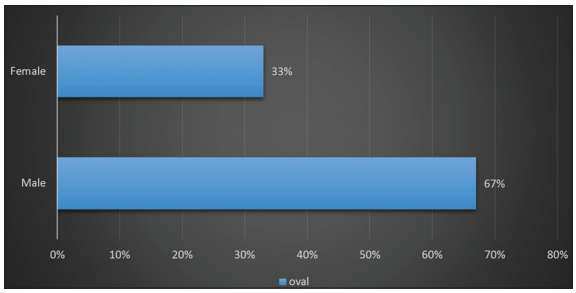

Figure 6: Most common shape seen in gender

DISCUSSION

Imaging is considered to be one of the most important diagnostic methods for clinical assessment of the diseases and morphology. There are several radiographic methods to analyze the changes occurring in the TMJ. It is important to get a clear image because abnormalities such as limited mouth opening, presence of artifacts, and mandibular movements during examination make the image of the TMJ difficult to obtain. There are many number of imaging modalities to examine the TMJ, of which OPG is the most reliable one. The OPG is performed by placing a plastic spatula between the incisors which makes the patient to bite in more forward and lateral shifted position. This prevents the superimposition of the images. The appearance of the condyle varies among various individuals in different age groups and individuals.[13] Human mandibular condyles have various shapes such as flattened, convex, angled, rounded, and concave.[14] Changes in the condyles occur due to various factors such as remodeling, developmental variations, trauma, endocrine disturbance, and radiation therapy.[15] Remodeling is greatly influenced by a variety of factors which can result in morphological changes and variations in shape.[16] Studies done using radiographic analysis show that oval shape is the most common shape observed. As age increases, there is a significant increase in the number of condyles that are affected.[17] Panoramic radiographs are cost effective and can be used as simple means to evaluate condyle.

The study was compared with the study done by Sonal *et al*. which shows similar results which say that oval-shaped condyle is the most common shape seen among the individuals and it also compares the combination of shapes.[12] There are other studies such as a study done by Shetty *et al*. which evaluates condylar changes in patients with TMJ pain using digital tomography, in which our study was done on patients with normal TMJ with exclusion of TMJ problems.[18]

This study is an attempt to evaluate the prevalence of the condylar shape on the OPG. On analyzing 200 OPGs, it was found that 63% of the adults have oval-shaped condylar head, whereas 22% of them had bird beak shape and 13% of them had diamond shape and at least 3% of them had a shape of a crooked finger. When there was a gender comparison, it was found that 67% of the males have oval shape as the most predominant one and 33% of the females have oval shape as the most predominant one. These radiographs are two-dimensional view of the three-dimensional TMJ so they can be viewed at a different angulation and position aspect.[19] There are also various other modalities that can be used such as the cone-beam computed tomography which can give a more detailed information about the TMJ.

CONCLUSION

The present study was done to assess the condylar shapes using OPG that can be tentatively used as a screening test for identification. It was found that oval-shaped condyle was predominant in a population with frequency of 65% of male. Condylar evaluation has been a keen interest to the dentists all over the world to make fine observations. This can gain more interest in the field of forensics.

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