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Assessment of Condylar Shape in Different Angle Classification of Malocclusions among Iraqi Subjects through Orthopantomography

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ORIGINAL STUDY

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Assessment of Condylar Shape in Different Angle Classification of Malocclusions among Iraqi Subjects through Orthopantomography

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Abstract

Background: Changes in occlusion is necessary to be taken into consideration for its importance as a causative factor for variability in the structural morphology of mandibular condyles which in turn may cause internal disorders of the Tempromandibular joint.

Objectives: To investigate the relationship of different Angle classification Cl I, Cl II, Cl III, on the trabecular structure of the mandibular condyles shape through Orthopantomography and demonstrate the most prominent shape in relation with angle classification.

Materials and Methods: A retrospective study in which 4000 condyle process were examined using Orthopantomograph (OPG). The patient sample was divided into three groups according to angled classification: class I, class II, class III then The shape of condyle was detected for both sides.

Results: The present study concludes the round or oval shape condyle mostly seen among Iraqi population in Baghdad city, then flat shape, crooked finger shape and bifid condyle are rare.

Conclusion: the condylar shapes, into six different type is a comprehensive way to describe the variation in the anatomy of condyle, which are: oval, flat, diamond, irregular, crooked finger, and bifid.

Keywords: Condylar Shape, Classification, Malocclusions, Orthopantomography

1. Introduction

Due to the ease of using Panoramic Imaging technic, their acceptance by patients, favorable cost-benefit relationship,, the use of a small amount of radiation in addition to reasonable accurate information and visualization of both the arches in a single glance including Tempromandibular joints, this makes type of radiographic technic the best choice for the dentist. [1]

Condylar shape and size have an important role on the physiological function of the jaw which thus affect sagittal skeletal malocclusions and because of Tempromandibular complexity, the exact relationship is not well under stood [2]. This is a knowledge highlights explain the demand to generate many researches to improve the understanding of the relationships and clinical complications [3]. Accordingly, the anterior posterior relationship that positioned in the jaws was classified as class I, II, and III malocclusion, that effect on Facial esthetic and mastication [4]. Several researchers have discussed the shapes and types of condyle head in different areas of the world (geographical variations) [5–9].

Most of the earlier researchers found four shapes of condyle head according to their community Type I - Oval shape, Type II - Diamond shape, Type III – Bird beak shape, Type IV - Crooked finger shape, in this study [10], six shapes of condyles head were establish which are round, flattened, diamond, mixed or

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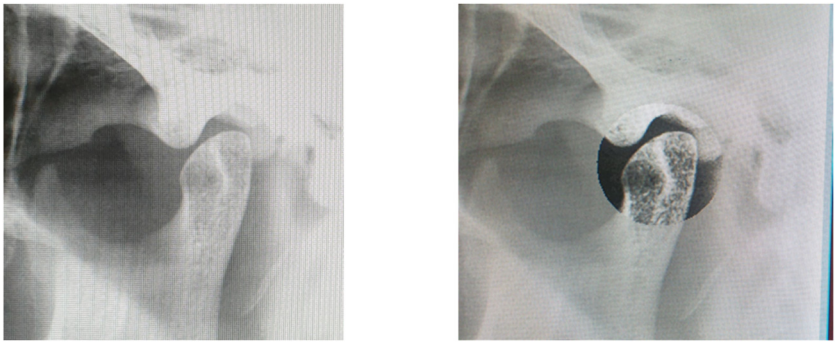

Fig. 1. Left: plan image, right: filter is used to expose the condyle clearly.

irregular, crooked finger, and bifid. As part from the widely used classification system that done by Sonal et al. [5].

Many researchers have studied the shape and size of the Tempromandibular joint specifically the mandibular condyles and generally, the oval shape was the most common in both genders [1, 10, 11].

There are many factors that make the human condyle to undergo remodeling. Türker & Yaşar concluded that SN-MP angle increases, the condyle dimensions decrease [11]. Osteophytes were found to be the most predominant feature than other condylar morphological changes [12]. Limitation of dental panoramic imaging must be taken in consideration during studying condylar shape. Although the bifid condyle is often found on accidental panoramic radiographs [13], Abhishek et.al [10] revealed that the rare shape observed is bifid and suggest to use cone beam computed tomography, would be more accurate even dimensionally.

2. Material and methods

OPG data were obtained from archives of oral and maxillofacial clinic, college of dentistry in Baghdad, Iraq.

The data were taken from the X-ray scan and case sheets of different patients attended seeking orthodontics treatment, therefore they did not expose to unnecessary x- ray exposure according to consent form and ethical approval.

The patients were selected according to selective criteria, which are:

1. good image quality, no distortion, no blurring and no artifact. Both sides of upper and lower jaws are presented clearly.
2. orthodontics patient, aged from 18- 25 years old, healthy, without systemic diseases or environmental factors that affect the TMJ or condyle of mandible.
3. No pathological lesion, fractures, missing teeth, dental anomalies or any cause that interfere with normal TMJ morphology.

According to these selective criteria 2000 panoramic radiograph were selected, that mean 4000 condyle process were examined,all the OPG scans obtained by SORDEX-device and the measurements were calculated by Scanora software, The evaluation of the images was assessed by two oral and maxillofacial radiologist experts separately for each patient with inter and intra radiologist examiner.

The patient sample divided into three groups according to angled classification: class I, class II, class III.

3. OPG measurements

The shape of condyle was detect for both sides, the observer study the condyles shape using the equalized filter of Scanora version 5.2.6 software, with calibration (1:1 magnification), as showed in the (Fig. 1).

The analysis of archive data which included in this research was done by using SPSS. Chi-square test was utilized to find the significance degree of relation. The p value of < 0.05 is significant.

Inter and Intra-observer were in coordination of the shape of condylar head examine, expressed as kappa values, that ranged from 0.826 to 0.851 for first examiner and second examinar. Thus, both intra- and inter-observer variability showed very good coordination for all observed data.

4. Results

This research was conducted by specialized oral and maxillofacial radiologists; it was a descriptive analytic study. The study showed shape of condylar process in individual with different angle classification.

Table 1. percentage of each angle classification in Iraqi sample.

Angle classification	Class I	Class II	Class III
%	44%	40%	15.%

Table 2. The relation of each angle classification and gender.

	Male	Female
Class I	62%	38%
Class II	30%	70%
Class III	65%	35%

In the examined 2000 panoramic radiographs depending on the previously mentioned criteria, 800(40%) were of males, and 1200 (60%) were of females.

The result showed that class I is more popular followed by class II, then class III, as shown in (Table 1).

As it shown in Table 2, the results showed the distribution of angle classification in gender, class III more prominent in males than females, in contrast to class II, which found more in females.

Among the whole of 4000 condyles heads were examined (for both sides on the OPJ), six different shapes of condyles heads were found: oval, flat, diamond, irregular, bifid; and, crooked finger as shown in (Table 3).

Table 3. Distribution of variation in mandibular condyle.

Condyle shape	Frequency	Percent
Round/oval	1760	44%
Flat	1000	25%
Diamond/angles	850	21.25%
Crooked finger	250	6.25%
Bifid	25	0.6%
Irregular	115	2.8%
Total	4000	100%

The condyle shape type oval is more prominent, while bifid condyle is rare.

Table 5 showed the percentage of each shape in comparison to angle classification, in class I, class II, oval shape is more prominent, cooked figure is less, while in class III the flat shapes is most prominent.

Table 6 explain the symmetry between right and left condyles in same patient in relation to gender and angle classification, the condylar processes in males seem to be more symmetrical than females, and class I has more symmetrical condyles than class II and class III.

5. Discussion

The temporomandibular joint (TMJ) is the joint that connects the mandible (lower jaw) to the skull. Many researchers studied about the condyle, coronoid and TMJ; with different results.

This study found six shape of condyles, others founded four shapes (Ribeiro E. C. etal 2015) [14], in sagittal view, they founded the round, angled, flattened, and mixed type. Another study established in Nepal also identified four types of condylar head; which done by [15].

The round or oval shape has the high prevalence in this study of Iraqi population in Baghdad sity which was also high in studies conducted by several authors worldwide [5, 15–23], with differences in percentage due to the sample size which was not mentioned with any of the studies.

The second most commonly shape seen in this study was flattened which was similar to the study by Nagaraj et al. [21] quite higher among many studies conducted by several authors by [17, 17, 20, 22],

Table 4. Distribution of variations in mandibular condyle between males and females.

	Condyle shape						
Gender	Round/oval	Flat	Diamond/angles	Crooked finger	Bifid	Mixed	Total
Male							
No.	435	160	75	44	11	75	800
%	54.3%	20%	9.4%	5.5%	1.4%	9.4%	100 %
Female							
No.	560	360	115	65	15	85	1200
%	46.6%	30%	9.5%	5.5%	1.25%	7%	100.0%

No significant differences between both genders in the shape of condyle (p value 0.162).

Table 5. Shape percentage in angle classification.

Angle classification	Class I	Class II	Class III
Condyle shape	Oval 46% Flat 33% Diamond 13% Cooked fing. 4 % Irregular 4%	Oval 45% Flat 16% Diamond 25% Crooked fing. 4% Irregular 10%	Oval 22% Flat 35% Diamond 20% Crooked fing 8% Irregular 15%

Table 6. Side symmetry in condyle shape.

	Side symmetry	Gender	Angle classification
%	66%	Male 68% Female 34%	Class I 62% Class II 27% Class III 11%

but reported it to be the most common after diamond/angle shape, whereas other studies of Sonal et al. [5], Khanal [15], Shaikh et al. [19], Anisuzzaman et al. [16], and Jawahar and Maragathavalli [18] did not mention anything about flattened shapes.

The third shape seen in this study is diamond, which was similarly seen in other studies by [5, 16, 18, 19, 23]. Other studies such as Maqbool et al. [17], Kanjani et al. [20] attributed a bird beak shaped as one of the classification which was not included in this study, as well as studies [15, 22] similar to this study. Nagaraj et al. [21] not mensioned anything about diamond shape in their study.

The forth less commonly found shape found was the irregular / mixed shape of the condyle which was very less than the study done by Singh and Chakrabarty [22] and Singh et al. [23] whereas other studies [5, 18–21] did not mention about irregular shape of condyle.

The least common shape found in this study was a crooked finger shape, half more prevalent than the bifid shape which is rare, which was similar studies, Anisuzzaman et al. [16], and Singh and Chakrabarty [22] and high in other study by Khanal [15], Shaikh et al. [19], and Jawahar and Maragathavalli [19], whereas most of the other studies did not discuss the crooked shaped condyle, and bifid condyle in exception of only one study done by Singh et al. [23].

This is the first study discuss the relationship between the shape of condyle and angle classification, it improved the class I is more prominent, and class III is less prominent, class II is more prominent in female, while class III is more in males. It also improve the ovale shape of condyle head is prominent in each angle classification, and crooked figure condylar shape is less prominent in each angle classification.

While the side asymmetry is more symmetrical in male related with class I.

These variation due to races, this first study done in Iraqi population in Baghdad city and related the shape of condyle with the angle classification, This classifications will aid and assist the dental staff to recognize the condyle head and fend off them from any un necessary treatments. This classification will provide a booster for many studies as well, and further be aid in the evaluation of gender and age in the growth estimation in dentistry researches.

6. Conclusion

This study concluded the round or oval shape condyle head are the most obvious can see in Iraqi population then, flat shape, and the less commonly seen is crooked finger shape and bifid condyle is rare in Baghdad city. This study identified six different shapes of condyle head, proposed a classification of condylar shapes with six different types as follows: oval, flat, diamond, irregular, crooked finger, and bifid. This study was done by using ortho- pantomograph (two-dimensional imaging), and discuss the angle classification, with side asymmetry.

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