

THE VARIATIONS OF MANDIBULAR NOTCH SHAPE BY USING PANORAMIC X-RAY IN PATIENTS ATTENDING DENTAL CLINICS: A CROSS-SECTIONAL STUDY

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The mandibular notch is located on the superior margin, between two prominent processes of the mandibular ramus, the coronoid and condylar processes. The mandibular notch permits the entry of the masseteric artery, vein and nerve to the deep surface the masseteric muscle.

Purpose. This study was conducted to evaluate different morphological variations of the mandibular notch shape by using panoramic X-ray and the deviations of the mandibular notch characters among different age groups.

Materials and methods. The study sample consists of 170 cases of both sexes, aged 18-88 years, who underwent panoramic X-ray imaging. The mandibular notch shape was categorized into three basic types (round shape, triangular shape, wide shape) based on the radiographic images, and the distribution of each type among the age groups was calculated.

Results. The results show that the most common mandibular notch shape is the wide shape (70.8%) in females followed by round shape (45.3%) in males. Also the triangular shape is the most public in young group (64%) followed by round shape in adult group (18.2%), the round morphology is also regularly public in old group (25.5%).

Discussion. The orthopantomogram (OPG) is the most common dental diagnostic tool. Although OPG has disadvantages of magnification, distortion, superimposition and misrepresentation of structures, however with low radiation dose and low cost. The study showed that round shape of mandibular notch was more common. In this study the mandibular notch was divided into three shapes: shape I triangular, shape II rounded and type III truncated quadrilateral. The triangular shape were found in 46% of sides and truncated quadrilateral shape form 20% of sides, they are mostly common in males, while the rounded shape was founded in 34% of sides, with females being the predominant gender.

Conclusions. The panoramic X-ray imaging is a reliable method for assessing mandibular notch shape and the findings can be useful in planning surgical procedures such as mandibular reconstruction and orthognathic surgery, in addition it may also aid forensic anthropologists in the identification of unknown remains.

Keywords: mandible, panoramic radiography, sigmoid notch, mandibular notch, masseteric artery.

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ВАРИАНТЫ СТРОЕНИЯ ВЫРЕЗКИ НИЖНЕЙ ЧЕЛЮСТИ ПРИ ИСПОЛЬЗОВАНИИ ОРТОПАНТОМОГРАФИИ У ПАЦИЕНТОВ, ОБРАЩАЮЩИХСЯ В СТОМАТОЛОГИЧЕСКИЕ КЛИНИКИ: КРОСС-СЕКЦИОННОЕ ИССЛЕДОВАНИЕ

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Вырезка нижней челюсти расположена на верхнем крае, между венечным и мышечковым отростками ветви нижней челюсти. Нижнечелюстная вырезка обеспечивает доступ жевательной артерии, вены и нерва к глубокой поверхности жевательной мышцы.

Цель исследования. Оценка различных анатомических вариантов строения нижнечелюстной вырезки с использованием ортопантомографии и выявление данных отклонений в разных возрастных группах.

Материалы и методы. Выборка исследования состоит из 170 случаев, мужчин и женщин, в возрасте 18-88 лет, которым была выполнена ортопантомография. На основании рентгенологических изображений форму вырезки нижней челюсти разделили на три основных типа (круглая форма, треугольная форма, широкая форма) и рассчитали распределение каждого типа по возрастным группам.

Результаты. Результаты исследования показали, что наиболее распространенной формой вырезки нижней челюсти является широкая форма (70,8%) у женщин, далее следует круглая форма (45,3%) у мужчин. Кроме того, треугольная форма является наиболее распространенной в группе молодых (64%), круглая форма – в группе среднего возраста (18,2%), а также круглая форма регулярно встречалась в старшей возрастной группе (25,5%).

Обсуждение. Ортопантомография является наиболее распространенным диагностическим методом, используемым в стоматологической практике. Хотя данное исследование имеет недостатки в виде масштабирования, искажения и наложения структур, однако имеет низкую лучевую нагрузку и невысокую стоимость. Исследование показало, что чаще встречается круглая форма вырезки нижней челюсти. В данном исследовании форма вырезки нижней челюсти была разделена на три типа: форма I – треугольная, форма II – закругленная и форма III – усеченный четырехугольник. Треугольная форма встречалась в 46%, а усеченная четырехугольная форма – в 20% (чаще у мужчин), тогда как округлая форма встречалась в 34% с преобладанием женского пола.

Выводы. Визуализация с помощью ортопантомографии является надежным методом оценки формы вырезки нижней челюсти, и полученные результаты могут быть полезны при планировании таких хирургических вмешательств, как реконструкция нижней челюсти и ортогнатическая хирургия, а также могут помочь судебным антропологам в идентификации неизвестных останков.

Ключевые слова: нижняя челюсть, ортопантомография, сигмовидная вырезка, нижнечелюстная вырезка, жевательная артерия.

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The mandible, one of the body's strongest bones, is utilized in forensic medicine to determine age, gender, and race as well as to provide socio-demographic structure for anthropology. In several studies undertaken by anatomists and surgeons, the significance of morphological changes found in the mandible's structure has been demonstrated in light of the intimate relationship between the mandible and surrounding formations [1, 2].

Due to the area's clinical significance for reconstructive surgery surgical technique, and postoperative treatment, maxillofacial surgeons take it into consideration. A maxillofacial surgeon would be able to treat chronic mandibular dislocations effectively using a unique mini-plate developed by Cavalcanti and Vasconcelos thanks to the knowledge about the morphological forms of the MN acquired [3]. The mandible is composed of two main parts: the body and the paired rami. These parts have several anatomical landmarks that contribute to important functions of the mandible, such as providing sockets for the teeth and providing a passage for nerves and blood vessels [2].

The mandibular notch, also referred to as the incisura mandibulae or sigmoid notch is a gap facing upwards and backwards occupying the superior margin of the mandibular ramus [4, 5]. Furthermore, this notch separates two prominent processes of the mandibular ramus. the coronoid process (anteriorly) and the condylar process (posteriorly) [6]. The mandibular notch acts as a passageway for the masseteric artery (accompanied by the masseteric vein and nerve) to enter the deep surface the masseteric muscle [5, 6].

Panoramic radiography is a simple, low-cost method to evaluate the bony structures of the temporo-mandibular joint (TMJ) and is one of the most commonly used techniques by dentists and dental specialists. Its principle is based on the tomographic concept of imaging a section of the body while blurring images outside the desired plane so that the TMJ and teeth are in focus, but adjacent structures are blurred [7].

The present study had witnessed various morphological shapes of the mandibular notch by using panoramic x-ray imaging. Sign the deviations of the mandibular notch characters among different age groups and conclude the most common morphology in each age group of patients. Notice the most common notch design between males and females. Determine the notch figure resemblance between right and left side in the same patient.

Materials and methods.

The present study was conducted on a sample of Iraqi patients who visited the teaching clinic at Basra Dentistry College University of Basra for diagnostic and treatment purposes.

A retrospective study was conducted in the Diagnosis Department, after sample size calculation was performed by power test. The sample size comprised of 170 panoramic radiographs, approximately 70 taken using Kodak 8000C Digital Panoramic and Cephalometric System, under standard exposure conditions as recommended by the manufacturer, the remaining samples collected from private clinics. The sample size consisted of 170 patients examined bilaterally ($n=340$), including 64 males and 106 females, who were randomly selected, their ages ranging between (16-88 years).

A value of $P \leq 0.05$ was considered statistically significant by the using of statistical package for social sciences (SPSS) program (version 26.0) for comparison between variables by chi-square.

Results.

Morphological parameters; in this study, the morphology of the notch was based on a combination of two classification schemes, Mohammad et al., and Shakya et al. [5, 8].

The table №1 clarifies that similarity in the mandibular notch morphology between the right and left side in the same patient was shown in about half of the study population. There was a similarity 86 (50.6%) and there was no similarity by 84 (49.4%).

The round mandibular notch accounted 137, wide notch found in 89 cases and triangular notch documented in 114 cases (Fig. 1-3).

In table №2, when the median age of the study sample was categorized and compared according to the shape, it was found that there was no any significant difference in age.

By comparing shape according to sex, it was found that the wide shape was highest in females than other shapes (Table №3).

When shape was compared according to the site, no any significant statistical association was found (Table №4). No significant statistical association between shape and similarity could be diagnosed ($p > 0.05$), (Table №5).

Discussion.

The current study was performed to identify the variation in shape of mandibular notch in both sides; right and left in same sample and compare it with sex and age. In this study used orthopantomogram (OPG) which is the most common dental diagnostic tool that use in Basra dental college. Although OPG has disad-

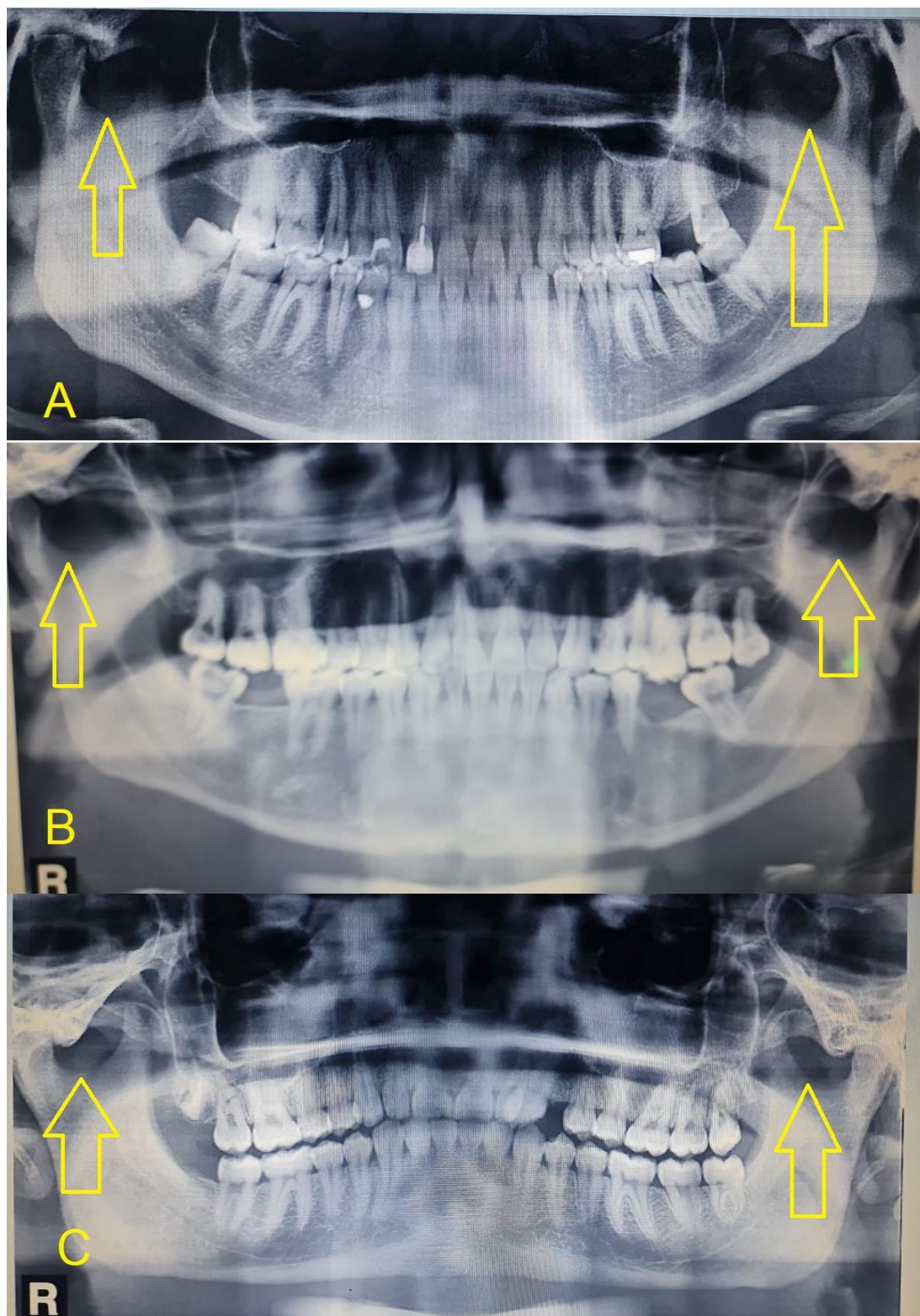


Fig. 1 (Рис. 1)

Fig. 1. Panoramic radiograph, round configuration of mandibular notch (right and left yellow arrows)

A – 56-year-old man, B – 24-years-old lady, C – 47-years-old man.

Рис. 1. Ортопантомограмма, круглая конфигурация вырезки нижней челюсти (желтые стрелки справа и слева).

А – мужчина, 56 лет, Б – женщина, 24 года, В – мужчина, 47 лет.

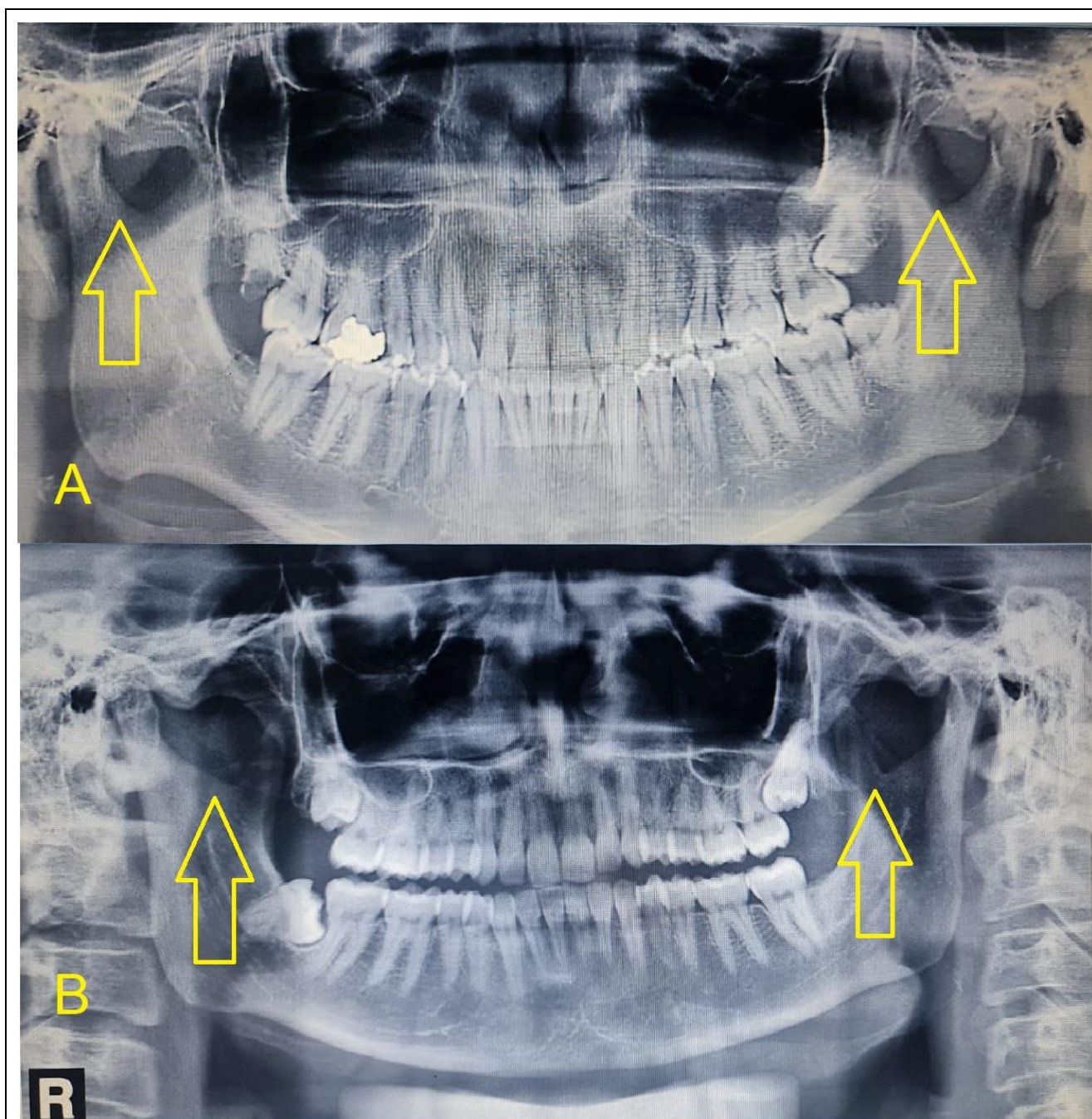


Fig. 2 (Рис. 2)

Fig. 2. Panoramic radiograph, triangular configuration of mandibular notch (right and left yellow arrows).

A – 57-years-old female, B – 44-years-old lady.

Рис. 2. Ортопантомограмма, треугольная конфигурация вырезки нижней челюсти (желтые стрелки).

A – женщина, 57 лет, B – женщина, 44 года.

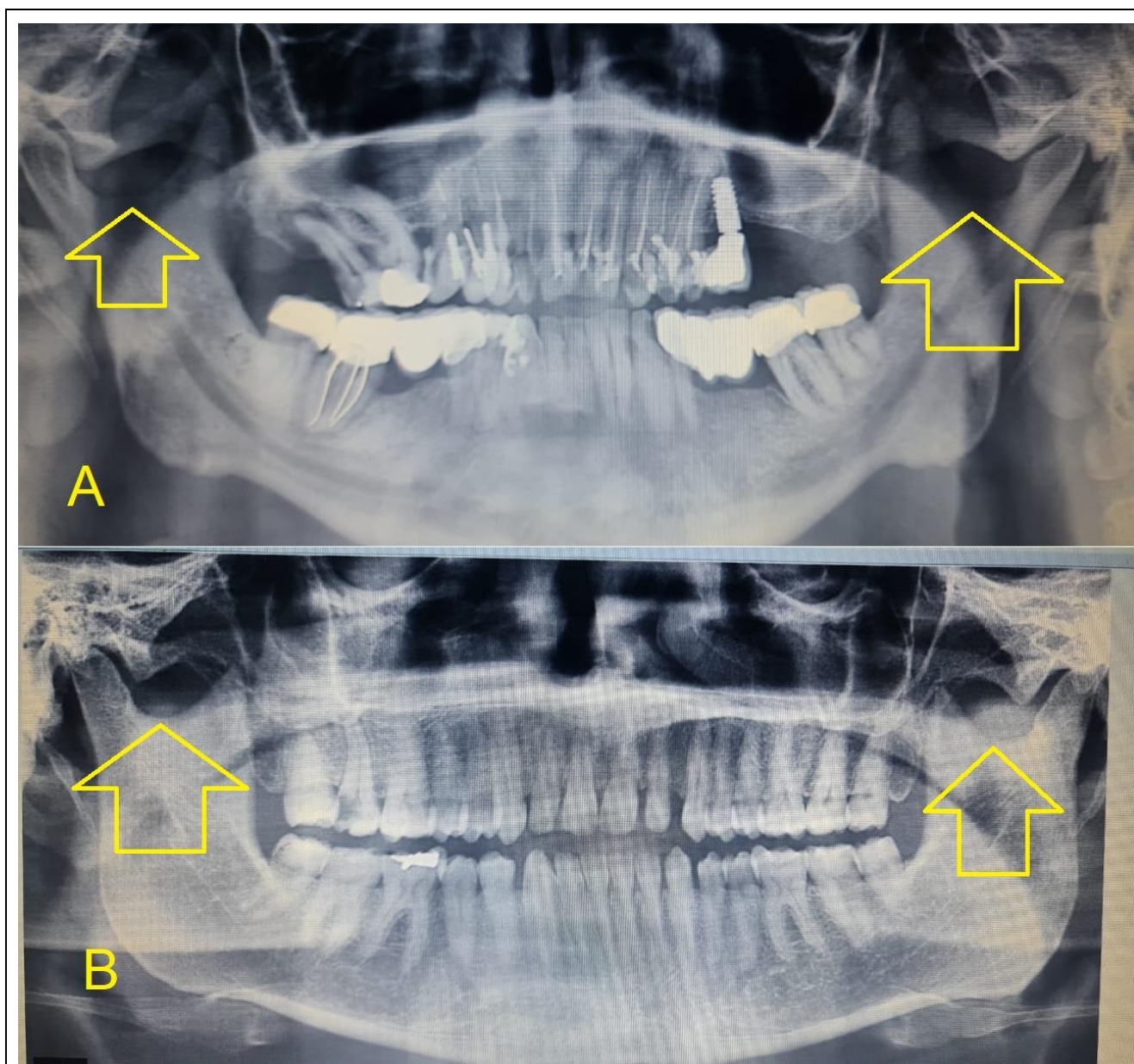


Fig. 3 (Рис. 3)

Fig. 3. Panoramic radiograph, wide configuration of mandibular notch (right and left yellow arrows).

A – 60-years-old man, B – 21-years-old female.

Рис. 3. Ортопантограмма, широкая конфигурация вырезки нижней челюсти (желтые стрелки).

А – мужчина, 60 лет, Б – женщина, 21 год.

Table №1. Distribution of similarity among the study population.

Similarity	No.	%
Yes	86	50.6
No	84	49.4
Total	170	100

Table №2. Distribution of shape among the study sample according to age.

Age (years)		
Round	No.	137
	Mean	36.32±18.284
	Median	30
Wide	No.	89
	Mean	33.6±17.278
	Median	26
Triangular	No.	114
	Mean	32.39±17.191
	Median	25
P= 0.152		

Table №3. The association of sex with the shape in the study sample.

		Shape			Total	P-value*
		Round	Wide	Triangular		
Sex	Male	62	26	40	128	0.041
	Female	75	63	74	212	
Total		137	89	114	340	

Table №4. The association of site with the shape.

Site		Shape			Total	P-value*
		Round	Wide	Triangular		
Right		64	49	57	170	0.472
Left		73	40	57	170	
Total		137	89	114	340	

Table №5. The association of similarity to shape.

		Shape			Total	P-value*
		Round	Wide	Triangular		
Similarity	Yes	38	19	29	86	0.095
	No	26	30	28	84	
Total		64	49	57	170	

vantages of magnification, distortion, superimposition and misrepresentation of structures, but it's also benefit tool with low dose and cost for patients [9].

The study showed that round shape was more common (40.3%), followed by triangular (33.5%) then wide shape (26.2%).

The results revealed there was not significant statistical association between the shape of mandibular notch and age. The study is dissimilar than those reported by Shakya et al.

which stated the most common shape of mandibular notch in panoramic radiographs was triangular shape [8].

Also the study is differ disagree with what reported by Sahithi et al. and Ashwinirani et al. which confirmed that the most public shape of mandibular notch in the OPG samples was wide shape in both males and females [10, 11].

The study is agree to those reported by Melek et al., where this study showed that round shape of mandibular notch was the pre-

dominant form, followed by triangular shape (20.8%) [12].

In another study that diverse to the existing study it reported by Mohammad done by using 100 OPG sample of Iraqi patients [5]. In this study the mandibular notch was divided into three shapes: shape I triangular, shape II rounded and type III truncated quadrilateral. The triangular shape were found in (46%) of sides and truncated quadrilateral shape form (20%) of sides, they are mostly common in males, while the rounded shape was founded in (34%) of sides, with females being the predominant gender.

In the present study, by comparing shape according to sex, it was revealed that the wide shape was main in females than round and triangular shape, while the round shape was highest in males than wide and triangular shape.

Mohammad confirmed results that disagree with current results that truncated quadrilateral shape form is mostly common in males, while rounded shape was predominant in females gender [5].

Ishwarkumar et al. agree with current results and stated that there was no any significant statistical association between the shape of mandibular notch and both sex and age [13].

From the outcome of the present study

the following recommendations may be suggested: Use Cone-beam computed tomography systems (CBCT) to differentiation the shape of mandibular notch, for more accurate results.

The mandibular notch shape arrangement in different races to compare with the current findings. Metric study of the notch and finding its distance. Mandibular notch configuration in other races to compare with present results. Further studies with larger sample sizes and more diverse populations are needed to confirm these finding and explore other factors that my influence the shape of mandibular notch.

Conclusions.

In conclusion, this study provides valuable information about the variation in shape of mandibular notch and its association with age and sex. The results conclude that the round shape is the most common, followed by triangular and wide shapes. Additionally, the study found that the shape of mandibular notch is not significantly associated with age but is associated with sex, with the wide shape being more common in females and the round shape being common in males. The use of OPG as a dental practice tool was found to be beneficial due to its low dose and cost for patients.

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