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Prevalence of patterns of impacted third molars

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ABSTRACT

Aim: As the patterns of impaction can affect the treatment plan of removing or remaining the impacted tooth, the difficulty of surgery, and the post-surgical complications, this survey aimed for assessment of the mandibular wisdom tooth impaction patterns in terms of angulation and depth in the north population of Iran.

Materials and Methods: 196 Panoramic radiographs were gathered from patients attending to the department of oral and maxillofacial surgery of GUMS in 2018-2019. To perform this retrospective study the prevalence of impaction, angulation, and the level of the eruption were assessed. The data were analyzed by SPSS 16.

Results: This study found that the most common pattern of impacted mandibular third molars was level B in terms of depth and mesioangular in terms of angulation.

Conclusion: The current study notes the importance of determining the angulation and level of wisdom tooth in designing the pre-surgical treatment and in post-surgical complaints.

Keywords: Impacted teeth; Panoramic radiography; Retrospective study; Third molar.

Introduction

One of the pathological conditions is the impaction of the tooth which means failing to complete the eruption and achieving into the functional position in the defined time [1,2]. Functional position is considered as a normal arch relation with adjacent teeth and tissues [3]. In human dentition, one of the most often impacted permanent teeth is the third molar with a prevalence rate of 98% followed by maxillary canine, central incisor, and mandibular second premolar [1,4]. Almost 30% of the population have at least one impacted wisdom tooth which have a greater incidence in the lower jaw [2,4]. The impaction can be due to adjacent tissue-related factors like deficient growth of the jaw causing lack of arch space, covered by dense bone and mucosa, the late eruption sequence, presence of supernumerary teeth, cysts, and odontogenic tumors and some tooth-related factors such as the increased size of the tooth, the incorrect path of tooth eruption, late mineralization, and late maturation. [1,2,4.5]. Some reports had demonstrated several systematic conditions accompanied by tooth impaction such as cleidocranial dysplasia, down syndrome, endocrine deficiencies, febrile diseases, and irradiation [5].

Also, the influence of genetic, racial, and environmental factors should be mentioned [4]. Impaction can cause serious complications despite showing no symptoms [1]. Dental caries, pericoronitis, periodontitis, resorption of the adjacent tooth, cysts, and neoplasms are reported side-effects associated with impacted third molars [2,6,7]. Furthermore, there are studies supporting the increased possibility of fracture of the mandibular angle as the result of impacted mandibular wisdom tooth [7]. Sometimes the presence of impacted third molar can play a role in temporomandibular Joint diseases and facial pain [7].

To decide whether to remove or maintain impacted teeth, their position should be determined. Different classifications have been introduced of which Winter and Pell and Gregory classifications are the most common ones [1]. The winter classification is defined by the angle formed between the longitudinal axis of second and third molars [2]. The Pell and Gregory system can evaluate the depth of impaction as well as their relation with the anterior border of the mandibular ramus [7]. The depth or level of impaction is assess based on the second molar occlusal table as follows:

Position A; the occlusal plane of the impacted tooth is level with of the second molar.

Position B; the occlusal plane of wisdom tooth is between occlusal plane and cervical line of the adjacent tooth.

Position C; the impacted tooth placed below the cement-enamel junction [1].

By highlighting the fact that the third molar impaction's pattern has not been evaluated in the north of Iran, this study aimed to assess the pattern of third molar impaction using orthopantomograms in a sample of patients attending to GUMS complex by examining the status of eruption and angulation on panoramic radiographs.

Materials and Methods

This retrospective study was carried out in the Department of Oral and Maxillofacial Surgery of GUMS in Rasht, Guilan, Iran between 2018-2019. The design of the study was approved by the GUMS Ethics Committee. A total of 196 orthopantomograms (OPGs) regardless of the prescribing reasons were selected based on inclusion criteria such as being older than 19 years and having at least 1 impacted mandibular third considering that "impaction" was defined as "not being in the functional occlusion".

The exclusion criteria were as following:

1. Any craniofacial anomaly or syndrome.

2. Incomplete root development.

3. Presence of bone pathology that disrupts the alignment of teeth in the occlusal plane.

4. Poor-quality radiographs.

5. Absence of mandibular second molar.

6. History of any dental extraction.

7. History of orthodontic treatment.

Radiography Analysis

All the records were examined by an individual to reduce the inter-examiner errors. Also to avoid the false assessments due to the researcher's tiredness, only 49 graphs were reviewed each time. The assessment was conducted by a proper X-ray viewer in a dark room.

The following sequence was designed for examination:

1. Demographic information: age–gender.

2. Side of impaction (left–right).

3. Angulation pattern according to Winter's classification by visual impression (Table 1).

4. Depth of impaction was documented as regard to Pell and Gregory classification (Table 2).

Based on the design of this study (being retrospective), it was not possible to obtain written consent but all the patients' identification information was kept in private.

Statistical Analysis

The data such as age, gender, number of impacted third molars, angulation, and the depth of impaction were documented into designed form. To describe the qualitative data, frequency and percentage were reported and to describe the quantitative data, mean and standard deviation were used. The analysis was performed by SPSS software version 16 and the statistical tests used included K-squared and Fisher tests. A p-value less than 0.05 was considered statistically significant. To measure the inter-examiner error, 50 OPGs were reviewed twice with a two-week interval and the value was reported to be 9.3%. The authors disclose no conflicts of interest.

Result

Of 196 patients aged 20-47 years (mean of 29.01± 7.85), 110 (56.1%) were of males and 86 (43.9%) were of females. From these 196 patients, 268 impacted mandibular third molars were reviewed as 63.3% of patients had just one impacted mandibular third molars (25.5% had right-side impaction and 37.8% had left-side impaction) and the others (36.7%) had bilateral impaction. So the highest impaction in this sample was for the left side. The relations of age with pattern and depth of impaction were insignificant (respectively P=0/135 and P=0/509). Also, this study showed there isn't any significant relationship between gender and pattern (P=0/890) or even depth of impaction (P=0/642). Mesioangular pattern was the most seen pattern of impaction (53.1%) followed by horizontal (34.7%) and vertical (12.2%) patterns (Table 3). The distribution of impaction based on its depth is demonstrated in table 4. The occlusal table of most of the examined wisdom teeth is between the occlusal surface and the cervical line of the second molar.

Types	*Angulation*
Vertical impaction	*(-10 ° to 10 °)*
Mesioangular impaction	*(11 ° to 79 °)*
Horizontal impaction	*(80 ° to 100 °)*
Distoangular impaction	*(-79 ° to -11 °)*
Others (Buccal, Lingual , Transverse)	*(111 ° to -80 °)*

Table 1. Winter's classification.

Position A	*The occlusal plane of the impacted tooth is level with of the second molar.*
Position B	*The occlusal plane of wisdom tooth is between occlusal plane and cervical line of the adjacent tooth.*
Position C	*The impacted tooth placed below the cement-enamel junction*

Table 2. Pell & Gregory classification (in terms of depth).

	Vertical angulation		*Mesioangular angulation*		*Horizontal angulation*		*Distoangular angulation*		*Other angulations*	
	Frequency	*Percentage*	*Frequency*	*Percentage*	*Frequency*	*Percentage*	*Frequency*	*Percentage*	*Frequency*	*Percentage*
Impacted tooth	*32*	*12.2%*	*142*	*53.1%*	*93*	*34.7%*	*0*	*0%*	*0*	*0%*

Table 3. Angulation pattern of the mandibular third molars based on winter's classification.

	Position A		*Position B*		*Position C*	
	Frequency	*Percentage*	*Frequency*	*Percentage*	*Frequency*	*Percentage*
Impacted tooth	*0*	*0%*	*151*	*56.1%*	*117*	*43.9%*

Table 4. Level pattern pf the mandibular third molars based on Pell and Gregory's classification.

Discussion

One of the challenging treatment plans in dentistry is related to impacted teeth. Among all teeth, absence or impaction of mandibular third molar in the dental arch is prevalent [8]. Various complications are accompanied by the abortive eruption of mandibular third molar such as dental caries, root resorption, apical lesion, inflammation of the tissue around crown, cysts, malignancies [8]. As most of the complications are associated with the angulation and level of impaction, to give the best treatment plan whether to retain or remove these retained teeth, their position in the jaw should be determined [2,9]. The factors contributing to impaction include lack of space, delayed third molar mineralization of wisdom tooth, dense bone or thick mucosa over the tooth, and tooth angulation also genetic factors can not be ignored [4,7].

In the current study, 268 impacted third molars of the lower jaw were examined in which 63.3% of them were unilateral (right or left side) while others were bilateral. However, the study of Anqudi showed that bilateral impaction was more routine (71%) [10]. On the other hand, Dachi and Howell stated an equal incidence of unilateral and bilateral impactions [11]. This observation found that the impaction of mandibular wisdom tooth is more prevalent on the left side (37.8%) coincide with Eshghpour statement (52.1%) [12]. Our results differ from the published articles of Alfergani et al reporting the right impacted mandibular third molar with a percentage of 55.2% [8]. Albeit, some researchers believed there is no significant difference between these sides [5,7,9]. These differences can contribute to the genetic and national factors influencing the impactions.

Overall, the occurrence of the mesioangular pattern (based on Winter's classification) had superiority (53.1%) from other impaction patterns in our survey confirmed by many other studies done in Saudia Arabia, Oman, Libyan, northeast and southeast of Iran [7,8,9,10,12]. Although, the percentage of prevalence in this study was less than Alfergani 8 (68%) and higher than Anqudi 10 (35%), Eshghpour 12 (48.6%), Hashemipour 7 (48.3%), and Hassan 5 (33.4%). However, Reddy et al [13], Šeèiæ et al [2], and Hugoson et al [14] estimated vertical impactions as highly found impaction. It seems that the third molar's path of eruption is the reason for the high prevalence of mesioangular pattern. Besides, the difference can be due to the variation of the classification criteria. Some studies determined the Winter's classification by visual impression 2 while others used a protractor [9]. Furthermore, our finding revealed no significant difference between angulation of mentioned teeth and gender 8 whilst Anqudi believed there is a statistically significant relationship between these two as mesioangular impaction is frequent among males and distoangular impaction has a high prevalence rate in females [10].

According to our data, the most frequent level of impaction in the mandibular third molar was B position (assessed with Pell and Gregory classification) which is agreeable with Alfergani et al study [8]. Also, Eshghpour et al and Shujatt et al proposed consistent outcomes [12,15]. In an investigation designed by Primo et al and Hatem et al level B impaction was documented as the most common depth [9,16]. As opposed to our finding, Gupta et al published that level A was dominant in their samples 17 which is aligned with findings of Hatem et al, Anqudi et al, Pakravan et al, and Hashemipour et al [4,7,9,10]. On the other hand, Yilmaz et al reported level C which was in contrast with most of the previous observations [1].

These controversies are results of different classification systems. In some studies, the impaction depth was measured from the alveolar bone level instead of following the Pell and Gregory classification [12]. These radiographic evaluations can be very useful as a pre-surgery assessment to reduce post-operative complications. Patterns of the impaction has never been studied previously in Guilan, Iran. So this study was planned to help the appraisement of patients, to indicate the prevalence of impaction, to highlight the need for more exploration on etiological factors. The current study was retrospective and it was not possible to use randomization which can be noted as one of the limitations. That's why some studies represented by the randomized samples are essential in this field. Also in this study, only patients attending the GUMS complex were evaluated so more studies should be planned to determine the patterns in other populations of Iranian.

Conclusion

The most common pattern of impacted mandibular third molar in Rasht, Guilan, Iran was determined to be level B depth and mesioangular position.

Conflict of Interest

There is no conflict of interest to declare.

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