PATTERN OF IMPACTED THIRD MOLARS AND THEIR ASSOCIATED RADIOGRAPHIC PATHOLOGICAL LESIONS IN MAKKAH REGION: A RETROSPECTIVE RADIOGRAPHIC SURVEY

Ali K. Barakat * *and* Reda.A.Nofal **

ABSTRACT

Background: In recent centuries the wisdom tooth impaction of both jaws considered a public health problem, because lack of space to erupt normally or even to appear in the oral cavity, this sequela may be due to insufficient activity of the jaws over the centuries.

Aim of the Study: The purpose of this study was to determine the prevalence of impacted wisdom associated with pathologies in relation to angulation of impaction in an adult Saudi population in Mecca area,

Materials and Methods: This is a cross sectional study in which records of 4000 patient's panoramic radiographs between 2017 -2018 from OPG & CEPH X-Ray Department. Umm Al-Qura University-Dental College and Hospital were reviewed. Finally, 411 out of 4000 patient's radiographs which showed impacted wisdom were selected. Data related to the type of impaction in both jaws and associated pathologies were then collected, tabulated and analyzed.

Results: Panoramic radiographs of 4000 patients aged 25-60 years were examined. A total of 411 (10.27%) demonstrate the presence of at least one impacted third molar. The study demonstrates that the highest number of impactions related to mandibular arch followed by maxillary arch then the least common cases with impaction related to both jaws. For the angulation of the impacted third molars, the most common angulation was vertical folwed by mesioangular and distoangular angulations were the less common, while the least common angulation was Horizontal. The most angulated wisdom associated with pathologies was the mesioangular angulation followed by vertical then the least common pattern distoangular and horizontal. The other angulations were negligible. The most common radiographic features of lesions associated with the third molar were radiolucent lesions Followed by radiopaque lesions. And the least common lesions were mixed lesions.

Conclusion: The radiographic features of impacted wisdom angulation could be correlated to their pathologies among all cases in Makkah region.

KEYWORDS: Radiography, Panoramic, Impacted Wisdom, Prevalence, Pathology.

* Bachelor's Degree in Dental Medical and Surgery, Faculty of Dentistry, Umm Al Qura University, Saudi Arabia.
** Professor of Oral and Maxillofacial Surgery, Faculty of Dentistry, Umm Al Qura University, Saudi Arabia.

INTRODUCTION

Impacted teeth are the teeth that fail to erupt into the oral cavity within the dental arch within the predicted time. [1] There're several systemic and local factors that may lead to teeth impaction, the main local factors for teeth impaction are: adjacent teeth, dense overlying bone, excessive soft tissue, genetic abnormality prevents eruption and inadequate dental arch length and space. [2]

Durbeck 1943 mentioned five main theories for teeth impaction: Orthodontic theory explained the impaction because of jaws develop in downward and forward direction. Movement of teeth occurs in forward direction any abnormalities within these movements may cause an impaction. Phylogenic theory mentioned that over centuries and generations both jaws get smaller and leaving insufficient room for wisdom teeth. Mendelian theory heredity was most common cause. This may be an important etiological factor in the occurrence of impaction. Pathological theory mentioned that the chronic infections affecting an individual may bring the condensation of osseous tissue further preventing the growth and development of the jaws. Endocrinal theory was about any increase or decrease in growth hormone secretion may affect the size of the jaws. [3]

There're several studies described the tooth impaction as a frequent phenomenon. However, there was a difference in the prevalence of teeth impaction among different population and regions, as well as the distribution and prevalence variations of impacted teeth in different regions of the jaw. Definite age group, time of teeth eruption and radiographic criteria are some of the factors that affect the prevalence of teeth impaction. [4-7]

The most common teeth that fails to erupt into the oral cavity are the maxillary and mandibular third molars, followed by the maxillary canines and mandibular premolars. The third molars are the most frequently impacted tooth because they are the last teeth to erupt and the jaws have inadequate space for their normal eruption. [8] In several studies they found that impacted mandibular wisdom is frequently more prevalent than impacted maxillary wisdom teeth. The prevalence of mesioangular impacted wisdom tooth was significantly higher than other angulations in the mandible while in the maxilla the vertical impaction was more frequent than another angulation. [9-13]

Wisdom tooth is the last tooth that appears in the oral cavity, many times this tooth have inadequate space for its complete eruption. There're so many pathological conditions associated with wisdom tooth retention. [14]

Adverse conditions arising from retained tooth such as: Pericoronitis and related infections, orthodontic problems, odontogenic cysts, odontogenic tumors, dental caries, periodontal disease and mandible fractures. [15,16]

Impaction classification was described by several methods, such as angulation and level of impaction such as: a classification was given by Pell & Gregory (1933). This is based on the relationship between the impacted lower wisdom (3rd molar) tooth to the ramus of the mandible and the 2nd molar based on the space available distal to the 2nd molar. Another wisdom impaction classification was described by Winter (1926) and classified the lower wisdom (3rd molar) impaction by the angle formed by the long axis of the impacted wisdom and the long axis of the tooth adjacent to it. For the upper wisdom (3rd molar) Archer (1975) and Kruger (1984) pioneered the angulation classification based on the radiographic position and angulation of the third molars. Different angulations of impaction were present: mesioangular, distoangular, horizontal, vertical, bucco-lingual version and inverted position. Impaction also classified according to the occlusal height, amount of distal bone covering the distal portion of tooth and the tooth overlying tissue (soft or hard tissues). [17-21]

Orthopantomograms (OPG) radiographs are a diagnostic aid to discover tooth impaction presence within the jaws, angulation of impaction, anatomical obstacles preventing the normal tooth eruption, amount of surrounding bone, relation to adjacent

teeth, and vital structures. Therefore, an accurate evaluation results in a correct planning and treatment in this regard. [22]

Currently there's no data on the prevalence of impacted wisdom angulation in association with pathologies in Mecca city.

Aim of the Study

The aim of this study was to investigate the Prevalence of impacted wisdom angulation in association with radiographic signs of pathology in panoramic radiographs of Saudi population in Mecca area.

MATERIALS AND METHODS

A cross sectional study of Consecutive panoramic radiographs of the patients with impacted third molars who attended the Department of Oral and Maxillofacial Surgery was carried out. Radiographs were taken from (OPG & CEPH. X-Ray Department). Umm Al-Qura University-Dental College and Hospital.

Study sample

Firstly, the records of 4000 patient's panoramic radiographs between (2017 -2018) were reviewed. Finally, 411 out of 4000 patient's radiographs which showed impacted wisdom were selected. The analysis of the type of impaction in both jaws and associated pathologies were then assessed.

Patients selection

Inclusion criteria: radiographic evidence of wisdom impaction within the age group of 25 to 60 years with at least one impacted wisdom. Exclusion criteria: inability to classify the impaction angle and if we can't examine the radiographs due to radiographic error.

Angulation measurements

The angulations of wisdom impaction were measured by the angle formed by the long axes of the impacted wisdom and the adjacent tooth according

Archer (1975) and Kruger (1984) classification for wisdom impaction. [23]

Associated Pathologies

Pathologies associated with impacted wisdom were observed on radiograph according to radiolucency: Radiolucent lesions considered when there is an increase in the pericoronal space of the dental follicle more than 3 mm around the impacted tooth. Radiopaque lesions considered when there were any radiopacity related to the impacted wisdom while the mixed lesions considered when both radiolucent and radiopaque appearance were associated with the impacted tooth. (Picture 1-3). [24]

Ethical approval

This study followed the protocol and ethics, it was approved by the Ethical Review Board of Umm Al-Qura University Dental College.

Statistical Analysis

All the collected data were coded, and tabulated. Statistical analysis was performed by Microsoft Office 2013 (Excel) and IBM SPSS Statistics for version 22. Descriptive analysis was performed using simple frequencies and percentage. Chi square test was performed to test the significance difference between the groups. P value of 0.05 was used as level of significance. (tables 1-3).

TABLE (1) Illustrate the P value for the statistical comparison between total impacted wisdom associated with the arches and angulated wisdom associated with pathologies.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1590.090[a]	18	.000
Likelihood Ratio	1507.881	18	.000
Linear-by-Linear Association	518.668	.000	.000
N of Valid Cases	878		

a. 7 cells (23.3%) have expected count less than 5. The minimum expected count is .40.

TABLE (2) Illustrate the P value for the statistical comparison between total impacted wisdom associated with the arches and the pathologies associated with the arches.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	530.390[a]	6	.000
Likelihood Ratio	718.168	6	.000
Linear-by-Linear Association	423.653	1	.000
N of Valid Cases	878		

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 2.81

TABLE (3) Illustrate the P value of the statistical comparison between angulated wisdom associated with pathologies and the pathologies associated with the arches.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Likelihood Ratio	1559.505	27	.000
Linear-by-Linear Association	722.534	1	.000
N of Valid Cases	878		

14 cells (35.0%) have expected count less than 5. The minimum expected count is .13.

RESULTS

Panoramic radiographs of 4000 patients aged 25-60 years were examined. A total of 411 (10.27%) demonstrate the presence of at least one impacted third molar. The study demonstrate that the total number of maxillary impacted wisdom teeth were 412 (%47) and the mandibular impacted wisdom teeth were 378 (%43) while the impacted wisdom in both jaws were 88 (%10) (table 4). For the angulation of the impacted third molars, the most common angulation was vertical followed by mesioangular, and distoangular angulations were less common, but the least common angulation was horizontal.

Results were summarized in (figure 1). The most angulated wisdom associated with pathologies in relation to other angulations was the mesioangular (%35.5) followed by vertical (%31.4) then, distoangular (%17.3) and horizontal (%13.3) were the least common pattern, while the other angulations (%2.5) were negligible (Table 5). Lesions were detected radiographically in 28 (17.8%) maxillary third molars and 129 (82.2%) mandibular third molars (Table 6). For the angulated wisdom in association with pathology within the same angulation (23.9%) of horizontal cases were associated with pathologies followed by mesioangular (21.3%) than distoangular (16.5%) and the least common was vertical (14.8%) and other angulations pattern were (12.1%) (Table 7). The most common radiographic lesion of the third molar was radiolucent lesions followed by radiopaque lesions and the least common lesion was mixed lesions (Figure 2). The maxillary impacted wisdom associated with pathologies was (6.3%) while the Mandibular impacted wisdom associated with pathologies (29.7%) this finding in relation to the same arch pathologies (table 8).

TABLE (4) Demonstrate the impacted teeth in maxilla, mandible & both arches.

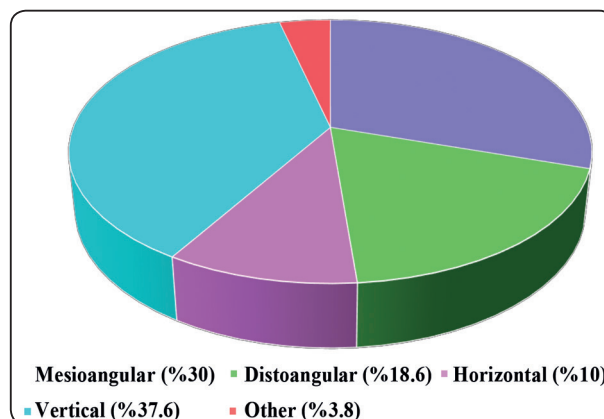| Area of the jaw	Number (%)
Maxillary impaction	378 (43%)
Mandibular impaction	412 (47%)
both	88 (10%)
Total	878 (100%)

Fig. (1) Shows the Angulation percentage of impacted wisdom

TABLE (5) Show the angular position in association with pathologies compared to other angulations.

Pattern of impaction	Associated with pathologies Number (%)	Not associated with pathologies Number (%)
Mesioangular	56 (35.5%)	207 (28.7%)
Distoangular	27 (17.3%)	137 (19%)
Vertical	49 (31.4%)	281 (39%)
Horizontal	21 (13.3%)	67 (9.3%)
Other	4 (2.5%)	29 (4%)
Total	157 (100%)	721 (100%)

TABLE (6) Displays the impacted wisdom within the jaw in association with pathologies.

Area of the Jaw	Associated with pathologies Number (%)	Not associated with pathologies Number (%)
Maxillary impaction	28 (17.8%)	415 (57.5%)
Mandibular impaction	129 (82.2%)	306 (42.5%)
Total	157 (100%)	721 (100%)

TABLE (7) Show the impacted wisdom angulation associated and not associated with pathologies within the same angulation.

Pattern of impaction	Associated with pathologies Number (%)	Not associated with pathologies Number (%)	Total
Mesioangular	56 (21.3%)	207 (78.7%)	263 (100%)
Distoangular	27 (16.5%)	137 (83.5%)	164 (100%)
Vertical	49 (14.8%)	281 (85.2%)	330 (100%)
Horizontal	21 (23.9%)	67 (76.1%)	88 (100%)
Other	4 (12.1%)	29 (87.9%)	33 (100%)

TABLE (8) Display the impacted wisdom associated and not associated with pathologies within the jaw.

Area of the Jaw	Associated with pathologies Number (%)	Not associated with pathologies Number (%)	Total
Maxillary impaction	28 (6.3%)	415 (93.7%)	443 (100%)
Mandibular impaction	129 (29.7%)	306 (70.3%)	435 (100%)

Radiolucent lesion (80.2%)
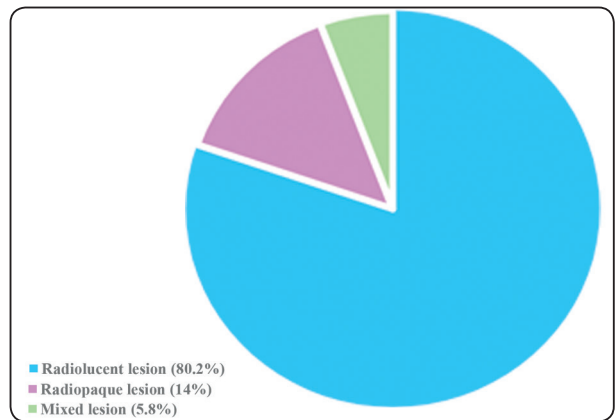Radiopaque lesion (14%)
Mixed lesion (5.8%)

Fig. (2) Shows the percentage of the radiographic lesions.

Picture (1) shows the impacted wisdom in association with radiolucent lesion.

Picture (2) Shows the impacted wisdom in association with radiopaque lesion.

Picture (3) Shows the impacted wisdom in association with mixed lesion.

DISCUSSION

The prevalence of impacted third molar is variable in different populations, ranging from almost nil in Nigerians to 72% in the Swedish. [25] in this study radiographic evaluation done with panoramic radiographs. The impacted third molars were classified radiographically according to the angulation impaction pattern, as done by Şimşek- Kaya et al. [26] Winter's classifications was used on the panoramic radiograph in this study as they were simple, practical, and easy to apply. In our study vertical angulation for impacted 3rd molars (37.6%) were most common, whereas mesioangular (30%) angulation was the next most common finding. The result was in accordance with that found by Hassan A, [10] Alsehimy M. [11] and Labeed et al., [27] in the other hand Dogan et al., [28] Bansal et al., [29] and Ramamurthy et al., [30] found that mesioangular pattern for impacted 3rd molars was most common, whereas vertical angulation was their next most common finding. however, the frequency of pathology was highest in the mesioangular position (35.5%), followed by vertical (31.4%), distoangular (17.3%) and the least common was horizontal (13.3%). This may be explained by the following: The occlusal surface of a mesioangular impacted tooth slope upward and mesially push the adjacent tooth by its eruption force and the amount of soft tissue covering a mesioangular impacted third molar is less and allow for the oral flu-

ids to leaked into the follicle than that with vertical, distoangular and horizontal impaction. In our study we found that mandibular impacted wisdom with associated pathologies (82.2%) is more than maxillary impacted wisdom associated with pathologies (17.8) this result was in accordance with Jung Y. [31] and this may be due to bone structure of the mandible tend to localize the spread of infection and the pathologies in the other hand maxillary bone nature tend to spread the lesion. regarding the nature of the pathologies we discovered that radiolucent lesions (80.2%) tend to be more compared to radiopaque lesions (14%) and mixed lesions (5.8%) was the least lesions.

CONCLUSION

Incidence of tooth impaction was higher in the mandible compared to maxilla. Highest incidence of impacted wisdom angulation was vertical impaction type followed by mesioangular then distoangular and the least common was horizontal impaction another impaction such as buccolingual impaction, inverted and ectopic impaction was negligible. The radiographical features of impacted third molar angulation pattern may be correlated to their pathological complications. In this study the mandibular impaction was associated more frequently with radiographic pathologies than maxillary impaction. The predominant angulation pattern that was associated

with radiographic abnormalities was mesioangular impaction type followed by vertical impaction then distoangular and the least common was horizontal impaction. (80.2%) of cases had radiolucent lesion in association with impacted wisdom and (14%) of cases showed radiopaque lesion and for the mixed lesion (5.8%).

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