Original Article

Pattern of Impacted Mandibular Third Molar Teeth in Rangpur Region, Bangladesh: A Radiological Evaluation

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Abstract

Background: *Third molar is the most commonly impacted tooth in the oral cavity and accounts for large of all impactions. The most common complication in the extraction of the third mandibular molars is nerve and vessels damage. Therefore, thorough radiographic assessment is a necessary to avoid these surgical complications.* ***Objective:*** *The purpose of this study was to evaluate the frequency, angulation, depth of the impacted mandibular third molars and its relationship with ramus on radiographs.* ***Materials and Methods:*** *This study comprised 800 orthopantomograms (OPGs) of patients attending different dental clinics and hospitals in Rangpur region, Bangladesh between June 2014 to May 2015. Panoromic Radiographic assessment was carried out to evaluate the pattern of third molar impaction in terms of age, gender, angulation of impaction, level of eruption and available retromolar space using panoramic radiographs and Pell & Gregory classification.* ***Results:*** *A total of 314 radiographic third molar areas were found in this study, out of them 137 belong to male patients and 177 belong to the female patients. The mesio angular types of angulation was most prevalent (46%) whereas distoangular was rare (5%) in our study. In relation to anterior border of the ramus of mandible Level B 52% and Class II 59% were the most common pattern of impaction. The female tends to be dominant as compared to male & the maximum number (35%) of impacted third molars are found in an age group of 38 years and above.* ***Conclusion:*** *Panoramic radiographs can be used as reliable investigation for evaluation of impacted mandibular third molar.*

Key words: *Mandibular Third Molar, Impaction, Angulation, Radiological Evaluation.*

Date of received: *22.01.2021*

Date of acceptance: *25.02.2021*

KYAMC Journal.2021;12(01): 08-13.

DOI: https://doi.org/10.3329/kyamcj.v12i1.53360

Introduction

Tooth impaction is a pathological condition in which a tooth fails to erupt to the normal functional position within the expected time, due to the lack of space, or physical barriers.[1] The mandibular third molars are the most frequently impacted teeth that can be found in human.[2] The frequency of third molar impaction varies substantially among different populations, and was reported to range from 18% to 70%.[3-7] Development of mandibular third molars starts in the ramus of the mandible at about the age of seven years.[8] The third molars are the last teeth to erupt in all races despite racial variations in the eruption sequence. Racial variation in facial growth, jaw and teeth size, nature of diet, extent of generalized tooth attrition, degree of use of masticatory apparatus and genetic inheritance are the crucial factors which determines the eruption pattern, impaction status and the incidence of agenesis of third molars.[9] The removal of impacted third molars is one of the most common procedures performed in the specialty of oral and maxillofacial surgery, since these teeth are often associated with pathological conditions including pain, food impaction, cheek bite, caries, periodontitis, cystic lesions or root resorption. [10,11] Third molar extraction can be performed using elevators and/or forceps, or may require surgical intervention. The risk of some post-operative complications like nerve injury, alveolar ostietis, haemorrhage, increasing with depth of the impacted mandibular wisdom teeth.[12] To some extent these complications can be anticipated prior to surgery by using radiographs, which can help surgeons to take steps to avoid or inform the patient of the likelihood of their occurrence. Currently, the panoramic radiograph is the technique of choice to evaluate impacted mandibular third molars the estimated sensitivity for radiographic signs, as

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predictor of nerve injury ranges from 24% to 38%, and the specificity ranges from 96% to 98%.[13]In this way panoramic radiography permits an initial evaluation of any problems related to impacted mandibular third molar.[14]
The aim of the present study was to radiographically evaluate the pattern of the mandibular third molar impaction in a sample of the patients living in Rangpur region of Bangladesh, in term of age, gender, angulation of impaction, level of eruption and available retromolar space using panoramic radiograph.

Figure 1: Orthopantomogram showing impacted mandibular third molars.

Materials and Methods

This study was undertaken on a group of patients attending different dental clinics and hospitals in Rangpur region. The duration of study was from June 2014 to May 2015. Eight hundreds Orthopantomograms (OPG) of patients were examined. Out of 1600 mandibular third molar sites, 314 mandibular third molars were evaluated in the study. One hundred and fifty seven OPGs were selected for evaluation, among them 68 were male and 89 were female. Remaining mandibular third molars were missing, under develop, or fully erupted. Patients were divided into 3 groups according to their age. Age range of first group was 18 to 27 years, second age group was ranges from 28 to 37 years and age range of third group was 38 years and above.
Patient aged younger than 18 years, history of permanent tooth extraction, mandibular fracture, orthodontic treatment or dento-alveolar trauma, incomplete root formation of third molars, patients with developmental anomaly, congenital diseases, systemic disease and/or major pathology in the mandible that has/had caused severe bone resorption/destruction, presence of incomplete records or poor quality OPG were excluded from the study.
OPGs were reviewed by a single examiner using an appropriate x-ray viewer, tracing paper and scale to determine the prevalence of impacted third molars in the sample, their levels of eruption and their angulations. The outline of the second and third molar along with the ascending ramus was traced on the paper.
The Pell & Gregory[15] and Winter's[16] classification were used to evaluate pattern of impaction of mandibular third molar. We evaluated five different planes. Mesio-angular, disto-angular, vertical, horizontal, inverted or other. The depth of impaction was measured by observing the lower third molar position in relation to its adjacent lower second molar & it was categorized as:

Level A: From occlusal third to middle third.
Level B: Between the middle third and cervical third.
Level C: Below the cervical.

The impaction's relation to the anterior border of ramus was assessed by observing the;

Class I: Crown of lower third molar is ahead of anterior border of ramus.
Class II: Partially embedded in the ramus of the mandible.
Class III: Completely embedded in the ramus of mandible.

The data were analyzed by using the SSPS version 24. The age, gender, number of impacted third molars and classification of impaction were displayed by frequency and percentage. The relations between the groups were analyzed by using the Pearson chi-square test. All assessment was done by a single examiner to eliminate inter examiner errors.

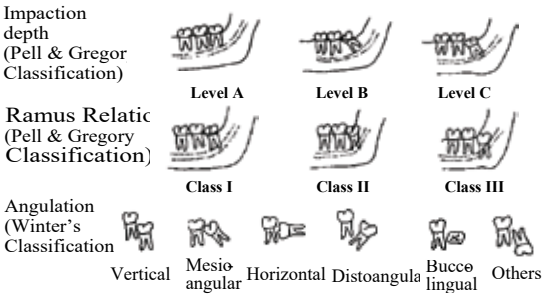

Figure 2: Pell & Gregory Classification Level A, B, C and Class I, II, III Winter's Classification of Angulation.

Results

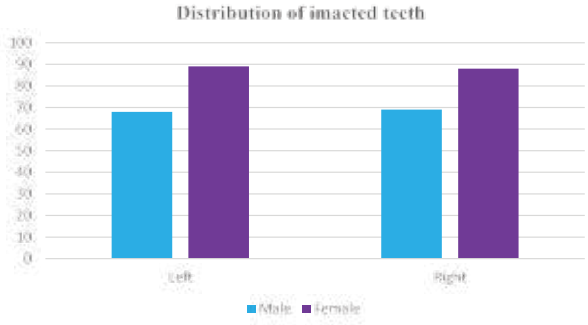

Figure 3: Distributions of Impacted Teeth according to Sex, and Side of the Jaw.

Table I: Distributions of impacted teeth according to angulation and relationship with gender.

Gender	Mesio-angular n(%)	Disto-angular n(%)	Vertical n(%)	Horizontal n(%)	Inverted or others n(%)	Absent n(%)	Total n(%)
Male	49(15.60)	8(2.55)	37(11.78)	33(10.50)	9(2.87)	1(0.32)	137(43.63)
Female	97(30.89)	8(2.55)	40(12.74)	26(8.28)	4(1.27)	2(0.64)	177(56.37)
Total	146(46.49)	16(5.10)	77(24.52)	59(18.78)	13(4.14)	3(0.96)	314(100)

Table II: Distributions of impacted teeth according age & relationship with angulation .

Age groups (years)	Mesio - angular n(%)	Disto - angular n(%)	Vertical n(%)	Horizontal n(%)	Inverted or other n%)	Impaction absent n(%)	Total n
18 -27	52 (17)	5(2)	24(8)	19(6)	5(2)	1(1)	106(34)
28 -37	48(15)	4(1)	26(8)	14(4)	6(2)	0(0)	98(31)
≥38	46(15)	7(2)	27(9)	26(8)	2(1)	2(1)	110(35)
Total	146(46)	16(5)	77(25)	59(19)	13(4)	3(1)	314(100)

The female tends to be dominant as compared to males, on right side male 69 (44%), female 88 (56%) & on the left side male 68 (43%), female 89 (57%) (fig. 1). The most common angulation was mesio-angular 46% followed by vertical 25%, Horizontal 19%, distoangular 5% respectively. Only 4% of the patients had the inverted or other impaction in our study (table I & II). According to the Pell & Gregory15 classification, Level B was the most prevalent type & was present on right side 74 (21%), on left side 89 (28%) of the patients. Followed by Level A on right side 54 (18%), left side 40 (11%) & Level C on right side 31 (10%), left side 27 (9%). According to the depth of impaction, female for the both side of mandible is higher than the male in Level B. It is on the right side 45(14%) and the left side 51(16%). But in terms of the total distribution for male and female are equal in both side (table III).

Table III: Distributions of impacted teeth according to depth of impaction compared with gender.

Gender	Site	Level A n(%)	Level B n(%)	Level C n(%)	Total
Male	**Right sid**	21(7)	29(9)	20(6)	70(22)
	Left side	12(4)	38(12)	17(5)	67(22)
Female	**Right sid**	33(11)	45(14)	11(4)	89(28%)
	Left side	28(9)	51(16)	10 (4)	88(28%)
Total		94(30)	163(51)	57(19)	**314(100)**

Table IV: Distributions of impacted teeth according to level of impacted third molar with anterior border of ramus compared with gender.

Gender	Class I n(%)	Class II n(%)	Class III n(%)	Total
Male	19(14)	81(60)	36(26)	136(43)
Female	51(29)	104(58)	23(13)	178(57)
Total	70 (22)	185 (59)	59 (19)	314 (100)

The relation to ramus Class I (22%), Class II (59%), Class III (19%) where female are tends to be dominant. With relation to the anterior border of the ramus, Class II level for the female is in the highest 104(58%) and male is in the lowered in Class I level 19(14%) (table IV). Here the table V showing that between the middle third and cervical third the number is most for the both male and female group respectively 67(21%) and 96(30%) among the level of eruption. It can be described from the above table, people with all age carrying the impacted tooth which are partially embedded in the ramus of the mandible is most 185(59%). 37 years and above people has the most impacted tooth 110(35%) in all categories (table VI).

Table V: Distributions of impacted teeth according to level of eruption and relationship with sex.

Gender	Level A n (%)	Level B n(%)	Level C n(%)	Total n(%)
Male	33(10.50)	67(21.34)	37(11.78)	137(44)
Female	61(19.50)	96(30.57)	20(7)	177(56)
Total	94(30)	163(52)	57(18)	314(100)

Table VI: Distributions of impacted teeth according to age & radiographic third molar space.

Age groups (years)	Class I n(%)	Class II n(%)	Class III (n%)	Total (n%)
18 - 27	25(8)	61(19)	20(6)	106(34)
28 - 37	16(5)	65(20)	17(5)	98(31)
≥ 38	29(9)	59(19)	22(7)	110(35)
Total	**70(22)**	**185(59)**	**59(19)**	**314(100)**

Discussion

The mandibular third molar impactions are the most common impactions worldwide. The third molars erupt between the ages of 17 and 21 years.[17]

The maximum number of samples 110 (35%) were in an age group of 38 years and above. Many impacted third molars can change their positions and erupt by the middle of the third decade. This indicates that the eruption periods for third molars are longer than supposed previously. Unerupted teeth can continue to change position after skeletal growth is complete and the tooth is fully formed. Insufficient information exists to clearly define when in an individual, permanent tooth will remain unerupted.

Virtually all horizontally impacted teeth, teeth in vertical ramus and those unerupted by middle of third decade are considered to remain impacted.[18] Out of 157 samples of present study were 69 (44%) males and 89 (57%) were females. For gender distribution this study is in accordance with study of Hattab et al,[4] Odusanya and Abayomi,[9] Sandhu and Kapila[19] Linden et.al[20], Yamaoka et al[21], and. However studies of Hazza'set al.[22] showed male predominance.

Regarding angulation, results of present study is in accordance with the study of Linden et. al[20], Hattabetal[4], Knutsson et al[23]and Sedaghatfar et al.[13] in their study found maximum number of third molars to be mesio-angular.[13, 18, 19, 23]

Rajasuoet al[24] found highest number of vertically placed their molars in their study. In the study of Richardson[25]he found maximum number of third molars in horizontal position.In another study by Chu et al[26],theyfound that maximum number of third molars (80% of 3178 mandibular third molars) were horizontal or mesio-angular. These variations in angular position of mandibular third molars may be the fact that the studied population in each study was quite different from each other.Present study shows maximum number of third molars at Level B 163 (52%) followed by Level A 94 (30%) and Level C 57 (18%).

Level of eruption in the present study is in agreement with that of Sandhu and Kaur, Susarla and Dodson.[27,28] Study of Jerjeset al.[29] & Hattabet al.[30] found maximum third molars are at Level A followed by Level B & Level C.

As maximum numbers of third molars in the present study are partially erupted 59%, it was found that 185 mandibular third molars are in Class II relation, followed by 70 in Class I and 59 in Class III.

Result of present study are in accordance with that of Susarla and Dodson[28] as they also found maximum third molars are in Class II relations followed by Class I and Class III relations. Results were not in agreement with that of Jerjeset al.[29] as they found maximum number of mandibular third molars in Class I relation followed by Class II and Class III.

An important variable to predict the eruption of third molar is mesio distal space, measured from a panoramic radiograph. Lack of space seems to be major cause of abortive eruption. However eruption cannot be guaranteed, despite adequate space available in the jaw.[27] Hattab reported that the space behind the second molar was reduced in 90% of cases with mandibular third molar impaction. Radiographic techniques used to assess lower third molar space and mandibular linear dimensions and angles's panoramic radiography yielded one of the most accurate estimations.[30] Lack of space is single most important cause of impaction of third molars. The average space/crown width ratio was 1:1 for erupted group and 0.8 for the impacted group.[30] But according to Venta et al.[31] It may be inaccurate to predict the eruption of third molars before the age of 20 years because of continuously positional changes of the third molars during further development.

Conclusion

The impaction of mandibular third molar is significantly prevalent in our adult population with female affected slightly more than males. Classifying the difficulty according to the radiographic findings can help in safe removal of the mandibular third molars especially in government sector hospital where we have limited resources and increased number of patients.

Acknowledgement

We deeply express our gratitude to authority of different hospitals and dental clinics who provided us preserved X-ray film to conduct the study.

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