Research Article

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Pattern of Mandibular Third Molar Impaction in Different Age Groups and Indications for Removal

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ABSTRACT

Introduction: Tooth impaction is more common in third molars, which are last to erupt in oral cavity at the age of 17-25 years. The major factors related to the third molar impaction are lack of space, limited skeletal growth, increased crown size, and its late maturation.

Objective: To study the pattern of mandibular third molar impaction and indications for its removal in relation to age.

Materials and Method: A retrospective chart review of orthopantomograms of 512 patients (1009 mandibular third molars) presenting to Bir Hospital for removal of impacted mandibular third molars from 2020 July to December was conducted. Cases were divided into three age groups (20-30 years, 31-40 years, and ≥41 years). Radiographs were studied for the angulation, position, and depth of the mandibular third molar. Data were entered in Microsoft Excel and descriptive statistics presented as frequencies and percentages.

Result: Most participants (250, 51.20%) belonged to age group 20-30 years. Mesioangular impaction (451, 44.69%), position A (628, 62.23%) and class II (565, 55.99%) were more commonly observed findings. This study showed male predominance (266, 51.95%) in incidence of impaction and pericoronitis (303, 31.62%) was the commonest indication for removal.

Conclusion: The impaction pattern of mandibular third molar and its indication for removal showed change from younger to older age groups. This highlights the need for awareness of early management of problematic third molar removal to minimise the potential complication due to delayed intervention.

Keywords: Impacted tooth; mandibular third molar; pericoronitis.

INTRODUCTION

An impacted tooth can be defined as one that is prevented from erupting up to occlusal level because of malposition, physical barrier or lack of space in the arch.[1] Impaction is more common in third molars, which are the last to erupt into the oral cavity at the age of 17-25 years.[2,3] The major factors related to tooth impaction are lack of space, limited skeletal growth, increased crown size, and late maturation of the third molars.[3] They have the potential to be associated with pathology, including pericoronitis, periodontal disease, caries, cystic lesions, neoplasm, pathological root resorption, crowding of lower anterior, when a communication exist between the tooth follicle and the oral cavity.[4,5] Eruption status, position and angulation have an impact on these symptoms.[6]

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Many studies have been done for mandibular third molar impaction pattern in relation to angulation, relation to second molar and distance from ramus. However, Nepal still lacks documented studies on third molar impaction. So, the purpose of present study was to assess the mandibular third molar impaction pattern in relation to age, sex, and the indication for its removal, among patients visiting Oral and Maxillofacial Surgery Unit, Dental Department, Bir Hospital, Kathmandu, Nepal.

MATERIALS AND METHOD

A retrospective chart review was conducted from July 2020 to December 2020 using the records of all the patients visiting unit of Oral and Maxillofacial Surgery, Bir Hospital, National Academy of Medical Sciences (NAMS), for extraction of mandibular third molar. Permission for study and data collection was taken from the department (Ref. 3088). Informed consent was obtained from patient for the use of radiographs and clinical records and Helsinki Declaration 2013 was followed to maintain ethical standards. Convenience sampling technique was utilised for data collection from clinical records for indication of extraction and orthopantomograms (OPGs) for the presence, location, depth, and angle of impaction of third molar.

Inclusion criteria included patients' age above 20 years, presence of second molars and patients undergoing or undergone mandibular third molar extraction. The exclusion criteria were any pathological dentoalveolar condition, any history of previous orthodontic treatment and cases of maxillofacial trauma or systemic condition.

For this study, the angular position of each mandibular third molar was recorded as vertical, mesioangular, distoangular, or horizontal according to criteria laid by Winter's classification with reference to the angle formed between the intersected longitudinal axis between the second and third molar. The level and position of impacted third molar was recorded using Pell and Gregory classification system as Class I, Class II and Class III according to the space between the third molar and ramus of the mandible. Position A, position B, and position C according to the relation between the occlusal level of third molar and the second molar.

The indications for the removal of the third molar were recorded from patients' clinical records which were pericoronitis, caries, periodontitis which included all the cases where bone loss was observed in OPGs, swelling around angle of mandible due to third molar, trismus due to infected third molar, pain, prosthodontic removal includes those third molar removal for the placement to prosthesis, prophylactic removal in cases where one side indicated for removal and patient wanted removal of other side as well due to similar impaction pattern and those cases where patient travelling abroad wanted removal of impacted third molar removal. All OPGs were taken using SIDEXIS XG software, version 2005 (Sirona Dental System GmbH, Bensheim, Germany). All statistical data analysis were carried out with the SPSS software program, IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, N.Y., USA)' SPSS version 25.0.

RESULT

Study included 512 OPGs, and their clinical records presented to the unit of oral and maxillofacial surgery for the removal of mandibular third molar. Total 1009 mandibular third molar were included out of which 958 underwent extraction for different reasons.

There were 266 (51.95%) males and 246 (48.05%) females in total ranging in age 20 to 70 years (Table 1). The cases were divided in three age groups, group I included 20 to 30 years of age, group II included 31 to 40 years and group III had age group from 41 years and above. Table 1 shows the age and sex distribution for all three-age groups. Male predominance was seen in group I, 128 (51.20%) and group II, 75 (56%) whereas in group III, 65 (50.79%) female predominance was observed.

Table 2 shows the angular position of mandibular third molar by patient's age group. For age group 20-30 years and 31-40 years mesioangular

Table 1: The age and sex distribution for all three-age groups, n (%).

	20-30 years	31-40 years	≥ 41 years	Total
Male	128 (51.20)	75 (56)	63 (49.21)	266 (51.95)
Female	122 (48.80)	59 (44)	65 (50.79)	246 (48.05)
	250	134	128	512

Table 2: Angular position of mandibular third molars by patient's age (Winter's classification), n (%).

Angular position	20-30 years	31-40 years	≥ 41 years	Total
Mesioangular	277 (55.40)	98 (38.73)	76 (29.68)	451 (44.69)
Vertical	66 (13.20)	93 (36.76)	145 (56.64)	304 (30.13)
Horizontal	104 (20.80)	37 (14.63)	10 (3.90)	151 (14.97)
Distoangular	53 (10.60)	24 (9.49)	25 (9.76)	102 (10.11)
Others	-	1 (0.39)	-	1 (0.10)
Total	500 (49.55)	253 (25.07)	256 (25.37)	1009

Table 3: Level and position of mandibular third molars according to patient's age (Pell and Gregory classification).

Level and position	20-30 years	31-40 years	≥ 41 years	Total
Level A	208 (41.60)	179 (70.75)	241 (94.14)	628 (62.23)
Level B	246 (49.20)	49 (19.36)	13 (5.07)	308 (30.52)
Level C	46 (9.20)	25 (9.88)	2 (0.78)	73 (7.23)
Class I	95 (19.00)	94 (37.15)	195 (76.17)	384 (38.06)
Class II	359 (71.80)	148 (58.49)	58 (22.65)	565 (55.99)
Class III	46 (9.20)	11 (4.34)	3 (1.17)	60 (5.95)
Total (1009)	500	253	256	1009
Percentage	49.55	25.07	25.37	100

Table 4: Indication for mandibular third molar removal.

Indications	n (%)
Pericoronitis	303 (31.62)
Caries	240 (25.05)
Facial pain	194 (20.25)
Periodontitis	110 (11.48)
Prophylactic removal	68 (7.09)
Caries of second molar	38 (3.96)
Prosthodontic reason	5 (0.52)
Total	958 (100)

Table 5: Indication for mandibular third molar removal according to patient's age.

Indications	20-30 years	31-40 years	≥ 41 years
Pericoronitis	251 (52.40)	46 (18.40)	6 (2.62)
Caries	49 (10.22)	70 (28.00)	121 (52.83)
Facial pain	115 (24.00)	54 (21.60)	25 (10.91)
Periodontitis	-	46 (18.40)	64 (27.94)
Prophylactic removal	64 (13.36)	4 (1.60)	-
Caries of second molar	-	27 (10.80)	11 (4.80)
Prosthodontic reason	-	3 (1.20)	2 (0.87)
Total (958)	479	250	229
Percentage (%)	50	26.09	23.90

angulation was more predominant: 277 (55.40%) and 98 (38.73%) respectively, whereas for ≥ 41 years vertical angulation was more (145, 56.64%). Overall, in this study mesioangular position predominated with 451 (44.69%) out of 1009 third molars.

Largest number of third molar (500, 49.55%) was seen in group I, the 20-30 years age group (Table 3).

For the age group 20-30 years, Level B impaction was seen in majority (246, 49.20%) while in 31-40 years (179, 70.75%) and ≥ 41 years (241, 94.14%)

age groups, Level A was more common (Table 3). On assessment of third molar position in relation to ascending ramus, Class II was the predominant finding on overall third molar position 565 (55.99%), however in age group ≥ 41 years above class I was most common 195 (76.17%).

The indication for the removal of third molar is shown in Table 4 for overall cases and Table 5 shows indication for all three age groups. Pericoronitis (303, 31.62%) was the most common indication for removal of third molar followed by caries (240, 25.05%) and facial pain (194, 20.25%). But in ≥ 41 years age group caries 121 (52.83%) was common indication for extraction followed by periodontitis 64 (27.94%).

DISCUSSION

Third molar extraction is the most commonly performed procedure in oral and maxillofacial surgery. The reasons for its removal could be anything ranging from pain, infection, acute or chronic pericoronitis, presence of cyst or tumour, unrestorable caries, food impaction, caries of second molar, pulpal involvement, periodontal problem, prosthetic rehabilitation, orthodontic consideration, prophylactic removal and preparation of orthognathic surgery are few examples given by various authors.[4,7,8] Not all impacted third molars cause clinical symptoms, some remain asymptomatic throughout life.[4]

In the present study higher prevalence was found in males (266, 51.95%) compared to female (246, 48.04%). Similar frequencies have been reported by previous studies[4,5,9,10] and is in disagreement with other studies where female predominates.[2,7,11,12] However for the age group above 40 years, females were found to outnumber male population (65, 50.78%).

In this study group subjects above 19 years were included as the chronology of eruption of third molar is 17-21 years and generally by the age of 24 the root completion is expected.[13] The groups were divided into 10 years interval (20-30 years, 31-40 years and ≥ 41 years) to accommodate all age groups. Peer group of 20-40 years were selected, as growth essentially completed by age of 17 years and if properly positioned, third molars emerge between age of 18 to 24 years.[7] The upper limit of 40 years was planned to avoid bias related to hard and soft tissue remodelling.[11,14] In the agewise distribution in present study majority of cases fall under age group 20-30 (48.825%). These finding are similar to other studies by various authors.[4,7,9,10]

The angulation pattern of this study is in similarity with other studies conducted in Nepal[2, 10, 12] where the common type of angulation was mesioangular and distoangular being the least. But for the age group ≥ 41 years, vertical angular patterns of third molar were most common. The change in pattern could be due to theories given in few studies which have found that a significant proportion of mesially impacted third molar change their position and become fully erupted after patient reach the age of 24 year.[4,13,15]

Several studies carried out worldwide shows wider variations for the pattern of impacted third molars. Studies conducted in Indian[5,7,9,14,16] population shows mesioangular pattern more common also in Chinese[11] population and Saudi population.[17] In contrast to studies carried out in Jordanian[4] and Turkish[3] population that show vertical type of angulation to be the most common and mesioangular being the least.

Level of impaction indicates the depth in which the tooth is buried in bone. Level of impaction for mandibular third molar was level B for the age group 20-30 (246, 49.20%) similar to Quek et al.[11] and level A for the age group 31-40 (179,70.75%) and age group ≥ 41 years (241, 94.14%), which are in similarity with another studies.[10,12-14,18] Hattab et al. studies suggested following findings for this change in pattern, they are positional changes and eruption of third molar in young adults appear to be more frequent than previously thought if given enough time and the mandibular growth causes increase in retromolar space which may continue into young adulthood.[13]

The eruption of third molar is usually predicted with the space available between the second molar and the ascending ramus of the mandible. If the available mesiodistal space is equal or greater than the mesiodistal width of the crown, then there is 70% probability for its eruption.[14] Similar findings were also observed in current study where Class II position was common finding in age group 20-30 and 31-40, but for advance age group Class I position was more frequent finding.

This change in angulation and pattern can be well explained by the findings of Hattab et al.[13] who state that third molar with a small degree of angulation become upright and erupt into good position more frequently than those with large angulation. It has been proposed that the third molar have a constant path of eruption until contact is made with adjacent teeth. At this stage they upright themselves as a result of "billiard ball action", providing the presence of adequate space for eruption.

Venta et al. in their 12-year observation of third molars on adults suggest that third molars undergo continuous clinical change at least up to the age of 32 years.[19] The change in pattern of angulation, level, and depth in this study is in accordance to all the above-mentioned studies.

Recurrent pericoronitis was the most common indication for third molar removal in this study for age group 20-30 years and 31-40 years. This finding is supported by other studies[4,9,10] where pericoronitis was the commonest indication for third molar removal in age group 20 to 30 years. Pericoronitis is a pathological condition most prevalent in young adults in the period between 16 and 30 years of age with a maximum incidence in 21–25-year-old, which is also a time for third molar eruption.[20]

Caries involvement of third molar itself or the second molar was the second commonest indication for overall cases and most frequent indication for age group above 40. The depth of impacted third molar and the occlusal angulation between the impacted tooth and the occlusal surface of the second molar influences the distal caries in second molar.[21,22] Similar findings were found in other studies.[4,5,7,10,17,21] Studies for adults above 40 years shows a higher incidence of periodontal pathology and caries of third molar or second molar due to impacted third molar, similar to this study.[21,23] Mc Ardle and Renton[22] study proposes prophylactic removal of third molars to avoid consequences of distal caries in the mandibular second molar. Impacted third molars can predispose the adjacent second molar to an array of detrimental effects such as caries, periodontitis, cervical resorption, and root resorption.[5]

Chronic facial pain is a common complaint in young adults.[4] There are many studies which shows an association between chronic facial pain and the presence of impacted third molar.[3-7,24] This is in an agreement with current study where age group 20-30 presented with complain of chronic facial pain as an indication for third molar removal.

Prophylactic removal of impacted mandibular third molar have still been a matter of controversy over the years. There has been evidence-based reasoning by surgeons for and against its removal, as a result the topic yet remains controversial and confusing.[7,9] Guidelines for the management of impacted mandibular third molar proposed by National Institute for Clinical Excellence (NICE) advises against the prophylactic removal of third molar which are pathologically free.[8] However, in this study 68 cases of third molar underwent prophylactic removal in the age group 20-30. The indication for removal were similar pattern of impaction where one side was symptomatic and required removal, to salvage the second molar and most commonly due to economic reason as these were the age group travelling abroad for further studies where surgical extraction were considered expensive. Similar findings were seen in other studies as well.[2,7]

Not all impacted third molar are detrimental to health and wellbeing of an individual, some can remain asymptomatic for life. However, decision to extract or not is in the hand of the surgeons. But in a country like Nepal where regular follow-up for all is not feasible due to socioeconomic condition and geographical terrain, judicious decision has to be made for third molar extraction.

CONCLUSION

The current study highlighted the higher number of mesioangular pattern for lower third molar impaction, most commonly involved group was 20-30 years, with male predominance. Recurrent pericoronitis was common indication for both age groups while caries was common indication for the group ≥ 41 years. Younger age group seeks for prophylactic removal of third molar for different reasons as compared to other groups this may also indicate the awareness of people toward the third molar as many called it 'wisdom tooth'. Improperly placed mandibular third molar which is either erupted or partially erupted in oral cavity can give rise to multiple problems if not taken care at an early stage hence surgeons who observed such cases should aware the patient for its potential

complication. Timely intervention may help in minimising potential complication associated with delayed management for the same. Our findings are in similarity with other studies conducted in Nepalese population for mandibular third molar impaction pattern and the indication for removal.

Conflict of Interest: None.

JNDA

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