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Assessment of Variables in Mesioangular Impactions and Vertically Erupted Mandibular Third Molars

Author(s): Guttal K S, Kavlekar A, Okade A, Naikmasur V

Abstract

Background - Impacted third molars may be responsible for various problems within the oral cavity. Impaction may be due to inadequate space or varied angulations. Assessment of variables contributing for impaction may influence the fate of impacted third molars.

Methodology- Retrospective analysis of panoramic radiographs of adolescents in Indian population subpopulation was done to evaluate angulation, mesiodistal width of crown, retromolar space, gonial angle among the mesioangular impacted teeth and vertically erupted teeth. Patients with syndromes associated with impactions were excluded from the study.

Results - In the impacted group angle of inclination was more, mesiodistal dimension and gonial angle was more compared to the non impacted group.

Conclusion- The factors associated with impaction varies in different populations. The importance of assessment of the variables associated with impaction may facilitate to decide whether the impacted third molars have chances of eruption or need to be surgically removed to prevent unnecessary clinical problems.

Introduction

A tooth is considered to be impacted when it fails to erupt into the oral cavity within its expected developmental time period and can no longer reasonably be expected to do so. Third molars account for 98% of all impacted teeth and Mandibular third molars are the most frequently impacted teeth compared to maxillary third molars. Third molars may be associated with various pathological processes ranging from caries and pericoronitis, pressure effects and resorption of adjacent II molars, to cysts and neoplastic lesions. Third molars exhibit great variation in size, shape, position, root formation, time of development, and path of eruption. The prevalence of impacted mandibular third molar is also variable in different populations, ranging from nil in Nigerians to 39% in Finns, 82.5% in Hong Kong Chinese population and in Indians it ranges from 22-27.4%. The significance of impaction or eruption of third molar is due to its possible advantage in being utilized as orthodontic anchorage, prosthetic abutments, or for transplantation. At an early stage it is difficult to decide whether the impacted tooth in question has to be retained or surgically removed as the impaction status and position does change over a period of time. Prediction of eruption have been studied most extensively in various populations. The aim of the present study was to investigate variables associated with mesio angular third molar impactions in comparison with erupted lower third molars.

Materials & Methods

Subject sample- The present study involved a retrospective analysis of Panoramic radiographs of patients attending the outpatient section of department of Oral Medicine & radiology for various complaints.

Inclusion criteria- Radiographs with mesioangular impactions & vertically erupted third molars were included for the study.

Exclusion criteria- Distoangular, horizontal impactions were excluded from the study. Patients with hereditary / syndrome associated multiple impacted teeth like Gardner’s syndrome, Cleido cranial dysplasia, Yunis- Varon syndrome were excluded from the study. 150 radiographs in each group i.e. mesioangular impactions & vertically erupted third molars were selected for the study. The patients’ age ranged from 18-25 years. The impacted group consisted of 71 females and 79 males where as the erupted group consisted of 73 females and 77 males.

The panoramic radiographs were traced on overlying matte acetate paper using an X-ray viewer and the following measurements were made by two observers.

Measurements

Dimensional radiographic measurements of the third molars and mandible in the impacted and erupted groups were carried out as follows:
Mesioangular slope of the third molar: The angle was measured between the two long axes which were drawn through the midpoint of the occlusal surface and the bifurcation of both second and third molar teeth.

Angle between the long axis of third molar and the base of the mandible: measured as the angle formed between the long axis of mandibular third molar and the tangent drawn to the inferior border of the mandible.

Mesiodistal crown width: The greatest distance of the mesiodistal crown width of third molars.

Retromolar space: The distance between the most distal point of the second molar and the junction of the anterior border of the ramus and body of the mandible was measured.

The gonial angle: The angle between the tangential line of the posterior border of the mandible and the tangential line of the lower border of the mandibular body was measured.

Statistical analysis: The results are expressed as means and standard deviations (SDs). Student's t-test was used to compare the parameters between the two groups and between males and females of both the groups. P value less than 0.05 was considered to be significant.

Results

The mean age of the patients in both the groups ranged from 18-25 years. Among all the assessed parameters, the inclination of third molar, angle between the third molar and the base of the mandible, the gonial angle, mesiodistal width differed significantly between the two groups but there was not much significant difference in the retromolar space between the two groups (Illustration -2).

In the impacted group the retromolar space was significantly less among females compared to the males where as the other values did not differ significantly.

The mean value of third molar angulation was 44.06 (SD± 11.2) in the impacted group and in erupted groups the mean was 25.29 (SD ±14.59) the difference was statistically significant.

The mean third molar angulation in females of impacted group was 43.75 (SD 11.85) and in the erupted group was 27.00 (SD ±16.29). The difference was statistically significant.

The mean value of angle between third molar and the base of the mandible in the impacted group was 85.93 (SD ±7.19) and in the erupted group it was 65.41(SD ±15.69) the difference being significant. The same parameter was significant among males and females in the impacted group (Illustration 2).

The mean value of gonial angle in the impacted group was 117.93 (SD ±6.60) and in the erupted group was 121.85 (SD ±8.49) the difference was statistically significant.

The mean of mesiodistal width of third molars in the impacted and erupted group was 13.13 and 13.91 respectively the difference being significant.

The mean of retromolar space in the impacted and erupted group was 13.29 (SD ±1.05) and 13.41 (SD ±2.78) respectively, this was the only parameter which did not vary significantly between the two groups. Similarly it did not vary among males and females in the impacted and the erupted groups (illustration 3).

Discussion

Presence of impacted third molars paves way for many problems in the oral cavity ranging from, pain, and recurrent infections to decay in the second molars. Third molar removal is considered as one of the most commonly performed minor surgical procedures. It has been suggested that third molar impaction is strongly influenced by facial growth pattern, direction of tooth eruption and root configuration. In the present study the gonial angle and the inclination of third molars varied significantly among the impacted group supporting the previous suggestions. These factors were not significant in a study based on Turkish population, implying the factors influencing third molar eruption varies in different populations. Ganss et al have emphasized the importance of retromolar space among the various parameters. In the present study the retromolar space did not differ significantly between the two groups.

In the present study, the mesiodistal width of third molars was more in the impacted group compared to that in the erupted group and it was significant high among males than in females in the impacted group. This data correlates with the reports of Hattab et al which also states that the mesiodistal crown width of third molars was larger in the impacted group and males had larger crown width than females.
impacted group as compared to the erupted group. Hattab et al\(^a\) have also reported similar findings that incidence of acute gonial angle is higher in the impacted group. Whereas Mollaoglu \(^{et\ al}\) in their study have reported that there was a significant difference in the gonial angle between female and male patients with erupted third molars but it did not vary much between the impacted and erupted group. The mean of retromolar space in the impacted and erupted group was 13.29 mm and 13.41 mm respectively in the present study this was the only parameter which did not vary significantly between the two groups.

Study reported by Hattab\(^b\) also states that retromolar space did not differ significantly between males and females similar to the results of the present study. But among the erupted group it was significantly larger.

Based on a study done on Taiwanese population Tsai\(^b\) has stated that significant differences was present between impacted and erupted group in terms of space between anterior ramus and distal aspect of second molar and size of the third molar. Another study done by Amin \(K^{10}\) et al on Indian population has also shown that highly significant variables include inclination of third molar, angle made by third molar with base of mandible and retromolar space between the impacted and the erupted teeth. Niedzielska IA et al\(^{11}\) have done a follow up study on 64 patients with respect to, the retromolar space to lower third molar crown width, third molar angulation to the base of the mandible, and third molar to second molar inclination. They concluded that based on the Ganss ratio, and third molar inclination to mandibular base and second molar, it is possible to predict potential lower third molar alignment in the dental arch using a panoramic radiograph.

A previous study in the same institution conducted in 2004 by Reddy KVG\(^6\) et al showed that the overall prevalence of third molar impactions was 27\% in the age group of 22-30 years. Prevalence being more in mandible but there were no significant gender differences.

Gupta S \(et\ al^{12}\) in their study, conducted a part of Indian population concluded that the maximum number of impacted teeth was in the age range of 18-27 years. Majority of them were mesioangular followed by distoangular, horizontal, vertical. With this regard the present study included comparison of factors related to impaction in mesioangular & erupted mandibular third molars in the age group of 18-25 years.

Sandhu S \(et\ al^{13}\) conducted a study to assess the changes in angular position & eruption status of third molars in students of Asian Indian population. Their study for a follow up for 4 years showed that changes in position & angulation of teeth continued to occur unpredictably even after the age of 19 years, more so in the vertical & distoangular than in mesioangular impactions. Kruger et al\(^{14}\) in their study have also reported similar conclusions that impacted third molars recorded at the age of 19 years may erupt during next few years, but this requires long term follow up and may avoid unnecessary removal of third molars. All these studies have tried to throw light on the prognosis of retained third molars and the criteria to be outlined for removal of third molars. Nance \(P\ et\ al^{15}\) conducted a study to assess the changes in third molar position & angulation in young adults & the resulting periodontal probing status. From their follow up study it was concluded that mesially inclined or horizontally placed lower third molars with angulation \(\leq 35^\circ\) will not erupt to the level of occlusal plane. Whereas a major portion of distoangular or vertically erupted third molars did erupt to the level of occlusal plane during the follow up period. Therefore they concluded that if the periodontal probing depth is \(\geq 4\) mm distal to second molar or around the impacted third molar, it has to be surgically removed as it is impractical to wait for the impacted to erupt to the occlusal plane which leads to worsening of periodontal prognosis and may not be restored back to normal. The prudent decision warranting removal holds true for mesially / horizontally impacted teeth with angulation \(\leq 35^\circ\) as they are unlikely to erupt & distoangular impacted or vertically erupted teeth with periodontal probing depth is \(\geq 4\) mm.

Venta \(et\ al^{16}\) in their radiographic assessment of third molars, tried to estimate whether lower third molars are likely to erupt after the age of 20 years. They concluded that panoramic radiographs taken at the age of 20 may predict the probable eruption of impacted third molars. The factors which determine the eruption include, completion of root formation, soft tissue impaction, type of impaction, space existing between the ramus & the second molar. They concluded that to optimize the surgical intervention these factors may be taken into consideration to determine if intervention is necessary or if the tooth will erupt. This would probably prevent unnecessary extractions or delay in surgical intervention possibly preventing damage to the adjacent teeth.

Mercier \(P^{17}\) in their critical review of intervention for third molars have described the analysis under the headings 1. Risk of non intervention - crowding of dentition, resorption of adjacent tooth, periodontal
problems. 2. Risk of intervention – minor transient factors viz- sensory nerve alterations, alveolar alveolitis, trismus, dentoalveolar fractures etc. 3. minor permanent complications like – periodontal injuries, temporomandibular joint injury etc. 4. Major complications- altered sensations, vital organ infections, and fracture of mandible or maxillary tuberosity. Keeping this in view the present study is an attempt to determine the factors associated with impactions in mandibular teeth which may facilitate early intervention and prevention of complications. In view of all the findings the present study can be considered to provide preliminary data regarding eruption status of third molars in Indian population furthermore follow up studies are required to conclude and confirm the factors causing impaction and the possibility of retaining the third molars. More over the study subjects in the present study included south Indians, further elaborate studies over large samples will be required to conclude regarding the impaction & eruption patterns in Indian population as a whole.

Conclusions

In conclusion among the variables associated with impaction and eruption of third molars in the Indian population, the inclination of third molar was more, angle between the third molar and the base of the mandible was more, the gonial angle was less, and mesiodistal width of the crown was less in the impacted group compared to the erupted group.

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References

Illustrations

Illustration 1

Parameters assessed X- Mesioangular slope of the third molar, M-D- mesiodistal width of third molar, Y- Angle made by third molar with base of mandible , Z-gonial angle.
Illustration 2

Comparison of various parameters among impacted and erupted groups.

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<th>Parameters</th>
<th>Mean</th>
<th>SD</th>
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Illustration 3

Comparison of various parameters among males & females of impacted and erupted groups.

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<th>P value significance</th>
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