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Original Article

Mandibular Third Molar Impactions In Relation To Different Skeletal Facial Axis Groups: A Radiographic Evaluation

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ABSTRACT

Objective: This study was conducted to assess the prevalence of impacted mandibular third molars in different skeletal facial types.

Materials and Methods: A total of 150 subjects were selected in this study. Lateral cephalometric radiographs and orthopantographs (OPG) were used in this study for determining anatomical locations. Pell and Gregory classification theory was used for evaluating degree of impaction of mandibular third molars. Winter's classification method calculated angulation of mandibular impacted third molar classified as mesioangular, distoangular, vertical, horizontal and buccolingual. Facial axis angle measurement was calculated by Dimaxis computer system. The p value of 0.05 or less was considered as statistically significant.

Results: The impaction rate of mandibular 3rd molars was 52% and mostly the impacted teeth were seen in mesioangular position (49.3%) followed by distoangular (22.7%) and vertical (20.2%). A significant difference between the percentage of impacted third molars within the brachyfacial, dolichofacial and mesofacial subjects (p=0.009).

Conclusion: In almost all the cases, the mesioangular impaction was commonly noticed and further a significant difference was seen in relation to different types of facial skeletals.

INTRODUCTION

Tooth impaction is a pathological situation in which a tooth is failed to attain its normal functional position. It cannot perform its normal function because of malposition and also create disturbances for the patient.[1]

It has been noted that third molars crypt formation starts at the age of 3 to 4, and calcification begins at 7 to 10 years of age. However, the time of eruption varies from 14 to 24 years in different populations.[2,3] Mandibular third molars which usually fail to erupt to their normal functional position due to short mandible or wrong angulation of eruption.[4]

Broadbent believed that when a third molar became impacted, it was due to an inability of the mandible to achieve its full growth potential.[5] Begg claimed that there was insufficient forward movement of the dentition of modern man due to a lack of interproximal attrition which was observed to be greater in ancient skulls.[6] Forsberg demonstrated that failure of eruption and degree of arch crowding was proportional. [7]

Numerous studies alao reported that mandibular third molars have significance impact on the growth pattern of facial structure.[2-5] Hattab and Alhaija showed that impacted mandibular molars were larger in size than erupted ones. Finally, impaction of mandibular molar has also been associated with the pattern of facial growth.[8] In contrast, Legovi´c et al showed no significant difference

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between the position of mandibular M3 and the type of facial growth.[9]

The facial skeleton grows in a forward and downward direction. In a ‘‘mesofacial’’ growth pattern, there is a relative harmony in these two directions, leading to a facial profile which is described cephalometrically by a 90 degree (±3) facial axis angle, or a 26 degree (±3) mandibular plane angle.

Brachyfacial is the term used to describe the person with a short anterior face height and a wide face (‘‘the short face syndrome’’), and was described by Opdebeek and Bell. Both the mandibular plane angle and the gonial angle are relatively small and the ramus height is increased, cephalometrically >93 degree facial axis angle, or <29 degree mandibular plane angle.[10]

Dolichofacial is the term used to describe a long anterior face height and a narrow face (‘‘the long face syndrome’’). There is a clockwise rotation of the mandible leading to a large mandibular plane angle and gonial angle but a relatively short ramus. Cephalometrically <90 degree facial axis angle, or >26 degree mandibular plane angle.[11]

Therefore, the aim of this study was to evaluate the impacted mandibular third molar positions in different skeletal facial types such as mesofacial, dolichofacial and brachyfacial.

METHODOLOGY

The study was planned in Indira Gandhi Govt Dental College Jammu during the time period of 2016 to 2017. The data was collected from the department of Oral Medicine & Radiology. Inclusion criteria for the study were cases having complete records of orthodontic history. Also cases with pre-orthodontic treatments, OPG having complete dentition and mandibular third molars which have root formation at least two-thirds complete.

The age criterion of the study subjects was between 16 to 31 years. Around 150 cases were finalized for the investigation. Age, gender, impaction and its degree were recorded and its relationship to facial axis was assessed. Lateral cephalometric radiographs and orthopantographs (OPG) were used in this study for determining anatomical locations.

Pell and Gregory classification theory was used for evaluating degree of impaction of mandibular third molars.[12] This classification system involves two main classes: 1, 2, 3 and A, B, C.

Classes 1, 2 and 3 relate to the relationship of the third molar to the anterior border of the ramus. Class 1 when mesiodistal (MD) width of tooth is completely anterior to the ramus, Class 2 when partly within the ramus, and Class 3 when completely within the ramus. Classes A, B and C relate to the occlusal height as compared to the adjacent second molar. Class A when level with the adjacent tooth, Class B when between the occlusal and cervical margins of the adjacent tooth, and Class C when the occlusal is below the cervical margin.[12]

Winter's classification method calculated angulation of mandibular impacted third molar classified as mesioangular, distoangular, vertical, horizontal and buccolingual.[13]

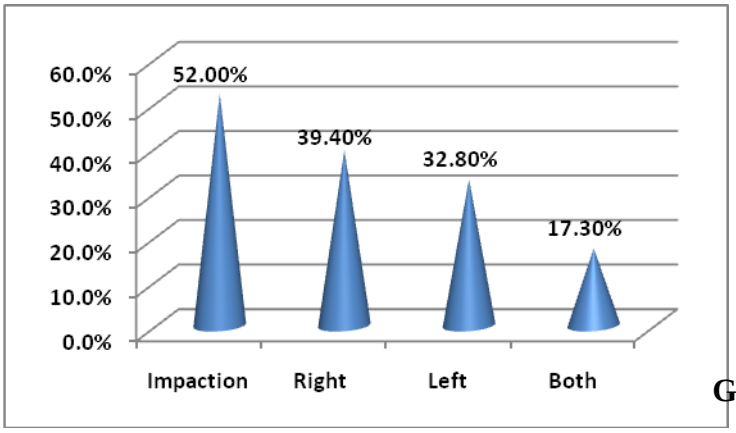
Facial axis angle measurement was calculated by Dimaxis computer system. The facial axis angle was measured as the posterior angle created by the lines Ba-Na and Pt-Gn. The mean was 90±2. An angle of >93was regarded brachyfacial, and an angle of <87was regarded dolichofacial.

The Statistical software namely SPSS version 15.0 was used for data analysis. Values were compared using chi-square test. The p value of 0.05 or less was considered as statistically significant.

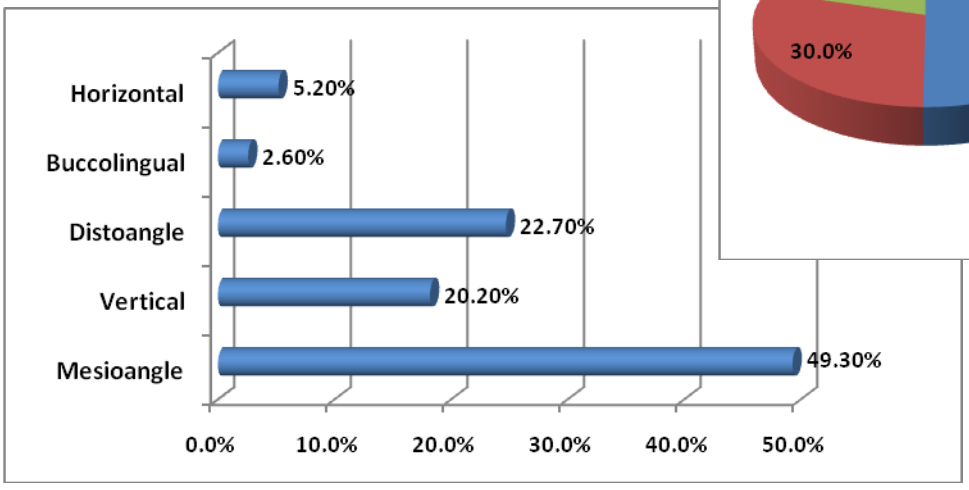
RESULTS

The total sample of 150 subjects was selected as described according to age and gender in Table 1. The impaction rate of mandibular 3rd molars was 52%, of

Graph 1: Frequency of impaction and its location in the arch



Graph 2: Different angulations of mandibular impacted third molars



Graph 3: Prevalence of different skeletal face types

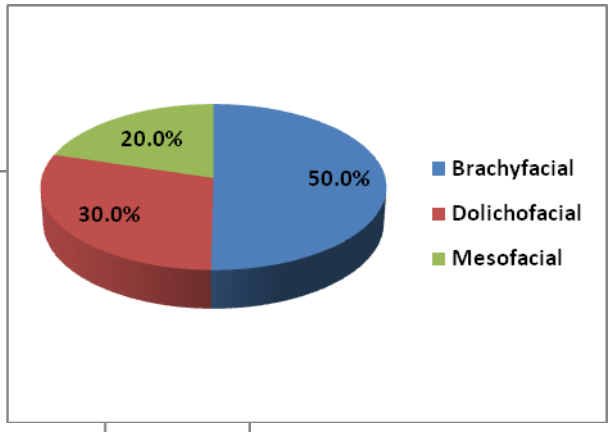


Table 1: Showing demographic profile of the study subjects

Age	Frequency	Percent
16 -21	**50**	**33.3**
21-26	**60**	**40.0**
26-31	**40**	**26.7**
Sex	**Frequency**	**Percent**
Male	**72**	**48.0**
Female	**78**	**52.0**
Total	**150**	**100.0**

Table 2: Occurrence of impaction according to different skeletal face types

Skeletal face types	Impaction		Sig.
	Absent	Present	
Brachyfacial	42(56.0%)	33(44.0%)	.009
Dolichofacial	23(51.1%)	22(48.9%)	
Mesofacial	7(23.3%)	23(76.7%)	
Total	72(48.0%)	78(52.0%)	

which 39.4% were on the right side and 32.8% on the left arch, whereas 17.3% were on the both sides (Graph 1). Mostly the impacted teeth were seen in mesioangular position (49.3%) followed by distoangular (22.7%) and vertical (20.2%). The percentage of horizontal and buccolingual impaction was rarely noticed (Graph 2).

According to the type of facial axis groups, brachyfacial subjects were 50% and the other half composed of dolichofacial (30%) and mesofacial (20%) (Graph 3). A significant difference between the percentage of impacted third molars within the brachyfacial,

dolichofacial and mesofacial subjects (p=0.009) as mentioned in Table 1.

DISCUSSION

The panoramic radiograph helps in diagnosis and allows the visualization of a series of anatomic structures and relevant factors. The simplicity of acquisition and the considerable amount of information obtained, combined with minimal amount of exposure to radiation, make the panoramic radiograph a well used diagnostic record in dentistry and orthodontics, especially in evaluating the position of third molars.[14]

The prevalence of mandibular 3rd molar impactions was 52% in the present study and the findings were slight lower than a study by Breik and Grubor reporting 58.76% for mandibular M3 impaction in Melbourne populace.[11] In contrast to the current data, various authors mentioned lower rate of mandibular 3rd molar impacted teeth. According to Andreasen et al, impaction of mandibular M3 varies from 18% to 32% in different populations.[15] This rate was also estimated by Dachi and Howell as 17.5% and 21.9% for mandibular and maxillary M3s, respectively.[16]

Furthermore, the higher rates of impaction in the lower jaw can also be attributed to the imbalance of the bone deposition-resorption process at the mandibular ramus, resulting in either a decrease in the angulation of the mandible or increase in the angulation of the mandibular plane.[17]

Regarding the angulation of impactions, mesioangular impactions were more common followed by distoangular and vertical. Similarly, Breik and Grubor showed that over 80% of the mandibular M3 impactions in all facial types were in the mesioangular position.[11]Quek et al,[18] Sandhu and Kaur,[19] and Venta et al[20] also noted the mesioangular position to be the most prevalent one.

It is mandibular growth that is associated with the provision of adequate space for correct positioning of the mandibular third molars. According to a study by Eroz et al.,[21] the mandibular length was shorter in the long-face facial type, consistently supporting the hypothesis that dolichofacial patients have an increased risk of third molar impaction. Richardson also demonstrated that the initial angulation of the lower third molar to the mandibular plane can be a factor in predicting impaction.[22] In this study the occurrence of mandibular third molar impaction is greater in patients with the mesofacial and dolichofacial skeletal facial type compared to brachyfacial.

The above conclusions demonstrate that in short-faced patients, in whom the direction of growth is more forward than downward, there is a more horizontal occlusal plane length requiring greater resorption from the anterior border of the ramus during growth, and subsequently resulting in a less crowded occlusion and greater space for the eruption of third molars. Nanda et al., also noted that the amount of time of growth differed between different facial types. It was shown that brachyfacial patients exhibited a prolonged period of facial growth in contrast to dolichofacial patients.[23]

The study by Nanda et al.[23] noted that brachyfacial patients exhibited a prolonged period of facial growth in contrast to dolichofacial patients. It would be interesting to observe if this additional growth means that it is more likely for changes in impaction status to occur in brachyfacial subjects over time. Further avenues for research may be to assess whether the changes in impaction status are more likely to be seen according to skeletal facial axis.

CONCLUSIONS

The study revealed higher percentage of impacted mandibular 3rd molar teeth. Further it was showed that

brachyfacial subjects have a lower incidence of mandibular third molar impactions compared to the other two facial types. It could be due to the greater growth potential of the mandible in brachyfacial subjects or the more forward direction of growth of the mandible leading to a more horizontal occlusal plane, which on the whole may help in resorption of the anterior border of the ramus.

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