

The Incidence of Types of Mandibular Third Molar Impactions in Different Skeletal Face Types: A Clinical Study

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Abstract

Introduction: It is seen that the failure of mandibular third molars to erupt is most affected by a lack of space in the alveolar arch between the distal of the second molar and the ascending ramus. Therefore, an appreciation of mandibular and facial growth may assist in predicting mandibular third molar eruption. **Aim:** The reason for this study is to appreciate the growth of mandible and facial growth which may assist in predicting mandibular third molar eruption as the lack of space in the alveolar arch between the distal of the second molar and the ascending ramus has been associated with failure of mandibular third molars to erupt. **Materials and Methods:** A list of patients who had visited the outpatient department at the Saveetha Dental Hospital of Chennai in April and May 2016 were sourced. The facial type determined by the facial index is calculated using an equation where; (i) Brachyfacial: Smaller than 80.0%–84.9%, (ii) Mesofacial: 85.0%–89.9%, (iii) Dolichofacial: 90.0%–95% or greater. **Results:** The incidence of horizontal impaction was higher in dolichofacial patients when compared to people with mesofacial profile. The incidence of mesioangular impaction was seen to be higher in mesofacial patients. **Conclusion:** In this study the classification of impaction describes only the impaction status at the time of taking the radiograph, and not the potential final status of the third molar. Further research may be done to assess whether the changes in impaction status are more likely to be seen in dolichofacial or brachyfacial subjects.

Keywords: Dolichofacial, molars, brachyfacial, impaction

INTRODUCTION

Third molar impactions are common. The impaction rate for third molars is higher than for any other teeth.^[1] In a study conducted by Dachi and Howell in 1961,^[2] 3874 radiographs were analyzed and it was determined that impaction of third molars was more prevalent in the maxilla than in the mandible. The incidence was determined as 21.9% for maxillary third molars and 17.5% for mandibular third molars. It has been suggested that the cause of third molar impaction is due to inadequate space in the retromolar area, between the distal of the second molar and the anterior border of the ascending ramus of the mandible.^[3,4] Broadbent^[5] believed that when a third molar became impacted, it was because of the inability of the mandible to achieve its full growth potential. Begg^[6] proposed that there was an 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. Forsberg^[7] showed that failure of eruption and degree of arch crowding were proportional. Bjork *et al.*^[3] demonstrated that

third molar impaction was not only associated with a reduced amount of growth but also with a downward as opposed to forward growth direction. Third molar impactions are seen to be rare after second molar extraction, suggesting an increase in eruption space.^[8] Recent studies have demonstrated that the premolar extraction therapy as part of orthodontic treatment leads to a reduced frequency of third molar impaction in both the maxilla and mandible.^[9]

From these studies, it is seen that the failure of mandibular third molars to erupt is most affected by a lack of space in the alveolar arch between the distal of the second molar and the ascending ramus. Therefore, an appreciation of mandibular and facial growth may assist in predicting mandibular third molar eruption.

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The facial skeleton under normal conditions grows in a forward and downward direction. In a “mesofacial” growth pattern, there is a relative harmony in these two directions.

Brachyfacial is used to describe the person with a short anterior face height and a wide face (“the short face syndrome”) and was described by Opdebeeck and Bell.^[10]

Dolichofacial is used to describe a long anterior face height and a narrow face (“the long face syndrome”). It has been hypothesized that brachyfacial subjects will have a significantly lower incidence of mandibular third molar impactions than dolichofacial subjects.

MATERIALS AND METHODS

A list of patients who had visited the outpatient department at the Saveetha Dental Hospital of Chennai in April and May 2016 were sourced. The criteria for inclusion of files in the study were as follows:

1. Evidence of mandibular third molar impaction like orthopantomogram (OPG) or intraoral periapical
2. Preorthodontic treatments OPG with complete dentition and mandibular third molars which have root formation at least two-thirds complete
3. Patients are above the age of 16 years.

In total, forty files were deemed appropriate for inclusion. The data recorded were age of the patient, gender, eruption or degree of impaction of mandibular third molars, and the facial axis angle. The facial type was determined by a measure of the facial index.

The distances measured for determining the facial index were: (1) anterior facial height (N'-Me') – it is the distance between the points, nasion and the chin in soft tissue and (2) facial width (Zid' – Zie') – it is the distance between left and right Zygium points in soft tissue corresponding to the lateral portion of the zygomatic process.

The facial type determined by the facial index is calculated as follows:

$$N'-Me' \times 100 / Zid' - Zie'$$

According to the above equation:

- Brachyfacial: Smaller than 80.0%–84.9%
- Mesofacial: 85.0%–89.9%
- Dolichofacial: 90.0%–95% or greater.

RESULTS

The results showed that the incidence of horizontal impaction was higher in dolichofacial patients when compared to people with mesofacial profile (from Figures 1 and 2). The incidence of mesioangular impaction was seen to be higher in mesofacial patients (from Figure 3). These results are however not statistically significant due to insufficient sample size.

DISCUSSION

Failure of mandibular third molars to erupt is mostly caused due to a lack of space in the alveolar arch between the distal of

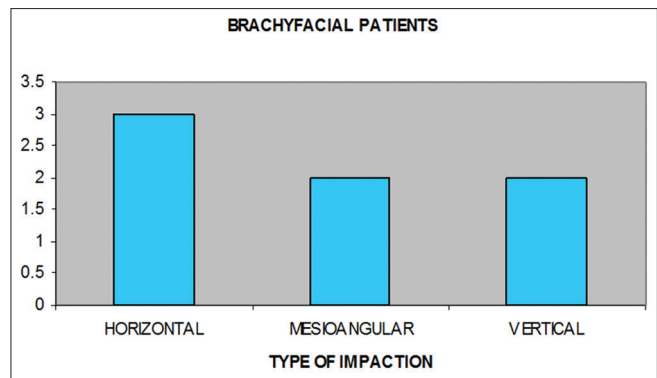


Figure 1: Incidence of type of impaction in brachyfacial patients.

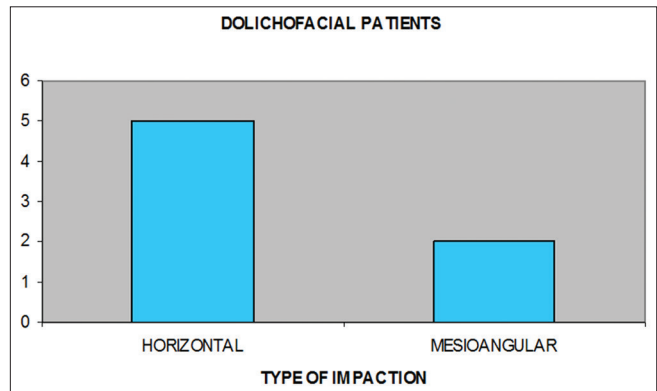


Figure 2: Incidence of type of impaction in dolichofacial patients.

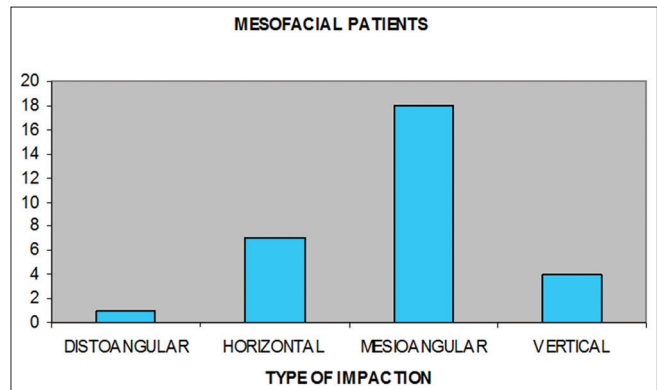


Figure 3: Incidence of the type of impaction in mesofacial patients.

the second molar and the ascending ramus. It is the growth of the mandible that is associated with the provision of adequate space for correct positioning of the mandibular third molars. In a study by Bjork *et al.*^[3] on the mandibular third molar impaction, the alveolar arch space behind the second molar was reduced in 90% of cases. It was also demonstrated that the space necessary for the third molar was reduced by three separate skeletal factors. They are as follows:

1. A short mandibular length (measured from gonion to the condylar head)
2. Vertical direction of condylar growth, and
3. By backward directed eruption of the dentition.

The most influential factor which contributed to diminished arch space was the vertical direction of growth of the condyle, which was seen in dolichofacial patients where growth was in a predominantly vertical component in those with impacted mandibular third molars.^[11-13]

The second most influential factor was mandibular length. A short mandibular length predisposed to mandibular third molar impaction.^[3,13,14] In a study carried out by Eröz *et al.*,^[15] it was found that the mandibular length was shorter in the long-face facial type, supporting the hypothesis that dolichofacial patients have an increased risk of third molar impaction. Richardson^[13] demonstrated that the initial angulation of the lower third molar to the mandibular plane can be a factor in predicting impaction.

Our results are consistent with our hypothesis that the incidence of mandibular third molar impaction is greater in patients who have a facial axis angle, that is, $<87^\circ$, which is consistent with that of a dolichofacial (long face) profile.

These 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. In a study conducted by Nanda,^[16] it was noted that the amount of time of growth differed between different facial types. It was shown that brachyfacial patients showed a prolonged period of facial growth in contrast to dolichofacial patients. This can also account for the greater amount of resorption of the anterior border of the ramus.

Over 80% of the impactions in all facial types were of the mesioangular type. This is similar to results from other studies,^[17] where the predominant impaction type is the mesioangular type. The incidence of horizontal impactions was found to be greater in the dolichofacial subjects than the brachyfacial and mesofacial subjects. However, the difference was not statistically significant due to the small sample size.

The limitations of this study include the limited sample size due to the difficulty in acquiring information of patients with at least two-thirds of the third molar root completed, who have had an OPG taken and have had no previous orthodontic treatment. Eruption time and impaction status are an unpredictable phenomenon and may be more dynamic than previously anticipated. The age range of the subjects used for this study was between 16.5 and 25 years of age. Mandibular growth is normally completed by the age of 16–17 years.^[18] The third molar is usually at its later stages of development by the age of 18 years according to Gravely.^[19]

However, it has been demonstrated in recent literature that a third molar that is impacted at the usual time of eruption may upright and erupt later in life. Sewerin and von Wowern^[20] demonstrated the changes in the positioning of the third molars between the ages of 20 and 24 years. In a study concluded by Richardson,^[21] he concluded that between the ages of 18 and

21 years, many of the unerupted third molars changed position appreciably, although rarely leading to clinical eruption. A study of Jordanian subjects carried out by Hattab^[22] showed that by the age of 19 years, some previously impacted teeth became erupted into functional occlusion. Kruger *et al.*^[23] showed full eruption of third molars by the age of 26 years which were impacted at the age of 19 years. Ventä *et al.*^[24] determined that changes like this can be seen up to the age of 32 years.

CONCLUSION

Therefore, in this study the classification of impaction describes only the impaction status at the time of taking the radiograph, and not the potential final status of the third molar.

Further research may be done to assess whether the changes in impaction status are more likely to be seen in dolichofacial or brachyfacial subjects. Also, assessment of the incidence of impaction as it relates to mandibular length is another interesting avenue to study.

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Conflicts of interest

There are no conflicts of interest.

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