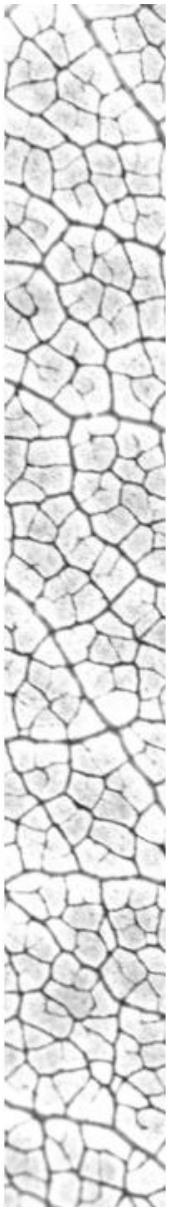

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Relationship between type of lower third molar impaction and facial deformity

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Abstract

Background: There is a relationship between facial deformity and angulation of impaction which is studied by many authors.
Aims and Objectives: To assess relation between the type of mandibular third molar impaction and skeletal deformity.
Materials and Methods: A cross sectional study was carried on 152 orthopantomograms (OPG) and lateral cephalometric of patients of 18 years and above (106 males and 46 females) and the type of lower third molar impactions and facial deformity was recorded.
Results: 106 (69.7%) were males and 46 (31.3%) were females. The commonest impaction angulation was mesio-angular impaction which was found in 98 teeth out of which 65 belonged to males (66.3%) and 33 belonged to females (33.7%). The majority of the impacted teeth were found in patients who had skeletal class I facial profile (78.2%) out of which, most of them (44%) had mesio-angular impaction while least had inverted impaction (1.6%).
Conclusion: Mandibular third molar impaction is significantly associated with anteroposterior skeletal molar relationship.

Keywords: Distoangular, Facial Deformity, Impaction, Mesioangular, Third Molar

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INTRODUCTION

A tooth is said to be impacted if it crosses its chronological eruptive age and did not emerge into the oral cavity in spite of normal eruptive forces owing to some mechanical obstruction (Miloro 2004; Anuonye, et al, 2016). Third molar eruption can be impeded by a lot of factors and these factors are divided into two main categories; obstruction or loss of space. The loss of space between distal aspect of the lower second molar and ascending ramus can prohibit the eruption of the lower third molar. Small mandible in comparison with the maxilla usually results in the loss of required space for third molar eruption, crowding and impacted third molars (Bjork et al. 1956).

Eruption failure can happen for any tooth either in mandible or maxilla. Studies were done to define the most common tooth that fails to erupt and these studies reported that lower 3rd molar as the commonest tooth (60% cases), followed by upper 3rd molar (30%). Upper canines and supernumerary teeth have the same chances to get impacted (5%). The most commonest type of third molar impaction was mesio-angular and the least type being disto-angular in both females and males. In class III patients, neither disto-angular nor horizontal patterns of impaction were usually seen (Sapkota et al. 2017).

In studying patients with dolichofacial pattern of face, the prevalence of mesio-angular impaction was higher than other patterns of impaction. These were followed by horizontal then disto-angular and vertical forms of impactions. Whereas in mesiofacial facial forms, mesioangular impaction of lower thirdmolar was the commonest pattern. The most frequent angulation class of impacted lower third molars in Saudi papulation is mesio-angular followed by horizontal, vertical and disto-angular (Hassan 2010). In the Chinese population, mesio-angular impaction was the commonest type of

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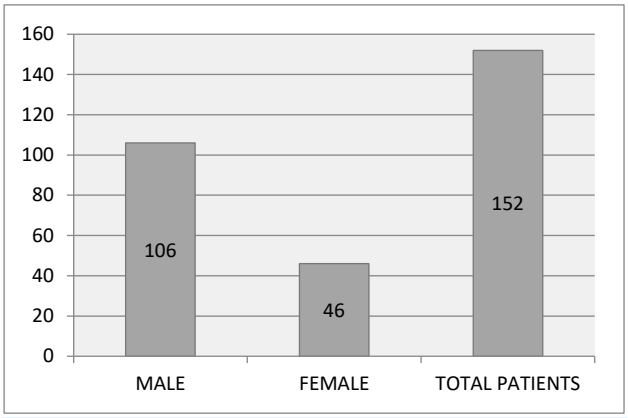

Fig. 1. Distribution of total sample according to gender

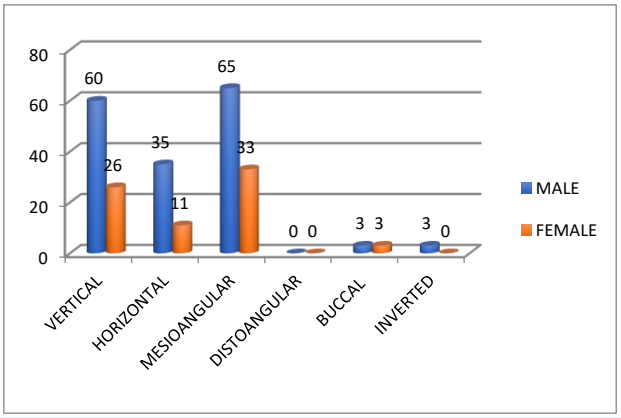

Fig. 2. Gender-wise distribution of the impacted teeth

lower third molar impaction followed by horizontal, disto-angular, vertical, buccal and lingual (Quek et al. 2003).

A study done on the Libyan population found that the commonest angle of lower third molar impaction is mesial (34.6%) vertical (31.3%), distoangular (21.7) and horizonal (Hatem et al. 2015).However a study in Nigeria found mesio-angular and vertical type impactions for upper third molar to be commonest (Olasoji and Odusanya 2000).

We did this study to explore the relation between lower third molar impactions, skeletal classification of facial forms and to study the pattern of impaction with each skeletal form.

MATERIALS AND METHODS

Sample: After obtaining Ethical Research Committee at the Faculty of Dentistry, Prince Sattam Bin Abdulaziz University (PSAU), in which records of 152 adult patients attending PSAU, were reviewed. One-hundred fifty-two orthopantomograms (OPG) and lateral cephalometric of patients of 18 years and above (106 males and 46 females) and their related data were selected from these records.

Exclusion Criteria:

1. Patients younger than 18 years,
2. Patients with lower third molars whose roots are incompletely formed or poor quality OPG
3. Patients who had orthognathic surgery, history of dentoalveolar trauma, jaw pathology, craniofacial anomaly or syndrome.

Type of Study: Cross-sectional study.

OPG was reviewed by two reviewers to determine the angulation of the impacted tooth, and the class of impaction according to Pell and Gregory classification.

1. Position A = Occlusal plane of impacted tooth and second molar are at the same level.
2. Position B = Impacted tooth is between the occlusal plane and the cervical line of the second molar.
3. Position C = The occlusal plane of impacted tooth is below the cervical line of the second molar.

Table 1. Gender-wise distribution of impaction types

TYPE OF IMPACTION	MALE	FEMALE
VERTICAL	60	26
HORIZONTAL	35	11
MESIOANGULAR	65	33
DISTOANGULAR	0	0
BUCCAL	3	3
INVERTED	3	0
TOTAL	166	73

4. Class I = A sufficient space exists between the distal part of the second molar and the ramus.
5. Class II = The space is less than the mesiodistal diameter of the third molar.
6. Class III = The third molar (all or most of it) is in the ramus of the mandible.

Results:

A total of 239 impacted teeth were observed from a sample of 152 orthopantomograms (OPG) and lateral cephalometric belonging to patients out of which, 106 (69.7%) were males and 46 (31.3%) were females (**Figure 1**).

Mean age was 27±8.414 years and out of 152 OPGs examined, most patients had bilateral mandibular third molar impaction. The frequency distribution of different groups of impacted teeth with regards to gender is depicted in **Figure 2**.

The commonest impaction angulation was mesio-angular impaction which was found in 98 teeth out of which 65 belonged to males (66.3%) and 33 belonged to females (33.7%). Vertical impaction was the next common type found in 86 teeth of which 60 belonged to males (69.7%) while 26 belonged to females (31.3%). Horizontal impactions accounted for 46 teeth of which 35 belonged to males (76%) while 11 belonged to females (24%). Distoangular impactions were not seen in any teeth while no inverted impactions were recorded in females. Only 3 inverted impactions were observed in males. There were 6 buccal impactions, 3 (50%) each in both males and females (**Table 1**).

The frequency distribution of impacted teeth according to skeletal morphology showed that the majority of the impacted teeth were found in patients

Table 2. Frequency distribution of impacted teeth according to skeletal morphology of the patients

Skeletal Class	Number of teeth	Mesio-angular	Vertical	Horizontal	Buccal	Inverted
Skeletal Class I	187 (78.2%)	83 (44%)	67 (35%)	30 (16%)	4 (2%)	3 (1.6%)
Skeletal Class II	31 (12.9%)	10 (32%)	9 (29%)	11 (35%)	1 (3%)	0
Skeletal Class III	21 (8.7%)	5 (23%)	10 (47%)	5 (23%)	1 (4%)	0

Table 3. Frequency distribution of impacted teeth with respect to dental relationship

Class	Number	Mesio-angular	Vertical	Horizontal	Buccal	Inverted
Class 1	107 (70.3%)	75 (44.1%)	57 (33.5%)	32 (18.8%)	4 (2.3%)	2 (1.1%)
Class 2	22 (14.4%)	8 (27.5%)	11 (37.9%)	9 (31%)	1 (3.4%)	0
Class 3	21 (13.8%)	14 (36.8%)	18 (47.3%)	5 (13.1%)	1 (2.6%)	0
Not Applicable	2 (1.3%)	1 (50%)	0	0	0	1 (50%)

Table 4. One-way ANOVA test among the variables

	Impaction	Skeletal			Dental			P&G Classification								
		1	2	3	1	2	3	1A	1B	1C	2A	2B	2C	3A	3B	3C
N	239	187	30	22	170	36	32	21	32	30	19	36	20	11	47	23
∑X	1211	517			338			313								
Mean	5.0669	2.1632			1.4142			1.3096								
∑X2	7753	1505			602			505								
Std.Dev	2.6065	1.2746			0.7218			0.6321								
F Ratio		61.06						317.2								
P Value		<.00001*						<.00001*								

who had skeletal class I facial profile (78.2%) out of which, most of them (44%) had mesio-angular impaction while least had inverted impaction (1.6%). The second most common impaction in Class 1 profile was vertical (35%) followed by horizontal (16%) and buccal (2%). Skeletal Class II profile accounted for 12.9% of the impacted teeth and horizontal impaction was the most common among Class II profiles (35%) followed by mesio-angular (32%), vertical (29%) and buccal (3%). No inverted impactions were found in Skeletal Class II profiles. Similarly, no inverted impactions were found in Class III profiles that accounted for only 8.7% of total impacted teeth. The most common impaction among Class III profiles was vertical (47%) followed by mesio-angular and horizontal (23% each) and buccal (4%). Similarly, Class I molar relationship was the most common dental relationship observed in this study (70.3%) followed by Class II and Class III (14.4% and 13.8% respectively) while 1.3% were unspecified (**Table 2**).

When the frequency distribution of impacted teeth was analysed with respect to molar (dental) relationship, it was observed that most impactions that occurred in Class I relationships were mesio-angular (44.1%) followed by vertical (33.5%), horizontal (18.8%), buccal (2.3%) and inverted (1.1%). In Class II relationships, vertical impactions were most common (37.9%) followed by horizontal (31%), mesio-angular (27.5%) and buccal (3.4%). In Class III relationships as well, vertical impactions were most common (47.3%) followed by mesio-angular (36.8%), horizontal (13.1%) and buccal (2.6%). No inverted impactions were observed in dental Class I and II relationships. Only 2 impactions were observed in unspecified relationships of which 50% each were mesio-angular and inverted (**Table 3**).

When frequency distribution of the sample was analysed according to Pell & Gregory classification, it was found that the most common impacted teeth were Class III B followed by Class II B and Class I B. Class III A was the least among all classes of impaction (**Figure 3**).

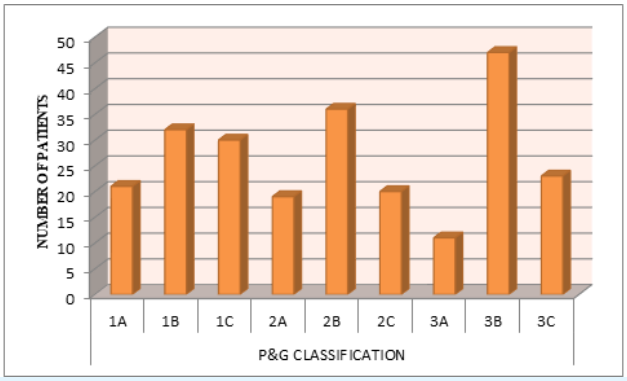

Fig. 3. Frequency distribution of impacted teeth according to Pell & Gregory classification

One-way ANOVA test was carried out to investigate the relationship between skeletal profile, dental molar relationship and the Pell and Gregory (P&G) classification of impacted mandibular third molar teeth (**Table 4**).

The results indicate that a statistically significant difference exists between the means of P&G classification in skeletal and dental Class I, II and III relationships ($p<0.00001$). This implies that the type of mandibular third molar impaction has a relationship with the facial profile and molar relationship in an individual.

Similarly, a statistically significant difference also exists between the means of skeletal profiles and dental relationship on both sides ($p<0.00001$). This implies that skeletal profile is related to dental occlusal relationship in an individual.

DISCUSSION

Studies have established that mandibular third molars have a relationship with skeletal morphology and occlusal relationships in humans. Even third molar agenesis is related with skeletal morphology. A study by Sugiki et.al. (2018) in Japan investigated the skeletal morphology of male and female orthodontic patients who had agenesis in all four molar teeth and a control group who had all four molars. This study reported that maxillary length, lower facial height and gonial angle were all significantly smaller in the test group than in the control group which suggested that agenesis of all third molars has a significant impact on skeletal morphology (Sugiki et.al. 2018). Other researchers showed that mandibular third molar impactions are associated with degree of crowding in the arch (Forsberg 1988) and a downward (as opposed to forward) growth of the lower jaw (Shalhoub et al. 1987).

Our present research aims to study the relationship of mandibular third molar impactions with the skeletal morphology and molar relationship in individuals. To the best of our knowledge, this is the first research that investigates this relationship in the Saudi population while at the same time investigating the most common types of third molar impactions present with each skeletal and dental relationship. These studies are important with regards to not only establishing correlations between important determinants of orthodontic and dental surgical care but also to establish cephalometric and profile standards of ethnic populations. Very few studies exist in the Arab population in this regard and even fewer that investigate the types of impactions associated with facial and dental relationships (Al-Jasser 2000, Hamdan AM and Rock WP 2001, Hassan AH 2011).

This was a cross-sectional study and majority of the observed OPGs of patients displayed a Class I skeletal and dental relationship (78.2% and 70.3%) respectively. Mean age of patients in our study was 27±8.414 years which close to the average age for eruption of mandibular third molars and is also close to the 20-25 year age range that is recommended for studying the eruption and impaction pattern of mandibular third molars (Scherstén et al.1989). Similarly, the most common form of impaction observed in both Class I skeletal and dental relationships was mesio-angular impaction (44% and 44.1% respectively). These observations are similar to other studies. For example. a study conducted in Nigeria on the pattern and symptoms of mandibular third molar impactions revealed that majority of the impacted teeth were mesio-angular impactions (48.2%) (Obeichina et al. 2001). Similarly, studies conducted in Iran (Eshghpour et al. 2014) and India (Padhye et al.2013) also reported mesio-angular impactions to be the most common pattern of mandibular third molar impactions. Furthermore, the most important finding of this study is the relationship between skeletal profile, dental relationship and impactions in mandibular third molars as per the Pell and Gregory classification.

Our study found a statistically significant relationship between depth of impaction (P&G classification), skeletal morphology and dental relationship. Our findings are supported by other studies which also report a relationship between anteroposterior skeletal profiles and mandibular teeth impactions. A study conducted by Richardson on 95 subjects reported that Class II skeletal profiles were more prone to unerupted and impacted mandibular third molars than other skeletal profiles (Richardson 1977). Studies have also compared between vertical and horizontal growth patterns on mandible and their relationships with lower third molar impactions and found that individuals with horizontal growth patterns had lower incidences of mandibular third molar impactions than the individuals who exhibited vertical growth patterns (Breik O and Grubor 2008). Reports even suggest that facial growth has no influence on the incidence of mandibular impaction. Nevertheless, our study reported a significant association of mandibular impaction with both skeletal and dental relationships.

Limitations of the study:

Since it was a retrospective study, it was not within the scope of this study to account for confounding factors that lead to the development of different skeletal relationships which would have given more predictive value to this research as it would give an insight into what factors are specific to the respective skeletal relationship. Another limitation is the small sample size that makes extrapolation and profiling difficult. It is recommended that large, multi-centre prospective studies be undertaken in the future that start during the development stage and monitor facial growth and mandibular third molar impaction.

CONCLUSION

Class I skeletal and dental relationships are most common in our sample with the most common form of impaction being mesio-angular impaction. Mandibular third molar impaction is significantly associated with anteroposterior skeletal molar relationship.

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