

# Position of Impacted Mandibular Third Molar in different Skeletal Facial Types

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## ABSTRACT

**Introduction:** Variation in growth pattern in different facial forms affect the space available for tooth eruption, therefore the mandibular third molar impaction has correlation with different skeletal facial types.

**Objective:** To determine the position of impacted mandibular third molar in different skeletal facial types in Nepalese samples.

**Materials & Method:** This cross sectional study was carried out on pre-treatment lateral cephalogram and orthopantomogram records of 207 orthodontic patients visiting Kantipur Dental College and Hospital. Age range of the sample was 16-33 years. Various facial forms were determined with the help of mandibular plane angle (SN-GoGn); for which Nemoceph software was used. Beta angle was used to determine the angle of impaction of mandibular third molar. Impaction pattern was classified as per Pell & Gregory and Winter's system. SPSS version 20 was used for statistical analysis.

**Result:** Overall rate of mandibular third molar impaction was 63.77% (11.11% unilateral and 52.66% bilateral impaction). The most common type of impaction bilaterally was mesioangular based on Winter's classification, Class II Position B based on Pell & Gregory's classification. Higher rate of mandibular third molar impaction was found in dolichofacial type of face (49.2%).

**Conclusion:** Decreased mandibular third molar impactions are seen in brachyfacial type compared to mesofacial and dolichofacial types.

**Keywords:** facial pattern, impaction, mandibular third molar, orthopantomogram

## INTRODUCTION

Impaction is the failure in tooth eruption, which can be a result of obstruction in the eruption path or inappropriate tooth position.<sup>1</sup> Mandibular third molar is the most commonly impacted tooth.<sup>2</sup> The etiology of mandibular third molar impaction are inadequate space between distal surface of second molar and anterior border of ramus,<sup>3</sup> amount and direction of mandibular growth, remodeling and width of ramus, rate of maturation of third molars, inclination of posterior dentition, size of dentition relative to the jaws, and systemic causes.<sup>4</sup>

According to Ricketts, facial morphology can be classified as brachyfacial, mesofacial and dolichofacial.<sup>5</sup> In dolichofacial face, excessive clockwise rotation of mandible during growth leads to relatively short body.<sup>6</sup> Lengthening of the body of mandible by anterior resorption and posterior deposition of ramus in brachyfacial face allows adequate space for the third molar to erupt. This remodeling is limited in dolichofacial type leading to inadequate space for third molar eruption. Thus it can be assumed that third molar impaction has correlation with

different skeletal facial types.<sup>6</sup> The aim of this study was to determine the position of impacted mandibular third molar in different skeletal facial types in Nepalese patient samples.

## MATERIALS AND METHOD

A cross-sectional study was performed on 207 pretreatment lateral cephalogram and orthopantomogram records of patients visiting Department of Orthodontics, Kantipur Dental College and Hospital. The study was conducted during September 2016 to January 2017 after receiving ethical approval from Institutional Review Committee. Inclusion criteria for the study were: complete patient records, pretreatment radiographs showing complete dentition, presence of mandibular third molars with at least two-third of root formation completed, and good quality radiographs. Patients with pathological conditions related to mandibular second and third molars such as extensive caries, cystic lesions were excluded.

All the radiographs were evaluated by a single examiner. Nemoceph software (Dental Studio NX) was used to trace

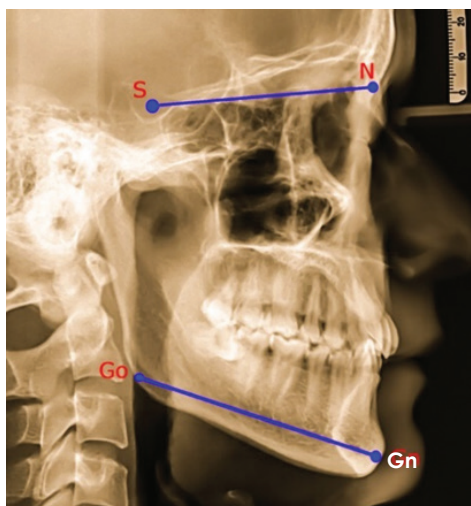


Figure 1: Cephalogram showing mandibular plane angle

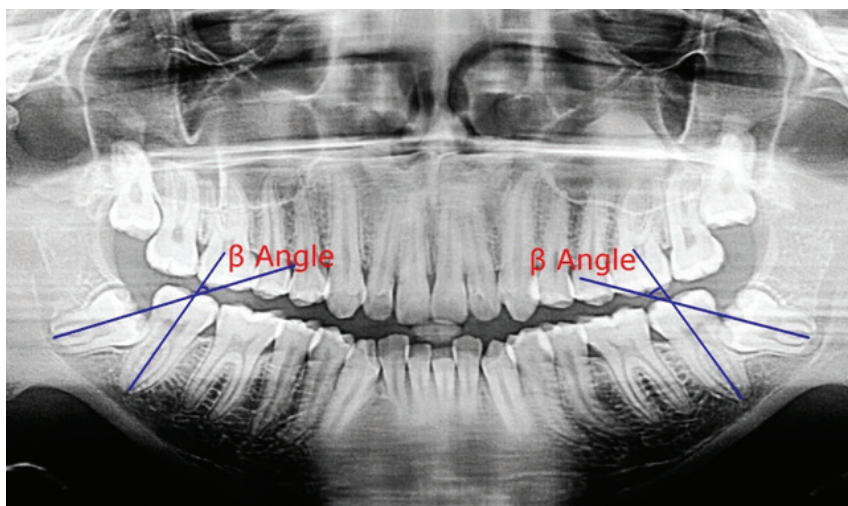


Figure 2: Orthopantomogram showing  $\beta$  angle

the lateral cephalograms whereas orthopantomograms were traced manually. The angle between Sella-Nasion line and Gonion-Gnathion line (mandibular plane) was measured using cephalometric protractor; which was termed as SN-GoGn angle or mandibular plane angle (Figure 1). This angle was used to determine different skeletal facial types based on Rickett's classification as shown in the following table.<sup>5</sup>

Skeletal facial type (Rickett's Classification)	SN-GoGn Angle
Brachyfacial	< 27°
Mesiofacial	27 - 37°
Dolichofacial	> 37°

Similarly, the angulation of mandibular third molar impaction was determined by  $\beta$  angle; which is the angle between intersecting long axis of mandibular second molar and mandibular third molar drawn through the midpoint of occlusal surface and midpoint of root bifurcation (Figure 2).<sup>8</sup>

Mandibular Third Molar Angulations	$\beta$ angle
Distoangular	$\leq -11^\circ$
Vertical	-10 - 10°
Mesioangular	11 - 79°
Horizontal	$\geq 80^\circ$

Impaction was also classified according to Pell & Gregory's classification system based on the amount of space available between distal surface of second molar and anterior border of ramus.<sup>9</sup>

Pell & Gregory's Classification	
Class I	Sufficient amount of space for accommodation of the mesio-distal diameter of crown of the third molar
Class II	Space between the ramus and distal side of second molar is less than the mesiodistal diameter of the third molar
Class III	All or most of the third molar is located within the ramus

Level of impaction was classified as Position A, B and C; which is related to the occlusal height as compared to the adjacent second molar.<sup>9</sup>

Level of impaction	
Position A	At the level of adjacent tooth
Position B	Between occlusal and cervical margins of the adjacent tooth
Position C	Below the cervical margin

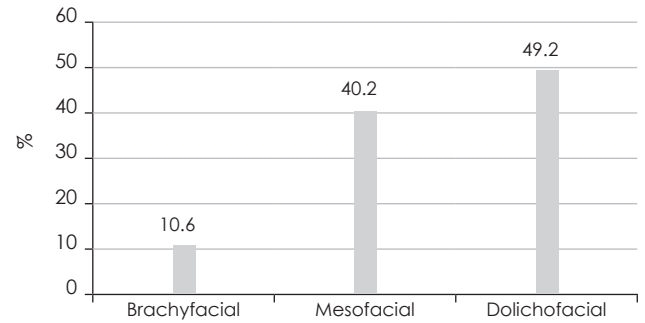
The findings were recorded using a data collection sheet. Kruskal-Wallis test was done to check the relationship of impacted mandibular third molar with different skeletal facial types. Level of significance was set at  $p < 0.05$ .

**RESULT**

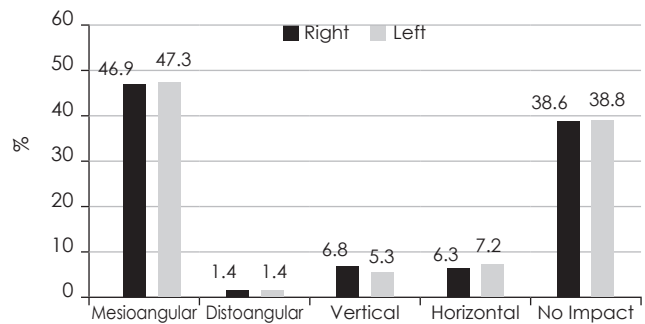
The sample comprised of 207 lateral cephalogram and orthopantomogram of the subjects of age range 16-33 (mean 21.04, SD 3.824). Among all, 42.5% were female and 57.5 % were male. A total of 63.77% of mandibular third molar was impacted, out of which 11.11% was unilateral and 52.66% was bilateral impaction. 59% of total impaction was seen in female and 41% in male. The occurrence of mandibular third molar impaction was found to be highest in dolichofacial type of face and least in brachyfacial type (Graph 1). Mesioangular type of impaction was the most common type on both sides of the mandible (Graph 2).

On right side of the mandible, Position A type of impaction was found in 19.3%, Position B in 39.1% and Position C in 2.9%. Whereas on left side, Position A, Position B and position C were found in 17.4%, 40.1% and 3.4% respectively. Various types of impaction according to Pell & Gregory's classification are shown in Graph 3.

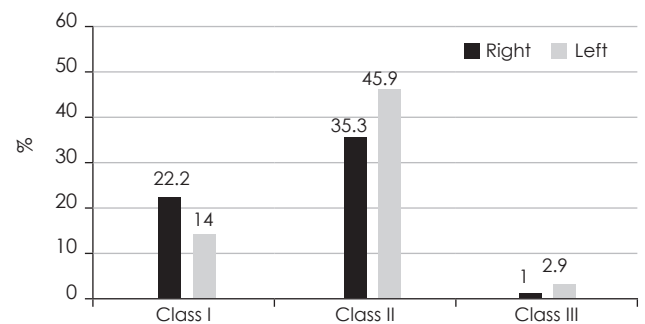
Regarding the angle of impaction, dolichofacial type of face had highest frequency of mesioangular impactions, whereas mesofacial and brachyfacial types had maximum of distoangular impactions (Table 1). Regarding the class of impaction, Class I and Class II impactions were found more in dolichofacial type and Class III in mesofacial type (Table 2). Concerning the position of impaction, the frequency of Position C was found to be more in mesofacial type, while Position A and B were more in dolichofacial type (Table 3).



**Graph 1: Occurrence of impacted mandibular third molar in different skeletal facial types (%)**



**Graph 2: Angulations of third molar impaction on right and left sides (%)**



**Graph 3: Distribution of impaction according to Pell & Gregory classification (%)**

**Table 1: Angulation of third molar impaction in different skeletal facial types**

	Brachyfacial		Mesofacial		Dolichofacial	
	Right	Left	Right	Left	Right	Left
Mesioangular	7.2%	9.2%	39.2%	36.7%	53.6%	54.1%
Distoangular	33.3%	33.3%	66.7%	66.7%	0%	0%
Vertical	21.4%	9.10%	28.6%	36.4%	50.0%	54.5%
Horizontal	7.7%	20.0%	53.8%	40.0%	38.5%	40.0%

**Table 2: Distribution of impaction in various facial types according to Pell & Gregory Classification**

	Brachyfacial		Mesofacial		Dolichofacial	
	Right	Left	Right	Left	Right	Left
Class I	10.9%	10.3%	43.5%	41.4%	45.7%	48.3%
Class II	6.8%	11.6%	37.0%	33.7%	56.2%	54.7%
Class III	50.0%	16.7%	50.0%	33.3%	0%	50.0%

**Table 3: Position of mandibular third molar impaction in different skeletal facial types**

	Brachyfacial		Mesofacial		Dolichofacial	
	Right	Left	Right	Left	Right	Left
Position A	12.50%	22.20%	40.00%	41.70%	47.50%	36.10%
Position B	7.40%	4.80%	39.50%	33.70%	53.10%	61.40%
Position C	33.30%	14.30%	66.70%	42.90%	0%	42.90%

**Table 4: Relationship of mandibular third molar impaction and skeletal facial types**

Status of mandibular third molar	Brachyfacial	Mesofacial	Dolichofacial	p-Value
No Impaction	43(75.4 %)	17(24.3%)	15(18.8%)	0.000*
Unilateral Impaction	7(12.3%)	13(18.6%)	3(3.8%)	
Bilateral Impaction	7(12.3%)	40(57.1%)	62(77.5%)	
Total	57(100%)	70(100%)	80(100%)	

\*Statistically significant at  $p < 0.05$

Kruskal-Wallis test showed a statistically significant difference between impaction of mandibular third molar and different facial types (Table 4). Subsequently, Post Hoc test depicted significant differences between brachyfacial and mesofacial types ( $p$ -Value 0.000), and brachyfacial and dolichofacial types ( $p$ -Value 0.000). However, there was no significant difference between mesofacial and dolichofacial types ( $p$ -Value 0.199).

## DISCUSSION

According to Andreasen *et al* impaction of mandibular third molar varies from 18-32% in different populations.<sup>10</sup> Vilela and Vitol reported the most frequently impacted teeth as third molar (90%) with the higher prevalence in mandible (60%) compared to maxilla (30%).<sup>11</sup> In this study, the frequency of mandibular third molar impaction was found to be 63.8%.

Short mandibular length provides insufficient space for third molar to erupt causing the impaction.<sup>3,12</sup> Eroz *et al* demonstrated shorter length of mandible in dolichofacial patients predisposing to impaction.<sup>13</sup> Increased occurrence of mandibular third molar impaction was seen in dolichofacial type of face (49.2%) compared to mesofacial (40.2%) and brachyfacial (10.6%). This result is consistent with the previous studies by Bashir *et al* and Eroz *et al*.<sup>6,13</sup>

Mesioangular impaction was the most common type of impaction (46.9% on right and 47.3% on left) and distoangular was the least common type bilaterally (1.4%). This finding is in accordance to the study by

Sokri *et al*.<sup>7</sup> Breik and Grubber showed that over 80% of the mandibular third molar impaction in all facial types was in mesioangular position.<sup>14</sup> Viela and Vitol found that vertical position was most prevalent, followed by mesioangular position contrary to findings by Sandhu *et al*<sup>11,15</sup> and Venta *et al*<sup>16</sup> where mesioangular position was the most prevalent.

Limitation of our study was the sample size and sample type. As orthodontic patients are more likely to suffer malocclusion and potential crowding, they are also likely to possess higher occurrence of mandibular third molar impaction compared to general population sample. As the study was carried out in a limited sample, the findings cannot be generalized.

## CONCLUSION

Greater horizontal facial growth pattern in brachyfacial subjects provides increased space for the full eruption of mandibular third molars. Decreased mandibular third molar impactions are seen in brachyfacial facial type as compared to mesofacial and dolichofacial. There is significant difference between facial form and presence or absence of mandibular third molar impaction.

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