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Effect of Rate of Third Molar Impaction on Mandibular Arch Crowding in Skeletal Class I Patients

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Study Title: Effect of rate of third molar impaction on lower arch crowding in skeletal class I patients.

Abstract: ***Aim: Assessment of Effect of rate of third molar impaction on lower arch crowding in skeletal class I patients. Materials and Method:150 Untreated subjects with different facial divergence pattern between age 16 – 25 years seeking for orthodontic treatment, crowding of lower arch calculated by using caliper and Impaction of lower 3rd molar is evaluated by Winter's classification. Results: Mandibular anterior crowding is divided into four groups according to severity, out of which 4-6mm of crowding most commonly found value .In Hypodiveregnt facial pattern Mesioangular impaction is most commonly found. Crowding in hypodivergent patients is mostly moderate between 4-6mm which is 45% and also 20% in 0-2mm and more than 6mm group while only 15% in 2-4mm crowding. Normodivergent subjects had 30% crowding in 2-4mm and 0-2mm group and 20% in other groups. Conclusion: Distoangularimpaction and vertical impaction type has significantly less crowding severity as compared to mesioangular and horizontal type irrespective of facial profile.***

Keywords: Third molar, impaction, crowding

1. Introduction

Third molars are the last teeth erupting into the mouth and might be impacted completely or partially due to space deficiency, obstructions or ectopic position of the tooth.[1] Examining the role of third molars in malocclusion, suggested that, in some cases, the mandibular third molars need to create space in the dental arch in order to erupt, causing crowding of the anterior teeth. Since then, numerous investigations have been conducted in an attempt to objectively identify a possible correlation between third molars and mandibular incisor crowding.[2]

Broadbent believed that when a third molar became impacted the mandible had failed to achieve its full growth potential. The improvement of the position and reduction of the inclination of third molars, although not directly associated with their eruption, seems to be considered as a very positive effect.[3]Prophylactic surgical removal is often suggested to avoid potentially severe complications of this condition. Although indications for prophylactic removal of lower third molars are limited.[4]

2. Materials and Method

Total 150 Untreated subjects with different facial divergence pattern between age 16 – 25 years visiting the Department Of Orthodontics And Dentofacial Orthopedics for seeking orthodontic treatment from which 98 have mandibular impaction on both sides. Under inclusion criteria will be included in the study.

Inclusion criteria:

1) Adequate records with complete history of orthodontic and surgicaltreatment
2) Pre-orthodontic treatments OPG with complete dentition and mandibular third molars whichhave root formation at least two-thirds complete.
3) Preorthodontic treatment lateral cephalometric radiograph taken at the same time as the OPG.

The data recorded were age of the patient, gender, eruption or degree of impaction of mandibularthird molars, and the facial axis angle, Mandibular angle.

Also, relationship of the impacted third molar to the ramus of the mandible and the second molar is classified.

1) Class I. Sufficient space available between the anterior border of the ascending ramus and distal side of second molar for eruption of the third molar.
2) Class II. The space available between the anterior border of the ramus and the distal side of the second molar is less than 1/2 mesiodistal width of the crown of the third molar
3) Class III. The third molar is totally embedded in bone from the ascending ramus because of absolute lack of space.

3. Result

The result demonstrated that out of 30 hyperdivergent facial profile subjects, predominately mesioangular molar impaction found. In normodivergent profile, all types of impaction equivalently found. While in hypodivergent profile, significantly subjects had mesioangular impaction as compared to other types of molar impaction.Chi square test showed highly significant difference ($p<0.001$) among types of molar impaction in different facial profiles.

Table 1: Distribution of mandibular 3rd molar impaction type in different facial profiles

	Hypodivergent (n =30)	Normodivergent (n =30)	Hyperdivergent (n =30)
Mesioangular (n = 58)	20 (66.7%)	10 (33.3%)	28 (93.3%)
Distoangular (n = 13)	4 (13.3%)	8 (26.7%)	1 (3.3%)
Vertical (n =9)	1 (3.3.%)	8 (26.7%)	0 (0%)
Horizontal (n =10)	5 (16.7%)	4 (13.3%)	1 (3.3%)
	Chi square test value = 29.373, p <0.001**		

Mandibular anterior crowding is divided into four groups according to severity. 4-6mm of crowding which is moderate crowding is most commonly found out of all. Also P value showed highly significant value.

Table 2: Distribution of mandibular anterior crowding severity type in different facial profiles

	Mandibular Anterior Crowding Severity			
	0-2 mm (n = 14)	2-4 mm (n =19)	4-6 mm (n =42)	>6 mm (n =15)
Hypodivergent	5 (16.7%)	5 (16.7%)	16 (53.3%)	4 (13.3%)
Normodivergent	4 (13.3%)	5 (16.7%)	12 (40%)	9 (30%)
Hyperdivergent	5 (16.7%)	9 (30%)	14 (46.7%)	2 (6.7%)
	Chi square test value = 4.286, p = 0.081			

Table 3: Association of mandibular anterior crowding severity with type of mandibular 3rd molar impaction in hypodivergent profile

Hypodivergent profile	Mandibular Anterior Crowding Severity			
Impaction type	0-2 mm	2-4 mm	4-6 mm	>6 mm
Mesioangular	4 (20%)	3 (15%)	9 (45%)	4 (20%)
Distoangular	0 (0%)	1 (25%)	3 (75%)	0 (0%)
Vertical	0 (0%)	0 (0%)	1 (100%)	0 (0%)
Horizontal	1 (20%)	1 (20%)	3 (60%)	0 (0%)
	Chi square test value = 4.462, p =0.878			

In Hypodiveregnt facial pattern Mesioangular impaction is most commonly found. Crowding in hypodivergent patients is mostly moderate between 4-6mm which is 45% and also 20% in 0-2mm and more than 6mm group while only 15% in 2-4mm crowding .

Table 4: Association of mandibular anterior crowding severity with type of mandibular 3rd molar impaction in Normodivergent profile

Normodivergent profile	Mandibular Anterior Crowding Severity			
Impaction type	0-2 mm	2-4 mm	4-6 mm	>6 mm
Mesioangular	2 (20%)	3 (30%)	3 (30%)	2 (20%)
Distoangular	1(12.5%)	1(12.5%)	6(75%)	0 (0%)
Vertical	0 (0%)	0 (0%)	2 (25%)	6 (75%)
Horizontal	1 (25%)	1 (25%)	1 (25%)	1 (25%)
	Chi square test value =16.004 , p =0.067			

Normodivergent subjects had 30% crowding in 2-4mm and 0-2mm group and 20% in other groups.

Table 5: Association of mandibular anterior crowding severity with type of mandibular 3rd molar impaction in hyperdivergent profile

Hyperdivergent profile	Mandibular Anterior Crowding Severity			
Impaction type	0-2 mm	2-4 mm	4-6 mm	>6 mm
Mesioangular	5(17.9%)	9(32.1%)	13(46.4%)	1(3.6%)
Distoangular	0 (0%)	0 (0%)	1 (100%)	0 (0%)
Horizontal	0 (0%)	0 (0%)	0 (0%)	1(100%)
	Chi square test value = 15.612, p =0.016*			

Hyperdivergent subjects also had most commonly found crowding in 4-6mm range, after Chi square test P value inthis group is not statistically significant.

Table 6: Association of mandibular anterior crowding severity with type of mandibular 3rd molar impaction irrespective of profile

Overall	Mandibular Anterior Crowding Severity			
Impaction type	0-2 mm	2-4 mm	4-6 mm	>6 mm
MESIOANGULAR	11 (19%)	15(25.9%)	25(43.1%)	7 (12.1%)
Distoangular	1 (7.7%)	2 (15.4%)	10(76.9%)	0 (0%)
Vertical	0 (0%)	0 (0%)	3 (33.3%)	6 (66.7%)
Horizontal	2 (20%)	2 (20%)	4 (40%)	2 (20%)
	Chi square test value = 24.82, p =0.003*			

Distoangularimpaction and vertical impaction type has significantly less crowding severity ($p <0.05$) as compared to mesioangular and horizontal type, when comparison done irrespective of facial profile.

4. Discussion

The facial type was determined by a measure of the facial axis angle. 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.[7]

According to study by Vigo the frequency of female in number of impaction ishigher than male, the reason for this may be due to the consequence of difference between the growth of males and females.Females usually stop growing when the third molars just begin to erupt, whereas in males, thegrowth of the jaws continues during the time of eruption of the third molars, creating more spacefor third molar eruption .[8]One study demonstrated that53.43% of the

patients had anterior lower arch crowding with impacted lower third molar while 39.7 % had anterior arch crowding with erupted lower third molar.[9]This valuedemonstrates that the impacted 3rd molar has effect on anterior lower dental arch crowding.[10]

The result demonstrated that out of 30 hyperdivergent facial profile subjects, predominately mesioangular molar impaction found. In normodivergent profile, all types of impaction equivalently found. While in hypodivergent profile, significantly subjects had mesioangular impaction as compared to other types of molar impaction. Chi square test showed highly significant difference ($p<0.001$) among types of molar impaction in different facial profiles. Mandibular anterior crowding is divided into four groups according to severity. 4-6mm of crowding which is moderate crowding is most commonly found out of all. Also P value showed highly significant value.

In Hypodiveregnt facial pattern Mesioangular impaction is most commonly found. Crowding in hypodivergent patients is mostly moderate between 4-6mm which is 45% and also 20% in 0-2mm and more than 6mm group while only 15% in 2-4mm crowding. Normodivergent subjects had 30% crowding in 2-4mm and 0-2mm group and 20% in other groups. Hyperdivergent subjects also had most commonly found crowding in 4-6mm range ,after Chi square test P value in this group is not statistically significant. In normodivergent profile, all types of impaction equivalently found In hypodivergent profile, significantly subjects had mesioangular impaction as compared to other types of molar impaction. Highly significant difference ($p<0.001$) was observed among types of molar impaction in different facial profiles. Distoangularimpaction and vertical impaction type has significantly less crowding severity ($p <0.05$) as compared to mesioangular and horizontal type. When comparison done irrespective of facial profile. In hyper divergent profile, predominately mesioangular molar impaction found.

5. Conclusion

In Hypodiveregnt facial pattern Mesioangular impaction is most commonly found. Crowding in hypodivergent patients is mostly moderate between 4-6mm which is 45% and also 20% in 0-2mm and more than 6mm group while only 15% in 2-4mm crowding. Normodivergent subjects had 30% crowding in 2-4mm and 0-2mm group and 20% in other groups.Hyperdivergent subjects also had most commonly found crowding in 4-6mm range, after Chi square test P value inthis group is not statistically significant. Distoangularimpaction and vertical impaction type has significantly less crowding severity as compared to mesioangular and horizontal type irrespective of facial profile.

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