

The relationship of the third molar to the anterior dental crowding

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ABSTRACT

The purpose of this study is to ascertain whether the upper and lower third molars can contribute to the occurrence or aggravation of crowding. The sample of this study consisted of 187 subjects (103 males and 84 females) aged 20–30 years, then the sample was divided into two main groups and three subgroups. The groups consisted of crowded and normal subjects. The subgroups consisted of persons who had maxillary or mandibular third molars that were either impacted, erupted into function or agenesis.

The results showed that the crowded group revealed a higher percentage of impacted third molar and a smaller percentage of erupted third molar particularly in the mandible and a smaller percentage of third molar agenesis than the normal group.

The females had more impacted third molar in the upper and lower jaws for both crowded and normal groups. The percentage of third molar agenesis in the males was higher in the upper jaw and smaller in the lower jaw than the females.

In normal group, no significant difference was found between upper and lower jaws except in females where the unilateral third molar agenesis was greater in the lower jaw. In crowded group, the lower jaw revealed a higher percentage of impacted third molar for all subjects and a smaller percentage of erupted third molar for females and a smaller third molar agenesis for the males as compared with upper jaw.

Key Words: Impaction, agenesis, anterior dental crowding.

الخلاصة

الغرض من هذه الدراسة هو التأكد ما إذا كان يضر العقل العلوي أو السفلي مساهمة في حدوث أو زيادة في حالة حدوث تزاحم في الأسنان الأمامية. تكونت عينة هذا البحث من ١٨٧ شخص (١٠٣ ذكور و ٨٤ إناث) تتراوح أعمارهم ما بين ٢٠-٣٠ سنة. قُسمت عينات البحث إلى مجموعتين رئيسيتين وثلاثه مجاميع فرعية. المجموعات الرئيسية متكونة من مجموعة الأشخاص أصحاب التزاحم في الأسنان وأصحاب الإطباق الطبيعي. المجاميع الفرعية متكونة من الأشخاص الذين لديهم أضرار عقل علوية أو سفلية في حالة انطمار أو بزوغ أو فقدان هذه الأسنان.

أظهرت النتائج أن مجموعة التزاحم بينت نسبة أعلى في حالة انطمار يضر العقل ونسبة أقل في حالة بزوغ يضر العقل خصوصاً في الفك السفلي؛ كما أظهرت نسبة أقل في فقدان يضر العقل عما عليه في مجموعة الإطباق الاعتيادي.

كان للإناث نسبة انطمار أكبر في يضر العقل في الفك العلوي والسفلي لكلا المجموعتين المتزاحمة والاعتيادية. وكانت نسبة فقدان يضر العقل عند الذكور أعلى في الفك العلوي وأقل في الفك السفلي عما عليه عند الإناث.

في المجموعة الاعتيادية لم يكن هناك فرق واضح بين الفكين العلوي والسفلي ما عدا عند الإناث. وكانت حالة فقدان يضر العقل في جهة واحدة أعلى في الفك السفلي. أظهر الفك السفلي في مجموعة التزاحم نسبة أعلى في انطمار يضر العقل لجميع الأشخاص ونسبة أقل في بزوغ يضر العقل عند الذكور إذا ما قورن بالفك العلوي.

INTRODUCTION

The role of third molars in anterior dental crowding has been debated for more than a century. The literature is almost equally divided with arguments for both sides.⁽¹⁾

One theory commonly reported is that of the third molars creating space to erupt by causing anterior teeth to crowd.⁽²⁻⁸⁾ Many authors compare the changes in arch perimeter in group with third molar present and other group with missing third molar. They concluded that third molar, particularly the lower, was contributory factor to arch crowding.⁽⁹⁻¹³⁾ Forsberg⁽¹⁴⁾ found more crowding in cases of impaction than other group with full complete eruption.

To the contrary, Broadbent⁽¹⁵⁾ was an early advocate of the insignificant role played by third molar in late low incisor crowding. Bjork and Skieller⁽¹⁶⁾ could find no clear evidence that crowding was caused by eruption of third molars. Ades *et al.*⁽¹⁷⁾ reported no post retention differences in the crowding of mandibular incisors among groups of subjects with functional third molars, third molar agenesis, third molar impaction and third molar extraction. Kaplan^(18, 19) also found no significant difference in subjects whose mandibular third molars were bilaterally erupted, impacted or congenitally absent and stated that the presence of third molars does not influence post retention changes in arch dimension, tooth position, or mandibular incisor crowding.

Richardson^(20, 21) found no difference in the amount of mesial first molar movement in person with impacted third molars as compared with subjects whose third molars were not impacted.

It is worthwhile to mention that several investigators⁽²²⁻²⁴⁾ suggest that third molars play very little, if any, role in a long term dental changes. Harradine *et al.*⁽²⁵⁾ concluded that the removal of third molars to reduce or prevent late incisor crowding cannot be justified. Lin⁽²⁶⁾ emphasizes the importance of careful consideration of the third molar in the treatment plan.

Clearly, there is a lack of agreement regarding the influence of third molars on dental crowding, and such confusion can

affect treatment regimens. For example, in a survey of more than 600 orthodontists, Laskin⁽²⁷⁾ reported that 65% believed third molars produce mandibular anterior teeth crowding. For many patients, the decision to have unerupted third molars removal may be predicted on the hope of improved orthodontic post-treatment stability, a hope that may be unfounded.^(28, 29)

The purposes of this study were to determine the relationship of the maxillary and mandibular third molars to anterior dental crowding; to explore the possible significant relationships of the gender difference in third molar status for crowded and normal group; and to detect any difference in the third molar status between maxillary and mandibular arch for crowded and normal groups.

MATERIALS AND METHODS

The sample of this study consisted of 187 subjects (103 males and 84 females) aged 20–30 years old. The sample was divided into 2 main groups: Crowded and normal groups. The crowded group selected from patients attending to the Department of Orthodontics, University of Mosul according to the following criteria: Full set of permanent teeth in both jaws (excluding third molar), crowded anterior teeth so they are malaligned, rotated or displaced with a lack of space more than 2 mm mesial to the first premolar, either in both upper and lower dental arches or separately against well aligned antagonist, no history of any oral habit and had not undergone orthodontic treatment.

While the normal group was selected from the students in Mosul University and were judged to have full set of permanent teeth in both jaws (excluding third molar) with normal occlusion, no apparent dental and facial discrepancy and had not undergone orthodontic treatment.

Radiographical examination was carried out for the patient who suspected to have impacted or congenital missing third molar by using intra-oral periapical view (bisecting-angle technique) and diagnosed by dental radiologist.

The selected groups were divided into subgroups according to the condition of the third molar in the sample:

- 1) **Subgroup 1 (third molar eruption):** Include dental arch with unilateral or bilateral third molar erupted to the occlusal plane, in good alignment buccolingually and of normal size and form.
- 2) **Subgroup 2 (third molar impaction):** Include dental arch with uni-lateral or bilateral third molar impaction. Impaction was defined as a tooth that has failed to erupt and remains completely or partially covered by bone, soft tissue, or both,⁽¹⁷⁾ as interpreted from periapical radiographs by three clinicians.
- 3) **Subgroup 3 (third molar agenesis):** Include dental arch with unilateral or bilateral third molar agenesis. The diagnosis of third molar agenesis was based on the examination of periapical radiograph taken after clinical examination and a negative history of previous third molar extractions.

Descriptive statistics including frequency tables and percentages were calculated for all third molar subgroups in response to the various test variables (location including upper and lower in crowded and normal groups for both genders).

The pooled Z-test was employed to show any statistically significance for each subgroup between crowded and normal groups, male and female and upper and lower dental arches.

If the value of Z is less than 1.69 it was regarded as statistically insignificant; whereas when the value of Z is more than 1.69 it was considered as significant.

RESULTS

The percentage distribution of the third molar subgroups (whether the third molar impacted, or erupted or agenesis) were presented in Table (1) for the male, female and all subjects with the comparison between the crowded and normal groups in the upper and lower dental arches. While Table (2) shows the comparison of the third molar subgroups between the males and females (in crowded and normal groups).

Table (3) reveals the comparison of the third molar subgroups between the upper and lower dental arches in crowded and normal groups.

DISCUSSION

Comparison between Crowded and Normal Groups

The crowded group in the upper arch revealed a higher percentage of impacted third molar and a lower percentage of erupted third molar than the normal group for the males and all subjects groups, while in the female group there is no significant difference between crowded and normal groups in any third molar subgroup.

Generally, the crowded group in the lower jaw showed a higher percentage of impacted third molar and lower percentage of third molar agenesis than the normal group for the males, females and total subjects. In addition, in the male and all subjects, the normal group revealed a higher percentage of erupted third molar than crowded group.

These findings are in agreement with many others,⁽²⁻¹⁵⁾ which believed that third molar may play a role in development of crowding and support the findings of previous studies^(5, 9) who found a positive correlation between change in space condition and forward movement of the lower first molar. In the light of these findings, it seems possible that space for the molar is gained to some extent at the expense of crowding farther forward in the arch; but these findings are in contrast with other investigators.⁽¹⁵⁻²¹⁾

Comparison between Males and Females

The female subjects had a higher percentage of impacted third molar particularly in the lower jaw in crowded group and in the upper jaw in normal group than the male subjects.

While the males showed a higher percentage of third molar agenesis especially in the upper jaw for crowded group and in the lower jaw for normal group. Also, the males revealed a higher percentage of erupted third molar than the females in the lower jaw for normal group.

Table (1): The percentage distribution of the third molar subgroups for the males, females and all subjects with the comparison between crowded and normal groups

Third Molar	Males %			Females %			All Subjects %			
	Crowded n= 28	Normal n= 75	Z-value	Crowded n= 29	Normal n= 55	Z-value	Crowded n= 57	Normal n= 130	Z-value	
Upper										
Impaction	Unilateral	14.28	2.67	2.24**	6.90	9.09	0.29*	10.53	5.38	1.28*
	Bilateral	25.00	13.393	1.42*	34.48	23.64	1.06*	29.82	17.69	1.87**
	Total	39.28	16.0	2.58**	41.38	32.73	0.25*	40.35	23.1	2.42**
Agensis	Unilateral	3.57	9.33	0.97*	0.0	1.82	0.73*	1.75	6.15	1.3*
	Bilateral	14.29	9.33	0.73*	3.45	10.91	1.18*	8.77	10.0	0.26*
	Total	17.86	18.66	0.09*	3.45	12.73	1.38*	10.53	16.15	1.04*
Eruption	Bilateral	42.86	65.33	2.06**	55.17	54.54	0.06*	49.12	60.77	7.27**
	Lower									
Third Molar	Males %			Females %			All Subjects %			
	Crowded n= 35	Normal n= 68	Z-value	Crowded n= 35	Normal n= 49	Z-value	Crowded n= 70	Normal n= 117	Z-value	
Impaction	Unilateral	14.29	4.41	1.77**	14.29	6.12	1.26*	14.29	5.13	2.17**
	Bilateral	40.0	14.71	2.88**	45.71	18.37	2.7**	42.86	16.24	4**
	Total	54.79	19.12	3.71**	60.0	24.19	3.31**	57.14	21.37	4.97**
Agensis	Unilateral	2.86	5.88	0.68*	0	16.33	2.51**	1.43	10.26	2.3**
	Bilateral	0	5.88	1.47*	5.71	8.16	0.5*	2.86	6.84	1.17*
	Total	2.86	11.76	1.51*	5.71	24.19	2.24**	4.28	17.09	2.58**
Eruption	Bilateral	42.86	69.12	2.58**	34.29	51.02	1.47*	38.57	61.54	3.04**

*If the value of Z is less than 1.69, it is not significant.

**If the value of Z is greater than 1.69, it is significant.

Table (2): The comparison of the third molar subgroups between males and females in crowded and normal groups

Crowded							
Third Molar	Upper (%)			Lower (%)			
	Males n= 28	Females n= 29	Z-value	Males n= 35	Females n= 35	Z-value	
Unilateral	14.28	6.90	0.91*	14.29	14.29	0.0*	
Impaction Bilateral	25.00	34.48	0.78*	40.00	45.71	0.48*	
Total	39.78	41.38	0.12*	54.79	60.00	4.4**	
Unilateral	3.57	0.00	1.02*	2.86	0.00	1.01*	
Ageneis Bilateral	14.29	3.45	1.44*	0.00	5.71	1.43*	
Total	17.86	3.45	1.77**	2.86	5.71	0.59*	
Eruption Bilateral	42.86	55.17	0.93*	42.86	34.29	0.74*	
Normal							
Third Molar	Upper (%)			Lower (%)			
	Males n= 75	Females n= 55	Z-value	Males n= 68	Females n= 49	Z-value	
Unilateral	2.67	9.09	1.58*	4.41	6.12	0.41*	
Impaction Bilateral	13.33	23.64	1.52*	14.71	18.37	0.52*	
Total	16.00	32.73	2.24**	19.12	24.19	0.66*	
Unilateral	9.33	1.82	1.76**	5.88	16.33	1.84**	
Ageneis Bilateral	9.33	10.91	0.3*	5.88	8.16	0.48*	
Total	18.67	12.73	0.91*	11.76	24.19	1.76**	
Eruption Bilateral	65.33	54.54	1.24*	69.12	51.02	1.99**	

*If the value of Z is less than 1.69, it is not significant.

**If the value of Z is greater than 1.69, it is significant.

Table (3): The comparison of the third molar subgroups between upper and lower dental arches in crowded and normal groups

Third Molar	Males (%)			Females (%)			All Subjects (%)		
	Upper n= 28	Lower n= 35	Z-value	Upper n= 29	Lower n= 35	Z-value	Upper n= 57	Lower n= 70	Z-value
Crowded									
Unilateral	14.28	14.29	0.0*	6.90	14.29	0.94*	10.53	14.29	0.63*
Impaction Bilateral	25.00	40.0	1.25*	34.48	45.71	0.91*	29.82	42.86	1.51*
Total	39.78	54.79	1.18*	41.38	60.0	1.48*	40.35	57.14	1.88**
Unilateral	3.57	2.86	0.16*	0.0	0.0	0.0*	1.75	1.43	0.14*
Ageneis Bilateral	14.29	0.0	2.31**	3.45	5.71	0.42*	8.77	2.86	1.45*
Total	17.86	2.86	2.02**	3.45	5.71	0.42*	10.53	4.28	0.83*
Eruption Bilateral	42.86	42.86	0.0*	55.17	34.29	1.69**	49.12	38.57	1.19*

Third Molar	Males (%)			Females (%)			All Subjects (%)			
	Upper n= 75	Lower n= 68	Z-value	Upper n= 55	Lower n= 49	Z-value	Upper n= 130	Lower n= 117	Z-value	
Normal										
Impaction	Unilateral	2.67	4.41	0.61*	9.09	6.12	0.57*	5.38	5.13	0.08*
	Bilateral	13.33	14.71	0.25*	23.64	18.37	0.66*	17.69	16.24	0.3*
	Total	16.0	19.12	0.52*	32.73	24.19	0.96*	23.1	21.37	0.32*
Agenesis	Unilateral	9.33	5.88	0.83*	1.82	16.33	2.63**	6.15	10.26	1.18*
	Bilateral	9.33	5.88	0.83*	10.91	8.16	0.47*	10	6.84	0.89*
	Total	18.67	11.76	1.22*	21.73	24.19	1.51*	16.15	17.09	0.2*
Eruption	Bilateral	65.33	69.12	0.46*	54.54	51.02	0.69*	60.77	61.54	0.12*

*If the value of Z is less than 1.69, it is not significant.

**If the value of Z is greater than 1.69, it is significant.

These differences reflect the male–female characteristic confirming the findings of previous studies^(30–32) who attribute this difference to the fact that the jaws of females stop growing at the time when third molars are just beginning to erupt and consequently there is frequently insufficient space for them. In males, growth of the jaws continues beyond the time of eruption of their third molars and, therefore, fewer impactions.

Comparison between Upper and Lower Jaws

Generally, crowding in the lower jaw was more than the upper jaw. This prove the findings of previous studies^(33, 34) who attribute this difference to that the lower jaws grow forward more than the upper jaws with the lower basal bone more than the alveolar bone. If the mandibular incisors are not free to move forward due to the restraining influence of the upper arch, it is likely that they will become retroclined and consequently crowded.

No significant differences were found between upper and lower jaws in normal group except in female subjects, where the lower jaw revealed a higher percentage of unilateral agenesis than the upper jaw.

While in case of crowding, the upper jaw in the males had a higher percentage of third molar agenesis than the lower jaw; whereas in the female group, the upper jaw had a higher percentage of erupted third molar than the lower jaw. Third

molar impaction was significantly higher in the lower jaw when compared with the upper jaw for all subjects.

This finding is in agreement with Bjork⁽³⁵⁾ who said “Failure of the wisdom teeth in the lower jaw to erupt is usually associated with lack of space in the alveolar arch between the second molar and the ascending ramus”.

The results in this study indicate the differences between upper and lower jaws, which were greater in the crowded group when compared with normal group.

CONCLUSIONS

The crowded group revealed a higher percentage of impacted third molar and a lower percentage of erupted third molar particularly in the lower jaw than the normal group. In addition, for the lower jaw, the crowded group showed a smaller percentage of third molar agenesis than the normal group for the males, females and total subjects.

The females had a higher percentage of impacted third molar particularly in the lower jaw in crowded group and in the upper jaw in normal group than the males. While the males had a higher percentage of third molar agenesis especially in the upper jaw for crowded group and in the lower jaw for normal group. Also, the male revealed a higher percentage of eru-

pted third molar than the females in the lower jaw for normal group.

In normal group, no significant difference was found between upper and lower jaws except in female subjects where the lower jaw had a higher percentage of unilateral third molar agenesis. While in crowded group, the upper jaw in male subjects had a higher percentage of impacted third molar than the lower jaw, whereas the upper jaw in the females had a higher percentage of erupted third molar than the lower jaw. Third molar impaction was significantly higher in the lower jaw when compared with the upper jaw for the total subjects.

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