

Prevalence of third molar impaction in patient with mandibular anterior teeth crowding

Tan Chun Wei*, Eky Soeria Soemantri*, Iwa Rahmat Sunaryo*

Department of Orthodontics, Faculty of Dentistry, Universitas Padjadjaran, Indonesia

ABSTRACT

Introduction: Third molar impaction has been a controversial topic among clinician when it comes to mandibular anterior teeth crowding. The aim is to know the prevalence of third molar impaction in patient with mandibular anterior teeth crowding in Orthodontic Department, Dental Hospital Universitas Padjadjaran (RSGM UNPAD), Indonesia. **Methods:** This was a descriptive research, with non-probability sampling obtained from a population with full arch 32 teeth. Totalling 54 samples from year 2011 to 2014 were obtained. The age of sample range from 15 to 25 years old. Also all panoramic radiographs taken from the year 2011 to 2014 were examined using a computer. The position of third molars were determined by Winter's classification using angle formed between the intersected longitudinal axes of the second and third molars and anterior teeth status by using Little's irregularities index. **Results:** This study obtained data that as much as 68.52% mesioangular third molar, 19.44% distoangular, 4.63% horizontal, 1.85% buccolingual, and 0% others. In mesioangular impaction condition there was crowding 83.78%, in distoangular condition there was 100% crowding, in horizontal position crowding found 100%, while at buccolingual crowding found 100%. **Conclusion:** In mesioangular impaction condition there was crowding 83.78%, in distoangular condition there was 100% crowding, in horizontal position crowding found 100%, while at buccolingual crowding found 100%. In all positions the third molar impaction was accompanied by crowding of the mandible anterior teeth, with the largest percentage of impaction was the mesioangular position.

Keywords: prevalence; impacted third molar; anterior teeth crowding; panoramic radiograph

INTRODUCTION

It is a pathological condition that the impacted tooth cannot or will not erupt into its normal functioning position. Also, it have shown by some research works that impacted third molar weakens the angle of mandible and susceptible to fracture and is implicated in the etiology of lower arch crowding, Temporomandibular joint (TMJ) disorders, vague orofacial pain and neuralgias.¹

In modern populations, the prevalence of third molar impaction is higher than other teeth and mandibular third molar is by far the most frequently impacted tooth after the maxillary third molar.²⁻⁴ The reason for this is probably they are the last teeth erupting into the dental arch therefore the chance of space deficiency for their eruption is high.⁵ In addition, third molar varies more than the other molars in terms of shape, size, timing of eruption, and even tendency toward

Corresponding author: Tan Chun Wei, Department of Orthodontic Faculty of Dentistry Universitas Padjadjaran. Jl. Sekeloa Selatan No. 1 Bandung, West Java-Indonesia, Phone/Fax: +6222-2504985, Email: tcwei94@hotmail.com

impaction.⁶ Studies found that females are earlier in the root development of other permanent teeth, while males are earlier in the case of third molar.⁷ A study stated that the frequency of third molar impaction was quite high with 84% in age group of 15-25 years, this maybe due to coincidence of this age with third molar eruption and initial complaints are usually encountered during eruption phases.⁸

A case report from Libyan population, the distribution of impacted third molars in angulation classification showed that mesioangular impaction was the most frequent (34.6%) followed by vertical (31.3%) and distoangular (27.7%). Besides, there were significantly more mesioangular impactions in the mandible (78.5%) and more distoangular (66.9%) and vertical (56.4%) impactions in the maxilla.⁹ Mesioangular impactions are probably the most common type and this may be due to their late development and maturation, path of eruption and lack of space in mandible at later age.¹

A study result from Sidlauskas¹⁰ indicated that general lower dental arch crowding is an essential feature of the completed permanent dentition with 90% cases of space lacking. However, some tendency for crowding in the anterior part of lower dental arch was more expressed in the group with third molars, than with agenesis.¹⁰

Based on the problems of impaction and crowding that are commonly found, the purpose of this study was to obtain prevalence data in patients with molar third impaction and crowding mandibular anterior teeth. The data can be used as a study material for prevention of occurrence of impaction and crowding, as well as become a consideration in crowding and malocclusion managment accompanied by third molar impaction.

METHODS

This was a descriptive research, with non-probability sampling obtained from a population with full arch 32 teeth. Totaling 54 samples from year 2011 to 2014 were obtained include models and panoramic radiograph. The age of sample range from 15 to 25 years old. The position of third molars were determined by Winter's classification using angle formed between the intersected longitudinal axes of the second and

third molars and anterior teeth status by using Little's irregularities index. Datas were collected in the form of secondary data from Orthodontic Department of *Rumah Sakit Gigi dan Mulut* (RSGM), Universitas Padjadjaran, Indonesia. All panoramic radiographs taken from the year 2011 to 2014 were examined using a computer. The sampling method used is the non probability sampling technique, based on the selection criteria. The sample for this research include age between 15 to 25 years old, patients with 32 full arch teeth and present with clear anatomical landmark and good exposure. Exclusive criteria include those who with systemic disease that alter the lower jaw growth development.

The impacted third molars were recorded based on Winter's classification. According to the position of impacted third molars to the long axis of the second molar, classification was done as mesioangular, horizontal, vertical, distoangular, and those rare angulations are classified in others. Measurement of angulations of third molars were



Figure 1. Measurement of angulation of third molar on panoramic radiograph to determine the classification of impacted teeth.¹¹



Figure 2. Measurement of anatomic contact points of each mandibular incisors to determine mandibular anterior teeth crowding.¹²

determined by tracing panoramic radiographs using digital protractor by the angle formed between intersected longitudinal axes of the second molar and the third molar (Fig.1).

The examination of mandibular anterior teeth crowding was done by using the Little's irregular index, a scoring method that involve measurement of 5 liner displacement (labio-lingually) of anatomic contact points of each mandibular incisor from the adjacent tooth. Five displacements from the mesial aspect of the right canine to the mesial aspect of left canine were examined.

The measurements were obtained directly from the mandibular cast. Caliper was held parallel to the occlusal plane (Fig. 2). Each of the five measurements represents a horizontal linear distance between the anatomic points of the adjacent teeth. Scoring were given for each patient cast according to Little's irregularity index, 0 for perfect alignment, 1-3 for minimal, 4-6 moderate, 7-9 severe and 10 for very severe. So index more than 0 was considered crowding.

RESULT

Table 1 shows the percentage of male and female samples that were included for this research. Based on Table 1. 68.52% of the sample were female whereas 31.48% of the sample were male. The ratio for gender is around 2:1 female: male.

Table 1. Sample mean, percentage and standard deviation according to gender.

| Gender | Mean | N | Percentage | Sd |
|--------|-------|----|------------|--------|
| Female | 20.54 | 37 | 68.52% | 2.4449 |
| Male | 19.06 | 17 | 31.48% | 2.6192 |
| Total | 20.70 | 54 | 100% | 2.6916 |

Table 2. Frequency of impaction status in patients.

| Impaction Status | Frequency | Percent (%) |
|------------------|-----------|-------------|
| Mesioangular | 74 | 68.52 |
| Distoangular | 6 | 5.56 |
| Vertical | 21 | 19.44 |
| Horizontal | 5 | 4.63 |
| Others | 0 | 0 |
| Buccolingual | 2 | 1.85 |
| Total | 108 | 100 |

Within all the patients, mesioangular occupy 68.52%, 19.44% for vertical, 5.56% distoangular, 4.63% horizontal, 1.85% for buccolingual and 0% for others, as seen at table 2 below.

Table 3 shows the frequency of anterior teeth status in patients in orthodontic department of RSGM Unpad, Indonesia. Of all the patients, crowding occupy the most with 87.03%, 7.41% for normal, 5.56% for anterior crossbite and 0% for spacing. Male has higher anterior crossbite than female with 11.76% over 2.70%. Female also has higher normal status than male with 8.11% over 5.88%.

Table 4 shows distribution of third molar impaction in Orthodontic Department of RSGM Unpad, Bandung, with mandibular anterior teeth crowding. Within all the anterior teeth status, crowding occupy the most in all type of third molar impaction. The mesioangular impaction patient who also has anterior teeth crowding were 83.78%, vertical impaction with anterior crowding occupy 90.48%, distoangular has 100% crowding, horizontal occupy 100% crowding and buccolingual 100% crowding.

Table 3. Frequency of anterior teeth status in patients in Orthodontic Department of RSGM.

| Anterior teeth status | Frequency | Percent |
|-----------------------|-----------|---------|
| Crowding | 47 | 87.03% |
| Normal | 4 | 7.41% |
| Anterior Crossbite | 3 | 5.56% |
| Spacing | 0 | 0% |
| Total | 54 | 100% |

Table 4. Distribution of third molar impaction with mandibular anterior teeth crowding in patients in Orthodontic Department of RSGM.

| | Frequency | Crowding |
|--------------------------------|-----------|-------------|
| Vertical (10° to -10°) | 21 | 19 (90.48%) |
| Mesioangular (11° to 79°) | 74 | 62 (83.78%) |
| Horizontal (80° to 100°) | 5 | 5 (100%) |
| Distoangular (-11° to -79°) | 6 | 6 (100%) |
| Others (110° to -80°) | 0 | 0 (0%) |
| Buccolingual | 2 | 2 (100%) |

The distribution of third molar impaction position, were seen in Table 4. In vertical impaction there were 90.48% of them experiencing crowding, while in mesioangular position there was 83.78%. Horizontal, distoangular, buccolingual and other impaction showed 100% with crowding on mandibular anterior teeth.

DISCUSSION

The incidence of third molar impaction is higher than other teeth and mandibular third molar is by far the most frequently impacted tooth after the maxillary third molar, their account for 98 per cent of all impacted teeth.²⁻⁴

Several mechanisms have been suggested to explain the aetiology of third molar impaction, these include: impaction of third molar occurs as a result of retardation of facial growth, shortage of space in the third molar region, vertical direction of the condylar growth associated with low resorption of the anterior border of the ramus, the distal direction of the eruption of the other teeth, low mandibular growth rate resulting in a reduction in the length of the jaws, early physical maturity, and late third molar mineralization.^{2,13-15} But the main reason for this is probably they are the last teeth erupting into the dental arch therefore the chance of space deficiency for their eruption is high.⁵

According to the analysis in this study, both male and female, mesioangular occupy the most impaction based on Winter's classification. The reason for this may be due to their late development and maturation, path of eruption and lack of space in mandible at later age.¹ Beside mandibular growth, tooth bud angulation also take part, typically tooth bud is mesially angulated and with the variation growth, some third molar might experience increased mesial angulation during early and late adolescence.¹⁶

These data has the same pattern to some research study in which 62.9% of mesioangular impaction studied by Kruger et al. 60% by Quek et al. and 50% by Hattab et al. and the second most impacted classification is vertical which occupy 19.44% which same pattern with Hattab et al. 34% and Kruger et al. 11.9% but different with Quek et al. being 9.5%, less than horizontal impaction. Distoangular and horizontal impaction

hold almost same amount which are 5.56% and 4.63% in this study, same pattern with Hattab et al. with distoangular 5% and horizontal 5%, a bit less on Kruger et al. with distoangular 1.4% and horizontal 1% and a bit higher on Quek et al. with distoangular 9.8% and horizontal 17.6%.¹⁷⁻¹⁹

In this study, the frequency of female in number of impaction is higher than male, the reason for this maybe 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, the growth of the jaws continues during the time of eruption of the third molars, creating more space for third molar eruption.²⁰

In the reference of Winter's classification and based on the order from most to the least in this study, mesioangular is the most followed by vertical, distoangular, horizontal, buccolingual and others but in male left mandibular being the only one exception with horizontal more than distoangular. The reason being the exception might be the little samples in the horizontal and distoangular compared to the main impaction such as mesioangular and vertical as there is no data on the male right mandibular horizontal and male left mandibular distoangular. There is no data obtained on others category in both male and female as well and there is only two buccolingual impaction measured, both are in the same female on both sides and none for male.

A study indicated that general lower dental arch crowding is an essential feature of the completed permanent dentition with 90% cases of space lacking.¹⁰ Based on this study, crowding occupy the most anterior teeth condition pattern both in female (89.19%) and male (82.35%), with total 87.03% occupy the whole population. In normal condition, female occupy 8.11 % and male slightly lower, 5.88%, and 7.41% in total. In anterior crossbite, female hold 2.70% and male 11.76% slightly higher, and 5.56% total calculation in both female and male. There is no spacing data measured in this study. It is apparent that if dental arch dimensions are reduced, dental crowding must increase. Factors responsible for dental arch reduction may vary from one person to another, and many factors, acting together or at different stages of development, may contribute to lower dental arch crowding.¹⁰

CONCLUSION

In mesioangular impaction condition there was crowding 83.78%, in distoangular condition there was 100% crowding, in horizontal position crowding found 100%, while at buccolingual crowding found 100%. In all positions the third molar impaction was accompanied by crowding of the mandible anterior teeth, with the largest percentage of impaction was the mesioangular position.

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