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Original Research Article

Prevalence of Impacted Mandibular Third Molar and its Relationship Based on Pell & Gregory Classification

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Abstract:

Objective: Tooth impaction arises due to insufficient space in the retromolar. Impaction of third molar teeth can cause various oral health problems, such as discomfort when chewing, caries, periodontal disease, TMJ disorder, root resorption and even cysts in the jaw. The prevalence of impacted teeth worldwide varies between 16.7% and 68.8%.

Research Method: pictorial review using consecutive sampling methods. The impaction class relationship was carried out Chi square test to see the impaction class relationship on teeth 38 and 48.

Results: The prevalence of third molar tooth impaction is more prevalent in women and dominates in the age group of 21-30 years. Based on the classification according to Pell & Gregory, the highest prevalence among 48 region is class 1, whereas among 38 region is class 2. From the chi square test, the result was $p = 0.000$ ($p < 0.05$), demonstrating a statistically significant association between region 38 and 48 in class 1, 2 and 3.

Conclusion: There is a relationship between the impaction class of the left and right mandibular third molar. Knowledge of the impaction class of third molar teeth can minimize post odontectomy complications.

Keywords: mandible, third molar, Pell & Gregory impaction classification

Introduction

Impaction from a Latin word,"impactus" which can be interpreted as trapped. In general, the term is used to describe a condition where an organ or body structure is fails to achieve its proper position due to abnormal mechanical interference . Durbeck WE define tooth impaction as incomplete eruption of the tooth, caused by a physical obstruction (which can be detected by clinical or radiologic examination) in the direction of tooth eruption or by an ectopic tooth position. This obstruction may be a neighboring tooth, solid bone, fibrous tissue, other pathology, lack of space, or an abnormal eruption path direction[1].

Impaction of third molar teeth can cause various problems in the oral cavity, including pain and discomfort around the gums and jaw, inflammation of the gums (gingivitis) and soft tissues, infection of the tooth and surrounding tissues (abscess), damage to adjacent teeth, changes in the

position of teeth and disrupting normal occlusion (bite) to the formation of cysts or tumors which are rare but can occur in severe cases[2].

The cause of impaction is unknown, but is thought to be multifactorial. In principle, the problem of tooth impaction arises due to insufficient space in the retromolar. The growth of the mandibular ramus is associated with bone resorption on the anterior and deposition on the posterior surface, in some cases the imbalance in this process results in insufficient space for the eruption of the third molar. Based on previous studies, the prevalence of tooth impaction varies across regions of the world and the highest incidence of impaction occurs in third molars[3]. A study in Hong Kong showed the prevalence of third molar impaction was 27.8%, in Japan it was 24.3%, Korea was 53.9%, Yamen was 38.8%, Iran was 23%, while in Saudi Arabia it was 23%[4].

Surgical intervention termed as odontectomy is performed to remove the impacted third molar. Assessment of the difficulty of odontectomy can be evaluated based on the classification of tooth impaction. The impaction classification can be made based on radiographic examination which will give an idea of the level of difficulty of extraction. One of the most commonly used classifications of tooth impaction to determine the classification of teeth using parameter in the form of position and direction of tooth growth is using the Pell and Gregory technique [3,5].

Based on this finding, the author wants to know the comparison of the prevalence of impaction of third molar teeth on the left and right mandible based on 75 panoramic x-rays in patients of the Oral Surgery Clinic, Dr. Drajat Prawiranegara Hospital. With this understanding and knowledge related to the prevalence and distribution pattern of impaction of mandibular third molar teeth, it is hoped that it can be a reference and make it easier for dentists to do odontectomy so as to minimize the occurrence of complications after the procedure.

Research Methods

The design of this study was a pictorial review using 75 panoramic x-rays or Orthopantomogram (OPG). Samples in this study were taken using consecutive sampling technique with the following criteria: patients of Oral Surgery Department of Dr Drajat Prawiranegara Hospital from 2023-2025, 20 years old or older, have no abnormalities in the mandible and dentition, never have experienced trauma in the jaw and teeth.

The third molar impaction classification used in this study is the Pell & Gregory impaction classification. 75 Panoramic X-rays will be observed to determine the impaction classification. Pell & Gregory's classification based on the space relationship between the second molar and the anterior border of the mandibular ramus consists of class 1 (enough space), class 2 (less space) and class 3 (no space). The data was then processed and analyzed by performing the Chi Square Test using IBM SPSS Statistics version 29.0.2.0.

Results

Table 1 presents data on the characteristics of sample. In this study, it was found that impaction was more prevalent in the female gender, 41 people (54.7%), compared to men who consisted of 34 people (45.3%). When viewed from the age grouping, the most impaction occurred in the age range of 21-30 years, as many as 36 samples (48%), while for the 31-40 age group there were 31 samples (41.3%) and the least occurred at the age of over 41 years, which consisted of 8 (10.67%) of the 75 total samples.

Table 1: Characteristics of the study sample (n=75)

Characteristics	n	(%)
Gender		
Male	34	45,3
Female	41	54,7
Age Group		
21-30	36	48
31-40	31	41,3
>41	8	10,67

Table 2 describes the distribution of impaction of teeth 38 and 48 based on class according to the Pell & Gregory classification. Class 2 impaction is the most common impaction in tooth 38, which is 44%, followed by class 1 as much as 33.33% and the least occurred in class 3 as much as 10.67%. For the regio 48, the most common impaction was class 1 as much as 41.33% and the least class 3 impaction occurred with a sample of 12%. A total of 84% of the total sample experienced impaction on both the right and left sides of the mandible. Bilateral impaction of class 1 and 2 together amounted to 20 samples of the total sample. Grade 3 impaction that occurred in both regions, teeth 38 and 48, only occurred in 6 of the total samples of this study. In Table 3, you can see the results of the chi square test performed on the impaction that occurred in teeth 38 and 48 based on the class according to the Pell & Gregory classification. Chi square test results on impaction based on classes 1, 2, and 3 show the same statistically significant relationship between teeth 38 and 48.

Sample frequency by grade, according to Pell & Gregory

Table 2:

	38		48		38 and 48	
Class	n	(%)	n	(%)	n	(%)
Class 1	25	33,33	31	41,33	20	26,67
Class 2	33	44,00	23	30,67	20	26,67
Grade 3	8	10,67	9	12,00	6	8,00

Table 3: Relationship of impaction of teeth 38 and 48 based on class according to Pell & Gregory

	Chi Square test of regions 38 and 48
Variables	P-value
Class 1	0,000
Class 2	0,000
Class 3	0,000

Discussion

The mandibular third molar is the last tooth to erupt. The timing of the third molar tooth eruption is different for each individual. Impaction that occurs in the mandibular third molar is usually associated with root resection, caries, pain and swelling6. Etiological factors of tooth impaction are lack of eruption space, facial growth retardation, premature physical maturity, late mineralization of third molar teeth, physical or mechanical barriers to healing such as tissue injury, fibromatosis, bone density, odontogenic cysts or tumors. The high incidence of impaction can also occur due to an imbalance of bone deposition and resorption in the mandibular ramus area,

resulting in a reduction in mandibular angulation[7].

The prevalence of third molar tooth impaction worldwide varies between 16.7% and 68.8%. This condition is a dental health problem that affects most of the human population in the world[8]. The results of this study showed that the prevalence of mandibular molar tooth impaction was more prevalent in female patients (54.7%), compared to male patients (45.3%). The results of this study are in line with studies conducted by Kaomongkolgit R and Tantanapornkul W [9], Braimah R et al [10], Ahmad P et al [11], Santos K et al [6], and Jaron A and Trybek G [12]. The higher frequency of third molar impaction in females may be attributed to differences in growth patterns between females and males. Females have a shorter mandibular growth duration than males. The skeletal growth pattern of females is rapid and short, whereas in males it is slow but lasts longer. Unlike men who continue to experience jaw expansion during a third molar eruption, women's jaw growth will stop when the third molar begins to erupt, so the space for a third molar eruption will be more limited[3,10,13].

Based on the age group, patients with the age range of 21-30 were the patients with the most third molar impaction cases in this study, the same results were also found by Braimah R et al [10], Adeola O et al [14], Rizqiawan A et al [15] and Shajahan [16], where this age range is the period of eruption and root formation of the third molar teeth has been completed. The high prevalence in this age range indicates that mandibular third molar impaction cases often occur in late adolescence to young adulthood [10,14] . In other studies, such as Kumar MP [17], the highest prevalence occurred in the age range of 20-40 years, while research in the Malaysian population by Shareif M et al [18] prevalence of mandibular third molar impaction occurred mostly in the age range of 28-33 years. From some of the results of this study it can be proven that the prevalence of mandibular third molar impaction will decrease with increasing patient age.

Research conducted by Shqra A et al [19] in the Syrian community, Idris A et al [20] in the Jazan community and Patel S et al [21] showed the prevalence of left third molar impaction cases was higher than the right. This is similar to the results of our study, where the incidence of third molar impaction on the left mandible is higher than the right side. The most prevalent classification of mandibular third molar impaction in this study was found to be class 2 of the Pell & Gregory classification. Some other studies that show similar results include Zain-Alabdeen E [22], Passi D et al [23], Lima D et al [24], Eshghpour M et al [25], and Shaari R et al [26].

Many theories have been proposed regarding the etiology of mandibular third molar impaction incidence. One of them is the lack of development of the retromolar space. In the growth of the mandibular ramus, if there is an imbalance between the process of anterior resorption and posterior deposition, the mandibular third molar does not get enough room to erupt. The eruption process and changes in position after the eruption of the third molar can be influenced by several factors including ethnicity, diet, intensity of the mastication process and genetics. [2]

Chi-square test between mandibular third molar tooth impaction and Pell & Gregory classification in all impaction classes, namely classes 1, 2 and 3 obtained a p-value of 0.000 ($p < 0.05$). These results indicate that the degree of impaction of teeth 38 and 48 is highly dependent on the anatomical position based on Pell & Gregory Class. Pictorial review in the form of panoramic radiographs can clarify the distribution pattern of third molar tooth impaction. Thus, the classification of impaction class according to Pell & Gregory can be a relevant predictor in performing odontectomy action plans and the risk of complications of third molar impaction.

Conclusions

The prevalence of mandibular third molar impaction in this study population was more in female patients (54.7%), occurred in the age group 21-30 (48%) and class 2 impaction was most prevalent in tooth 38 (44%) while class 1 was most prevalent in region 48 (41.33%). Chi square test between teeth 38 and 48 against impaction class showed significant results with a p-value = 0.000 ($p<0.05$). Knowledge of the impaction class of third molar teeth can facilitate action and minimize complications after odontectomy.

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