Original Article

Assessment of Different Patterns of Impacted Mandibular Third Molars and their Associated Pathologies

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Abstract

Background: The most common impacted tooth is mandibular third molar. The knowledge and assessment of its different angulations, positions, patterns and their associated pathologies help the surgeons not only to decide about the prophylactic removal of impacted mandibular third molars but also help in better management planning for the associated pathologies. Objective: To enlist different patterns of mandibular third molar impactions and their associated pathologies in patients presenting at a tertiary care centre. Material and Methods: A total of 250 patients with 393 impacted mandibular third molars were assessed by history, clinical and radiographic examination. Patterns of mandibular third molar impactions and associated pathologies were assessed by classification systems developed by Winter and Pell & Gregory on periapical and panoramic radiographs. Results: The most frequent pattern of impaction was mesioangular (37.6%), with Class II ramus relation (53.2%) and Position A depth (62.8%). A total of 329 pathologies were seen in 250 patients. Dental caries (38.53%), followed by pericoronitis was the most common (29.36%). The overall frequency of cysts and tumours with impacted mandibular third molars was low. Conclusion: Third molars with the unfavourable angulations, patterns and positions should be removed prophylactically to prevent the patients from associated pathologies. Key Words: Impacted third molar, dental caries, pericoronitis, odontogenic cysts, odontogenic tumours.

Mandibular third molars may acquire a range of patterns and positions and can lead to diverse pathologies. Clinical and radiographic examinations not only facilitate to classify these teeth but also help to diagnose and differentiate different pathologies associated with them. Pericoronitis is the most common followed by dental caries of third molar or adjacent second molar. There could also be root resorption of second molar, periodontal problems, odontogenic cysts and tumours etc (Figure 1a-i).9-11 Pericoronitis is an acute inflammatory

Introduction

Impacted teeth are those which fail to erupt in dental arch within expected time.1,2 Any tooth may become impacted but the most common are mandibular third molars. The tooth may become impacted because of adjacent teeth, dense overlying bone or soft tissue, lack of space in the jaw, aberrant path of eruption, abnormal positioning of tooth bud or pathological lesions etc.3-5 Mandibular third molars erupt at 17 to 21 years age and frequency of impaction is more in mandible than maxilla, with significantly higher frequency in females than males.2,4,6-8,24,36
condition associated mostly with partially erupted mandibular third molars.\(^1\)\(^2\)\(^3\)\(^4\)\(^5\) Clinical features include pain, swelling, limited jaw opening, difficulty in swallowing, fever, malaise and lymphadenopathy.\(^6\)\(^7\) Position of third molars in jaw and their occlusal anatomy with deep occlusal fissures favours the accumulation of biofilm on tooth and leads to dental caries. Impacted mandibular third molars that contact cemento-enamel junction of second molar place this tooth at risk of distal cervical caries.\(^8\) Impacted third molars cause root resorption of second molar due to pressure from eruptive effort of third molar and chemical mediators secreted by reduced enamel epithelium. Moreover, impacted third molar decreases the amount of bone on distal aspect of second molar and leads to periodontal defect which is difficult to manage. In these situations, prophylactic removal of impacted tooth can benefit dental health of patient.\(^9\)\(^10\)\(^11\)\(^12\)\(^13\)\(^14\)\(^15\)\(^16\)\(^17\) When impacted teeth are retained within alveolar process, associated follicular sac is also retained. Odontogenic tissue surrounding the impacted teeth has potential to differentiate into a variety of tissue types and may lead to cyst or tumour formation.\(^11\)\(^16\) The universal recommendation is to consider each case individually to balance the benefits and risks of retention versus extraction of impacted third molar. Furthermore, where non-extraction strategy is adopted, long-term clinical and radiographic follow up should be maintained, so that surgical intervention can be instituted if some pathology starts to develop.\(^17\) There are several studies about impacted teeth both in national and international literature but relatively a few articles about their associated pathologies. The present study will elucidate on pathologies associated with different patterns of mandibular third molar impaction. This in turn will help to prioritize treatment in patients with such patterns and rationalize decision making in relation to removal of impacted third molar.

**Materials and Methods**

This case series was conducted over a six months period from October 2012 to March 2013 in the Department of Oral and Maxillofacial Surgery, de’Montmorency College of Dentistry/Punjab Dental Hospital, Lahore, Punjab, Pakistan. Ethical approval was taken from the Institution. A total of 250 patients having 393 impacted mandibular third molars were selected for the study.

**Inclusion criteria**

Complete root formation of impacted mandibular third molars, patients with chief complaints related to impacted mandibular third molars or their associated pathologies and ASA I (American Society of Anaesthesiologists).

**Exclusion criteria**

Patients younger than 20 years, presence of maxillofacial trauma, any systemic or craniofacial anomaly or syndrome (e.g. Down syndrome, cleiodo-cranial dysostosis) and absence of mandibular second molar.

**Assessment of impaction**

The assessment of angulations, patterns and positions of impacted mandibular third molars and their associated pathologies was done by detailed relevant history, clinical examination and radiographs i.e. peri-apical and panoramic views. Angulation of impacted mandibular third molars was assessed by Winter’s classification and teeth were labeled as mesioangular, distoangular, vertical or horizontal and other impactions (buccal, lingual or transverse). Pattern and position of impacted third molar was documented according to Pell and Gregory classification. If space between anterior border of ramus and distal surface of
second molar was sufficient, it was labeled Class I. If space was less than mesiodistal diameter of impacted tooth, it was termed Class II. A tooth completely into ramus was assigned Class III. A third molar with its highest part at level of occlusal plane of second molar was assigned position A. In position B, impacted tooth was between occlusal plane and cervical margin of second molar while a tooth below cervical margin was labeled position C.

Clinical, radiographic and histopathological variables

For each patient, a number of variables were recorded including demographic details (age and sex), side (right or left), type (mesioangular, distoangular, vertical, horizontal), pattern of impaction (class I, II, III or position A, B, C) and associated pathologies (dental caries of second or third molar, pericoronitis, periodontal defect, root resorption of second molar). Definitive diagnosis of cysts and tumours was made from histopathological report of specimen taken while removing the impacted third molars.

Statistical analysis

All the data were collected in a specially designed proforma and entered in SPSS version 16 to analyze through its statistical package by using Chi Square test. The data were presented as proportion and percentage. The variables were also presented in tables and graphs.

Results

A total of 250 patients having 393 impacted mandibular third molars were included in the study. The age range was of 20 to 65 years. The highest number of patients having impacted third molars was of 20-25 years, followed by 26-30 years. There was a uniform decline in number of patients with increasing age (Figure 2). A predilection was noted for right-sided impacted third molars (54%). There were 143 patients (57.2%) having bilateral impacted mandibular third molars while 107 patients (42.8%) having unilateral impacted third molars. Our findings showed a male preponderance (54%) for impacted mandibular third molars. According to Winter’s classification, the highest number of patients were with mesioangular impactions, followed by vertical, distoangular and horizontal (Figure 3). More than half of the patients had impacted mandibular third molar with ramus relationship of class II according to Pell and Gregory classification followed by class I and class III. More than half of the patients had impacted mandibular third molar at position A depth, followed by position B and C (Figure 4).

A total of 329 pathologies were seen in 250 patients who presented for removal of impacted mandibular third molars. Twenty two patients had asymptomatic third molars. The most frequent reason for extraction of third molar was dental caries in adjacent second molar or third molar itself followed by pericoronitis. Periodontal problem was also a frequent reason for extraction of third molar (Figure 5). The distribution of pathology according to age was analyzed. Caries was the biggest reason for extraction in all age groups, except in 31-35 years, where pericoronitis formed a more frequent reason. Impacted third molars in distoangular angulation were mostly involved with pericoronitis. Root resorption was mostly seen in horizontally angulated third molars. Caries in adjacent second molar or third molar itself was caused by mesioangular and vertical angulation (Table I). The highest number of pathologies was seen in impacted third molars with class II ramus relationship. Caries was main pathology in patients having impacted molar in class I relationship. Ninety-seven of 147 symptomatic third molars in position A had caries in adjacent second molar or third molar itself. The most frequent pathology of impacted molars in position B was pericoronitis. There was no statistically significant relation between angulation, ramus relation or depth of impaction with age and gender (p>0.05).
Figure 1a: Pericoronitis around impacted left mandibular 3\textsuperscript{rd} molar

Figure 1b: Pericoronitis and dental caries associated with impacted 3\textsuperscript{rd} molar

Figure 1c: Extracted 3\textsuperscript{rd} molar of patient in Fig. 1b with prominent carious lesion.

Figure 1d: Dental caries in impacted mandibular 3\textsuperscript{rd} molar

Figure 1e: Dental caries in impacted 3\textsuperscript{rd} molar; radiograph of patient in Fig. 1d.

Figure 1f: Distal caries of mandibular 2\textsuperscript{nd} molar due to impacted 3\textsuperscript{rd} molar

Figure 1g: Root resorption of mandibular 2\textsuperscript{nd} molar due to impacted 3\textsuperscript{rd} molar

Figure 1h: Periodontal disease due to mesio-angular impacted 3\textsuperscript{rd} molar

Figure 1i: A radiolucent pathological lesion associated with impacted 3\textsuperscript{rd} molar

Figure 2: Distribution of patients; age wise

Figure 3: Distribution of patients; angulation wise
Table I: Distribution of Pathology; Angulation wise  (n=250, pathology = 329)

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Distoangular</th>
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<th>Vertical</th>
<th>Mesioangular</th>
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<td>Asymptomatic</td>
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<td>7</td>
<td>7</td>
<td>4</td>
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<tr>
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<td>11</td>
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<td>63</td>
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<tr>
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<td>1</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Infection</td>
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<td>-</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Pericoronitis</td>
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<td>4</td>
<td>26</td>
<td>21</td>
<td>-</td>
<td>96</td>
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<td>Periodontal problem</td>
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<td>-</td>
<td>19</td>
<td>18</td>
<td>-</td>
<td>42</td>
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<tr>
<td>Root resorption</td>
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<td>13</td>
<td>-</td>
<td>13</td>
<td>-</td>
<td>26</td>
</tr>
<tr>
<td>Tumour</td>
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<td>-</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>38</td>
<td>92</td>
<td>126</td>
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Chi-square tests was applied, P <0.001 i.e. statistically highly significant

Discussion

Symptoms associated with impacted teeth are one of the common complaints of patients presenting to oral surgeons for treatment. The removal of impacted third molars is a frequently performed dento-alveolar surgical procedure worldwide and also at minor oral surgery clinic of de’Montmorency College of Dentistry/Punjab Dental Hospital, Lahore, Punjab, Pakistan. The present study was conducted on patients over 20 years, because by this age, one can differentiate more reliably if third molar has insufficient space or is improperly positioned or its root formation has completed. Though the literature holds a significantly higher frequency of impacted third molars in females, the findings of current study showed a slight male preponderance (54%). These observations are not in favour of Hellman’s theory which states that jaws of females stop growing when third molars just begin to erupt, whereas in males growth of jaws continues beyond the time of eruption of third molars resulting in decreased incidence of third molar impactions in males compared to females. People in their third decade of life were seen with highest percentage of impacted third molars (Figure 2). Mesioangular impactions were the highest
number of impacted mandibular third molars, followed by vertical, distoangular and horizontal angulation. About 53% patients had a ramus relationship of class II, followed by class I and class III. About 62.8% patients had impacted third molar placed at position A depth, followed by position B and C. These findings closely match the national and international studies.\textsuperscript{2,4,9,10,20-26}

A total of 329 pathologies were seen in 250 patients who presented for extraction of impacted mandibular third molars. The most frequent reason for extraction of third molar was dental caries in adjacent second molar or third molar itself (38.53%), followed by pericoronitis (29.36%) and periodontal problem (12.84%). These findings are different from other studies done in Pakistan where pericoronitis was 48.5% in Peshawar\textsuperscript{36} and 53% in Lahore\textsuperscript{37}. Pericoronitis, being an acute problem, draws the patient’s attention to hospital consultation more than other symptoms associated with impacted third molar.\textsuperscript{27} The reason that pericoronitis was seen to be the second common and not the most common complaint for extraction of third molars in the current study could be the appointment schedule protocol of our department. Moreover, our department is the biggest treatment centre of surgical dento-alveolar problems in the province of Punjab and a very high number of patients with impacted third molars are referred from different primary care centers or private clinics. The acute problem may resolve up till the patient visited our centre for extraction of impacted third molar. This could also be a reason that we encountered a substantial number of patients with asymptomatic impacted third molars in the current study. The higher proportion of patients having caries in the present study can be attributed to lack of oral health measures taken by the population under study. Periodontal disease formed the third common pathology in the present study (12.84%) This is relatively higher percentage than other studies. The most important finding was that a periodontal probing depth of more than 5 mm on second molars was significantly associated with an adjacent visible third molar.\textsuperscript{28,29,30}

In the present study, 6.73% of teeth were asymptomatic and removed due to prophylactic reason which is also a little bit different finding than certain other studies.\textsuperscript{27}

Only 1.83% of pathologies in our study were fascial space infections due to impacted mandibular third molars. This is quite low as compared to the literature.\textsuperscript{27,31} This can be due to the fact that patients in the current study exhibited better clinic attendance and timely appointment for primary care. Most of the studies in the literature showed very low prevalence of cyst and tumour development associated with impacted third molar. This information is used to support the rationale for no treatment of asymptomatic impacted teeth.\textsuperscript{13,27,32,33} Only a small percentage of current study comprised of radiographic cystic changes (1.83%) or tumour (0.92%). This could be due to the fact that teeth with pathological process (e.g. odontogenic cysts or tumours) take longer to make a third molar symptomatic and patients present at later age for removal of lesion and third molar. However, the highest numbers of cystic lesions were seen in patients of third decade of life. This could be a justification for prophylactic removal of impacted mandibular third molars in certain patients.\textsuperscript{13,32,33}

Interestingly, the highest proportion of asymptomatic third molars were seen to have a horizontal angulation, which may suggest that if there is an adequate depth and distance from adjacent second molars, these horizontally angulated impacted teeth may remain disease free.\textsuperscript{27,33} Caries was most frequently present in patients who exhibited position A depth along with pericoronitis. Pericoronitis was more often seen in patients with positions A and B, because these depths are generally
associated with soft tissue impaction forming a cuff of gingiva over partially erupted molars. Similarly, pericoronitis manifested most commonly in class II impacted molars, which is probably because they are half visible in the mouth with an operculum and do not have a good inter-cuspation with maxillary counterparts. Erupted maxillary third molars may further aggravate infective process in the operculum by constantly traumatizing soft tissue. Partial or submucosal impaction is a significant risk factor for acute pericoronitis in impacted mandibular third molars. All of the impacted third molars which showed an associated tumour growth or cystic change displayed position C depth. But it may not indicate a true depth because of tumour or cyst related displacement resulting in an increased depth.

**Conclusion:** Impaction of mandibular third molars was most commonly seen in patients in their third decade of life. The most common pattern of impaction was mesioangular, with position A depth and class II ramus relation. Dental caries was the most common pathology associated with impacted mandibular third molars. It was more frequently associated with mesioangular, position A, class I molars. Pericoronitis was associated more commonly with distoangular, position A or B, class II molars. The overall frequency of cysts and tumours associated with impacted mandibular third molars was relatively low.

Therefore, the patients having third molars with these unfavourable angulations, patterns and positions could be considered the candidates for prophylactic removal of impacted mandibular third molars. Moreover, early diagnosis of associated pathologies and proper management of impacted third molar is necessary to prevent further consequences.

Although this study may not represent the Pakistani population as a whole, the results are useful for general dental surgeons and oral surgeons because the patients studied represent a range of dental patients presenting to a dental hospital. Moreover, the results of current study may also help for decision making for management of impacted mandibular third molars.

**References**


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