



Original Article

An Assessment of Radiolucencies Associated with Second Molar Adjacent Impacted Third Molar in Left in Comparison to Right Mandible

Maha Shafique¹, Samra Farukh¹, Hafiz Zain Bin Tajamal¹, Darab Fatima Babry², Amna Qasim¹ and Hira Butt^{2*}

¹General Dental Practitioner, Lahore, Pakistan,

²College of Dentistry, Sharif Medical and Dental College, Lahore, Pakistan

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***Corresponding Author:**

Hira Butt
 College of Dentistry, Sharif Medical and Dental College, Lahore, Pakistan
hira.ah.butt@gmail.com

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ABSTRACT

Mandibular third molars are the most prevalently impacted teeth in the oral cavity. These partially impacted teeth in addition to being the root cause of pathologies in the third molar themselves also pose problems for their adjacent second molars. The second molars adjacent impacted third molars lead to the development of various pathologies that manifest themselves as radiolucencies on radiographic evaluation. **Objective:** To evaluate the radiolucencies of the left mandible's second molar next to the impacted third molar in comparison with right mandible. **Methods:** A cross-sectional and descriptive study was undertaken on patients visiting College of Dentistry, Sharif Medical and Dental College (SMDC). A total of 385 OPGs were assessed for the presence of radiolucencies in the second molars adjacent impacted mandibular third molars from December 2020 to February 2021. **Results:** The association between the availability of periapical radiolucencies ($p \leq 0.001$) and radiolucencies due to caries and external resorption in second molar in the right and left mandible ($p \leq 0.001$) was significant. **Conclusion:** It was seen that majority of the cases with periapical radiolucency in the right mandible also had them left mandible as well but most of the cases with caries and external resorption in the right mandible did not have them in left mandible as well.

INTRODUCTION

A physiological process in which tooth position shifts from its normal developmental position towards its normal position in oral cavity is called tooth eruption [1]. However, some systemic and local factors hinder this normal process and tooth fails to erupt leading to the impaction of tooth. Impactions are caused due to malposition, lack of space and other impediments [2, 3]. Impactions can be partial when the tooth is not completely embedded within the bone conversely when a tooth is completely submerged within the bone and not exposed in oral cavity it is called

completely impacted [3-5]. Among the impactions of permanent dentition, mandibular third molar impactions are most common [5-7]. Among the systemic factors that lead to impaction are endocrine deficiency, febrile illness, Cleidocranial dysplasia, Down Syndrome [8] and irradiation [9]. Local factors leading to impactions are; prolonged retention, mal-positioned tooth buds, cysts, tumours, cleft lip and palate [10, 11]. Among the pathologies associated with impacted third molars, the most prevalent one is pericoronitis [12, 13]. In pericoronitis there is infection of

soft tissues that partially or completely surrounds the tooth [14]. Long standing impactions lead to the progression of the pathoses which lead to development of cysts and tumorigenesis in cysts and tumours around the tooth [15, 16]. Most commonly found cysts and tumours include Dentigerous cysts [17], Odontogenic Keratocyst [18] and Ameloblastoma [19]. Incidence of malignant tumours such as squamous cell carcinoma has been reported to be associated with impacted third molars is low [20]. There are many studies that highlight the pathologies of the impacted third molars but our study analysed two important aspects. The first one is the pathologies caused by impacted third molar in the adjacent second molar and second one is the radiographic presentation of these pathologies. The objective of this research was to compare radiolucencies associated with second molars next to impacted third molars in the left and right mandibles.

METHODS

A cross-sectional and descriptive study was undertaken on patients visiting College of Dentistry, Sharif Medical and Dental College (SMDC). A total of 385 OPGs were assessed for the presence of radiolucencies in the second molars adjacent impacted mandibular third molars from December 2020 to February 2021. Ethical committee of Sharif Medical Research Centre (SMRC) approved ethical concerns from (No. SMDC/SMRC/147-20). Non-probability convenience sampling technique was used. The sample size was estimated to be 383 with a 95% confidence level, an expected population number of 0.462, and an absolute precision of 0.05 (13)³. The exclusion criteria were OPGs with mandibular third molar that did not have adequate tooth structure left for evaluation and those in which the impacted third molar was absent. The inclusion criteria were OPGs of patients of age 21 years and above and both genders. Statistical analysis was done using SPSS version 23.0. All data in numeric was presented with mean and their standard deviation. All data in nominal was described as frequency with percentages. *P* value less than equal to 0.05 was considered significant. Chi square test was used to find the statistical association between the presence of radiolucencies (periapical, owing to external resorption and caries) in the right and left mandibular second molar adjacent an impacted third molar.

RESULTS

The study included 49.9% females and 50.1% males with a mean age of 32.71±9.198 years. Table 1 shows association which is statistically significant between presence of periapical radiolucenices associated with the second molar in the right and left mandible. It was seen that majority of the cases with periapical radiolucency in the right mandible also had them left mandible.

Table 1: Association of periapical radiolucenices in the right and left mandibular second molar adjacent an impacted third molar

Right mandibular second molar periapical radiolucencies	Left mandibular second molar periapical radiolucency		p-value
	Yes	No	
Yes	161 (85.6.1%)	27 (14%)	≤0.001*
No	26 (49.1%)	27 (50.9%)	

Table 2 shows an association which is statistically significant between presence of radiolucenices due the presence of caries in the second molar in the right and left mandible. It was seen that majority of the cases with caries in the right mandible did not have them in left mandible as well.

Table 2: Association of presence of caries in the right and left mandibular second molar adjacent an impacted third molar

Right mandibular second molar caries	Left mandibular second molar caries		p-value
	Yes	No	
Yes	17 (30.4%)	39 (69.6%)	≤0.001*
No	15 (8.1%)	170 (91.9%)	

Table 3 shows an association which is statistically significant between the presence of radiolucencies due to external resorption in second molar in the right and left mandible. It was seen that majority of radiolucencies due to external resorption in the right mandible were absent in the left mandible as shown in table 3.

Table 3: Association of presence of external resorption in the right and left mandibular second molar adjacent an impacted third molar

Right mandibular second molar external resorption	Left mandibular second molar external resorption		p-value
	Yes	No	
Yes	4 (44.4%)	5 (55.6%)	≤0.001*
No	4 (1.7%)	228 (98.3%)	

DISCUSSION

The most frequently impacted tooth as reported by literature are the 3rd molars [21]. In various countries, the incidence of impacted teeth was calculated to range from 8% to 38% with a female predisposition [22]. Carious infections, the decay of neighbouring teeth, periodontal disorders, as well as oral and maxillofacial lesions or tumours can all be brought on by an impacted molar. In 16% of instances, cystic and neoplastic abnormalities are discovered to develop next to the impacted teeth, most frequently in the second as well as third decade of life [22]. In order to correlate the histological findings to the pericoronal radiolucency encircling 50 impacted mandibular 3rd molars, Satheesan et al. examined the tooth follicles of these teeth. In roughly 52% of the follicles, they discovered significant histological abnormalities that were consistent with cystic changes [23]. They came to the conclusion that there was more proof of calcification in the

follicle's connective tissue with age. Additionally, Cutright's examination of 130 dental follicles of impacted molars in the mandible revealed calcifications in 54 of them [24]. By measuring the pericoronal breadth of 201 tooth follicles of impacted molars of the mandible on panoramic imaging along with analysing them in histopathologic segments, Majidi et al. performed an examination on them. Dental follicles were examined, and it was found that 50.7% of patients had pathological alterations with follicular widths ranging from 0.21 to 8.8 mm [25]. In a retrospective cohort research, Camargo et al. examined radiographic records of 26 people that have 49 impacted third molar that had been studied during a 10-month period. 21.1% of the detected alterations showed cystic evidence. The scientists also noted that distoangular impactions were shown to be strongly linked with the occurrence of cystic alterations [26]. A follicle in the third molar which is still in the jaw but has an influence may develop cysts. Additionally, the follicular cyst could grow into an odontogenic tumour. Typically, these degenerative conditions affect people under the age of 40. The most frequent odontogenic developing cyst of the jaws is a dentigerous cyst, according to research. It makes up about 20–24% of the jaw cysts that have epithelial linings. It grows up surrounding the unerupted teeth's crowns [27]. The incidence of higher coronal radiolucency around an impacted third molar that is more than four mm has been shown to be slightly higher than 1% in earlier radiographically guided investigations [28]. The overall incidence of the pathological conditions in both jaws had been nevertheless, as high as 4.6% in investigations that used a gap of >3mm for expanded coronal radiolucency [29]. Research studies reveal a low prevalence of pathologies linked to impacted third molars, which may be as the majority of pathologies go undetected since numerous professionals dispose of the erupted tissue after surgically extracting the impacted teeth instead of sending out those tissues for histopathological analysis. According to an analysis, there is a 1.79% chance of disease surrounding third molars that are impacted, along with a 1.54% chance of cysts and tumours alone, ameloblastoma prevalence was 15.7%, OKC - 14.3%, periapical cyst prevalence was 5.7%, and there were two occurrences of squamous cell carcinoma related to Dentigerous cysts and impacted 3rd molars [29]. There is not an elaborate body of literature that reports a comparison between radiolucencies associated with second molars adjacent and impacted third molars with respect to right and left mandible. According to our study a statistically significant association between presence of periapical radiolucencies associated with the second molar in the right and left mandible. It was seen that majority of the cases with periapical radiolucency in the

right mandible also had them left mandible as well. Our study shows an association which is significant statistically between presence of radiolucencies due the presence of caries in the second molar in the right and left mandible. It was seen that in majority of the cases with caries in the right mandible did not have them in left mandible as well. Furthermore, our study reported a statistically significant association between the presence of radiolucencies due to external resorption in second molar in the right and left mandible. It was seen that majority of radiolucencies due to external resorption in the right mandible were absent in the left mandible. One study although did not study the radiolucencies in the right and left second mandibular molars but did analyse the difference of these radiolucencies in the maxilla and mandible reported that a higher percentage of mandibular second molars adjacent impacted third molars had radiolucencies due to periapical lesions, caries, external resorption and pericoronal radiolucencies as compared to their maxillary counterparts [30]. Our study has explored a new avenue of pathologies associated with second molars adjacent impacted third molars. These findings will shed light upon the importance of pathological implication of impacted third molars on second molars.

CONCLUSIONS

It was seen that majority of the cases with periapical radiolucency in the right mandible also had them left mandible as well but most of the cases with caries and external resorption in the right mandible did not have them in left mandible as well.

Authors Contribution

Conceptualization: HZBT, DRB, HB

Methodology: HZBT, DFB, HB

Formal analysis: MS, DFB, HB

Writing, review and editing: MS, SF, DFB, AQ, HB

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

The authors declare no conflict of interest.

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