INTER-RATER RELIABILITY REGARDING THE RADIOLUCENCIES ASSOCIATED WITH THE SECOND MOLAR ADJACENT AN IMPACTED THIRD MANDIBULAR MOLAR

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ABSTRACT

OBJECTIVES

To assess the inter-rater reliability regarding the radiolucencies associated with a second molar adjacent to an impacted third molar.

METHODOLOGY

A cross-sectional comparative study was conducted in the College of Dentistry, Sharif Medical and Dental College, Lahore, in which dentists from four different specialities, namely; Oral Pathology, Endodontics, Prosthodontics and Oral and Maxillofacial surgery, were included as raters. 21 Orthopantomograms were assigned to each rater for assessing radiolucencies associated with a second molar adjacent to an impacted third molar.

RESULTS

The level of agreement regarding the radiolucencies associated with the second molar observed on the Orthopantomograms between rater 1 with rater 2 (κ=0.158., p=0.036) and rater 1 with rater 3 (κ=0.139, p=1.000) was very weak but was fair between rater1 and 4 (κ=0.271, p=0.200).

CONCLUSION

The only radiolucency that rater one observed was external root resorption. Rater 2 identified one case of radiolucency as dental caries and another as caries and periapical radiolucency that were identified by Rater 1 as external resorption; hence they had a weak agreement between Rater 1 and Rater 2 regarding the radiolucencies associated with second molars. Rater 3 identified radiolucencies owing to caries which were reported to be radiolucency due to external resorption by rater 1, and this agreement was weak. Most radiolucencies determined by rater 1 as external resorption were reported to be external resorption by rater 4, resulting in a fair agreement between rater 1 and 4.

KEYWORDS: *Second Molar, Impacted Third Molar, Oral Pathologist, Endodontist, Oral and Maxillofacial Surgeon, Prosthodontist, Orthopantomograms (OPG)*

INTRODUCTION

An impacted tooth is completely or partially affected due to its position against another tooth, bone or soft tissue that could hamper its further eruption.[1] A sac on its coronal part surrounds an impacted or unerupted, called a peri coronal sac or follicle. This follicle is composed of fibrous connective tissue. It may also contain odontogenic residues, which could trigger a pathology.[2] Radiographically, the peri coronal follicle around an unerupted tooth presents as a peri coronal radiolucency with a thin radiopaque border. This radiolucency can show enlargement or asymmetry, most common pathology associated with unerupted or partially erupted tooth odontogenic cysts of the jaw that accounts for 24% pericoronitis, dental caries, root resorption of second molar are some of the other detrimental effects of impacted or partially erupted third molars.[3,4] The imaging modalities used for viewing impacted third molars are intra-oral periapical radiographs, panoramic radiographs, computed tomography magnetic resonance imaging and cone beam computed tomography.[5,6] The imaging techniques most commonly used for assessing impacted mandibular third molars are IOPAs and panoramic radiographs. The major disadvantage of these images is that they are two-dimensional and do not accurately assess the depth of impacted mandibular molars. Due to the angulation of the tooth, the location of the tooth perceived from the crest might not be the actual position of the tooth when assessed by IOPAS. However, these two-dimensional radiographs do not accurately assess the depth of the impacted mandibular third molars.[7] This study aimed to determine the inter-rater reliability regarding the radiolucencies associated with the second molar adjacent and impacted the third molar.

METHODOLOGY

A cross-sectional comparative study was conducted in the College of Dentistry, Sharif Medical and Dental College, Lahore, after obtaining ethical clearance from the ethical committee of Sharif Medical Research Centre in which dentists from four different specialities namely; Oral Pathology, Endodontics, Prosthodontics and Oral and Maxillofacial surgery were included as raters. The study was conducted from December 2020 to February 2021. A total of 21 Orthopantomograms were assigned to each rater for assessing the angle of the impacted third molar. The classification for a grade of impaction used was Winter's classification. The raters received the OPGs and a proforma for recording their observations. SPSS 23 was used for statistical analysis. P values ≤0.05 was considered significant. Cohen Kappa test was used to find the inter-rater reliability.

RESULTS

A Cross-sectional comparative study was conducted in which four dental specialists evaluated 20 OPGs to determine the angles of impacted third molars. Table 1 shows that the only radiolucency that rater 1 observed was external resorption. Rater 2 identified one case of radiolucency as dental caries and another as caries and periapical radiolucency identified by Rater 1 as external resorption, as shown in Table 1. Table 2 shows a weak agreement between rater 1 and 2 regarding the radiolucencies associated with second molars. Table 3 shows that rater 3 identified radiolucencies owing to caries which were reported to be radiolucency due to external resorption by rater 1. Table 4 shows a statistically non-significant weak agreement regarding radiolucencies in the second molar between rater 1 and 3. Table 5 shows that most radiolucencies identified by rater 1 as external resorption were also reported to be external resorption by rater 4. Table 6 shows a fair agreement between rater 1 and rater 4 which was statistically non-significant.

Table 1: The Level of Agreement between Rater 1 and 2 Regarding the Radiolucencies of Second Molar Adjacent Impacted Third Molars

Oral and Maxillofacial Surgeon (rater 1)	Oral Pathologist (rater 2)						
	Caries	Periapical radiolucency	Pericoronal radiolucency	External resorption	Caries and periapical radiolucency	No radiolucency	P-Value
External Resorption	01(5.9%)	0(0%)	0(0%)	01(5.9%)	01(5.9%)	0(0%)	0.128
No Radiolucency	03(17.6%)	03(17.6%)	01(5.9%)	0 (0%)	01(5.9%)	06(35.3%)	

Table 2: Cohen Kappa Demonstrating the Inter-Rater Agreement between Raters 1 and 2

Symmetric Measures						
		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Measure of Agreement	Kappa	0.158	0.092	2.100	0.036	0.100
N of Valid Cases		17				
a. Not assuming the null hypothesis.						
b. Using the asymptotic standard error assuming the null hypothesis.						

Table 3: The Level of Agreement between Rater 1 and 3 Regarding the Radiolucencies Associated with the Second Molar Adjacent to an Impacted Third Molar

Oral and Maxillofacial Surgeon (Rater 1)	Endodontist (Rater 3)		P-Value
	Caries	None	
External Resorption	01(5.9%)	02(11.8%)	0.331
None	01(5.9%)	13(76.5%)	

Table 4: Cohen Kappa Demonstrating the Inter-rater Agreement between Raters 1 and 3

Symmetric Measures						
		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Measure of Agreement	Kappa	0.139	0.139	1.278	0.201	1.000
N of Valid Cases		17				
a. Not assuming the null hypothesis.						
b. Using the asymptotic standard error assuming the null hypothesis.						

Table 5: The Level of Agreement Between Rater 1 and 4 Regarding the Radiolucencies Associated with the Second Molar Adjacent to an Impacted Third Molar

Oral and Maxillofacial Surgeon (Rater 1)	Prosthodontist (Rater 4)				P-Value
	Caries	External Resorption	None	Caries and external resorption	
External Resorption	01(5.9%)	01(5.9%)	0(0%)	01(5.9%)	0.051
None	02(11.8%)	02(11.8%)	10(58.8%)	0(0%)	

Table 6: Cohen Kappa Demonstrating the Inter-rater Agreement between Raters 1 and 4

Symmetric Measures						
		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Measure of Agreement	Kappa	0.271	0.144	1.843	0.065	0.200
N of Valid Cases		17				
a. Not assuming the null hypothesis.						
b. Using the asymptotic standard error assuming the null hypothesis.						

DISCUSSION

There is most available data from case reports about the

root resorption of second molars as a complication of impacted third molars.[8,9,10] The published data have shown that the position and angulation of third molars affect symptoms and pathological effects associated with impacted third molar.[11,12] A relationship between the width of the peri-coronal space and the presence of an epithelial lining associated with an impacted tooth has been previously reported.[13,14,15,16] This is not a vast body of literature exploring the domain of inter-rater reliability of dental specialists regarding pathologies and radiolucencies associated with second molars adjacent to an impacted third molar. According to our study, the only radiolucency that rater 1 observed was external resorption. Rater 2 identified one case of radiolucency as dental caries and another as caries and periapical radiolucency that were identified by Rater 1 as external resorption; hence they had a weak agreement between Rater 1 and Rater 2 regarding the radiolucencies associated with second molars. Rater 3 identified radiolucencies owing to caries which were reported to be radiolucency due to external resorption by rater 1, and this agreement was weak. Most radiolucencies determined by rater 1 as external resorption were reported to be external resorption by rater 4, resulting in a fair agreement between rater 1 and 4. A retrospective study conducted by the Department of Oral and maxillofacial surgery, university of Ankara, Turkey, was to determine the incidence of development of cysts and tumours around third molars and relevant issues associated with the removal of asymptomatic, impacted third molars, 9994 impacted third molars removed in 7582 patients, analysis of this study revealed 231 cysts (2.31%) and 79 tumours (0.79%), that includes 7 benign tumours (0.77%) and two malignant tumours (0.02%). The incidence of tumours and cysts around an impacted third molar was calculated to be 3.10%.[17] An NIH conference was conducted on the removal of third molars. At this conference, 11,598 panoramic radiographs were reviewed, of which 1,756 patients had 3,702 impacted teeth. The average age of these patients was 47 years, and approximately 27 years being the average retention period. 30 ITMs (0.81%) showed dentigerous cystic changes, and 16(0.43%) showed internal resorption. Periodontal ligament damage and bone loss distal to the second molar were 166 times more (4.48%), and pressure resorption of 2nd molar was 113 times (3.05%). Approximately 12.0% of an impacted 3rd molar population and 1.82% of the general population pathological changes were found.[17] An NIH conference on - Removal of Third Molars debated the need to remove asymptomatic impacted teeth without evidence of pathology but stressed the need for long-range studies. The assumption is that - neglected impacted third molars (ITMs) will sometime cause serious pathology. Examination of panoramic radiographs of 11,598 patients revealed 1,756 patients with 3,702 impacted teeth, average age of 47 years, and an average retention period of approximately 27 years. Dentigerous cystic changes occurred in about 30 ITMs (0.81%), internal resorption in 16 (0.43%), periodontal ligament damage and bone loss distal to the 2nd molar 166 times (4.48%), and pressure resorption of the 2nd molar 113 times (3.05%). No great surge in pathology occurred with increasing age. Some pathological change can be expected eventually in approximately 12.0% of an impacted 3rd molar population and 1.82% of the general population. A reappraisal of routine removal of ITMs might be indicated.[18]

LIMITATIONS

A larger sample size and multicenter study would have helped us unravel more findings.

CONCLUSIONS

The only radiolucency that rater 1 observed was external resorption. Rater 2 identified one case of radiolucency as dental caries and another as caries and periapical radiolucency that were identified by Rater 1 as external resorption; hence they had a weak agreement between Rater 1 and Rater 2 regarding the radiolucencies associated with second molars. Rater 3 identified radiolucencies owing to caries which were reported to be radiolucency due to external resorption by rater 1, and this agreement was weak. Most radiolucencies determined by rater 1 as external resorption were reported to be external resorption by rater 4, resulting in a fair agreement between rater 1 and 4.

CONFLICT OF INTEREST: None

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