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ORIGINAL ARTICLE

Inter-Rater Reliability to the Assessment of Ramus Relationship of Mandibular Impacted Third Molar Among Denitsts: An Orthopantomographic Study

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ABSTRACT

Objective: To find the inter-rater reliability to the assessment of ramus relationship of mandibular impacted third molar among denitsts.

Methodology: A cross sectional comparative study was conducted in College of Dentistry, Sharif Medical and Dental College, Lahore after obtaining ethical clearance from ethical committee of Sharif Medical Research Centre (SMRC) in which dentists from three different specialties namely; Oral Pathology, Endodontics and Prosthodontics 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 ramus relationship of impacted third molar. The classification for angle of impaction used was Winter`s classification. The raters were provided with the OPGs and a proforma for recording their observations.

Results: The level of agreement regarding the ramus relationship of impacted third molars observed on the Orthopantomograms between rater 1 and rater 2 was fair (κ=0.366 ,p=0.022). The agreement was also fair between rater 1 and rater 3 (κ=0.300, p=0.094).

Conclusion: There was a fair agreement in assessment of ramus relation of the impacted mandibular molars of rater 1 with rater 2 and 3 where majority of the class 2 and class 3 relations were rated similarly by both the raters as

Keywords: Inter-rater reliability, Cohen Kappa, Impacted third molar, Orthopantomogram, Ramus relationship

INTRODUCTION

The coronal as well as radicular anatomy of the mandibular third molar mostly in human dentition varies throughout its development[1]. In around 90% of instances, the crown development of lower third molar begins at age 11, and its eruptions duration varies. It commonly comes out around the ages of 18 and 20. The mandibular third molars constitute the most frequent congenitally absent teeth, and their prevalence may be explained by human development, multisystem illnesses, inherited genotyping, mutagens, diet modification, physiological interruption of or innate deformity with in dental lamina, space constraints, and the absence of initiation of a fundamental tissues for their structure. It may happen alone or as a symptom of a condition[2]. Mandibular third molar hypoplasia occurs anywhere from 14.4% to 51.1% of the time[3]. Due to its differential inclination toward the neighbouring tooth, the ascending section of the ramus, or its vertically positioning, the impacted mandibular third molars reflects a partial eruption; the eruption is impeded by a lack of available area or an obstruction from overlaying soft tissue[4]. A typical tool to assess the frequency of mandibular third molar, its impaction condition, and the vicinity of the impacted mandibular third molar to inferior alveolar canal is orthopantomographs. A greater incidence of inferior alveolar canal damage has been linked to a number of imaging studies, including discoloration of the radicular region, the absence of cortical boundaries, mandibular canals distortion, and deflection or constriction of the radicular part. The fundamental benefit of panoramic radiographs is that it requires less overexposure and exposes biologically to fewer X-rays[5]. Third molars must have been surgically removed, which requires pre-surgical radiography assessment to categorize the impacted teeth based on the degree of deformation, the third molars' disorder, and their connection to the anterior aspect of the ramus to calculate the difficulty index[6]. Given the aforementioned information, an OPG examination remains a common way to check how an impacted tooth is connected to the mandibular canal. OPG continues to be one of the most effective diagnostics methods for determining impacted lower third molar, according to investigations[7]. OPG is adequate for assessing relationship of impacted lower third molar, according to the standards of contemporary clinical practise of the Royal College of Surgeons (Britain)[8]. According to European recommendations, CBCT should only be used if traditional radiography demonstrates close interface among the impacted lower third molar roots and with the mandibular canal. Therefore, in all instances of lower third molar impaction, OPG examination is required[9]. A study conducted by Sureshkannan P suggested that For such above indications in OPG, there was good inter-observer concordance and moderate to great intra-observer confidence for both operators. The assessment of the OPG for the aforementioned symptoms is generally accepted by the specialists and aids in determining the potential danger of nerve damage prior to surgery[10]. This could be ascribed to variations in how each observer saw the relationships between the nerve roots, the calibre of the OPG, and additional susceptibility variables like age, sex, as well as root curve. The standardisation of surgical monitoring, operators expertise in patient orientation, exposures, and processing settings, and the diagnostics accuracy of OPG can all be enhanced[11]. The aim of this study was to find the inter-rater reliability to the assessment of ramus relationship of mandibular impacted third molar among denitsts.

METHODOLOGY

A cross sectional comparative study was conducted in College of Dentistry, Sharif Medical and Dental College, Lahore after obtaining ethical clearance from ethical committee of Sharif Medical Research Centre (SMRC) in which dentists from three different specialties namely; Oral Pathology, Endodontics and Prosthodontics 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 ramus relationship of impacted third molar. The classification for angle of impaction used was Winter`s classification. The raters were provided with 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 21 OPGs. Table 1 shows that there was a fair agreement in assessment of ramus relation of the

impacted mandibular molars between rater 1 and 2 where majority of the class 2 and class 3 relations were rated similarly by both the raters as shown in table 1.

Table 1: Level of Inter-rater agreement od rater 1 and rater 2 regarding the observation of ramus relationship of impacted third molar

		Ramus Relationship of Impacted Third Molar (Rater 1: Oral Pathologist)		
		Class 1	Class 2	Class 3
Ramus Relationship of Impacted Third Molar (Rater 2: Prosthodontist)	Class 2	2 (22.2%)	6 (66.7%)	1 (11.1%)
	Class 3	1 (20%)	1 (20%)	3 (60.0%)
	Absent tooth	1 (100%)	0 (0%)	0 (0%)

Table 2: Cohen Kappa demonstrating the inter-rater agreement between rater 1 and 2

Symmetric Measures					
		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Measure of Agreement	Kappa	.366	.160	2.289	.022
N of Valid Cases		15			
a. Not assuming the null hypothesis.					
b. Using the asymptotic standard error assuming the null hypothesis.					

Table 2 shows a statistically significant fair level of agreement between rater 1 and 2 as shown in table 2.

Table 3: Level of Inter-rater agreement of rater 1 and rater 3 regarding the observation of ramus relationship of impacted third molar

		Ramus Relationship of Impacted Third Molar (Rater 1: Oral Pathologist)		
		Class 1	Class 2	Class 3
Ramus Relationship of Impacted Third Molar (Rater 3: Endodontist)	Class 1	2 (40%)	3 (60%)	0 (0%)
	Class 2	1 (20%)	3 (60%)	1 (20%)
	Class 3	1 (20%)	1 (20%)	3 (60%)

Table 3 shows a that there was a fair agreement between rater 1 and 3 regarding the ramus relationship of mandibular impacted third molars. It was seen that a substantial number of observations regarding the ramus relationship were made similarly by rater 1 and rater 3 as shown in table 3.

Table 4: Cohen Kappa demonstrating the inter-rater agreement between rater 1 and 3

Symmetric Measures					
		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Measure of Agreement	Kappa	.300	.192	1.677	.094
N of Valid Cases		15			
a. Not assuming the null hypothesis.					
b. Using the asymptotic standard error assuming the null hypothesis.					

Table 4 shows a statistically non-signficant fair level of agreement between rater 1and 3.

DISCUSSION

A researcher named Muglali M conducted a survey on the inter-rater accuracy for assessing the relationship between the inferior alveolar nerve and the mandibular third molar[12]. This analysis found that four experienced operators from different organizations disagreed more than a senior surgeons as well as trainee from such an institute regarding the relationship between the impacted lower third molar roots as well as the inferior alveolar nerve canal. This may be due to the fact that the trainees received their instruction from the similar surgeon and used the same interpretation[12]. In a separate analysis, the assessments of parameters related to the roots of the lower third molars produced by three different categories of trainees (a first-year trainee, a second trainee, and a third-year resident) were analysed. They discovered that the concordances between the root contour as well as the overall number of roots were, respectively, the greatest and lowest[13]. Another study shows that the amount of research on evaluating inter-rater accuracy for measuring the angle of impacted third molars on OPGs is insufficient. The degree of concordance among rater 1 (maxillofacial surgeons) & rater 2 (oral pathologists) about the inclination of impacted third molars seen on Orthopantomograms was very great, while it was just medium with raters 3 (endodontist) with rater 4. (Prosthodontist)[14].

The preferred radiography at the moment to assess impacted molars is an OPG. It is employed to categorise impacted teeth and calculate the difficulties index, however because inter-rater perception varies, the understanding of OPG is liable to change. According to research, personal interpretations, a lack of expertise and the raters' varied occupational backgrounds account for the heterogeneity in radiological perception across raters[15].

There are numerous researches on the inter-rater accuracy of radiographs, but there are none that analyzed the inter-rater validity of orthopantomograms in identifying impacted third molars in the literature. This will add to the pool of knowledge and assist professionals in better understanding how to interpret orthopantomograms. With respect to the observing and evaluation of the ramus relationship of impacted mandibular third molar on the OPG, the objective of this experiment was to determine the inter-rater validity of general dentist from different specialties and disciplines.

CONCLUSION

There was a fair agreement in assessment of ramus relation of the impacted mandibular molars of rater 1 with rater 2 and 3 where majority of the class 2 and class 3 relations were rated similarly by both the raters as

Limitation: A larger sample size and inclusion of more dental specialists would have help us unravel more findings.

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