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ASSESSMENT OF ARTIFACTS IN ROUTINE DENTAL RADIOGRAPHY: AN INSTITUTIONAL RETROSPECTIVE STUDY

Dr. Cheena Singh* Associate professor, Dept. of Oral Medicine and Radiology, Post Graduate Institute of Dental Sciences, Rohtak, Haryana. *Corresponding Author

Dr. M. S. Raju Principal, Mithila Minority Dental College & Hospital, Laheriasarai, Darbanga.

ABSTRACT **Aims And Objectives:** The aim and objective of this study was to assess radiographic faults and artifacts on routine dental radiographs at Dental College & Hospital and to improve the quality of radiographs at the institution level respectively. **Materials And Methods:** The present study was carried out in the Department of Oral Medicine & Radiology, Teerthanker Mahaveer Dental College & Research Center, Moradabad. In this study 300 radiographs were collected randomly taken by interns, under graduates post graduates and technician posted in Department of Radiology. All the radiographic faults and errors were analyzed by trained and qualified staff members by placing on departmental viewer with proper lightening using (MediXView Medical Illuminator- Trade Name, Model MXV, Viewing size-14"X 17"). **Limitations:** This study is carried out at one institute i.e. Teerthanker Mahaveer Dental College & Research Centre. Moradabad (Uttar Pradesh).This study was conducted in limited six months period of time i.e. from10th October 2011to 31st March 2112. **Results And Conclusion:** Presence of any artifacts whether it is technical or processing both decrease the diagnostic value of radiographs and lead to double exposure of patient. As in present study, mostly artifacts were due to technical problems as compared to processing problems. In OPG, improper patient position is the commonest error. To avoid these artifacts proper techniques should be used. Ahead of these factors is the improper patient positioning. This factor is applicable to both in case of extra oral radiographs and intraoral radiographs. Other causes may be carelessness; machines are not in proper condition, negligence and less knowledge.

KEYWORDS : Artifacts, Intraoral radiographs, Orthopantomogram, Processing artifacts, Technical artifacts and Positional artifacts.

INTRODUCTION

Radiography is a useful tool in various disciplines of medicine and dentistry for diagnosis and treatment planning of diseases. Changes in quality of radiographs may lead to misinterpretation, resulting in incorrect diagnosis and treatment planning[1]. Radiographs with a diagnostic quality aids in accurate diagnosis of the lesions[2]. The quality of any radiograph is dependent upon accurate technique and careful processing[3]. Radiographic errors or artifacts are not normally present on radiographs and may be produced may be due to technical errors (errors related to technique of taking the radiographs) or processing errors(related to all aspects of processing), improper handling of film packet, excessive movements of tube, the patient's head and or the film may result in a variety of unusual radiographic flaws[4,5]. Panoramic radiographs have been one of the most common means for imaging dental structures among dentists due to their many advantages with few disadvantages of magnification of anatomical structures[6]. Many types of artifacts and technical errors occur during panoramic radiography[7]. Being aware of these artifacts would ensure a correct diagnosis and the appropriate treatment given to the patient [8,9-11].

AIMS AND OBJECTIVE:

1) To assess radiographic artifacts on routine dental radiographs at dental college hospital.
2) To improve the quality of radiographs at institutional level.

METHODOLOGY:

The present study was conducted in the Department of Oral Medicine & Radiology, Teerthanker Mahaveer Dental College & Research Center, Moradabad. 300 different (both intraoral and extraoral) radiographs taken by interns , undergraduates , post graduates and technicians posted in department which included 166 intraoral periapical radiographs, 46 bitewings, 10 occlusal radiographs, 66 orthopantoograms Fig. 1(a,b) and 15 lateral cephalographs radiographs(Table. 1). These radiographs were divided into technical, processing errors and radiopaque artifacts{ Figure no. 2 (a),(b),(c)} and (Table no. 2). Radiographs were placed on viewer View box (MediXView Medical Illuminator-Trade Name, Model MXV, Viewing size-14"X 17"); accordingly artifacts were initially evaluated by post graduates and after that by the qualified staff members to prevent any bias. Each artifact was mentioned on a master chart and sent for statistical analysis.

Table 1: To Show Frequency Of Different Radiographs.

S. No.	Type of radiograph	Number of radiographs
1.	IOPA	166
2.	Bitewings	46
3.	Occlusal	10
4.	cephalograms	15
5.	OPG	63
	Total	300

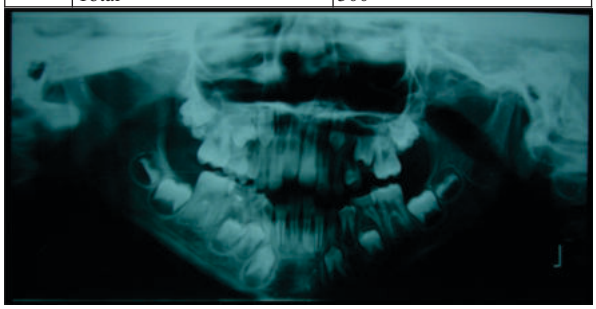

Figure 1(a). Chin Tipped Too Low- Excessive Curving Of Occlusal Plane

Figure 1(b): Slump Patient Position – Horizontal Overapping

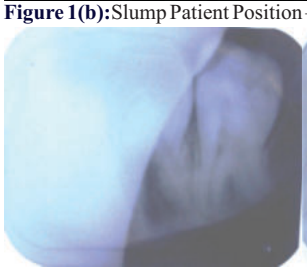

Figure 2(a): Cone Cut And Dark Radiograph Of Mandibular Posterior Teeth

Figure 2(b): Elongation, Apical End Cut Off And Occlusal Dot Placed Apically In Premolar And Molar Teeth.

Figure 2(c) : Radiopaque Artifact In Maxillary Anterior Teeth

Table 2: To Show Different Types Of Artifacts (Processing Errors And Radiopaque Artifacts)

Technical errors	Processing errors	Radiopaque artifacts
Elongation	Dark radiographs	Jewelry
Foreshortening	Light radiographs	Spectacles
Tire track	Developer cut off	Hair pins
Double image	Stains on films	Eye lenses
Blurred image	Fogging	Thyroid collar
Apical end cut off	Clear film	Spine shadow
Occlusal dot placed apically	Streaks on films	Denture
Horizontal overlapping	Blister	
Crown of opposite arch	Reticulation	
Cone cut	White spots	
Magnification	Blank films	
	Frilling	
	Emulsion peel	
	Graining	
	Phalangioma	
	Static electricity	
	Dark spots	

RESULTS:

In present study a total of 300 radiographs were included which include IOPAR (Intraoral periapical radiographs),Bitewing, Occlusal and Cephalograms with intraoral periapical radiographs has maximum frequency i.e. 55.3% (Table. 3). In the present study maximum number of radiographs were taken by post graduate students and minimum numbers by undergraduate students under guidance of qualified staff members (Table no. 4). It was also observed that maximum technical error occurred in IOPA is elongation (44), cone cut (07), (14) occur in Occlusal radiographs and Bitewing radiographs respectively. No technical error in the lateral cephalograms in OPG maximum error is patient positioning (58). In total, patient positioning is maximum (58) under technical errors (Graph No.1). It was a also observed that 87 radiographs had scratch on films and minimum of blistering, blank films and phalangioma as artifacts **(Graph no. 2)**. **Graph no. 3** revealed that artifact due to patient low chin is more (16) followed by artifact due to tongue not touching the palate (15) Chi square test revealed a strong significance (p=0.00001) between education level and type of radiographs taken by them.

Table 3: To Show Total Number Of Radiographs Included In Present Study

Type of radiograph	Frequency	Percentage
IOPA	166	55.3
Bitewings	46	15.3
Occlusal	10	3.3
cephalograms	15	5.0
OPG	63	21.0
Total	300	100.0

Table 4: To Show Frequency And Percentage Of Radiographs Taken By Different Individuals.

Taken By /Education Status	Frequency	Percent
Intern	96	32.0
Post graduate student	114	38.0
Technician	83	27.7
Undergraduate student	07	2.3
Total	300	100.0

Education / Technical Errors	Interns	% age	PG Students	% age	Technician	% age	UG Student	% age
Elongation	26	8.7	06	2.0	17	5.7	03	1.0
Foreshortening	10	3.3	01	0.3	04	1.3	00	00
Tire Track	02	0.7	00	00	00	00	00	00
Double Image	00	00	00	00	00	00	00	00
Blurred Image	11	3.7	08	2.7	04	1.3	01	0.3
Apical End Cut Off	11	3.7	01	0.3	08	2.7	01	0.3
Occlusal Dot Placed Apically	03	1.0	01	0.3	00	00	01	0.3
Horizontal Overlapping	24	8.0	13	4.3	13	4.3	01	0.3
Crown Of Opposite Arch	10	3.3	01	0.3	05	1.7	01	0.3
Cone Cut	11	3.7	14	4.7	10	3.3	02	0.7
Magnification	02	0.7	00	00	04	1.3	00	00
Adumbration	00	00	00	00	00	00	00	00
Total	110	36.8	45	14.9	65	21.6	10	3.2

DISCUSSION

A diagnostic radiograph is mandatory for proper diagnosis and treatment planning. Without proper knowledge of radiographic techniques radiographs (extraoral and intraoral)may lead to many technical and processing errors. Natalia A. Brezden et al [12] in 1987(in vivo) conducted a study on 500 panoramic radiographs, out of which only one had no technical error. The average radiographs contain 2.2 positioning errors, 1.0 processing error and 1.5 miscellaneous errors. However in present study maximum artifacts seen was patient tongue not touching palate. Neill Serman (in vitro 2000) did a review on "Radiographic errors and artifacts" He concluded that proper knowledge of these artifacts will help to minimize the chance of inappropriate diagnosis[5]. There are very less number of studies on inraoral periapical radiogprahs artifacts as compared to extraoral .

CONCLUSION

The value of any diagnostic procedures depends upon the amount of information gained by its utilization. Presence of any artifacts whether it is technical or processing both decrease the diagnostic value of radiographs and lead to double exposure of patient. As in present study, mostly artifacts were due to technical problems as compared to processing problems. In OPG, improper patient position is the commonest error. To avoid these artifacts proper techniques should be used. Ahead of these factors is the improper patient positioning. This factor is applicable to both in case of extra oral radiographs and intraoral radiographs. Dentist should aware from all the artifacts and also know the remedy for this. So that accurate diagnosis can be done properly.

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