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Short Communication

Multiple Intra Oral Film Packets: An Alternative for Conventional Duplicating Films - A Short Study

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ABSTRACT

Purpose: This study was carried out to create and evaluate an alternative method of duplicating intraoral periapical films conventionally and to compare the image quality of four intra oral periapical films (IOPA) exposed in a single packet, obtained on single exposure using standard exposure parameters.
Materials & Methods: In this study a total of 40 films of intra oral periapical radiographs were used. These 40 films were rearranged into 10 film packets in the dark room such that each IOPA packet contained 4 films. Ten patients who visited the department of radiology were randomly chosen and included in the study. A standard intra oral radiographic technique was followed. Sirona Vario DG 70kV 3.5 mA intra oral radiographic machine was used to expose these radiographic film packets and all four films were developed simultaneously. The resultant radiographic images were jumbled and viewed by 5 observers and were asked to identify the correct order of placement in film packet based on quality of the image.
Results: The results were tabulated using Microsoft excel and overall percentage of identifying the correct radiographic sequence were calculated.19(38%) were identified as first radiograph, 14(28%) were identified as second radiograph, 17 (34%) were identified as third radiograph, 12 (24%) were identified as fourth radiograph.
Conclusion: The results of the study showed that all four radiographs have clinically similar image quality. Hence this method can be used for obtaining multiple images of the same patient in single exposure, wherever indicated thereby saving time and exposure to the patient.

Key words: Dental radiography, Digital radiography, Duplicating films, Radiographic film.

INTRODUCTION

Dental radiography is one of the most common methods of determining dental caries especially in proximal surfaces of teeth, [1] the incipient caries or actual surface cavitations, periapical pathologies, proximal caries, periodontal conditions etc. Although the radiation dose received by patients in dental radiography is low, any radiological procedure should be justified and optimized in order to keep the radiation risk as low as reasonably achievable. [2]

There are many reasons why a second radiograph or a copy of the original is required like Medico Legal Cases, insurance claims where pre-operative and

post-operative radiographs are required and in a teaching institute duplicate radiographs are required for record purpose etc. In spite of the fact that films are indisputably the property of the operator, the patient having no actual legal right in demanding them, many needless and frequently involved misunderstandings can be dispensed with when duplicate films are in hand. [3] The patient's good will, an invaluable asset, can be retained by giving him his film and the operator will still have a duplicate for his record purpose. Dentists make second/third radiograph of the same patient for the above purposes but there is always a moral dilemma of exposing the patient to additional radiation. Although a couple of studies are performed on evaluation of image quality of double film packets, there isn't any study conducted on image quality assessment of four intra oral radiographic films in a single packet. Hence the purpose of this study is to compare the image quality of images obtained on four individual IOPA radiographs with single exposure and there by developing a practical and viable alternative for duplicating intra oral periapical films.

MATERIALS AND METHODS

In this study a total of 10 packets (40 films) of intra oral periapical radiographs were used. The films were taken into the dark room and films were removed from their respective film packets and placed in a single pouch after removing the black paper but the lead foil was retained such that each packet contained four intra oral films and a lead foil (Fig.1). The pouch was sealed using a black insulating tape. Ten such film packets were prepared. Ten patients who visited the department of radiology were randomly selected and included in the study. A standard intraoral radiographic technique was followed. Sirona Vario DG 70kV 3.5mA intraoral radiographic machine was used and the parameters are as follows: upper incisors 1.75mAs, lower incisors 1.40mAs, lower molars 1.75mAs and upper molars 2.24mAs.

The exposed film packet (4 films in each packet), were developed simultaneously in a single holder for the same duration in developer and fixer, according to standard processing parameters.

While developing, the films were placed in a sequential order as it was placed in the pouch. After developing they were dried and stored in individual pouches and marked as 1, 2, 3 and 4 respectively.

The films were then jumbled and marked as A, B, C and D. The correct sequence was noted and not revealed to the observers. 5 Oral Medicine and Radiology specialists were employed as expert observers. The films were mounted on viewer box.

The observers were made to sit individually, one at a time, at a distance of 40cms away from the viewer box in a dark room. Each observer was asked to assess the position of radiographic films in the packet based on image quality, which was intern based upon radiographic density, parallax effect and fogginess of the image.

RESULTS

Each observer was given 10 films of each set & results of observer are as follows, the first observer was able to identify 4 first, 3 second, 3 third and 3fourth radiographs correctly, second observer was able to identify 3 first, 2 second, 1 third and 2 fourth radiographs correctly, third observer was able to identify 4 first, 2 second, 5 third and 2 fourth radiographs correctly, fourth observer was able to identify 4 first, 4 second, 5 third and 2 fourth radiographs correctly and fifth observer was able to identify 4 first, 3 second, 3 third and 3 fourth radiographs correctly.

Overall taking the average of all the observer findings, 19 (38%) first

radiographs were correctly identified (closest to the source in the film packet), 14(28%) second film radiographs were correctly identified as second radiograph, 17(34%) third film radiographs were correctly identified as third radiograph and 12 (24%) fourth radiographs were correctly identified as fourth radiograph (farthest from the source in the film packet). The opinion of all the 5 observers was that all the four intra oral periapical radiographs were clinically acceptable with no gross difference in the image quality and acceptable for diagnostic and recording purpose (Fig.2).

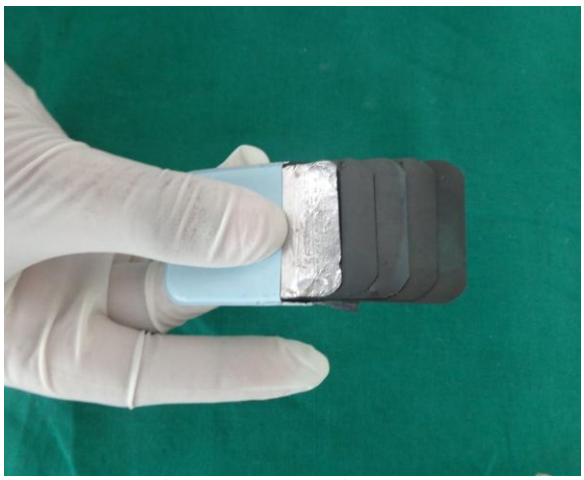

Fig1: Contents of the radiographic film packet used in the current study, 4 intra oral radiographs and 1 lead foil.

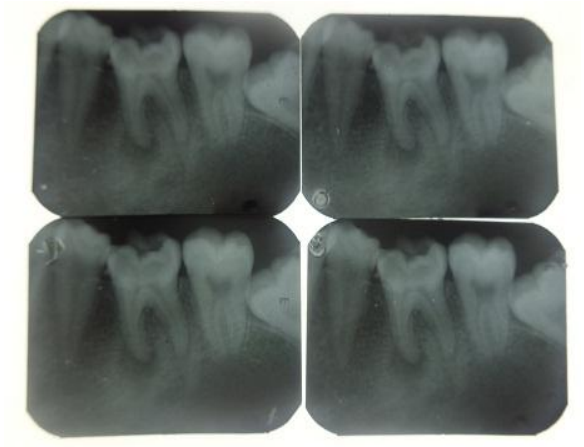

Fig 2: Processed intra oral periapical films placed in one single packet showing similar image quality.

DISCUSSION

Direct intraoral digital radiography is being widely used in private practices for various advantages. However conventional intra oral radiograph films are the main stay in most of the teaching institutes in many countries, since digital images are not superior to film based radiography in detecting initial periapical bone lesions, incipient caries, interdental bone loss and other pathologies. [4]

Though duplicating intra oral films requires no X-ray exposure but special equipment and separate duplicating films are required which is time consuming and technique sensitive. Hence this technique is not commonly used. Double film packets are higher price [3] than two individual single packets and are less commonly available in the market.

Our study was an attempt to develop an alternative to duplicating films. All the observers in the present study were instructed to assess the image quality based upon parallax effect, radiographic density and film fogginess.

Parallax, the apparent displacement in position of an object as seen from two different points not in a straight line with the object, causes images recorded on each of the four emulsions to be magnified as films become more distant to the source. Since increased magnification results in decreased sharpness, emulsions further from the source will be less well defined and detailed than their counterparts closer to the source. [5]

When a film is exposed by an X ray beam (or by light in the case of screen-film combinations) and then processed, the silver halide crystals in the emulsion that are struck by the photons are converted to grains of metallic silver. These silver grains block the transmission of light from a view box and gives its dark appearance. The overall degree of darkening of an exposed film is referred to as radiographic density. Reducing the distance between the focal spot and film also increases the film density, [6] hence the film closest to object should have superior image quality than others.

Scattered radiation results from photons that have interacted with the subject by Compton or coherent interactions. These interactions cause the emission of photons that travel in directions other than that of the primary beam. The consequent scattered radiation causes fogging of a radiograph that results in overall darkening of the image that results in loss of radiographic contrast. The lead foil is positioned in the film, away from the tube, [6] this shields backscatter radiation which fogs the film hence the film away from the lead foil that is first film should have superior image quality when compared to others.

The results of the present study suggested that in spite of above factors playing a key role in determining the image quality the observers could not successfully determine the correct position of the film in the packet in majority of the situations.

However, there are certain disadvantages using this technique of multiple film packets in the routine practice and academic institutions, as it is time consuming and utmost precautions to be taken while preparing film packet to avoid light leaks which can affect the image quality of all the films. Excessive bending and contamination of emulsion surface should also be taken care of while preparing the packets.

Such similar results were also observed by William. D. Jarvis (1990) in his study of assessing the image quality in double film packet. It was concluded in his study that the front films (film closest to the source in the packet) had superior image quality compared to the second film. This was in concordance with our results that the first film in the packet was correctly identified (38%) regarding its position in the film packet by the observer due to its superior image quality.

CONCLUSION

All the observers in the present study opined that all four radiographs have similar image quality, hence this method can be used for obtaining multiple images of the same patient in single exposure and as an alternative for duplicating films, wherever indicated thereby saving time and exposure to the patient and the radiologist. Further studies have to be carried out with greater sample size and different techniques to determine the accuracy of this technique.

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