

Original Research Article

Fabrication of Intraoral Radiographic Cassette - A Radiographic Study

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ABSTRACT

Purpose: Vertex occlusal radiograph is an intraoral occlusal radiograph of maxilla which is considered to be a true/cross sectional radiograph. This is the only intraoral radiographic technique which requires an intra-oral cassette with intensifying screen. However such intraoral radiographic cassettes are not readily available in the Indian market. Hence this study was taken up to fabricate an intraoral radiographic cassette using a dismantled extraoral radiographic cassette and to assess the efficacy of this cassette in obtaining vertex occlusal radiographs and comparing the image quality and exposure parameters between occlusal radiographs with and without the intraoral cassette.

Materials and Methods: dismantled fragments of extraoral radiographic cassette and endofiles box were basically used to fabricate an intraoral radiographic cassette. 25 patients were involved in the present study for obtaining various types of occlusal radiographs with and without the usage of fabricated intraoral cassette. Five oral radiologists were involved in assessing the efficacy of the fabricated intraoral radiographic cassette in obtaining and interpreting vertex occlusal radiographs. They further compared the image quality and exposure parameters between occlusal radiographs obtained with and without fabricated intraoral cassette.

Results: Vertex occlusal radiographs obtained with usage of fabricated intraoral cassette were successfully obtained in which interpretation of normal anatomy and identification of buccal cortical plate and buccopalatal localization of impacted canines was possible in all the situations. The image quality of occlusal radiographs obtained with intraoral cassette was found to be inferior when compared to the direct film occlusal radiographs.

Conclusions: fabricated intraoral radiographic cassette is useful in obtaining vertex occlusal radiographs. The image quality of other occlusal radiographs obtained with intraoral cassette, though inferior to their counterparts, is still good enough for recognition and interpretation of anatomy and pathology of jaws since usage of intraoral radiographic cassette for obtaining occlusal radiographs would reduce the radiation exposure to the patient by at least fifty percent.

Key words: occlusal radiograph; vertex occlusal; intensifying screen; radiographic cassette.

INTRODUCTION

An occlusal radiograph is an intra oral radiographic technique designed to be placed between the occlusal surfaces of the teeth with the central beam directed at

90degrees or at 50-60 degrees to the plane of the film depending on what is required to be viewed. True/cross sectional occlusal radiographs are taken to assess the buccolingual cortical plate status of the

jaws, to determine the buccolingual position of impacted canines and supernumerary teeth, to assess the presence/absence of sialoliths, to assess the direction of displacement of fractured fragments of the jaws etc. ^[1,2] These indications are easily assessed in the mandibular occlusal radiographs since projection of central x-ray beam at 90° is relatively easier and does not require any radiographic cassette. However this is not the case with True/cross sectional maxillary occlusal radiographs, (also known as vertex occlusal radiograph) since it requires an intra-oral radiographic cassette with intensifying screen. A radiographic cassette is mandatory for maxillary true occlusal radiography as there would be huge radiation exposure to the patient if direct exposure of the film is made without using a cassette.

Though CT and CBCT gives ideal cross sectional images of maxilla, high cost and radiation exposure of these imaging modalities limit their usage in above mentioned indications. There is a need for fabrication of intra-oral radiographic cassette with intensifying screen as they are not readily available in the Indian market. Hence this study was undertaken to fabricate an intra-oral radiographic cassette with intensifying screen and assess its efficacy in obtaining various radiographs. According to the available literature this is the first study to manually fabricate an intra oral cassette with intensifying screen by dismantling an old extra-oral radiographic cassette making this technique a simple, practical and cost effective one.

Aims and Objectives

- 1) To fabricate an intra-oral radiographic cassette with intensifying screen
- 2) To assess the efficacy of this cassette in obtaining true maxillary occlusal radiographs
- 3) To assess the efficacy of this cassette in obtaining other types of occlusal radiographs.

- 4) To compare the image quality and radiographic exposure of occlusal radiographs obtained with and without intra-oral radiographic cassette.

MATERIALS AND METHODS

Materials used in the present study were

- A. An old extra oral cassette
- B. Endofiles box
- C. Disposable plastic sleeve
- D. Intra oral radiographic machine
- E. Indirect films.
- F. Direct occlusal films.
- G. Radiographic processing solutions

The extra-oral radiographic cassette was dismantled and the intensifying screen was separated. This intensifying screen was cut to a size which would snugly fit the endofiles box, the outer layer of the cassette. Sponge material was used to support the placement of intensifying screen in the cassette. The intensifying screen was placed in either side of the endofiles box and thus an intra-oral radiographic cassette was fabricated. [Fig-1]



Figure-1 showing fabricated intraoral cassette with intensifying screen and extraoral film.

25 individuals were randomly selected from the OP of oral medicine and radiology for obtaining occlusal radiographs with and without fabricated intra-oral radiographic cassette, except for maxillary vertex occlusal radiographs, which were obtained only with the intra-oral radiographic cassette. Hence a total of

40 occlusal radiographs were included in the present study. The distribution of types of occlusal radiographs included in the

present study is shown in Table-1. The technique used in obtaining vertex occlusal radiograph is shown in Figure-2.

Table-1 showing distribution of types of occlusal radiographs included in the present study.

Sl no.	Type of occlusal radiograph	Number of occlusal radiographs made with fabricated intra-oral cassette	Number of occlusal radiographs made without cassette
1.	Vertex occlusal radiograph	10	nil
2.	True mandibular occlusal radiographs	5	5
3.	Mandibular anterior topographic occlusal radiographs	5	5
4.	Maxillary lateral occlusal radiographs	5	5

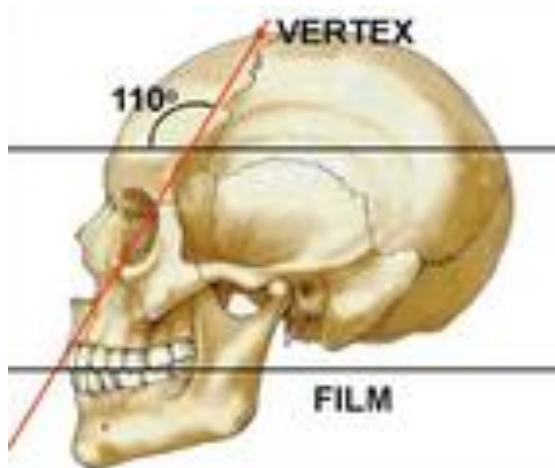


Figure-2 shows the technique used in obtaining vertex occlusal radiograph.

All the radiographic exposures made using the fabricated intra-oral cassette were exposed for duration ranged from 3.0-4.0 seconds for vertex occlusal radiographs; 0.6-1.1 sec exposure for occlusal radiographs with intraoral cassette and 1.2-2.0 sec exposure for other occlusal radiographs without intraoral cassette. All the radiographs were processed by standard procedures. 5 oral radiologists were involved in the present study to assess the image quality of occlusal radiographs obtained with and without intraoral occlusal radiographs. Image quality was assessed on the basis of radiographic density, radiographic contrast and resolution.

RESULTS

The processed and dried occlusal radiographs were interpreted and analyzed by five oral radiologists. All the five specialists opined that vertex occlusal radiographs obtained using fabricated

intra-oral cassette were able to demonstrate the buccal cortical plates and successfully localize the buccopalatal positioning of impacted canine/supernumerary teeth, if any [Fig- 3 & 4]. Moreover the image quality of occlusal radiographs obtained with and without intraoral cassette was compared. All the specialists reported that occlusal radiographs obtained without intraoral cassette had superior image quality compared to occlusal radiographs obtained with intraoral cassette. However recognition of anatomical structures and interpretation of pathology in the jaws was equally good in all the radiographs. The mean duration of exposure for vertex occlusal radiographs obtained with intraoral cassette was 3.5 seconds; 0.8 sec exposure for occlusal radiographs with intraoral cassette and 1.6 sec exposure for other occlusal radiographs without intraoral cassette.

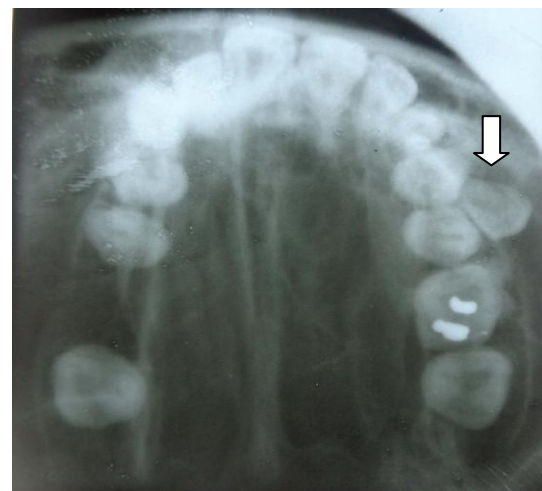


Figure-3 showing a vertex occlusal radiograph successfully demonstrating buccal localization of impacted left maxillary canine [white arrow]

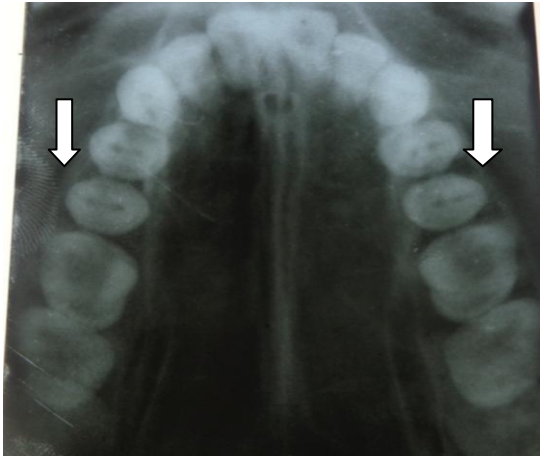


Figure-4 showing a vertex occlusal radiograph demonstrating buccal cortical plate of maxilla. [White arrows]

DISCUSSION

Vertex occlusal radiographs are considered to be true occlusal radiograph which requires an intra-oral cassette with intensifying screen. The central x-ray beam is projected through the vertex of the skull and later passing through various anatomical structures to reach the film placed in the oral cavity. This radiograph reveals the buccopalatal cortical status and buccopalatal localization of impacted canines/supernumerary teeth/foreign objects etc. [3] Obtaining vertex occlusal radiograph by using intra-oral cassette minimizes the radiation exposure to the patient as obtaining the same radiograph with a direct intraoral film [without cassette] would require radiation exposure of not less than 7-10 seconds. Our study supported this fact and a mean duration of 3.5 second exposure was enough to obtain a vertex occlusal radiograph. The image quality assessed by the five specialists concluded that in all the vertex occlusal radiographs the buccal cortical plate was traceable and could successfully locate the buccopalatal position of impacted canines.

The second parameter assessed in the present study was the radiographic image quality, which is based on several factors like type of film used [direct/indirect] radiographic density, radiographic contrast, image resolution, film fog etc. In the present study apart

from vertex occlusal radiograph, all other occlusal radiographs used were made with and without intraoral cassette and their image quality was compared. As expected the image quality of occlusal radiographs made with intraoral cassette was found to be inferior when compared to their counterpart. This finding is obvious and is related to the usage of intensifying screen in the intra-oral cassette which definitely has an impact on image quality. Moreover indirect films are used with radiographic cassette with intensifying screen. Indirect films have inferior resolution when compared to direct intraoral films. However the recognition/identification of normal anatomic structures in the jaws was not compromised inspite of inferior image quality in occlusal radiographs obtained with intraoral cassette.

Radiographic exposure with cassette required a mean duration of 0.8 seconds which was half the exposure time [1.6 seconds] required for occlusal radiographs without cassette [direct film]. Again this is obvious because the intensifying screen used in radiographic cassette is known to reduce the exposure to the patient as the presence of intensifying screen creates an image receptor system that is 10 to 60 times more sensitive to x-rays than the film alone. [2,4] It was observed in the present study that usage of a cassette, for any type of occlusal radiograph, minimized the dosage to fifty percent. This would definitely add up as an advantage to the patient.

CONCLUSION

In conclusion, an intra-oral radiographic cassette with intensifying screen was fabricated which was successful in making a vertex occlusal radiograph and aided in identification of buccal cortical plate and buccopalatal localization of impacted canines. Though the image quality of occlusal radiographs obtained with intraoral cassette was considered to be relatively inferior, we still

recommend the usage of the cassette as it did not compromise in the interpretation of these radiographs. Moreover radiation exposure to the patient can be minimized to fifty percent.

REFERENCES

1. Haring JI, Jansen L. Dental radiography: Principles and techniques. 2nd edition. Philadelphia. WB Saunders Company; 2000. Pg no. 325
2. Karjodkar FR. Essentials of oral and maxillofacial radiology. New Delhi. Jaypee brother's medical publishers; 2014. Pg no. 76 & 116.
3. Whaites E. Essentials of dental radiography and radiology. 3rd edition. China. Elsevier science; 2003. Pg no 113.
4. White SC, Pharaoh MJ. Oral radiology: Principles and interpretation. 6th edition. Missouri. Mosby Elsevier; 2009. Pg no 56.

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