

Extra Oral Periapical Radiography: A review

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ABSTRACT

Background: Intra oral periapical radiographs remain the backbone of diagnostic assessment of dento-facial pathologies. However, in some clinical situation like in developmentally disabled individuals, those with an exaggerated gag reflex, pediatric dental patients and anxious dental patients, it may be very difficult to obtain an intra-oral periapical radiograph of diagnostic quality. In such situations, extra oral periapical radiographs are very useful. They are obtained by placing a sensor outside the oral cavity and then making the radiographic exposure using a digital X ray machine for intra oral radiographs. The radiation dose in this technique is much lesser as compared to panoramic radiographs. This article reviews the technique, advantages, disadvantages and indications of extra oral periapical radiographs.

Keywords: Diagnosis, Radiation dosage, Radiology.

INTRODUCTION

Intra Oral Periapical (IOPA) radiographs are an important tool in the diagnosis of various dental pathologies¹. These are the initial radiographs usually advised for imaging of teeth and periodontium. However, a vast group of patients cannot tolerate the intra oral film/ sensor. These include developmentally disabled individuals, those with an exaggerated gag reflex, pediatric dental patients and anxious dental patients. Also, intra oral film/sensor placement may be cumbersome in others like those patients with limited mouth opening, rubber dam or those who have undergone facial trauma^{2,3}. In these clinical situations, the essence of the speciality of oral and maxillo-facial radiology comes into picture which is not only about the diagnostic assessment but also equips the clinician with the ability to interpret images of maxillofacial structures. To overcome the difficulty encountered by the clinicians in these situations, Michael Newman and Seymour Friedman² in 2003 developed

an alternative technique which uses an extraoral film/sensor and reported that the patients tolerated the procedure well, preferring the extraoral technique to the conventional IOPA radiography. In 2007, Chia-Hui et al devised a film/sensor beam aiming device for the extra oral periapical (EOPA) radiographic technique to align the X-ray beam directly at the film/ sensor under the guidance of the locator ring to avoid cone cuts⁴. Kumar et al^{5,6} have employed the EOPA radiographic technique in various clinical situations and found the EOPA radiographs provided essential diagnostic information.

TECHNIQUE

The images can be obtained using digital imaging system and an intraoral sensor. An IOPA X-ray machine can be used to take the radiographs when set at 60kv-7Ma for 0.45-0.55 seconds.

For maxillary teeth:

The patient should sit upright with his/her mouth wide open. This allows the X-ray beam to pass to the film/sensor unobstructed from the



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opposite side of the mouth. The film/sensor is placed on the external surface of the cheek, directly buccal to the tooth. A cotton roll can be placed between the film/sensor and the cheek to parallel the film/sensor with the buccal surface of the tooth. The X-ray cone is angled approximately $-25^{\circ} \pm -5^{\circ}$ from the horizontal plane. Additionally, the X-ray beam is aligned perpendicular to the sensor so as to provide an accurate image.

For mandibular teeth:

The patient sits upright with raised chin and the film/sensor is placed on the external surface of the cheek, directly buccal to the tooth. The X-ray cone is angled approximately $-15^{\circ} \pm -5^{\circ}$ from the horizontal plane. The X-ray beam is aligned perpendicular to the film/sensor to provide an accurate image.

DISCUSSION

Although conventional intra oral radiography is the back bone of initial radiographic investigations, there are situations where employing this technique is difficult. These situations include disabled patients, patients with a severe gag reflex, some pediatric dental patients, patients with limited mouth opening, patients with edentulous ridges, patients with severe mucosal pathologies, endodontic patients with rubber dam etc.

In these patients EOPA radiographs come to the rescue. In 1974, Fisher proposed an extra oral radiographic technique for obtaining images of third molars using occlusal films⁷. However; this technique used a high kVp (as high as 90 kVp) and hence was found to have limitations in daily clinical application. In addition, EOPA radiography is technique sensitive in nature with slightly lower contrast and resolution of the image and is unable to obtain radiographs of the anterior teeth due to curvature of the arch and difficulty in positioning of the X-ray cone. Also, to compensate for the increased distance between the X-ray source and film/sensor a slightly increased radiation dose is given in EOPA radiography. But, this can be argued on the fact that lesser number of unacceptable films are taken intra orally in these patients. Moreover, the radiation dose is much lesser as compared to

panoramic radiographs usually advised for such patients⁸.

Though EOPA radiography is an effective alternative approach for obtaining periapical radiographs in certain patient population groups who are unable to tolerate IOPA radiographs; it is not intended to be a substitute for conventional intra oral radiography. With the recent advances in dental radiography, various techniques like panoramic radiographs are available in situations where IOPA radiographs are not feasible. It can be recommended in personal dental clinics where panoramic radiographic machines are not readily available.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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