VALIDITY OF THE PARALLAX METHOD WITH A COMBINATION OF IMAGING RECEPTORS – A REVISIT


ABSTRACT

Objective: To determine the amount of displacement of a structure noticed on an image when the tube of a dental X-ray machine was shifted vertically and horizontally. Periapical and occlusal images were combined with dental panoramic images to determine the location of structures.

Methods: Our research is based on the parallax technique which requires manipulation of horizontal and vertical angulations of the X-ray tube. A metal object is positioned on the buccal and palatal side of the maxilla on the canine area of a skull. The X-ray tube is shifted incrementally to obtain images on phosphor plates. Subsequently, panoramic and occlusal images were taken to assist in localization of the metal object.

Results: To obtain a clear image shift of 2-3mm using the parallax method, there must be an adequate horizontal tube shift of approximately 30-35 degrees. When images were used in combination of dental panoramic images, it was found that the buccally placed structures can be accurately located with the periapical or occlusal images. However, the displacement of images in the palatally placed structures in panoramic imaging is not fully appreciated with the principle of parallax method.

Discussion: Tube movement of 30-35 degrees horizontally is needed for a 2-3 mm image shift. To successfully localize a buccal structure, a combination of either periapical or occlusal images with a dental panoramic imaging can be employed. However, this combination with panoramic imaging is limited when looking at palatally placed structures.

Key words: Dental Radiography, Parallax method, Digital Imaging, Horizontal angulation, Vertical angulation

INTRODUCTION

Many disorders affecting the crowns of teeth can be assessed by inspection and palpation methods. Radiography or imaging technology aids in visualizing beyond the barrier created by the supporting structures of the dentition. There are innumerable situations where this is critical for diagnosis, treatment planning and provision of appropriate treatment. The most popular radiographic technique today, discovered in the twentieth century, is still the intra-oral radiographs and dental panoramic radiographs. However, studies have shown a significant discrepancy between what was found anatomically and seen radiographically (1). These radiographs provide good structural information with nominal magnification of the images on the mesio-distal plane, but inadequate details on the bucco-lingual plane.

Parallax is an apparent displacement or difference in the apparent position of an object caused by an actual change of position on the point of observation (2). In radiological terms, this is the apparent displacement of the image of an object to be localized relative to the image of a reference point. It results by changing the angulations of the X-ray beam which in turn is caused by change in the X-ray tube position. The method is also therefore sometimes referred to as the image/tube shift method (3). Application of the parallax method is most relevant especially when there is a failure to locate a “structure” as it is hidden by another structure. Conventional radiographs compress a three-dimensional structure into a two-dimensional image, which limits the diagnostic accuracy of the treatment (4,5). When a different vantage point is adopted from where structures do not overlap, their relative position becomes clear even though the actual intrinsic relationship in question has not altered. In this way, apart from visualizing features in the usual mesio-distal dimension, we are also able to appreciate features in a third dimension, the bucco-lingual dimension.

The parallax method was introduced by Clark in 1910 as a preferred means of radiographic localization (6). With the help of two periapical radiographs and the horizontal tube shift (HTS), he was able to ascertain the relative position of an unerupted tooth. Due to parallax, the more distant object appears to travel in the same direction as the tube shift and the object