YENEPOYA UNIVERSITY

COMPARISON OF EFFICACY OF PHOSPHOR PLATE AND FILM BASED PANORAMIC RADIOGRAPHS IN REPLICATING ANATOMICAL STRUCTURES OF OROFACIAL REGION – A RADIOGRAPHIC STUDY

By

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ABSTRACT

Background and objectives

It is well known that superior radiographic appearance of normal anatomy helps in delineating anatomical variations and also to recognize the extension of a lesion. Panoramic radiography is usually used for visualizing gross structures and gross lesions. Even though screen-film based panoramic system helps in diagnosing diseases, it is technique sensitive. New modalities of obtaining panoramic radiographs have been introduced. Digital imaging benefit to panoramic radiography by eliminating errors associated with processing and providing an opportunity for the use of digital enhancement. Digital panoramic radiography also promises a decrease in radiation exposure as they require a lower dose for image formation. At the same time; the ability of a digital imaging system or receptor to reproduce anatomy is limited by the unavoidable degradation of the input information that may manifest as blurring, increase in noise or reduction in contrast. Henceforth this study is undertaken to evaluate the efficacy of storage phosphor plate system in replicating anatomical landmarks in panoramic radiographs and to compare the ability of storage phosphor plate system and screen-film system to replicate different anatomical landmarks in panoramic radiographs.

Materials & Methods:

Hundred subjects including fifty males and fifty females over the age of 15years were randomly selected for the study. Each individual was subjected to panoramic radiographs which were taken in Planmeca ProMax panoramic machine after obtaining informed consent. Subjects were made to wear lead apron throughout the procedure. First panoramic radiograph of each subject was obtained using Kodak T-MAT G/RA dental films of size 5× 12 inches. Operating unit was set at 70 kVp,

10mA and 16sec. Processing was done using Velopex XE automatic processor. Second panoramic radiograph of each subject was obtained using AGFA storage phosphor plate of size 15×30 cms by setting operating unit at 68 kVp, 8mA and 16sec and processed using CR system (AGFA CR 30-X SCANNER, AGFA DRY STAR 5302 PRINTER). Two types of panoramic radiographs thus obtained for each of hundred subjects were given to 3 observers for evaluating the visibility of 11 anatomical landmarks of orofacial region including condyle, coronoid process, mental foramen, mandibular canal, articular eminence, anteromedial wall of maxillary sinus, floor of maxillary sinus, lateral pterygoid plate, nasal fossa, nasal septum and inferior orbital rim in a three-point rating scale. Scoring criteria used for the study was: 0- landmarks are not diagnostic (not visualized) (poor), 1- landmarks are diagnostic but could be improved (moderate) and 2- landmarks are optimally visualized (excellent). The scores thus obtained for each anatomical landmark from each observer for its replication in storage phosphor plate panoramic system and screen-film based panoramic radiographs for each of hundred subjects were statistically analyzed using Wilcoxon Signed-Rank test.

Results:

Storage phosphor plate panoramic system showed better efficacy in replicating the anatomical landmarks to its optimized visibility level when compared with screen-film panoramic radiographs. The interobserver reliability done to evaluate the agreement between three observers showed that the scoring given to each anatomical landmark in both the systems by 3 observers was highly reliable with an intraclass correlation coefficient value 0.8 and above. The landmarks such as condyle, mandibular canal, articular eminence, nasal fossa, nasal septum that scored 2 in the screen-film panoramic system, had same score for more number of subjects in storage

phosphor plate panoramic system. The landmarks such as mental foramen, anteromedial wall of maxillary sinus, floor of maxillary sinus, inferior orbital rim that scored 1 in screen-film panoramic system, had scored 2 for more number of subjects in storage phosphor plate panoramic system. Only landmarks that scored 1 in storage phosphor plate panoramic system were coronoid process and lateral pterygoid plate. Moreover p-Value for 11 anatomical landmarks was < .005 that makes difference in efficacy of two systems to replicate anatomical landmarks of orofacial region highly significant with high scores for storage phosphor plate panoramic system.

Interpretation & Conclusion:

The significantly higher scores obtained by the storage phosphor plate system over the screen-film panoramic radiographs with high interobserver agreement reliability between 3 observers in replication of 11 anatomical landmarks [Condyle, coronoid process, mental foramen, mandibular canal, articular eminence, anteromedial wall of maxillary sinus, floor of maxillary sinus, lateral pterygoid plate, nasal fossa, nasal septum and inferior orbital rim] in the present study conducted on 100 subjects (50 males and 50 females) above 15 years of age can be attributed to the advantage of image enhancement (increasing contrast, optimizing brightness, reducing unsharpness and noise) property dependent on viewer's preference accomplished by the introduction of digital systems in panoramic radiography.

Key words: radiography, panoramic; radiography, dental, digital; replication