The Effect of Dose Reduction on Subjective Image Quality in Digital Panoramic Radiography

A Thesis

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Abstract

Background:

Panoramic radiographs are widely used to obtain a comprehensive survey of the maxillofacial complex .One of the advantages is reduction in radiation dosage compared with a complete intraoral radiography. Digital imaging was first introduced in dentistry for intra-oral radiography, but is now widely available for panoramic radiography based on either a charge coupled device or storage phosphor receptor. Many studies have demonstrated that it is possible to achieve a degree of dose reduction in digital panoramic radiography.

Aims of study:

This study was designed to assess the perfection of interpretation of certain anatomical landmarks at reduced dose digital panoramic radiography and studying the capability of minimizing hazardous effects of radiation through studying the effect of dose reduction on human living tissue in digital panoramic radiography.

Material and Methods:

In the present study two digital panoramic images were obtained with Planmeca Proline CC with Dimax 3 digital panoramic unit for 50 subjects, 35 male and 15 female.

The age distribution of them was ranging between 18-30 years old. The first image was obtained with the standard exposure setting of the device as recommended by manufacturer, the second image was taken at reduced tube current of 50%.Two observers evaluate the appearance of 14 anatomical landmarks divided into three regions (Maxilla,Mandible,TMJ) using visual grading method composed of 5 point rating scale(1=much worse,2=worse,3=equal,4=better,5=much better).

Seven subjects with their images were excluded from the sample due to improper image quality for viewing.

Results:

There was a distribution of scores between equal and worse score with the higher percentage for equal score, equal score for first examiner=87.4

Equal score for second examiner=86.9

There is a small tendency of the scores to shift toward the worse score with decreasing the tube current, worse score percentage for first examiner =12.3, for second examiner =13.1

Visualization of large anatomical structure was judged to be equal than for smaller structures, equal score was above 90% for most of the large landmarks.

There is non significant difference between first and second examiner, p-value>0.05,except for one landmark (mental foramen) p-value<0.05 for both equal and worse scores. There is non significant difference between first and second image for all the three regions p-value>0.05.

Conclusion:

In Conclusion, this study has shown that in digital panoramic radiography with Planmeca Proline CC with Dimax 3, a dose reduction up to 50% can be achieved while maintaining satisfactory image quality and interpretation performance. It should be noted that these results are based on only a small number of verified anatomical structures, therefore further investigation are still needed to clarify the many issues associated with the diagnostic performance of digital panoramic systems.