Journal of
Dental Science and Medicine

Abstract

Optimizing a CBCT imaging protocol for root canal treatment planning

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Abstract:

Purpose: Due to the complex morphological variations of teeth, a successful root canal treatment (RCT) is always a compelling issue for dentists. Cone beam computed tomography (CBCT) is one of the emerging imaging modality for RCTs. Although it provides a 3D view, the patient dose is a substantial limiting factor. The aim of the study is to reduce the patient dose of the CBCT imaging specific to the RCTs by optimization techniques in different acquisition protocols.

Method: An extracted 3rd molar that was embedded in a c-type silicon representing soft tissue was used for the optimization procedure. Promax 3D Max CBCT device was utilized to produce 3D images. KVp, mA and exposure time were considered as the acquisition parameters. Image resolution was 421x421x511. Voxel size was 0.1 mm^3. Image quality was quantified by the Dice Similarity Index. The dose was recorded µGy by the software of the CBCT.

Results: Overall 18 different protocols (3 for KVp, 2 for mA and 2 for exposure time) were evaluated. Radiation dose was reduced from 326 µGy to 33 µGy while maintaining a Dice Similarity Index of 0.5 and above.

Conclusion: The proposed optimization technique might provide an evident dose reduction of CBCT imaging with an acceptable imaging quality for RCT.

Keywords: CBCT, Root Canal Treatment, Dose optimization, Image quality, Dice Similarity Index.

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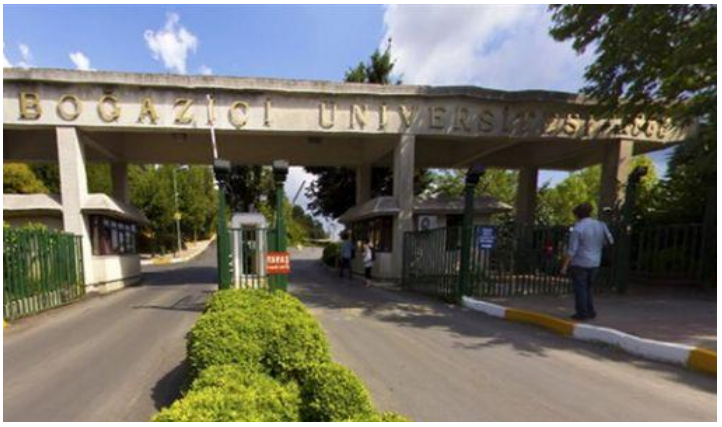

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Biography:

Adem Cihan Arslan has completed his BSc at the age of 22 years from Bogazici University Mathematics Department and MSc at the age of 25 years from Bogazici University Institute of Biomedical Engineering. He works at Bogazici University Mathematics Department as a teaching asssistant since 2012.