AI FOR CRACK AND FRACTURE IDENTIFICATION IN ENDODONTIC TEETH

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ABSTRACT

Cracks and fractures in endodontically treated teeth present significant diagnostic problems for the clinical dentist-an issue that is often left untreated due to late diagnosis and end up cementing the final fate of the tooth. Conventional diagnostic approaches via simple visual inspection, transillumination, radiographs, and cone-beam computed tomography (CBCT) are susceptible to variable degrees of sensitivity and specificity plus the element of subjectivity from the clinician. Through machine learning (ML) and deep learning (DL) models, AI has come in as a potential solution to improve the detection and classification of cracks and fractures in dentistry. Through analyzing huge volumes of clinical and radiographic information, AI systems improve the diagnostic accuracy of dentists while supporting them in treatment planning with minimal incidences of false negatives. Recent developments in convolution neural networks (CNNs) and technologies of image segmentation and predictive modeling indicate that AI-assisted systems can indeed be operational on a real-time clinical basis. Then, along with assisting in the diagnostic process, this can certainly augment patient outcomes by opening avenues for early intervention, patient-based care, and fewer retreatments.

KEYWORDS: *Artificial Intelligence; Endodontics; Tooth fractures; Crack detection; Deep learning; Machine Learning; Dental Imaging; Diagnostic Accuracy; Cone-beam Computed Tomography; Predictive Modeling*