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AI-ENHANCED DETECTION OF ACCESSORY CANALS

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ABSTRACT

Accessory canals, which are anatomical variations, are often hindrances to a root canal therapy and upon failure to detect them bring about persistent endodontic infections. They have to be identified for effective cleaning, shaping, and obturation; nonetheless, conventional imaging methods and clinical probing often cannot detect these canals because of their small size and complex positioning. But the advent of artificial intelligence (AI) has brought about advanced tools for enhancing the detection of accessory canals by analyzing high-resolution radiographic and cone-beam computed tomography (CBCT) data. AI-based models, especially those built on deep learning algorithms, go far beyond just detecting minute anatomical details; they predict the presence of accessory canals, estimate their orientation, and finally assist clinicians to implement a more complete treatment plan. Such systems combine data obtained from imaging with patient-specific clinical factors to present objective, reproducible, evidence-based treatment plans, thus reducing the chance of a missed canal and enhancing the prognosis and sustenance of the treatment.

KEYWORDS: *Artificial Intelligence, Accessory Canals, Deep Learning, Cone-Beam Computed Tomography, Endodontic Anatomy, Root Canal Treatment, and Diagnostic Accuracy*

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