Editorial

Artificial intelligence.....A futuristic tool for advanced endodontics

One of the primary areas where artificial intelligence (AI) excels in endodontics is in the realm of diagnosis. Traditional methods of diagnosing dental issues often rely on subjective and objective assessments by clinicians, which can sometimes lead to errors or oversights. AI-based systems, however, leverage machine learning (ML) algorithms trained on vast datasets of dental images and patient records to accurately identify abnormalities, lesions, and other pathological conditions with remarkable precision. Through the analysis of radiographs, cone-beam computed tomography scans, and intraoral images, AI algorithms can detect minute details that might escape the human eye, enabling early detection of dental problems and facilitating timely intervention.

There has been phenomenal development of neural networks in dentistry. AI is a broad term that signifies the use of machines and technologies to perform tasks similar to those performed by humans. In 1955, a mathematician named John MeCarthy proposed the word AI and is regarded as the father of AI.[1]

The neural networks employed are mostly based on convolutional neural networks and artificial neural networks.[2] Deep learning and ML are two components of AI. These networks have been used in endodontics to study root canal system anatomy, determine working length measurements, detect periapical lesions and root fractures, and predict the success of root canal procedures along with predicting the viability of dental pulp stem cells.[2] The success rate of endodontic treatment outcomes may rise as a result of the usage of AI to improve the treatment plan.

AI allows multiple and heterogeneous information domains, such as dental history and clinical and sociodemographic data to be integrated.[3] It can reduce the number of misdiagnoses and can predict patient-specific drug complications. AI could also help in diagnosis, staging, and predict outcomes such as forecasting or prognostic risk determination.[4] The majority of research on AI applications in endodontics has been on tracing apical foramen, verifying the working length, projection of periapical pathologies, and root morphologies, and discovering vertical root fracture.

Treatment planning and decision support through workflow optimization automated systems for image analysis and data interpretation reduce the time and effort required for manual tasks, allowing clinicians to focus their expertise on more complex aspects of patient care. AI-driven software solutions also facilitate seamless integration with electronic health records systems, enabling efficient documentation, communication, and collaboration among multidisciplinary health-care teams. By automating routine administrative tasks and optimizing resource allocation, AI helps improve productivity and workflow efficiency in dental clinics, ultimately leading to better patient experiences and outcomes.

By simulating realistic clinical scenarios and providing real-time feedback, these educational platforms promote experiential learning and mastery of complex endodontic techniques, thereby aiding in education and skill development.

In endodontics, AI displays accuracy in terms of diagnostic and prognostic evaluation. However, further study is necessary to evaluate the dependability, usefulness, and cost-effectiveness of AI models before incorporating them into standard clinical procedures.[4]

CONCLUSION

Integration of AI will bring about a paradigm shift in endodontic practice offering unprecedented to enhance diagnostic accuracy, optimize treatment planning, streamline workflow processes, and promote ongoing educational and skill development. By harnessing the power of AI-driven technology, endodontics can deliver superior patient care, improve clinical outcomes, and contribute to the advancement of dental science and practice in the 21st century and beyond.

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