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Comment on "Detection of Mucous Retention Cysts Using Deep Learning Methods on Panoramic Radiographs"

"Panoramik Radyografilerde Mukos Retansiyon Kistlerinin Derin Öğrenme Yöntemleri Kullanılarak Tespiti" Başlıklı Yazı Üzerine

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Dear Editor,

I read the article "Detection of Mucous Retention Cysts Using Deep Learning Methods on Panoramic Radiographs" by Coşgun Baybars et al. (1) published on pages 203-208 of the 26(3) issue of the Duzce Medical Journal in 2024 with great interest. The article aimed to perform clinical diagnosis and treatment planning of mucous retention cysts (MRCs) with high accuracy and low error using the deep learning-based EfficientNet method, and proposed a hybrid approach to distinguish between healthy individuals and those with MRCs using panoramic radiographic images. I found the article interesting and enlightening. I am writing about a few points that stood out while reading the article, and to offer additional comments and a few more discussions on the article.

As the authors also point out, MRCs are a common finding on panoramic radiographs, often discovered incidentally. While usually benign, their accurate identification is crucial to avoid unnecessary investigations and alleviate patient anxiety. Automating this process can significantly improve diagnostic efficiency and reduce the burden on radiologists and dentists (2).

The authors correctly identify deep learning as a promising approach for image analysis tasks. Deep learning models, particularly convolutional neural networks (CNNs), have demonstrated remarkable performance in object detection and classification, making them suitable for identifying MRCs on panoramic radiographs (1,2). However, a more detailed description of the CNN architecture used (e.g., number of layers, activation functions, pooling methods) would be beneficial. Furthermore, information regarding the training parameters (e.g., batch size, learning rate, optimization algorithm) and data augmentation techniques is critical for understanding the model's performance and generalizability. The performance of deep learning models is highly dependent on the size and quality of the training dataset.

The article needs to clearly state the number of panoramic radiographic images used in the study, the proportion of the panoramic radiographic images belonging the individuals with and without MRCs, and the demographic features and distribution of the patient and healthy groups. A larger, more diverse dataset would likely lead to a more robust and generalizable model (3). The accuracy of the deep learning model relies heavily on the accuracy of the ground truth annotations. The article should specify who performed the annotations (e.g., experienced radiologists, dentists), the method used for annotation (e.g., bounding boxes, segmentation), and measures taken to ensure inter-observer reliability (4). While the authors likely reported accuracy, sensitivity, and specificity, a more comprehensive evaluation using metrics like precision, recall, F1-score, and area under the receiver operating characteristic (AUROC) curve would provide a more nuanced understanding of the model's performance. Specifically, the precision-recall curve would be crucial, as it addresses the potential for false positives, which could lead to unnecessary downstream investigations.

Future studies should focus on acquiring larger and more diverse datasets of panoramic radiographs to improve the generalizability of deep learning models. Exploring more advanced deep learning architectures, such as transformer-based models, could lead to further improvements in performance. Incorporating explainable artificial intelligence (XAI) techniques to understand the reasoning behind the deep learning model's predictions could improve clinician trust and facilitate its integration into clinical practice (5). Integrating information from other imaging modalities, such as cone-beam computed tomography (CBCT), could further enhance the accuracy of MRC detection. Prospective clinical validation studies are needed to assess the impact of the deep learning model on patient outcomes in real-world clinical settings. A thorough understanding of the dataset characteristics, the choice of deep learning architecture, and a rigorous evaluation of performance metrics are essential for translating these research findings into practical clinical applications. By addressing these considerations, future studies can pave the way for the widespread adoption of deep learning in the detection of MRCs and other dental pathologies.

Ethics Committee Approval: Since our study was not an experimental study including human or animal subject, ethics committee approval was not required.

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