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Application of artificial intelligence in oral and Dentomaxillofacial surgery: A science mapping approach

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Background: Artificial Intelligent systems have revolutionized the field of oral and maxillofacial surgery by the introduction of image-guided surgery. Preoperative CT and MRI images are registered with CBCT images for intraoperative imaging due to the reduced radiation exposure and high resolution of CBCT. Image-guided surgery is now performed at many large hospitals (e.g., for implant placement), enabling these procedures to be performed more precisely than was previously possible. Intelligent technologies are able to precisely identify dental regions that are vulnerable to caries and complicated periapical pathologies, more precisely determine the boundaries of lesions using automated segmentation, and enable their differentiation. Intelligent systems have been used for the early detection of head and neck cancers and cervical lymph node metastasis, which may affect the treatment choice and prognosis of head and neck cancer patients.

The inferior alveolar nerve (IAN) and mandibular third molar (M3) are located in close proximity, making surgical extraction of lower third molars difficult. These procedures can result in damage to the IAN, causing neurosensory impairment in the chin and lower lip segmentation on panoramic radiographs by this technique to detect the proximity of M3 in relation to the IAN prior to surgical removal of M3 and suggested that it was an encouraging approach to the segmentation of anatomical structures.

Owing to the exceptional ability of these algorithms to recognize images of different dentofacial deformities, they will also have many uses in orthognathic surgery in the future.

Objective: The aim of this study is a brief report on the use of artificial intelligence in recent research in various fields of oral and maxillofacial imaging.

Methods: On Sep 1, 2021, the Scopus database searched via the following query TITLE-ABS-KEY (("artificial intelligence" OR "machine learning") AND surgery) AND (LIMIT-TO (SUBJAREA, "DENT")). Bibliometric data was extracted and analyzed via VOS viewer software using the author's keywords co-occurrence, country co-authorship and co-citation network analysis.

Results: 40 articles found and analyzed. Author's keywords co-occurrence analysis showed among 95 keywords, artificial intelligence, orthogenetic surgery and deep learning were the most popular topics (hot topics). Country co-authorship analysis indicated among 22 countries, Germany, the U.S and Brazil were the most active countries. Co-citation network analysis displayed among 158 journals, Journal of Prosthetic Dentistry, Journal of Dental Research and International Journal of Periodontics & Restorative Dentistry were the most influential journals.

Conclusion: The progressive development of Artificial Intelligent technology in the field of oral and maxillofacial surgery will benefit clinicians and researchers to integrate different fields of knowledge and improve patient care. However, to minimize potential errors of this technology it seems logical to combine it with conventional methods. The cooperation between clinicians, researchers and engineers will be serious for the development of this field. Therefore, we suggest interdisciplinary research in related sciences in the country to be supported by research centres and research institutes. And thus we can benefit from new technologies and researchers in engineering sciences in the clinical and preclinical fields.

Recent publications

1. Correlation of radiomorphometric indices of the mandible and mandibular angle fractures. Aida Karagah et al. Heliyon.
2. Effect of Sinus Floor Augmentation with Platelet-Rich Fibrin Versus Allogeneic Bone Graft on Stability of One-Stage Dental Implants: A Split-Mouth Randomized Clinical Trial. Aida Karagah et al. Int J Environ Res Public Health. 2022
3. Does platelet-rich fibrin increase the stability of implants in the posterior of the maxilla? A split-mouth randomized clinical trial. R Tabrizi ,A Karagah ,et al. Int J Oral Maxillofac Surg. 2018 May

Biography

Aida Karagah has completed her maxillofacial speciality in 2017 from shiraz University, Iran. she is assistant professor of Qazvin University of medical sciences, Iran. She has over 12 publications that have been cited over 328 times, and her publication H-index is 9 and has been serving as a review committee member of reputed Journals.

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