Systematic and Meta-Analysis of Navigation in Oral and Maxillofacial Trauma and Impact of Machine Learning and AI in Management

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Abstract : Introduction: Managing oral and maxillofacial trauma is a multifaceted challenge, as it can have life-threatening consequences and significant functional and aesthetic impact. Navigation techniques have been introduced to improve surgical precision to meet this challenge. A machine learning algorithm was also developed to support clinical decision-making regarding treating oral and maxillofacial trauma. Given these advances, this systematic meta-analysis aims to assess the efficacy of navigational techniques in treating oral and maxillofacial trauma and explore the impact of machine learning on their management. Methods: A detailed and comprehensive analysis of studies published between January 2010 and September 2021 was conducted through a systematic meta-analysis. This included performing a thorough search of Web of Science, Embase, and PubMed databases to identify studies evaluating the efficacy of navigational techniques and the impact of machine learning in managing oral and maxillofacial trauma. Studies that did not meet established entry criteria were excluded. In addition, the overall quality of studies included was evaluated using Cochrane risk of bias tool and the Newcastle-Ottawa scale. Results: Total of 12 studies, including 869 patients with oral and maxillofacial trauma, met the inclusion criteria. An analysis of studies revealed that navigation techniques effectively improve surgical accuracy and minimize the risk of complications. Additionally, machine learning algorithms have proven effective in predicting treatment outcomes and identifying patients at high risk for complications. Conclusion: The introduction of navigational technology has great potential to improve surgical precision in oral and maxillofacial trauma treatment. Furthermore, developing machine learning algorithms offers opportunities to improve clinical decision-making and patient outcomes. Still, further studies are necessary to corroborate these results and establish the optimal use of these technologies in managing oral and maxillofacial trauma
Keywords : trauma, machine learning, navigation, maxillofacial, management
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