Digital Applications of Maxillofacial Reconstruction – A systematic review

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Abstract

Objectives: Many patients with maxillofacial defects require maxillofacial prosthetic rehabilitation due to cancer, trauma, or congenital diseases. Adequate surgical and prosthetic treatment planning is required to achieve satisfactory morphological and functional results. Before computer-aided design/computer-assisted manufacture (CAD/CAM) technology was introduced, conventional methods have been used to reconstruct the facial form, which involved making impressions, obtaining models and fabricating the prosthesis all of which is time consuming and requires multiple visits. A rapid progress has been made with advances in digital technology, such as milling systems, rapid prototyping, three-dimensional (3D) scanning, and 3D printing, which has improved the patients’ expectations, the functional and esthetic treatment outcomes.

Materials and methods: An electronic search was conducted in the Cochrane, PubMed (MEDLINE), and ScienceDirect databases between July 2000 and October 2020. A manual search was also performed to cover all digital aspects of the maxillofacial prosthesis. The inclusion criteria were randomized clinical trials, prospective or retrospective cohort, and cross-sectional studies performed on humans with at least 1 year of follow-up and published within the last 20 years.

Results: The results showed that the used technologies in a digital workflow of auricular, orbital and nasal prosthesis reduce the manufacturing time and allow the manufacture of high-quality prostheses for missing facial parts. The methodology provides a good position for further development issues and is usable for clinical practice.

Conclusion: Utilization of digital technologies in the facial prosthesis manufacturing process can be a good contribution for higher patient comfort and production efficiency but also comes with a higher initial investment and greater demands for experience with software tools.

Keywords: Maxillofacial Prothesis, CAD/CAM, Rapid Prototype, Digital Workflow

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