

Abstract

Pitfalls and prospect in the treatment with patient-specific implants: An oral and maxillofacial surgeon's perspective

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The advantages of patient-specific implants in modern oral and maxillofacial surgery are manifold and already well documented in the literature. For example, laser-sintered implants for the reconstruction of posttraumatic orbital defects lead to significantly more accurate implant positioning [1]. But also in other areas such as tumour surgery, the advantages are obvious. Examples include reconstruction after resection of sphenoorbital meningiomas or masticatory rehabilitation after ablative therapy of oral cancer [2,3]. Despite all the advantages, however, there are also some pitfalls to be considered, above all the lack of intraoperative modification options. If errors occur during planning that are transferred to the final implant, this can lead to serious problems during the operation and, in the worst case, to the abortion of the operation and the production of a new implant. In addition, especially in tumour operations, initial plans have to be modified intraoperatively and, for example, more extensive tissue parts have to be resected, which means that implants may be undersized. A promising option for this missing adaptation possibility could be in-situ printing. By printing directly into the defect, a perfect fit to a defect that may not be precisely scalable preoperatively seems possible. However, this presupposes, on the one hand, an exact recording of the defect by means of different scanning methods and, on the other hand, a biocompatible procedure that takes into account the special requirements of different interfaces. For example, the jawbone is only separated from the special microbial environment of the oral cavity by thin soft tissues. From a technical point of view, the printing technique itself, i.e. extrusion printing versus micro-dispensing printing as well as the temperatures during printing and the travel paths of the print heads are particularly demanding. In addition, different material properties are required, and of course, medical device regulations present major hurdles. The aim of the lecture is to present the specific requirements from the perspective of oral and maxillofacial surgeons and to highlight current research approaches and collaborations between surgeons and engineers for in-situ printing.

AUTHOR'S STATEMENT

Conflict of interest: N-CG and PK received honoraria for speaking or traveling from KLS Martin. Informed consent: Informed consent has been obtained from all individuals included in this study. Ethical approval: The research related to human use complies with all the relevant national regulations, institutional policies and was performed in accordance with the tenets of the Helsinki Declaration, and has been approved by the authors' institutional review board or equivalent committee. Research funding: The authors state no funding involved.

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