TECHNOLOGY OFFER

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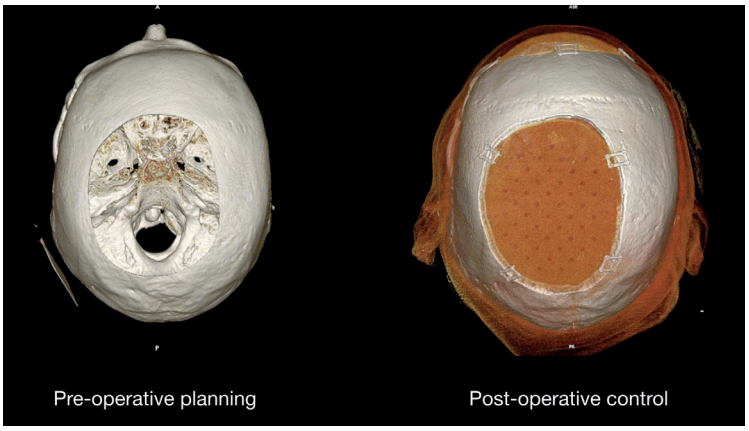
Simulation based algorithm to streamline surgical planning, patient specific fabrication and image-guided implantation of cranioplastic implants.

BACKGROUND

Skull prostheses (also known as cranioplastic implants) replace portions of the skull that have been previously removed during a resection surgery. In a range of clinical situations, it is desirable to perform such reconstruction immediately after the resection, as part of the same surgical operation. This is the case, for example, for resection of skull-infiltrating tumors. A common approach to performing such reconstruction is to manually shape a filling material such as polymethyl methacrylate to form the skull prosthesis. This procedure is time consuming and can be associated with adverse events such as thermal necrosis, material fracture and infections, as well as providing unsatisfactory cosmetic results.

TECHNOLOGY

To address the issues of the lengthy intervals between the two stages of cranioplasty or the tedium of intraoperative implant molding, a dedicated software program and operative workflow was developed. The intention was to empower surgeons so that they could virtually and independently plan the craniotomy on personal computers and to send a ready-to-fabricate dataset to the implant manufacturer. The surgeon-modified DICOM data integrates seamlessly into current implant design and fabricating workflows, resulting in the manufacturing of patient-specific PEEK alloplastics. The final stage of the algorithm that has been validated in a clinical setting consists in the image-guided skull resection and simultaneous implantation of the sterile, prefabricated implants. Our workflow represents a highly time-efficient method with the potential to optimize the allocation of expensive surgical time and to perfect surgical cosmesis in maxillofacial and cranial surgery.



ADVANTAGES

- First experimentally validated virtual planning and implantation algorithm.
- This intuitive method allows cranial and maxillofacial surgeons to plan simultaneous resection and reconstruction procedures anytime and anywhere on consumer hardware.
- The surgeon-modified datasets integrate seamlessly into current implant design and fabricating workflows.
- The PEEK workflow resulted in up to tenfold shorter reconstruction times than the traditional PMMA technique.
- The proposed algorithm is both accurate in terms of neuronavigation and surgically precise (submillimeter surgical precision in 50% of the cases).

REFERENCE:
736.18

DEVELOPMENT STATUS:
Validated in a clinical setting

IPR:
PCT/EP2018/076526

AVAILABLE FOR:
- R&D collaboration
- License Agreement

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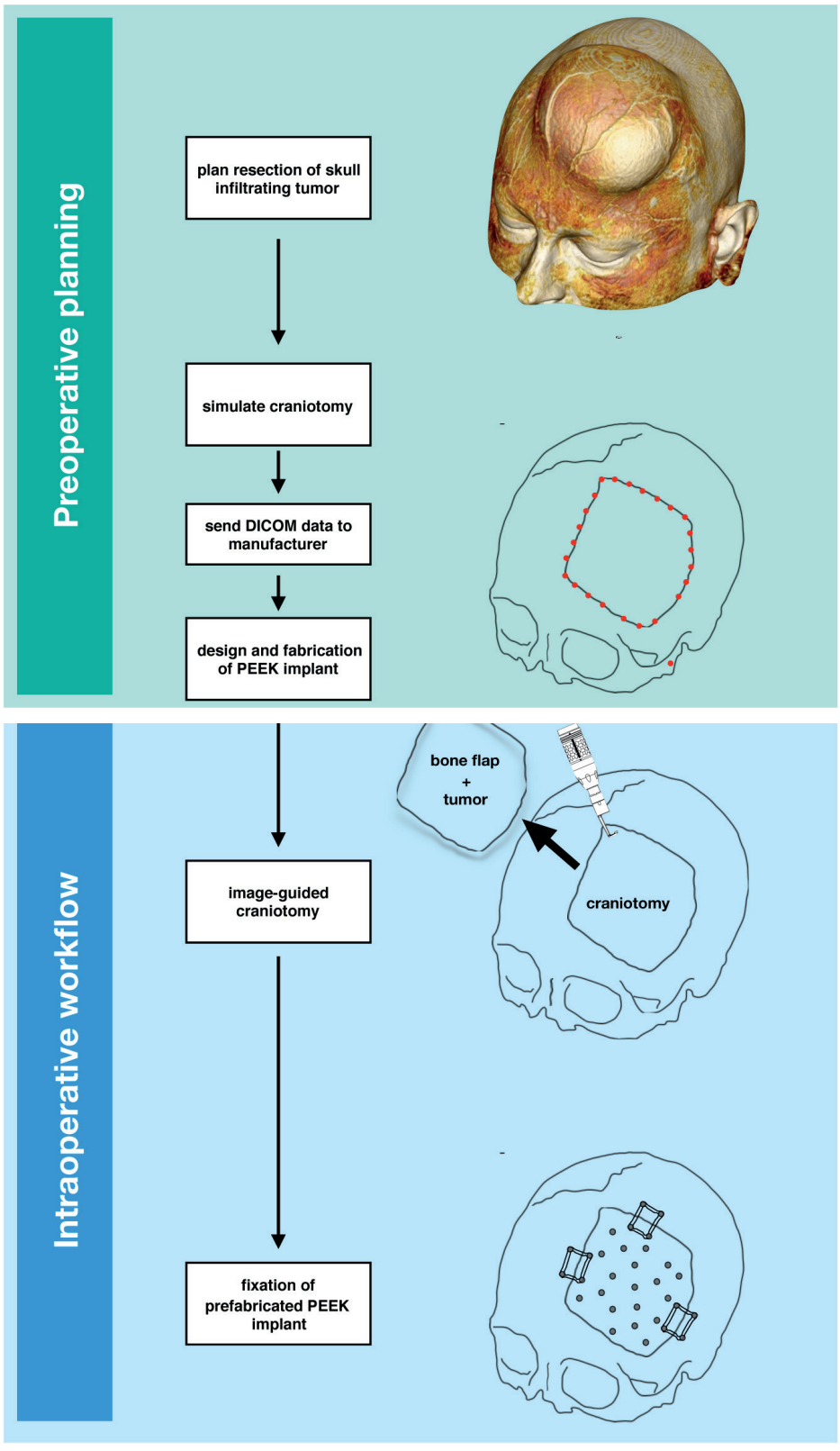
SCHEMATIC WORKFLOW



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