Patient-Specific 3D Printed Model

Patient-Specific 3D Printed Models provide added value for initial clinical diagnosis, preoperative surgical and implant planning, and patient and trainee education.

3D printing-based patient-specific design and fabrication of Polymethylmethacrylate cranioplasty is safe and achieves acceptable cosmetic and clinical outcomes in patients with decompressive craniectomy. A study ensured clinically acceptable structural and mechanical properties of implanted PMMA, suggesting that a low-cost 3D printer-based PMMA flap is an affordable option for cranioplasty in resource-constrained settings [1].

3D spine models are usually designed using CT data, due to the ability to rapidly image osseous structures with high spatial resolution. Combining CT and MRI to derive a composite model of bony and neurological anatomy can potentially provide even more useful information for complex cases. Parthasarathy et al. described such a case involving an adolescent with a grade V spondylolisthesis in which a composite model was manufactured for preoperative and intraoperative evaluation and guidance. They provide a detailed workflow for creating such models and outline their potential benefit in guiding a multidisciplinary team approach [2].

The use of 3D-printed patient-matched, anatomically accurate replicas of the cerebral vascular tree is a valuable adjunct to the microsurgical clipping of IAs, and our study conclusions support this concept. However, both the feasibility and clinical utility of 3D printing remains the subject of much, ongoing investigations [3].

Spatial proximity of diffuse low-grade gliomas (DLGGs) to cortical eloquent areas and subcortical tracts can be readily assessed in patient-specific 3D printed models with high fidelity. 3D-printed multimodal models could be helpful in preoperative patient consultation, surgical planning, and resident training [4].

References

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