Introduction:
Rapid prototyping technologies have successfully been introduced in surgical planning and in the fabrication of custom made implants for craniofacial reconstruction.

Study I: Five patients with the diagnosis of chronic subdural hematoma were included into the study. Following trephination and evacuation of the subdural hematoma the Burr holes (14mm in diameter) was closed using a biodegradable polymer plug made of polycaprolactone (PCL). The implants have a computer controlled design with an upper rim diameter of 16mm and a body of 14mm in diameter and fully interconnected honeycomb-like pore architecture of 400-600 µm size.

Study II: A variety of biodegradable implants have been used for orbital floor reconstruction. In a clinical study we reconstructed the orbital floors of seventy patients who had orbital floor defects following facial trauma with biodegradable PCL sheets of 3mm thickness.

Study III: Large calvarial and craniofacial osseous defects represent a particular challenge for reconstruction due to the anatomical complex shapes and functional aspects of the bone. Customized implant technology has recently resulted in a paradigm shift in reconstructive procedures. We developed a technology using imaging-computational modeling- rapid prototyping and bioresorbable scaffold technology for the reconstruction of large bone defects.

Conclusions: Clinical data from several studies indicate that a variety of craniofacial defects can be reconstructed with the novel bioengineered polymer-scaffolds. In summary: Advances in medical imaging and computational modelling have enabled the development of computer-designed implants, which in combination with cell transplantation can successfully be used to regenerate complex-shaped craniofacial skeletal defects.

References:

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