CRANIO-MAXILLOFACIAL BROCHURE
3D PLANNING, SURGICAL GUIDES AND PATIENT-SPECIFIC IMPLANTS

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3D LifePrints (3DLP) has expertise in the design and 3D printing patient specific anatomical models, surgical simulation models, prosthetics, orthopaedic and cranio-maxillofacial cutting guides and implants.

3DLP is the largest specialist medical 3D printing company in the UK. They have a number of embedded 3D printing manufacturing centres such as Alder Hey Children’s Hospital, Nuffield Orthopaedic Centre and Wrightington Hospital.

Hospitals using embedded 3D printing services have the dual advantage of avoiding capex investment in the hardware, software and personnel necessary to set up a 3D printing facility whilst still benefiting from having the service immediately available in-house.

3DLP business model of embedding a commercial facility within a hospital was highlighted in an recent NHS commissioned paper on personalized medicine.
3D planning, surgical guides and patient-specific implants are increasingly being used in cranio-maxillo facial surgery. Clinical papers report that the use of 3D planning, surgical guides and patient-specific implants reduces operative time, complications and improves surgical outcomes.

3DLP can offer your organisation both 3D / CAD modelling and planning services as well as the physical manufacturing of 3D printed surgical cutting guides and implants.

The 3DLP CMF team comprises of experts in the field who have worked on hundreds of cases including:

- Maxillary and mandibular reconstructions with fibula/scapula free flap;
- Midface reconstruction (orbital floor reconstruction, zygoma repositioning);
- Complex deformities (craniosynostosis sequelae, facial bi-partition, Treacher Collins syndrome, hemifacial microsomia);
- Orthognathic surgery (Lefort I, BSSO, chin wing osteotomy, bi-maxillary osteotomy with or without genioplasty).

* Tarsitano A.: Is a computer-assisted design and computer-assisted manufacturing method for mandibular reconstruction economically viable? 2016
OUR PROCESS

Segmentation
From a CT scan, we reconstruct the patient’s anatomy in 3D.

3D Planning
A biomedical engineer will discuss with you the proposed treatment and validate the virtual planning.

Design
The engineer will then design the patient-specific devices to accurately translate the digital plan.

 Manufacture
Once the design is approved, we will manufacture the devices, using cutting-edge 3D printing technology.

Surgery
The devices are then supplied to your hospital (non-sterile).
EXAMPLE: FIBULA FREE FLAP RECONSTRUCTION

DESCRIPTION

The surgery is virtually planned: the tumour resection is performed and the reconstruction is made with the patient’s own fibula. The cutting guides for the fibula, mandible and the osteosynthesis plates are virtually designed. The holes in the guides correspond to the screws in the titanium plates, which help the surgeon reposition the parts in the exact position.

BENEFITS

The use of 3D virtual planning and 3D printing of cutting guides and implants for this procedure has been shown to provide many benefits such as:

- Less time needed for the reconstruction process (no plate bending)
- Less ischemia time as the reconstruction can be performed while the fibula is still supplied by blood
- Improve patient outcomes and lower rehabilitation times
- Optimal positioning of dental implants
DESCRIPTION

A mirror of the contralateral side is used to design the cranioplasty, when the defect is unilateral. If the defect is bilateral, we can use reference skulls to model the right implant for your patient. In case of fronto-orbital meningioma for example, the resection and the reconstruction can be both planned. We would provide you with the guide to remove the exact amount of bone, and the patient-specific implant to reconstruct immediately the defect.

BENEFITS

• Less time needed for the reconstruction process (no plate bending)
• Reduce surgery time
• Resection and reconstruction in a single surgical time
• Reconstruction of complex anatomical part (e.g. frontal orbital region)
DESCRIPTION

When possible, orbital floor reconstruction is based on the contralateral side. Mirroring tools are used to design the implant, allowing an anatomically correct shape implant to be created, along with an adequate positioning of the orbital floor. If needed, we can provide a multi-part implants, decreasing the invasiveness of the procedure. When positioning of the orbital floor implant is intricate, a surgical guide will allow the surgeon to drill the position of the future screws, to ensure that the implant will be perfectly positioned afterwards.

BENEFITS

- Improve accuracy & surgeon confidence
- Less time needed for the reconstruction process (no plate bending)
- Improve patient outcomes
- Decrease procedure invasiveness
EXAMPLE: FACIAL BI-PARTITION

DESCRIPTION

The goal of this complex surgery is to reduce the intercanthal distance.

Thanks to virtual planning, the amount of bone to be removed is precisely defined to obtain optimal symmetrical results. The repositioning of the bony flaps is guided by the pre-drilling of guides which correspond to the screws of the custom-made plates.

BENEFITS

- Improve accuracy & surgeon confidence
- Decrease intraoperative decision making and surgery time
- Improve patient outcomes
- Symmetrical results