The use of stereolithographic models to aid rehabilitation of oral, head and neck cancer patients

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INTRODUCTION

- Stereolithographic models are life size resin replicas of the patients anatomy made from data acquired through computed tomography (CT) scans.
- These models have shown great value in overcoming the challenges faced in the rehabilitation of patients with oral head and neck cancer (OHNC).
- This poster aims to describe the use of stereolithographic models to:
  1. Pre-bend bone plates for surgical reconstruction following mandibulectomy.
  2. Construct a surgical healing plate to aid formation of keratinised peri-implant tissue.

USE OF STEREOLITHOGRAPHIC MODEL TO PRE-BEND SURGICAL BONE PLATES

- Following mandibulectomy, reconstructing the mandible to its original shape can be challenging.
- Bone plates used to secure grafted bone in place are often bent into an estimated shape during reconstructive surgery which can take up to an hour.
- This process can result in asymmetry of the face and an incorrect occlusal relationship post surgery.
- Stereolithographic models can be used to accurately pre-bend the surgical bone plate to a shape that resembles the patients original anatomical shape prior to surgery as shown below.

STEREOLITHOGRAPHIC MODEL OF PATIENT'S MANDIBLE

Bone reconstruction plate which has been bent to the shape of the stereolithographic model

Mandible following resection of the tumour

Pre-bent bone plate accurately fixed to the remaining part of the mandible

DCR graft in situ which has been trimmed to fit around the pre-bent bone plate

Pre and Post operative extraoral view of patient

Use of stereolithographic model to construct an acrylic surgical healing plate

- Dental implants are increasingly used in the rehabilitation of OHNC patients following surgical reconstruction using grafted bone and non keratinised soft tissue.
- The need for immobile keratinised tissue around implants remains controversial. It is thought that in its absence there is excessive tissue overgrowth, increased plaque accumulation and gingival inflammation.
- This makes maintenance of dental implants very difficult leading to pocket formation and the potential of bone loss around dental implants (peri-implantitis).
- A Free Gingival Graft (FGG) placed around dental implants along with a surgical healing plate made using a stereolithographic model can aid the formation of immobile keratinised peri-implant tissues as shown below.

PHOTOS OF STEREOLITHOGRAPHIC MODEL AND TECHNICAL STAGES OF CONSTRUCTING A SURGICAL HEALING PLATE

- The pictures above show a 60 year old female who had partial left sided mandibulectomy and reconstruction with DCR flap following diagnosis of an Ameloblastoma.
- The lack of peri-implant keratinised tissue was treated using a FGG and a custom made surgical healing plate as shown above.
- The three week post op view shows formation of immobile keratinised peri-implant soft tissue around the healing abutments.

DISCUSSION

- Improving the overall quality of life and minimise the risk of any complications.
- This poster highlights several uses of stereolithographic models which will help achieve more predictable results in the rehabilitation of OHNC patients.

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REFERENCES


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