

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

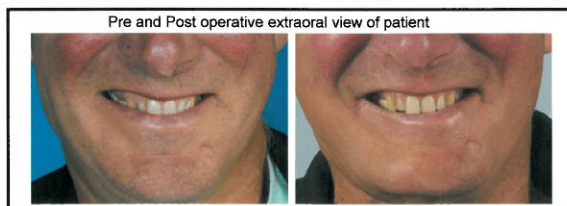
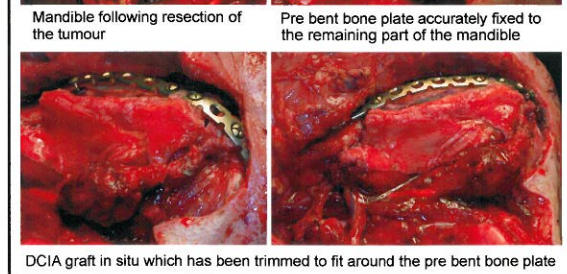
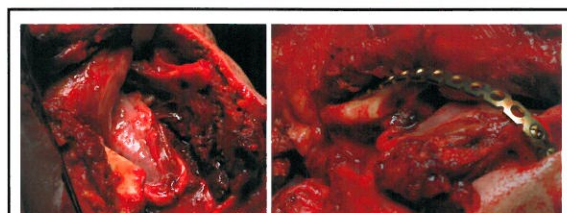
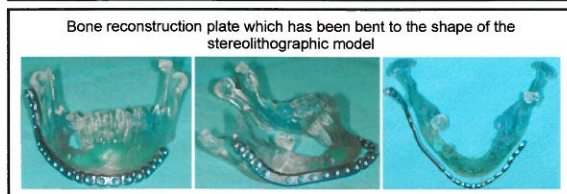
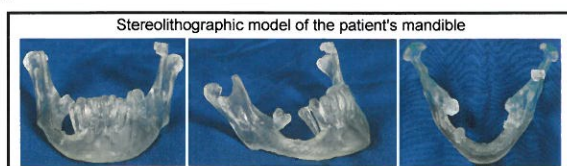
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INTRODUCTION

- Stereolithographic models are life size resin replicas of the patients anatomy made from data acquired through computerised 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:
 - Pre-bend bone plates for surgical reconstruction following mandibulectomy
 - Construct a surgical healing plate to aid formation of keratinised peri-implant tissues

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 show below

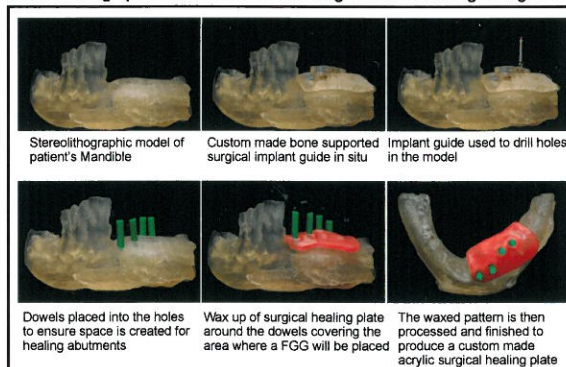


- The pictures above show a 69 year old gentleman who underwent right sided mandibulectomy to treat a metastatic squamous cell carcinoma followed by reconstruction with a DCIA free flap
- The bone plate was bent to fit the shape of the stereolithographic model a few days prior to surgery and sent for routine sterilisation
- During surgery the plate was simply fixed into the predetermined position following resection which saved time and ensured correct positioning
- Post op photos show that the patient's mandible has retained its original shape, recreated the facial symmetry and the correct occlusal relationship was also maintained on the unresected side

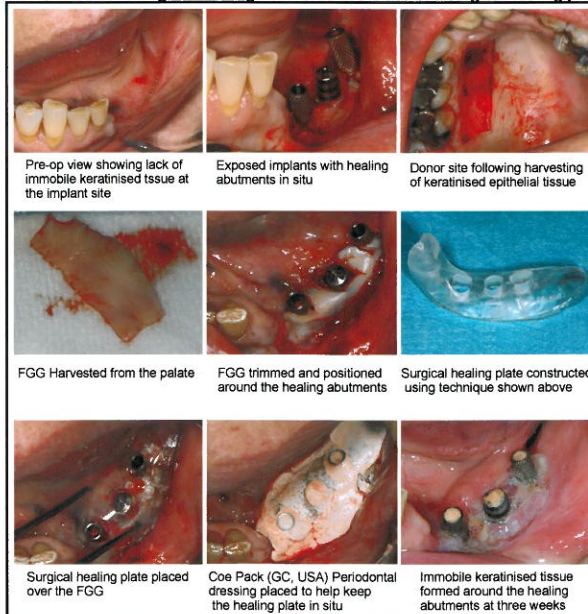
Use of stereolithographic model to construct an acrylic surgical healing plate

- 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 an 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



Clinical case showing a Free Gingival Graft and the use of a surgical healing plate



- The pictures above show a 60 year old female who had partial left sided mandibulectomy and reconstruction with a DCIA free 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 outcome of treatment for OHNC patients is important as it will directly improve their 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

- Chung DM, Oh TJ, Shotwell JL, Misch CE, Wang HL. Significance of keratinized mucosa in maintenance of dental implants with different surfaces. *J Periodontol* 2006;77(8):1410-20.
- Chang YM, Chan CP, Shen YF, Wei FC. Soft tissue management using palatal mucosa around endosteal implants in vascularized composite grafts in the mandible. *Int J Oral Maxillofac Surg* 1999;28(5):341-3.
- Kwasnicki A, Butterworth C. 360 degree peri-implant, keratinised, soft-tissue grafting with stereolithographic-aided dressing plate. *Int J Oral Maxillofac Surg* 2009;38(1):87-90.