

### Tripaddled anterolateral thigh chimeric flap for extensive full-thickness cheek reconstruction after radical resection of advanced buccal cancer

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**Objectives:** Anterolateral thigh (ALT) free flap can provide a very large soft-tissue for reconstruction of extensive full-thickness cheek defect after salvage surgery of advanced buccal cancer, however the donor site cannot be closed primarily if ALT flap is too wide. The aim of this study was to evaluate the reliability of tripaddled ALT flap with kissing pattern for reconstruction of extensive full-thickness cheek defects, which can ensure the primary closure of donor site simultaneously.

**Methods:** 10 patients with advanced buccal cancer who underwent reconstruction of extensive full-thickness cheek defects with tripaddled ALT chimeric flap between March 2013 and June 2015 were enrolled. Among three skin paddles, distal paddle was used to reconstruct the inner mucosa defect, and other two large skin paddles were stacked side by side as kissing pattern for outer mega cheek defect.

**Results:** All patients were male, with a mean age of 48.3 years (range, 29–61 years). All tumour sizes were T4 stage. The mean area of intraoral defect was 32.2 cm<sup>2</sup> (range, 24–40 cm<sup>2</sup>) and the mean area of extraoral defect was 106.34 (range, 85.4–143 cm<sup>2</sup>). The mean width of outer skin defect was 9.5 cm. All flaps survived and all donor sites were closed primarily.

**Conclusion:** Tripaddled ALT flap stacked as kissing pattern is a novel and reliable modification on conventional flap design, which provides customised coverage for extensive and full-thickness buccal defects whilst minimising donor-site morbidity.

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### Imaging evaluation of recipient vessel of osteoradionecrosis of the mandible with vascularised flap reconstruction

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**Objectives:** To investigate colour duplex sonography (CDS) and computed tomography angiography (CTA) — two types of detection technology used in the evaluation of recipient vessel of osteoradionecrosis of the mandible with vascularised flap reconstruction, to provide guidance for surgeons, and reduce the risk of flap necrosis.

**Methods:** 10 patients with osteoradionecrosis underwent surgery and vascularised flap reconstruction, CDS and CTA technology were used to detect the affected side of the neck, arteriovenous were detected before operation, and record the related vascular examination results, statistical analysis of inspection data. The results of the operation to be confirmed as the gold standard, the diagnostic test was designed to investigate the accuracy of CDS and CTA in the diagnosis.

**Results:** 10 patients underwent reconstruction with fibula myocutaneous flap. CDS and CTA detected external maxillary artery

occlusion in four cases (40%), external jugular vein occlusion in three cases (30%), and carotid artery stenosis, arterial wall calcification formation in one case; CDS could detect the vessel of blood dynamic before operation, and recipient area around soft tissue can be three-dimensional imaging display through CTA.

**Conclusion:** CDS and CTA are used for the detection of osteoradionecrosis of vascular reconstruction of patients before surgery, can provide the recipient vessels without absence for surgery, haemodynamic course and syntopy precise information, can significantly reduce the risk of vascular tissue flap reconstruction failure.

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### Transfer virtual surgery plan in maxillary defect reconstruction: navigation surgery or model-guided surgery?

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**Background:** As virtual surgery plan (VSP) becomes an important method for preoperative design in maxillary defect reconstruction, the two methods to transfer design from computer to real-time surgery: the navigation guided surgery and model guided surgery technique had been frequently used and reported.

**Objectives:** To compare the repeatability of different methods in transferring VSP for maxillary defects reconstruction.

**Methods:** 21 Patients who received maxillary defect reconstruction using either navigation and/or model guided surgery to transfer VSP from March 2012 to December 2015 were included in this study, and divided according to the transfer methods adopted: Group A ( $n=5$ , used model-guided surgery solely); Group B ( $n=16$ , used navigation and model guided surgery in combination). The three-dimensional (3D) deviation in midface area of preoperative design and postoperative CT scan were compared using a 3D comparing algorithm, the result of 3D deviation less than 2 mm was recorded.

**Findings:** The postoperative computed tomography showed that the 3D deviation less than 2 mm on midface area was 91.76% (86.77–96.68%) in Group A, and 90.56% (83.00–96.012%) in group B, with no significant differences between two groups.

**Conclusion:** There was no significant difference between these two groups in repeatability, but still needs to be proven by a larger sample. Model-guided surgery can be used for facilitating the titanium plate/mesh bending, while navigation guided surgery show the real-time location of the grafts. Surgeons can choose different methods solely or in combination base on the extent of defect and reconstruction methods.

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### Total mandibular titanium prosthesis in a child

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**Objectives:** The aim of this study was to report a case of a six-year-old child with the diagnosis of Gorham-Stout syndrome, presenting without the complete mandible. The patient was

breathing because an acrylic device was projecting the muscles, but is sustained a local infection.

**Methods:** The mandibular reconstruction was planned using computer-aided design/computer-aided manufacturing (CAD/CAM) technology. The skull of the patient was used to design and manufacture the customised total mandibular prosthesis with two temporomandibular joint fossae. CAD of the surgical devices used NX 10.0 software (Siemens, Plano, Texas, United States of America). The authors assumed that this design would maximise aesthetics, mandibular projection, facial height and future growth. The virtual designed mandible was submitted to a topological optimisation and finite element analysis in order to remove excess material and improve stiffness of the mandible.

**Findings:** The final result was a mandible weighing 59 g with two fossae for articulation and with threaded holes for future implant insertions and dental rehabilitation. Surgery and postoperative follow-up was uneventful. The patient resumed normal functions at the first postoperative day, with decrease morbidity when compared to microvascular grafts. No bone grafts were used.

**Conclusion:** The project of this mandible may benefit many others patients which sustain serious mandibular defects, providing less morbidity and allowing for total mandibular and dental rehabilitation.

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#### Application of digital and three-dimensional print surgical guiding plates in free flaps reconstruction of mandible defect

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**Background:** The three-dimensional (3D) print surgical guiding plates could be used to assist the mandibular reconstruction.

**Objectives:** To establish digital and 3D print surgical guiding plates in order to provide a comprehensive reconstruction plan for patients with mandible defect with free fibular flap.

**Methods:** Preoperative spirals computed tomography (CT) scan and 3D reconstruction imaging was taken in 11 patients with mandibular tumours or defect from 1 September 2015 to 1 March 2016. The stereolithographic model of mandible was made using RP technique and reverse engineering (RE) from CT data. The processes of cutting tumour and shaping fibula transplantation were simulated using Mimics 15.0 software. The surgical guiding plates were devised and incised. Segmental mandibulectomy and mandibular reconstruction with vascularised fibula were performed based on the preoperative design and guiding plate. All patients with follow-up were evaluated for postoperative functional and aesthetic results.

**Findings:** The method could effectively transfer the virtual surgical planning information. During operation, the surgical guiding plates were small and tightly fit with bone tissues without extending the original surgical incision. Cutting, reformation and reposition of the fibula could be accelerated by surgical guiding plates. An average precision of 2 mm was found for the mandibular angle region and condyle.

**Conclusion:** The surgical guiding plates can enhance the operative accuracy and improve the surgical effect with good feasibility, leading to better aesthetic and functional reconstruction outcome in mandible defect reconstruction.

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#### Visualisation of perforator free flap perfusion in the immediate postoperative period using spy elite fluorescent imaging system

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**Background:** Use of microvascular free flaps for head and neck reconstruction has reported success rates over 94%. Administration of intraoperative fluids >7 L has been shown in the literature to increase the complication rate in head and neck reconstruction, intraoperative vasopressors are given to assist in limiting the amount of fluid administration and to counteract vasodilatory effects of inhalational and intravenous anaesthetics. However, concern exists that the use of vasopressors results in peripheral vasospasm, reduced flap perfusion, thrombosis and failure. Despite this belief, vasopressors are routinely administered during head and neck reconstruction.

**Objectives:** Prospective study of 20 reconstructive patients aims to use SPY Elite Fluorescent Imaging System during the intraoperative and immediate postoperative period to assess the potential effects of inhalational and vasoactive medications administered intraoperatively on perfusion of perforator free flaps.

**Methods:** Perforator free flap were viewed under SPY Elite twice during the intraoperative period (prior to pedicle division and after inset) and once in the immediate postoperative period. Type, concentration of the anaesthetics, type and amount of vasoactive medications and vital signs were recorded. In the immediate postoperative period clinical exam and Doppler ultrasound were also assessed. These time points were compared to ascertain differences in flap perfusion.

**Findings:** Preliminary data shows mild decrease in flap perfusion in immediate postoperative period when compared to intraoperative period with no significant in change in flap outcomes.

**Conclusions:** Flap perfusion during the intraoperative and immediate postoperative periods is nominal with no overall changes in flap survival.

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#### Microvascular reconstruction in vessel-depleted neck: alternative vascular options

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**Background:** The commonly used recipient vessels in head and neck reconstruction are often significantly compromised, non-viable or absent in patients exposed to previous treatment such as radiotherapy and/or chemotherapy or surgery.

**Methods:** The author aims to present a review of microvascular reconstruction in this challenging group and formulate an algorithm for vessel selection, including alternative that are not considered common practice in head and neck reconstruction.

**Results:** Several patients presenting with recurrent malignant disease or osteoradionecrosis following extensive treatment for previous head and neck cancer were successfully treated with microvascular reconstruction.