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Short Communication

A new autologous block-bone prefabricated flap concept based on the supraclavicular artery island flap (SCAIF) for reconstruction of a neo-mandibular osteoradionecrosis (ORN) defect, IDEAL Stage 1 report

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ABSTRACT

Reconstruction of the mandible due to osteoradionecrosis (ORN) can be very challenging. Currently, only complex high-risk options are available, and microvascular free-tissue transfer of composite flaps is considered the gold standard. However, this is fraught with an increased risk of perioperative complications.

This technical note presents, for the first time, an IDEAL Stage 1 use of a prefabricated supraclavicular artery island flap (SCAIF) for the reconstruction of an ipsilateral mandibular defect, on a patient with advanced mandibular ORN.

We have used an iliac crest cancellous bone block. This was shaped into the anticipated defect and was allowed additional length. It was then inserted into a fasciocutaneous pocket within the region planned for harvest as the skin paddle of the SCAIF. The bone was left in-situ for approximately seven weeks to achieve blood supply. The SCAIF flap was raised as a composite flap. Excellent integration and bleeding from the bone was clearly evident. The cutaneous part of the flap was used to reconstruct the soft tissue defect and the bone was used to bridge the bone defect.

We believe that this technique can be an excellent alternative option for reconstructing mandibular defects. It is simple, elegant, carries minimal morbidity, achieves equal or potentially better result than traditional microvascular free flaps and minimises hospital stay as compared to similar cases treated within the same department in a more conventional surgical manner. The long-term results of this technique are yet to be seen, however will

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form part of our IDEAL Stage 2a & 2b report. In the future, this may become the gold standard for ORN mandibular reconstruction.

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Introduction

Reconstruction of the osteonecrotic mandible is challenging.¹ Advanced stages of osteoradionecrosis (ORN) are currently dealt with microvascular free-tissue transfer of composite flaps.² Donor sites include the scapula, fibula or iliac crest. Such surgery is both lengthy and challenging. It has a three-fold higher perioperative complication rate when compared with microvascular free-tissue transfer on a non-irradiated patient.³ The donor sites have significant morbidity, and not all are always readily available. The patient requires high dependency care post-operatively, and will typically spend an average of two weeks in the hospital.^{4,5} Often, the causative radiotherapy results in vessel depletion within the neck adding further complexity to any reconstruction.

Here, we describe for the first time in the literature, a two-stage prefabricated supraclavicular artery island flap (SCAIF) that enabled composite autologous reconstruction of a Notani stage III⁶ osteonecrotic neo-mandible in accordance with IDEAL principles for the application of new surgical techniques.⁷

Case report

A 67-year-old patient was previously treated for oral squamous cell carcinoma of the mandible. He received radical ablative surgery (subtotal mandibulectomy, resection of chin skin, floor mouth, and ventral tongue), neck dissection with a composite fibula free-flap reconstruction. This was followed by adjuvant radiotherapy. Subsequently, six months post radiotherapy he developed Notani stage III⁶ osteonecrosis of the neo-mandible. The area of ORN was centred around the right canine region along with the overlying skin (Figure 1). The patient was symptomatic, troubled with pain and chronic discharge, saliva leak and recurrent infections.

Stage 1

Pre-operative Doppler assessment revealed the course of the supraclavicular artery (SCA) from its origin, the transverse cervical artery (TCA) posterior to the medial third of the clavicle. A good signal was evident 4 cm laterally to the acromioclavicular joint (ACJ). The key landmarks were marked on the skin with prolene sutures. These were reconfirmed prior to the induction of general anaesthesia with a repeat Doppler. After GA, bolsters were placed under the right shoulder and left pelvis prior to skin preparation and standard surgical draping.

Through the non-viable skin, exploration of the neo-mandible enabled delineation of the bony resection margins resulting in a resultant bony defect of 4.5 cm.

A single incision along the anterior belly of the right deltoid was made down to, but not through, the overlying fascia. This was followed by dissection to create a 3 × 7 cm suprafascial subcutaneous pocket, 2 cm distal/lateral to the ACJ (Figure 2a).

A 6.5 cm free block bone graft was harvested from the contralateral iliac crest via conventional approach. The tri-cortical block was harvested 3 cm posterior to the anterior superior iliac spine (ASIS) to minimise donor site morbidity. A wound infusion catheter was inserted in the donor site for post-operative analgesia. No drain was placed.

The bone block was decorticated using a standard acrylic, trimming bur to achieve a 5.5 × 2 × 1 cm cancellous block (Figure 2b). This was then inserted in the prepared subcutaneous pocket in the

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