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Modifications of the deep circumflex iliac artery free flap for reconstruction of the maxilla[☆]

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KEYWORDS

DCIA;
Deep circumflex iliac artery;
Free flap;
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Summary *Background:* The deep circumflex iliac artery (DCIA) free flap remains underused in maxillectomy reconstruction. A number of surgical techniques have been described however, maxillary defects vary greatly and modifying techniques to account for such variation can be challenging.

Purpose: This article presents the first standardized approach to DCIA free flap modification for maxillary reconstruction where graded modifications are made to a standard procedure based on defect grade. A review of 11 cases that underwent maxillectomy reconstruction with this technique is presented.

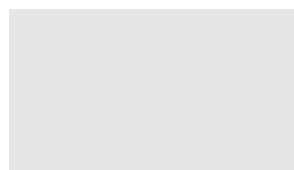
Methods: Defect complexity is stratified according to the Brown Classification System and graded modifications of increasing complexity are made to a standard harvest and flap inset technique. Modifications include increasing the depth of the harvested iliac crest bone to correspond to the height of the anterior maxillary wall defect, addition of a titanium mesh plate to reconstruct the orbital floor and harvest of the internal oblique muscle to fill the orbital cavity. Short and long-term outcomes and complications of 11 cases that underwent maxillectomy reconstruction according to this technique were documented.

Results: Defects ranged from Brown Class I–IV, b–c. All but two patients had malignant diagnoses with squamous cell carcinoma (n = 5) being the most prevalent. Short-term flap related complications were neck cellulitis (n = 1) and donor site haematoma (n = 2) whilst long-term flap related complications were mild trismus (n = 1) and donor site pain (n = 1). There were no reported problems with speech, swallowing or vision.

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Conclusions: This stepwise approach to DCIA free flap modification for maxillectomy defect reconstruction may be used as a guide for future maxillary reconstruction.

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Introduction

Reconstruction of the maxilla presents a complex surgical problem. Of functional and aesthetic importance, its successful reconstruction following trauma or ablative surgery restores the midfacial pillars, roof of mouth, orbital floor, nasal cavity wall, support of upper dentition and facial symmetry. Its complex three-dimensional anatomy means that defects vary greatly and a number of classification systems have been developed to assist with the study and treatment of this heterogenous group of patients. The class system developed by Brown^{1,2} has become the most widely used.³⁻⁵

The iliac crest free flap based on the deep circumflex iliac artery (DCIA) is well described.⁶⁻⁹ First proposed for use in mandibular reconstruction,⁶⁻⁸ it is also well suited to maxillary reconstruction as the natural curvature of the iliac crest corresponds well to that of the maxilla, muscle can be harvested with bone to provide tissue for palatal repair and donor site morbidity is minimal.^{9,10} Brown's seminal description of the DCIA free flap for maxillary reconstruction remains a reference text in regards to surgical technique.⁹ However, aside from brief comments relating to flap orientation,⁹ there is no description in his article, or in more recent literature, of how the DCIA free flap may be modified to suit differing maxillectomy defect types.¹ Hence in reality, technique varies widely between surgeons, as each makes their own adaptations on a case-by-case basis.^{11,12}

This article presents the first standardized approach to modification of the DCIA free flap for maxillectomy defects

based on the Brown Classification system. The approach has been developed by the senior author, and has become routine practice in our Plastic and Reconstructive Surgery unit for reconstruction of Brown Class defects I-IV, b-d.¹ The method is based on a standard inset orientation and use of iliacus for palatal reconstruction. The procedure is then modified depending on the defect complexity, quantified by the Brown Classification System. Outcomes for 11 patients who underwent reconstruction according to this method are analysed and presented here. Defect complexity is stratified according to the Brown Classification System and graded modifications of increasing complexity are then made to a standard harvest and flap inset technique.

Method

Surgical technique

The patient is placed in the supine position with the ipsilateral hip marked. The skin is incised and external and internal oblique elevated off the iliac crest whilst the ascending branch of the DCIA is protected. Transversus abdominis is cut at its lateral border and elevated. DCIA and vein are dissected off the transversalis fascia. The inguinal ligament is detached from the anterior superior iliac spine (ASIS) and left unattached. Iliac crest osteotomies are performed to correspond to the maxillectomy defect (see Figure 1), that is, the pelvic depth of the harvested bone, the posterior osteotomy (red arrow in Figure 1a), is taken according to the height of the anterior

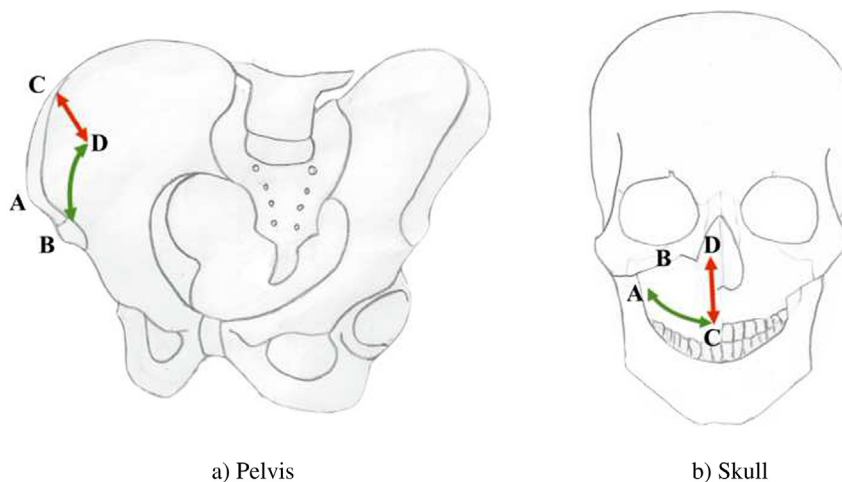


Figure 1 Diagrams of a pre-operative a) pelvis and b) maxillectomy defect. The red arrow in a) indicates the posterior osteotomy whose length corresponds to the height of the anterior maxillary wall defect (red arrow in b)). The green arrow in a) indicates the inferior osteotomy whose length corresponds to the length of the alveolar margin deficit (green arrow in b)). Points A-D indicate original and planned free flap positioning. *Note: Harvested iliacus and internal oblique muscles are not shown.*

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