

# Reconstruction of a Large Composite Hemicraniofacial Defect with Bipedicled DIEP/TRAM Flaps

Jake Chia, BMedSc (Sydney),  
MBBS, MS\*  
Bishoy Soliman, BCom, MBBS  
(Hons 1), MS (PLAST), FRACS  
(PLAST)\*§  
Frank Hsieh, MA (CANTAB),  
MBBChir, FRACS (PLAST)\*†‡

**Summary:** Head and neck reconstructions are often challenging due to the mix of functional and aesthetic goals. It can be tricky when different tissue types are required to reconstruct each subunit. Craniofacial reconstructions require a large volume of tissue to cover defects that span across a large convex area. The latissimus dorsi muscle flap is a workhorse free flap used frequently by surgeons due to its ability to cover over a large surface area. However, there are unique situations when even the latissimus dorsi muscle is not enough to provide the bulk cover for the craniofacial defect. We present a complex case of a hemicraniofacial reconstruction after a hemifacial orbital exenteration and cranial resection of a large neglected basal cell carcinoma. (*Plast Reconstr Surg Glob Open* 2024; 12:e5713; doi: 10.1097/GOX.0000000000005713; Published online 8 April 2024.)

## INTRODUCTION

Craniofacial defects are often reconstructed by myocutaneous flaps such as the latissimus dorsi (LD) flap or by fasciocutaneous flaps like the anterolateral thigh (ALT) flap.<sup>1</sup> Nevertheless, deep inferior epigastric perforator (DIEP) or transverse rectus abdominis myocutaneous (TRAM) flaps have also been used in craniofacial reconstruction.<sup>2,3</sup> We report the use of a bipedicled DIEP/TRAM flap to safely reconstruct a composite large hemicraniofacial defect.

## CASE REPORT

A 48-year-old man presented with a 2-year history of a large 15×12 cm locally invasive fixed basal cell carcinoma on most of his left mid-face and parietotemporal region of his scalp with visual loss to his left eye (Fig. 1). No distant or local metastasis was evident clinically or radiologically (See figure, Supplemental Digital Content 1, which displays MRI images of the lesion showing the depth of tumor invasion. <http://links.lww.com/PRSGO/D132>).

He underwent a multidisciplinary radical excision of the lesion with curative intent. The resulting defect was 17 cm × 17 cm with obliteration of most of his left upper mid-face and cranium, as shown in Figure 2. A large, bipedicled left DIEP and right TRAM flap was raised to provide lining to the exposed nasal cavity with rectus muscle and extensive external soft tissue coverage. The TRAM pedicle was anastomosed to the left facial artery in an antegrade fashion, whereas the DIEP pedicle was connected to the retrograde limb of the facial artery. Unfortunately, the TRAM anastomosis suffered from repeated clots. To perfuse the TRAM pedicle, we decided to perform a salvage intraflap arterial anastomosis between the cranial end of the DIEP pedicle and the caudal end of the TRAM pedicle. However, the main perforator of the DIEP pedicle (cranial) had to be compromised for a better vascular configuration and size match, as illustrated in Supplemental Digital Content 2. (See figure, Supplemental Digital Content 2, which displays an illustration of the bipedicled DIEP/TRAM flap configuration. <http://links.lww.com/PRSGO/D133>.) No vascular impairment on the DIEP side was evident. Figure 3 shows the inset of the bipedicle flap with a small posterior skin graft to the TRAM muscle. The TRAM donor site was repaired with a Prolene mesh. He was later discharged with no flap-related complications or cerebrospinal fluid leak. Formal histopathology showed complete tumor eradication with clear margins. He maintains good abdominal strength with no evidence of any postoperative hernias. A year later, he had a debulking procedure with good aesthetic result (Fig. 4) even after adjuvant radiotherapy.

From \*Department of Plastic and Reconstructive Surgery, Westmead Hospital, Westmead, NSW, Australia; †Sydney Medical School, Sydney University, Sydney, NSW, Australia; ‡Department of Plastic and Reconstructive Surgery, Bankstown Hospital, Sydney, NSW, Australia; and §Department of Plastic and Reconstructive Surgery, Royal North Shore Hospital, Sydney, NSW, Australia.

Received for publication December 12, 2023; accepted February 8, 2024.

Copyright © 2024 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: 10.1097/GOX.0000000000005713

Disclosure statements are at the end of this article, following the correspondence information.

Related Digital Media are available in the full-text version of the article on [www.PRSGlobalOpen.com](http://www.PRSGlobalOpen.com).



**Fig. 1.** Preoperative photograph of large invasive BCC on patient involving left hemicranium.

## DISCUSSION

To reconstruct a large defect after extensive oncological resection, some surgeons may consider the LD free flap to provide a large pliable tissue coverage.<sup>1</sup> The muscle may atrophy over time to provide a thin layer that contours well to the underlying defect, as seen in total-scalp resurfacing. However, as the muscle atrophies, the soft tissue can result in a cicatrice scarred tissue that may require further revision to restore bulk. There is also a limit to the LD flap skin paddle harvest to allow for primary closure. Because the resulting defect was 17 cm × 17 cm, an LD flap skin paddle would not be amendable to direct closure of the donor site.

Alternatively, a fasciocutaneous flap can provide a bulky soft tissue reconstruction to circumvent the issue of muscle bulk atrophy. Uzun et al found that the ALT flap can provide significant soft tissue coverage to reconstruct scalp and cranium defects with less flap atrophy than musculocutaneous flaps.<sup>4</sup> The ALT flap can also be harvested in a chimeric fashion to provide composite tissue types for reconstruction. However, in our opinion, the vastus lateralis will not provide enough muscular tissue to cover the synthetic dura compared with the rectus muscle. Similar to the LD flap, as the size of the ALT skin paddle becomes larger, the difficulty to primarily close the secondary defect increases.<sup>5</sup>

The DIEP and TRAM flaps are workhorse adipocutaneous and myocutaneous flaps used in breast reconstruction.



**Fig. 2.** Photograph of the large hemifacial defect after oncological resection.

They can provide large tissue volume, and the donor site can be closed primarily to achieve an aesthetically pleasing scar. The skin paddle can be raised as large as 25 × 15 cm based on a single perforator.<sup>6</sup> Interestingly, DIEP and TRAM flaps have also been shown to have utility beyond breast reconstruction, extending to head and neck surgery. Yano et al described two cases of using DIEP flaps in reconstructing intraoral defects with remarkable aesthetic and functional results.<sup>2</sup> Likewise, Miyamoto et al illustrated the use of DIEP flaps in reconstructing maxillary defects.<sup>3</sup> The use of rectus abdominis-based flaps has been well described by Cordeiro and Santamaria to reconstruct large maxillary defects such as those that involve orbital exenterations.<sup>7</sup> Our patient required not only a large but also a bulky flap to fill the dead space. Based on this, we were inspired to raise a rectus abdominis-based flap both as a DIEP on the one side and a TRAM flap on the other to increase tissue bulk to fill the large dead space in the resultant defect. The flaps were raised as bipediced flaps to ensure that zones I–IV were reliably perfused. The muscle tissue may also provide the added benefit of preventing and minimizing infections in soft tissue reconstructions.<sup>8</sup>

An alternative solution is to raise two separate flaps, an LD flap to provide lining to the nasal cavity and skull base, and a large ALT flap to provide external soft tissue coverage. We decided against this approach to minimize the need for two different donor sites as well as prolonging operative time. The TRAM/DIEP flap approach also



**Fig. 3.** Photograph of the defect reconstruction with bipediced TRAM/DIEP free flap.



**Fig. 4.** Six-month follow-up photograph after secondary revision of free flap demonstrating a good cosmetic result.

has the added advantage of being able to be raised concurrently during resection as well as negating the need for repositioning.

We describe a complex case of a bipediced DIEP/TRAM flap to reconstruct a large composite hemicraniofacial defect safely and effectively. Although the main perforator of the DIEP was compromised, the perfusion provided by the TRAM pedicle may have made the non-dominant perforator sufficient to perfuse the DIEP side. We were able to provide bilayered tissue reconstruction with a relatively low donor site morbidity and aesthetic burden. However, it is important to note that, like DIEP flaps in breast reconstruction, the sheer volume of tissue may require a second debulking stage to achieve better contouring in the future.

*Jake Chia, BMedSc (Sydney), MBBS, MS*  
Westmead Hospital  
Westmead, NSW, Australia  
E-mail: [drjakechia@gmail.com](mailto:drjakechia@gmail.com)

#### DISCLOSURE

*The authors have no financial interest to declare in relation to the content of this article.*

#### PATIENT CONSENT

*The patient provided written consent for the use of his image.*

#### ACKNOWLEDGMENT

*All surgeries and procedures performed in this study conform to all guidelines of the Declaration of Helsinki.*

#### REFERENCES

1. Aladimi MT, Han B, Li C, et al. Factors to consider when deciding on the type of free-flap reconstruction of head and neck soft tissue defects. *ORL J Otorhinolaryngol Relat Spec.* 2017;79:230–238.
2. Yano T, Sakuraba M, Asano T, et al. Head and neck reconstruction with the deep inferior epigastric perforator flap: a report of two cases. *Microsurgery.* 2009;29:287–292.
3. Miyamoto S, Arikawa M, Fujiki M. Deep inferior epigastric artery perforator flap for maxillary reconstruction. *Laryngoscope.* 2019;129:1325–1329.
4. Uzun H, Bitik O, Ersoy US, et al. Comparison of musculocutaneous and fasciocutaneous free flaps for the reconstruction of the extensive composite scalp and cranium defects. *J Craniofac Surg.* 2018;29:1947–1951.
5. Collins J, Ayeni O, Thoma A. A systematic review of anterolateral thigh flap donor site morbidity. *Can J Plast Surg [Journal Canadien de Chirurgie Plastique]* 2012;20:17–23.
6. Koshima I, Soeda S. Inferior epigastric artery skin flaps without rectus abdominis muscle. *Br J Plast Surg.* 1989;42:645–648.
7. Cordeiro PG, Santamaria E. A classification system and algorithm for reconstruction of maxillectomy and midfacial defects. *Plast Reconstr Surg.* 2000;105:2331–2346; discussion 2347.
8. Ascherman JA, Patel SM, Malhotra SM, et al. Management of sternal wounds with bilateral pectoralis major myocutaneous advancement flaps in 114 consecutively treated patients: refinements in technique and outcomes analysis. *Plast Reconstr Surg.* 2004;114:676–683.