

# A Case Report of Reconstruction of the Great Toe with a Homodigital Island Flap

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**Summary:** Homodigital flaps are frequently used in the reconstruction of defects in the fingers. Their use in the coverage of defects of the toes is not commonly reported because such defects are usually treated with skin grafts, proximally based local flaps, or even amputation and shortening of the toe. We describe the implementation of a homodigital island flap of the great toe for reconstruction of a traumatic defect of the dorsal aspect of its distal phalanx. (*Plast Reconstr Surg Glob Open* 2021;9:e3503; doi: [10.1097/GOX.0000000000003503](https://doi.org/10.1097/GOX.0000000000003503); Published online 23 March 2021.)

Soft tissue defects of the distal phalanx of the great toe are both uncommon and difficult to treat. When it comes to isolated deformities of the aforementioned area, the usual course of action is simply shortening or amputating the toe, leaving it permanently disfigured.

When the decision is made to cover the defect, the use of skin grafts or local flaps give variable aesthetic and functional results. Grafts require a superficial defect, without exposure of the bone or tendon, which is usually not the case in toes, either after trauma or excision of lesions. Reconstruction with local flaps usually requires employing tissue from proximal areas of the foot, such as the dorsum, thus compromising a large donor area compared with the size of the defect.<sup>1,2</sup>

The robust arterial network of the great toe gives the opportunity for a fairly large amount of skin of its dorsal aspect to be raised and used to cover deformities of its distal end as a homodigital flap.<sup>3</sup> It is supplied by both the first dorsal metatarsal and the first plantar metatarsal arteries, which communicate via numerous branches. Adequate dorsal flow is usually present when Doppler signal from the dorsalis pedis to the first webspace is strong.

## CASE PRESENTATION

A 22-year-old man was referred to us by the orthopedics department for a traumatic defect of the dorsal aspect of the distal phalanx of his right great toe. The bone of the distal phalanx was fractured and the nail bed had been avulsed. He also had sustained a traumatic amputation of

the distal phalanx of the second toe. The wound on the first toe had been debrided and the nail bed was completely removed, leaving the distal phalanx exposed dorsally. A k-wire was put in to stabilize the fractured bone (Figs. 1, 2). Also, revision amputation of the distal phalanx of the second toe had been performed, without remaining skin deficit. After completion of the above treatment by the orthopedics department and the referral to us, a treatment plan by our team was contemplated for the defect of the first toe. After clinical and laboratory examination, we decided to employ a local homodigital flap for the coverage of this defect.

Using Doppler ultrasound to detect the dorsal distal arterial arc, a pedicled homodigital island flap from the proximal phalanx of the great toe was raised, approximately the size of the defect, perfused by reverse flow through the dorsal distal arcade, without the need to sacrifice the plantar digital arteries. The flap was transposed to the distal dorsal aspect of the distal phalanx, covering the exposed bone and inset in the anatomical area of the nailbed. The edges of the flap were sutured only subcutaneously, thus leaving them inverted, resembling the anatomy of the nail body.

The patient had expressed concerns over the aesthetic appearance of the donor site, as he desired the best possible outcome when it came to depth and color match. Also, because the dissection of the flap was done with an effort to include as much bulk as possible, the resulting defect had a very thin layer of intact paratenon. After his informed consent, we decided to employ a 2-staged operation, using artificial dermis (Nevelia bi-layer matrix), to both maximize the cosmetic result and avoid graft failure. The matrix was replaced with a split thickness skin graft 3 weeks after the above operation (Figs. 3, 4).

The patient had an uncomplicated recovery, and the flap showed no signs of local stress or infection. The k-wire was removed by the Orthopedics at a later stage. At 6 months, the patient had no significant problems in

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*Received for publication November 30, 2020; accepted January 29, 2021.*

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DOI: [10.1097/GOX.0000000000003503](https://doi.org/10.1097/GOX.0000000000003503)

**Disclosure:** The authors have no financial interest to declare in relation to the content of this article. This study was supported by Symatse Group.



**Fig. 1.** The defect after debridement and the placement of the k-wire.



**Fig. 3.** First stage of flap reconstruction. Flap inset and acellular dermal matrix on the donor defect.



**Fig. 2.** X-ray of the injuries sustained.



**Fig. 4.** Second stage of reconstruction with split thickness skin graft as a replacement to the donor site.





**Fig. 5.** Final appearance.

ambulation and also expressed his satisfaction with the appearance of the reconstruction, since the way of inset described above made the flap appear as a new nail, especially when the patient was standing, thus allowing him to wear sandals without concerns (Fig. 5).

### DISCUSSION

Soft tissue loss involving the great toe is usually treated conservatively, with simple methods of skin grafting or partial amputation. In most cases, the functionality of the foot is maintained, but the patient is left with a disfigured great toe, which is obviously shortened. When the defect also involves the nail, the deformity is even more recognizable, even from a greater distance.

Homodigital reverse island flaps have been used extensively for the reconstruction of the fingers, but rarely reported in toe reconstruction. This method was first reported by Niranjana et al.<sup>3</sup> for great toe defects and has also been used for reconstruction of neuropathic great toe ulcers in diabetics.<sup>4</sup> A variation as a lateral toe pulp flap of the great toe has also been reported by Cheng et al.<sup>5</sup>

The above case highlights the potential of this flap as a “substitute” of the great toe’s nail, since the aesthetic result is significantly more optimal than the other simpler methods of closure, without compromising functionality or a large donor surface. It is also a reminder that local flaps are very useful in the plastic surgeon’s workforce and should never be forgotten or underestimated as a simpler and effective reconstructive tool.

### CONCLUSIONS

Traumatic wounds of the great toe can be covered with local homodigital flaps after debridement, especially when the size allows for it. These flaps are rarely used in the reconstruction of the toes. We advocate for more frequent implementation of them when the appropriate indications are met, which will lead to simple, effective, and quicker recovery of the patients.

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