

# A homodigital two stage reverse dorsal adipofascial flap for fingertip reconstruction:

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## Abstract

Fingertip injuries are one of the commonest injuries encountered by a plastic surgeon. Various loco regional flaps have been described for reconstruction of fingertip injuries. Presented here is a case of two-stage reverse dorsal adipofascial flap for transverse fingertip amputations with injury distal to the germinal matrix. The flap survived completely providing a stable and durable cover to the fingertip. This flap was based on the distal dorsal branches of the digital arteries just distal to the distal interphalangeal joint. We believe that this flap should be strongly recommended in selected cases.

## INTRODUCTION

Microsurgical advances have enabled distal replantations to be successful however such facilities and expertise are not universally available. Terminalisation and loco regional flaps are the mainstay of management of these injuries in areas without microsurgical capabilities.

Traditionally, various volar advancement flaps including the Tranquilli-Leali, the Segmuller flap, the Venkatswami flap, the thenar flap are used for fingertip reconstruction. The two stage dorsal cross-finger flap may be used in cases where single stage volar flap resurfacing is not possible. However all these flaps leave scars at the volar aspect of the reconstructed fingertip that may remain hypersensitive or even painful. Stiffness of an adjacent uninjured finger may follow crossfinger flap reconstruction.<sup>1</sup>

We describe a homodigital two stage reverse dorsal adipofascial flap for finger tip reconstruction based on the distal dorsal arterial branches of the digital artery that gives a pleasing and stable coverage for fingertip injuries.

## CASE HISTORY

An adult male patient presented with a transverse amputation to the index finger through the nail bed just distal to the germinal matrix with loss of tuft of the terminal phalanx. The amputated part was not brought to the hospital with the patient. The remainder of the finger was uninjured.

{image:1}

A homodigital two stage reverse adipofascial flap was used for fingertip reconstruction. At six months follow up the flap was well settled with normal static two point discrimination of 3 mm and no cold intolerance. There was a full range of movement of the affected finger.

## OPERATIVE TECHNIQUE

After assessing the defect, the flap was planned in reverse. A template was kept with its base just distal to the distal interphalangeal joint covering the defect. Keeping the base fixed, the template was flipped over to cover the skin over the middle phalanx of the injured finger. If the planned template crosses over to the skin on the proximal phalanx, the homodigital two stage reverse adipofascial flap cannot be used and another reconstructive option should be considered.

A base is drawn just distal to the distal interphalangeal (DIP) joint to include the vascular basis for the flap. This flap is based on the distal dorsal branches of the digital arteries that originate just distal to the distal interphalangeal joint on either side, forming a rich vascular bed on top of the extensor tendon insertion just proximal to the germinal matrix.<sup>2</sup>

An appropriate sized flap is marked on the dorsal surface of the middle phalanx extending between the midlateral lines. A 'Z' type incision was given, with the parallel limbs of the Z placed at the proximal and distal interphalangeal joints. Thin skin flaps were raised taking care not to damage the sub-dermal plexus. After the skin flaps were raised, the adipofascial flap is raised from the proximal interphalangeal

(PIP) joint level to the DIP level without damaging the paratenon.

{image:2}

No effort is made to identify and isolate the pedicles. After elevation, the flap is flipped over by 180 degrees and sutured to the defect and covered by split thickness skin graft taken from the upper medial arm.

{image:3}

{image:4}

The flap is kept moist with saline irrigation at the time elevation and while preparing for skin graft to prevent drying of the perforators.

After a period of two weeks, flap division and inset is undertaken and any excess flap tissue is discarded.

In the case illustrated at three months follow up, the flap was settled and the patient was using the injured finger as before. There was scarring on the dorsal aspect of the finger without any functional deficit.

{image:5}

{image:6}

## DISCUSSION

Various loco regional flaps are available for reconstruction of the amputated finger tip. Tsai et al<sup>4</sup> advocate replantation of the amputated part. However, the majority of the flaps suggested are skin flaps. Lai et al<sup>5</sup> first described the use of adipofascial flaps for the reconstruction of dorsal hand defects, but they did not use them to reconstruct fingertip amputations. Dorsal flaps described as local transposition skin flaps,<sup>6</sup> island flaps,<sup>7</sup> are based on the distal dorsal branches of the digital arteries but with limited arc of rotation and limited application. Unlu et al<sup>8</sup> describe dorsal adipofascial flaps that make use of the dorsal adipofascial tissue over the proximal and middle phalanx. They describe the dorsal adipofascial turnover flap for amputations proximal to the nail matrix. However, with this method the dorsal arterial branches distal to the distal interphalangeal joint are in jeopardy, and a random adipofascial flap must be raised that extends to the proximal third of the proximal phalanx with increased chance of flap necrosis. Dimitrios et al,<sup>9</sup> describe the dorsal adipofascial flap for amputations at a level distal to the germinal matrix with removal of the residual nail bed remnants. The residual nail has to be

sacrificed which is one of the important aesthetic and functional considerations in fingertip reconstruction. The flap we describe can only be used when the digital arteries beyond the distal interphalangeal joint are intact to provide the dorsal branches, which form the basis of this flap. It uses only the adipofascial tissue on the dorsal surface of the middle phalanx of the traumatized finger. Thus, the volar surface is left intact with no scars to compromise its use. Utmost care to keep the paratenon intact during flap elevation prevents damage to the extensor tendon. Early mobilization and no use of the adjacent normal finger prevent joint stiffness. This flap is safe, as it is a bipediced flap based on the dorsal branches of the digital arteries on both sides of the finger. The operative technique is easy to perform, even without loupe magnification. Both the stages are performed under local anesthesia on a day case basis. Probably the only major drawback of this flap is that simultaneous nail bed grafting is not possible as the flap traverses over the normal skin and nail to cover the exposed distal phalynx. If desired, lengthening of the nail for cosmetic enhancement can be done by eponychial flaps after the flap settles.<sup>10</sup> A longer follow up with more cases is needed. However, with our preliminary data, we strongly recommend this flap for select cases.

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