

Reconstruction of Distal Phalangeal Injuries with Homodigital Island Flap: a Case Report

Parintosa Atmodiwirjo, Sachraswaty Laidding
Jakarta, Indonesia.

Background: Reconstruction of distal phalangeal defects with exposure of bone, tendon, or joint can be a difficult reconstructive problem, particularly since immediate coverage is of paramount importance for preserving function. The objectives of distal phalangeal defect or fingertip reconstruction included preservation of functional length and sensibility, prevention of symptomatic neuromas, acceptable donor site morbidity, the absence of cold intolerance, mineralization of aesthetic deformity, and quick return to occupational activities.

Patients and Method: A review of one case, 26 years old male with phalangeal defect at tip to radial site of 3th finger of right hand, with tendon and bone exposed. After adequate debridement, shape and size of the defect are measured, the flap designed at the ulnar site of the same finger and the vascular of the flap is marked to palmar arch. Lazy "S" incision performed, donor flap is elevated with pedicle and transferred to the recipient site. Donor site was covered up with skin graft.

Result: After follow up the homo digital island flap was healed nicely and the skin graft take was 100%, length is less diminish, sensibility conformed with two-point description, joint flexibility is good.

Summary: Homodigital island flap is a useful safe option for fingertip or distal phalangeal reconstruction because it offers multiple advantages in comparison with advancement, regional, and free flaps, with an almost negligible donor site defect and can be done in a 1-stage procedure.

Keywords: Phalangeal defects, homo digital island flaps (HDIF), distal injuries

Latar belakang: Rekonstruksi defek pada falang distal dengan tulang, tendon atau sendi pada dasar defek merupakan masalah rekonstruksi yang cukup rumit mengingat penutupan defek sangat penting untuk mempertahankan fungsi. Tujuan rekonstruksi defek ini mencakup preservasi fungsi, ukuran dan sensibilitas dengan memperhatikan morbiditas donor, deformitas dan fungsional.

Pasien dan Metode: Melaporkan pasien laki-laki 26 tahun dengan defek pada falang distal sisi radial jari 3 tangan kanan dengan dasar tulang dan tendon. Setelah debridement ukuran defek dinilai dan dilakukan desain flap untuk menutup defek pada sisi ulnar jari yang sama. Dilakukan elevasi pedikel dan flap ditransfer ke resipien, lalu area donor ditutup dengan tandur kulit.

Hasil: Setelah follow-up didapatkan flap homodigital baik dan tandur kulit take 100%, panjang jari tidak terlalu berkurang dan sensibilitas untuk membedakan dua titik baik, fleksibilitas sendi baik.

Ringkasan: Flap homodigital island merupakan pilihan yang baik untuk rekonstruksi falang distal karena memiliki beberapa kelebihan dibandingkan flap lokal, regional ataupun free flap, dengan defek area donor yang tidak berarti dan dapat dilakukan dalam satu tahap operasi.

Kata Kunci: Phalangeal defects, homo digital island flaps(HDIF), distal injuries

Reconstruction of distal phalangeal defects with exposure of bone, tendon, or joint can be a difficult reconstructive problem, particularly since immediate coverage is of paramount importance for preserving function. The treatment options included the use of local and regional flaps, and free flap transfers. Skin grafts that can be applied over an exposed

bone, tendon, or joint surface are usually nondurable or unsuccessful.¹⁻³

The objectives of distal phalangeal defect or fingertip reconstruction included the preservation of functional length and sensibility, prevention of symptomatic neuromas, acceptable donor site morbidity, the absence of cold intolerance, minimization of aesthetic deformity, and quick return to

From The Division Of Plastic Reconstructive and Aesthetic Surgery, University of Indonesia, Cipto Mangunkusumo Hospital, Jakarta, Indonesia Presented in 16th IAPS Scientific Meetings In Sibolangit, North Sumatra, Indonesia.

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



Figure 1. Fingertip injury from tip to radial side of third finger of right hand

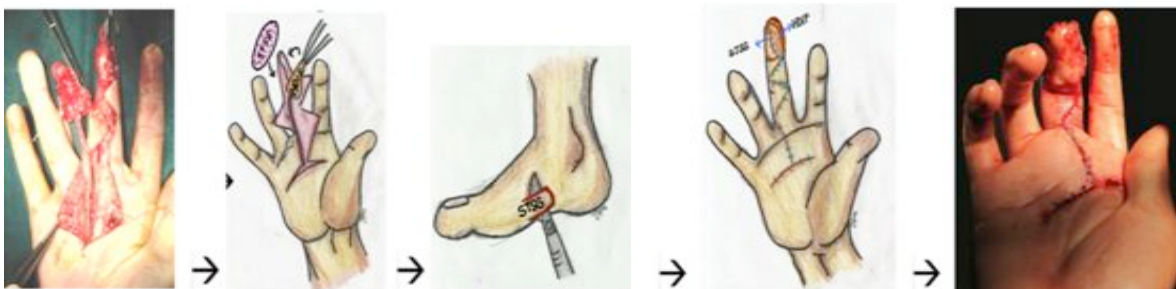


Figure 2. The design of operation according to specific design of Homo Digital Island Flap

occupational activities. Considering these objectives we reported one case of distal phalangeal defect reconstructed with Homo Digital Island Flap.⁴

PATIENT AND METHODS

A review of one case, 26 years old male with phalangeal defects from tip to radial site of 3th finger of right hand with dirty surface, lost of skin and pulp, bone and tendon exposed (Figure 1).

The procedures reviewed in this study was performed in the emergency operation theater and the patient was then followed-up at the outpatient clinic in Cipto Mangunkusumo Hospital Jakarta.

Following the preoperative digital Allen test, the operation was then performed under general anaesthesia and we used tourniquet. Routinely, a second generation cephalosporin is administered intravenously for prophylaxis. After adequate debridement, shape and size of the defect were measured,

the flap designed at the ulnar side of the same finger and the vascularization of the flap is marked to arcus of palmar of the right hand. The design of operation according to the specified design of Homo Digital Island Flap (Figure 2).

Lazy "S" incision was performed on palmar area following previous design, to avoid contracture risk in healing wound process. The flap is raised under loupe magnification following proximal identification of the neurovascular bundle at arcus Palmaris from proximal to distal direction.

Donor flap is elevated, when the identification of the neurovascular bundles have reached the distal end of the flap, flap at dorsum phalanx was incised following the design and it was elevated from the base above the periosteum of distal phalanx bone, and elevated carefully while preserving the neurovascular bundle.

Donor flap along with the pedicle was then transferred to recipient site and sutured in place with 5/0 polypropylene. The wound



Figure 3. Follow-up on third day after surgery



Figure 4. Follow-up on second month after surgery

was only treated with antibiotic ointment so it is easy to check vitality of the flap at radial site.

Donor site was covered up with split-thickness skin graft (STSG) taken from arcus plantaris pedis which has the same color with skin finger, draped with tulle-grass, moist and dry gauze and fixated with tie-over.

RESULTS

Patients was hospitalized for one day and sent home with oral antibiotics and analgesics, follow-up of patient done at the time the patient came to the outpatient clinic on day 3 and 7, and 2 months after surgery.

During follow up, the homodigital island flap is healing good, and STSG take 100%, the finger's length is less diminish, sensibility is good conformed with two point description, joint flexibility is good (Figure 3-4).

DISCUSSION

There are a lot of different techniques that has been introduced for reconstruction of phalangeal defects, but appropriate treatment should preserve functional digital length and sensibility and minimize aesthetic loss. The reconstruction should result in a painless digit lacking symptoms related to neuroma formation or cold intolerance. Finally, quick return to full occupational activity should be provided for reconstructive tools include various advancement flaps, regional flaps and free tissue transfers.^{2,5,6}

The advancement flaps often display limitations in size and arc of rotation as well as persistent cold intolerance. Regional flaps such as the thenar flap or the cross-finger flap require a 2-stage surgical approach along with the associated risk of residual joint stiffness, in particular in the elderly. Free tissue transfers not only require significant microsurgical expertise but also subject the patient to prolonged surgery.²

Weeks in 1973 by and Wray describe the distally based homodigital island flap offers multiple advantages for fingertip reconstruction. It allows a 1-stage surgical approach avoiding the involvement of a second finger (cross-finger flap) or the thenar eminence (thenar flap), thus, confining surgery to the involved digit only. Since prolonged immobilization of the injured digit is prevented the risk of residual joint stiffness is minimized.^{6,7}

The thin and glabrous skin surface of the contralateral defect is still good, thus, enabling reconstruction according to the time honored principle of replacing like with like. Because the defect and donor came from the same site so it can easily allow functional length preservation.

Donor flap was elevated very carefully so it minimized the disadvantages of arteries or venous trauma. Although, we transferred the homodigital island flap including the nerve, we still check the sensate flap with 2-point discrimination test and the result is good.^{3,4,7}

SUMMARY

In conclusion, homodigital island flap is useful safe option for fingertip or distal phalangeal reconstruction because it offers multiple advantages in comparison with advancement, regional, and free flaps, with an almost negligible donor site defect and can be done in a 1-stage procedure.

Parintosa Atmodiwirdjo, MD.

Division of Plastic Surgery

Cipto Mangunkusumo General Hospital, Jakarta.

parintosaa@yahoo.com

REFERENCES

1. Buncke, H J, and Rose, H. E. Free toe-to-fingertip neurovascular flaps. *Plast. Reconstr. Surg.* 1979;63: 607.
2. Atasoy E, Ioakimidis E, Kasdan ML, et al. Reconstruction of the amputated finger tip with a triangular volar flap. A new surgical procedure. *J Bone Joint Surg Am* 1970;52(July (5)):921—6.
3. Lai, C S, Lin, S D, and Yang, C C. The reverse digital artery flap for fingertip reconstruction. *Ann. Plast. Surg.* 1989;22:495.
4. Edwards, EA. Organization of the small arteries of the hand and digits. *Am J Surg* 1960;99(June):837—46. 3. Federal Statistical Office Germany, Wiesbaden, Germany.
5. Zbrodowski, A, Gajisin, S, and Grodecki, J The anatomy of the digito palmar arches. *J. Bone Joint Surg. (Br.)* 1981;63:108.
6. Han, S K, Lee, B L, and Kim, W. K. The reverse digital artery island flap: An update. *Plast. Reconstr. Surg.* 2004;113:6
7. Foucher G, Delaere O, Citron N, Molderez A. Long-term outcome of neurovascular palmar advancement flaps for distal thumb injuries. *Br J Plast Surg* 1999;52 (January (1)):64—8.