

Fingertip Reconstruction with Toe Transfer



Fig. 1. Left middle finger amputation involving nearly the entire pulp tissue.



Fig. 2. Pulp tissue harvested from the lateral aspect of the left great toe, including the digital artery, vein, and nerve.



Fig. 3. The flap immediately after microsurgical transfer.



Fig. 4. Appearance of the finger and toe after three months.

As much as any other procedure, toe-to-hand transfer epitomizes the field of reconstructive plastic surgery, restoring critical function and form to the injured patient. The earliest efforts in toe transfer focused on the replacement of the totally amputated thumb, a condition so functionally debilitating as to justify the great risk and effort—both surgical and rehabilitative—attendant to the procedure. Today, microvascular techniques have evolved to such a degree that a variety of lesser injuries and deformities, including partial finger amputations, arthritic joints, and dystrophic nails, is now reconstructible. This case review focuses on another indication for transfer of tissue from the toe: the loss of pulp tissue from the fingertip.

PATIENT HISTORY

The patient is a healthy 41-year-old electrical lineman who caught his left middle finger under a trailer hitch, sustaining an amputation of the tip. While the nail was undamaged and the bone—although exposed—was not fractured, nearly the entire pulp had been removed (Fig. 1). The amputated part was badly traumatized and unusable. The patient's occupation demands full function of the hands, including

normal length, tactility, and durability of the fingertips. For this reason he elected to undergo replacement of the lost tissue with the available tissue that is most similar—pulp tissue from the great toe.

PROCEDURE

The lateral aspect of the left great toe was chosen as the donor site. Under tourniquet control, dissection began with identification of the lateral digital nerve, artery, and vein in the first web space. These structures were then traced distally toward the lateral pulp. The flap, comprised of skin and subcutaneous fat and measuring 2.5 cm in width and 3.5 cm in length (matching the dimensions of the defect on the finger), was elevated in continuity with the neurovascular bundle. The tourniquet was released and the flap was allowed to reperfuse *in situ* while the recipient site was prepared (Fig. 2).

At the hand, the amputation stump was thoroughly debrided. From a mid-lateral incision, the ulnar digital artery and nerve were exposed well proximal to the zone of injury. A dorsal subcutaneous vein was also isolated and mobilized toward the neurovascular bundle. The flap was then removed from the toe and the donor site was closed primarily. The flap was inset over

the amputation stump, and the nerve, artery, and vein were coapted to the recipient structures with 10-0 nylon suture using standard microsurgical techniques. The incisions were carefully closed, avoiding tension over the vessels (Fig. 3).

OUTCOME

The patient's postoperative course was unremarkable. He was discharged from the hospital after five days and began rehabilitation shortly thereafter. Therapy focused first on restoring range of motion, then on sensory re-education. He returned to work in a limited capacity at two weeks and to full duty at six weeks. His range of motion and grip strength have returned to normal, and his static two-point discrimination (8 mm at three months) has continued to improve. He has had no problems with dysesthesia, hypersensitivity, or cold intolerance, and is able to perform tasks at work with normal dexterity.

DISCUSSION

The benefits of toe transfer are numerous. The specialized tissue of the pulp—with skin that is glabrous, durable, and highly sensitive, and septated subcutaneous tissue that balances conformability with sturdiness—can be replicated only by another digit. In the case of this patient, if missing tissue was to be replaced with like tissue, only a toe transfer would do.

But toe transfer is not without its drawbacks. The procedure is lengthy and requires substantial surgical skill, and carries with it the risk of complete failure. A relatively long hospitalization is necessary. The foot can be left with an abnormal appearance (although, as in this case [Fig. 4], the deformity is often very inconspicuous). Finally and most importantly, it is mandatory that the patient be motivated to comply with a rigorous and time-consuming rehabilitation, and accepting of the fact that full function will not be attained for many months. Obviously these drawbacks must be thoroughly explained to the prospective toe transfer patient, but they should not be overstated, for the potential benefits often exceed the risks.

The question, therefore, is not *if* a defect could be reconstructed with toe transfer, but whether the patient is *willing* to undergo reconstruction with toe transfer. The concepts of "adequate function" and "optimal function" are therefore of central importance when discussing treatment options with a patient. Obviously, these parameters will be different for each patient depending upon his/her vocation, avocations, and desires. For many people, adequate function might be expected with shortening of the finger and primary closure. Acceptable outcomes can also be achieved in many cases with local/regional flaps and skin grafts.. However, for patients who desire optimal rather than adequate function, toe transfer should be considered.



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