

DIGITAL AMPUTATIONS

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Digital amputations are probably the most common classification of amputation involving the lower extremity. The majority of patients are diabetics with peripheral neuropathy. The constant repetitive trauma of shoe gear and weightbearing result in ulceration and subsequent infection. Left unattended, bone and tendon necrose necessitating amputation. This process is often further complicated by ischemic changes. Occasionally, amputations are performed prophylactically to prevent more serious complications from developing. Other indications for amputation include congenital abnormalities, trauma, tumor, and ischemia with pain and or necrosis.

The ultimate goal of any lower extremity amputation is to provide a functional weightbearing stump. This has diminished importance in the lesser digits, but becomes significant in hallucal amputations. Absence of the great toe results in decreased balance and propulsion. This often needs to be addressed by postoperative orthotics and shoe therapy.

To ensure proper wound healing, minimize infection and eliminate the need for further revisional surgery, proper technique and surgical timing are critical. Amputations can be performed in the presence of infection, but not through an infected part. To preserve as much tissue as possible, antibiotic therapy should be initiated and infection controlled prior to surgery. Unless the infection is ascending, or life threatening, amputation should be delayed until most of the cellulitis has resolved.

If the incision is made proximal to the area of cellulitis, the incision can be closed primarily. Should there be any doubt as to whether there is still infection present, the wound should be left open and later closed by delayed primary intention or secondary healing. However, in individuals with marginal circulation delayed primary closure and secondary intention healing of a distal

amputation may not be successful. These patients may require either a more proximal amputation or a delay until the cellulitis has resolved, then primary closure may be performed

Choosing the correct level of amputation is empiric because there are no tests which can accurately predict wound healing. Absolute digital arterial pressures and digital/arm indices are more useful than ankle/arm indices because the smaller digital arteries are less likely to be calcified and produce abnormally elevated values. However, it is often difficult to obtain digital pressures because of infection or necrosis in the toe. The author prefers to place a doppler at the base of the affected toe. If pulsatile flow is present, the wound will probably heal.

Multiple incisional approaches have been described, but often the technique is dictated by tissue viability and surgical ingenuity. No matter which incisional approach is taken, several principles must be adhered to. Skin incisions should be planned and outlined in ink so that minimal revision is needed at closure. The initial incision is made boldly, down to bone if and when possible. Skin should not be grasped with forceps and all tissue handling should be done on the subcutaneous layer. These and other atraumatic techniques will lessen the chance of wound dehiscence and tissue necrosis.

If a joint is to be disarticulated, the articular surface of the remaining bone is usually removed. This removes avascular tissue and exposes the vascular medullary channels of bone. The remaining stump must be smooth and tapered. On disarticulation of the hallux at the metatarsophalangeal joint, some surgeons recommend leaving the base of the proximal phalanx. This technique preserves intrinsic muscle function and allows some weightbearing to the first ray. Occasionally, it is necessary to perform an extensor lengthening or tenotomy to prevent dorsal

angulation of the stump following transection of the long and short flexors.

Following the removal of all necrotic and avascular (tendon, capsule) tissue skin flaps are closed. To prevent entrapment within the skin incision, cutaneous nerves, when identifiable are retracted distally and severed proximally. Prior to closure all bleeding must be controlled. Dead space can usually be eliminated by suture or compressive bandaging. Drains should be avoided in vascular compromised patients as the drain hole may take many months to heal.

Flaps should be closed without any tension to prevent vascular insufficiency and adhesion to bone. Ideally the scar should be dorsal so it is not subjected to the pressures of weightbearing. Accurate skin edge approximation is vitally important to prevent dehiscence and delayed healing. Since sutures may have to remain in place for more than two weeks, a non-reactive monofilament is recommended. (Fig. 1, 2, 3)

An insole with a toe filler may be necessary postoperatively to prevent excessive motion in the shoe when either multiple digital amputations are performed or the hallux is amputated. Upon removal of the second toe, a molded silicone spacer is useful in preventing lateral drift of the great toe.

Following amputation of the hallux, propulsion is lost and weight is transferred laterally. To aid in propulsion and restore a more normal gait, a rocker bottom shoe or shoe with a steel spring insole may be required.

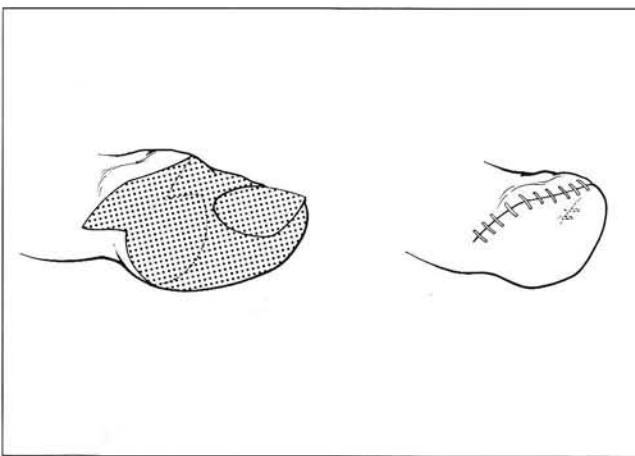


Fig. 1. This technique is useful on hallux amputations and distal articulations of the lesser digits. It gives a thick plantar flap with dorsal scar which is ideal for propulsion.

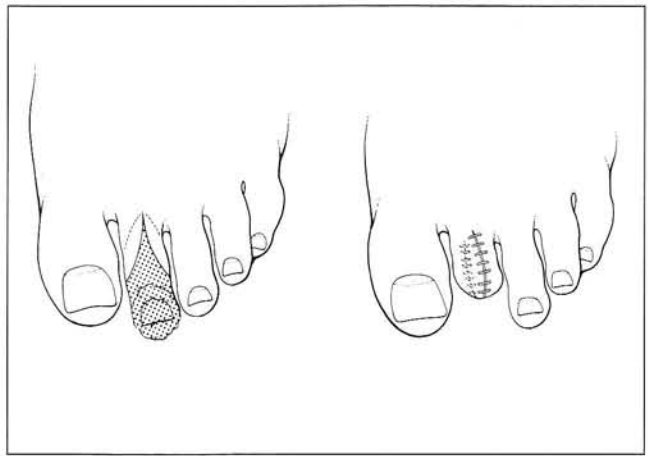


Fig. 2. This technique creates medial and lateral skin flaps which are adequate for lesser digits. The scar is longitudinal.

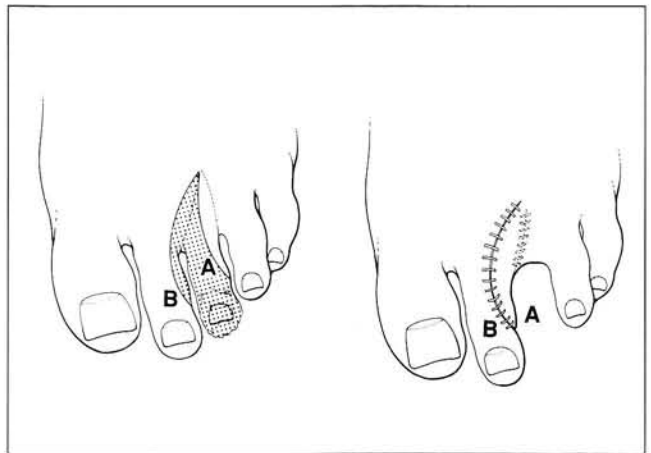


Fig. 3. Removing the interspace. Skin flap A is transferred to subcutaneous tissue B, providing the best cosmetic results.

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