

PRIMARY BONE GRAFTING WITH PEDICLED FLAP COVER FOR DORSAL COMBINED INJURIES OF THE DIGITS

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Twenty digits in 15 patients with dorsal combined tissue loss were treated by radical debridement, primary non-vascularised iliac crest bone graft and immediate lower abdominal flap cover between 1996 and 2006. The average length of the bone grafts was 3.3 (range 2.5–5) cm. No extensor tendon reconstruction was carried out. The flaps were divided at 3 weeks without delay. Permissible thinning of the flap was done at the time of division of flaps. No secondary procedure was done. All patients were retrospectively reviewed and X-rays obtained. Radiological union was achieved in 18 of 20 digits. One bone graft was removed because of infection. One bridging bone graft united with the distal phalanx but had a painless non-union with the proximal phalanx. There were no flap complications. Bone graft length resorptions of 20% and 15% occurred in two terminal bone grafts. We recommend this protocol as a solution to this challenging problem.

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Management of dorsal digital injuries with skin, extensor tendon and bone loss pose many challenges. Given the inherent difficulties of management, amputation seem to be convenient. However, this reduces the overall function of the hand unnecessarily and the goal in treating such injuries should be maintenance of the functional length of the digits. Salvage of these fingers requires flap cover with immediate, or delayed, bone grafting. If bone grafting is delayed, a spacer is required to maintain length. Reconstruction becomes more challenging when multiple, or non-adjacent, fingers are involved.

Recently, Saynt-Cyr and Gupta (2006) re-emphasised the need for good soft tissue cover over primary bone grafting in open fractures of the hand. The skin defects are generally too large for use of homodigital flaps and neither radial nor posterior interosseous flaps reach easily to the tips of the digits as pedicled flaps. Although use of an exteriorised pedicle is possible (Brunelli et al., 2000), these flaps are also inconvenient to use when there is intact skin on the dorsum of the hand. Many free flaps are available but require syndactylisation of adjacent injured fingers and are less easily used when non-adjacent fingers are injured (Teoh et al., 1995).

There is no recent series in the literature dealing with the management of large bone and dorsal soft tissue defects in the digits. This paper reports the results of reconstruction by radical debridement, non-vascularised iliac crest bone graft and lower abdominal pedicle flap cover in 20 digits in 15 patients.

PATIENTS AND METHODS

We retrospectively reviewed 15 patients who had sustained dorsal combined tissue losses of 20 digits

during the period 1996 to early 2006. All but one were manual workers. There were 13 men and two women with an average age of 29 (16–55) years. Four patients had injuries to several fingers. The total of 20 injured digits included eight thumbs, four index fingers, five middle fingers, two ring fingers and one little finger. All but one of the injuries were industrial machinery accidents. One patient had sustained an injury while playing cricket.

All of the injuries included dorsal skin loss, extensor tendon loss and variable lengths of phalangeal bone loss, the smallest of which was 1.5 cm. The bone defects were in two proximal phalanges, ten middle and four distal phalanges in the fingers. In the thumb, the defects were in five proximal and five distal phalanges. In 14 digits, the defect involved a single phalanx and, in six digits, it involved two phalanges.

Operative technique

All patients were operated under regional anaesthesia. The wounds were radically debrided under tourniquet control. Since there was segmental loss of extensor tendon and bone, care was taken not to injure the digital vessels and nerves which were at the bases of the wounds. The viability of the fingers was assessed by the senior author after letting down the tourniquet. If the vascularity was adequate, corticocancellous bone graft was taken from the iliac crest. A length of bone graft of 1 cm more than the length of the bone defect was harvested and both ends were made into pegs in bridging bone grafts and the grafts were pegged into the proximal and distal bones. Only one end was made into a peg in terminal bone grafts and this was pegged into the proximal adjacent bone. Axial K-wires were