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Finger-Tip Injuries

D. C. Robertson

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FINGER-TIP INJURIES are among the most common injuries which have to be dealt with in emergency departments. They present a variety of problems which can be treated in different ways. This paper will present a variety of these injuries and discuss the treatment of each of them.

In brief it may be said that the treatment of the most minor finger-tip injuries may be by dressing only. A more important injury may require suture while the completely damaged tip may require amputation. In between these extremes are those injuries which are best treated by some type of graft in order that the maximum usefulness of the finger may be preserved. In many of these injuries a nice judgment is required to decide what form of treatment will give the best result.

Dressing

Whether the injury is minor or severe, it is likely that a dressing will be required. It must always be remembered that a dressing itself, if it is too tight, can cause gangrene of a finger-tip. Care must be taken therefore to apply the dressing firmly enough to give support but not so tightly as to produce insult. Those finger-tip injuries in which the nail is avulsed[1] or partly avulsed can be treated by a very simple dressing on the dorsum[2] which will allow the tip of the finger to be visible. However, the crush injury may not permit any such window for inspection. The common injury in which the base of the nail has been dislocated from the eponychium[3] but not completely detached, with fragmentation of the tuft of the terminal segment and a bursting of the pulp of the finger in several places, will require a rather elaborate dressing. In this case the dressing must be applied

* M.D.; of the Toronto General Hospital and the Department of Surgery, University of Toronto, Toronto, Canada.]

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1 Torn away.

2 The back surface of the finger.

3 The thin skin adherent to the nail at its proximal position.

in such a way that the wound edges are held in apposition and a mild compression holds the bony fragments together, and yet tension should not be so great as to produce pain which is the forerunner of gangrene. It has been our practice in cases like this to cut a strip of Gelonet and suture this around the finger as snugly as possible. The strands of the mesh begin to pull apart before any dangerous tension can be applied. However, enough tension can be maintained to close the multiple wounds and compress the nail back on the bed without being dangerous. Over this basic dressing a soft dressing can be applied. If there should be undue pain, it is then quite possible to remove the outer dressing and inspect the finger through the Gelonet mesh. It should also be pointed out that finger-tip injuries should be dressed with the finger in the position of function whenever possible. It is a universal experience that stiffness of the finger often follows an injury to the tip. This stiffness is commonly as much the result of the type of dressing used in the treatment of the injury as of the injury itself.

Suture

Suture would seem to be an obvious form of treatment, but it merits discussion because its application is rather limited. Indeed most finger-tip injuries do not lend themselves to suture. We have already discussed the management of the multiple small wounds sustained when the pulp is burst open in a crush injury. The suture of the wounds might result in increased pulp pressure because of lack of drainage. In such a case the finger-tip gradually becomes suffused, cyanotic, and then gangrenous; or healing may take place but the patient is left with a finger-tip which is atrophied, extremely sensitive to cold, and very tender to the touch. It is a finger such as this that becomes stiff at the proximal interphalangeal joint[4] owing to disuse; such a result leads to amputation.

Amputation

This may be required because the injury has already produced a partial amputation or because the injury to the tip is severe, involving the loss of soft tissue and damage to bone and blood supply so great that no other treatment is possible. Am-

[4] The second joint back from the nail.

putation is often considered an easy way out of the difficulties following an injury. It must be pointed out here that poor results in the amputation of fingers, no matter how well done, are not uncommon. The author sees a steady stream of patients, each of whom is complaining about his amputation stump. The commonest complaint is tenderness, often of such a degree that the patient cannot work. Another common complaint is the appearance. The patient objects to a wide and ugly amputation stump, the result of a disarticulation[5] through the distal interphalangeal joint[6] without reduction of the distal end of the middle phalanx.[7] A very frequent complaint is the regrowth of a deformed nail which is difficult to look after and may be painful. An amputation of the distal half of the distal phalanx may have been done without including all of the nail-bed, thus leading to the development of cysts or of a tiny little horn in the wound scar. The amputation of the very tip of a finger may have been treated conservatively resulting in scar contracture at the tip with deformity and tenderness. Many patients complain of inability to work because of sensitivity to cold. The fingers are often smooth and shiny with insufficient subcutaneous tissue covering the amputation stump and this atrophy may extend up to the mid-shaft of the middle phalanx.

A few words must also be said about the development of neuromata.[8] The author has come to believe over the past few years that the development of painful neuromata as cause of tenderness in an amputation done for a finger-tip injury is an unusual thing. Neuromata are a much more common cause for complaint when the amputation is more proximal, but in the distal type of amputation done for finger-tip injuries it is highly probable that in the absence of such signs as trophic changes or inadequate cover of bone the pain is more central in origin.

It is apparent that amputation for finger-tip injury must be done with care and forethought. The nail and nail-bed must be adequately dealt with if they require removal. If the whole terminal segment requires removal it is always wise to find the digital nerves and deal with them either by transposing them

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[5] Amputation of part of the finger at a joint.

[6] The finger joint nearest the nail.

[7] The middle bone of the finger.

[8] A mass of nerve tissue in an amputation stump resulting from abnormal regrowth of the stumps of severed nerves.

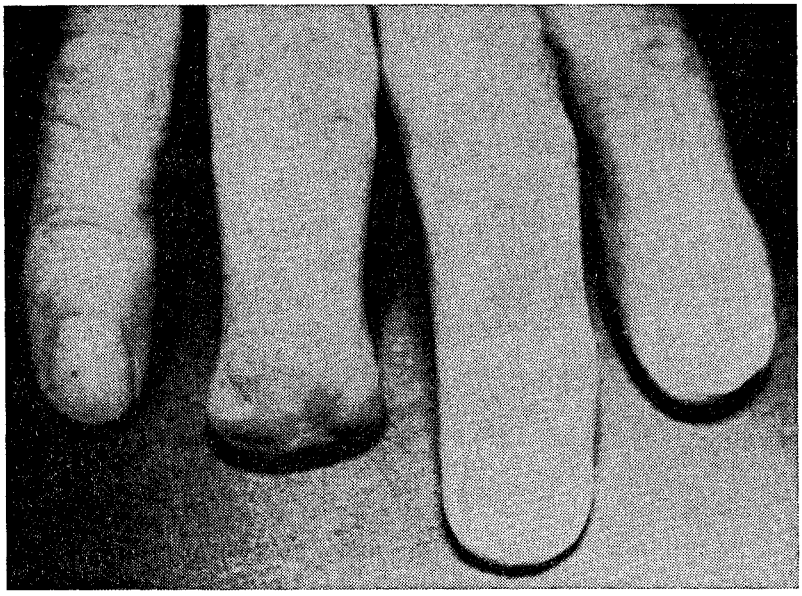

Fig. 1—An ugly amputation stump, the result of disarticulation without proper attention to narrowing the bone and soft tissues.

dorsally or by resecting them far enough back to be out of the way of the wound. If a disarticulation is required at the distal interphalangeal joint, it is wise to reduce the distal end of the middle phalanx so that a wide and unattractive amputation stump will not result.

Skin Grafts

Between the relatively minor injuries which can be treated with dressings or simple suture and those so severe that amputation of the tip is required, fall a large number of injuries in which some type of skin graft is necessary. It is from this group that the largest number of poor results come. It must be emphasized that the best chance for a good result is at the time of emergency treatment. Nothing can salvage the shrivelled finger-tip which was treated conservatively instead of being covered with a skin graft. Nothing can be done about the finger shortened unnecessarily in order to close a defect which could have been covered with a pedicle graft. Therefore, the use of the various types of grafts in the treatment of finger-tip injuries will be examined in some detail.

Fig. 2.—Free full-thickness skin graft, used to replace nail and nail-bed, is shown outlined in ink.

Free Grafts

Free grafts may be of split-thickness, of full-thickness, or composite. The split-thickness graft is easily taken from the lateral surface[9] of the upper arm under local anesthesia. It is required in those injuries where skin has been lost over any part of the surface of the finger-tip but subcutaneous tissue is still present and no bone is exposed. Under these circumstances a split-thickness skin graft will give an excellent result with no deformity. In many cases it may be applied to the defect without suture and held in place by dressing only.

The free full-thickness skin graft is easily taken also, but usually from the flexor aspect of the forearm[10] and the wound must of course be closed by primary suture. This graft is very useful in re-covering defects where there is considerable loss of the subcutaneous tissue. The author uses it very frequently to cover the defect resulting from avulsion of the nail and the nail-bed as well as the tip of the finger. The debridement of such an injury often requires the removal of the remainder of the nail-bed and the resulting defect leaves bone or bone covered by periosteum exposed. Even though this defect is usually on the dorsum of the finger, a split-thickness skin graft is not durable

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[9] The outside surface of the upper arm.

[10] The inside of the forearm.

or comfortable enough and it is here that a free full-thickness skin graft is advisable. This graft requires meticulous suture and dressing if a good take is to be achieved.

No discussion of free grafts would be complete without mention of the composite graft. This is the grafting in place of the amputated portion which is brought in by the patient. In our experience it has been a fairly common occurrence to have the patient bring in the amputated piece of tissue. However, we usually find that this amputated tissue has been injured so grossly that there is no question of using it. Occasionally, however, the tissue is in good condition and the question of using it as a graft arises. The author has done this two or three times with only one success, although Douglas[11] has reported a series in which his rate of success was high.

Local Pedicle Grafts

Those injuries, particularly of the guillotine type and of the flexor surface of the tip of the finger where the skin and all the subcutaneous tissue and perhaps even some bone have been lost, are very well treated by means of a cross-finger pedicle graft.[12] This is an operation which can be done on an outpatient basis and under local anesthesia. It deserves a much greater use than is generally accorded to it. Instead, it is avoided by doing an amputation and thus considerably shortening a thumb or finger which might not have needed any shortening whatsoever. The technique of this most useful operation is perhaps not as widely understood as it should be, but it has been well and completely described in the literature.[13]

A visor flap for cover of a small defect at the tip is a very useful procedure under certain circumstances. The partly amputated finger-tip with a tiny remnant of useless and troublesome nail at the very tip is satisfactorily treated by this means.

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[11] Douglas, Successful Replacement of Completely Avulsed Portions of Fingers as Complete Grafts, 23 Plast. Reconstr. Surg. 213 (1959).

[12] The pedicle type of skin graft requires cutting a flap of skin from some other part of the body (but not detaching this flap) and suturing it over the wound. When the graft has taken, the flap is then severed from the donor area of the body. A cross-finger pedicle graft indicates that the flap is taken from the back of the adjacent finger.

[13] Robertson, The Cross-Finger Pedicle Flap in the Repair of Finger Tip Injuries, 2 Canad. J. Surg. 272 (1959); Gurdin and Pangman, Repair of Surface Defects of Fingers by Transdigital Flaps, 5 Plast. Reconstr. Surg. 368 (1950).

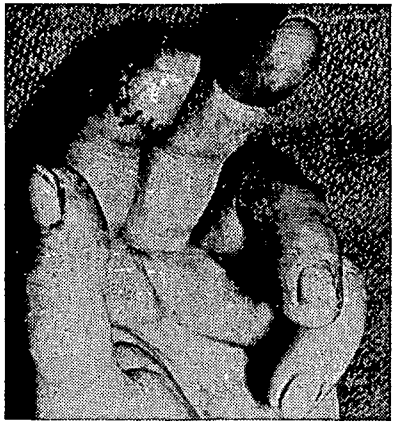

Fig. 3.—Index finger-tip covered with cross-finger pedicle flap.

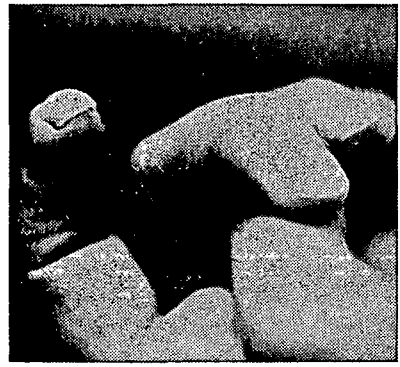

Fig. 4.—Injury, similar to previous figure, in which treatment was neglected. As a result the nail is contracted by scar tissue until the edges are cutting into the soft tissue producing exquisite discomfort.

The remnant of nail and nail-bed is excised from the tip leaving a defect right on the end of the amputation stump which can be very satisfactorily filled by a visor flap taken from the dorsum of the finger and advanced over the end. This will transfer the defect from the end to the dorsum of the finger where a split graft is all that is necessary.

Every so often one sees a reference or perhaps a case which has been treated by means of a pedicle flap taken from the palm of the hand to cover the defect produced by a finger-tip injury. This operation is to be deplored. While it seems at first to be easy to accomplish, in the end it gives a very poor result. The finger is required to be flexed at the proximal interphalangeal joint at least 90 degrees. From this position of flexion it may never retreat again. The scar on the palm of the hand may be troublesome. The flap raised from the palm of the hand is frequently too small because to make it any larger would mean placing a skin graft on the palm of the hand. In this operation all of our surgical principles are flouted. It is not recommended.

Distant Pedicle Grafts

The pedicle graft brought from a distance is occasionally a useful procedure. However, it is often used where a cross-finger pedicle graft would be the proper choice of treatment. Frequently the pedicle graft taken from the abdomen or the in-

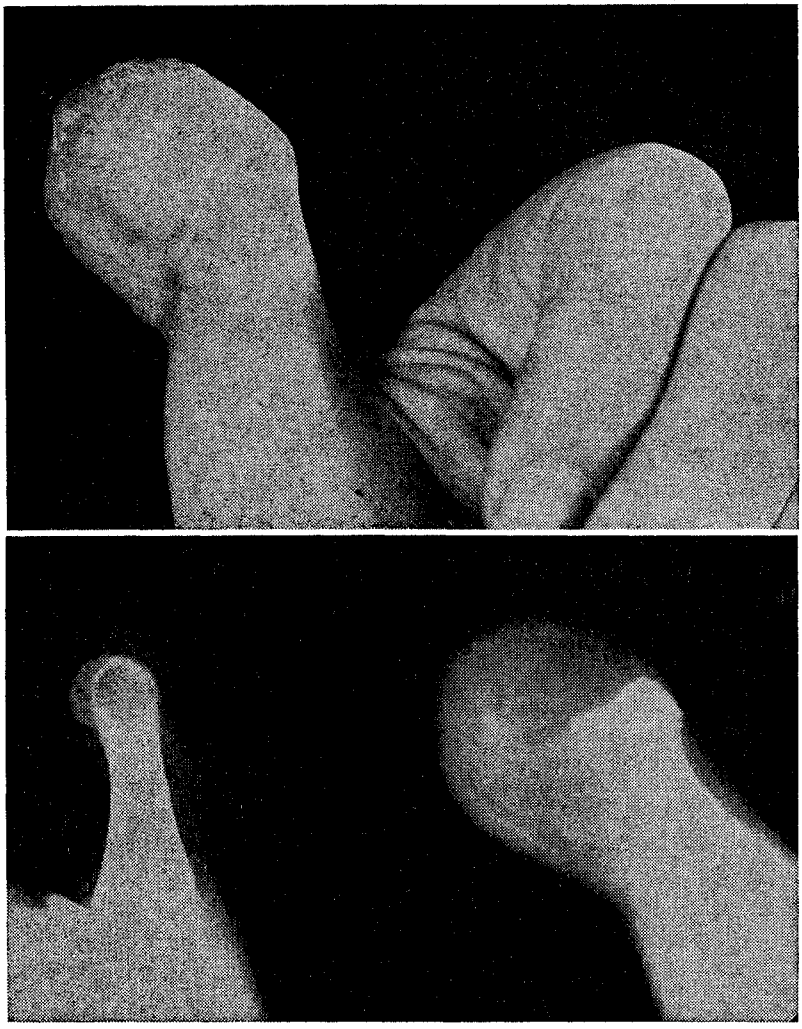

Fig. 5.—An abdominal pedicle to thumb and the radiographic view showing the extent to which the grafted tissue exceeds requirements.

fraclavicular region is far too big and thick for the defect it is to cover. It must be remembered that this skin is frequently hair-bearing and will always be insensitive. It will be flabby and loose and altogether more of a nuisance than an asset as far as grasp is concerned. It is therefore an operation to be undertaken only when there is no other possibility.