SURGICAL PROCEDURES IN GENERAL PRACTICE

This is one of a series of articles contributed by invitation

INFECTIONS OF THE HAND AND FINGERS—III

BY

NORMAN C. LAKE, D.Sc., M.D., M.S., F.R.C.S.

Incisions

Infection of the pulp of a finger is best dealt with by an incision that skirts the end of the finger about one-eighth of an inch from the nail margin, which it follows. The whole pulp is raised as a flap from off the periosteum of the underlying bone (Fig 6, *a*). The wound is kept wide open by packing the interval with gauze soaked in a suitable antiseptic, such as 1 in 1,000 flavine. In this way all the loculi previously described are drained, as this incision cuts across the bases of them all. The spread of infection is thus arrested, and the bone, unless already involved, is saved. When the infection has been overcome the flap falls back readily into position with an intact

FIG. 6.—Incisions for drainage of infections of terminal phalanx. (*a*) Incision for draining pulp. (*b*) Flap turned back. (*c*) Flap to be turned back for drainage of infection of the root of the nail. (*d*) Transfixion incision for drainage of central pulp infection.

nerve and blood supply; the final scar is obviously well removed from all pressure points. In some cases half only of the flap is raised: this is especially useful when one side of the nail groove is involved. Exceptionally, a central infection of the pulp may be treated by a transfixing incision extending from one side to the other (Fig. 6, *d*).

Infections under the nail are best dealt with by removal of that structure, either wholly or in part. For central infections of the nail bed it is sometimes recommended that a small trephine hole be made through the underlying nail, but this is apt to provide very inadequate drainage, and in the long run little time is saved over the more certain removal of half or the whole nail. When the root of the nail is involved, as in onychia, two lateral vertical incisions are made, continuing the line of the

lateral nail groove for about half an inch (Fig. 6, *c*). The whole skin flap thus outlined is raised off the nail root and packed as above. Multiple chronic infections of the nail groove are not uncommon. In some cases there may be a general syphilitic or tuberculous infection; in others, infection is due to a ringworm; but in a third variety, of increasing frequency, manicuring is to blame. For this group in the earlier stages local antiseptic applications, especially those having great penetrating powers, are advisable. Ultra-violet light has also proved effective in many instances, but for those intractable cases where,

FIG. 7.—Diagram indicating position of incisions for drainage: (*a*) of digital thecae, (*b*) of proximal end of digital thecae, (*c*) of ulnar bursa, (*d*) of theca of thumb.

owing to reinfection or lack of resistance, the condition fails to respond to other methods, removal of all the nails may prove the quickest method of clearing up the infection.

Infections in the intermediate and proximal sections of a digit are drained by lateral incisions which avoid the nerves and vessels by keeping well on to the palmar aspect. These incisions into the subcutaneous tissues may cross the skin creases with impunity. Drainage of the thecae is a much more difficult problem. If the whole length of a theca were to be opened by a median incision an adequate drainage would undoubtedly be established, but the tendons would retract out of the wound like a "bow-string." It is true that this might be avoided by splinting in complete extension, but dense anterior adhesions would form which it would be impossible to break down subsequently. In addition the sheath would

be weakened at its most important part and the scar would be right over the pressure area. For these various reasons the incisions are usually made in a bridged fashion (Fig. 7, *a*) leaving the intervening portion of the theca intact. They are placed at the lateral borders of the sheath, but carefully avoid the digital nerves and vessels. With these provisos the incisions should be made as extensive as possible.

The extension of a theca into the palm may be drained by a median incision (Fig. 7, *b*); care is necessary, however, in the case of the index finger to avoid the nerves and vessels which cross it (see anatomical section, Fig. 3).

There is some divergence of opinion as to the best position into which to fix a finger in these cases. If

approached directly through the palm without grave risks of damage to important structures. The routes by which these infections spread naturally have already been outlined, and it is along this same track that the surgeon should attempt their drainage. The incisions are therefore made in the appropriate web spaces, and, from these, sinus forceps are carefully pushed into the deep spaces until pus is reached. The operator must visualize the position of these spaces in so doing. Drainage may be maintained by keeping the tracks open with strips of thin glove rubber. No drainage tube should be used owing to the great risk of causing pressure necrosis and secondary haemorrhage. In view of what has already been said on this subject in previous paragraphs there should be no

FIG. 8.—Diagram of the important structures in the palm. (*a*) Ulnar nerve. (*b*) Ulnar artery. (*c*) Superficial palmar arch. (*d*) Deep palmar arch. (*e*) Median nerve.

the theca is not divided in its whole length there is little fear of tendon prolapse, and a somewhat flexed finger is much easier to manipulate than one which is fully extended, so that any subsequent adhesions can be more easily dealt with. Difficulties may arise when it has been impossible to say before operation whether the theca is involved. In these circumstances the surgeon should first dissect carefully down to the theca. If it is obviously infected it can then be opened; if it is doubtful the wound may be left wide open and a fresh observation made in twenty-four hours. In exceptional cases the discreet use of a needle and syringe may decide the issue, but the greatest care should be taken not to introduce infection in so doing.

Drainage of the Palm

A glance at the anatomical diagrams (Figs. 8 and 9) will indicate that infections in the palmar spaces could not be

FIG. 9.—Transparency showing the relation of the palmar and thenar spaces of Kanavel to the chief overlying structures. The horizontal lines represent the limits of the anterior annular ligament.

need to warn the unwary against making incisions into the swollen tissues on the dorsum of the hand.

The proper drainage of the theca of the thumb and of the main palmar bursa demands a rather high degree of skill, otherwise considerable damage may be done to the important structures which are crowded together in this region. These thecae may be approached through the lateral and medial extensions of the palmar fascia, which are much thinner and less important than the central portion. Before dealing with these cases the operator should review the anatomical diagrams (Figs. 4 and 9). The incision for drainage of the thumb sheath skirts the inner margin of the thenar eminence. The sheath is first opened in its distal portion, where it is easy to find, and is then followed upwards towards the wrist. Part of the vascular and sensory nervous supply to the thumb crosses the sheath, and should if possible be

preserved. In any case the incision must not extend so far proximally as to endanger the motor nerve supply of the thenar muscles from the median. The proximal end of this bursa may, however, be drained in the forearm immediately above the annular ligaments (Fig. 7, d).

The common palmar bursa and its extension to the little finger is drained by an incision which follows the ulnar border of the sheath. Part of the sensory nerve supply of this digit crosses the sheath and may perforce have to be sacrificed. The incision must be strictly limited proximally to avoid damage to the ulnar nerve, but the proximal end of this bursa may be drained in the forearm, as in the case of the thumb (Fig. 7, c). The deep space of the forearm, which may become infected by extension from the palmar space and which lies deep to the tendons and their bursae, is drained by medial and lateral incisions which approach the space from both aspects; the superficial structures are retracted forwards.

Involvement of bones will be very largely avoided if early and adequate drainage of more superficial infections is instituted. Bone infection, especially of the terminal phalanx, may be suspected if the wound or sinus does not readily close, if the finger remains swollen, or if fresh abscesses and sinuses form. The use of a probe will reveal a necrotic bone, and in these cases, although not in the initial stages of bone involvement, a radiograph is of great value. At the earliest possible moment the cavity should be laid freely open and all necrotic bone removed. It has already been mentioned that the terminal joint and the tendon sheaths usually escape. The final result following necrosis of the terminal phalanx, when the soft tissues have not been allowed to become extensively destroyed, is good.

Necrosis of the long flexor tendons is a serious outcome of infection. This sequel could be very largely avoided by the early recognition and energetic treatment of infections by operation. Efficient drainage of a sheath as soon as it becomes infected, followed by splinting of the digit, allows adhesions to form between the tendon and the sheath, which limit the further spread of the process. These adhesions are usually thin, and can be easily broken down subsequently. For the reasons already given, if the sheath be not drained early the tendon will surely undergo necrosis and the function of the finger be thus destroyed. A dead tendon must be removed, since it is otherwise a source of prolonged suppuration, and there is nothing to be gained by its retention. At a later date the question of a plastic operation or of amputation of the digit will have to be considered.

Infection of joints is luckily uncommon, at least until the general condition of the digit has become so serious that there is little hope of retaining it. In the rare examples of solitary joint infection the condition is recognized by the localization of the swelling and the immobility of the joint concerned. As in the case of joint infections elsewhere, incisions are made down to and through the capsule, but no drainage material is allowed to enter the joint cavity.

It remains to consider the value of hot baths, Bier's congestive bandages, etc., in the treatment of these cases. Many have great faith in the value of hot arm baths with various antiseptics, and in cases where adequate drainage has already been established there may be some virtue in the method. Frequently, however, the use of these measures leads to procrastination in dealing with the spread of infections by surgery, and in these circumstances they are to be condemned. Hot baths, etc., must never be allowed to replace surgical drainage; but there

may be little harm, and possibly equally little value, in using them after such drainage is established. Occasionally, if the edges of an incision tend to become encrusted with discharge which prevents free drainage, a bath of weak flavine, eusol, or milton may be used, but it should be repeated with caution lest the skin become sodden.

The application of a Bier's congestive bandage appears at times to be of some value, but it must not be expected to replace surgical measures. It may be used both in the very early stages to help localization, and later, after drainage, to flush the wound with serum and assist free discharge.

The treatment of the chronic infections previously mentioned falls outside the scope of this article.

Prophylaxis

Finally a word must be said concerning prophylaxis. It has been pointed out that many of these cases arise from wounds and injuries, so that, except for certain difficulties already considered, it would appear feasible to prevent the complication of infection in a large number of them. In the hand, with its anatomical complexity and the contraction and retraction of structures after division, immediate complete sterilization of the wound will very often prove impossible. It is therefore frequently an error to attempt immediate closure. The wound should be left wide open, after a preliminary cleansing, and packed lightly with some suitable antiseptic gauze. After a few days a secondary suture may be attempted without fear of gross infection. Divided structures of importance may have an identifying suture passed through them, to prevent retraction and to aid recognition at the secondary suture. Punctured wounds—for example, those produced by needles—present a special problem in prophylaxis. If the penetration is known to be of very limited extent, it may be proper to attempt sterilization by the passage, along the track, of the eye end of a needle dipped in carbolic. In most cases, however, it is wise to avoid the use of strong antiseptics and to rely upon suction or the use of a congestive bandage above the part for twenty-four hours or so.

LISTER AT UNIVERSITY COLLEGE AND HOSPITAL

ADDRESS BY SIR STCLAIR THOMSON

At a reception held at University College Hospital on October 11 Sir StClair Thomson, who was house-surgeon to Lister in 1883, delivered an address on Lister at University College and Hospital.

Sir StClair said that University and King's Colleges had only recently celebrated their first centenary and both could rejoice in cherishing the memory and example of the greatest of all the masters of surgery, for Lister felt the first impulse towards his great life-work in University College Hospital, and this reached its fruition during the sixteen years that he worked in the wards of King's College Hospital to demonstrate the truth of his principles. Lister was a "true-born Englishman." His people came from Yorkshire. His father was a wine-merchant in the City of London, and had a love of learning and a taste for scientific pursuits, for he was deeply interested in the science of optics, helped to perfect the microscope, and was a Fellow of the Royal Society. He was also a good classical scholar and skilful both with his brush and pencil. Moreover he was a Quaker, and Joseph Lister grew up in the atmosphere of that rather serious-minded sect.