SURGICAL PROCEDURES IN GENERAL PRACTICE

This is one of a series of articles contributed by invitation

AMPUTATION OF THE FINGERS

BY

HAROLD C. EDWARDS, M.S., F.R.C.S.

A conservative policy should be followed in dealing with the question of amputation of the fingers and thumb, for the smallest portion of a digit that may be of value to the patient should be saved. Such a policy is to be strongly recommended in connexion with injuries, and particularly with injuries to the thumb. It is surprising how pronounced is the power of recovery in the hand, and immediate amputation is best avoided unless the finger is literally "hanging by a thread." Operation should be postponed until there is unmistakable evidence that the finger, or a part of it, will not survive. Unless complicated by sepsis, no set amputation should be done for such injuries, but the doomed portion should be separated at the point at which the injury has ordained it and the flaps fashioned accordingly. Further operative procedures should be postponed until the wounds are healed.

In sepsis, early amputation need be considered only when the infection has involved bone or joint, and not when it is limited to the soft parts, in which case it is wise to defer the question of amputation until the wounds have healed and the damaged finger has been afforded an opportunity to recover function. Stiff and useless fingers may result from both injury and sepsis, and form one of the most common indications for amputation. Whether amputation should be done, and if so at what level, depends entirely upon the degree of usefulness of the finger affected.

Fixed Finger

A fixed finger—whether fixed in extension like a poker or flexed up into the palm—is a worse than useless member. Not only does it fail to contribute anything towards the work of the hand in general, but it often exerts a malign influence upon the activity of its neighbours. A "poker" finger may prevent the adjacent fingers from flexing fully, and a permanently flexed finger may limit their powers of extending. Of the two, a permanently straight finger is the greater evil, for it cannot fail to get in the way for whatever purpose the hand is used. However, with fixed flexion, except possibly in the case of the little finger, the hand will be the better for the loss of the affected digit, and both fixed flexion and fixed extension, therefore, may be regarded as definite indications for amputation.

In cases in which the flexor tendons are bound down by adhesions so that their action is greatly limited or totally abolished, but in which the joints themselves remain supple so that passive flexion is possible, amputation is not necessarily indicated. In such cases the affected finger may be flexed into the palm by its neighbours, and hence need not by its mere presence as a "passenger" impair the hand's efficiency to any appreciable extent. The personal inclination of the patient himself should be studied before any decision to amputate is made. The operation of Sterling Bunnell—that of substituting the disorganized tendons by free tendon transplants—may be worthy of trial in fingers so

impaired, although the results of such operations are not, on the whole, encouraging.

Partially disabled fingers—for example, those in which there is ankylosis only of one or both distal joints—are not usually so severe a handicap as to warrant operation, but again it is a question of weighing up with the patient the relative advantages and disadvantages of retaining the finger and of partial amputation.

Apart from injury, sepsis, and stiffness, indications for amputation are rare and include a miscellany of unusual conditions—growth of bone, tuberculous dactylitis in adults, epithelioma, and melanoma. In cases of streptococcus-infected puncture wounds of the finger pulp associated with septicaemia immediate amputation is sometimes advocated. My personal view is that local excision of the wound is preferable. It is to be hoped, however, that the use of prontosil and its allies will in the future obviate the need even for the less radical operation for these distressing cases.

Some Anatomical Points

In connexion with amputations there are three anatomical points of surgical importance which need special mention:

Position of Joints.—The joints do not correspond with the prominences of the knuckles, which are formed by the heads of the phalanges and metacarpals, but are situated one-twelfth, one-sixth, and one-third of an inch respectively distal to these prominences (starting at the distal joint). (See Fig. 2.)

Flexor Tendons.—These are attached to the anterior surfaces of the phalanges by fibrous bands (vincula), and these tend to prevent the cut tendons from retracting (Fig. 1). If the tendon be cut proximal to the middle

FIG. 1.—Diagram showing the arrangement of the vincula. The smaller drawing is a cross-section through the middle of the first phalanx to show the relation of the digital arteries and nerves.

of the second phalanx the tendon is free to contract, and in order to preserve movement at the first interphalangeal joint in amputation through the middle phalanx, the flexor tendons should be held before division and stitched to the periosteum of the bone or over the end of the divided bone to the extensor tendons. This precaution is not necessary in amputation through the first inter-

phalangeal joint because flexion at the metacarpal joint, and therefore of the resulting stump, is brought about by the interossei.

FIG. 2.—Diagram showing incisions for various amputations described in the text and the relative positions of the joints.

Position of Digital Nerves.—These lie on either side of the finger immediately in front of the digital artery, and both artery and nerve lie slightly anterior to the mid-plane (Fig. 1). In amputations proximal to the second interphalangeal joint these nerves should be identified and divided as high up as possible.

Anaesthesia

Local anaesthesia is ideal for amputations distal to the root of the finger. A 1 per cent. novocain solution is injected through a puncture wound on the dorsal aspect so that a collar of the anaesthetic is formed, encircling the base of the finger completely. About 3 c.cm. of anaesthetic should be sufficient, and to this should be added 3 minims of 1 in 10,000 adrenaline hydrochloride. Local anaesthesia may also be used for amputation at the metacarpo-phalangeal joint, but it will usually be found more convenient to do this operation under gas-and-oxygen anaesthesia.

Technique

In cases where the local condition does not permit of one of the set amputations—to be described subsequently—it should be borne in mind that if possible the long flap to be used to cover the end of the stump should consist of skin of the palmar surface. This flap will have greater tactile sensibility than one taken from the dorsum, and the resulting stump will therefore be of greater usefulness. The length of the flaps should be no more than sufficient to cover the end of the stump without tension, and the skin edges should be

approximated accurately with interrupted stitches of fine silkworm-gut. The flaps should be so fashioned that no corners are left on them which would result in an ugly or redundant scar. A tourniquet may be used, but it is unnecessary if a local anaesthetic is employed with adrenaline. If a tourniquet is desired in the more distal amputations a soft rubber tube tied tightly around the base of the finger will be found satisfactory. For amputations at the metacarpo-phalangeal joint a rubber tube tied tightly around the forearm will suffice, or, if it is preferred, a blood pressure apparatus around the upper arm. A firm bandage on an adequate covering of wool is used in order to diminish the tendency to the formation of haematoma. After amputation through one of the fingers a small wooden finger-splint should be used until the stitches are out, in order to obtain that rest which is so helpful to healing; but it should be discarded with the stitches, for its continued use will not only tend towards lack of mobility of the stump itself but will also affect the mobility of the neighbouring fingers, which readily become stiff in sympathy with their fellow.

Instruments.—A finger amputation set should comprise a narrow-bladed scalpel, two pairs of fine Spencer Wells forceps, one toothed forceps, a small bone-holding forceps and a pair of fine bone-cutting forceps, a small curved cutting-edged needle, some fine silkworm-gut, and a tube of 00 catgut; and for the anaesthetic a 5 c.cm. Record syringe and fine hypodermic needle.

Disarticulation at Distal Interphalangeal Joint of Fingers and Thumb

The end of the digit is grasped in the fingers and the joint flexed. A transverse incision is made on the dorsum at the level of the joint—that is, one-twelfth of an inch below the prominence of the head of the second phalanx—and the knife passed right through the articulation. The knife is now turned at a right angle and an incision made towards the end of the finger so that a palmar flap of sufficient length is formed. The knife is turned again through a right angle to the palmar surface and the tip of the finger is cut through so that the distal phalanx with the nail-bed is removed (Fig. 2).

Amputation through Middle of Finger

An anterior flap equal in length to the diameter of the finger at the point of section is marked out (Fig. 2). The edges are rounded off and the flap, consisting of skin and subcutaneous fascia, is raised up. The tendons are divided, care being taken to fix the flexor tendons before the division is made. If the point of section is to be across the lower end of the second phalanx the flexor tendon is stitched to the periosteum or is cut of sufficient length to be passed over the end of the bone and stitched to the divided extensor tendon. The digital nerves on either side of the fingers are defined and grasped in Spencer Wells forceps and pulled upon, to be cut as high up as possible.

Disarticulation through the first interphalangeal joint is performed with a similar type of flap. In amputation here, however, the flexor tendons may be allowed to retract after section.

Amputation through Metacarpo-phalangeal Joint

The most useful incision in amputations at this level is a racket incision, with the handle on the dorsal aspect. The palmar aspect of the racket should be cut with a

notch so as to prevent a corner on the scar (Fig. 2). In the case of the two central fingers the flaps should be of equal lengths, but care should be taken to see that they are long enough to cover the head of the metacarpal bone if it is intended that this should be left. There appears to be little truth in the contention that inclusion of the head of the corresponding metacarpal in the amputation occasions any added weakness of the hand, although on theoretical grounds this might seem to be the case. The fact that the cosmetic result to be obtained if the head is removed is so much better than if it is left would outweigh any risk of weakness, which experience has proved to be questionable—except perhaps in heavy manual workers, in whom muscular strength is of far greater importance than the appearance of their hands. If two adjacent fingers are to be amputated, excision of the metacarpal heads is probably best avoided. When either the first or the fourth finger is the candidate for amputation, there should be no hesitation in removing the metacarpal head, for the cosmetic result is vastly improved thereby. In the case of the first finger, moreover, the removal will result in a more efficient hand. In amputations of the first and the little fingers the racket incision should be so fashioned that there is a long flap on the exposed aspect—that is, in the case of the index finger the outer (or radial) flap should be the longer, and in the case of the little finger the inner (or ulnar). (Fig. 2.)

Amputations of Thumb

For amputation of the distal phalanx the method is similar to that of the fingers. Amputation through the metacarpo-phalangeal joint may be done either by a long flap from the palmar surface (Fig. 2) or by a racket incision. Amputation proximal to this point—that is, at the metacarpo-carpal articulation—so severely disables the hand that it should be avoided if possible. If the thumb metacarpal is so damaged that operation is essential, every effort to save the joint must be made, for without it future reconstructive operations have very much less chance of a successful outcome. In respect of this, reiteration of the opening sentence of the article makes a fitting conclusion.

H. Servièrès (*Thèse Paris*, 1938, No. 182) records seven illustrative cases of gonococcal septicaemia in patients aged from 19 to 28, three of whom were males and four females. Two stages can be distinguished. The first is a more or less latent period in which gonococci are present in the blood, while the second is characterized by metastatic complications. Of the numerous possible localizations of the gonococcus the following are the most important: (a) joint manifestations, of which the pseudo-phlegmonous form and polyarticular rheumatism are the most serious; (b) cardiovascular localizations (myocarditis and pericarditis are rare, but ulcero-vegetative endocarditis is frequent and the prognosis grave; gonococcal arteritis and phlebitis sometimes occur); (c) nervous complications in which the spinal cord, peripheral nerves, and meninges are affected; (d) skin complications, of which purpura is the most important; (e) miscellaneous complications in which the liver, kidneys, eyes, ears, pharynx, and thyroid are affected. As regards diagnosis, a search must be made for the gonococcus both in the genital organs and in the blood, joint fluids, and cerebrospinal fluid. As the presence of the organism in the blood is not constant repeated examinations must be made, especially during the febrile period. In addition to treatment by vaccines and serum the use of drugs such as the salts of acridine and mercurochrome is recommended.

Correspondence

Convalescent Serum in Infantile Paralysis

SIR,—The statement of Drs. Paterson and Critchley, cited and traversed by Mr. Girdlestone, that we have no means of controlling the infection in acute poliomyelitis, is surely at this date a truism that no one with any large-scale experience in dealing with the disease and no one who has kept in touch with the relevant clinical and experimental literature would care to dispute.

And if it be accurate, as I submit it is, then it cannot be too widely known. It is not right that the public should be led to suppose that we possess the means of scotching this dread infection or of mitigating or averting the development and severity of paralysis, and that lack of medical enterprise in this country has failed to make these means generally and easily accessible, when in fact no such means exist.

A reading of certain past epidemics shows that unwise claims for the efficacy of serum treatment have prevented the making of the vitally necessary control observations, since public opinion could not be expected to tolerate the experimental withholding of the vaunted remedy from any case for control purposes. For this and other reasons serum treatment had been in use for over twenty years before the elementary scientific requirements of any just assessment of its value could be satisfied. Of the quality of much of the evidence upon which the former belief in the efficacy of this treatment was based, Mr. Girdlestone's own letter provides a fresh and illuminating example. He writes: "My own experience with convalescent serum . . . has been very happy, though relatively small and without controls." To speak of this as "experience" is surely to use the language of hyperbole. It expresses simply an act of faith in which, despite the disillusionments of the past quarter of a century, Mr. Girdlestone hopefully asks us to join him.

A remedy that is specific for a given infection reveals its specific potency rapidly, as we have seen in the cases of salvarsan and sulphanilamide, and does not need twenty-five years' extensive use to establish its value. That after so long a period convalescent serum treatment should still find us wholly unable to claim that it has any value surely indicates that it has none and that the time for that hopeful suspension of cerebration, euphemistically known as "the open mind," is past.

In the circumstances neither the cause of medicine nor public policy is served by an attempt, unsupported by any new evidence, to revive that belief in serum treatment that still apparently lingers, as a consolatory but obscuring superstition, in the minds of those who cannot bring themselves to face the realities of a grim situation. We all like to think that we bring healing in our hands, but to attain this happy belief at the expense of the facts is to pay too high a price for it.—I am, etc.,

London, W.1, Sept. 9.

F. M. R. WALSHE.

Fracture of the Neck of the Femur

SIR,—I think the profession ought to be very grateful to Mr. Nicholson for his most interesting account of his own experiences when suffering from a fracture of the neck of the femur.

I only wish to comment upon two points. One is the statement that the operation cannot be properly carried out