THE SEPTIC HAND

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The importance of this subject has been universally recognised by the profession for a long time and much study devoted to it. Those who want guidance in understanding and treating infections of the hand can find it in such excellent books as those by Kanavel, Handfield-Jones and Iselin. The signposts are there if we take the trouble to use them. Unfortunately the subject, without being exactly dull, hasn't the glamour of more major surgery and the young surgeon, as his experience increases, finds himself drawn always towards bigger and better operations with less time and inclination to attend to minor things like septic fingers. Little wounds of the hand and lesser infections are very common and often lightly regarded by patients and practitioners. The potentiality of these little infections to cause long continued and perhaps permanent and severe disability is not always recognised. Once a septic focus in the hand has progressed to any considerable extent the likelihood is that, even with the best surgery, there will be left some impairment of function. The hand is a beautiful machine, a complicated and precise instrument and in consequence extremely vulnerable. The natural process of inflammation, of combating the infection, of the walling off and of healing, all lead to matting and adhesion formation. Later results of the major infections of the hand are little better than they were fifty years ago and are never likely to be good. Uniformly good results without disability can be obtained only by cutting the infection short in its early stages. Efficient early treatment will at least lessen the duration of infection, and it will prevent spread with the consequent crippling disability and so cause less risk to life and limb. Great operative skill is not required; what is needed is the strict application of good general surgical principles and some particular knowledge of the peculiar anatomy and pathology of the affected part.

As the first step in the prevention of septic conditions of the hands all wounds of the fingers and hand should be systematically explored under local or general anaesthetic, contused tissue should be excised and all foreign matter and small bone fragments removed. If the wound is less than six hours old and can be approximated without tension after excision of bruised skin edges it may be sutured, otherwise it should be left open. To

generalise it may be said that wounds in the flexures of the fingers are liable to open the tendon sheath, wounds on the dorsum to open the joints and wounds at the tips of fingers are liable to have bone involvement. Where there is any danger of ankylosis the fingers must be maintained in the "position of function" from the outset. The suture of wounds of the fingers and hand without exploration under an anaesthetic is asking for trouble and should not be done.

Infections of the Hand.

A short classification of whitlows is not possible because of the numerous segments, spaces and tissues in the hand. Whitlows of the fingers fall roughly into two groups, superficial and deep. The superficial group includes the septic blister, paronychia, furuncle, and acute spreading infection. The deep includes cellulitis of the subcutaneous cellular tissue and infection in the tendon sheaths of the second, third and fourth fingers. In the hand the deep group includes:—

- (a) Subaponeurotic infection in the cellular spaces of the thenar, hypothenar and middle palmar spaces.
- (b) Tendon sheath infection—radial and ulnar bursae. Teno-synovitis of the flexors of thumbs and little finger are more properly included in the abscesses of the hand on account of their communication with the carpal tendon sheaths.

The number of spaces makes for difficulty both in diagnosis and in treatment. Infections of the cellular spaces and tendon sheaths are localised only at the outset and if suppuration occurs it should be dealt with as soon as possible. But diagnosis must be certain. This diagnosis is the most difficult part of the surgery in these cases and here it is that experience counts more than in the actual operative treatment. An incision made too early or in the wrong place may do a great deal of harm. If there is doubt about the localisation of the pus it is better to wait even for a few days until it is more clear.

All incisions for drainage of sepsis in the fingers and hand must be made under proper anaesthesia and in a bloodless field. A tourniquet is half

the battle. There is no place for the quick stab of a knife in a welter of blood.

1. *Superficial whitlow of fingers.*—(1) Erythematous type. This is a fleeting type of infection with local signs of inflammation which clears up in a few days. It is really an aborted infection, and demonstrates the wisdom of waiting for localisation of pus before incision is attempted.

(2) Septic blisters are common, occurring on the dorsal and palmar aspects. They have to be differentiated from the "collar stud" abscess caused by a deep whitlow pointing under the epidermis. In the septic blister the superficial collection of pus is large, pain is slight and the corresponding segment of the finger is not swollen. When the blister is "cut away" a small hole may be visible and there may be a small deeper abscess which will require drainage.

Peri-ungual whitlow.—This common variety occurs after a puncture wound or spontaneously. There is a superficial variety which is really a septic blister but more commonly there is a subungual collection at the root of the nail. It may start at one side but it tends always to spread towards the base and across to the opposite side. Hence the name "run-around." It tends to point along the lateral edges of the nail. It may burrow towards the bone and may infect the joint which is very close to the nail-bed. In untreated cases the pain subsides after a few days and the infection becomes chronic with swelling round the nail edge and with pus exuding upon pressure. A mass of granulations may extrude between the nail and the skin.

The whole nail gradually becomes detached and falls off. Where there is a sub-ungual collection or a sinus, the base of the nail should be removed after dissecting up a flap of skin, as described by Kanavel. The undetached distal part of the nail is left as a protection for the nail bed—this makes for comfort in subsequent dressings. The condition clears up quickly after this operation, otherwise with sinuses and poor drainage suppuration may continue for some time and the new growing nail tends to be deformed.

(3) Acute spreading infection is a grave but rare condition. It concerns us closely, being commonest in surgeons, nurses and mortuary attendants. A small scratch or prick usually on the dorsal surface is followed in a few hours by a red swelling extending up the arm and with signs of a most severe toxæmia. Incisions release only blood-stained serum and surgery is not indicated. The seriousness of the condition must be recognised at the outset and immediate and adequate chemotherapy instituted.

2. *Subcutaneous infections.*—The creases on the palmar aspects of the fingers demarcate three segments which are separated from one another and each can be the seat of a subcutaneous whitlow. The commonest is whitlow of the distal segment, the pulpar space. Here the cellular tissue is firm and intersected by vertical fibrous strands running from the dermis to the bone. Infection causes swelling and tenseness with considerable pain which reaches its peak about the third to the fifth day. Spread may be towards the surface, forming a collar stud abscess on the palmar aspect, towards the dorsum causing paronychia, or deep, to invade the bone and then the joint. In the thumb once the bone and joint are involved further spread may infect the thenar space and the long flexor tendon.

Mid-line incision in pulp infection is to be deplored. Owing to the structure of the pulp this incision fails to drain it, it prejudices more adequate treatment and leaves an ugly and painful scar. The shark's-mouth incision gives good drainage but is slow to heal and tends to leave a depression near the nail. The half horse-shoe lateral incision reaching to the tip of the finger is best. It must be carried deep enough to divide the fibrous strands anchoring the skin.

Osteitis is common and causes at least marked prolongation of the infection. The vessels to the distal part of the phalanx are vulnerable as they cross the pulp. The diaphysis of the phalanx has a separate blood supply coming off higher up the finger—hence the necrosis of bone often tends to be subtotal leaving a thin layer of bone which may protect the joint.

We often see cases of pulp infection where the suppuration has been going on for weeks and in

them X-ray discloses sequestrum formation. A great deal of time would be saved if this common complication were kept in mind and sequestra removed as soon as they separate. When the joint is involved the distal phalanx should be disarticulated. Teno-synovitis complicating osteitis of the distal phalanx is usually accompanied by sloughing of the tendon and may necessitate disarticulation of the finger. The thumb of course must be preserved; the thenar muscles will move it.

Infection of digital tendon sheath.—This is the most serious type of whitlow of the finger. Diagnosis is difficult; treatment is difficult owing to the peculiar anatomy of the sheath and there is a real danger of spread leading to deep palmar abscess. The results have been bad. The classical sign of teno-synovitis is the hook finger with extreme pain on attempted straightening. This sign is only present when the tendon sheath is intact. Once tension is released either by leakage from a wound or by rupture of the sheath at its top end, the sign is lost. Iselin points out that the most constant sign is pain on pressure over the upper end of the sheath in front of the head of the metacarpal. But even this may be absent.

The usual cause of digital teno-synovitis is direct infection by a wound most often in one of the creases of the finger. Mr. Dickson Wright in 1944 demonstrated cases treated by passing a ureteric catheter through the wound, enlarged if necessary, up the whole length of the sheath, washing out the sheath with saline, and instilling one or two c.c.s of a strong penicillin solution. This was repeated each day for seven days and the catheter then removed. Movement was then started and full function quickly restored. This method seems to offer a chance of far better results than before. General penicillin has no effect on teno-synovitis since it does not reach the synovial fluid.

For draining the tendon sheath directly lateral incisions are commonly used and the pulley divided. At this site the sheath is narrow, drainage is poor and adhesion formation almost certain. Iselin drains the sheath at its superior cul-de-sac by two palmar incisions 2 cms. long, one over each metacarpal space. He makes counter incisions on the dorsum and uses through-and-through drains. This seems a preferable method of drainage. The incision in the palm may be transverse.

Hand.—Infections of the subaponeurotic spaces of the hand have been well described. The palmar space is really two spaces, a superficial one lying in front of the tendons, and a deep one behind the tendons. The deep space is the one which becomes infected when a digital tendon sheath ruptures at its superior end. Infection of this space causes severe disability, including paralysis of the interossei which lasts for a considerable time. This

space is drained by incisions in the webs of the fingers along the lumbrical canals. Where a finger has been destroyed by teno-synovitis, drainage of the deep space can be obtained by removing the finger together with the head of the metacarpal.

The thenar space can be drained by an incision in the web or by incisions on dorsal and palmar aspect.

Tendon Sheath of the Hand.—This encloses the tendons in the palm and in the carpal canal under the anterior annular ligament. The radial bursa is in direct continuity with the digital sheath of the long flexor of the thumb. The flexor sheath of the little finger is continued up to join with the ulnar bursa which at the wrist surrounds the two layers of the flexors of the fingers. The ulnar bursa has three cul-de-sacs in transverse section and the tendon sheath of the little finger opens into the posterior of these. Hence a lateral drainage by an incision above the annular ligament, which opens this posterior cul-de-sac, is the most efficient as well as the least damaging. In nearly every case of radial bursitis the ulnar bursa quickly becomes infected. Spread from ulnar to radial bursa is not so common. When these sheaths become infected drainage is best carried out by an incision on both sides of the lower forearm and a drain across front of the pronator quadratus. Instillation of penicillin into the sheath should be carried out.

To close, I would advocate the ideal treatment of infections of the hand and fingers as:—

- (i) General treatment in bed. These patients are ill with pyrexia and pain.
- (ii) Fixation of all cases in the position of maximum function either by plaster of Paris or by a combination of wire and plaster. This should be coupled with elevation of the hand.
- (iii) Chemotherapy. The predominant organisms are haemolytic streptococci and staphylococci aureus. Penicillin and sulphonamide should be given from the beginning. This will not abolish surgical interference but it will help to reduce the operative risks and will make any surgical procedures safer and, therefore, will help to restore functional activity of the parts.

This line of treatment means that all cases of septic infections of the fingers and hand must be treated as in-patients. We cannot afford that ideal at present but we should aim at it. The treatment is expensive, but in my opinion it would pay good dividends.

REFERENCES

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