Hand Injuries at a Mine Hospital

BY

Q. J. SCOTT, M.B., F.C.S.

Hon. Consultant Surgeon, Salisbury Hospital Group. (Formerly Chief Medical Officer and Surgeon, Mangula.)

SUMMARY

An analysis of 100 successive industrial hand injuries, (plus a small number of domestic hand injuries), presenting at Mangula Hospital. (Mangula Hospital caters for the Mangula Copper Mining Complex about 120 miles north of Salisbury).

INTRODUCTION

Hand injuries constitute a very important element of total injuries seen at the hospital. They resulted in considerable loss of working hours and production.

It was felt that a study of the circumstances and nature of these injuries might help in prevention and future management.

According to past records 100 such injuries take place over approximately 8-9 months, thus it was decided to study the next 100 cases.

When the records were reviewed it was found that there were a small but significant number of domestic injuries which required to be admitted to hospital and these have now been included to increase the overall figure.

It was soon discovered that most such injuries could be fitted into three main groups; crushing, cutting and a polyglot mainly consisting of various penetrating injuries or their complications. These rough categories appeared to work quite well as management usually differed somewhat for crushing or cutting injuries e.g. amputations at similar levels.

No record is taken of return to "light" duties as such duties invariably are designed to spare the limb. Return to duty means "normal" duty. (In most cases heavy manual labour.)

RESULTS

Results have been graded strictly on the effective loss of function to the hand e.g. if there is sensory loss over the ulnar side of the thumb this will result in considerable interference with all functions requiring sensory inter-relationship between thumb, index and middle fingers such as in the movement of turning a key.

Most results were graded at three weeks but suture of digital nerves was reviewed at three months.

All results were graded as follows:

Excellent: complete return to normality.

Good: good function but slight disability e.g. in length of digit or anaesthesia of tip.

Acceptable: useful function but obvious disability.

Poor: some function but considerable disability.

Fail: little or no function (this may be temporary due to pain or sepsis).

DISCUSSION OF TREATMENT METHODS

Crushing Cases: (83 cases)

General:

All cases with the exception of those with mild nail bed crushes and haematomata were given an antibiotic on admission.

Usually benzyl penicillin, but for heavily contaminated lesions ampicillin was used.

In cases of alleged penicillin hypersensitivity tetracycline was administered.

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All cases except nail bed trephining were taken to theatre (after radiography), for repair which was always carried out under a tourniquet.

Where possible a general anaesthetic was used but this was often difficult with full stomachs, regional blocks under a cover of valium/pethidine "sludge" was found to be most valuable.

Post operatively all such limbs were elevated initially on pillows and later when the patient was mobile, in slings until all oedema had cleared.

Physiotherapy, as active movement, was commenced on the second post operative day.
A. Specific Injuries

Those involving the nail bed were divided into two groups:
1. Injuries with a tear of the nail bed (and possibly pulp) with little or no bone damage.
2. Injuries with compound fracture of the distal phalanx.

Group I

(a) Subungual haematoma.

These were trephined and returned to duty after a few days rest when no longer painful. They were protected with a tube gauze dressing.

The only complication was a single septic case resulting from a contaminated wet dressing requiring removal of the nail and 14 days off duty.

Total cases six
Average days off duty seven
Results. Excellent six.

(b) Nail bed tears.

In all cases portions of torn nail were removed, torn wound edges trimmed if necessary and the wounds irrigated before repair.

(i) Dressing with tulle gras (the least severe cases).
Total cases five
Average days off duty 12
Results. Excellent 3, Good 2.

(ii) Suture
Total cases 7
Average days off nine
Results. Excellent four, Good two, Acceptable 1.

(iii) Split skin grafting
Covering raw nail bed and tears resulted in good early healing but distortion of nail so was discontinued.

Total cases two
Average days off duty eight
Results. Good two.

Group II

Nail bed damage plus fracture of distal phalanx.

(i) Suture
Total cases nine
Average days off duty 10.5
Results. Excellent five, Good three, Fail one.

This group did remarkably well as it included some severe injuries. A single exception after an attempt at repair by suture came to a pulp flap amputation.

(ii) Amputation
Total cases one
Average days off duty 12
Results. Good, one.

(iii) Split skin graft
Total cases two
Average days off duty 17
Results. Good two.

From these findings it is quite evident that an associated bone injury even of mild degree increased the morbidity significantly.

B. Lacerations of Shafts of Fingers

Lacerations of the shafts of fingers seldom (in crush as opposed to cuts) resulted in damage to tendons or neurovascular bundles.

Most were sutured; two had sufficient defect to warrant a small split-skin graft. One had an associated infected haematoma which was evacuated.

Total cases 22

(i) Sutured
Average days off duty 10
Results. Excellent 15, Good four.

(ii) Split skin graft two.
Average days off duty 16
Results. Excellent one, Good one.

(iii) Drainage one
Average days off duty 10
Results. Excellent one.

C. Soft Tissue Crush Injuries of Hand

Soft tissue crush injuries (lacerations) to the hand were all treated by toilet and suture.

Total cases 22
Average days off duty 12
Results. Excellent five.

D. Fractures and Joint Injuries excluding Terminal Phalanges.

(i) Digital fractures—three were compound and treated by toilet and suture of soft tissue and Zimmer external splintage.

Total cases four
Results. Excellent two, good one, Fail one.

The good case had 20 degree flexion loss at the metacarpo-phalangeal joint. The fail case was first seen three weeks after his fracture had occurred, he showed a painful thickened finger with an ununited fracture. He would accept only external splintage for two weeks which left him with a malunion and joint stiffness—considerable disability.

(ii) Metacarpal fractures

All of these were of the neck of the fifth metacarpal.
Internal fixation with Kirschner wire and early movement gave the best results.

The only external fixation showed some metacarpophalangeal joint stiffness and 30 degrees palmar angulation of the distal fragment.

Total cases four

Internal fixation three
Average days off duty 23
Results. Excellent two, Good one.

External fixation
Average days off duty 12
Results. Acceptable one.

(iii) Avulsion of ulnar collateral ligament of thumb, treatment by internal fixation of fragment with Kirschner wire—good result.

E. Amputations

In all cases where possible the length of the digit was preserved. However should the damage be just distal to a joint, the finger was shortened to that joint and closed with a convenient flap.

(i) Pulp flaps were preferred but in ragged crush injuries this is not always possible and if the only available viable tissue was dorsal or lateral this was used. A minimum of co-apting sutures were used. Two cases with multiple digital injuries were treated by both grafts, and amputations on different digits.

(ii) Wolff grafts (from forearm). These ensured good coverage of the defect. However, innervation was seldom complete and most contracted somewhat giving a rather firm insensitive fingertip.

(iii) Cross flap grafts. These came from adjacent fingers (in one case from abdominal wall. The cross finger flaps, although making use of dorsal donor skin gave good supple flaps which remained so. However, this is a two stage procedure and thus time consuming. The single case performed on an intermediate phalanx amputation was to preserve length in an index finger. The abdominal wall flap was successful though rather bulky. The patient regrettably was a farm labourer, was paid off and was lost to follow up.

(iv) Transposition flaps gave good early function as they have an innervated finger tip. An added advantage is that their construction is one stage procedure. (Rank, Wakefield, and Hueston. 1973).

Results were as follows:

(a) Tip amputations 3.
Wolff graft one. Days off duty 14, result good.

Cross flap graft five. Days off duty 19, results good. two.

(b) Amputations of or through distal phalanx nine.
Volar pulp flap. one. Days off duty 21, results good.

Cross flap graft five. Days off duty 19, results good four. acceptable one.

Transposition flap three. Days off duty 16, results good three.

(c) Amputation intermediate phalanx (both index) two.

Cross flap one. Days off duty 70, result acceptable one.

Transposition flap one. Days off duty 21, result good one.

F. Neurovascular Injuries.

Crush injuries to digit shaft with obvious damage to neurovascular bundle. At repair, if possible, the digital nerve was co-apted with 6/0 polydek suture. On review at 3/12 one patient claimed return of sensation and paraesthesia distal to the wound. Function in both digits was adequate for manual work. They are graded as good and acceptable respectively. Average time off duty was 19 days.

Cutting Injuries

The majority of these resulted in wounds much more easily dealt with initially. There was a proportionate drop in bone damage and a corresponding increase in damage to tendons and neurovascular bundles. In all these cases a primary nerve suture was attempted (with one exception which was skin sutured earlier at a clinic).

Two of the three digital nerve sutures claimed some improvement of sensation distal to the injury at review. One of these also had flexor tendon injury of the thumb which was repaired at the same time (three weeks after skin suture of the initial injury).

The cutting injury to the dorsum of the hand, a large oval defect four x three cm, was the result of a human bite. This was excised, allowed early granulation, and then covered with a thick split skin graft giving an excellent result.

The tendon sutures three did well although one flexor tendon suture showed some tethering of the distal portion of profundus interfering with full distal flexion. He was graded as poor on review as index was involved. Grip was still fairly efficient.
Puncture wounds, (nine)

These were due to the following agencies: dog bite two, wire four, drill fragment one, snake bite two. Many were septic on admission and required only simple drainage.

One of the dog bites was in a dog handler whose charge had had enough and bit him severely on the hand, resulting in 28 days off duty.

Grease injection into a web space resulted in 32 days off duty as the wound was opened, widely curetted and allowed to granulate.

The snake bites resulted from an exhibition of snake handling (of a burrowing adder), to an audience in a bar.

The more skilful was bitten twice on one hand, the less expert was bitten nine times (some on each hand).

The snake was later brought to the hospital for exhibition, very angry, in a plastic bag, but having exhibited such prowess was not molested by any of the staff.

The bitten limbs showed very considerable swelling, with the skin being warm and mildly tender to the touch. The patients themselves complained of an agonising burning pain in the affected parts, especially in the region of the bites, which were easily seen as small punctures, but which were otherwise unremarkable.

Systemic effects were few, occasional extra-systoles were detected in both cases but pulse rate remained only slightly elevated (90-100/min) and blood pressure in normal range for their age.

Pethidine was given for pain and diazepam for sedation.

However in the severely bitten patient (bitten second, and thus, although bitten more frequently may have had little greater overall volume of venom) his pain was so severe that it was felt that a trial of polyvalent anti-serum was warranted (reports on its effect in envenomation by this species are conflicting though the majority view is that it is ineffective). Twenty millilitres was given very slowly I.V. over 20 minutes. No effects of any sort were observed.

Two weeks after discharge the same patient presented with two small deep painful ischaemic ulcers on the index finger and thumb, which were cleaned to reveal a healthy granulating base. In addition he had some stiffness of the joints of both digits, which have still not completely recovered although he has good function.

CONCLUSION

We have been fortunate in having the facilities and time to admit the majority of these cases, operate on them under ideal conditions and follow up almost all of them. This has resulted in a favourable result in most of them. Sepsis has not been a problem but did influence unfavourably the outcome in one compound fracture of a finger tip.

The ultimate conclusion is however, that because the vast majority of these patients rely directly on their hands for their living, a hand injury, whether motor or sensory, in this region is of the utmost importance to them. They should thus be dealt with under optimum conditions by someone interested in the problem.

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REFERENCE


The After-Care Treatment of Varicose Veins

BY

J. A. GORDON, M.B., CH.B., F.R.C.S.E.
Hon. Consultant Surgeon, Salisbury Hospital Group

INTRODUCTION

The ultimate results of treatment of varicose veins do not entirely devolve on the procedure but on the after-care to which the patient is subjected. It has been suggested recently that Fegan's therapy is only about 30 per cent. successful, whereas the operative procedure is 85 per cent. successful.

This is not the experience in the local context. It is felt that after ten years of trial from 1967-77 the results are equally successful and that both procedures are efficacious, provided, the patient is instructed on the after-care of the legs and carries out these instructions almost to the letter.