

Applied hand anatomy: its importance in accident & emergency

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SUMMARY

Hand injuries account for 10–20% of an Accident & Emergency department's workload. Early recognition of serious injury is vital to ensure appropriate management. This is only possible with a good working knowledge of hand anatomy.

Forty consecutive A&E senior house officers (SHOs) were assessed on their knowledge of basic hand anatomy. The results are discussed as are the implications for undergraduate and post-graduate training.

INTRODUCTION

Hand injuries account for 10–20% of all attendances to the A&E department. Several studies have outlined the spectrum of hand injuries seen in the A&E department (Frazier *et al.*, 1978, Clark *et al.*, 1985, Wilson, 1986). The majority are simple soft tissue injuries. However, approximately one third are associated with a wound. Wounds are important because of the increased possibility of injury to underlying structures. The incidence of significant nerve or tendon injury is low, accounting for approximately 0.6%–6% of all open hand wounds (Table 1).

Table 1. Incidence of significant nerve and tendon injuries.

	Significant injury	
	Nerve	Tendon
Ross <i>et al.</i> (<i>n</i> = 472)	1.0%	2.9%
Clark <i>et al.</i> (<i>n</i> = 548)	3.0%	5.4%
Wilson (<i>n</i> = 488)	0.6%	2.6%

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The optimum treatment of any serious hand injury depends upon early recognition and appropriate referral. This can only be achieved with an understanding of basic hand anatomy.

METHODS

Over a 12-month period all new SHOs in A&E, working in three units in the Oxford region, were asked to complete a brief hand anatomy test. This was undertaken within 1 week of taking up their post (see Appendix 1). The clinical experience of these 40 doctors varied from 12–120 months post-qualification. All replies were assessed by one individual (N.M.M.).

RESULTS

Knowledge of the site of the major nerves in the hand and assessment of their motor and sensory function was good (see Table 2). Appreciation of the situation of the digital nerves (those most commonly injured) was poor with an error rate of 65%.

The knowledge of tendon anatomy in the hand was inconsistent. The role of the deep flexor tendons and the extensor tendons was understood by most doctors. The usefulness of the palmaris tendon as a surface marker for the median nerve was infrequently known. The function and insertion of the superficial flexor tendons to the digits was poorly understood (80% gave an incorrect response).

The descriptive clarity of the terms 'ulnar' and 'radial' as distinct from medial and lateral in referring to hand injuries was not understood (see Questions 2 and 6 in Appendix 1). The average number of incorrect responses was three out of a

Table 2. Results of questionnaire (Appendix 1).

Questions	Percentage correct
<i>Bones</i>	
Name the bones in the finger.	72
<i>Tendons</i>	
What is the function of Flexor Digitorum Profundus?	78
What does Flexor Digitorum Superficialis insert into?	20
What tendon lies over the median nerve?	38
What can be damaged by a penetrating wound to the dorsum of the MCP joint?	78
What is a mallet finger?	85
<i>Nerves</i>	
Shade in the area of the hand supplied by the ulnar nerve.	83
How would you test the motor function of the ulnar nerve?	83
Indicate the site of the median nerve at the wrist.	83
How would you assess a patients ability to oppose the thumb?	90
Draw the course of the ulnar digital nerve in the index finger.	35

possible 11. There was no appreciable difference between the three departments used in the study.

DISCUSSION

This study indicates that a doctor unfamiliar with hand injuries will recognize approximately 80% of tendon or nerve injuries in the hand. The diagnostic rate will be much lower for isolated superficial tendon injuries or digital nerve injuries. We must assume that at least 20%, and in some situations almost 80%, of hand injuries may not be detected at initial attendance.

A hand injury is the most common injury that an A&E SHO will need to examine, assess and manage. In Milton Keynes (45,000 new patients per annum) we have calculated that each SHO will see in the region of 480 patients with a hand injury over a 6-month period.

The majority are soft tissue injuries and are not associated with an open wound. Even in the presence of a laceration the incidence of nerve or tendon injury is low. Therefore, A&E SHOs, during their 6-month tenure, would be expected to see about eight patients who have a tendon or nerve injury.

The principle diagnostic role of the examining A&E doctor is to exclude a serious hand injury. Failure to do this results in inadequate treatment of the injury and may give rise to a medico-legal claim.

A&E departments generate about 5% of all claims received by the defence societies (personal communication, 1990). Missed tendon and nerve injuries account for approximately 9% of this figure. These injuries are not a financial drain on the societies, however, they are time consuming and the suffering experienced by the patients involved is difficult to quantify.

The demands made upon the undergraduate curriculum by diverse specialties have resulted in a significant reduction in the time allocated to the teaching of topographical anatomy. This has been reduced from over 250h per annum to nearer 160h (personal communication). The upper limb is normally covered in one term, roughly 39h. Despite the reduced time allocated, there has been greater emphasis in recent years to integrate the teaching of topographical anatomy with clinical application.

If we are to expect qualified doctors to have a good working knowledge of applied anatomy then we must provide appropriately tailored postgraduate anatomy classes. Successful learning requires reinforcement of previously acquired skills, feed back and time for reflection (Brown & Atkins, 1989).

Over 1.5 million hand injuries are seen annually in A&E departments throughout the country. Most injuries (95%) are treated in the A&E department, the majority by SHOs. This study underlines the need for continuing post-graduate teaching of applied anatomy. The recollection of appropriate anatomical knowledge by hospital doctors is far from ideal. Failure to continue post-graduate education will result in the inevitable 'missed diagnosis' of serious hand injuries at first presentation.

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APPENDIX 1

Hand anatomy questionnaire

- (1) Name the bones in a finger.
- (2) What is this border of the hand called (indicated on diagram by arrow)?
- (3) What is the function of Flexor Digitorum Profundus?
- (4) What does Flexor Digitorum Superficialis insert into?

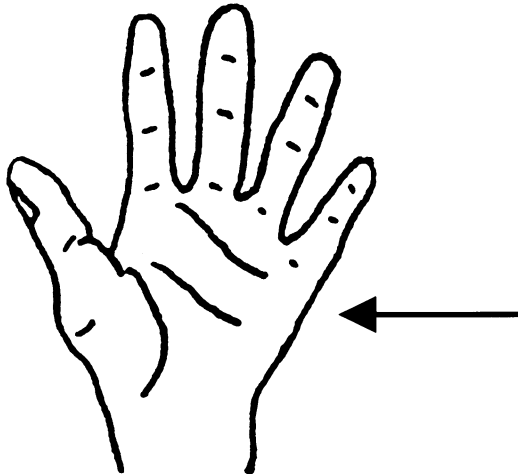


Fig. 1. Diagram of left palm.

- (5) Shade in the area of the hand supplied by the Ulnar nerve.
- (6) Draw the course of the ulnar digital nerve in the index finger.
- (7) How would you test the motor function of the ulnar nerve?
- (8) Indicate, with an X, the site of the Median nerve at the wrist. What tendon lies over it?
- (9) How would you assess a patients ability to oppose the thumb?
- (10) What can be damaged by a penetrating injury to the dorsum of the metacarpophalangeal joint (MCP) joint?
- (11) What is a 'Mallet finger'?