

Physical examination of the foot and ankle by orthopaedic and accident and emergency clinicians

Andy Roche^{*}, Laura Hunter, Nick Pocock, Daniel Brown

The Royal Liverpool and Broadgreen University Hospitals Trust, Prescot, St. Liverpool L7 8XP, United Kingdom

ARTICLE INFO

Article history:

Accepted 16 July 2008

Keywords:

Foot and ankle
Injury
Examination
Anatomical landmarks

ABSTRACT

Our aim was to test the knowledge of clinicians in the Orthopaedic clinic and in the Emergency department of the surface anatomical landmarks that should be examined routinely in the assessment of foot and ankle injuries. A survey of 109 clinicians was conducted. Each participant was asked to palpate six important surface landmarks. Two participants failed to identify even a single landmark. Of 109 assessed only 27% correctly identified all six landmarks. The mean number of landmarks correctly identified by each clinician was 4.1 with a standard deviation of 1.5 and range of 0–6. The knowledge of surface anatomy overall by junior Orthopaedic and Emergency clinicians was found to be very poor. Clinicians are becoming more reliant on potentially unnecessary and expensive imaging investigations. They have neglected the basic art of physical examination based on a sound knowledge of human anatomy. At present, the authors believe that the anatomical teaching that should begin in undergraduate medicine is inadequate.

© 2008 Elsevier Ltd. All rights reserved.

Introduction

It is estimated that each year in the UK, over 300,000 people present to accident and emergency departments with acute ankle sprains. Lateral ligament injuries account for 85% of all ankle sprains.⁵ The majority of patients admitted to emergency departments with ankle sprains undergo radiographic assessment although 15–20% do not have a fracture of the ankle or mid-foot.¹ As a result, the Ottawa foot and ankle rules were developed to attempt to rationalise the use of radiography in the assessment of these injuries.¹⁰ The use of the rules has been shown to have nearly 100% sensitivity for ankle fractures and has reduced the need for foot and ankle X-rays.¹¹ It is important to realise however that the sensitivity of these rules is based on the assumption the clinician has a sound knowledge of human surface anatomy. The purpose of this study was to test that knowledge of clinicians in the Orthopaedic clinic and in the Emergency department of the surface anatomical landmarks, that should be examined routinely in the assessment of common foot and ankle injuries.

Lateral and medial malleolar fractures are most frequently encountered in inversion injuries (supination/external rotation)⁶

and are usually easily palpated as they are prominent bony landmarks. The anterior talo-fibular ligament (ATFL) is the weakest of all the lateral ligaments and most commonly injured¹³ and usually reflects the localised swelling seen in clinical assessment. The proximal fibula may be fractured in pronation and rotatory injuries with associated medial ligament rupture and should be examined routinely.⁴ The base of the 5th metatarsal may be fractured in sudden inversion injuries often associated with lateral ligament injury. Tenderness of the navicular is an indication for radiographic assessment to exclude mid-foot fracture often seen in eversion injuries of the foot.⁸ If these landmarks are not accurately palpated then the injury sustained may be under-estimated or even missed.

Methods

The three most junior authors (AR-specialist registrar in Orthopaedics, LH specialist registrar in Emergency Medicine, NP final year medical student) were observed by the senior author examining uninjured lower limbs to ensure they had knowledge of the surface anatomy of the leg, foot and ankle. Between November 2007 and March 2008, 109 clinicians were asked to participate in the study. All those approached agreed to take part in the study. Participants were recruited from Accident and Emergency Departments and Trauma and Orthopaedic departments from within the Merseyside area. Emergency Nurse Practitioners (ENP),

^{*} Corresponding author at: The Royal Liverpool and Broadgreen University Hospitals Trust, 22 Lowestoft Drive, Liverpool L19 2HD, United Kingdom.

E-mail address: andyroche@hotmail.com (A. Roche).

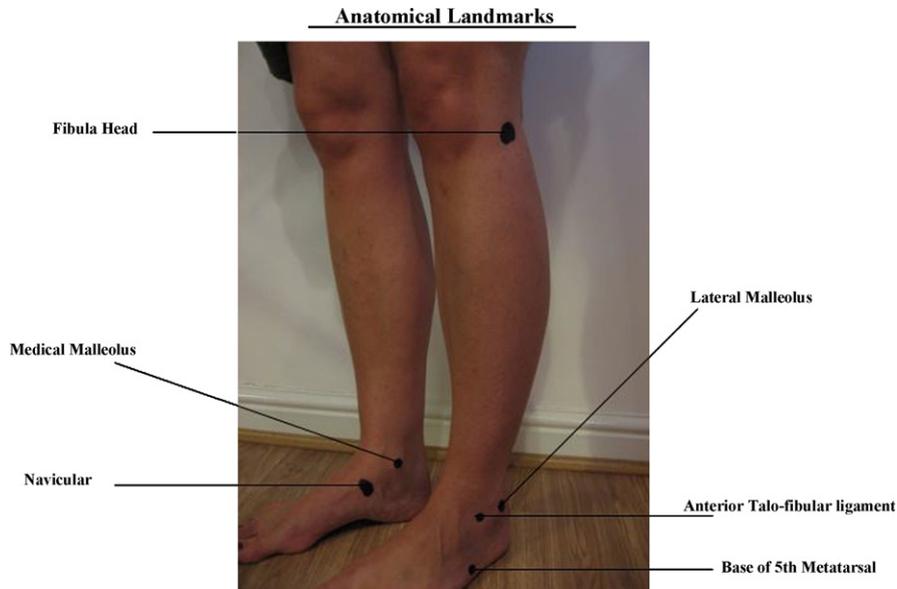


Fig. 1. Anatomical landmarks palpated.

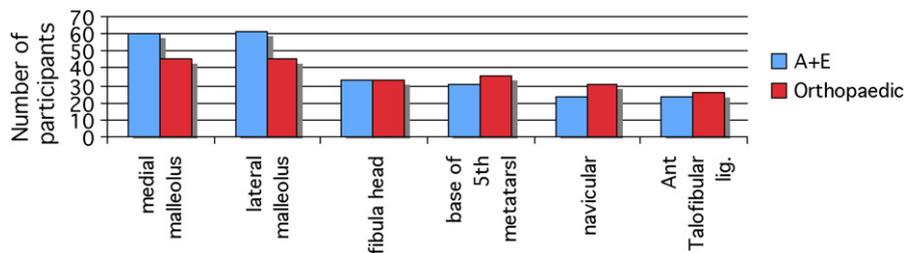


Fig. 2. Landmarks accurately palpated by each group.

Foundation year 2 (F2, 2nd year post-qualification), Specialty training years 1 and 2 (ST1, ST2, 3rd and 4th years post-qualification, respectively) and Specialist registrar (Specialist senior trainees in A+E or Trauma/Orthopaedics) trainees were recruited. Participants were observed examining six anatomical landmarks of the lower limb on one of three uninjured subjects (AR, LH and NP). Two authors, AR and LH supervised the examinations. Each landmark was chosen for their relevance in the assessment of common foot and ankle injuries. The landmarks were the medial malleolus, the lateral malleolus, the head of the fibula, the navicular, the base of the 5th metatarsal and the anterior talo-fibular ligament (ATFL). For each correctly identified landmark the participant was awarded one point (range 0–6). The landmarks are shown in Fig. 1.

Results

Sixty two A+E and 47 Orthopaedic clinicians were recruited. One clinician from each of the Orthopaedic and A+E group failed to identify even a single landmark. Of 109 assessed only 27% correctly identified all six landmarks. The mean number of landmarks correctly identified by each clinician was 4.1 with a standard deviation of 1.5 and range of 0–6.

One hundred and seven clinicians (98%) correctly identified the lateral malleolus, the most consistently identified. The most poorly identified landmark was the ATFL, by only 49 clinicians (45%) followed by the navicular by 54 clinicians (49.5%), Fig. 2. Tables 1 and 2 show the specialty specific results.

Discussion

The knowledge of surface anatomy pertinent to examination of common foot and ankle injuries overall by junior Orthopaedic and Emergency clinicians was found to be very poor and only seems to significantly improve once higher specialty training is reached

Table 1
Orthopaedic scores with number of clinicians and experience level (n = 47).

Score	F2	ST 1	ST 2	SpR
0	1	0	0	0
1	0	0	0	0
2	3	3	2	0
3	3	3	4	0
4	2	2	1	3
5	1	0	2	4
6	0	0	4	9

Table 2
A+E scores with number of clinicians and experience level (n = 62).

Score	ENP	F2	ST 1	ST 2	SpR
0	0	1	0	0	0
1	0	0	0	0	0
2	0	4	2	3	1
3	0	2	5	4	0
4	0	2	2	3	3
5	2	2	2	0	8
6	2	1	0	2	11

(SpR). It was noted that the emergency nurse practitioners performed excellently although only four were assessed. They do however have significantly more and constant exposure to minor injuries than certainly the more junior clinicians assessed. Lateral ligament injuries often result from forces acting on the supinated foot hence injury to the ATFL but 55% of clinicians were unable to identify this structure despite it being a very common site of injury.^{2,12} Poor anatomical knowledge will lead to an inaccurate diagnoses or even mal-treatment of patients, which, in the current climate, could lend the doctor to litigation claims.³ Problem based learning methods have largely replaced traditional didactic lectures and cadaveric dissection in the undergraduate medical curriculum⁷ but there is a fear that students are ill-prepared and deficient in gross anatomical knowledge as a result of this method of teaching.⁹ Clinicians are becoming more reliant on potentially unnecessary and expensive imaging investigations.

Despite the potential for subjectivity and bias in the methodology the authors believe it is sufficient to demonstrate a lacking in anatomical knowledge amongst clinicians.

They have neglected the basic art of physical examination based on a sound knowledge of human anatomy. At present, the authors believe that the anatomical teaching in undergraduate medicine is grossly inadequate.

Conflict of interest

None.

References

- [1] Bachmann LM, Kolb E, Koller MT, Steurer J, ter Riet G. Accuracy of Ottawa ankle rules to exclude fractures of the ankle and mid-foot: systematic review. *BMJ* 2003;326:417.
- [2] Broström L. Sprained ankles. 3. Clinical observations in recent ligament ruptures. *Acta Chir Scand* 1965;130:560–9.
- [3] Cahill DR, Leonard RJ, Marks SC. Standards in health care and medical education. *Clin Anat* 2000;13:150.
- [4] Duchesneau S, Fallat LM. The Maisonneuve fracture. *J Foot Ankle Surg* 1995;34:422–8.
- [5] Ferran NA, Maffulli N. Epidemiology of sprains of the lateral ankle ligament complex. *Foot Ankle Clin* 2006;11:659–62.
- [6] Lauge-Hansen. Fractures of the ankle: combined experimental surgical and experimental roentgenologic investigations. *Arch Surg* 1950;60:957–85.
- [7] Older J. Anatomy: a must for teaching the next generation. *Surgeon* 2004;2: 79–90.
- [8] Pigman EC, Klug RK, Sanford S, Jolly BT. Evaluation of the Ottawa clinical decision rules for the use of radiography in acute ankle and midfoot injuries in the emergency department: an independent site assessment. *Ann Emerg Med* 1994;24:41–5.
- [9] Prince KJ, Van De Wiel M, Scherpbier AJ, Can Der Vleuten CP, Boshuizen HP. A qualitative analysis of the transition from theory to practice in undergraduate training in a PBL-medical school. *Adv Health Sci Educ Theory Pract* 2000;5:105–16.
- [10] Stiell IG, Greenberg GH, McKnight RD, et al. A study to develop clinical decision rules for the use of radiography in acute ankle injuries. *Ann Emerg Med* 1992;21:384–90.
- [11] Multicentre Ankle Rule Study Group, Stiell I, Wells G, Laupacis A, et al. Multicentre trial to introduce the Ottawa ankle rules for use of radiography in acute ankle injuries. *BMJ* 1995;311:594–7.
- [12] van Dijk CN, Lim LS, Bossuyt PM, Marti RK. Physical examination is sufficient for the diagnosis of sprained ankles. *J Bone Joint Surg Br* 1996;78:958–62.
- [13] van Dijk CN. Management of the sprained ankle. *Br J Sports Med* 2002;36: 83–4.