ORIGINAL ARTICLE

Injuries initially misdiagnosed as sprained wrist (Beware the sprained wrist)

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Objectives: To describe the injuries misdiagnosed as a sprain of the wrist and to determine the approximate incidence of misdiagnosis in patients diagnosed as having a sprain of the wrist.

Methods: All diagnostic errors in an accident and emergency (A&E) department were noted on a computerised database. Injuries initially misdiagnosed as wrist sprain are described and compared with the number of diagnoses of sprained wrist on the A&E department computer.

Results: 57 injuries initially diagnosed as a sprained wrist had a different diagnosis (1.76% of all diagnoses of sprained wrists). This is an underestimate of the true incidence of diagnostic error. Forty two per cent of the misdiagnoses were of greenstick or torus fractures of the distal radius.

Conclusions: Training for junior doctors in A&E departments should be improved—especially training in radiological interpretation. Other methods of preventing diagnostic errors by misreading of radiographs, for example, more hot reporting of radiographs by radiologists or radiographers should be considered.

In a series of 934 patients with diagnostic errors,¹ it was noted that the second most common initial diagnosis in patients who had a diagnostic error made was sprained wrist. This paper analyses these patients. It is recognised that a number of injuries including fractures of the radius and scaphoid may be initially misdiagnosed as a sprained wrist but there is little in the medical literature to indicate the frequency of this type of misdiagnosis. By determining the number of patients diagnosed as having a sprained wrist in the department during the study period it is possible to calculate an approximate incidence of diagnostic error.

METHOD

A database of diagnostic errors occurring in an accident and emergency (A&E) department between 1 August 1992 and 6 August 1996 has been described elsewhere.¹ An attempt was made to note all diagnostic errors in an A&E department over a four year period. Details of all diagnostic errors were given to one A&E consultant who entered the information into a computerised database. As part of that study the original diagnosis made by the A&E doctor was noted. Details were obtained from the database of all patients with diagnostic errors whose initial diagnosis was “sprained wrist”.

The total number of patients with a diagnosis of sprained wrist was obtained from the A&E computer. This was the South West Regional A&E computer system with information written by the A&E doctors entered into the computer by clerks. Diagnoses accepted as sprained wrist included “ligamentous injury of the wrist” and “strained wrist” (excluding any diagnosis that indicated strained tendons)

RESULTS

Fifty seven injuries (6.1% of all diagnostic errors) were initially wrongly diagnosed as sprained wrists. These are shown in table 1.

Fifty two (91%) were abnormalities missed on radiograph. In three cases wrong radiographs contributed to this: two fractured scaphoids were missed on wrist radiographs but might have been more easily seen had scaphoid views been taken and a fractured terminal phalanx was missed on a

Table 1 Injuries initially misdiagnosed as sprained wrist

Wrist injuries	
Fracture distal radius	8
Fracture distal radius and chip # triquetrum	1
Greenstick # distal radius	23
Greenstick # distal radius and # capitate	1
Epiphyseal # distal radius	3
Fracture radial styloid	3
Avulsion # distal radius	1
Fracture scaphoid	6
Fracture scaphoid tubercle	3
Chip fracture triquetrum	2
Flake # lunate and osteochondritis	1
Fracture pisiform	1
Intercarpal ligament rupture	1
Associated injuries	
Fracture radial neck	1
Fracture TP thumb	1
Incidental findings	
Non-union # scaphoid	1
	57

radiograph of the hand and wrist but would have been seen better had the digit been radiographed. In another case, poor quality films were a contributory cause to an abnormality being missed. In four cases (7%) the abnormality was missed because of failure to radiograph. One case was missed because the patient was discharged after a set of normal scaphoid radiographs and was not followed up. Later radiographs revealed a fractured scaphoid.

During the period 1 August 1992 to 31 July 1996, 243 437 new patients were seen in the department. Altogether 3230 patients (1.3%) had a diagnosis made of sprained wrist. In those patients initially diagnosed as having a sprained wrist the incidence of misdiagnosis is 1.76%. Patients diagnosed as having a sprained wrist are more likely to have a diagnostic error than those not diagnosed as having this injury ($\chi^2 = 160$, $p < 0.0001$).

DISCUSSION

In this series nearly 2% of all patients diagnosed as having a sprain of the wrist had a more significant injury and this figure is statistically significantly higher than patients with other diagnoses. As discussed elsewhere,¹ no series of diagnostic errors can be complete and so the true incidence of diagnostic error is likely to be much higher.

Forty two per cent of these diagnostic errors were greenstick or torus fractures of the distal radius, either as an isolated injury or (in one case) with a fracture of the capitate. Other common diagnostic errors were other fractures of the distal radius and fractures of the scaphoid.

Others have found that the wrist is a common site for misinterpreting radiographs in an A&E department. One study showed an incidence of misinterpretation (including false positives) of 9.3% with a clinically important false negatives in 3.4% of all wrist radiographs. Altogether 8.8% of positive radiographs were missed.² Another study³ showed that 9.9% of 1276 wrist radiographs were misinterpreted (including false positives) and that this was the second most important area for radiological misinterpretation. Altogether 2.1% had significant important errors, the commonest of which were fractures of the scaphoid (11), undisplaced greenstick fractures (10), Colles fractures (2) and avulsion fractures (2). Fractures of the scaphoid are not uncommonly overlooked on a radiograph. In a series of 222 patients with a scaphoid fracture, Leslie and Dickson⁴ found that 3% were missed by the casualty officer and Young *et al*⁵ found that of 85 patients referred with a clinical scaphoid fracture (defined as recent wrist trauma with tenderness over the scaphoid but normal wrist radiograph), five (5.9%) actually had a fracture visible on the initial radiographs.

There was one missed rupture of an intercarpal ligament causing scapholunate dissociation visible on the original plain radiographs. It is possible that there might have been more such injuries but clenched fist radiographs were not performed.⁶

The majority of errors are made by senior house officers (SHOs)¹ who currently see most of the patients. Almost by definition SHOs are inexperienced. Diagnostic errors could be reduced but this would require more resources for staffing and

training. Doctors working in A&E departments should receive training in radiological interpretation and should, ideally, be tested on their ability to do so accurately before they are allowed to discharge patients. However, senior and middle grade staffing levels in A&E departments do not allow this and radiology staffing levels do not allow 24 hour reporting of radiographs by radiologists. Radiographers can assist in interpreting radiographs.⁷ Among competing demands on the health service, improvements to A&E services will be judged by risk management. I have presented no evidence to suggest that patients have come to any harm as a result of these diagnostic errors. Torus fractures of the distal radius do not require plaster immobilisation⁸ and the incidence of non-union in fractures of the scaphoid is not increased by failure to immobilise the wrist initially.⁹ However, errors have the potential for causing harm, loss of patient confidence, complaint and legal action. They are also inefficient for the hospital as patients need to be recalled for the correct diagnosis to be explained to the patient and correct treatment to be given; complaints need to be investigated and general practitioners need to be written to. Although there is no evidence in this group of patients that outcomes have been adversely affected, efforts should be made to improve diagnostic accuracy in A&E departments.

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