Figure 4 AP (A) and lateral (B) views of right wrist showing trans-styloid radio-carpal fracture-dislocation.

Summary of the five reported cases

Patient	Age	Sex	Side	Diagnosis	Delay in treatment
1	32	M	Left	Trans-styloid perilunate dislocation	2 days
2	62	F	Right	Trans-scaphoid perilunate dislocation	10 days
3	24	M	Right	Trans-scaphoid perilunate dislocation	7 days
4	40	M	Right	Perilunate dislocation	7 days
5	42	M	Right	Trans-scaphoid perilunate dislocation	21 days

cases the characteristic radiological appearances were initially missed by the A&E staff. There was no routine reporting of trauma x rays by radiologists on patients referred for orthopaedic follow up, and two of the cases were also missed on first attendance at the orthopaedic clinic. Early accurate diagnosis spares the patient unnecessary discomfort and allows the best chance of avoidance of median nerve dysfunction.³ It also permits conservative

management when appropriate, but delay necessitates operative intervention and may compromise eventual functional outcome⁴ and initiate the spiral towards late salvage surgery. We therefore recommend this method of analysis of all wrist x rays and have found it very effective in establishing the correct diagnosis. The routine reporting of all A&E x rays by an experienced radiologist may also be of value as an additional fail safe measure.

- 1 Barton JR. Views and treatment of an important injury to the wrist. *Medical Examiner* 1838;1:365.
- 2 Herzberg G, Comtet JJ, Linscheid RL, Amadio PC, Cooney WP, Stalder J. Perilunate dislocations and fracture dislocations: a multicenter study. *J Hand Surg* 1993;19A:768-9.
- 3 Hill NA. Fractures and dislocations of the carpus. *Orthop Clin North Am* 1970;1:275-84.
- 4 Inoue G, Tanaka Y, Nakamura R. Treatment of trans-scaphoid perilunate dislocations by internal fixation with the Herbert screw. *J Hand Surg* 1990;15B:449-54.

Hope Hospital,
Eccles Old Road,
Salford M6 8HD,
United Kingdom:
University Department
of Emergency
Medicine
A P. Gleeson

Division of
Orthopaedics
C Brookes
G Brydon

Correspondence to:
Mr A Gleeson,
Accident and Emergency
Department, Royal Infirmary
of Edinburgh, Lauriston
Place, Edinburgh EH3 9YW.

Scapholunate instability – a spectrum of pathology

A P Gleeson, C Brookes, G Brydon

Abstract

Five cases of scapholunate instability are reported. The condition is commonly misdiagnosed in accident and emergency de-

partments. The importance of a complete clinical assessment of the suspected scaphoid injury and the need to measure the scapholunate distance and the scapho-

lunate angle on the radiographs is stressed.

(*J Accid Emerg Med* 1996;13:216–219)

Key terms: scapholunate instability; assessment; diagnosis

Scapholunate instability is uncommon and is often misdiagnosed as a “bad sprain” at first presentation.^{1 2} The clinician must have a high index of suspicion for this condition when significant wrist pain and swelling follow an acute injury, as the diagnosis may not be obvious from standard radiographs. Failure to detect the condition early results in disability and secondary osteoarthritis of the wrist joint.^{3 4} We present five cases with a review of the literature.

Case reports

CASE 1

A 73 year old woman presented to accident and emergency (A&E) after she fell onto her outstretched right hand. Examination revealed swelling over the dorsoradial aspect of the wrist, with distinct tenderness over the dorsum of the scaphoid and in the anatomical snuffbox. A PA radiograph showed scapholunate dissociation (fig 1), and this was confirmed clinically by a positive “scaphoid shift test”. In view of her age the patient was managed conservatively in a scaphoid plaster of paris (POP) for six weeks. Two months later she had good grip strength and minimal symptoms.

CASE 2

A 37 year old man sustained a right wrist injury when he punched someone. He presented to A&E 16 days after this incident as his wrist was still swollen and painful. X rays revealed a

fracture of the proximal pole of the scaphoid (fig 2A) and he was treated with a scaphoid POP for eight weeks. Following this he complained of persistent pain and stiffness in the wrist for several months. A clenched fist x ray revealed a scapholunate dissociation and apparent non-union of the fracture (fig 2B), and thus he underwent exploration of the joint. At this point the fracture had united, but there was a complete disruption of the scapholunate ligament. This was repaired, but continuing pain and loss of function necessitated a limited wrist arthrodesis.

CASE 3

A 21 year old woman injured her right hand and wrist in a fall and complained of bruising and swelling of the thenar eminence. Standard scaphoid x rays were normal but in view of tenderness in the anatomical snuffbox she was placed in a scaphoid POP. On review 10 days later it was noted that there was some painless scapholunate instability, and a mild scapholunate diastasis was evident on a clenched fist view. As her symptoms originated from the thenar eminence as opposed to the scaphoid area, a magnetic resonance scan was performed. This showed the scapholunate diastasis but no evidence of recent injury in that area. The patient could not recall any significant wrist injury in the past and was therefore diagnosed as having a congenital ligament laxity.

CASE 4

A 90 year old woman injured her right wrist when she fell onto her outstretched hand. Examination revealed dorsal wrist swelling and scaphoid tenderness, and the x rays were interpreted at that time as being normal apart from an erosive arthropathy. She was treated with a POP backslab and at review five days later a scapholunate dissociation and a fracture of the tubercle of the scaphoid were diagnosed (fig 3). In view of her advanced years she was managed conservatively in a scaphoid POP splint for six weeks.

CASE 5

A 90 year old woman complained of acute left wrist pain after she pushed up to a standing position from an armchair. On examination, swelling and tenderness indicated a scaphoid injury and x rays showed rotatory subluxation of the scaphoid with a scapholunate angle of 90 degrees (fig 4). Again, in view of her age, she was treated with a scaphoid POP.

Discussion

Scapholunate dissociation has been described in rheumatoid arthritis,^{5–7} spastic paraparesis,¹ and following trauma to the wrist.^{8 9} Congenital ligament laxity can cause symptomatic^{10–12} or asymptomatic¹³ dissociation. An allied condition, rotatory subluxation of the scaphoid, is the result of additional rupture of the volar radiocarpal ligament, causing further instability and a volar tilt of the distal pole of the scaphoid.¹¹

The clinical signs of acute scapholunate ligament rupture are very similar to those of a

Figure 1 Scapholunate dissociation.

Figure 2 (A) Fracture of proximal pole of scaphoid. (B) Increased scapholunate distance with clenched fist.

scaphoid fracture, but the “scaphoid shift test”¹⁴ is diagnostic of the former. This test, otherwise known as Watson’s test, is a very sensitive clinical indicator of scapholunate instability. It is performed with the patient’s elbow resting on a table with the forearm held vertically. The operator’s thumb is placed over the patient’s scaphoid tubercle while his fingers wrap around the dorsum of the wrist. The patient’s hand is then put into ulnar deviation and slight dorsiflexion. With the thumb pressing firmly on the scaphoid tubercle, the wrist is moved into radial deviation and volar flexion. This manoeuvre, in the normal individual, tilts the scaphoid in a volar direction, but if there is an acute disruption of the scapholunate ligament the scaphoid will be displaced dorsally by the operator’s thumb, resulting in a painful palpable “thunk”.

Twelve per cent of the population have normal hypermobile scaphoids due to inherent ligament laxity,¹⁵ and differentiation between these and acute ruptures should be clear. The presence of swelling, scaphoid tenderness, and a painful positive Watson’s test are indicative

Figure 3 Scapholunate dissociation with erosive arthropathy.

Figure 4 (A) Rotatory subluxation of the scaphoid. (B) Scapholunate angle of 90 degrees.

Figure 5 (A) Normal alignment on lateral view. (B) Increased scapholunate angle with rotatory subluxation of the scaphoid.

of an acute ligament disruption. If doubt remains as to whether a positive Watson's test is due to congenital laxity or to an acute rupture, assessment of the contralateral wrist is required. An increased scapholunate distance and a positive Watson's test in the uninjured wrist makes the diagnosis of an acute rupture less likely.

Radiographs provide the diagnosis of scapholunate dissociation in the majority of cases. A scapholunate gap of 2 mm on the posteroanterior (PA) x ray is normal, 2–4 mm is suggestive, and greater than 4 mm (Terry Thomas sign) is diagnostic of scapholunate dissociation.¹⁶ Rotatory subluxation of the scaphoid is recognised by a foreshortened appearance of the scaphoid and a ring sign (due to the plane of the distal pole being parallel to the x ray beam) on the PA film, while dorsal angulation of the lunate and volar tilt of the scaphoid result in an increased scapholunate angle on the lateral film. This angle is calculated by drawing a line through the centre of the distal and proximal poles of the scaphoid, that is, the longitudinal axis, and measuring its angle of intersection with a line drawn through the midpoints of the proximal and distal concavities of the lunate (fig 5). The normal range is from 30 to 60 degrees with a mean of 47 degrees.¹¹

In some cases scapholunate dissociation may not be evident on routine x rays despite a positive Watson's test. A clenched fist view in supination, a manoeuvre which drives the capitate between the scaphoid and the lunate, may reveal the instability by increasing the scapholunate distance, but it is often restricted by pain. A tangential PA view with 20 degrees of ulnar deviation of the wrist and hand also demonstrates dissociations not seen on routine radiographs.¹⁷ Other useful diagnostic tools are cineradiography,^{18–20} magnetic resonance imaging, and arthroscopy.

Scapholunate dissociation and rotatory subluxation of the scaphoid are particularly

difficult to treat because the majority of cases are detected late when the intercarpal ligaments have fibrosed. If detected early the treatment of choice is open repair of the ruptured ligaments and K-wire fixation of the scaphoid.^{21–22} Cases detected after the acute phase which have no radiological evidence of secondary arthritis have been treated with ligament reconstruction using tendon grafts, but the results up to now have been disappointing.²³ Late cases with degenerative arthritis require limited wrist arthrodesis,²⁴ wrist implantation arthroplasty, or proximal row carpectomy.²⁵

Correct clinical and radiological assessment of wrist injuries is essential in A&E so that subtle wrist injuries are not missed.²⁶ To avoid the significant morbidity associated with the late detection of scapholunate instability those patients who have clinical signs of a scaphoid injury and normal scaphoid x rays should have the "scaphoid shift" test performed. If this is positive, a clenched fist radiograph with the wrist in supination should be performed and a senior orthopaedic opinion sought.

- 1 Seballd JR, Dobyns JH, Linscheid RL. The natural history of collapse deformities of the wrist. *Clin Orthop Related Res* 1974;104:140–8.
- 2 Frankel VH. The Terry-Thomas sign [letter]. *Clin Orthop Related Res* 1977;129:321–2.
- 3 Hudson TM, Caragol WJ, Kaye JJ. Isolated rotatory subluxation of the carpal navicular. *Am J Roentgenol* 1976;126:601–11.
- 4 Kleinman WB, Steichen JB, Strickland JW. Management of chronic rotatory subluxation of the scaphoid by scapho-trapezio-trapezoid arthrodesis. *J Hand Surg* 1982;7A:125–36.
- 5 Collins LC, Lindsy MD, Sharp JT, Moreland J. Malposition of carpal bones in rheumatoid arthritis. *Radiology* 1972;103:95–8.
- 6 Cope R. Rotatory subluxation of the scaphoid. *Clin Radiol* 1984;35:495–501.
- 7 Cope R, Salmon AP. Bilateral scapholunate diastasis. *Ann Radiol* 1987;30:218–21.
- 8 Fisk GR. Carpal instability and the fractured scaphoid. *Ann R Coll Surg Engl* 1970;46:63–76.
- 9 Crittenden JJ, Jones DM, Santarelli AG. Bilateral rotational dislocation of the carpal navicular. *Radiology* 1970;94:629–30.
- 10 Jackson WT, Protas JM. Snapping scapholunate subluxation. *J Hand Surg* 1981;6A:590–4.
- 11 Linscheid RL, Dobyns JH, Beabout JW, Bryan RS. Traumatic instability of the wrist. Diagnosis, classification and pathomechanics. *J Bone Joint Surg Am* 1972;54A:1612–32.
- 12 Hergenroeder PT, Penix AR. Bilateral scapholunate dissociation with degenerative arthritis. *J Hand Surg* 1981;6A:20–2.
- 13 Vance RM, Gelberman R, Braun R. Chronic bilateral scapholunate dissociation without symptoms. *J Hand Surg* 1979;4A:178–80.
- 14 Watson HK, Ashmead D, Makhlof MV. Examination of the scaphoid. *J Hand Surg* 1988;13A:657–60.
- 15 Watson H, Ottoni E, Pitts EC, Handal AG. Rotatory subluxation of the scaphoid: a spectrum of instability. *J Hand Surg* 1993;18B:62–4.
- 16 Gilula LA, Weeks PM. Post-traumatic ligament instabilities of the wrist. *Radiology* 1978;129:641–51.
- 17 Moneim MS. The tangential posteroanterior radiograph to demonstrate scapholunate dissociation. *J Bone Joint Surg Am* 1981;63A:1324–6.
- 18 Arkless R. Cineradiography in normal and abnormal wrists. *Am J Roentgenol* 1966;96:837–44.
- 19 Nielsen PT, Hedeboe J. Post-traumatic scapholunate dissociation detected by wrist cineradiography. *J Hand Surg* 1984;9A:135–8.
- 20 Mayfield JK. Patterns of injury to carpal ligaments: a spectrum. *Clin Orthop Related Res* 1984;187:36–42.
- 21 Howard FM, Fahey T, Wojcik E. Rotatory subluxation of the navicular. *Clin Orthop Related Res* 1974;104:134–9.
- 22 Green DP, O'Brien ET. Open reduction of carpal dislocations: indications and operative techniques. *J Hand Surg* 1978;3A:250–65.
- 23 Palmer AK, Levinsohn EM, Kuzma GR. Arthrography of the wrist. *J Hand Surg* 1983;8:15–23.
- 24 Watson HK. Limited wrist arthrodesis. *Clin Orthop Related Res* 1980;149:126–36.
- 25 Campbell RD, Lance EM, Yeoh CB. Lunate and perilunate dislocations. *J Bone Joint Surg Br* 1964;46B:55–72.
- 26 DaCruz D, Dias J. Traumatic wrist pain. *Hosp Update* 1990;16:665–75.