Management of suspected scaphoid fractures in accident and emergency departments – time for new guidelines

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ABSTRACT

INTRODUCTION The objectives of this work were to assess the clinical knowledge of clinicians in the accident and emergency (A&E) departments in England & Wales and evaluate the current trend for the acute management of radiologically normal, but clinically suspected, fractures of the scaphoid.

SUBJECTS AND METHODS We conducted a telephone survey on 146 A&E senior house officers (SHOs) in 50 different hospitals. This survey assessed the clinicians' experience, their clinical and radiological diagnostic methods, and their initial treatment of suspected scaphoid fractures.

RESULTS The majority (55.8%) of SHOs performed only one clinical test to diagnose suspected scaphoid fractures. Overall, 41% were unable to cite the number of the radiographic views taken and only 10% of departments have direct access to further radiological investigation. There is wide variation in the early treatment of this injury, with the scaphoid cast used most commonly (46%). The majority of SHOs (89%) were unable to describe the features of immobilisation. The mean follow-up period was 10 days, and 53% of cases were followed-up by the senior staff in A&E. Of SHOs, 54% were not aware of any local guidelines for the management of suspected scaphoid fractures in their departments, and 92% were not aware of the existence of the 1992 British Association for Accident and Emergency Medicine (BAEM) guidelines.

CONCLUSIONS The clinical knowledge and the management of suspected scaphoid fractures in A&E are unsatisfactory. We, therefore, suggest that the dissemination of up-to-date guidelines could help to educate clinicians to provide better care to the patients.

KEYWORDS

Scaphoid – Suspected fractures – Fracture management – Guidelines

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The scaphoid is the most common carpal bone to be injured,¹ and this injury occurs most frequently in young men (85%) between 15 and 29 years old.² Typically, scaphoid injury accounts for 1 in 10,000 attendances at Accident and Emergency (A&E) departments in the UK annually.³ It is imperative to make an early diagnosis in patients with scaphoid fractures in order to avoid complications such as pseudarthrosis, avascular necrosis and non-union.⁴ Most scaphoid fractures are diagnosed with difficulty by examination of radiographs, and the subsequent management is straightforward.⁵ However, it is known that some scaphoid fractures may be imperceptible on initial radiographs^{5–7} due to the unique shape and position of the scaphoid in the carpus.⁸ Furthermore, there

is a high interobserver variability in the interpretation of radiographs of suspected scaphoid fractures.^{8,9}

The clinician is faced with diagnostic and management dilemmas: to identify patients with scaphoid fractures, in the absence of radiographic evidence, without immobilising the majority who do not.^{7,10} In 1992, the British Association for Accident and Emergency Medicine (BAEM) issued guidelines for the management of suspected scaphoid fractures. However, there still remains confusion and controversy; consequently, there is a wide variation in the management of suspected scaphoid fractures in hospitals across the UK. We have conducted a survey to investigate current management protocols for suspected scaphoid fractures, and to assess the level of clinical knowledge among clini-

Table 1 The questions asked to the A&E SHOs

Clinical experience	How long have you worked in an A&E department in total? How many months' experience have you had in orthopaedics and trauma? Are there local guidelines for management of suspected scaphoid fractures? Are you aware of the 1992 BAEM guidelines?
Diagnostic examination	What clinical test(s) would you perform to diagnose a scaphoid fracture? If you perform more than one test, name the most sensitive and/or specific test(s)?
Radiological investigation	How many radiographic view(s) is/are taken in your department? Name the view(s) taken Do you have access to other radiological investigation(s) in your department?
Early treatment	Describe the method(s) of treatment for suspected scaphoid fracture in your department What is the typical length of follow-up? Who usually performs the follow-up?

cians who deal with the initial presentation of this injury, mainly the senior house officers (SHOs) in A&E departments.

Subjects and Methods

A telephone questionnaire survey was conducted on 146 SHOs on duty at A&E departments in 50 different hospitals (2–3 SHOs per hospital) in England and Wales. We asked the interviewees a set of questions in relation to their clinical experience, their diagnostic methods and radiological investigations used, and their initial treatment of suspected scaphoid fractures. A set of questions asked is shown in Table 1.

Figure 1 Number of clinical test(s) performed by the SHOs in diagnosing scaphoid fractures.

Results

Clinical experience

A total of 120 SHOs (71 male, 49 female) participated in this survey. Twenty-six SHOs refused to take part, the majority due to time constraints. On average, the SHOs had 6.3 months of A&E experience (range, 2–24 months). Twenty had worked in orthopaedic and trauma units, and the mean experience was 7 months. SHOs from 23 of the 50 A&E departments were aware of local guidelines for the management of suspected scaphoid fractures in their departments, whereas SHOs from 27 A&E departments reported either absence or uncertainty of the existence of local guideline, respectively. A significant majority of SHOs (92%) were unaware of the 1992 BAEM guidelines.

Diagnostic examination

The clinical test to elicit tenderness in the anatomical snuffbox (ASB) was the most common test performed (100%; Table 2). For the majority (55.8%), this was the only clinical test performed (Fig. 1). Notably, 75% of SHOs considered this test to be the most sensitive and specific test for diagnosis of a scaphoid fracture (Table 2). None of the SHOs suggested that two or more tests in combination would increase diagnostic accuracy for these injuries.

Radiological investigation

Forty-nine SHOs (40.8%) were able to cite the number of radiograph views taken in their departments, with 4 views taken on average (range, 2–5 views). However, none was able to name all the views taken. The majority (79.2%) named anteroposterior and lateral views as the only two that they could remember from the scaphoid series. Only 5 of the 50 departments had access to further radiological

Table 2 Diagnostic clinical examinations performed, and the most sensitive or specific one mentioned by the SHOs

Clinical test	SHOs performing test	Most sensitive specific test
Anatomical snuffbox tenderness	100%	75%
Scaphoid compression test	24%	9.2%
Scaphoid tubercle test	15%	2.5%
Range of thumb movement	7%	–
Range of wrist movement	7%	–
Table press test	< 1%	–
Pain on pronation and ulnar deviation	< 1%	–

Of the SHOs surveyed, 13.3% were not able to state which was the most sensitive or specific test for diagnosing scaphoid fractures.

investigations. In all, bone scintigraphy was the most likely further investigation suggested, which was normally only available upon request by senior A&E clinicians.

Early treatment

There was wide variation in the types of treatment prescribed for radiologically normal but clinically suspect scaphoid fractures (Fig. 2). Surprisingly, 89% of SHOs were unable to describe the features of immobilisation, and 65% had never seen a scaphoid cast. This included 10 of the 55 SHOs who normally prescribe this cast. The mean period till follow-up was 10 days (range, 1–14 days) after the initial A&E consultation (Table 3).

Discussion

Fracture of the scaphoid bone is the most common injury of the carpal bones (51–90%) and represents 2–7% of all fractures.^{8,11–15} In 1992, the Academic Committee of the BAEM produced clinical guidelines for good practice in the management of suspected scaphoid fracture in order to provide accurate diagnosis and to avoid long-term morbidity.

Diagnostic examination

The BAEM recommended clinical examination for signs of tenderness over the anatomical snuffbox (ASB), the scaphoid compression test (SCT), the scaphoid tubercle test (STT) and assessment of pain over the ASB on pronation and ulnar deviation of the affected wrist. However, when Waizenegger *et al.*⁵ examined 52 patients with either proven or suspected scaphoid fractures, they concluded that none

Figure 2 Type of treatment prescribed by the SHOs.

of the 11 clinical tests used were reliable. Although ASB tenderness has always been advocated as the cardinal sign of a scaphoid fracture, Grover¹² found it to be only 29% specific. The reported sensitivity and specificity of other clinical tests are also highly variable. For example, whereas Grover¹² found the SCT to be 100% sensitive and 80% specific, Esberger¹⁴ showed that it only had sensitivity of 71% and specificity of 22%. On the other hand, Freeland¹⁵ found that the STT had a sensitivity of 87% and specificity of 57%, which notably, is more specific than the widely accepted ASB tenderness test. Pain over ASB on pronation followed by ulnar deviation of the affected wrist also gave a specificity of only 52%.¹⁶ Parvizi *et al.*,¹⁰ in a prospective study involving 215 patients with suspected scaphoid fractures, showed that clinical signs of ASB tenderness, the STT and the SCT had low specificity, 19%, 30% and 48%, respectively, when used alone. However, combination of these three clinical tests within the first 24 h increased the specificity to 74%.

Taken together, these studies suggest that clinical signs are poor indicators of scaphoid fractures, particularly when

Table 3 Grade/specialty of doctors reviewing the patients for follow-up for suspected scaphoid injuries patients

Follow-up clinician	Percentage (n) of patients referred
A&E senior staff	53.3% (64)
Orthopaedic surgeon	43.3% (52)
Hand surgeon	3.3% (4)

used alone. Therefore, it is of concern that the majority of the SHOs surveyed performed only a single clinical test before immobilising patients. Indeed, immobilisation based on ASB tenderness alone has been shown to lead to over-treatment of 85% of patients with acute wrist injuries.¹⁰

Radiological investigation

Given that clinical assessments are unreliable, radiological investigation is, therefore, important for diagnosing these fractures. The BAEM has recommended four scaphoid views, and generally it has been suggested that a second set of radiographs should be taken about 2 weeks later, as resorption around the fracture line makes fractures more apparent.¹⁷ However, the radiographic interpretation of the suspected scaphoid fractures has not always been straightforward. First, the incidence of false-negative initial radiographs varies between 1% and 16%, and occasionally an observer may diagnose a 'fracture' where the scaphoid is intact.^{5,7,10,18–21} Second, there is also low interobserver agreement beyond chance.^{9,18} Finally, the value of the second set of radiographs taken at a later date has been doubtful: the sensitivity of the scaphoid X-ray series decreased from 64% in the first-day radiographs to 30% in the follow-up radiographs.²² It is only a small minority²³ or none⁶ of suspected scaphoid fractures became visible radiologically after a period of immobilisation, suggesting that repeat radiographs after 2–3 weeks do not necessarily lead to improved diagnostic accuracy.⁷

As a result, early bone scintigraphy has been recommended to increase the accuracy of diagnosis of scaphoid fractures^{18,24–27} as its sensitivity approaches 100%,^{25,27} and specificity 98%.²² However, bone scintigraphy is expensive, and the question as to when to perform bone scintigraphy also remains controversial.^{11,24,28}

In our survey, only 10% of the A&E departments had direct access to bone scans. Most clinicians would repeat the radiographs even at second follow-up, and bone scanning is generally not considered until 3–4 weeks after initial injury. The delay in providing an accurate diagnosis by appropriate investigation at an early stage results not only in the unnecessary immobilisation of patients for prolonged periods of time, but might also delay the appropriate treatment for other serious injuries. Indeed, 33–48% of patients presenting with clinically suspected scaphoid fractures showed fractures at sites other than scaphoid on bone scintigraphy.^{26,28}

Early treatment and duration of immobilisation

The traditional method of management, which is also recommended by the BAEM, is to immobilise all suspected scaphoid fractures in a scaphoid cast until further review.^{17,20,29} However, continued immobilisation without a definitive diagnosis may extend over several weeks, during

which the patient is unable to live and work normally. Recent studies have shown that the incidence of proven scaphoid fractures from clinically suspected scaphoid fractures is only 2–12%^{2,3,15,19} and, therefore, the need to treat all patients in full scaphoid cast is questionable. DaCruz *et al.*¹⁹ demonstrated that by resting all suspected scaphoid injuries in a broad arm sling initially and re-assessing them within a week, the number of patients that required cast immobilisation was significantly reduced. An alternative is to use a supportive bandage with careful follow-up, which has been shown to make no difference in wrist function compared with cast immobilisation.³⁰ In fact, with the use of supportive bandage, the average time of treatment was lower, as was the average sick leave for manual workers.

One may argue that adopting such an approach would occasionally delay the definitive treatment of this injury. However, Langoff and Anderson³¹ showed that a delay of up to 4 weeks in the diagnosis of scaphoid fractures makes little or no difference to the long-term prognosis. Most of these fractures are Class A fractures, according to the McLaughlin classification,³² where the fractures are internal, incomplete, and substantially surrounded by an intact or almost intact shell of cartilage and bone. Such fractures are, therefore, likely to heal under most circumstances. Cooney *et al.*³³ reported that only 2 non-unions occurred out of 32 undisplaced scaphoid fractures – one had a treatment delay of 6 weeks and the second patient had an associated Colles' fracture that required wrist immobilisation in flexion and ulnar deviation for 8 weeks. There is, therefore, a strong argument against immobilising patients with clinically suspected scaphoid fractures until a definitive diagnosis can be provided. Most published studies have focused on the treatment of and complications for established scaphoid fractures, but none on occult fractures. This raises important questions as to whether initial occult fractures should be recognised as a different entity from other scaphoid fractures, and they may not need to be managed according to conventional treatment protocols.

Conclusions

Scaphoid fractures attract particular interest in adults due to their notoriety for non-union and avascular necrosis. As a result, the diagnosis and treatment of scaphoid fractures have been fraught with uncertainty and fear.¹⁵ To prevent these severe complications, a dogmatic approach to patients with clinical signs but absent radiological evidence has been expounded by many authors.^{4,17,31} Despite numerous reports in the literature, this issue has seen few practical changes in more than 50 years. However, it is time to rethink our approach to the diagnosis and management of these injuries. The old 'knee-jerk' practice of putting all

patients in plaster and repeating radiographs at an interval because of fear of litigation needs to be revised. The complications of missing a fracture can be considerable, but inappropriate diagnosis and prolonged immobilisation of patients may lead to protracted hospital attendance, unnecessary investigation and repeat plaster casting, with loss of earnings for patients (many of whom are young and economically productive) who may not have a scaphoid fracture.¹⁸

Instead, we recommend that the diagnosis should be made at the earliest opportunity – this should encompass proper evaluation by a suitably qualified clinician, with adequate radiographs and, where necessary, access to special investigations such as bone scan.

It is clear from this simple survey that the knowledge and management of suspected scaphoid fractures by SHOs in A&E departments are unsatisfactory, despite the presence of the BAEM guidelines and local guidelines in some hospitals. This is hardly surprising given that most of these clinicians were not aware of these guidelines, and the confusion and controversy surrounding the clinical examination, investigation and initial treatment of these fractures. The dissemination of up-to-date guidelines in A&E departments could help to educate these clinicians and may reduce the number of patients who are unnecessarily immobilised following a wrist injury.

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