Radiological diagnosis of scaphoid fractures: are two views enough?

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INTRODUCTION

Standard radiological diagnosis of scaphoid fractures involves four views of the wrist — PA, lateral, and two obliques. This amount of irradiation may be unnecessary, and previous authors have claimed that two views, Stecher (1937) (PA with 30° angulation towards the elbow giving an elongated view of scaphoid) and lateral, are of equal, or better, diagnostic accuracy. This study was performed to test the authenticity of this claim.

PATIENTS & METHODS

All patients presenting to the Accident & Emergency Department at Leeds General Infirmary with suspected scaphoid fractures followed the same protocol. If clinical suspicion warranted radiography, then scaphoid views were requested. For the first 3-month period of the study (Group A — study group) lateral and Stecher views only were provided. For the second 3-month period (Group B — control group) a standard four-view examination was provided.

If a fracture was evident on the day of presentation this was noted, and the patient transferred to the Orthopaedic Clinic for treatment. If no fracture was noted, but suspicion remained, then splintage was applied (usually POP) and the patient returned to the follow-up clinic 10–14 days later. Those with no symptoms at all at this point were discharged, but those with continuing symptoms or tenderness had repeat radiography (the same views as initially). Any fractures identified were referred to the Orthopaedic Clinic for treatment. If no fracture was identified, they were then referred for a $^{99}\text{Tc}$M bone scan.

The numbers of patients presenting, and number of fractures identified at each...
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attendance and by what method these were identified, were collected retrospectively at the end of the trial period and the two groups were compared.

All the X-ray films for this study were reported on by one radiologist (NDG) with verification of the initial report in all cases of positive bone scan results.

Table 1. Total patients with age and sex distribution

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
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<tbody>
<tr>
<td>No. of Patients</td>
<td>140</td>
<td>106</td>
</tr>
<tr>
<td>F:M ratio</td>
<td>67:73</td>
<td>52:54</td>
</tr>
<tr>
<td>Median age (range)</td>
<td>29 (08–80)</td>
<td>28 (08–81)</td>
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</tbody>
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RESULTS

The numbers of patients attending and their progress are shown in Figs 1 & 2.

The two groups of patients were comparable both in age and sex ratio (Table 1). More patients presented in the study group probably due to the increased incidence of falls on snow and ice in the first quarter of the year. Out of 140 patients in the study group, 33 (23.4%) had bone scans compared with 14 out of 106 patients (13.2%) in the control group.

![Diagram](http://emj.bmj.com/)

Initial presentation (140) 7 fractures

No fracture (133) Review day 14 2 fractures 98 no symptoms

Symptomatic bone scan (33) 1 fracture 5 other fractures

Normal (27)

Fig. 1. Group A (study group).
Fig. 2. Group B (control group).

Table 2 shows a higher proportion of patients in the control group had a positive bone scan and hence higher incidence of missed fractures than the study group.

Table 3 compares the amount of radiation, cost and time taken to accomplish a set of radiographs in the two groups of patients with clear advantage of the study group.

### Table 2. Bone scan results

<table>
<thead>
<tr>
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<th>Group A (%)</th>
<th>Group B (%)</th>
<th>Total</th>
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<tbody>
<tr>
<td>Positive scan</td>
<td>6 (18.18)</td>
<td>6 (42.86)</td>
<td>12</td>
</tr>
<tr>
<td>Negative scan</td>
<td>27 (81.82)</td>
<td>8 (57.14)</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>14</td>
<td>47</td>
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$x^2 = 3.148 \ (0.1 > P > 0.05)$

### Table 3. Radiation dose, cost & time per patient

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<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiation dose/</td>
<td>0.33</td>
<td>0.70</td>
</tr>
<tr>
<td>examination (mSv)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Film cost/</td>
<td>30 p</td>
<td>49 p</td>
</tr>
<tr>
<td>examination (p)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time per patient (mins)</td>
<td>2</td>
<td>3</td>
</tr>
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</table>
DISCUSSION

The difficulty of diagnosing acute scaphoid fracture has been long recognized. This, in addition to fear of litigation, has resulted in the unnecessary long immobilization in plaster of patients presenting to Accident and Emergency Departments with traumatic painful wrist (Staniforth, 1991). Graziani’s suggestion as early as 1940 of at least 16 X-ray projections to diagnose scaphoid fracture was evidence of this problem. These suggested 16 views have been contracted to the present traditional four views. Earlier work, however, has shown that the two view X-ray comprising Stecher (elongated PA) and lateral views has a better diagnostic yield than the four view X-ray. We found the two groups to be about the same in diagnostic sensitivity with a higher proportion of missed fractures in the four views.

The two view X-ray involves reduction of patient dose with the additional benefit of time saving. The cost difference between the two groups also could add up to an appreciable figure where many patients are dealt with in large A&E departments and this could not be over emphasized at the present time.

Scintigraphy has been suggested as an alternative (Jorgensen, 1979) and is the gold standard of diagnosis at the present time. Apart from being an invasive procedure, it will also seem impracticable from number of patients with suspected scaphoid fracture in a busy A&E department. The high incidence of false positives in older patients with arthrosis or halisteresis and in children with unfused epiphyseal lines further limit its value as an initial imaging investigation though it remains valuable in cases of continuing clinical doubt with normal or equivocal radiographic changes.

CONCLUSION

We deduce from this study that four view radiography has no advantage over two views (Stecher and lateral) in diagnosing scaphoid fractures and with the added advantage of less radiation and cost, we postulate that generally the two views could replace the traditional four views but a larger series is required to validate this deduction.

ACKNOWLEDGEMENTS

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REFERENCES


