way to have known this in advance and correct treatment was nevertheless given relying on the clinical signs.

An alternative possibility would be that this was an avulsion injury with non-union. At the time of this injury the forearm was subjected to a longitudinal stress while in full pronation. In this position the interosseous membrane is known to be taut (Last, 1978). However, it would be unlikely that the membrane could have avulsed the bone per se. The muscles gaining origin from the membrane (and adjacent bone) in this region would be unlikely to have contributed to the avulsion as such a force would have produced signs in the fingers or thumb.

Several forearm fractures are attributed to longitudinal stress but usually these are in association with other stresses such as pronation or supination. Borden (1974) describes bowing of the forearm without fracture in children with forearms subjected to longitudinal stress alone. He describes some features which appear prior to fracture. In particular, experimentally, a number of pre-fracture lines appear in the cortex of the bone in areas of maximum compression which can be shown to be areas of bone fragmentation. In some of his cases there was bowing with no associated fracture whereas some cases showed a fracture of one or other forearm bone. It is known that children’s bones are more porous and better able to withstand compressive forces than adults (Rang, 1974). Therefore this same mechanism could be the cause of the fracture described when combined with a taut interosseous membrane: in a child the forces may have simply produced bowing whereas in the adult situation an overt fracture has occurred at the site of maximum compression with further avulsion by the membrane.

As X-rays before the accident or much later after are not available it is difficult to know which of these two explanations is correct; each has its merits. Nevertheless, the message remains that doctors should treat the patient and not the X-rays. This patient received the correct treatment whichever explanation is accepted.

G. J. GARDNER & S. COGHLAN
Accident and Emergency Department,
Manchester Royal Infirmary,
Manchester, England

REFERENCES


SHOs’ performance on diagnosing X-ray abnormalities

Sir

I was interested to read Dr Vincent’s report in the June 1988 edition regarding SHOs performance on diagnosing X-ray abnormalities.
However, the results are at variance with a similar analysis of SHOs performance at this hospital. Over a 23 week period when the department was manned by the same six SHOs, 18 498 patients were seen, 13 570 suffered trauma, 4743 were X-rayed and 2167 had fractures or dislocations. The total number of X-rays misdiagnosed was 141 or 2:97% of the total number of X-rays. However 40 of these were false positives leaving 101 or 2:13% as missed. Of these, 59 (56-7%) were significant and 42 (43-3%) were not significant. However, of those considered significant, 27 (46%) had appointments for the review clinic which suggests that although the abnormalities were missed, the clinical examination suggested that there might be significant pathology.

The data in this study was further broken down to show that wrong diagnoses were made in the under 16 age group in 47 cases (33%) of total of which 18 (38-3%) were false positive compared to 21-2% in the older age group. Twenty-nine were missed of which 22 (75-8%) were significant compared to 75 of which half (37) were significant and half (38) not, in the over 16s.

Thus false positives are more common in the under 16 age group probably due to the presence of epiphyseal lines, but missed abnormalities are more likely to be significant.

Where I would agree with the authors is in the common sites for missed diagnosis. Five of the 12 skull fractures (41-6%) were missed, of which four were significant. Seven of 33 facial fractures were misdiagnosed—four were missed, all significant, but three were false positives. Table 1 shows the other common sites of X-ray abnormality but even in wrist and ankle injuries, the percentage incorrect is not as high as the 35% reported by Vincent et al., and several of these are false positives.

This analysis is not strictly comparable as it includes all X-rays taken in the department, of which a certain percentage were taken between 1000 h and 1600 h when reports are available (except between 1230 h and 1400 h). However, it is doubtful as to whether this fact would raise the percentage of missed X-rays from its present 6-65% of positive to 35%.

The percentage of positive X-rays in this study is 45-7% whereas the University College Hospital study reported a positive rate of approximately 10%. These discrepancies show that it would be unwise to extrapolate either departments’ figures to accident and emergency practice as a whole, but it would be worrying if 39% of all significant X-rays were actually being missed by SHOs.

The number of patients having to be recalled by this department is halved by the availability of a registrar review clinic on the following day—including weekends. Although abnormalities were missed, SHOs had sufficient clinical acumen to ensure patients were reviewed in half the cases.

**Table 1**  X-ray abnormalities and anatomical site

<table>
<thead>
<tr>
<th>Site</th>
<th>Total abnormal</th>
<th>Incorrect</th>
<th>Missed</th>
<th>Significant</th>
<th>Not significant</th>
<th>False + % incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skull</td>
<td>12</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Face</td>
<td>33</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Wrist</td>
<td>298</td>
<td>30</td>
<td>16</td>
<td>14</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Digits</td>
<td>235</td>
<td>22</td>
<td>14</td>
<td>4</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Ankle</td>
<td>145</td>
<td>16</td>
<td>15</td>
<td>5</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Foot</td>
<td>124</td>
<td>18</td>
<td>12</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>
The higher rate of positive findings in X-rays requested by our SHOs suggests better judgement based on examination. Perhaps emphasis should be placed on this aspect of care in accident and emergency departments and de-emphasize reliance on radiological diagnosis.

PETER BURDETT-SMITH
Accident and Emergency Department,
The Royal Victoria Infirmary,
Newcastle-upon-Tyne, England

Computer-unaided diagnosis of acute abdominal pain in an accident and emergency department

Sir

I read with interest the article (Archives of Emergency Medicine 1988 5, 74–78) by Maitra et al. on computer-unaided diagnosis of acute abdominal pain in an accident and emergency department.

The authors surveyed 200 patients with acute abdominal pain, where the diagnosis was made without computer aid or structured data sheet in the accident and emergency department. The authors claim 65% to have been correctly diagnosed, claim a normal laparotomy rate of 5%, and conclude that the results compare favourably with those obtained using computer assistance and structured history taking (Adam et al., 1986).

Unfortunately, there are some problems in comparing the results of this presentation with those of the earlier experience which they quote. For example, the authors claim a normal laparotomy rate of 5% and a negative laparotomy rate of 10·5%; however, in the earlier studies to which they refer, negative laparotomy was defined as the proportion of non-specific patients coming to operation. In the present series, there were only 29 such patients and 10 came to operation (34·5%—slightly different from the figures quoted, and somewhat higher than the baseline data from earlier trials (Adam et al., 1986).

The diagnostic accuracy quoted (65%) is certainly higher than the baseline value in the multi-centre trial (45%). However, the diagnostic categories chosen by Maitra et al. (1988) are different and somewhat vague. For example, many diagnostic errors concern specific gynaecological diseases; whereas in Maitra’s study ‘gynaecological’ and ‘urological’ are recorded as disease categories.

One might argue that such a category at least determines the disposal of the patient from the accident and emergency department; but in this connection what is one to make of a category entitled ‘peptic perforation, acute peptic ulcer with or without bleeding’.

Even so, only 46·7% of these patients were correctly diagnosed (and only 57·7% of the appendicitis cases), whereas the bad surgical error rate (failure by the initial diagnosis to identify a disease requiring urgent operation) is quoted as 2·1%.

It seems curious to say the least that a situation where only about half of the surgical cases are correctly diagnosed can give rise to a bad surgical error rate of 2·1%.

Perhaps the problem which has arisen is rooted in the different nature of the studies concerned. The study of Adams et al. (1986) was conducted on a prospective basis;