GUEST EDITORIAL

Fractures not X-rayed

Discharging a patient from an accident and emergency department with an undiagnosed injury is a cause for concern. Our major concern should be that we have failed to provide optimum care for that patient, but possible medicolegal problems sometimes worry us more. Failure to diagnose even a minor injury, while not important clinically, may have adverse consequences if it reduces a patient's confidence in the accident and emergency department.

Most missed diagnoses are due to a failure to recognize radiological abnormalities and, in reported series, the percentage of injuries missed has varied between 0·8% (Galasko & Monahan, 1971) and 5·5% (Warren & Fergusson, 1984), though many of the injuries missed are not significant. Assuming that all the X-rays are reported, the majority of these injuries will be diagnosed by a radiologist and the patient can be recalled if necessary. The percentage of injuries missed by both accident and emergency staff and radiologist has been quoted as 0·2% (Galasko & Monahan, 1971) and 0·75% (de Lacey *et al.*, 1980). Possibly of more concern are those patients with fractures who are sent home without being X-rayed. Numerically, this is not a large problem and the Royal College of Radiologists' working party report (1985) found that only 0·03% of new patients to an accident and emergency department had a limb fracture missed because it was not X-rayed at the initial visit. Out of 135 536 patients seen in this department over 2 years, 31 were discharged without X-ray but were later found to have had a fracture. Most of the serious injuries, including all the compound fractures and all the fractures needing operation or manipulation, were missed because of failures (sometimes gross failures) of clinical method.

A good history of the forces causing an injury is essential but, in two of our cases, no history of injury was obtained. It is of relevance that both were children and, in one case, the accompanying parents spoke no English.

It is equally important that this history is actually used in establishing a provisional diagnosis. A fall onto the chin causing a laceration of the chin and a fractured condyle of the mandible is a classic injury but, because the history was not appreciated, a patient was not properly examined and the fracture was missed. In addition, five patients had wounds and the possibility of an underlying fracture seems not even to have been considered, despite the fact that four of them had been subjected to forces which might have been expected to cause a fracture rather than a simple laceration (for example, a blow with a hockey stick to an arm raised in defence and a fall from a motor cycle).

It should go without saying that all patients must be adequately examined but unfortunately this is not always done. In five cases, the doctor had failed to correctly identify which part of the body was injured and had examined (and, in two cases, X-rayed) an adjacent part. Examination of a limb must include the joint above and below the suspected injury. In four other patients, the major cause of the missed diagnosis was that the physical examination had been inadequate.

It is known that, if a patient has an injury requiring admission, other fractures may be missed (Pringle, 1973), but even a minor injury may cause a more serious one to be overlooked: three patients had a fracture missed because the doctor was concentrating on a minor head injury. Two other patients also had more than one injury. It is common for injured patients to have more than one injury and, although patients injured in road accidents and falls may complain of pain in just one area, they should all be fully examined. One patient had been seen previously (and not X-rayed) in another accident and emergency department. In an earlier study of missed diagnoses (Guly, 1984), two out of seven injuries, missed because they were not X-rayed had been seen in other departments. If a patient has been seen and even X-rayed by a previous doctor who says that there is no significant injury, any new doctor taking over the patient's care must fully reassess the patient himself.

The largest group of patients were those who had had a history taken, who appeared to have been fully examined and for whom a decision had been made that there was no indication for an X-ray.

The decision to X-ray a patient depends on the likelihood of finding a fracture, based on clinical findings and experience, and on the importance of a fracture. Thus, the management of an uncomplicated, minor chest wall injury is not altered by finding a rib fracture and so the decision not to X-ray such a patient is quite permissible as long as the patient is told the reason. Similarly with toe injuries.

With any selective policy towards skull X-rays it is inevitable that some skull fractures will be missed. The Royal College of Radiologists' study (1983) suggests that even the most conservative guidelines would miss 6% of fractures. The skull fractures in our patients would not have been detected using those guidelines. The importance of this is debatable, with radiologists (Evans, 1977) arguing that it is not important and neurosurgeons (Mendelow *et al.*, 1983) arguing that to detect skull fractures is crucial.

Selection of patients for ankle X-rays has also been investigated. de Lacey & Bradbrooke (1979), examining radiological evidence, concluded that, if there was no swelling adjacent to a malleolus, then no X-rays were indicated. Garfield (1960) reached similar conclusions. Vargish *et al.* (1983), however, found that swelling was not a useful discriminator and stated that patients with localized tenderness below the lateral malleolus who could weight bear had a 97.5% probability of a soft tissue injury only. Brookes *et al.* (1981) concluded that patients with localized tenderness over the anterior fibres of the lateral ligament in the absence of severe tenderness over the lateral malleolus required no X-ray. Positive pointers to a fracture include patients aged over 40, bony tenderness and a history of a blow to the ankle (Vargish *et al.*, 1983).

All four ankle fractures of the series were missed, in spite of adhering to these guidelines, excepting that two patients were aged over 40 and were, thus, statistically more likely to have a fracture. Cuboid fractures are uncommon and routine foot X-rays in ankle injuries are not indicated.

For many parts of the body guidelines on the likelihood of finding a fracture do not exist and casualty officers must use clinical judgement as to which patients to X-ray. Unfortunately, because of inexperience, this is not very accurate. Patients thought to have no fracture on clinical grounds have been found to have radiological abnormalities in 6.1% (Morgan *et al.*, 1980) and 8.7% (Warren & Fergusson, 1984) of cases. X-ray examinations, for reassurance and for medicolegal reasons, reveal a 6% and 8%

incidence of unexpected abnormalities (de Lacey *et al.*, 1979). The severity of spinal injuries is particularly likely to be underestimated but the majority of these abnormalities are not very serious (Morgan *et al.*, 1980).

The majority of major errors occur because of failure to obtain a proper history of the injury and to properly examine the patient. When a decision not to X-ray the patient is based on sound clinical methods, fractures may still be missed but will be less severe. There is a need for more guidance (based on research) for inexperienced staff as to which physical signs or combinations of signs make a fracture likely or unlikely. Inexperienced staff should always err on the side of caution when deciding which patients to X-ray.

It is the responsibility of the medical schools to ensure that their graduates are able to examine the musculoskeletal system.

It is the responsibility of consultants in charge of accident and emergency departments to confirm that their junior staff are able to do so and to insist that it is done in every case.

It is the responsibility of every doctor treating a patient to do so to the best of his or her ability.

It is the responsibility of the health authority to ensure that medical staffing and other facilities are adequate to ensure that doctors working in accident and emergency departments do not feel compelled to take short cuts when examining patients.

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