

which is reported to occur in as many as 70% of cases.^{13,14}

Our patient was managed conservatively because of his haemodynamic stability and minimal peritoneal signs. When his condition gradually worsened, a laparotomy was considered too hazardous because of the coagulation disorder and the multiple intra-abdominal hamartomas. Urgent angiography was performed, and embolisation of the splenic artery was possible, completely controlling the haemorrhage.

Arterial embolisation is not routinely used in controlling intra-abdominal bleeding following trauma. A few reports mention its use in treating bleeding from post-traumatic pseudoaneurysms¹⁵ or splenic trauma in a patient with hepatic cirrhosis.¹³ Only one report mentions its limited role in patients who are a poor operative risk.¹⁶

This case illustrates the possible role of therapeutic angiography in the management of splenic trauma in the presence of major drawbacks to surgery.

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An unusual cause of rib fracture following a road traffic accident

R J Daniels, R A Fulcher

Abstract

A case is presented which is thought to be the first described example of rib fracture occurring as a result of airbag inflation. It would appear that the propellant cartridge came loose during deployment to form a missile, striking the patient on his chest and fracturing a rib.

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Keywords: airbag; airbag related injury; rib fracture.

Case report

The patient, a 73 year old asthmatic, was driving a 1994 Ford Mondeo 1.8 LX estate when he was involved in a low velocity frontal collision with another vehicle. The patient was wearing a seatbelt and the impact caused his air bag to inflate. Immediately after the impact, the patient felt a sharp blow on the left side of his chest. He received no other injuries. He was admitted to hospital complaining of chest pain, shortness of breath, and difficulty in breathing.

Examination of his chest revealed reduced expansion bilaterally, basal crepitations, and focal tenderness over his left anterolateral chest wall. Breath sounds were vesicular and no

wheeze was heard. The jugular venous pulse was not raised and the trachea was central. Peak expiratory flow rate was 180 litres/min, compared with a normal value of 300 litres/min for this patient. An ECG showed no acute ischaemic changes and arterial blood gases on air were normal. A chest x ray was taken of the patient which showed a fracture of the left ninth rib laterally (fig 1). The patient was treated with analgesia, and admitted overnight for observation. He made an uneventful recovery and was discharged the following day.

Close examination of the clothes that this patient was wearing at the time of the crash revealed a hole approximately 1.5 cm in diameter surrounded by a chemical residue in a position overlying the site of the fracture (figs 2 and 3). Unfortunately it was not possible for chemical analysis to be performed on this residue. The patient reported that the coat was undamaged before the accident.

Discussion

Many studies have shown the benefits of airbags as a passenger restraint system, particularly in conjunction with seatbelts, where their use has been estimated to reduce fatalities by

Royal Devon and Exeter Hospital, Barrack Road, Exeter EX2 5DW, United Kingdom
R J Daniels

Department of Medicine for the Elderly, Norfolk and Norwich Hospital, Brunswick Road, Norwich NR1 3SR, United Kingdom
R A Fulcher

Correspondence to:
Dr R J Daniels, 9 Mile End Road, Norwich NR4 7QY.

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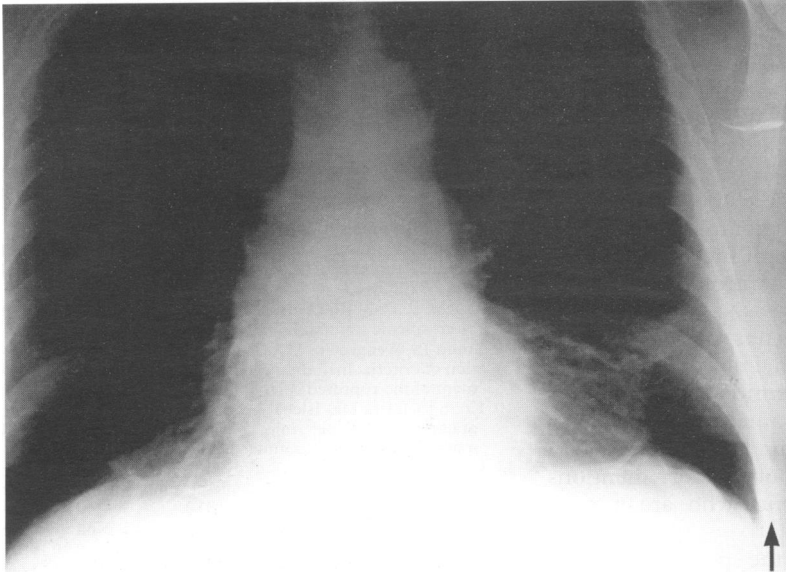


Figure 1 Chest radiograph showing fracture of left ninth rib laterally (arrowed).

up to 24%.¹ The rise in availability of airbags in cars has, however, also seen the development of a new phenomenon, that of airbag trauma.

This patient sustained a fracture of his rib after apparently being struck by a component of his airbag shortly after deployment in a frontal collision. We believe this to be the first reported case of an airbag inflation mechanism causing a fractured rib. The occurrence of this injury in a patient whose respiratory reserve was already significantly compromised by his asthma resulted in a potentially serious combination of airway restriction and obstruction, in an otherwise trivial collision.

Air bags are designed to be deployed rapidly by deceleration sensors igniting a solid rocket propellant which produces a large volume of gas. The propellant capsule is mounted in a steel cup and it appears that this capsule had come loose during deployment to form a high velocity missile, striking the patient on his chest and fracturing his ninth rib. This hypothesis is further supported by the finding of solid fuel residues around the impact site on the patient's clothing.

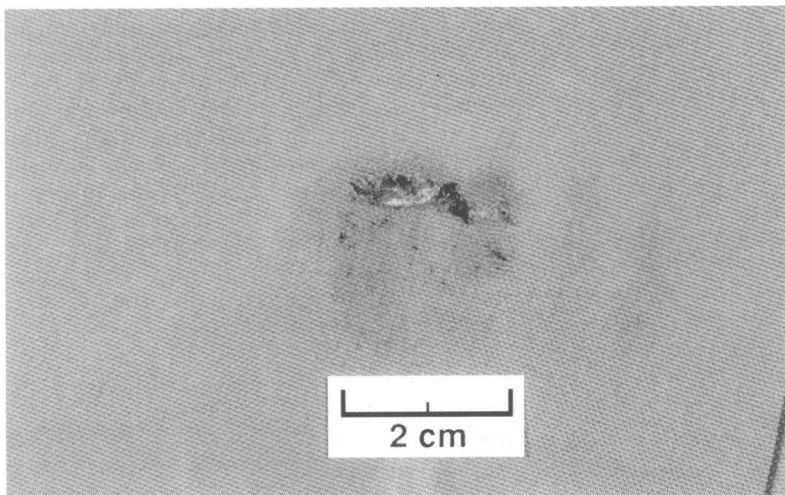


Figure 3 Close up view of hole, showing chemical residues.

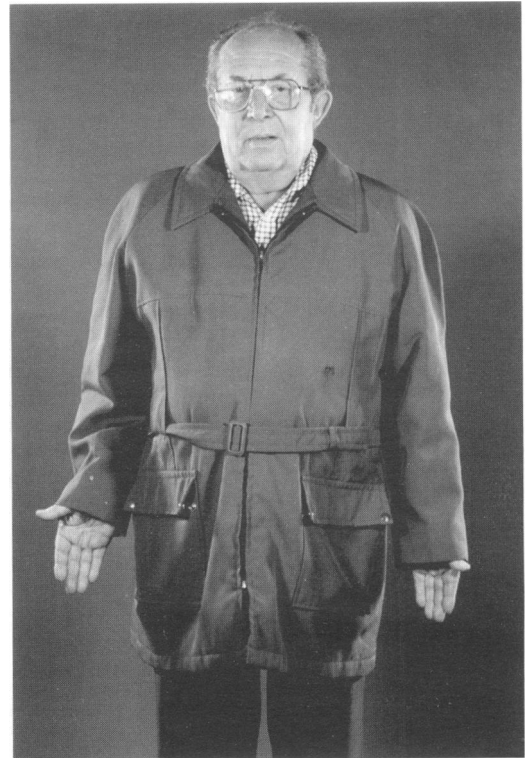


Figure 2 Damaged clothing overlying fracture site.

Other reported injuries caused by airbags include those caused by mechanical components such as the airbag module cover, which has been shown to reach speeds of up to 144 mph during deployment.² One paper describes three such cases resulting in avulsion of the thumb at the metacarpophalangeal joint, multiple fractures of the upper limb including fracture dislocation of the elbow, and a subdural haematoma with subsequent respiratory arrest.³ The forceful and rapid inflation of the airbag may fling the upper limb into the instrument panel, windscreen, or rear view mirror as well as cause contusions, abrasions, and sprains by the impact of the inflating airbag with the driver's body.⁴ Facial and ocular trauma have also been reported by both the inflating airbag and by the airbag forcing objects such as spectacles or tobacco pipes into the eye.⁵⁻⁷

This case report illustrates that while continual improvements are made in occupant protection systems we are still some way from the ideal combination of maximum protection with minimum risk, and that in situations where the risk of injury due to the impact is low, morbidity and even mortality due to airbag deployment may become significant.

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