Traumatic deltoid rupture caused by seatbelt during a traffic accident: a case report

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ABSTRACT
A right-handed 53-year-old man presented with a subcutaneous bruise on his right shoulder caused by a seatbelt during a traffic accident. He had no history of shoulder pain or hydrocortisone injections. The contour of the anterior deltoid was deformed and its belly was retracted distally. The active range of movement of the shoulder was limited to 120 degrees and the strength weakened to 3/5. Magnetic resonance imaging demonstrated detachment of the anterior fibres of the deltoid. Surgical repair of the deltoid and supraspinatus tendon was performed 2 months later using a pull-out suture technique. After 12 months of follow-up, the patient had returned to work without any problems. Both the range of movement and muscle strength had recovered completely.

Key words: accidents, traffic; magnetic resonance imaging; rotator cuff; rupture; shoulder

INTRODUCTION
Seatbelts prevent serious injuries from traffic accidents. However, they may also cause severe injuries, including rupture of the abdominal aorta, lacerations to internal organs, haemopneumothorax, and rib and vertebral fractures. We report a case of traumatic rupture of the deltoid caused by a seatbelt. The pathophysiological mechanism and clinical outcome are discussed.

CASE REPORT
In January 2005, a right-handed 53-year-old man presented with a pelvic fracture and rupture of the left hemidiaphragm following a traffic accident. He underwent embolisation of the internal iliac artery and repair of the diaphragm. Three weeks later, he complained of weakness in his right shoulder during physiotherapy. He had no history of shoulder pain or hydrocortisone injections.

A subcutaneous bruise was noted extending from the right clavicle to the anterior chest where the
The contour of the deltoid was deformed and a soft mass was seen just lateral to the scar of the seatbelt (arrow). Radiographs of the shoulder showed that there was no fracture or narrowing of the acromiohumeral interval. Magnetic resonance images revealed detachment of the anterior fibres of the deltoid near its origin (arrow) and distal retraction of the deltoid belly.

All these findings suggested the diagnosis of a traumatic rupture of the deltoid with a small tear of the anterior supraspinatus tendon. Surgical repair was performed 2 months after the accident. A 12-cm incision was made from the clavicle to the anterior upper arm. Complete rupture of the anterior deltoid was seen. Muscle fibres were lacerated just distal from their attachment to the clavicle. The width of the rupture was 6 cm and the distal deltoid was retracted 5 cm caudally from the clavicle (Fig. 4a). The anterior supraspinatus tendon was torn just beneath the ruptured deltoid. The torn edge of the anterior fibres of the deltoid near its origin. The deltoid belly was retracted distally and formed a redundant mass at the anterior upper arm, with an unclear rotator cuff tear (Fig. 2). Arthrography revealed a small leakage of dye into the subacromial bursa at a slightly externally rotated position, suggestive of a small rotator cuff tear in the anterior supraspinatus tendon (Fig. 3). All these findings suggested the diagnosis of a traumatic rupture of the deltoid with a small tear of the anterior supraspinatus tendon.
supraspinatus tendon was sharp with no evidence of degenerative changes. The width of the tear was 2 cm with no obvious retraction of the proximal tendon (Fig. 4b). The proximal supraspinatus tendon was repaired with No. 2 non-absorbable threads into a bony trough created on the greater tuberosity. The retracted distal deltoid was released and advanced to attach to the clavicle using a pull-out suture technique with No. 2 non-absorbable threads.

Postoperatively, the shoulder was kept at a 70º-elevation for 3 weeks with an abduction brace. A rehabilitation programme of passive elevation and isometric strengthening of the deltoid and supraspinatus was started one week after surgery. The elevation angle of the shoulder was decreased to 45º for the subsequent 2 weeks. The abduction brace was removed at 5 weeks and active exercises were prescribed for 6 months to increase the range of movement and muscle strength.

At 12-month follow-up, the patient had returned to work without any problems. Both the range of movement and muscle strength had recovered completely (flexion=150º, 5/5; abduction=150º, 5/5; Fig. 5). The JOA score was 97 and the patient was satisfied with the functional outcome.

DISCUSSION

Ruptures of the deltoid usually occur secondary to massive rotator cuff tears or repeated hydrocortisone injections around the shoulder joint. In cases of massive rotator cuff tear, the upward migration of the humeral head causes rubbing between the undersurface of the deltoid and the greater tuberosity. Such friction may cause degeneration and eventually rupture of the muscle fibres of the deltoid. Repeated hydrocortisone injections may accelerate this process.

Traumatic rupture of the deltoid is rare; only 7 such cases have been reported, involving, for example, a man carrying a heavy rail, a cricket player doing fast-bowling arm movements, and an elderly woman playing golf. The pathophysiological mechanism can be explained as sudden self-contraction of the deltoid and direct contusion of the shoulder.

Our patient had neither a massive rotator cuff tear nor a history of corticosteroid injection. No evidence of degenerative changes in the torn supraspinatus tendon was observed. The laceration of both the deltoid and supraspinatus tendon were just beneath the subcutaneous bruise, suggesting that the rupture was caused by trauma rather than degeneration.

REFERENCES