Simultaneous anterior dislocation of the shoulder and fracture of the ipsilateral humeral shaft

Two case reports

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Summary. *Two patients with anterior dislocation of the shoulder and ipsilateral fracture of the shaft of the humerus have been studied and the mechanism of their injuries has been documented. Closed reduction of the dislocations was performed under anaesthesia during surgery for humeral fixation with a dynamic compression plate. The fractures and dislocations healed without any problems at 6 to 9 months postoperatively. At recent follow-up, one patient had returned to work and regained normal mobility. The other patient had the sequelae of a brachial plexus injury. The literature on this subject is reviewed.*

Résumé. *Deux cas de luxation de l'épaule avec fracture associée de la diaphyse humérale ont été rapportés. Le mécanisme des blessures a été décrit. Une réduction fermée de la luxation a été réalisée sous anesthésie pendant l'opération chirurgicale. Pour la fixation, la méthode utilisée fut celle de la mise en place d'une plaque de compression dynamique après réduction ouverte. La fracture et la luxation ont été guéries sans problème trois mois après l'opération. Après un suivi récent, l'un des patients a été autorisé à reprendre son travail sans restriction, et a recouvré une mobilité normale. Le second conserve des séquelles de sa blessure du plexus brachial. La littérature sur ce sujet est révisée.*

Introduction

Dislocations associated with fractures of the adjacent long bones, usually resulting from severe trauma, are among the most uncommon and functionally serious injuries. Dislocation of the shoulder associated with fracture of the ipsilateral humeral shaft is rare and only 14 case reports can be found in the literature and textbooks. We present two cases and discuss the mechanism of the injury, the problems encountered in management, and the treatment modalities of this complex trauma.

Case reports

Case 1

A male aged 35 years sustained a motorcycle accident. On admission he was conscious and well-orientated, with normal vital signs. There was deformity and painful swelling of the left shoulder and arm. No neurovascular deficit was found and all other clinical findings were normal. Initial radiographs revealed a fracture of the middle-lower third of the right humerus together with an ipsilateral anterior glenohumeral dislocation. After failure of closed reduction of the dislocation in the emergency room, operation was undertaken. Under general anaesthesia, closed reduction of the dislocation was performed successfully and the humeral shaft fracture was treated by open reduction and internal fixation with a dynamic compression plate and screws. There were no surgical complications after operation and the affected limb was immobilised with a sling. The patient was instructed to start active movement of the glenohumeral joint 3 weeks after operation.

After twelve weeks, bony union was demonstrated radiographically (Figure 1). Aggressive muscle strength exercises were then commenced. Six months after the injury the patient was asymptomatic, with a full range of movement of the shoulder joint. At one-year follow-up, he had returned to his normal occupation and sporting activities without restriction.

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Table 1. Reported cases of an anterior shoulder dislocation with an ipsilateral fracture of the humeral shaft

Author	Age/Sex	Mechanism of injury	Dislocation (Treatment)	Fracture (Treatment)	Follow-up	Results
Winderman (1940) [12]	68/F	Fall	anterior GTF (CR)	U-M/3 (Splinting)	3 m	fair
Bohler (1941) [3]	17/M	?	Anterior (CR)	M/3 (Splinting)	3 m	Good
Gui (1957) [8]	?	?	Anterior (CR)	U-M/3 (Closed)	?	?
Baker (1971) [1]	25/M	Fall	Anterior GTF (OR)	M/3 (Rush pin)	15 m	Fair
Barquet (1985) [2]	23/M	Traction	Anterior GTF (CR)	M-D/3 (Splinting)	16 m	Good
	42/M	MVA	Anterior (CR)	U/3 (Splinting)	8 m	Good
Sankaran (1989) [11]	28/M	MVA	Anterior GTF (CR)	M/3 (CREF)	4 m	Good
Brooks (1989) [4]	19/M	?	Anterior (CR)	U/3 (CREF)	?	Excellent
Canosa (1994) [6]	16/M	MCA	Anterior (CR)	M/3 (IM Pin)	12 m	Good
Davick (1995) [7]	29/M	MCA	Anterior (CR)	U-M/3 (Splinting)	12 m	Good
	45/M	MCA	Anterior (CR)	M/3 (IM rod)	12 m	Good
Kontakis (1995) [9]	41/M	MVA	Anterior (OR)	M/3 (Plate)	22 m	Good
	45/M	Fall	Anterior (CR)	M/3 (Splinting)	12 m	Good
Calderone (1995) [5]	27/M	MVA	Anterior (CR)	M/3 (Plate)	24 m	Good
Chen (1997)	35/M	MCA	Anterior (CR)	M-L/3 (Plate)	36 m	Good
	28/M	MCA	Anterior (CR)	L/3 (Plate)	12 m	Radial N palsy

GTF: greater tuberosity fracture; U, M, L/3: upper, middle, lower third; MCA: motorcycle accident; MVA: motor vehicle accident; CR: closed reduction; OR: open reduction; IM: intramedullary; EF: external/fixation

Table 2. Problems encountered in 16 reported cases

Problems	Cases	Incidence
Failed closed reduction	4	25%
Nerve palsy at injury	3	19%
Permanent nerve palsy	1	6%
Associated greater tuberosity fracture	4	25%
Limitation of shoulder motion	6	38%

Case 2

A man aged 28 years sustained injuries to his left arm in a motorcycle accident. He had an obvious deformity of the right upper arm, a swelling in the shoulder region and weakness of dorsi-flexion of the hand. Neurological examination revealed injury to the brachial plexus, particularly affecting the axillary, radial and ulnar nerves. He had no other injuries and his haemodynamic condition was stable. Radiographs showed a butterfly fracture of the lower-third of the humeral shaft and an anterior dislocation of the shoulder. Under general anaesthesia,

the shoulder dislocation was reduced while the fracture of the humeral shaft was treated by open reduction and internal fixation with a dynamic compression plate. The radial and ulnar nerves were explored in the region of the fracture but no interruption or sharp injury by the fracture fragments was observed. Bony union had occurred by 3 months post-operatively. At this stage the shoulder movements were 110 ° abduction, 80 ° forward flexion, and 15 ° external rotation. At follow-up, after one year, the brachial plexus neuropathy remained with high radial nerve palsy and motor weakness of the wrist and metacarpophalangeal joint extension. Thereafter, the patient was lost to follow-up.

Discussion

In 1940, Winderman et al [12] reported simultaneous dislocation of the shoulder and with an ipsilateral fracture of the humeral shaft. Since then, 13 such cases have been reported by other authors

Fig. 1. **a** Radiograph showing a comminuted fracture of the middle-third of the left humerus with anterior dislocation of the glenohumeral joint. **b** Radiograph showing union of the fracture at 12 weeks postoperatively following dynamic compression plate fixation

(Table 1). The mechanism of the injury is similar to that in the leg where a femoral shaft fracture is associated with an ipsilateral dislocation from dashboard trauma in automobile accidents [10]. Sankaran-Kutty [11] suggested that the shoulder and arm injury may result from a force transmitted through the axis of the humerus to the shoulder simultaneously causing fracture of the shaft and the dislocation. Kontakis [9] proposed that the dislocation always occurred first and the action of the subsequent forces resulted in the shaft fracture. The type of fracture is related to the mode of forces acting upon the bone. Both our patients were injured in high-velocity and high energy collisions and subsequently fell to the ground. When falling their shoulders were abducted and extended, while their elbows were flexed. The impact was taken on the flexed elbow. The force dissipated simultaneously at the shaft of the humerus, resulting in fracture, and at the shoulder, which dislocated. The second patient had a brachial plexus injury due to traction by the dislocated shoulder.

Various methods of management of this complex injury have been proposed (Table 1). The

shoulder dislocation is usually difficult to reduce without sedation or anaesthesia in the emergency room. Calderone et al [5] reported that a complete high radial nerve palsy developed after a failed attempt at closed reduction. Under adequate anaesthesia, dislocation may be reduced manipulatively or by pins or external fixation on the proximal humerus. Open reduction for dislocation is seldom necessary. Fractures of the shaft of the humerus may be managed by splinting, external fixation, or internal fixation. Union is usually not a problem. Problems which have been reported in the literature include failure of closed reduction, neurological deficit, and limitation of shoulder motion (Table 2).

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