7 SCAPULA, CLAVICLE, HUMERUS

7.1 Fractures of the Scapula

Fractures of the scapula are rare injuries and mainly result from a severe direct force to the shoulder and thorax. They are, therefore, often found in the multiply injured patient. As the major parts of the scapula are enveloped by muscles which act as a splint, most fractures of this bone are minimally displaced and may be treated nonoperatively.

7.1.1 Classification of Scapula Fractures

We can distinguish between stable extra-articular, unstable extra-articular and intra-articular fractures of the scapula depending on their location in relation to the glenoid and on the stability of the whole shoulder.

Stable extra-articular fractures (Fig. 7.2a) comprise the injuries of the body and processes of the scapula, which can be simple or combined. Fractures of the neck of the scapula, in spite of some displacements, usually appear to be quite stable fractures and also fall into this category.

The unstable extra-articular fractures of the neck (Fig. 7.3a) are usually associated with a fracture of the coracoid process or acromion and most typically with a fracture of the clavicle. This latter combination — fracture of the neck and clavicle — renders the entire shoulder joint quite mobile with a tendency to caudad rotation due to the weight of the arm. The severe force necessary to cause such a complex injury — similar to a pelvic ring fracture — often also results in fractures of the upper three to four ribs and may damage the brachial nerve plexus and major vessels as well.

Intra-articular fractures (Fig. 7.1a) are much rarer and as a rule present with a transverse fracture through the glenoid. Large lip fractures of the glenoid are usually associated with a luxation or partial dislocation of the head of the humerus.

7.1.2 Indications for Surgery

Stable extra-articular fractures (Fig. 7.2a) should be treated non-operatively in most instances, with a sling or Desault bandage, as bony union practically always occurs and functional deficits are rare. Only severely displaced and unstable fractures of the neck, acromion, or coracoid process are indications for surgery (Fig. 7.2b).
In unstable fractures of the neck and clavicle (Fig. 7.3a), the clavicle should be approached first and fixed with a 3.5-mm dynamic compression plate (DCP) (Fig. 7.3b) or reconstruction plate (Fig. 7.6b). This maneuver usually partially reduces the neck fracture and renders the whole shoulder stable so that no fixation of the neck fracture is necessary. Grossly displaced neck and body fractures (Fig. 7.2a) may however also require open reduction and internal fixation with either single screws, a short 3.5-mm DCP or a one-third tubular plate (Fig. 7.2b). Internal fixation for transverse fractures of the glenoid (Fig. 7.1a) and for lip fractures is best performed with small cancellous bone screws (Fig. 7.1b).

Fig. 7.1
a Displaced intra-articular fracture of the glenoid.

b After open reduction and fixation with two 3.5-mm cortex screws in lag fashion.

Fig. 7.2
a Extra-articular fracture of the glenoid.

b Open reduction and internal fixation with a short 3.5-mm DCP or one-third tubular plate is only indicated in cases of gross displacement of the glenoid in regard to the rest of the scapula. Minor dislocations — treated nonoperatively — hardly interfere with functional aftertreatment or with a good result.

Fig. 7.3 Combination injury with fractures of the glenoid, spine, and clavicle due to a heavy blow to the shoulder.

a This results in an unstable joint with a tendency of secondary caudad displacement of the whole shoulder. Associated injuries of the thorax and neural plexus are quite common.

b If approached early, the plating (3.5-mm DCP or reconstruction plate) of the clavicle is usually sufficient to approximate the other fractures as well, thus permitting functional aftercare. Only exceptionally is there a need to stabilize the scapular fractures per se.