



Glenoid fractures of the shoulder

Peter Ström

- Glenoid fractures of the shoulder are uncommon.
- Any scapular fracture involving the glenoid should be scrutinized carefully for a surgical treatment option.
- Classification is helpful in deciding the surgical tactic.

Keywords: fracture; glenoid; scapula

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Introduction

Scapular fractures involving the glenoid are uncommon. According to the Swedish Fracture Register (SFR, a web-based registration that covers roughly 80% of the orthopaedic clinics in Sweden), scapular fractures account for slightly less than 1% of all fractures; a number that corresponds well with other reports.¹ The occurrence of intra-articular fracture involvement of the glenoid varies in the literature between 10% and 48% of all scapular fractures.^{2,3} Most scapular fractures can be treated conservatively with expected good outcome.^{4,5} However, whenever there is involvement of the glenoid, especially if there is great fracture displacement which may lead to post-traumatic arthritis or instability problems of the shoulder joint, surgery is considered.

Anatomy and aetiology

The glenohumeral (GH) ball-and-socket joint is rather similar to a golf ball on a peg, except for it being horizontally rather than vertically orientated. At a first glance this is an unstable joint, where the muscles of the rotator cuff stabilize the shoulder joint, and also protect the scapula well by covering it on both sides. Lesions of the glenoid cavity can occur from a dislocation of the shoulder, either caused by low- or high-energy trauma, or by a direct blow (usually high-energy) to the thoracic cage, scapula and/or arm, resulting in scapular fractures with fracture extensions to the glenoid.

Diagnosis and classification

History reveals injury mechanism, especially paying attention to dislocation of the shoulder and any residual instability. Full physical examination of the shoulder girdle both active and passive motion, strength, neurovascular status, and apprehension test is essential. Plain films including anterior-posterior (AP), lateral, and axillary views identify fractures that will need further investigation with computed tomography (CT) and 3D reconstructions. The Ideberg classification⁵ modified by Goss,⁶ describing six types of fractures, is most commonly used in the literature (Fig. 1). Type I is a glenoid rim fracture, subdivided



Fig. 1 Ideberg classification.

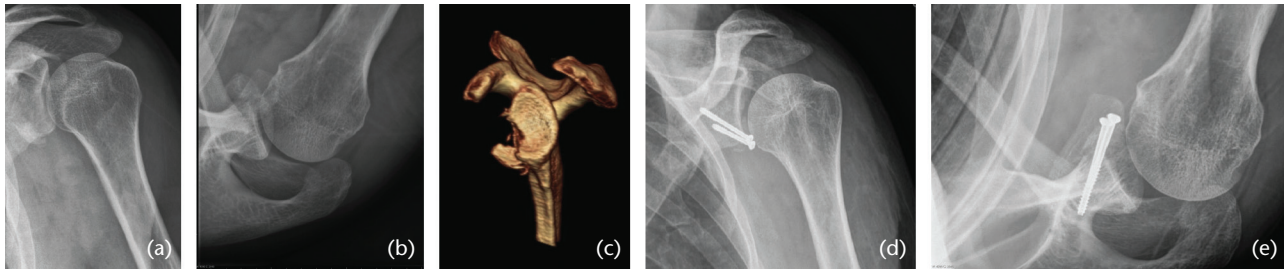


Fig. 2 Bony Bankart (Ia): (a) anterior-posterior (AP) view, (b) axillary view, (c) 3D CT-reconstruction, (d) post-operative AP view – cannulated screws through deltopectoral approach, (e) post-operative axillary view.

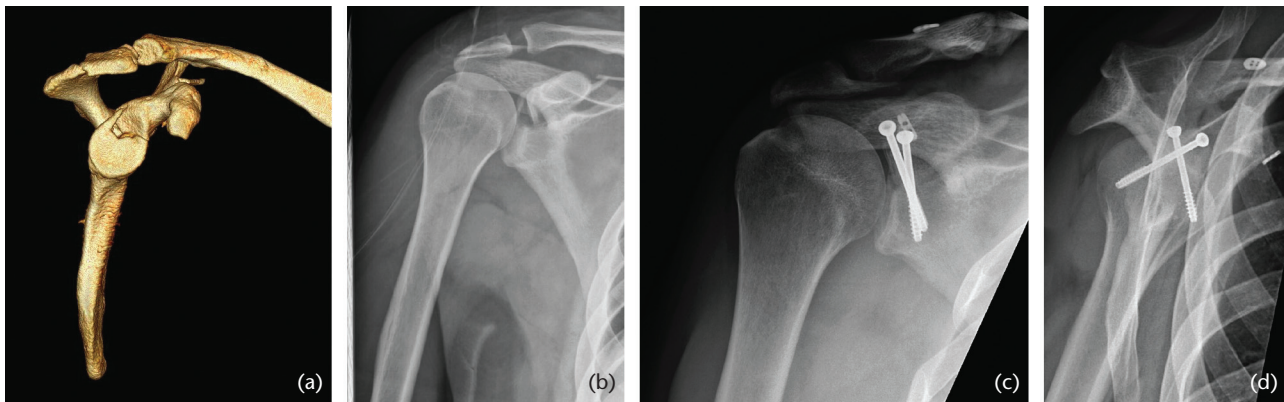


Fig. 3 Ideberg III: (a) 3D CT lateral view, (b) AP view, (c, d) post-operative cannulated screws through deltopectoral approach, AP and lateral view.

into type Ia (anterior rim fracture), and type Ib (posterior rim fracture). Type Ia, also called ‘Bony Bankart’, is the most common glenoid fracture, and is usually caused by dislocation of the shoulder. Types II–V are transverse fractures. Where type II exits scapula-laterally-inferiorly, this usually results in subluxation of the humeral head. Types III–V exit into the scapular body at different places. Type VI is severe comminution of the glenoid.

Treatment options

Non-operative treatment with a sling for a couple of weeks, followed by early motion, is indicated for the majority of scapular fractures. However, fractures involving the glenoid are more likely to require surgical treatment.⁷ The commonly used indications for surgery are GH instability, intra-articular involvement of more than 25%, and/or a glenoid surface step of more than 5 mm. In this context, it is also worth mentioning the extra-articular (neck fracture), where a displacement of the glenoid $> 40^\circ$, or a 1 cm translation usually indicates surgery, to regain the mechanical axis.⁸

The most widely operated glenoid fracture, the ‘Bony Bankart’ (Ideberg type Ia) (Fig. 2) is approached from the

front with the patient in the ‘beach chair’ position. Thereafter, management is either through open reduction and fixation via the deltopectoral approach, or with arthroscopic and percutaneous well-described techniques. Some transverse types, such as Ideberg type III (Fig. 3), are also reached the same way, and there are several reports on specific arthroscopic techniques.^{9,10} The anterior approach gives a better view into the joint, and – if the fracture configuration allows – possibility for direct reduction.

When dealing with posterior fractures and fractures involving the scapular body, a posterior approach might be considered. The patient is placed in a lateral or semi-lateral position with the affected arm free-draped (Fig. 4, Fig. 5). The Judet approach (Fig. 5) gives full access to the posterior scapula, below the spine. Skin incision follows the spine of the scapula and curves downward medially to follow the medial border of the scapula. The origin of the posterior deltoid is dissected off from the scapular spine. The infraspinatus muscle is detached medially and lifted off from the scapula, taking care of the upper lateral corner, where the suprascapular neurovascular bundle passes. Stepwise fixation of the body with dedicated plates, or mini-fragment plates, will indirectly



Fig. 4 (a, b) Patient positioned for dorsal approach with Judet incision.

reduce the joint fragment(s) (Fig. 6). The joint can be opened and partly visualized to check the reduction. An alternative is to use the modified Judet approach described by Obrebsky et al.¹¹ Instead of lifting off the infraspinatus muscle, a split is made between the infraspinatus and teres minor. If only the lateral column needs to be addressed, the less extensive lateral column approach can be used. Skin incision follows the lateral border of the

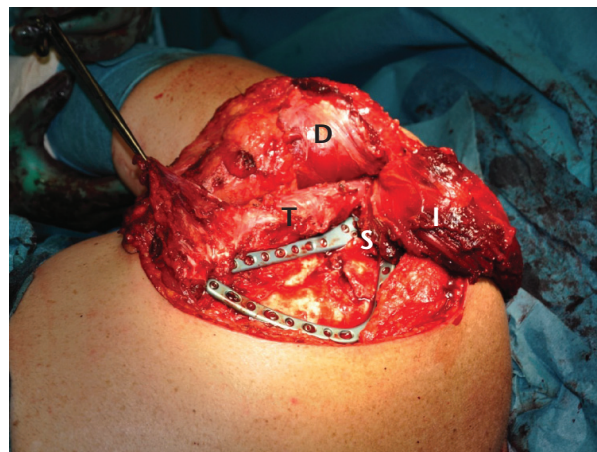


Fig. 5 Judet incision.

Note. D, deltoid muscle; I, infraspinatus muscle; T, teres minor muscle; S, suprascapular artery and nerve.

scapula. Through this skin incision, the same interval, between the infraspinatus and teres minor muscles, as in the modified Judet approach is developed to reach the fracture for reduction and fixation. In some rare cases both anterior and posterior approaches are needed.

Post-operatively the patient is usually put in a sling and allowed passive range of motion and gradually active motion, under the supervision of a physiotherapist. The only time that motion is restricted, is when division of subscapular muscle has been carried out. Restriction of external rotation is to allow healing of the re-attached muscle. The common case would be a ‘Bony Bankart’ lesion treated with open surgery deltopectoral approach, and the use of subscapular tenotomy to reach the joint.

Conclusions

Glenoid fractures are unusual. Surgery is considered if there is instability in the GH joint, or an intra-articular gap of 5 mm or more. Either open surgery via the deltopectoral approach, or arthroscopic technique can be used for some transverse intra-articular fractures, as well as the most common glenoid fracture, the ‘Bony Bankart’ lesion. Posterior fractures and fractures involving the scapular body usually require more extensive surgery from a posterior approach.

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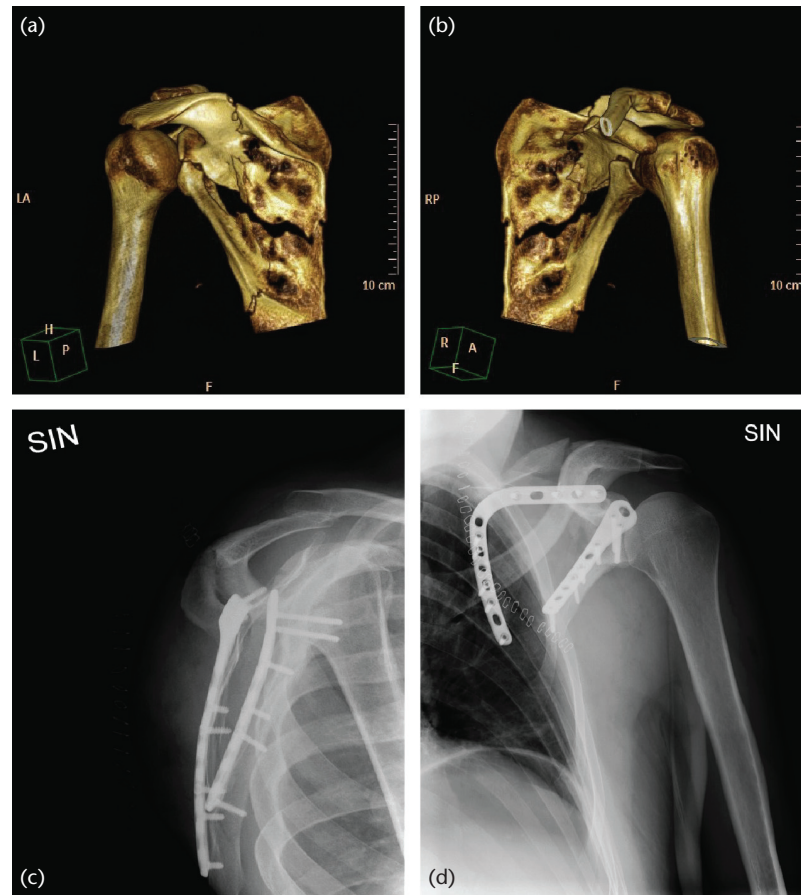


Fig. 6 (a, b) Scapular fracture with glenoid involvement – Ideberg type V. (c, d) Post-operative X-ray after open reduction (Judet approach), and fixation with plates.

ICMJE CONFLICT OF INTEREST STATEMENT

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