Ministry of Defence

Synopsis of Causation

Scapula Fractures

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Disclaimer

This synopsis has been completed by medical practitioners. It is based on a literature search at the standard of a textbook of medicine and generalist review articles. It is not intended to be a meta-analysis of the literature on the condition specified.

Every effort has been taken to ensure that the information contained in the synopsis is accurate and consistent with current knowledge and practice and to do this the synopsis has been subject to an external validation process by consultants in a relevant specialty nominated by the Royal Society of Medicine.

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1. Definition

1.1. A scapular fracture is a break in the continuity of the cortex of the scapula bone. Scapular fractures are uncommon. They represent 1%[1] of all fractures and 3%[1] of shoulder-girdle injuries.

1.2. To aid prognosis, they can be classified into 3 groups.[2]

1.2.1. Type 1: 54% Fractures of the body.

1.2.2. Type 2: 17% Fractures of the acromion, spine, and coracoid process.

1.2.3. Type 3: 29% Fractures of the glenoid rim and fossa, and anatomical and surgical necks.

1.3. The scapula provides a stable base for upper limb movement. It attaches the upper limb to the thorax via an articulation with the humerus and its attachment to the clavicle by the acromioclavicular and coracoclavicular ligaments. Factors which explain the low incidence of scapula fractures include its mobility on the chest wall and protection by surrounding muscles (supraspinatus, infraspinatus and subscapularis).

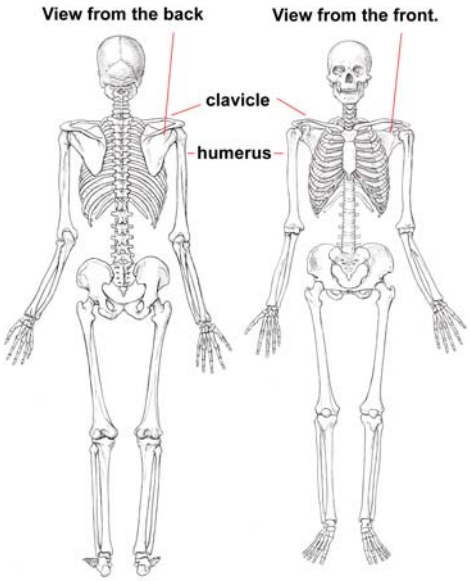

Figure 1: Skeletal view

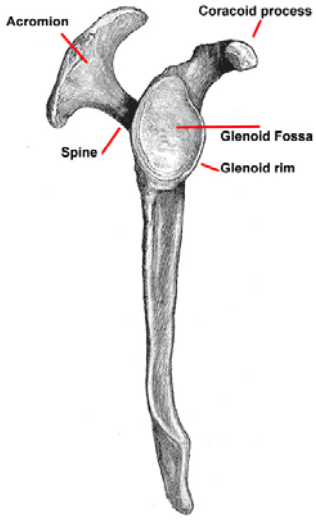

Figure 2: Scapula – lateral view

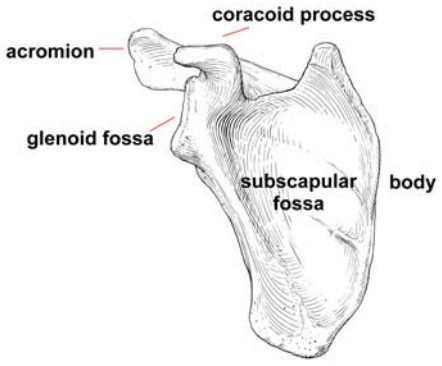

Figure 3: Right scapula – front view

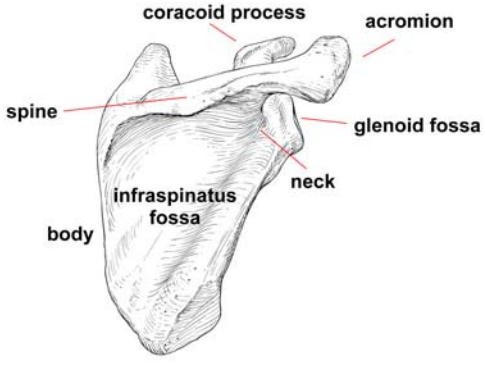

Figure 4: Right scapula – back view

2. Clinical Features

2.1. Patients with scapula fractures must be carefully assessed and resuscitated appropriately, as they often have other serious injuries. Thompson et al.[3] reviewed 56 patients who had a range of associated injuries:

Deaths	8
Rib fracture	30
Haemo- or pneumothorax	30
Brachial plexus injury	7
Subclavian vessel injury	7
Head Injury	32
Clavicle fracture	17
Spinal fracture	12

2.2. Scapular fractures are often missed. A retrospective review of 100 patients with major blunt chest trauma in whom a scapular fracture had been diagnosed found that only 57 patients had their scapular fracture diagnosed on the initial chest radiograph. In 31 patients the fracture was visible but not identified.[4]

2.3. Scapular fractures are seen more commonly in men and young adults (25-40 years). Blunt trauma is more frequently seen in these groups.

2.4. Examination findings at the time of injury may include:

2.4.1. **Body or spine fracture**. Pain, swelling, localised tenderness and bruising may occur over the fracture site, the arm is held in towards the body and moving the arm out to the side causes pain due to rotation of the scapula.

2.4.2. **Acromion fracture**. Pain is felt at the tip of the shoulder. Again, moving the arm out to the side causes pain due to rotation of the scapula. An associated brachial plexus injury must be excluded by careful neurological examination.

2.4.3. **Scapular neck fracture**. Pain occurs on any movement of the shoulder and most pain is felt on the outer aspect of the shoulder. The arm is held into the side of the body.

2.4.4. **Glenoid fracture**. Pain occurs on any movement of the shoulder as with fractures of the neck of the scapula. Shoulder dislocation may cause avulsion fractures of the glenoid rim.

2.4.5. **Coracoid fracture**. Pain occurs anterior and medial to the shoulder. Pulling the arm into the side and lifting by bending the elbow causes increased pain.

2.5. **Radiographs.** The 2 standard views of the shoulder (antero-posterior and lateral) should show most scapular fractures and dislocations. A computerised tomography (CT) scan offers further information but is often not necessary.

3. Aetiology

3.1. As a group, scapula fractures usually result from a high energy injury: road traffic accidents (RTA) cause 60%, falls from a height cause 20%, and the remaining 20% result from a variety of causes. A **stress fracture** may occur through repetitive use.[5]

3.2. **Injuries to the body or the spine** of the scapula typically result from a direct blow with significant force, such as from an RTA or a fall.

3.3. **Acromion injuries** are usually caused by a direct downward force to the point of the shoulder.

3.4. **Scapular neck fractures** most frequently result from a force applied to the shoulder from the front or from the back.

3.5. **Glenoid rim fractures** most often result from force transmitted along the humerus after a fall onto the flexed elbow.

3.6. **Stellate glenoid fractures** usually follow a direct blow to the lateral aspect of the shoulder.

3.7. **Coracoid process fractures** are usually due to a direct blow or an avulsion.

4. Prognosis

4.1. This is generally good but should be considered for each region of the scapula. Treatment is generally conservative, but specific indications for surgery are recognised:

4.1.1. Acromion fractures impinging on the rotator cuff in the sub-acromial space.

4.1.2. Scapular neck fractures angulated beyond 40 degrees or displaced by more than 10mm.

4.1.3. Multiple scapular fractures.

4.1.4. Articular fractures displaced more than 10mm, with a step of more than 5mm, or with subluxation of the humeral head.

4.2. Operative treatment would normally be via the posterior approach using a reconstruction plate. Some reports suggest a worse outcome following conservative treatment in these cases, with up to 50% of patients having restricted and painful movements of the shoulder at 6 months.[7]

4.3. **Type 1 fractures of the scapula body**. These can be treated non-operatively as the muscular envelope prevents significant displacement. Union should occur in 5 weeks with a sling and physiotherapy.[8] A study of 27 patients with isolated fractures of the body of the scapula regained full shoulder movement independent of treatment type.[7] There can be a period of pseudo-rotator cuff rupture associated with the injury due to bleeding into the surrounding muscles. Function returns as the blood clot is broken down.

4.4. **Type 2 fractures of the acromion, scapula spine and coracoid process**.

4.4.1. **Acromion**:

- Minimally displaced fractures may be treated conservatively with a sling and physiotherapy and union will occur in 3-4 weeks.[9]

- Displaced acromial fractures can compromise the function of the rotator cuff as well as the development of a painful non-union (4%).

4.4.2. **Scapular spine**. These heal well with conservative treatment, unless severely displaced. All should gain full gleno-humeral movement.[7]

4.4.3. **Coracoid process**. The coracoid process may be injured in isolation or as part of an injury complex including acromioclavicular joint dislocation, avulsion fractures of the upper edge of the scapula, dislocation of the shoulder or clavicular fractures.[9] Thirty-nine out of 45 (87%) patients had an excellent result when reviewed at a mean of 37 months.[9] Fractures united in 2-4 months and patients were able to resume full work from 6 weeks to 3 months after injury. A full range of movement was restored by 4 months. Painful non-unions have however been reported.

4.5. **Type 3 fractures through the superior lateral angle**.

4.5.1. **Scapular neck fractures**. These regain a good range of motion and function in many series with conservative treatment. One review of 8 cases treated non-operatively demonstrated a return to a full range of motion.[7] Another review failed to show restoration of normal movement in 6 out of 11 patients but none lost function.[10] However, a further study of displaced glenoid neck fractures treated non-operatively showed significant weakness, pain and loss of motion.[11] Pain was eliminated and 85% shoulder motion was restored in similar patients treated operatively.

4.5.2. **Intra-articular glenoid fractures**. These are classified into 5 types and represent 10% of scapula fractures.[12] Ten percent will be displaced and should probably undergo open reduction and internal fixation. Type I fractures are anterior avulsion fractures (separate from Bankart lesions) and may predispose to instability. Satisfactory results are reported in such cases treated operatively.[13] Good functional results have been reported in 75% of cases in the remaining types (II-V) treated nonoperatively.[9,12] Other reports suggest a worse outcome following conservative treatment with up to 50% having restricted and painful movements of the shoulder at 6 months.[7,10]

4.5.3. **Superior lateral angle fractures**. Overall up to 55% of patients with fractures of the superior lateral angle have been reported to have ongoing symptoms. Up to 1 in 7 may have pain at rest and degeneration of the joint may be seen in up to two thirds of cases.[1]

4.6. **Osteoarthritis following scapula fracture**.

4.6.1. There is little long-term follow up data. The only type of scapula fracture expected to lead to post-traumatic osteoarthritis would be an intra-articular scapula fracture. Other scapula fractures could result in pain and stiffness; however, such symptoms are not dissimilar to those of osteoarthritis.

4.6.2. **Upper third glenoid fracture**. Good results are expected when treated non-operatively.[9]

4.6.3. **Inferior two thirds glenoid fracture**. Very few cases are available. Of those that are, all were treated non-operatively. Three of 6 patients with this injury had stiff painful shoulders at 6 months.[10] Two of 3 patients seen between 1 and 12 years post injury in another series had fair results and the third a poor result (moderate pain and more than 25% loss of motion).[7] Two of 3 patients had a decreased range of motion in another series followed long term.[1] The assumption is that they are developing arthritis, but this is only an assumption. Certainly, unless treated recently, it would be reasonable for these injuries to have been treated non-operatively. Increasingly now, articular glenoid fractures would probably be treated with surgery.

5. Summary

5.1. Scapula fractures are uncommon injuries but need to be identified because of other associated injuries. Usually, treatment in a sling with physiotherapy is adequate and will result in union by 6 weeks. A full return to function can be expected by 3 months. Displaced articular and scapula neck injuries may benefit from internal fixation.

5.2. Clinicians have started to examine the current recommendations for surgery biomechanically, but much work remains. Good prospective, functional outcome studies must be completed to determine which patients need surgical intervention and, if surgical intervention is performed, whether it ultimately improves patient outcomes.

5.3. Most of the results from studies detailed in this Synopsis have been retrospective reviews or case series. Currently, focus is shifting to prospective work aimed at providing a more solid evidence base for current practices.[14] This will establish exactly what imaging is required for different fractures as well as when operative or non-operative treatment works best.

6. Related Synopses

Neck Pain

Whiplash Injury

Head Injury

Clavicle Fracture

Spinal Cord Injury

7. Glossary

abduction	Moving the arm away from the body.
acromion	The outer end of the spine of the scapula. It is a flat, wide piece of bone and hangs over the shoulder joint; it has a joint with the collar bone. Its outer border is the point of the shoulder.
acromioclavicular ligament	Ligament attaching the acromion to the clavicle.
acromioclavicular joint	Joint between the acromion and the clavicle.
adduction	Moving the arm towards the body.
articular	Relating to a joint – here, the shoulder (gleno-humeral) joint.
avulsion	Pulling off.
Bankart lesion	Tear in the lining of the shoulder joint usually due to a dislocation and usually resulting in repeated dislocation.
conservative treatment	Treatment not involving surgery, i.e. a sling and physiotherapy.
coracoid	Shaped like a crow's beak; denoting a process of the scapula.
coracoclavicular ligament	Ligament attaching the coracoid process to the clavicle.
clavicle	Collar bone.
extra-articular	Not involving the joint.
glenoid	Like a socket; this forms the socket of the shoulder joint.
haemothorax	Bleeding into the chest.
intra-articular	Into the joint – a fracture involving the joint surface.
non-union	Failure of a broken bone to heal.
pneumothorax	Punctured lung.
rotator cuff tear	Tear involving any or all of supraspinatus, infraspinatus, subscapularis or teres minor.

scapula	The shoulder blade. A large triangular flattened bone lying over back of the ribs at each shoulder, joined to the collar bone and arm.
scapular neck	Part of the shoulder blade connecting the joint to the body of scapula.
stellate	Star shaped – consisting of a number of radial lines.
subluxed	Falling out of joint – almost dislocated.

8. References

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