1 Humeral fractures
1.11 | Proximal humeral fractures—Nonoperative treatment

**Indication**
All 11-A, 11-B, and 11-C type fractures

**1 Principles**

**General considerations**
Most proximal humerus fractures will heal without surgery, and many recover satisfactory function. Outcome of nonoperative treatment depends upon the type of fracture, the degree of fragment displacement, and intrinsic fracture stability. Assessment of stability with image intensification is helpful according to the author’s experience. Without fixation, displaced proximal humerus fractures are rarely improved with closed fracture reduction.

Nonoperative treatment should provide mechanical support until the patient is sufficiently comfortable to begin shoulder use, and the fracture is sufficiently consolidated that displacement is unlikely. Once these goals have been achieved, rehabilitative exercises can begin to restore range of motion, followed by strength, and function.

The three phases of nonoperative treatment are thus
1. Immobilization
2. Passive/assisted range of motion
3. Progressive resistance exercises

Duration of Immobilization should be as short as possible, and as long as necessary. Typically, immobilization is recommended for 2-3 weeks, followed by gentle range of motion exercises. Resistance exercises can generally begin at 6 weeks. Isometric exercises may help maintain strength during the first 6 weeks.
2 Reduction of glenohumeral fracture dislocation

Proximal humeral fracture dislocations (A1.3, B3, and C3) require prompt reduction of the glenohumeral joint dislocation. Keep in mind that with fracture dislocations it may be necessary to convert to an open reduction procedure in order to reduce the joint. Therefore, arrange for operating room availability. Since the reduction of the dislocation may be difficult, regional or general anesthesia, including muscle relaxation, is recommended.

**Note:** Definitive operative treatment is usually best for glenohumeral fracture dislocations. Nonoperative treatment should be considered only if surgery has a significant risk, or if shoulder reduction has resulted in acceptable reduction of the fracture components.

2.1 Principles of closed reduction
(See illustration) Axial traction on the arm is almost always helpful. Even with a fracture of the proximal humerus there is usually sufficient intact soft tissue so that the traction is transmitted to the humeral head. Direct manipulation of the dislocated head segment can assist the reduction. Pressure should be applied over the prominent humeral head, and directed to push it back into the glenoid. Beware pressure on neurovascular structures.

2.2 Confirmation of glenohumeral reduction
Once the glenohumeral reduction is felt, it should be confirmed with true AP and axillary x-rays. Additional fractures or displacement should be looked for. When x-ray anatomy is not completely clear, a CT scan, often with reconstructed views, can be very helpful.

Check also the neurovascular status, especially distal pulses, motor function, and sensation. The axillary nerve is at particular risk, and can be assessed by sensation over the lateral deltoid and the cooperative patient’s ability to contract the deltoid muscle.

2.3. Rule out rotator cuff tear
Particularly in older patients, glenohumeral dislocations may result in a torn rotator cuff. Early repair, before tendon retraction or significant atrophy, is the most effective treatment. If physical assessment does not confirm rotator cuff strength, additional studies (eg. ultrasound, MRI) should be performed promptly.
3 Sling and swath

Optimal shoulder immobilization is achieved when the upper arm and forearm are secured to the chest. Traditionally, this has been done with a sling that supports the elbow and forearm and counteracts the weight of the arm. The simplest sling is a triangular bandage tied behind the neck. Additional support is provided by a swath which wraps around the humerus and the chest to restrict shoulder motion further, and keep the arm securely in the sling. Commercially available devices provide similar immobilization, with or without the circumferential support of a swath.

4 Shoulder immobilization

Sling and swath (A), shoulder immobilizer (B), Gilchrist bandage (C), and other such devices all provide essentially similar support for the shoulder joint.

5 Collar and cuff

The simplest arm support is a so-called collar and cuff that limits shoulder motion but does not support much of the arm’s weight. This may be desirable when gentle traction is expected to improve fracture alignment. It provides less stability than a sling, with or without swath, and must be removed for shoulder or elbow motion.

Most shoulder supports can be worn underneath or outside the patient’s clothing. The latter requires sufficient shoulder motion and comfort for dressing before the support is applied.

Keeping the hand accessible, and encouraging the patient to move use wrist and fingers, helps to prevent stiffness that may be very hard to correct if it is allowed to develop.
6 Arm sling

Slight to moderate displacement of proximal humerus fractures may be treated by external support alone. A broad arm sling is the commonest method. In its simplest form, a triangular bandage is wrapped around the elbow and the forearm and tied behind the neck. The sling can be adjusted to avoid distraction at the shoulder which might cause undesirable disimpaction. Commercial slings are available to provide similar support.

7 Shoulder abduction cushion

To relieve tension on the supraspinatus tendon and greater tuberosity, one may support the arm in abduction. This can be done with a so-called airplane splint or a shoulder abduction cushion as shown.

8 Mobilization: 2-3 weeks posttrauma

Nonoperative management of proximal humerus fractures usually begins with maximal support - a sling and swath equivalent worn continuously. If the patient is uncomfortable, a sitting position may be preferred for sleeping.

A patient who is very comfortable, at the beginning of treatment or after some recovery, may need less immobilization, and even begin gentle use of the injured arm.
As soon as pain permits, pendulum exercises (as illustrated) should begin. Active hand and forearm use should also be encouraged. Isometric exercises can begin as soon as tolerated for the shoulder girdle including scapular stabilizers, and the upper extremity. X-rays should be checked to rule out secondary fracture displacement.

9 Active assisted exercises: 3-6 weeks postoperative

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10 Shoulder therapy set: 3-6 weeks postoperative

A «shoulder therapy set» might be helpful. Typically included devices are:

1. An exercise bar, which lets the patient use the uninjured left shoulder to passively move the affected right side.
2. A rope and pulley assembly. With the pulley placed above the patient, the unaffected left arm can be used to provide full passive forward flexion of the injured right shoulder.

11 Strengthening: from week 6 on

As passive motion improves, and the fracture becomes fully consolidated, active motion against gravity and resistance exercises are added to build strength and endurance. Many surgeons advise forward flexion before abduction against gravity, which puts significant strain on the supraspinatus. Elastic devices can be used to provide varying degree of resistance, and ultimately the athletic patient can progress to resistance machines and free weights. Physical therapy instruction and supervision may be helpful for optimal rehabilitation or if the patient is not progressing satisfactorily. Remember to monitor rotator cuff strength. Significant weakness may indicate an unidentified rotator tendon cuff rupture in need of surgical repair.

12 Pitfall: shoulder stiffness

To reduce the risk of stiffness, immobilization should be discarded as soon as possible. This can be done progressively, beginning with elimination of the swath (circumferential bandage) during the daytime and encouraging pendulum exercises.

The sling may be used on a part-time basis as soon as appropriate. If formal physical therapy has not been prescribed, it should be considered for any patient whose range of motion is not improving as expected.