Reduction of the dislocated shoulder

Indications

The glenohumeral joint is the most commonly dislocated major joint of the body. Patients presenting with a suspected dislocation should be fully assessed as previously described. Of clinical importance are the distal neurovascular status, including axillary nerve function as examined through 'regimental patch' sensation, and the type of dislocation, anterior, posterior or inferior (luxatio erecta). The protocols described below apply to the reduction of the commonest type of injury, anterior dislocation. Posterior and inferior dislocations warrant discussion with the on-call orthopaedic team.

Anterior glenohumeral dislocation is diagnosed clinically, through the loss of normal shoulder contour, and the palpable anterior humeral head. Three plane X-rays including anteroposterior (AP), axillary and scapula Y views confirm the diagnosis (*Figure 1*). The radiographs may also highlight associated injuries, such as humeral neck injuries in the elderly, greater tuberosity fractures or Hill–Sachs lesions (indentations to the humeral head resulting from dislocation). The patient's general condition should also be documented as part of a full history and examination. This may help with decisions regarding appropriate anaesthesia.

Figure 1. Anteroposterior view of anterior glenohumeral dislocation.

Mr Sam Oussedik *is Clinical and Research Fellow in Orthopaedic Surgery, Department of Orthopaedics, University College Hospital, London NW1 2BU and* **Mr Fares Haddad** *is Consultant Orthopaedic and Trauma Surgeon, Department of Trauma Surgery, Middlesex Hospital, London*

Correspondence to: Mr S Oussedik

Planning

Having confirmed the diagnosis and documented the neurovascular status of the arm, consideration must be given to both the type of anaesthesia, if any, to be used, and the method of reduction to be used. A sling should be prepared to immobilize the arm following reduction. This should preferably hold the arm in adduction and internal rotation, but a broad arm sling may be used.

Anaesthetic options

Three types of anaesthesia are available in the accident and emergency department. These are:

- No anaesthesia (analgesia alone)
- Local anaesthesia
- Sedation and analgesia.

No anaesthesia

The main difficulty to overcome in reducing the dislocated shoulder is the spasm present in the shoulder musculature. However, in cases of recurrent dislocation of a pathologically lax shoulder, or in the elderly with weak musculature, this may be overcome without resorting to specific anaesthetic measures. This does not mean that the patient should not receive adequate analgesia, however, and this should be provided in all cases.

Local anaesthesia

Equipment

- 20 ml syringe
- 20 ml of 1% lidocaine (lignocaine) (maximum dose 4 mg/kg)
- 20 gauge needle
- Skin preparation (iodine based or chlorhexidine)
- Sterile gauze
- Dressing.

Technique

The patient sits at a comfortable angle on a trolley. A sterile field is prepared around the shoulder, using the skin preparation and sterile gauze. The dislocated humeral head results in a depression just below the acromial edge, known as the lateral sulcus sign. The site for injection of the lidocaine is 2 cm below the lateral or posterolateral acromial edge. The tip of the needle is directed towards the empty glenoid cavity. The syringe is aspirated to ensure the needle does not lie intravascularly. A small volume of lidocaine is injected at first, and a note is made of the resistance to injection. If correctly positioned, there should be minimal resistance. If resistance is encountered then the needle should be repositioned, and resistance reassessed. Once correctly positioned, the rest of the lidocaine is injected. The patient is allowed to rest for 5 minutes until the local anaesthetic has taken effect. Reduction can then be attempted.

Sedation and analgesia

Equipment

- 18 or 20 gauge intravenous (IV) cannula
- 5 mg of morphine in labelled syringe
- 10 mg of midazolam in labelled syringe
- Oxygen and mask
- 20 ml of 0.9% saline in labelled syringe
- Pulse oximeter
- Electrocardiogram (ECG) monitoring
- Defibrillator, advanced life support equipment and drugs.

Technique

The patient should be starved. Informed written consent is obtained. Baseline observations are recorded. ECG and pulse oximeter monitoring are established. Oxygen is provided. The cannula is inserted into the contralateral arm and 5 mg of morphine is given by slow IV injection. Five minutes are allowed to pass for the morphine to take effect. The midazolam is then given by slow IV injection. An initial dose of 1.5 mg is provided. Further boluses are then titrated to effect, allowing 1–2 minutes between injections. Saline flushes are administered between doses. Adequate sedation is achieved once the eyelids begin to droop. Further doses can be administered once manipulation has been attempted if sedation is inadequate. The total dose of midazolam necessary is usually 3.5–7.5 mg; in the elderly 3.5 mg should be the maximum dose provided. Monitoring is continued throughout the recovery period, and the patient is not discharged until he/she is able to eat and drink. The patient must be accompanied home.

Greater muscular relaxation may be achieved through sedation and analgesia. However, intra-articular lidocaine has the advantage of being quicker and simpler to apply, requiring less observation following the procedure and allowing earlier discharge. As with any invasive technique, a theoretical risk of introducing infection exists, and all precautions must be taken to avoid this.

Techniques for reduction

A number of techniques are described for the reduction of anterior glenohumeral dislocation. Outlined below are those in common usage. Selection should depend on patient factors such as age and fragility of bones, injury factors such as the presence of associated fractures, and operator experience and preference. No prospective randomized controlled trial exists comparing the various techniques.

Traction–countertraction

This is perhaps the simplest technique. An assistant is necessary to provide the countertraction. The patient is positioned supine. The operator takes hold of the patient's forearm which is held in a neutral position with the elbow extended. The assistant loops a pillow case or sheet around the axilla and applies countertraction while the operator applies traction to the forearm. This is held for up to 5 minutes of steady traction. Success is signalled by an audible 'clunk' as the humeral head reduces. It is important to apply a steady force to the arm and to avoid any sudden jerks.

The Hippocratic technique

This is a variation on the traction–countertraction technique. It has the advantage of being carried out by a single operator, but is less elegant. The assistant's countertraction is replaced by the operator's foot being placed in the axilla. Steady traction and countertraction is then applied in a similar manner to that described above.

The external rotation technique

The external rotation technique (Leidelmeyer, 1977) is also sometimes called the Kocher method. The patient is positioned in a supine position. The elbow is flexed and held at a 90° angle. The operator's other hand holds the wrist and applies longitudinal traction. Once traction has been established over a period of several minutes to allow relaxation of the shoulder musculature, the arm is very slowly externally rotated. This is halted every few degrees to allow further relaxation. The arm is simultaneously slowly adducted across the chest.

Reduction is achieved following 5 minutes of this procedure, once the arm has reached the coronal plane and is at right angles to the body. Reduction may also be effected if the forearm is internally rotated once full external rotation and adduction has been achieved.

Stimson's technique

The patient is positioned in the prone position, with the affected arm hanging vertically over the edge of the couch. In this position, the operator can either apply weights to the forearm, beginning with 5 lb and increasing to 15 lb as necessary, or manually apply downward pressure. In either case, 15–20 minutes of pressure are necessary to effect reduction. Traction on the arm in this position allows the scapula to rock anteriorly, increasing the anteversion of the glenoid cavity and facilitating reduction.

The Milch technique

This technique was developed by Milch (1938). The patient is positioned in the supine position. The operator places one hand on the patient's shoulder with the thumb supporting the dislocated humeral head. The operator's other hand then takes hold of the patient's forearm and gently abducts it until it comes to lie above the patient's head. The humeral head is fixed in position such that it rotated in its dislocated position. This allows the force exerted by the shoulder musculature to be eliminated, and the humeral head is then gently pushed back into position.

In the elderly population with osteopenic bones, a method which avoids forceful rotation should be selected because of the potential risk of iatrogenic humeral fracture. The traction–countertraction technique can be safely used in this population.

Reduction may be unsuccessful in the younger population where muscular spasm is difficult to overcome. Associated greater tuberosity fracture may also mechanically block reduction. In such cases, reduction under general anaesthesia or open reduction should be considered.

Post-reduction

Following successful reduction, three plane radiographs should be repeated to both document reduction and reassess the presence of associated injuries. The distal neurovascular status is also reassessed and documented. The patient is discharged in an appropriate sling. Follow-up should be arranged according to local protocols. **BJHM**

Conflict of interest: none.

Leidelmeyer R (1977) Reduced! A shoulder subtly and painlessly. *J Emerg Med* **9:** 233

Milch H (1938) Treatment of dislocation of the shoulder. *Surgery* **3**: 732–40

KEY POINTS

- Glenohumeral dislocation is commonly seen in emergency departments.
- A number of anaesthetic options are available, choice often depending on local protocols and clinician's preference.
- Care should be taken when making a choice of reduction technique in order to avoid iatrogenic injury.