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# Intra-articular Shoulder Injection for Reduction Following Shoulder Dislocation

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## Overview

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The anterior shoulder dislocation is one of the most common joint dislocations seen in emergency settings. In anterior shoulder dislocation, the humeral head is displaced out of the glenohumeral joint in front of the scapular glenoid, resulting in a loss of the articulation between the arm and the rest of the shoulder. This can be caused by a fall onto an abducted, extended, and externally rotated arm, such as in a bicycle or running accident. Sometimes anterior shoulder dislocation can be due to a minor trauma or even result from rolling over in bed with an externally rotated and stretched overhead arm.

Anterior shoulder dislocation is a painful injury. Patients cannot actively abduct, adduct or internally rotate the shoulder. Reduction of the shoulder is the best form of analgesia and, of course, is necessary to restore arm function. While it is current practice for patients to undergo procedural sedation during the shoulder reduction procedure, the sedatives have serious side effects (cardiac and respiratory depression), and require long stays in the emergency department (ED), dedicated nursing staff, multiple radiographs, and consulting services.

Intra-articular injection with a local anesthetic, such as lidocaine, offers significant pain relief in patients with shoulder dislocations and during the reduction procedure. It is a technically simple procedure that doesn't require long ED stays or significant hospital resources. The success of the intra-articular anesthesia can be enhanced further by performing the procedure under the guidance of bedside ultrasound, which allows real-time visualization of the needle tip reaching the appropriate area.

## Procedure

### 1. Physical Exam Findings

1. On general inspection, observe the patient for the loss of shoulder contour and flattened shoulder definition compared with the unaffected side. This occurs because the humeral head is no longer beneath the deltoid. Notice if the patient rests with the arm held in slight abduction and external rotation, supporting the arm with the uninjured hand. These are signs of an anterior dislocation.
2. Palpate the radial pulse. Although injury to the axillary artery is rare from a dislocation, a decreased or absent radial pulse can be a clue, especially if the injury occurs in an elderly patient.
3. Palpate along the clavicles of both sides (affected and unaffected), outward towards the shoulders, to determine if there is any pain or deficit that points to a clavicular injury.
4. Palpate for the humeral head. In a dislocated shoulder, it is often felt in the lateral subclavicular region anterior to the armpit.
5. Assess the status of the axillary nerve by testing sensation over the lateral upper arm in the "regimental badge" area of the deltoid muscle. The axillary nerve is the most common nerve injury associated with anterior shoulder dislocations, and sensory losses are usually temporary.
6. Test the rest of the brachial plexus by performing sensory and strength examinations of the hand, wrist, and elbow while supporting the patient's shoulder. Brachial plexus injuries are rare, but may occur if a stretch injury is the reason for dislocation.
7. Record any deficits found on examination in range of movement, sensation, or motor strength to establish a baseline. These will need to be retested once the procedure is complete to evaluate for any changes. Large sensorimotor deficits, or worry for involvement of brachial plexus branches, may be an indication for operative management.
8. Obtain an anteroposterior, lateral, and "Y view" shoulder X-ray to rule out fractures.

### 2. Procedure Without Ultrasound

1. Equipment needed: betadine solution, sterile gloves, 1% lidocaine, a 20 mL syringe, 20-gauge 3.5 cm needle, gauze, tape, sterile tray to place equipment
2. Place the patient in a sitting or semi-recumbent position, as this is usually the most tolerable position for patients with anterior shoulder dislocation.
3. Palpate the surface landmarks of the posterior acromion, coracoid, and the lateral sulcus. The lateral sulcus is an abnormal finding associated with anterior shoulder dislocation; it is formed by the empty glenoid fossa when the humeral head has vacated that space. Press into the shoulder from the posterolateral or lateral side, and the sulcus will be evident by finger intrusion into the space or depression of the skin. This will be the insertion site for the analgesia.
4. Mark the insertion site by placing an "X" over the spot with a skin marker. Apply betadine generously over the site in a sterile fashion.
5. Prepare the syringe with 10-20 mL of lidocaine 1%, and attach a needle to the syringe.
6. Don sterile gloves, and palpate the anticipated insertion site again to confirm the point of entry.
7. Insert a small wheal of subcutaneous lidocaine to anesthetize the skin. Direct the needle about 2 cm inferior and lateral to the acromion in the lateral sulcus, toward the shoulder joint. Slowly proceed deeper, injecting a small amount of lidocaine into the tract of subcutaneous tissue and muscle.
8. Aspirate intermittently. Once you have breached the injured joint capsule, serosanguinous fluid should be freely aspirated. At this point, slowly inject 10-20 mL of lidocaine.

9. If the needle has been inserted all the way in, but no blood has been aspirated, this means that either you are not in the correct space, or the needle is not long enough. Do not inject more lidocaine as it will not be effective. If this happens, you can attempt to repeat the procedure using a longer needle (this sometimes requires a spinal needle) or use ultrasound guidance as described below.
10. Once lidocaine has been inserted into the shoulder joint, wait 10-15 minutes and assess if the patient is more comfortable and numb in the shoulder.
11. Proceed with shoulder reduction.

### 3. Procedure Using Ultrasound Guidance

1. It is usually helpful to have an assistant, as one person holds the ultrasound probe and the other performs the injection; however, it is not entirely necessary.
2. Using the linear probe (for a thin person) or the curvilinear probe (for a larger person), place the probe in a transverse plane across the dorsal aspect of the affected shoulder. On the ultrasound screen, look for anterior displacement of the humeral head away from the glenoid. In the evacuated glenoid fossa in between the glenoid and the humerus, you will see clot formation.
3. Sterilize the lateral shoulder using betadine.
4. Prepare the syringe with 10-20 mL of lidocaine, attaching the needle. Don sterile gloves.
5. Inject a superficial wheal of lidocaine to anesthetize the skin at the insertion site on the lateral or posterolateral aspect of the shoulder. Proceed deeper slowly, injecting a small amount of lidocaine into the subcutaneous tissue and muscle.
6. Follow the needle tip on the ultrasound screen as it enters in an "in plane" approach, meaning that the direction of needle insertion is parallel to or in plane with the direction of probe orientation.
7. Direct the needle tip towards the blood clot in the empty glenoid fossa. When the needle tip is seen within the joint capsule, aspirate. Aspiration will be visible on the screen and confirmed with blood in the syringe.
8. Inject 10-20 mL of lidocaine into the joint space. This will be visible as a "swirling" motion on the ultrasound screen.
9. Wait 10-15 minutes and assess the effect of intra-articular anesthesia by asking the patient if the pain has decreased.
10. Proceed with shoulder reduction and confirm correct humeral head placement in line with the glenoid by ultrasound.

### Summary

For shoulder dislocation, intra-articular injection of lidocaine as analgesia (and subsequent reduction) avoids the cardiopulmonary depression and side effects associated with procedural sedation. Intra-articular injection of lidocaine is a safe procedure since the administered dosages are below the levels that cause cardiotoxicity. In addition, the direct injection into the joint space decreases the risk of systemic infection, and the risk of septic arthritis is mitigated by sterile precautions.

One of the main reasons for not achieving adequate analgesia is not accessing the joint capsule due to inadequate needle length in obese patients or those with large musculature. Regular needles may be too short to pierce through the subcutaneous tissue in these patients, and the procedure may require a longer 22-gauge spinal needle. In addition, the inserted needle might be abutting a bony prominence due to inappropriate trajectory of the needle insertion, and the operator report meeting resistance during the procedure. Performing the intra-articular injection under ultrasound guidance helps to determine the appropriate pathway to the joint capsule. The ultrasound allows visualization of the hemarthrosis of the joint capsule and confirmation of needle entry, resulting in aspiration and injection of the appropriate area and increasing success of the procedure.