



Bone Chillin'! Orthopedic Reductions and Regional Block

Would you want your loved one to wait in pain for that x-ray? Haven't you always wanted to possess new and better ways to reduce pain in your patients with orthopedic injuries as they wait for x-ray and during reduction/relocation? Learn methods to reduce pain and have some fun while doing it.

- Review the most common orthopedic reductions: shoulder, elbow, knee, and hip.
- Describe regional blocks that may facilitate decreasing pain in orthopedic reduction/relocations.
- Discuss the potential pitfalls of these blocks and how to augment them if necessary.

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McCormick Place - Lakeside Building

(+)No significant financial relationships to disclose

(+)Gregory W. Hendey, MD, FACEP
Professor, Clinical Emergency Medicine,
UCSF School of Medicine, San Francisco,
California; Vice Chair and Research
Director, UCSF-Fresno Emergency
Medicine Residency Program, Fresno,
California

Bone Chillin' Orthopedic Reductions
Gregory W. Hendey, MD, FACEP
Professor of Clinical Emergency Medicine
UCSF Fresno Medical Education Program

Objectives:

- 1) To demonstrate several techniques for the reduction of dislocations of the:
 - Ankle
 - Knee
 - Hip
 - Elbow
 - Shoulder
- 2) To describe regional blocks that may decrease pain and facilitate orthopedic reductions.

General Principles:

- Nomenclature
 - Direction of displacement of distal relative to proximal part
- Muscle spasm is the enemy
 - Sedation, local/regional anesthesia is often necessary
 - Multiple options as follows:

Sedation options:

- 1) No sedation.
Sometimes, gentle reduction may be accomplished without sedation.
- 2) Light sedation or analgesia
Small doses of a narcotic or benzodiazepine.
- 3) Procedural sedation.
Moderate or Deep sedation, with Midazolam/Fentanyl, Ketamine, Methohexital, Etomidate, or Propofol.

Local / Regional anesthesia:

- 1) Intra-articular injection of local anesthetic.
 - a. Shoulder dislocation
 - b. 20 ml local anesthetic
- 2) Hematoma block
 - a. Metacarpal fracture
 - b. Distal radius fracture
- 3) Femoral nerve block
 - a. Femur fracture

- 4) Digital nerve block
 - a. Finger dislocation / fracture
- 5) Bier block
 - a. Forearm and wrist fractures
 - b. Requires special Double BP cuff
 - c. 30-40 ml plain Lidocaine through butterfly IV in hand
 - d. Slowly let down cuff after procedure (15-30 mins)

CASE 1:

24 yo M semi-pro football player
Another player rolled over his ankle from behind

ANKLE DISLOCATION:

- Usually posterior
- Often associated with fracture and ligamentous injury

Reduction:

- Place one hand behind heel, with other over dorsum of foot.
- Downward and anterior traction, with foot plantar-flexed initially.
- Finally bring ankle back to 90 degrees flexion.

Clinical Pearl:

Put the knee in a slightly flexed position (20-30 degrees) during the reduction to reduce tension at the ankle.

Post-reduction:

- Immobilize in short leg, 3-sided splint, ankle at 90 degrees
- Follow up with Orthopedic surgeon

CASE 2:

20 yo football player struck in the knee during a game
L knee is swollen, deformed
DP and PT pulses are weak, but present

KNEE DISLOCATION:

- Uncommon, but potentially limb-threatening
- Direction of tibial displacement:
Anterior > Posterior > Medial or Lateral



Causes:

- Motor vehicle accident (>60%)
- Falls
- Sports injuries
- Industrial accidents.

Clinical Pearl:

- Beware of spontaneously reduced knee dislocation, when faced with severe, bicruciate ligamentous injury with an unstable knee.
- In approximately half the cases of knee dislocation, spontaneous reduction has occurred prior to evaluation.

Twaddle B, et al: Knee Dislocations: Where are the Lesions? *J Orthop Trauma* 2003;17:198.

60 knee dislocations
2/3 were in a reduced position on presentation
Ligamentous injuries:
ACL 84%, PCL 87%, ACL+PCL 71%
Fractures in 24%, Popliteal artery injury in 9 (14%)

Reduction:

- 1) Assistant places *slight* longitudinal traction on the leg
- 2) Physician keeps one hand on tibia and one on femur to lift femur anteriorly and guide it back into position.
- 3) Posterior splint, in 15⁰ flexion.

Vascular evaluation:

- Significant incidence of major vascular injury (10-30%)
- Recent studies support a selective approach (rather than mandatory angiogram)
 - Careful physical exam
 - Measurement of arterial pressure indices (API)
- Selective Approach:
 - Abnormal neurovascular exam on PE or abnormal API:
 - Angiogram
 - Emergent Orthopedics consult, admission
 - No sign of vascular compromise on PE or API, consider:
 - Doppler Ultrasound
 - Serial exams

Hollis JD, Daley B, et al: 10-year review of knee dislocations: is arteriography always necessary? *J Trauma*. 2005 Sep;59(3):672-5.

Review of 39 patients with knee dislocation
All had angiograms, 19 abnormal, 7 required surgery

All 7 requiring surgical repair had abnormal physical exam.
Advocated selective approach to angio based on PE.

Klineberg EO, Crites BM, Flinn W, et al: The role of arteriography in assessing popliteal artery injury in knee dislocations. *J Trauma*. 2004 Apr;56(4):786-90.

Maryland shock trauma. 55 knee dislocations, 7 years
Evaluated by PE, ABI (>0.8), selective angio, follow up.
32 had normal exam and ABI. None required surgery.
23 had abnormal exam. 12 had injury on angio, 7 needed surgery.
Advocated selective approach based on PE and ABI's.

Caution is advised in this area, and when a selective approach is used, it should be combined with consultation and admission for serial observation. The role of Doppler ultrasound for patients with knee dislocation and normal vascular examination has yet to be defined, but should be a useful tool.

CASE 3:

45 yo female involved in MVA, c/o hip pain
Exam: hip is flexed and internally rotated

HIP DISLOCATION:

- Usually posterior
- Complications:
 - Fracture (in approximately half)
 - Pelvis, acetabulum, femoral head/neck
 - Avascular necrosis, femoral head
 - Time matters!
 - Reduction within 6 hours

Stimson:

- 1) Patient is prone on stretcher with leg hanging off end.
- 2) Hip and knee flexed to 90°
- 3) Apply downward force over proximal calf with your hand (or better yet, your knee), while holding patient's ankle.
- 4) May add internal / external rotation at the hip.



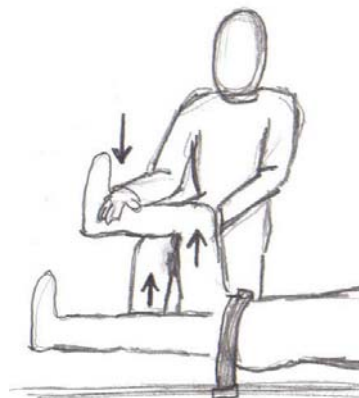
Allis (Reverse Stimson):

- 1) Patient is supine on stretcher, or on backboard on floor.
- 2) Hip and knee are flexed to 90°
- 3) Assistant holds patient's pelvis down (or strap pelvis to board).
- 4) Standing above patient, apply upward traction from behind patient's proximal calf. A sheet tied in a loop around your back and patient's calf may help, as you lift from your legs.
- 5) Add internal / external rotation.



Captain Morgan:

- 1) Patient is supine, Hip and knee flexed to 90° as above
- 2) Assistant holds patient's pelvis down (or strap pelvis down with belt or sheet)
- 3) Place your foot on stretcher, with knee under patient's knee
- 4) Holding patient's ankle, exert an upward force with your knee up by flexing your calf.



CASE 4:

Young female fell onto R arm playing volleyball.

Exam: swollen, deformed elbow, neurovascular exam normal.

ELBOW DISLOCATION:

- Large majority are posterior
- Associated fractures common
- Careful neurovascular exam

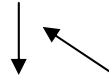
Traction / Flexion maneuver:

- 1) Grab wrist, supinate forearm, apply traction, with counter-traction on the distal humerus with your other hand.
- 2) Then flex elbow.
- 3) May also apply medial force to lateral elbow with thumb.



Arm Wrestling / Leverage:

- 1) Place your elbow firmly in patient's antecubital fossa.
- 2) Grab wrist with both hands.
- 3) Slowly flex patient's elbow, maintaining your elbow position, and grip on wrist.



CASE 5:

3 yo male pulled by the arm, won't use it
Elbow in slight flexion, pronated

NURSEMAID'S ELBOW

- Radial head subluxation from the annular ligament
- X-ray not necessary when history is clear
- Sedation unnecessary

Reduction:

Two methods:

- 1) Supination/Flexion
Place thumb over radial head, grab wrist, supinate forearm, flex elbow.
- 2) Hyperpronation
Place thumb over radial head, grab wrist, slowly pronate.

Studies:

Macias CG, Bothner J, Wiebe R: A comparison of supination/flexion to hyperpronation in the reduction of radial head subluxations. *Pediatrics* 1998;102(1):e10.

Prospective, randomized, 90 kids under 6 years of age
Supination/flexion vs Hyperpronation, repeat after 15 minutes
Crossover if unsuccessful x2, radiographs if both failed
Pronation better (95% vs 77% successful first attempt)
Of 6 crossovers from supination, 5 reduced by pronation

McDonald J, Whitelaw C, Goldsmith LJ: Radial head subluxation: comparing two methods of reduction. *Acad Emerg Med* 1999;6(7):715-8.

Prospective, randomized, 135 patients

Supination/flexion vs Pronation/flexion
Pronation better (80% vs 69% successful first attempt)
Physicians rated less pain with pronation

CASE 6:

30 yo male with history of shoulder dislocation reached up for a can on a shelf and felt his shoulder dislocate.

SHOULDER DISLOCATION:

Types:

- 97% Anterior
- 1-2% Posterior
- <1% Luxatio Erectae

Causes:

- Blunt trauma
- Chronic instability
- Seizure, Electrocutation (posterior)

Associated Fractures:

- Hill-Sachs
- Greater Tuberosity
- Bankart



Reduction techniques:

- External rotation
- Snowbird
- Traction / counter-traction
- Stimson
- Milch
- Scapular manipulation
- Forward elevation
- Eskimo
- Spaso

External Rotation (plus Milch):

- First described by Leidelmeier in 1977.
- Often referred to as the “Hennepin” method after Mirick published a series using this method in 1979.

- 1) Place patient supine on stretcher.
- 2) Hold the elbow at the patient’s side, flexed at 90°.
- 3) Externally rotate shoulder.



Modification: add a little Milch

- After full external rotation, pull downward traction, and fully abduct arm into overhead position (Milch), then return to normal position.

Scapular Manipulation (plus Stimson):

Described by Bosley (1979), Anderson (1980)

- 1) Patient is prone on stretcher with arm hanging toward floor.
- 2) Rotate infero-lateral aspect of scapula upward, toward the midline.



Modification: add some Stimson

- Place weights on hanging arm (Stimson), or pull arm down, and externally rotate.
- Also effective in Sitting position.

Traction / Counter-Traction:

Modification of Hippocratic method, with force on chest wall, not axilla.

- 1) One person pulls patient's wrist.
- 2) Second person wraps sheet around patient's chest and pulls opposite.



Modification:

- Flex elbow to 90 degrees, and place sheet around your waist and patient's forearm, near the elbow (rather than pulling from wrist).

Additional References:

1. Anderson D, Zvirbulis R, Ciullo J: Scapular Manipulation for Reduction of Anterior Shoulder Dislocations. *Clinical Orthopaedics and Related Research* 1982;164:181-183.
2. Kosnik J, Shamsa F, Raphael E, et al.: Anesthetic methods for reduction of acute shoulder dislocations: a prospective randomized study comparing intraarticular lidocaine with intravenous analgesia and sedation. *Am J Emerg Med* 1999;17:566-70.
3. Leidelmeyer R: Reduced! A Shoulder, Subtly and Painlessly. *Emergency Medicine* 1977;9:233-234.
4. Matthews DE, Roberts T: Intraarticular lidocaine versus intravenous analgesic for reduction of acute anterior shoulder dislocations. A prospective randomized study. *Am J Sports Med* 1995;23:54-8.
5. Yang R, Tsuang Y, Hang Y, Liu T: Traumatic Dislocation of the Hip. *Clin Orthop Rel Res* 1991;265:218-27.