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The Shoulder II: Open and Arthroscopic Techniques #3620
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Percutaneous Pinning of Proximal Humerus Fractures
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Introduction

- Percutaneous Pinning (PP) - excellent option for *certain* proximal humerus (PH) fractures
- Requirements
 - Accurate imaging studies - to define the fracture parts and their locations
 - Radiographs - anteroposterior (AP), velpeau axillary and outlet
 - CT scan
 - Good metaphyseal and cortical bone for hardware fixation
 - Surgeon understanding that the PP technique can be technically demanding
 - Patient who accepts immobilization period, frequent follow-up and pin removal

Indications

- For displaced surgical neck and 3-part PH fractures
 - Achieve a closed reduction that would not remain stable without fixation
- For valgus-impacted 4-part PH fractures
 - Must be able to elevate the head fragment through a limited incision to allow the tuberosity fragments to return near to their anatomic positions prior to applying fixation
- For more advanced indications
 - Utilize additional limited incisions to reduce fracture parts prior to stabilization
 - i.e., the deltopectoral approach, with limited soft-tissue dissection to maintain fracture fragment vascularity

Notes

Essential Equipment

- Terminally threaded pins
 - i.e., AO/ASIF 2.5 - 2.7 mm
- Cannulated screws
 - 4.0 mm - 4.5 mm
- Fluoroscopic imaging
 - Anteroposterior (AP) and axillary planes
 - Assess fracture reduction
 - Insure acceptable hardware placement

[If the above parameters for requirements, indications or equipment cannot be achieved, an alternate surgical technique should be utilized.]

Case Example

- Displaced, reducible 2-part surgical neck fracture in a younger patient with good bone stock
- Beach-chair position
 - 30° with the arm/shoulder lateral to the operative table
- Closed reduction is performed to confirm the indication for this technique prior to prep
- Following preparation and draping
 - Maintain arm position, usually in abduction with flexion
 - Commercially available devices - i.e., McConnell ASIP or the Tenet Medical Spider
 - Allows for the image intensifier to be moved easily between the AP and axillary images
- Pin placement
 - Determined with guidance from the fluoro image by placing pins on skin
 - 5-10 mm skin incisions along the anterior-lateral arm
 - Use clamp to bluntly spread down to bone
 - Allows pins to enter the cortex at about a 45° angle in the AP plane
 - Distal to proximal direction (proximal to distal fixation can be added)
 - Above the deltoid insertion
 - Pins directed slightly posterior (more if starting anterior and less if starting lateral)
 - To account for normal retroversion
 - 3 pins are typical
 - Spaced within humeral head, in both planes
 - Position the pins *near* subcortical bone within the humeral head
 - Rotate arm while under fluoro to insure pins within humeral head
 - Pins are cut below the skin

Notes

- Post-op care
 - Serial radiographs (weekly, if necessary) to insure fixation/reduction is maintained
 - Immobilize in sling for approximately 3 weeks
 - With better fixation, and if tolerated by the skin over the pins, gentle limited passive motion exercises can be started earlier
 - Wrist and hand exercises as able
 - Pins removed between 3-5 weeks
 - Often through new 5-10 mm incisions
 - Usually in the office
 - Sometimes in stages
 - Rehabilitation
 - Passive ROM initially
 - Active-Assisted ROM by 5-6 weeks, based on healing
 - Active exercises with further evidence of healing

Complication and Results

- Complications - Not commonly reported
 - Infection, neurovascular injury and mal- or non-union
 - Avascular necrosis - when indication extended
- Results
 - Jaberg, et al. - Good and excellent results in 70% of patients
 - Resch, et al. - 3- & 4-part fractures, Constant score 91 and 87, respectively
 - 4-part fractures with 11% AVN (and those had lower Constant score)

Conclusion

- Patient selection, fracture assessment, operative technique and postoperative treatment are all important factors in the ultimate outcome for PH fractures treated with the PP technique

Bibliography

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Notes
