

*Lake Tahoe Knee and
Shoulder Update 2002*

*Elbow Arthroscopy:
Basic Technique, Portals
and Anatomy*



Jeffrey Halbrecht MD

Elbow Arthroscopy Experience

Uncommonly scoped joint

Based on AAOS Survey:

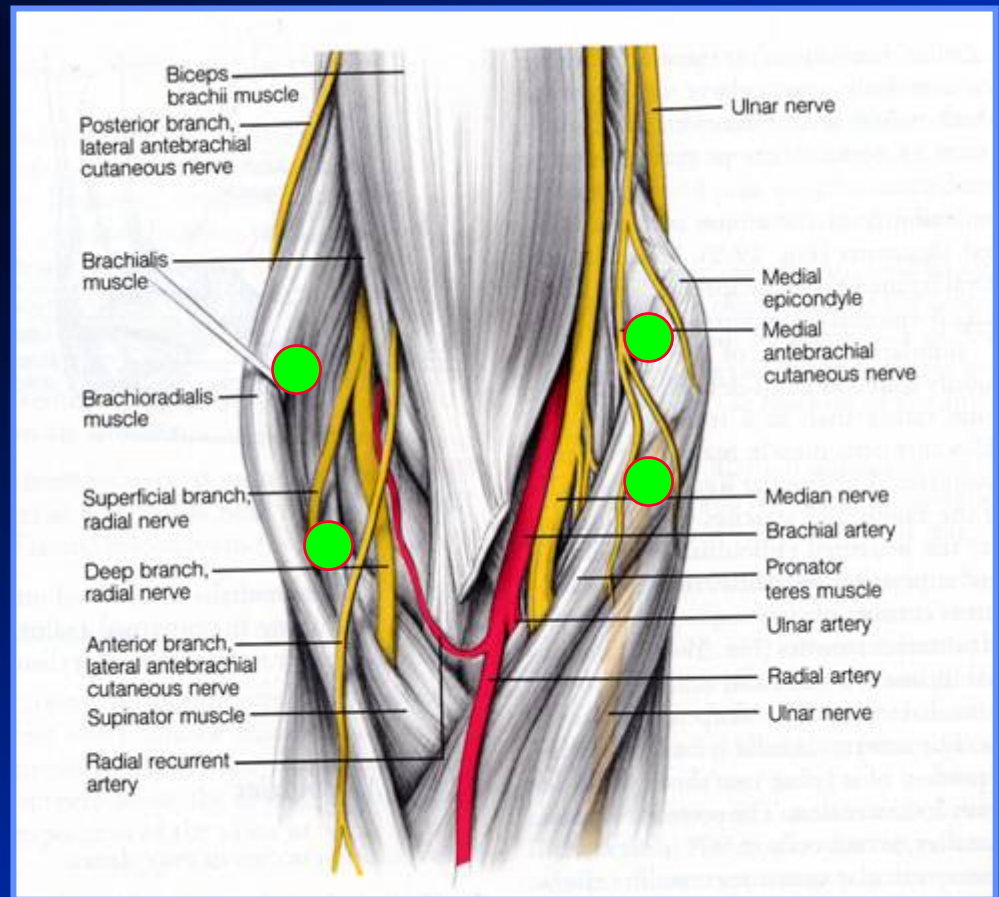
- Only 7.6% of Orthopaedic Surgeons perform elbow arthroscopy*
- Elbow arthroscopy constitutes only 2% of all orthopedic procedures*



Elbow Arthroscopy

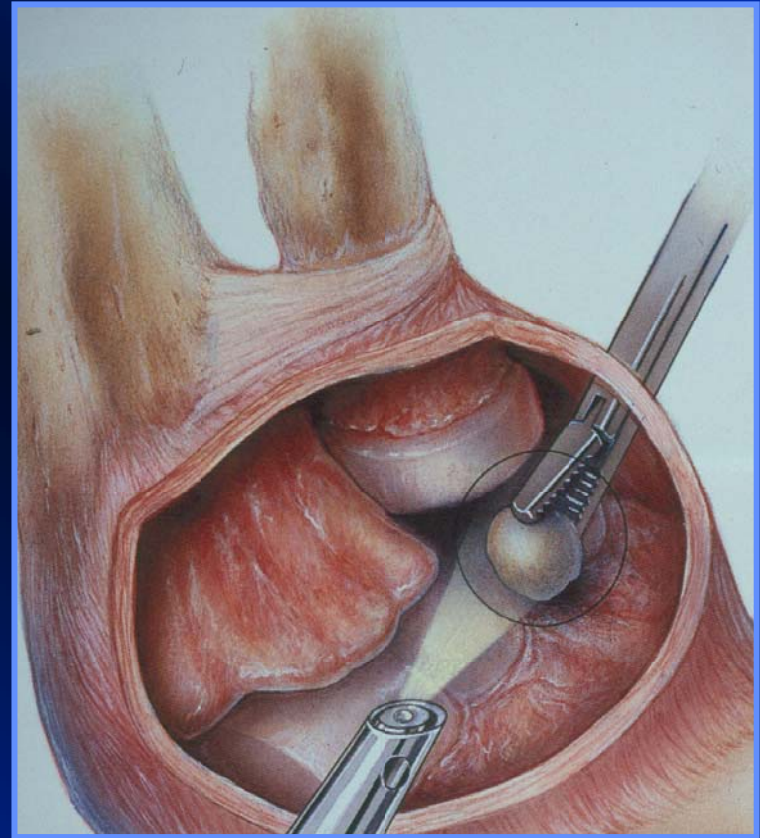
The most hazardous joint in terms of risk to intimately associated neurovascular structures

Poses greater technical challenges/neurologic risks than knee/shoulder scope



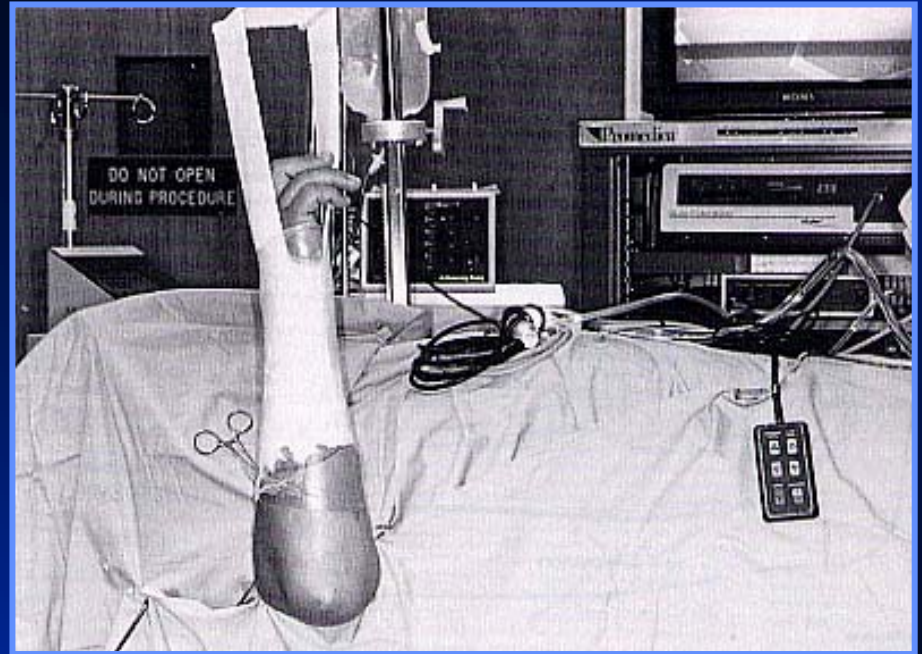
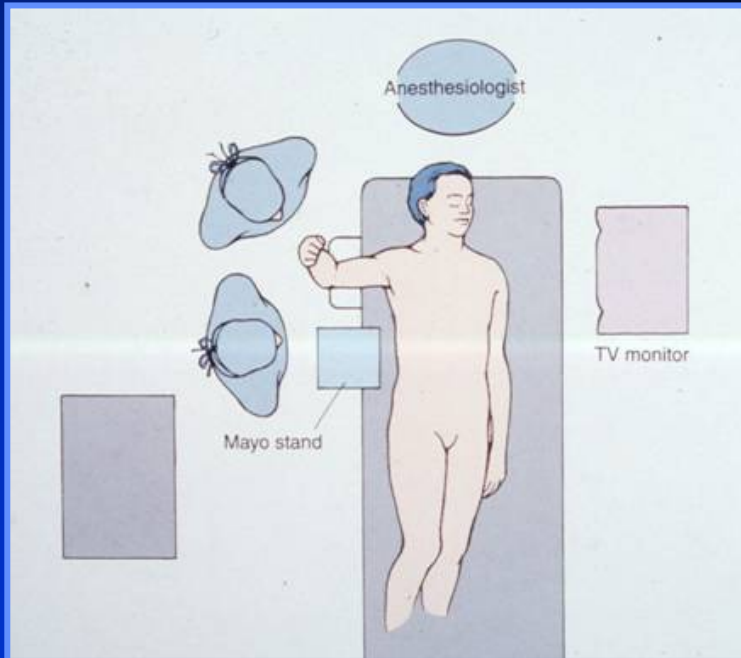
Indications

- *Removal of Loose body(ies)*
- *Olecranon Impingement
Overload*
- *OCD Capitellum*
- *Debridement Degenerative
Arthritis*
- *Synovectomy*
- *Diagnostic Evaluation*
- *Capsular Release*
- *Fx evaluation/Tx*
- *Debridement Lateral
Epicondylitis*



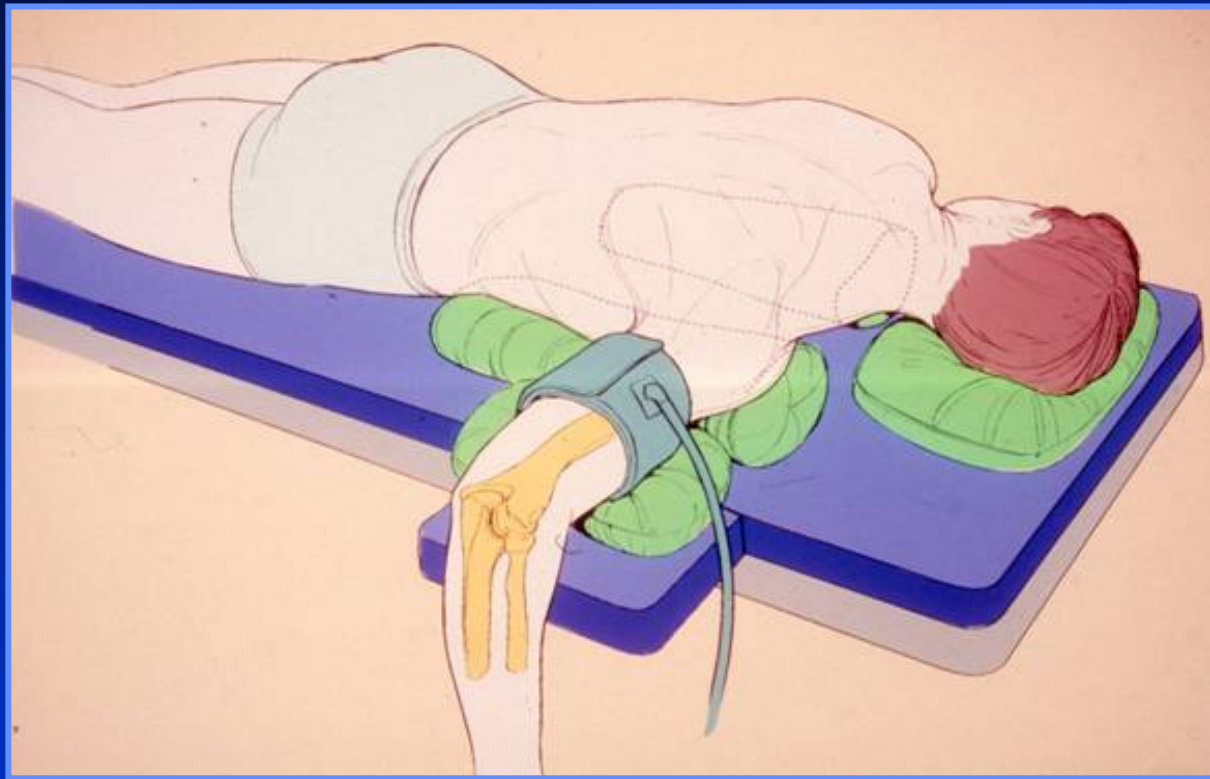
Positioning

Supine



Positioning

Prone



Positioning

Lateral Decubitus



Portals Anatomy

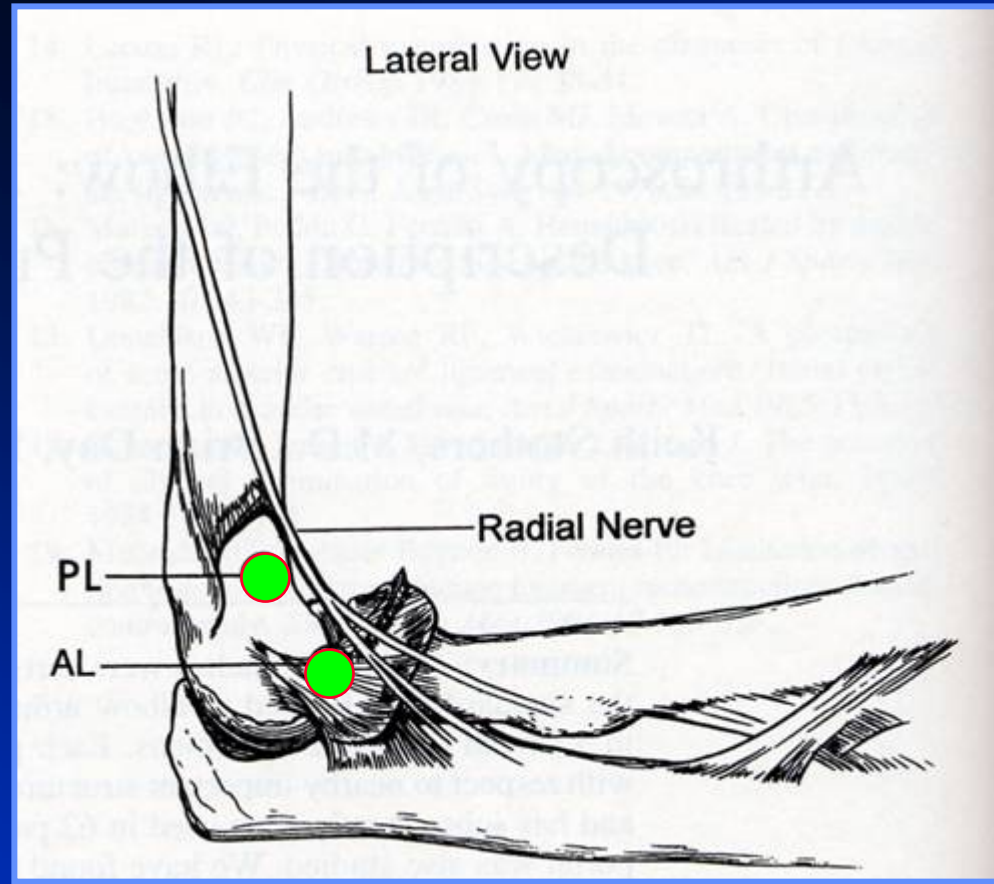
*Familiarity more critical
than w/ any other
arthroscopic procedure*

- *Anterior*
- *Posterior*

Anterior Portals

- *Assoc w/ greatest potential risk to nv structures*
- *Thorough exam of anterior compartment important in all cases*
- *Lateral*
- *Medial*

Lateral Portals

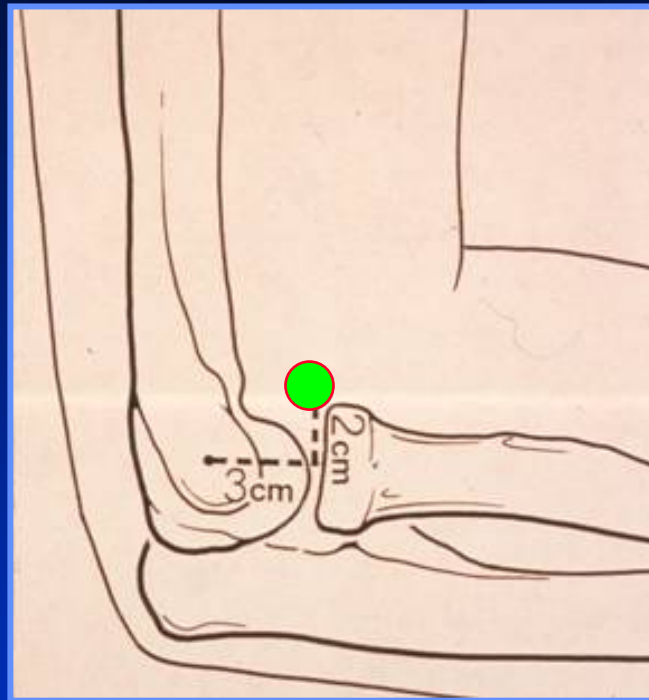


Anterolateral Portal

Initially described by Andrews and Carson

(Arthroscopy, 1:97-107, 1985)

- *3cm distal and 1-2cm anterior to lateral epicondyle*
- *Penetrates Extensor Carpi Radialis Muscle*



Anterolateral Portal

Visualization

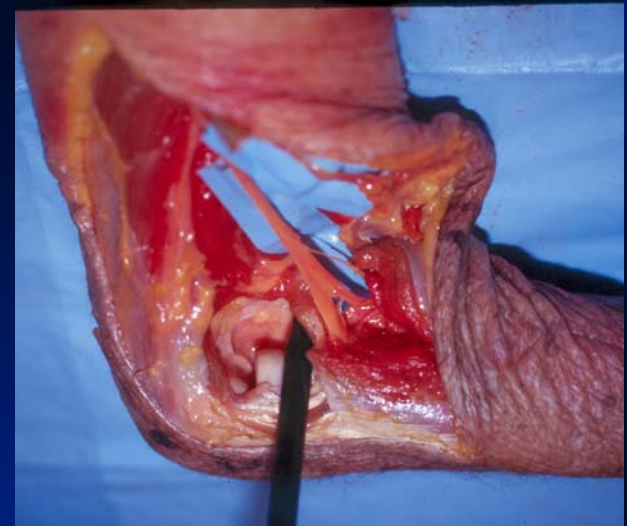
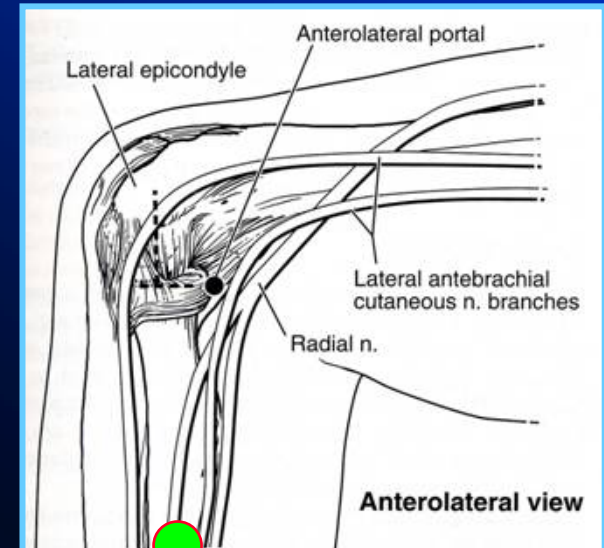
- *Trochlea*
- *Distal Humerus*
- *Coronoid Process and Fossa*
- *Medial and Superior Capsule*



Anterolateral Portal

Structures @ Risk

- **LABCN** ave. 7.6mm (0-20mm), in contact 43%
- **Radial nerve** is “at extreme risk” ave. 4.9mm (2-10mm)
 - Recommended placement 3cm from LE results in entry point that is distal I most pts, below jt in some pts
- **PIN** (fixed @ Arcade of Froshe) poorly protected, even in flexion, close to distal capsular attachment (little chance of displacement w/ jt distension)
- No longer used by some, if used, established from “inside-out”, proximal to radial head

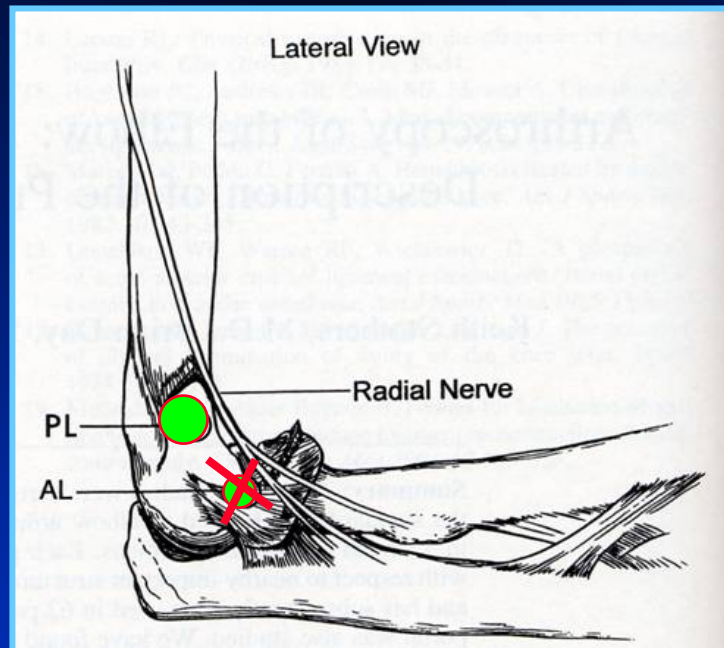


Proximal Lateral Portal

Described by Strothers, Day and Regan

(Arthroscopy, Vol. 11, No4, 449-457, Aug 1995)

- *1-2cm proximal to the lateral epicondyle, pierces Brachioradialis and distal Brachialis to reach lateral elbow capsule, lying directly on anterior surface of the humerus*
- *Improved margin of safety, supplants earlier AL portal*



Proximal Lateral Portal

Visualization

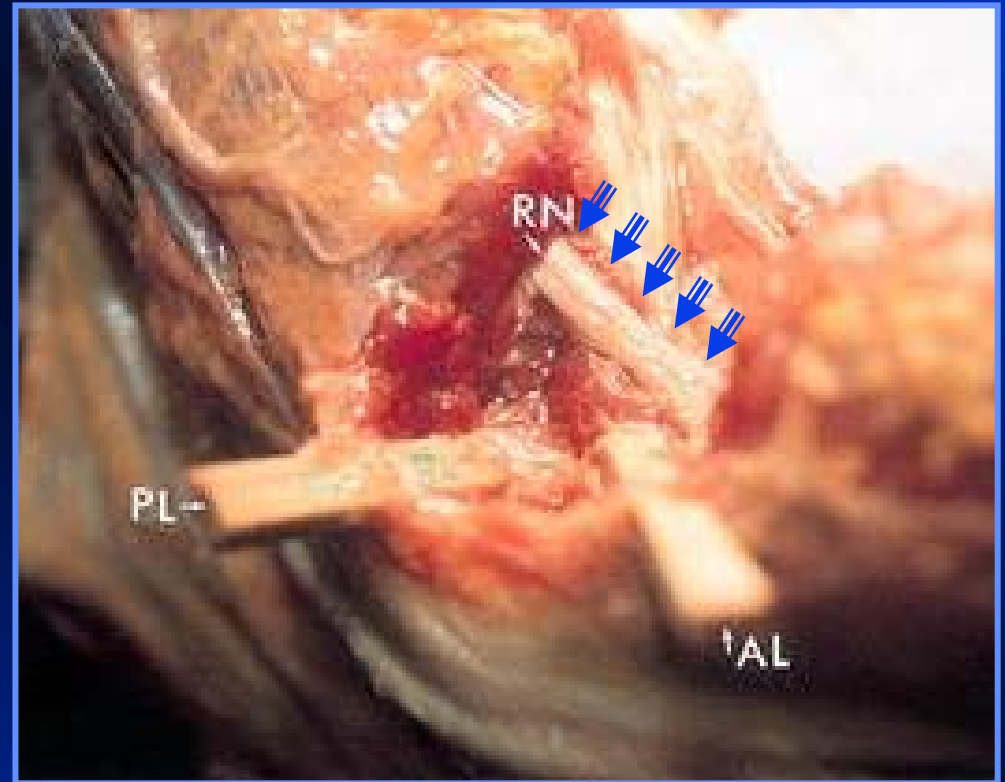
- *Anterior/Lateral aspect of Radial head and capitellum*
- *Medial aspect of elbow including:*
 - *Coronoid Process/Fossa*
 - *Distal Humerus*
 - *Trochlea*
 - *Medial Capsule*



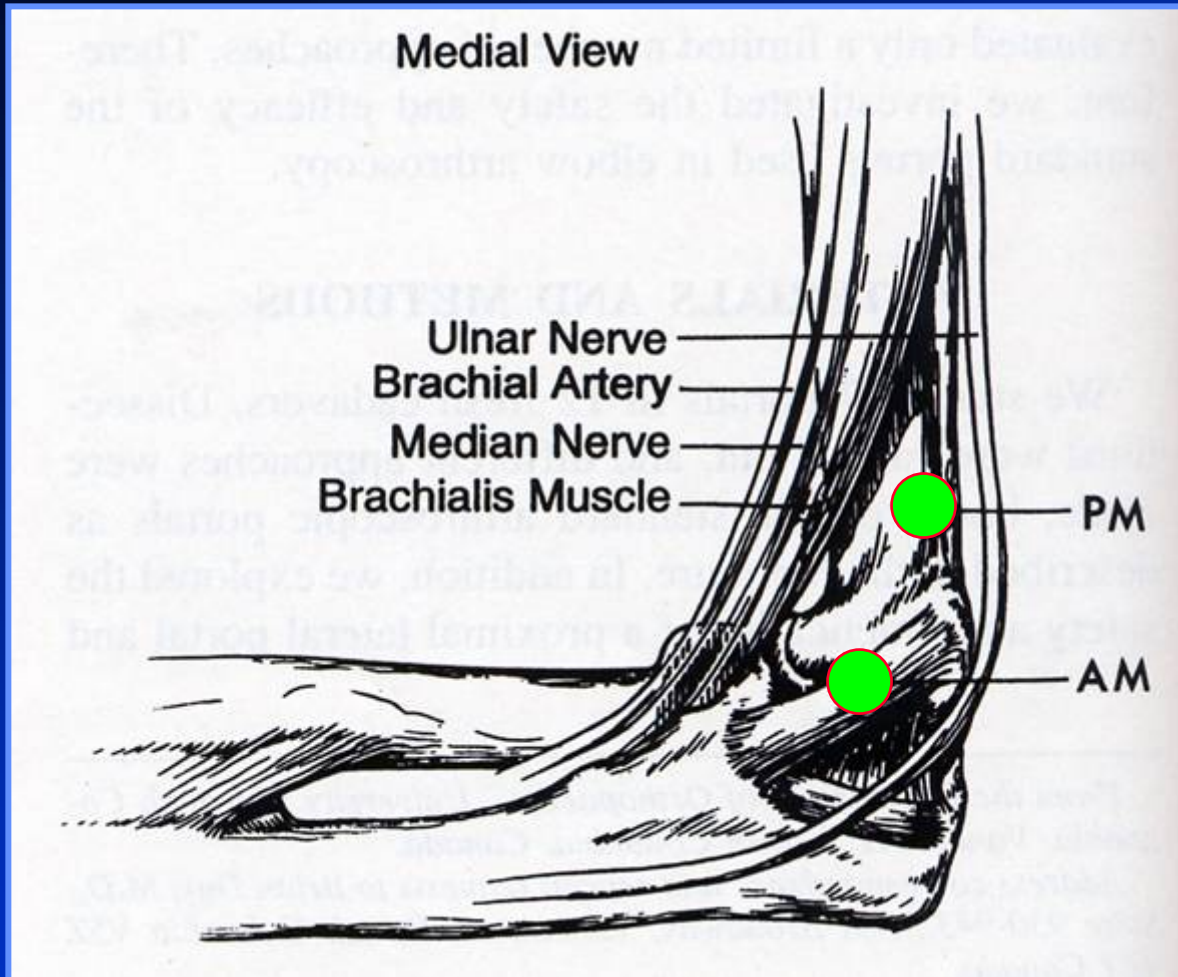
Proximal Lateral Portal

Structures @ Risk

- **LABCN** branch
ave 6.1mm (0-14mm), in contact 29%
- **Radial nerve** 2x
distance vs AL
portal (ave 9.9mm
in flexion)

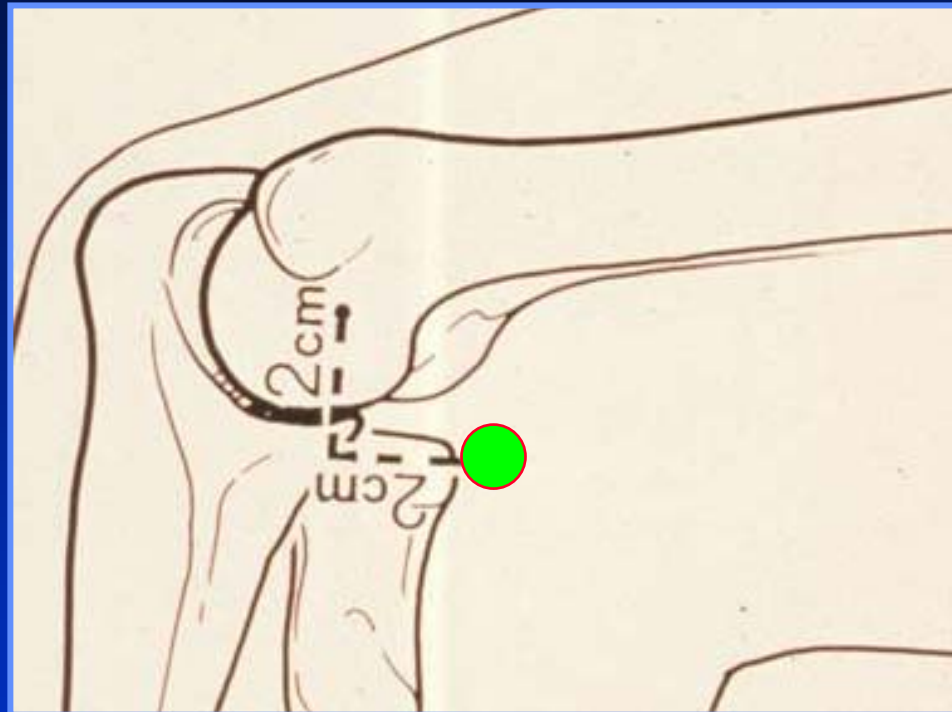


Medial Portals



Anteromedial Portal

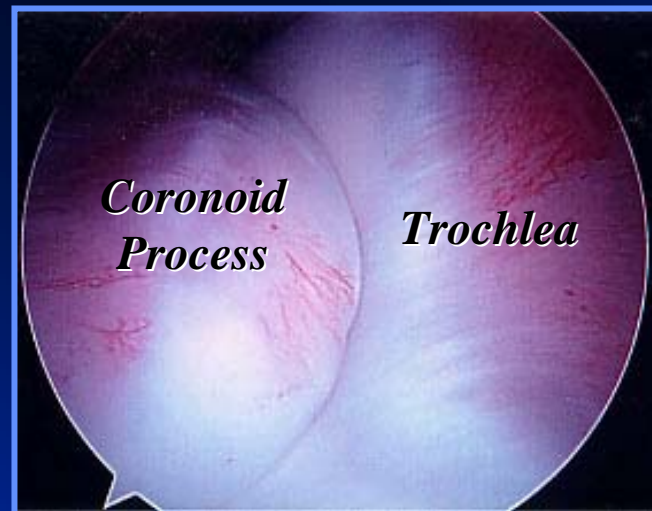
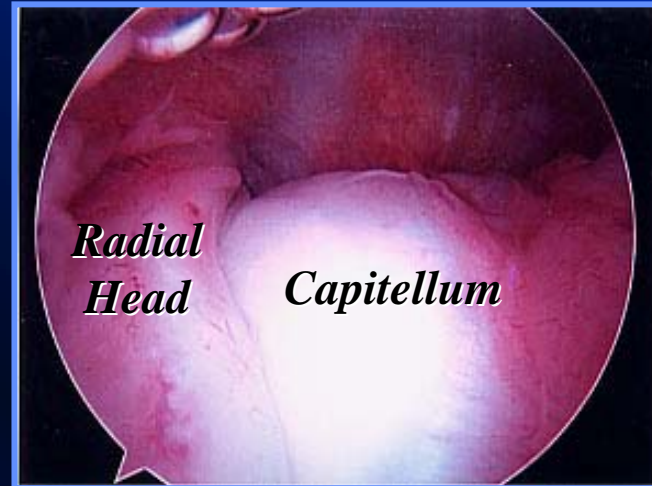
- *2cm distal, 2cm ant to medial epicondyle*
- *Passes through common flexor origin, then beneath or penetrates brachialis to enter capsule*



Anteromedial Portal

Visualization

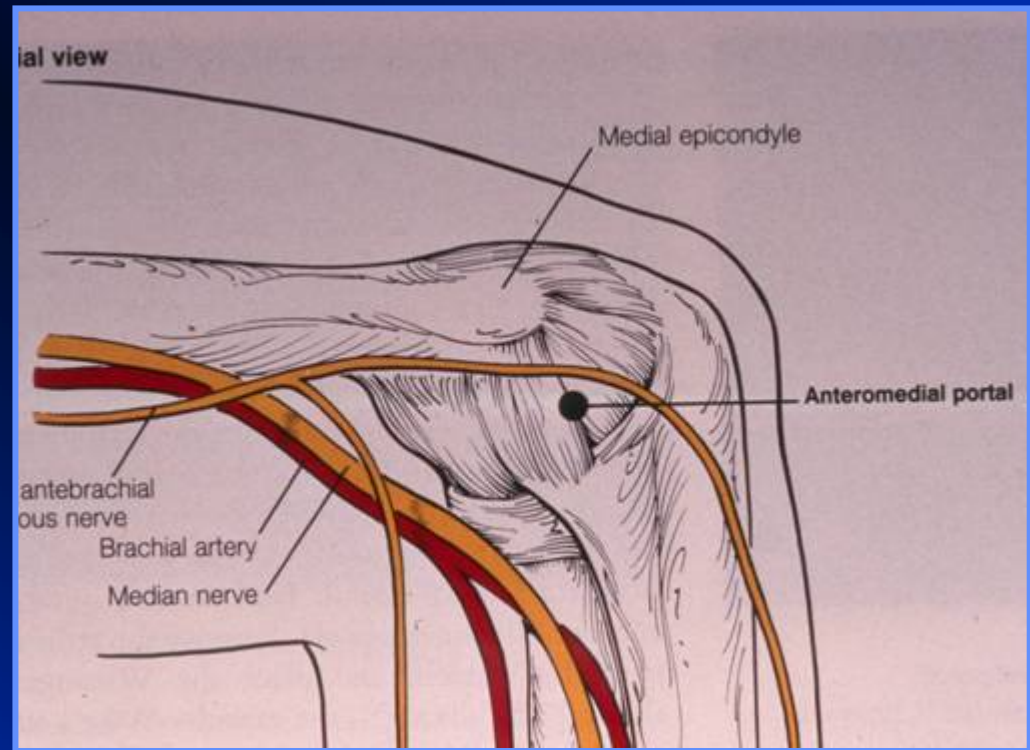
Affords excellent view of both radiocapitellar and ulnohumeral joints, coronoid fossa, capitellum and superior capsule



Anteromedial Portal

Structures @ Risk

- **MABCN Branch** ave 1mm (0-5mm), in contact 71%
- **Median Nerve** ave 7mm (5-13mm) w/ flexion
- **Brachial Artery** ave 15mm (8-20mm)



Proximal Medial Portal

*Described by Poehling
(Arthroscopy, 5:222-224, 1989)*

- *2cm proximal to medial epicondyle, directly anterior to intermuscular septum*
- *Contact maintained w/ distal humerus to avoid med nerve risk*
- *scope lies deep to brachialis muscle*



Proximal Medial Portal

Visualization

- *Similar to AM portal*
- *Excellent view, esp distal part of jt*
- *Radiocapitellar jt*
- *Ulnohumeral jt*
- *70 Deg scope proximal capsule visualization prn*

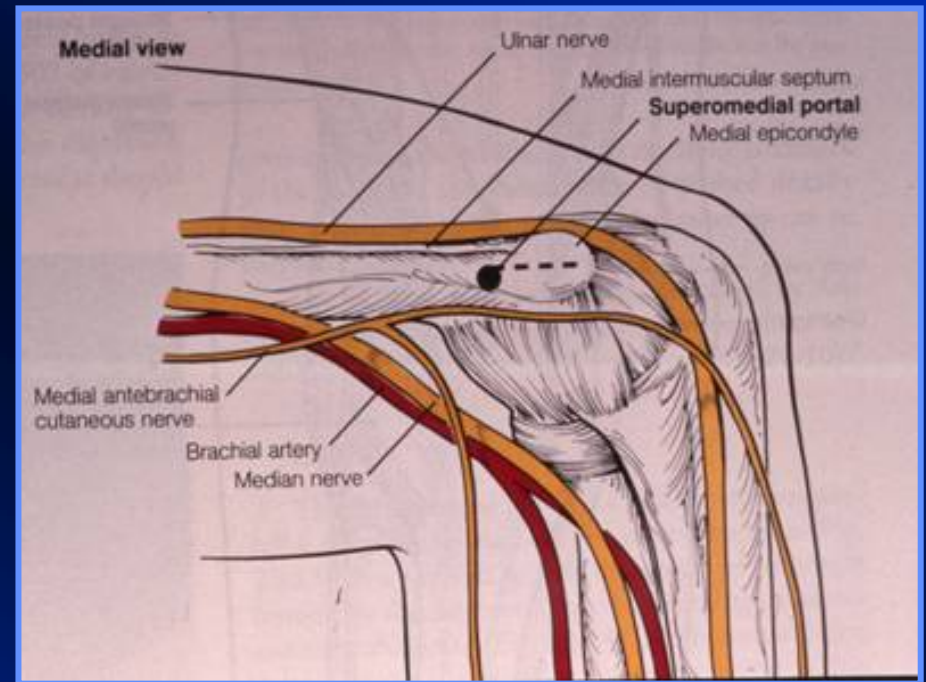


Proximal Medial Portal

Structures @ Risk

- **MABCN** very close, ave. 2.3mm (0-9mm), in contact 56%
- **Median Nerve** ave. 12.4mm (7-20mm)
- **Brachial Artery** ave. 18mm
- **Ulnar Nerve** ave 12mm (7-18mm)

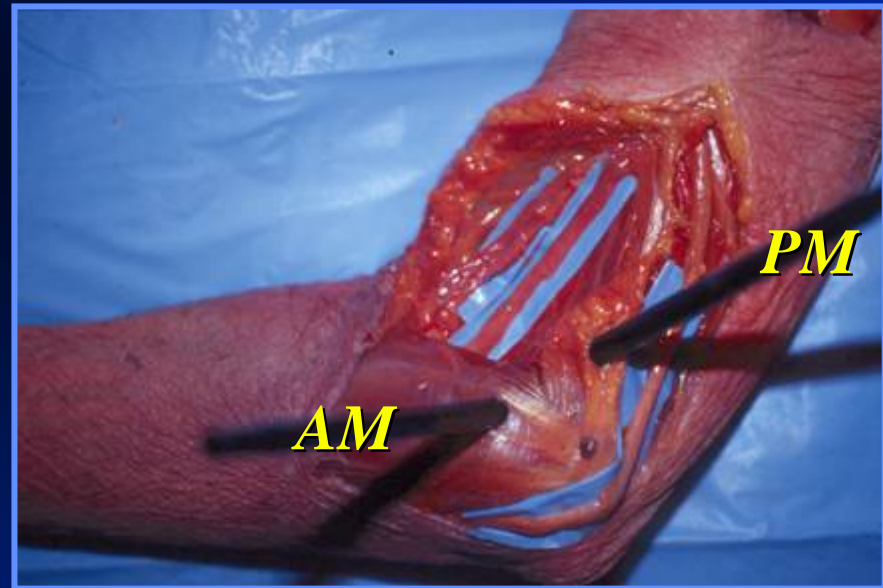
Important to confirm location, stability of Ulnar nerve before establishing any medial portals



Proximal Medial Portal

Recommended that proximal medial portal be first portal used in most cases of elbow arthroscopy

- Safer than anteromedial portal*
- Excellent view*



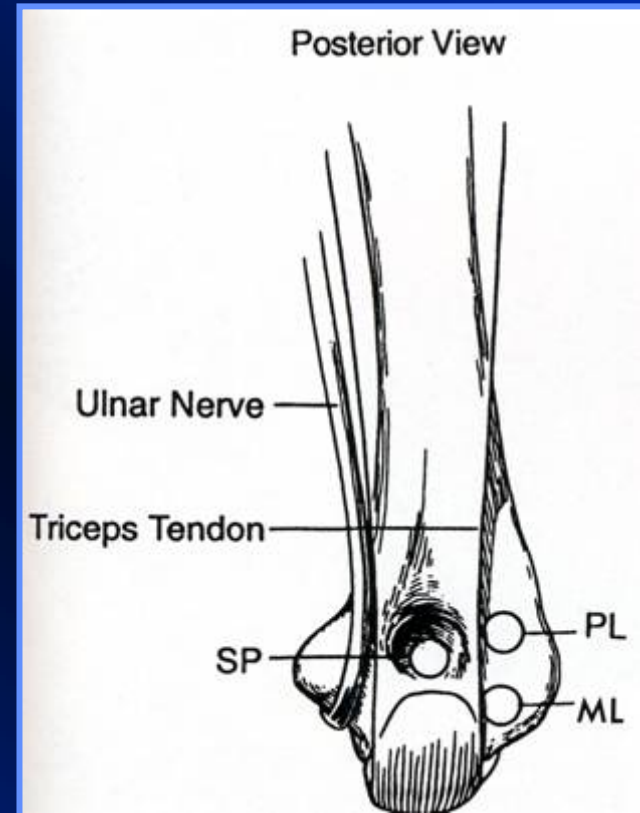
Posterior Portals

All are relatively safe w/ distance to closest cutaneous or major nerve 15-20mm

–Mid or Direct Lateral (“Soft spot”)

–Central Posterior

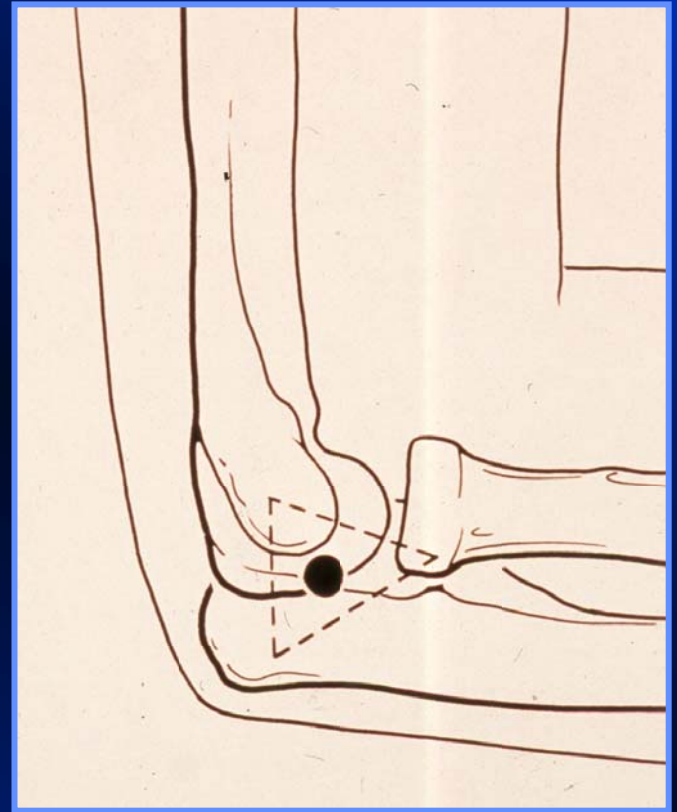
–Posterolateral



Mid-Lateral Portal

AKA “Soft spot” portal

- Located within triangle formed by olecranon, lateral epicondyle and radial head*
- Pierces Anconeus muscle*
- Initial joint insufflation*
- Only portal to provide easy access to posterior capitellum and radioulnar joint*



Mid-Lateral Portal

Visualization

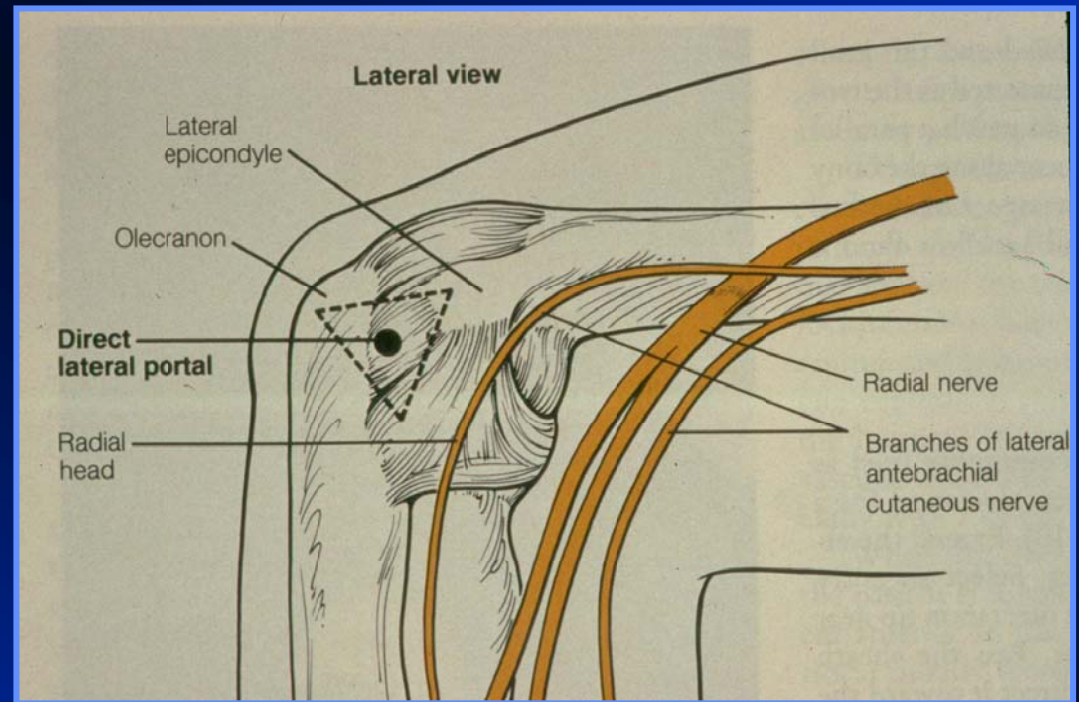
- *Posterolateral radial head*
- *Capitellum*
- *Trochlea notch*
- *Olecranon*



Mid-Lateral Portal

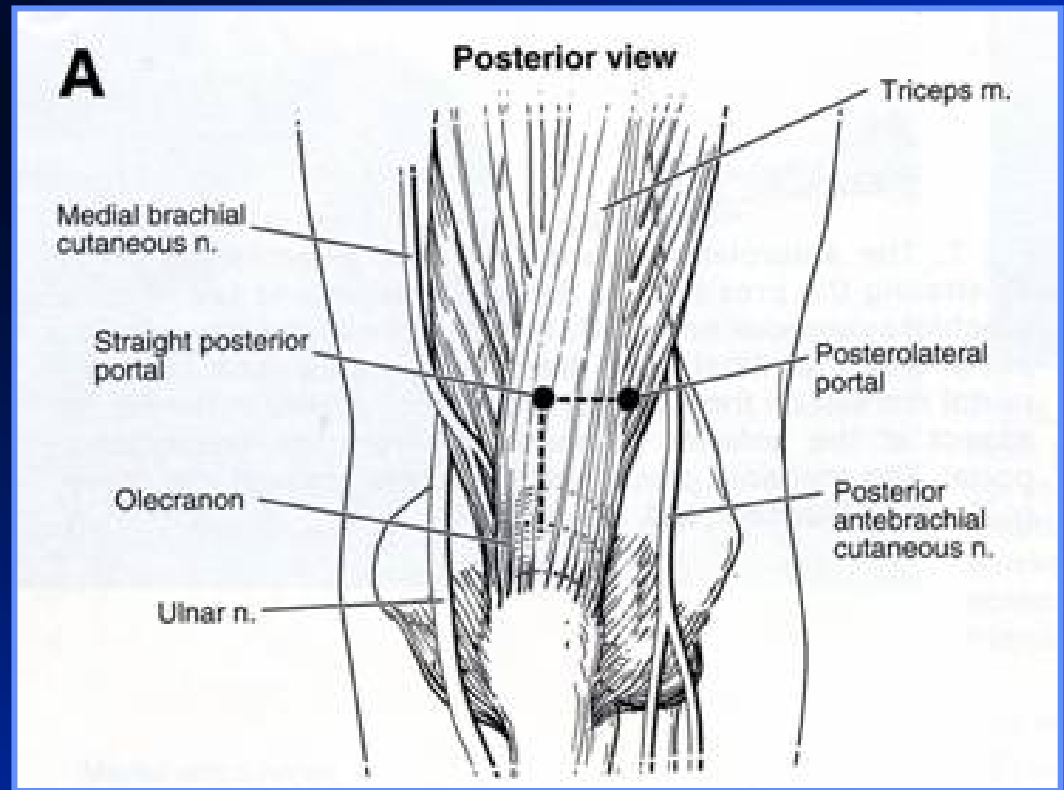
*Structures @
Risk*

*Articular
Cartilage*



Central Posterior Portal

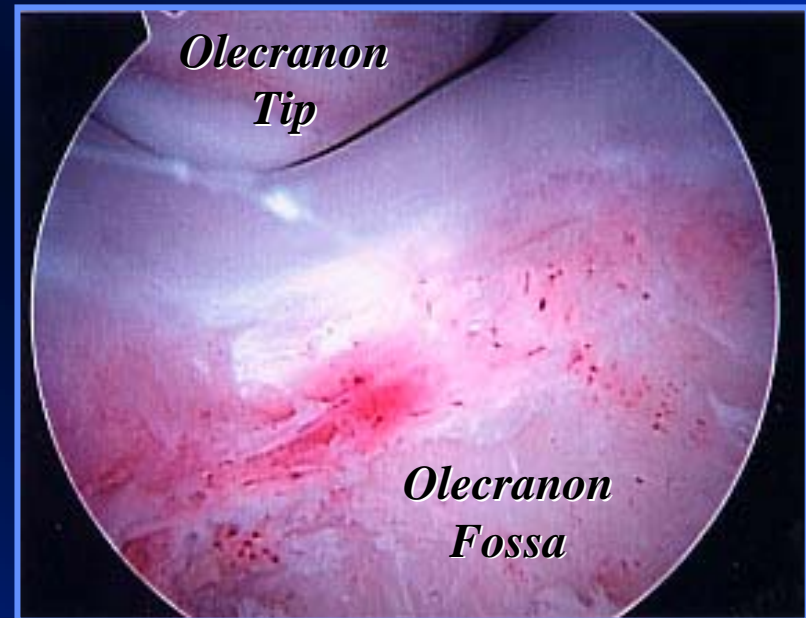
- *3cm proximal to Olecranon tip*
- *Passes through triceps tendon at its medial margin*



Central Posterior Portal

Visualization

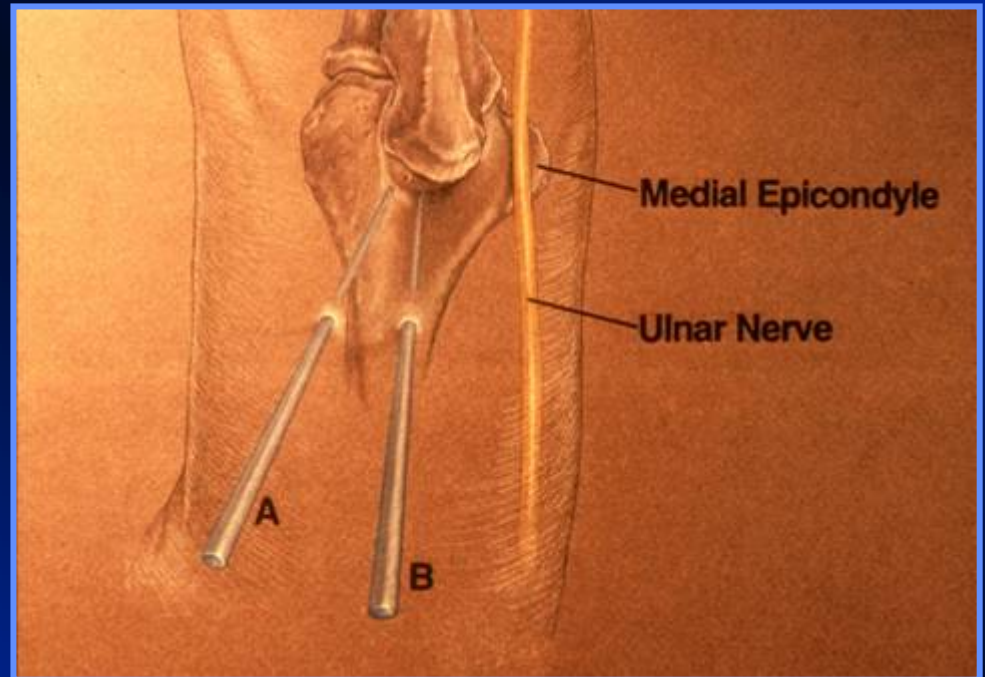
- *Olecranon Tip*
- *Olecranon Fossa*
- *Posteromedial Gutter*



Central Posterior Portal

*Structures @
Risk*

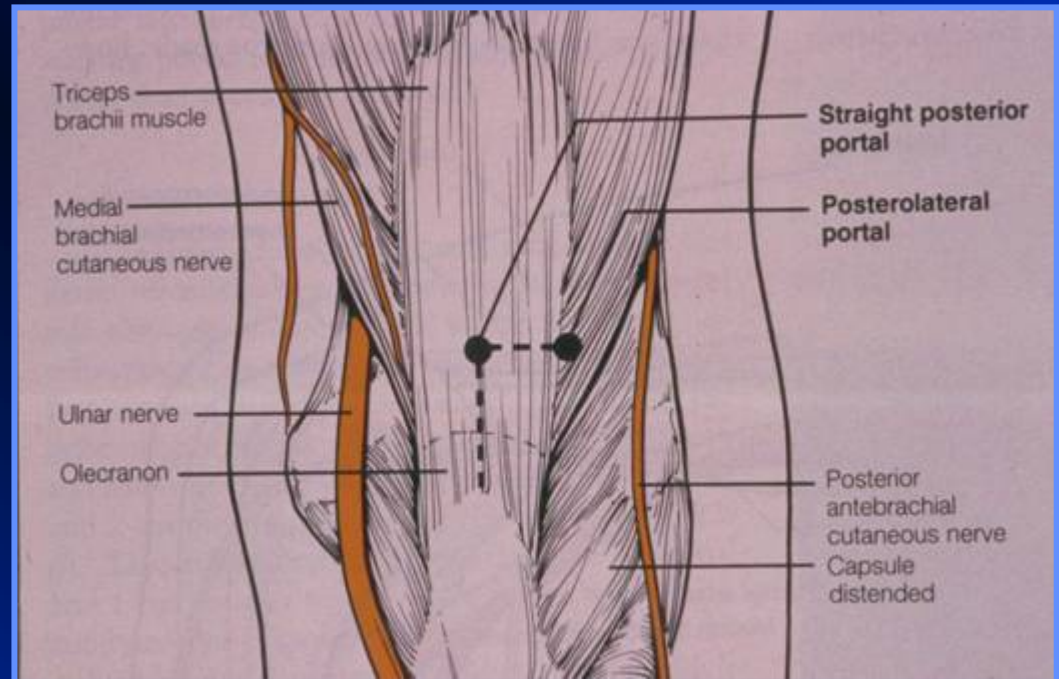
*Ulnar Nerve
ave 19.1mm
(15-25mm)*



Posterolateral Portal

3 cm proximal to olecranon tip, adjacent to lateral edge of triceps tendon

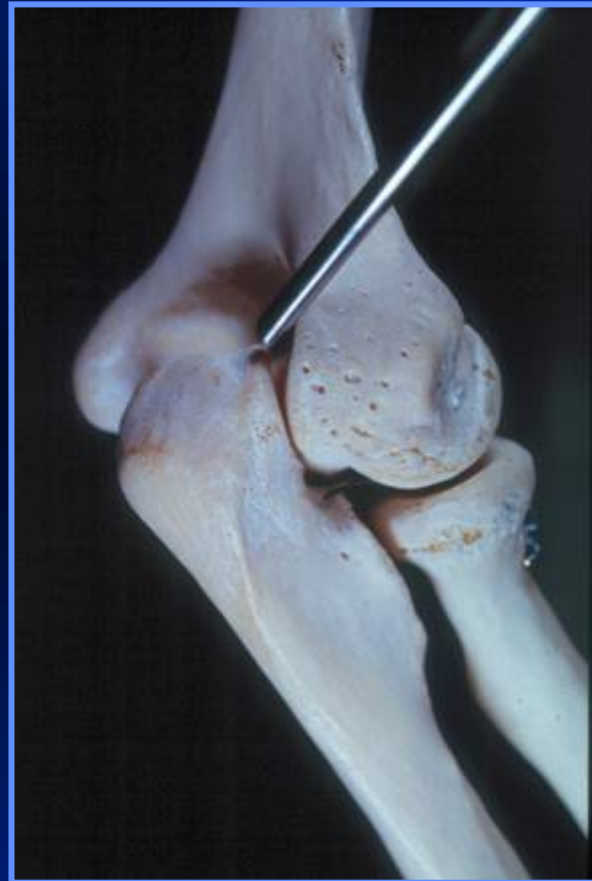
Passes through triceps muscle



Posterolateral Portal

Visualization

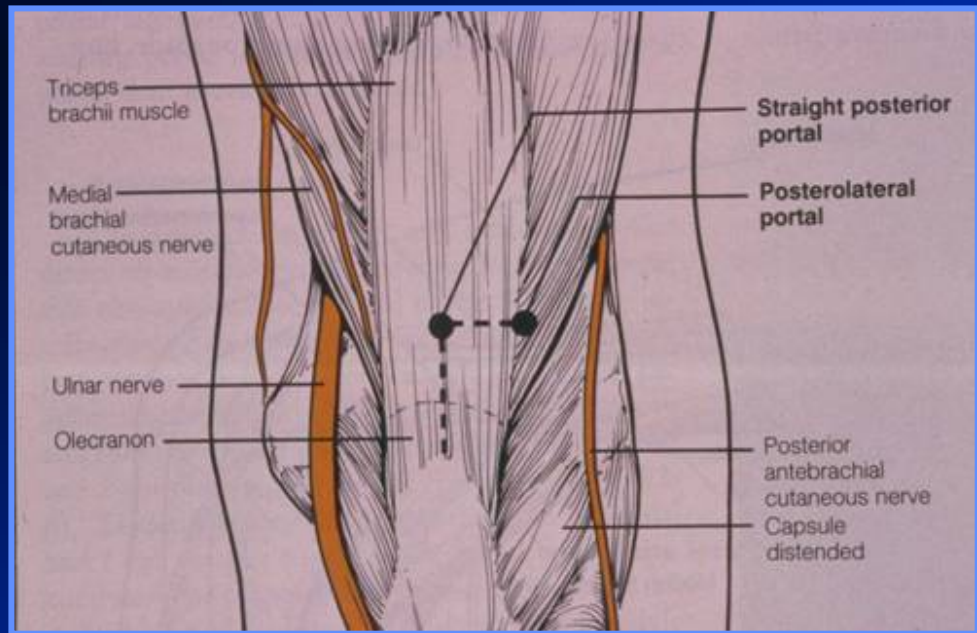
- *Olecranon Fossa, Tip*
- *Posterior trochlea*



Posterolateral Portal

*Structures @
Risk*

*PABCN
branch*



Technique - Video



Complications

- *Relatively higher incidence compared to other scope procedures (3-14%)*
- *Most significant is nerve injury (0-14%)*
- *Radial/PIN most common (Median/Ulnar/AIN/MABC)*
(Rodeo etal JBJS A 1993;75:917-26)
- *Other reported complications include:*
 - *Compartment syndrome*
 - *Septic Arthritis*
 - *Superficial infection*
 - *Persistent Drainage*

Complications

THE JOURNAL OF BONE & JOINT SURGERY • JBJS.ORG | VOLUME 83-A • NUMBER 1 • JANUARY 2001

COMPLICATIONS OF ELBOW ARTHROSCOPY

BY EDWARD W. KELLY, MD, BERNARD F. MORREY, MD, AND SHAWN W. O'DRISCOLL, PHD, MD

Investigation performed at the Mayo Clinic and Mayo Foundation, Rochester, Minnesota

Background: Although the potential complications of elbow arthroscopy, including nerve injuries, have been described, the prevalence of their occurrence has not been well defined. The purpose of this paper is to describe the serious and minor complications in a large series of patients treated with elbow arthroscopy.

Methods: A retrospective review of 473 consecutive elbow arthroscopies performed in 449 patients over an eighteen-year period was conducted. Of the 473 cases, 414 were followed for more than six weeks. The most common final diagnoses were osteoarthritis (150 cases), loose bodies (112), and rheumatoid or inflammatory arthritis (seventy-five). The arthroscopic procedures included synovectomy (184), débridement of joint surfaces or adhesions (180), excision of osteophytes (164), diagnostic arthroscopy (154), loose-body removal (144), and capsular procedures such as capsular release, capsulotomy, and capsulectomy (seventy-three).

Results: A serious complication (a joint space infection) occurred after four (0.8%) of the arthroscopic procedures. Minor complications occurred after fifty (11%) of the arthroscopic procedures. These complications included prolonged drainage from or superficial infection at a portal site after thirty-three procedures, persistent minor contracture of 20° or less after seven, and twelve transient nerve palsies (five ulnar palsies, four superficial radial palsies, one posterior interosseous palsy, one medial antebrachial cutaneous palsy, and one anterior interosseous palsy) in ten patients. The most significant risk factors for the development of a temporary nerve palsy were an underlying diagnosis of rheumatoid arthritis ($p < 0.001$) and a contracture ($p < 0.05$). There were no permanent neurovascular injuries, hematomas, or compartment syndromes in our series, and all of the minor complications, except for the minor contractures, resolved without sequelae.

Conclusions: Our results indicate that the prevalence of temporary or minor complications following elbow arthroscopy may be greater than previously reported. However, serious or permanent complications were uncommon.

Complications

473 cases

11.8% complication rate

0.8% (N=4) “serious” – Infection

11% (N=50) “minor”

- Prolonged drainage/superficial infection @ portal site (N=33)*
- Persistent minor contracture <20 deg (N=7)*
- Transient nerve palsies (N=12) (extravasation of local anesthetic, direct blunt trauma, compression by tourniquet/forearm wrapping, use of indwelling catheter)*

Avoiding Complications

- *Most serious complications are reported assoc. w/ advanced procedures, which ought to be performed only by experienced surgeons*
- *Most minor complications however, are probably avoidable by*
 - *Familiarity w/ normal anatomy/portals*
 - *Attention to technique:*
- *Incise skin only w/ #11 blade*
- *Blunt dissection to/through capsule*
- *Maintain portal sites (avoid repeated re-entry)*
- *Beware use of pump*
- *Limit procedure duration*

THANK YOU

