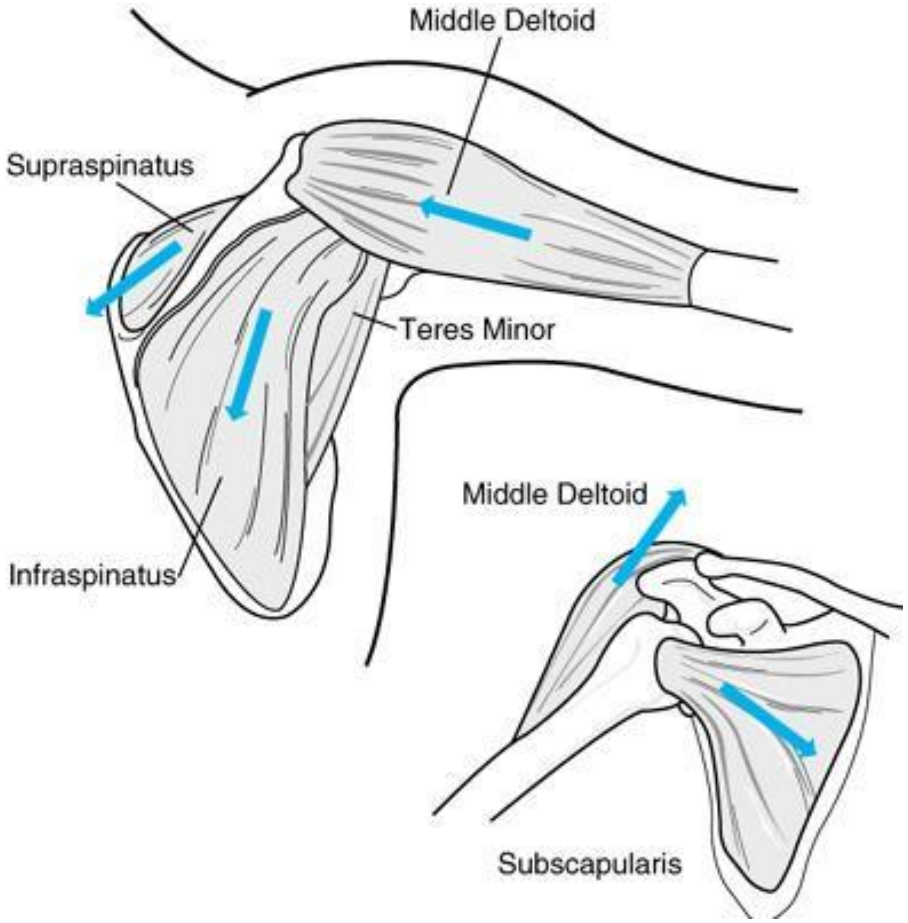
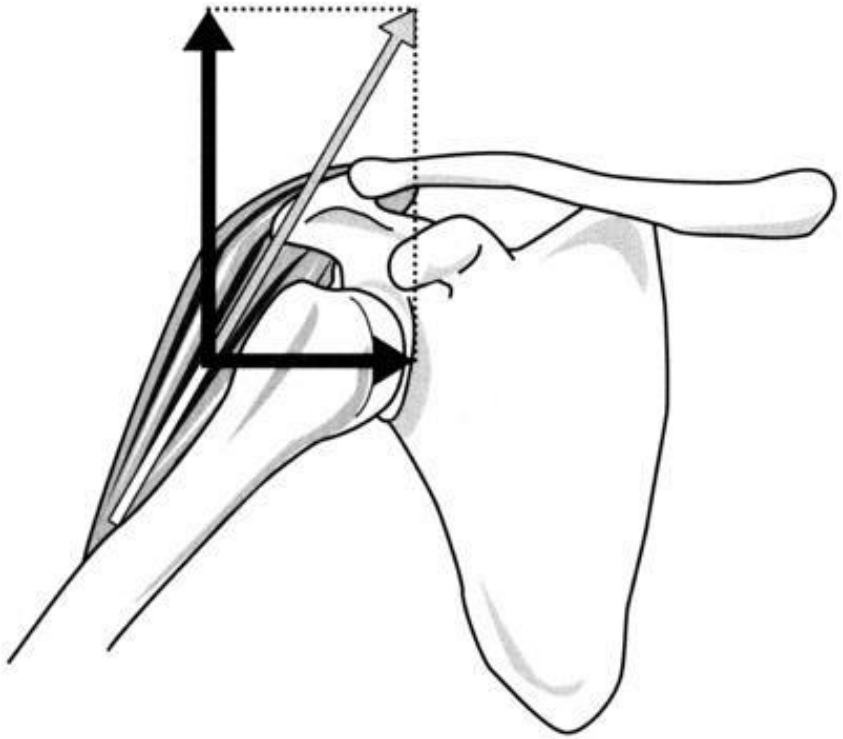
Shoulder Arthroplasty

M.N. Naderi, MD

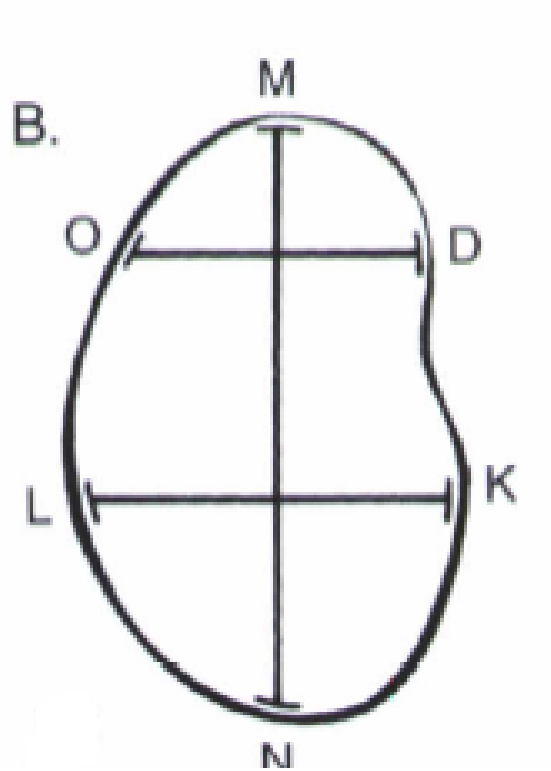
Anatomy


Middle Deltoid
Supraspinatus
Teres Minor
Infraspinatus
Middle Deltoid
Subscapularis



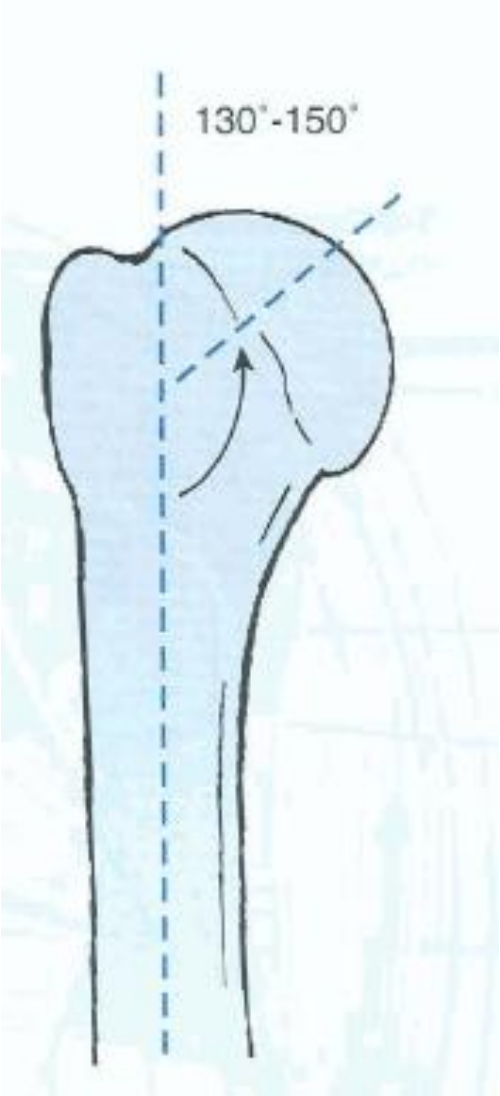
Anatomical Characteristics of the Shoulder Important for Prosthesis Design

- **Glenoid diameter**
  - Superior anteroposterior 15-30 mm
  - Inferior anteroposterior 20-35 mm
  - Superoinferior (height) 30-50 mm



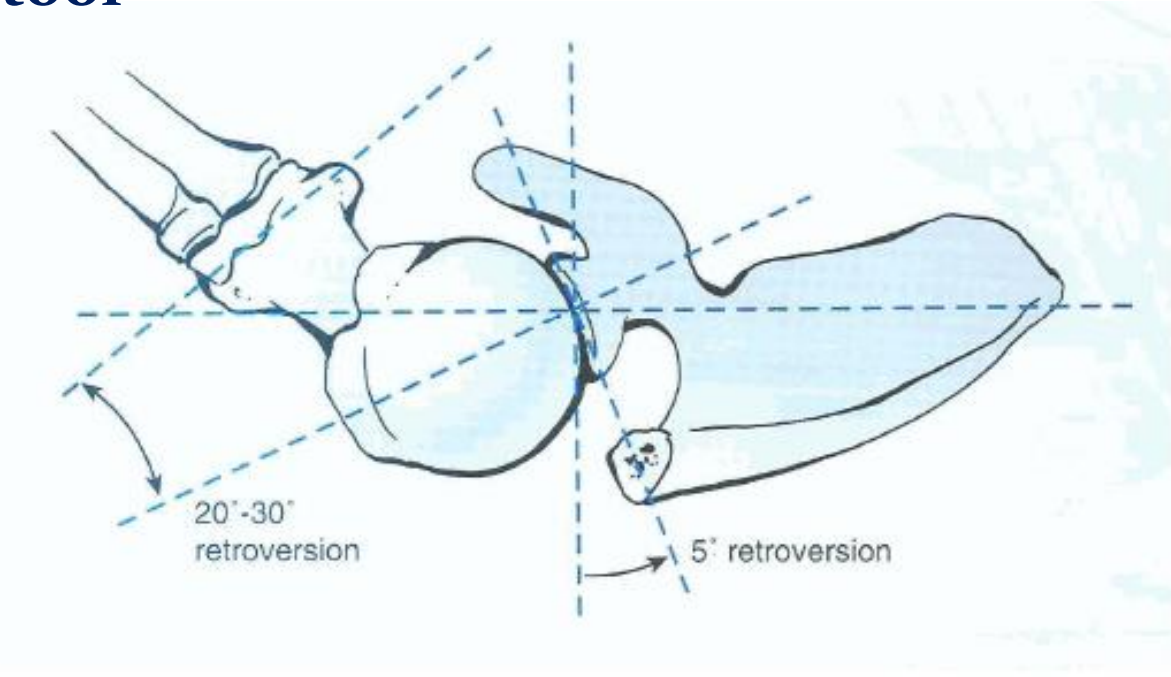
Anatomical Characteristics of the Shoulder Important for Prosthesis Design

- **Inclination**
  - Humeral head 130-150 degrees
  - Glenoid 4.2 degrees (–7 to 20 degrees)



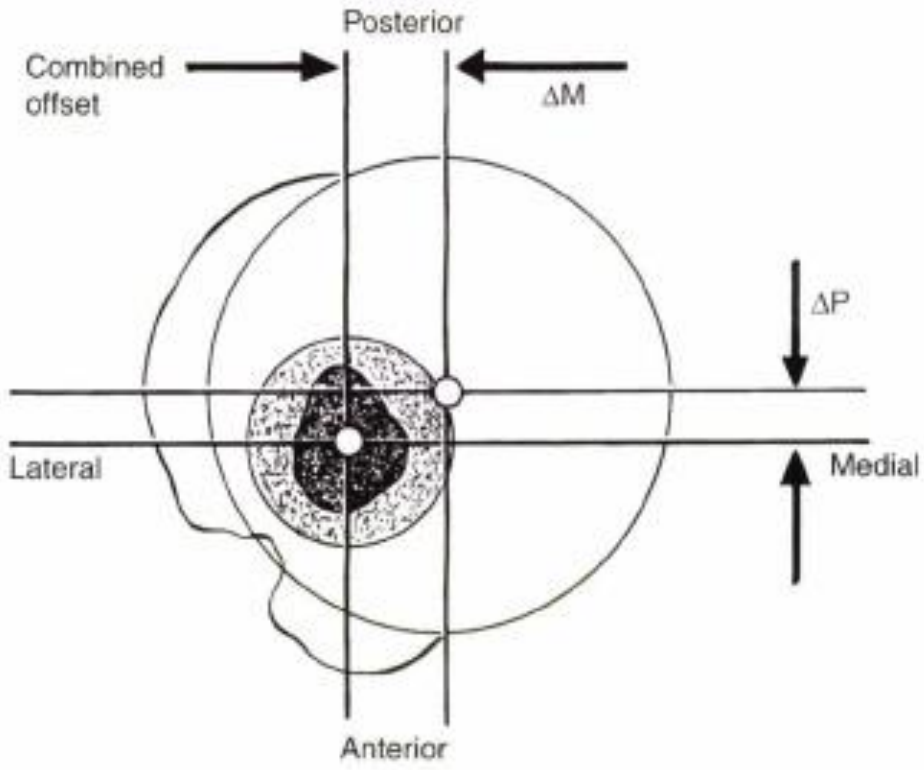
Anatomical Characteristics of the Shoulder Important for Prosthesis Design

- **Version**
  - **Glenoid : 0° to 10° retroversion**
  - **Humeral Head: 20° - 40° retroversion**
  - **CT →a valuable pre-op planning tool**



Humeral Head Offset

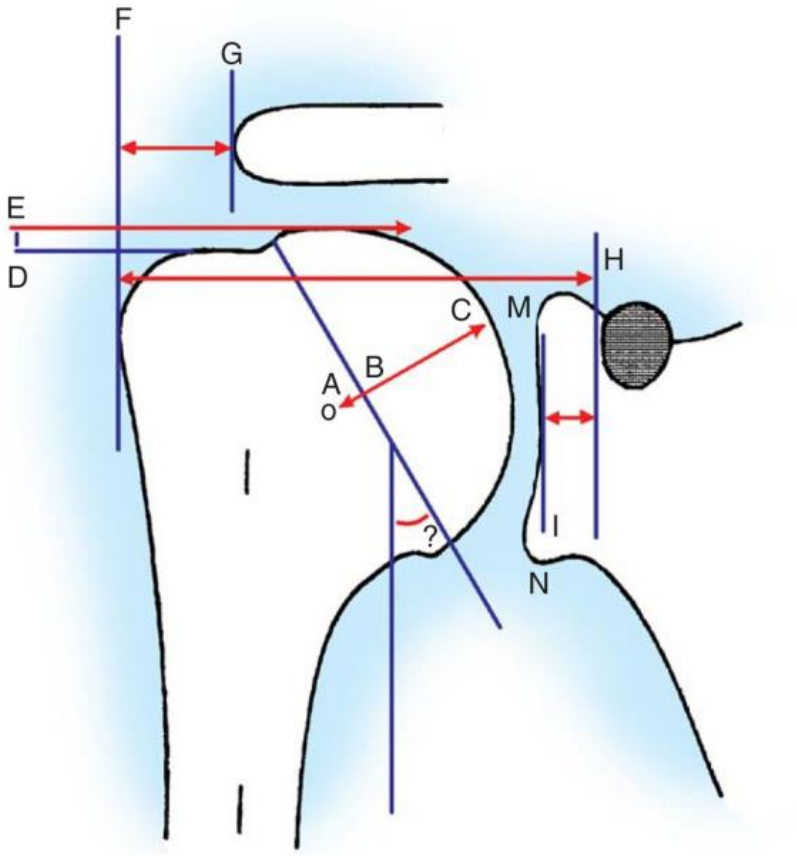
- **distance between the center of the humeral head and the central axis of the intramedullary canal is defined as the humeral head offset.**

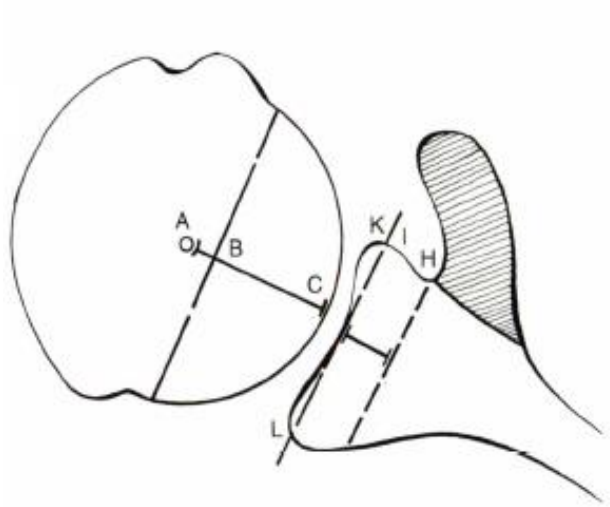


Normal glenohumeral relationships

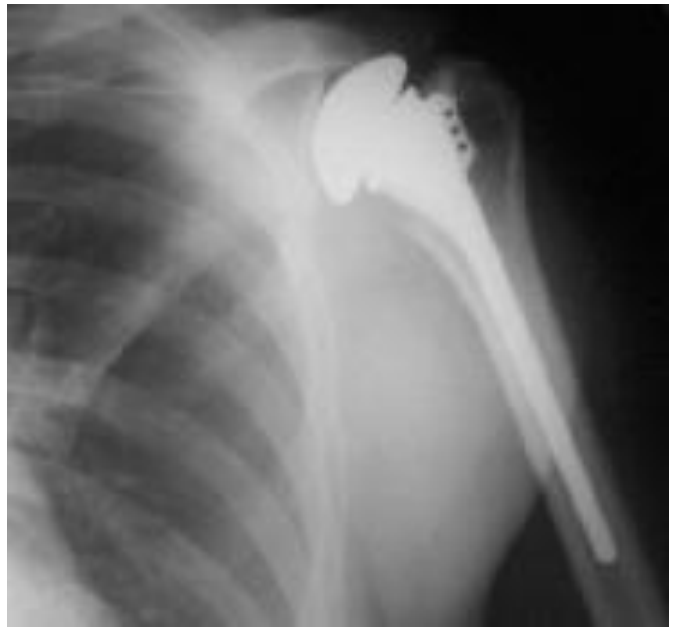
- F-H Offset
- B-C Head thickness
- D-E = 8mm

Top of humeral head is higher than greater tuberosity





Arthroplasty Options



Hemiarthroplasty

Total Shoulder

resurfacing

Reverse prosthesis

Contraindications to Shoulder Arthroplasty

- Active or recent shoulder joint infection
- Neuropathic arthropathy
- Inadequate bone stock and soft tissue coverage
- Lack of rotator cuff and deltoid function

Indications for Shoulder Arthroplasty

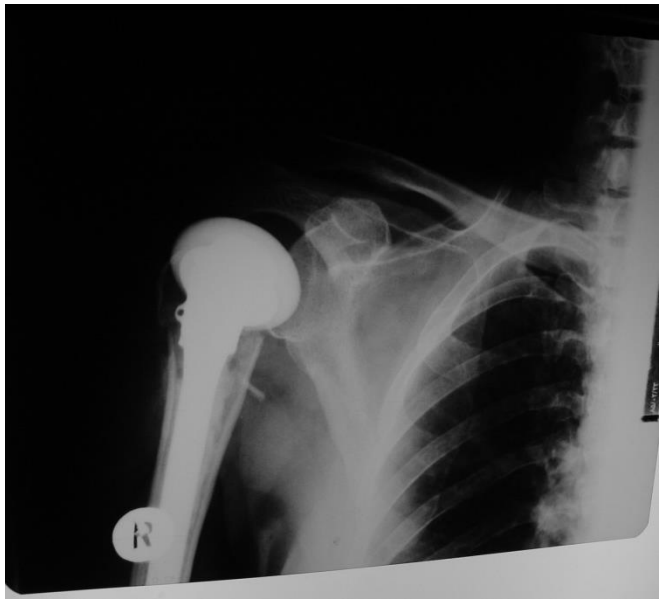
- Osteoarthritis
- Rheumatoid arthritis
- Rotator cuff tear arthropathy
- Avascular necrosis
- Post-traumatic arthritis
- Severe proximal humeral fractures

Severe proximal humeral fractures

Displaced 3 &4-part fx and fx-dx in old patients
(osteonecrosis, failure of fixation, posttraumatic arthritis, & stiffness)

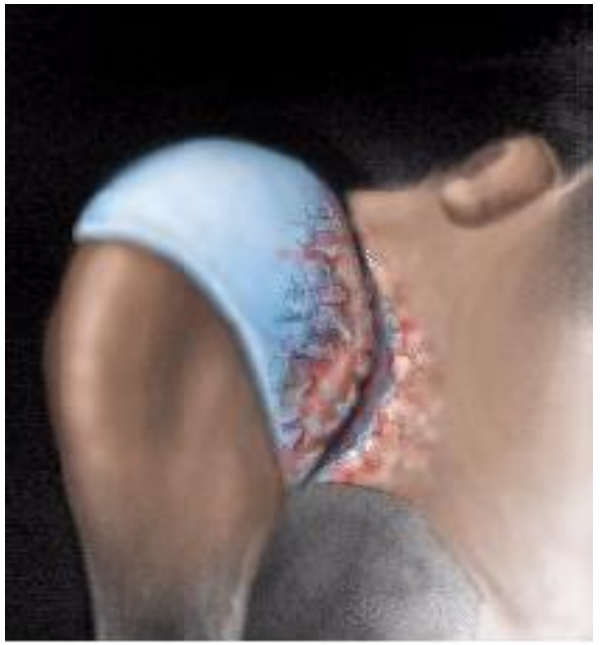
ORIF → poor outcome

Arthroplasty is a good choice



Osteoarthritis

- Joint space narrowing, cyts, osteophytes
- Posterior glenoid erosion
- Flattening of the humeral head



From: www.medicalmultimedia.com

Rotator cuff tears are uncommon in OA

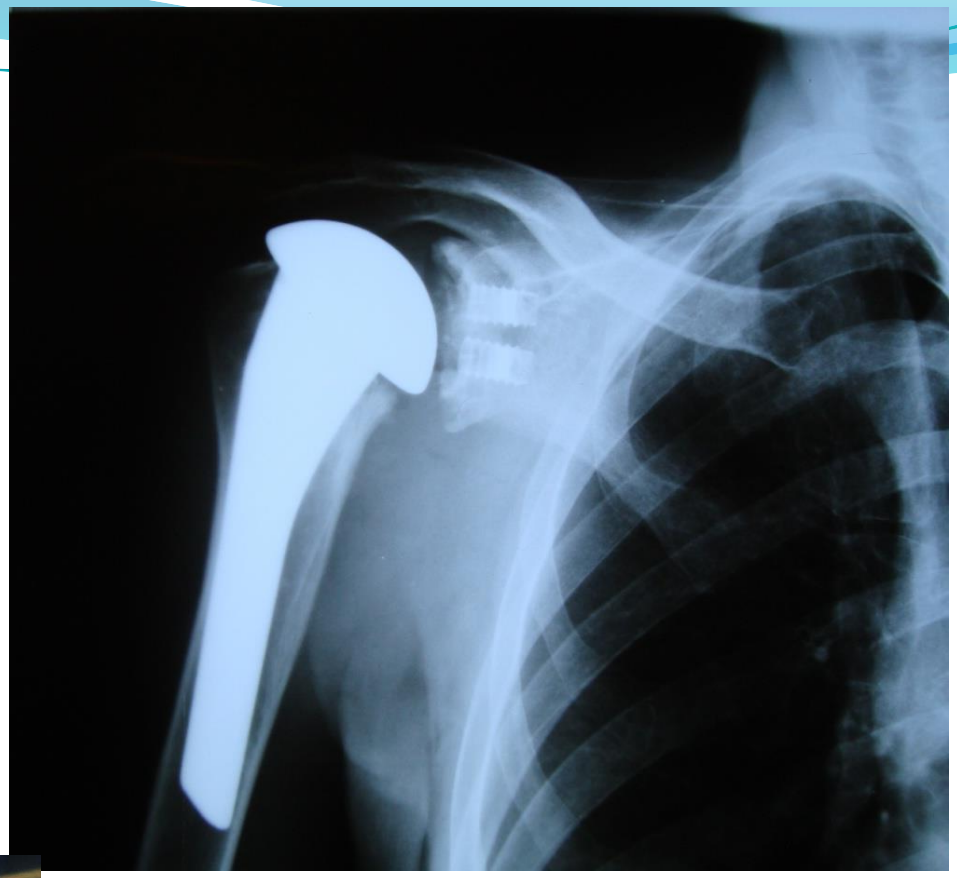
Hemi vs Total Shoulder

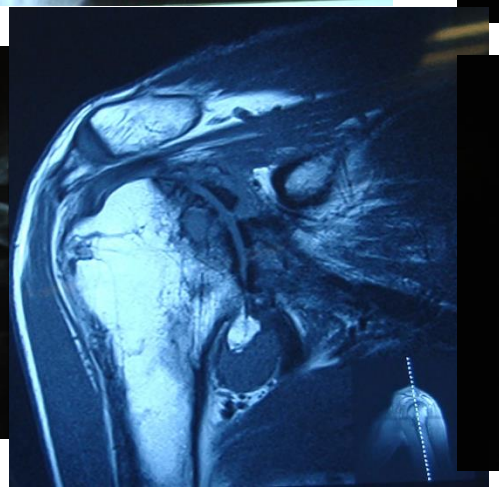
- Easy procedure
- Short Operating time
- Less risk of instability
- Can be revised to TSA

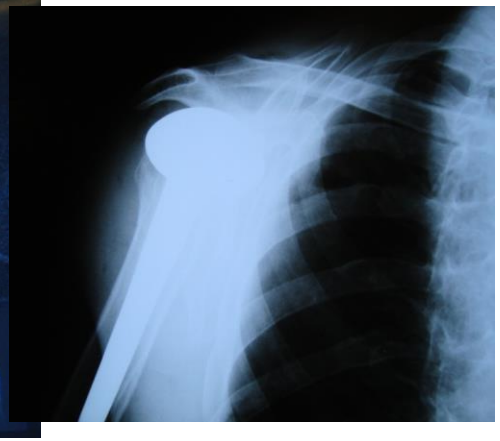
- × Less reliable pain relief
- × Glenoid erosion

- More consistent pain relief
- Better fulcrum for active motion

- × Difficult procedure
- × Longer OR time
- × Polyethylene wear
- × Glenoid loosening

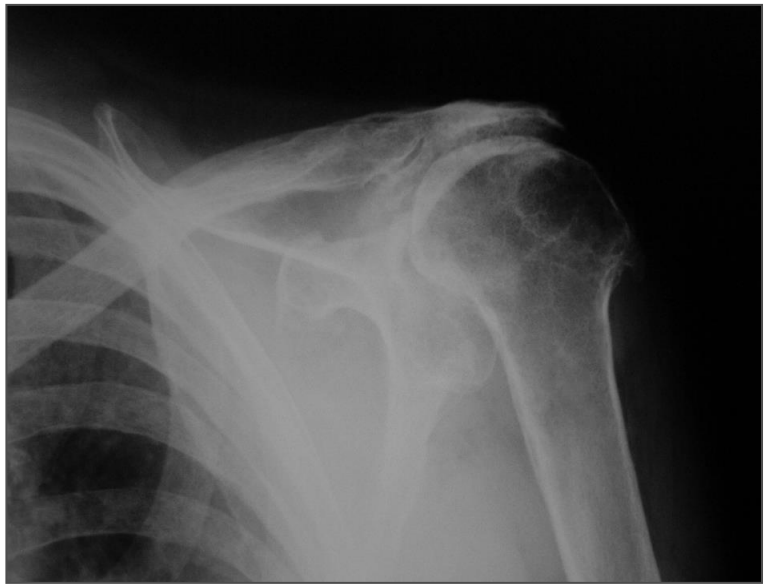


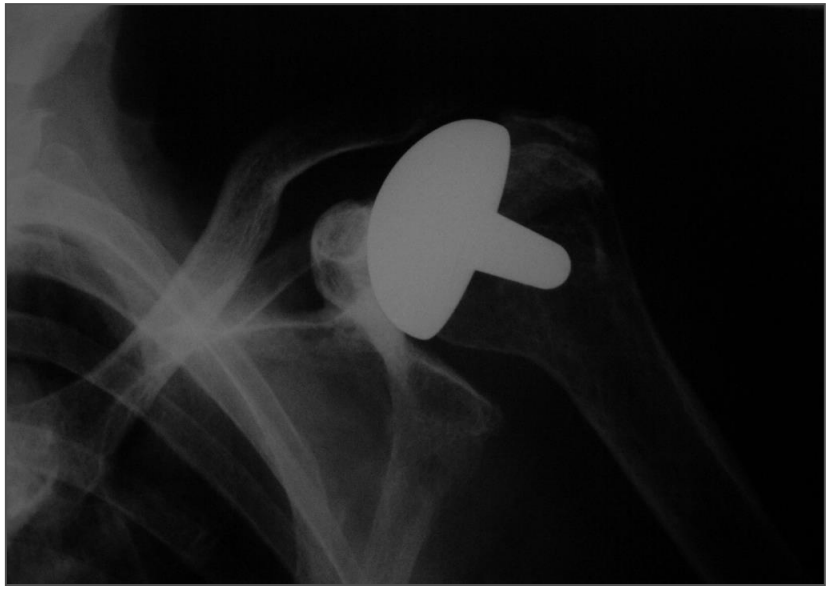




Rotator Cuff Arthropathy

- Massive rotator cuff tears result in proximal migration of the humeral head
- Glenoid resurfacing results in eccentric (superior) glenoid loading and early component loosening



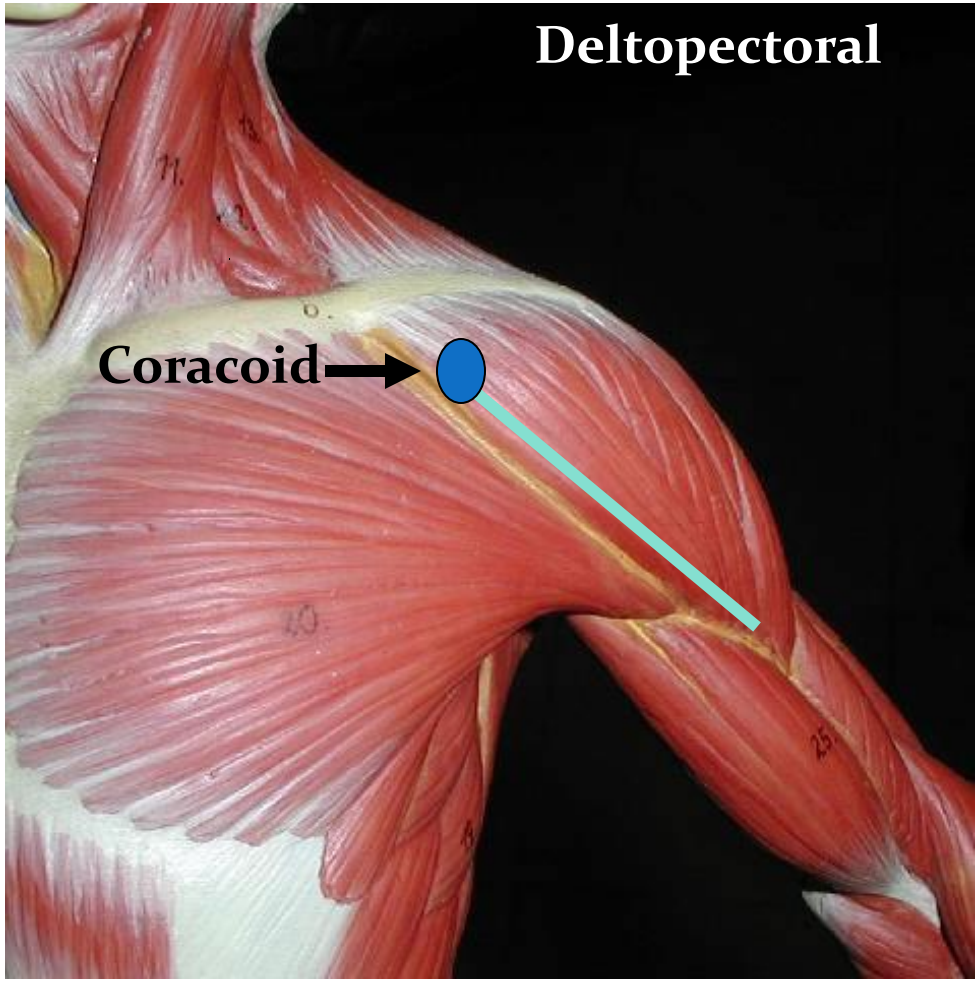


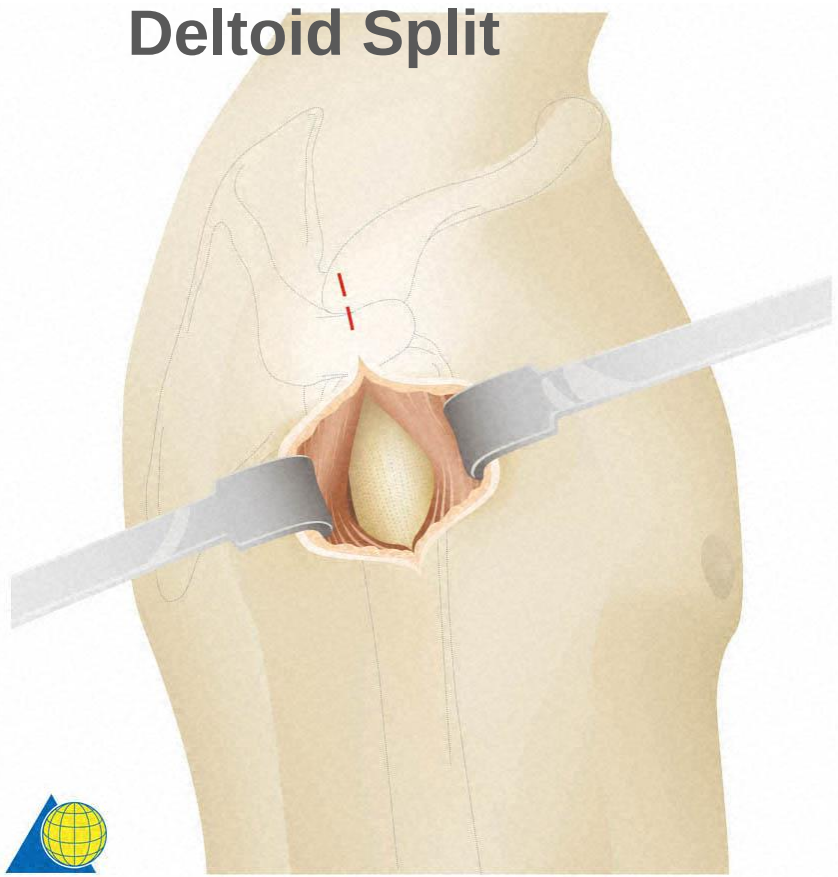
www.shoulderdoc.co.uk

Surgical Options for cuff arthropathy

- **Repair of rotator cuff and TSA**
- **Hemiarthroplasty with a large head**
- **Reverse TSA**

Surgical Approach





Technique of shoulder prothesis

- deltopectoral approach
- identifiation/mobilization of tuberosities fragments
- removal of head fragment
- Implantation of cemented prosthese
- restoration of humerus length and retroversion
- stable refixation of the tuberosities

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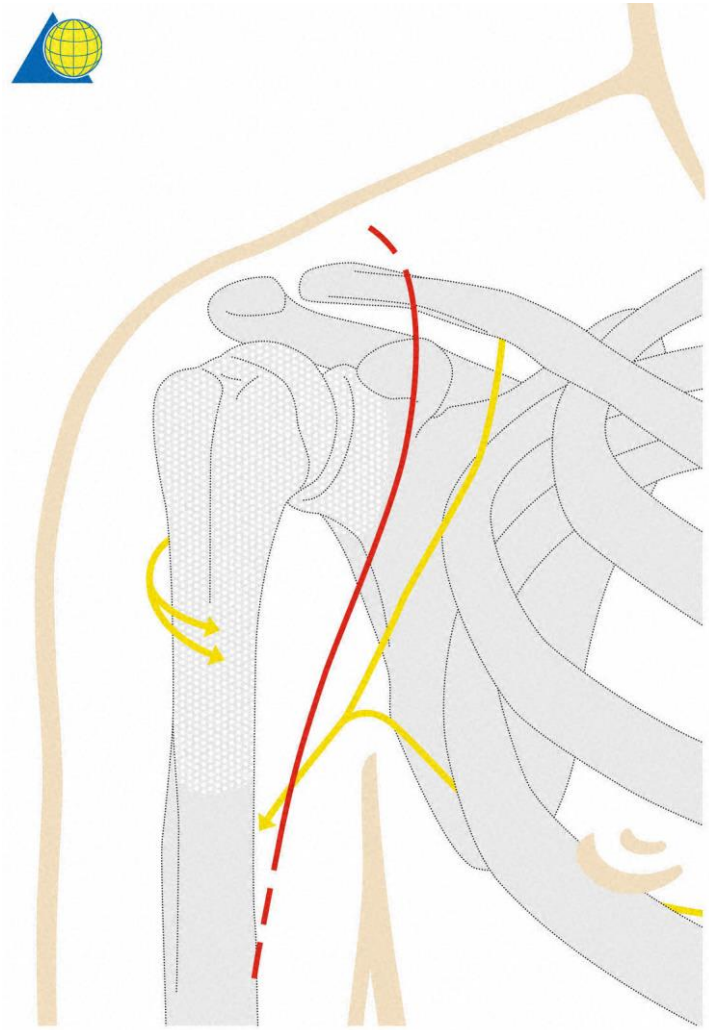

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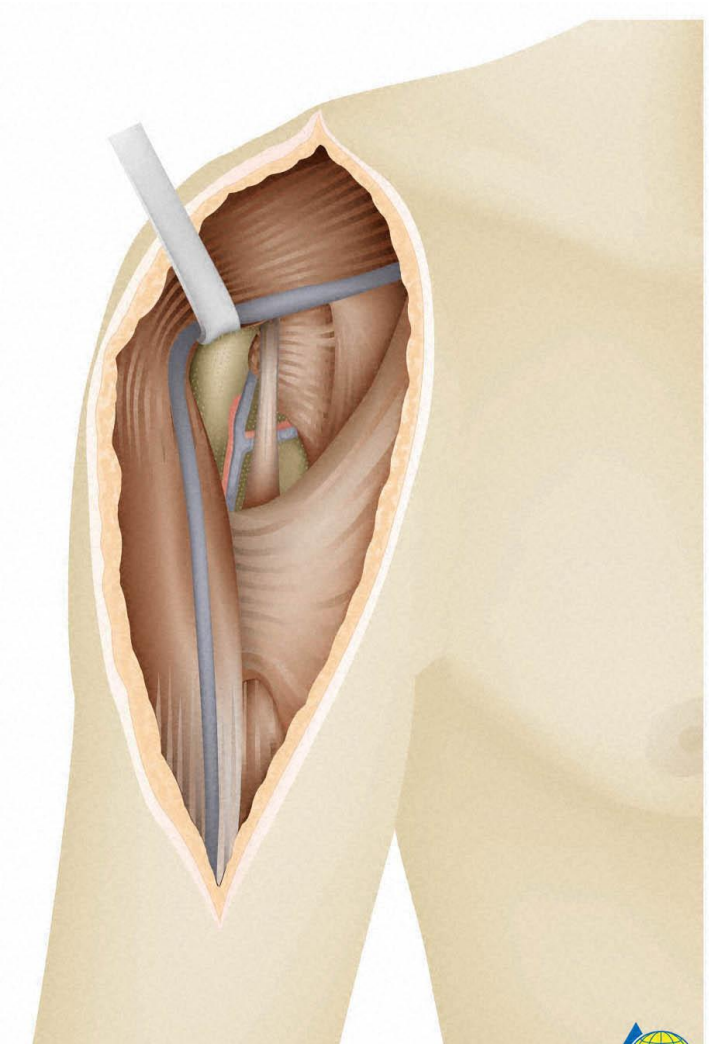

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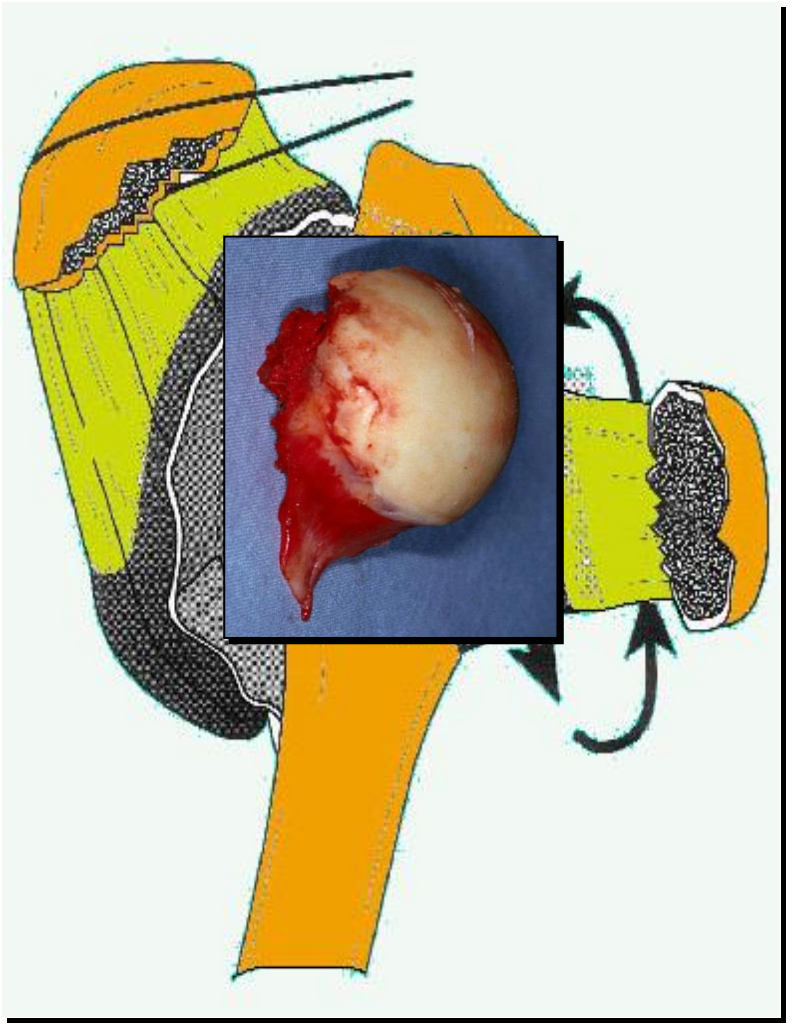

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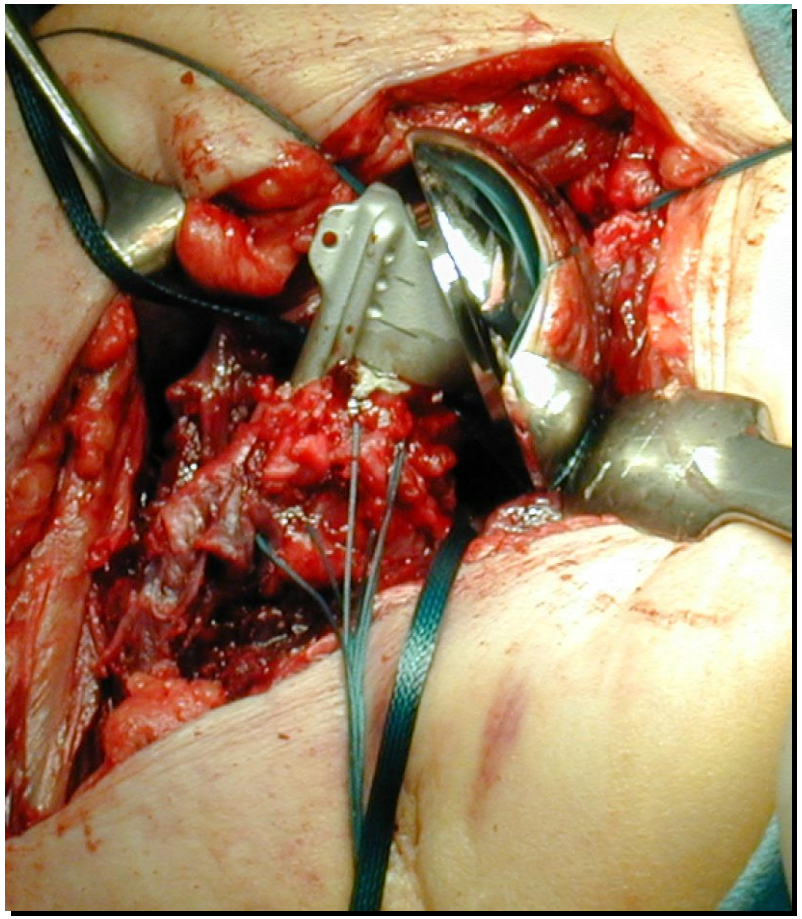

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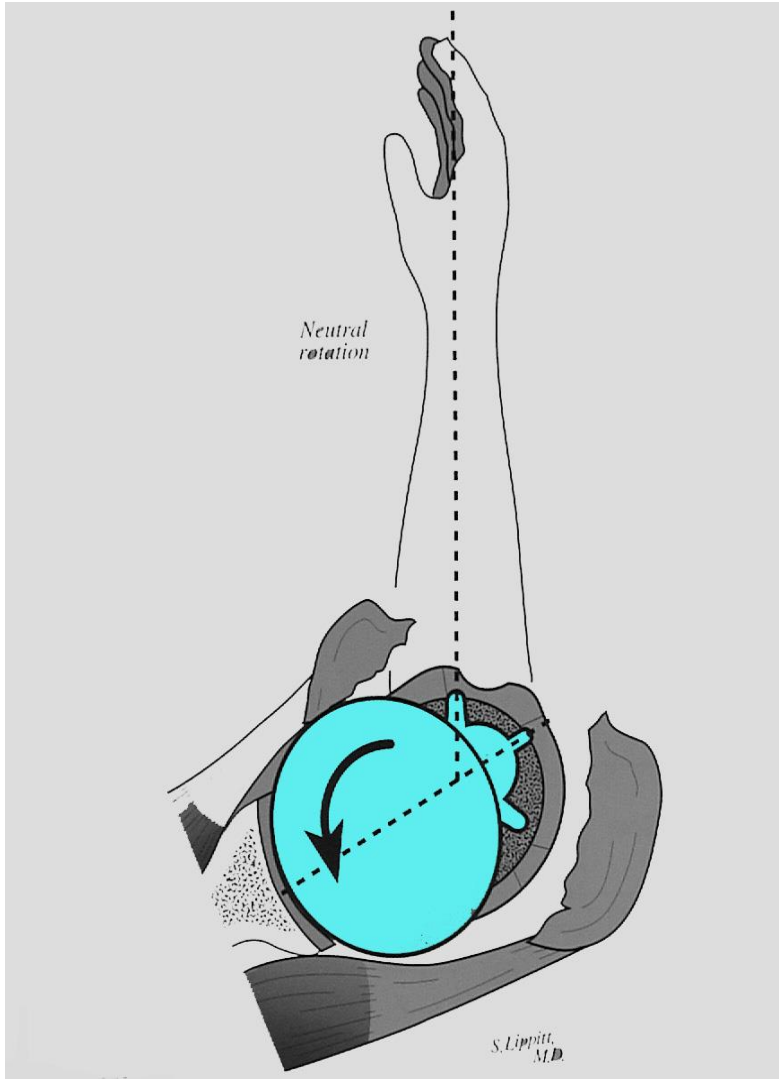

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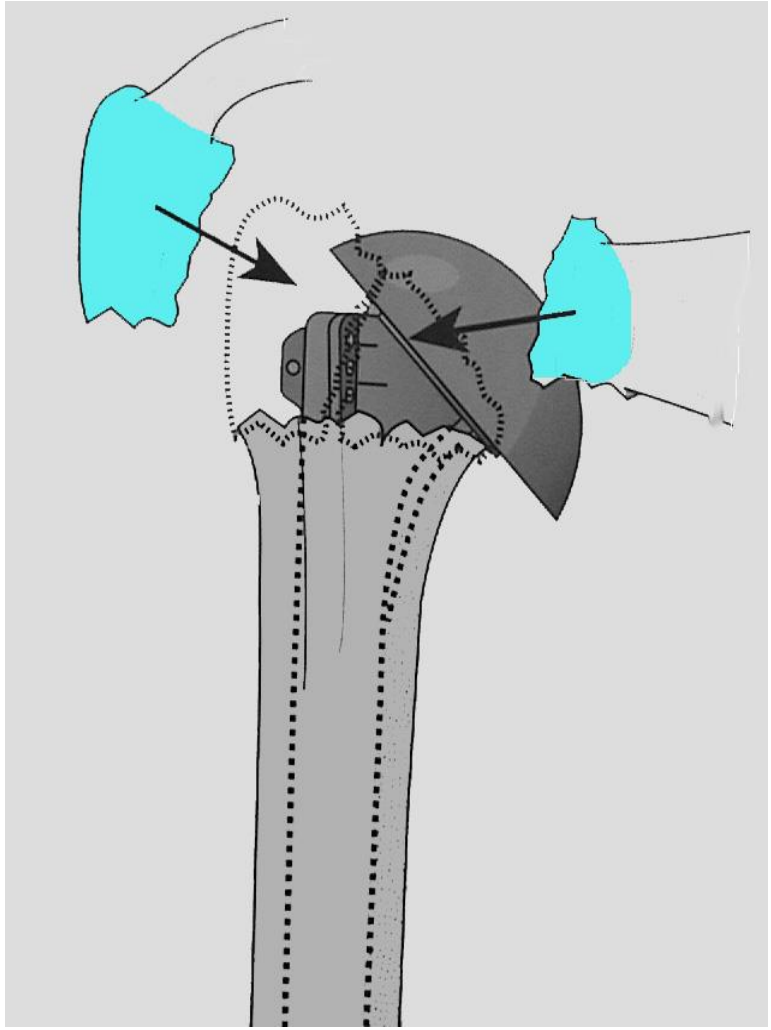

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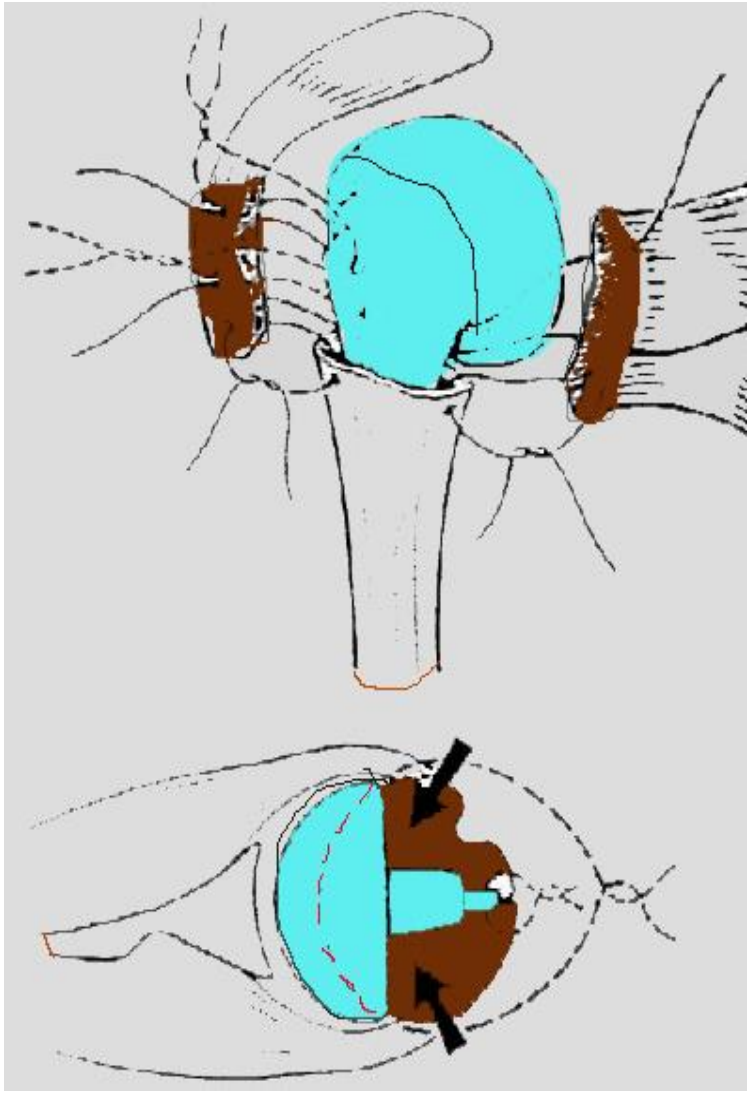

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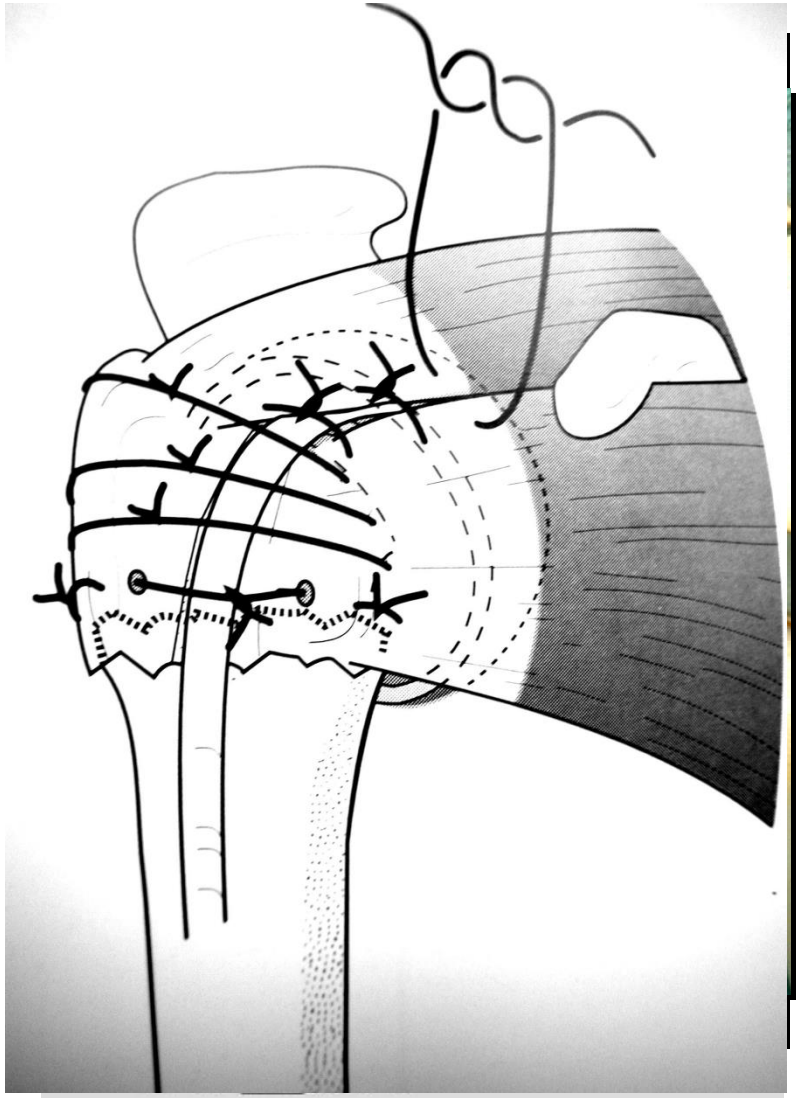
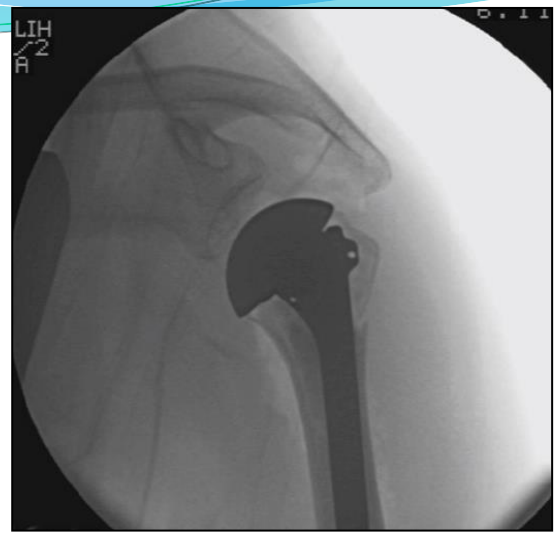
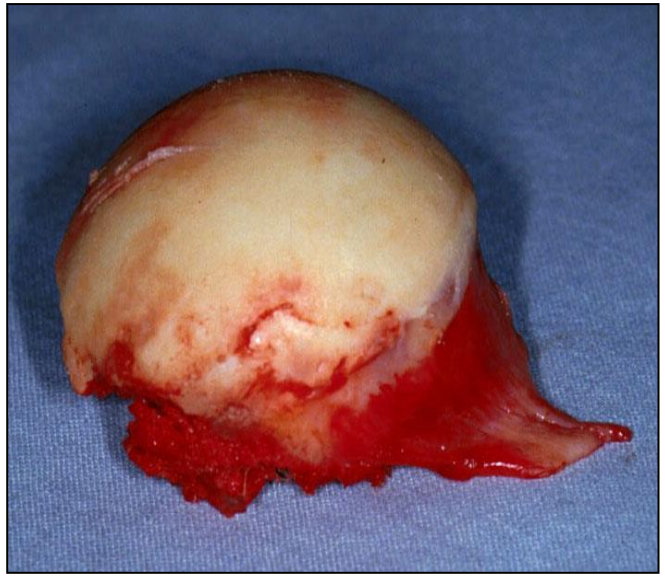


Implantation height

- Reference „greater Tuberosity“
- Reference „Calcar“
- Reference „Cuff as Spacer“
- Comparison with other side

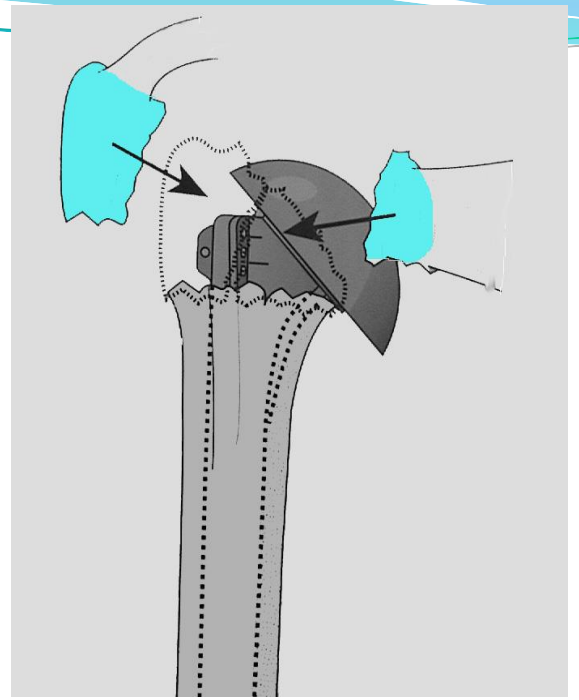




Implantation height

Too deep

Tuberosities will not fit



Too high

Tension on the tuberosities too high

Healing at risk

Head size

- A-P translation ~ 1-2 cm
- cranio - caudal translation ~ one finger
- 30° ER mandatory

Head size

Too big

high intraarticular pressure

Glenoid erosion

ROM ↓

Too small

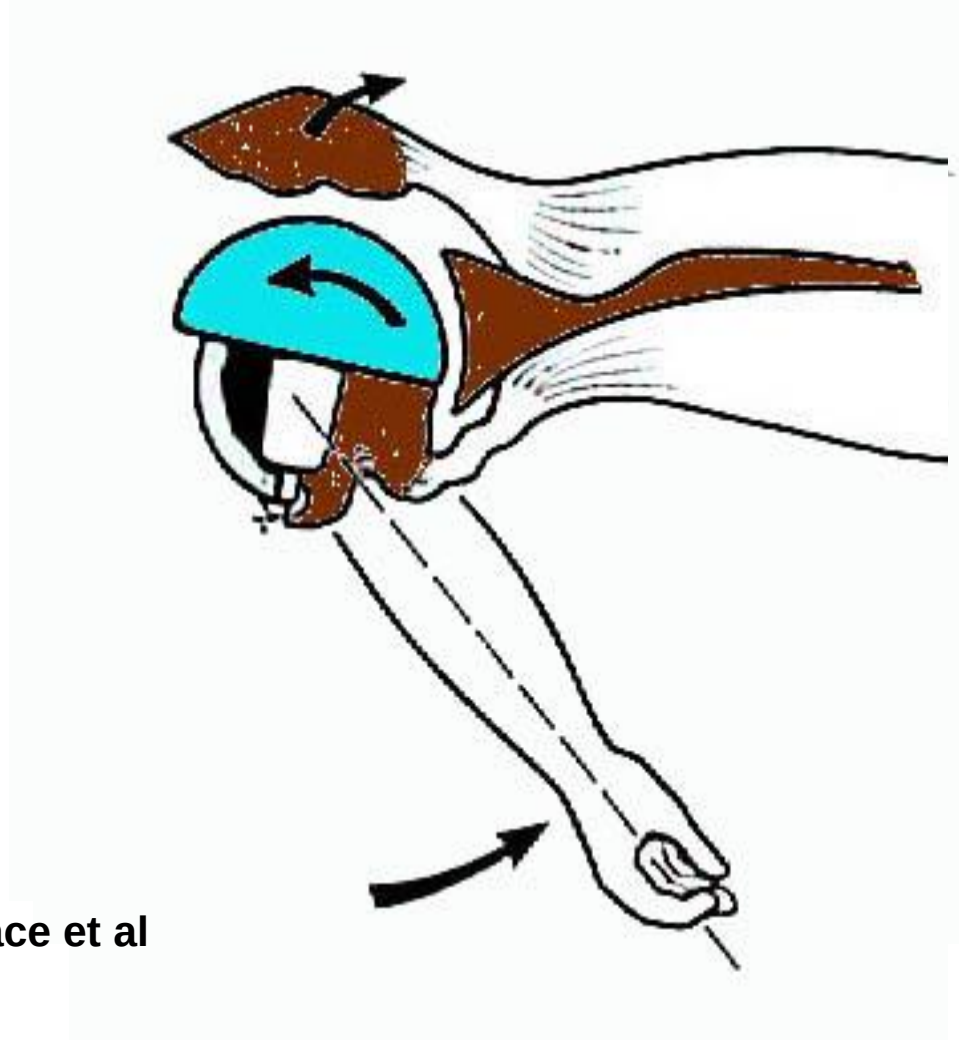
AP Translation ↑

Subluxation

Function ↓

Retroversion

- 0 - 50°
- 20°- 30°



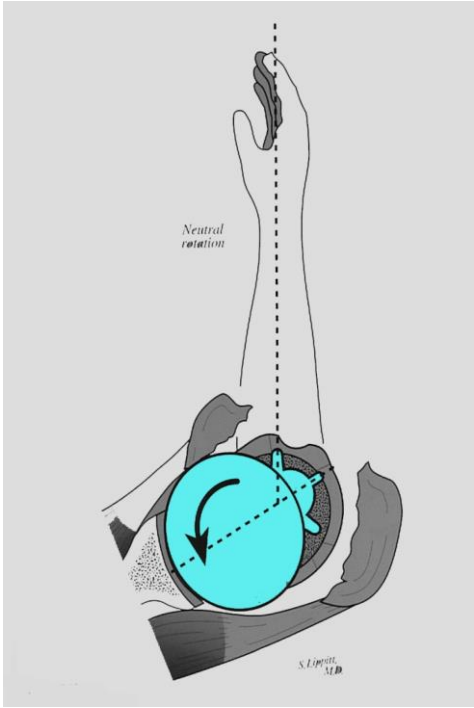
1955 JBJS-Am Neer CS

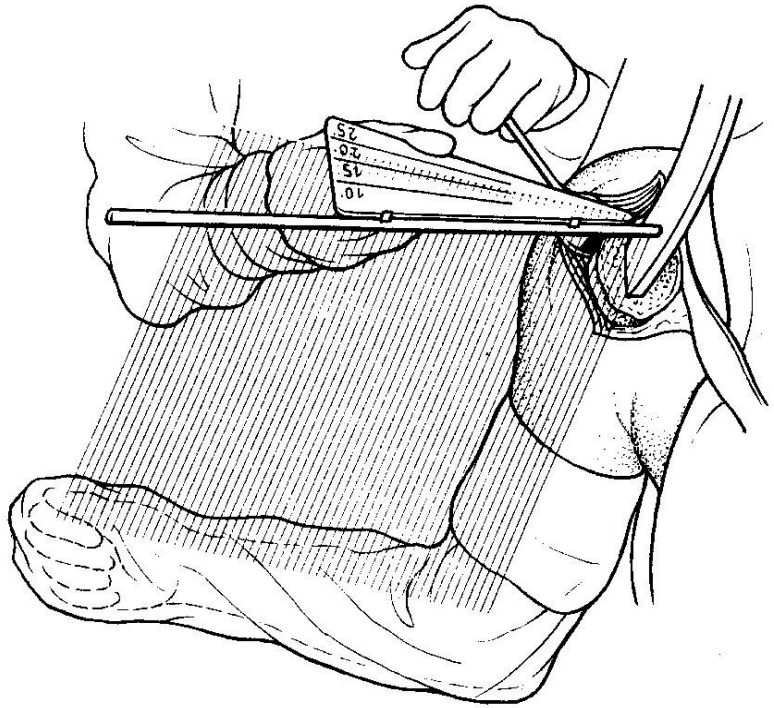
1991 JBJS-Br Roberts SNJ, Wallace et al

Retroversion

Landmarks

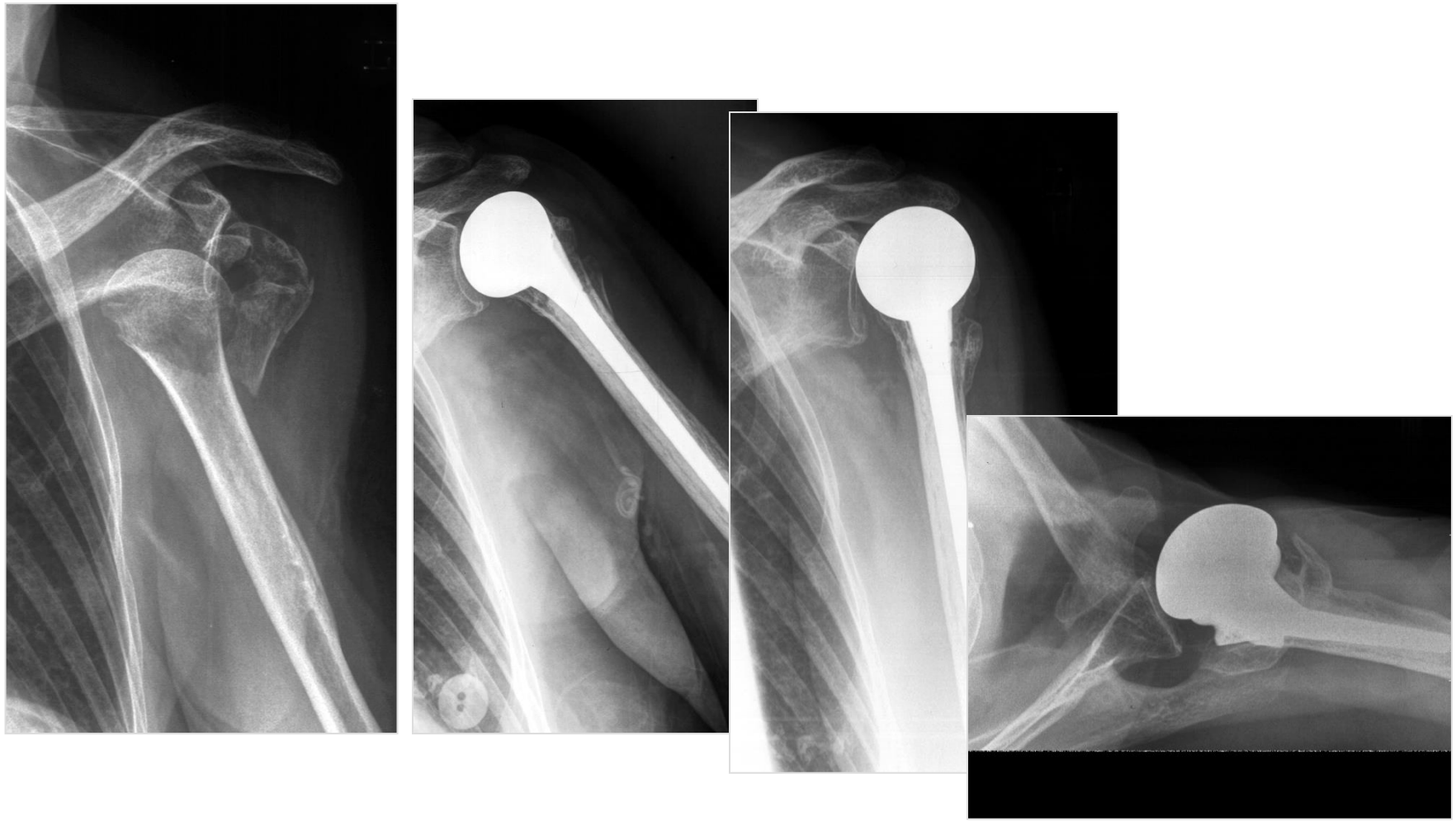
- **Bicipital groove**





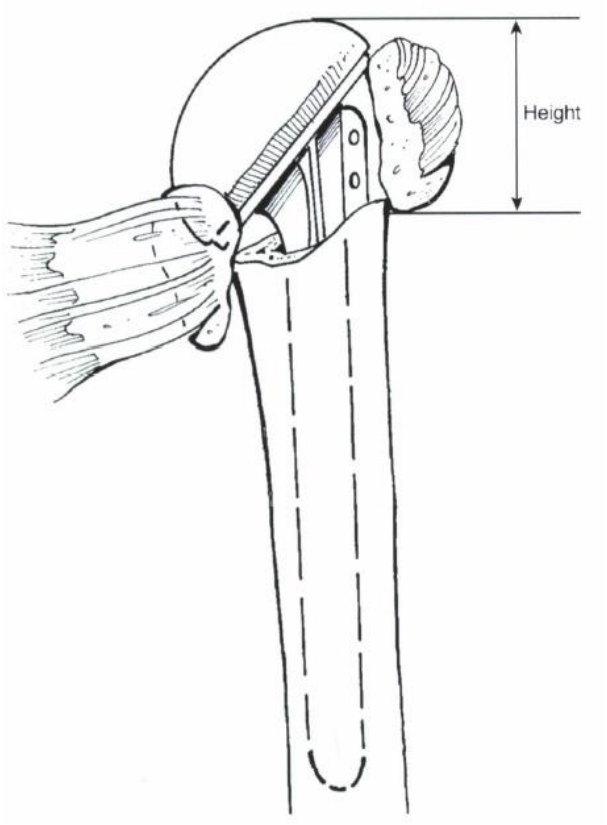
2001 JSES Hempfling A, Hertel R
Surgical landmarks to determine
humeral head retrotorsion for hemiarthroplasty in fractures

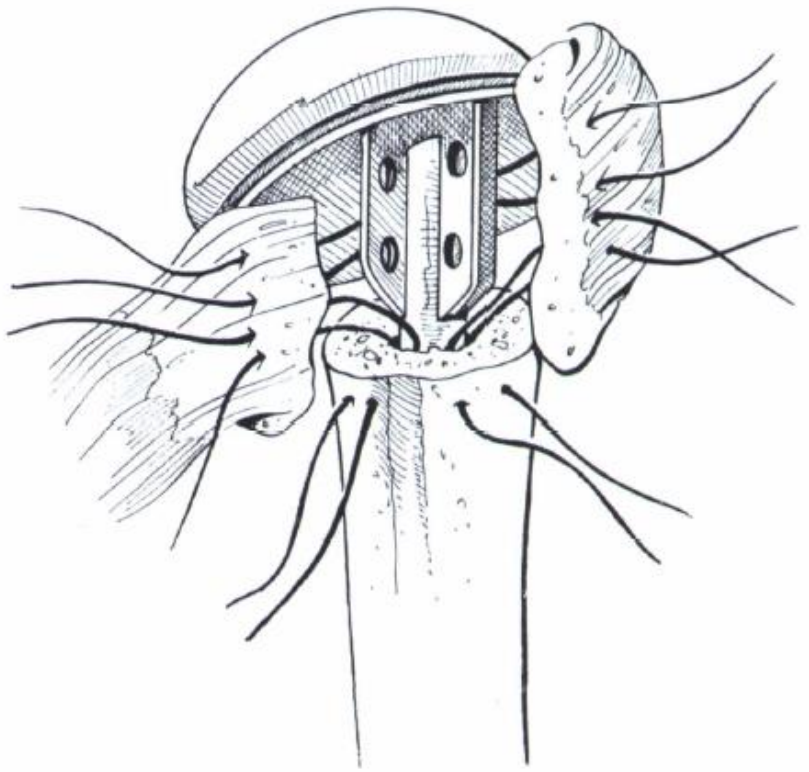
Malrotation

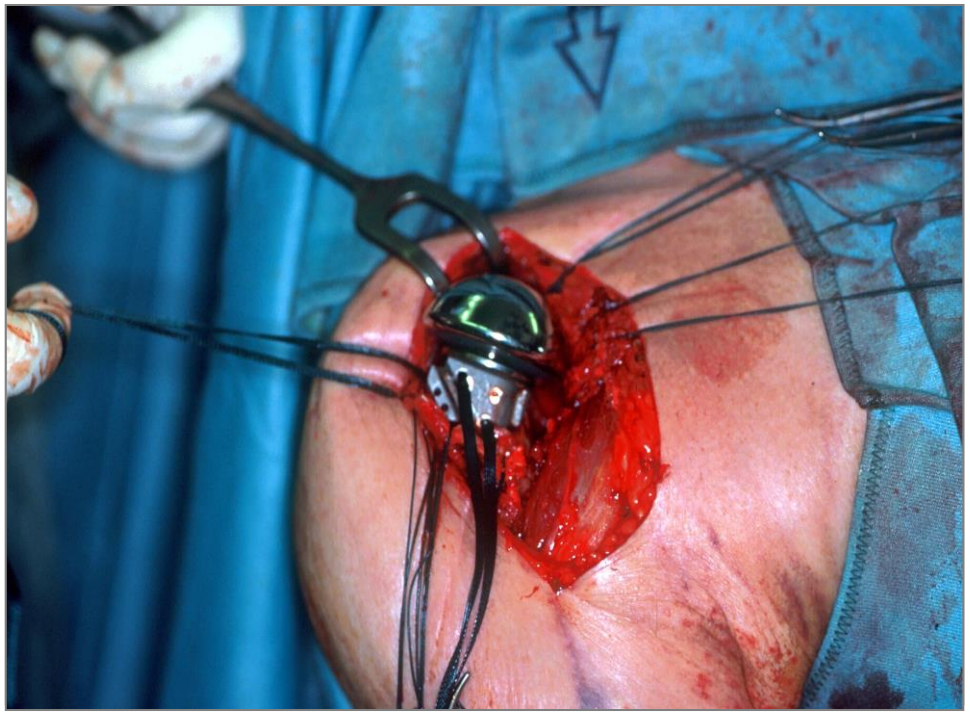


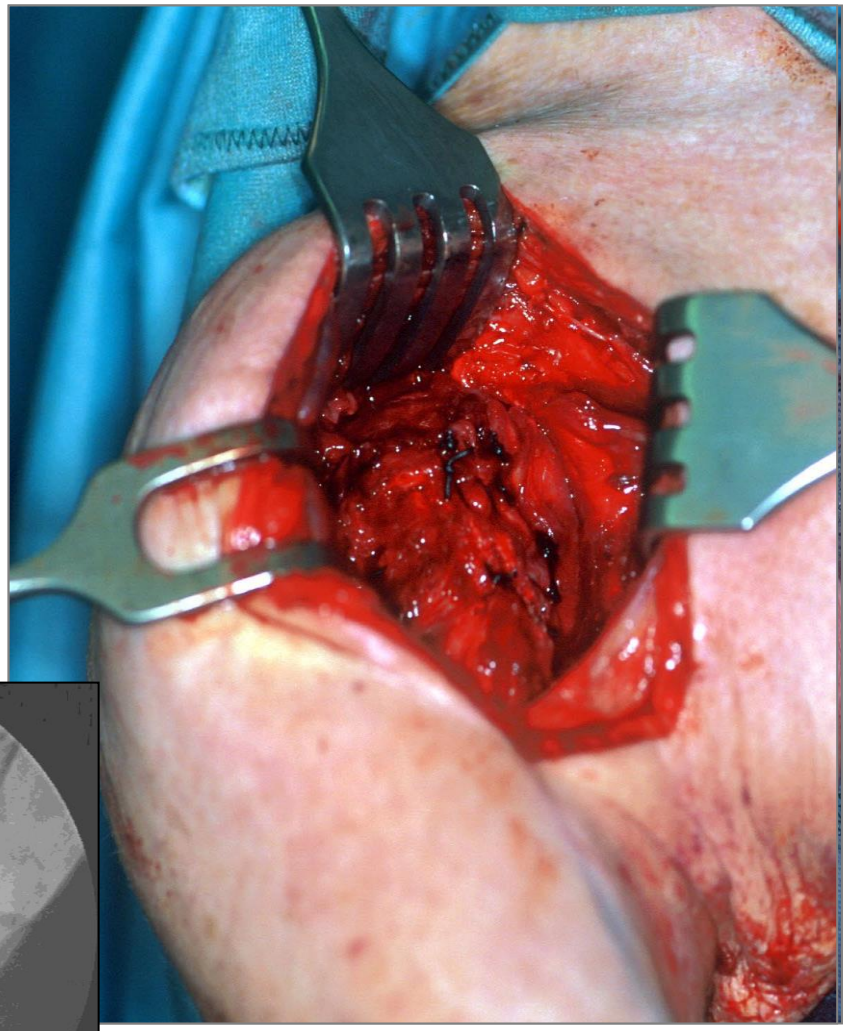
Importance of tuberosities

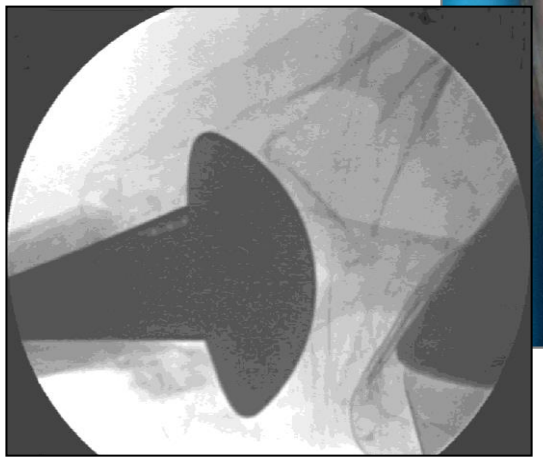
- Secure fixation of tuberosities











Complications of shoulder arthroplasty

- **Instability 1.2%**
- **Rotator Cuff Tear 2%**
- **Infection 0.5%**
- **Heterotopic Ossification 10 -45%**
- **Stiffness**
- **axillary nerve injury**
- **Periprosthetic Fracture**

76a DM II PARKINSON

Summary

the quality of the anatomical reconstruction correlates with the functional outcome

- retroversion
- restoration humeral length
- head size
- Healing of the tuberosities

Shoulder Arthroplasty (99) Boileau P, Walch G:
Shoulder arthroplasty for proximal humeral Fx: problems and solutions

Summary

- **Shoulder arthroplasty is a sucessful operation:**
  - **Attention to indication**
  - **Consider meticulous technique**

Thanks for your attention