The Humeral Head Component in Anatomic Shoulder Arthroplasty

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Disclosure

Relevant financial relationships

- **Stryker design team**
  Shoulder implants / products
- **Exactech**
  Fracture fixation
- **Acumed – Paid speaker**
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- **Associate editor JSEA**

Off-label usage: none

Humeral head *design*, *sizing* and *placement* influence stability, motion, cuff strain, and glenoid wear and loosening

Suboptimal Head Placement

#1 Stiffness ± pain
#2 Rotator cuff
- Subscap/interval tension
- Late cuff attrition

#3 Glenoid edge loading
- Wear
- Loosening

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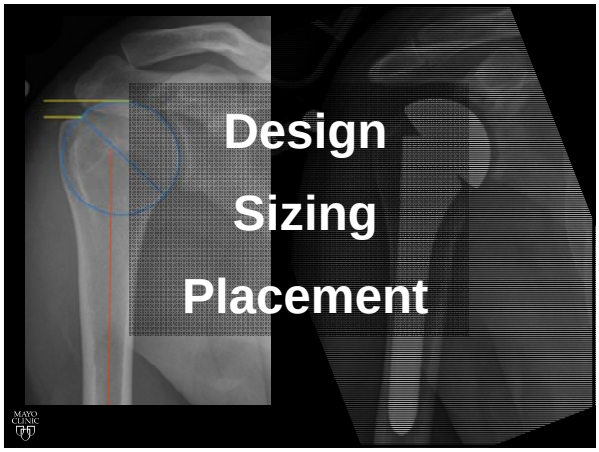

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Design

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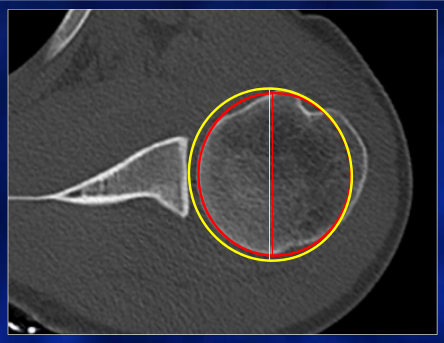
Humeral Head Geometry

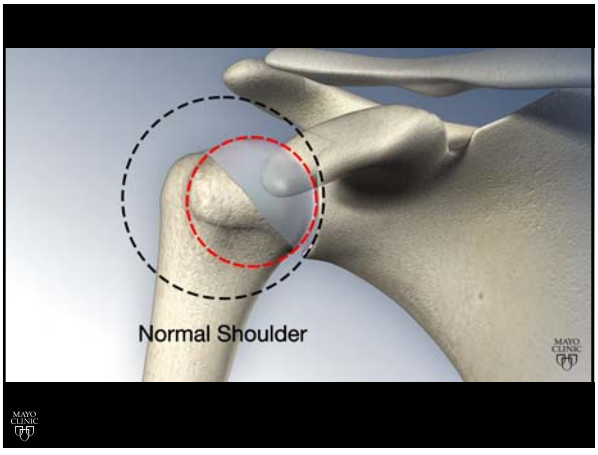
Head diameter	46.2 ± 5.4 (37 – 57)
Articular surface diameter	
Articular surface thickness	15 ± 3.5 (12 – 18)
Head to tuberosity	6 ± 2 (3-8)
Head retroversion	21.5 ± 15.1 degrees

Diameter/height ratio

Range

The Concept of Mismatch

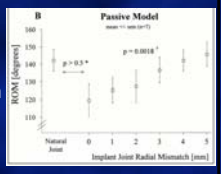




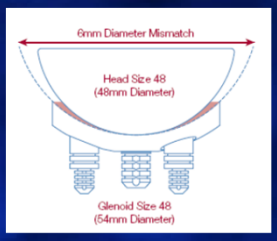
Does Mismatch Matter?

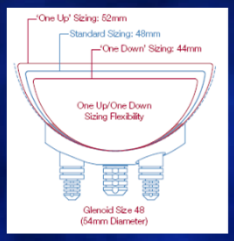
Yes

- *Iannotti JBJS Am 1997*
  - Ideal radial mismatch 4 mm
- *Walch JBJS Am 2002*
  - Ideal radial mismatch 6-10 mm
- *Wiater JSES 2015*
  - < 10 mm radial mismatch
- *Iannotti JSES 2016*
  - Humeral-based mismatch (non-spherical head)

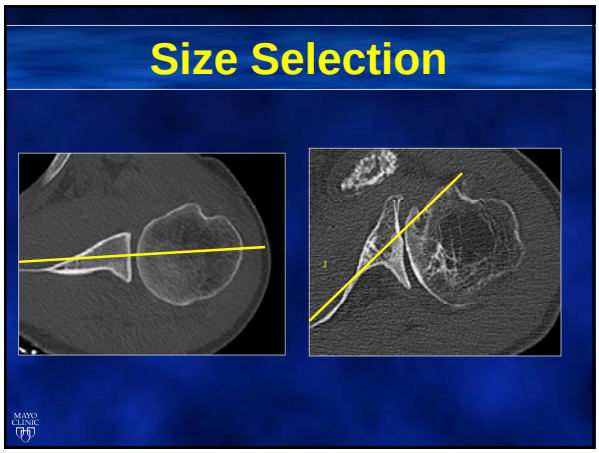


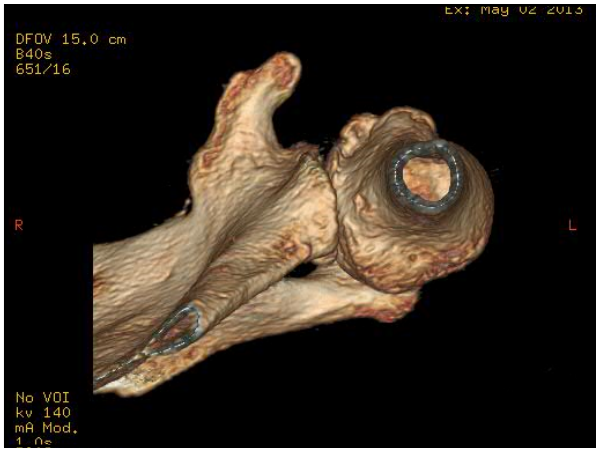
Glenoid Head Mismatch

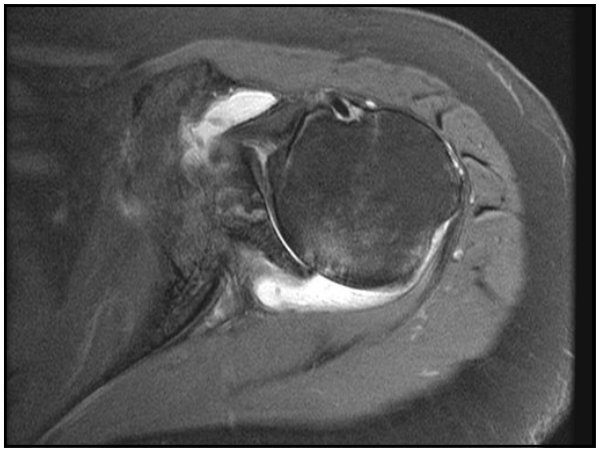




Sizing


Size Selection


DFOV 15.0 cm
B40s
651/16
R
L
No VOI
kv 140
mA Mod.



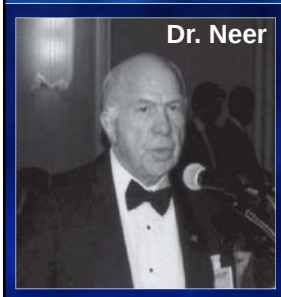
Humeral Heads

40	14, 17, 20
44	16, 19, 22
48	15, 18, 21, 24
52	17, 20, 23, 26
56	19, 22, 25, 28

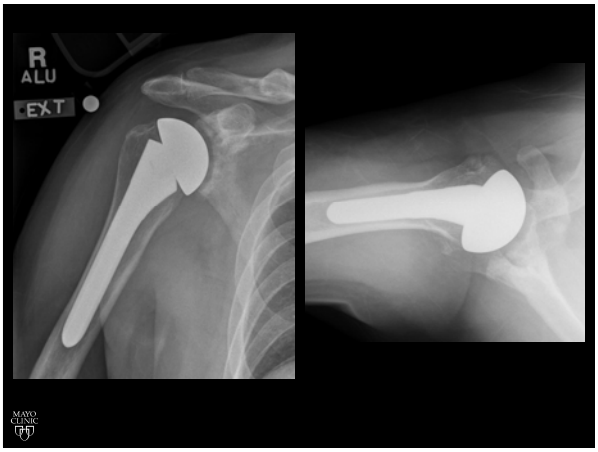
- Radius of curvature miss-match
  - Same size – 3 mm
  - One size larger – 1 mm
  - One size smaller – 5 mm
- 3-4 thicknesses per diameter
- Eccentric and non-eccentric

Placement

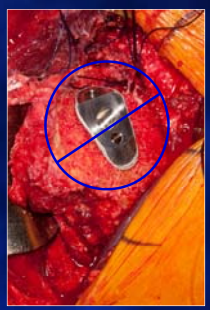
Component Placement

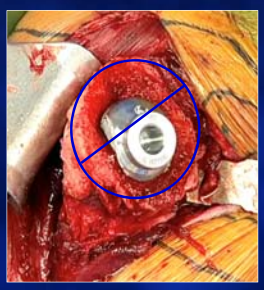


Neer CS 2nd. Articular replacement for the humeral head.
J Bone Joint Surg 1955 Apr;37-A:215-28



Placement





Summary

Summary

Humeral head design, sizing and placement influence the outcome of anatomic shoulder arthroplasty

Summary

Key factors

- Well-designed head
- Mismatch
- Sizing and soft-tissue balance
- Stem to head relationship

Suboptimal Head Placement

#1 Stiffness ± pain
#2 Rotator cuff
- Subscap/interval tension
- Late cuff attrition

#3 Glenoid edge loading
- Wear
- Loosening


Mayo Clinic Shoulder Tendon Transfers
And Complex Cuff Tears Course
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