



# Lessons Learned: Tissue Sparing THA

Mini-Symposium held prior to AAHKS  
20th Annual Meeting  
Friday, November 5, 2010  
2pm-4pm

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&  
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The concept of neck sparing stems or better described as neck stabilized stems is not new. Pipino, Freeman, Townley and Whiteside have all advocated saving the femoral neck in THA. The challenge has been to create a design that loads the medial calcar maintaining integrity of that bone structure.

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JISRF has presented on this subject at a number of CME activities including “A New Approach To Neck Sparing THA” both as poster 32 at the AAOS, 2008 and as part of a Mini-Symposium held here at AAHKS in 2008 on “Cutting-Edge Developments on Proximal Modularity in THA”.

We are dedicated to the advancement of clinical/surgical outcomes in total joint arthroplasty and present this symposium in the tradition established by Professor Charles O. Bechtol, M.D. in 1971.

JISRF has established an international hip tissue sparing study group and welcome members of AAHKS to view and become members of this educational activity.  
[www.jisrf.org](http://www.jisrf.org)

# Course Overview

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Historical Overview

Design Rationale

Pre-operative planning

Surgical Approaches

Intraoperative Techniques

Intraoperative Assessment

# Learning Objectives

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- Indicate a basic knowledge of tissue sparing designs for THA.
- Describe the various designs and limits of neck-sparing hip designs.
- Define the indications and contraindications for the use of neck-sparing THA
- Review the early experience and describe lessons learned with neck-sparing THA.

## **Co-Directors:**

**S. David Stulberg, M.D. & Timothy McTighe, Dr. H.S. (hc)**

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### **Faculty**

**Charles Bryant, MD**

**Declan Brazil, PhD**

**John Keggi, MD**

**Louis Keppler, MD**

**Thomas Tkach, MD**

**Bradley K. Vaughn, MD**

### **Contributors**

**Tony N. Aram, MD**

**Frank Schmidt, MD**

**Sam Sydney, MD**

### **Moderators**

**Terry Clyburn, MD**

**Audley Mackel, MD**

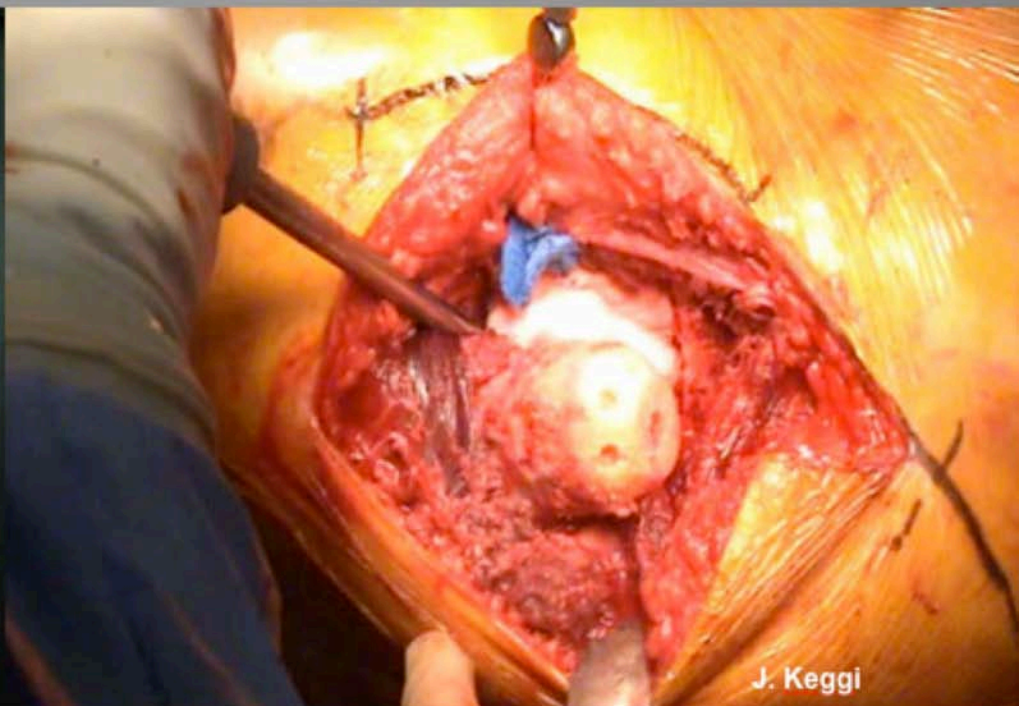
**Ed McPherson, MD**

# Architectural Changes

- Changes take place after THA and these changes can lead to a loss of bone, implant loosening and implant revision.



# Motivation to improve on tissue sparing (hard & soft)

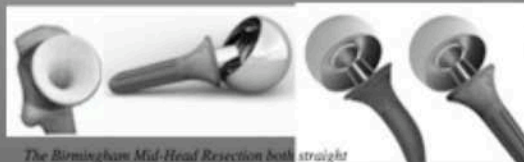


J. Keggi

# Head Stabilized



Hip Resurfacing



*The Birmingham Mid-Head Resection both straight and curved stem designs*



Mid-Head Resection







# Hip Resurfacing

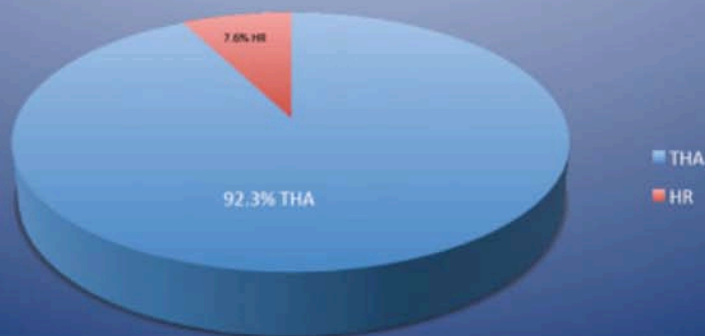
- Steep Learning Curve
- Limited Indications
- Risk of Fracture
- Late Remodeling and Aseptic Loosening
- Limited to MOM Bearings
- Extensive Soft Tissue Dissection
- ? Conservative



# Australian Registry

HR  
high learning curve  
limited indications 8-15%

All THA  
2008 Australian Registry



- Decreasing use  
(8.9% of primary THR 2005)  
(8.2% of primary THR 2006)  
(7.6% of primary THA 2008)





# Neck Stem Less Stabilized



To early to tell if this is going to be a viable concept. Will be design and technique dependent

McTighe

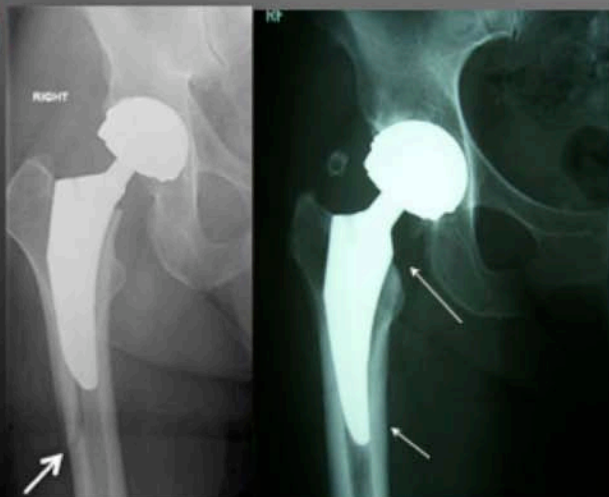


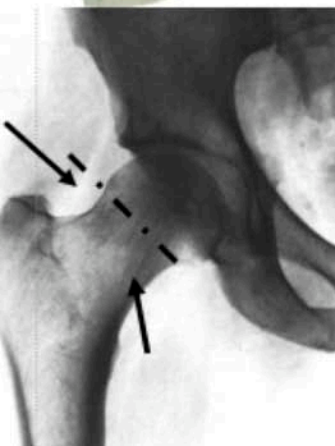
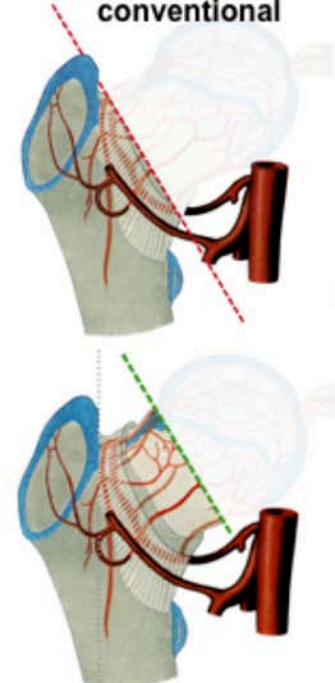
# Short Taper Styles



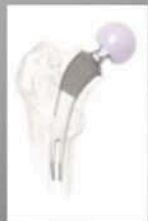
Microplasty™  
Hip Stems

TRI·LOCK®  
BONE PRESERVATION STEM





# Neck Retention

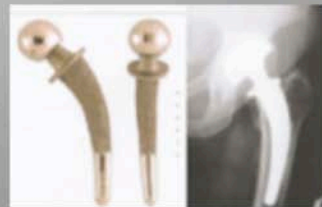


- Provides better blood flow vs. hip resurfacing [Pipino](#)
- Provides better axial and torsional stability vs. conventional THA [Whiteside](#)
- Provides for more tissue sparing approaches (both hard & soft tissue) [Pipino](#)
- Potential for less blood loss
- Potential for quicker rehab



# Save the Neck

There is a historical reference to  
neck sparing THA



- Pipino started arguing save the neck 1977-78
- 1979 Pipino started implanting the Biodynamic stem
- Freeman, made the argument back in 1984 that modern hip stems should retain the femoral neck
- Studies showed that 70% of the blood flow to the femoral neck is retained after THA and the vitality of the bone is good (Pipino et. al., 2006)

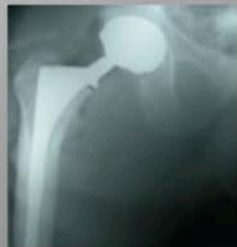




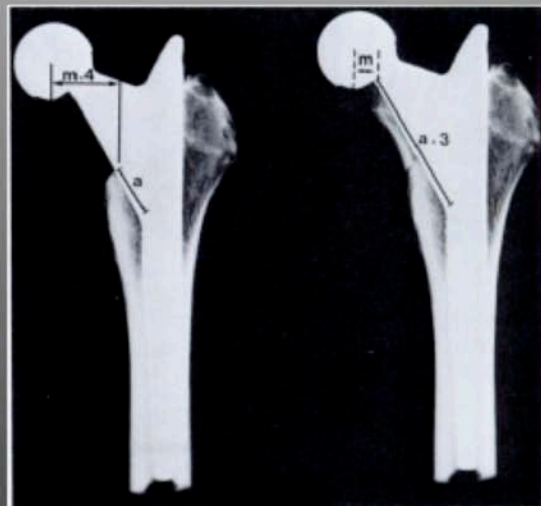
## Topic For Debate

# Why Resect The Neck?

M.A. R. Freeman JBJS 1984



- The varus-turning moment increases by a factor of 4 when the neck is resected
- Increase of femoral offset also increase torsional loads on the implant interface



The bending moment is also reduced by saving the neck

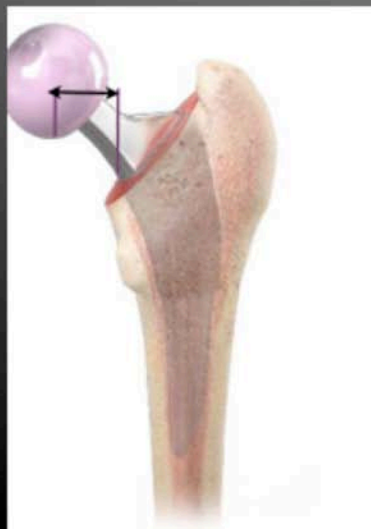
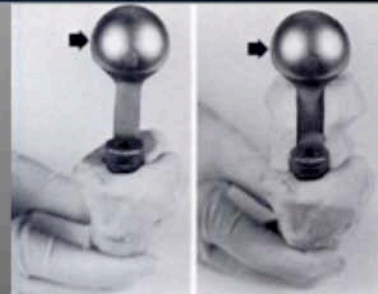


“the neck of the femur is not obviously reduced in strength in the osteoarthritic hip and is no more weaker than the rest of the femur in the inflammatory arthropathies.”



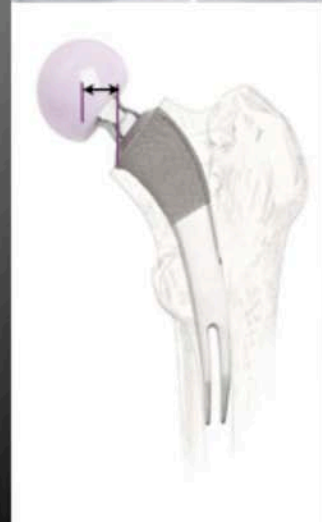
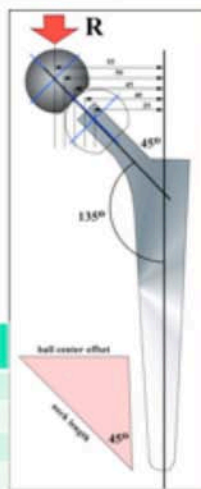
# Why Save The Neck?

Neck resection generates significant torsional moment at the stem/bone interface  
Freeman



- 8% per 1mm increase in true lateral ball-center offset
- 6% per 1mm increase with the ball's neck-length size adjustment.

offset	Neck-length	Nm
35 mm	49.50	84
40 mm	56.58	96
45 mm	63.65	108
50 mm	70.72	120
55	77.79	132

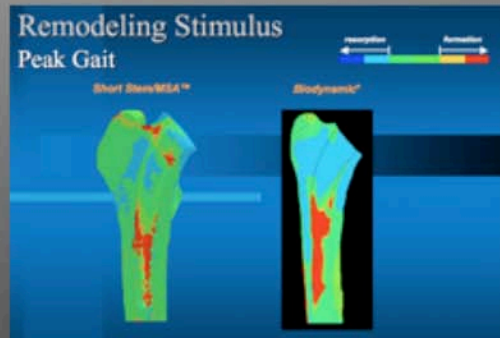






## Pipino current stem design CFP™

- He has experienced improved results over the c.c. material, but still encounters some stress shielding



- FEA modeling of the MSA/ARC stem has demonstrated better bone loading patterns compared to the Biodynamic™ design
- The CFP stem is the current bench mark in clinical/surgical results for short curved neck-sparing stems





## Concept to improve on Prof. Pipino's work of Tissue Sparing

- Tissue Preserving for early intervention
- Alternative to HR (broader indications)
- Choice of bearings
- Revision option after HR
- Easier surgical technique for anterior approach
- Reproducible technique for all surgical approaches
- Modular neck for fine tuning joint mechanics
- Ease of retrievability and conversion to conventional THA if necessary



# Short Curved Neck Stabilized



Pipino



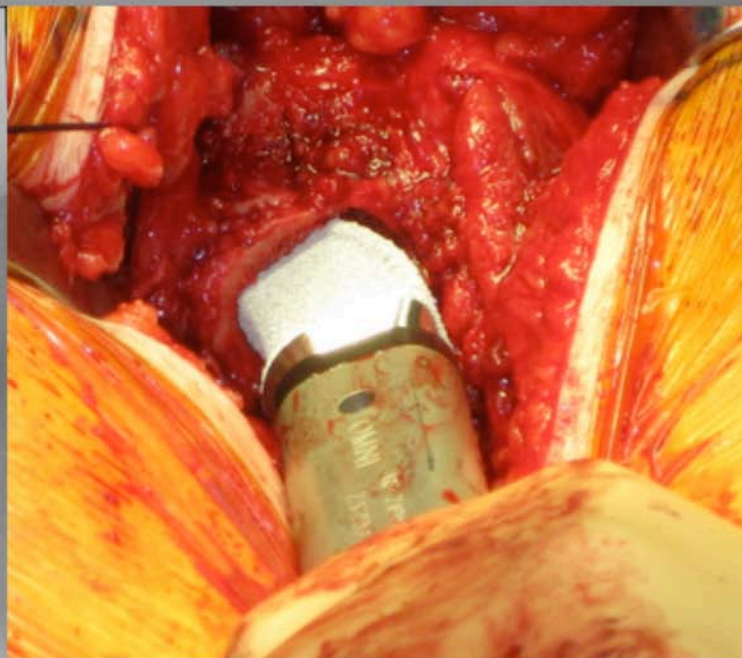
ARC™ & MSA™ Stems  
licensed TSI™ technology patents pending



Corin

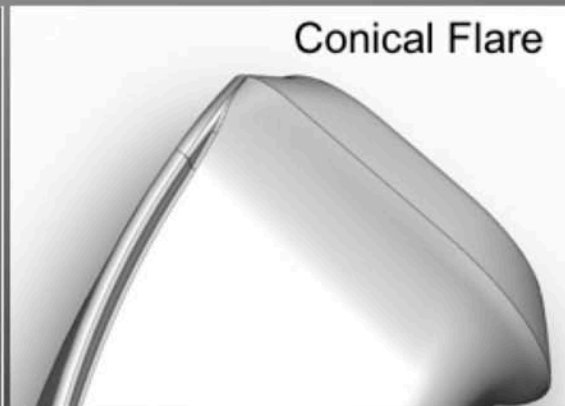
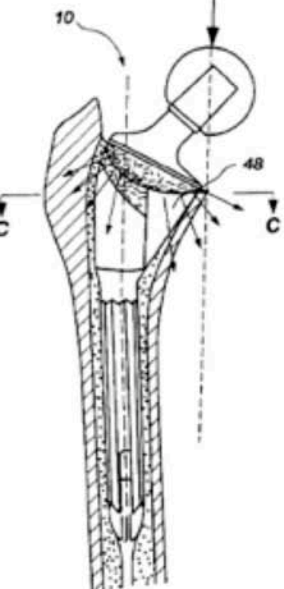


# Save Hard Tissue & Lateral Hard and Soft Structures



# The conical flare was build off conical collar of 1993 stem design

**Fig. 2** McTighe et al patent



Transfer hoop tension into compressive loads

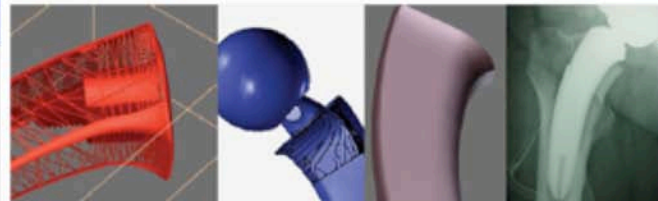




## "Neck Sparing Total Hip Arthroplasty Lessons Learned"

By: T. McTigue<sup>1</sup>,

I. Woodgate<sup>2</sup>, A. van der Rijt<sup>3</sup>, A. Turnbull<sup>4</sup>, I. Harrison<sup>5</sup>, D. Brazill<sup>6</sup>,  
L. Keppler<sup>7</sup>, J. Keggi<sup>8</sup>, K.J. Keggi<sup>9</sup>, R. Kennon<sup>10</sup>, S.D. Stulberg<sup>11</sup>, L.E. Rubin<sup>12</sup>



Novel: proximal conical  
flair loads the medial neck



Prof. K. Keggi, MD  
Presented in  
Florence, Italy  
May 2010



Posterior approach



Anterior approach



## Check Range of Motion

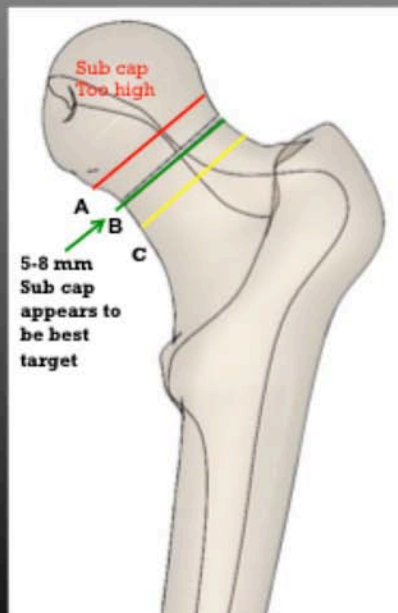


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# Lessons Learned Summary

Three key technique related features

## ① The level of neck resection



- Top of level A is too short risk leg length being long and increased in risk of mechanical impingement.
- You can go down to the top of C without risking stability



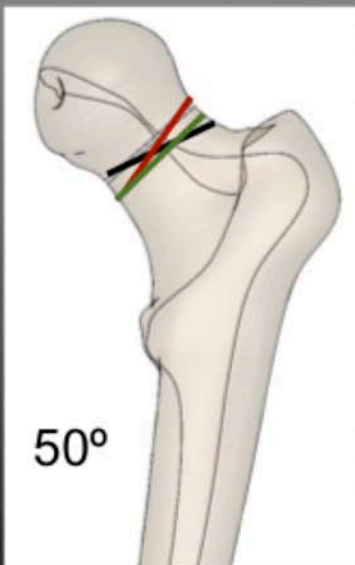
# Lessons Learned Summary

## ② The angle of the neck resection

50° at 5-8 mm

Note:

Slight varus, valgus does not appear to make any significant difference in early clinical results.



➤ Too vertical stem can be in varus

➤ Too horizontal stem can be in valgus

## Lessons Learned Summary

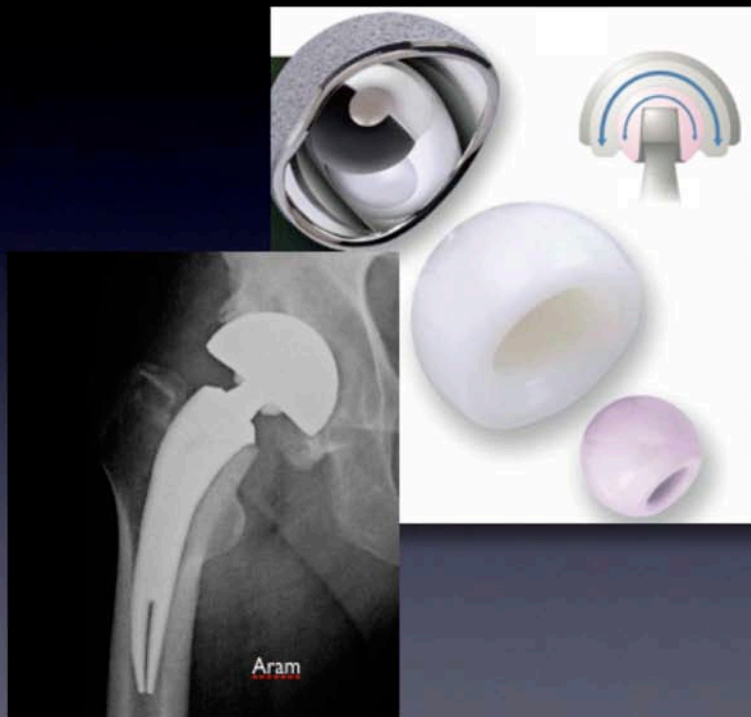
➤ Rasp shape the medial curve

### ③ Work the medial curve



There is a learning curve (3-4 cases) and a different technique as compared to broaching.

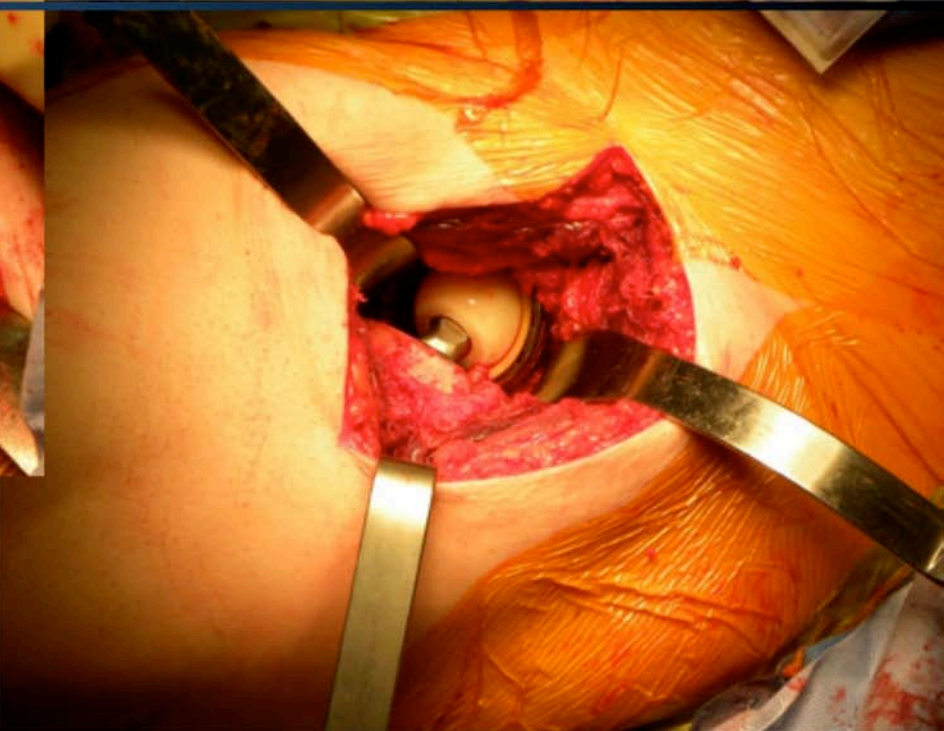
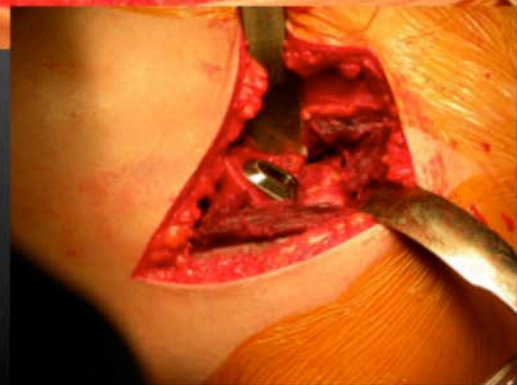
# Dual Mobility Cups



# Sub Cap FX. Keppler

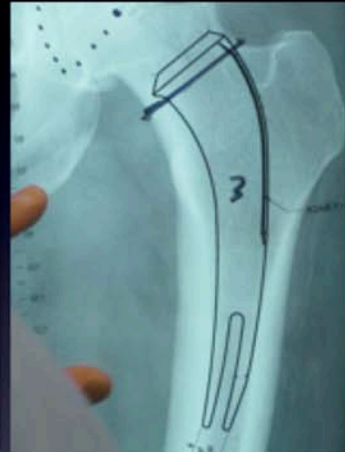


# Anterior Approach J. Keggi





# Templating



- AP helps determine neck level of resection
- Lateral helps determine stem size

➤ 20° of internal rotation is more accurate for offset and medial curve measurement

You don't template like a conventional stem. This would be too tight. The distal stem is a pilot. A size #2 will ensure proper seating of the conical flair.

(Ideally AP film should be in Internal Rotation)

# Intra-operative Assessment

## X-Rays are helpful

Keppler

➤ 70%  
of the  
time  
some  
change  
is made  
(25 yrs.)



➤ No problem in taking more neck  
➤ Make a intra-operative  
assessment and fine-tune your  
mechanics



➤ Decision to take a  
little more bone



Less need to go lateral



# 17 year post index surgery

C. Bryant





# 17 year old

## Motor cycle accident

McPherson



# Lessons Learned Complications

- One case in Au that subsided 1.5 cm (80 yr. old male) no pain stable 12 months post-op was this do to a intra-op fx or post-op?
- 3 cases we needed a smaller stem size (all female)
- Two intra-operative calcar cracks one significant converted to primary stem and one minor treated with a wire.
- One neck/head disassociation (converted to a Mallory/Head)



# Neck Stabilized Design



- Short curved trapezoidal style
- Proximal conical flare
- T-Back
- Saggital slot
- Distal lateral portion of the stem angle  $11^{\circ}$
- Porous Coating (Plasma Ti & HA)
- C.C. modular neck (two lengths, two varus/valgus angles  $8^{\circ}$  &  $12^{\circ}$ , anteverted neck  $12^{\circ}$ )
- Neck has a taped threaded hole for retrievability

# Bi-lateral First Side May Second August







The tradition established by Charles O. Bechtol, MD lives on!

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Timothy McTighe  
Executive Director, JISRF  
Chagrin Falls, Ohio