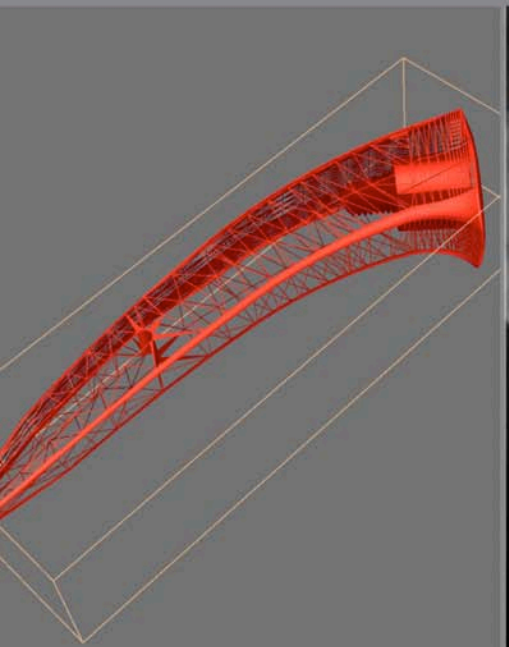


Neck Sparing Stem Design Concept

by Timothy McTighe, Dr. H.S. (hc), Chagrin Falls, Ohio Dec. 2007

Back to the future in THA (Neck Sparing Stems).

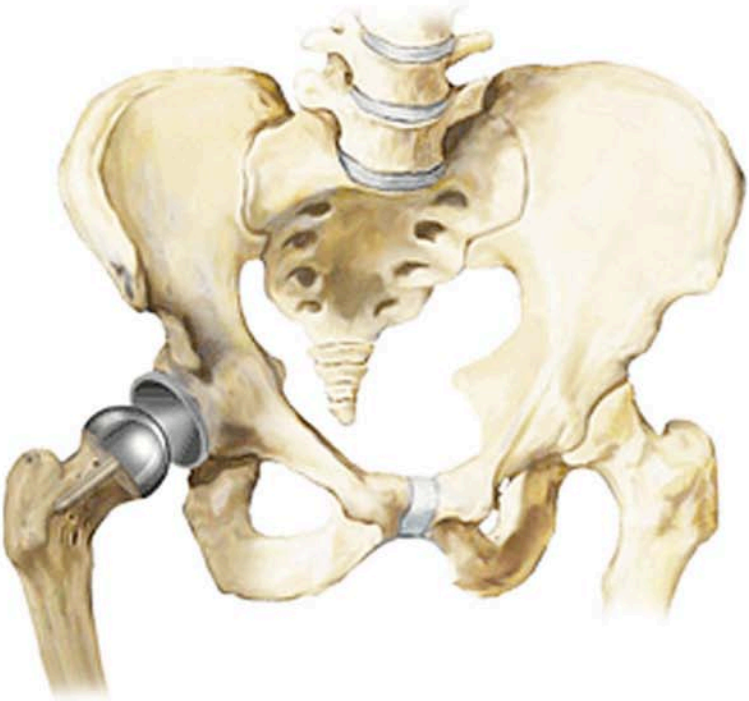
The concept of neck sparing stems is not new. Frederick R. Thompson (New York) developed a device to treat neck fractures and in 1948 Philip Wiles implanted the first Thompson stem with a metal socket.

Freeman, Townley, Pipino and Whiteside have continued to advocate the use of neck sparing stems. Mechanical studies have clearly shown an early advantage to increased axial and torsional resistance with the intact femoral neck. The challenge has been to create a design that loads the medial calcar in compression maintaining the integrity of that bone structure.

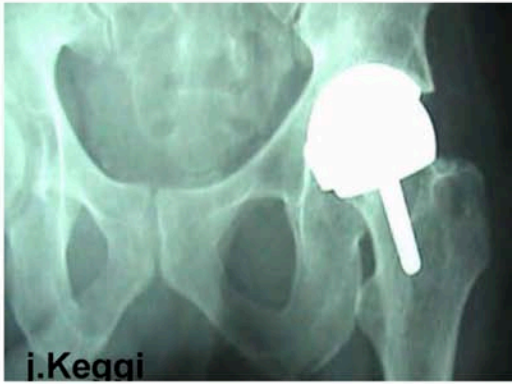
The Muscle Sparing Approach™ (MSA™) or Neck Sparing Approach™ (NSA™) has been conceived in an attempt to create a bone conserving stem allowing soft tissue sparing approaches that would provide more reproducible results as compared to hip resurfacing. The stem is simple in design, reproducible in technique and provides for fine tuning joint mechanics. The novel proximal internal flare is designed to improve proximal load transfer and the shape of the stem allows for immediate torsional and axial stability.

Collaboration with Omni Life Science and Global Orthopaedic Technology has advanced this concept into a viable alternative to both conventional and hip resurfacing total hip arthroplasty.

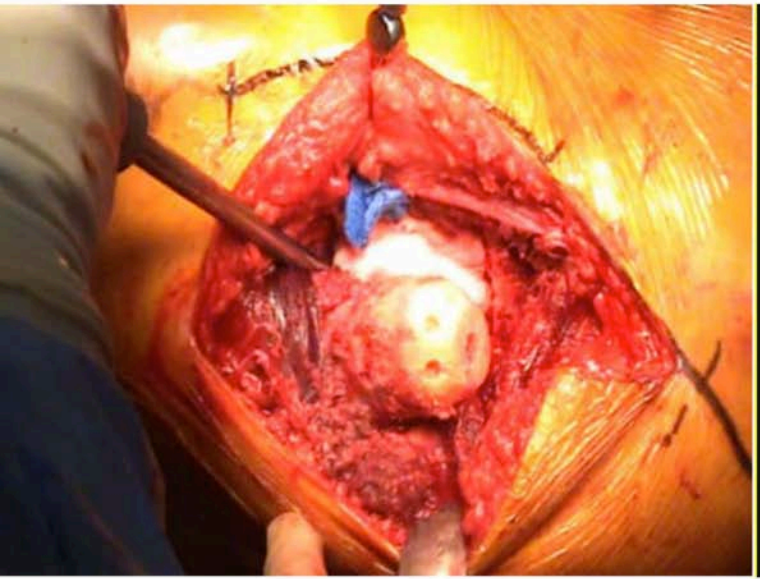
We can do better than this with regards to bone remodeling.

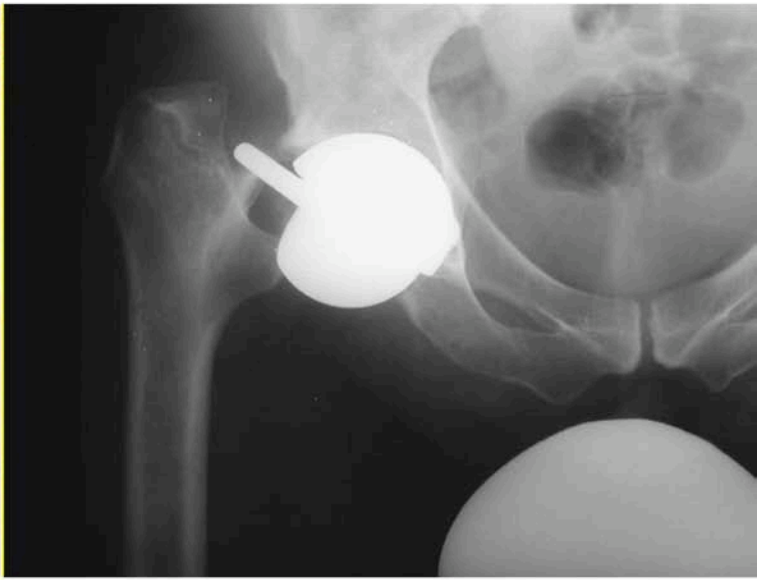


The current trend, is it reproducible? What has really changed?

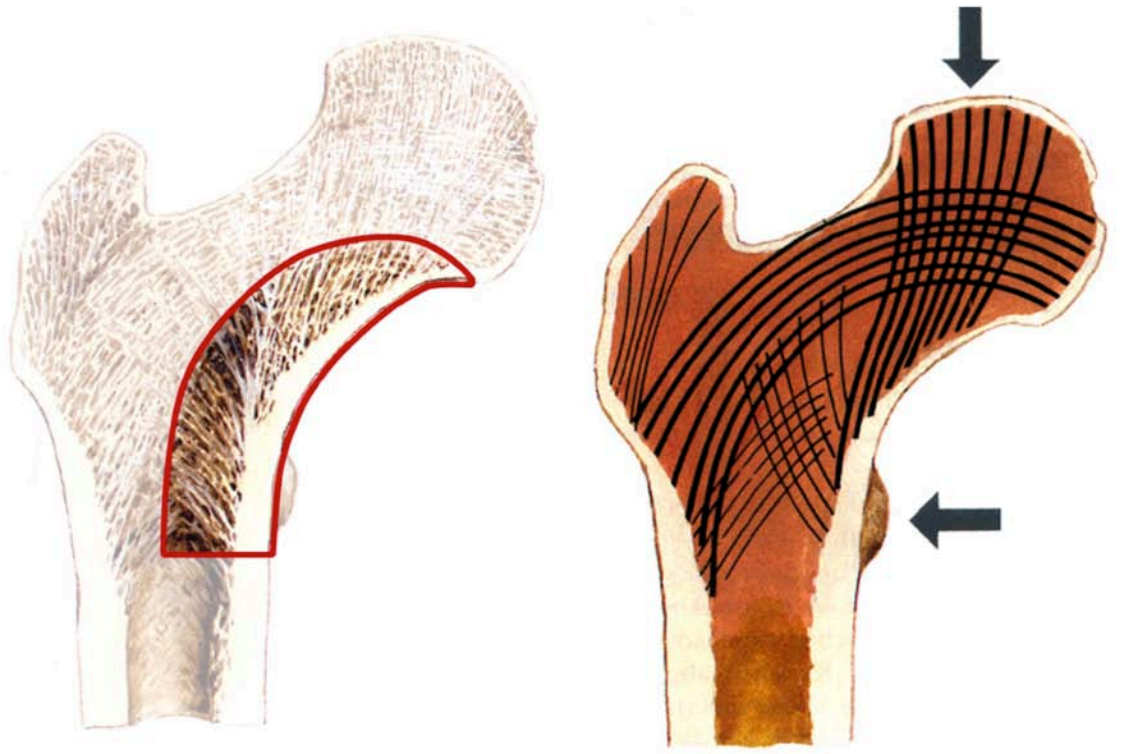


Townley and BMH resurfacing

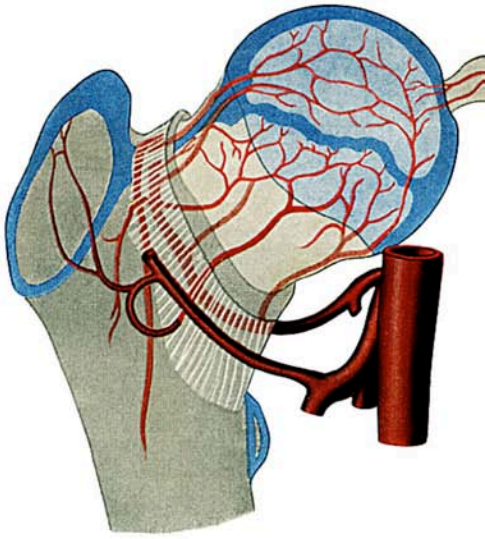




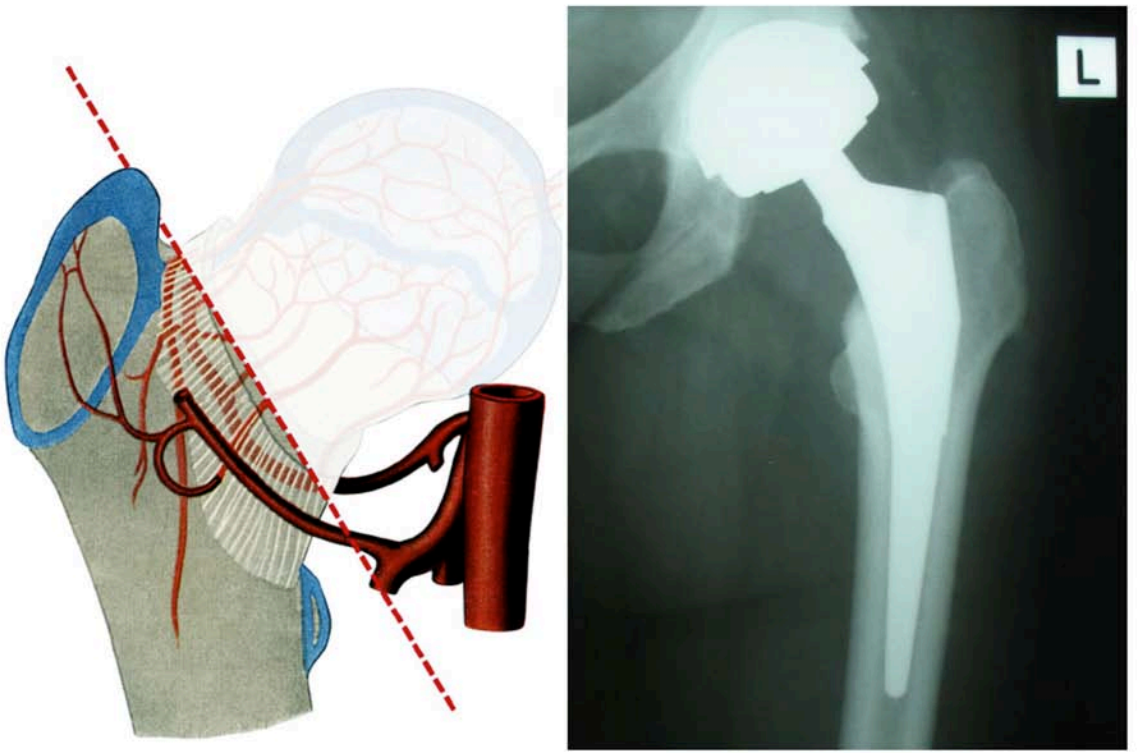
J. Keggi soft tissue exposure is greater than muscle sparing approach and problems occur in the most experienced hands.



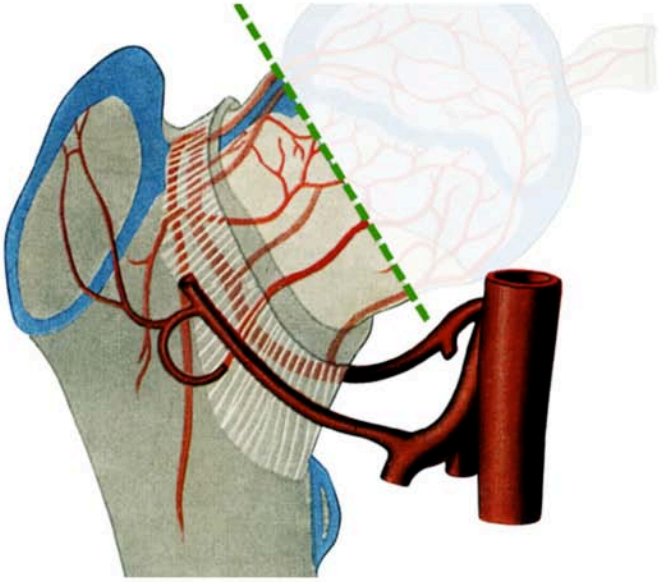
Wolf's Law

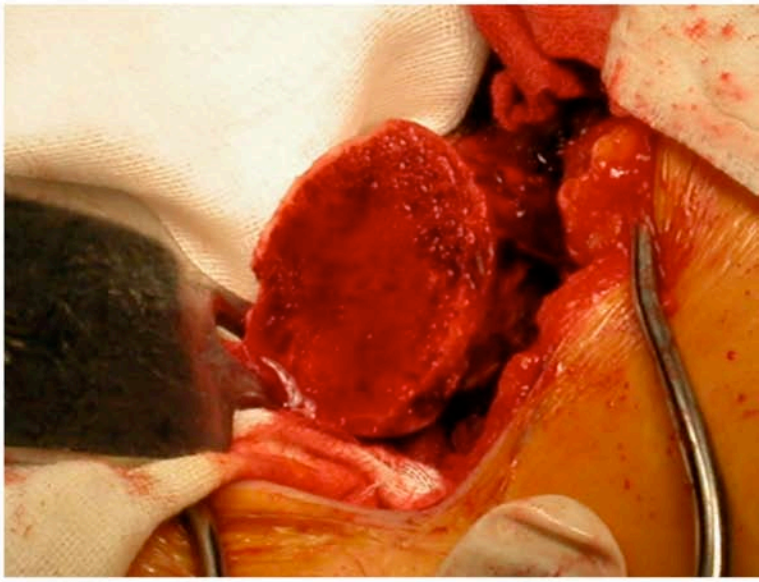


Vascular supply of femoral head and neck

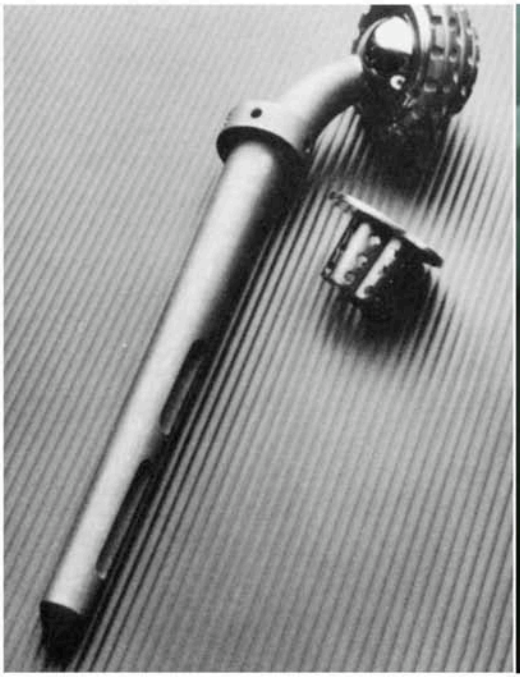


Conventional neck resection



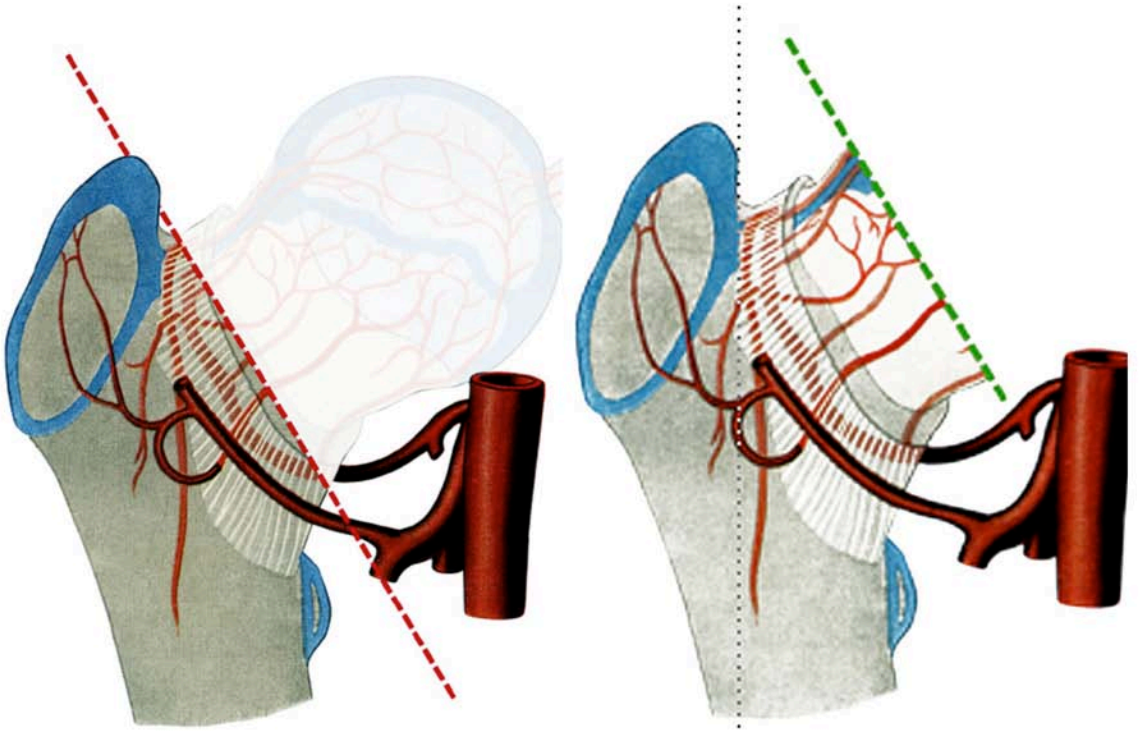


conventional neck resection vs. high resection

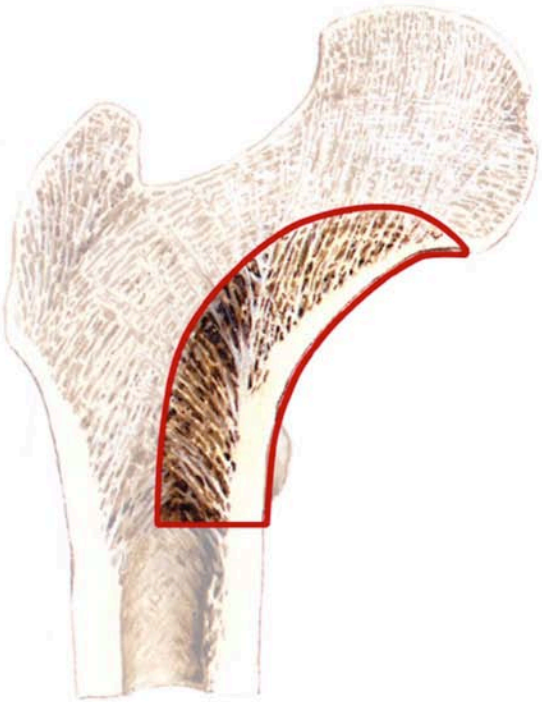


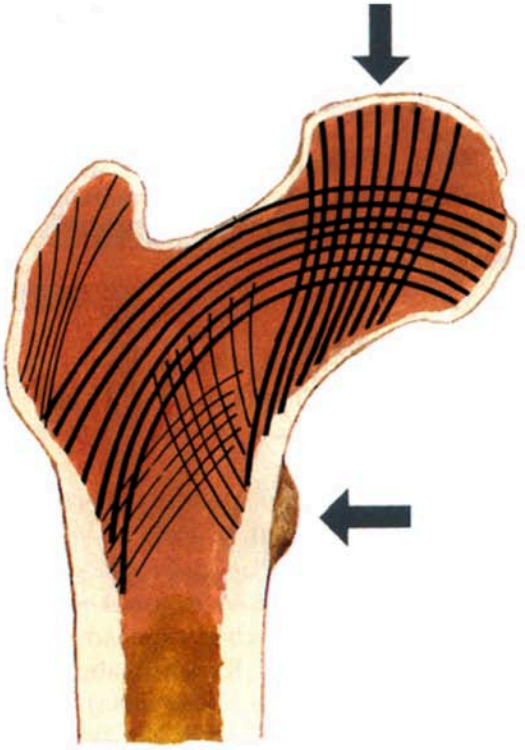
Is MOM the answer or just a limitation

Thompson stem designed for femoral neck fractures



neck sparing vs. conventional neck resection





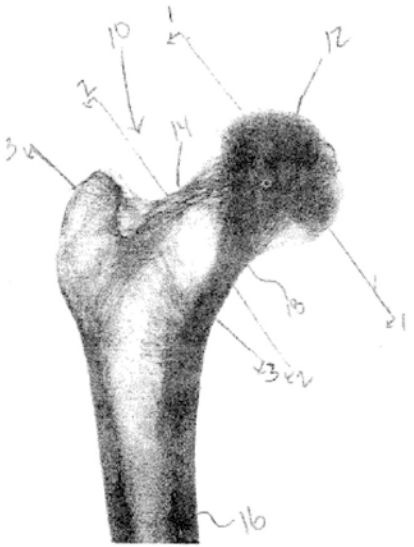


FIG. 2.

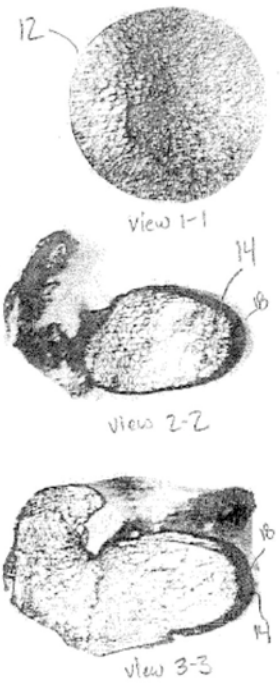
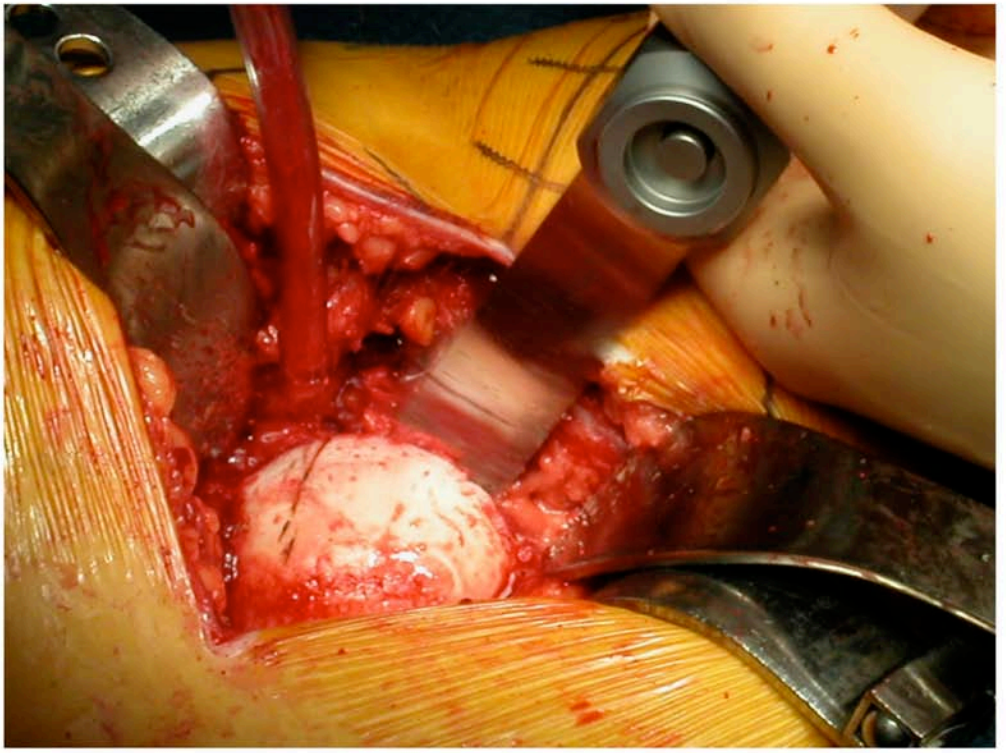
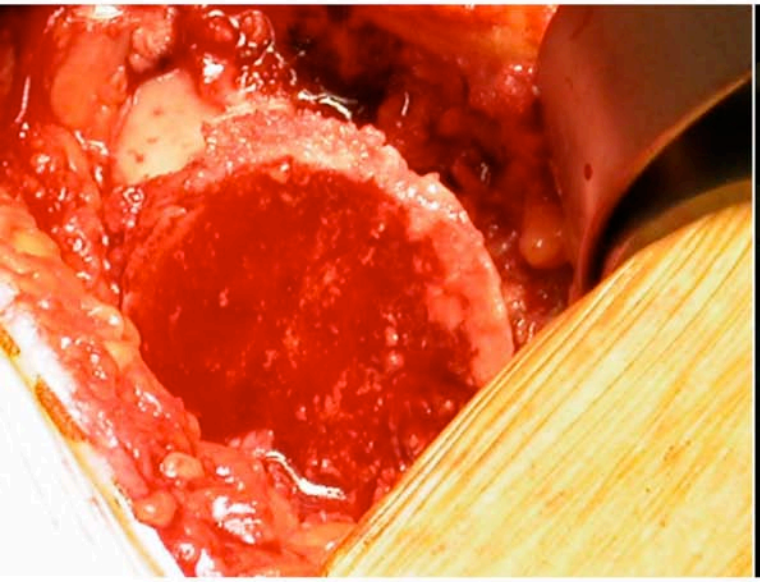


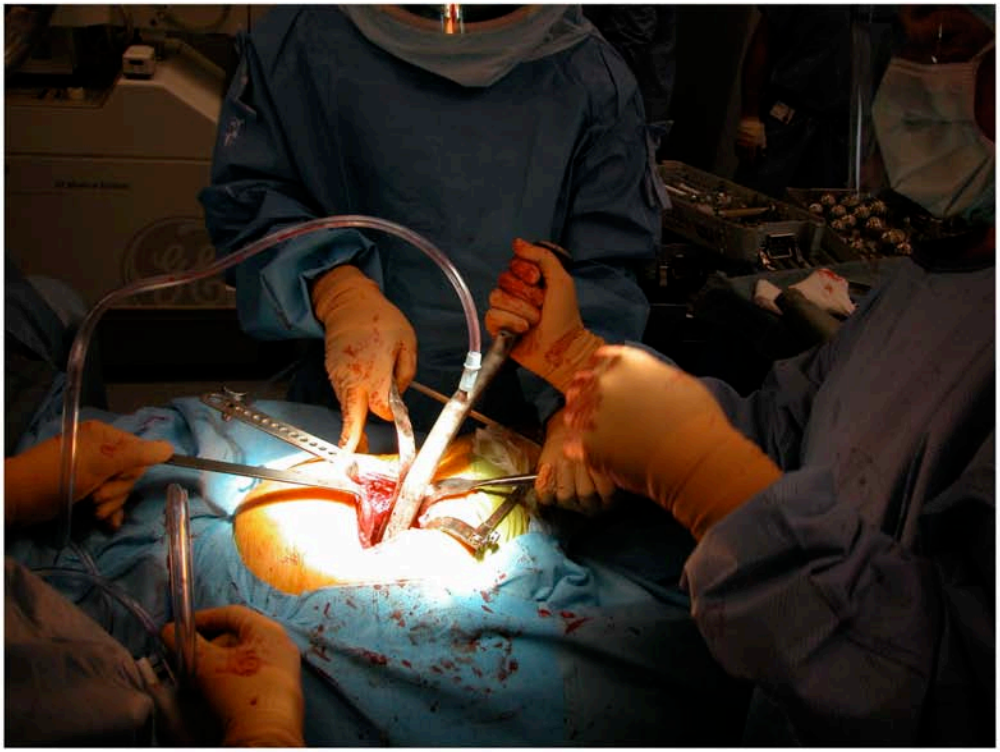
FIG. 2A



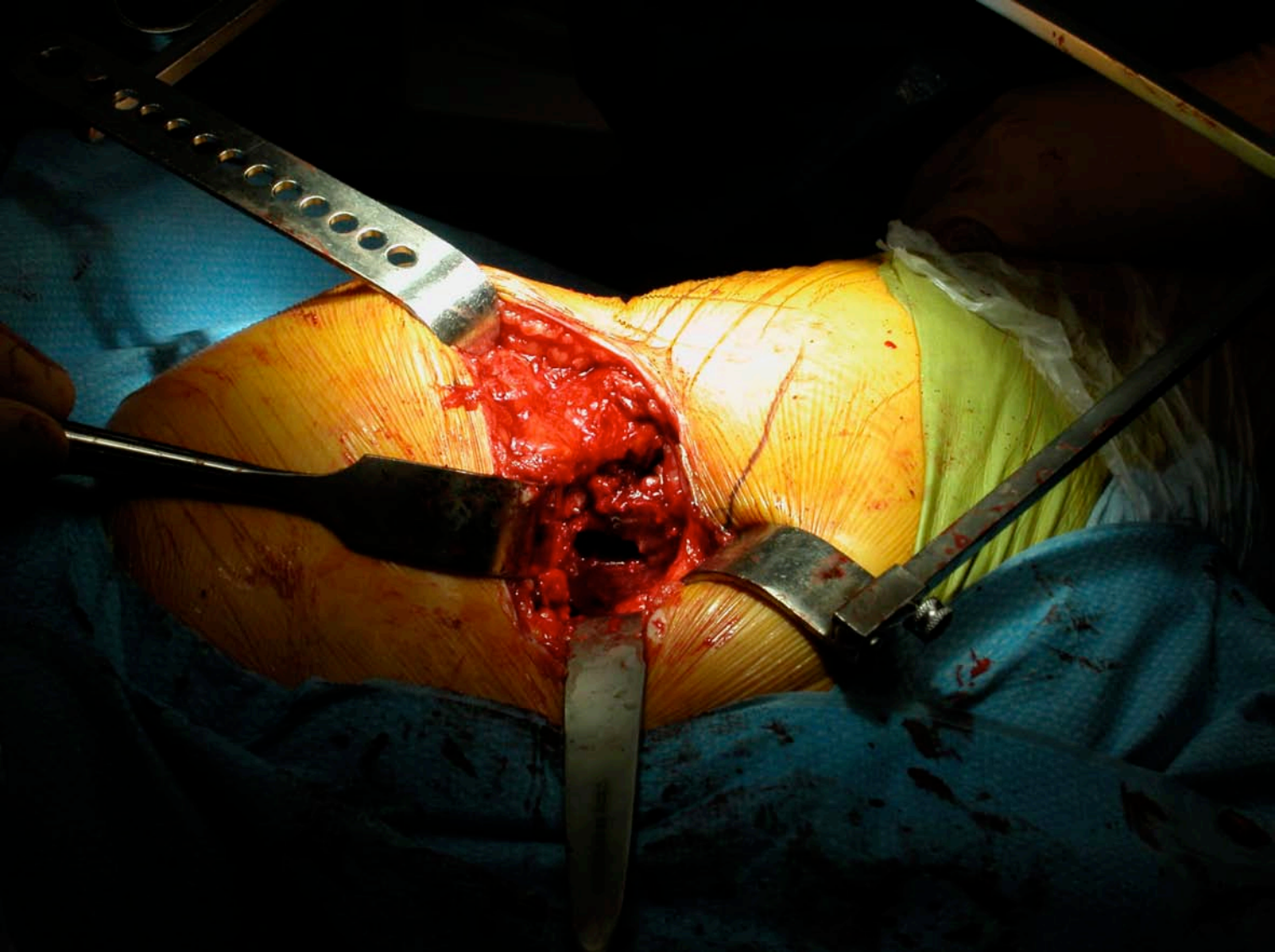
High neck resection

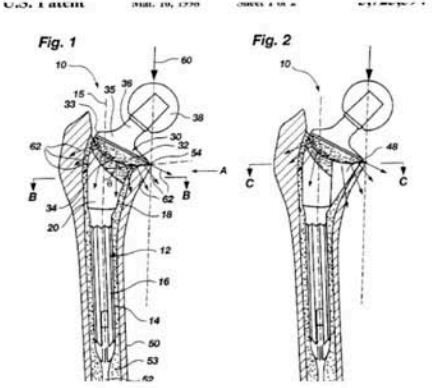


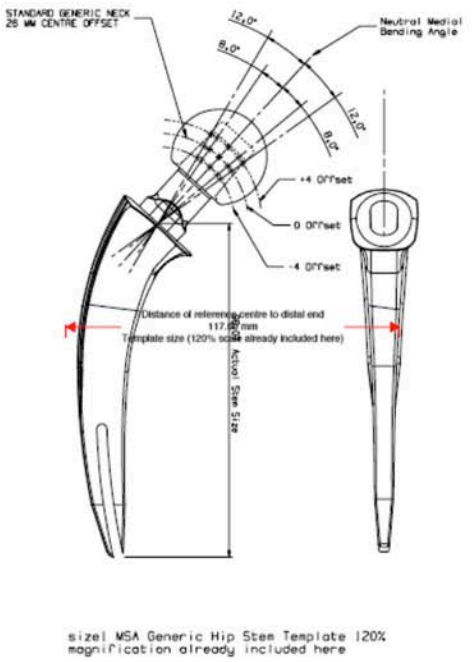
Surgical evaluation of technique



MOM cup insertion with high neck resection (Keppler)

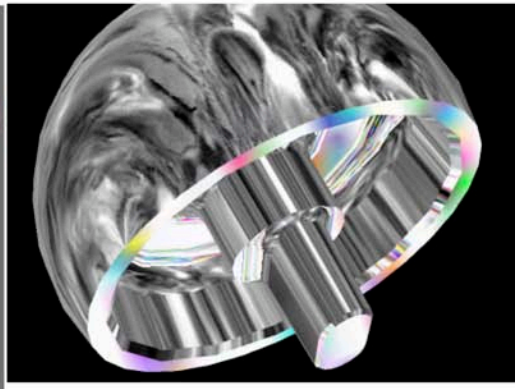






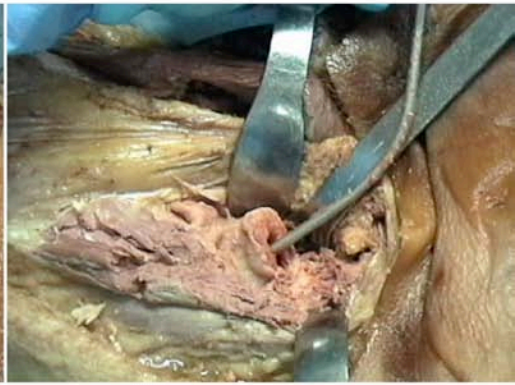
sizel MSA Generic Hip Stem Template 120% magnification already included here

Design experience and historical review. The type of bone remodeling were are looking for.



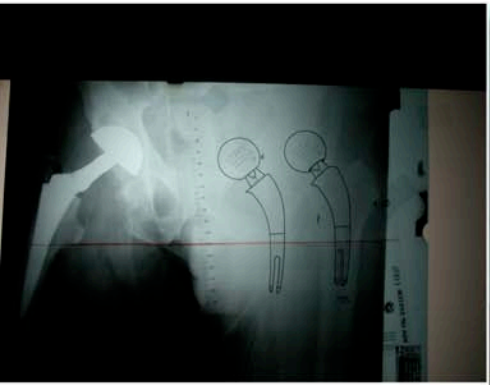
Concept





Anterior approach (John Keggi)

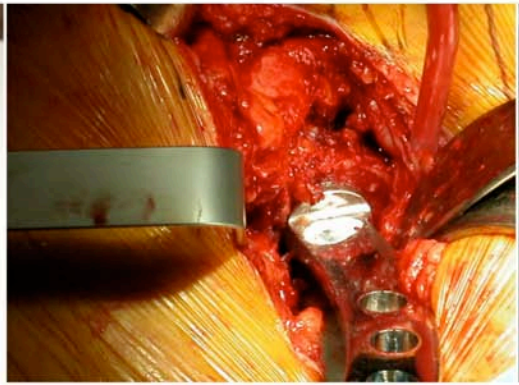
Significant templating and review of many designs and concepts.



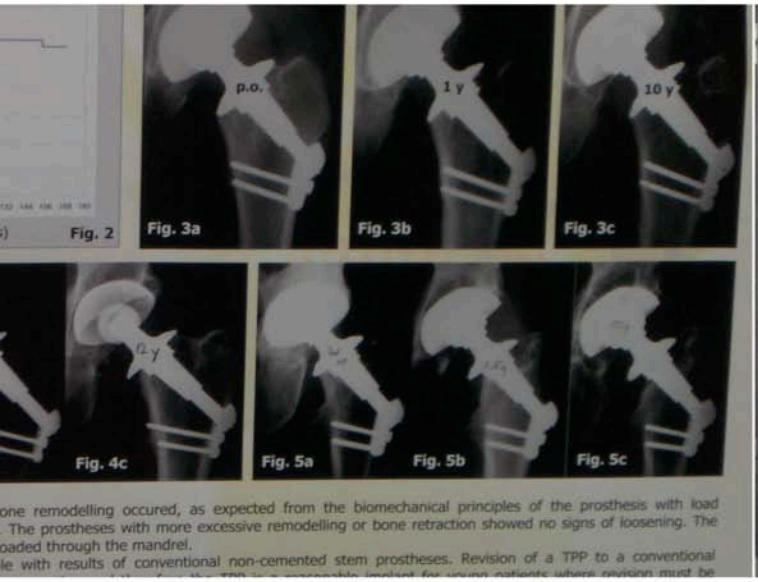
Over 100 patients have been templated including my own x-rays.

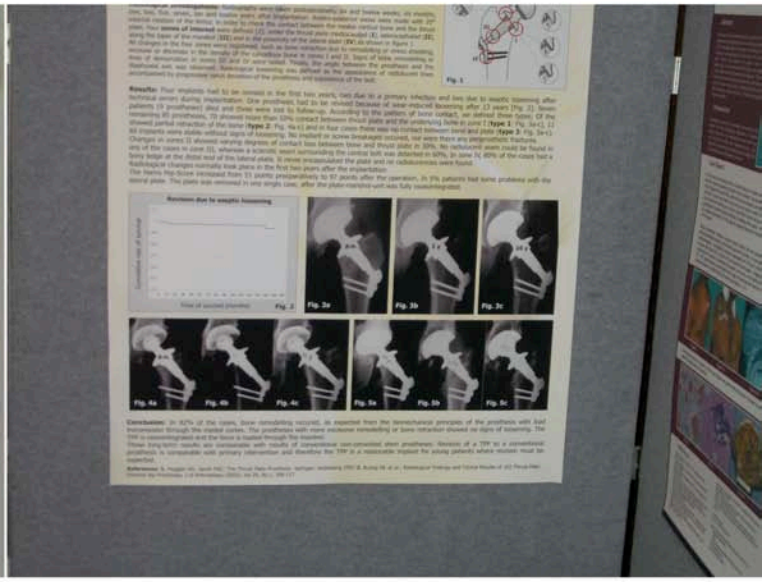
High offset custom stem from Biomet vs. neck sparing design

Surgical collaboration has been conducted in both the U. S. and australia.

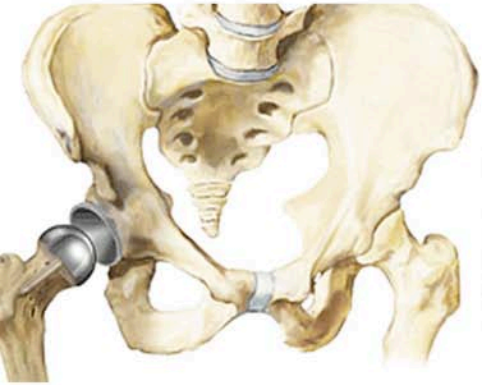


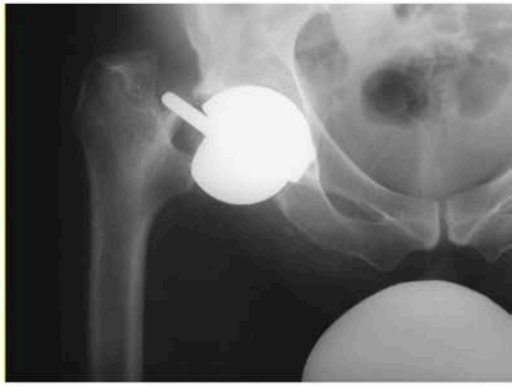
New technologies have been utilized to step up the development process.



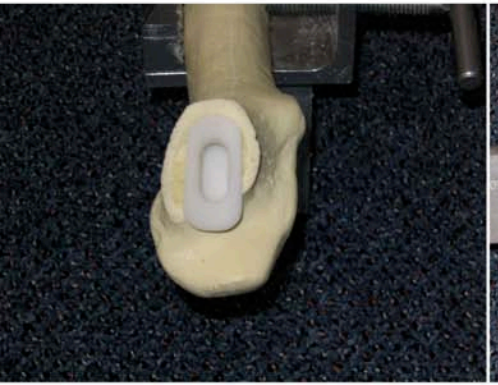


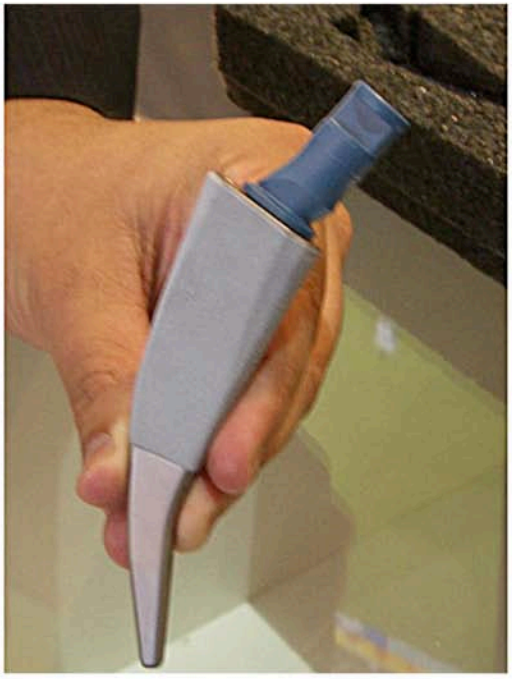
Poster 2007 AOA in Australia (significant bone remodeling)





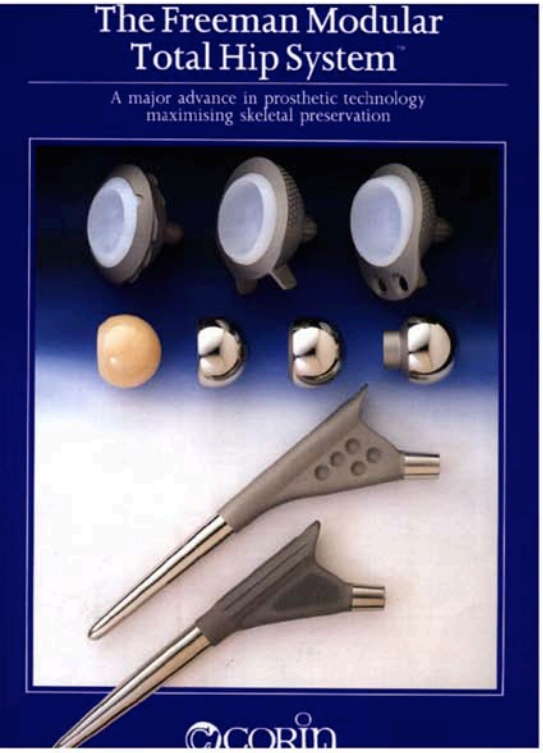
Hip resurfacing has limited application



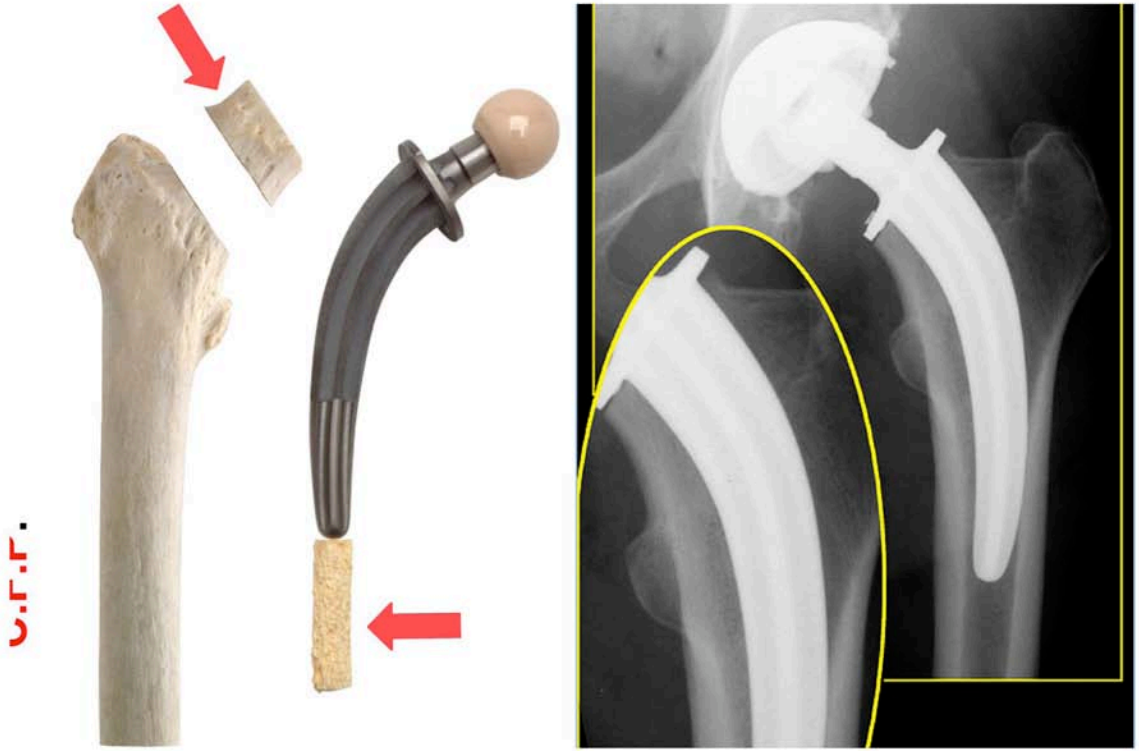


Competitive small stems (not all neck sparing in design)

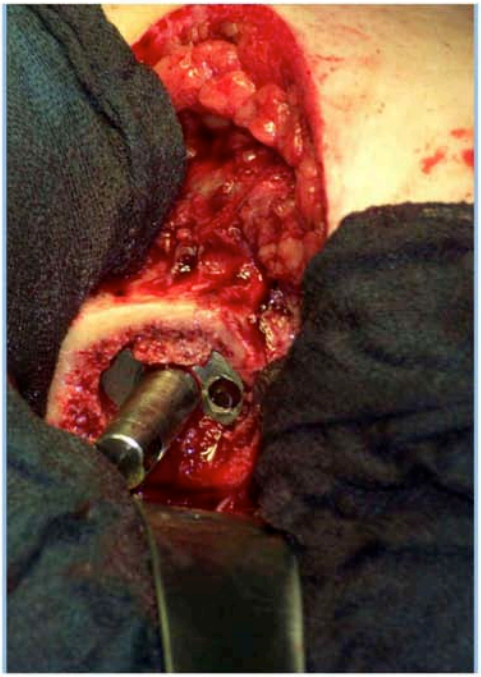
Small stems, some with limited intrinsic stability and some difficult to revise.



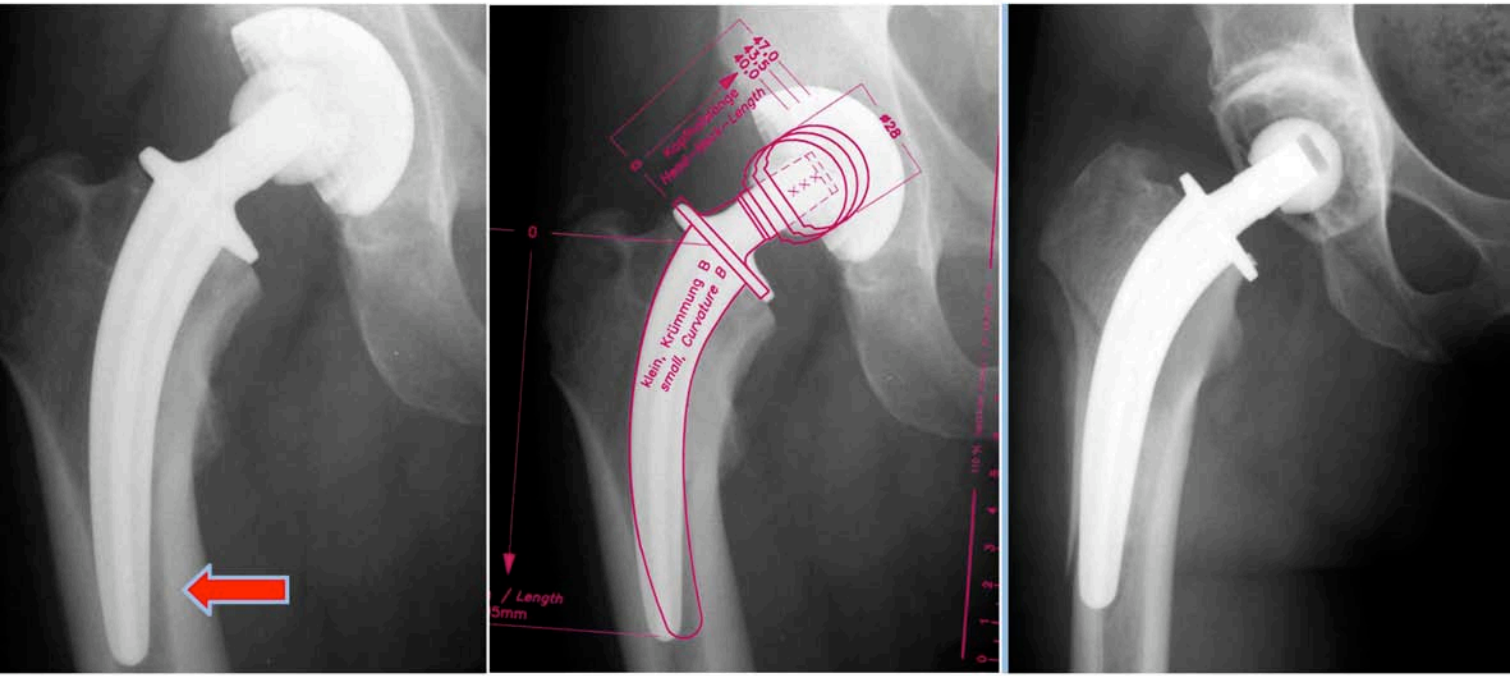
Freeman and Whitside neck sparing stems



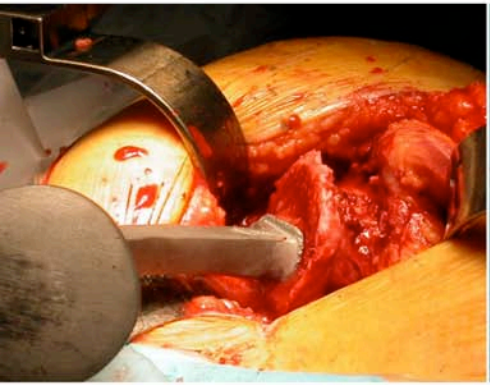
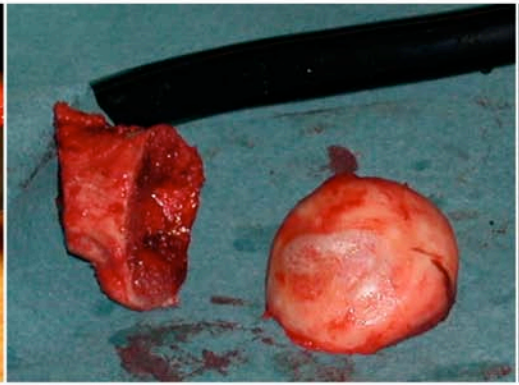
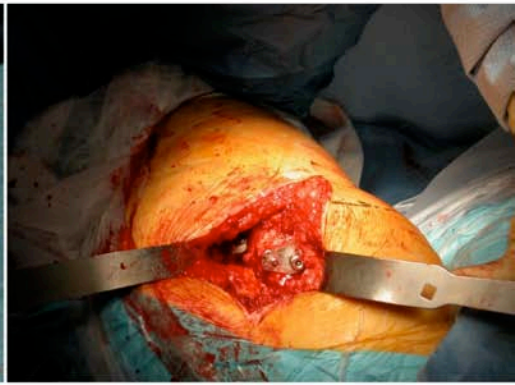
C.F. P. stem by Papino



C.F.P. Stem (Link)

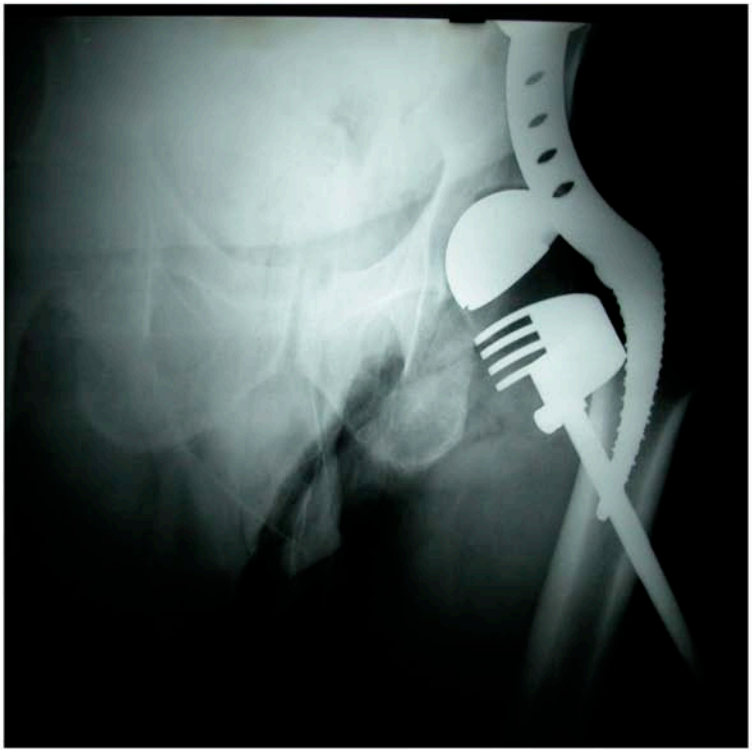


C.F.P. stem Thigh pain / distal crack

Surgical development/ conversion to K2 cementless stem (Keppler)

The first MSA™ stem off the line in Australia



High neck resection with rasp in place



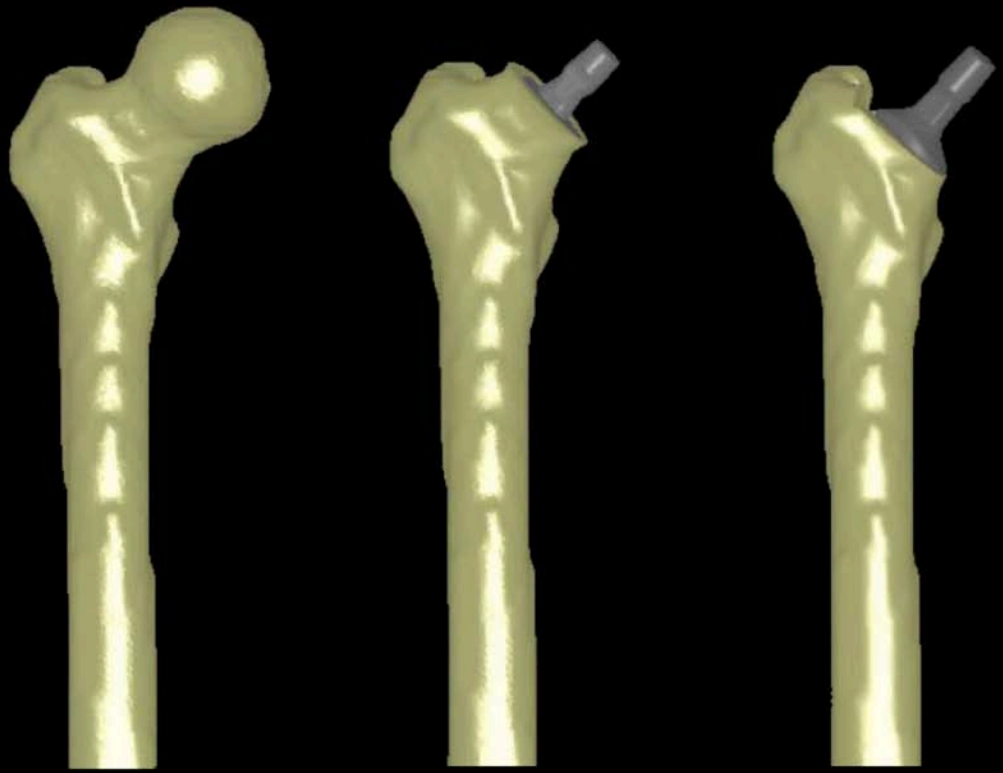
Keppler converting to a K2 Modular stem

Cadaver CT Data

Right hip
39 y.o. male
5' 11", 199 lbs

Visible Human Project *- Digital image dataset of complete human male and female cadavers in MRI, CT and anatomical modes*

Models

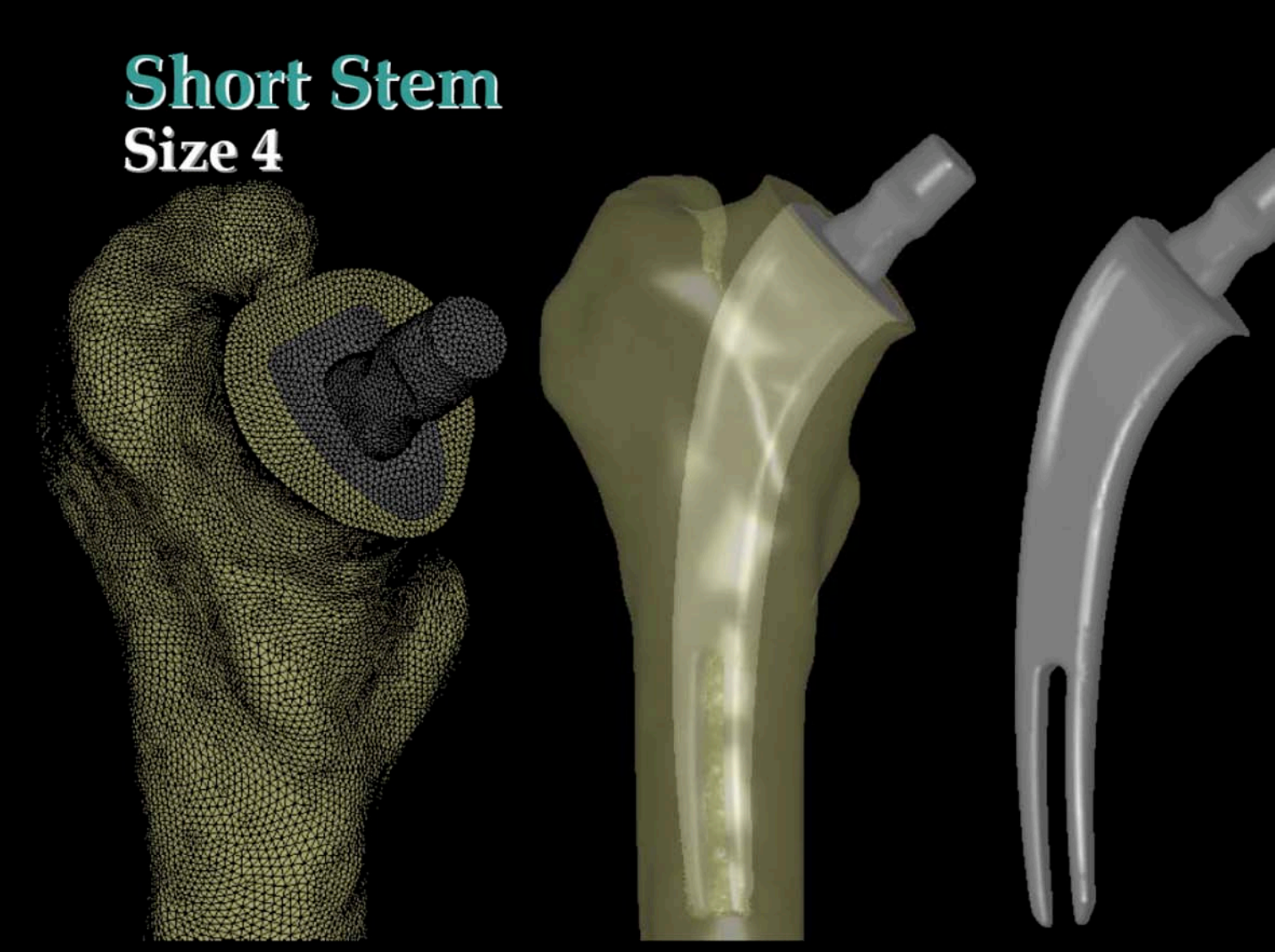


484,748 elements

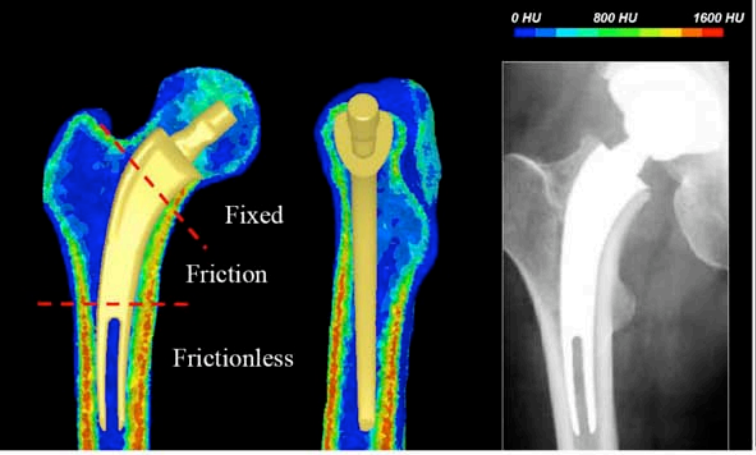
510,344 elements

760,502 elements

Short Stem
Size 4



Implant Placement and Fixation
Short Stem



Implant Placement and Fixation
Long Stem

Loads and Boundary Conditions

Peak Gait

1783 N (2.4x BW)
Peak gait load
(level walking)

784 N (1.0x BW)
abductor and tensor fascia
lata muscle loads

13°

710 N (0.9x BW)
vastus lateralis
muscle load

Distal femur fixed

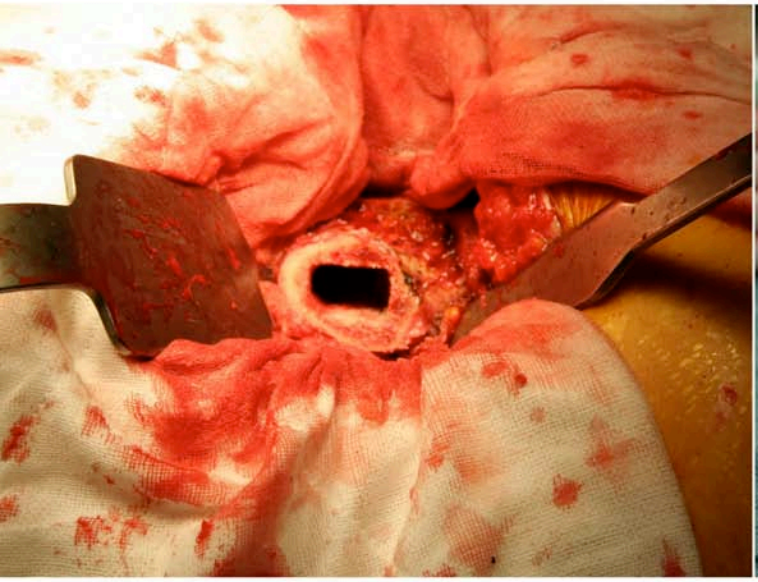
[Heller*et al.*, J. Biomech, 2005]

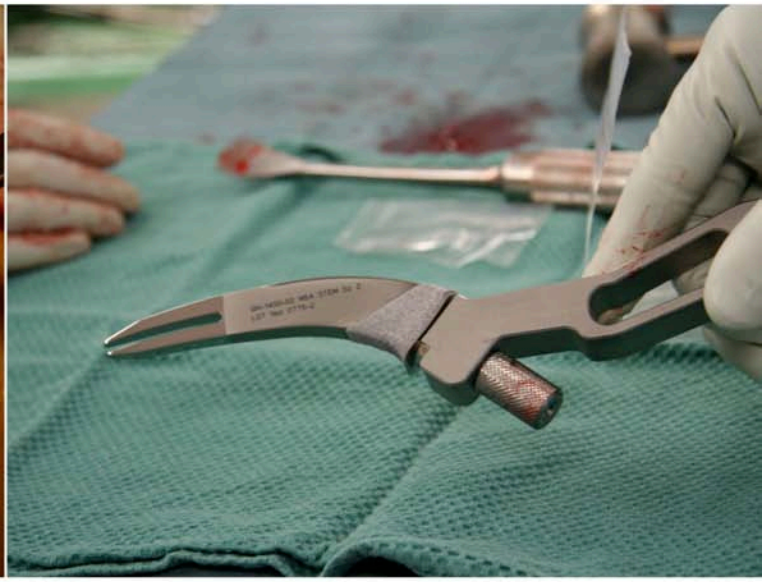
Significant FEA modeling has been done to-date.

Novel design concepts to improve outcomes.

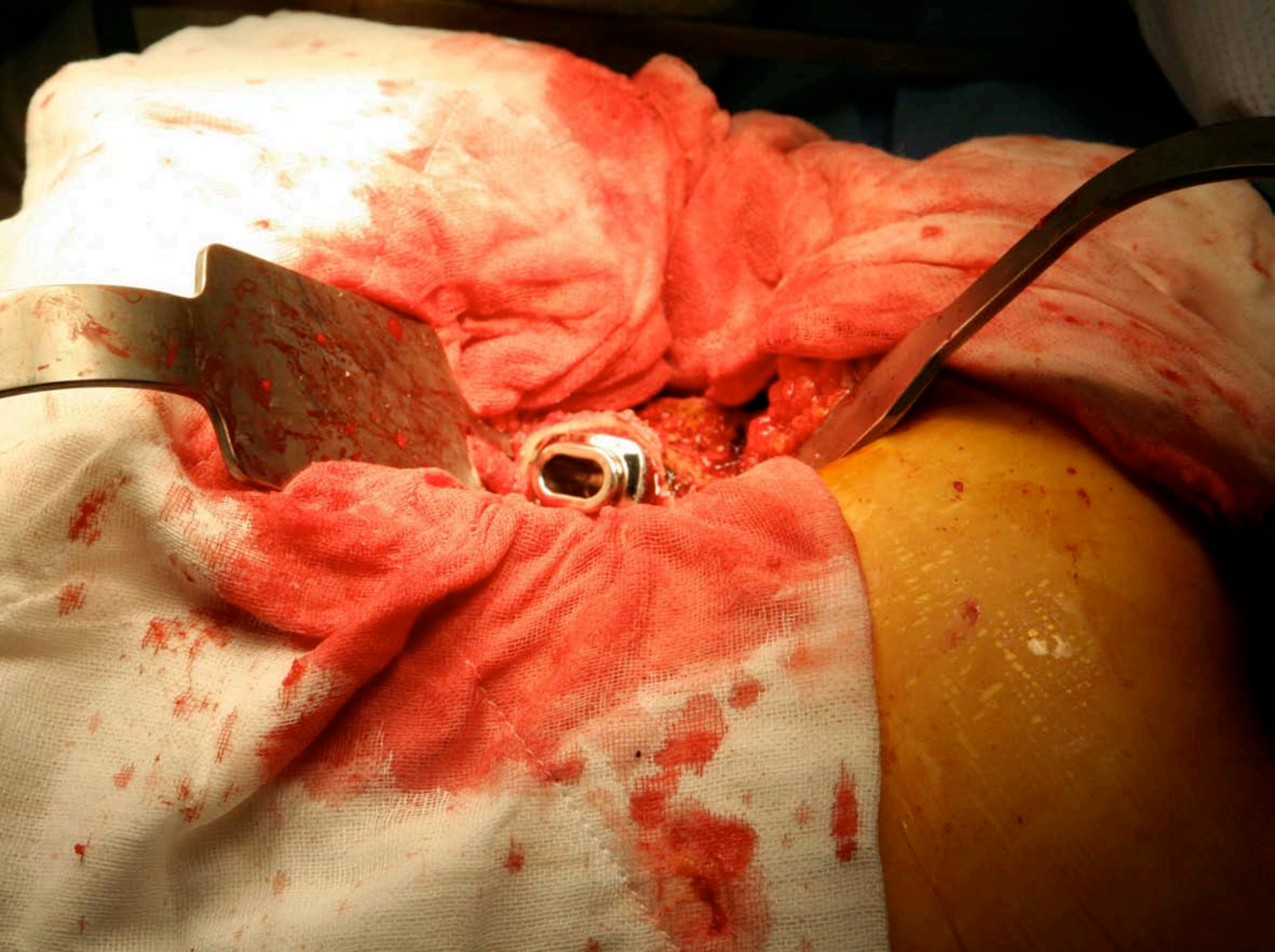
We hope you will consider being be part of this exciting hip project!

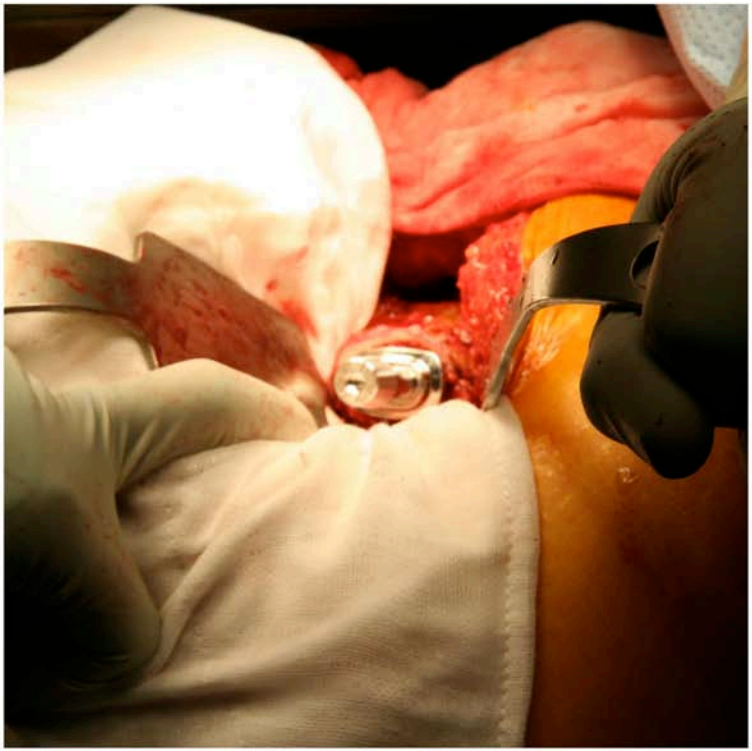
Third MSA™ neck resection



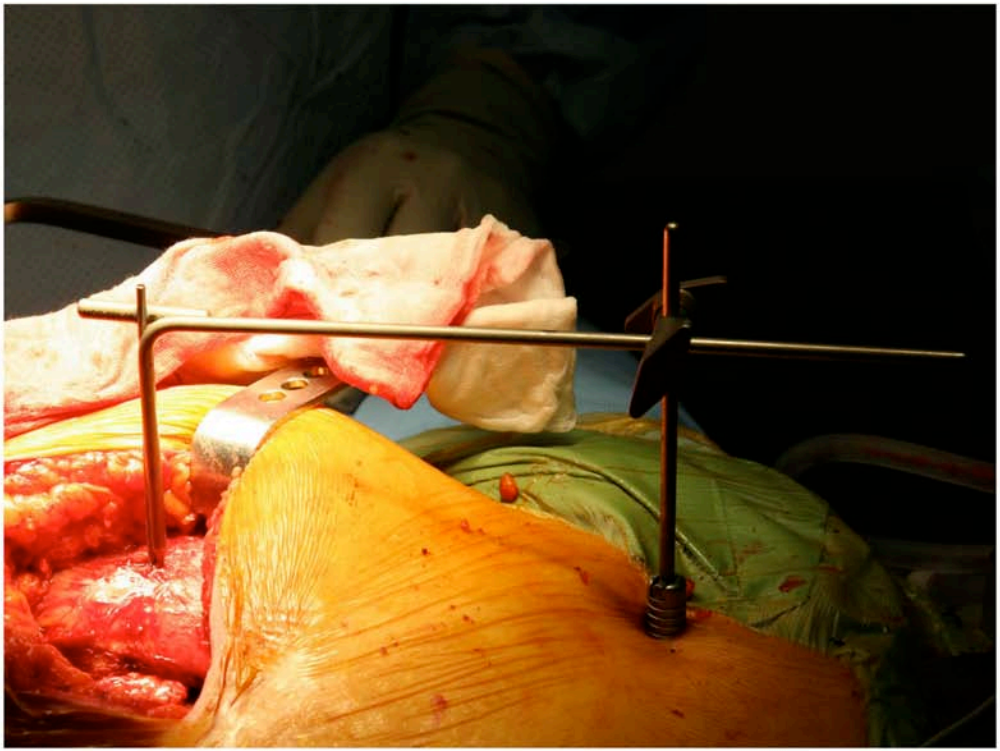


Intrinsic shape





Stem & neck



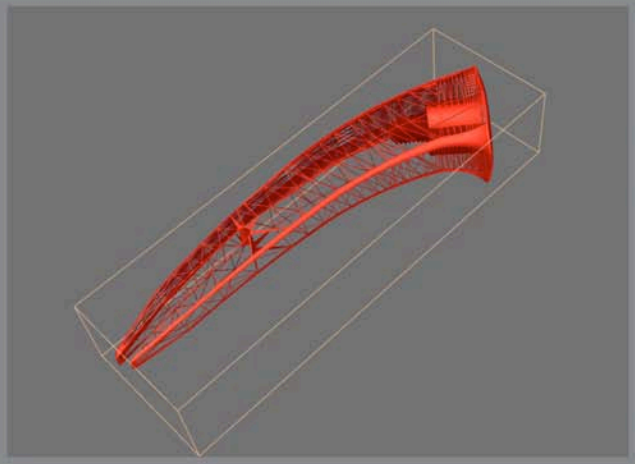
measurement matches up!


GH-1400-02 MSA STEM Sz 2
LOT Not 077S-2

MSA™ Neck Sparing Stem


L

The tradition established by Charles O. Bechtol continues within JISRF and the development of the (MSA™, NSA™) Neck Sparing Stem. (patent pending)



MSA™ (Muscle Sparing Approach), NSA™ (Neck Sparing Approach)

Timothy McTighe presentation Orlando, Florida Dec. 2007
Patents pending

Made on a Mac