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Poster Exhibit

"Neck Sparing Total Hip Arthroplasty Lessons Learned"

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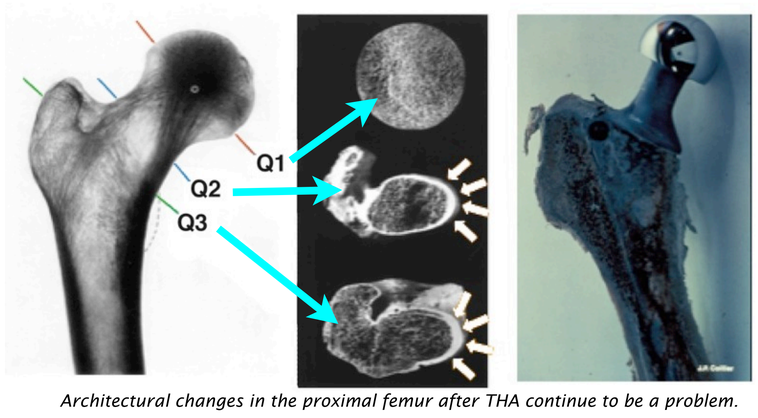
Introduction:

Architectural changes occur in the proximal femur after THA and can lead to implant loosening and or breakage.

Previous surgeon designers (Freeman, Townley, Whiteside and Pipino) have advocated the concept of neck sparing stems. However, to-date most neck sparing stems have had disappointing results with regard to maintaining proximal bone mineral density.



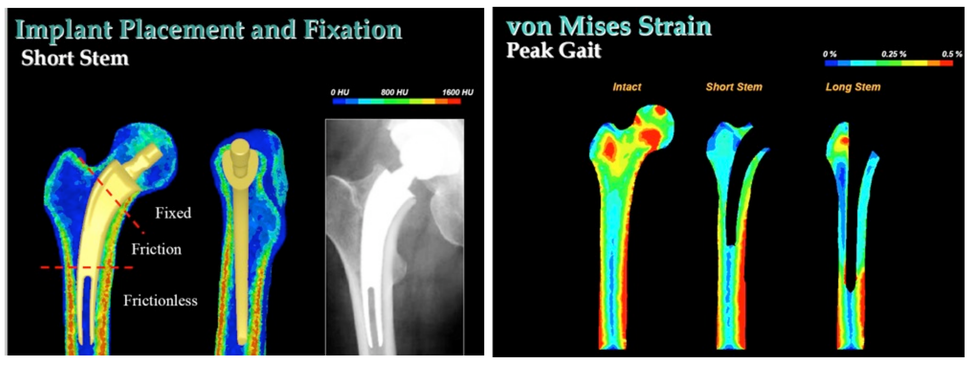
Architectural changes in the proximal femur after THA continue to be a problem.

Our aim was to identify design features that would improve proximal load transfer, simplify surgical technique, and be economical by inventory size and cost.

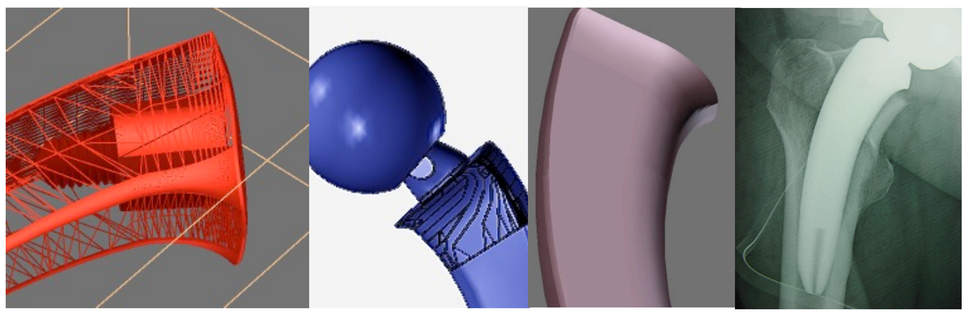
Examples of stress shielding.

Materials and Methods:

Review of previous published work was evaluated along with new FEA modeling providing for a new approach to neck sparing short curved stem design.



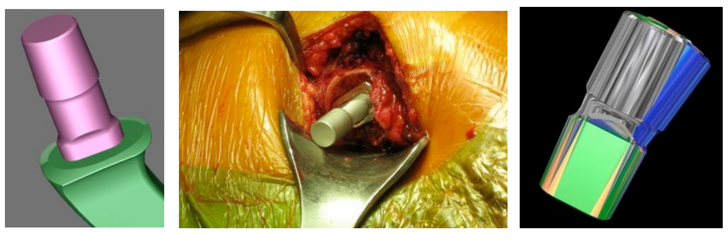
The FEA analysis demonstrates better strain patterns compared to fully porous coated straight stem design.



The proximal conical flair is a significant novel feature that provides for transfer of hoop tension into compressive loads to maintain stress on the medial calcar neck.

Three hundred radiographs were evaluated for sizing. Twenty intra-operative trial implantations were performed to aid the development of simplified and reproducible surgical instrumentation. All surgical approaches were utilized. The review process provided for a novel new design that was validate by the fabrication and implantation of five custom stems with post-operative follow-up between twenty and twenty-nine months.

The proximal modular neck allows for fine tuning joint mechanics without disruption of implant to bone interfaces.

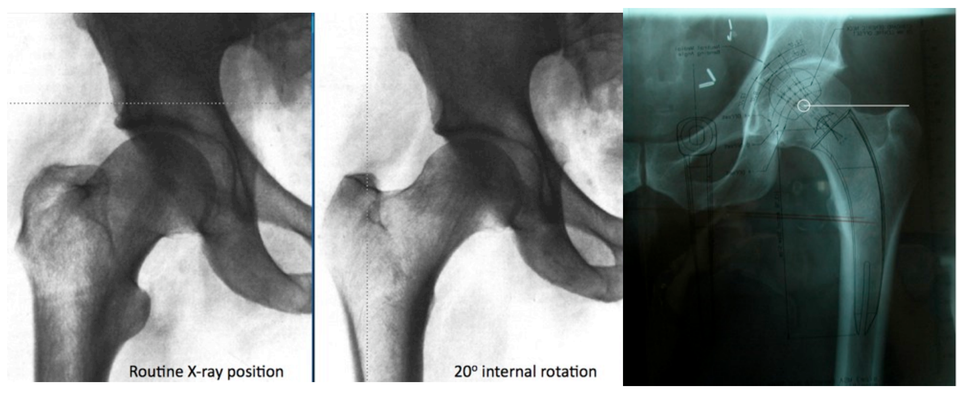


Sub cap is too high. First cut provides maximum conical flair contact design allows flexibility in level of cut but might effect size of stem, example: from a 2 to a size 3.

A: 5-8mm below sub cap
B:8-16mm below sub cap
C: >16mm Below sub cap

Note: conventional tends to run approximately 20 mm below sub cap level or 1.0 to 1.5 cm above LGT.

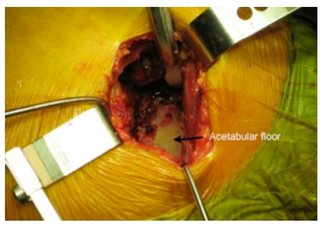
Maximum offset variations with size 3.



Internal rotation provides for a more accurate measurement for both femoral offset and medial curvature of the neck.

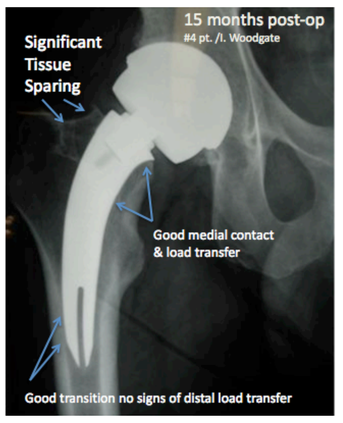
Results:

Over fifty stems have been implanted to date with no revisions. Both anterior and posterior small incisions have been used with no difficulty for access to the socket or proximal femur.



Posterior approach good exposure for the socket

Anterior Approach no problem with access to the femur



Radiographic review clearly demonstrates the need for 20˚ of internal rotation for proper measurement of femoral offset and medial neck curve. Surgical intra-operative evaluations demonstrated any standard conventional or small incisions works with this stem. The anterior single incision is especially attractive since the curvature of the stem reduces the need for as much femoral mobilization required by a straighter stem design.

FEA modeling demonstrated improved proximal strain patterns to the retained femoral neck. Fatigue FEA modeling showed reduced implant strains in the modular neck as a result of a shorter bending moment by design use of neck sparing feature. If there is any concern on length being too long resect another 4-6mm. This a forgiving design that allows for fine-tuning.

Conclusions:

We are encouraged with FEA modeling and short-term clinical/surgical results to-date and believe there are significant advantages in the concept of neck sparing stems. Additional mechanical and clinical /surgical evaluations are underway (fifty stems implanted to-date with no adverse effects.) U.S. clinicals begin in April 2010. We will follow up and report on all cases at least once per year.

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Tissue Sparing Implant™ (TSI™) Total Hip Stem Designs

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