Introduction:

Architectural changes occurring in the proximal femur after THA continues to be a problem. Proximal stress shielding occurs regardless of fixation method. The resultant bone loss can lead to implant loosening and or breakage of the implant.

We are seeing younger patients with higher levels of physical activity as compared to just a decade ago. A tissue sparing total hip stem provides for less tissue damage, a quicker rehab and leaves behind more infrastructure in case of future revision surgery.

Why Save the Femoral Neck?


• Significant Mechanical Advantages1,2,3

  1. Bone structure of the neck is not reduced in strength in OA1
  2. Natural joint mechanics is maintained and provides better axial and torsional stability vs. conventional THA (Whiteside, Freeman & Pipino)2
  3. Stress is reduced on the implant by 35% compared to monoblock3

• Saves both Hard & Soft Tissue1,4

  1. Provides more structure for revision surgery2,4
  2. Maintains blood supply to the proximal femur
  3. Reduced OR time & blood loss4
  4. Quicker Rehab4
  5. Easier Explication & Conversion4

Retention of the femoral neck reduces both torsional moment and axial moment at the stem bone interface.1 (Shorter Femur / Cantilever)

• 1mm increase in femoral offset increases torque by 8%
• 1mm increase in head/neck length increases torque by 6%

Two surgical approaches were used, the single anterior incision and posterior incision. The ARC™ short curved stem was used with a variety of cementless cups with a variety of bearing surfaces (MoM, CoC, CoP, MoP).

The titanium stem comes in six sizes 0-5 and features a c.c. modular neck that is available in the following styles: Neutral, 8° Varus / Valgus, 12° Varus / Valgus, & 12° Anteverted/Retroverted.

Note: There has been recent concern raised over modular necks in conventional cementless stem designs5. Neck sparing stems reduce principal tensile stress in the stem 35% compared to monoblock conventional cementless stems6. Note: Not all modular tapers are equal in design and performance.

Material:

There have been 1,790 stems implanted with this novel neck sparing stem design since April 2010 to October 2012 with 1,200 from the primary surgical team. This included the limited introduction while fine-tuning of surgical instruments. Typical patient profile showed two-thirds being female with an age range overall between 17 to early 90s, 90% were treated for OA. This stem has been used in all Dorr bone classifications (A, B, & C)

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Optimizing Modular Neck Interface

Less stress means less chance of movement on modular surfaces

• Neck Sparring Design reduces stress by 35%
• c.c. increases fatigue resistance by 83% vs. Ti modular
• c.c. increases fatigue resistance by 18% over monoblock Ti stem

• Neck Sparing Design provides 3-dimensional stabilization of the modular neck in the stem

Stem Distribution

<table>
<thead>
<tr>
<th>Size</th>
<th>% of Total</th>
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<tbody>
<tr>
<td>0</td>
<td>4%</td>
</tr>
<tr>
<td>1</td>
<td>21%</td>
</tr>
<tr>
<td>2</td>
<td>36%</td>
</tr>
<tr>
<td>3</td>
<td>26%</td>
</tr>
<tr>
<td>4</td>
<td>10%</td>
</tr>
<tr>
<td>5</td>
<td>3%</td>
</tr>
</tbody>
</table>

Neck Distribution

Neutral Standard = 35%
Neutral Long (+3.5mm) = 3%
Total Neural Necks = 36%
8° Varus/Valgus = 19%
8° Varus/Valgus Long (+3.5mm) = 3%•
Total Varus/Valgus = 22%
12° Varus / Valgus = 17%
12° Version = 25%•
(Reverse Posterior Approach)
(Retroverted Anterior Approach)
Angled Necks Total = 64%

*New Stem Size

Summary:

We are encouraged with our initial clinical / surgical observations (patients are happy) and we believe the potential and real benefits warrant not only further evaluation but expanded evaluation of this tissue conserving approach to THA. This is equivalent to recent results presented at recent European Hip Society.

References:

1. Freeman, "Why Resect the Neck?" THR 1986
7. Joint Implant Surgery and Research Foundation
8. "JISRF Tissue Sparring Implant Study Group"