Modular Hips to Restore Proper Mechanics

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Introduction:

THA continues to improve but complications still occur. Dislocation and osteolysis continue to be a significant problems. The causes for dislocation can be multi-factorial, and include: mal-positioned components, soft tissue laxity, and impingement of component-on-component or on fixed obstructions such as osteophytes. Weakness of the abductor muscles due to improper reconstruction can also be a contributing factor. In countering these factors, stability is often achieved at the expense of limb lengthening.

What are the Goals of THA?

Eliminate Pain
• New Hip

Restore Function
• Reproduce Hip Mechanics
  1. Femoral Offset
  2. Neck Length
  3. Version Angle

Two Remaining Significant Problems in THA

Dislocation
• Reports from 2-8%
• Higher in Posterior Approach
• Higher in Sm. Dia. Heads
• Higher in Revisions >20%

Osteolysis
• Eccentric Poly Wear
• Result Lytic Lesion
(4 year post-op)

Discussion:

Current Dislocation Costs

Estimating a conservative 2% dislocation rate, there would be a corresponding 6,000 dislocated hips each year.

- Non-operatively treated - 4,500 (75%) - $6,000
  Cost: relocation, brace, x-rays, rehabilitation
- Operatively treated - 1,500 (25%) - $25,000
  Cost: operation, brace, and rehabilitation

$6,000 x 4,500 = $27 million
$25,000 x 1,500 = $37.5 million

Total cost of dislocations per year in the United States, $64.5 million

"Despite a number of improvements in femoral stem neck geometry and increasing femoral head sizes up to 36mm, dislocation continues to be a significant problem after THA”
- Dr. Amstutz

Dislocation Treatment Trends

Big Heads
Constrained Sockets
Navigation

Intrinsic Modular Indexable Neck (IMIN™)

Stem Designs

R-120™ - Cemented
Alfa II™ - Cementless

IMIN™ Modular Neck Design

3 neck lengths
32, 35 , 38 mm

2 neck angles
8° & 12°

Version Angle
Neck Shaft Angle
0° 4° 7° 10° 13° 16°
127° 128° 130° 135° 138° 141° 142°

Neck Positions for 8°

Surgical Technique:

Technique is the same as any standard fixed neck cement or cementless stem.

Option
Stem First - Then Cup

Posterior Approach

Trial stem in place.
Implant orientation is a significant part of surgical technique. The mini-incision places a higher demand on implant positions. Proximal modular stems provide adjustments reducing the risk of implant discrepancy, and soft tissue laxity.

The Advantage of Proximal Modular Necks: With the trials in place the surgeon can verify joint stability and range of motion without disrupting the implant/bone interface. If necessary, the surgeon can also fine tune the joint mechanics by adjusting the modular neck.

Post-op X-Rays

Variable Femoral Offset

Femoral Stem & Cup in Place w/o Neck

Variable Femoral Offset

Valgus Neck Shaft Angle 147° (position 6)

Varus Neck Shaft Angle 123° (position 0)

(Same pt., same implants, different neck positions)

Insertion of Neck & Head

Head neck insertion can be done by assembling head onto neck and inserting as a single unit.

Another approach is to insert the modular neck first then assemble the head onto the neck then impacting both tapers.

Ways to Reduce Dislocation

• Restore Hip Mechanics
• Modular Necks Aid in Restoration
• Anterior or Direct Lateral Approach
• 32 mm Dia. Head or Larger
• Do not use skirted necks or modular traction necks
• Constrained sockets (not indicated for impingement problems)
• Reduce Use of Angled Poly Inserts
• Navigation System (Digital $60,000 / Image 250,000)

Summary

• Modular neck designs aid in fine tuning joint mechanics
• Works with all surgical approaches
• Allows for femoral stem insertion first (aids in reducing blood loss)
• Allows for ease and access in case of revisions
• Allows for replacement of ceramic heads by replacement of modular neck
• Reduces chances of mechanical impingement of implants especially with mini-incision surgical approaches

2004 Predictions and Concerns

Modularity is here to stay
Increased Pt. activity & BMI influences outcomes & Device Failures
1. High Impact Yield Failure
2. Long Term Fatigue Failure
Increased device malposition due to limited exposure
Increased medical/legal exposure

Early Clinical/Surgical Impressions

No long term data available at this point, however, we are extremely encouraged that this device will aid in reducing post-op dislocations and help restore joint mechanics.