Hip Resurfacing in 2015

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Disclosures
- Consultant
- Stryker
- Smith and Nephew

Birmingham Hip Resurfacing

BHR

Goals
- Summarize benefits
- Risks
- Patient factors: indications
- Results of BHR
- Recent developments

Why Resurface?
- Save bone the day of surgery
- No bone loss from stress-shielding
- Dislocations rare
- No leg length problems
- No thigh pain

Why Resurface?
- Young, active patients
- Proprioception maintained
- Return to high activity
- Potential for longevity
- Easy to revise

Calcar Bone Loss, THR vs BHR

Metallosis and Pseudotumor
- Generally the most feared and talked about issue
- Can be related to
  - Implant factors
  - Patient factors
  - Surgeon factors

MOM Total Hip Replacement
- Very popular 7-8 years ago
- Big head, less dislocation
- Small neck, great ROM
- Turned out to be a disaster
- Metal debris, pseudotumors
- Gave MOM bearings a bad name

Why? It's the Trunion! Micromotion, fretting, corrosion.

Morse Tapers
- Fine for 28, 32
- 50+: Too much torque for small diameter tapers
- Bigger head -> more wear

More metal debris than the bearing itself!

Metallosis in Resurfacing
- There is no trunion
- *Always* due to edge loading
- Edge loading results in high wear
- Not a mystery
- Not an allergy
- Easily understood

Resurfacing is Different
- Sockets have less coverage than traditional THR sockets
- Must be placed more horizontally
- Size matters
  - Bigger is better
  - Opposite with MOM THR

THR Socket Profile

BHR Socket Profile

Wear Patch
- MoM wear patch is 440 mm²
- Regardless of the size of the bearing
- Always the size of a quarter
- This is why bigger is better

Limes and Oranges
38 mm 58 mm
## Malposition & Edge Loading

<table>
<thead>
<tr>
<th>Female</th>
<th>Male</th>
</tr>
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## Normal Edge Wear

## What is the Risk?
- McMinn series: 7/3200 pseudotumor (0.2%) all BHR
- Canada 3/3200 (0.1%)
- Cleveland Clinic 1/2200 (0.05%)

## Prof. David Murray, Oxford
- March 2010 JBJS
- Pseudotumor cases sent for wear analysis
- All showed increased wear
- 100% had edge wear

## Australian Joint Registry 2013

<table>
<thead>
<tr>
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## Better than THR in Young Men
- Men are the best candidates for resurfacing
- Larger size
- Stronger bone
- Fewer complications

## 10 yr Revision Risk

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## BHR is Unique
- In 2015, BHR is the only FDA-approved resurfacing available in US, so comparisons don't matter now
- Conserve +: Wright sold to Microport (China), no sales in US
- Cormet: (Corin, formerly Stryker) withdrawn for 21% failure rate

## March 2010 JBJS
- Prof. David Murray, Oxford
- “A resurfacing. Of course” (CCJR Dec. 2010)
- Repeated in 2012

## Prof. David Murray, Oxford
- What would he have done?
- “A resurfacing. Of course” (CCJR Dec. 2010)
- Repeated in 2012
The ASR Recall
- Depuy MOM, THR and resurfacing
- FDA-approved as MOM THR
- Never approved as a resurfacing
- Terrible results in 93,000 cases
  - 25% resurfacing failures
  - 50% THR failures
- Recalled in 2010

Why did the ASR Fail?
- Metallurgy
- Socket Design
- Clearance
- Sphericity
- Gave resurfacing a bad name

ASR Metallurgy
- As-cast head
- Double heat-treated socket
- Weakened carbide microstructure
- Different metallurgy ball and socket
- "Hard-on-soft" bearing
- BHR is completely as-cast, harder

ASR Socket Design
- Shallow socket
- BHR has 162° inner bearing
- ASR had 145° in smaller sizes
- Outlier

ASR Clearance
- Cut clearance in half from historically successful bearings
  - 100 µ instead of ~200 µ
  - Expected to improve lubrication

ASR Metallurgy
- Groove for Impactor
  - Edge wear

Cup Deformation
- Cup deforms on impaction
  - Finger and thumb = 30µ
  - Sawbones = 70µ
  - More in hard bone
  - Easily more than 100µ

Low Clearance -> No Clearance
- 100 microns becomes zero
- Equatorial clamping
- No lubrication
- High wear, pseudotumors
Sphericity

- Rounder is better
- Less wear
- ASR had poor roundness
- So do others

Roundness Deviation $\mu$

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<tr>
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<th>Socket</th>
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<tbody>
<tr>
<td>BHR</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>ASR</td>
<td>3.4</td>
<td>3.8</td>
</tr>
<tr>
<td>Conserve Plus</td>
<td>3.2</td>
<td>1.8</td>
</tr>
<tr>
<td>Cormet</td>
<td>7.3</td>
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<td>Recap</td>
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Poor Outcomes with ASR

- Combination of factors:
  - Metallurgy
  - Socket design
  - Clearance
  - Sphericity
  - They are not all the same

The Implant Matters

- Historical poor results of other resurfacing devices can be explained
- Only the BHR is available in USA
- Has the best data

Mortality

- BHR in men has a lower death rate than THR
- That’s important
- Very important if it’s true

Conclusion

- "After adjustment for all known risk factors, patient survival with BHR is superior to uncemented THR, which in turn is superior to cemented THR”

Another Study: BMJ 2013

- 385,000 THR
- 18,000 resurfacing
- Survival advantage compared to Cemented THR: 1.0
  - Cementless THR: 0.86
  - Resurfacing: 0.52

Conclusion

- "Patients receiving hip resurfacing have reduced long-term mortality compared to patients receiving other types of hip replacement"
Why Lower Death Rate?
- Persists even when corrected for age, gender, co-morbidities, socio-economic status, rurality
- Allows greater post-op activity
- Less fat embolism during surgery?
- *Stride length!*

Stride Length
- Independent risk factor for Type 2 diabetes
- Independent factor in longevity
- Any THR, short stem, IM femoral nail decreases stride length
- 9% slower walking speed
- Resurfacing keeps it normal

9% is a Lot!
- Usain Bolt, Olympic Sprinter
- Fastest man in the world

Secretariat, Belmont 1973

Cancer Risk??
- Concerns about this for many years
- Decades-long studies
- Scandinavia, UK
- There is no evidence of an increased risk of cancer.

Cancer: BMJ 2012
Risk of Cancer?
- Compared with alternative bearings, there was no evidence that metal-on-metal bearing surfaces were associated with an increased risk of any cancer diagnosis

Cancer rates (Visuri)

UK Registry 2012
10-15 yr Revision Risk

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CCF Hip Resurfacing Series

- 2,200 BHR's, 2006 – present
- 72% male
- Average age 53 (12-84)
- 91% OA

Few Complications

- No dislocations
- No femoral loosening
- 1 socket loosening
- 2 deep infections

Survivorship in Young Men

100% in 426 men < 50, up to 8 yrs

- Similar to:
  - McMinn: 98% all men at 15 yrs
  - Treacy: 100% men, OA < 50, 14 yrs
  - Murray: 99% men < 50, 10 yrs

Lessons Learned

- Patients are driving the volume
- Strong word-of-mouth
- Internet
- Orthopedic surgeons who do no resurfacing may not mention it
More Lessons Learned

- By far, the most common pathology is femoro-acetabular impingement
- Un-noticed by total hip surgeons
- Resurfacing can completely correct this

Other Lessons Learned

- Be careful with dysplasia
- Excessive anteversion
- Especially in small females

Conclusions

- Resurfacing is very attractive to patients
- Less attractive to surgeons
- There are many ways to get into trouble
- If you do it, you will become a better hip surgeon

Is Resurfacing Safe?

- No:
  - Poorly selected patient
  - Poorly done surgery
  - Poorly designed implant
- Otherwise, Yes!

Is it Better than THR?

- Fewer dislocations (1/10)
- Less leg length problems
- Higher functional activity
- Saves bone on the femoral side

Beware Women and Small People

- Keeps options open for the future
- Lower revision risk in men up to 65
- Lower death rate and cancer rate
- YES! In young men
NHL: Florida Panthers

WWF: The “Undertaker”

MLB: Texas Rangers
Colby Lewis

Thank You