Activity and Sports After Total Knee and Hip Arthroplasty

Scott T. Ball, MD
Chief, Adult Joint Reconstruction
Department of Orthopaedic Surgery
University of California, San Diego

Where discoveries are delivered.™
Disclosures

• DePuy Orthopaedics
• Biocomposites, Inc.
• Conformis
Who does this affect?

- Approximately 500,000 Total Knee Replacements / year
- Approximately 200,000 Total Hip Replacements / year

Approximate Age Distribution

At least 100,000 patients under age 55 per year
What are patients being sold?

- Pictures from Manufacturers’ and Surgeons’ Websites
What are the concerns?
Wear, Osteolysis, Loosening
What are the concerns?
Broken Implants
What are the concerns?
Periprosthetic Fractures
What are the opinions?

• **1999 Recommendations** by the Hip Society

  – No jogging
  – No singles tennis
  – No skiing
  – No basketball
  – No baseball / softball
  – No soccer
  – No volleyball
What are the opinions?

- **2005 Recommendations** by the Hip Society and AAHKS


<table>
<thead>
<tr>
<th>Activity</th>
<th>% Allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singles Tennis</td>
<td>15%</td>
</tr>
<tr>
<td>Doubles Tennis</td>
<td>63%</td>
</tr>
<tr>
<td>Jogging</td>
<td>5%</td>
</tr>
<tr>
<td>Skiing</td>
<td>25%</td>
</tr>
<tr>
<td>Baseball / Softball</td>
<td>15%</td>
</tr>
</tbody>
</table>
What are the opinions?

- **2008 Recommendations** by the Hip Society and AAHKS
  

<table>
<thead>
<tr>
<th>Activity</th>
<th>% Allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singles Tennis</td>
<td>20%</td>
</tr>
<tr>
<td>Doubles Tennis</td>
<td>70%</td>
</tr>
<tr>
<td>Jogging</td>
<td>20%</td>
</tr>
<tr>
<td>Skiing</td>
<td>35%</td>
</tr>
<tr>
<td>Baseball / Softball</td>
<td>Not Included</td>
</tr>
<tr>
<td>Sprinting</td>
<td>3%</td>
</tr>
</tbody>
</table>
What are the opinions?

- **2008 Recommendations** by the Hip Society and AAHKS
  

  - Higher volume surgeons are more liberal
  - Surgeons that do more revisions are more liberal
  - Activity restrictions are becoming more liberal
  - Opinions are not based on evidence
What are the facts?

• Activity levels after joint replacement are grossly under-reported
• UCLA activity score is most commonly used
• Used in < 10% of major joint outcomes studies
• We know surprisingly little about patient activity after joint replacement
• Let’s talk about what we do know…
What are the Facts?

• Health Benefits of Exercise
  – Cardiovascular
  – Anxiety / Depression
  – Bone Health / Bone Density
  – Muscularity / Coordination

What are the Facts?

May be beneficial for:

- Diabetes
- Hypertension
- Coronary Artery Disease
- Obesity
- Low Back pain

What are the Facts?

• Current recommendations for baseline activity
  – 30 minutes of moderate aerobic activities for 5 or more days per week
  – OR, 20 minutes of vigorous aerobic activity at least 3 days per week
  – A minimum of **10,000 steps/day** as a target for obtaining health benefits

Florian D. Naal, MD and Franco M. Impellizzeri, PhD. How Active are Patients Undergoing Total Joint Arthroplasty?: A Systematic Review. Clin Orthop Relat Res. 2010
What are the facts?
Steps per day in joint replacement patients

- No studies showing step counts above 10,000
- Activity level / step counts decline with age
What are the facts?

Validation of activity reporting after hip arthroplasty

- Ball ST, Severns D.
- 20 self-proclaimed ‘active’ patients
- Average age = 52 (41-73)
- UCLA activity score 8 or higher (max 10)
- Minimum 1 year follow-up
- Average steps/day = 8,800
- 25% of patients > 10,000 steps/day
- UCLA activity score correlates poorly with objective activity monitors / pedometers / accelerometers
What are the facts?

Return to ‘Sports’ after joint replacement

<table>
<thead>
<tr>
<th></th>
<th>Pre-Surgery Sports</th>
<th>Post-Surgery Sports</th>
</tr>
</thead>
<tbody>
<tr>
<td>TKA (5 years)</td>
<td>Sports participation declines by 30%</td>
<td>42% 34%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>49% 32%</td>
</tr>
<tr>
<td>THA (5 years)</td>
<td>Sports participation remains equal</td>
<td>36% 56%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>78% 55%</td>
</tr>
<tr>
<td>Hip Resurfacing (2 years)</td>
<td>Participation remains high</td>
<td>96% 98%</td>
</tr>
</tbody>
</table>

What are the facts?

- Tennis After Total Hip Replacement
  - 58 competitive tennis players
  - 8 year follow-up
  - All patients returned to competitive tennis
  - 16% complained of residual pain with tennis post-op

What are the facts?

- **Tennis After Knee Replacement**
  - 33 competitive tennis players
  - 7 year follow-up
  - All patients returned to competitive tennis
  - 12% complained of residual pain/stiffness post-op

What are the facts?

Golf after Total Hip Replacement

- 115 patients
- 6 year follow-up
- All patients returned to golf
- 86% pain free
- Improved average drive distance
- Improved average handicap

What are the facts?

Golf after total knee replacement

- 83 patients
- 5 year follow-up
- 84% reported no knee pain while playing
- Improved average drive distance
- Improved average handicap
- Right handed golfers have more pain in left knee replacement

What are the facts?

- The **E-Knee**
  - Total knee with internal force strain gauges
  - Provides real-time force measurements from inside the knee
  - Cycling (1.3 x body weight)
  - Treadmill (2.05 x body weight)
  - Walking (2.6 x body weight)
  - Tennis (3.6 x body weight)
  - Jogging (4.3 x body weight)
  - Golf (4.5 x body weight)

What is the effect of activity on the implants?

- Polyethylene Wear
Wear of today’s implants / materials

- Prior to Y2K, conventional polyethylene was used
- C 2000, cross-linked polyethylene introduced
  - ≈ 75% reduction in wear vs. conventional poly
  - Bitsch RG, Ball ST, Schmalzried TP. JBJS 90-A; 2008.
- c 2010, 2nd generation cross-linked poly introduced
  - ≈ 50% reduction in wear vs. 1st generation
- 2nd Gen X-linked poly → 85%-90% decreased wear compared to implants from just 17 years ago
Monitoring Wear after Joint Replacement

• X-rays every few years
  – Look for evidence of wear and bone loss
  – If identified, follow-up more often
  – Consider prophylactic revision to halt the process and place better quality materials (before the whole implant fails!)
Monitoring Wear after Joint Replacement

56 y active F. Primary THA approximately 14 years ago.

Osteolysis
What do I tell my patients?

• Your artificial joint may restrict you, but I won’t.
• Regular *activity* is more important for your health than *inactivity* is for your joint replacement.
• You are only young once; enjoy _____ activity now while you are able to.
• Hip Resurfacing: No precautions.
• Total Hip / Total Knee: If you have to jog for exercise, run on a treadmill or just on flats or uphill, not downhill.
• You have to come back at least every 5 years for xrays.
• If you are out doing something really cool, you have to send me a picture!

*UC San Diego Health Sciences*
WESTERN STATES 100-MILE ENDURANCE RUN
SQUAW VALLEY TO AUBURN, CA

Thank you Dr. Ball for fixing me so that I can keep running! Charlie Bachmann
Thank You!

Where discoveries are delivered℠