Minimally Invasive Hip and Knee Replacement in the Active Patient

Updates and Emerging Technologies in Diagnosis, Treatment, and Outcomes

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Agenda

• Introduction

• Hip and Knee Arthritis
  – Causes
  – Diagnosis
  – Treatment modalities (conservative to surgical)

• Outcomes
  – Non-Surgical
  – Surgical

• Summary
  – Questions, Discussion, and Answers
My Background

• Pre-orthopaedics:
  – Born in St. Paul, MN
  – Moved to Oak Park, IL at age 2
  – Graduate of Oak Park and River Forest High School

• Hobbies/Activities:
  – Aviation (FAA private pilot)
  – Athletics
  – Family
  – Orthopaedic research/Resident teaching
    • Co-Director NorthShore OPD Orthopaedic Clinic
My Background

• **Education/Training:**
  – Undergraduate Degree (4 years):
    • University of Illinois at Urbana-Champaign
  – Medical School (4 years)
    • University of Pennsylvania School of Medicine – Philadelphia, PA
  – Residency (5 years)
    • Washington University in St. Louis
  – Sub-Specialty Fellowship (optional – 1 year)
    • Hip and Knee Reconstruction – Harris Hip and Knee Fellowship
    Harvard Medical School, Massachusetts General Hospital – Boston, MA

• **Research interests**
  – THA and TKA in young active patients
  – Minimally invasive techniques
  – High performance THA and TKA

Current Practice – Adult Hip and Knee Reconstruction, NorthShore University Health System
Most Common Types of Arthritis

- Osteoarthritis
- Rheumatoid Arthritis
- Post-traumatic Arthritis
- Avascular Necrosis

More common than OA in younger, active patients
Rheumatoid Arthritis, Post-traumatic Arthritis, Avascular Necrosis

– Rheumatoid Arthritis
  Membranes or tissues lining the joint become inflamed

– Post-traumatic Arthritis
  Irregularities lead to more wear on the joint

– Avascular Necrosis
  Bone may collapse and damage the cartilage
A Normal Knee

Femur (thigh bone)

Patella

Healthy Cartilage

Tibia (shin bone)
An Arthritic Knee

Femur (thigh bone)

Diseased Cartilage

Tibia (shin bone)
A Normal Hip

Pelvic Bone

Healthy Cartilage

Femur (thigh bone)
An Arthritic Hip

Pelvic Bone

Diseased Cartilage

Femur (thigh bone)
Treatment Options

- Medication
- Physical therapy
- Injections
- Surgery
  - Partial joint replacement
  - Total joint replacement
Medications

– Aspirin-free pain relievers—acetaminophen

– Nonsteroidal anti-inflammatory (NSAIDs)

– Supplements/Glucosamine?
Physical Therapy

– Passive range-of-motion exercises may help:
  • Reduce stiffness
  • Keep joints flexible

– Isometric (“pushing”) exercises help build muscle strength

– Isotonic exercises (“pulling”) further increase muscle strength and preserve function

– Daily walking, using a cane or other assistive device
Injections

For patients whose joint pain does not improve with medication or physical therapy, injections may provide temporary relief.

– Corticosteroids (aka cortisone, or steroid shots)
  • Quick, effective pain relief
  • Only use a few times a year; they can weaken bone and cartilage

– Viscosupplementation (aka “gel” or “cushioning” shots)
  • Made from the comb of a rooster
  • Usually 3-5 shot series
  • Rare flare reaction

– Stem Cells/Regenerative???

Injections provide temporary relief – length of effect is variable
When conservative measures are no longer effective, and pain/stiffness start to affect quality of life, it may be time to discuss surgical options.
Joint Replacement

• Joint replacement is a decision that should include:
  – Patient
  – Family
  – Primary care provider
  – Orthopaedic surgeon
Partial Joint Replacement (knees)

- Partial joint replacement is a surgical procedure in which only the damaged or diseased surfaces of the joint are replaced, leaving much of the natural bone and soft tissue in place.

  - Post-operative pain may be reduced
  - Recovery period may be shorter than total knee replacement

Total Joint Replacement

- Total joint replacement is a surgical procedure in which certain parts of an arthritic or damaged joint are removed and replaced with a plastic or metal device or an artificial joint.

- The artificial joint is designed to move just like a healthy joint.
Joint Replacement

• Joint replacement is a treatment option when pain:
  – Is severe
  – Interferes with daily activities
  – Interferes with work
Did you know?

• Total joint replacements of the hip and knee have been performed since the 1960s. Today, these procedures have been found to result in significant restoration of function and reduction of pain in 90% to 95% of patients.

Source: National Development Conference, National Institutes of Health, December 2003
Joint Surgery

• May be suitable for patients who:

  – Have a painful, disabling joint disease of the joint resulting from a severe form of arthritis
  – Are not likely to achieve satisfactory results from less invasive procedures, medication, physical therapy, or joint injections
Total Joint Replacement

– Goals of total joint replacement are to help:

• Relieve pain
• Restore motion
Did you know?

- More than 300,000 knee replacements are performed each year in the US.¹
- More than 300,000 hip replacements are performed in the United States each year.²
- Both going up fast!

Emerging expectations with THA and TKA

- “quick” recovery/rehab
- “small” incision
- Return to higher level of activity sooner

As THA/TKA has become more “routine” advancing patient expectations have resulted in innovation, but must keep in mind initial goals.
Minimally Invasive THA and TKA

• Advances in technique, instrumentation, and implants have allowed for THA/TKA to be done through smaller incisions with less soft tissue disruption, and with potential advantages in rehabilitation and return to function
Minimally Invasive THA and TKA

• However, certain “keystone” points must be kept in mind:
  – Need to see enough for accurate component placement
  – Need to critically examine the clinical outcome advantages of MIS vs standard approaches

Goal is for a better operation that results in improved outcomes without increased complications in the APPROPRIATE candidate
Minimally Invasive THA and TKA

• Contraindications to MIS include:
  – Complex deformity
  – Revisions
  – Increased BMI

Remember – MIS is a philosophy of minimal damage to soft tissues to achieve appropriate component positioning – so techniques and principles can still be utilized in these patients.
MIS THA

• Numerous THA approaches
  – Posterolateral
  – Anterolateral
  – Direct lateral
  – Direct anterior

• “MIS” portion of the surgery more dependent on technique (muscle sparing) than approach only
A Replaced Hip

Pelvic Bone

Artificial Hip Implant

Femur (thigh bone)
Total Hip Replacement
Replaced Hip X-ray
Bearing Surfaces/Improved Materials

• Metal on Metal
  – Soft tissue risks

• Ceramic on Ceramic
  – Fracture risks
  – Squeaking

• Metal or Ceramic on Polyethylene
  – Favorable wear characteristics
  – UHMWPE improved over prior generation
Your Knee Joint

- Femur – thigh bone
- Cartilage – tissue between bones that provides cushioning
- Patella – knee cap
- Tibia – shin bone
- Synovium – tissue that provides lubricating fluid to joint
- Ligament – flexible tissue that holds knee joint together
Total Knee Joint Replacement

- End surface of femur replaced with metal
- End surface of tibia replaced with metal
- Plastic liner is inserted between femur and tibia
- Patella is resurfaced with plastic
A Replaced Knee

Femur (thigh bone)

Artificial Knee Implant

Tibia (shin bone)
Total Knee Replacement
Replaced Knee X-ray

Anterior (front) View

Lateral (side) View
REMEMBER - Goals of THA and TKA

• Pain Relief
• Increased Mobility
• Return to ADLs
• Safe, reproducible, reliable surgery
• New technologies/innovations continue to emerge, and allow faster recovery, and higher levels of activity post-op
Thank You

Questions?