MAKOplasty®

Walk Away From KNEE and HIP Pain With Surgeon-Interactive Robotic Arm Surgery
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MAKOplasty®

I. Walk Away From Knee Pain With Surgeon-Interactive Robotic Arm Surgery
II. Walk Away From Hip Pain With Surgeon-Interactive Robotic Arm Surgery
Osteoarthritis

• Knee Anatomy
Osteoarthritis (OA)

- A degenerative bone disease that causes cartilage found on healthy joints to break down, removing the buffer between bones.
- 15 million Americans suffer with OA of the knee.¹
- 46% of people will develop knee OA over their lifetime.²
- The 55+ age group, peak knee pain candidates, will grow 3 times the average rate of the U.S. Population, reaching 96 million by 2020.³

¹ AAOS
² Arthritis Care & Research, September 2008. Thurston Arthritis Research Center, University of North Carolina-based Johnston County Osteoarthritis Project.
³ U.S. Census Bureau
Osteoarthritis Disease Progression

Progression of knee joint disease

• Early-stage: Mild disease
  – Sports related injuries
  – Minor defects/ loss of cartilage

• Mid-stage: Moderate disease
  – Increased pain
  – Reduced mobility
  – Changes to lifestyle/sports activities
  – Partial knee disease: one or two compartments

• Late-stage: Severe disease
  – Leading cause of disability
  – Severe pain
  – Walking, stair climbing challenging
  – Total knee disease
Osteoarthritis of the Knee

• Who Experiences the following Signs & Symptoms?
  • Pain
    • Standing or walking short distances
    • Climbing up and down stairs
    • Getting in and out of chairs
  • Stiffness
    • Initiating activities from a sitting position
    • After getting out of bed
  • Swelling
  • A Grating Sensation or Crunching Feeling
  • Decreased Range of Motion (Ability to bend knee fully)
  • Instability
  • Reduced Activity
Osteoarthritis

- Reduced Joint Space (Bone-on-bone)

Normal  Bowleggedness (Varus)  Knock Knees (Valgus)
Osteoarthritis

- Reduced Joint Space (Bone-on-bone)
Osteoarthritis *causes of bone-on-bone knee pain?*

- Old Sports Injury (tears or fractures)
Osteoarthritis causes of bone-on-bone knee pain?

- Long-term Impact Activities (work or sports)
Osteoarthritis *causes of bone-on-bone knee pain?*

- Obesity

*Normal joint force*  
*Joint force due to obesity*
Non-Surgical Treatment Options

- Change in activities to include low-impact exercising (i.e. biking, swimming etc)
- Nonsteroidal anti-inflammatory drugs
- Injections (Cortisone & Viscosupplements)
- Weight loss
Surgical Treatment Options

Arthroscopic Surgery

- Cleans or trims damaged cartilage (debridement)
- Variable benefits - may be just for diagnostic purposes
Surgical Treatment Options

Unicondylar Knee Arthroplasty (UKA)  
(also known as Partial Knee Arthroplasty)

- Less than 50,000 partial knee procedures in the United States in 2007
- ACL and PCL remain intact
- Traditionally performed with manual instruments
Surgical Treatment Options

**Total Knee Arthroplasty (TKA) is considered the Gold Standard**

- 600,000 performed annually in U.S.
- Proven long term survivorship 90% out 15 years
- Can correct large deformities
What do we consider when selecting implants?

- **Substrate strength (polyethylene)**
  - How long will the plastic last?
  - Lab testing is positive.

- **Alignment of the implants**
  - If aligned properly, we believe the plastic and components will last longer
RIO® Enables Consistently Reproducible Precision

Pre-operative Planning
RIO® Enables Consistently Reproducible Precision

Intra-operative Registration
RIO® Enables Consistently Reproducible Precision

Intra-operative Adjustments – Knee Balancing
RIO® Enables Consistently Reproducible Precision

Intra-operative Resurfacing
RIO® Enables Consistently Reproducible Precision

Partial Knee Replacement
RIO® Enables Consistently Reproducible Precision

Total Knee
RIO® Enables Consistently Reproducible Precision

Post-operative X-rays - Unicondylar
RIO® Enables Consistently Reproducible Precision

Post-operative X-rays - Patellofemoral
RIO® Enables Consistently Reproducible Precision

Post-operative X-rays - Bicompartmental
Potential Benefits of MAKOplasty®

- Performed through a smaller incision than that required for traditional total knee replacement surgery.
- Only the arthritic portion of the knee is removed, preserving healthy bone and tissue.
- Implants are optimally positioned in the knee joint to allow the knee to move smoothly again.
  - Improved surgical outcomes
  - Less implant wear and loosening
  - Bone sparing
  - Smaller incision, Less invasive
  - Less scarring
  - Reduced blood loss
  - Minimal hospitalization
  - Rapid recovery
  - Ligaments remain intact for a more natural feeling knee

* Individual results may vary. There are risks associated with any knee surgical procedure, including MAKOplasty®. Your physician can explain these risks and help determine if MAKOplasty® is right for you.
Traditional Treatment Gap

<table>
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<th>Early to mid-stage OA</th>
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Hardly Any Performed
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**MAKOplasty® May Fill the Gap**
What is MAKOplasty®?

• An innovative treatment option for patients who suffer from early to mid-stage osteoarthritis of the knee

Unicompartmental MAKOplasty®

Bicompartmental MAKOplasty®
MAKOplasty®

Walk Away From Hip Pain With Surgeon-Interactive Robotic Arm Surgery
Degenerative Joint Disease (DJD) of the Hip

- Hip Anatomy
Degenerative Joint Disease (DJD) of the Hip

Osteoarthritis (OA)

- A degenerative bone disease that causes cartilage found on healthy joints to break down, removing the buffer between bones.

- Osteoarthritis (OA) is the most common cause of hip replacement surgery.¹

- 14.3% of older adults report significant hip pain²

- 50% growth in hip OA expected by 2035, from the 3 million currently suffer with hip OA

1. AAOS website, retrieved September 2011
Degenerative Joint Disease (DJD) of the Hip

**Rheumatoid Arthritis (RA)**
- An inflammatory arthritis of the joints.
Degenerative Joint Disease (DJD) of the Hip

- Post-Traumatic Injury (severe fracture or dislocation)
Degenerative Joint Disease (DJD) of the Hip

- Avascular Necrosis (AVN)
  - Condition where the “ball” of the femoral head has lost a healthy supply of blood flow, causing the bone to die and the femoral head to become misshapen.
Degenerative Joint Disease (DJD) of the Hip

- **Hip Dysplasia**
  - Condition in which bones around the hip did not form properly, which may cause misalignment of the hip joint.
Degenerative Joint Disease (DJD) of the Hip

- Who Experiences the following Signs & Symptoms?
  - Pain while putting weight on the affected hip
  - Limping to lessen the weight-bearing pressure on the affected hip
  - Pain that may radiate to the groin, lower back, or down the thigh to the knee
  - Hip pain or stiffness during walking or other impact activities
  - Failure to respond to non-surgical treatments or nonsteroidal anti-inflammatory medication
Osteoarthritis

- Reduced Joint Space (Bone-on-bone)
RIO® Enables Consistently Reproducible Precision

Post-operative X-ray
Complications in Total Hip Arthroplasty

• Short Term
  • **Dislocation** is the leading short term complication for total hip Replacements\(^2\) -- National average is around 4%\(^2\)
  • **Leg Length Discrepancy**

• Long Term
  • **Implant loosening** caused by vertical cups and polyethylene wear\(^4\)
  • **Accelerated Wear**

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THA Implant Alignment Options

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<td><strong>Navigation Systems</strong></td>
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- **Conventional Techniques**
  - Manual Alignment Guides

- **Advanced Alignment Tools**
  - Navigation Systems

- **Precision Surgical Assistance**
  - MAKOplasty® Robotic Arm Assisted THA
Robotic Arm Assisted MAKOplasty® Hip

- Consistently Reproducible Precision
- Patient-specific 3-D pre-op and intra-op planning
- Guided femoral neck resection
- Robotic arm assisted and controlled acetabular reaming
- Robotic arm assisted and controlled cup placement
- Leg length and offset measurement intra-op
RIO® Enables Consistently Reproducible Precision

Pre-operative Planning
RIO® Enables Consistently Reproducible Precision

Intra-operative Reaming
RIO® Enables Consistently Reproducible Precision

Intra-operative Impaction
Am I a Candidate?

• Typical process
• Office Visit
• Physical Exam
• X-rays Taken
• If Yes
  • CT Scan performed
  • Joint Arthroplasty Education Seminar
  • Pre-admission Testing
  • Admission to Hospital
  • Discharge Home typically 1\textsuperscript{st} or 2\textsuperscript{nd} day post-op
  • Home and/or Outpatient Physical Therapy
• In-office Follow-up Exam
• Timothy A. Damron, MD
  – David G. Murray Endowed Professor of Orthopedic Surgery
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  – Community General Hospital
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  – 464-4472
Thank You

Restoring Quality of Life Through Innovation®