

Relieving Painful Hip or Knee Arthritis

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- Undergrad - Carroll College - Helena, MT
- Medical School - University of Washington
- Residency - University of New Mexico
- Fellowship in Joint Replacement - Coon Joint Replacement Institute, St. Helena, CA
- First Surgeon with Fellowship training specifically in Robotic Joint Replacement

Medical License: CO and MT

Boulder County Fair circa 1990





About my practice...

- Focus on minimally invasive surgical techniques combined with advanced technology
- 99% of cases done under spinal anesthesia
- Avg LOS: TKA <1 days, THA <1 days
- 91% of patients discharged to home with outpatient PT
- Now doing Outpatient Surgery Center Same Day discharge 70% of all cases

Lowest Complication Rate in Boulder



Boulder Centre

for Orthopedics & Spine

Your Life in Motion

What is Osteoarthritis?



The most common form of arthritis

Osteoarthritis is a degenerative disease that breaks down one or more joints in the body.

- Wear and tear grinds away at joint cartilage¹
- Symptoms: pain, stiffness, swelling, and decreased flexibility
- Changes develop slowly and get worse over time¹
- Joint changes are irreversible²
- Often goes undiagnosed until it has progressed³

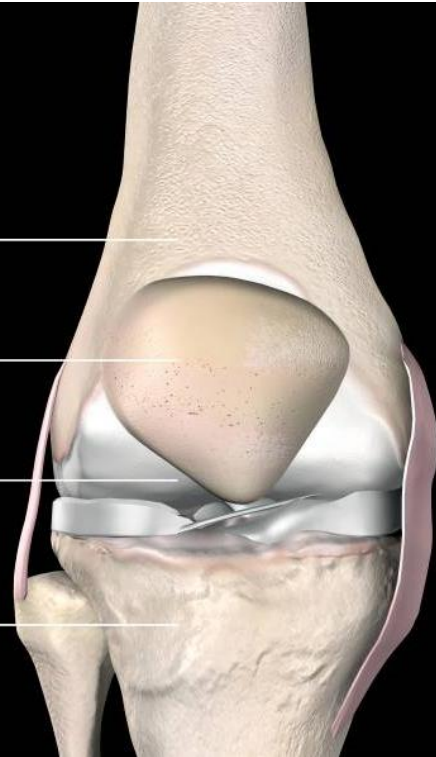
A Normal Knee

Femur (thigh bone)

Patella

Healthy Cartilage

Tibia (shin bone)

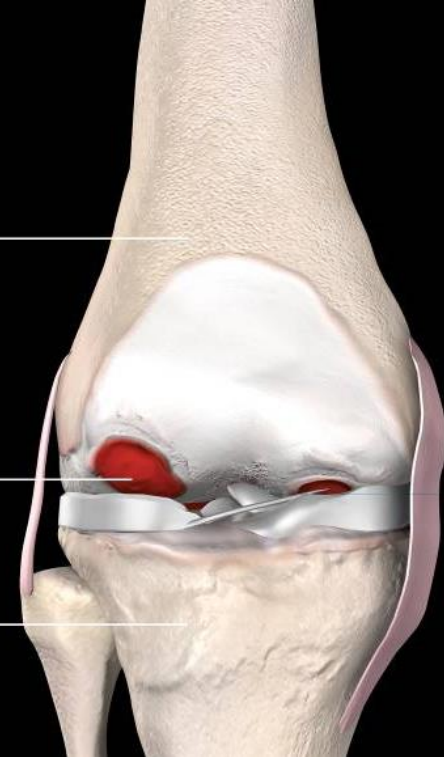


An Arthritic Knee

Femur (thigh bone)

Diseased Cartilage

Tibia (shin bone)



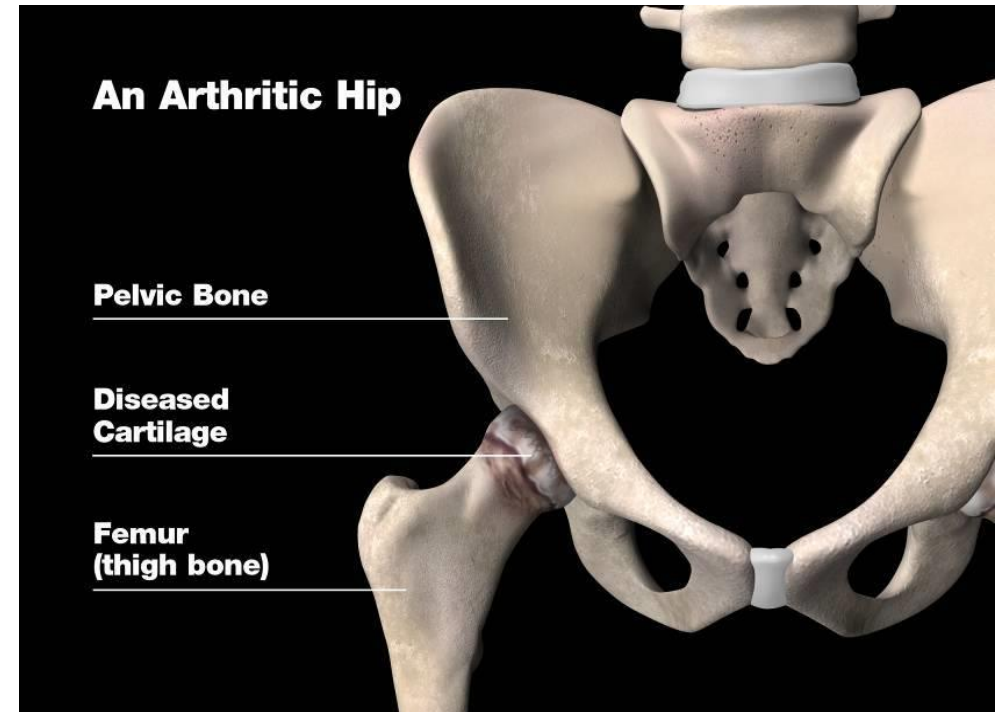
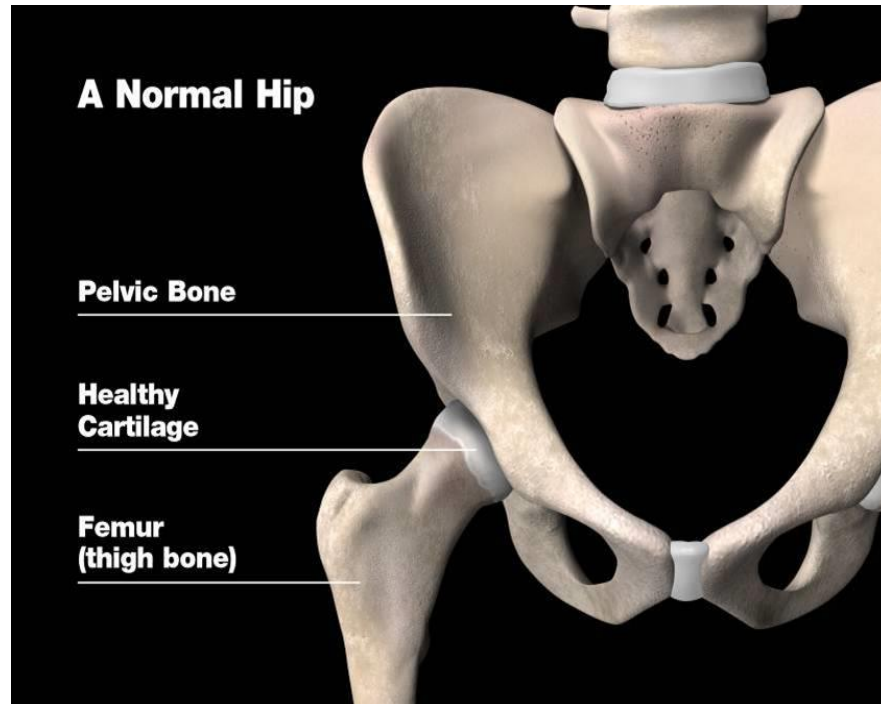
Osteoarthritis - Worn out articular cartilage

**Inflammatory Arthritis - Systemic process
ex: Rheumatoid, Psoriatic, etc.**





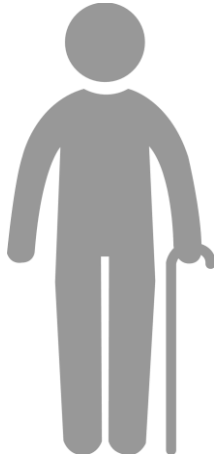
Hip Stages



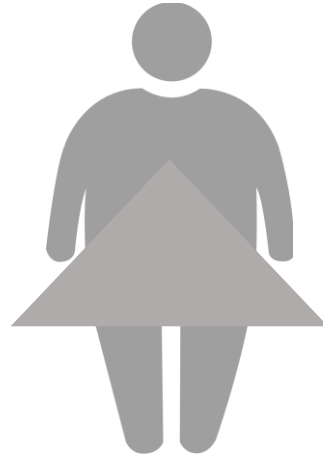
X-ray Showing Arthritis



Why is OA So Prevalent?



We're all getting older, and most Americans are getting heavier too¹



Overweight women have a nearly 4 times greater risk of developing knee OA; the risk is 5 times greater for overweight men²

2x

People diagnosed with diabetes are 2 times as likely to have OA³

References: 1. Fryar CD, Kruszon-Moran D, Gu Q, Ogden CL. Mean body weight, height, waist circumference, and body mass index among adults. United States, 1999-2000 through 2015-2016. Natl Health Stat Report. 2018;(122):1-16. 2. Johns Hopkins Arthritis Center. Role of body weight in osteoarthritis. Johns Hopkins Arthritis Center. <https://www.hopkinsarthritis.org/patient-corner/disease-management/role-of-body-weight-in-osteoarthritis/#obesity>. Accessed January 9, 2025. 3. Schett G, Kleyer A, Perricone C, et al. Diabetes is an independent predictor for severe osteoarthritis: results from a longitudinal cohort study. Diabetes Care. 2013;36(2):403-409. doi:10.2337/dc12-0924.

How Are Joint Problems Diagnosed?



MEDICAL HISTORY

Your doctor will ask about any injuries or other conditions that might be causing the pain



PHYSICAL EXAMINATION

Your doctor will:

- Feel for any injuries
- Discover your limits of movement
- Find the location of your pain
- Determine the extent of your joint instability



TESTS

Your doctor may order 1 or more tests to make a specific diagnosis.

Tests may include:

- Standard X-ray
- Joint Aspiration
- MRI

Normalizing Pain

People often adapt to limitations both physically and emotionally by creating a “new normal”

OA may affect you both...

PHYSICALLY

Pain makes people tired and makes it difficult to concentrate

- Restricts physical and leisure activities
- Limits spontaneity



EMOTIONALLY

People are forced to give up something that was part of their lives

- Creates a feeling of loss
- Missing out on activities affects social life or relationship with loved ones

THINK ABOUT YOUR NEW NORMAL

- ☐ What activities are you avoiding because of joint pain?
- ☐ How has your lifestyle changed?
- ☐ What do you miss the most?
- ☐ Has this impacted your social life and quality of life?

Assessing Your Pain

Check your mobility

If you have difficulty performing any of the movements below, it may be time to talk to your doctor about next steps.



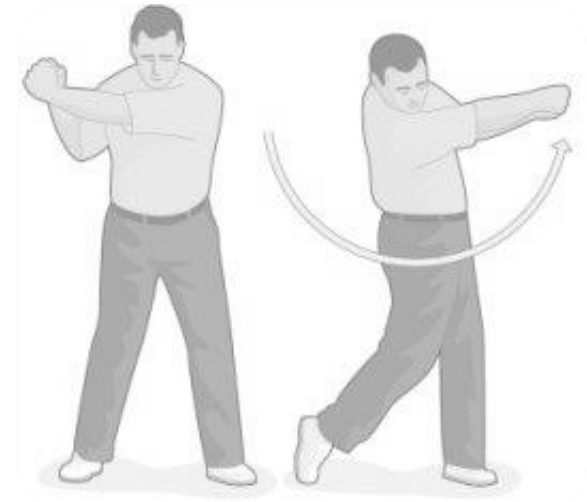
Walking



**Bending at the
hips & knees**



**Pretending to drive
(pushing gas & break)**



**Pretending to golf
(swing a club)**

Assessing Your Pain



Ask yourself the following questions

Does the pain interfere with your sleep?

Is it painful for you to walk more than a block?

Are pain medications no longer working?

Is joint pain limiting your participation in activities (e.g., family vacations or other functions)?

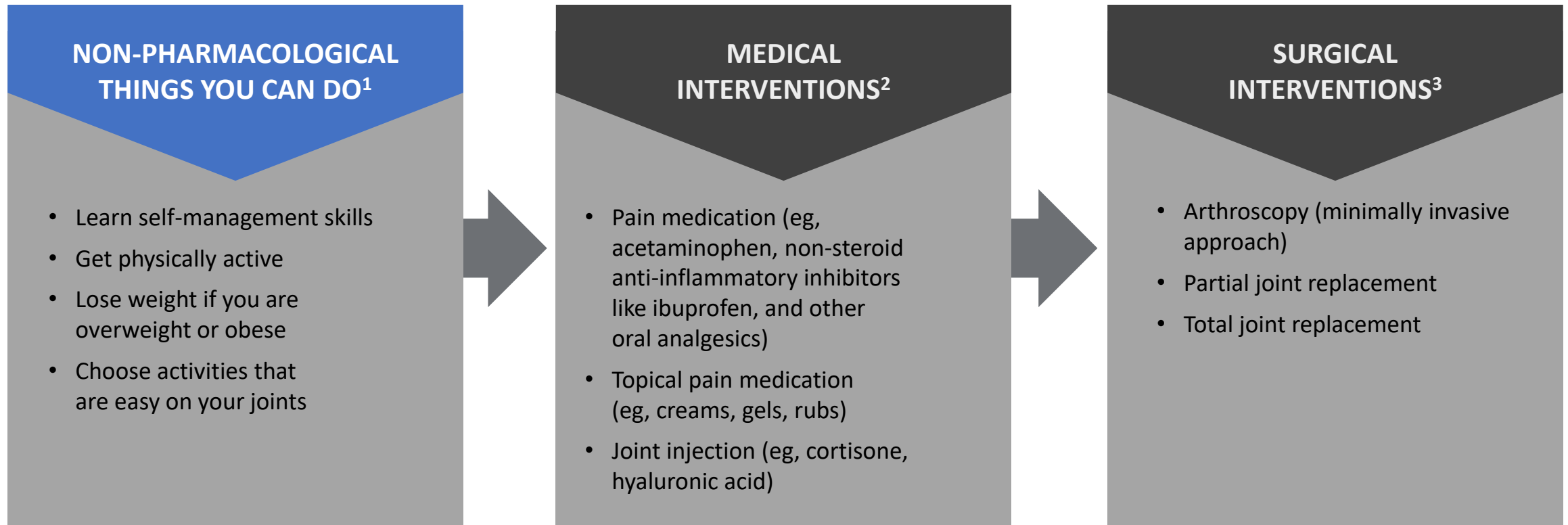
Has inactivity from joint pain caused you to gain weight?

Do any of your joints hurt 1 or more days per week?

Osteoarthritis treatment pathway

OA Treatment Pathway

Non-pharmacological



At the first sign of joint pain, start with R.I.C.E



Rest

Rest and protect the painful area.

Avoid activities that may cause pain or soreness. You may need to use crutches if you've injured your leg and want to remain mobile.

Then reintroduce movement gradually, so you don't delay your recovery by losing muscle strength.



Ice

Ice the painful area with a cold compress such as ice or a bag of frozen peas wrapped in a towel. Apply cold pack for 10 to 20 minutes, 3 or more times a day. Don't apply ice directly to the skin as it can damage it.



Compress

Compress the injured area with an elastic bandage or elasticated tubular bandage to help limit swelling and movement. Don't wrap it too tightly.



Elevate

Elevate the injury by resting it above the level of your heart and keep it supported.

This could mean lying on the sofa with your foot on some cushions if you've injured your leg.

**If pain and stiffness
continue for
48 hours or more, call
your doctor.**

Obesity and Osteoarthritis

Obesity is a significant risk factor for osteoarthritis (OA) and can increase the severity of the disease.

Excess weight places additional stress on the joints, particularly those in the lower body, contributing to the development and progression of OA.

Managing weight through diet and exercise is crucial for reducing the risk of OA and minimizing its impact on overall joint health.

4x

Every extra pound you weigh adds four pounds of pressure on your knee joint.¹

Joint-sparing Exercise

Consider exercises that are lower in impact such as walking, cycling or water-based activities.

Water exercise (aquatic therapy)

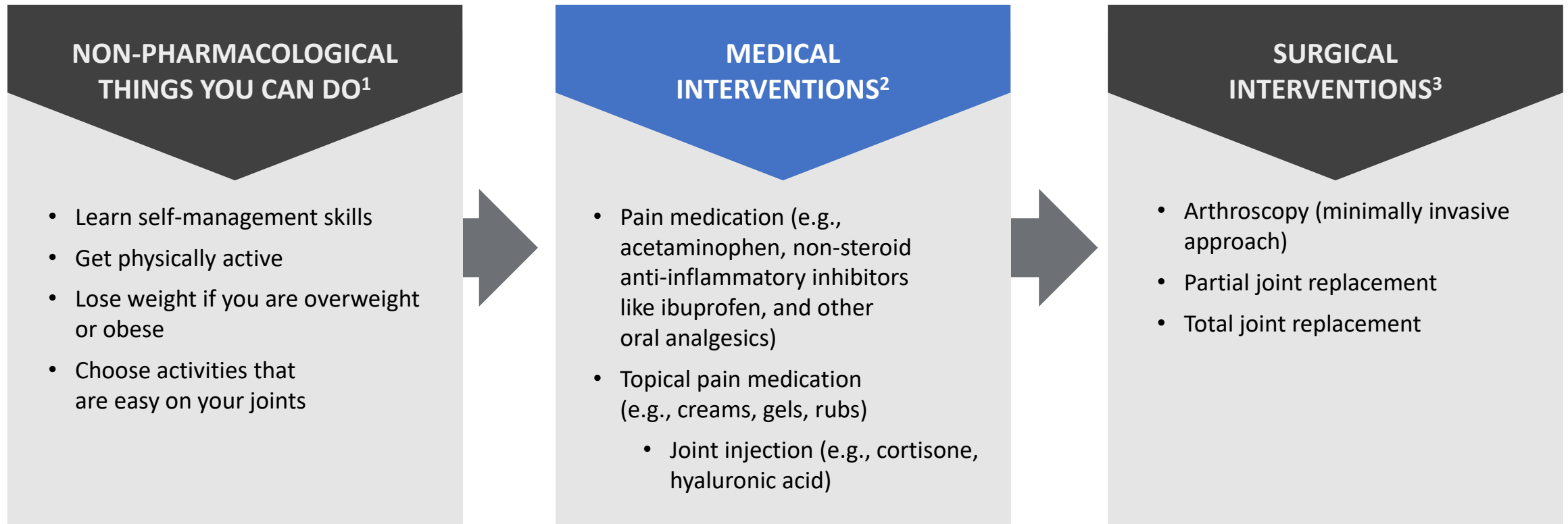
- You can do many of the same exercises in the water as you do on land
- Water exercises apply less force on your joints and can relieve pain while helping you build muscle and bone strength
- Aerobic workouts can include marching, walking, running, jumping, and swimming
- Local fitness centers, senior centers, physical therapy centers, or hospitals may offer this option




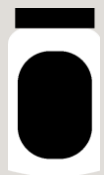
Be sure to follow your doctor's / therapist's recommendation by starting out easy to build strength.

OA Treatment Pathway

Medical interventions





Types of over-the-counter (OTC) pain relievers

MEDICATION*	RECOMMENDED DOSE	GOOD FOR	NEED TO KNOW
ACETAMINOPHEN Tylenol® Acephen™ Feverall® 	650-1000 mg every 4-6 hours as needed	Headache, general aches and pains, fevers. Not recommended for pain associated with swelling, as it has no anti-inflammatory effect.	Acetaminophen is often in combination drug products, so read labels carefully if you are taking multiple medications. Avoid if you have liver disease or chronically consume alcohol (an occasional drink is okay while taking it, but it's not advisable if you regularly have large amounts of alcohol)
Aspirin Bayer® Bufferin® Ecotrin® 	325-650 mg every 4 hours	Headache, general aches and pains, pain associated with inflammation (arthritis, sprain, broken bone, etc.)	Gastrointestinal bleeding is a serious concern, particularly for elderly patients and those with a history of ulcer disease, chronic smokers, or chronic alcohol users. Avoid aspirin as a first choice pain reliever, if you can, because of the gastrointestinal side effects.

* Prior to use of any medication, please refer to accompanying package insert and consult with your healthcare provider

Types of over-the-counter (OTC) pain relievers

MEDICATION*	RECOMMENDED DOSE	GOOD FOR	NEED TO KNOW
IBUPROFEN Advil® Genpril Iprin Ibu™ Motrin® IB 	200-400 mg every 6 hours	Headache, general aches and pains, pain from inflammation. Ibuprofen and naproxen are very similar. Some people respond better to one or the other. Choose which one seems to be better for you.	Side effects include upset stomach, ranging from mild indigestion to severe nausea. Can cause gastrointestinal bleeding. Avoid use if you have kidney disease or impaired kidney function.
NAPROXEN Aleve® Naprosyn® 	220 mg every 8-12 hours	Headache, general aches and pains, pain associated with inflammation	Side effects include upset stomach. Ranging from mild indigestion to severe nausea. Can cause gastrointestinal bleeding. Avoid if you have kidney disease or impaired kidney function.

* Prior to use of any medication, please refer to accompanying package insert and consult with your healthcare provider

Consideration for OTC pain relief

Even though they are available over-the-counter (OTC), these medicines are still drugs with active ingredients and must be taken seriously.

The right OTC pain reliever for you can depend on multiple factors. For example:

- Are you taking other medications?
- Do you have medical conditions?
- Are you 60 years of age or older?

- ✓ Always read and follow the medicine label.
- ✓ Avoid taking multiple medicines that contain the same active ingredient.
- ✓ Talk to your pharmacist or doctor if you have any questions about what OTC pain reliever may be right for you

Reference: Get Relief Responsibly: Professional Resource Center. OTC analgesic interactions & contraindications. <https://www.getreliefresponsiblyprofessional.com/otc-analgesic-interactions-contraindications>. Accessed January 3, 2025



Knee Injection Options

Hyaluronic acid injections¹

- Supplements joint fluid in your knee, helping to provide cushioning and lubrication to the knee
- Acts as a shock absorber
- Can be given as a single injection or weekly for 3 to 5 weeks, depending on the product used, to provide pain relief for up to 6 months

Corticosteroid injections²

- Useful for treating flare-ups of pain and swelling with fluid buildup in the knee
- Should not be used frequently; may contribute to cartilage breakdown
- Pain relief may last anywhere from a few days to up to 3 months³



Hyaluronic Acid Injections

ORTHOVISC®

High Molecular Weight Hyaluronan¹



- A series of knee injections that may help to replenish the joint fluid that cushions, protects and lubricates your knee joint
- Knee osteoarthritis (OA) pain relief that lasts up to 6 months
- FDA-approved
- Non-avian
- 3 or 4 injections

MONOVISC®

High Molecular Weight Hyaluronan²



- A knee injection that supplements the joint fluid to provide cushioning, lubrication, and protection for the knee joint.
- Knee osteoarthritis (OA) pain relief that lasts up to 6 months.
- FDA-approved
- Non-avian
- 1 injection

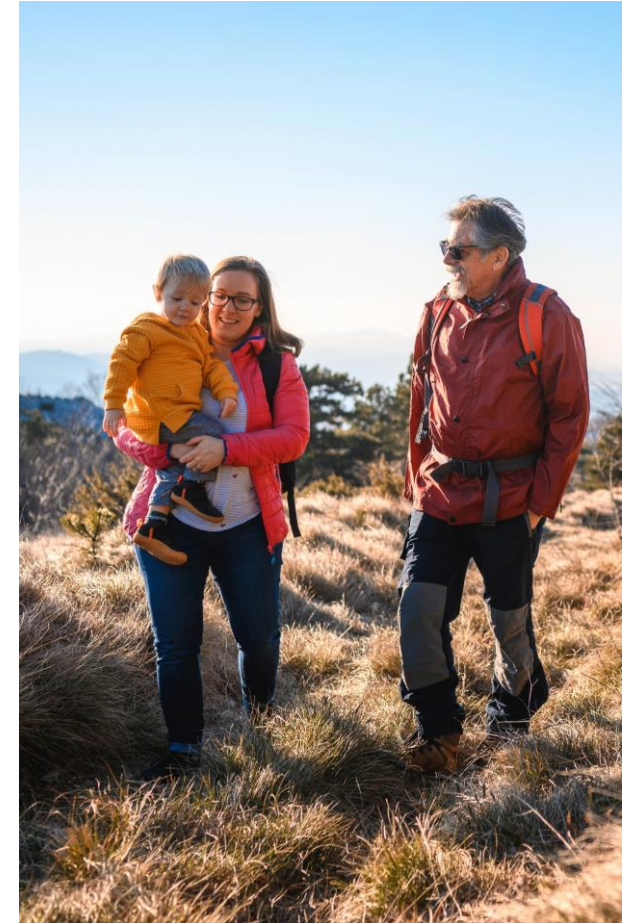
MONOVISC® and ORTHOVISC® are registered trademark and manufactured by Anika Therapeutics, Inc.

Please refer to the instructions for use for complete list of indications, contraindications, warnings and precautions.

References: 1. ORTHOVISC High Molecular Weight Hyaluronan Instructions For Use. Anika Therapeutics. Bedford, MA. 2020. 2. MONOVISC High Molecular Weight Hyaluronan Instructions For Use. Anika Therapeutics. Bedford, MA. 2020.

Potential Benefits of Early Intervention Injections

- A non-surgical treatment for early-stage osteoarthritis (OA) knee pain^{1,2}
- Provides pain relief for up to 6 months^{1,2}
- Helps to restore knee movement^{1,2}



References: 1. OrthoInfo by the American Academy of Orthopaedic Surgeons. Viscosupplementation Treatment for Knee Arthritis. <https://orthoinfo.aaos.org/en/treatment/viscosupplementation-treatment-for-knee-arthritis/>. Accessed November 24, 2025. 2. Arthritis Foundation. Hyaluronic Acid Injection for Osteoarthritis. <https://www.arthritis.org/health-wellness/treatment/treatment-plan/disease-management/hyaluronic-acid-injections-for-knee-pain>. Accessed November 24, 2025. 3. Altman R, Lim S, Steen RG, Dasa V. Correction: Hyaluronic Acid Injections Are Associated with Delay of Total Knee Replacement Surgery in Patients with Knee Osteoarthritis: Evidence from a Large U.S. Health Claims Database. PLoS One. 2016;11(1):e0148591. Published 2016 Jan 29. doi:10.1371/journal.pone.0148591.

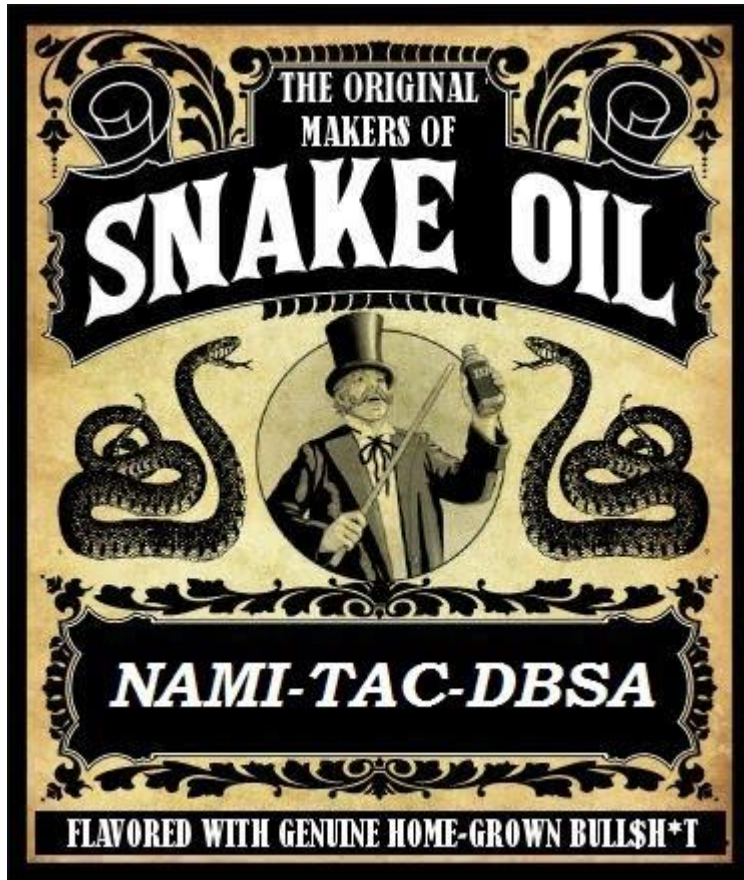
The Promise of Stem Cells

Obtain stem cells, concentrate them and inject them into the joint to decrease inflammation and promote healing.

**Not covered by insurance, very expensive*

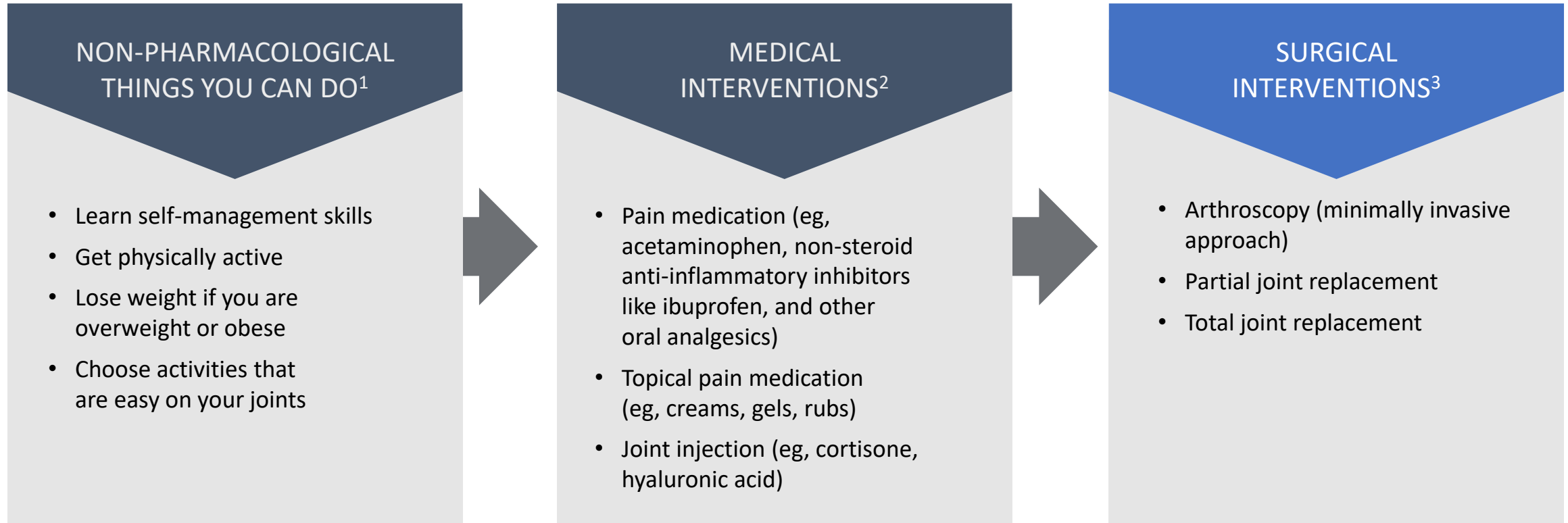


Stem Cells = Snake Oil?



OA treatment pathway

Surgical intervention



Deciding on joint replacement surgery

6 Signals it May Time for a Joint Replacement

1

You can no longer complete routine daily tasks without help

2

You have severe pain that disrupts your sleep, prevents walking or bending, isn't relieved by rest, and isn't improved by non-surgical treatments.

3

Your doctor says that less-complicated surgical procedures are unlikely to help

4

You have OA and feel the disease is wearing you down physically, emotionally, and mentally

5

You are suffering severe side effects from the medications for your painful joint

6

Tests show advanced arthritis or significant joint damage

Should You Wait to Have Your Joint Replaced?

For OA patients requiring surgery, joint replacement surgery often provides pain relief and functional improvement.

Early diagnosis and treatment are important.

Delaying surgery may lower your quality of life.¹

OA is degenerative.

It won't get better and it may get worse.²

References: 1. McLeod Health. The risks of delaying joint replacement too long. https://www.mcleodhealth.org/blog/the-risk-of-delaying-your-joint-replacement-surgery/?crb_phantom_pdf_paged=yes&single_post=yes&key=1630603241/. Accessed January 4, 2025. 2. National Institute of Arthritis and Musculoskeletal and Skin Disease. Overview of Osteoarthritis. <https://www.niams.nih.gov/health-topics/osteoarthritis#:~:text=Osteoarthritis%20is%20a%20degenerative%20joint,a%20short%20period%20of%20time>. Accessed March 11, 2025.



4 Myths of Joint Replacement

1

**OA PAIN
IS A PART
OF AGING
AND JUST SOMETHING
YOU LEARN
TO LIVE WITH**

2

**I'M TOO
YOUNG
FOR JOINT REPLACEMENT**

3

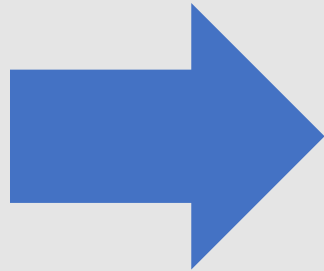
**I SHOULD
WAIT AS LONG
AS POSSIBLE
TO HAVE JOINT
REPLACEMENT SURGERY**

4

**ALL JOINT
REPLACEMENTS
ARE THE SAME**

1

**OA PAIN
IS A PART
OF AGING
AND JUST
SOMETHING
YOU LEARN
TO LIVE WITH¹**

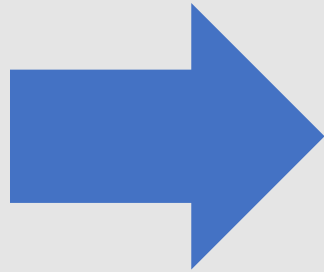


REALITY

If everyday activities are causing pain and interfering with your daily life, you may benefit from talking to an orthopaedic surgeon, no matter your age²

2

**I'M TOO
YOUNG
FOR JOINT
REPLACEMENT**

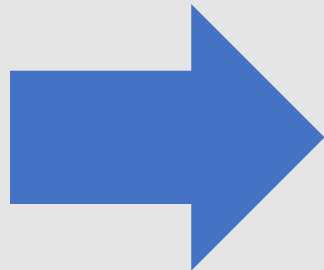


REALITY

Candidacy for a joint replacement is not based on age, but on your level of pain and immobility. The average age of patients undergoing a joint replacement today is approximately 65 years old and getting younger.

3

**I SHOULD
WAIT AS LONG
AS POSSIBLE
TO HAVE JOINT
REPLACEMENT
SURGERY**



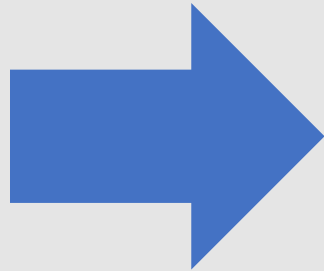
REALITY

Waiting for joint replacement surgery may worsen the outcome.

Delaying surgery may lower quality of life, and waiting too long may keep you from achieving the full benefit of joint replacement surgery^{1,2}

4

**ALL JOINT
REPLACEMENTS ARE
THE SAME**



REALITY

Today, joint replacement surgeons have a choice of implant types, shapes, and sizes along with a variety of assisted technologies designed to accommodate specific needs and different lifestyles of their patients.

- Surgery is a difficult decision
 - Duke Study: 88% pts decline Joint Replacement
- OA is a degenerative disease
- Better outcomes are reported in patients who had a total joint operation earlier in the disease process¹
- At 2 years post-operation, patients who chose surgery earlier in disease process vs. those who waited¹
 - Had improved function
 - Had reduced pain

1. Fortin PR, et al. *Arthritis Rheum.* 2002;46:3327-3330.

- Improvements in hip and knee replacement materials
 - Success rates >90% ¹
- Partial vs. total knee replacements
- Minimally invasive procedure and techniques
- New implant designs and technology

1. American Academy of Orthopaedic Surgeons. <http://orthoinfo.aaos.org/topic.cfm?topic=A00389>, accessed Dec. 15, 2010, and http://www.niams.nih.gov/Health_Info/Hip_Replacement/default.asp#8.

Early Arthritis

- Damage and pain isolated to one compartment of the knee, usually medial or lateral.



Early Arthritis

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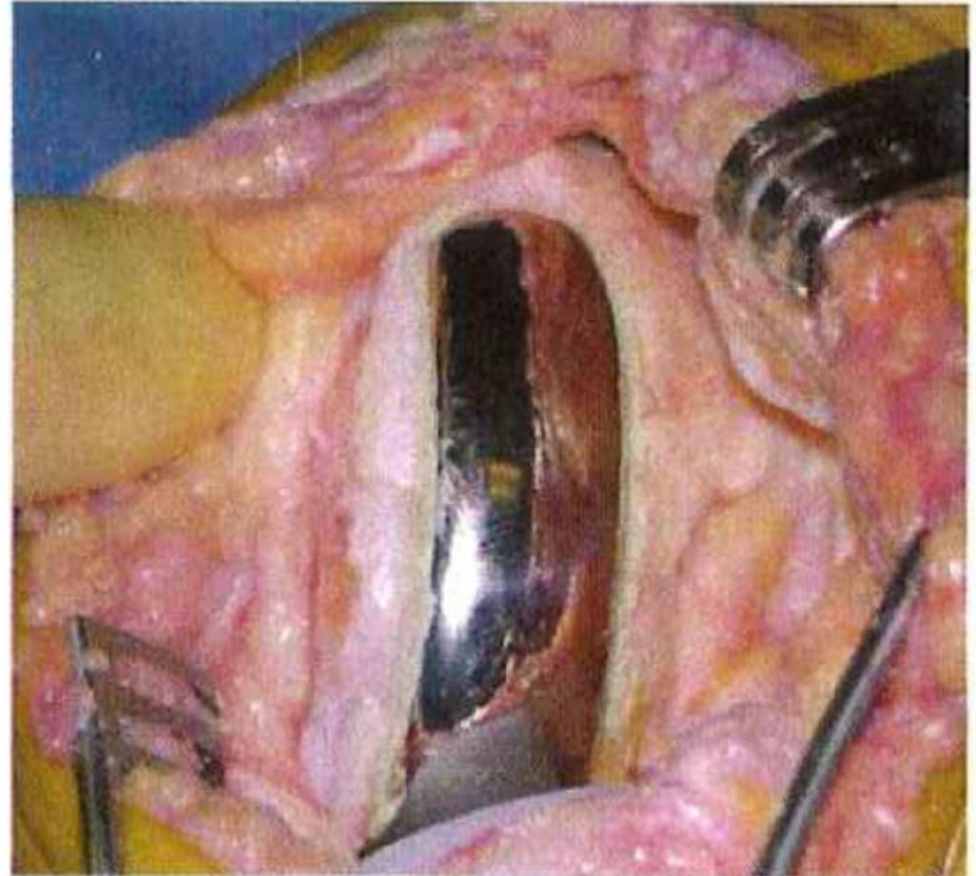
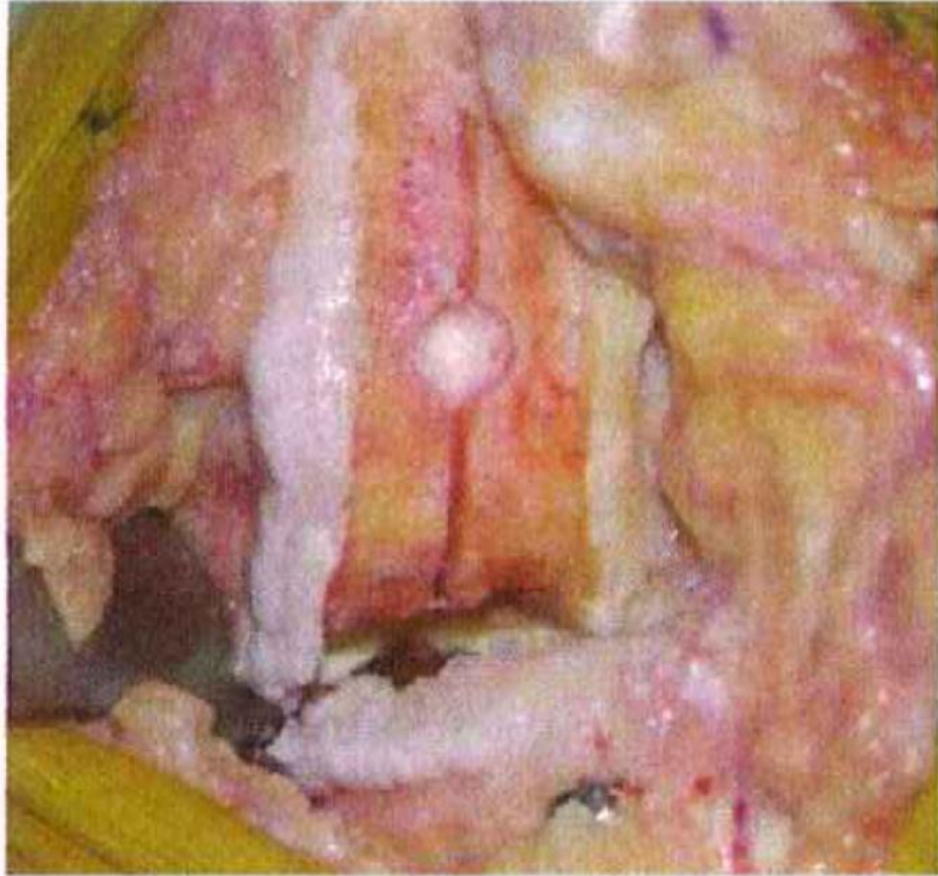


Early Arthritis

- Can also be isolated to the patella femoral joint.



Surgical Technique



Pre-op



Post-op



- Less invasive
- Accurate
- Reproducible
- Bone conserving



Mako Total Knee

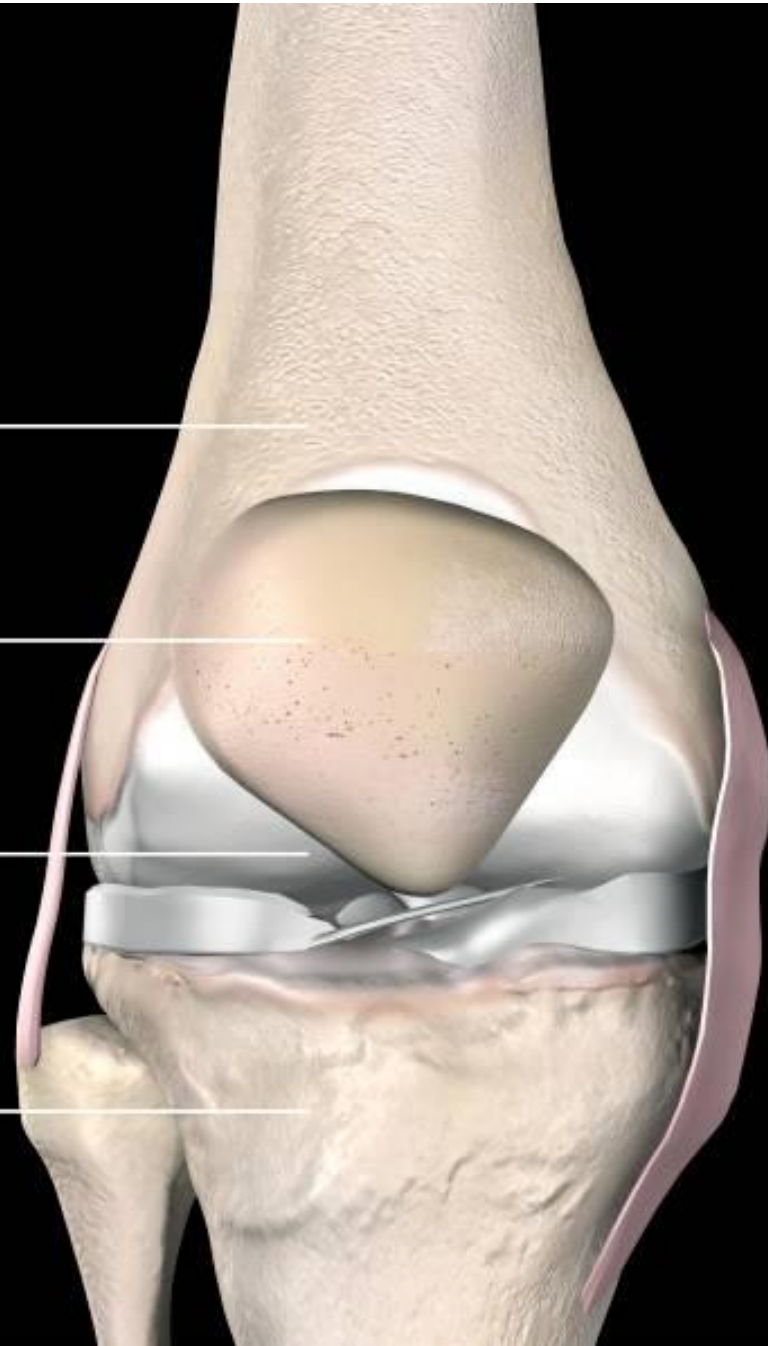
A Normal Knee

Femur (thigh bone)

Patella

Healthy Cartilage

Tibia (shin bone)

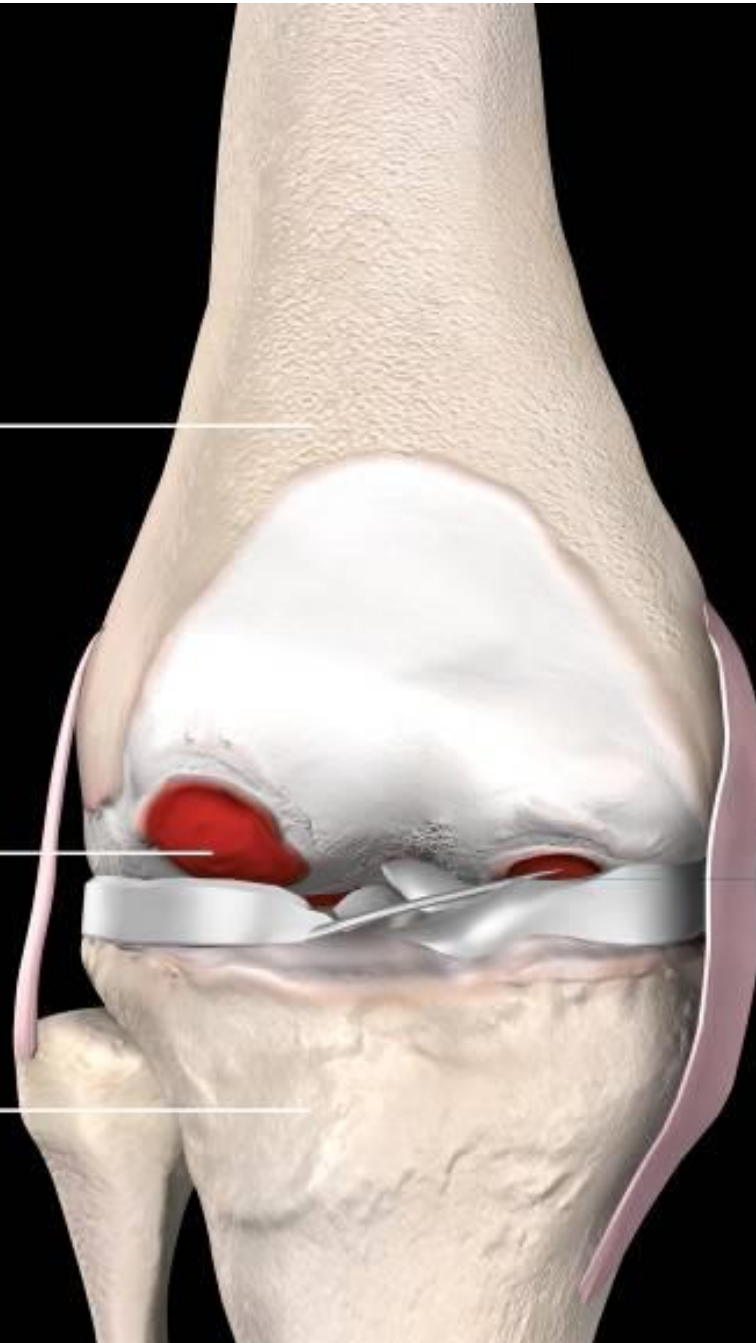


An Arthritic Knee

Femur (thigh bone)

Diseased Cartilage

Tibia (shin bone)

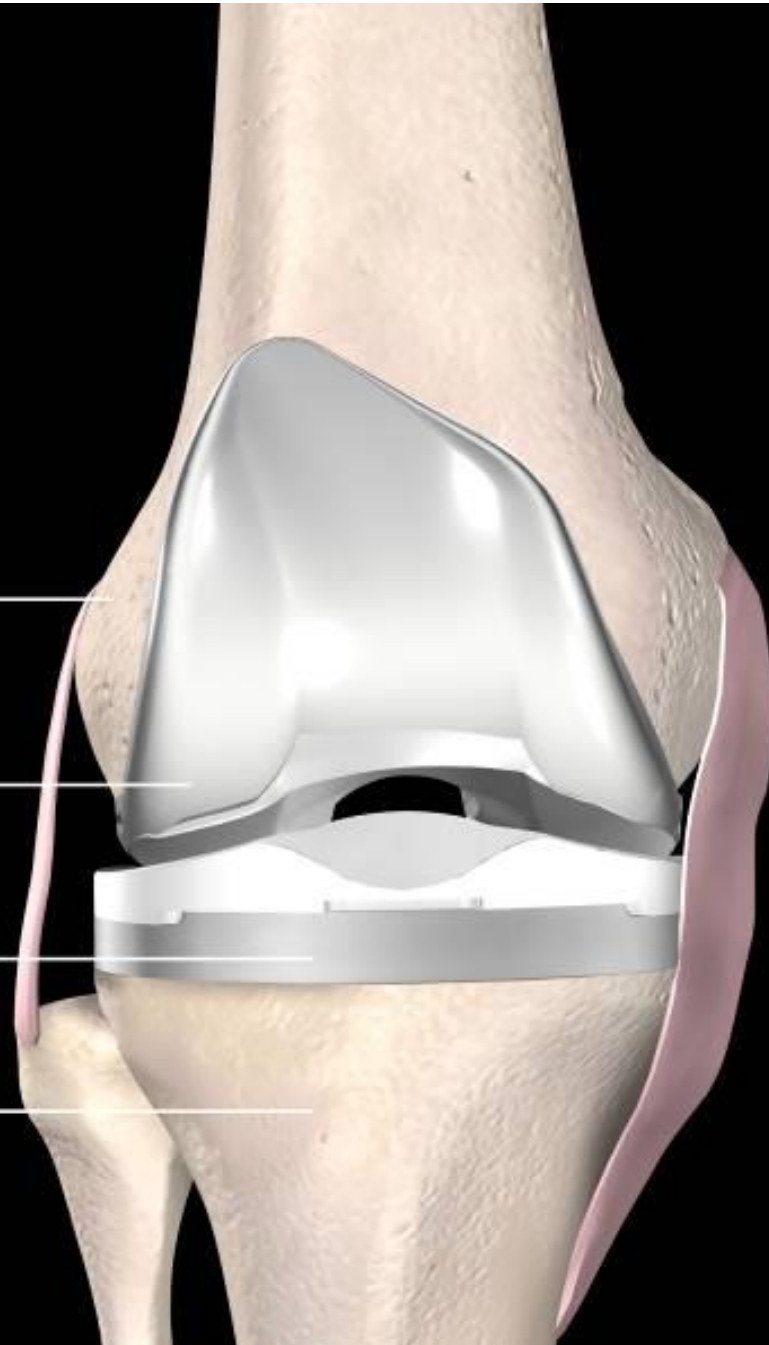


A Replaced Knee

Femur (thigh bone)

Artificial Knee Implant

Tibia (shin bone)

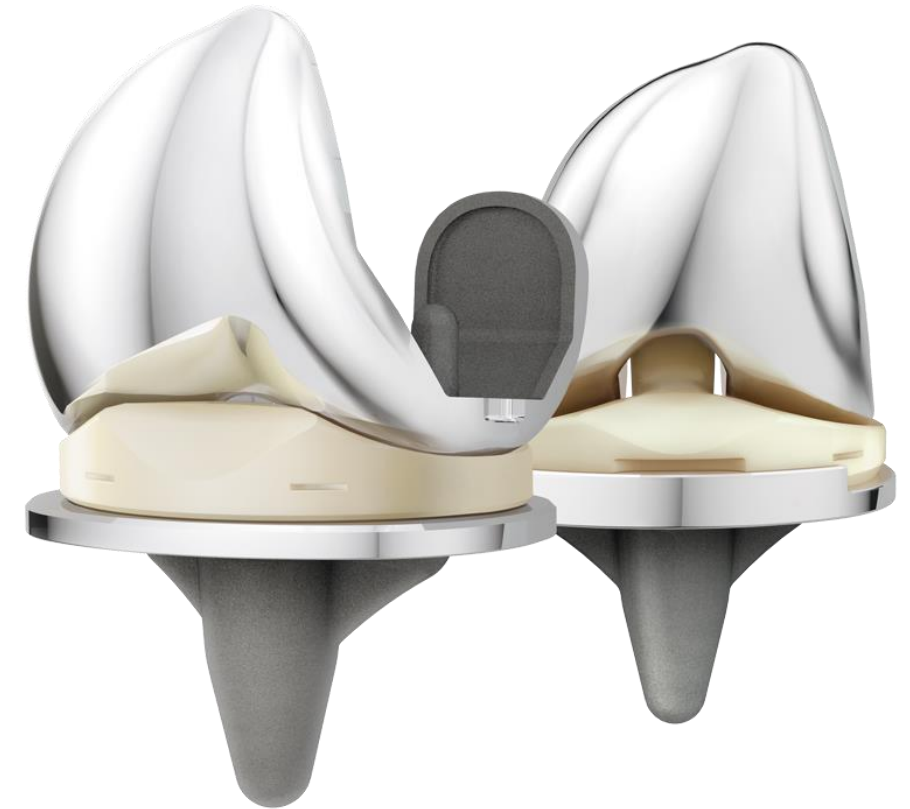


Designed by Experts, Based on Science

Backed by DePuy Synthes' largest-ever research and development program, the ATTUNE Knee has been provided for more than **2 million patients** worldwide since its first clinical use in 2011.¹

The ATTUNE Knee System is designed to deliver a **greater range of motion** and **faster recovery**.^{2,3}

The ATTUNE Knee System works in harmony with your knee muscles and ligaments to **deliver stability and motion**, helping you get back to living your life and pursuing your passions.³⁻⁷



* Greater range of motion compared to another leading total knee arthroplasty system

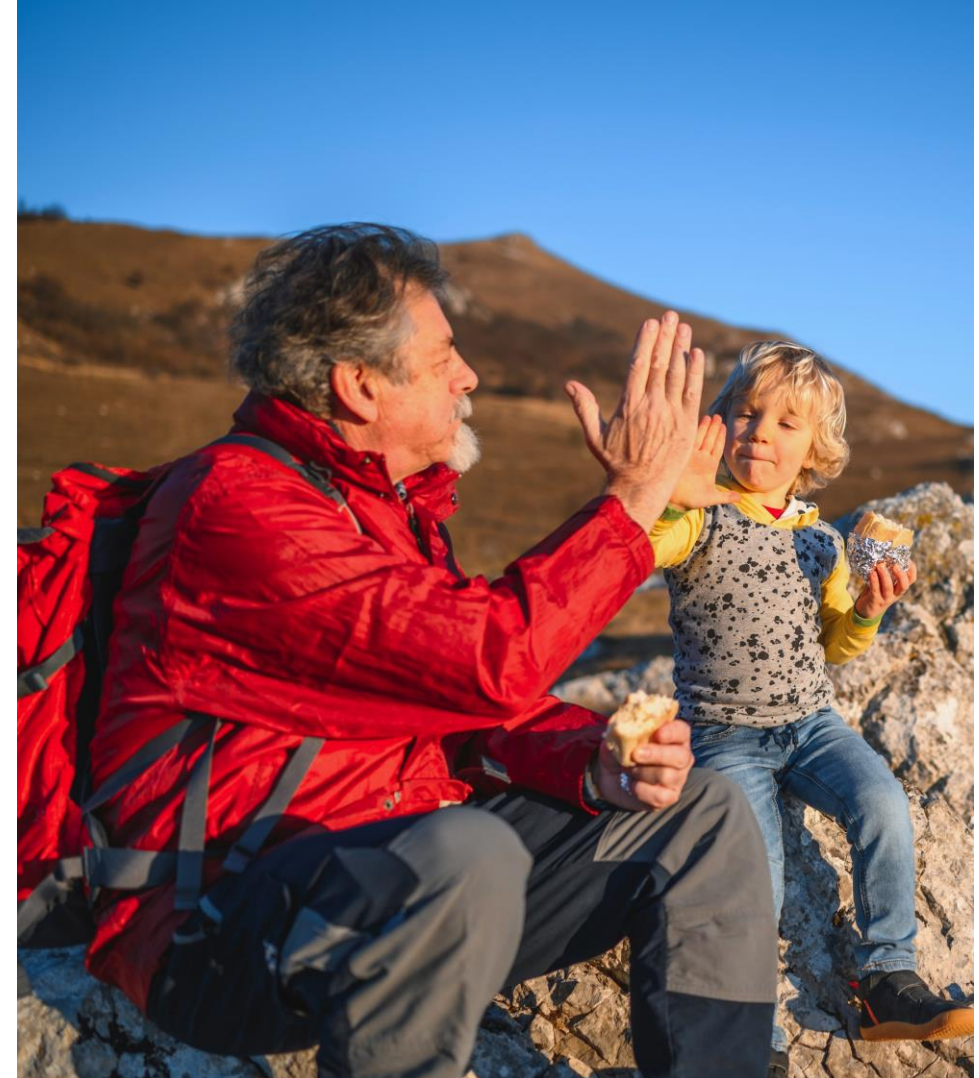
References: 1. DePuy Synthes. ATTUNE™ Knee System Unit Sales 2023. 2. van Loon C, Baas N, Huey V, Lesko J, Meermans G, Vergroesen D. Early outcomes and predictors of patient satisfaction after TKA: a prospective study of 200 cases with a contemporary cemented rotating platform implant design. *Journal of experimental orthopaedics*. 2021;8(1):30. 3. Hamilton WG, Brenkel IJ, Barnett SL, et al. Comparison of Existing and New Total Knee Arthroplasty Implant Systems From the Same Manufacturer: A Prospective, Multicenter Study. *J Am Acad Orthop Surg Glob Res Rev*. 2021;5(12) 4. Indelli PF, Pipino G, Johnson P, Graceffa A, Marcucci M. Posteriorstabilized total knee arthroplasty: a matched pair analysis of a classic and its evolutionary design. *Arthroplasty Today*. 2016;2:193-198. 5. Fitzpatrick CK, Clary CW, Rullkoetter PJ. The influence of design on TKR mechanics during activities of daily living. Poster presented at: Orthopaedic Research Society Annual Meeting; February 4-7, 2012; San Francisco, CA; poster 2034. 6. Lim D, Kwak DS, Kim M, et al. Kinematically aligned total knee arthroplasty restores more native medial collateral ligament strain than mechanically aligned total knee arthroplasty. *Knee Surg Sports Traumatol Arthrosc*. 2022;30(8):2815-2823. doi:10.1007/s00167-021-06680-y 7. Courtney PM, Lee GC. Early Outcomes of Kinematic Alignment in Primary Total Knee Arthroplasty: A Meta-Analysis of the Literature. *J Arthroplasty*. 2017;32(6):2028-2032.e1. doi:10.1016/j.arth.2017.02.041.

Benefits of the ATTUNE Knee System Boulder Community Health

Compared to other knee replacement, the ATTUNE Knee enables patients to:

- Spend less time in the hospital^{1,2}
- Have a faster recovery^{1,2,5}
- Experience less pain^{1,3,4}
- Get back to doing the activities that they love sooner^{1,2,4,5}

References: 1. Clatworthy, M. (2015). An Early Outcome Study of the ATTUNE™ Knee System vs. the SIGMA™ CR150 Knee System. DePuy Synthes Companies White Paper, M_US_DPS_JRKN_134529. 2. Etter K, Lerner J, Kalsekar I, de Moor C, Yoo A, Swank M. Comparative Analysis of Hospital Length of Stay and Discharge Status of Two Contemporary Primary Total Knee Systems. J Knee Surg. 2018;31(6):541-550. doi:10.1055/s-0037-1604442. 3. Hamilton WG, Brenkel IJ, Barnett SL, et al. Comparison of Existing and New Total Knee Arthroplasty Implant Systems From the Same Manufacturer: A Prospective, Multicenter Study. J Am Acad Orthop Surg Glob Res Rev. 2021;5(12):e21.00136. Published 2021 Dec 15. doi:10.5435/JAAOSGlobal-D-21-00136. 4. Indelli PF, Pipino G, Johnson P, Graceffa A, Marcucci M. Posterior-stabilized total knee arthroplasty: a matched pair analysis of a classic and its evolutionary design. Arthroplast Today. 2016;2(4):193-198. Published 2016 Aug 21. doi:10.1016/j.artd.2016.05.002. 5. van Loon C, Baas N, Huey V, Lesko J, Meermans G, Vergroesen D. Early outcomes and predictors of patient satisfaction after TKA: a prospective study of 200 cases with a contemporary cemented rotating platform implant design. Journal of experimental orthopaedics. 2021;8(1):30.



4 Days After Surgery



Exclusively at BoulderCentre



Fast»Path

Accelerated Recovery Knee Replacement

What About “Jiffy Knee”

	FastPath	Jiffy Knee
Used Since	2020	New in Area
Surgeon-Owned	Yes	No
Boulder-Based	Yes, Unique to Colorado Patients	Metro/Corporate

How Do You Become a Jiffy Surgeon?

- Watch the original surgeon for one day
- Then pay him 20-30k/yr for the rest of your operative career
- That's it, that's all the training they get



Quality?



Exclusively at BoulderCentre



Fast»Path

Accelerated Recovery Knee Replacement

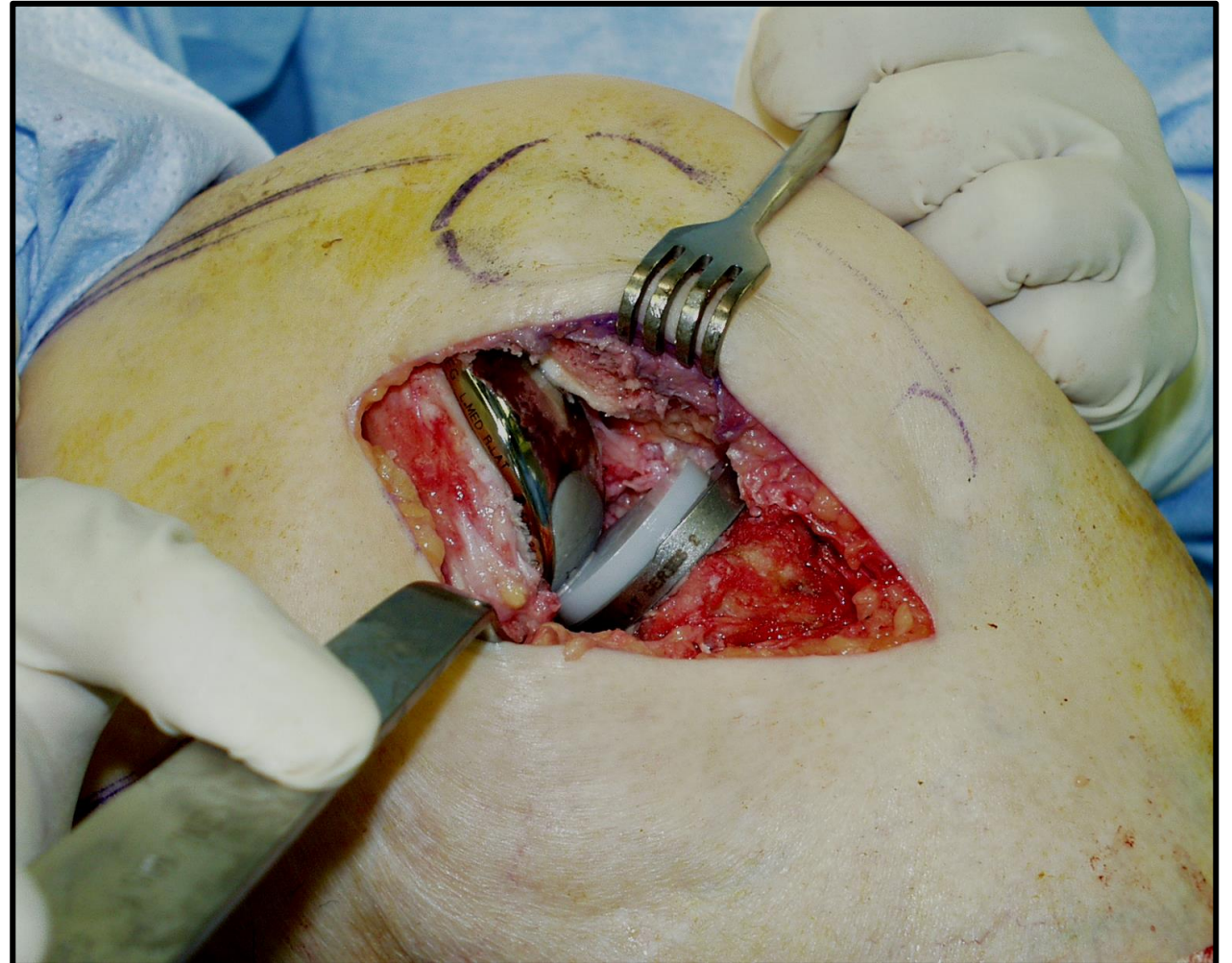
Minimally Invasive TKA

- Provide early and exceptional analgesia
- Low trauma surgery
- Early discharge and rapid rehab

- Pre-emptive analgesia
 - Celebrex
 - Spinal Anesthetic
 - Journavx (new pain medicine)
- Pre-emptive anti nausea
 - Pepcid
 - Dexamethasone

Operative Management

- SPINAL anesthetic
- IV sedation
- Capsular injection
- Post op Pain Pump
 - Helps with pain for 4-5 days after surgery



Post-Operative Management

- Early ROM with PT
- Ambulation same day



Post-Operative Management

- Gait training POD1
- Stairs and PT instruction
- Possible outpatient

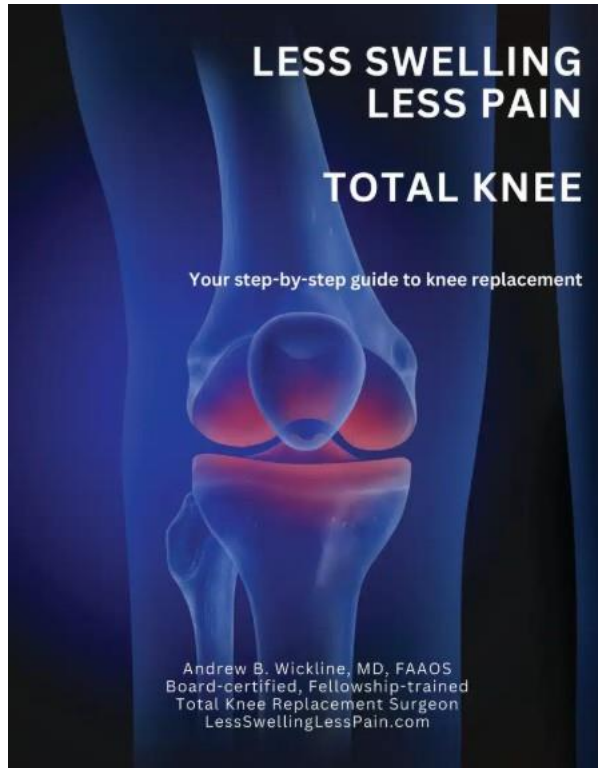


Opioid Free Joint Replacement



These are the changemakers of March2AMillion.

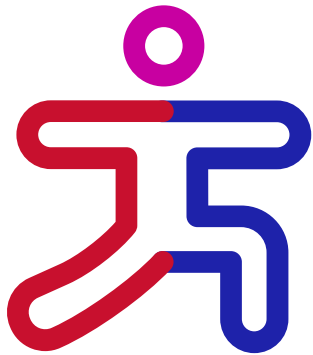
Surgeon	City	State/Country	Total Patients
Andrew Wickline MD	Utica	NY	364
Tim Kavanaugh MD	Scottsdale	AZ	236
Travis Clegg MD	New Albany	IN	200
Paul Jacob DO	Oklahoma City	OK	132
Chris McClellan DO	Altoona	PA	121
Henry Biggs DO	Naples	FL	110
Brian Blackwood MD	Boulder	CO	108
Kevin Smidt MD	Columbus	OH	105
James Mitchell MD	Oklahoma City	OK	72
Kevin Kopko MD	Syracuse	NY	70
Brian Nelson MD	Grand Blanc, MI	MI	68



Benefits of Robotic-Assisted Knee Replacement

Compared to traditional knee surgery

Robotic-assisted technology may deliver*:



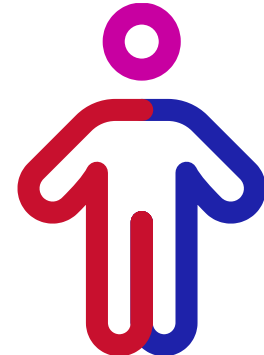
A greater range of motion

(how well you can bend and flex your knee after surgery)^{1,2}



Faster recovery times

(reduced length of hospital stay, hospital readmissions, and health visits)^{3,4}



Less pain

(compared to traditional methods)^{1,3}

* Findings based on studies conducted across multiple robotic-assisted total knee replacement systems.

References: 1. Agarwal N, To K, McDonnell S, Khan W. Clinical and Radiological Outcomes in Robotic-Assisted Total Knee Arthroplasty; The Journal of Arthroplasty 35 (2020) p. 3393-3409. 2. Morrissey ZS, Barra MF, Guirguis PG, Drinkwater CJ. Transition to Robotic Total Knee Arthroplasty With Kinematic Alignment is Associated With a Short Learning Curve and Similar Acute-Period Functional Recoveries. Cureus. 2023. 3. Clatworthy M. Patient-Specific TKA with the VELYS Robotic-Assisted Solution. Surg Technol Int. 2022;40. 4. Allon TB, Chitnis AS, Goldstein L, et al. Resource utilization and costs for robotic-assisted and manual total knee arthroplasty - a premier healthcare database study. Expert Rev Med Devices. 2023;20(4):303-311. doi:10.1080/17434440.2023.2185135.

What is the VELYS™ Robotic-Assisted Solution?

The VELYS Robotic-Assisted Solution can help your surgeon perform a precise knee replacement surgery **personalized for your specific anatomy**.^{1,2}

It uses a variety of advanced technologies to provide the surgeon with the information and tools they need to perform an accurate and precise knee replacement.^{1,2}

Works exclusively with the **ATTUNE™ Knee System**, which has been provided to over **2 million patients** worldwide.³



Currently available only at Broomfield Orthopedic Surgery Center.

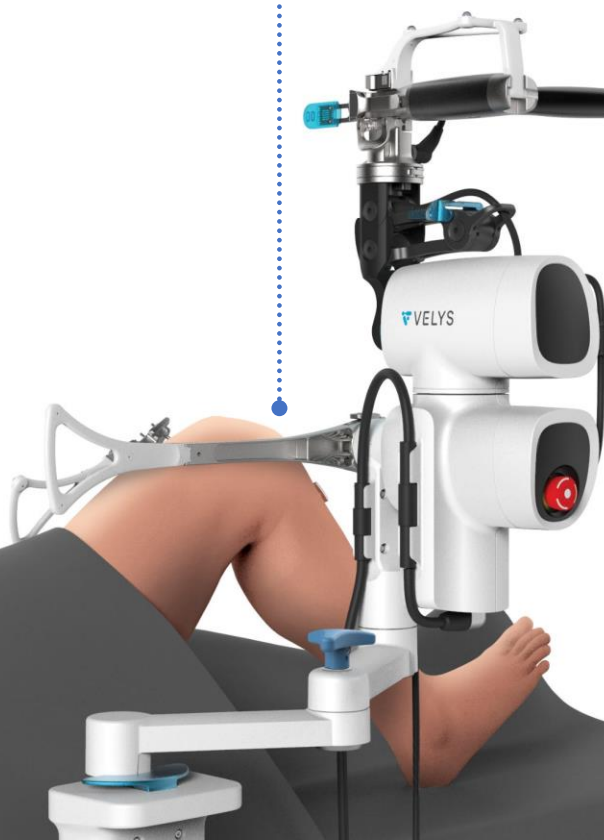
Understanding the Technology

Utilizes these advanced technologies:

Infrared camera and optical trackers help your surgeon gather the necessary data about your knee's anatomy.

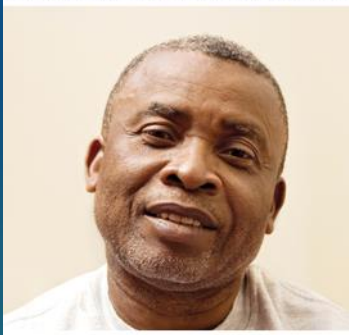
The robotic-assisted device helps your surgeon remove damaged bone with accuracy.^{1,2} It does not move or operate on its own.

Important details and data related to your knee help your surgeon find the right implant fit and make surgical decisions in real time.^{1,2}



References: 1. Doan GW, Courtis RP, Wyss JG, Green EW, Clary CW. Image-Free Robotic-Assisted Total Knee Arthroplasty Improves Implant Alignment Accuracy: A Cadaveric Study. J Arthroplasty. 2022;37(4):795-801. doi:10.1016/j.arth.2021.12.035 2. Clatworthy M. Patient-Specific TKA with the VELYS™ Robotic-Assisted Solution. Surg Technol Int. 2022;40:315-320. doi:10.52198/22.STI.40.OS1561

Update on Hip Arthroplasty



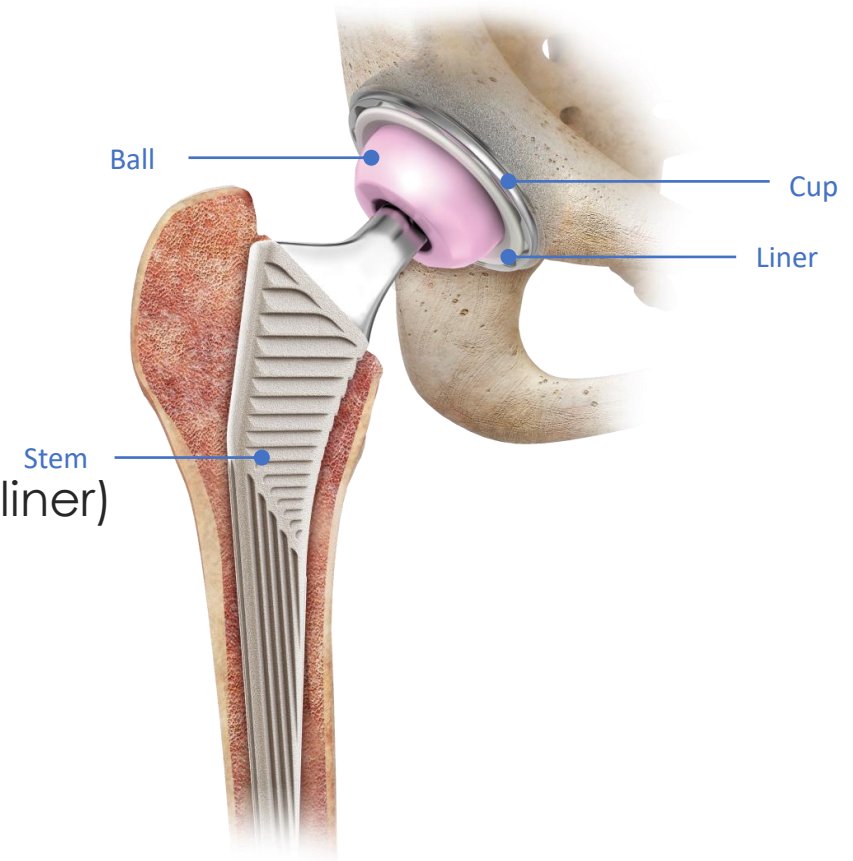
Common Types of Hip Replacement

Adhesion¹

- Acrylic cement
- Cementless (biological fixation provides a bond)

Bearing options²

- Ceramic-on-ceramic
- Metal-on-plastic (a metal ball with a polyethylene liner)
- Ceramic-on-plastic (a ceramic ball with a polyethylene liner)

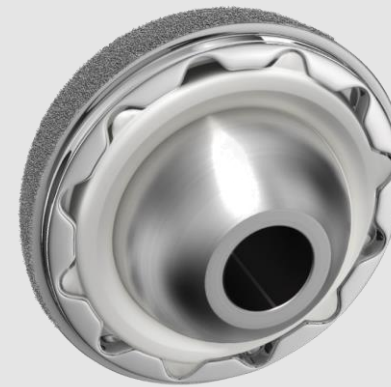


Which Implant is Right for You?

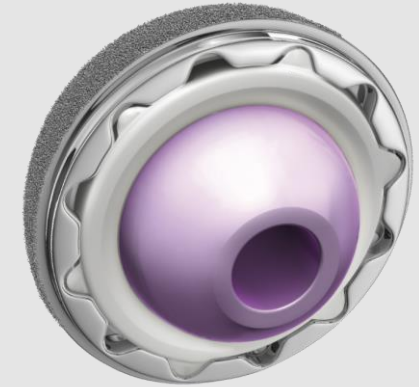
When choosing the type of implant, the surgeon will consider the following¹:

- Range of motion
- Stability
- Wear characteristics
- Lifestyle
- Age
- Severity of disease

Your surgeon will work with you to select the implant most suitable for your needs.

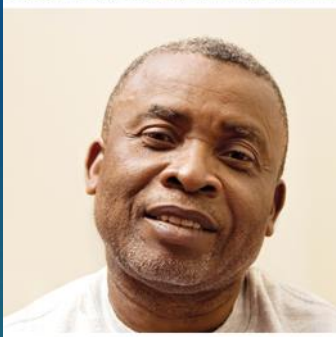


Metal-on-Plastic
(Polyethylene)



Ceramic-on-Plastic
(Polyethylene)

MIS Hip Replacement Direct Anterior Approach



What is the 'Direct Anterior Approach'?

- The direct anterior approach is a minimally invasive hip replacement technique that allows the surgeon good access to the hip without detaching any muscles or tendons.

Traditional Hip Replacement

- 8-12 inch incision
- Surgical approach - side (lateral) or back (posterior)
- Disturbance of the joint and connecting tissues

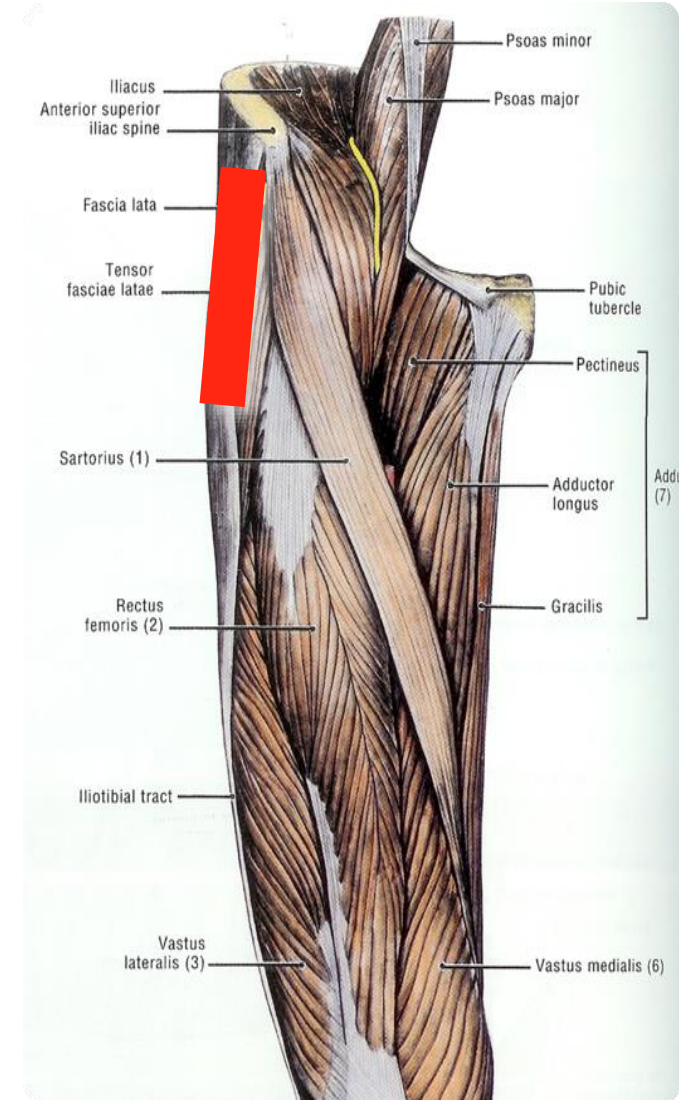
MIS with Direct Anterior Approach

- 4-5 inch incision
- Surgical approach – front (anterior)
- Muscles or tendons not detached

Why I Do The Direct Anterior Approach?

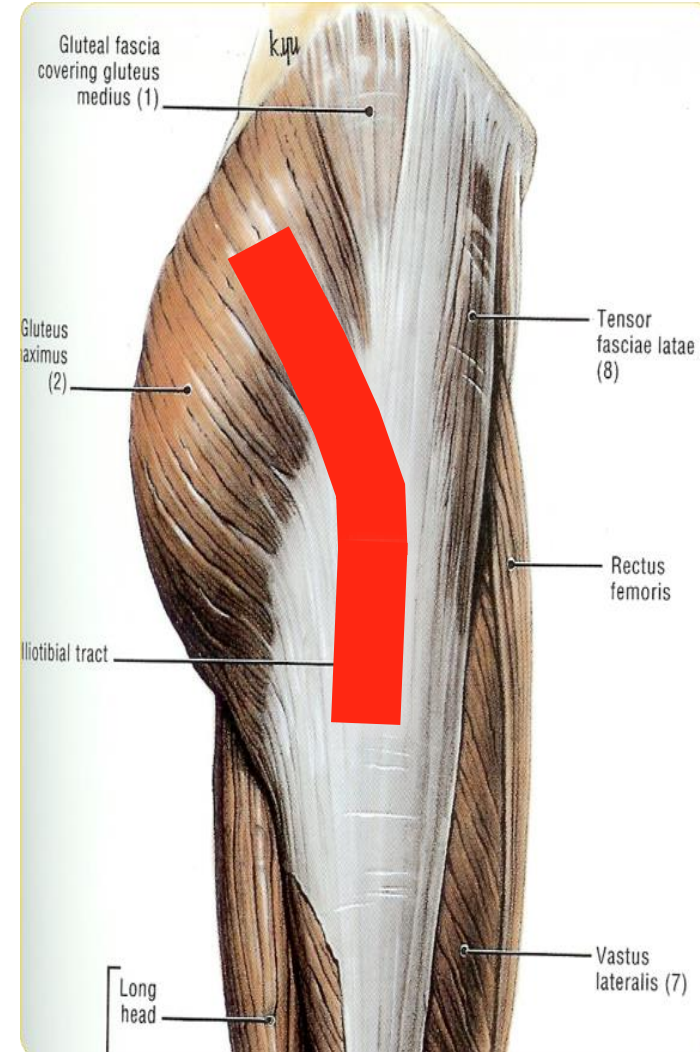
Why Direct Anterior?

- Hip closer to the front of the body
- Surgical anatomy
- Doesn't detach any major muscles
- Minimal risk to nerves
- Truly MIS



Why Direct Anterior?

- Less pain
- Quicker restoration of function
- Shorter hospital stay
- Probably more economical



Direct Anterior Hip Replacement

Why?

- Ideal soft tissue interval
- Ease of patient position
- Simple socket instrumentation



Direct Anterior Hip Replacement

Why not?

- Unfamiliar territory
- Femoral exposure is difficult
- Specialized equipment



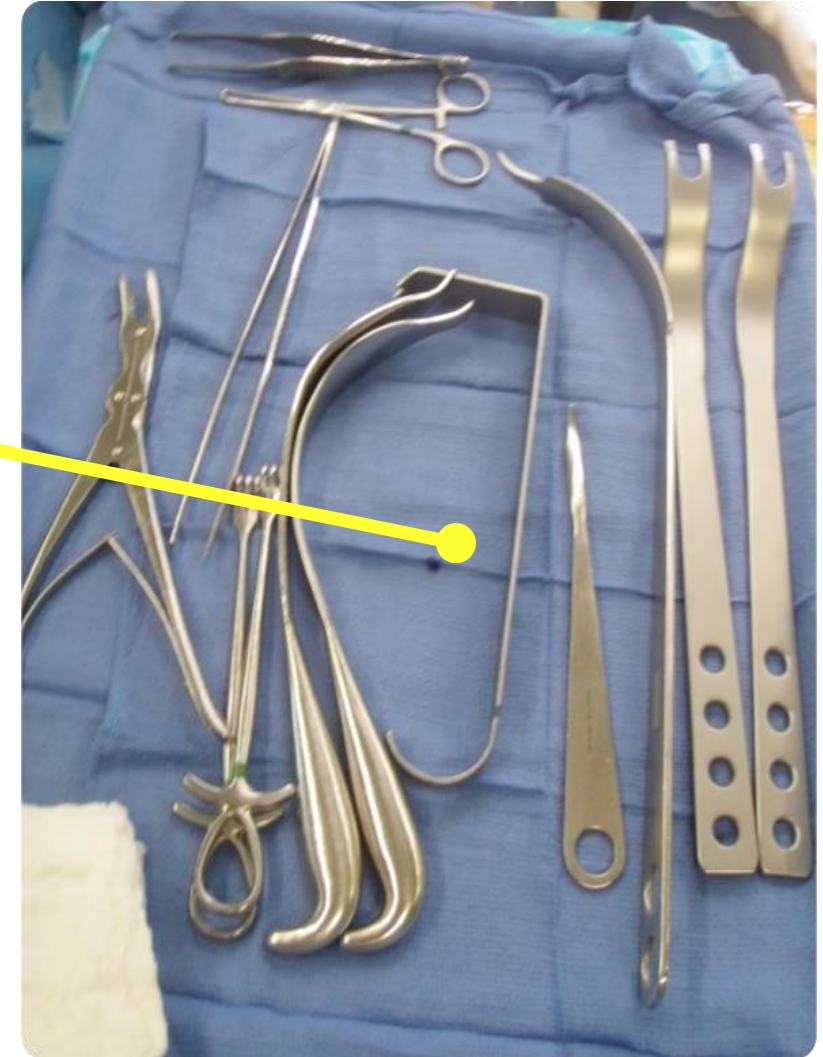
How it's done

Special Instruments



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Retractors



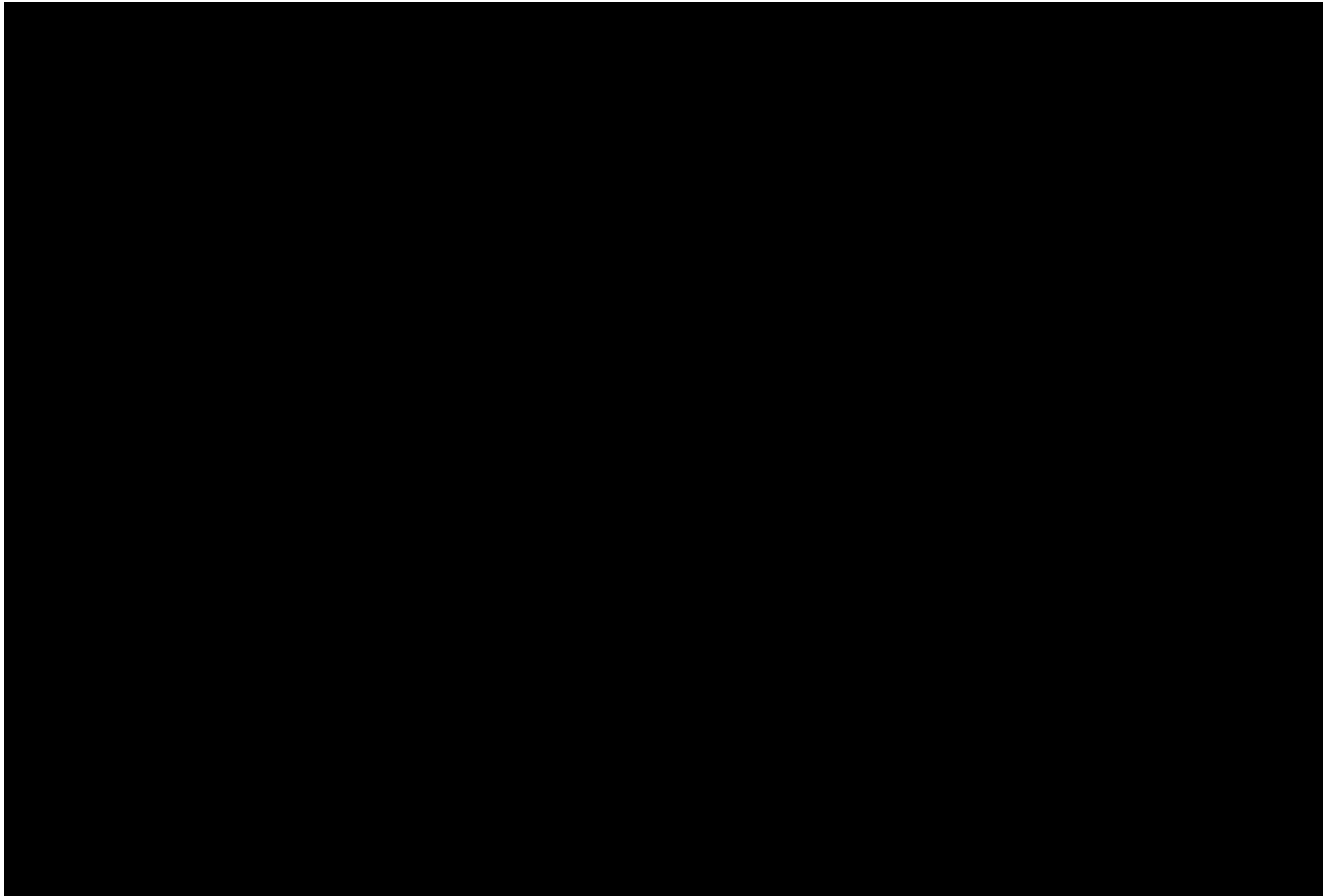
Special Equipment



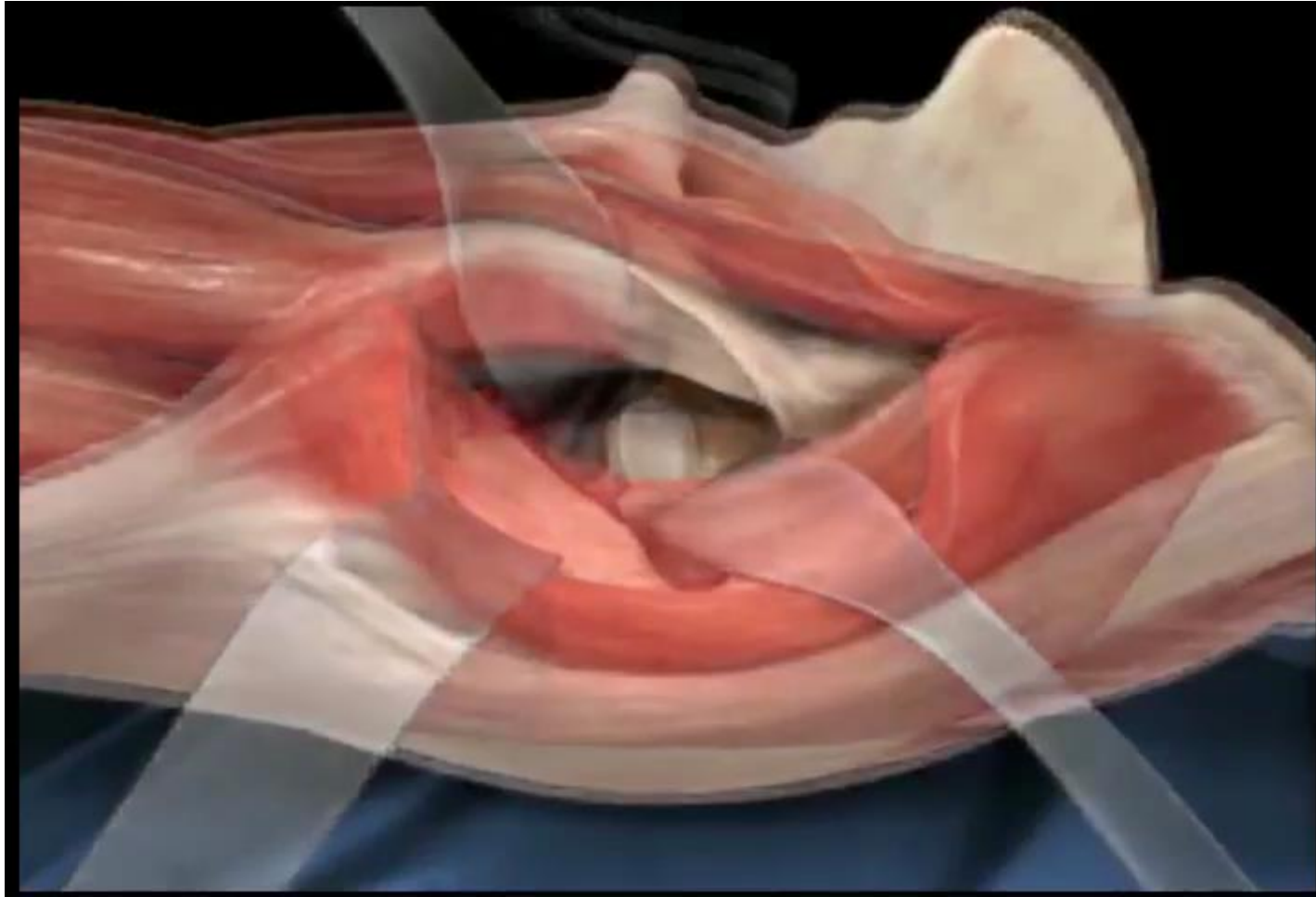
Lighting

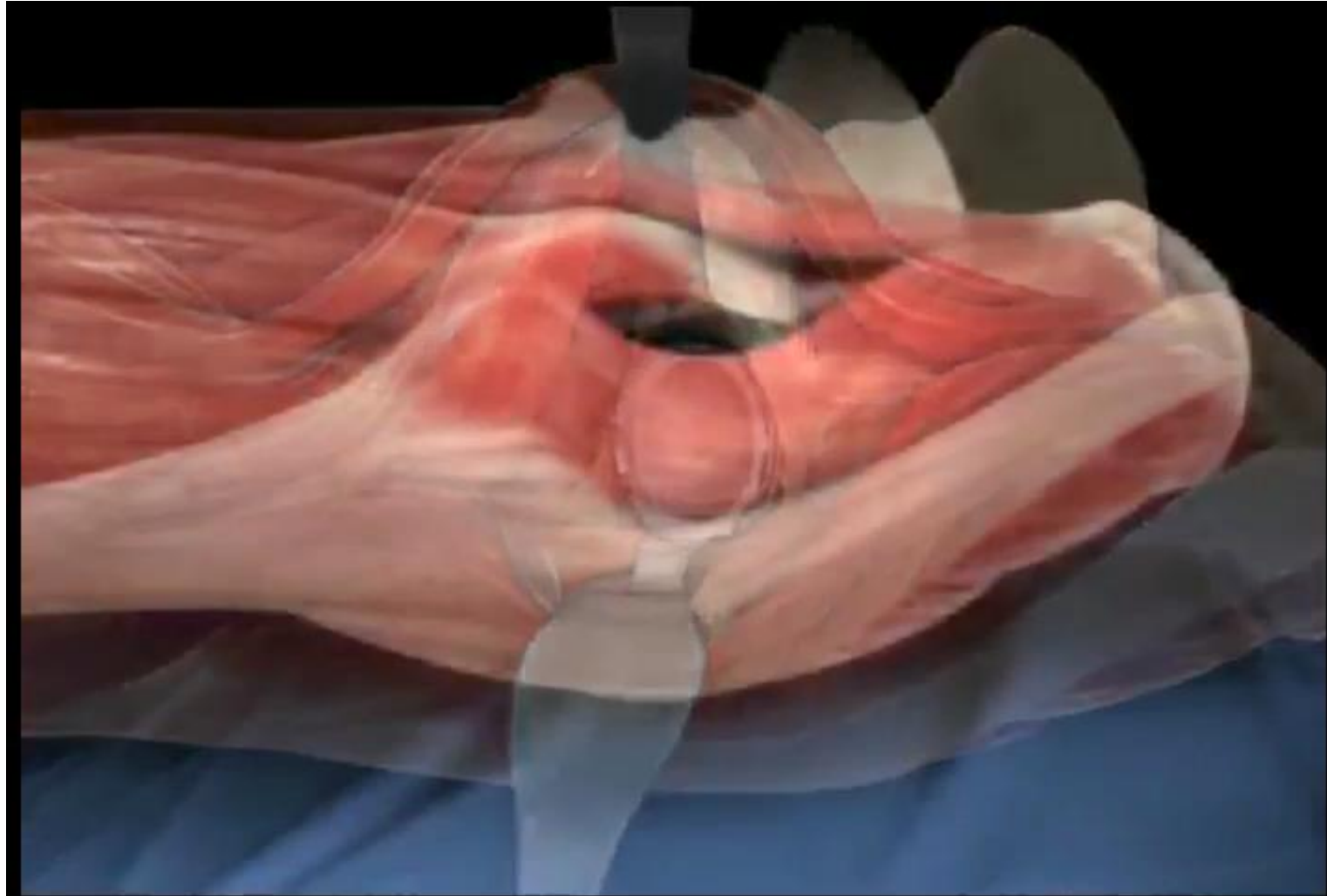
Arch table

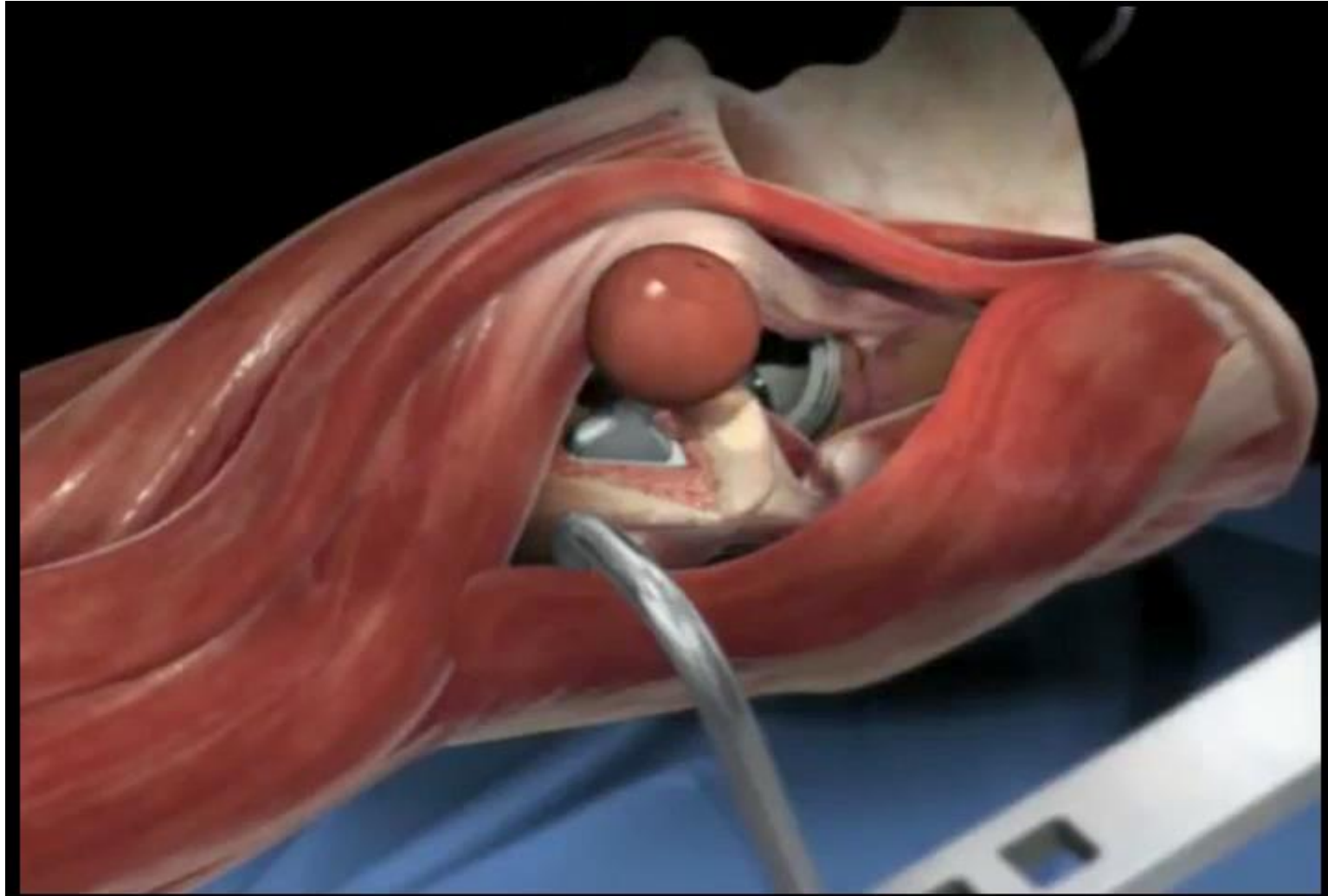












Typical Precautions: Traditional vs. Direct Anterior

Traditional Hip Replacement

- Do not cross legs
- Do not bend hip more than a right angle
- Do not turn feet excessively inward or outward
- Use a pillow between your legs when sleeping

Direct Anterior Approach

- Under doctor's supervision, may be immediately allowed to move their hips
- May potentially avoid restrictions associated with traditional hip replacement¹

1. <http://www.anteriorhip.org/anterior-hip-replacement.html> accessed Nov 2010.

Potential Benefits of MIS with Direct Anterior Approach

- Decreased hospital stay and quicker rehabilitation.²
- Smaller incision and reduced muscle disruption may allow patients a shorter recovery time and less scarring.¹
- Potential for less blood loss, less time in surgery, and reduced post-operative pain.^{1,3,4}
- Risk of dislocation reduced.²
- May allow for a more natural return to function and activity.^{1, 3}

1. Wenz, J, Gurkan, I., Jibodh, S., "Mini-Incision Total Hip Arthroplasty: A Comparative Assessment of Peri-operative Outcomes," Orthopedics Magazine, 2002.

2. www.anteriorhip.org/anterior-hip-replacement.html accessed Nov 2010.

3. Keggi, Kristaps, I., "Total Hip Arthroplasty Through a Minimally Invasive Anterior Surgical Approach," JBJS, Vol. 85-A. 2003.

4. Baerga-Varela, L., Malanga, G.A., "Rehabilitation after Minimally Invasive Surgery." Hozack, W., Krismer, M., Nogler, M., Bonutti, P., Rachbauer, F., Schaffer, J., Donnelly, W., ed. Minimally Invasive Total Joint Arthroplasty. New York, NY: Springer-Verlag; 2004: 2-5.

Advantages of Direct Anterior

- MIS approach is better for patients
- No Hip Precautions
- Improved control over component position



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Surgical goals of hip replacement

- Pain relief
 - Restoration of function/lifestyle
 - Optimize patient outcomes
 - Economics

The Use of Technology in Hip Replacement

Why Navigation?

- Increased level of precision
- Confidence in component position
- Recovery room film is too late for changes
- Optimize surgical results

What is VELYS™ Hip Navigation?

- VELYS Hip Navigation is a **non-invasive, digital technology** designed to help surgeons with **accuracy and precision** in hip replacement surgery.¹
- To provide the **best fit for your body**, surgeons use this technology to help select the implant size and components that will work together in your body the most natural way.



How Does it Work?



Before surgery, a fluoroscopic image is taken of your hip bones and entered into VELYS Hip Navigation to help determine the unique size of your bones and which implant sizes may fit best.



During surgery, your surgeon will use the trial instruments to find the best position for your final implant. One last fluoroscopic image is taken to confirm that the final position of your implant is right for your hip.

Advantages of VELYS Hip Navigation

May include:

- Enabling the surgeon to better plan and measure key aspects of the hip replacement which may lead to **better hip stability** and preservation of the **hip's natural movement**
- Verification of desired implant position that may potentially help **reduce the likelihood of hip dislocation and increase the joint's stability**¹
- Potential to increase operating room efficiency and **reduce operative time**²



References: 1. Moskal JT, Capps SG. Improving the accuracy of acetabular component orientation: avoiding malposition. J Am Acad Orthop Surg. 2010;18(5):286-296. 2. Goodell P, Ellis S, Kokobun B, Wilson H, Kollmorgen RC. Computer Navigation vs. Conventional Overlay Methods in Direct Anterior Total Hip Arthroplasty: A Single Surgeon Experience. Cureus. 2022;14(10):e29907. Published 2022 Oct 4. doi:10.7759/cureus.29907.

Exclusively at BoulderCentre



Fast»Path

Also works for hips!

- Provide early and exceptional analgesia
- Low trauma surgery
- Early discharge and rapid rehab

Prevent the Bad Effects

- Pre-emptive analgesia
 - Celebrex
 - Spinal anesthesia
- Pre-emptive anti nausea
 - Pepcid

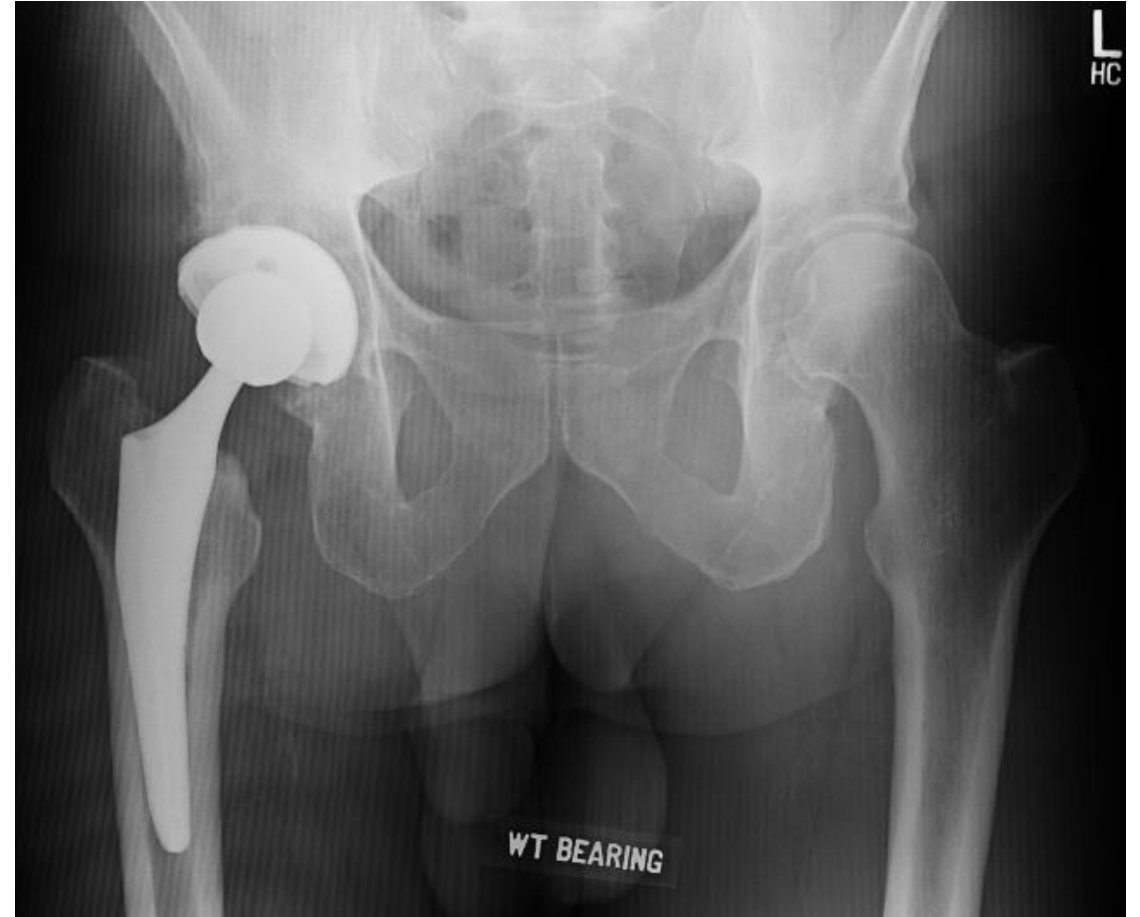
Operative Management

- IV sedation
- Capsular injection



Post-Operative Management

- Gait training POD1
- Stairs and PT instruction
- Ideally same day ambulation



10,000 Miles in 18 mos after THA



Including but not limited to:

- Bleeding
- Infection
- Damage to nerves and vessels
- Blood clots (DVT)
- Blood clots in lungs (PE)

And rare things like:

- Stroke
- Heart attack
- Death

Questions?





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Over 40 Years of Community Impact

**Enhancing the quality and availability
of health care in our community**

COMMUNITY

We believe everyone should have a fair and just opportunity to reach their full health potential, both physically and mentally.

PATIENTS

We believe providing the community with the highest value in health care requires an innovative, patient-centered environment.

WORKFORCE

We believe it's imperative to invest in the professional growth and physical and mental health of BCH's greatest asset—the staff and physicians providing care to the community.

Learn more at **bch.org/foundation**



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