QUESTIONS to ask your doctor

My Knee

- What does joint preservation mean in your practice?

- If a reconstruction doctor specializes in joint replacement, that's working on the bone, and a sports doctor works on the cartilage, meniscus, ligament, and tendons, how do either of you as an individual surgeon save my joint if a good joint needs healthy bone and healthy cartilage, ligaments, and tendons?

- Aren't joint injections that use steroids, PRP, stem cells, and viscosupplements just like using a mouthwash without first brushing the teeth? Meaning my joint is not cleaned out before something is injected into it. I have heard that some people just have an in-office injection. Should my joint be cleaned out before an injection? Would making an effort to clean my joint before an injection be helpful? If not, why not?

- I know these injections can help, but if you get rid of my pain with a series of injections, is my knee actually getting better, or is my condition worsening? Is my cartilage still grinding down leading up to bone on bone, but I just can't feel any pain? How is that beneficial to me if I want to save my joint? So, am I just having less pain leading up to a total knee? What if I do not want a replacement at all?

- Does it make sense to clean my joint thoroughly and release all the excess fat built-up in the bone (not a simple lavage with removal of maybe one little bone spur) and then inject something to help the cartilage? Why is a lot of fat released from the femur during a total knee, yet no one talks about how maybe all of the fat being released is part of why a total knee is a good procedure?

- If I undergo arthroscopy for a meniscus tear, how is my knee thoroughly cleaned in 30 minutes, or do you even try to clean my knee thoroughly? Why would a doctor not thoroughly clean my knee joint during the arthroscopy that is being performed for a meniscus tear when I have osteoarthritis? Does thoroughness mean that since you are an excellent arthroscopist, the knee was "thoroughly" cleaned? Why do some say that cleaning the knee for osteoarthritis does NOT work when the surgery supposedly only takes 30 minutes, and bone spurs are only randomly removed based on the articles some rely on to say that arthroscopy does not work?[1,2]

- Some doctors that replace knees say that arthroscopy for osteoarthritis is not effective.[1,2] My question is, how is arthroscopy for osteoarthritis ever

be effective if the arthroscopy procedure lasts only 30 minutes, specialized equipment for thoroughly cleaning the knee is not used, and the surgeon is thinking, "if this doesn't work, the knee can be replaced after nine months?"[3]It seems to me that many people are relying on an article that says arthroscopy is not effective, yet this article appears to describe only a minimal amount of cleaning and releasing fat from the bone is not even mentioned.[1,2]

- I would like a "one and done" procedure if I am going to have my knee replaced. Since I am fairly young, won't I need a revision at some point? So, I am still not finished.

- During a knee replacement, a long rod is pushed into the thigh bone. A lot of fat is released from the thigh bone. Why would it be okay to release all of that fat during a knee replacement, yet no one has considered releasing at least some of that excess fat during arthroscopy? Please explain this. Why wouldn't you consider that maybe the excess fat inside my bone contributes to my pain and the development of osteophytes somehow? Too much fat in the blood may cause heart disease, so why would too much fat in the bone be okay or not worth considering? I know that the bone stores fat, but so do other parts of the body until the person is overweight, and that is not okay. Could a person have too much fat in their bones because of their diet?

- What does thoroughly cleaning the knee mean in your practice? Do you remove osteophytes to make sure my meniscus is not trapped in the back of my knee? Do you move my knee around during surgery as if I were walking to see where things might be contacting each other in an abnormal way? If not, why not? Do you use the proper equipment to clean my knee thoroughly, or do you consider it thoroughly cleaned because you are good at "scoping a knee?"

- If you are a knee replacement doctor, can I also expect you to be just as skilled performing arthroscopy procedures?

- Have you ever performed an IA Saucerization of the knee? This is extensive cleaning of the joint, removing nearly all bone spurs, smoothing over the cartilage, and releasing the pressure and excess fat from the bone. The procedure also cleans or repairs the meniscus if it is damaged.
- My specific question is can you perform an Intraarticular Saucerization (IAS) on my knee. I am not asking about routine arthroscopy or supposedly more extensive arthroscopy using traditional equipment. Can you perform an IAS on my knee using the specialized equipment developed by Orthopedic Sciences for this specific procedure?

- I'm puzzled. I know that if I have a total knee, all of the osteophytes are removed; but, if I have arthroscopy for a meniscus tear associated with osteoarthritis, many of the osteophytes are NOT removed.[1,2]

- How do you address the quality of my bone during arthroscopy for osteoarthritis with a meniscus tear?

- If I had a lot of fat in my bone before a knee replacement and it is released, what prevents that fat from building up again? Will a return of all of that pressure and fat make the prosthesis loose or contribute to malalignment? Will I need a revision if the prosthesis becomes loose or is malaligned?

- If my diagnosis is osteoarthritis, are there more problems in my knee than possibly just a meniscus tear and torn cartilage? If so, are these other problems addressed if I am a candidate for arthroscopy for osteoarthritis with a meniscus tear?

- If my diagnosis is osteoarthritis with a meniscus tear and you perform arthroscopy the traditional way and only clean or repair the meniscus and the average time in surgery is 30 minutes, how am I to expect a good outcome when there are more problems in my knee since my major problem is osteoarthritis? What about the quality of my bones? What about the excess fat, if any, in my bones?

- Yes, everybody knows that a total knee is a good procedure, but why can't you perform an excellent arthroscopy procedure by extensively cleaning my joint? Robots are used to replace the knee, but the arthroscopy equipment used to clean the knee was developed in the 190s. It seems that if and when arthroscopy is performed for osteoarthritis with a meniscus tear, the knee may not be extensively cleaned at all, the proper equipment is not used, and the doctor may be simply thinking that the knee can be replaced in nine months.[3]

- If you are performing several joint replacements per year, how often are you trying to preserve the joint?
- What type of incision is better suited for a telemedicine visit after surgery since we are in the COVID pandemic?

- Is it a good idea for me to perform home exercises after an IA Saucerization, or do I need to go to physical therapy like people who have had a total knee? It seems to me that a home exercise program would not require contact with people outside of my family and would not cost any money.

- If I am a candidate for knee arthroscopy, will all of the osteophytes be removed, followed by smoothing over the cartilage? Will the meniscus be repaired or cleaned? Will excess fat be released from the bone, and will healthy cancellous bone and bone marrow be injected into my bone? Why would returning the health to my bone by injecting cancellous bone and bone marrow, all taken from my hip, into it and cleaning my joint not be a good option for me or an option at all? If the health of my bones is good or is good enough for a replacement, why

do I have osteoarthritis? Isn't osteoarthritis a disease of the cartilage and the bone?

- I understand that bone marrow can be taken from my hip and concentrated and then injected into my joint, but does taking bone and bone marrow from my hip and injecting into the bad areas of my bones diseased by osteoarthritis represent a good option to help me save my knee if you are going inject bone marrow into my joint? Will you use the proper equipment for thoroughly cleaning my knee? It seems surprising a doctor will use a robot to replace the knee, but when performing an arthroscopy, he may use an arthroscope developed in the 70s.

- Why would thoroughly cleaning my knee the way I have mentioned be unreasonable if I am a candidate for arthroscopy?

- How are my interests in saving my joint and reading about various treatment options and then asking you about them different from reading about a knee replacement and asking you about a knee replacement? Maybe my knee is so worn out my only option is a knee replacement. If not, can we discuss thoroughly cleaning my knee and restoring the health to my bone if I am a good candidate for joint preservation?

- Besides exercising and losing weight if I need to, what other things can I do to assist you with helping me keep the joint I was born with? I am sure that if I were scheduled to have my knee replaced, any doctor would want me to be engaged and ask these same questions.

Important Information

Intraarticular Saucerization of the Knee

An Intraarticular (IA) Saucerization of the knee is intended for individuals with joint disease resulting from degenerative and post-traumatic arthritis, and their treating doctor has determined that a given individual is a candidate for the procedure. Ask your doctor if you are a candidate for an IA Saucerization. Because your doctor cannot perform or is not familiar with an IA Saucerization does not mean you are not a candidate for the procedure. Ask your doctor if he or she can perform an IA Saucerization and if he or she can ensure the proper equipment is available for the procedure. An IA Saucerization is not appropriate for all patients. **An IA Saucerization is NOT a substitute for a knee replacement.** An IA Saucerization requires significant patient involvement with respect to helping your doctor understand the source and location of your pain. In comparison, a knee replacement removes the entire knee joint. The IA Saucerization removes the diseased painful parts of the knee and reshapes the inside of the joint. The procedure additionally relieves the pressure in the knee by removing osteophytes and allowing the excess fat in the bone to

escape.

Osteoarthritis of the Knee and the Role of Intraosseous (within the bone) Fat

It is clear that patients that are NOT overweight and exercise daily may still develop osteoarthritis. That said, the complete cause of osteoarthritis is not known. However, excess fat that leads to increased pressure within the bone and the development of osteophytes that irritate the joint lining, cause abnormal joint motion, and trap the menisci is a common finding during arthroscopy and a knee replacement.

An easy way to understand osteoarthritis and its relationship to fat intake is to consider coronary artery disease. In coronary artery disease, elevated levels of low-density lipoproteins (LDLs) that contain triglycerides and cholesterol gain access to the internal lining of an artery. Once the LDL enters the artery's lining, it does not easily leave, and through a complex biologic process, it calcifies. This calcification hardens and narrows the artery and may lead to a heart attack by obstructing the blood flow to the heart muscle.

Similarly, LDL enters the bone marrow and is stored in fat cells. This fat, in excess, may obstruct the inflow of blood into the ends of the bones and, through a complex process, lead to calcification of the marrow spaces through oxidation of the LDL.[5,6] Calcification of the marrow spaces makes the bone brittle. It is easy to think of the insides of the bone at the knee to have the appearance of a honeycomb. Blood vessels travel through these combs and communicate with each other through a capillary network.[7]In osteoarthritis and avascular necrosis, these combs become occluded with calcium, making the bone brittle and consequently obstructing blood flow through the bone. When the combs are not occluded by calcium, excess fat within the comb or the blood vessel may also obstruct blood flow through the bone. **See Figure 1**. This excess fat plays a role in the calcification of the marrow spaces. The doctor may see this calcification on x-ray and call it sclerosis. The cartilage overlying sclerotic bone thins, and over time the joint space narrows. The disease continues as increasing amounts of fat are ingested and deposited in the bone. This is not to say that fat is the sole cause of osteoarthritis. Fat and oxidized LDL (oxLDL) play a role in disease progression. The increasing amount of fat must find an exit to allow blood to flow into the bone. The fat attempts to exit at the bone's weakest point (the osteochondral junction, the location where the cartilage meets the bone). The fat creates an osteophyte as it exits the bone but also releases oxLDL into the joint. **See Figure 2**. Oxidized LDL has been shown to lead to the destruction of hyaline cartilage and significant

inflammation.[8] The osteophytes, as they form, may trap the meniscus and other structures in the knee and further lead to abnormal motion of the joint, accelerating the wear of the cartilage. **See Figure 3**.

Surgical Risks During an IA Saucerization

As with any surgery, an IA Saucerization has serious risks which include, but are not limited to, pain, infection, peripheral neuropathies (nerve damage), circulatory compromise (including deep vein thrombosis [blood clots in the legs]), genitourinary disorders (including kidney failure), gastrointestinal disorders (including paralytic ileus [loss of intestinal digestive movement]),
vascular disorders (including thrombus [blood clots], blood loss, or changes in blood pressure or heart rhythm), bronchopulmonary disorders (including blood emboli and fat emboli, stroke or pneumonia), heart attack, and death. No implant is used for an IA Saucerization. In simple terms, when performing an IA Saucerization, the doctor must commit to cleaning the knee joint thoroughly and using the proper equipment.

An IA Saucerization is not routine *arthroscopy with a different name.*

An IA Sauerization is a comprehensive approach to arthroscopy performed on the knee using specialized equipment in patients with osteoarthritis and a meniscus tear or other mechanical symptoms. Speak to your doctor to decide if an IA Saucerization is right for you. An IA Saucerization cannot be performed with standard arthroscopic equipment. The surgeon must commit to cleaning your knee thoroughly and using the proper arthroscopic portals. Standard arthroscopic portals were not developed for an IA Saucerization. Further, only when a non-digital 3D image is created during surgery with the OSI Clear Cannula and Q Arthroscope can the full-dimensional anatomy of the bone spurs be appreciated. This spatial orientation is critical to providing the surgeon with a dynamic understanding of how your knee operates and how your pain is elicited to give you the best chance for a successful IA Saucerization. Individual results may vary, and a knee replacement may ultimately be medically necessary.

Consider the Facts

The IA Saucerization aims to eliminate your pain, improve the function of your natural knee, and improve the health of your bones. You and your doctor must work together as a team with the shared goal of preserving your joint. When properly performed on a patient committed to reducing their fat intake and following the doctor's postoperative instructions, a good outcome can be expected. Ask yourself, "What can my doctor and I do together to preserve my joint?" Before and after the procedure, you will have time to consider that your knee is worth preserving. Early *recognition of disease* and lifestyle and diet changes are important first steps in maintaining overall good health and keeping your natural joints.

Your doctor will counsel you about how best to maintain your activities to improve the health of your knee. Such strategies may include daily walking, jogging, running, swimming, kneeling, and other home exercises so long as your health and strength of the bone are adequate. It is essential to follow your doctor's instructions closely regarding post-surgery activity and follow-up care.

Whatever beliefs we hold, be it creation or evolution, the knee joint is an extraordinary structure. Any problems we have with it will require extraordinary care similar to that of a parent with a BandAid to a caring orthopedic surgeon during our later years of life. Ask your doctor if an Intraarticular Saucerization is right for you.

Through science, innovation, and you, Orthopedic Sciences delivers healthcare solutions that preserve our humanity.

Figures

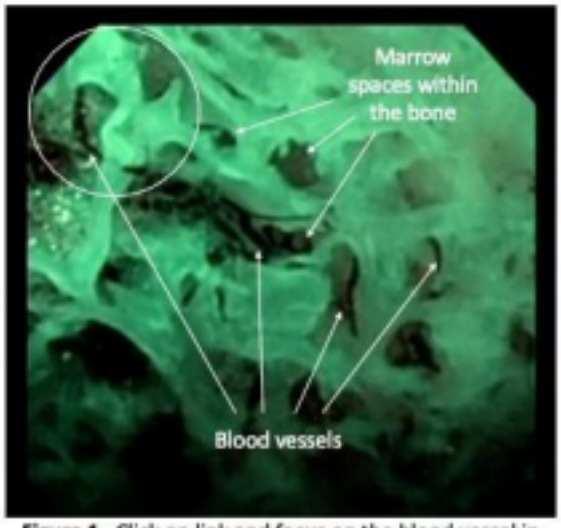

Figure 1. Click on link and focus on the blood vessel in the top left of this image to see fat traveling through the blood vessel.

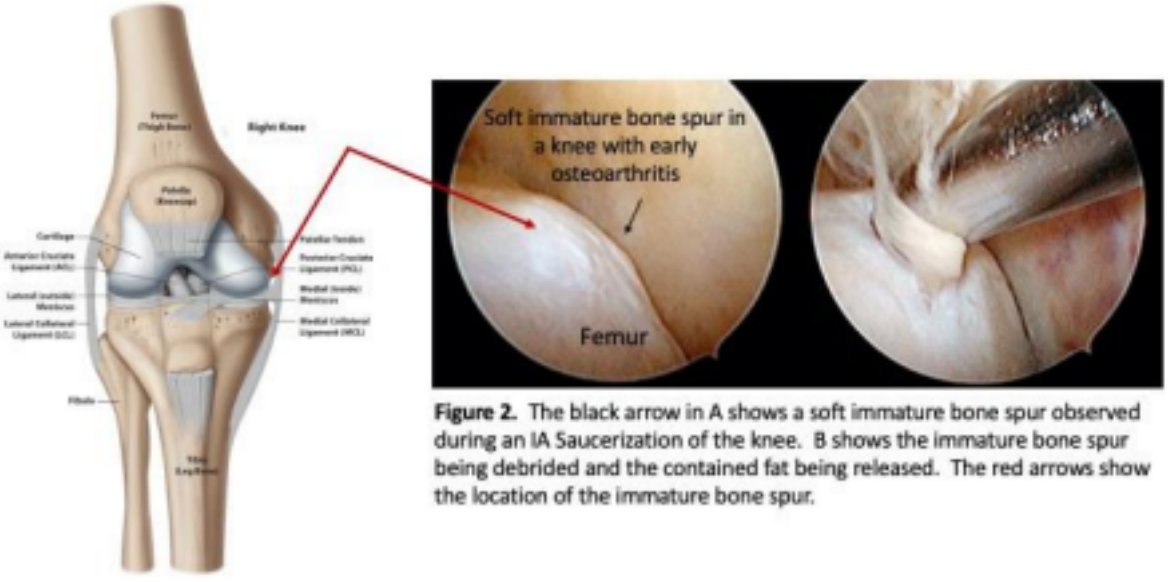

Figure 2. The black arrow in A shows a soft immature bone spur observed during an IA Saucerization of the knee. B shows the immature bone spur being debrided and the contained fat being released. The red arrows show the location of the immature bone spur.

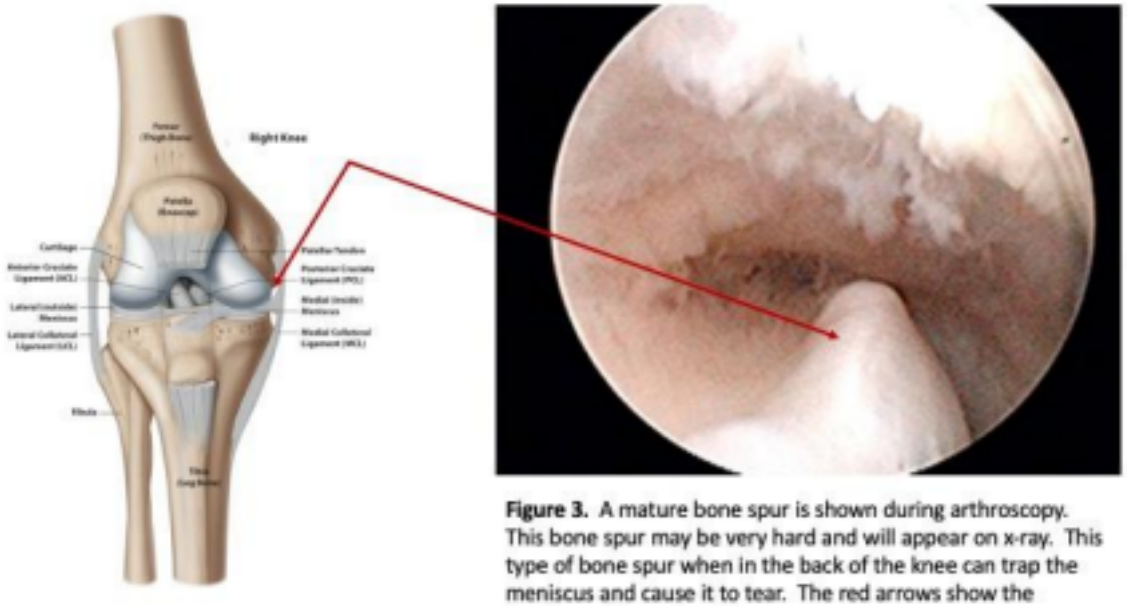

Figure 3. A mature bone spur is shown during arthroscopy. This bone spur may be very hard and will appear on x-ray. This type of bone spur when in the back of the knee can trap the meniscus and cause it to tear. The red arrows show the location of the mature bone spur.

References

1. Moseley, JB, et al. *A Controlled Trial of Arthroscopic Surgery for Osteoarthritis of the Knee. N Engl J Med* 2002; 34:81-88. DOI: 10.1056/NEJMoa013259. This paper concludes that arthroscopy for osteoarthritis is ineffective. However, these authors describe inadequate debridement of the knee. Further, no description of meniscus function after debridement is described nor the release of the excess fat from the bone. The meniscus appears to have been removed in some cases.

> "After diagnostic arthroscopy in patients in the débridement group, the joint was lavaged with at least 10 liters of fluid, rough articular cartilage was shaved (chondroplasty was performed), loose debris was removed, all torn or degenerated meniscal fragments were trimmed, and the remaining meniscus was smoothed to a firm and stable rim. No abrasion arthroplasty or microfracture was performed. Typically, bone spurs were not removed, but any spurs from the tibial spine area that blocked full extension were shaved smooth."

2. Kerkley A, et al. *A Randomized Trial of Arthroscopic Surgery for Osteoarthritis of the Knee. N Engl J Med* 2008; 359:109-110. DOI: 10.1056/NEJMoa0708333.

This paper is a follow-up to the Moseley et al. paper after the orthopedic community considered the statistical methods inadequate. Nonetheless, these authors concluded that arthroscopy for osteoarthritis was ineffective

after unwittingly performing inadequate debridement and using antiquated equipment, as in the Moseley paper.

> "Arthroscopic treatment was performed within 6 weeks after randomization with the patient under general anesthesia and with the use of a tourniquet and a thigh holder. The orthopedic surgeon evaluated the medial, lateral, and patellofemoral joint compartments, graded articular lesions according to the Outerbridge classification, irrigated the compartment with at least 1 liter of saline, and performed one or more of the following treatments: synovectomy; débridement; or excision of degenerative tears of the menisci, fragments of articular cartilage, or chondral flaps and osteophytes that prevented full extension. Abrasion or microfracture of chondral defects was not performed."

3. Ma, JN., Li, XL., Liang, P., *et al.* When can total knee arthroplasty be safely performed following prior arthroscopy?. *BMC Musculoskelet Disord* 22, 2 (2021) https://doi.org/10.1186/s12891-020-03859-1.

4. American Academy of Orthopaedic Surgeons Management of Osteoarthritis of the Knee (Non-Arthroplasty) Evidence-Based Clinical Practice Guideline (3rd Edition) https://www.aaos.org/oak3cpg, Published August 31, 2021.

5. Brannon JK. Nontraumatic osteonecrosis of the femoral head: endoscopic visualization of its avascular burden. *Orthopedics.* 2012 Sep;35(9):e1314-22. DOI: 10.3928/01477447-20120822-15. PMID: 22955395

6. Freund E. BILATERAL ASEPTIC NECROSIS OF THE FEMORAL HEAD: PROBLEMS ARISING IN A COMPENSATION CASE. *Ann Surg*. 1936;104(1):100-106. doi:10.1097/00000658-193607000-00010.

7. S. Boraiah, J.P. Dyke, C. Hettrich, R.J. Parker, A. Miller, D. Helfet, D. Lorich. Assessment of vascularity of the femoral head using gadolinium (Gd-DTPA)-enhanced magnetic resonance imaging. **A CADAVER STUDY** https://doi.org/10.1302/0301-620X.91B1.21275

8. Hashimoto K, Akagi M. The role of oxidation of low-density lipids in pathogenesis of osteoarthritis: A narrative review. *J Int Med Res*. 2020;48(6):300060520931609. doi:10.1177/0300060520931609

Notes
