

[MUSIC PLAYING]

**JOEY ROMERO:** We're going to start by giving a little bit of my background. You can get to little know a little bit more about me and our practice here. We're going to discuss different types of arthritis and some of the non-operative treatment options for arthritis.

We're going to go over some of the surgical advancements we've made in joint replacement over the years and more recently. And then we're going to focus on 2020 updates in robotic arthroplasty surgery. And then we'll close with a few questions.

So this is my family, my wife Bridget my two sons, who are 5 and 3, Carter and Colson. This was a photo we took in New York when I was finishing my fellowship. I'm a native Texan, grew up in South Texas, did my undergrad at UT Austin, medical school at UT Houston, residency at UT Southwestern in Dallas and Parkland, and did my fellowship in joint replacement at Hospital for Special Surgery in New York, which is primarily an orthopedic and rheumatology hospital.

So I work for the Center for Hip and Knee Replacement at St. David's. There's three orthopedic and joint replacement surgeons here-- my senior partner, Shelby Carter, on the left, our other partner, Jake Manuel, on the right, and our two PAs, Alison and Alex. We also have a clinical team of 11 members, which kind of keep everything running smoothly here.

So a little bit about what I do-- my practice in primary joint replacement is really focused on minimally invasive hip and knee replacements, including anterior muscle sparing approaches, partial joint replacement for the right candidates, and robotic-assisted surgery. I also do revision joint replacement for joints that have really just worn out over time, failed for one reason or another, or whether there's been an infection or fracture. There's no joint that's too complex for us to manage here. We sort of run the gamut of all things that are related to joint replacement and hip and knee care.

So different types of arthritis we're going to talk about can really be broken down into two main categories of primary osteoarthritis, which is seen with our typical wear and tear and aging, common for patients over the age of 60. And then we have secondary osteoarthritis, which, if you're seeing patients under the age of 55, and they have significant arthritis, you have to start thinking about other factors that may be at play here, including BMI, genetics, previous injury, potential autoimmune or inflammatory diseases, avascular necrosis, and hip dysplasia.

We're going to focus on three of the most common types of inflammatory arthritis, just to give some pearls for diagnosis, treatment, and workup. But this is going to be rheumatoid arthritis, psoriatic arthritis, and ankylosing spondylitis. Then we're briefly going to touch on arthritis secondary to avascular necrosis.

And I know most of this, but just a brief rundown-- the femur and tibia, they have a cartilaginous surface that allows for smooth, painless gliding of the joints. And this cartilage surface is protected by the meniscus in the knee, which act as shock absorbers to prevent further damage and injury. But if you have damage to the meniscus or the cartilage, over time, you'll see that this cartilage can wear away to expose the subchondral bone in the femur and the tibia. And this exposure of the subchondral bone will lead to painful, debilitating types of arthritis that inhibit motion, function, quality of life.

Some typical findings that you can see in osteoarthritis are going to include things like loss of joint space, osteophyte formation, and subchondral sclerosis, which is really this dense whitening of the bone near the articular surface, where you have increased joint surface stress forces. Kellgren Lawrence classification is used to grade these. Grade 1 and 2 are really the more doubtful and mild joint space narrowing.

This is early arthritis, where you may see a little bit of osteophyte formation and osteophyte lipping. But the more moderate and severe, grade 3 and grade 4 arthritis, you're going to see more significant loss of joint space. As you see here on the right, you can have complete obliteration of the joint space.

And in primary osteoarthritis, it can be more concentrated on one side versus the other. An example of what you may see clinically and in X-rays here is progressive deformities in primary osteoarthritis can focus more on wearing the inside versus the outside of the joint. On the left side here of the screen, we see a patient that has a large bow-legged deformity, also known as a varus deformity, where they've really worn out more of the medial aspect of their knee joints as opposed to the lateral side. And then the X-ray and clinical image on the right show what a knock-kneed patient could look like with a bad valgus deformity.

Pelvis also has a smooth cartilage surface, the acetabulum, the femoral head. And this is a ball-and-socket joint, which is supposed to allow smooth gliding and motion. But as you damage the cartilage there and as arthritis progresses, you do have the ability to lose the sphericity of the femoral head. And when that happens, you lose smooth gliding. Patients can have stiffness in their joints. And they can have progressive debilitating pain.

On an X-ray, what you can see here on the right side of the screen, there's a complete loss of joint space, as opposed to the left side here, you can see that there's still a decent amount of space between the acetabulum and femoral head. And like the knee, the changes you can see on X-ray include sclerosis, subchondral cyst, and loss of joint space. Kellgren Lawrence classification can also be used to grade hip arthritis.

So switching over to inflammatory types of arthritis, these aren't your typical wear and tear, like we just covered. This is more things that are caused by systemic disease, autoimmune disease, inflammatory-type reactions, where there's many different types of inflammatory arthritis. But we're really going to focus on the most common three types here, which include rheumatoid, ankylosing spondylitis, and psoriatic arthritis.

I think it's important that you identify patients that may have an inflammatory type of arthritis [INAUDIBLE]. And it is very important here, because it can really delay and even sometimes prevent the need for surgery down the line if patients are treated appropriately. And we're going to review of the unique clinical and X-ray findings of these three inflammatory arthritis.

So rheumatoid arthritis is the most common form of inflammatory arthritis. It's a chronic systemic autoimmune disease that affects women three times more than men. And you can have diffuse musculoskeletal joint destruction, including in the neck, hands, wrist. Early diagnosis and treatment with medications like NSAIDs, low-dose corticosteroids, and immune-modifying medications, like biologics and DMARDs, is important.

You can see on an X-ray here in a patient with rheumatoid arthritis, you don't necessarily have the same type of pattern of where or the joint surface that you would see in routine primary osteoarthritis, like the image on the left. The image on the left shows that you have more wear on the medial side of the joint. But the image on the right shows that you have a little more of a symmetric wear. And that's because inflammatory arthritis really attack the entire joint surface and not a focal point of the joint surface. And for this reason, things like partial knee replacement are really contraindicated in these patients.

Ankylosing spondylitis affects males more commonly than females. It affects 0.2% of the Caucasian population. The X-ray on the right here shows really advanced and progressive disease. But these are some of the X-ray findings that you can see in patients that have severe ankylosing spondylitis. You can see obliteration of their SI joints because they get sacroiliitis.

You can also have ankylose hips. And you can see there's no joint space here. And it looks like the femoral head is in complete continuity with the acetabulum. You can see bamboo spines on spine X-rays and really progressive deformities. You can get this chin-on-chest deformity, as you see in the bottom-left picture.

So if you ever have a patient that show up to your clinic, especially a male that describes progressive stiffness, and low back pain, and some SI joint pain, and you see that there may be some loss of the joint space in the SI joints, you have to consider ankylosing spondylitis. And these patients, if diagnosed, should also be looked into for cardiac conduction abnormalities, pulmonary fibrosis, and acute uveitis. And they should be started on PT that's focused towards flexibility. And if it's severe, then TNF alpha blocking agents are important.

Psoriatic arthritis affects 5% to 20% of patients that have psoriasis. And this disease is really characterized by having these silver-like plaques the extensor surfaces of their elbows and their knees. You can also see some significant findings in their hands. You can get this dactylitis, or also known as sausage digit, and pitting of the nails.

And then on X-ray of their DIP joints in their hands, sometimes you'll get this what we call pencil and cup deformity on the bottom X-ray on the lower right. It's a pretty pathognomonic sign for this type of disease. And these patients need to be treated with similar medications to rheumatoid arthritis.

And then, just a side note for primary care providers, I think this is really useful information. Whenever we're planning on doing surgery for a patient that's been diagnosed with an autoimmune or a rheumatic disease, they're often going to be on medications that modify their immune systems. And some of these medications will place patients at risk for infection around the time of surgery.

So it's important that we be aware of the meds that they're taking and that we have a good idea of when to stop their medications before surgery and when we're able to restart them after surgery in a safe manner. More often than not, most of these medications are held at least one dosing cycle before and one dosing cycle after. And this statement was put together by the American College of Rheumatology and American Association of Hip and Knee Surgeons.

Moving on to avascular necrosis. So this is a disruption of the blood supply of the femoral head, which leads to osteonecrosis, or bone death. And as this bone loses its vascular supply, it can collapse. And if you have subchondral bone collapse under the articular surface, that can end up leading to flattening of the femoral head and progressive, painful, debilitating type of arthritis.

There's approximately 20,000 new cases of this a year in the US. And 80% of cases are bilateral. And about a quarter of these cases don't have an identifiable cause. But we do know that there's some common causes that are highlighted here in yellow. And a helpful mnemonic that I use to remember this called ASEPTIC, so things like AIDS, steroid use, sickle cell disease. Alcohol use is very common, people that have AVN, pancreatitis, Perthes, prior trauma, infection.

And then anybody that's had cancer or cancer treatments, especially if they have a history of leukemia, lymphoma, or they've undergone chemotherapy or radiation, this can lead to avascular necrosis; coagulopathies, or anything that can cause microemboli in the circulatory system of the femoral head; and then Caisson's disease, also known as the bends, associated with barometric pressure changes with things like scuba diving.

Avascular necrosis has a grading system. Most commonly used, the Ficat classification-- there's a few others, but this one's the most commonly used. And looking at X-ray and MRI findings, you can see that there's a big differentiation here as you go from stage 2 to stage 3.

And this is where the treatment options change. So what happens when you go from stage 2 to stage 3 is that you end up having a crescent fracture and a subchondral bone collapse. And the femoral head loses its sphericity. And when it's no longer round, and patients are going through their normal, everyday activities, loss of that round structure and shape is going to predispose them to rapidly accelerating progressive painful arthritis.

And this is important for our treatment options, because once you lose the sphericity of the femoral head, there's not much short of an arthroplasty that's going to give you a good, predictable result. And even with stages 1 and 2, I think, as you progress further along in those stages, the chances of you having a good result with something short of an arthroplasty aren't the best.

But we do know that something like core decompression has proven to have some pretty decent results in early avascular necrosis. And what a core decompression is, it's really drilling of the femur into the area location with avascular necrosis. And there's some thought that this decompresses an area that there's increased intraosseous pressure. And this can help relieve pain and possibly slow the progression of avascular necrosis.

This 2019 meta-analysis from nearly 2,500 hips showed that if you were to perform a core decompression in stage 1 and stage 2 of this disease, that you have a 65% chance of success early on, defined by no further avascular necrosis, no need for short-term conversion to a total hip, and a Harris Hip Score greater than 70.

In our clinic, and this is my senior partner, middle partner, and my opinion of this, but essentially, if anybody has avascular necrosis, even if they haven't developed collapse, but they're older maybe, 60-plus, we really think that going to something like a total hip arthroplasty out the gate is probably a better option, because this has more predictable results. And in this day and age, they last so long that they're likely to only need one surgery for the rest of their life.

And doing a total, as opposed to a core decompression, these patients that are older, certainly will allow them to have immediate weight bearing, as opposed to having protected weight bearing for six weeks or two months, and also maybe only a two-thirds chance of that surgery working. So certainly, going to a total hip if somebody's a little older may be a better idea for some of these patients.

So a lot of patients, they want to be active, but they want to know how they can avoid injury. But they don't want to feel like this. And they definitely would like to avoid this if possible. So the American Academy of Orthopedic Surgeons has released guidelines on the non-operative management of knee osteoarthritis. They've reviewed the data.

And they've made panels to sort of give recommendations on some of the best treatment options. And I've kind of highlighted these here. But there's moderate recommendation for weight loss in patients with BMI over 25. Exercise and physical therapy are certainly important. And there's a strong recommendation to initiate this early on in non-operative management.

Oral medications come with a strong recommendation. Here, they describe NSAIDs and tramadol. And there's been a little bit of a move away from opioids and definitely more focus of NSAIDs here.

And then intra-articular injections, they say it's inconclusive. And a lot of that depends on what type of injection you're giving. We'll cover that in a second. But corticosteroid injections can be considered. And the data for viscosupplementation and hyaluronic acid is mixed. But there's a fair amount of data that shows that the benefit may not be as great as some of our other injection options.

Covering the non-operative treatment options that we go with our patients-- that we describe with our patients as they come into our clinic, we talk about weight loss, reduction of impact in training, the importance of stretching, building muscles around their joints, and avoiding improper training, and also describing activity modification. So weight loss is important because the average person takes one to three million steps a year, 7,000 steps a day.

And if you are obese or overweight, we know that the stress forces that your joints experience are increased. And you can see up to five times your body weight just going up and down stairs. And there's been some really good data that comes out of multiple orthopedic journals that suggest that your likelihood of undergoing an arthroplasty procedure if you're obese or morbidly obese is increased. And we've seen that for morbid obesity, a BMI greater than 40, your risk of needing a total knee replacement in your lifetime could be 32 times higher than the general population.

So the things that really cause progression of arthritis once there's been an injury to a meniscus, or there's a little bit of mild arthritis, and you're worried about not causing it to further progress, patients need to avoid repetitive pounding type of exercise in which the body weight is repetitively pounding and wearing away at the cartilage in the joints. And three alternative low-impact exercises that I recommend to my patient include cycling, elliptical, and swimming. These all work to reduce the repetitive pounding motions in normal exercises and to reduce some body weight that is going across the hip and knee joint.

So stretching often is important, because as people develop arthritis, stiffness tends to set in, and patients have tight muscles and tendons. And stretching will allow patients to maintain flexibility, which is important to keep range of motion and function. And we know that one of the biggest predictors of postoperative range of motion after something like a knee replacement is what your preoperative range of motion is. So even if patients are going on to need a knee replacement, I prefer that they do the best they can to maintain their motion, because that will ultimately give them a better result after surgery.

Building supporting muscles around the knee joints is important, because muscles act like a brace to support the joint to help reduce the likelihood of injury. And working opposing muscle groups, like quads and hamstrings, hip flexors and extensors is important. I personally like closed chain exercises, or exercises that we use bands or free weights, because it's less stress and less shear force across the joints.

And then lastly, activity modification-- there's something to be said for speaking with patients about what their exercise regimen is and what their activities are, because what they're doing has a big impact on how it's affecting the progression of their arthritis. And I have patients that come in who have pretty significant arthritis, but they still like to be involved in things like CrossFit or pivoting-type sports that put a lot of stress and strain on their joints. And we have to have pretty frank discussions that if they change their exercise, their sport, and the intensity of their training, they may be able to reduce the progression of their arthritis and reduce their symptoms.

Moving on to medical treatment options, we have pain medications, anti-inflammatory medications, injections, arthroscopic surgery, partial joint replacement, and total joint replacement. So medications and pain relievers, such as Tylenol and tramadol-- they can certainly work to provide some pain relief, but they may not be the best option. Tramadol, being an opioid, [INAUDIBLE] the potential for addiction. And the country is dealing with an opioid crisis. So certainly, if we have other options that are better, we consider those.

And there's also data to support that chronic opioid use prior to a total knee replacement places patients at a greater risk for complications and prolonged, painful recoveries. Having said that, if patients aren't a candidate for things like NSAIDs or other oral pain medications, and an opioid is needed, there is some recent data that was just published in May in the *Journal of Arthroplasty* that suggests that tramadol may be a better option to some of the more traditional opioids, like hydrocodone, Percocet, because it has a lower risk of postoperative complications.

NSAIDs are really our go-to medication for hip and knee arthritis if patients are able to take them and don't have renal disease or gastric ulcers. But I like prescribing Aleve, ibuprofen, naproxen. And some of the newer things that I think we really try and introduce to patients are things like selective Cox-2 inhibitors, sort of reduce some of the other symptoms and gastric issues you can get with NSAIDs.

But meloxicam, diclofenac do great. Certainly, I think the best impact that NSAIDs have is they reduce the inflammatory reactions in arthritic joints. And reducing that inflammation really helps to reduce the pain that is experienced in the joints. And I think consulting a physician before starting NSAIDs is important for a fair amount of patients, because like I said, if they have underlying renal disease or a history of gastric ulcers, you don't want to just give them this recommendation and not know the potential side effects.

For patients that can't take oral nonsteroidal anti-inflammatories, we do often recommend some topical-type options. And Voltaren gel, although it is a topical nonsteroidal anti-inflammatory, there's less systemic absorption than some of the oral medications. And there may be less propensity for developing side effects.

Injections-- for patients that come into our clinic, if they've never had an injection, generally, one of the first things we'll discuss and offer is the corticosteroids. I think they have a little more predictable pain relief. We can't give these more often than every three months. But certainly, this is one of the first injection options we try in our clinic.

And viscosupplementation is often requested and sometimes used. But I would say there's plenty of options out there, including Synvisc, Euflexxa, Orthovisc. And there's limited efficacy of this. And the American Academy of Orthopedic Surgeons has really taken a recommendation saying that they can't necessarily advocate for the use of these.

But certainly, like I said, there's patients that will come in asking for this. And the time that we'll certainly consider using it is if patients have had success with these in the past and they request these. And we certainly will offer this to them as a option.

PRP and stem cells have become much more popular over the last 5 to 10 years. The early results in laboratory trials showed that there was some encouraging data. However, we haven't had any great level one qualitative data that suggests that this is having predictable improvements and pain relief and reversal of degenerative disease. And the Academy has not really endorse these.

I think there's still data coming out on this. And this is still somewhat experimental. But in 2019 *The Journal of Arthroplasty* came out, and took a stance, and said, the enthusiasm for stem cell and PRP injections is really outpacing the science behind it. But hopefully, more studies will come through to support the use of these in treating osteoarthritis. And also, for primary care providers out there, if you know that a patient has possibly an upcoming hip or knee replacement, you may want to consider not giving an injection within three months of surgery, because there's good data to support that an injection within three months of surgery can increase the chance of a prosthetic joint infection.

Arthroscopic surgery is certainly an option in degenerative disease. But mainly, what I tell my patients, if you have moderate to severe arthritis, and someone is offering you an arthroscopy procedure to clean out the arthritis, you need to really consider possibly other treatment options, because there's no great data to support that arthroscopic surgery in the setting of arthritis can provide long-term predictable relief.

Now, the time that I do feel that this could be useful, if somebody has minimal arthritis, and they have a significant meniscal tear that is causing mechanical symptoms, which we would describe as painful popping, catching, or locking, where their knee may actually get stuck in a certain position, then they may benefit from a arthroscopic procedure to really remove those mechanical symptoms. Hip arthroscopy can be done early on if there's labral tears and not significant osteoarthritis.

And then really, what we do at our clinic when we've failed conservative treatment options, we focus on arthroplasty surgery and joint replacement. And the goals for us really include four things. One, we want to reduce pain. We want to correct deformity. We want to improve motion and overall quality of life.

And patients have different ideas of what it's like to have a physician cutting on them. And everyone has a different imagination. It can be scary. But I will say that in this day and age, we've really advanced arthroplasty. And this is not the same as it used to be 10 to 20 years ago.

Patients of younger ages and higher activity levels are having arthroplasty procedures. And this patient in the bottom left had a hip resurfacing. And then he went and won a gold medal for Russia in fencing. So certainly, there's potential to do higher levels of activity in this in the right patient.

The materials have really evolved over time. And we started with ivory and plaster, but we've made our way to evolve to things like ceramics, titanium, polyethylene, and modern-day implants. And the goals of surgery in this day and age have really work to lessen pain and include a quicker return to activities of daily living, improved overall function, and patient-reported outcomes.

And a lot of what we've had success with can be attributed to things that were introduced in the mid-2000s, including modern post-operative pain control. So we really more often use something like spinal or epidural anesthesia as opposed to general anesthesia. And we also focus on multimodal pain regimens, including indwelling catheters, periarticular injections, and different modalities of pain meds.

And the rehab protocol is vastly different. Now we encourage early independence. We want patients up and walking within three hours of surgery. And we prefer that they go home with an outpatient physical therapy or an inpatient home physical therapy plan as opposed to a rehab facility.

The introduction of tranexamic acid has reduced bleeding, the need for transfusions, and the chance of developing an infection. And we've also improved our surgical techniques. So different types of procedures, we focus more on minimally invasive type stuff. And we've used technology to improve outcomes. And this has really changed the way that people are recovering after their joint replacement surgeries.

Some of the things that have really gained some traction over the last decade include doing more partial knee replacements. As you can see here on the left X-ray, that's just one side of the knee that's replaced as opposed to the entirety of the knee on the right. And this allows patients to recover faster. There's a lower complication rate with this. And it feels a little more like a natural knee, because the don't have to mess with the ligaments in the middle of the knee including, the ACL and the PCL.

Anterior muscle sparing hip replacement has become very popular. The image on the left shows that muscles are kind of just pulled to the side as opposed to the image on the right, which is a posterior approach to the hip and is still the most commonly used approach to the hip in the United States. But in the posterior approach, the muscle is split. And that can lead to some delayed recoveries early on.

Robotic arm surgery is what I'm going to sort of focus on discussing in the next few slides here. And what we're also going to cover is the 2020 Knee Society studies. The Knee Society is a very prestigious society that has surgeons from all over the world that are experts in the field of knee replacement, kind of submit their research and present their data to all the other surgeons.

But I want you to remember this. The keys to a successful joint replacement surgery include that implants must be well sized, well positioned, well aligned, and well balanced. And robotic technology has really helped to do this.

A surgeon eye and hand only have so much accuracy and precision. And the robot helps us to really hone in on [INAUDIBLE], which is important for outcomes in these patients. And I'm going to discuss that moving forward.

So how a robotic knee replacement works, or a hip replacement, is we start by getting a preoperative CAT scan to define the patient's anatomy, size, and [INAUDIBLE]. And we do that CT scan to preoperatively template and place our implants in a three-dimensional type of template, which will guide us in the sizing and position.



And in surgery, we can do intraoperative mapping of the bones, as well as do range-of-motion assessments. And this helps us define what the soft tissue balance is around the joints [INAUDIBLE]. In surgery, we will remove the arthritic bone. And then the robot has what we call haptic feedback. And if we're ever leaving the boundaries of our surgical plan, the robot will just stop and abort. And this can really help prevent injury to the patient in surgery.

And lastly, we have implant placement with position verification. So we can place this where we think it's appropriate. And the robot can help confirm that we're doing what we set out and planned to do. Here's an example of some of the preoperative planning. And we can move our implants in space to best position them for that patient-- custom surgical planning.

Here's some intraoperative photos showing how this works. You see these arrays here? Basically, we temporarily place pins into the bone to hook up these arrays. And this gives the robot eyes in surgeries. We have a receiver here that identifies where the leg is in space. And then it can give us live feedback on the surgical maneuvers that we're doing during the procedure.

There's a precision in cutting in surgery, because you can see there's a bordered green outline here. And basically, what we're trying to do is remove bone that's highlighted in green. And we're trying to avoid bone that is not highlighted. And the machine will essentially stop you from going out of this boundary. And that's important.

So once again, implants must be well sized, positioned, aligned, and balanced. And this is an example of some different types of improperly balanced knees. So on the image on the left, you can see that the contact points between the femoral component and the tibial component are symmetric as opposed to this image here, there's a gap on one side and not on the other side.

And depending on how many degrees you're off in surgery, you can have larger gaps. And those gaps are important, because I really describe a knee replacement to patients kind of like getting an alignment of your tires on a car. If you have one wheel that is just one degree or two degrees out of alignment with the others, you're going to wear out the tread faster.

And one of the studies that came out of the Knee Society this year really showed that radiographic and early clinical outcomes after robotic surgery has proved to be more accurate. And you have less outliers in terms of malposition or malalignment. And they think that this is going to be important for really improving the longevity of the implant and avoiding early failure.

We do know that implants that aren't well balanced can have asymmetric contact pressures. And as you can see here in the middle picture, this is a plastic liner between knee joint-- knee replacement. And it has asymmetric wear, because this wasn't very well balanced. And this patient needed a revision procedure.

So aside from balancing, which the robot really gives you intraoperative feedback in terms of what your gaps are in surgery and to make sure that everything's balanced, there's also the factor of implant sizing and position. And as you can see from this photo, if you're-- this tibial baseplate is overhanging the bone.

And millimeters matter here, because if it's not flush and contained within the boundaries of the bone, this metal will irritate the tendons that are around the knee joint. And as you can imagine, if someone has a knee replacement put in, and they have a piece of metal sticking out and rubbing their hamstrings or IT band, that's going to be a chronic source of pain for them going forward.

And another study out of the UK from Dr. Haddad really-- they looked at 30 different patients that underwent conventional versus robotics-only arthroplasty. And they also identified that robotics-only arthroplasty had reduced inflammatory markers at seven days after surgery, including reduced IL-6, tumor necrosis factor alpha, ESR, and CRP.

And I think there was less damage to the soft tissue envelope because there was more accurate placement, and the robot allowed for haptic feedback to avoid us venturing into areas outside of the planned surgical resection. And they also verified that component positioning and-- sorry, component positioning of the femur and the tibia was much more accurate with the robot.

So we know that accuracy and precision is improved. But is this correlating to patient-reported outcomes? And we could say that at least this year, there was also another study from the Knee Society that demonstrated that patients that underwent robotic total knee arthroplasty, as opposed to the conventional manual total knee arthroplasty, had higher outcome scores.

This was the robotic outcome scores for the Knee Society. And this was the nonrobotic outcome scores. And they did find that there was a statistically significant difference in this group of approximately 180 patients.

So in summary, hip and knee arthritis can come in many forms. It's important to identify inflammatory arthropathies early to initiate medical treatment. The main non-operative treatment include weight loss, physical therapy, activity modification, injections, and training exercises.

Surgical advancements have really changed how people are recovering after these types of surgeries and have improved on their outcomes. And the benefits of robotic surgery are becoming more and more apparent. And this includes improved accuracy and precision, decreased likelihood of soft tissue injury, and improved early patient reported outcomes. Thank you. Any questions?

And we got a little bit of time. So I may just do one last thing here and do what we call myth busting. But common things that patients will ask me or other providers in the community will ask me is, they'll say, well, am I too young or too old for a joint replacement?

I would say that age in this day and age is really just a number. What matters more is what your medical problems are, what your comorbidities are, because I have patients that are 95 years old, but physiologically, they're like 70. And we've done elective joint replacements-- I did an elective joint in a 94-year-old woman who is as happy as can be with her hip replacement.

And what I tell all my patients is the advancements we've made with spinal anesthesia and reduced blood loss, it takes less of a toll on your body to have a hip and knee replacement. So as long as you are able to get cardiac clearance and the appropriate medical clearances, there is no age cutoff.

And given that hip and knee replacement technology has advanced, and implants are lasting longer, we're doing surgery in younger and younger patients who have debilitating arthritis-- patients in their 30s, 40s, 50s that are candidates for joint replacement surgery. And they have great outcomes. Certainly, if you're younger, there's a higher likelihood that you may need a revision down the line. But with the advancements in technology, people can still have a good result that lasts them for decades.

And that's the second myth here is, my hip and knee replacement states that it will only last 10 years. I would say that the current data for hip replacement after the invention of highly cross-linked polyethylene, we've seen that implants can last up to 20 years with little to no wear in clinical data. And we have 30-year laboratory data right now.

Knee replacements, you can get about somewhere between 15 and 25 years. But a lot of it's dependent on the patient's activity level. If patients are avoiding running and jumping activities, they're certainly going to avoid a faster wear on their joints.

Myth-- the recovery time is too long. I'll be bedridden. This is false. In this day and age, we have patients up and walking two to three hours after surgery. They become independent quickly. Most patients stay in the hospital one night and go home the next day. And there's plenty of outpatient surgery, same-day surgery for the right patient.

Another myth is, I'll be in even more pain after the surgery, and I won't be able to get home. This is not true. People do have soreness after surgery. But generally, the combination of our multimodal pain regimens, the periarticular injections, the indwelling catheter, the oral pain meds can have people being comfortable doing their exercises. And they'll be able to be independent at home.

Lastly, I'll never recover 100%, and I won't be able to do the things I used to do. So I would say that a fair amount of our patients that have hip and knee replacement will come to us and say, I wish I had it done sooner, especially in hip replacement. *The Lancet* voted hip replacement the surgery of the century previously because of how much of a positive impact it could make in a patient's life, how it returned them back to the activities they love and allow them to be a contributing, happy member of society.

So certainly, there's plenty of myths in joint replacement. But as technology and surgical techniques advance, I think we're going to continue to see further improvements in recovery and outcomes. And I think that arthroplasty is a very successful procedure that can really improve people's lives for the better.

**FEMALE** Dr. Romero, we have one quick question.  
**SPEAKER:**

**JOEY ROMERO:** Yes?

**FEMALE** What are protocols for replacements for women with osteoporosis?  
**SPEAKER:**

**JOEY ROMERO:** So that's a really good question. Osteoporosis does not change the ability to have a surgery. But it does increase risk factors for things like periprosthetic fractures occurring in the bones. I advise lots of my patients to supplement with vitamin D and calcium.

Having osteoporosis in itself does not forbid anyone from having a joint replacement surgery if they have arthritis. But it does change some of the surgical techniques that we do. In a hip replacement, for example, if I see that a patient has significant osteoporosis, instead of using a traditional noncemented solid hip replacement, I would opt to do what we call a cemented hip replacement, because there's good data to show that-- a lot of it's from the European literature-- that cemented hip replacements have a lower chance of having a fracture around the time of surgery and later down the line.

And you know, it's something that I think is gaining in popularity. I spent several months working at a hospital in the NHS, just outside of London. And cemented hip replacement is actually more common in most parts of the country there than it is for uncemented, even for younger patients. So I think Americans generally do less cemented hip replacement. But if somebody has osteoporosis, they need to speak with their surgeon about having a cemented type of surgery and certainly avoid things like falls, which can predispose them to having something like a fragility fracture during the recovery period.

**FEMALE** That's all the questions we have from the chat.

**SPEAKER:**

**JOEY ROMERO:** Awesome. Thank you for giving me the opportunity to speak with you. If you ever need anything, please feel free to reach out to us. An easy number to get a hold of our clinic is 512-HIP-KNEE.

[MUSIC PLAYING]