



## Patient Factors: How to Optimize Your Outcome for a hip or knee replacement

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As an orthopaedic surgeon who performs over four hundred hip and knee replacements a year, I get asked by my patients who are preparing for their surgery, “what can I do myself to prepare for my surgery?” There is simply never enough time in an office visit to answer this question, so I have put together my thoughts into this document so that I can provide a proper answer to this important question. The contents of this piece are derived from a review of scientific literature and my personal experience from practicing orthopaedic surgery for the past twenty-one years.

Every surgery that happens is like a science experiment, a patient goes into it with a certain set of pre-existing variables, a predictable/reproducible surgery occurs and then the results play out in real life fashion. The experiment starts when knife hits the skin. The actual surgery is typically the most predictable part of the experiment with a surgeon performing a procedure that he/she/they has typically performed over a thousand times before. The intent of this article is to make patients aware of what variables they can influence to optimize their outcome, OYO.

### **Pre-existing variables:**

Pre-existing medical conditions  
Medications and supplements the patient is taking prior to surgery  
Fitness/activity level  
Amount of joint flexibility  
Nutritional status  
Mental health status  
Smoking status  
Body mass index (BMI is height/weight)  
Bone density status- normal, vs osteopenia, vs osteoporosis  
Blood clotting abnormalities  
Level of arthritis present in the joint  
Systemic Inflammation

## 1. Pre-existing medical conditions

### a. Diabetes

- It is pretty simple, get your blood sugars under control to **OYO**
- The Orthopaedic Literature demonstrates that having a HgbA1C below a value of 7.5 leads to a lower incidence of post-operative complications like infection, heart attack, pneumonia, etc.
- So, get your blood sugars under control. Please work with your primary care/internist/cardiologist to get strict control of your sugars with diet and medications and let's knock it out of the park with upcoming surgery and recovery.

### b. Obesity

- This is covered in section 8, under Body Mass Index

### c. Autoimmune Disease

- There are numerous diseases like rheumatoid arthritis, psoriatic arthritis, lupus, Sjogren's Syndrome and others, that lead to the destruction of patients joints and necessitate a joint replacement surgery.
- The treatment for many of these diseases are medications that suppress the immune system and this can increase the chance of a post-operative infection if this immune-suppressing medication is in your body and still active at the time of your surgery
- Depending on what the half-life (amount of time for the drug you are taking to stop being active) is for the drug that you are taking, you will need to stop this drug before your surgery. This may be 2 weeks, 1 month, 3 months or longer and when to stop this medication will be determined by the provider who normally prescribes this medication. Your surgeon will ask for a clearance from this prescribing physician and a plan for when to stop it.
- You will restart this medication after your surgery when directed to by your surgeon and your prescribing physician.

### d. Dental Disease

- Active dental infections can allow bacteria to get into your bloodstream and go to other locations in your body and cause a new infection there.
- Any active dental infection is an absolute no-go for proceeding with surgery
- Dental clearance is not needed if you have no active dental disease requiring on going procedures and/or dental surgeries.

- If you are in the middle of a complex dental reconstruction, which could take several months, then dental clearance will be requested
  - An example of this may be that you have had a dental implant like a post placed in your mouth and you are waiting for the bone to grow into it which may take up to six months. As long as there is no infection and your dentist clears you for surgery, then it is safe to go ahead with joint replacement surgery.
  - Any major dental procedure should be delayed until three months after your joint replacement surgery.
- e. Cardiac Disease including hypertension, coronary artery disease, arrhythmia's, etc.
- These conditions need to be under control and confirmation of this will come in a clearance letter from either your cardiologist, internist or primary care physician.
  - There will be a detailed plan for which medications should be stopped prior to surgery and which medications should be continued even on the morning of surgery. **Please pay great attention to this**, because if you stop taking your blood pressure medication, and show up to your surgery with a pressure of something like 160/100 then it is not safe to proceed with surgery that day due to risk of a stroke or other ailments occurring.
  - Blood thinning medications such as Plavix, Lovenox, Eliquis, etc will need to be stopped prior to surgery and you will be provided a plan for this by your prescribing physician. This is discussed again in the medications section.
- f. Chronic pain/Fibromyalgia
- Patients with these conditions are typically already on significant pain medications before surgery and this is important to know for your surgeon.
  - Chronic use of narcotics like Percocet, Oxycodone, Oxycontin, etc. will alter the sensitivity of your pain receptors and make it more difficult to get your pain under control in the early post-operative period.
  - As much as you can minimize the amount of these medications you are taking prior to surgery, this will help your body be more sensitive to the medications that will be used to control your pain after your surgery.
  - A clear plan will need to be determined by your regular narcotic prescribing physician for who is prescribing your post-operative narcotics.
  - This is absolutely necessary so that you do not have issues with your pharmacy refusing to fill a prescription because you have multiple doctors prescribing you narcotics. This is a red flag for pharmacies and insurance companies and can make your recovery more painful than it needs to be.
  - Patients with Fibromyalgia tend to have more pain after surgery and for a longer period of time, but my experience is that these patients have the

same outcomes as patients without this condition, it just takes longer for them to get there.

2. Medications the patient is taking prior to surgery that concern us surgeons:

- a. NSAID's- non-steroidal anti-inflammatories- Aspirin, Ibuprofen, etc.
  - These need to be stopped 2 weeks prior to surgery
  - These medications can inhibit platelet function and lead to an increased risk of bleeding during/after your surgery
- b. High blood pressure medications
  - You will be directed by your prescribing physician if you are to continue taking this medication on the day of your surgery, or when to stop it before your surgery
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- c. Blood thinners- Coumadin, Lovenox, Eliquis, Plavix, etc.
  - You will be directed by your prescribing physician when this will need to be stopped prior to your surgery. Some medications need to be stopped 7 days prior, or 5 days prior, or 1-2 days prior to surgery.
- d. Steroids- Prednisone
  - Steroids suppress your immune system and may increase your risk of infection but you may not be able to stop this medication.
  - If you have the ability to reduce the amount of this medication you take on a daily basis prior to your surgery, this will be beneficial to you.
  - You will be given a stress dose of steroids by the anesthesiologist during/after your surgery.
- e. Cardiac/Heart medications
  - There will be a detailed plan from your cardiologist, internist or primary care physician for which medications should be stopped prior to surgery and which medications should be continued even on the morning of surgery.  
**Please pay great attention to this.**
- f. Antibiotics

- You will be given intravenous antibiotics prior to your surgery so that the antibiotics are flowing through your bloodstream at the time of your surgery.
  - You will not typically be taking an oral antibiotic prior to your surgery and most likely will not need to go home on antibiotics after surgery.
  - An exception to this is that you may be taking an oral antibiotic in the days leading up to your surgery for the treatment of a bladder/urinary tract infection that was picked up in your pre-operative clearance lab studies.
- g. Immune suppression medications for autoimmune disease
- Discussed above in Autoimmune disease
  - These medications are typically recommended to be stopped prior to surgery.
- h. Chronic pain medication
- Discussed above in Chronic Pain/Fibromyalgia
- i. Supplements- Vitamins, pro-biotics, hormones
- We recommend stopping all other supplements 1 week prior to your surgery.

### 3. Fitness Level

- The stress that your body goes through during an elective surgery like a hip or knee replacement is equivalent to the stress from running a marathon. You want to be in the best cardiovascular shape that you can be. The literature shows that patients with severe knee osteoarthritis are generally in worse shape than patients their same age<sup>i</sup>. Any activity that you can do to raise your resting heart rate for a least a half hour per day in the month leading up to your surgery will pay dividends in your ability to recover from surgery.
- Finding an activity to get yourself in shape for surgery may be difficult due to how much pain you are in from your arthritic joints. I would recommend low impact exercises like riding a stationary/recumbent bike, elliptical machine, rowing machine, cycling, swimming, yoga, or an upper extremity bike. Spending time at the gym lifting weights will be beneficial to your recovery. Doing upper extremity exercises will give you good strength to help you lift yourself up when your legs are painful as well as give you good strength to maneuver your walker. Lower extremity weight exercises will get your legs stronger and help with getting up from chairs, couches and the toilet when your operative leg is not helping you very much. In addition to strength, balance and proprioception are an important part of walking and having these tuned up prior to surgery can decrease your risk of a fall. It is my experience that patients who come into a surgery with higher level of physical fitness tend to get through their recovery easier, faster and with less

complications. Please see our PDF or lower extremity exercises that our physical therapy department has recommended.

- I have empathy for my patients as I too experience the joy of pain and stiffness from hip and knee arthritis. I had the pleasure of playing club, collegiate and international water polo for approximately fifteen years which allowed me to travel the world and have amazing athletic experiences but unfortunately, I have worn out some of my body parts prematurely- hip and knee. I have found a very effective treatment for my sore and stiff joints to be staying active with low impact activities like yoga, Piyo, Pilates, swimming, walking, elliptical trainer, lifting weights, and watching college football☺ The key is to find an activity in which you can get your heart rate up to work on your cardiovascular fitness, and stress your muscles but not overwork your arthritic joint so that you end up with a lot of pain and swelling after your workout. If you decide to just push through the pain and push yourself through the pain and endure rigorous workouts, this will not have a negative effect on your surgical result.

#### 4. Amount of joint flexibility

- The hallmark effects of arthritis on a joint, is that the joint becomes swollen, stiff and painful. Losing range of motion in an arthritic joint can have a serious effect on the outcome of your joint replacement surgery. The more range or motion or joint mobility that is present pre-operatively, the more likely you are to have a good functional range of motion after your surgery. The orthopaedic literature has established that patients with poor range of motion going into a surgery tend to regain less range of motion after their new hip or knee has been implanted.
- In my experience, joints that have limited flexibility are more difficult to mobilize intra-operatively which can increase operative time and soft tissue trauma leading to increased bleeding, inflammation and post-operative discomfort.
- For knees, long term lack of full flexion (bending) or extension (straightening) may permanently limit the end stage motion of knee joint replacement.
- For hips, significant stiffness prior to surgery means your surgeon will have to release a lot more of the structures around the joint- capsule, ligaments, tendons which directly correlates with increased post-operative swelling, stiffness and potential bleeding. Focusing on stretching of the hip flexors as well as the IT band and lateral rotators (gluteal muscles) will be particularly beneficial. Regular stretching along with low impact activities such as yoga or Pilates can significantly improve joint motion as well as soft tissue flexibility. Hip patients, please try and sit “Criss cross applesauce” frequently, even-though you will be severely restricted on one side, try it and see if you can improve your flexibility slowly. If it is too painful, don’t do it.

For knee patients, work on bending and straightening your knee three times a day, try a stationary or real bike and pump those pedals!

- As your surgeon, I am asking you to please work on your flexibility as much as you can prior to your joint replacement surgery, as this will facilitate a more efficient surgery and recovery for the both of us! If your joint is very stiff and you cannot loosen it up, don't fret, we got you covered.

## 5. Nutritional Status

- When your body goes through a surgery or a trauma, your body switches to a catabolic metabolism (using more nutrients than you are taking in) which means that your body scours all of its resources- muscles, fat, and protein reserves to provide the nutrients to fuel its recovery. You are digging deep into your reserves to pull your body out of a catabolic state.
- One of the most important building blocks your body needs for recovery from a surgery/trauma is protein.
- Leading up to surgery and during the first four weeks of your recovery, you should focus on a high-protein diet. Your body needs the protein for wound and soft tissue healing.
- Good sources of protein are: meat, chicken, turkey, fish, and vegetarian proteins such as beans and lentils. Supplemental options such as protein drinks and bars are readily available, so stock up and get prepped for your surgery.
- An adult multi-vitamin will supplement vitamins and minerals that are absent in the diet. Key vitamins and minerals for bone strength and immune response include Vitamin D, Vitamin C, Calcium and Magnesium. Zinc Copper and Iron are all important for wound healing.
- Vitamin D Deficiency is a lot more common in our Arizona population than one might expect. We have an abundance of sunshine that we are exposed to but a lot of patients can be Vitamin D deficient due to the fact that they use a lot of sunblock when they go outside and their body is unable to convert the inactive Vitamin D in their body to active Vitamin D.
- I personally have been Vitamin D deficient twice during the past six years.
- This is important because we know from the orthopaedic literature that having a below normal level of Vitamin D going into a hip or knee replacement can lead to higher-than-normal rate of complications after a hip or knee replacement. Specifically, patients with a low Vitamin D level are more prone to developing infections or fractures.
- We measure Vitamin D levels by a blood test and it is very common for the approx. \$200 test to not be covered by insurance, which is quite frustrating for patients and providing surgeons. I used to test all my patients but I stopped doing this because too many patients were upset about the cost of this lab test on top of all the other expenses that occurred around the time of their surgery.

- If you know that your Vitamin D level is normal, continue your normal diet and don't stress. If you are unaware of your Vitamin D level, don't stress, simply start a Vitamin D supplement of 5,000 IU's per day approx. 3-4 weeks out from your surgery and your levels will be sufficient for your surgery. Please take your Vitamin D with food as it is not absorbed as well if you take it on an empty stomach.

## 6. Mental health status and expectations

- Being in sound mental health is associated with superior outcomes from total hip and knee replacement as per study ...
- Underlying depression or unstable mental health can lead to a more difficult recovery, so please consult with your primary care or mental health provider before committing to a major orthopaedic surgery, so you can OYO. Having depression and anxiety at their lowest levels possible will be helpful to your recovery.
- It has been well documented that substance abuse (alcohol, and drugs) during recovery from a hip or knee replacement surgery is associated with a poor outcome (blank %) and the combination of poor mental health and substance abuse leads to the worst outcomes.
- A recent poster presentation at the American Academy of Orthopaedic Surgery Conference showed increased complications for patients undergoing joint replacement while chronically using Cannabis products.
- Please think of these issues and get your mind and body in the best possible shape so that you only have to go through this surgery and recovery once.

Long and Short-term expectations are important during the recovery process. Understanding the time frame for healing is important for expectations. Even though there has been likely a long period of time of pain and decreased function leading up to Joint Replacement surgery, the surgery itself starts a new time frame for recovery. It will take your body a 1-1.5 years completely recover from surgery. It is important to understand that there are many components to this marathon.

### **Psychological Expectations Post-Surgery**

#### 24-48 Hours post-surgery

- pain blocks wear off and there is more stiffness swelling and discomfort as acute inflammation increases. Your hip or knee will not feel like the brand-new joint you had 3-12 hours after your surgery when it was numb.

#### 2 Weeks post-surgery



- focus continues to be on pain control, walking, range of motion and exercises. It is very normal to have difficulty sleeping and pain control is key. You will likely continue walking aids during this time.

#### 6 Weeks post-surgery

- sleep will begin to improve but still stiffness, swelling and tightness remain. It is normal to still feel fatigued. Mentally this is a challenging time frame as there is more mobility and less restrictions but progress can plateau as there are less noticeable daily improvements. It is important to remember that significant portions of the healing is happening subconsciously and you are still in the acute phases of healing.

#### 3-4 Months post-surgery

- the next stage in healing where you move out of the acute stages into the more chronic phases of healing. Less swelling, less stiffness, more mobility but your body is still recovering.

#### 6-8 Months post-surgery

- when you maximize muscle strength

#### 1 year -1.5 Years post-surgery

- you have finally finished this marathon where strength and endurance have improved, nerves have recovered to maximum level, and residual swelling and inflammation have resolved. You will have maximal strength, coordination and flexibility at this time. Remember, your arthritis probably took 3-4 years to progress to the point where you could feel it and another several years for it to get bad enough to require a surgical solution. You are walking back 5-7 years of how your body has been performing sub-optimally, please ensure you have the appropriate reasonable expectation that it will take a reasonable amount of time to achieve your maximal outcome.

It is important to remember that this is a long process. You will have pain from time to time that you or your surgeon cannot explain, and you will have moments of feeling discouraged. It is important to enter the process of surgery recognizing that this is a long phase of healing with the ultimate goal being better function, more stability and less discomfort. Prior to surgery you exhausted all of the conservative stages of treatment such as Physical therapy, Low impact activities, anti-inflammatories, injections, bracing, use of walking aids without significant improvement to the point that activities of daily living and quality of life are affected. You have committed to the process of a joint replacement, prepare yourself for the long-haul journey you are about to embark upon.

## 7. Smoking status

- Nicotine containing products like cigarettes, chewing tobacco, cigars, and vaping cause constriction of the small blood vessels in your extremities. This leads to less blood flow to your tissues which results in less delivery of oxygen and nutrients to the cells that are trying to recover from the trauma of surgery.
- The orthopaedic literature is quite clear on the negative affect of using nicotine products around the time of a hip or knee replacement (. Paper). Patients are at a 10 times increased risk of an infection of complication after their surgery if they are using nicotine products.
- Due to this increased risk, most orthopaedic surgeons feel that it is unethical to perform a surgery on a patient who is using nicotine routinely. We require patients to stop using nicotine 3 weeks prior to surgery and for one month after surgery. The breakdown product of nicotine in the blood is serum cotinine. A blood test will be performed on patients 2 weeks prior to their scheduled surgery, and if positive, surgery will be delayed until there is a negative test.

#### 8. Body mass index (BMI is height/weight)

- A standard measurement used in medicine is a patient's body mass index, BMI. This is used as a general indication of health and fitness levels.
- The orthopaedic literature has looked at BMI level and its association with hip and knee replacements. The literature is conclusive that patients with a BMI over 40.0 have a higher risk of complications such as infection, wound healing difficulties, fractures, deep vein thrombosis, strokes and death.
- Most orthopaedic surgeons feel it is unethical to perform a hip or knee replacement on patients with a BMI over 40 and require their patients to lose weight until their BMI is below 40 so that they can proceed with their surgery.
- Again, you want to have this surgery once, recover once and get back to your normal life so correcting a critical variable in this surgical experiment is only to your benefit. Please work with your surgeon or primary care physician to get your BMI below 40.0.
- We have resources available to refer you to weight loss physicians/surgeons to help you achieve your goal.

#### 9. Bone density status- normal, vs osteopenia, vs osteoporosis (soft, fragile bone)

- This is a pre-operative variable that needs to be communicated to your surgeon through your new patient paperwork as this may affect the type of surgical implant that your surgeon will choose for your joint replacement.

- Thin bones are not a major issue for knee replacement surgery, as most surgeons will anchor the implant to the bone with bone cement, so bone quality is not a major issue.
- Hip replacement patients with osteopenia or osteoporosis have a lower rate of post-operative fractures if bone cement is used to fix the femoral (thigh) component at the time of surgery. Using bone cement for fixation of the femoral component in patients with softer bone has demonstrated less post-operative bleeding, decreased pain, and reduced incidence of post-operative fractures after hip replacement surgery.

#### 10. Blood clotting abnormalities

- An infrequent complication of knee or hip replacement is Deep Vein Thrombosis which can lead to spread of the blood clot to the lungs resulting in a Pulmonary Embolus, which can be fatal.
- Patients with no risk factors will be placed on 81 mg of Aspirin BID for 5 weeks post-operatively to minimize the risk of a DVT.
- Patients with risk factors for blood clots will have an individual plan for their DVT prevention as recommended by their primary care/internist/cardiologist/hematologist/pulmonologist.
- Patients on a daily blood thinner like Coumadin/Plavix/Lovenox or others will have a specific plan from their primary care/internist/cardiologist/hematologist/pulmonologist as to when to stop their blood thinner before surgery, and when to start taking the medication after their surgery is completed. The question of when to start blood thinners after your surgery is determined with combined input from your surgeon and an internist/primary care physician involved in your post-operative care.

#### 11. Level of arthritis present in the joint

- The bottom line is that patients with very little arthritis, get the least benefit from a joint replacement. This is the main reason that most orthopaedic surgeons will recommend starting treatment with conservative treatments like therapy, anti-inflammatories, injections and braces. This is done so that patients can experience good pain relief from simple non-invasive treatments. When the pain becomes more severe, and these treatment modalities no longer provide relief, then it is time to consider surgery.
- I have found that a patient with a lesser amount of arthritis will experience more pain after their surgery and it will take a longer time for them to fully recover. This is logical because they did not have the severe, motion limiting pain leading up to the surgery that gives them a high pain threshold. Therefore, the pain from the surgery is much more extreme than what they were experiencing pre-operatively and these are not happy patients post-

operatively. If you have pretty extreme, motion limiting pain pre-operatively, then the pain you have after your surgery really seems like nothing as compared to how you felt before.

## 12. Systemic Inflammation

- High levels of systemic inflammation can cause higher levels of pain and soreness to arthritic joints as well as have significant effects on many of your other body systems like the gastrointestinal, endocrine, neurologic, cardiovascular systems. –reference paper--
- A good way to reduce your systemic inflammation include an anti-inflammatory diet and I have included a link to multiple sources for guidance on this diet -- links
- Turmeric is a natural supplement that can reduce inflammation in your body.
- Another way to reduce systemic inflammation and improving your immune system is to take regular ice baths and learn the Wimhoff breathing technique. I am an avid partaker of ice baths 4-5 times per week and this has drastically reduced the amount of pain and swelling in my arthritic knee and hip to the point where I rarely use an anti-inflammatory medication. You can reference the Wimhoff website to look for a location near you where you can partake in an ice bath pre-operatively. I used to regularly attend Optimize which is located in Arcadia on Indian School Rd. (There is no paid sponsorship here) and get my 34 degree Fahrenheit five minute ice bath fix. Please watch the HBO special on Mr. Wimhoff, it will explain a lot of the health and immunologic infection fighting aspects of this health routine that could be a potential “ace in your sleeve” preparing for and recovering from your joint replacement surgery. The knee or hip is typically ready for submersion (prolonged exposure underwater) exposure approximately three weeks after your surgery.
- Reducing systemic inflammation by specific control of your dietary intake is also a factor that you can take control of prior to your surgery. If you have time (approx. 3 months) you may want to look at the dietary program from Viome. I have no financial connection to the company. **Viome** will genetically analyze a sample of your blood and stool to determine which foods are best for your body and what foods you need to avoid or minimize. They also will recommend supplements for you, but you don’t need to sign up for this part of the program. In general, your new diet will reduce your systemic inflammation and I can attest, you will feel more energized, and ready to attack the world. Please note, this is a pure recommendation from my personal experience. There is no literature that Viome has published with regards to surgical outcomes, but here is a reference to a paper that looked at the effect of a Viome diet on several mental health conditions. There was a clear improvement in patient’s symptoms from being on the Viome program.

There are other modalities such as cryotherapy as well as cold therapy with compression devices such as Polar Care and other brands that can help to control pain and inflammation. Compression stockings and sleeves can also improve circulation and decrease swelling in your extremities pre and post operativity.

Well, that was a lot to take in! Digest this, and think about what you can do to OYO!

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<sup>i</sup> PHYSICAL FITNESS IN INDIVIDUALS WITH KNEE OSTEOARTHRITIS COMPARED TO NORMATIVE DATA - A CROSS-SECTIONAL STUDY

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