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Joint Preservation – Do I Need A Joint Replacement? Pt. 2**ARTHRITIS OVERVIEW**

- Arthritis is defined as the LOSS of articular cartilage. Articular cartilage is the smooth shiny white surface at the end of the bone that provides a frictionless environment for the joint to move in space.
- Osteoarthritis, also known as ‘wear and tear’ arthritis is the most common type of arthritis. This results in GLOBAL or widespread loss of the articular cartilage. Osteoarthritis is the most common reason for a joint replacement
- Cartilage loss can also happen following an acute injury or can be isolated to one area of the joint in the setting of altered limb alignment (i.e. bowed legs, patellar tracking).
- In the setting of FOCAL or isolated cartilage loss, there are several treatment options to PRESERVE the joint with the goal of delaying or even preventing joint replacement all together.



Image of a right knee demonstrating a focal cartilage defect

XRAY FINDINGS

- Osteoarthritis (wear and tear) has the common xray findings of:
 - Joint space narrowing
 - Osteophytes (bone spurs)
 - Subchondral sclerosis (bone hardening)
 - Subchondral cysts
- Focal cartilage injury typically does NOT result in abnormal xray findings
- In some cases, isolated cartilage loss may demonstrate these findings; however, they are isolated to one area of the joint (i.e. the patella).

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- As x-rays are typically normal, and MRI is required to further analyze the cartilage and other structures of the joint (meniscus, ligaments etc.)
- X-rays of the entire limb are often obtained as well to evaluate for limb alignment



Long leg alignment x-rays. The yellow line is from the hip to the ankle and demonstrates the weight bearing axis through the knee joint. This line should fall in the center of the knee joint. For this patient, the line falls on the inside (medial) of the joint, demonstrating the bow legged (i.e. Varus) alignment.

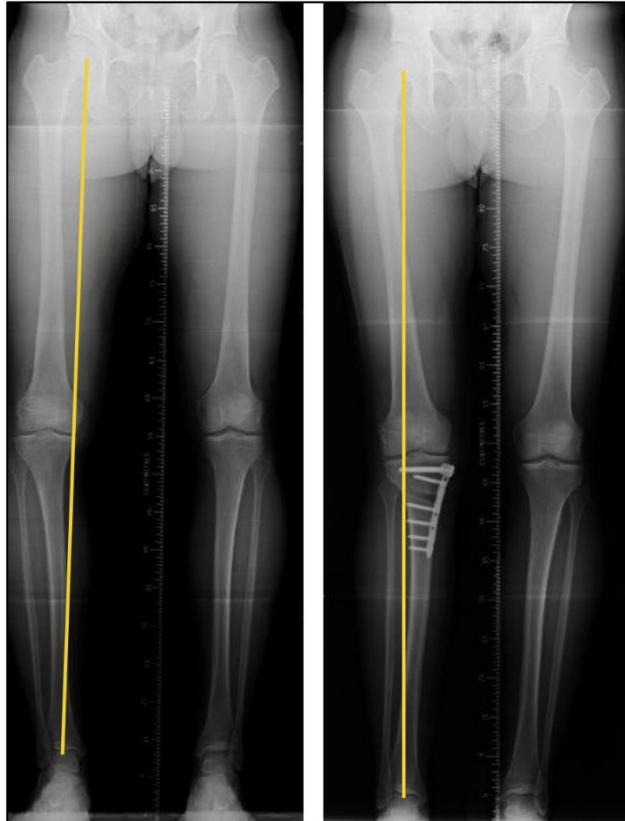
JOINT PRESERVATION TREATMENT OPTIONS

- It should be emphasized that treatment options vary greatly from patient to patient and are based on a myriad of factors, including but not limited to:
 - Size and location of the cartilage damage
 - Limb alignment
 - Prior surgery
 - Patient age
 - Patient desired activities
- **Medications and Injections –**
 - Currently, there are no known medications or injections that can reliably restore cartilage that has been lost or injured. Medications and injections can be used for symptom management but it should be emphasized that the goal of these is not to slow down or reverse the cartilage damage.

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- **Alignment correction –**

- Abnormal alignment can lead to pressure overload of the cartilage in certain areas of the joint. An osteotomy can be performed to correct abnormalities in the limb alignment and therefore relieve the pressure on the cartilage. To simplify, osteotomy means cutting the bone in such a way to allow for opening/closing of a hinge or to translate the bone. Again, the goal of this surgery is to unload those areas that are damaged or wearing out. For example, a patient that is bow legged (as in the above picture) will overload the inside of their knee joint. An osteotomy here can be performed to open a wedge on the tibia (which is then secured with a plate) to shift the weight bearing axis to the center or lateral side of the knee joint.



Tibial osteotomy for a patient with medial knee overload. The osteotomy works to shift the weight bearing line (yellow) from the medial (inside) of the knee joint to the lateral (outside) of the knee joint.

- **Cartilage Regrowth –**

- Most commonly this involved a procedure call microfracture. The area of the cartilage defect is completely cleaned of all remaining cartilage and the underlying bone is exposed. The bone is then gently penetrated to create several small holes which allow for blood to gently flow into the defect. This blood flow allows for regrowth of new cartilage. Unfortunately, however, this new cartilage (called fibrocartilage) is not as durable as the native cartilage.
 - New research has demonstrated encouraging results of this procedure with the addition of medications that allow for regrowth of healthy cartilage as opposed to the less durable fibrocartilage

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- **Cartilage Replacement –**

- Cartilage defects OF LIMITED SIZE can in fact be “replaced.” There are several ways this can be performed.
- Osteochondral Autograft: This involves direct transfer of healthy cartilage and underlying bone to the area of damaged cartilage. This is performed for small defects so as to limit the size of healthy cartilage that is taken from the joint
- Osteochondral Allograft: This involves transfer of health cartilage and underlying bone from a cadaver donor. Because this is obtained from a cadaver, the size of the donor graft can be much larger.



<https://sportsmedicineweekly.com/2019/12/11/how-osteochondral-allografts-are-made-possible/>

- Osteochondral allograft transplantation involves obtaining a matched size of cartilage and bone from a cadaver and implanting this into the patient’s cartilage defect.
 - Autologous Cartilage Implantation: This involves obtaining a biopsy of the patient’s healthy cartilage which is then sent to the lab and allowed to grow in a matrix. That matrix sheet of cartilage cells can then be later implanted into the patient’s cartilage defect. This does involve two separate surgeries with the first involving the biopsy and the second involving the implantation.
- These treatment options can be performed in isolation or combined with each other depending on the factors mentioned above.

FURTHER DISCUSSION:

- Joint preservation surgery is indicated for patients with symptoms related to their cartilage injury. Surgery is not typically performed for prevention in patients that are asymptomatic.
- Joint preservation surgery is helpful to patients who have exhausted all conservative options
- The indication for surgery is not based solely on X-ray or MRI. It is about the patient’s symptoms and acceptable function.
- Only the patient can decide when they can no longer tolerate the pain or function of their joint.

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