



THE UNIVERSITY OF TOLEDO
MEDICAL CENTER

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THE UNIVERSITY OF TOLEDO MEDICAL CENTER

ORTHOPAEDIC MONTHLY

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Knee Pain and Arthritis

The cartilage of the knee is complex and it is made up of an elastic compressive structure. The normal articular cartilage is called hyaline cartilage. Hyaline cartilage provides a smooth, gliding surface that helps in the motion of the joint.

There is about 2 cc's of synovial fluid inside the knee which helps in the motion and lubrication of the joint. Between the hyaline cartilage (articular cartilage) is the meniscus. The meniscus is a shock absorbing cartilage or cushion between the articular cartilage.

The hyaline cartilage has four layers: superficial layer, middle layer, deep layer, and calcified layer. After the calcified layer is the bone. These cartilage cells are supposed to live forever! Good cartilage cells are sterile and cannot make more cartilage if these cartilage cells are destroyed.

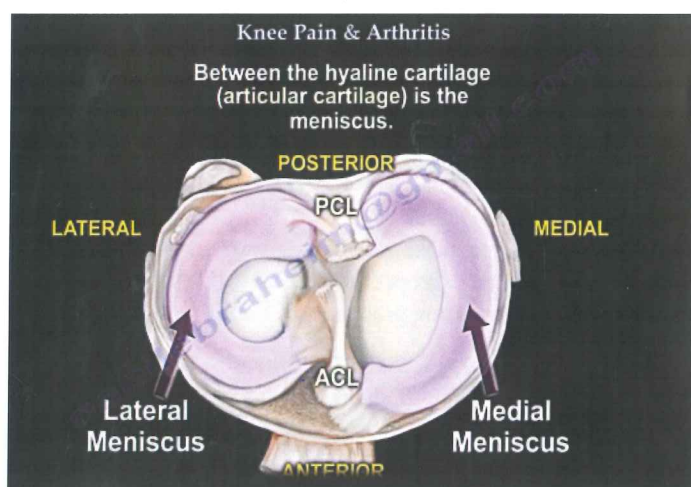
If the cartilage is subjected to excessive wear, excessive trauma or injury, overuse, excessive weight or improper alignment, then the cartilage will wear away leaving the bone to rub against the bone. If injured, cartilage does not have the ability to heal itself with hyaline cartilage, however it does sometimes heal itself with an inferior type of cartilage called fibrocartilage, especially if the area that needs to be repaired is small.

What is the treatment of arthritis of the knee? There are a number of treatment options that will help the patient.

1. The doctor will choose the right kind of medication including the type, dose and duration of the treatment. The medication has to be safe and effective!

The selection of medication is usually based on the physician's experience, preference and the patient's susceptibility. Nonsteroidal anti-inflammatory drugs (NSAIDs) will be used. Ultram (tramadol) is used for symptomatic osteoarthritis. Some doctors prefer a combination of Ultram (tramadol) and Tylenol (acetaminophen). Medications are a core initial treatment that is very important and recommended.

2. Losing weight: For a person to be classified as overweight, they would have a BMI between 25 and 29.9. An obese person would be described as someone who has a BMI of 30 or more. If a person's BMI is above 25, diet control and exercise is recommended in order to lose about 5% of the body weight. The patient should be given a nutritional consult and some encouragement.



How to handle a person with metabolic syndrome? These patients will have abdominal obesity, high blood pressure, elevated fasting blood glucose levels, and dyslipidemia.

3. Low impact physical therapy: Low impact activities such as swimming or cycling are usually better and put less stress on the knees. Jogging, running and tennis are high impact activities and will put more stress on the knees. Lifestyle modifications to protect the knee will slow the progression of the arthritis. Physical therapy will decrease the pain, improve the function of the knee, and increase the strength, range of motion and flexibility of the knee.

The initial treatment for arthritis of the knee is usually nonsurgical. The physician will also use intra-articular injection of steroids viscosupplementation, or hyaluronic acid. The injection will relieve the patient's pain and disability. Steroid injections can be administered about 3 - 4 times per year. Viscosupplementation will improve the quality of the joint fluid.

Other methods of injection are gene therapy, PRP, growth factors and stem cells. It is logical to pursue the efficacy of stem cells in cartilage regeneration. More clinical trials and more research are needed in this area.

Continued on page 2

Assistance devices may be helpful. These devices include a cane, shock absorbing shoes, shoe inserts, knee sleeves, and a support brace.

Arthroscopy should not be done with arthritis unless there is a loose body or meniscal tear causing mechanical symptoms of recurring locking, catching, swelling and pain.

Other treatment options with no clinical effective response include acupuncture, massage, glucosamine, chondroitin sulfate, valgus directing brace, wedges in the foot, and Arthroscopic Debridement and Lavage.

Arthritis of the knee could be minimal and anything could help the arthritis in this situation. Arthritis of the knee is similar to a leaky roof, when you patch it up the leak will stop.

If the knee arthritis is moderate, then the physician has many options for treatment and none of these options have predictable in the result.

When arthritis of the knee is considered a severe case, simply "patching" the problem will not work. With severe arthritis, a total knee replacement is the most reliable option for treatment.

We need to reduce the level of pain and improve the function of the knee. When the roof of the house is totally destroyed, we have to change the roof, and the same principle applies with a total knee replacement. As arthritis destroys the cartilage of the knee, the water content will increase early, collagen becomes disorganized, proteoglycan concentration and synthesis will decrease, and the modulus of elasticity of the cartilage is reduced; a total knee replacement is needed!

The doctor will remove all of the damaged cartilage and bone to insert a new knee. There is some potential risk of complications with every surgery! Blood clots, infection, pain, failure of the procedure and instability are examples of the complications. The patient is usually given a blood thinner, which may have its own significant complications hemorrhage, hematoma, infection or blood clots. No treatment is waterproof, and there is not a cure for arthritis.

Clinical Examination of Ankle Fractures

You need to check to make sure the patient has good circulation, diabetes, or peripheral neuropathy. Examine the pulses and check the circulation. There are some problems associated with diabetic ankle fractures.

Does the patient have peripheral neuropathy? Does the patient have Charcot arthropathy?

Also, look for soft tissue conditions. You may want to delay surgery until any soft tissue conditions improve.

- Elevate the foot and ankle
- Try to identify if there are any open fractures

- Try to reduce the dislocations
- Try to improve the positions of the fractures and splint the patient.

There are two points related to clinical exam that are worth mentioning:

1. Clinical examination is unreliable in predicting medial injury. - Swelling, tenderness or ecchymosis is not reliable in predicting medial ankle injury. You need to get stress view x-rays in order to see if the deltoid ligament is injured or not.
2. If the patient has tenderness over the area of the malleolus, is unable to bear weight, and is an older patient: - Get an x-ray, the injury may be a fracture and not an ankle sprain.

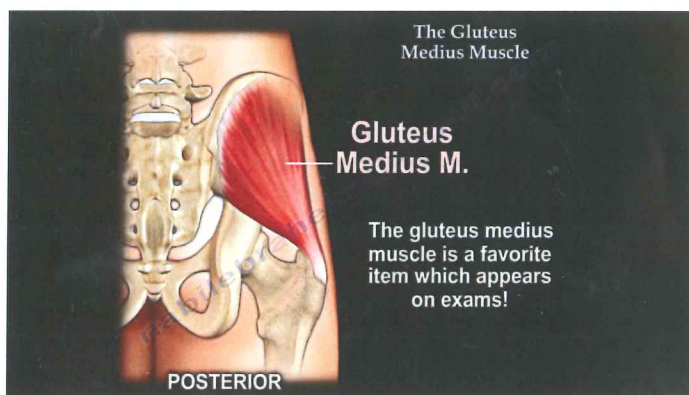
The Gluteus Medius Muscle

Origin - It arises from the dorsal ilium inferior to the iliac crest from the posterior gluteal line to the anterior gluteal line. The gluteus medius muscle forms the middle layer of the gluteal muscles.

Insertion - It inserts into the lateral and superior aspect of the greater trochanter of the proximal femur. The caudal portion of the gluteus medius tendon is close to the piriformis muscle. The gluteus medius muscle covers the entire gluteus minimus muscle. **REMEMBER!** The gluteus medius muscle runs from the ilium to the greater trochanter of the proximal femur.

Innervation - The gluteus medius muscle is supplied by the superior gluteal nerve (L4, L5, S1-predominantly L5).

Blood Supply - The blood supply comes from the superior gluteal artery which runs above the piriformis muscle. This artery may become injured due to acetabular fractures either due to the trauma



or by the surgery. This may lead to compromise of the abductor muscles.

Continued on page 3

Function - The gluteus medius muscle is the most powerful abductor of the hip joint! There are two muscles that abduct the hip; the gluteus medius muscle and the gluteus minimus muscle. The abductor muscles play an important role in the stabilization of the pelvis. The anterior fibers of the gluteus medius muscle provide some internal rotation of the hip and the posterior fibers provide some external rotation of the hip.

The superior gluteal nerve may be injured due to the Watson-Jones or lateral approach to the hip if the incision extends more than 5 cm above the acetabulum. Surgeons like the lateral approach (Hardinge approach) better than the posterior approach to the hip because the rate of hip dislocation is less.

The superior gluteal nerve will limit the proximal extent of the gluteus medius split. This nerve is approximately 5 cm proximal from the tip of the greater trochanter. If you split the gluteus medius muscle about this point, then you run the risk of injuring the superior gluteal nerve and compromise the muscle function.

If injury occurs to the gluteus medius muscle, there will be weakness of hip abduction. Weakness of the muscle could be seen early after a total hip replacement. The patient will be sent to therapy to regain the strength of the muscle. Occasionally there is an occult injury or

rupture of the muscle itself that goes unrecognized. Injury to the muscle may sometimes be mistaken for trochanteric bursitis but it is really an occult rupture of the tendon. MRI may be needed to check for a rupture. Injury may or may not result from surgery in this area.

If there is gluteus medius muscle weakness, the Trendelenburg gait may occur.

What is Trendelenburg Gait?

When the patient is standing on the weakened side, the weakened gluteus medius muscle will allow the opposite side of the pelvis to tilt downwards. The body will try to compensate by having the trunk lean towards the weakened side. When leaning towards the weakened side, this will move the center of gravity near the fulcrum on the weak side. This will shorten the moment arm from the center of gravity towards the hip joint and reduce the effect required by the abductors of the hip. If the patient has weakness on the one side of the pelvis and when the patient stands on that side, the pelvis on the contralateral side will drop (called Trendelenburg Sign).

A posterolateral disc herniation between the level of L4 and L5 will affect the L5 nerve root (gluteus medius) and cause Trendelenburg gait. The superior gluteal nerve injury is a major factor in Trendelenburg Gait.

Ankle Fracture Syndesmosis

The intraoperative stress exam determines if syndesmotom instability is present.

Abduction – external rotation of the talus will try to displace the fibula from the incisura fibularis. The talus moves laterally and displaces the fibula. The ankle will show a valgus talar tilt or an increase in the medial clear space.

Before you do syndesmotom reduction and fixation, it is important to restore the length and rotation of the fibula. When syndesmotom instability is present, syndesmotom screw fixation is done.

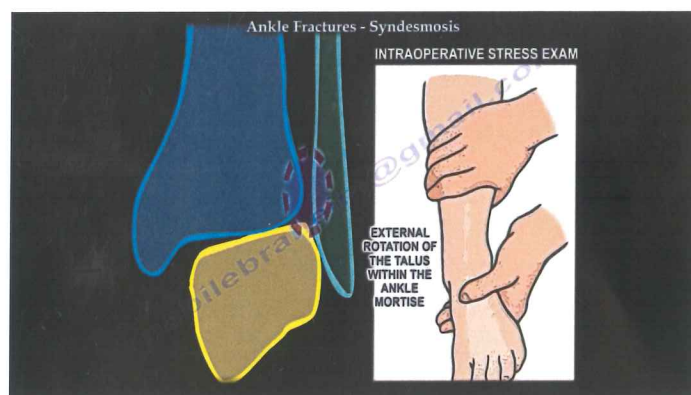
How do you know when instability is present? Always have a high index of suspicion.

Syndesmotom fixation is often required when the fibular fracture is high and it is associated with a deltoid ligament injury.

REMEMBER! Weber Type C fracture is commonly associated with syndesmotom injury. • Fracture of the fibula occurs above the level of the syndesmosis. • The syndesmosis is usually unstable.

Get stress view x-rays and look at certain measurements in order to determine if the syndesmosis is injured or not.

Measure the tibiofibular clear space at 1 cm above the joint. If there is a syndesmotom injury, the tibiofibular clear space will be greater than 5 mm. With syndesmotom injury, the medial clear space will be increased, normally it should be less than 4 mm. The medial clear space can be increased preoperatively due to injury of the deltoid ligament. This is used to differentiate between supination – external rotation Stage II and Stage IV injuries. The medial clear space can be



helpful intraoperatively after fixation of the fibula to diagnose syndesmotom injury on stress view radiographs. We need to fix the instability of the syndesmosis!

What is the technique?

Restoring the length and rotation of the fibula is not good enough! Accurate reduction of the syndesmosis is required and direct inspection of the syndesmotom reduction is helpful. Syndesmotom reduction should be supported by the x-rays and check for widening.

Check the dime sign. The shenton's line and dime sign will be restored after reduction of the syndesmosis and use of a reduction clamp. This is the time to get AP view and lateral view radiographs. Assess the syndesmotom injury before placement of syndesmotom screws.

Continued on back page



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Ankle Fracture Syndesmosis continued

Try to use multiple techniques to check on the stability of the syndesmotic injury!

1. External rotation stress view x-rays (intraoperative).
2. Cotton Text - Pull on the fibula with a bone hook and assess the movement of the syndesmosis.
3. Direct inspection of the syndesmosis. - The crural fascia may be intact and covering a major syndesmotic injury.

Technique: 1. Dorsiflex the ankle. 2. Directly inspect and reduce the fibula. 3. Use reduction clamp. 4. Get x-rays to prove that the syndesmosis is reduced and then you can place the screws. - Syndesmotic screws can be placed about 2-4 cm above the joint with an angle of 20% - 30% posteriorly to anteriorly. - Do not use Lag screws and do not over compress the syndesmosis with the position of the talus in plantar flexion. The use of syndesmotic screws is controversial!

Problems with the Syndesmosis

- Reading the x-rays: - Make sure that the fibular length and rotation is normal. - Make sure that the fibula is anatomically reduced to the incisura fibularis (fibular notch) before inserting the syndesmotic screws. - Get x-rays to check the talus both in the AP and lateral plane.

The two important problems with the syndesmosis are:

1. Missing the injury. 2. Malreduction of the syndesmosis - Malreduction may be as high as 50%. - Try to use direct inspection and intraoperative radiograph before you fix the syndesmosis.

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