

GENICULAR NERVE BLOCK AND ABLATION

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DISCLOSURE

- I have nothing to disclose



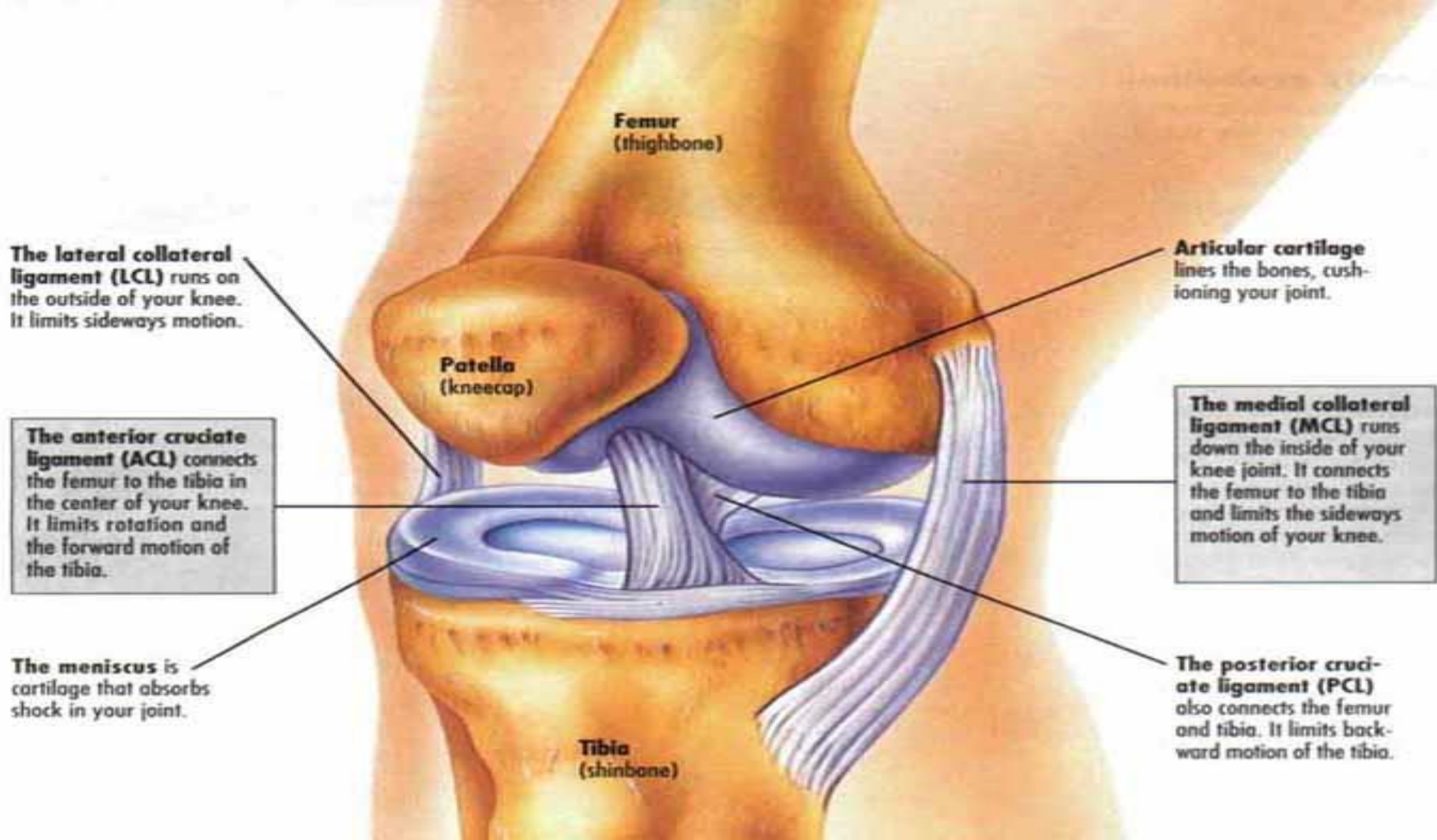
"The knees are the first thing to go."

INTRODUCTION

- Osteoarthritis (OA) of the knee is one of the most common joint diseases affecting adults in the United States [[1](#)]. With up to 20 million adults in the US suffering from OA of the knee¹, close to 700,000 cases progress to total knee joint replacement
- Symptomatic OA clinically manifests as either pain or decreased function and affects roughly 10% of men and 13% of women over the age of 60.
- Population studies have shown that the prevalence of symptomatic OA is around 20% in individuals greater than 65 years of age [[2](#)].
- Diagnosis of OA is made when the clinical signs and symptoms correlate with radiologic changes.

For elderly patients with multiple medical comorbidities who do not wish to undergo total knee arthroplasty (TKA), **lifestyle modification, pharmacologic management, and injections are the mainstay of therapy.**

Previously, pain management interventions were limited to intra-articular joint steroid injections and visco-supplementation with hyaluronic acid . Recently, Choi et al. described a fluoroscopic-guided technique for radiofrequency ablation (RFA) of the genicular nerves .



Femur
(thighbone)

The **lateral collateral ligament (LCL)** runs on the outside of your knee. It limits sideways motion.

Articular cartilage lines the bones, cushioning your joint.

Patella
(kneecap)

The **anterior cruciate ligament (ACL)** connects the femur to the tibia in the center of your knee. It limits rotation and the forward motion of the tibia.

The **medial collateral ligament (MCL)** runs down the inside of your knee joint. It connects the femur to the tibia and limits the sideways motion of your knee.

The **meniscus** is cartilage that absorbs shock in your joint.

Tibia
(shinbone)

The **posterior cruciate ligament (PCL)** also connects the femur and tibia. It limits backward motion of the tibia.

ANATOMY OF THE GENICULAR NERVE

The knee joint is innervated by the articular branches of various nerves, including the

- **Femoral**
- **Common Peroneal**
- **Saphenous**
- **Tibial**
- **Obturator** nerves

These articular branches around the knee joint are known as genicular nerves. Genicular nerves can be easily approached percutaneously under fluoroscopic guidance.

Nerve Supply Of Knee Joint

1) **Femoral Nerve:** gives branches from the nerves to the three vasti

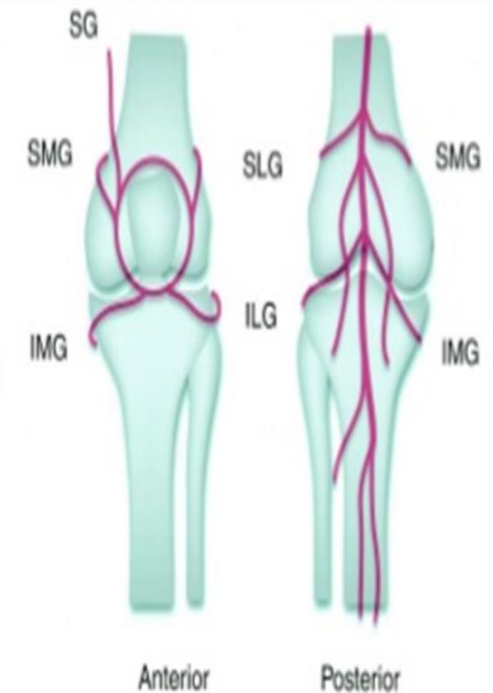
2) **Tibial Nerve Branches**

- a) *Superior medial genicular*
- b) *Inferior medial genicular*
- c) *Middle genicular nerve*

3) **Common Peroneal Nerve Branches**

- a) *Superior lateral genicular*
- b) *Inferior lateral genicular*
- c) *Recurrent genicular nerve*

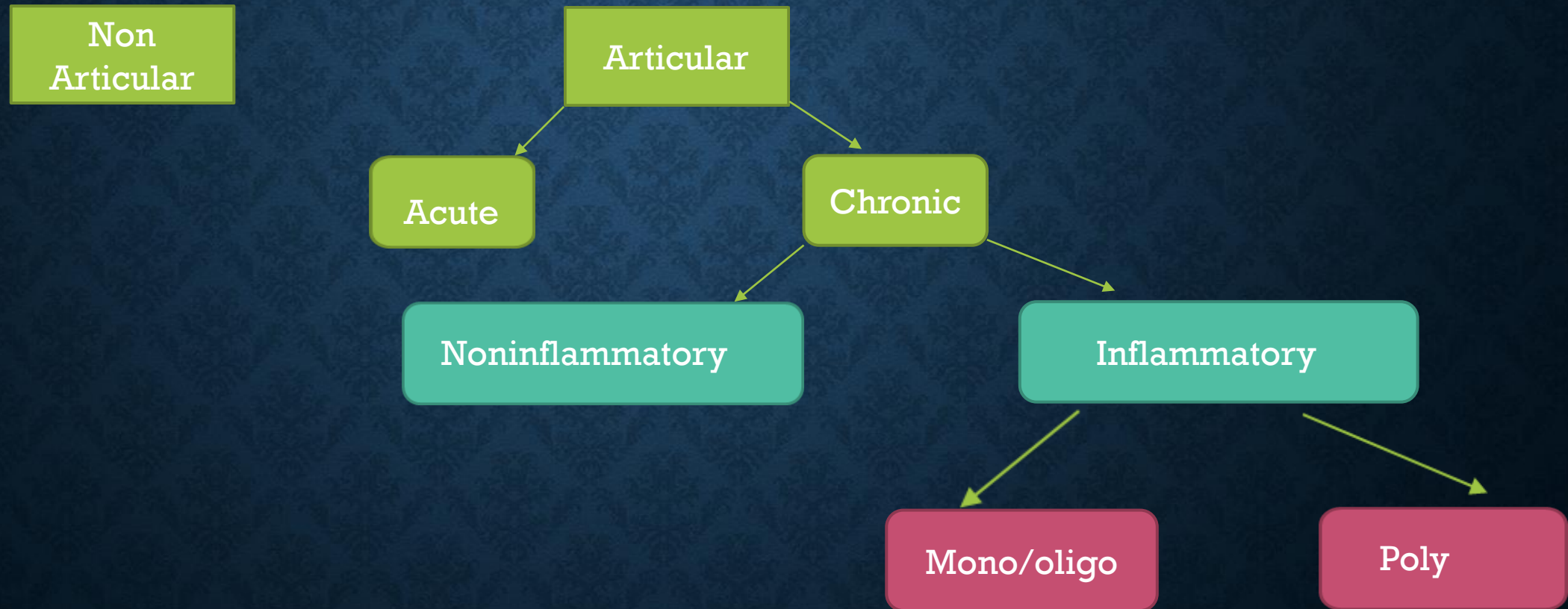
4) **Obturator Nerve:** gives genicular branch from its posterior division



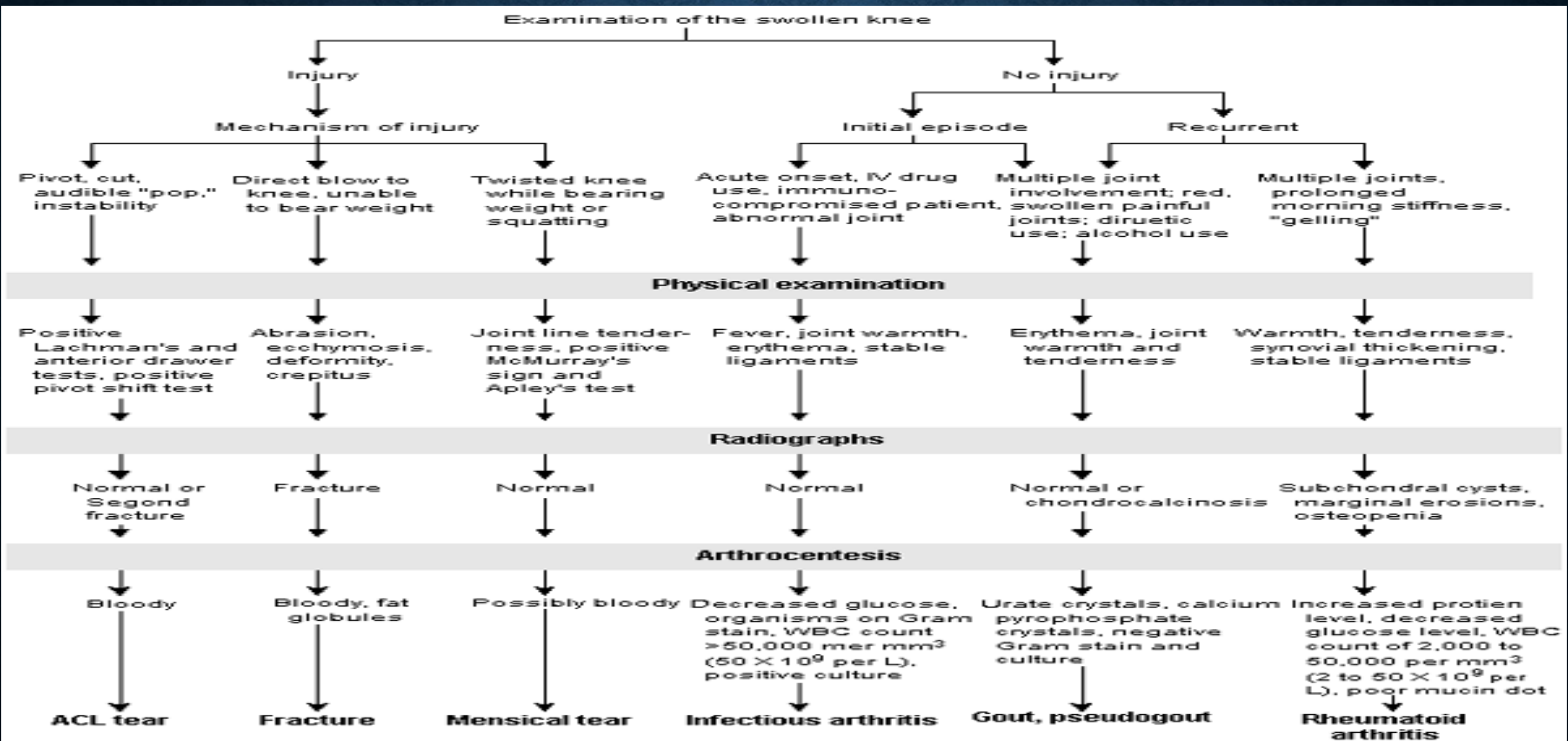
GENICULAR BRANCHES OF THE KNEE JOINT

- Genicular nerves consist of the **superior lateral (SL), middle, superior medial (SM), inferior lateral (IL), inferior medial (IM), and recurrent tibial genicular nerve** .
- The targets included the **SL, SM and IM genicular nerves** which pass periosteal areas connecting the shaft of the femur to bilateral epicondyles and the shaft of the tibia to the medial tibial plateau.
- Although genicular nerves are the main innervating articular branches for the knee joint, **other articular branches may also be present**. For this reason, pain of the knee joint **may not be completely relieved**, resulting in poor response to radiofrequency neurotomy.

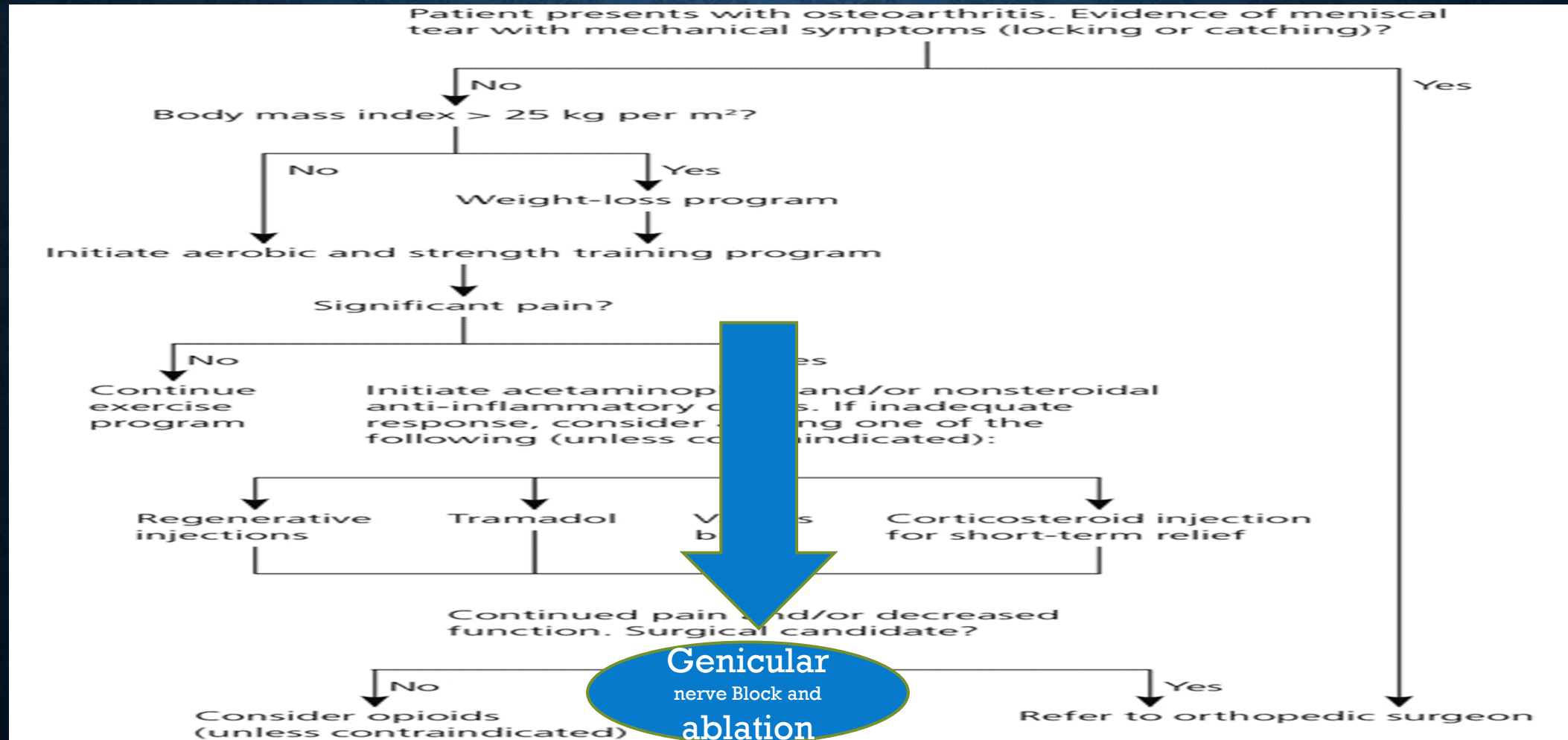
DIFFERENTIAL DIAGNOSIS OF MUSCULOSKELETAL PAIN

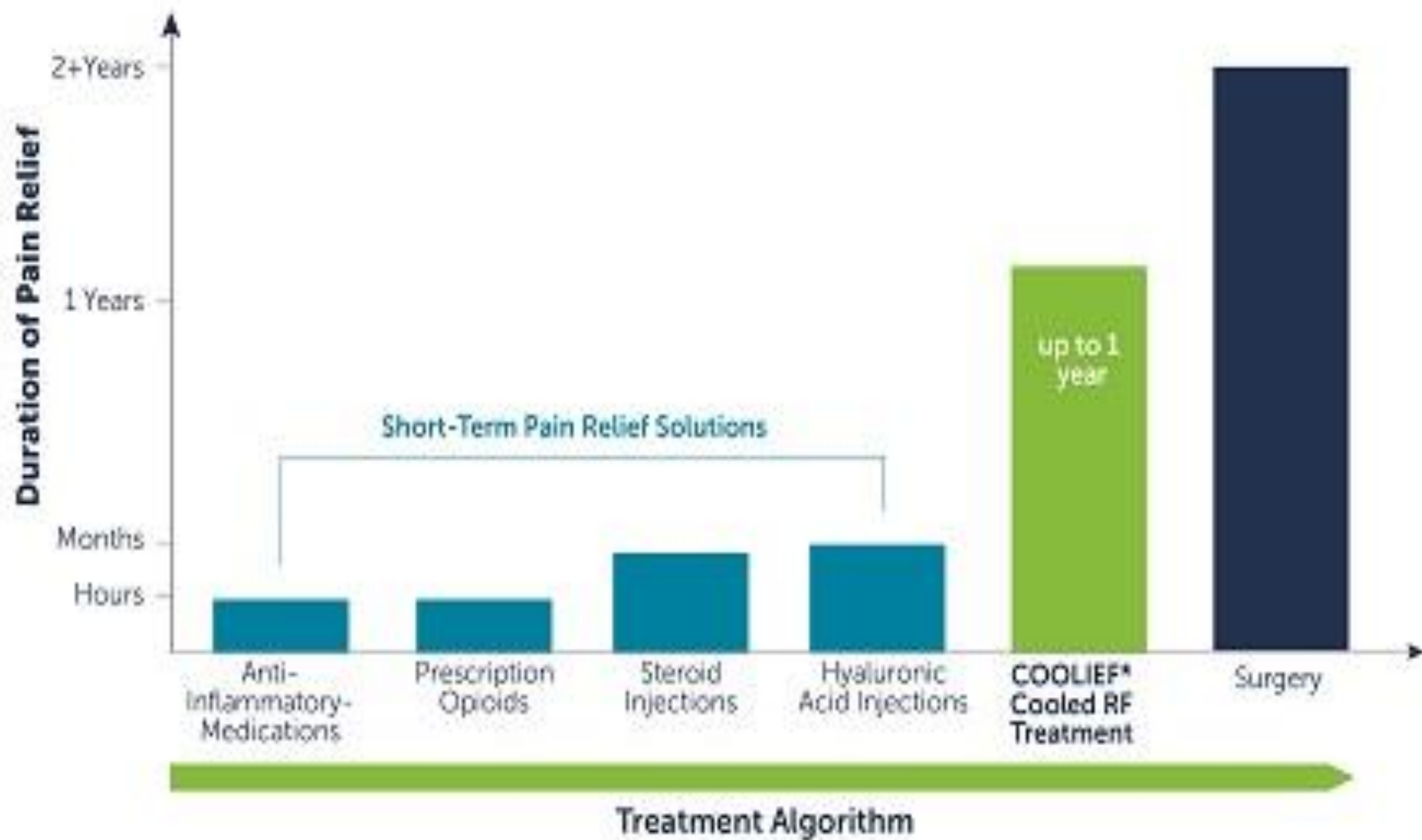


Examination of Swollen knees



CURRENT TREATMENT ALGORITHM





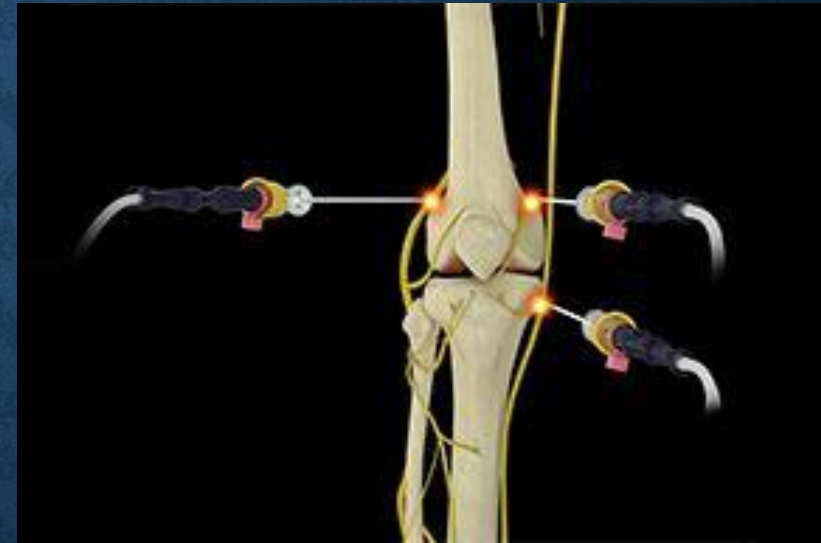
INDICATIONS

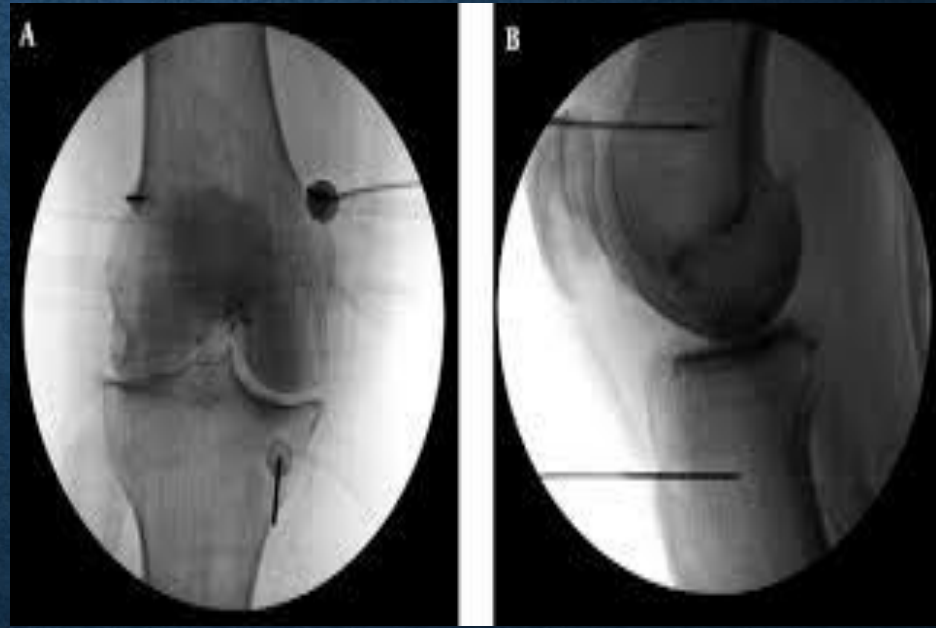
- Chronic knee pain secondary to osteoarthritis, unresponsive to conservative managements
- Failed knee replacement
- Unfit for knee replacement, patients with **comorbidities may not be appropriate surgical candidates.**
- Want to avoid surgery, patients do not wish to consider surgery and prefer non- surgical options.

DIAGNOSTIC GENICULAR NERVE BLOCKS

- These injections are performed under fluoroscopy guidance. A small amount of local anaesthetic (1-2ml) of lidocaine or bupivacaine is injected around the
- **Superior lateral (SL),**
- **Superior medial (SM) and**
- **Inferior medial (IM) branches.**

A response is considered positive if there is at least **50%** reduction in pain in the 24hrs following injection.





RADIOFREQUENCY OF GENICULAR NERVES

Patients with a positive response are offered either

- **Cooled (Coolief)**
- **conventional radiofrequency neurotomy** for a more sustained response.

The procedure is usually done on an outpatient basis. The procedure is performed under fluoroscopic guidance to ensure accuracy of needle placement.

RADIOFREQUENCY OF GENICULAR NERVES

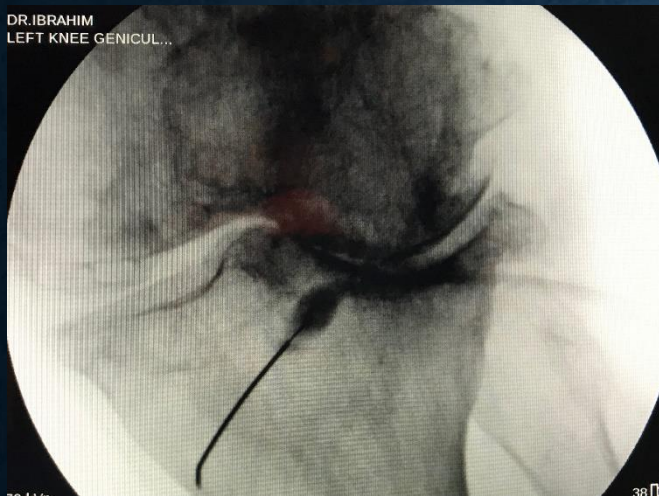
- Radiofrequency treatment involves creating a heat lesion around the genicular nerves carrying painful impulses from the knee joint. Successful treatment can result in pain relief lasting several months.
- Either conventional radiofrequency treatment (70-80°C) or cooled radiofrequency treatment (60°C) can be used. Cooled radiofrequency (Coolief) allows creation of larger-volume, spherical lesions compared to conventional radiofrequency.
- Treatment is performed under local anesthetic and can take 4 to 6 weeks to work.

COOLIEF* KNEE COOLED RADIOFREQUENCY FOR GENICULAR NEUROTOMY

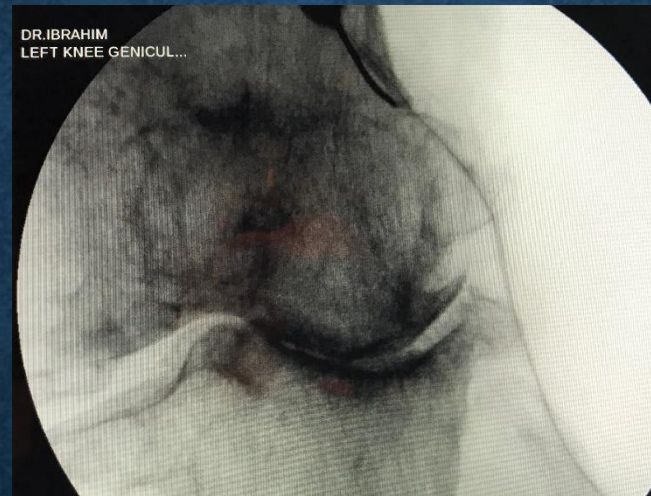
- Clinical studies of cooled RF addressing other sources of pain have demonstrated over 20 months of pain relief and improved physical function³
- Potentially reduces the amount of time and fluoroscopic exposure through straightforward, familiar placement techniques
- Genicular Nerve RF is a non-surgical, minimally-invasive . Because it can be performed in an outpatient setting, patients have the potential to return to an enhanced quality of life much sooner than with surgery --- and with a reduced need for narcotics.³
- Physical function is significantly improved
- Pain and disability are decreased
- Drug utilization is reduced

There is still ongoing studies to compare between the efficacy of cooled vs conventional genicular radiofrequency ablation

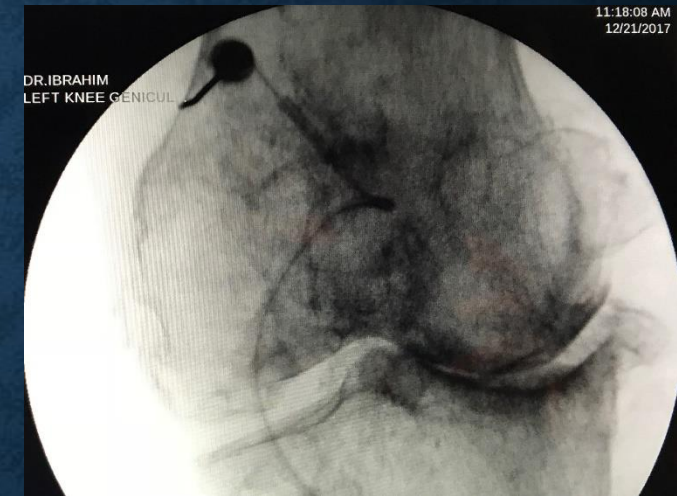
82 YEARS OLD FEMALE WITH SEVERE OSTEOARTHRITIS OF THE KNEE



Inferior Medial Genicular
Nerve Ablation



Superior Lateral
Genicular Nerve
Ablation



Superior Medial
Genicular Nerve
Ablation

82 YEARS OLD FEMALE WITH SEVERE OSTEOARTHRITIS OF THE KNEE



Patient had 100% relief with 0/10 pain upon her 2 weeks follow up and continued to be pain free for 11 months

COMPLICATIONS

1. **Septic arthritis** can be avoided with appropriate aseptic precautions plus injection is extra articular.
2. Severe **allergic reactions** to local anesthetics are uncommon.
3. **Post-procedural pain flare-up** is not uncommon, and may be treated with painkillers.
4. Neurological complications including **paraesthesias and numbness** have been described but are extremely rare.
5. **Patchy numbness** of the over lying skin.

IS GENICULAR NERVE RADIOFREQUENCY ABLATION SAFE? A LITERATURE REVIEW AND ANATOMICAL STUDY.

- [Pain Physician](#). 2016 Jul;19(5):E697-705.
- [Kim SY](#)¹, [Le PU](#)², [Kosharsky B](#), [Kaye AD](#)³, [Shaparin N](#), [Downie SA](#)⁴.

Abstract

- Genicular nerve radiofrequency ablation (RFA) has recently gained popularity as an intervention for chronic knee pain in patients who have failed other conservative or surgical treatments. Long-term efficacy and adverse events are still largely unknown. Under fluoroscopic guidance, thermal RFA targets the lateral superior, medial superior, and medial inferior genicular nerves, which run in close proximity to the genicular arteries that play a crucial role in supplying the distal femur, knee joint, meniscus, and patella. RFA targets nerves by relying on bony landmarks, but fails to provide visualization of vascular structures. **Although vascular injuries after genicular nerve RFA have not been reported, genicular vascular complications are well documented in the surgical literature.** This article describes the anatomy, including detailed cadaveric dissections and schematic drawings, of the genicular neurovascular bundle. The present investigation also included a comprehensive literature review of genicular vascular injuries involving those arteries which lie near the targets of genicular nerve RFA. These adverse vascular events are documented in the literature as case reports. Of the 27 cases analyzed, 25.9% (7/27) involved the lateral superior genicular artery, 40.7% (11/27) involved the medial superior genicular artery, and 33.3% (9/27) involved the medial inferior genicular artery.
- Most often, **these vascular injuries result in the formation of pseudoaneurysm, arteriovenous fistula (AVF), hemarthrosis, and/or osteonecrosis of the patella.** Although rare, these complications carry significant morbidities. Based on the detailed dissections and review of the literature, our investigation suggests that vascular injury is a possible risk of genicular RFA. Lastly, recommendations are offered to minimize potential iatrogenic complications.

PAIN PHYSICIAN. 2017 MAR;20(3):E437-E444.

A REVIEW OF LONG-TERM PAIN RELIEF AFTER GENICULAR NERVE RADIOFREQUENCY ABLATION IN CHRONIC KNEE OSTEOARTHRITIS.

IANNACONE F¹, DIXON S², KAUFMAN A³.

- **STUDY DESIGN:**

Chart review and study design was approved by Newark Health Sciences Institutional Review Board (IRB). Chart review and follow-up was performed on all patients who underwent genicular nerve RFA during the period of February 2014 through August of 2015. During this inclusion period 41 genicular nerve RFAs were performed on 31 patients, 5 patients received RFA procedure in both knees. Patient follow-up was performed via telephone interview or in-office visit at least 3 months and 6 months post RFA.

- **RESULTS:**

At 3 month follow-up, the average pain relief was 67% improvement from baseline knee pain, 0% being no relief and 100% being complete relief, and average 0 - 10 pain score was 2.9. At 6 month follow-up, of those who described pain relief at 3 months, 95% still described pain relief. This group's average percent pain relief was 64% and average day's 0 - 10 pain score 3.3.

- **LIMITATIONS:**

Our study included a retrospective component in chart review followed by prospective follow-up, only 76% of patients were able to participate in the interview process. Furthermore, some patients suffered from other chronic pain ailments, most commonly chronic back pain, which at times disturbed the patient's ability to focus on solely knee pain.

- **CONCLUSIONS:**

Based on patient interviews and data collection, RFA of genicular nerves can supply on average greater than 60% pain relief in our patient population for as long as 6 months.

CONCLUSION:

Radiofrequency nerve ablation of genicular nerves is a safe and effective therapeutic procedure for chronic knee pain.

THANK YOU