

# Severe Knee Pain Status-Post Total Knee Arthroplasty (TKA): A Primer for Possible Interventional Procedures

Rishabh Agrawal MD, Rohan Kapuria BS, Arthur M. Freedman MD, Hanping Wu MD

## Objective

- Review nonsurgical and surgical management of the osteoarthritis (OA) patient population.
- Understand common post-operative outcomes of TKA surgeries.
- Compare different interventional procedures that may help relieve such postoperative complications.

## Background

- **Osteoarthritis:** non-inflammatory condition in which joint cartilage breaks down, often causing joint pain, stiffness, and a decrease in functional mobility
- Osteoarthritis affects ~32.5 million Americans yearly
  - Most common locations: knees, hands, spine
- Severe cases = surgical intervention (~ 1 million TKAs yearly in the US)
- Approximately 15-50% failure rate. Most common reasons:
  - Continued knee pain
  - Hemarthrosis
  - Hardware failure

## Discussion

### Intraarticular (IA) Injections <sup>1</sup>

- Various cocktails (20-40 cc) composed of various materials:
  - Local anesthetics + glucocorticoids
  - Opioids, adrenaline, NSAIDs, exogenous hyaluronate, PRP
- Usually conducted under US or CT guidance with 22-Gauge or 25-Gauge needle
- Risk of side effects
  - Effusion and knee stiffness for 24h (normal)
  - Cortisone flare
  - Risk of serious complications <1% (osteonecrosis, fat necrosis, septic arthritis, worsening OA)
- Arthrocentesis has a role in patients with significant joint space effusions/infections.

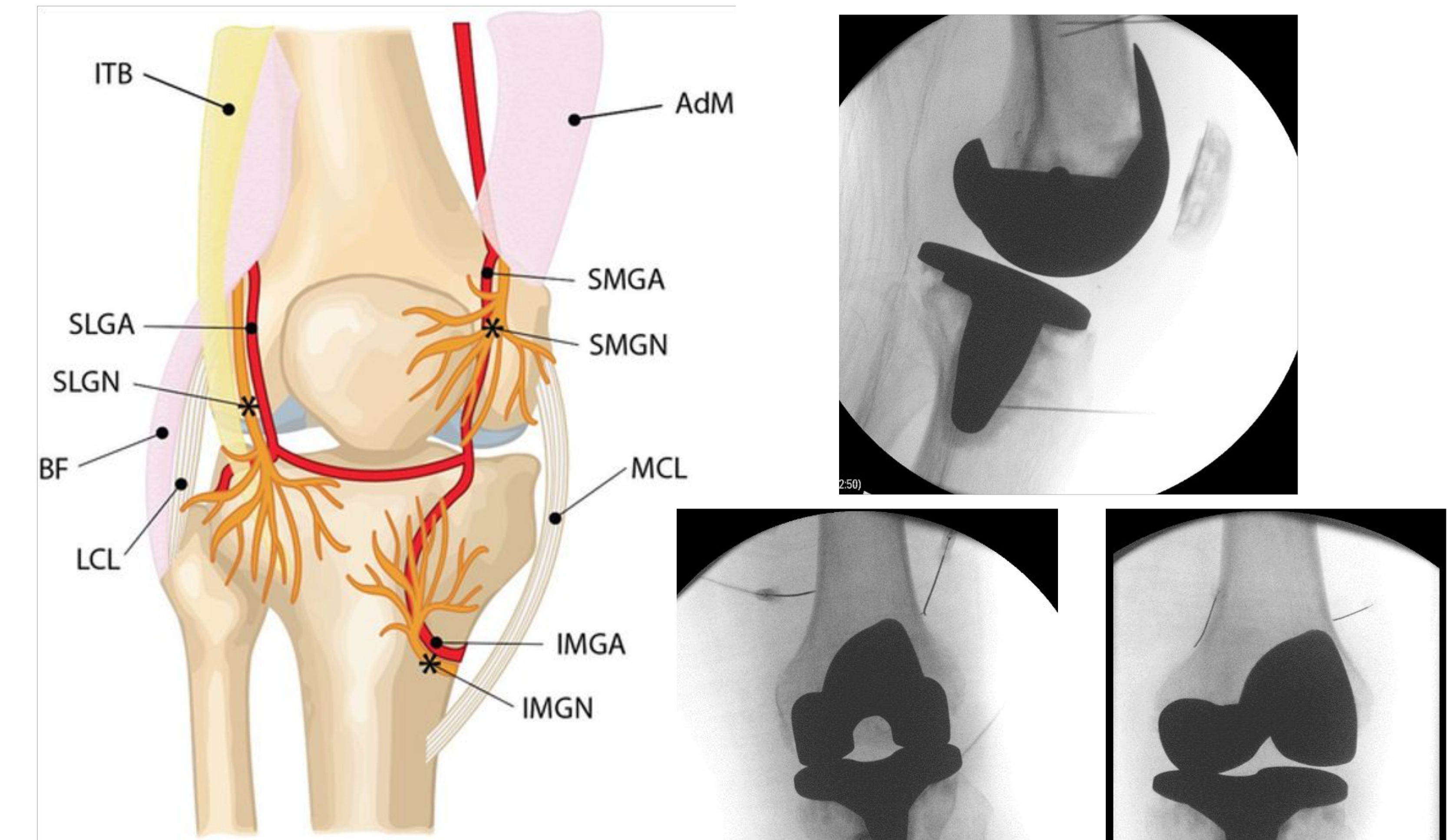
### Geniculate Artery Embolization (GAE) <sup>2,3</sup>

- Superselective embolization of genicular artery neovessels with antibiotics (Imipenem/cilastatin particles) or microspheres
- Targets abnormal vasculature (primary blood source for hemarthrosis) and neovascularity that may be source of inflammation
  - Most commonly the SLGA
- Risk of serious complications <1% (osteonecrosis, fat necrosis, septic arthritis, worsening OA)
- Technique challenges/complications
  - Metal prosthesis artifacts
  - Transient cutaneous ischemia (most common side effect)
    - Can protect against with ice pack
- Success rates x1 procedure ~50%, x3 procedures ~90%

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Case images provided by study team outside of an HCA Healthcare facility.

## Cases/Images

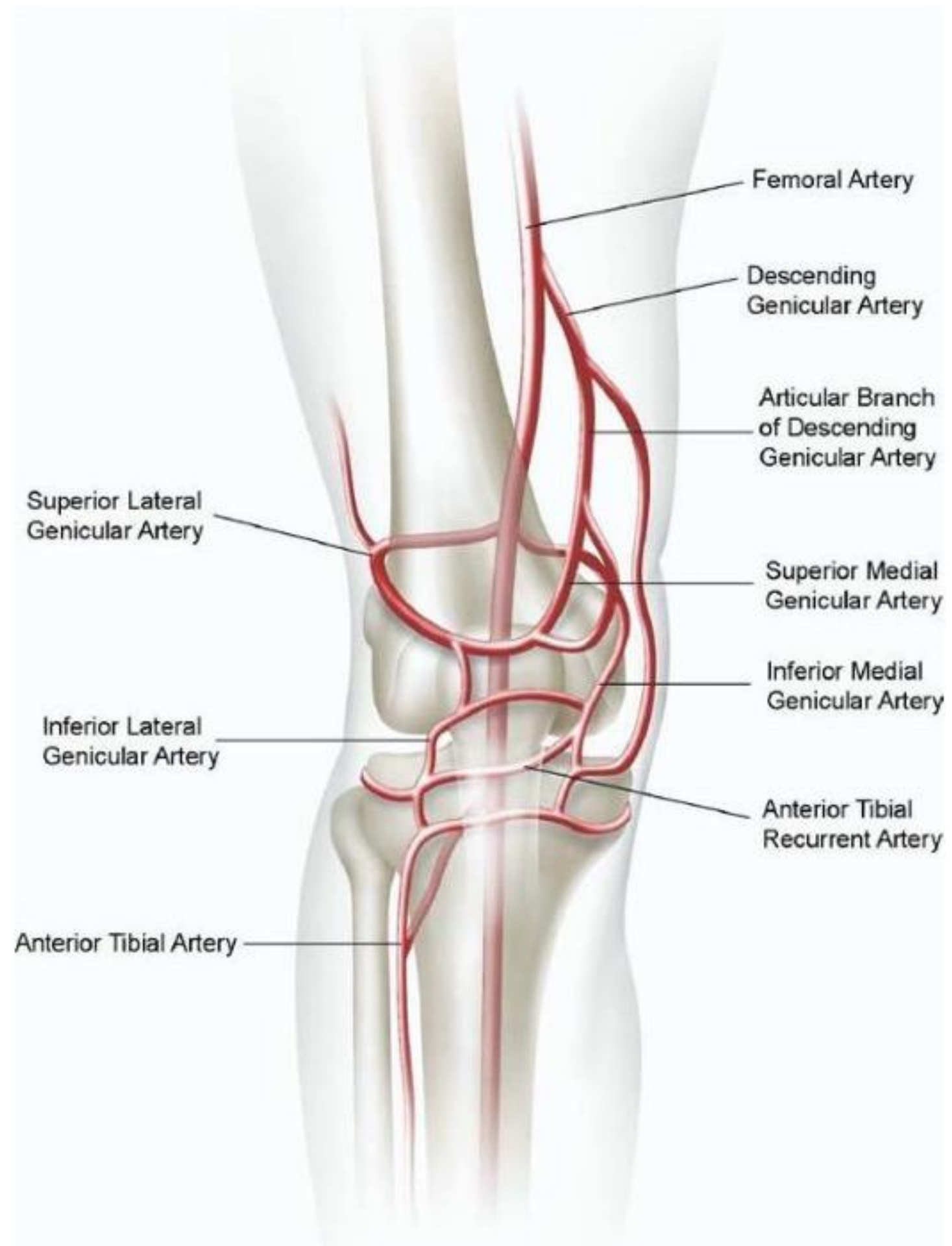


Neural anatomy of the knee joint (SLGN - superolateral genicular nerve, SMGN - superomedial genicular nerve, IMGN - inferomedial genicular nerve).  
Ref: <https://onlinelibrary.wiley.com/doi/full/10.1002/ajum.12280>



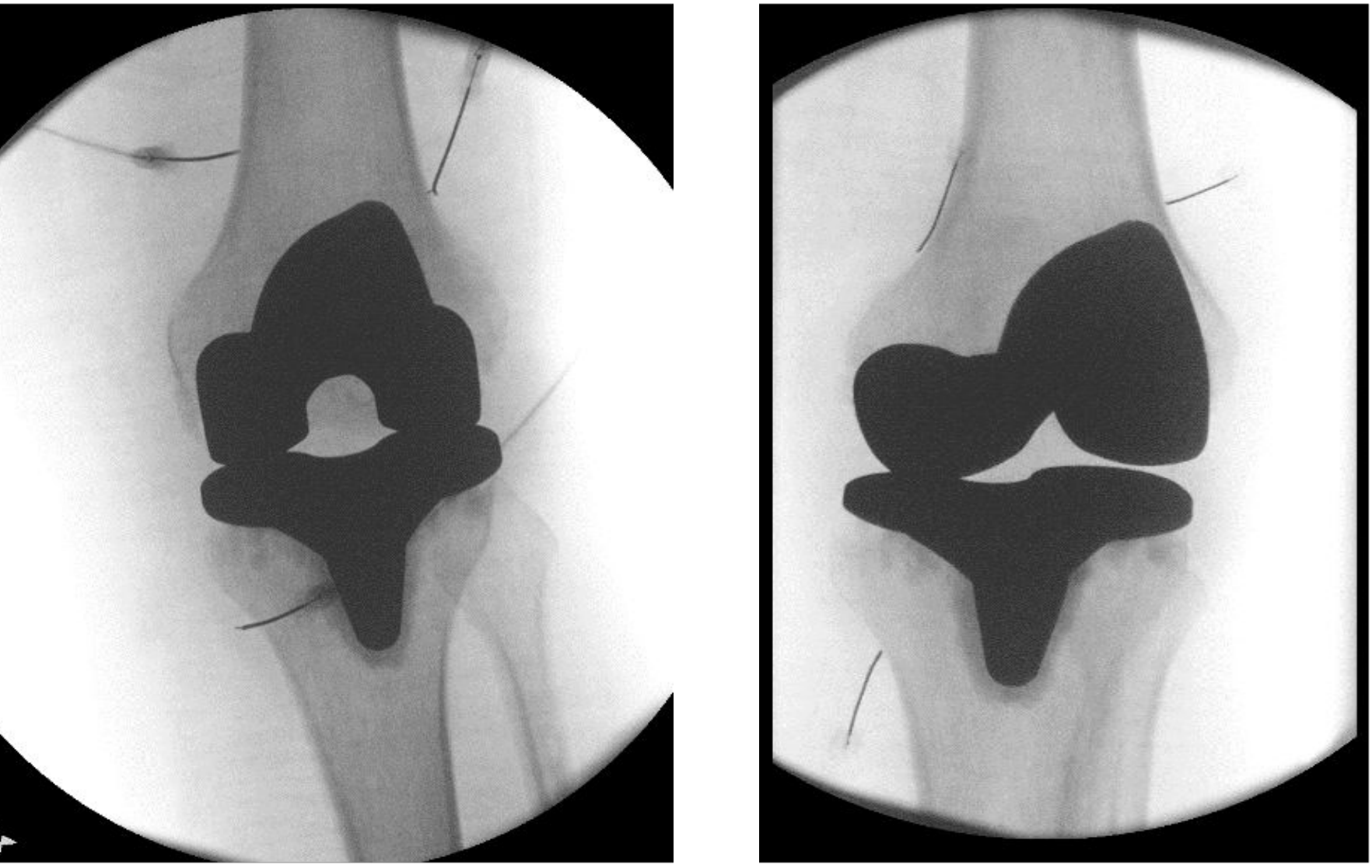
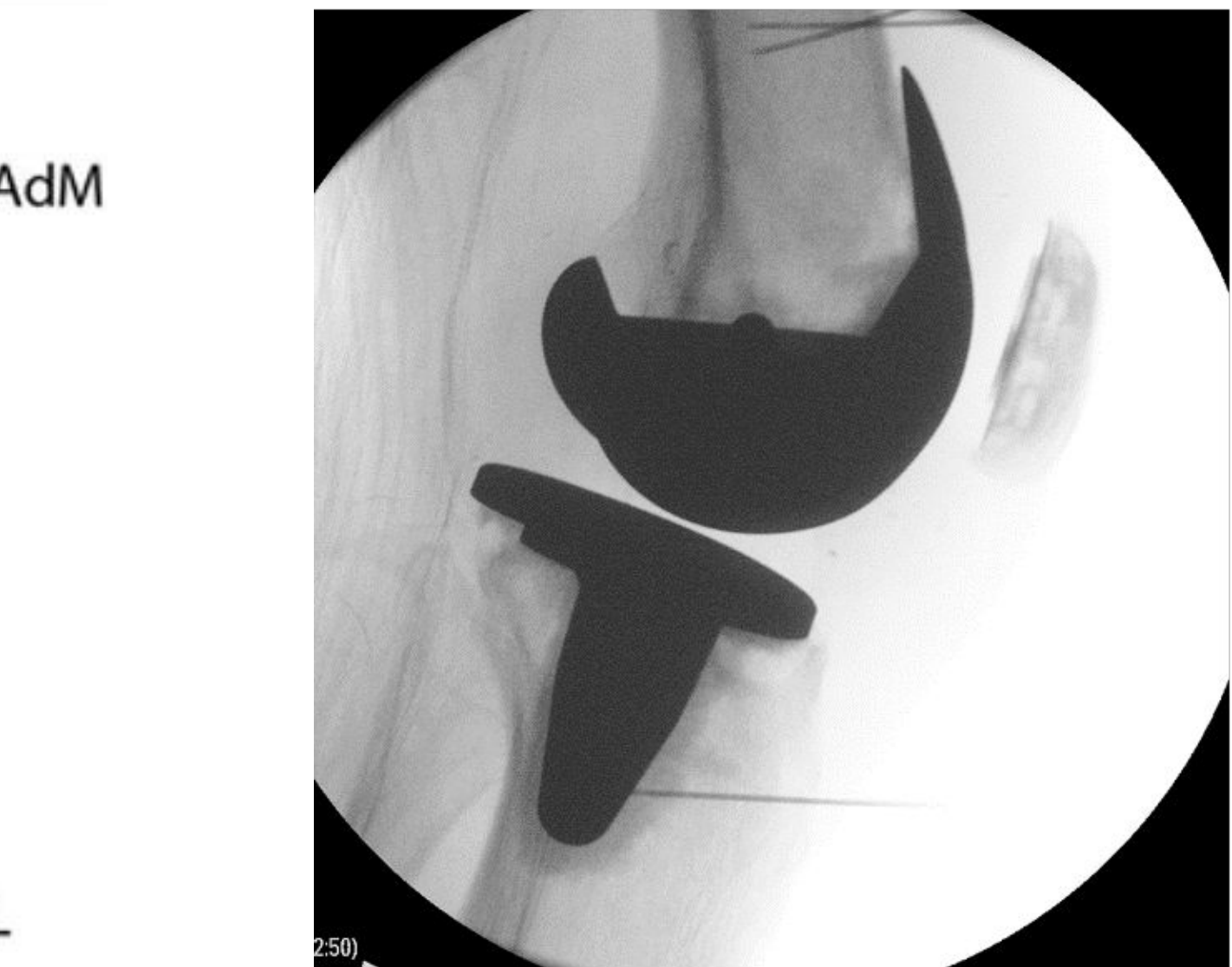
Pictured on left: Arthrocentesis of the knee joint via the superolateral approach (used in large effusions in contrast to the conventional lateral mid-patellar approach).  
Ref: <https://musculoskeletalkey.com/the-role-of-knee-aspiration-in-the-infected-total-knee-arthroplasty/>

Pictured on right: Short-axis view of IA injection under US guidance  
Ref: <https://radiopaedia.org/articles/knee-joint-injection-technique?lang=us>

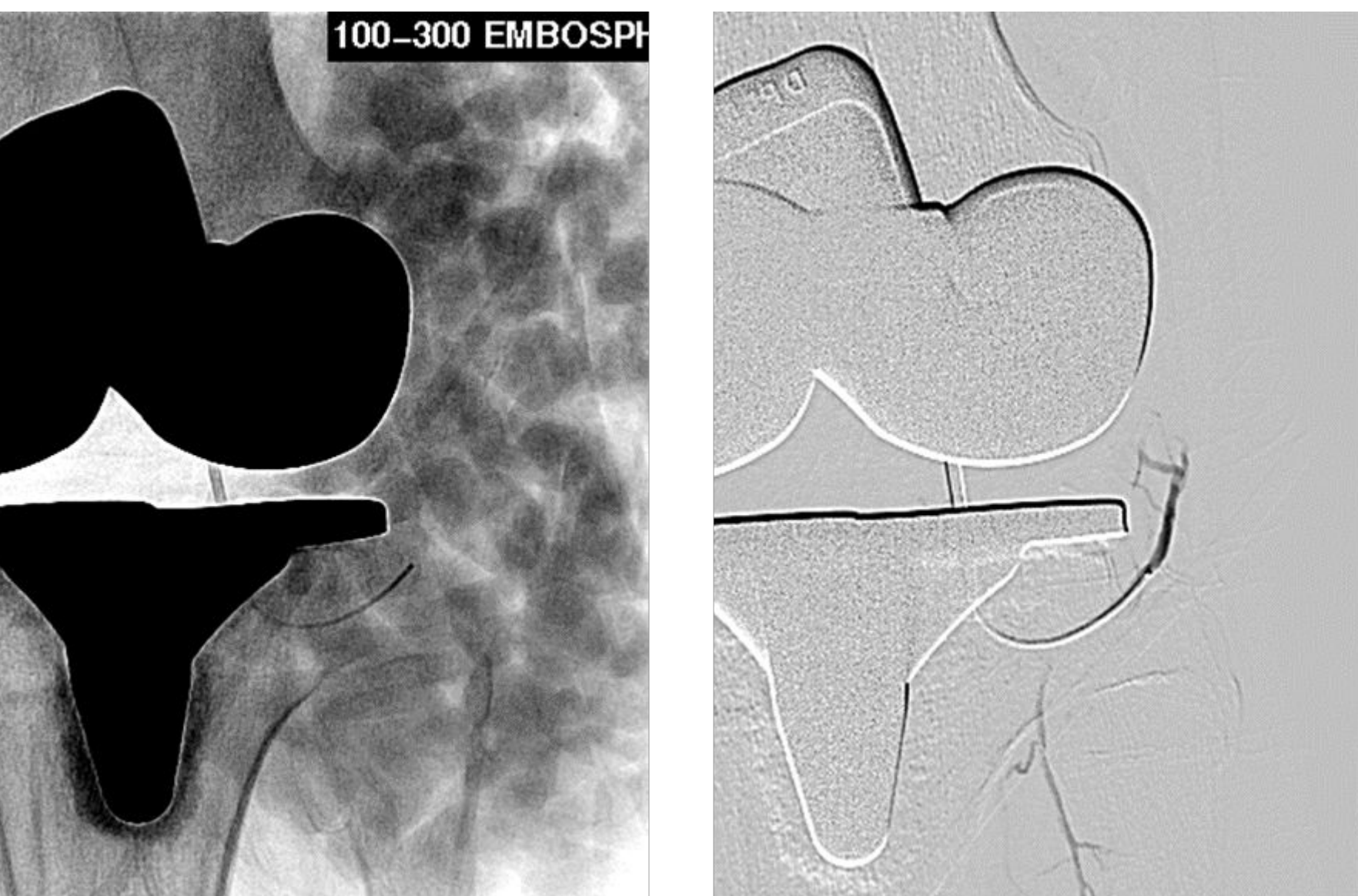
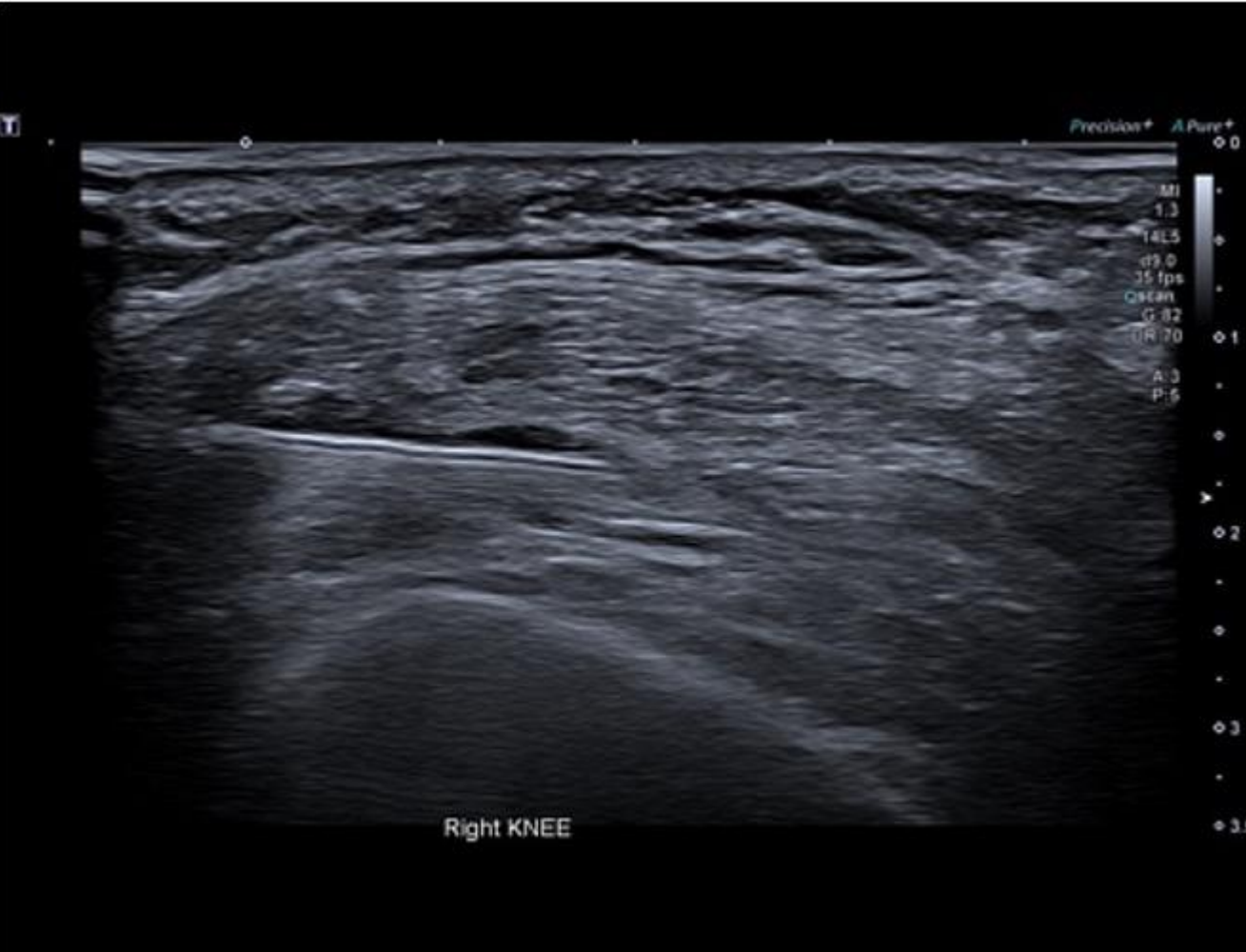


Pictured above: Vascular anatomy surrounding the knee joint.  
Ref: [https://www.jvir.org/article/S1051-0443\(21\)01072-1/fulltext](https://www.jvir.org/article/S1051-0443(21)01072-1/fulltext)

Pictured on right: Example case of fluoroscopic superselective catheterization of lateral genicular artery branch with 100-300µm Embospheres embolization



Example case: Fluoroscopic RFA of SLGN, SMGN, IMGN with additional application of 30mg triamcinolone + 3cc 0.5% bupivacaine. Patient originally had 8/10 pain, subsequently decreased to 0/10 with good ambulation afterwards.



## Discussion (continued)

### Genicular Nerve Block (GNB) <sup>4</sup>

- Procedure that targets the sensory branches of tibial, common peroneal, and obturator nerves (SLGN, SMGN, IMGN)
- Can be conducted in outpatient setting
- >50% pain reduction for 24hr = good candidate for RFA

### Radiofrequency Ablation (RFA) <sup>4,5</sup>

- Same 3 sites as the GNB
- Denatures proteins of nerves sheaths of the joint, halting pain signals to the CNS
- Lasts 6-12 months as nerves regenerate
- Also can be conducted in the outpatient setting
- Complications include risk of foot drop when targeting the ILGN (common peroneal nerve in proximity), hemarthrosis or pseudoaneurysm by hitting the genicular artery

## Conclusion

- Post-operative complications remain a large problem in patients undergoing TKA surgeries for OA.
- RFA is a simple, effective, and safe procedure for chronic pain relief after TKA, and can be a first-line treatment.
- GAE is also an effective procedure for post-TKA chronic pain but may be a 2nd line option after RFA given the relative technique difficulty and complication profile.

## References

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