

Geniculate Artery Embolization: A New Frontier for Osteoarthritis Management

Learning Objectives

To delineate the role of geniculate artery embolization in the management of osteoarthritis via a review current literature

Background

Osteoarthritis (OA) is a condition that negatively impacts the patient's quality of life. Although total knee arthroplasty (TKA) is a common solution, certain patients are poor candidates due pre-existing conditions.

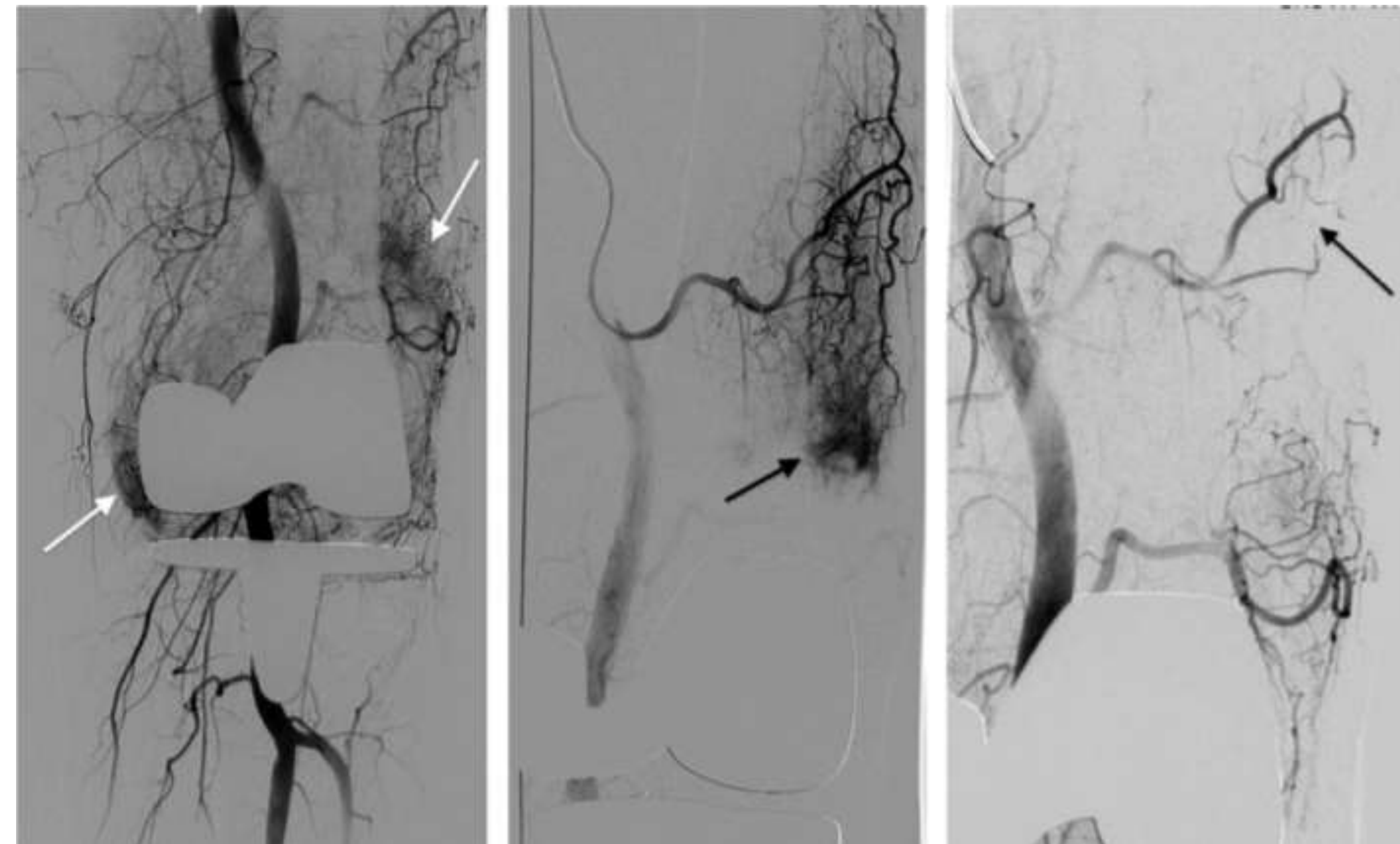
Conservative therapy consists of anti-inflammatory drugs, joint injections, and physical therapy but sometimes this may not be enough.

Recent research has shown that inflammation is a driver of OA since certain markers secreted from the synovium contribute to further joint destruction. As inflammation increases, angiogenesis occurs allowing further aggravation plus the development of nerves to run with new vessels. These newer nerves contribute to the cycle of chronic pain.

One new therapy for such a patient population is Geniculate Artery Embolization (GAE). Selective catheterization of the arteries with microspheres can occlude blood flow and thus decrease inflammation.

Materials and Methods: Based on information gathered from a literature review, a description of the workflow from pre-procedural planning to post-procedural factors will be given. A description of the steps will also be given along with figures for visual benefit. A literature search was done in PubMed and a total of three clinical trials were found. These trials were reviewed to determine the number of patients treated, the number of geniculate artery procedures performed, and the outcomes.

Results: Three studies were used from an initial search consisting of forty-one results. A total of 55 patients were analyzed across the three trials and results showed a consistent decrease in Western Ontario and McMaster University Osteoarthritis Index (WOMAC) scores. The technical success rate was 100%. Average WOMAC and VAS scores improved from baseline at 1-, 4-, and 6-month intervals during follow up. VAS scores on average decreased by 53.3% across all three trials over the follow up periods. No major adverse events were reported across the trails.



- A. Angiography of popliteal artery shows superior medial and lateral artery hypertrophy with synovial hypervascularity as indicated with the arrows.
- B. Selective superior lateral geniculate artery angiography shows tumor blush-type appearance of synovium.
- C. After the embolization there is less vascularity within the superior lateral distribution.

Benefits of embolization of OA

Embolization of the GAE is a potentially safe and minimally invasive treatment alternative to surgery for OA. To improve the efficacy of procedure and avoid complications, careful evaluation of the anatomy of the Geniculate Artery on angiogram is needed in order to provide complete embolization to all synovium, and to avoid dangerous adverse effects like bone infarction and skin necrosis. The pathology behind OA is combination of "wear and tear" stress as well as analgesia from newly created nerves supplied from nearby blood vessels and thus occlusion of these fragile vessels with embolization is necessitated.

References:

1. Padia SA, Genshaft S, Blumstein G, et al. Genicular Artery Embolization for the Treatment of Symptomatic Knee Osteoarthritis. *JB JS Open Access*. 2021;6(4):e21.00085. Published 2021 Oct 21. doi:10.2106/JBJS.OA.21.00085
2. Bagla S, Rholi KS, van Breda A, Sterling KM, van Breda A. Geniculate Artery Embolization in the Management of Spontaneous Recurrent Hemarthrosis of the Knee: Case Series. *Journal of Vascular and Interventional Radiology*. 2013;24(3):439-442. doi:10.1016/j.jvir.2012.11.011