Radiofrequency ablation of genicular nerves for knee pain

Clinical Policy ID: CCP.1335

Recent review date: 5/2025

Next review date: 9/2026

Policy contains: Diagnostic genicular nerve block; genicular nerve block; osteoarthritis; radiofrequency ablation.

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Coverage policy

Radiofrequency ablation of the genicular nerve for chronic knee pain is clinically proven and may be medically necessary (Kolasinski, 2020; Hunter, 2022) in the following instances:

For individuals with osteoarthritis of the knee.

For individuals who have undergone total knee arthroplasty (knee replacement surgery).

Limitations

No limitations were identified during the writing of this policy.

Alternative covered services

Routine patient evaluation and management by a network health care provider.
Physical therapy.
Intra-articular injections.
Oral medications.

Background

The knee consists of the lower femur, upper tibia, and the patella wrapped in articular cartilage that protects, cushions, and absorbs shock as the joint bends and straightens. Time, trauma, and overuse contribute to a degeneration of these structures causing arthritic inflammation and pain. Osteoarthritis is the most common type of knee arthritis, usually develops slowly, and results in bone rubbing against bone (American Academy of Orthopaedic Surgeons, 2021a).

Pain from osteoarthritis of the knee is often effectively managed with pharmacological or non-pharmacological treatments (Jones, 2015). When conservative therapy fails, options include surgery (e.g., arthroscopy or total knee arthroplasty). Genicular nerve neurolysis is a second-line therapy on its own or as an adjunct to arthroplasty.

Genicular nerve block has traditionally been performed via local anesthetic with or without corticosteroid injection of the superolateral, superomedial, and inferomedial branches of the nerves around the knee joint. Radiofrequency ablation, also known as radiofrequency neurotomy, is a commonly used intervention to treat pain from an innervated structure. It was historically used successfully for lumbar and cervical facet joints in the spine but it has expanded to peripheral structures, as well. Radiofrequency neurotomy of the major or periarticular nerve supply or intra-articular branches innervating the knee has been proposed as a treatment for osteoarthritic knee pain (Lee, 2021).

Findings

Professional Guidelines:

According to the American Society of Pain and Neuroscience, radiofrequency ablation is an option for treating knee pain secondary to osteoarthritis as well as pain refractory to total knee arthroplasty, with Level 1, Grade A evidence and strong consensus. radiofrequency ablation of these genicular nerves can significantly reduce knee pain and improve function in these patient populations. The guidelines recommend that thermal or cooled radiofrequency ablation should be utilized when performing genicular nerve ablation. For patients with persistent knee pain after radiofrequency ablation of the three main genicular nerves, the guidelines suggest that targeting the inferior lateral, medial retinacular and/or infrapatellar branch of the saphenous nerve may be considered for supplemental treatment, but only with Level III, Grade B evidence and moderate consensus (Hunter, 2022).

The National Institute for Health and Care Excellence (NICE) states that radiofrequency denervation osteoarthritic knee pain in patients who have not responded to non-pharmacological and pharmacological treatments. The procedure should only be performed by clinicians with specific training and experience. This recommendation is supported by good evidence showing that radiofrequency denervation relieves knee pain in the short term (less than 2 years) without major safety concerns (NICE, 2023).

The American College of Rheumatology conditionally recommends radio frequence ablation for patients with knee osteoarthritis. The recommendation is conditional due to the heterogeneity of techniques and controls used across a limited number of trials, as well as the lack of long-term safety data. The available studies have demonstrated potential analgesic benefits with various ablation techniques in knee osteoarthritis patients (Kolasinski, 2020).

According to the American Academy of Orthopaedic Surgeons, denervation therapy may reduce pain and improve function in patients with symptomatic knee osteoarthritis. The supportive evidence came from one or more “low” quality studies with consistent findings or evidence from a single “moderate” quality study recommending for or against the intervention. The strength of recommendation was downgraded from “moderate” to “limited” due to major quality concerns (American Academy of Orthopaedic Surgeons, 2021b).

Additional Evidence

A review was conducted of 12 studies of anterior knee joint innervation and six studies of posterior innervation to examine if radiofrequency ablation techniques could completely denervate the knee joint and, therefore, reduce the pain. Although the number of anterior and posterior articular branches with their respective nerve innervators could be isolated and identified, there was still a lack of precise anatomic targets on fluoroscopy and ultrasound for radiofrequency ablation or a diagnostic knee block, however participants achieved an effective reduction in pain (Roberts, 2020).

A systematic review/meta-analysis of eight studies (n = 256) of patients with chronic osteoarthritis pain in the knee treated with ultrasound-guided radiofrequency ablation revealed that targeting the genicular nerve achieved better pain relief than intra-articular or sciatic nerve. The authors identified several limitations in the study, including inability to analyze long-term effectiveness of the treatment in these patients (Huang, 2020).

A systematic review of 33 studies, including 13 randomized controlled trials found that patients (n = 1,512) who received radiofrequency ablation for knee pain from osteoarthritis experienced alleviated symptoms 3 to 12 months after baseline. In 6 studies, the proportion of patients with > 50% pain relief was 65.5% and 19.3% for treatment and control groups. Of ten studies, eight reported significant patient satisfaction. Only 9 of 29 studies reported adverse effects, and these were considered minor (Ajrawat, 2020).

A systematic review/meta-analysis of 12 studies (n = 841) showed that radiofrequency ablation on the genicular nerve was associated with an improvement in knee pain, starting at one week and lasting through six months. This procedure was more effective than intra-articular pulsed radiofrequency ablation for reducing knee pain, but demonstrated limited improvement in knee joint function (Hong, 2019).

A systematic review of 19 studies (four of which were randomized) of mitigation of chronic knee pain concluded radiofrequency ablation was promising and efficacious after observing significant short- and long-term pain reductions (Orhurhu, 2019).

A systematic review (Gupta, 2017) analyzed radiofrequency ablation by conventional, pulsed, or cooled radiofrequency technique to relieve chronic knee pain. Most of the 17 included publications described studies assessing treatment of the genicular nerves or an intra-articular approach. Different therapeutic approaches to targeting the genicular nerve (conventional, pulsed, or cooled) or an intra-articular approach produced no clear advantage. While most studies reported positive outcomes, ongoing concerns regarding the quality and procedural aspects of the included studies limit the ability to draw conclusions.

A systematic review (Bhatia, 2016) noted 13 reports on ablative or pulsed radiofrequency treatments of innervation of the knee joint. A high success rate of these procedures in relieving chronic pain of the knee joint was reported at one to 12 months after the procedures; however, only two of the publications were randomized controlled trials. There was evidence for improvement in function and a lack of serious adverse events of radiofrequency treatments. Randomized controlled trials of high methodological quality are required to further elaborate the role of these interventions in this population.

An analysis of 265 patients with a > 30% decrease in average knee pain scores for at least three months at three medical centers found radiofrequency ablation of the genicular nerves had a positive response of 61.1%. Larger electrode size, repeated lesions, having > 80% pain relief during the prognostic block, not being on opioids, having no coexisting psychiatric condition, having a lower baseline pain score, and having > three nerves targeted had especially high rates of positive outcomes and can be factors in patient selection (Chen, 2021).

In 2023, we updated the references, deleted older references, and added one new systematic review of nine studies that found moderate-quality evidence supporting the effectiveness of fluoroscopically-guided genicular radiofrequency ablation for reducing pain associated with knee osteoarthritis in the short term. The six-month success rates (for 50% or greater pain relief) after radiofrequency ablation ranged from 49% to 74%. Compared

to intra-articular steroid injection or hyaluronic acid injection, the probability of success was 4.5 times higher and 1.8 times higher with radiofrequency ablation, respectively (Fogarty, 2022). No policy changes are warranted.

In 2024, two recent systematic reviews and meta-analyses have evaluated the effectiveness of radiofrequency ablation for treating symptomatic knee osteoarthritis. The first analyzed nine studies (n = 899) and found that radiofrequency ablation was associated with significantly greater improvement in knee pain relief and function compared to intra-articular injections at three, six, and 12 months follow-up ($p<0.001$ and $p<0.05$, respectively), despite a higher overall complication rate (10.2%) compared to corticosteroid ($p=0.023$) and platelet-rich plasma injections ($p=0.017$) (Chalidis, 2023). The second evaluated 21 randomized controlled trials (n = 1,818) and found that conventional bipolar radiofrequency ablation of the genicular nerves had the greatest benefit for knee pain (mean difference -5.5, 95% confidence interval -4.3 to -6.7) and cooled monopolar radiofrequency ablation had the greatest benefit for knee function (mean difference -33, 95% confidence interval -37 to -29) at 6 months, with patients responding better to cooled modalities than conventional or pulsed modalities, and bipolar being more effective than monopolar for conventional and pulsed radiofrequency ablation (Kapural, 2022). Policy changed from not medically necessary to medically necessary.

In 2025, we found a systematic review examined the efficacy of radiofrequency ablation of genicular nerves for pain management before and after total knee replacement (Bahha, 2025). The review included six studies published between January 2019 and August 2024, evaluating a total of 265,713 patients. Three studies found that genicular nerve radiofrequency ablation had no therapeutic effect on postoperative opioid consumption, pain, or functional evaluations compared to control groups (Bahha, 2025). One study showed some improvement, while two studies reported that conventional radiofrequency ablation combined with fluoroscopy produced positive outcomes for both pain and knee function in patients experiencing persistent pain following total knee replacement. Most of the analyzed studies concluded that preoperative radiofrequency ablation had no significant effect on postoperative opioid use, analgesic use, or postoperative function (Bahha, 2025). However, for patients with chronic pain after total knee replacement, conventional radiofrequency ablation with fluoroscopy showed significant improvement according to two studies (Bahha, 2025). No policy changes were warranted.

References

On April 4, 2025, we searched PubMed and the databases of the Cochrane Library, the U.K. National Health Services Centre for Reviews and Dissemination, the Agency for Healthcare Research and Quality, and the Centers for Medicare & Medicaid Services. Search terms were “genicular nerve,” “nerve block,” “diagnostic genicular nerve block,” and “pain management.” We included the best available evidence according to established evidence hierarchies (typically systematic reviews, meta-analyses, and full economic analyses, where available) and professional guidelines based on such evidence and clinical expertise.

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Policy updates

9/2017: initial review date and clinical policy effective date: 10/2017

11/2018: updated references. Policy number changed to CCP.1335.

10/2019: Policy references updated.

4/2020: Policy references updated. The policy originally addressed diagnostic nerve block and radiofrequency ablation of the genicular nerve. We added the topic of genicular nerve block for pain.

5/2021: Policy references updated.

5/2022: Policy references updated.

5/2023: Policy references updated.
5/2024: Policy references updated.
5/2025: Policy references updated.