

Effectiveness of Chemical Neurolysis for Treatment of Knee Pain: A Systematic Review of the Current Literature

Vladislav Zhitny, M.D., Kenny Do, B.S., Eric Kawana, B.S., Adlai Pappy, M.D., Shengping Zou, M.D., Michael C. Wajda, M.D., Jenifer Do, Ryan Gualtier, M.D., Joseph Manne, M.D., Benjamin Klyachman, D.O., Benjamin Vachirakorn tong, B.S., Adam Khattak, D.O., Aditi Singh, M.D., Mohammed Issa, M.D.

INTRO

- Osteoarthritis is a prevalent condition affecting over 250 million people worldwide, with a significant proportion experiencing its effects in their knee joints. Current treatments for knee osteoarthritis include Nonsteroidal anti-inflammatory drugs (NSAIDs) and total knee replacement, which may provide only temporary relief. In recent years, blocking or ablation of the genicular nerves, which provide sensory innervation to the knee joint, has emerged as a potential therapy.
- Chemical neurolysis may even be preferred when the physicians want to visualize the injection spread under live imaging, allowing them to have a better view of the genicular nerves. In fact, the use of chemical neurolysis for pain management was first reported in 1863, whereby in, 1904, the first case of neurolytic blocks using chemicals was reported for trigeminal neuralgia. Its application is typically used for patients with pain secondary to cancer, where it has also been used for patients who have brain injury, nerve compression from nonmalignant neoplasms, trigeminal neuralgia, and more.
- The two main chemicals that are used in chemical neurolysis are alcohol and phenol. Alcohol with concentrations of 50% - 100% is often applied to interfere with pain signaling by destroying nerve fibers through the degradation of lipoproteins, phospholipids, and cholesterol. Phenol with concentrations of 5% - 15% destroys the Schwann and axonal cells in the basal lamina. Few studies have investigated the efficacy and safety of chemical neurolysis in treating knee pain, and this systematic review hopes to expand this field of knowledge.

METHODS

- Preferred reporting Items for Systematic Reviews and Meta Analyses
- Databases: EMBASE and PubMed from the years 1970-2023 and 1966-2023, respectively.
- “genicular nerve” and “chemical neurolysis knee”
- 2216 studies on PubMed and 437 studies on EMBASE identified
- 9 manuscripts included in our systematic literature review
- Bias Evaluation: Cochrane Risk of Bias tool and the National Institutes of Health tool.
- The Kellgren and Lawrence tool was used in multiple articles in order to assess the severity of a patient's knee osteoarthritis.



HARVARD MEDICAL SCHOOL AND
BRIGHAM AND WOMEN'S HOSPITAL

Chemical nerve neurolysis
has average pain reduction
efficacy rate 56.1%, range
43.5% to 100%



RESULTS

Not many studies in the current literature have accessed the use of chemical neurolysis in treating knee pain by targeting the genicular nerve. Our comprehensive and systematic search yielded 9 articles that were mainly case reports, case series, and observational studies. Only 1 randomized clinical trial was found and was included in our study. This systematic literature review examines patients with knee pain who were successfully treated with chemical neurolysis of the genicular nerve.

Study Characteristics

Our comprehensive screening process produced a total of 9 articles for our systematic review.

- These 9 articles examined a total of
- 196 patients who experienced knee pain
- all treated with chemical neurolysis to their genicular nerves
- 110 of them experienced pain reduction or complete pain resolution after treatment, yielding an average efficacy rate of 56.1% for the use of chemical neurolysis on the genicular nerves.
- The efficacy rates ranged from 43.5% - 100% in individual studies.
- Demographics: 147 female patients and 47 male patients.
- Initially presentation: severe pain due to osteoarthritis, secondary causes include postsurgical operations and bone fractures.

Knee Osteoarthritis

Ahmed et al, Elashmawy et al, Ng et al, Risso et al, Shaikh et al, Walega et al, and Yildiz et al reported patients who experienced advanced osteoarthritis and were treated with genicular nerve chemical neurolysis. In these 3 case series, 3 observational studies, and 1 randomized clinical trial study, 194 patients had chronic knee pain secondary to osteoarthritis. Dass et al reported 2 patients in their case report, with one of the patients having knee osteoarthritis being successfully treated with the procedure. Of the 194 patients with knee osteoarthritis, 108 of them experienced pain relief or complete resolution of their pain, yielding an efficacy rate of 55.7% for genicular nerve chemical ablation in treating knee osteoarthritic pain. In these studies, 50% or more reduction in pain relief was considered a positive outcome.

2.3.2 Trauma/Postsurgical

Another common reason for knee pain is direct trauma to the area, either through accidents or inflammation post-surgery. Dass et al presented a case report that included 2 patients, with one having knee osteoarthritis and the other patient experiencing pain after undergoing 3 arthroscopic surgeries. Another case report by Dhingra et al examined an elderly patient who fell and fractured his right distal femur shaft and experienced pain in his right knee. Both patients who experienced pain secondary to trauma were successfully treated with chemical neurolysis of the genicular nerve, yielding an efficacy rate of 100%.

