

# Radiofrequency Ablation of Genicular Nerves in Pain Management in Chronic Knee Pain

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## Abstract

**Background:** Osteoarthritis (OA) is the second most common rheumatologic problem and it is the most frequent joint disease with a prevalence of 22% to 39% in India. Incapacitating the patients and compromising the quality of life. Conservative treatments may not be effective always, and that some of them have serious adverse effects. Various surgical methods have been used to treat OA. Genicular nerve neurotomy is currently being evaluated for the treatment of chronic knee pain due to Osteoarthritis. **Aim and Objectives:** The study was aimed to evaluate the efficacy of single radiofrequency thermocoagulation (RFT) of the knee joint with the objective to compare the success rates at the end of first, third and sixth month and to study the complications. **Materials and Methods:** A total number of 88 patients were included in the study of age ranging from 40 to 80 years of age from Jan. 2016 to Dec. 2016. The patients with knee pain of more than 6 months and not responding to the conventional line of treatment, were included in the study. Two groups, 44 each group, were made depending on the severity of osteoarthritis changes of knee joint on X-ray findings of the knee joint. After diagnostic blocks were given to all of the patients and on satisfactory pain control RFT was done. Pain score was assessed immediately after the procedure, while discharge i.e. two hrs after the procedure, 2<sup>nd</sup> day on telephonic call, 1 week, 4 week and 12 week and 6 months. **Results:** Out of 88 patients 50 (56.81%) were males and 38 (43.18%) females included in the study. Majority of the patients 36 (40.90%) tried analgesic drugs for pain relief and 27 (30.68%) patients tried analgesic drugs + physical therapy + intra-articular injection prior to RFT treatment. At the 3<sup>rd</sup>-month follow-up, 73 (82.95%) patients were pain-free and at the end of 6 months, 62 (70.45%) were pain-free. There was no significant statistical difference between both groups at the end of 6 months. **Conclusion:** It was concluded that PRF, applied to the knee joint of patients suffering from chronic knee pain due to OA and not responding to the conservative treatment methods sufficiently, seems to be an effective and safe method.

**Keywords:** Radiofrequency Ablation; Genicular Nerves; Osteoarthritis (OA).

## Background

Osteoarthritis (OA) is a type of joint disease that results from the breakdown of joint cartilage and underlying bone. The most common symptoms are joint pain and stiffness. Initially, symptoms may occur only following exercise, but over time may become constant. Other symptoms may include joint swelling, decreased range of motion, and when the back is affected weakness or numbness of the arms

and legs. Usually, the symptoms come on over years. It can affect work and normal daily activities. Symptomatic knee OA is observed in approximately 12% of individuals aged more than 60 years [1]. Osteoarthritis is the second most common rheumatologic problem and it is the most frequent joint disease with a prevalence of 22% to 39% in India. OA is more common in women than men, but the prevalence increases dramatically with age [2]. Nearly, 45% of women over the age of 65 years have symptoms while radiological evidence is found

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in 70% of those over 65 years. OA of the knee is a major cause of mobility impairment, particularly among females [3]. OA was estimated to be the 10<sup>th</sup> leading cause of nonfatal burden [4].

The conservative treatment of OA usually includes physical therapy, analgesics including nonsteroidal anti-inflammatory drugs (NSAIDs) and intra-articular steroid and hyaluronan injections [5]. Although conservative management is effective in most OA patients. Other modalities may slow the disease process, such as weight loss, physical and occupational therapy, and knee bracing. Eventually, these various modalities are not enough, and patients require invasive procedures. Minor and major surgical methods are also applied for treatment of knee OA [6]. Another method that can be applied for surgical treatment of OA is a total knee replacement. A significant percent of the patients continue suffering from pain despite total knee replacement [7]. Genicular Nerve Neurotomy is currently being evaluated for the treatment of chronic knee pain due to Osteoarthritis. When an individual exhibits knee pain, the pain signals are found to arise from the genicular nerves, sensory nerve branches of the tibial, common peroneal and obturator nerves. They supply the capsule of the knee joint, as well as the intra-articular and extra-articular ligaments. A diagnostic genicular nerve block is first done. If there is sufficient pain relief in the knee then a Genicular Nerve Neurotomy is performed to alleviate the knee pain, thereby restoring function [8].

#### *Aim and Objectives*

The study was aimed to evaluate the efficacy of single radiofrequency thermocoagulation (RFT) of the knee joint with the objective to compare the success rates at the end of first, third and sixth month and to study the complications.

#### **Materials and Methods**

A total number of 88 patients were included in the study, of age ranging from 40 to 80 years of age attending Varad The pain clinic, Aurangabad. The study was conducted from Jan. 2016 to Dec. 2016. Patients thorough checkup was done including physician's opinion regarding the comorbid conditions like hypertension, DM, were included in the study after good control of the parameters. Patients and relatives consent was obtained after informing the probable side effects of the RFT. The patients with knee pain of more than 6 months and

not responding to the conventional line of treatment, were included in the study. Two groups, 44 each group, were made depending on the severity of osteoarthritis changes of knee joint on X- ray findings of the knee joint. Grade 1 and 2 were included in group A and grade 3 and 4 were included in group B [9]. After securing intravenous line, mild sedation was given to patients, antibiotic was given prior to procedures to all patients. A multipara monitor applied to the patients. A diagnostic block was given to all of the patients at superior medial and lateral genicular nerves and inferior medial genicular nerves under local anaesthesia. On satisfactory pain control (4 out of 8 at least or 70% or more pain relief), we planned for RFTC at 70, 75 and 80 degree centigrade for 90 sec each after sensory and motor stimulation at superior medial and lateral condyle of femur and inferior medial condyle of the tibia after a week of diagnostic block [10,11]. Acosman RF generator was used for RF ablation with 20 g RF needle with 10 mm active curved tip. Post procedure patients were observed for two hrs and then discharged home. Mild analgesic and ice fomentation were advised on first 24 hrs to reduce the pain of needle pricks and post procedure edema around the knee joint. Pain score was assessed immediately after the procedure, while discharge i.e. two hrs after the procedure, 2<sup>nd</sup> day on telephonic call, 1 week, 4 week and 12 week and 6 months.

#### *Observations*

As procedure was performed under local anaesthesia, patients were having very good to excellent pain relief immediately after the procedure and 2 hrs after the procedure that is while discharge from the hospital. No adverse effects were seen. Out of 88 patients 50 (56.81%) were males and 38 (43.18%) were females included in the study.

Analgesic drugs + physical therapy + intra-articular injection (steroid or hyaluronan) 27 (30.68%)

Majority of the patients 36 (40.90%) tried analgesic drugs for pain relief and 27(30.68%) patients tried analgesic drugs + physical therapy + intra-articular injection prior to RFT treatment. On the 2<sup>nd</sup> day of follow-up, the majority of the patients complained of pain of procedure but their original pain of knee joint was not there. On 1<sup>st</sup> month follow-up, 82 (93.18%) patients had very good pain relief. At the 3<sup>rd</sup>-month follow-up, 73 (82.95%) patients were pain-free and at the end of 6 months, 62 (70.45%) were pain-free. There was no significant statistical difference between both groups at the end of 6 months.

**Table 1:** Distribution of patients according to Gender and Grade of OA

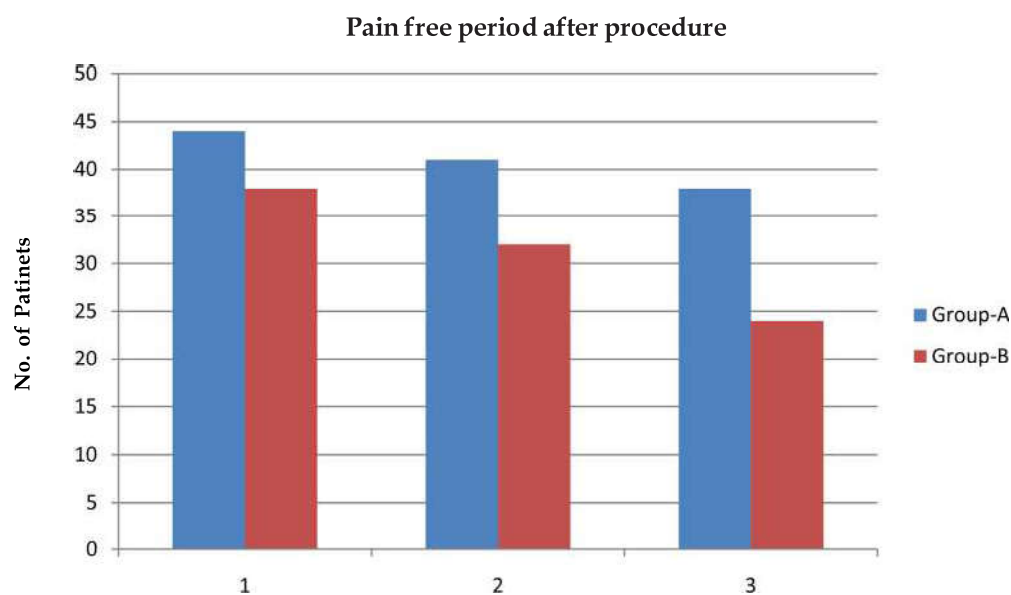
Grade of OA	Male	Female	Total
Group -A	29(58.0%)	15(39.47%)	44(50.0%)
Group -B	21(42.0%)	23(60.52%)	44(50.0%)
TOTAL	50(56.81%)	38(43.18%)	88

**Table 2:** Distribution of patients according to treatment forms applied before procedure

Treatment	Total no. of patients
Analgesic drugs	36(40.90%)
Analgesic drugs + physical therapy	25(28.40%)
Analgesic drugs + physical therapy + intra-articular injection (steroid or hyaluronan)	27(30.68%)

**Table 3:** Distribution of patients according to efficacy in pain relief

Grade of OA	Months of pain free		
	1	3	6
Group -A	44(50.0%)	41(46.59%)	38(43.18%)
Group -B	38(43.18%)	32(36.36%)	24(27.27%)
TOTAL	82(93.18%)	73(82.95%)	62(70.45%)

**Fig. 1:** Distribution of patients according to efficacy in pain relief

## Discussion

In the present study, it was found that RF genicular neurotomy induced potent analgesia in elderly patients with chronic knee OA pain. Although the follow-up period was only six months, these patients also experienced significant functional improvement and treatment satisfaction. Furthermore, RF neurotomy for knee OA relieved the knee pain without any adverse event, as well as it's being accessible and acceptable to elderly patients. However, as this procedure is more invasive than other treatments, RF

neurotomy should preferably be used for knee OA patients without response to conservative treatments and with a positive response to diagnostic block.

In the present study out of 88 patients, 50 (56.81%) were males and 38 (43.18%) females included in the study. In a study by Haktan et al (2011) [1] the knee PRF application was performed on a total of 31 patients between January 2009 and June 2009 found that the mean age of the patients was  $62.8 \pm 9.3$  years, and 71% of them were women.

In the present study majority of the patients, 36 (40.90%) tried analgesic drugs for pain relief and

27(30.68%) patients tried analgesic drugs + physical therapy + intra-articular injection prior to RFT treatment. In a study by Haktan et al (2011) [11] they found that the mean symptom duration was 78.8±64.3 months. Twenty-three patients had bilateral knee OA, all of them underwent PRF application made bilaterally whereas 16.1% of the patients took only analgesic drugs (NSAIDs and/or opioids) and 35.5% of them had been treated with analgesic drugs (NSAIDs and/or opioids) + physical therapy + intra-articular injection (steroid or hyaluronan) before PRF applications.

On the 2<sup>nd</sup> day of follow-up, the majority of the patients complained of pain of procedure but their original pain of knee joint was not there. On 1<sup>st</sup> month follow-up, 82 (93.18%) patients had very good pain relief. At the 3<sup>rd</sup>-month follow-up, 73 (82.95%) patients were pain-free and at the end of 6 months, 62 (70.45%) were pain-free. At the end of 6 months 24(54.54) patients in group-B out of 44 had pain relief. So pain relief was more with Group -A. Hence, in group B additional support in the form of analgesics were needed for pain relief. There was no significant statistical difference between both groups at the end of 6 months. Similarly, in a series of cases published by Sluijter et al [12] in 2008, PRF was applied to various joints (cervical facet, knee, shoulder, sacroiliac, atlantoaxial, and radiocarpal joints) of six different patients who had arthrogenic pain. The authors have reported that they have obtained excellent results from all application in mid and long term. In another study, by Halim et al [13] applied intra-articular PRF to atlanto-axial joints of 86 patients with a cervicogenic headache. In this retrospective study, the long-term effectiveness of PRF was studied, and the rate of patients reporting ≥50% decrease in their pain scores 1 year after the application was reported as 44.2%.

In a study by Choi WJ (2011) [14] no patient reported a post-procedure adverse event during the follow-up period. They concluded that RF neurotomy of genicular nerves leads to significant pain reduction and functional improvement in a subset of elderly chronic knee OA pain, and thus may be an effective treatment in such cases. Similarly in a case series by Reddy et al (2016) [15] all patients reported 80% - 100% improvement in knee pain at 6 - 12 months follow-up. All patients reported improved daily function, including walking and climbing stairs. One of the two patients taking opioids reduced use. Also in the study by Soo Yeon et al (2016) [8] concluded that after appreciation of the potential risks associated with geniculate RFA, it is crucial to utilize appropriate safety measures to prevent arterial puncture during the procedure.

## Conclusion

It was concluded that PRF, applied to the knee joint of patients suffering from chronic knee pain due to OA and not responding to the conservative treatment methods sufficiently, seems to be an effective and safe method. PRF is very effective in grade 1 and 2 OA patients.

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