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Effectiveness of Cooled Radiofrequency Ablation of Genicular Nerve in Patients with Chronic Knee Joint Pain To Osteoarthritis

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ABSTRACT: **INTRODUCTION-** Genicular nerve radiofrequency ablation (RFA) has emerged as a promising interventional technique aimed at alleviating knee pain by targeting the genicular nerves responsible for transmitting pain signals from the knee joint.
AIMS- The aim of this study to evaluate the efficacy, safety, and clinical outcomes associated with genicular nerve RFA in the treatment of knee joint pain.
METHOD-The study was randomized controlled trials, observational studies. Study was selected based on criteria including patient population with knee pain, intervention using genicular nerve RFA with fluoroscopic guidance and outcomes related to pain relief and functional improvement. Primary outcomes assessed included pain reduction and functional improvements . Secondary outcomes quality of life measures.
CONCLUSION- When GN RFA yields better analgesic effect and improves functional capacity in patients with knee joint pain in osteoarthritis compared to IASI
.**KEYWORDS:** Genicular nerve, radiofrequency ablation (RFA),knee joint pain.
Study Design- Observational Study.

I. INTRODUCTION-

Discomfort or pain localized to the knee area, which can affect daily activities and quality of life.Affects millions globally,

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particularly prevalent in older adults, athletes, and individuals with obesity. Common Causes:- Osteoarthritis ,Rheumatoid arthritis , Injury ,Patellofemoral pain syndrome ,Bursitis.

Radiofrequency Ablation (RFA)-RFA is a well-established technique for managing chronic pain through the precise targeting of nerve tissues, offering a less invasive alternative to more traditional surgical interventions.RFA is the targeted delivery of radiofrequency energy to lesion through a probe that causes the thermal degradation of nerve structures via ionic heating .

Tradition radiofrequency ablation probes operate at a set temperature of 80 degree celsius . In cooled radiofrequency ablation ,the internally cooled probes operate at a set temperature of 60 degree celsius

Aims -

Primary Objective- The aim of this study to evaluate the efficacy, safety, and clinical outcomes associated with Genicular nerve Radiofrequency Ablation (RFA) in the treatment of knee joint pain.

Secondary Objective- To compare the functional capacity improvement as measured by VAS , WOMAC score.

MATERIALS AND METHODS

Materials required - Antiseptic solution for skin disinfection
-The Cooled Radiofrequency Kit (Probes, Active Tips, COOLIEF kits)
-22 G needle
-Lignocaine 2%
-Triamcinolone
-C-arm/image intensifier

STUDY DESIGN- Prospective observational study

SAMPLE SIZE- 30 patients were studied, after approval of the Institutional Ethics Committee and written informed consent was obtained from each patient who participated in this study. All aspects of participant privacy and confidentiality were preserved.

II. METHODOLOGY–

- **Preparation**: In the operating room standard monitoring was instituted. The patient was placed in a supine position on a fluoroscopy table, and a pillow was placed under the popliteal fossa of the affected knee to achieve a flexion of 10–15◦. Ensure the patient is comfortable and positioned correctly for the procedure.
- **Anesthesia-** Under local Anesthesia - Administer a local anesthetic to numb the skin and deeper tissues around the target area. This helps minimize discomfort during the procedure.
- The nerves targeted for treatment encompassed the superomedial, superolateral, and inferomedial genicular nerves in RFA groups, with the three target points following a standardized approach .
- The true anteroposterior fluoroscopic view of the tibiofemoral joint was obtained to show an open tibiofemoral joint space with equal-width interspaces on both sides.
- After identifying the target point, the skin and subcutaneous tissues were anesthetized with 2 mL of 2% lidocaine. The Cooled Radiofrequency Kit which has a 75mm-long, 17-gauge straight RF introducer with a 4 mm active tip and an 18-gauge cooled RF probe with saline circuit, was employed for the technique.
- The cannula was advanced percutaneously toward the junction between the femoral or tibial shaft and the epicondyle under fluoroscopic guidance until contact was made with the bony cortex.
- Sensory stimulation < 0.6 V at 50 Hz was performed to identify the nerve position. A motor simulation of 2.0 V at 2 Hz was performed to test for the absence of fasciculation in the corresponding area of the lower extremity. Then, to provide anesthesia for the denervation, 2% lidocaine was injected through each introducer cannula.
- In the cooled RFA group, the cooled RF electrode was inserted through the cannula, and the RF generator was activated. The electrode tip temperature was increased to 60 ◦C for 2mins. One RFA lesion was made for each genicular nerve.
- After the allocated procedure, 2 mL of 1% lidocaine and 5 mg of triamcinolone were injected into each treated site.

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- In other IASI group of participants a volume of 2-3 ml 2% lignocaine and intra-articular triamcinolone 40 mg was injected with a 22 G needle from the superior medial aspect of the knee in supine position with 30 degree flexion at knee joint.
- All the patients were evaluated with Visual analogue score (VAS) for pain intensity and Western Ontario and Mc Master Universities Osteoarthritis Index (WOMAC) for functional status of the patients.
- All the assessments were measured and compared at baseline, 1 month, 3 month and 6th month after treatment.

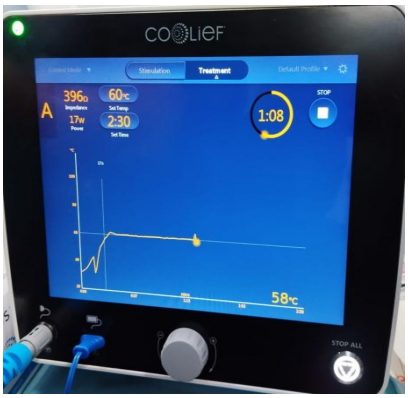

Fig1-The Cooled Radiofrequency Kit


Fig2-Probe Placed Over Genicular Nerve


Fig3-Active Tips On C Arm Film

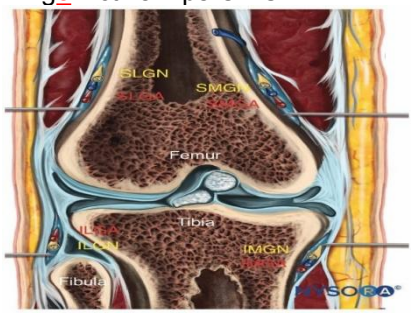

Fig4-Anatomical Presentation Of Genicular Nerve

Inclusion Criteria -
1. Chronic Knee Pain- Patients suffering from chronic knee pain for more than 3 months
2. Radiographic Evidence: Presence of Osteoarthritis of knee grade II and III
3. Pain Localization: Pain that can be attributed to the genicular nerves, often confirmed through diagnostic nerve blocks.
4. Functional Impairment: Significant impact on quality of life or daily activities due to knee pain.
5. Age group->35-80 years of age
6. Persistence of pain even after total knee Arthroplasty
7. Known cases of Controlled Medical Conditions

Exclusion Criteria:
1.Local Infection: septic arthritis
2. Coagulation Disorders
3. Pregnancy

STATISTICAL ANALYSIS

All observations were analysed using Unpaired t-test with the help of MS excel.

Variables were presented as mean & standard deviation.

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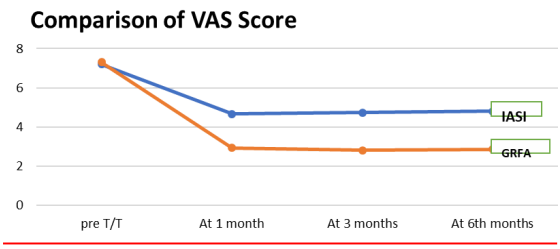
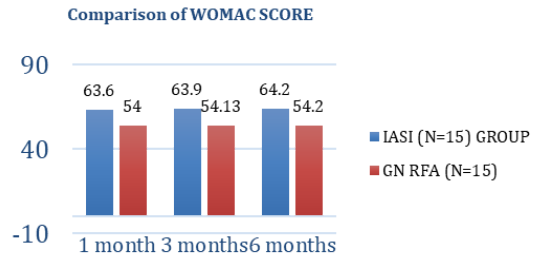
P value <0.05 was considered to be significant.

III. RESULT

-The VAS score of GN RFA group was significantly lower than VAS score of IASI group during all the intervals of time (p<0.05).



-WOMAC consists of a total of 24 questions under 3 main headings as 5 questions on joint pain, 2 questions on stiffness, and 17 questions on physical function in daily life. (0= the best score, 96=the worst score).



IV. DISCUSSION-

1- Fogarty AE, Burnham T and et al-In this study they determined the effectiveness of fluoroscopically guided genicular nerve radiofrequency ablation for painful knee osteoarthritis. Primary outcome measure was improvement in pain after 6 months. Six-month success rates for 50% or greater pain relief after radiofrequency ablation ranged from 49% to 74%. When compared with intra-articular steroid injection, the probability of success was 4.5 times higher for radiofrequency ablation . When radiofrequency ablation was compared with hyaluronic acid injection, the probability of treatment success was 1.8 times higher.

2- Kim CS, Shin JW,and et al.- This is double-blind, randomized, controlled study, participants were randomly assigned to receive cooled RFA of the knee and a sham procedure. For the primary outcome, the successful responder rate was significantly higher in the cooled RFA group (76.5%) than in the sham group (33.3%) . For the secondary outcome, more successful responders were observed in the cooled RFA group than in the sham group at one and six months after the procedure .The decreased knee pain intensity was maintained throughout the six-month follow-up period in the cooled RFA group.

V. CONCLUSION –

GN RFA and IASI are possible treatment for patient with knee joint pain in osteoarthritis. When GN RFA yields better analgesic effect and improves functional capacity in patients with knee joint pain in osteoarthritis compared to IASI

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