PAIN MEDICINE CASE REPORTS

ISSN 2768-5152

Volume 8, Number 5, pp. 195-197

Infrapatellar Branch of the Saphenous Nerve Radiofrequency Ablation for Refractory Knee Pain: Case Series

Sajal Kulhari, BS[1], Nafis Eghrari, BS[1], Matthew Chen, BA[1], Nikhil Grandhi, MD[2] and Chong Kim, MD[2]

Background: Chronic knee pain (CKP) is common, and one of the treatment options includes the targeting of the genicular nerves with radiofrequency ablation (RFA). RFA of the genicular nerve or genicular nerve ablation (GNA) for CKP, traditionally includes several nerves, the superior lateral, superior medial, and inferior medial. More recently, other nerves, such as the infrapatellar branch of the saphenous nerve (IFBS), have been investigated.

Case Report: Four patients with mostly refractory inferior medial CKP who were all nonresponsive to conservative treatments were evaluated for treatment for GNA. All the patients underwent traditional genicular nerve blocks (superior lateral, superior medial, and inferior medial) under fluoroscopy and failed to obtain relief of > 50%. Subsequently, these 4 patients underwent successful IFBS nerve blocks and RFA.

Conclusions: GNA is a treatment option for patients with CKP. Despite the growing evidence of support for GNA, other targets, such as the IFBS, may be more appropriate to include or target specifically and may be considered based on the location of pain or response to traditional targets.

Key words: Chronic knee pain, infrapatellar branch of the saphenous, radiofrequency ablation, case report

BACKGROUND

Chronic knee pain (CKP) impacts millions of adults in the United States, up to 25% of adults, and as a result, has a significant impact on function and quality of life of those suffering from CKP (1,2). The most common cause of knee pain is osteoarthritis and fortunately, there are a wide range of treatment options for those with CKP, ranging from medications to joint replacement. Another and more recent treatment option is the genicular nerve ablation (GNA).

GNA is a percutaneous, minimally invasive treatment option where a needle is used to target the nerve(s) to block or interrupt the pain signal transmission. GNA, also known as radiofrequency ablation (RFA) or rhizotomy, is commonly performed after successful or positive local anesthetic blocks. RFA utilizes radiofrequency energy to generate heat to coagulate the targeted nerve.

GNA targets the genicular nerves , a complex network of nerves that innervate the knee joint. Traditional targets are the superior lateral, superior medial, and inferior medial genicular nerves (3). Recently, additional targets have been added, particularly in those who do not respond adequately and to better optimize clinical outcomes (4-6). One of the additional targets is the infrapatellar branch of the saphenous nerve (IFBS), particularly for refractory, chronic, anterior inferomedial knee pain (7).

In this case series, we describe the successful treat-

From: [1]Case Western Reserve University School of Medicine, Cleveland OH; [2]MetroHealth Medical Center, Cleveland OH

Corresponding Author: Chong Kim, MD , E-mail: ckim3@metrohealth.org
Disclaimer: There was no external funding in the preparation of this manuscript.
Conflict of interest: Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.
Patient consent for publication: This report was exempt from obtaining Informed consent per institutional policy as all patient information has been deidentified.
This case report adheres to CARE Guidelines and the CARE Checklist has been provided to the journal editor.
Accepted: 2024-06-10, Published: 2024-07-31

ment of refractory anterior inferior medial knee pain with the IFBS RFA in patients who did not respond to the traditional genicular nerve targets.

CASE PRESENTATION

Four patients with mostly refractory inferior medial CKP who were all nonresponsive to conservative treatments were evaluated for treatment for GNA. Patient demographics can be found in Table 1. All the patients underwent traditional genicular nerve blocks (superior lateral, superior medial, and inferior medial) under fluoroscopy and failed to obtain relief of > 50%. Subsequently, these 4 patients underwent IFBS nerve blocks under fluoroscopy. A 25G 1.5-inch needle was used to target the IFBS, with 1 mL of 0.25% bupivacaine. All obtained at least 50% relief on 2 separate occasions with a limited duration of relief. All 4 underwent RFA (20G 10-mm tip RFA needles at 80 °C for 90 seconds) of the IFBS. At 9 months post-RFA, 3 of the 4 had > 50% relief at 6 months, with an average percent relief of 78% and a duration of over 7 months (Table 2). The other patient only obtained 30% relief for 3 months with the RFA of the IFBS (Table 2).

Informed consent was not obtained as per the local institutional policy. Local institutional review board approval was obtained (Study00000108).

DISCUSSION

CKP is common in the United States, and the incidence increases with age. Due to the prevalence of CKP, particularly due to osteoarthritis, numerous studies and guidelines have been published on the various treatment options that exist (8). These include medications, such as oral and topical nonsteroidal anti-inflammatory drugs to physical therapy and bracing to injection-based treatments. Injection options include corticosteroids and hyaluronic acid. In those patients with refractory CKP despite conservative treatments, total joint replacement surgery, or total knee arthroplasty (TKA), is also an option.

TKA is considered a safe and effective surgical procedure for refractory CKP. However, as in all treatments, complications and risks exist. Additionally, some patients continue to experience CKP after TKA. Studies (9) have shown ~ 20% of the patients report moderate-to-severe knee pain after TKA. In patients with persistent pain after TKA or those that are not candidates, GNA has become a treatment option.

GNA targets the genicular nerves, which provide innervation to most of the knee. Initial targets for GNA included superior lateral, inferior medial, and inferior lateral genicular nerves (10). As a result, most of the evidence and publications have focused on these 3 nerves for refractory knee pain, before and after TKA. However, despite the growing evidence for targeting these 3 nerves, other nerves have been debated to optimize outcomes. One of the newer targets includes the IFBS (11,12). With the emerging support for the other targets, recent guidelines suggested the targeting of these other nerves in those with persistent pain after the traditional GNA (8).

The IFBS provides sensory innervation to the anterior capsule of the knee, along with the skin overlying the patellar ligament, and may be involved more in patients with persistent pain after TKA due to the potential for injury during the surgical procedure (12,13). The IFBS RFA in isolation or in conjunction with the traditional targets appears to be a reasonable option and may be appropriate in refractory or in specific patient care.

In this case series, all 4 patients had limited response to the traditional targets and were not candidates for GNA. Three of these patients had TKA with persistent pain after the nerve blocks. All the patients noted ≥ 50% pain relief with the IFBS nerve block. As we typically do before GNA, we repeated the local block to better confirm the need for the RFA. The average relief from the local block was 80%. An average of 66% pain relief was noted in the 4 patients overall after the IFBS RFA. The RFA lasted a little over 6 months as an average

Table 1. Patient demographics.

Patient	Age	Gender	BMI*	Knee	KL** Score	TKA***
#1	72	Woman	30	Right	NA	Yes
#2	49	Woman	36	Left	3	No
#3	78	Woman	28	Right	NA	Yes
#4	63	Man	29	Right	NA	Yes

*BMI - body mass index.
**KL - Kellgren-Lawrence Scale.
***TKA - total knee arthroplasty

(Table 2). Various techniques have been described for the IFBS RFA (6,7). We used a lateral-to-medial approach in the anteroposterior view. Two needles were used, with monopolar lesions at 80 °C for 90 seconds.

We report the results of 4 patients with persistent knee pain, refractory to traditional targets of superior lateral, superior medial, and inferior medial genicular nerve branches, with improved pain after the IFBS RFA.

Table 2. Patient results.

Patient	IFBS^ % relief	RFA^^ % relief	Duration (mo)
#1	95	95	8
#2	100	80	6
#3	50	30	3
#4	75	60	8

^IFBS - infrapatellar branch of the saphenous nerve.
^^RFA - radiofrequency ablation.

CONCLUSIONS

GNA is a treatment option for patients with CKP. Despite the growing evidence of support for GNA, other targets, such as the IFBS, may be more appropriate or should be considered based on the location of pain or response to traditional targets.

REFERENCES

1. Jinks C, Jordan K, Croft P. Measuring the population impact of knee pain and disability with the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). *Pain* 2002; 100:55-64.
2. Nguyen US, Zhang Y, Zhu Y, Niu J, Zhang B, Felson DT. Increasing prevalence of knee pain and symptomatic knee osteoarthritis: Survey and cohort data. *Ann Intern Med* 2011; 155:725-732.
3. Choi WJ, Hwang SJ, Song JG, et al. Radiofrequency treatment relieves chronic knee osteoarthritis pain: A double-blind randomized controlled trial. *Pain* 2011; 152:481-487.
4. Fonkoue L, Behets CW, Steyaert A, et al. Current versus revised anatomical targets for genicular nerve blockade and radiofrequency ablation: Evidence from a cadaveric model. *Reg Anesth Pain Med* 2020; 45:603-609.
5. Sperry BP, Conger A, Kohan L, Walega DR, Cohen SP, McCormick ZL. A proposed protocol for safe radiofrequency ablation of the recurrent fibular nerve for the treatment of chronic anterior inferolateral knee pain. *Pain Med* 2021; 22:1237-1241.
6. Koshi E, Cheney CW, Sperry BP, Conger A, McCormick ZL. Genicular nerve radiofrequency ablation for chronic knee pain using a three-tined electrode: A technical description and case series. *Pain Med* 2020; 21:3344-3349.
7. Beckwith M, Cushman D, Clark T, et al. Radiofrequency ablation of the infrapatellar branch of the saphenous nerve for the treatment of chronic anterior inferomedial knee pain. *Pain Med* 2023; 24:150-157.
8. Hunter CW, Deer TR, Jones MR, et al. Consensus guidelines on interventional therapies for knee pain (STEP guidelines) from the American Society of Pain and Neuroscience. *J Pain Res* 2022; 15:2683-2745.
9. Beswick AD, Wylde V, Gooberman-Hill R, Blom A, Dieppe P. What proportion of patients report long-term pain after total hip or knee replacement for osteoarthritis? A systematic review of prospective studies in unselected patients. *BMJ Open* 2012; 2:e000435.
10. Alcidi L, Beneforti E, Maresca M, Santosuosso U, Zoppi M. Low power radiofrequency electromagnetic radiation for the treatment of pain due to osteoarthritis of the knee. *Reumatismo* 2007; 59:140-145.
11. Ikeuchi M, Ushida T, Izumi M, Tani T. Percutaneous radiofrequency treatment for refractory anteromedial pain of osteoarthritic knees. *Pain Med* 2011; 12:546-551.
12. Mochida H, Kikuchi S. Injury to infrapatellar branch of saphenous nerve in arthroscopic knee surgery. *Clin Orthop Relat Res* 1995; 320:88-94.
13. James NF, Kumar AR, Wilke BK, Shi GG. Incidence of encountering the infrapatellar nerve branch of the saphenous nerve during a midline approach for total knee arthroplasty. *J Am Acad Orthop Surg Glob Res Rev* 2019; 3:e19.00160.