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Original study

Patient Perspectives on Radiofrequency Treatment for Chronic Knee Pain: A Qualitative Study Embedded in the COGENIUS-Trial

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Abstract

Background: The COGENIUS trial is an ongoing double-blinded randomized trial evaluating the effectiveness, cost-effectiveness, and safety of radiofrequency (RF) of the genicular nerves, an emerging minimally invasive treatment for chronic knee pain due to osteoarthritis (OA).

Objectives: This qualitative study, embedded within the COGENIUS trial, explored how individuals with knee OA perceive their current treatment options, including RF.

Design & Methods: Twelve semi-structured interviews were conducted with COGENIUS participants diagnosed with therapy-resistant knee OA pain of ≥1 year. The sample included seven males and five females (mean age of 66 years, SD 10.5). An interpretive paradigm and descriptive qualitative design guided data collection and analysis.

Setting: 17 Belgian hospitals

Results: Participants described a substantial burden of knee OA, characterized by pain, functional limitations, sleep disturbances, and emotional impact. Treatment trajectories were long, heterogeneous, and often inconsistent with guideline-based care. RF was perceived as feasible, acceptable, and credible in the setting of the COGENIUS trial. Sedation was considered important to minimize discomfort. The run-in phase was

The results of the study have not been presented elsewhere, also not in any kind of meeting. The manuscript has been previously submitted to the European Journal of Pain, with a following desk rejection.
IC / Ethics committee: Written informed consent was obtained before participation.
Ethics approval was obtained alongside the COGENIUS trial from the central Ethics Committee of the University of Antwerp (Number Project ID 3069-Edge 002190-BUN B3002022000025) and the separate ethics committees of each participating hospital.
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generally seen as offering little added value. Participants emphasized functionality alongside pain as key treatment outcomes. They were open to targeting multiple genicular nerves to improve treatment effectiveness and expressed willingness to repeat the procedure.

Conclusions: This qualitative study highlights the substantial burden of knee OA and the variability of treatment trajectories in Belgium Participants regarded genicular nerve RF as a meaningful option for therapy-resistant knee pain, particularly when sedation is tailored to individual needs. Their perspectives provide direction for optimizing RF delivery, enhancing patient education, and informing future research, including studies with larger samples, clinician input, and qualitative evaluation of RF in persistent postsurgical knee pain.

Key words: **Osteoarthritis of the knee, Chronic pain, Radiofrequency ablation.**

Introduction

Chronic knee pain due to osteoarthritis (OA) is a rapidly growing public health concern and a leading cause of disability and reduced quality of life1. Its prevalence has doubled in recent generations, contributing to rising levels of pain, functional limitation, psychological distress, and decreased social participation[2,3]. The cornerstone for treatment of knee OA is education, physiotherapy, weight management, and self-management, aided by medications and intra-articular injections[4,5]. When symptoms persist, patients resort to surgical interventions such as a total knee arthroplasty (TKA), but up to one in five individuals continue to experience pain after a TKA[6]. Radiofrequency (RF) treatment of the genicular nerves is a relatively novel, minimally invasive technique with the potential to reduce knee OA burden and has seen increasing clinical use[7]. Emerging evidence suggests that RF can provide meaningful pain relief in knee OA[8].

Current care for individuals with knee OA in Belgium is highly variable, with patients often following treatment trajectories that do not align with clinical practice guidelines[9]. The 2018 Evikey report identified the underuse of conservative treatments and the tendency for early referral to surgery as key issues[9]. Recently, the RF treatment has been reimbursed in Belgium for patients with therapy-resistant knee OA. As ongoing research continues to refine optimal RF treatment protocols, considerable variation exists in procedural approaches and image-guidance methods[8,10,11]. Standardization of the RF technique would likely improve consistency and quality of clinical care.

The COGENIUS trial is an ongoing double-blinded randomized trial conducted in 17 Belgian centers and 2 Dutch centers, designed to evaluate the effectiveness, cost-effectiveness, and safety of the RF treatment in 200 knee OA patients[12]. Patients are required to undergo an initial run-in phase where conservative care is optimized following Belgian Health Care knowledge center quality standards and international guidelines[13]. Participants with persistent pain after the run-in period are randomized to either a RF treatment of the genicular nerves (conventional or cooled RF) (80% of the participants) or a sham procedure (20% of the participants). Patients are followed up at 1-, 3-, 6-, 9 months-, one year, and two years after the intervention.

This multicenter trial provides a valuable opportunity to explore participants' experiences of the current treatment trajectories in Belgium, including the RF treatment. As such, we designed a qualitative trial embedded in the COGENIUS study. The aims are threefold. Firstly, to document the experiences and reflections on the current treatment modalities in individuals suffering from knee OA in Belgium. Secondly, to document participants' experiences on the RF treatment of the genicular nerves. And thirdly, to examine participants' preferences and expectations on future developments on the RF intervention, enabling them to influence future research.

Methods

Study Design

A qualitative descriptive design using individual interviews with semi-structured and structured topics was employed to explore participants' reflections on treatment modalities both before and during the COGENIUS trial, as well as their preferences and expectations for future research on RF treatment. This qualitative study was embedded within the COGENIUS trial, which evaluates the effectiveness, cost-effectiveness and safety of RF of the genicular nerves. Ethics approval was obtained alongside the COGENIUS trial from the central Ethics Committee of the University of Antwerp (Number Project ID 3069-Edge 002190-BUN B3002022000025) and the separate ethics committees of each participating hospital.

Recruitment

Potential participants were initially approached by their treating physician. After expressing interest, they were contacted by the qualitative research

team. Written informed consent was obtained before participation.

Participants

Sampled participants were enrolled across 17 Belgian hospital sites. Eligible participants were adults (≥18 years) with knee osteoarthritis (Kellgren–Lawrence grade II–IV) who had exhausted at least one year of conservative treatment, including education, physiotherapy, self-management strategies, medication, and at least one intra-articular injection. No participant had undergone a knee arthroplasty. Participants had completed the run-in phase of the COGENIUS trial and had a minimum follow-up of four months after the study intervention. Purposive sampling was used to include a heterogeneous population in terms of age, language, and study treatment received, without aiming for data saturation. Participants were as such chosen to ensure variation in age (<65 and ≥65 years), and language (Dutch and French). All patients had undergone the study intervention and were chosen to have undergone RF treatment versus placebo following a 4:1 randomization ratio. The age stratification was used to include both working age and retired individuals. Exclusion criteria were limited to language barriers and the inability to provide informed consent. After purposive sampling, participants were chosen at random using Microsoft Excel.

Interviews were conducted by two interviewers with medical backgrounds: AB (female, MD) conducted interviews in Dutch, and MD (male, medical student) conducted interviews in French. Neither interviewer had a prior relationship with the participants. Both received external training in qualitative research methods and followed a standardized interview approach.

Data collection

Twelve individual interviews took place in June, July, and August 2025, either face-to-face or via Microsoft Teams, at participants' homes, clinics, or a public setting (e.g., a café). Interviews were semi-structured (topic 1) and structured (topic 2) (see Appendix S1) and were audio-recorded. Some partners were present during the interviews. The topic guide was piloted with a participant of the COGENIUS trial before data collection. Field notes were taken during the interviews. Two interviewers with a background in medical science conducted the interviews: AB (female, MD) in Dutch and MD (male, MD) in French. AB and MD had no previous relationship with the participants.

Appendix S1-scan QR

Data analysis

The audio-recordings were transcribed verbatim using the Amberscript AI transcription software[14]. Patient names were coded similarly to the COGENIUS trial.

Descriptive statistics were used for participant and interview characteristics. Interview data were analyzed thematically, combining deductive and inductive coding, in the interviewees' language (Dutch and French) by authors TV, JVZ, VB, AB, DL, and MD using Microsoft Excel. We used an interpretive paradigm and a descriptive design for the interviews.

Rigor

The quality criteria used for this study followed the framework described by Lincoln and Guba, and the methodology was based on the 'Handboek kwalitatieve onderzoeksmethoden' from Dimitri Mortelmans[15,16]. Credibility was enhanced through listening to the audio-recording along with the transcripts, by repeated reading of the transcripts before coding, and through ongoing comparison across data segments. Dependability was supported by having all interviews conducted by two researchers, one in each language, ensuring consistency in data collection. Confirmability was strengthened through participant checking of the findings. Authenticity was illustrated by the inclusion of verbatim participant quotations, while transferability was facilitated by providing detailed participant characteristics and verbatim transcriptions. The planned external audit was not conducted due to time and resource constraints. This manuscript conforms to the Consolidated criteria for Reporting Qualitative research (COREQ) and Standards for Reporting Qualitative Research checklists[17,18].

Results

Participant characteristics

Twelve participants, 5 females and 7 males, belonging to the OA group of the COGENIUS trial, were included, aged from 43 to 84 years

Table I. — Participant characteristics and study-related outcomes.

Participant number	Age (years)	Sex (Male/Female)	Employment status (Working/ Retired)	Knee Pain Compared to Baseline (Better/Same/Worse)	Relation Between Improvement and Study Intervention (Yes/No/Unclear)
1	73	Female	Retired	Worse	No
2	63	Female	Retired	Better	Yes[a]
3	63	Male	Retired	Better	Yes
4	66	Female	Retired	Better	unclear
5	75	Male	Retired	Better	No
6	72	Male	Retired	Better	Yes
7	52	Female	Working	Same	No
8	60	Male	Retired	Better	Yes
9	74	Male	Working	Better	Yes
10	65	Female	Retired	Better	Yes
11	43	Male	Working	Better	Yes
12	84	Male	Retired	Same	No

[a]Sham procedure.
The relation between improvement and study intervention reflected whether the participant felt the improvement was a direct consequence of the study intervention.

old (average age 66) from 5 medical hospitals in Belgium (see Table I). Five individuals declined to be interviewed (due to lack of time or unsuitable scheduling), and three could not be reached or had language barriers. The duration of interviews was on average 38 min (range 10 – 76 min).

Thematic analysis

Four major themes and 17 subthemes emerged from the analysis. The four themes were: Experience of living with knee OA, Experience of treatments for knee OA, Experience of the COGENIUS study, and Participants' preferences on RF treatment. The first theme was emergent.

Study Design and Patients

Theme 1: Experience of living with knee OA

Subtheme 1.1: The perceived causes of knee OA

Participants attributed knee OA to intrinsic factors (the knee being a weak joint, genetic predisposition, and aging) and external factors (heavy manual work, repetitive trauma). Participants perceived the disease to be spontaneously progressive; however, they voiced beliefs that sport, trauma, and manual labor were strong determinants of disease acceleration. The discrepancy between the grade of osteoarthritis in imaging techniques and the perceived symptoms was also noted. Participants understood that the symptoms did not only derive from a diseased bone, but that OA is a disease of the whole joint and the surrounding tissue (e.g., tendons and nerves).

I used to do a lot of triathlons and marathons, so I was very sporty. And that was also partly because of my job. I had the opportunity to train six to eight hours a day… But then you start having trouble with your knees, with your back (Participant 3, 63y, NL).

No, not really, because I know that it [sport] would have continued to worsen the osteoarthritis. So I didn't expect to be able to start doing sports again (Participant 7, 52y, FR).

Subtheme 1.2: Burden of disease

Pain and limitation in functionality emerged as a dominant constant feature of experienced knee OA burden. Participants expressed that the limitations they encountered influenced their sleep, their work, and their emotional well-being. They reported that this burden was central in their life, that it, in certain periods, resulted in work discontinuation and limited social engagement. Despite this, social engagement was also identified as a distraction to pain. Participants stated that living with knee OA resulted in feelings of frustration, frequent complaining, and uncertainty about the future. They reported that knee pain required life adjustments such as not carrying heavy objects, using fewer stairs, and switching to an automated car.

For example, if I take a break to stop and eat, when I start again [walking], I feel like an old diesel engine. Everything has to get going again (Participant 7, 52y, FR).

I was crying from pain all the time. It's like when you have a toothache, it's the same thing. …

When you have a cavity, you're very nervous, you can't even touch the skin (Participant 8, 60y, FR). But what if it gets worse? That's what I wonder. What are they going to do then? They always say, 'We don't want to put in a prosthesis, we don't want to put in a prosthesis.' What are they going to do in my case?! (Participant 2, 63y, NL).

Theme 2: Experience of treatments for knee OA

Participants conveyed having undergone different treatment trajectories. Participants generally recalled active non-interventional care; however, application of physical therapy specifically for knee OA was inconsistent. They understood treatments to be divided into symptomatic treatments (e.g., medications) and disease targeting (e.g., intra-articular injections and surgery). There were differences in the number of received infiltrations, with participants having undergone a minimum of three and an estimated maximum of more than twenty, with variable effects. Participants had consistently considered the need for a TKA and had consulted orthopedic surgeons; they expressed uncertainty about the appropriateness of the proposed treatments, especially when second or third opinions recommended different approaches. Another recurring topic during the interviews was participants' wish for new treatments for knee OA.

I went to see a specialist. Right away, he advised me to get a prosthesis. I was a bit shocked because immediately—after five minutes, after looking at the X-rays—he said that a full prosthesis was needed. I had been told that a partial prosthesis was possible. So I went to see a second specialist. In the end, out of the three specialists I consulted, one said a full prosthesis, one a partial one, and the other said, 'Whatever you want.' That didn't reassure me at all. I wondered whether this is medical care or medical business (Participant 10, 65y, FR).

(AB: What could be improved?) That they could control the pain better. When I hear about athletes, they are always treated immediately… they get operated on and shortly after that—boom—and they're back at it. That can't be right, can it? Couldn't they help ordinary people a bit more? (Participant 1, 73y, NL).

Subtheme 2.1: Non-pharmacological treatments

Participants reported varied beliefs on the value of physiotherapy for knee OA. Physiotherapy was described as having positive attributes (e.g., important for improvement in function and experience of less pain, to improve equilibrium, as a preventive treatment, and valuable for the general health) and negative attributes (e.g., as painful, as a deteriorator for the knee pain, and as being ineffective). There appeared to be distinct participant groups: some had not engaged in knee OA-specific physiotherapy at all, while others had undergone years of physiotherapy and adhered to exercise programs.

Participants generally understood the importance and implemented other self-management strategies, including staying active, activity modification (e.g., pacing), using assistive devices, and weight management. Knee braces and canes were reported to help improve equilibrium and provide support during walking or running, but they were also reported to limit movement and cause discomfort. Need for education on the disease cause and prognosis was not acknowledged in the interviews, except for the need for education on the RF treatment of the genicular nerves.

I found the second operation by Dr. [name omitted] to be very successful. But because of the physiotherapist's actions, the improvement was undone again (Participant 2, 63y, NL).

Subtheme 2.2: Medication

Participants articulated strong views on medication use, mentioning that medication was not viewed as a solution to their problem, medication was a final recourse when all other treatments did not work, and when used, it was perceived as having a short effect and undesirable complications (addiction and constipation). Medications recurrently mentioned were paracetamol, non-steroidal anti-inflammatory drugs, and tramadol. When strong opioids were mentioned, they were used for knee OA pain in a setting of generalized arthrosis.

I can tolerate pain very well, but at a certain point you say, well… because taking painkillers, I did that as little as possible. And after a while… it's an addiction too (Participant 2, 63y, NL).

In fact, I don't take any [painkillers], except during real crisis moments, when for a few days I've overdone it a bit. Or if I make a wrong movement and really put pressure on it, I hurt my knee quite badly. Then, for several days, I sometimes have moments when I can't walk anymore, and so then I take some anti-inflammatories. But otherwise, I try not to take them continuously, painkillers either, and I try to live in a way that avoids hurting myself (Participant 7, 52y, FR).

Subtheme 2.3: Minimally invasive treatments (intra-articular injections)

Interviewees expressed willingness to undergo articular infiltrations (intra-articular corticosteroids, intra-articular hyaluronic acid); however, an aversion to glucocorticoid injections

was also mentioned as they were viewed to have systemic adverse events, especially when the person was suffering from diabetes mellitus. For intra-articular injections, participants reasoned the effect to be more valuable in the early stages of knee OA than in the end-stage disease. The effect of intra-articular injections varied from ineffective to initially effective, with a duration of action of a single infiltration of up to 3 months; however, the effect would diminish after repeated injections. Participants had also undergone Platelet-Rich Plasma infiltrations and considered them painful and not very effective.

That gel is then absorbed by the cartilage. But if the cartilage is gone? Well, yes, then it can't penetrate that space, can it? (Participant 2, 63y, NL).

I tried knee supplementation, it worked, it worked, but over time it wasn't as effective anymore (Participant 8, 60y, FR).

.. and corticosteroids, I prefer to avoid them because I've heard a lot of negative things about them. That really puts you off. There's an exceptional improvement with the first injections, and then the improvement decreases over the injections, so it deteriorates—the improvement deteriorates over the injections(Participant 11, 43y, FR).

Subtheme 2.4: Surgery

The possibility of a surgical intervention was a topic that participants had discussed with an orthopedist, and the wish to have undergone a surgical procedure in earlier age was commonly mentioned. Five reasons were mentioned for not having undergone an operation: the perception that a TKA is a heavy operation, anxiety about the operation, diabetes as a risk factor for surgical wound healing, anxiety about persistent post-surgical pain, and advanced age. The decision did not rest solely with the patient; orthopedists determined whether a participant was an appropriate candidate by considering the individual's general health and degree of physical condition (such as low muscle mass), rather than basing the decision solely on the radiological grade of osteoarthritis. Participants also reported inconsistent surgical advice, which heavily influenced their decision to undergo a TKA. One of the participants underwent an unicondylar knee arthroplasty during the study and was very content with their decision.

But when they explained to me how a total prosthesis works, there were people who were satisfied and others who weren't. That was terrible for me. Yeah, I wasn't laughing about that, as they say (Participant 10, 65y, FR).

It's unfortunate that when something is worn out, you can't do anything about that, can you? Or put in prostheses, right? What is that? Prostheses for everything. Yes. A robot man (Participant 4, 66y, NL).

The best treatment I've had done is that operation now. I'll say it again, from the first day I came back to my room, I didn't have any pain anymore (Participant 5, 75y, NL).

Theme 3. Experience of the COGENIUS study

Subtheme 3.1: Study organization and run-in phase

Participants reported high overall satisfaction with the study, independent of treatment outcomes. Study personnel were described as friendly, supportive, and thorough in their explanations, and the study's organization—particularly short waiting times—was viewed positively. Participants, however, expressed some skepticism and difficulty when reporting the NRS pain score, noting individual differences in pain interpretation and daily fluctuations influenced by activity, sleep, and emotional state. Certain questionnaire items were also identified as repetitive or irrelevant - such as functionality questions that did not apply to the participant's situation - and had trouble with not knowing the randomization group. Participants suggested conducting walking tests in a straight line to avoid turns, which can increase the measured time, provoke pain, and discomfort.

Participants were frequently unaware of the study's run-in phase and perceived it as offering little added value, given their extensive prior conservative treatments. This phase was recalled primarily as a waiting period before receiving the study intervention—either following a recent intra-articular injection, while trying a new medication, or as time to reflect on whether they wished to proceed with the intervention. Differences in the type of exercises for knee OA received during physiotherapy went unnoticed.

So I was eligible for that study. I said that I had already had an injection before, but it had to be at least three months without an injection in my knee before I could even take part (Participant 3, 63y, NL).

I actually found it nice that I could talk about it with my family in the meantime (Participant 4, 66y, NL).

Subtheme 3.2: Experienced effect of the study intervention

Participants reported improvement in pain, functionality, sleep, emotional well-being, and social participation. The reduction in pain was meaningful, even though it did not result in full

recovery. The onset of improvement varied considerably from two days to several months after treatment. In some cases, the perceived improvement was not clearly attributable to the study intervention itself, but may have been influenced by concurrent physiotherapy, additional injections, or surgery. Participants highlighted a synergistic effect between the study intervention and weight loss. One participant who knew they had received the placebo intervention and yet experienced notable improvement emphasized the role of mindset in influencing treatment outcomes.

But before, sometimes I had to get up in the middle of the night to take a painkiller. I don't have to do that anymore. It's very, very exceptional now if I take something [painkiller]. I can cycle. I go walking (Participant 2, 63y, NL).

After the treatment, I also went to the physiotherapist. Yes, and then I could feel that things were getting a bit better. Yes, those exercises became a bit easier (Participant 4, 66y, NL).

Subtheme 3.3: Experienced burden of the study intervention

When asked about the burden of the intervention during and after the procedure, participants reported a wide range of experiences. The intervention was described as causing no or only minimal discomfort, but also as very painful. The intervention was also perceived as requiring additional logistical planning due to the use of periprocedural sedation, when, for example, compared to an IA injection, which is performed during a consultation. Notably, even among those who found the procedure painful, all indicated they would be willing to undergo it again if there were a possibility of improvement, despite the actual effect they experienced from the intervention. Participants shared the perception that sedation, individually titrated, can diminish periprocedural pain.

Yeah, there was a preparation like you would prepare an operating room. They prepared me as if they were going to do something to me, and they pressed the laser against my leg (Participant 8, 60y, FR).

The only thing that you feel is when they give those little injections beforehand to numb it. But that's minimal, right? (Participant 3, 63y, NL).

The more the seconds passed, the more I was in agony. It was really, honestly horrible. And then the anaesthesiologist said, 'Can't we put me a little bit under gas anyway?' Can't we add'—I don't remember what anymore. And when they did the external part [of the knee], then it was much better, it was—well, I didn't have that much pain anymore. … I suppose they added an anaesthetic (Participant 7, 52y, FR).

Subtheme 3.4: Participants' perceptions of the RF treatment

Participants on multiple occasions perceived that the RF treatment is not a well-known treatment for knee osteoarthritis and felt that the option of undergoing the treatment and participating in the study was not offered by their treating physician. Input from treating physicians and family members was also identified as an important factor in participants' decision-making regarding whether to undergo the intervention.

Participants shared the perception that the intervention was invasive due to logistic factors, such as day-hospitalization, preparations before intervention, and peri-procedural sedation, finally comparing it to a surgical intervention. The RF treatment was believed to work symptomatically, possibly reducing their disease burden without being disease-modifying. One participant explained that, for her, the RF treatment was a good alternative to surgical intervention. Participants raised significant concerns about possible adverse events and possible joint degradation when the RF treatment is repeated. They also reflected on the reasons for the diminishing effect after several months, such as nerve regeneration.

Yes, of course it would be easier if a general practitioner or an orthopedic surgeon said, 'Why don't you go and do that and try it [RF] instead of getting another injection again! (Participant 4, 66y, NL).

But my question is: how is it that for those two months you're practically, practically pain-free, and then it comes back? I then imagined, for example, when you go to the dentist—well, those are nerves too, right?—that they sometimes burn. But when I go to the dentist and they burn my nerve, that pain doesn't come back. So how come in my knee it came back? (Participant 5, 75y, NL).

Well, I think four, five years at least, that it will work [RF], I hope. Four, five years—yes, up to seven, eight years. Yes, then it should, right? Because I thought, well, eventually it's been burned. Or well, if you're allowed to say it like that. Yes, that nerve will probably sooner or later come back to life (Participant 3, 63y, NL).

Theme 4: Participants' preferences on RF treatment

Subtheme 4.1: Optimal timing of the RF treatment

When asked about the optimal timing of RF treatment within their care pathway, participants expressed a range of opinions. These varied

between the following: the RF should be offered earlier, though the exact timing varied; the RF was best performed after intra-articular injections or instead of intra-articular hyaluronic acid in more advanced OA; the timing was appropriate; and RF should be proposed before total knee arthroplasty (TKA). Despite the previous answer, they reported feeling that they had waited a long time before being informed about RF or the opportunity to participate in the study.

I think after a year or two [of knee pain]. I wouldn't wait that long anymore, honestly. I wouldn't wait that long. I would have it done earlier and see what the result is (Participant 5, 75y, NL).

I would have been very happy if that had been years earlier. So before I had pain for such a long time. Because I really had pain for a very long time" (Participant 4, 66y, NL).

Right, I would have done it, because those interventions [RF] are good alternatives to putting in a prosthesis (Participant 10, 65y, FR).

Subtheme 4.2: Definition of treatment success

Participants defined a successful treatment as diminished pain, improved functionality, and recurrently as less pain during movement (such as standing up from a chair, cooking, walking, jogging, and gardening). Upon inquiry about the degree of relief, participants recognized 50% and 70% improvement as a very good result. When prompted on the duration of relief, perspectives were mixed, ranging from any duration of relief to a one-year effect to be considered important. One participant reported a 2-month effect as not important.

Yes, I just want to be properly mobile again. To be able to go jogging, go walking (Participant 2, 63y, NL).

Let's say about 70% [improvement]. But still, I can live with that (Participant 5, 75y, NL).

Preferably forever, right? … But yes, if I had to have it done every year or so, then I would do it. Yes, yes, if that meant that I could—well—have less pain (Participant 5, 75y, NL).

Subtheme 4.3: Willingness to undergo a repeat RF treatment

Nearly all participants were willing to undergo a repeat of the RF treatment in the future if they experienced increased burden of knee OA or if the intervention could offer additional pain relief (e.g., if additional nerves were to be targeted). One participant was indecisive about a reintervention due to the possibility of adverse events and uncertainty about the possible additional effect. Participants mentioned repeatedly that they were willing to undergo the treatment every few months, yearly, or every two years. This inquiry also triggered some questions on possible adverse events and possible joint degradation after repeated treatment.

I'm ready to do it again in two years because it gives me quality of life (Participant 10, 65y, FR).

I really hope it's once every… once a year. Well, not too often anyway. Yes, yes, I know, now it's ten months [of improvement], that's not what's going to change the world, right. But still, yes, it would be worth it [every 10 months] (Participant 12, 84, FR).

But well, if after several months we see that it [pain] comes back and we talk about it again, then after all, why not. Yeah, I think I would do it, but if I had to do it every year, then I think I would start asking myself questions. Clearly, I would be thinking: it's true that there is effectiveness, so that tells you that there is something in my body that's doing that. So, yeah… I would ask myself questions because it's a resistance at the level of the body, meaning there's probably something going on. And maybe it deteriorates more than it improves (Participant 11, 43y, FR).

Subtheme 4.4: Willingness to undergo treatment of more than 3 genicular nerves

Participants were predominantly open to treating more than 3 genicular nerves, believing that any additional periprocedural burden (such as longer treatment time or increased discomfort) could be compensated for by the potential for greater effectiveness. Participants felt that there should be a limitation on the number of needles used without specifying this number. Those who opposed targeting more nerves felt that it would increase the risk of adverse events and doubted any added benefit, particularly in cases where treatment of three nerves had not produced improvement.

If I knew that it would help? Absolutely. I would try anything to have a bit less pain (Participant 1, 73y, NL).

If there are no negative side effects, why not? … The pain mustn't be multiplied by—by three. Well yes, why not, if it brings something extra. If at the beginning I have to suffer a bit more, well then, that's the price to pay. But if the result is even better, why not? (Participant 10, 65y, FR).

Yes, but it's like everything—at some point, there's always a limit. The advantages will no longer be compensated by the disadvantages. The disadvantages become far too bothersome or far too present to justify the benefit alone (Participant 11, 43y, FR).

No, it really becomes microsurgery. It only takes one needle that isn't placed properly (Participant 8, 60y, FR).

No significant variation in answers to the topics related to participant characteristics was seen.

Discussion

This qualitative study provides insight into how individuals with knee OA in Belgium experience and navigate treatment strategies, with particular attention to RF treatment of the genicular nerves administered during the COGENIUS trial. Part of the findings can be interpreted within the FAME framework (Feasibility, Appropriateness, Meaningfulness, and Effectiveness)[19]. The main finding is that participants perceived RF treatment as both meaningful and appropriate. In terms of meaningfulness, participants expressed confidence that RF could diminish the burden of knee OA, at least for a subgroup of patients. Outcomes currently used in clinical research, pain, function, and quality of life, were considered relevant, with functionality repeatedly emphasized as a central treatment goal. Regarding appropriateness, participants felt that RF aligns well with their priorities within the context of the COGENIUS trial. They indicated that patients with chronic knee pain who do not improve with standard conservative treatments should be considered eligible for RF. The treatment context, a day hospitalization procedure performed by a pain specialist under periprocedural sedation, was also viewed as acceptable. Participants also addressed aspects of feasibility, emphasizing that the overall burden of the RF treatment is acceptable under periprocedural sedation. To minimize discomfort, systematic use of sedation, individually titrated, should be considered.

If the COGENIUS trial demonstrates positive effectiveness and supports broader implementation of RF in Belgium, several challenges may arise. These include limited awareness of RF treatment among patients, their families, and clinicians, as well as the fact that many individuals with chronic knee pain do not routinely consult pain specialists. Additionally, RF may be perceived as more invasive than other minimally invasive treatments, such as intra-articular injections, because it typically requires a day-hospital admission rather than standard consultation-based procedures. Together, these findings highlight the need for improved patient education and stronger interprofessional collaboration.

Another key finding of this trial was the confirmation of the substantial burden of living with knee OA. Participants described significant pain, functional limitations, sleep disturbances, reduced work capacity, and emotional strain. These accounts are consistent with findings reported in other OA populations and highlight the need to optimize care for this growing patient group[2, 20]. This trial demonstrates that individuals with knee OA in Belgium undergo long and highly variable treatment trajectories, typically managed by general practitioners, physiotherapists, and orthopedic surgeons. Based on this study, future initiatives should focus on expanding standardization of theses treatment trajectories, with emphasis on active patient education regarding exercise and exercise adherence, with special attention to the minimal risks of contributing to disease progression, referral to a dietician or psychologist when necessary, and education about treatment options in the multidisciplinary pain clinic, such as RF of the genicular nerves. All treatment trajectories should incorporate a biopsychosocial approach[21,22]. Variation was also evident in the use of intra-articular injections, with participants reporting anywhere from three injections to more than twenty, with inconsistent benefit. Participants generally agreed that infiltrations were effective in the early to mid-stages of the disease and that their effect diminished. This suggests that continuing with repeated injections at that stage may be unwarranted, opening a potential window in which RF treatment of the genicular nerves could be more appropriate.

An important strength of this study is the exploration of participant preferences for future RF-related research. Participants expressed varied views on the optimal timing of RF within the treatment pathway, but agreed that therapy-resistant patients should be referred to a pain clinic to evaluate suitability for RF. A 50% improvement in pain, function, or pain during activity was considered a meaningful treatment outcome, sustained over several months to a year. Of note, although previous surveys report that nearly nine out of ten patients with osteoarthritis identify pain as the main impact of the disease, participants in our interviews repeatedly highlighted functionality as a major concern[3]. This indicates that future RF research should include both pain outcomes and functional measures, such as in combined pain and functionality patient-reported scores, as important endpoints. Participants generally supported repeat RF treatment if initial benefit was observed and were open to targeting multiple genicular nerves when procedural risks were minimal.

Strengths and Limitations

As this is the first study to report patient perceptions of RF treatment for knee OA, we undertook multiple measures to increase the

transferability of findings, including purposive sampling, investigator triangulation, and inductive analysis. Many identified themes converge with prior qualitative research on other knee OA interventions—such as the heavy disease burden, variable care trajectories, and desire for clearer treatment guidance—supporting the credibility of our findings.

Limitations of this trial include potential recall bias, as participants had long-standing symptoms and had exhausted conservative options, as required by the COGENIUS inclusion criteria. The sample, while heterogeneous, included slightly more men than women and more non-working participants. Another limitation is that interviews were conducted by a physician and a medical student, whose differing levels of clinical experience may have influenced participants' responses.

Implications and future directions

Further research should explore whether these thematic patterns hold in other cultural contexts, healthcare systems, and in additional clinical groups, such as individuals with persistent postsurgical pain, which is another indication for RF of the genicular nerves.

Conclusions

This qualitative study highlights the substantial burden experienced by individuals with knee OA and the variability of treatment trajectories in Belgium. Participants viewed RF treatment of the genicular nerves as an appropriate and meaningful component of care when knee pain is therapy-resistant, and periprocedural sedation is titrated according to need. The reported patient perspectives offer important direction for optimizing RF delivery, improving patient education, and guiding future research to better align the intervention with patient needs and preferences. Future studies should incorporate larger sample sizes, strive for data saturation, integrate clinicians' perspectives, and include qualitative investigations into patients' experiences with genicular nerve RF treatment for patients suffering from persistent postsurgical knee pain.

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Data sharing: No individual participant data will be shared. Due to the sensitive and potentially identifiable nature of qualitative data (including transcripts and recordings), data will not be made publicly available or provided to external researchers, even in de-identified form. No additional study documents (e.g., coding frameworks, or analysis files) will be shared.

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