## RESEARCH

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# Healing beyond bone: a qualitative study of the core decompression experience of physically active patients with stage II hip avascular necrosis

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### Abstract

**Background** Avascular necrosis (AVN) of the femoral head is a degenerative condition characterized by ischemic bone death, resulting in pain and impaired mobility. Core decompression, a surgical intervention, is widely performed for stage II AVN to alleviate symptoms and delay disease progression. While clinical and radiological outcomes are well-documented, the psychosocial dimensions of recovery remain underexplored. This study aims to understand the experiences of physically active patients diagnosed with stage II AVN who have undergone core decompression surgery during their follow-up period, allowing for a broader evaluation of the experiences of this patient group.

**Methods** This study used semi-structured interviews, in-depth follow-up questions, and thematic analysis to explore the experiences of physically active patients who underwent core decompression surgery for stage II AVN of the femoral head. The participants were assessed 1–3 years post-surgery. Conducted in the Orthopaedics and Traumatology outpatient clinic of Adana City Training and Research Hospital, the study included 31 patients who had core decompression surgery between January 2020 and January 2024, with at least one year of follow-up data. Data collection, including demographic and qualitative information, was carried out during the first week of April 2024, followed by the member-checking process in the third week. A thematic analysis checklist and COREQ guidelines were used to ensure analysis reliability.

**Results** The experiences of 31 patients (mean age 37.19±8.21 years, 12 females, 19 males) were summarized into five main themes that emerged from the data analysis process: 'Expectations and Concerns Before Surgery,''Postoperative Physical Experiences,''The Psychological and Emotional Process,''Social Support and Family Relationships,' and 'Health Services and Medical Support.''Twelve sub-themes emerged from the main themes.

**Conclusions** Core decompression offers significant benefits to patients with stage II AVN by improving mobility and reducing pain. However, psychological support, patient education, and robust social networks are essential to address the holistic needs of recovery. These findings highlight the importance of integrating patient-centered approaches

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into surgical care to optimize outcomes and satisfaction. Further qualitative research is needed to explore the experiences of AVN patients at different stages to inform multidisciplinary care strategies.

Keywords Femoral head, Avascular necrosis of, Osteonecrosis, Patient-centered care, Interview, Qualitative research

#### Introduction

Avascular necrosis (AVN) of the femoral head is a degenerative and progressive disease characterized by localized ischemic changes in the femoral head due to reduced blood flow to the bone tissue. The lack of blood supply to the affected bone tissue results in the death of bone cells, leading to structural collapse that compromises bone integrity and consequently causes severe pain and restricted mobility [1]. This disease often affects young and physically active individuals, making it a significant issue not only because of its impact on physical functionality but also due to its profound effect on patients' quality of life and psychosocial well-being [2].

AVN has a wide range of etiological factors, including corticosteroid use, alcohol consumption, trauma, and certain coagulation disorders. However, in many cases, the disease's development process is not fully understood [3]. Clinically and radiologically, AVN is evaluated in different stages [4]; while conservative treatments may be attempted in the early stages, surgical intervention becomes necessary in the advanced stages [5].

Core decompression, a commonly preferred surgical option for patients with stage II AVN, aims to increase blood flow to the femoral head by reducing pressure on the affected bone area [6]. Although this procedure is described as a simple but effective intervention, its success rates and long-term outcomes are debated in the literature [7, 8]. This procedure is predominantly performed to alleviate pain and improve quality of life, yet there is limited data on its influence on patients' psychological and social well-being. Existing studies primarily focus on clinical and radiological outcomes, often overlooking the psychosocial dimensions of recovery [9]. Moreover, quantitative studies emphasize biomechanical and radiological improvements without fully capturing patients' personal experiences or the effects on their social lives [10]. They provide limited information on patients' personal experiences and social lives during the treatment process. This gap highlights the need for comprehensive research that includes qualitative assessments to fully understand the impact of core decompression on patients' overall well-being.

Understanding the patients' experiences and challenges of stage II AVN patients after core decompression will allow us to address the impact on their daily lives more comprehensively, going beyond the clinical outcomes of the treatment [11]. Cultural and social dimensions play a pivotal role in understanding patients' experiences, where social support and cultural attitudes towards surgery can significantly influence recovery and decisionmaking processes [12]. By examining these aspects, our study aims to provide a more comprehensive understanding of patient recovery. The focus of this study includes patients' emotional states during the recovery process, the physical and psychological effects post-surgery, expectations of the treatment, and encountered challenges. Qualitative research, in particular, offers in-depth data based on patients' personal experiences, making significant contributions to identifying the issues and needs faced by patients during and after the treatment process.

This study aims to understand the experiences of physically active patients diagnosed with stage II AVN who have undergone core decompression surgery during their follow-up period, allowing for a broader evaluation of individual experiences in this patient group. In this way, by addressing the effects of core decompression surgery on patients' quality of life and social functionality, it aims to contribute to the development of a patient-centered approach in clinical decision-making processes.

#### **Materials and methods**

#### **Ethical approval**

Ethical approval for the study was obtained from the Adana City Training and Research Hospital Clinical Research Ethics Committee on February 15, 2024, with meeting number 146 and decision number 3164. The patients' rights, as outlined in the Declaration of Helsinki, were strictly observed.

Participants received written information about the study's purpose and procedures, and detailed verbal explanations were provided before each interview. They were fully informed of their rights and assured that they could withdraw from the study at any time. All participants signed informed consent forms in adherence to the patients' rights principles of the Declaration of Helsinki.

#### Research design, setting, and participants

This study was designed within a qualitative framework following an interpretive paradigm. This approach prioritizes understanding patients' subjective experiences, acknowledging that reality is socially constructed and varies from person to person [13]. The study employed semi-structured interviews with in-depth follow-up questions to explore the experiences and psychosocial processes of participants diagnosed with stage II AVN of the femoral head 1–3 years after core decompression surgery. A thematic analysis checklist was utilized to enhance the reliability of the analysis [14], and the Consolidated Criteria for Reporting of Qualitative Research (COREQ) guidelines were adhered to throughout the study [15].

Participants with stage II AVN of the femoral head who underwent core decompression surgery between January 2020 and January 2024 were selected through purposive sampling by the orthopaedic and traumatology surgeons in the research team (MYG and OÇ). This process involved leveraging clinical records and physician referrals to identify eligible participants. Challenges in the recruitment process included ensuring diversity in patient demographics and securing consent for follow-up interviews, which required extended communication and scheduling flexibility. Patients who met the inclusion criteria and were willing to share their experiences related to their stage II AVN treatment process were included in the study.

The inclusion criteria for participation were as follows: adults diagnosed with stage II AVN of the femoral head according to the Ficat classification [4], having undergone core decompression with iliac crest autogenous bone grafting performed between one and three years prior, with complete outpatient follow-up data available for at least one year after surgery, the Mini-Mental State Examination (MMSE) [16] and the Montreal Cognitive Assessment (MoCA) [17] scores of normal cognitive function, and the International Physical Activity Questionnaire-Short Form (IPAQ-SF) [18, 19] score of moderate or high. To ensure consistency in data, patients with prior surgical interventions for other lower extremity conditions or additional surgeries during the follow-up period were excluded.

Exclusion criteria included the presence of chronic non-communicable diseases, such as diabetes mellitus, hypertension, or organ failure; any lower extremity deformities (e.g., genu varum, genu valgum, or pes planus); and prior surgical treatment for other lower extremity injuries. In addition, patients with any cognitive, psychiatric, or metabolic disorders impacting daily life or musculoskeletal function and those with missing follow-up data were also excluded from the study. Forty-two eligible patients in the hospital database were informed about the study, and 31 of them agreed to participate. Sampling continued until data saturation, the point at which no new themes emerged from the data [20, 21]. By the 26th interview, our team agreed that saturation had been met [22], a conclusion reinforced through peer debriefing. To further ensure data saturation, five additional interviews were conducted, culminating in a total of 31 participants.

#### Data collection and analysis

Demographic information and initial interviews were collected during the first two weeks of April 2024. Follow-up interviews were conducted in the last week of April, which included a member-checking process to validate the initial findings. Each interview was conducted in a quiet room and recorded using a digital audio device after obtaining verbal and written consent from the patients and then transcribed for later analysis.

Prior to conducting the interviews, the second author (HSG) evaluated the cognitive function of the patients using the MMSE and MoCA assessments. Subsequently, the sixth author (EAU) performed the evaluations necessary for calculating the IPAQ-SF scores. The interview phase followed. All interviews were conducted in Turkish, with participant responses translated into English by a professional translator after transcription. A second translator then re-translated the English version back to Turkish, allowing the research team to confirm consistency with the original statements. All team members and translators reviewed and agreed upon the final English translations.

The interview guide (Appendix 1), tailored specifically for this study, was developed by MYG and OÇ based on discussions and relevant literature. After drafting the guide, EAU, experienced in qualitative research, provided additional feedback to refine the guide. Iterations continued until all authors reached a consensus.

The semi-structured interviews were led by MYG, a trained researcher with qualitative research experience. The interviews focused on eliciting participants' personal narratives surrounding their AVN diagnosis, core decompression surgery, recovery, and their reflections on daily life post-treatment. Throughout the interviews, MYG encouraged participants to discuss their experiences freely, noting any non-verbal cues. Interviews ranged from 30 to 75 min, depending on the depth of each participant's responses.

After transcription, general themes and important points from each participant's initial responses were highlighted and used as reference points for the second interview (Appendix 2) with the same participants, ensuring alignment through the member-checking process. During this follow-up, participants reviewed their statements from the initial interview and could suggest edits or clarifications, which were documented in the final transcripts.

The data analysis process began with creating a word cloud to highlight the frequency of specific terms used by patients (Fig. 1). Each transcript was independently read and cross-checked by two coders with expertise in qualitative analysis (MU and ALÖ) to ensure consistency and accuracy. The initial coding was conducted using an inductive approach, followed by team discussions to refine the codes and develop a unified codebook. This codebook was iteratively re-applied to all transcripts to capture any unaddressed quotes and ensure comprehensive coverage. Thematic analysis was performed

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# family challenges Surgery support frustration coping physical reassurance Mealth healthcare

Fig. 1 The word cloud was constructed using interview transcripts

iteratively in alignment with the COREQ guidelines [15], and structured coding followed the methodology outlined in Saldaña's The Coding Manual [23]. To further ensure reliability, peer debriefing and member-checking were conducted to validate the themes. Finally, the codebook was reviewed and finalized by EAU, an academic with extensive experience in sports and health sciences.

In the second phase, the coded data were systematically categorized into main themes and subthemes through an iterative thematic analysis process. Themes were identified by thoroughly reviewing codes and cross-referencing them with interview transcripts to ensure fidelity. The rigor of the analysis was maintained through peer debriefing and member-checking. Potential themes and subthemes were independently identified by each coder and subsequently refined and validated through collaborative discussions guided by ÖP, who has substantial expertise in qualitative research. The team reached a consensus on the finalized themes and subthemes, ensuring both reliability and depth in the thematic analysis.

#### Results

Thirty-one patients (12 females, 19 males) with a mean age of  $37.19 \pm 8.21$  years participated in this study.

A word cloud was generated to emphasize the prominence of the patients' statements from the interview transcripts (Fig. 1).

Following the coding and thematization process, five main themes were identified: 'Expectations and Concerns Before Surgery,' 'Postoperative physical experiences,' 'The Psychological and Emotional Process,' 'Social Support 
 Table 1
 Themes and subthemes related to the experiences of patients undergoing core decompression surgery

Themes	Subthemes	Frequencies (Participant)
Expectations and Concerns Before Surgery	• Health status and concerns about the future	31
	<ul> <li>Decision-making process for surgery</li> </ul>	31
Postop- erative physical experiences	Pain management and recovery process	28
	<ul> <li>Changes in daily activities</li> </ul>	25
	<ul> <li>New habits and physical adaptation</li> </ul>	21
The Psychologi- cal and Emo- tional Process	Postoperative psychological support     and emotional recovery	27
	<ul> <li>Hopes for the future and motivation</li> </ul>	22
	<ul> <li>Change of lifestyle and priorities</li> </ul>	26
Social Support and Family Relationships	The effect of family support on the recovery process	25
	<ul> <li>Support groups and communication with other patients</li> </ul>	22
Health Services and Medical Support	The quality of the communication and information with the healthcare team	24
	<ul> <li>Satisfaction with health services and suggestions for improvement</li> </ul>	24

and Family Relationships,' and 'Health Services and Medical Support.' The frequency data of the themes and subthemes of the study participants are presented in Table 1.

#### **Expectations and Concerns Before Surgery**

In the preoperative period, patients expressed a great deal of anxiety in assessing the physical benefits and potential risks of treatment. Uncertainties about the success of surgery and the impact on long-term quality of life were important sources of concern for patients. This theme highlighted patients' attitudes to the surgical process and their expectations and concerns about the benefits of surgery.

#### Health status and concerns about the future

In the preoperative period, patients experienced high levels of anxiety caused by uncertainty about recovery and postoperative quality of life. One of the main factors influencing the treatment decision was the patient's desire to be pain-free and to regain their former physical abilities. Patients turned to surgery in the hope of improving their quality of life and ability to move independently in the future. This suggests that the physical benefits of surgery are a critical factor in patient motivation.

"...I thought a lot about what my health would be like after the operation. Although the prospect of being free of pain was gratifying, I didn't know what to expect." (Participant 4).

"I was worried about whether the operation would work. I thought a lot about what if I would never be the same again." (Participant 9).

"...I hoped for a pain-free life in the future, but at the same time, I was afraid that the operation might not be successful." (Participant 2).

"It was my greatest wish to be able to walk comfortably and painlessly again in the future, but I was not sure whether the surgery would give a definite result." (Participant 14).

"...I agreed to have the operation, but I was afraid that if my pain did not go away, my quality of life would decrease even more. I was told that if the operation was unsuccessful, a hip prosthesis would be placed in the future." (Participant 6).

#### Decision-making process for surgery

Participants mentioned that gathering information about the condition and treatment options is often a challenging process. Patients reported seeking information to better understand their condition, manage their expectations, and make informed decisions about the core decompression procedure. This information-gathering process took place in a variety of ways, from discussions with healthcare professionals to the use of online resources and support from social networks.

For the participants, the decision to undergo surgery was seen as an important step in solving their physical problems. Under the influence of the information provided about the treatment process, patients accepted surgery as an obligatory solution. Doctors' support in the decision-making process and the hope of improvement through surgery helped patients to take this step with confidence. It is noted that the support of health professionals in making a decision about surgery increases the sense of trust.

"I had tried every way in the preoperative period, but the pain in my hip would not go away. I decided when my doctor said that surgery could solve this problem." (Participant 7).

"...Initially, I was afraid of the surgery, but I was having more and more difficulty every day. My doctor's reassurance and my belief that the results would be positive made me take this decision." (Participant 10).

"I was afraid of having an operation, but the pain in my hip was so bad that I couldn't even do my daily work anymore, so I decided that surgery was the best option." (Participant 5).

"I tried different treatment methods, but to no avail, the pain in my hip had become unbearable. When my doctor told me that surgical treatment could offer a permanent solution, I started to think about it." (Participant 3).

"... My hip pain was very intense and getting worse every day. I believed that surgery would benefit me, and I felt that I had no other choice." (Participant 12).

#### **Postoperative Physical Experiences**

It was understood that physical experiences in the postoperative period were one of the main factors affecting both the physical and psychological well-being of patients. Patients thought that the significant decrease in pain and increase in mobility after surgery were the factors that directly determined the progress in the healing process.

#### Pain management and recovery process

Pain management in the postoperative period emerged as one of the most critical factors affecting the quality of life of patients. Patients typically reported that pain was severe in the early postoperative period but gradually decreased over time. Although the efficacy of pain medication varied, some patients reported that they had difficulty tolerating pain.

Patients emphasized that they reached a new quality of life with reduced pain and improved mobility in the postoperative period. In the early postoperative period, painkillers, physiotherapy, and other pain management methods increase the comfort of patients during the recovery process. In addition, patients felt that postoperative pain control helped them to recover more quickly, which directly contributed to their improved physical performance.

"It is very relaxing not to feel as much pain as before after the operation. Thanks to this, I started to lead a more active life." (Participant 8).

"There was pain at first, but it decreased over time. Now I can move comfortably without using painkillers." (Participant 13).

"... Previously, I could not sleep at night; after the operation, my pain was very relieved, and I started to sleep more comfortably." (Participant 11).

"As the pain decreased, I started to be able to walk more. I used to have to sit constantly." (Participant 17).

"It is a great comfort to be able to live without being dependent on painkillers. I feel better physically." (Participant 15).

#### Changes in daily activities

Postoperatively, patients gained independence and increased functionality in activities of daily living. The improvements experienced by the patients in activities such as climbing stairs, walking, and undertaking housework reveal that the surgery directly contributed to their quality of life.

"I used not even to be able to do small jobs at home. Now I can move freely and do things myself." (Participant 3).

"...Before the operation, even climbing one flight of stairs was a big problem for me." (Participant 9).

"I've started walking and I can even walk long distances comfortably, which is a big improvement for me." (Participant 14).

"...I can do everything myself at home now. I used to need someone all the time." (Participant 7).

"I can spend more active time with my children; playing with them is no longer a challenge for me." (Participant 5).

"After the operation, walking has become easier than before, but I have not fully regained my old mobility. I have difficulty, especially in long walks." (Participant 15).

"There is some improvement in my movement, but I'm not quite back to my old self. It seems to take a long time to regain it." (Participant 29).

#### New habits and physical adaptation

After the surgery, patients adopted new habits such as regular exercise, healthy diet and sleep patterns. These changes contributed to the healing process and increased their physical capacity, enabling patients to have a positive outlook on recovery.

"...I now walk regularly every day and I feel better thanks to this new habit." (Participant 2).

"I started to pay attention to my diet to lead a healthier life. I pay more attention to my health after the operation." (Participant 15).

"Physical activities are now part of my daily routine, which increases my energy." (Participant 10).

"...I do light exercise every day to feel strong. This habit has contributed a lot to my recovery." (Participant 8).

"I have started to pay attention to my sleep patterns. I wake up more rested and feel more energized." (Participant 6).

#### The Psychological and Emotional Process

Patients expressed that they experienced not only physical but also emotional recovery in the postoperative period. Patients who had negative emotions such as stress, anxiety and depressive mood before surgery emphasized that they developed a positive psychological state in the postoperative period. Most of the participants thought that this positive psychological state was a factor that accelerated the healing process by positively improving their hopes for the future and their motivation in the healing process.

Some patients found themselves in a state of intense uncertainty after surgery, and this sense of uncertainty increased their stress levels. In particular, the length of the recovery process and their anxiety about whether they would fully regain their former health aggravated the postoperative psychological burden. While some of the patients maintained hope that the surgery would be successful, others developed a more pessimistic outlook due to uncertainty about the future. This situation challenged the patients' ability to adapt to the process and cope with stress psychologically.

# Postoperative psychological support and emotional recovery

Patients stated that it was easier for them to cope with their emotional processes when they received psychological support after surgery. Patients who struggled with postoperative stress, anxiety, and anxiety got through this process more easily, thanks to support groups and professional psychological help.

"...Sometimes I despaired that recovery was slow, but I learned to calm myself by meditating." (Participant 22). "...In order to get better psychologically, I joined a group on Facebook where people with the same disease as me were registered. It was good for me to talk to people who had undergone surgery like me." (Participant 13).

"...I had concerns during this process, but I tried to motivate myself all the time. I look to the future with more hope." (Participant 9).

#### Hopes for the future and motivation

In the postoperative period, some patients had both hopeful and anxious expectations about the recovery process. While positive thoughts about the treatment were a facilitating factor for some patients, the concern about the recurrence of pain was expressed by many patients. The presence of uncertainties about long-term recovery complicated patients' perspectives on the process. These uncertainties made it difficult for them to have confidence in the exact time of recovery. In the postoperative period, some patients strengthened their hopes for the future and gained motivation as they achieved physical and emotional recovery. Patients expressed that they were motivated by the desire to lead a healthy life as they gained independence in daily life activities.

"I am afraid of the pain returning because I don't want to experience the same pain again." (Participant 15).

"...Even if the treatment works, I am afraid that in the long run the same problem will occur again." (Participant 26).

"I am both hopeful and anxious for the future. I experience different emotions every day in this process." (Participant 21).

"It was very good for me to be able to go hiking again. I believe I can live a more active life in the future." (Participant 18).

"My self-confidence increased after the operation. Now I feel stronger than before, and I look to the future more positively." (Participant 5).

"...Seeing that my health is improving day by day gives me great motivation. I also quit smoking on the advice of my doctor. I am getting more hopeful as I get better." (Participant 12).

#### Change of lifestyle and priorities

Following surgery, patients stated that they re-evaluated their priorities in matters such as health, family, and personal care. The operation process reminded the patients of the value of a healthy life and led them to make changes in their lifestyles. These changes enable patients to lead a more balanced and healthy life in their daily lives.

In postoperative work life, some patients had to reorganize their expectations about work. Especially those who continued to work in jobs requiring physical strength faced problems such as decreased work performance and fatigue caused by prolonged standing. This led to changes in work and career plans, and some patients had concerns about their ability to maintain their jobs.

"...Now my health has become more important to me than anything else. My job was exhausting me, so I had to quit. I pay more attention to myself and prioritize healthy living." (Participant 3).

"...After the operation, I started to spend more time with my family. I better understand the value of the time I spend with them." (Participant 10).

"I used to neglect my health due to my busy schedule, but now I have learned to make time for myself. Moreover, this disease has helped me quit smoking" (Participant 25).

#### Social Support and Family Relationships

In the post-surgical recovery process, social support and family relationships played a critical role for patients. In this process, patients face not only physical but also psychological difficulties. The presence of such support makes patients feel stronger, increases their motivation for the recovery process, and helps them cope with stress. The support provided by family and friends enabled patients to be more resilient to the difficulties they faced in daily life. Social support facilitates patients' adaptation to the process, reduces the feeling of loneliness, and increases the sense of trust.

Family support was one of the most important elements in the recovery process for many patients. Particularly in the post-operative care process, family members and their close associates with patients provided moral support and helped keep patients' morale high. The interest and compassion shown by spouses, children, and other family members made patients feel that they were not alone in the postoperative period and helped them to be more resilient during the process.

#### The effect of family support on the recovery process

It was understood that postoperative family support plays an important role in the recovery process of patients. They stated that the physical and emotional support provided by family members was a factor that accelerated recovery after surgery by helping patients feel stronger and cope with the process.

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"My family was always with me; they helped me in every need. I think this accelerated my recovery process. I felt stronger." (Participant 1).

"... My husband did all the work at home and gave me time to rest. Without his support, I would not have got through this process so easily." (Participant 7).

"My children were always by my side and gave me moral support. Without my family, I would not have gotten through this process so strongly." (Participant 4).

#### Support groups and communication with other patients

Communicating with other patients experiencing similar processes and participating in support groups made the patients feel better. In the preoperative and postoperative processes, patients found morale by communicating with other patients with similar processes and received support for their recovery processes. Support groups, especially on social media, were seen to help patients feel that they were not alone and to cope with the difficulties they encountered in the process.

"I met people in Facebook groups who had undergone surgery like me. Listening to their experiences gave me hope." (Participant 9).

"In the postoperative period, I joined a group on social media. Talking to people with the same problems facilitated my recovery process." (Participant 3). "...I did not have the opportunity to meet other patients face to face, but I communicated with many people in online groups. It was a great relief to share my difficulties with them." (Participant 13).

#### **Health Services and Medical Support**

Patients' perceptions of healthcare services and overall satisfaction directly affected their adherence to treatment and expectations from treatment during the postoperative recovery process. Patients attach great importance to the quality of healthcare services provided to them before and after surgery and stated that the support they received from the healthcare team during the recovery process affected their satisfaction. In particular, the information and guidance provided during the postoperative care and follow-up process made patients feel more confident.

While some patients stated they were generally satisfied with the healthcare services, some said they would prefer to be more informed and more actively involved in the recovery process. Confidence in healthcare services increases patients' commitment to treatment and helps them develop a positive outlook on the long-term outcomes of the process. However, some patients who felt that there were deficiencies in healthcare services emphasized the need to improve postoperative care.

## The quality of the communication and information with the healthcare team

The communication of the patients with the healthcare team during and after the surgery shaped their expectations about the treatment process. Patients reported that the healthcare team's approach to informing and guiding them contributed to the healing process. In particular, providing clear and understandable information about the treatment process reduced the patients' concerns due to uncertainty and made them feel more confident.

However, some patients felt deficiencies in communication with the healthcare team and expressed that they would like to get more detailed information, especially about the recovery process. Patients stated that the continuous support of the healthcare team increased their morale and motivation but wished they could have received more information. The fact that the physician and healthcare staff provided guidance at every stage helped the patients confidently approach the process and strengthened their trust in the treatment.

"...My doctor explained the operation process in detail, and I was able to find answers to all my questions. This made me very comfortable." (Participant 1).

"The medical team explained the whole process to me in detail. It was very important for me to know what to expect." (Participant 11).

"...They told me what would happen at every stage. In this way, I was able to prepare for the process more consciously, and my fears decreased." (Participant 16).

"... My doctor explained in detail what I could experience after the operation. Getting information about the process made me feel more peaceful." (Participant 20).

"...My doctor gave me detailed information about the preoperative and postoperative process, which made me feel safe." (Participant 23).

"The medical team was very interested, but I expected more guidance about the process. I especially needed clearer information about what I should do after surgery." (Participant 31).

## Satisfaction with health services and suggestions for improvement

Patients expressed that they were generally satisfied with the health services after the operation and during the recovery process. The interest of the healthcare team and the quality of care they provided contributed to the patients feeling safe. However, some patients made suggestions about the areas they thought should be improved in health services.

"...I am very satisfied with the health services; the team was very interested. Everything was very well organized." (Participant 19).

"I am generally satisfied, but preoperative waiting times could be a little shorter in the hospital. An improvement can be made in this regard." (Participant 24).

"The service quality was very good, the team was helpful in every aspect. However, more information on pain management could be provided." (Participant 27).

"During my time at the hospital, the care was thorough. I just think that some procedures could have been faster, such as the preparation for anesthesia before the operation." (Participant 28).

"The medical team was very professional, but I think that communication could be further improved. More information could be provided, especially in outpatient clinic control processes." (Participant 30).

#### Discussion

This study analyzed and summarised the postoperative experiences of patients who underwent core decompression surgery for stage II AVN of the femoral head. Analysis of the statements provided five main themes: 'Preoperative Expectations and Concerns,' 'Postoperative Physical Experiences,' 'Psychological and Emotional Process,' 'Social Support and Family Relationships,' and 'Health Care and Medical Support.'

The findings of our study were obtained using a qualitative approach and shed light on the difficulties, physical, psychological, and social experiences of stage II hip AVN patients before and after cor decompression surgical treatment, and contribute to a comprehensive understanding of the treatment process by addressing the individual experiences of patients and their effects on their daily lives.

A review of the literature reveals that research on the recovery pathways of stage II hip AVN following coredecompression surgery predominantly centers around quantitative outcomes. Studies frequently emphasize metrics such as pain reduction, functional improvements, and radiographic assessments [9, 24, 25]. This quantitative emphasis reflects a prevailing trend in current research on postoperative recovery among stage II hip AVN patients, often overlooking the nuanced experiences that accompany these clinical measures. Patients reported that pain after core decompression surgery persisted in the early postoperative period, especially in the first few days, followed by a very significant decrease in pain in the following week. Studies have shown that the pain-reducing effect of core decompression occurs over time, and pain levels decrease even more in the following period after surgery [26, 27]. It was observed that some patients developed various strategies for postoperative pain management, and the frequency of needing pain medication decreased. This suggests that personalized pain management protocols are important to ensure an effective recovery in the postoperative period [28].

Patients were found to experience psychological distress in the postoperative period and had difficulty coping with feelings of uncertainty. Participants in our study stated that emotional distress, such as stress, anxiety, and uncertainty, increased after surgery and that they needed psychological support in this process. It is emphasized that psychological support in the postoperative period has a positive effect on the healing process of patients [29, 30]. Social media support groups contributed to the patients' feeling better by reducing their anxiety and anxiety levels both in the preoperative period and postoperatively. Research indicates that social media support groups can effectively reduce anxiety and worry in both preoperative and postoperative periods, thereby enhancing patients' overall well-being. A study by Ni et al. highlights that preoperative anxiety is closely related to the occurrence of postoperative adverse events, such as insomnia, pain, nausea and vomiting, and neurocognitive dysfunction [31]. Additionally, Salzmann et al. found that preoperative anxiety is prevalent and has harmful effects on postoperative outcomes [32]. These findings underscore the importance of psychosocial support mechanisms, including social media support groups, in the postoperative recovery process.

Our study shows that family support is a crucial factor in the postoperative recovery process. Family support contributed to patients' physical and psychological recovery and increased their motivation. Patients in our study reported that support from their spouses and other family members helped them to feel strong during the recovery process. These findings emphasize that postoperative social support is a factor that directly influences the recovery process of patients. It has been shown in the literature that a lack of social support leads to negative effects in the recovery process, whereas patients cope better with the process when social support is provided [33].

Patients highlighted the contribution of communication with the healthcare team and the information provided to them to the recovery process. The fact that the healthcare team provided patients with detailed information about both the pre-operative and postoperative processes helped to reduce anxiety caused by uncertainty. In addition, patients reported that this information process positively increased their motivation, indicating that the postoperative information process is a key element in increasing patient satisfaction.

Effective communication between patients and healthcare teams, along with comprehensive preoperative and postoperative information, plays a crucial role in reducing patient anxiety and enhancing motivation [34]. Studies have demonstrated that detailed preoperative education can significantly alleviate patient anxiety and improve satisfaction levels. For instance, a study by Ng et al. found that preoperative education interventions effectively reduced anxiety and depression among patients undergoing cardiac surgery, leading to improved perioperative outcomes [35]. Similarly, Wongkietkachorn et al. reported that needs-based preoperative education decreased patient anxiety and increased satisfaction more effectively than traditional methods [36]. These findings underscore the importance of thorough patient education and clear communication in enhancing postoperative recovery and patient satisfaction.

Many patients developed healthy lifestyle habits in the post-operative period and reported that these habits contributed to the healing process. Our study found that postoperative lifestyle changes helped patients feel stronger and healthier. This highlights the importance of health education and support programs to improve patients' quality of life in the postoperative period. As many studies have highlighted, postoperative lifestyle changes have a positive impact on long-term health outcomes [37–39].

In our study, many patients indicated that they were generally satisfied with the healthcare services they received, but there were some needs for improvement in the healthcare services. In particular, it was stated that the preoperative preparation for anaesthesia and the postoperative care and information processes could be more attentive and effective, and it was emphasised that more information and support services would contribute positively to the recovery process. Research indicates that patient satisfaction with perioperative care is significantly influenced by the quality of preoperative anesthesia preparation and postoperative care. A study found that factors such as preoperative education and patient expectations are closely associated with satisfaction levels in preoperative nursing care [40]. Additionally, a systematic review highlighted that effective communication and comprehensive information provision during the perioperative period are crucial for enhancing patient satisfaction [41]. These findings underscore the importance of attentive and informative preoperative and postoperative processes in improving patient experiences and outcomes.

#### Limitations

This study has several limitations. First, the sample is limited to a single hospital and a specific population, which restricts the generalizability of the findings. Second, only Turkish-speaking patients were included in the study, so the findings may vary in different cultural and linguistic contexts. Moreover, the participants involved in the study had up to three years of history of injury, and the long period may have caused a lack of complete recall of events in detail. Finally, the fact that this study was performed only on patients with stage II AVN and that different surgical techniques were used on the patients limits the generalisability of the results to other stages of AVN.

#### Conclusions

This study is the first to qualitatively analyze the postoperative physical, psychological, and social effects of core decompression surgery in physically active stage II hip AVN patients. The findings indicate that factors such as pain management, psychological support, social recovery, and treatment satisfaction play a critical role in the recovery process following surgery. In particular, structuring pain management and psychological support programs more effectively in the postoperative period is thought to contribute to patients' quality of life. Furthermore, strengthening social support systems and providing more detailed information about the treatment process stand out as key factors that could enhance patient satisfaction. Future research may examine the qualitative experiences of patients at different stages of AVN, addressing individual differences in this process more comprehensively and contributing to the development of a multidisciplinary approach.

#### Supplementary Information

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Supplementary Material 1

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#### Author contributions

All authors contributed to the design of the study. MYG and OÇ designed the interview guide, conducted the analyses of the data, and in the drafting of the manuscript. MYG conducted and transcribed the interviews. All authors checked the coding processes and actively participated in the process of creating themes and sub-themes.

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#### Data availability

The data supporting this study's findings are available from the MYG, MU, and  ${\rm O}\zeta$  upon request.

#### Declarations

#### **Consent for publication**

Not applicable.

#### **Competing interests**

The authors declare no competing interests.

#### Ethical approval

Ethical approval for the study was obtained from the Adana City Training and Research Hospital Clinical Research Ethics Committee on February 15, 2024, with meeting number 146 and decision number 3164. The patients' rights, as outlined in the Declaration of Helsinki, were strictly observed. Participants received written information about the study's purpose and procedures, and detailed verbal explanations were provided before each interview. They were fully informed of their rights and assured that they could withdraw from the study at any time. All participants signed informed consent forms in adherence to the principles of the Declaration of Helsinki regarding patients' rights.

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