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Turkish men's experiences of positive SMA carrier results: a qualitative study within a gendered screening framework

Ersan Gürsoy[1*] and Mert Yeğ[1]

Abstract

Background Spinal muscular atrophy (SMA) carrier screening has been part of Türkiye's premarital and prenatal program since 2021, using a stepwise algorithm that first tests men. Little is known about how male carriers interpret a positive result—particularly when their partners test negative—within the country's sociocultural context. This study qualitatively explored Turkish men's emotional, cognitive, and interpersonal responses to a positive SMA carrier result to illuminate needs that current screening practices may overlook.

Methods Eleven male participants who had received a positive SMA carrier result while their partners tested negative were recruited through purposive sampling from official health records in Erzincan Province. Data were collected via in-depth, semi-structured interviews conducted by telephone between November and December 2024. Interviews explored emotional responses, information-seeking behaviour, reproductive decision-making, and communication with healthcare professionals. All interviews were audio-recorded, transcribed verbatim, and analysed thematically using Braun and Clarke's six-phase framework, supported by NVivo 12 software.

Results Participants described intense, sometimes overwhelming emotions; widespread confusion stemming from scarce or inconsistent genetic counselling; and a heavy reliance on internet and social-media sources that often intensified fear. Disclosure decisions were shaped by stigma concerns and extended-family expectations, while interactions with healthcare professionals ranged from reassuring to dismissive. Many men postponed or reconsidered childbearing, weighed assisted-reproduction options, and ultimately reported greater awareness of genetic risk—some becoming advocates for broader screening. Across accounts, carrier status was framed not as a purely biomedical label but as a socially embedded responsibility compounded by the gendered design of the screening algorithm.

Conclusion Findings highlight the psychosocial burden placed on male carriers and point to gaps in counselling and follow-up care. Integrating accessible, culturally sensitive, and gender-aware genetic counselling—through tele-genetics, community outreach, and primary-care training—could mitigate distress and support informed reproductive choices. Addressing these needs would strengthen the ethical and practical impact of Türkiye's SMA screening program and offer guidance for similar initiatives elsewhere.

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Keywords Spinal muscular atrophy, Carrier screening, Genetic counselling, Psychosocial impact, Qualitative study

Introduction

Spinal Muscular Atrophy (SMA) is a severe autosomal recessive neuromuscular disorder caused by biallelic pathogenic variants in the SMN1 gene, leading to progressive degeneration of motor neurons, muscle atrophy, respiratory failure, and—in its most severe phenotypes—early infant mortality [1, 2]. Globally, SMA affects approximately 1 to 3 per 10,000 live births, with a carrier frequency estimated at 1 in 40 to 1 in 60 individuals [1, 3–5]. The most recent population-based study reports an SMA carrier frequency of 3.6% (1 in 27.7 individuals) among Turkish adults [6]. Although recent advancements in disease-modifying therapies have improved clinical outcomes, population-based carrier screening, accompanied by informed reproductive counselling, remains the cornerstone of public health efforts aimed at providing options for avoiding this life-limiting condition [7, 8].

In response to the high carrier prevalence and the cultural context of consanguineous marriages, Türkiye implemented a nationally funded premarital and prenatal SMA carrier screening program in 2021 [9]. This program employs a stepwise testing algorithm wherein only male partners are initially screened, and female partners are tested only if the male is identified as a carrier [9]. Pre-test information is generally provided by family physicians in primary care settings, who are also responsible for communicating test results. If both partners test positive, couples are referred to tertiary hospitals with medical genetics departments, where qualified clinical geneticists and genetic counsellors are available to provide comprehensive counselling and follow-up. For men identified as carriers with a negative partner result, follow-up is usually limited to reassurance or basic information at the primary care level, and no formal referral pathway to specialist services currently exists [9]. While this algorithm offers a cost-effective and pragmatic approach to resource allocation, it also imposes significant emotional and informational burdens on male carriers—who often receive this potentially distressing genetic information in the absence of comprehensive support or contextualized guidance. Existing clinical observations indicate substantial variability in the availability and quality of genetic counselling, further exacerbating feelings of uncertainty and psychological distress among those affected [10, 11].

To date, the literature on SMA screening has primarily concentrated on test accuracy, implementation strategies, and decision-making outcomes, predominantly through quantitative methodologies [12, 13]. While such studies yield valuable insights into clinical uptake and policy effectiveness, they fall short in capturing the subjective experiences of individuals navigating the emotional, social, and ethical complexities of a positive carrier result—particularly in socio-cultural contexts where reproductive choices are deeply intertwined with familial expectations and gendered norms. To address these limitations, qualitative research offers a robust methodological framework for examining how individuals interpret genetic information, manage uncertainty, and construct meaning in the aftermath of carrier screening.

Situated within this context, the present qualitative study investigates the emotional, cognitive, and interpersonal experiences of Turkish men who received a positive SMA carrier screening result, as part of the national screening program. Employing inductive thematic analysis, the study aims to generate contextually grounded insights that can inform the development of more patient-centred, ethically responsive, and culturally sensitive genetic counselling practices and public health policies.

Materials and methods

This study adopted a qualitative research design situated within an interpretivist epistemology and a social constructionist framework, which assumes that individuals construct meaning through their interactions and sociocultural context. Guided by this perspective, we employed thematic analysis to explore the experiences and perspectives of individuals who received a positive SMA carrier screening result. The analysis followed the six-phase framework proposed by Braun and Clarke (2006): familiarization with the data, generation of initial codes, search for themes, review of themes, definition and naming of themes, and production of the final report. Key elements of trustworthiness in qualitative research—credibility, dependability, confirmability, and transferability—were addressed throughout the research process.

Context and sampling strategy

Türkiye's national SMA carrier screening program follows a stepwise algorithm in which only male partners are initially tested; if the male is found to be a carrier, the female partner is then tested. In this system, results are typically communicated by family physicians, who are also expected to provide information and support, rather than formal genetic counselling. Referral to a genetics specialist or clinical geneticist for counselling occurs only if both partners test positive. This structure shaped the inclusion criteria for the study.

According to official records from the Erzincan Provincial Directorate of Health, no dual-carrier couples were

identified between January 2022 and May 2024. Thus, the study focused on couples where the male tested positive and the female tested negative. Of 94 eligible men, 11 participated in in-depth interviews, selected through purposive sampling until thematic saturation was reached. Saturation was monitored; the last interviews yielded no novel codes but confirmatory instances of existing themes, at which point further recruitment was deemed unnecessary.

Participants and data collection

Participants were selected using purposive sampling. Inclusion criteria were: [1] Being a male over 18 years of age [2], testing positive for SMA carrier status while the female partner tested negative, and [3] providing informed consent. Data were collected between November and December 2024. Participants were recruited through premarital screening program records at Erzincan family health centers. Eligible men who had received a positive SMA carrier test result were contacted by telephone and invited to participate. We distinguished T0 (testing), T1 (result disclosure), and T2 (interview). Our sampling window included results recorded in the prior 12–24 months, so T0 could precede T2 by up to two years.

All interviews were conducted in Turkish by the same male researcher (M.Y.), by phone, and lasted approximately 20–35 min. No interpreters were used in any of the interviews. The other researcher (E. G.), also male, took part in the coding and analysis phase. A semi-structured interview guide, developed based on the literature [7–9], included open-ended questions about emotional reactions, genetic counseling experiences, decision-making regarding childbearing, sources of information, and communication with healthcare professionals. The guide was semi-structured; while all participants were asked the core questions, interviewers also posed follow-up questions tailored to participants' responses, allowing themes to emerge beyond the pre-determined domains. All interviews were audio-recorded with participants' consent and transcribed verbatim. All transcripts were de-identified by removing names and any potentially identifying information prior to analysis. An English version of the interview guide is provided as Supplementary File 1. Both researchers are trained family physicians working in a tertiary hospital, which serves as the only referral center in the province. Researcher 1 (E.G.) is an academic physician with over 10 years of experience in family medicine, while Researcher 2 (M.Y.) is a resident physician with 2 years of experience. As there are no medical genetics specialists available in the province, this tertiary hospital is the center where all positive SMA carrier cases are referred before further transfer to genetics clinics. Thus, both researchers work in the unit that routinely evaluates and refers such cases, providing them with direct clinical experience in the SMA screening program.

Ethical considerations

Ethical approval for this study was obtained from the Non-Interventional Clinical Research Ethics Committee of Erzincan Binali Yıldırım University (approval date: 23.05.2024, decision number: 2024-07/1). In addition, formal permission was obtained from the Erzincan Provincial Directorate of Health to access participants' contact information for recruitment purposes. The study was conducted in accordance with the principles of the Declaration of Helsinki and its later revisions. Verbal informed consent was obtained from all participants prior to data collection. Participation was entirely voluntary, and participants were informed that they could withdraw from the study at any time without any consequences. Confidentiality and anonymity were ensured throughout the research process. All transcripts were anonymised and stored on a password-protected computer accessible only to the research team. No data were uploaded to external servers or cloud platforms.

Data analysis

Thematic analysis was performed in accordance with Braun and Clarke's (2006) methodology. An inductive approach was adopted, allowing themes to emerge organically from the data. Although the interview guide informed data collection, themes were generated inductively from coded meaning units across the dataset, rather than being a simple restatement of the guide questions. We defined meaning units as segments of text (from a phrase to several sentences) that conveyed a discrete idea related to participants' experiences of receiving, interpreting, or acting on a positive carrier result (e.g., an expression of panic upon disclosure of results, or an account of postponing childbearing). Meaning units were coded semantically, with openness to latent content where participants' accounts implied underlying norms or expectations. NVivo software (version 12) was used to facilitate the organization, coding, and management of qualitative data.

Operationalisation of Braun and Clarke's six steps in this study was as follows: both authors familiarised themselves with the data by repeatedly reading transcripts and writing reflexive memos; independently conducted line-by-line inductive coding in NVivo to generate meaning units; clustered codes into preliminary themes, which were iteratively reviewed against the dataset and refined in a shared codebook; and finally defined and named themes before selecting representative extracts to illustrate variation across participants.

To enhance dependability and confirmability, both researchers independently coded the data and engaged in iterative discussions to achieve consensus, maintaining a detailed audit trail of all analytic decisions. Disagreements were identified by comparing code applications within NVivo and were resolved through discussion until consensus; no third coder or adjudicator was required. Revisions to code definitions and theme boundaries were logged contemporaneously. Reflexivity was ensured through memo writing and ongoing self-awareness regarding personal assumptions and potential biases. Thematic saturation was considered to be achieved after 11 interviews, as no new codes or themes emerged in the final stages of analysis.

Results

All eleven participants were male and had undergone SMA screening as part of the national premarital testing program. At the time of testing, all were single and had no children.

Initial Emotional Reactions and Anxiety

A significant number of participants reported experiencing intense emotions such as fear, anxiety, uncertainty, and panic upon learning the results of the SMA carrier screening. This emotional impact was especially pronounced among those who received the news during an ongoing pregnancy. Some participants noted difficulty coping with the results, even describing physical manifestations of their distress. Conversely, a few individuals responded more calmly, either due to emotional resilience or limited understanding of the implications at the time.

> *"It was mostly fear, nothing else. My wife was already pregnant, and we panicked a lot. We didn't know what to do. I tried searching online, but that only made us more anxious. I remember how overwhelmed we got because we couldn't find clear information." (P1).*
>
> *"We already had our child, but honestly, we're still afraid. We keep praying that nothing's wrong with the baby. Even now, when my wife and I talk about that period, we recall how anxious we felt. That unease hasn't fully gone away." (P2).*
>
> *"I suffer from panic attacks. When I first heard the result, my hands started shaking, and I couldn't breathe properly. I immediately imagined the worst scenarios. My wife calmed me down, and talking to a doctor helped a bit, but I still wasn't fully reassured." (P8).*

Genetic Counseling and Professional Support

Many participants indicated that they did not receive formal genetic counseling during or prior to the testing process. Instead, most only received basic information or support from their physicians, which was often insufficient. The lack of professional guidance often contributed to heightened confusion and anxiety. While some accessed informal advice through healthcare contacts, only a few had structured discussions with specialists. Although all participants underwent screening during the premarital period, delays in processing results meant that some received their carrier status after major life transitions, such as marriage or even pregnancy. These disparities highlight both a lack of awareness and systemic barriers to equitable access to genetic counseling services.

> *"No, we didn't receive any. My wife was pregnant at the time, and when the results came back, we really didn't know what to do. The doctor wasn't clear. We turned to the internet, but that only made things worse. We felt lost and unsupported." (P1).*
>
> *"We were advised to consider IVF for our second child. They told us not to conceive naturally. We spoke with Dr. Cengiz (family physician) —he explained the entire process in detail. That was incredibly helpful because we were so confused at that point." (P6).*
>
> *"We consulted with the gynecologist and the family planning unit. They reassured us a bit. The test result came from Trabzon (regional genetics laboratory), and once we learned I was a carrier, we went back for more guidance. Without that support, we would've struggled much more." (P9).*

Sources of Information About SMA

Participants demonstrated varied levels of knowledge about SMA. While some participants admitted they had never heard of SMA prior to testing, others associated it generally with a neuromuscular disorder. A few men demonstrated more specific knowledge, noting its genetic transmission or life-limiting prognosis, although detailed understanding of disease progression and treatment was uncommon. While some actively sought information through online platforms, social media, and news articles, others refrained from further inquiry—either because they underestimated the issue or lacked access to reliable information. Participants with healthcare experience or contacts appeared to manage the information process more effectively.

> *"After getting the results, my wife and I started searching online. What is SMA? How does it work? We even watched YouTube videos. But after a while,*

we got more scared—most examples online were the worst cases. If it weren't for our nurse friend, we'd probably still be panicking." (P2).
"I mostly saw things on social media—videos showing the difficulties faced by children with SMA. Those were very moving. But I didn't really look for scientific articles or anything. Maybe I was just too scared to dig deeper." (P3).
"I used to work in the national health system, and we had some training on SMA. So I had a basic understanding. But once we had the result in hand, I still did a lot of online reading. My wife did too. It's a situation that catches you off guard." (P9).

Family and Social Support

Participants' choices to disclose or withhold information about the SMA test from their social circles varied considerably. While some shared the experience openly and received emotional and practical support, others refrained from disclosing it to anyone, citing concerns about being misunderstood or further distressed. However, participants who disclosed their results did not elaborate on the reasons underlying this choice; their accounts focused on the support received rather than on why they decided to share. The presence or absence of support appeared to influence the emotional and decision-making processes significantly. In this study, we use 'interpersonal' to refer to these disclosure practices and interactions within family and social networks.

"I told both my own family and my wife's family. They didn't pressure us—they left the decision up to us. That actually helped, because we didn't feel alone or forced. We made our own decision (about whether or not to have children) but felt supported throughout." (P9).
"We shared it with our close relatives. They supported us, especially when we had to travel to other cities for further evaluation. It meant a lot not to be alone during that time." (P10).
"We didn't tell anyone. We didn't see the point. Honestly, we thought they wouldn't understand, and we didn't want to upset ourselves even more." (P1).
"We didn't tell our families, but I talked to a few friends. They didn't say much, but just talking about it helped me feel a bit better." (P2).

Some participants also placed their carrier status within broader social and moral frameworks, rather than viewing it solely as a biomedical fact.

"I did not tell my wife because she was pregnant at the time; I did not want to upset her." (P6).
"We are believers; whatever comes is from God." (P11).

These narratives suggest that decisions to withhold results were not only to avoid distress but also reflected concerns about how others might judge or misunderstand them. Such non-disclosure patterns are consistent with stigma-related dynamics, even though participants did not explicitly use the term.

Reconsidering Parenthood Decisions

The SMA test significantly influenced reproductive decision-making among many participants. Several individuals reported postponing or reevaluating their plans for having more children due to uncertainty or fear. Others indicated that the test encouraged them to approach family planning with greater caution. A few participants, however, were unaffected in their decisions—either because they were not planning children or felt the results did not warrant a change.

"There were no issues with our first child, but when it came to having a second, we really hesitated. The results left us unsure. We didn't know what steps to take, so we put the whole thing on hold for a while." (P5).
"They suggested IVF for the second child and discouraged natural conception. That slowed everything down. We didn't feel ready—financially or emotionally." (P6).
"After this test, we became much more careful in planning to have children. In the past, we might have rushed things. Now we think through every step." (P11).
"I didn't want to have children in the first place—my wife did. The test result didn't really affect me. I wasn't emotionally invested in the idea." (P3).

Communication with Healthcare Professionals

Participants described varying experiences in their interactions with healthcare providers. Some appreciated clear, empathetic communication that helped them navigate the situation, while others felt confused or dismissed due to inadequate explanations. Establishing a sense of trust with healthcare professionals appeared to facilitate better emotional and cognitive processing of the test results.

"Our doctor at the public hospital (clinical geneticist) was very attentive. He explained everything clearly; what the risks were, what being a carrier meant. He even gave us options. That made a big difference." (P8).

"We barely talked to our family physician. They just said, 'No problem' and handed us the results. I wanted more detail. I didn't appreciate how such an important test was brushed off like that." (P3).
" My family physician is a friend of mine, so we had a very open conversation. He simplified the medical jargon for me. Thanks to him, I understood much more." (P6).

Post-Test Attitude Shifts

Following the test, many participants reported a noticeable increase in awareness regarding genetic risks and reproductive health. Individuals who initially ignored or underestimated the test's importance reevaluated their perspectives after receiving results. Some advocated for wider public access to carrier screening, emphasizing the test's societal value. However, a minority remained indifferent, perceiving the results as inconsequential to their lives.

"At first, I didn't take it seriously. But once I saw the results, I became much more cautious. I even started recommending the test to people around me. If I could go back, I'd prioritize this test from the beginning." (P5).
"My perspective changed completely. For our second child, we wouldn't even consider trying without getting tested first. We used to think this was something distant from our lives, but now we encourage others to do it too." (P6).
"I think this test should be mandatory. Everyone deserves to know their risk. It's too important to be left to personal choice." (P11).

Discussion

This qualitative study provides an in-depth exploration of the emotional, cognitive, and interpersonal experiences —specifically disclosure practices and interactions within family and social networks— of Turkish men who received a positive result in the national SMA carrier screening program. The findings reveal that even when their partners tested negative, these individuals encountered substantial emotional distress—most commonly fear, anxiety, confusion, and isolation—especially when disclosure of results coincided with key life events, such as pregnancy or marriage preparation. Although testing was premarital, delays in obtaining results meant that some participants first learned of their status during early pregnancy or after marriage. These reactions were frequently intensified by the lack of structured, accessible genetic counselling by qualified specialists, and inconsistent information/support from non-genetic healthcare providers, limited provider knowledge, and the psychological burden of navigating an uncertain reproductive future alone. It should also be noted that our participants did not provide detailed explanations for their motivations to disclose, which represents a limitation of our dataset. Nevertheless, prior literature on genetic disclosure and male infertility suggests that such openness may often be motivated by a desire to seek emotional support, to maintain openness in relationships, or to involve family in reproductive decision-making [14].

These findings strongly align with and extend prior research that has consistently shown how receiving positive carrier status without appropriate support can be emotionally destabilizing. The literature suggests that individuals in such situations often experience heightened vulnerability, particularly when results are delivered without anticipatory guidance or structured follow-up communication [15, 16]. In the absence of formal genetic counselling, many turn to unregulated digital content or anecdotal sources in an attempt to understand their risk, which can result in exposure to misleading, exaggerated, or fear-inducing narratives [17, 18]. Consistent with these patterns, the present study found that participants frequently relied on the internet and social media for information, yet reported that these sources often intensified their confusion and anxiety rather than alleviating it. This variability may be partly explained by the program's design, in which family physicians—not genetics specialists—are responsible for facilitating testing and delivering results, potentially without adequate training or resources.

Beyond emotional responses, this study underscores how sociocultural context significantly shapes the interpretation and implications of genetic information. Prior research has shown that factors such as health literacy, language barriers, and culturally embedded expectations can influence how individuals perceive genetic risk and respond to carrier status [10, 19, 20]. Consistent with these findings, participants in the present study did not interpret carrier status solely as a biomedical issue but instead framed it within broader social, familial, and moral dimensions. Difficulties in disclosing their results—often rooted in fears of stigma, blame, or misunderstanding—were commonly reported. Although participants did not explicitly use the term 'stigma,' their reluctance to tell family members (P1, P2) or their wider community indicates concerns that align with -related dynamics. This aligns with evidence from collectivist cultural settings, where reproductive decisions are frequently influenced by extended family dynamics and intergenerational considerations, shaping both emotional reactions and disclosure practices [21–23].

A particularly novel contribution of our study is its focus on the gendered implications of Türkiye's stepwise screening algorithm, which initially tests only male partners. While this approach is cost-effective and logistically

efficient, it places a disproportionate emotional and cognitive burden on men—especially when no further testing is indicated due to a negative result in the female partner. This dynamic remains relatively underexplored in the existing literature, which more frequently focuses on women's experiences, high-risk couples, or families affected by genetic disease. Our findings suggest that male carriers, even when not part of a "high-risk" couple, carry a unique burden of responsibility and often struggle with emotional isolation and decisional conflict. Similar dynamics have also been reported in male infertility research, where men experience stigma, isolation, and a socially constructed sense of reproductive responsibility [14].

Moreover, the reproductive consequences of receiving a positive result—even in the context of a low-risk pairing—were evident in this cohort. Participants reported a wide spectrum of reactions, ranging from postponement of childbearing to proactive engagement with reproductive technologies such as IVF with preimplantation genetic testing. These choices were influenced by both emotional readiness and practical considerations such as financial constraints, family planning intentions, and healthcare system navigation. These patterns mirror findings in studies from North America and Europe, where individuals' reproductive decisions following carrier screening are often context-dependent and shaped by available support systems [24–27].

Finally, our results confirm previous findings by Celik et al. (2024), who reported significant gaps in Turkish healthcare professionals' awareness of the SMA screening program and the content of pre- and post-test counselling [9]. These systemic shortcomings further compound the emotional and decisional challenges individuals face, particularly in regions where genetics-trained professionals are scarce. The present study highlights how such deficits in health system infrastructure directly influence patient experiences and may reduce the ethical effectiveness of national screening programs, even when participation is high.

Limitations

Several limitations must be acknowledged. First, the sample size was relatively small and limited to one province. As this is a qualitative study, the findings are not intended to be generalizable in the positivist sense of statistical representativeness. Rather, they should be understood as providing contextualised insights that may be transferable to comparable settings, consistent with an interpretivist view of generalizability [28]. While thematic saturation was reached, the inclusion of participants from more diverse socioeconomic or geographic contexts could have provided additional insights. Second, the study focused exclusively on male carriers with female partners testing negative; perspectives from dual-carrier couples, women, or individuals who declined testing were not captured. Third, potential recall and social desirability biases may have influenced participant responses. Lastly, the absence of longitudinal follow-up limits our ability to evaluate how attitudes and decisions evolve over time. Additionally, the fact that both the interviewer and participants were male may have influenced the disclosure of emotional responses due to masculine norms that discourage expressions of vulnerability, a possibility we acknowledged and monitored through reflexive memoing during analysis.

Conclusion

In conclusion, this study offers rich, contextually grounded insight into the psychosocial dynamics of SMA carrier screening among Turkish men—an underrepresented group in the existing literature. It reinforces the necessity of integrating accessible, culturally sensitive, and gender-aware genetic counselling services into population-based screening programs. Furthermore, the study highlights how emotional and reproductive decision-making processes are embedded in broader social structures and influenced by the design of screening algorithms themselves.

These findings carry important implications for public health policy. First, counselling services should be scaled and diversified to ensure timely, accurate, and empathetic communication of genetic risk. Innovative delivery models—such as tele-genetic counselling, community-based support, and enhanced primary care training—may help close existing gaps. Second, program designers must consider the unintended psychosocial burdens created by gendered testing protocols and offer supportive resources even for "low-risk" couples. Finally, future policies should adopt a more person-centered framework that considers the emotional, relational, and cultural dimensions of carrier status. By addressing these components, Türkiye's SMA screening initiative—and similar efforts globally—can evolve into ethically robust and psychologically supportive public health interventions.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12889-025-25145-2.

Supplementary Material 1.

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None.

Authors' contributions
E.G. contributed to the conceptualization, methodology, software, investigation, validation, formal analysis, supervision, and writing of the original draft. M.Y. contributed to software development, data curation, formal

analysis, writing of the original draft, and writing—review and editing. All authors reviewed and approved the final manuscript.

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Data availability
The datasets generated and/or analyzed during the current study are not publicly available due to ethical restrictions imposed by the local clinical ethics committee but are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
Ethical approval for this study was obtained from the Non-Interventional Clinical Research Ethics Committee of Erzincan Binali Yıldırım University (approval date: 23.05.2024, decision number: 2024-07/1). Verbal informed consent was obtained from all participants prior to data collection.

Consent for publication
Not applicable, as the manuscript does not contain any individual person's data in any form (including images, videos, or case details).

Competing interests
The authors declare no competing interests.

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