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# Perceptions and attitudes of medical students regarding the coronavirus disease 2019 pandemic and relationships with personality traits and psychological resilience

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**Ethics Committee Approval**
The study was approved by the Clinical Ethics Committee of Hitit University Faculty of Medicine (Date: March 2, 2021, No:398). All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

**Conflict of Interest**
No conflict of interest was declared by the authors.

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## Abstract

**Background/Aim:** COVID-19 adversely affects mental health. We aimed to investigate COVID-19-related perceptions and attitudes in medical school students and to assess possible relationships with students' psychological resilience levels and personality traits.
**Methods:** This was a cross-sectional study carried out with 186 students in medical school at Hitit University Faculty of Medicine from March 18, 2021 to May 27, 2021. The sociodemographic form, perceptions and attitudes related to the COVID-19 pandemic, the Eysenck Personality Inventory (short form), and the Brief Psychological Resilience Scale were delivered to the students via mobile phone or e-mail and data were collected online.
**Results:** In the COVID-19 perception scale, the assessment of dangerousness was found to be significantly higher among those living with at-risk individuals ($P$=0.026). In the perception of control subscale, personal control was found to be significantly higher in students who did not live with at-risk individuals ($P$=0.018). In the COVID-19 avoidance attitudes scale, behavioral avoidance was significantly more pronounced in students living with at-risk individuals ($P$=0.016). In our study, anxiety and depression were predominant in the brief symptom inventory. In the short form of the Eysenck Personality Inventory, it was observed that higher scores were obtained mostly in the neuroticism and extraversion dimensions.
**Conclusion:** The findings of this study examining medical students show links between demographic factors, personality traits, and responses in the context of COVID-19 coping behaviors.

**Keywords:** COVID-19 pandemic, personality, resilience, medical school students

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## Introduction

The coronavirus disease 2019 (COVID-19) pandemic has been shown to have negative effects on mental health [1-3]. Varying research results in the literature suggest that medical school students experienced considerable psychological adverse outcomes during the COVID-19 pandemic, both in Turkey and other countries [4-7].

Psychological resilience is defined as "the mental processes and behaviors that are effective in protecting an individual from the potential negative effects of stress factors" [8]. It has been reported that one of the most important factors predicting anxiety associated with COVID-19 is the psychological resilience of the individual [9]. As a recent example, a study from China evaluated psychological resilience for its role in the relationship between stressful experiences and acute stress disorder in university students. The results showed that resilience was a factor that determined the development of acute stress disorders due to COVID-19 [10].

Additionally, evidence from recent studies show that personality can impact overall coping responses, including coping responses to the COVID-19 pandemic. In particular, personality subdimensions such as extraversion, conscientiousness, and emotional stability (instability) seem to influence individuals' abilities to cope with COVID-19 [11]. In a study investigating young adults' coping responses to COVID-19 with respect to personality traits and demographic characteristics, many personality subgroups were found to be directly related to coping responses [12]. To our knowledge, no studies have investigated the relationship between personality traits and COVID-19-related perceptions and attitudes in medical school students.

In the present study, we investigated medical students' perceptions and attitudes regarding the COVID-19 pandemic and evaluated their relationships with students' psychological resilience levels and personality traits. In addition to revealing various personality traits that determine pandemic-related thoughts and attitudes of medical school students, we aimed to ascertain how the psychological resilience levels of students affected their thoughts and attitudes about the pandemic, and which personality traits were effective in resilience.

## Materials and methods

### Participants and study design

This cross-sectional study was carried out among medical students in their first to fourth year of study at Hitit University Faculty of Medicine from March 18 to May 27, 2021. Data were collected through online questionnaires and forms sent to students by mobile phone or email via the help of student representatives after obtaining necessary permissions from the Faculty of Medicine. Students who completed the questionnaire were included in the study. The faculty has a total of 556 students enrolled in years 1-4. All students were contacted and 186 were included in the study. Investigations were begun after approval was granted from the Clinical Ethics Committee of Hitit University Faculty of Medicine (Date: March 2, 2021, No: 398). All steps of the study were in agreement with the principles of the Declaration of Helsinki.

Comparisons were performed based on students' gender, presence/absence of an at-risk individual living with the student, and the presence/absence of a relative with severe COVID-19.

### Scales used in the study

*Sociodemographic form:* This was prepared by the physicians responsible for the study.

*Scale of perceptions and attitudes related to the COVID-19 pandemic:* This scale performs assessments of the following COVID-19-related dimensions: attitudes toward vaccines, perceptions of COVID-19, avoidance attitudes, perceptions of the control of COVID-19, and perceptions of causes of COVID-19. Henceforth, we refer to this scale as the "COVID-19 opinions scale" for simplicity [13].

### Perception of COVID-19 scale scoring

The Perception of COVID-19 Scale consists of seven Likert-style items which assess the two subdimensions of dangerousness and contagiousness. The first category (dangerousness; Questions 1, 2, and 3) assesses the dangers perceived in relation to COVID-19, whereas the second subdimension, (Questions 4, 5, 6, and 7) evaluates contagiousness. The first and second questions in the dangerousness subdimension of the scale are scored inversely. Inverse items are coded as 1→5, 2→4, 3→3, 4→2, 5→1 points. Scores range from 1 to 5, calculated as the average score from items in each subdimension. High dangerousness and contagiousness scores indicate greater perception (more severity) of these features among individuals.

### Avoidance attitudes from COVID-19 scale scoring

The Avoidance Attitudes from COVID-19 Scale consists of ten items scored using a five-point Likert scale. It contains the two subdimensions of cognitive avoidance (Items 1-5) and behavioral avoidance (Items 6-10). Cognitive avoidance evaluates avoidance of information related to COVID-19 (refusing to pay attention or think about other subjects when faced with COVID-19 information). Behavioral avoidance assesses avoidance of social activities, personal contacts, and public transportation. Higher scores indicate greater avoidance.

### Perception of control of COVID-19 scale scoring

This scale comprises 12 items scored on a five-point Likert scale. The three categories include macro control (Items 1-4), personal (micro) control (Items 5-8), and controllability (Items 9-12). Macro control concerns beliefs about the effectiveness of measures implemented at institutional, national, or global levels, while personal control relates to the efficacy of individual actions to prevent the disease. Controllability evaluates perceptions about the degree to which the disease can be managed. Higher scores in macro control reflect confidence in the adequacy of implemented measures, while elevated scores in personal control indicate belief in the effectiveness of personal actions. Likewise, heightened scores in controllability suggest a belief in the disease's manageability.

### Perception of causes of COVID-19 scale scoring

The COVID-19 Perception Scale consists of 14 items, utilizing a five-point Likert scale, and is categorized into three subdimensions: conspiracy, environment, and faith. Conspiracy (Items 1-6) addresses media-driven beliefs like biological warfare and big-pharma conspiracies. The environment subdimension (items 7-11) explores social and environmental factors like diet and pollution. The faith category (Items 12-14) examines religious

interpretations, such as viewing the pandemic as destiny or divine punishment. Each subdimension's score, ranging from 1-5, indicates the strength of perception within it.

**Attitudes toward the COVID-19 vaccine scale scoring**

The COVID-19 Vaccine Attitudes Scale includes nine items, which are divided into positive and negative attitude groups. In the negative attitude section (Items 5-9), scoring is reversed. Each subdimension's score (1-5) is obtained by dividing the total score by the number of items. Higher scores in the positive attitude section (Items 1-4) indicate a positive vaccine attitude. In contrast, higher scores in the negative attitude section suggest a less negative attitude toward the vaccine after reversing the scores.

**Eysenck Personality Inventory (short form)**

This form examines personality traits in four dimensions (psychoticism, extraversion, neuroticism, and lies) There are 48 items, 12 for each dimension, and each item is answered with 'yes' and 'no' options. Topcu [14] translated and adapted the Eysenck Personality Inventory (short form) to the Turkish language.

**Brief psychological resilience scale**

This scale measures psychological resilience with a six-item Likert-type (5 points) scale, as described by Smith et al. (2008) [15]. It was adapted into Turkish by Doğan [16]. Responses of "I strongly disagree" correspond to a score of 1, while "I completely agree" correspond to a score of 5. Scores increase in parallel with level of psychological resilience.

**Brief symptom inventory**

This scale comprises five subscales: anxiety (13 items), depression (12 items), negative self (12 items), somatization (9 items), and anger (7 items). It employs a Likert-type self-assessment format, with responses ranging from (0) "Not at all" to (4) "Advanced" for each question, yielding a total score range of 0 to 212. Higher scores indicate a greater frequency of symptoms. The Turkish validity and reliability study of this scale was conducted by Şahin and Durak (1994) [17].

**Statistical analysis**

All statistical analyses were conducted using SPSS version 21 (SPSS Inc., Chicago, IL, USA). Normality of distribution for variables was assessed using Q-Q plots and histograms. Continuous variables are presented as mean (standard deviation) or median (1st quartile - 3rd quartile) based on their distribution, while categorical variables are expressed as frequency (percentage). Between-group comparisons were conducted using the Mann-Whitney U test. Spearman correlation coefficients were calculated to assess directional relationships between continuous variables. Statistical significance was defined as two-tailed *P*-values less than 0.05.

## Results

The majority of participants (n=186) were females (63.98%) and the mean age was 21.14 (1.47) years. The great majority of participants (n=155, 83.33%) lived with their families. It was observed that 82.26% of the students had obtained information about COVID-19 from the media. Fear of contracting severe COVID-19 was present in 87.63%. With regard to attitude toward the COVID-19 vaccine, the positive subdimension revealed a score of 4.25 (3.75-4.75), while the negative subdimension revealed a score of 3.8 (3.4-4.4) points. Overall scores of other scales were as follows: 17.01 (5.11) points from the brief psychological resilience scale, 66 (34-104) points from the brief symptom inventory, and 11.62 (3.15) points from the Eysenck Personality Inventory (short form). Scores were similar for genders on the COVID-19 opinions scale (*P*>0.05 for all).

Overall, 92 of the 186 students were living with individuals who were defined to be in risk groups. In the perception of COVID-19 scale, the dangerousness subdimension was found to be significantly higher in those living with risk groups (*P*=0.026). In the perception of control of COVID-19 feature, personal control was found to be significantly higher in students who did not live with risk groups (*P*=0.018). In the COVID-19 avoidance attitudes scale, behavioral avoidance was higher among students living with risk groups (*P*=0.016) (Table 1).

Table 1: Summary of participants' COVID-19 opinions scale scores with regard to the presence of individuals at risk in their household

| | Live with individuals in risk groups | | |
|---|---|---|---|
| | No (n=94) | Yes (n=92) | *P*-value |
| **Perception of COVID-19** | | | |
| **Dangerousness** | 4.33 (3.67 - 4.67) | 4.67 (4 - 5) | 0.026 |
| **Contagiousness** | 4 (3.5 - 4.5) | 4 (3.75 - 4.5) | 0.378 |
| **Perception of Causes of COVID-19** | | | |
| **Conspiracy** | 2.17 (1.5 - 3) | 2.67 (1.5 - 3) | 0.564 |
| **Environment** | 3 (2 - 3.4) | 3 (2.2 - 3.4) | 0.736 |
| **Faith** | 2 (1 - 2.67) | 1.83 (1 - 2.5) | 0.386 |
| **Perception of Control of COVID-19** | | | |
| **Macro** | 2 (1.25 - 2.5) | 1.88 (1.5 - 2.5) | 0.381 |
| **Personal** | 2.75 (2 - 3.25) | 2.5 (1.88 - 3) | 0.018 |
| **Controllability** | 3.25 (2.5 - 3.75) | 3 (2.5 - 3.5) | 0.064 |
| **Avoidance Attitudes from COVID-19** | | | |
| **Cognitive** | 2.2 (1.8 - 3.6) | 2 (1.4 - 2.9) | 0.093 |
| **Behavioral** | 4 (3.4 - 4.4) | 4.2 (3.4 - 5) | 0.016 |
| **Attitudes Towards the COVID-19 Vaccine** | | | |
| **Positive** | 4.13 (3.5 - 4.75) | 4.38 (3.75 - 4.75) | 0.556 |
| **Negative** | 3.9 (3.4 - 4.4) | 3.8 (3.4 - 4.2) | 0.547 |

Data are given as median (1st quartile - 3rd quartile) according to normality of distribution

There was no significant difference between students with or without relatives who had suffered from severe COVID-19 in terms of COVID-19 opinions scale scores (*P*>0.05).

A range of demographic factors and personality traits appeared to have significant positive or negative correlations with responses to coping with COVID-19 (Table 2).

## Discussion

Our study aimed to explore the association between the perceptions and attitudes of medical school students toward the COVID-19 pandemic and their levels of psychological resilience and personality traits. Initial findings indicated that various demographic factors and personality traits were correlated, either positively or negatively, with responses to coping with COVID-19. The majority of the 186 participating students were female and resided with their families. Gender did not influence scores on the COVID-19 opinions scale. Notably, among the medical students surveyed, anxiety regarding infecting at-risk family members was notably higher compared to anxiety about personal infection.

Our study determined that anxiety and depression were more common in the brief symptom inventory. However, in the Eysenck Personality Inventory (short form), it was seen that the participants mostly scored higher on neuroticism and extraversion. A personality trait is an enduring characteristic of an individual's psychological makeup that influences how they perceive and interact with the world around them, as well as how they are affected by their experiences [18]. Three broad personality traits are believed to have implications for dealing

Table 2: Correlations between age and scale/inventory/questionnaire scores

| | | P-COVID-19 | | PCa-COVID-19 | | | PCo-COVID-19 | | | AA-COVID-19 | | ATV-COVID-19 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Dangerousness | Contagiousness | Conspiracy | Environment | Faith | Macro | Personal | Controllability | Cognitive | Behavioral | Positive | Negative |
| **Age** | r | 0.003 | -0.120 | **-0.330*** | 0.005 | **-0.249*** | -0.081 | -0.092 | -0.049 | **-0.163*** | -0.037 | 0.034 | -0.024 |
| | *P* | 0.966 | 0.105 | **<0.001** | 0.946 | **0.001** | 0.275 | 0.215 | 0.513 | **0.027** | 0.622 | 0.645 | 0.742 |
| **BRS** | r | -0.021 | -0.010 | 0.050 | -0.041 | 0.032 | 0.079 | 0.111 | 0.087 | -0.023 | -0.065 | -0.031 | -0.053 |
| | *P* | 0.774 | 0.888 | 0.500 | 0.578 | 0.661 | 0.283 | 0.132 | 0.237 | 0.751 | 0.375 | 0.672 | 0.473 |
| **BSI Anxiety** | r | 0.021 | 0.036 | **-0.173*** | 0.021 | **-0.267*** | **-0.235*** | **-0.255*** | -0.140 | -0.072 | 0.078 | -0.042 | 0.033 |
| | *P* | 0.774 | 0.629 | **0.018** | 0.774 | **<0.001** | **0.001** | **<0.001** | 0.057 | 0.327 | 0.293 | 0.569 | 0.651 |
| **BSI Depression** | r | -0.037 | -0.061 | **-0.156*** | 0.037 | **-0.263*** | **-0.270*** | **-0.262*** | **-0.171*** | -0.044 | -0.004 | -0.061 | -0.006 |
| | *P* | 0.619 | 0.406 | **0.034** | 0.616 | **<0.001** | **<0.001** | **<0.001** | **0.020** | 0.550 | 0.953 | 0.408 | 0.937 |
| **BSI Negative self-concept** | r | -0.094 | -0.139 | -0.041 | 0.020 | **-0.168*** | **-0.205*** | -0.134 | -0.116 | 0.018 | -0.078 | **-0.168*** | -0.111 |
| | *P* | 0.201 | 0.059 | 0.575 | 0.789 | **0.022** | **0.005** | 0.069 | 0.114 | 0.805 | 0.288 | **0.022** | 0.133 |
| **BSI Somatization** | r | 0.081 | -0.043 | -0.104 | 0.041 | **-0.269*** | **-0.235*** | **-0.201*** | -0.079 | 0.007 | 0.108 | -0.037 | 0.049 |
| | *P* | 0.269 | 0.564 | 0.159 | 0.580 | **<0.001** | **0.001** | **0.006** | 0.286 | 0.920 | 0.142 | 0.614 | 0.502 |
| **BSI Hostility** | r | -0.002 | -0.023 | -0.100 | 0.081 | **-0.232*** | **-0.275*** | -0.121 | -0.122 | -0.060 | -0.106 | -0.076 | -0.078 |
| | *P* | 0.978 | 0.754 | 0.173 | 0.271 | **0.001** | **<0.001** | 0.100 | 0.097 | 0.419 | 0.150 | 0.302 | 0.292 |
| **BSI Total** | r | -0.020 | -0.055 | -0.125 | 0.044 | **-0.249*** | **-0.256*** | **-0.210*** | **-0.144*** | -0.027 | -0.008 | -0.086 | -0.032 |
| | *P* | 0.788 | 0.452 | 0.090 | 0.549 | **0.001** | **<0.001** | **0.004** | **0.049** | 0.715 | 0.914 | 0.242 | 0.668 |
| **EPQR-A Extraversion** | r | 0.038 | -0.058 | 0.040 | -0.024 | 0.047 | **-0.186*** | -0.041 | 0.030 | -0.026 | -0.064 | 0.004 | 0.079 |
| | *P* | 0.605 | 0.434 | 0.589 | 0.747 | 0.523 | **0.011** | 0.577 | 0.685 | 0.724 | 0.385 | 0.961 | 0.286 |
| **EPQR-A Neuroticism** | r | -0.089 | **-0.145*** | -0.058 | 0.097 | -0.067 | -0.139 | -0.142 | -0.025 | 0.067 | -0.044 | -0.070 | -0.057 |
| | *P* | 0.228 | **0.048** | 0.433 | 0.188 | 0.366 | 0.058 | 0.054 | 0.734 | 0.363 | 0.551 | 0.344 | 0.441 |
| **EPQR-A Psychoticism** | r | -0.014 | -0.024 | -0.132 | -0.046 | **-0.283*** | **-0.294*** | -0.100 | 0.126 | -0.062 | 0.002 | -0.010 | 0.068 |
| | *P* | 0.851 | 0.750 | 0.073 | 0.531 | **<0.001** | **<0.001** | 0.174 | 0.086 | 0.401 | 0.977 | 0.888 | 0.359 |
| **EPQR-A Lie** | r | -0.005 | **0.148*** | 0.011 | -0.062 | 0.039 | **0.173*** | 0.138 | 0.095 | -0.103 | 0.072 | 0.092 | 0.021 |
| | *P* | 0.945 | **0.044** | 0.878 | 0.399 | 0.595 | **0.018** | 0.060 | 0.196 | 0.163 | 0.327 | 0.211 | 0.776 |
| **EPQR-A Total** | r | -0.017 | -0.032 | -0.044 | -0.040 | -0.073 | **-0.236*** | -0.077 | 0.121 | -0.051 | -0.015 | 0.018 | 0.064 |
| | *P* | 0.816 | 0.668 | 0.552 | 0.584 | 0.321 | **0.001** | 0.294 | 0.101 | 0.489 | 0.836 | 0.805 | 0.389 |

r: Spearman correlation coefficient, * Correlation is significant at the 0.05 level (2-tailed). P-COVID-19: perception of COVID-19, PCa-COVID-19: perception of causes of COVID-19, PCo-COVID-19: perception of control of COVID-19, AA-COVID-19: avoidance attitudes from COVID-19, ATV-COVID-19: attitudes towards the COVID-19 vaccine

with COVID-19: extraversion, conscientiousness, and emotional stability. Extraversion, which reflects a person's inclination toward social engagement, was surprisingly associated with a reduced inclination to practice social distancing with others [11]. People with high extraversion are likely to have difficulty adhering to restrictions (particularly social distancing containment measures) aimed at slowing the spread of COVID-19. The high extraversion scores in our study can be attributed to the inclusion of university students who generally have relatively higher socialization characteristics. Conscientiousness, reflecting aspects of self-control and planning, is positively linked with adherence to various regulations such as social distancing, hand hygiene, and stockpiling [11,19]. Finally, low emotional stability (e.g., neuroticism) is associated with stress and anxiety [19,20]. In a multicenter study by Al-Omiri et al. [21], higher neuroticism scores were associated with more adverse changes and effects related to COVID-19. In the aforementioned study, higher extraversion, compatibility, and conscientiousness scores were associated with greater acceptance of COVID-19 containment measures, in addition to less change and impact related to COVID-19. The negative impact and consequences of COVID-19 are very broad, including increased depressive and anxiety symptoms, stress disorders, insomnia, anger and fear, as well as negative consequences on mental health [22,23].

Gender had no impact on the distribution of COVID-19 scale scores in the present study. Gender is influential in coping behaviors and stress reactions [24]. Recent research on COVID-19 has primarily concentrated on the varying behavioral reactions between men and women. Findings have consistently shown that women exhibit higher levels of emotional distress and negative thoughts in response to the pandemic compared to men [25-30]. We could not obtain results compatible with the literature in our study. This can primarily be attributed to the high female proportion in our population, the fact that these women were financially dependent on their families, and the timing of the study (late stages of the pandemic).

In our study, COVID-19 opinions scale scores were similar among students with and without a relative who had a history of severe COVID-19. In the COVID-19 avoidance attitudes scale, behavioral avoidance was found to be significantly higher in students living with at-risk individuals. In the perception of COVID-19 scale, the perception of dangerousness was significantly higher among those living with at-risk individuals, whereas personal control was significantly higher for students who did not live with at-risk individuals. Our findings show that medical students' anxiety levels related to possible infection/or serious illness of their relatives in the risk group were significantly greater compared to their anxiety of being infected themselves. From this point of view, it can be said that students' concerns about COVID-19 are of an altruistic nature; that is, they are more concerned about the survival or well-being of their loved ones than their own health [31]. This type of altruistic anxiety is common in healthcare workers involved in the treatment of patients with COVID-19 [32]. In a study by Chan et al. in Hong Kong, it was reported that many healthcare workers volunteered to stay in hospital facilities instead of going home, thereby forfeiting their rights to interact with the outside world for fear of transmitting the virus to their family members [33].

**Limitations**

The first limitation of our study is that it was conducted during the relatively later stages of the COVID-19 pandemic, when all health institutions were on maximum alert and health policies had been stabilized. Secondly, our study was cross-sectional and was conducted in a single medical school, and therefore, may not be universal and should not be generalized to dissimilar populations. Thirdly, while anonymous self-reporting is generally considered reliable, enabling individuals to accurately describe both positive and negative aspects of their behavior, our reliance on self-reporting may have introduced participant bias [34]. Finally, since the data is entirely based on online surveys, there is a potential risk of bias. There is a need for multicenter studies with a larger number of participants.

## Conclusion

In conclusion, the perception of dangerousness was higher among students living with at-risk individuals. Conversely, the perception of control was significantly higher among students who did not live with at-risk individuals. Behavioral avoidance was notably higher among students living with at-risk individuals. Anxiety and depression emerged as predominant factors. Moreover, higher scores were predominantly observed in the neuroticism and extraversion dimensions in the short form of the Eysenck Personality Inventory. In our study of medical school students, we identified several direct and indirect connections between demographic factors, personality traits, and responses to coping with COVID-19. Notably, certain personality traits were observed to function as both adaptive and maladaptive factors in health-related coping responses. Further research and evaluation, from both clinical and theoretical viewpoints, are warranted to fully understand these findings.

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# Person-centered perioperative nursing levels of surgical nurses and factors affecting them

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**Ethics Committee Approval**
The study was approved by the Nevşehir Hacı Bektaş Veli University Ethical Board on July 21, 2023 (Decision number: 2023-08). Verbal and written consent was obtained from all participating nurses.
All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

**Conflict of Interest**
No conflict of interest was declared by the authors.

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## Abstract

**Background/Aim:** There is evidence that effective perioperative care provided by nurses shortens the length of hospital stay, particularly in surgical units. However, studies on the level of perioperative nursing by nurses are limited. This study aimed to analyze the level of person-centered nursing by nurses working in surgical units and the factors affecting them.
**Methods:** This cross-sectional descriptive study was conducted between July and August 2023 through face-to-face interviews with 150 nurses working in surgical units of two government hospitals in Adana and Nevşehir provinces who agreed to participate. Data were collected using the "Nurse Introductory Information Form" and the "Person-Centered Perioperative Nursing Scale (PCPON)".
**Results:** It was found that 52% of the nurses were aware of person-centered care, and 71.3% did not believe that the same care should be applied to each patient. The mean score of the PCPON for nurses working in surgical units was 77.233 (14.62). There was a statistically significant difference between the PCPON scores of nurses working in intensive care units, those who chose the nursing profession willingly, those who willingly worked in surgical units, and those with knowledge of person-centered nursing ($P$<0.05).
**Conclusion:** This study revealed that nurses working in surgical units demonstrated a high level of person-centered perioperative nursing performance. Factors such as willingly choosing the nursing profession, willingly working in surgical units, and educational status were found to influence perioperative nursing.

**Keywords:** perioperative nursing, surgical nursing, nursing, patient safety

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## Introduction

Surgical nursing is the field that implements policies for patient safety, sterilization, anesthesia, and minimizing surgical risks [1]. Nursing applied in the surgical field encompasses the nursing practices that patients require before, during, and after surgery [2]. Patients often experience anxiety and stress during hospitalization due to various factors such as the hospital environment, preoperative, perioperative, or postoperative complications, and uncertainty. However, nurses may face challenges in providing care in surgical units, particularly when they focus solely on surgical interventions, which can hinder communication, empathy, and personal care [3,4].

Person-centered nursing has been shown to have positive effects, including reducing the length of hospital stay, infection rates, and hospital costs. To enhance the quality of nursing care, nurses should consider patients and their families holistically. By implementing evidence-based guidelines in a perioperative setting, nurses can positively impact patient outcomes, such as reducing surgical site infections and length of hospital stay. Participation in preoperative assessment, training, intervention, and decision-making processes by perioperative nurses can enhance patient safety [5]. Feng et al. (2022) found that providing focused care in the perioperative period significantly decreased anxiety and depression in patients with lung tumors [6]. Perioperative care begins in the preoperative period, continues during and after surgery, and extends until no further care is required [7]. Person-centered care is essential for enhancing the quality of perioperative nursing practices [8]. When applied in the perioperative setting, person-centered nursing promotes rapid patient recovery, increased patient satisfaction, and reduced medical costs by shortening hospital stays [9]. The Association of Perioperative Registered Nurses (AORN) has established a perioperative nursing data set and standards based on a patient-focused model.

According to AORN standards of practice, perioperative nurses should consider patients' goals and preferences when developing and implementing care plans. Therefore, a person-centered nursing plan that addresses the patient's physiological, sociocultural, and spiritual needs should be devised. Consequently, person-centered care provided by nurses in surgical units is crucial. Despite limited research on the levels of person-centered perioperative nursing among surgical nurses [4,6,7,9], this study aims to analyze the person-centered nursing practices of nurses working in surgical clinics during the perioperative period.

Research Questions

1. What is the level of person-centered nursing practices among surgical nurses during the perioperative period?

2. What factors influence the level of person-centered nursing practices among surgical nurses during the perioperative period?

## Materials and methods

**Research type**

This is a cross-sectional descriptive study.

**Population and sample of the study**

The study was conducted with nurses working in the surgical units of two hospitals in Adana and Nevşehir provinces. Therefore, the study population consisted of nurses working in surgical units. Sample size calculation was done using the G*Power 3.1.9.7 program. Since no study with sample characteristics and criteria similar to this study was determined, Cohen's standardized effect size was used [10]. In the evaluation of person-centered nursing levels of nurses working in surgical units and the factors affecting them, the independent t-test and analysis of variance were used when there was a normal distribution, and the Mann-Whitney U Test and Kruskal–Wallis test were used when there was no normal distribution. Accordingly, the sample size was determined as n=145 when a priori analysis was made with a medium effect size (0.50), α error=0.05, β error=0.05, and power=0.95. Considering the possible loss of data during the study, 150 nurses were included in the study. After the research, the person-centered nursing levels of surgical nurses and the factors affecting them were evaluated in the posthoc power analysis using the G*Power 3.1.9.7 program. Accordingly, in the analysis of variance, the effect size was 0.50, the alpha value was 0.05, and the minimum power of the study was 0.95.

**Data collection**

Data were collected between July and August 2023. A face-to-face questionnaire was administered to the nurses who agreed to participate in the study by explaining the purpose of the study. Volunteer nurses were asked to fill out questionnaire forms by the responsible nurses in the surgical units. The nurses who volunteered to participate in the study read the consent text at the beginning, answered the research questions without a time limit, and declared that they voluntarily participated.

**Data collection tools**

**Nurse introductory information form**

The form, developed by the researchers in line with the literature, included socio-demographic questions about gender, age, total years of employment, duration of employment in the surgical unit, educational status, and 16 statements about the nursing profession [9,11].

**Person-centered perioperative nursing (PCPON)**

The 'Person-Centered Perioperative Nursing Scale' was developed by Soyeung Shin and Jiyeon Kang in South Korea in 2019 to evaluate person-centered perioperative nursing. The Cronbach's alpha coefficient of the scale was found to be 0.76-0.88 [12]. A Turkish validity and reliability study of the scale was conducted by Yılmaz et al. in 2022, where Cronbach's alpha was determined to be 0.97. The scale consists of 20 questions, which are answered using the following scale: "1: Never, 2: Rarely, 3: Occasionally, 4: Frequently, 5: Always". The lowest score that can be obtained from the scale is 20, while the highest score is 100. A high score indicates a high level of person-centered perioperative nursing performance [13]. In the present study, the Cronbach's alpha value was determined to be 0.98.

**Ethical considerations**

The necessary Ethics Committee approval (Decision No: 2023/08) was obtained from Nevşehir Hacı Bektaş Veli University Non-Interventional Research Ethics Committee, and approval was also obtained from the health institutions where the research was conducted. Additionally, the purpose of the study was explained at the beginning of the questionnaire form, approval of the participating nurses was obtained, and the nurses were informed that participation in the study was voluntary. The

principles of the Declaration of Helsinki were applied during the implementation of the study. The authors obtained the necessary permission via email for the scale to be used in the study.

**Data analysis**

The data was analyzed using the SPSS 25.0 (Statistical Package for Social Sciences) program. The normal distribution of numerical characteristics was assessed using the Shao test and Skewness-Kurtosis values. It was found that the Skewness value ranged from -0.102 to -0.910, and the Kurtosis value ranged from -1.288 to 1.386. Kurtosis and Skewness values between -1.5 and +1.5 indicate a normal data distribution [14]. In the descriptive data analysis of the study, number and percentage distributions, mean, standard deviation, minimum, and maximum values were calculated. The independent t-test was used to compare the measurement values of two independent groups, while analysis of variance was used to compare three or more independent groups. All data obtained were evaluated using appropriate statistical methods based on their characteristics, with the statistical significance level set at $P<0.05$.

## Results

The mean age of the nurses participating in the study was 31.74 (5.54) years, with a monthly working time of 180.39 (33.70) hours, and 55.3% were female. It was found that 68.7% of the nurses had a Bachelor's degree, 54% worked in surgical units, 32.0% had been working for 6-10 years, 30% had been in surgical units for 1-5 years, and 80% worked day and night shifts. On the other hand, 42.7% of the nurses willingly chose the nursing profession, 61.3% willingly worked in surgical units, 52% had knowledge about person-centered nursing, 50% knew the definition of perioperative nursing, and 34.7% did not attend symposiums/congresses. When analyzing statements regarding patient care, it was found that 71.3% did not agree with the idea that the same care should be applied to each patient, and 82% communicated with patients during patient care (Table 1).

The mean PCPON score of the nurses working in surgical units was 77.233 (14.62) (Table 2). The distribution of PCPON scores of nurses working in surgical units according to some variables was examined. It was found that the scale score of female nurses was higher than male nurses, but the difference was not statistically significant ($P=0.162$, t=1.404). A statistically significant difference was found between educational status and PCPON score ($P=0.016$, F=3.560). The Bonferroni correction test, one of the pairwise comparisons, was used to identify the group that made a difference. It was determined that nurses with postgraduate education scored higher than other nurses (Table 2). Additionally, it was observed that the PCPON scores of nurses working 6-10 years in the profession, working in surgical units for 21 years or more, receiving training/certification related to surgical nursing, and working only night shifts were higher, but the differences were not significant ($P=0.720$, F=2.201; $P=0.104$, F=1.957; $P=0.561$, t=0.582; $P=0.071$, F=2.698, respectively) (Table 2). A statistically significant difference was found between the PCPON scores of nurses working in intensive care units, those who willingly chose the nursing profession, those who willingly worked in surgical units, and those who had knowledge about person-centered nursing ($P=0.04$, F=3.300; $P<0.001$, F=10.094, $P=0.004$, F=5.795; $P<0.001$, F=5.95, respectively) (Table 2). According to the Bonferroni correction, it was determined that nurses who answered "yes" received higher scores (Table 2). Furthermore, it was found that the scale scores of nurses who participated in symposiums/congresses, knew what perioperative care was, stated that the same care would not be applied to every patient, and communicated with patients were significantly higher ($P=0.001$, F=13.610; $P<0.001$, F=10.087, $P<0.001$, F=14.438; $P<0.001$, F=11.817, respectively) (Table 2).

Table 1: Socio-demographic and occupational characteristics of nurses working in a surgical unit

| Characteristics | mean (SD) | min-max |
|---|---|---|
| **Age** | 31.74 (5.54) | 22-48 |
| **Monthly working hours** | 180.39 (33.70) | 100-220 |
| | **n** | **%** |
| **Gender** | | |
| **Female** | 83 | 55.3 |
| **Male** | 67 | 44.7 |
| **Educational status** | | |
| **High school** | 18 | 12 |
| **Associate degree** | 13 | 8.7 |
| **Bachelor's degree** | 103 | 68.7 |
| **Postgraduate** | 16 | 10.7 |
| **Unit of work** | | |
| **Surgical units** | 81 | 54 |
| **Intensive care units** | 48 | 32 |
| **Operating rooms** | 21 | 14 |
| **The duration of working in the profession of nurses (years)** | | |
| **1 years<** | 12 | 8 |
| **1-5 years** | 33 | 22 |
| **6-10 years** | 48 | 32 |
| **11-20 years** | 45 | 30 |
| **21 years≥** | 12 | 8 |
| **The duration of working in the surgical units (years)** | | |
| **1 years<** | 25 | 16.7 |
| **1-5 years** | 45 | 30.0 |
| **6-10 years** | 40 | 26.7 |
| **11-20 years** | 35 | 23.3 |
| **21 years≥** | 5 | 3.3 |
| **Ways of working** | | |
| **Night (16-08)** | 17 | 11.3 |
| **Day (8-16)** | 13 | 8.7 |
| **Night-Day (shift) (8-16, 16-08)** | 120 | 80.0 |
| **The status of willing choosing the nursing profession** | | |
| **Yes** | 64 | 42.7 |
| **Undecided** | 45 | 30.0 |
| **No** | 41 | 27.3 |
| **The status of willing working in surgical units** | | |
| **Yes** | 92 | 61.3 |
| **Undecided** | 34 | 22.7 |
| **No** | 24 | 16.0 |
| **Knowing what individualized patient care** | | |
| **Yes** | 78 | 52.0 |
| **Partially** | 61 | 40.7 |
| **No** | 11 | 7.3 |
| **Participation in studies/symposiums/congresses in the field of nursing** | | |
| **Yes** | 51 | 34 |
| **Partially** | 47 | 31.3 |
| **No** | 52 | 34.7 |
| **Status of receiving training/certificate related to surgical nursing** | | |
| **Yes** | 80 | 54 |
| **No** | 70 | 46 |
| **Knowing what perioperative nursing** | | |
| **Yes** | 75 | 50.0 |
| **Partially** | 55 | 36.7 |
| **No** | 20 | 13.3 |
| **The level of agreement with the idea that the same care should be applied to each patient** | | |
| **Yes** | 18 | 12.0 |
| **Partially** | 25 | 16.7 |
| **No** | 107 | 71.3 |
| **Communicating with patients in surgical units** | | |
| **Yes** | 123 | 82 |
| **Partially** | 25 | 16.7 |
| **No** | 2 | 1.3 |

Values are presented as mean (SD), number (%). SD: standard deviation

Table 2: Distribution of person centered perioperative nursing scale scores of nurses working in surgical unit

| | mean (SD) | min-max |
|---|---|---|
| **Person Centered Perioperative Nursing Scale Total Score** | 77.23 (14.629) | 40-100 |
| **Characteristics** | **mean (SD)** | **Test *P*-value** |
| **Gender** | | |
| **Female** | 78.73 (14.93) | t=1.404 |
| **Male** | 75.37 (14.13) | *P*=0.162 |
| **Educational status** | | |
| **High school[a]** | 70.05 (17.55) | **F=3.560** |
| **Associate degree [b]** | 74.53 (13.85) | ***P*=0.016*** |
| **Bachelor's degree [c]** | 77.51 (14.25) | **d>a d>b d>c** |
| **Postgraduate [d]** | 85.68 (9.79) | |
| **Unit of works** | | |
| **Surgical units [a]** | 74.67 (15.63) | **F=3.300** |
| **Intensive care units [b]** | 81.41 (13.13) | ***P*=0.004*** |
| **Operating rooms [c]** | 77.52 (11.95) | **b>a b>c** |
| **The duration of working in the profession of nurses (years)** | | |
| **1 years<** | 74.25 (20.33) | F=2.201 |
| **1-5 years** | 79.24 (14.61) | *P*=0.720 |
| **6-10 years** | 81.10 (11.90) | |
| **11-20 years** | 72.97 (15.41) | |
| **21 years≥** | 75.16 (11.91) | |
| **The duration of working in the surgical units (years)** | | |
| **1 years<** | 81.04 (14.96) | F=1.957 |
| **1-5 years** | 76.97 (13.68) | *P*=0.104 |
| **6-10 years** | 79.25 (12.08) | |
| **11-20 years** | 71.88 (17.85) | |
| **21 years≥** | 81.80 (5.20) | |
| **Way of working** | | |
| **Night (16-08)** | 84.88 (11.76) | F=2.698 |
| **Day (8-16)** | 75.53 (19.86) | *P*=0.071 |
| **Night-Day (shift) (8-16, 16-08)** | 76.33 (14.14) | |
| **The status of willing choosing the nursing profession** | | |
| **Yes [a]** | 83.07 (12.25) | **F=10.094** |
| **Undecided [b]** | 73.51 (14.68) | ***P*<0.001*** |
| **No [c]** | 72.19 (15.07) | **a>b a>c** |
| **The status of willing working in surgical units** | | |
| **Yes** | 80.35 (13.21) | **F=5.795** |
| **Undecided** | 72.55 (16.45) | ***P*=0.004*** |
| **No** | 71.87 (14.32) | **a>b a>c** |
| **Knowing what individualized patient care** | | |
| **Yes [a]** | 80.35 (13.21) | **F=5.95** |
| **Partially [b]** | 72.55 (16.45) | ***P*<0.001*** |
| **No [c]** | 71.87 (14.32) | **a>b a>c** |
| **Participation in current studies/symposiums/congresses in the field of nursing** | | |
| **Yes [a]** | 84.68 (11.39) | **F=13.610** |
| **Partially [b]** | 70.61 (14.22) | ***P*<0.001*** |
| **No [c]** | 75.36 (14.75) | **a>b a>c c>b** |
| **Status of receiving training/certificate related to surgical nursing** | | |
| **Yes** | 77.87 (14.85) | t=0.582 |
| **No** | 76.47 (14.63) | *P*=0.561 |
| **Knowing what perioperative nursing** | | |
| **Yes [a]** | 82.00 (12.97) | **F=10.087** |
| **Partially [b]** | 73.92 (14.47) | ***P*<0.001*** |
| **No [c]** | 68.45 (14.08) | **a>b a>c b>c** |
| **The level of agreement with the idea that the same care should be applied to each patient** | | |
| **Yes [a]** | 68.45 (14.08) | **F=14.438** |
| **Partially [b]** | 64.12 (13.15) | ***P*<0.001*** |
| **No [c]** | 77.94 (14.52) | **c>a b>a c>b** |
| **Communicating with patients in surgical units** | | |
| **Yes [a]** | 79.60 (13.94) | **F=11.817** |
| **Partially [b]** | 67.76 (12.17) | ***P*<0.001*** |
| **No [c]** | 50.00 (14.14) | **a>b a>c b>c** |

Values are presented as mean (SD). ANOVA F test, t: independent-Samples T test, **P*<0.05

## Discussion

Person-centered nursing is an essential aspect of nursing that takes into account patients' personal characteristics related to their clinical condition, personal lifestyles, preferences, and involvement in decision-making processes that impact their care. It also considers patients' behaviors, thoughts, and perceptions regarding physical indicators and primary coping mechanisms [15]. This study focused on examining the levels of person-centered perioperative nursing among nurses working in surgical units.

The study found that the majority of participating nurses were knowledgeable about person-centered perioperative nursing and believed it should be implemented. A similar study emphasized the importance of person-centered perioperative nursing in the surgical unit [16].

Zúñiga et al. [17] highlighted that while nurses had a high level of knowledge about person-centered patient care, they faced challenges in implementing person-centered perioperative nursing due to factors such as work intensity, long shifts, high patient loads, and inadequate staffing. Given that care is central to the nursing profession, it is crucial for surgical nurses to be well-versed in person-centered nursing to deliver more effective, individualized care to patients.

The study revealed a significant correlation between education level and person-centered perioperative nursing, with higher education levels correlating with a greater emphasis on person-centered care. Most nurses in the study held a Bachelor's degree, which was found to positively impact person-centered perioperative nursing. Lemos and Poveda [18] noted that academic education significantly influenced the level of person-centered perioperative nursing. Another study with surgical unit nurses indicated that as nurses' education levels increased, the quality of perioperative care improved, and their awareness of providing patient-specific care heightened [19]. Enhancing education levels, pursuing additional theoretical and practical training in perioperative care, and complementing education with relevant certification programs are believed to be effective strategies for promoting person-centered perioperative nursing.

The study found that nurses working in surgical units had high scores on the person-centered perioperative nursing scale, indicating above-average levels of care. Previous research also noted that operating room nurses demonstrated high levels of perioperative care for patients, leading to positive outcomes [20]. Another study evaluating nurses found that their person-centered perioperative care was consistently high [21]. Patients treated in surgical units, both before and after surgery, may experience uncertainty and stress. The high level of person-centered perioperative nursing provided by nurses, who prioritize patient care, supports the findings of this study.

Additionally, the study revealed a significant difference in person-centered perioperative nursing between surgical nurses in the intensive care unit and those who chose the nursing profession voluntarily. Previous research indicated that intensive care unit nurses exhibited high levels of person-centered perioperative nursing. Conversely, another study found that nurses who voluntarily entered the profession had significantly higher levels of person-centered perioperative care [22,23].

Furthermore, nurses who participated in symposiums/congresses, understood perioperative care, acknowledged the importance of individualized care, and engaged in patient communication had significantly higher scale scores. A study with perioperative nurses developed a protocol that emphasized the importance of training in perioperative patient care, leading to improved effectiveness and communication skills [24]. Surgical units, like other healthcare settings, encourage innovation [25], requiring nurses to stay updated on new practices and participate in events that enhance patient care and communication skills.

### Limitations

The limitations of this study include that it was solely conducted with nurses in the surgical unit, the findings were based on the nurses' statements, and it was not an observational study. Additionally, the possibility that hospital management may have marked the positive option without carefully reading the survey questions could have influenced the results. These uncontrollable issues may have impacted the statistical analyses.

### Conclusion

The study revealed that nurses in surgical units exhibit a high level of person-centered perioperative nursing. Factors such as educational background, job satisfaction, participation in symposiums/congresses, understanding of perioperative nursing, and belief in individualized patient care were found to influence person-centered perioperative nursing. This approach is believed to enhance communication between nurses and patients, improve care effectiveness, and increase patient satisfaction. Increasing awareness among nurses in surgical units about perioperative nursing is expected to have a positive impact on patients, potentially reducing hospitalization periods and improving nursing quality. Continued research on this topic is recommended, along with support for nurses through in-service training and certificate programs, and the provision of positive work environments by healthcare institution managers.

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# Sequestrated lumbar disc herniation mimicking intradural spinal tumor: A case report

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**Abstract**

Sequestered disc herniation is characterized by a portion of the nucleus pulposus rupturing and releasing into the spinal canal. The size of this extruded disc fragment can range from small to large. In certain instances, the disc fragment may be large enough to obstruct cerebrospinal circulation, causing it to be confused with intradural pathologies in radiological imaging. This confusion can potentially impact the choice of surgical approach for spinal interventions. This study presents and discusses a case of an atypically located sequestered disc herniation, initially misdiagnosed as an intradural tumor on radiological imaging.

**Keywords:** lumbar disc, sequestered disc herniation, intradural mass, cerebrospinal fluid

## Introduction

A sequestered disc fragment refers to the migration of the nucleus pulposus from the main intervertebral disc into the epidural space. It typically presents as relatively round-shaped and small compared to non-discogenic epidural pathologies [1]. While MRI is effective in diagnosing a sequestered disc, atypical migration and variations in size and shape may lead to misdiagnosis [2,3]. Symptoms and physical examination alone are insufficient to differentiate between epidural space-occupying lesions [4]. A definitive diagnosis requires surgical removal and pathological examination of the specimen.

We present a case of a 67-year-old male with L4-L5 radiculopathy symptoms who was initially misdiagnosed on pre-operative MRI as having an intradural tumor.

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## Case presentation

The patient presented with persistent left leg pain for 4 months, despite undergoing anti-inflammatory treatment. The initial lumbar MRI suggested a joint cyst (Figure 1A and 1B), and the patient's condition temporarily improved following a facet injection. However, symptoms recurred, resulting in an admission to our hospital. Upon physical examination, the patient tested positive for a left straight-leg raise, showed 4/5 foot dorsiflexion muscle power, and had hypoesthesia in the L5 and overlapping L4 dermatomes. A contrast-enhanced MRI revealed a T1 (Figure 2A) and T2 (Figure 2B) hypointense lesion with peripheral enhancement (Figure 2C), initially interpreted as an intradural tumor. The surgical intervention included a left L4 hemilaminectomy, flavectomy, and foraminotomy, uncovering a cystic mass compressing the L5 root and L4 axillary region. The mass, sticking to the posterior longitudinal ligament, was dissected and removed, revealing fibrocollagenized connective tissue fragments with signs of degeneration upon pathology (Figure 3 and 4).

Immunohistochemical staining exhibited Vimentin-positive fibrotic stroma, along with CD34 and WT-1 staining in vascular structures and a noted absence of epithelial lining or specific staining with Pancytokeratin and Calretinin. The staining of fibrotic stroma was further amplified with PAS (Periodic Acid Schife) and Masson Trichrome, whereas no hemosiderin pigment was identified with Iron stain. The patient granted written consent for the report to include their images.

Figure 3: The appearance of the cyst-like mass during the operation.

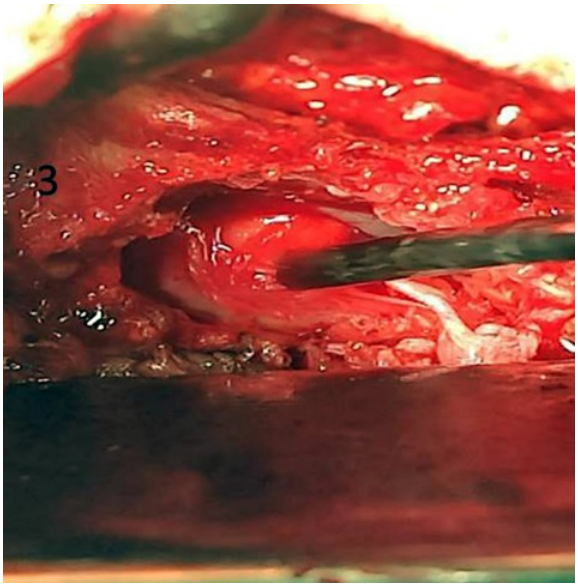



Figure 4: In the prepared sections (hematoxylin and eosin), fibrocollagenized connective tissue fragments, which are rich in elastic fibers, were observed.

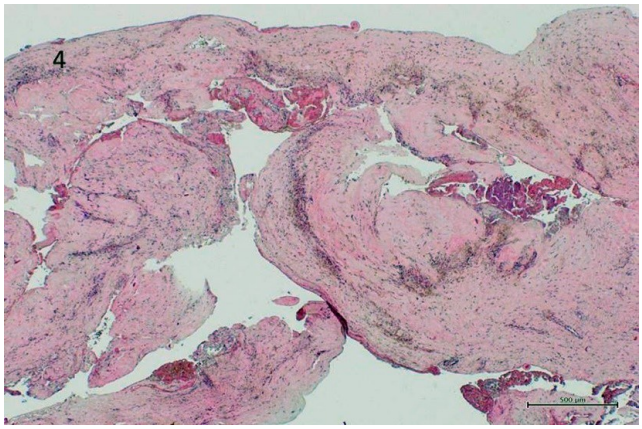



Figure 1: The cyst-like mass is indicated by a blue arrow in sagittal (1A) and axial (1B) t2-weighted sections.

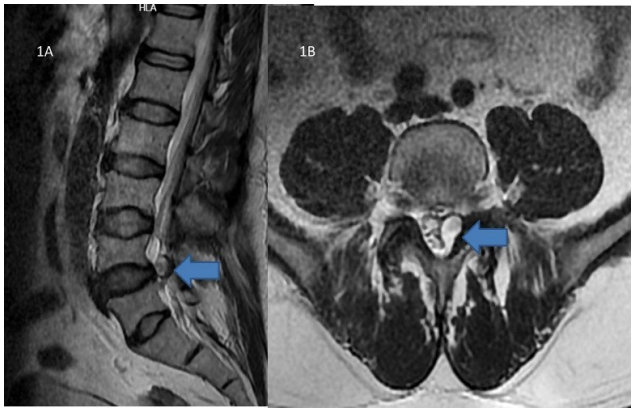
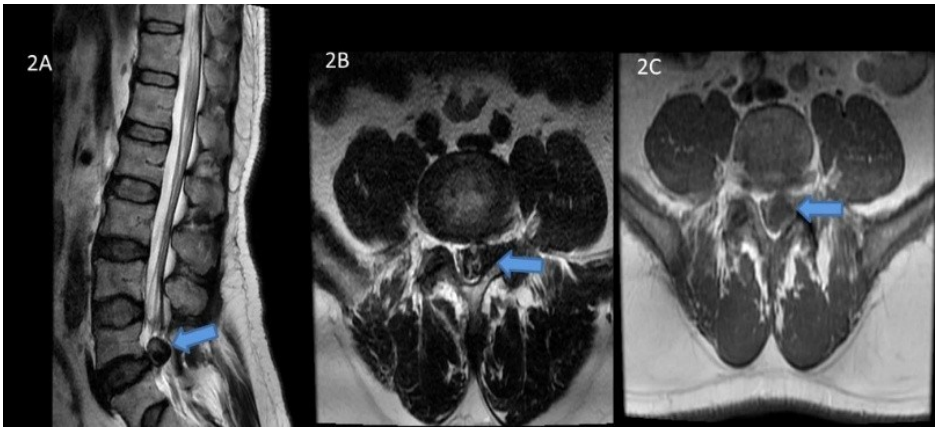



Figure 2: The MRI revealed a T2 sagittal (2A) and T2 axial (2B) hypointense lesion with peripheral contrast enhancement (2C).



## Discussion

More than 28.6% of intervertebral disc herniations are caused by sequestered disc fragments, with the lumbar region being the most frequently affected [4,5]. These sequestered disc fragments can migrate in various directions within the spinal canal, which can lead to multiple root compressions, lumbar stenosis, or in severe cases, cauda equina syndrome due to ischemia and compression. It is generally anticipated that sequestered disc fragments will be small and round-shaped compared to other extradural or intradural pathologies causing similar symptoms [1]. However, an increase in the volume of the fragment and its migration to unusual locations can complicate radiological diagnosis. Akhaddar et al. [7] reported a 60% rate of misdiagnosis of posteriorly sequestered fragments with other pathologies.

MRI is the preferred imaging modality for evaluating spinal pathologies and is considered the gold standard for intraspinal soft tissue pathologies [5]. Computed tomography serves as a supportive diagnostic tool [2]. Although MRI is generally reliable for diagnosing most intervertebral disc cases, sequestered discs can sometimes be mistaken for benign pathologies or tumors such as ganglion cysts, synovial cysts, meningiomas, schwannomas, metastatic malignancies, and abscesses [4,8].

Disc sequestrations exhibit characteristic intensity and contrast enhancement patterns on MRI, which can help distinguish them from other epidural space-occupying pathologies and abscesses. Sequestered discs typically appear hypointense on T1-weighted and hyperintense on T2-weighted MRI scans, though signal patterns may vary with age and degeneration [2]. In some instances, sequestered disc fragments mimicking spinal neoplasms may exhibit isointense, hypointense, or hyperintense signals on both T1 and T2 weighted images [3,8]. Often, peripheral contrast enhancement is observable on gadolinium-enhanced T1-weighted images; this is likely attributable to inflammation and neovascularization surrounding the fragments [1,5]. Moreover, homogenous gadolinium enhancement may be apparent due to the partial granulation of disc fragments [1,3].

Spinal malignancies typically display a homogeneous or heterogeneous post-gadolinium enhancement pattern and rarely exhibit peripheral contrast enhancement [4,9,10]. Benign pathologies, such as schwannomas and meningiomas, usually show homogeneous contrast enhancement [11]. Synovial cysts and ganglionic cysts, which are located posterolaterally, may resemble sequestered disc fragments on MRI. They show similar signal characteristics and peripheral gadolinium enhancement [12,13]. Intraspinal abscesses typically appear isointense on T1-weighted and hyperintense on T2-weighted MRI scans, with variable gadolinium enhancement patterns [4].

In our case, a pathologically confirmed sequestered cyst presented challenges in radiologic diagnosis due to its hypointense signal on both T1 and T2-weighted MRI scans, increased volume, obstruction of cerebrospinal fluid flow, ventral to posterolateral localization, and peripheral gadolinium enhancement. Such factors complicated efforts to differentiate the lesion from other pathologies. Given these findings, pre-operative radiologic diagnoses can be challenging because of the overlapping MRI signals from various pathologies.

Surgery is the preferred treatment for sequestered disc fragments when conservative measures prove ineffective, or if progressive motor deficits or cauda equina syndrome are present. Minimally invasive unilateral approaches are often favored, while intradural pathologies might necessitate more extensive surgical interventions, such as the removal of posterior elements. The primary objective is to gain comprehensive control of the surgical site to safeguard neural tissue. Minimally invasive surgery offers multiple benefits including early mobilization, shorter hospital stays, and financial efficiency in comparison to traditional approaches. Therefore, an accurate pre-operative diagnosis is vital in determining the most appropriate surgical approach. In our case, we decided on a minimally invasive approach based on the lesion's resemblance to an intervertebral disc in imaging. The detected volume increase in the lesion over 4 months might be due to bilateral fluid diffusion from peripheral neovascular structures. Had unilateral fluid absorption occurred, a more advanced degenerative appearance would be expected on T2-weighted imaging in comparison to the adjacent intervertebral disc.

### Conclusion

In summary, it can be challenging to differentiate sequestered disc fragments from other intraspinal pathologies based on their size, shape, and migration patterns. A careful evaluation of radiological findings and consideration of sequestered disc fragments in cases of suspicious appearances are essential for determining the appropriate surgical approach.

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# Necrotizing granulomatous vasculitis of the gallbladder. A case report

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**Abstract**

Granulomatous inflammation is a tissue reaction caused by various factors. Granulomatous vasculitis is a subgroup of systemic necrotizing vasculitis. Necrotizing granulomatous vasculitis is a rare inflammatory condition consisting of granulomas restricted to blood vessels. Although it is quite rare in the gallbladder, numerous necrotizing granulomas were found in the gallbladder in this particular case. Many acute and chronic inflammatory cells, including eosinophils, were seen within the fibrinoid necrosis in the vascular structures in the central area of these granulomas.

**Keywords:** gallbladder, vasculitis, granuloma, necrotizing granulomatous vasculitis

## Introduction

Prominent gallbladder disorders include cholelithiasis-associated disease, acute acalculous cholecystitis, functional disorder, polyps, hydrops, porcelain gallbladder, and cancer [1]. Except for acute acalculous cholecystitis and polyps, disorders tend to predominate in females [2-6].

Granulomatous inflammation is a tissue reaction caused by infectious, autoimmune, toxic, allergic, drug, and neoplastic conditions. It includes necrotizing granulomas, non-necrotizing granulomas, suppurative granulomas, diffuse granulomatous inflammation, and foreign-body giant cell reaction [7].

Granulomatous vasculitis is a subgroup of systemic necrotizing vasculitis. Its main feature is the presence of granulomatous inflammation [8]. Necrotizing granulomatous vasculitis, an inflammation restricted to blood vessels, is a rare histopathological finding, particularly in the gallbladder [9-11].

Gallbladder vasculitis was reported as part of systemic vasculitis and focal single-organ vasculitis. It most often consists of a non-granulomatous necrotizing vasculitis affecting medium-sized vessels. Granulomatous necrotizing vasculitis is much less common than non-granulomatous necrotizing vasculitis [9]. Systemic vasculitis involving abdominal structures has a poor prognosis [9,10]. Gastrointestinal involvement is usually associated with a worse prognosis than other forms of systemic vasculitis [12,13]. Single-organ vasculitis is reported to occur in several locations within the abdominal cavity. These organs are the esophagus, stomach, omentum, small and large intestine, appendix, pancreas, and gallbladder [9].

Gallbladder vasculitis was rare in the cholecystectomy findings; it is seen as a single-organ vasculitis or as a part of systemic vasculitis [9,14].

This study presents a case of a 66-year-old female with a necrotizing granulomatous vasculitis of gallbladder.

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**Informed Consent**
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**Conflict of Interest**
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## Case presentation

A 66-year-old female patient was admitted to our hospital with a complaint of pain in the right upper quadrant of the abdomen, which she had been experiencing for six months. After a detailed clinical examination, abdominal ultrasonography revealed an increased thickness of the gallbladder wall as well as gallstones.

A chest X-ray was normal. In the biochemical examination, blood values were gamma-glutamyl transferase (GGT): 64 U/L (normal value range 0-38), alkaline phosphatase (AP): 233 U/L (normal value range 30-120), C reactive protein (CRP): 65.7 mg/L (normal value range 0-5) and amylase: 110 U/L (normal value range 28-100). GGT, AP, and CRP were significantly elevated, and amylase was slightly elevated. The patient was diagnosed with active chronic cholecystitis and underwent cholecystectomy. The cholecystectomy material was sent to our pathology laboratory. The gallbladder measured 8x2.5x2 cm. The wall thickness in the cross section was 0.2-0.3 cm. Its mucosa was green and had lost its velvety texture. There were eight stones in the lumen, the largest of which was 1 cm in diameter; the smallest was 0.5 cm in diameter, dirty yellow in color and friable. Paraffin blocks were prepared from tissue samples taken from this material. Sections measuring 0.4 micron thick, which were prepared from paraffin blocks were deparaffinized. They were examined using Hematoxylin and Eosin histochemical stain. In the routine microscopic examination of the cholecystectomy specimen, there was an occasional occurrence of erosion in the mucosa. Granulomas were located in the muscularis propria facing serosa (Figure 1).

In the sac wall, there were numerous eosinophil leukocytes as well as chronic and acute inflammatory cells within fibrinoid necrosis in the central area of the medium-sized vascular structures (Figure 2). Areas of fibrinoid necrosis had a marked eosinophilic appearance (Figure 3).

No multinucleated giant cells were observed in these. An occasional deletion was seen in the muscularis propria where the granulomas were located. Histopathological findings included necrotizing granulomatous vasculitis.

The patient was informed and consent was obtained for the publication of this case report.

Figure 1: Two necrotizing granulomatous vasculitis structures in the gallbladder. (HEx40)

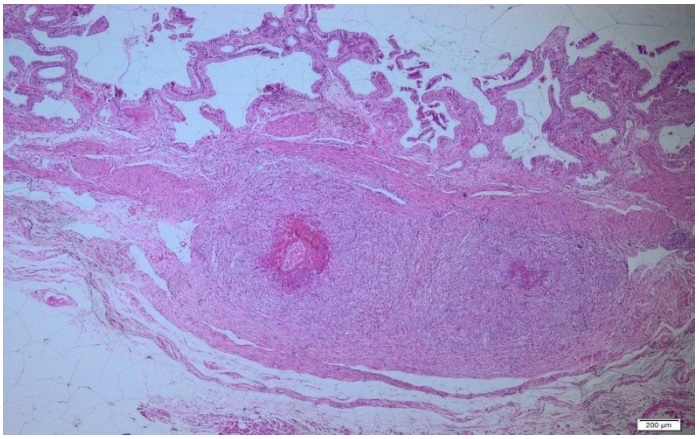


Figure 2: Chronic and acute inflammatory cells in the stroma and granuloma structure with fibrinoid necrosis in the central area. (HEx100)

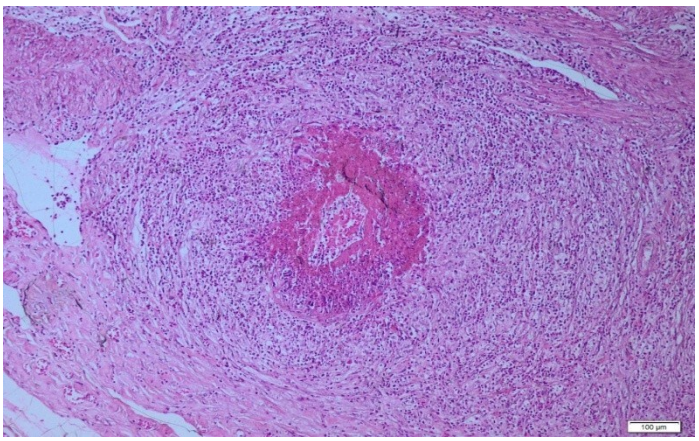
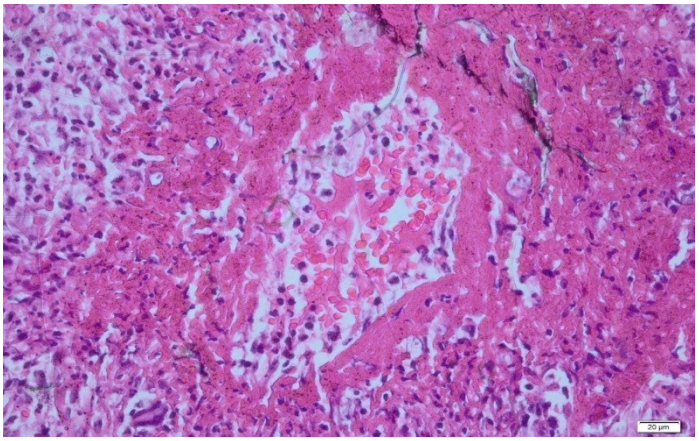


Figure 3: Area of fibrinoid necrosis with a marked eosinophilic appearance involving the blood vessel wall (HEx400)



## Discussion

Gallbladder vasculitis is only found in 0.04 - 0.29% of the cholecystectomies performed, based on various studies [9,14]. It is seen as a single-organ vasculitis or a part of systemic vasculitis. It is an uncommon site for both single-organ vasculitis and as part of systemic vasculitis [10]. It is observed in fewer than 2% of patients with other systemic vasculitis [14]. Single-organ gallbladder vasculitis is usually associated with local symptoms, whereas systemic gallbladder vasculitis is associated with systemic symptoms. In single-organ gallbladder vasculitis, surgery is adequate for treatment, whereas systemic gallbladder vasculitis is associated with high mortality and requires systemic anti-inflammatory or immunosuppressive therapy [9].

There were no differences in age or gender among patients with single-organ vasculitis or systemic vasculitis of the gallbladder. Calculous cholecystitis was more frequent in patients with single-organ gallbladder vasculitis, whereas acalculous cholecystitis occurred more often in patients with systemic gallbladder vasculitis [9].

It should be considered that, although rare, necrotizing granulomatous vasculitis may occur incidentally in cholecystectomy material. When vasculitis is diagnosed, the distinction between single-organ vasculitis and systemic vasculitis should be made with clinical correlation. It should be thoroughly investigated whether gallbladder vasculitis is a single-organ vasculitis or part of systemic vasculitis, because the prognosis and treatment differ significantly. While cholecystectomy is sufficient in the treatment of single-organ gallbladder vasculitis, treatment

of systemic gallbladder vasculitis is intensive and requires systemic anti-inflammatory or immunosuppressive therapy [9].

In this case, there was no clinical, laboratory, or radiological evidence of systemic vasculitis or other pathological findings. The vasculitis in the gallbladder was characterized as a single-organ vasculitis; the patient had gallstones. The potential trigger of this isolated gallbladder vasculitis was thought to be primarily inflammation accompanied by gallstones. Cholecystectomy was performed in this case, and since there was no other pathology, surgical treatment was deemed sufficient. During the one-year follow-up period, no other signs of systemic vasculitis were observed in the patient. There was no need for any systemic anti-inflammatory or immunosuppressive therapy within one year after cholecystectomy.

**Conclusion**

Since necrotizing granulomatous vasculitis is a rare pathology of the gallbladder, considering it in the differential diagnosis will increase diagnostic efficiency and contribute to correct treatment.

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