Original Article

Eurasian Journal of Critical Care

The Effect of Hope Level of Surgical Oncology Patients with Urinary Tract Infection on Their Satisfaction with Life

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Abstract

Background: To determine the effect of hope level of surgical oncology patients with urinary tract infection on their satisfaction with life.

Methods: The study is of descriptive type. The universe of the study consisted of oncology patients who underwent surgery and had urinary tract infection in the Oncology and Infectious Diseases departments of Turgut Ozal Medical Center. The sample consisted of 81 patients determined by power analysis and selected from the universe by non-probability random sampling method. The study data were collected between May 2018 and September 2018 using the Patient Identification Form, the Beck Hopelessness Scale, and the Satisfaction with Life Scale. The data were evaluated using number, percentage, mean, standard deviation, regression, and anova tests.

Results: It was found that the hope level of surgical oncology patients alone had a 25.7% effect on satisfaction with life, hope level and gender had a 33.9% effect size, and hope level, gender, and marital status had a 38% effect size and were also effective on satisfaction with life scores. Conclusion: In the study, it was found that the hope level of surgical oncology patients had a major impact on their satisfaction with life. In this context, it is recommended that the awareness of nurses who care for surgical oncology patients about the concept of hope be increased and that nursing practices be planned to increase satisfaction with life by supporting hope in patients. It is also recommended to develop social support and coping strategies to increase the hope of surgical oncology patients to achieve better life satisfaction and clinical outcomes.

Conclusion: In the study, it was found that the hope level of surgical oncology patients had a major impact on their satisfaction with life. In this context, it is recommended that the awareness of nurses who care for surgical oncology patients about the concept of hope be increased and that nursing practices be planned to increase satisfaction with life by supporting hope in patients. It is also recommended to develop social support and coping strategies to increase the hope of surgical oncology patients to achieve better life satisfaction and clinical outcomes.

Keywords: Surgery, oncology, hope, urinary infection, satisfaction with life

Introduction

Cancer is a chronic disease that begins slowly, continues without symptoms for a very long time, and creates hypersensitivity, fragility, helplessness, and fear of the unknown in the individual (1). Cancer can cause serious problems for patients, including the uncertainty of the disease, symptoms that occur after treatment, deterioration of close relationships, body image disorders, the disease making the patient defenseless, and fears about the recurrence of the disease(2).

Cancer treatment generally includes chemotherapy in addition to local treatments such as surgery and radiotherapy (3). In addition to many side effects due to the development of phagocyte resistance in cellular and humoral immunity disorders caused by these treatments, the frequency of urinary system infections also increases(4). This causes a decrease in patients' quality of life and causes patients to be exposed to psychological stressors. This causes cancer patients to experience various psychological problems such as anger attacks, worry, fear, anxiety, depression, sadness, and hopelessness, and thus the patients' satisfaction with life decreases (5, 6). In the study conducted Arslan et al. on cancer patients receiving chemotherapy, it was determined that the patients' satisfaction with life was moderately affected (7).

Hope is one of the important factors increasing a person's motivation and prevents feelings of pessimism and

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• **Received:** 15.02.2025 • **Revision:** 12.03.2025 • **Accepted:** 30.04.2025
DOI: 10.55994/ejcc.1640286
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Cite this article as: Dolanbay N, Sarıtas S. The effect of hope level of surgical oncology patients with urinary tract infection on their satisfaction with life. Eurasian Journal of Critical Care. 2025;7(1): 1-6

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helplessness in case of illness (8). Hope is an important factor in oncology patients that helps them cope with the problems, uncertainty, and pain caused by the disease (9). Hopelessness is among the important issues for nursing care because it affects patients' compliance with treatment, motivation, coping with the disease and predisposes to depression (10). Nurses should support patients who have a problem of hopelessness to cope with this problem (11). In their study with terminal cancer patients, Duggleby et al. stated that the psychosocial support approach called the "Living with Hope Program" increased the hope level of the patients (12).

In this context, in this study, it was aimed to evaluate the effect of hope level on life satisfaction by using Beck Hopelessness Scale and Life Satisfaction Scale on oncology patients who had urinary tract infection and underwent surgery, and to ensure that patients have a better quality of life by developing social support and coping mechanisms. In addition, it is thought that this study will contribute to nursing research, can be used in nursing care and will give ideas to nurses.

Materials and Methods

Time and type of the study: This descriptive study was conducted between May 2018 and September 2018.

Universe and sample of the study: The universe of the study consisted of oncology patients who underwent surgical operations and had urinary tract infections in Turgut Ozal Medical Center Oncology and Infection services. After power analysis, the sample group consisted of 81 patients with an effect size of 0.7, a margin of error of 0.05 and a population representation power of 0.95. Data were collected from the population using the non-probability sampling method due to access difficulties and patient limitations. The inclusion criteria for the study included patients who had no communication problems, were 18 years of age or older, underwent surgery, and volunteered to participate in the study. The exclusion criteria from the study included patients who did not undergo surgery and those who did not speak Turkish.

Data collection tools: The study data were collected by the researchers using the Patient Identification Form, the Beck Hopelessness Scale, and the Life Satisfaction Scale.

Patient identification form: The form, prepared by the researchers in line with the literature, determines the sociodemographic and medical characteristics of oncology patients who undergo surgery. This form consists of 14 questions including age, gender, marital status, educational level, employment status, who the patient lives with, income level, whether the patient is aware of the disease, disease diagnosis and duration, what treatments he/she has received, frequent urinary tract infection status, antibiotic use, and urethral catheter application status (13,14).

Beck hopelessness scale: This is a self-evaluation scale consisting of 20 items developed by Beck et al. (15). The scale consists of three important topics: "feelings about the future", "loss of motivation", and "expectations about the future". The questions are answered with yes or no and convey pessimistic expectations. 11 'yes' and 9 'no' options for the items receive 1 point. The total score is accepted as the hopelessness score (16). The first validity and reliability study in Türkiye was conducted by Seber et al. on psychiatric patients. The Cronbach's α value was found to be 0.86 (17). Durak and Palabıyıkoğlu applied the scale to healthy individuals, those with psychological disorders, cancer patients, those with epilepsy, chronic renal failure, and 373 patients between the ages of 15 and 65. The Cronbach α value of the scale was found to be 0.85 (16). The Cronbach α value of this study was found to be 0.92.

The satisfaction with life scale: The scale was developed by Diener, Emmons, Larsen, and Griffin (18). The original form of the scale is a scale in the person assessment group consisting of one factor, five items and a Likert-type 7-point scale. The validity and reliability of the scale in Türkiye was made by teachers Dağlı and Baysal. The scale uses a 5-point Likert-type evaluation system ranging from "Strongly disagree (1)" to "Strongly agree (5)". An increase in the score indicates an increase in satisfaction with life. The Cronbach α value of the scale was determined as 0.88 and the test-retest reliability was determined as 0.97 (19). The Cronbach α value of this study was found to be 0.86.

Data collection: After all necessary permissions were obtained, the study data were collected by the researcher through face-to-face interviews considering the determined number of participants in the sample between May 2018 and September 2018. The data collection time was approximately 10-15 minutes.

Ethical Aspects of the Study: Before conducting the study, written permissions were obtained from the Malatya Clinical Research Ethics Committee (Decision No = 2018/10-21) and the İnönü University TÖTM Chief Physician's Office (Permission Document No: 68636013-770), to which the hospital where the study would be conducted is affiliated. The patients were informed about the study topic and informed that the information obtained from them would be protected. After written consent of the volunteers were taken, study data were collected.

Evaluation of data: While evaluating the study data, number, percentage, mean, and standard deviation tests were used to determine the descriptive characteristics of the patients. The Cronbach α reliability coefficient was used to determine the internal consistency of satisfaction

with life and hope level scales. The stepwise regression analysis was used to determine the relationship between the satisfaction with scale and the patients' socio-demographic characteristics and hope level variables. Age, gender, marital status, educational level, disease diagnosis, disease duration, income level, and hope level were used as independent variables. The satisfaction with life scale score was taken as the dependent variable. The linear regression step wise analysis was performed to determine the affecting variables. The linear and logistic regression analysis and anova test were used to determine the effect of independent variables on the dependent variable. The study results are at 95% confidence interval and the significance level is $p<0.05$.

Findings

When the sociodemographic characteristics of the oncology patients who underwent surgery included in the study were examined, it was determined that 81.4% were 42 years old or older, 59.3% were male, 82.7% were married, 40.7% were primary school graduates, 79.0% were unemployed, 58.0% lived with extended families, 69.1% had a medium income level, and 84.0% were aware of their disease. When the medical characteristics of the patients were examined, it was found that 35.7% had digestive system cancer, the disease duration of 71.6% was between 0 and 3 years, 44.4% received 2 or 3-phase treatment, 79.0% had frequent urinary tract infections, 96.3% used antibiotics during the disease, and 53.1% did not have a catheter before the urinary tract infection (Table 1).

According to the regression analysis of the prediction of satisfaction with life with hope level and socio-demographic characteristics, it was observed that the level of hope taken as a variable had an effect size of 25.7% alone, the level of hope and gender had an effect size of 33.9%, the level of hope, gender, and marital status had an effect size of 38.0% and also had an effect on satisfaction with life score. Additionally, it was determined that the independent variable, the hope level score, had the largest effect size on its own (Table 2).

Discussion

The weakening of the immune system in oncology patients causes infections to occur. The duration and inten-

Table 1. Descriptive characteristics of the patients (n=81)

Descriptive characteristics	Number	%
Age		
18-29	4	5.0
30-41	11	13.6
42 and above	66	81.4
Gender		
Female	33	40.7
Male	48	59.3
Marital status		
Married	67	82.7
Single	14	17.3
Educational status		
Illiterate	18	22.2
Literate	12	14.8
Primary school	33	40.7
High school	11	13.6
University	7	8.8
Employment status		
Employed	17	21.0
Unemployed	64	79.0
People lived with		
Nuclear family	22	27.2
Extended family	47	58.0
Other	12	14.8
Income level		
Low	23	28.4
Middle	56	68.1
High	2	2.5
Awareness of the Disease		
Yes	68	84.0
No	13	16.0

(Continue)

Table 1. Descriptive characteristics of the patients (n=81) (Continue)

Descriptive characteristics	Number	%
Diagnosis		
• Digestive System Cancers (Stomach, Esophagus, Duodenum, Colon, Rectum, Pancreas, Liver and Chongiocellular Carcinoma)	29	35.7
• Respiratory System Cancers (Lung,	14	17.3
Nasopharynx and Bronchus)		
• Reproductive System Cancers (Uterus, Prostate,	14	17.3
Testis, Cervix, Ovary and Malignant Epithelial Tumor)		
• Urinary System Cancers (Bladder Cancer)	7	8.6
• Musculoskeletal System Cancers	15	18.5
(Osteosarcoma, Breast Ca)		
• Neurological Cancers (Brain tumor)	1	1.2
• Endocrine System Cancers (Thyroid Ca)	1	1.2
Disease duration		
0-12 months	29	35.8
1-3 years	29	35.8
3-5 years	12	14.8
5-7 years	6	7.4
7 years and above	5	6.2
The treatments received		
Chemotherapy	32	39.5
Radiotherapy	6	7.4
Surgical Treatment	7	8.6
Status of receiving 2 or 3- phase treatments	36	44.4
Frequent Urinary Tract Infections		
Yes	64	79.0
No	17	21.0
Antibiotic Use		
Yes	78	96.3
No	3	3.7
Catheter Application Status Before Urinary Tract Infection		
Applied	38	46.9
Not applied	43	53.1

sity of chemotherapy administered to these patients is directly related to the risk of infection (20). One of the most common infections in cancer patients is urinary tract infections. Various bacteria can cause urinary tract infections (14). Infections seen in oncology patients and the physical, psychological, and socioeconomic problems caused by the disease affect the quality of life of individuals and the patients' satisfaction with life decreases (9, 21). Oncology nurses have great responsibilities in identifying and eliminating these psychosocial problems experienced by oncology patients (22). There are few studies in the literature on surgical oncology patients with urinary tract infections (4, 20, 23). In this context, this study was conducted to examine the effect of hope level surgical oncology patients with urinary tract infection on their satisfaction with life and was discussed in line with the relevant literature.

According to the sociodemographic characteristics of the surgical oncology patients included in the study, it was determined that the patients were middle-aged and older, the majority were male, the majority of the patients were married, the level of education was low, the majority were unemployed and lived with extended families, their income levels were moderate, and the patients were generally aware of their disease (Table 1).

When the medical characteristics of the patients were examined, it was understood that the majority had digestive system cancer, the duration of the disease was generally between 0-3 years, they usually received 2 or 3-phase treatments, the majority had frequent urinary tract infections and used antibiotics during the disease, and a catheter was not applied before the urinary tract infection (Table 1).

When the related literature was examined, in Yajima et al.'s study on cancer patients, it was found that 14% of the patients had urinary tract infections (23). In the study conducted by Shrestha et al. with cancer patients, bacterial growth was observed in the urine culture of 24% of the patients (13). These studies showed that cancer patients were prone to urinary tract infections.

Table 2. Explaining the prediction of satisfaction with life with hope level and socio-demographic characteristics using regression analysis

Model	β1	SE	β2	t Test	p1 Value	F Test	p2 Value	R2	Effect Size
-Constant	25.188	1.388	-0.507	18.153	0.000	27.391	0.000[a]	0.507[a]	0.257
-Hope	-0.593	0.113	-5.423	-5.423	0.000				
Level									
-Constant	18.568	2.502	-0.492	7.423	0.000	20.046	0.000[b]	0.583[b]	0.339
-Hope	-0.574	0.108	0.287	-5.334	0.000				
Level	-0.126								
-Gender	4.032	1.295		3.113	0.003				
-Constant	22.977	3.141	-0.514	7.314	0.000	15.699	0.000[c]	0.616[c]	0.380
-Hope	-0.600	0.106	0.295	-5.679	0.000				
Level									
-Gender	4.148	1.265	-0.201	3.279	0.002				
-Marital	-3.680	1.651		-2.229	0.029				
Status									

β1; Unstandardized Regression Coefficient, SE; Standard Error, β2; Standardized Regression Coefficients, t-test for the significance of the coefficients, p1 <0.05, F test for the significance of the model, p2 <0.05 and R2Explanatory coefficient

- aPredictors: (Constant), Hope Level
- bPredictors: (Constant), Hope Level, gender
- cPredictors: (Constant), Hope Level, gender, marital status

According to the results obtained from our study, it was determined that the hope level of surgical oncology patients with urinary system infections had a great impact on their satisfaction with life (Table 2). It should be noted that hope has a significant impact on life satisfaction, but it is also influenced by many sociodemographic factors.

As a result of the literature review, some studies conducted with oncology patients were found. In the study conducted by Temizsoy, it was determined that as hopelessness increased in patients, their satisfaction with life decreased21. In the study conducted by Rustoen et al. a significant link was found between hope and satisfaction with life (24). In the study conducted by Wnuk et al., a relationship was found between disease duration and level of hope and satisfaction with life (25). These studies support our study.

In conclusion, it was determined that the hope levels of surgical oncology patients have a great impact on their satisfaction with life.

Based on these results, the following are recommended:

- It will guide nurses caring for surgical oncology patients to develop a new approach to increase the level of hope and support life satisfaction of patients, and
- It is recommended to ensure that the quality of care provided to patients is improved.
- Long-term follow-up studies with larger sample sizes that examine how other factors such as social support, coping strategies or depression affect this relationship may provide a broader perspective on how changes in levels of hope positively/negatively affect life satisfaction.

Limitations of the Study

The limitations of the study are that the patient group was limited to the patients hospitalized in the İnonu University Turgut Ozal Medical Center Oncology and Infectious Diseases wards and the sample was selected by the non-probability random sampling method. In addition, pain levels, fatigue and social support may also be considered as limitations as they may affect life satisfaction.

Author Contribution: Idea- ND, SS; Design – ND, SS; Supervision- SS; References – ND, SS; Materials – ND, SS; Data Collection and/or Processing – ND, SS; Analysis and/or Commentary – ND, SS; Literature Review – ND, SS; Written by – ND, SS; Critical Review – SS.

Financial Support: No financial support was received for this study.

Conflict of Interest: There is no conflict of interest in this study.

Acknowledgements: We would like to thank all oncology patients who participated and supported the study.

References

1. Esa Jafari MN, Faramarz Sohrabi , Gholam Reza Dehshiri, Esmail Soleymani , Rasoul Heshmati. Life satisfaction, spifituality well-being and hope in cancer patients. Procedia Social and Behavioral Sciences. 2010:5:1362-1366. .
2. Anja Visser BG, Ad Vingerhoets. Spirituality and well-being in cancer patients: a review. Psycho-Oncology 2010:9: 565-572.

3. Şuayib Yalçın ES. Kanserde Bireyselleştirilmiş Tedavilere Genel Bakış. Nükleer Tıp Seminerleri. 2015:2: 128-35.

4. Akbulut H. Kanserli hastalarda enfeksiyonlar ve hemotolojik sorunlar. 2022. https://acikders.ankara.edu.tr/pluginfile.php/55292/mod_resource/content/0/Kanserli%20Hastalarda%20enfeksiyonlar%20ve%20Hematolojik%20sorunlar.pdf

5. Benzer DÇ, Yılmaz FT "Kemoterapi Alan Hastalarda Aktiflik Düzeyi ve Yaşam Kalitesinin İncelenmesi", Journal of Innovative Healthcare Practices, c. 5, sy. 2, ss. 78–87, 2024, doi: 10.58770/joinihp.1513604.

6. Michael A Andrykowski EL, Andrea Floyd. Psyclogical health in cancer survlvots Seminars in Oncology Nursing. 2008:24(3), 193-201.

7. Arslan S, Çelebioğlu A, Tezel A. Kemoterapi Alan Kanserli Hastalarda Depresyon ve Yaşam Doyumunun Belirlenmesi. Türkiye Klinikleri J Med Sci. 2008:28(5):628-34.

8. Özlem Aslan KS, Şeref Kömürcü, Ahmet Özet. Kanserli Hastalarda Umut. CÜ Hemşirelik Yüksek Okulu Dergisi. 2007:11(2).

9. Selma Turan Kavradım ZCÖ. Kanser Tanısı Alan Hastalarda Umut, Psikiyatride Güncel Yaklaşımlar. Current Approaches in Psychiatry 2014:6(2): 154-164.

10. Çalışkan BB. Hematoloji Hastalarının Depresyon, Umutsuzluk ve Yaşam Kalitelerinin Değerlendirilmesi. Journal of Medical Sciences. 2018:25-32.

11. Hülya Arslantaş FA, Fadime Kaya, Dilek Turan. Yatan Hastalarda Umutsuzluk ve Sosyal Destek Düzeyi ve Bunları Etkileyen Faktörler. İUFN Hemşirelik Dergisi. 2010:18(2): 87-97.

12. Wendy D Duggleby LD, Allison Williams, Karen Wright, Dan Cooper, David Popkin, Lorraine Holtslander. Living with hope: ınitial evaluation of a psychosocial hope ıntervention for older palliative home care patients. J Pain Symptom Manage. 2007:33: 247-257.

13. Gambhir Shrestha XW, Katrina Hann , Kyaw Thu Soe, Srinath Satyanarayana , Bhola Siwakoti, Shankar Bastakoti, Rashmi Mulmi , Kritika Rana , Nirmal Lamichhane. Bacterial profile and antibiotic resistance among cancer patients with urinary tract infection in a national tertiary cancer hospital of Nepal. Tropical medicine and infectious disease. 2021: 6(2), 49.

14. Wondewosen Tseagye Sime HB, Tamrat Abebe Zeleke,-Zelalem Desalegn. Urinary tract infection in cancer patients and antimicrobial susceptibility of isolates in Tikur Anbessa Specialized Hospital. Addis Ababa Ethiopia PLoS ONE 2020:15(12).

15. A T Beck AW, D Lester, L Trexler. The measurement of pessimism: The Hopelessness Scale. J Consult Clin Psycholgy. 1974:42(6), 861-5.

16. Ayşegül Durak RP. Beck Umutsuzluk Ölçeği geçerlilik çalışması. Kriz Dergisi. 1994:2 (2)311-319.

17. Gülten Seber ND, Cem Kaptanoğlu, Durmuş Tekin. Umutsuzluk Ölçeği: Geçerlilik ve Güvenirliği. Kriz Dergisi. 1993:1, 139-42.

18. Sharon DEERALRJG. The satisfaction with life scale. . Journal of Personality Assessment, 1985:49 (1), 71-75.

19. Abidin Dağlı NB. Yaşam doyumu ölçeğinin Türkçe' ye uyarlanması: geçerlik ve güvenirlik çalışması. Electronic Journal of Social Sciences. 2016:15(59).

20. Özlem Alıcı EA, Süleyman Alıcı. Kanser Hastalarında Fırsatçı Enfeksiyonlar. Türk Onkoloji Dergisi. 2008:23:153-62.

21. Temizsoy M. Kanser Hastalarında Kırılganlığın Umutsuzluğa ve Yaşam Doyumuna Etkisi İstanbul Medipol Üniversitesi Sağlık Bilimleri Enstitüsü Yüksek Lisans Tezi. 2021:9-19,52-64.

22. Mualla Yılmaz ZGY. Onkoloji Hastalarının Yaşadığı Psikososyal Sorunlarla Baş Etmesinde Hemşirenin Rolü. Adnan Menderes Üniversitesi Sağlık Bilimleri Fakültesi Dergisi. 2020:4(1); 60-70.

23. Ryo Yajima YI, Tetsuya Wako, Shirou Katayama, Junko Kizu. Retrospective Study Of Risk Factors for Infection in Cancer Patients Receiving Specialist Palliative Care. J Nippon Med Sch. 2013: 80:481-5.

24. Tone Rustøen BAC, Christine Miaskowski. The importance of hope as a mediator of psychological distress and life satisfaction in a community sample of cancer patients. Cancer nursing. 2010:33(4), 258-267.

25. Marcin Wnuk JTM, Patricia Fobair. The relationship of purpose in life and hope in shaping happiness among patients with cancer in Poland. Journal of psychosocial oncology. 2012:30(4), 461-483.

Original Article

Eurasian Journal of Critical Care

One-Year Diagnosis and Cost Analysis of Patients Admitted to Intensive Care Units from the Emergency Department

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Abstract

Background: This study aimed to conduct a one-year diagnostic and cost analysis of patients admitted from the emergency department to intensive care units.

Methods: In this retrospective study, we analyzed demographic data, the intensive care units to which patients were admitted, months of admission, admission diagnoses, length of stay, costs associated with diagnoses, and one-year prognosis outcomes for patients admitted from the emergency department of Göztepe Prof. Dr. Süleyman Yalçın City Hospital to internal medicine and general ICUs from January 1, 2015, to December 31, 2015.

Results: The study included data from 90 patients, comprising 52 males (57.8%) and 38 females (42.2%). The average age of participants was 68.04 ± 18.44 years. Patients were mainly admitted to the ICU with diagnoses of pneumonia (22.2%) and congestive heart failure (15.6%), respectively. ICU admissions peaked in March (16%), followed by May (12%) and April (11%). A total of 89 patients (98.9%) were admitted to the Internal Medicine ICU. The highest costs were linked to patients diagnosed with pneumonia and anemia. The average cost of services provided for all diagnoses was 1,572.33 Euros. The average length of stay for each patient in the ICU was 11.26 days. The highest daily costs were observed in patients with myocardial infarction (MI), sepsis, and pneumonia. Among the patients, 45.6% died, while 52.2% were discharged.

Conclusion: In our study, most intensive care patients were male. Pneumonia was the most prevalent diagnosis, peaking in late winter and early spring. Patients suffering from pneumonia and anemia incurred the highest treatment costs. Sepsis and CHF contributed to the longest stays in intensive care. Our mortality rate was 45.6%, significantly higher among those diagnosed with pneumonia.

Keywords: Emergency Department, Diagnosis, Cost, Intensive Care Unit, Mortality

Introduction

Intensive care units are specialized areas where healthcare professionals provide multidisciplinary services for the diagnosis, management, and follow-up of critically ill or injured patients. Patients admitted to intensive care units face a significant risk of death in the hospital. For instance, mortality rates stand at 17% for patients with cardiac causes (1). Early intervention and prompt access to intensive care are linked to better survival outcomes (2). ICU admission rates vary significantly between countries, with these variations connected to patient severity (1), institutional resources (3), physician practices, and local protocols (4). Coordinating transportation to the intensive care unit, motivating healthcare professionals, and developing clinical guidelines can enhance the healthcare system's quality, equity, and efficiency. These factors are directly related to patient survival.

Several publications in the literature, including APACHE and SAPS, have examined and compared mortality prediction models for ICU patients that depend on expert panels or statistical models (5). These models and scoring systems are typically available 24 to 48 hours after admission. Predictions are based on information that is available early on (6). Cardiovascular diseases, respiratory diseases, multi-organ issues, nervous system disorders,

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• **Received:** 16.02.2025 • **Revision:** 12.03.2025 • **Accepted:** 08.04.2025
DOI: 10.55994/ejcc.1638575
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Cite this article as: Karahaliloglu CU, Ay D, Al B, Erim K, Altay TS, Torun E. One-Year Diagnosis and Cost Analysis of Patients Admitted to Intensive Care Units from the Emergency Department. Eurasian Journal of Critical Care. 2025;7(1): 7-12

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cerebrovascular diseases, renal failure, advanced age, and electrolyte imbalances are the main factors that extend the length of stay in intensive care (7). It is essential to follow accepted evidence-based guidelines for admitting patients to intensive care units and discharging them home after treatment. This method effectively utilizes resources, potentially cuts costs, enhances patient comfort, and reduces prolonged hospitalizations and complications (8).

In this study, we aimed to retrospectively analyze the diagnoses, morbidity, mortality, and cost of patients admitted to the intensive care units from the Emergency Department of Göztepe Prof. Dr. Süleyman Yalçın City Hospital between January 1, 2015, and December 31, 2015.

Method

Objective: This study aimed to retrospectively analyze the one-year diagnoses and costs of patients admitted to internal medicine and general intensive care units (ICUs) from the emergency department of Göztepe Prof. Dr. Süleyman Yalçın City Hospital between January 1, 2015, and December 31, 2015. Ethical committee approval was obtained on May 31, 2016, and the Helsinki Declaration was used to conduct the study.

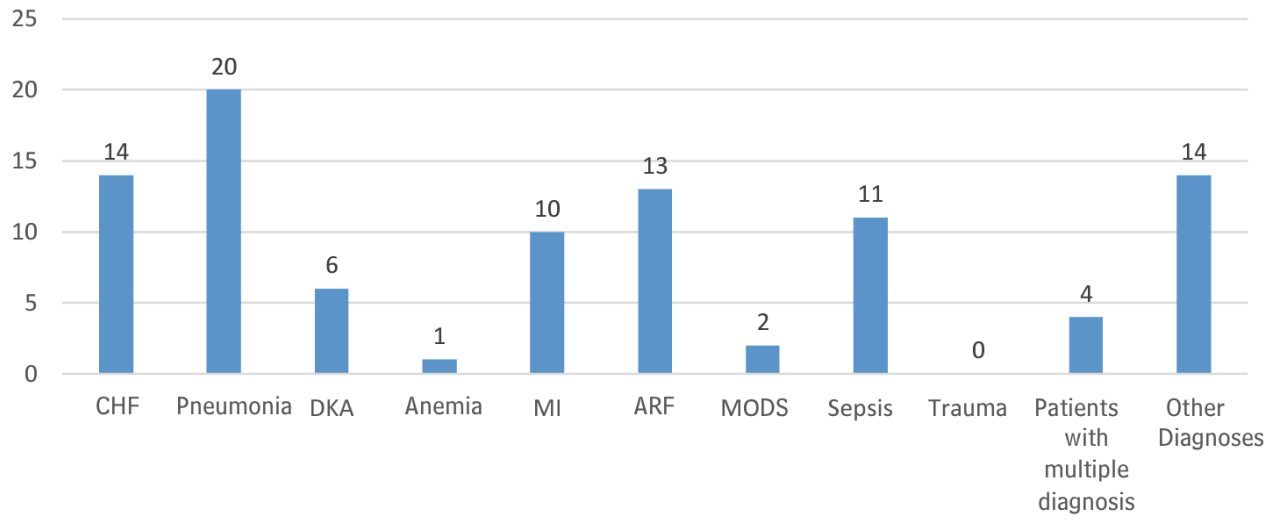
- **Data Collection**: Our hospital records all information using the Nucleus program. With the ethical committee's approval, the data required for this study were accessed through the Nucleus database.
- **Collected Data**: Patients' demographic information (age, gender), the ICUs admitted to, months of admission, admission diagnoses, length of stay, costs based on diagnoses, and prognosis.
- **Diagnosis Selection**: The main reason or predominant condition that led the patient to the emergency department was accepted as the diagnosis (in patients with multiple comorbidities, the primary condition resulting in ICU admission was considered the diagnosis).
- **Non-ICU Costs**: Dialysis costs were assessed by incorporating them into the unit's expenses associated with the dialysis procedure performed.
- **Inclusion Criteria**: Patients who are 18 years or older and have been admitted to ICUs from the emergency department.
- **Exclusion Criteria**: Patient files that contained incomplete data were excluded from the study.
- **Statistical Analysis**: Analyses were conducted using SPSS version 23.0 software. The variables' normality was evaluated visually (through histograms and probability plots) and analytically (using Kolmogorov-Smirnov and Shapiro-Wilk tests). Descriptive analyses were provided using means and standard deviations for normally distributed variables. The Pearson Chi-Square and Fisher's Exact Tests were applied to 2x2 tables. Mann-Whitney U tests were employed to compare the two groups for data that was not normally distributed. A p-value less than 0.05 was deemed statistically significant.

Results

The study included data from 90 patients, consisting of 52 males (57.8%) and 38 females (42.2%). The mean age of the participants was 68.04 ± 18.44 years, with a median age of 71.5 years. The most common diagnoses for ICU admission were pneumonia (22.2%, n=20) and congestive heart failure (CHF) (15.6%, n=14) (Table 1).

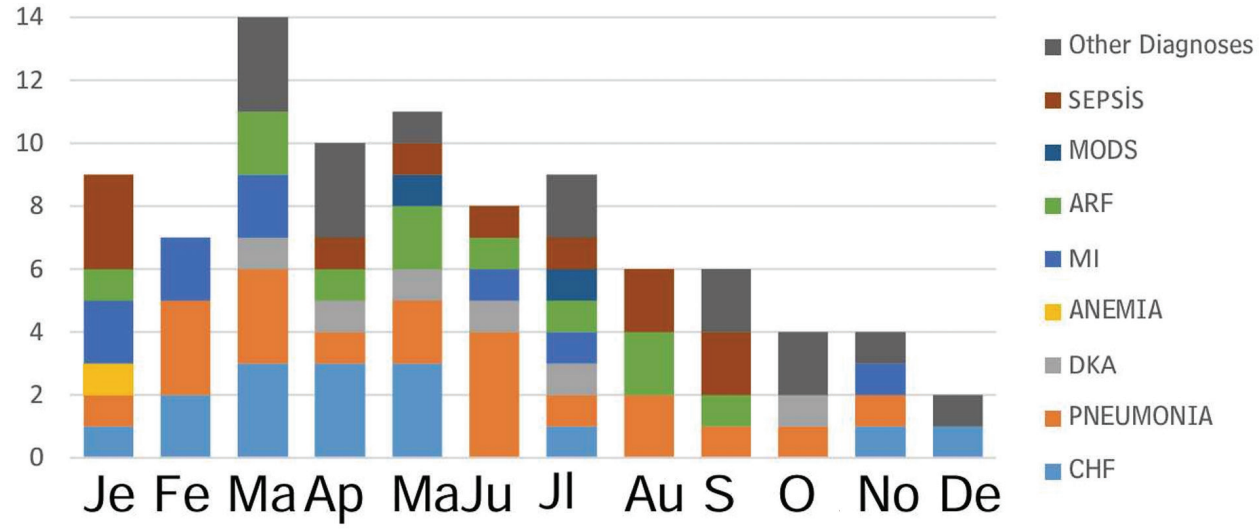
Admissions to emergency services and ICUs were most common at the end of winter and in spring. The highest

Table 1. Diagnoses leading to ICU admissions



CHF: Congestive Heart Failure, DKA: Diabetic Ketoacidosis, MI: Myocardial Infarction, ARF: Acute Renal Failure, MODS: Multiple Organ Dysfunction Syndrome

Table 2. Distribution of emergency department admissions by time and diagnosis



ARF: Acute Renal Failure, MI: Myocardial Infarction, DKA: Diabetic Ketoacidosis, CHF: Congestive Heart Failure, MODS: Multiple Organ Dysfunction Syndrome

ICU admissions occurred in March (16%), May (12%), and April (11%) (Table 2). Pneumonia admissions were spread throughout the year, while CHF admissions rose at the end of winter and early spring. Sepsis admissions peaked in the summer (Table 2). Among the patients, 89 (98.9%) were admitted to the Internal Medicine ICU, 2 (2.2%) to the Coronary ICU, and 3 (3.3%) to the General ICU. Four patients required ICU admission due to clinical conditions involving multiple diseases. Twenty-seven patients (30%) were treated solely in the ICU, while 63 (70%) received treatment in both the ICU and inpatient wards. Three patients, two diagnosed with sepsis and one with myocardial infarction (MI), required care in two different ICUs.

Cost Analysis: The costs during ICU stays included hemodialysis, blood transfusions, consultations, and medical treatments. Total expenses comprised both ICU services and the subsequent inpatient ward services. Patients with pneumonia and anemia incurred the highest costs in both ICU and total expenditures. The lowest average ICU expenditure was recorded in patients with diabetic ketoacidosis (DKA), while the lowest total spending was observed in patients with myocardial infarction (MI).

Table 3. Distribution of diagnoses by gender

Diagnoses	Male	Female	P
Congestive Heart Failure	9(17,3)	5(13,2)	0,592**
Pneumonia	11(21,2)	9(23,7)	0,775**
Diabetic Ketoacidosis	3(5,8)	3(7,9)	0,690*
Anemia	0(0,0)	1(2,6)	0,239*
Myocardial Infarction	5(9,6)	5(13,2)	0,597*
Acute Renal Failure	8(15,4)	5(13,2)	0,767**
Multiple Organ Dysfunction Syndrome	2(3,8)	0(0,0)	0,221*
Sepsis	6(11,5)	5(13,2)	0,817*
Patients with multiple diagnosis	2(3,8)	2(5,3)	0,747*
Other Diagnoses	10(19,2)	7(18,4)	0,923**

(Significance evaluated using Fisher's Exact Test or Chi-Square Test)

The average ICU cost for internal medicine patients was €6,299.54, while the average inpatient ward cost was €383.16. The average cost for all services provided across all diagnoses was €1,572.33. Patients spent an average of 11.26 days in the ICU, with a daily average cost of €624.52. No significant correlation was observed between the length of ICU stay and daily ICU costs ($p > 0.05$). Sepsis, CHF, and pneumonia had the longest average ICU stays (Table 5). The highest daily costs were linked to MI, sepsis, and pneumonia. Pneumonia was the most common admission diagnosis and ranked third in daily expenses (Table 5).

Mortality and Outcomes: ICU mortality rates encompassed patients who passed away after being transferred from the ICU to inpatient wards. Patients admitted to the ICU multiple times within a year were assessed separately for each admission, while readmissions during the same episode were regarded as a single admission.

A total of 41 patients (45.6%) died, 47 patients (52.2%) were discharged, and two patients (2.2%) were transferred to the ICU of another hospital. Pneumonia had the highest mortality rate. No deaths were reported among patients with DKA (5).

Discussion

The frequency of emergency department admissions in our country is increasing daily. Hospital patient admis-

Table 4. Costs by diagnoses (in ₺)

Diagnoses	Mean (₺)	±ss (₺)	Minimum (₺)	Maximum (₺)
CHF				
Intensive Care	5477,22	7261,07	117,27	21315,75
Total sum	6011,10	7074,39	326,56	21315,75
Pneumonia				
Intensive Care	14698,83	12674,94	173,09	37691,98
Total sum	16517,68	15228,94	60,00	58010,21
Diabetic Ketoacidosis				
Intensive Care	1669,10	1219,63	174,88	3741,70
Total sum	2251,68	2218,82	174,88	6558,02
Anemia				
Intensive Care	10980,61	0,0	10980,61	10980,61
Total sum	11755,69	0,0	11755,69	11755,69
Myocardial Infarction				
Intensive Care	1759,18	1458,89	587,66	5641,02
Total sum	2128,19	1461,28	1001,27	5665,76
Acute Renal Failure				
Intensive Care	5265,58	5038,18	390,55	16470,17
Total sum	7443,89	6291,27	857,96	21283,83
MODS				
Intensive Care	5895,27	1842,08	4592,72	7197,82
Total sum	6153,80	1951,49	4773,89	7533,71
Sepsis				
Intensive Care	5946,50	5983,28	955,98	20223,66
Total sum	7709,16	5453,54	2298,42	20223,66
Other Diagnoses				
Intensive Care	3542,34	2815,96	459,36	9335,72
Total sum	3899,85	2972,72	459,36	9335,72
Patients with multiple diagnosis				
Intensive Care	1750,54	1938,72	173,09	4491,42
Total sum	3718,72	1738,34	1490,35	5672,76

sions are rapidly growing alongside population growth. In 2023, Turkey's population was 85,372,377 individuals, 50.1% male and 49.9% female (9). According to data from the Ministry of Health of the Republic of Turkey for 2022, there are 1,555 hospitals, 264,969 hospital beds, and 48,617 intensive care unit beds (10). The number of physicians per 100,000 population is 228.

The acceptance of walk-in patients and the rise in ambulance entries have increased the workload of emergency services and their supporting units. This increasing workload has become more challenging to identify and manage critically ill patients. We strive to overcome this challenge by actively utilizing an appropriate triage system. For emergency department staff, understanding the impact of chronic diseases on prognosis in critical patients, the cost implications of patients on the social security system, and the seasonal characteristics of patient admission frequencies can assist in proper workforce planning and the development of an effective cost-strategy for emergency services and supporting inpatient units.

The number and quality of intensive care units responsible for the care of critical patients following emergency department management are increasing every day. However, this increase does not meet the admission rates of patients requiring intensive care; thus, the challenges persist. Given the high cost of utilization, need, and limited availability, the rational use of intensive care beds is essential. According to the Turkish Statistical Institute (TÜİK) data, the occupancy rate of adult intensive care beds was approximately 80% in 2015, 83% in January 2024, and around 71% in February 2024 (Ministry of Health Press Bulletin). These rates are even higher in densely populated metropolitan areas. During times of increased viral infections, particularly in winter, many patients with indications for intensive care often wait hours or even days in emergency departments for an available bed. These delays sometimes cause interruptions in treatment.

A study by Shih, Chia, and colleagues showed that the mortality rate of patients on mechanical ventilation awaiting an intensive care bed in the emergency department increases after four hours (11).

The patient population in our study was middle-aged (68.04 ± 18.44 years), with most males (57.8%). Similarly, Shih, Chia, and colleagues' study of 1,242 patients

Table 5. Distribution of diagnoses, ICU length of stay, daily costs, and mortality rates

Diagnosis	Length of stay in the ICU Average (ss)	Daily Cost Average(ss)	Exitus	In terms of mortality P
Congestive Heart Failure	14,86 (16,09)	427,81(200,55)	7(50,0)	0,716**
Pneumonia	12,10 (15,33)	726,96(631,15)	12(60,0)	0,141**
Diabetic Ketoacidosis	6,83(3,66)	461,80(305,12)	0(0,0)	0,020*
Anemia	1,00(0,0)	173,09(0,0)	1(100,0)	0,272*
Myocardial Infarction	6,10(5,97)	795,64(557,29)	5(50,0)	0,765**
Acute Renal Failure	11,23(7,81)	579,09(497,52)	4(30,8)	0,247**
MODS	6,50(6,36)	438,32(138,83)	1(50,0)	0,898*
Sepsis	17,00(14,91)	739,29(593,57)	7(63,6)	0,199*
Patients with Multiple Diagnosis	7,00(5,10)	330,14(29,65)	3(75,0)	0,226*
Other Diagnosis	9,12(8,53)	562,12(391,65)	7(41,2)	0,687**

Diagnosis | ICU Stay (Mean ± SD, days) | Daily Cost (Mean ± SD, Euros) | Mortality (%) | p-value

reported a mean age of 67.0 ± 15.4 years and a male ratio of 60.1%, which aligns with our findings (11).

The primary reason for higher admissions in winter is the rise in viral infections during this time, significantly affecting individuals with comorbid conditions. A study by Sert, Mutlu, and colleagues involving 2,254 patients revealed that emergency department admissions peaked in March 2015 (9.48%) and in January 2016 and 2017 (11.07% and 9.44%, respectively), aligning with the increased winter admissions observed in our study. (12) The rise in viral infections also accounts for higher pneumonia diagnoses and increased admissions to intensive care units. In the same five-year study, respiratory diseases accounted for the highest emergency department admissions at 24.71% (12).

Most patients requiring intensive care had an internal cause. A study by Chin-Yee and colleagues reported that 62% of patients were admitted to intensive care units for internal pathologies and 25% for surgical emergencies (13). The absence of trauma-related intensive care admissions in our study can be attributed to the low number of trauma cases presented to our emergency department. Additionally, coronary intensive care units at our hospital did not manage patients requiring mechanical ventilation during the study period, and coronary angiography was not performed after 9:00 PM due to equipment and personnel constraints, resulting in fewer coronary intensive care patients.

In four patients, clinical conditions requiring intensive care were associated with more than one disease, with pneumonia also present in three of these patients in addition to their primary diagnosis. Advanced age and immunosuppression increase the risk of community-acquired pneumonia, while dental care and a high socioeconomic status reduce it. Community-acquired pneumonia remains a major driver of healthcare costs worldwide. In our study, the mean age of patients was 68 years, and approximately half had a diagnosed chronic condition. Patients diagnosed with pneumonia accounted for highly intensive care admission and treatment costs. Chin-Yee and colleagues' study with 1,671 patients found that respiratory diseases were the most common reason for intensive care admissions (26%), followed by cardiovascular diseases (23%), aligning with our findings, where pneumonia was the most common and congestive heart failure (13). The high cost associated with these patients stems from prolonged hospital stays. The lowest costs were observed in diabetic ketoacidosis (DKA) patients due to their rapid response to treatment and early discharge.

Decompensated congestive heart failure was the second most common diagnosis, leading to admission to intensive care from the emergency department. According to the "Heart Failure Prevalence and Predictors in Turkey (HAPPY) study," the prevalence of heart failure was reported at 2.9%. Effective management of heart failure can lower hospital admissions, mortality, morbidity, and associated costs (14). In our study, congestive heart failure was identified as the most common comorbid condition, observed in 15.6% of cases.

The group with the most extended average length of stay in intensive care consisted of patients diagnosed with sepsis. We believe this is due to a delayed response to treatment. At our hospital, patients admitted to intensive care from the emergency department had an average length of stay of 11.26 days, with a daily cost averaging €624.52. In a study by Toptas and colleagues involving 3,925 patients, the average length of stay in intensive care was 10.2 days (15). A review by Chacko and colleagues of cost studies from countries such as India, the United States, Germany, France, and Australia revealed that daily intensive care costs ranged from €200 to €4,300, with labor costs and length of stay being the primary drivers of these differences (16).

In terms of daily costs based on diagnoses, myocardial infarction, sepsis, and pneumonia were associated with the highest daily costs in our study. As noted above, pneumonia was the most common diagnosis in our study. Early detection and treatment of uncomplicated pneumonia cases could prevent intensive care admissions, leading to lower morbidity, mortality, and healthcare costs. Improving primary care services could facilitate the early detection and management of diseases such as pneumonia and congestive heart failure, either in outpatient settings or inpatient wards, reducing the workload of emergency services and intensive care units and mortality rates and associated costs for social security systems.

Establishing and expanding palliative care centers could help elderly patients with chronic conditions receive proper follow-up and care, potentially reducing their frequency of emergency department visits.

Approximately 45.6% of our patients died. Çakır and colleagues reported a lower intensive care unit mortality rate of 34.7% in a study with 757 patients (17). Similarly, Şahin and colleagues' study involving 300 patients reported an emergency-to-intensive care unit mortality rate of 38.7%, which was also lower than our study's (18). Although not statistically significant, patients with pneumonia, sepsis, or multiple diagnoses had higher mortality rates.

Limitations: We consider the study's limitations to be its retrospective nature, its conduct in a single center with a relatively small number of patients, and its inability to follow up with patients referred to external centers.

Conclusion: In our study, most intensive care patients were male. Pneumonia was the most prevalent diagnosis, peaking in late winter and early spring. Patients with pneumonia and anemia faced the highest treatment costs. Sepsis and CHF led to the most extended stays in intensive care. Our mortality rate was 45.6%, notably higher among patients diagnosed with pneumonia.

References

1. Chioncel O, Mebazaa A. Characteristics of intensive care in patients hospitalized for heart failure in Europe. Heart Fail Clin 2015;11:647–56.
2. Epstein AJ, Polsky D, Yang F, et al. Geographic variation in implantable cardioverter-defibrillator use and heart failure survival. Med Care 2012;50:10.
3. Adhikari NK, Fowler RA, Bhagwanjee S, et al. Critical care and the global burden of critical illness in adults. Lancet 2010;376:1339–46.
4. Dondo T, Hall M, Timmis A, et al. Geographic variation in non-ST-segment myocardial infarction treatment in the English National Health Service: a cohort study. BMJ Open 2016;6:e011600.
5. Knaus WA, Draper EA, Wagner DP, et al. APACHE II: a severity of disease classification system. Crit Care Med 1985; 13(10): 818–829.
6. Awad A, Bader A Den M, Al Sonbath Y et al. Predicting hospital mortality for intensive care unit patients: Time-series analysis. Health Informatics J. 2020; 26(2):1043-1059.doi: 10.1177/1460458219850323.https://doi.org/10.1177/146045821985032.
7. Topbaş M, Samanci NS, Akkoç İ, et al. Factors Affecting the Length of Stay in the Intensive Care Unit: Our Clinical Experience. Biomed Res Int. 2018, 20:2018:9438046. Doi: 10.1155/2018/9438046.
8. Hassan EM, Jama AB, Sharaf A, et al. Discharging patients home from the intensive care unit: A new trend. World J Clin Cases.2024 Aug 16;12(23):5313-5319. doi: 10.12998/wjcc.v12.i23.5313.
9. https://data.tuik.gov.tr/Bulten/Index?p=Adrese-Dayali-Nufus-Kayit-Sistemi-Sonuclari-2023-49684
10. https://dosyasb.saglik.gov.tr/Eklenti/48054/0/siy202205042024pdf.pdf
11. Hung, SC., Kung, CT., Hung, CW. et al. Determining delayed admission to the intensive care unit for mechanically ventilated patients in the emergency department. Crit Care 18, 485 (2014). https://doi.org/10.1186/s13054-014-0485-1
12. Sert ET, Mutlu H, Kokulu K, Yeşildağ K, Sarıtaş A. Acil Servisimize Başvuran Hastaların 5 Yıllık Analizi, Medical Jurnal of Muğla, Year 2021, Volume:8, Issue:1,1-4, 30/04/2021, https://doi.org/10.47572/muskutd.794039
13. Chin-Yee, N., D'Egidio, G., Thavorn, K. Et al. Cost analysis of the very elderly admitted to intensive care units. Crit Care 21, 109 (2017). https://doi.org/10.1186/s13054-017-1689-y
14. 2023 Focused Update of the 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure
15. Toptas, Mehmet, Sengul Samanci et al. Factors Affecting the Length of Stay in the Intensive Care Unit: Our Clinical Experience, BioMed Research International, 2018, 9438046, 4 pages, 2018. https://doi.org/10.1155/2018/9438046
16. Chacko B, Ramakrishnan N, Peter JV. An approach to Intensive Care Costing and the Provision of Cost-effective Care. Indian J Crit Care Med 2023;27(12):876–887.
17. Çakır Esra, Kocabeyoğlu Gül Meral, Yoğun Bakım Ünitesinde Mortalite Sıklığı ve Rişsk Faktörlerinin Değerlendirilmesi, Anakara Eğt. Arş. Hast. Derg. (Med. J. Ankara Tr. Res. Hosp.), 2020; 53(1): 20-24
18. Şahin O, Kucuk M, Küçükgüçlü S. Acil Servisten Anestezi Yoğun Bakım Ünitesi'ne Kritik Hasta Yatışlarının Değerlendirilmesi. DEU Tıp Derg. 2023;37(2):161-7.

Original Article

Eurasian Journal of Critical Care

Evaluation of Patients with Corona Disease in the City Hospital

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Abstract

Background: Monitoring the values of eosinophils in particular among the blood cell count (CBC) parameters of patients who experienced COVID-19 and then worsened and become ex, highlights the importance of the mortality caused by the disease, and by early diagnosis, the necessary measures can be taken.

Methods: Our study is retrospective case control study. The clinical and laboratory data of 1039 patients who received a diagnosis of COVID-19 between March 11th and September 11th, 2020.

Results: The study was completed with a total of 1039 patients. Of the participants, 378 (36.4%) were female and 661 (63.6%) were female. The number of people who died from the disease was 172 (16.6%). Of the deceased patients, 63 were female. The mortality rate was higher in male patients, at 63.37%. Severe eosinopenia was found in 77.02% of the deceased patients. The number of eosinophil cells in surviving patients were very weak compared to the others, while the number of monocytes and lymphocytes in deceased patients were correlated.

Conclusion: Close monitoring of CBC parameters, particularly eosinophils, can be helpful in the early screening, treatment, and follow up of critically ill COVID-19 patients in terms of mortality

Keywords: COVID-19, eosinopenia, mortality, early diagnosis

Introduction

In December 2019, a new coronavirus disease called COVID19, characterized by dry cough, fever, fatigue, and lung involvement, was detected in patients in the city of Wuhan, China (1). It has been seen that laboratory tests used in the morbidity, severity, mortality, and follow up of COVID-19 patients are extremely important (2). The clinical course of these patients varies from asymptomatic to serious and fatal findings (3). Eosinophils are important leukocytes in tissue or periphery, which have proinflammatory effects in many diseases. In particular, their immune regulatory and antiviral functions have been shown in recent years (4). It is thought that the eosinopenia seen in COVID-19 is also effective due to the inhibition of the production and eosinophilopoiesis of type 1 interferons in the bone marrow as a result of the effective factors (5). Eosinophils have also shown antiviral immune responses to respiratory viruses such as respiratory syncytial virus and influenza (5). Eosinophils recognize various toll-like receptors (TLRs), such as TLR-3, TLR-7, TLR-9, which play a role in identifying viruses (6). Eosinophiles have the ability to block viral replication by producing nitric oxide (NO) with the help of inducible nitric oxide synthase (7). In recent years, it has been shown that peripheral blood eosinophil count is an effective and sufficient indicator in the diagnosis, evaluation, and prognosis of COVID-19 patients (8).

Materials and Methods

Our study is a retrospective case control study. After getting the approval of the Ethics Committee (Fırat university 2020/14-16), the study was completed with a total of 1039 patients diagnosed with COVID-19 between March 11th and September 11th, 2020. Statistical analyzes were

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• **Received:** 24.02.2025 • **Revision:** 12.03.2025 • **Accepted:** 02.05.2025
DOI: 10.55994/ejcc.1645847
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Cite this article as: Canpolat O. Evaluation of Patients with Corona Disease in the City Hospital. Eurasian Journal of Critical Care. 2025;7(1): 13-17

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Table 1. Statistical distribution of age and gender between recovered and deceased patients

	Ex- Trimmed Mean (5%)	Right - Trimmed Mean (5%)	Ex- Median	Right - Median	Ex- Minimum-Maximum	Right - Minimum-Maximum	P Value
AGE	74,32	74,16	75,00	75,00	28-101	28-100	0.855
BA	0,04	0,04	0,03	0,04	0-0,26	0-0,25	0.003
%BA	0,40	0,56	0,36	0,52	0-1,62	0,01-4,47	<0.001
EO	0,02	0,07	0,01	0,04	0-0,47	0-3,4	<0.001
%EO	0,17	0,89	0,05	0,54	0-3,95	0-23,75	<0.001
MO	0,59	0,66	0,51	0,62	0,03-2,48	0,01-6,37	0.001
%MO	6,44	8,72	5,91	8,44	0,54-17,98	0,46-41,57	<0.001
LE	1,02	1,44	0,83	1,36	0,18-6,3	0,2-21,17	<0.001
%LE	12,50	20,51	10,73	20,16	1,29-60,08	1,31-75,76	<0.001
NE	8,23	5,52	7,31	4,92	0,08-42,79	0,08-31,99	<0.001
%NE	80,12	68,61	81,73	67,95	25,44-97,43	8,65-95,73	<0.001
WBC	10,13	7,91	9,05	7,30	0,3-45,1	0,9-36,3	<0.001
RBC	4,58	4,67	4,60	4,70	2,18-6,18	1,81-7,06	0.109
PLT	217,52	213,49	201	206	85-547	42-928	0,919
NELE	10,05	4,79	7,79	3,36	0,44-75,78	0,15-70,29	<0.001

performed using IBM SPSS statistics. The distribution of the data was determined by the Kolmogorov-Smirnov test. Continuous variables were expressed as median (minimum maximum), and categorical variables were expressed as frequency and percentage. Continuous variables were compared using the Mann-Whitney U test. The linear relationship between two continuous blood test variables was evaluated using the Spearman correlation analysis. Results were evaluated at a 95% confidence level, and a P value less than 0.05 was considered statistically significant for all tests. There were 378 (36.4%) female patients and 661 (63.6%) male patients. The number of patients who recovered from the disease was 867 (83.4%), and the number of deaths was 172 (16.6%).

This study did not find a statistically significant difference in terms of age and gender distribution between recovered and deceased patients in this population (Table 1).

There were 63 female and 109 male deceased patients, and 315 female and 552 male recovering patients. The mortality rate was higher among male patients, with only 36.63% of the deceased being female. When evaluating the percentage of eosinophiles among the deceased and surviving patients, 77.02% of the deceased had severe eosinopenia, while the rate was 35.41% among surviving patients. Among patients with lymphopenia and severe eosinopenia, 81% had lost their lives. In patients who died but were not lymphopenic, the rate of severe eosinopenia was approximately 70%. The number of patients discharged with a lymphocyte count above 1.11 was 549 (63.32%). The number of patients discharged a non-lymphopenic and eosinophil percentage below 0.25 was 134 (24.41%). The number of patients discharged with a non-lymphopenic and eosinophil percentage above 0.25 was 415 (75.59%). The number of patients discharged with a lymphocyte count below 1.11 was 318 (36.68%). The number of patients discharged with a lymphopenic and eosinophil percentage below 0.25 was 173 (54.40%). The number of patients discharged with lymphopenic and eosinophil percentage above 0.25 was 14 (45.60%). The number of patients discharged with a lymphocyte count above 1.11 and ex was 49 (31.06%). The number of patients discharged with a non-lymphopenic and eosinophil percentage below 0.25 and ex was 34 (69.39%) the number of patients with a non-lymphopenic and eosinophil percentage above 0.25 who became ex was 15 (30.61%). The number patients with a lymphocyte count below 1.11 who became ex was 11 (68.94%). The number of patients with a lymphopenic and eosinophil percentage below 0.25 who became ex was 90 (81.08%). The number of patients with a lymphopenic and eosinophil percentage above 0.25 who became ex was 21 (18.92%). Among patients who recovered with a non-lymphopenic and eosinophil percentage below 0.25, the number with a monocyte percentage below 6 was 26 (4.46%), while among those who died, the number with a monocyte percentage below was 21 (61.76%). Among patients who recovered with a non-lymphopenic and eosinophil percentage above 0.25, the number with a monocyte percentage below 6 was 48 (11.57%), while among those who died, the number with a monocyte percentage below 6 was 3 (20%). There was a correlation between the total number of leukocytes and the number of other cells besides lymphocytes. In recovered patients, the number of basophils had a weak correlation with the number of eosinophils, monocytes, lymphocytes,

and neutrophils, while in deceased patients, this correlation partially increased. In recovered patients, the number of eosinophils had an almost non-existent correlation with the others, while in deceased patients, it correlated with the number of monocytes and lymphocytes.

Conclusion

Eosinophil levels in critically ill COVID-19 patients, who experience progression of the disease, were found to be significantly lower than in those with moderate or severe disease. No significant difference was observed in eosinophil counts (normal range: 0.02-0.52 x 109/L) or ratios (normal range: 0.4-8%) between moderate or severe COVID-19 patients.

Eosinophil counts and ratios were significantly lower in critically ill COVID-19 patients compared to those with moderate or severe disease. A higher number of male COVID-19 patients with critical illness was observed. And these male patients had significantly lower eosinophil counts compared to female patients. A progressive decline in eosinophil levels was observed in relation to mortality in COVID-19 patients, with deceased patients having significantly lower eosinophil counts compared to surviving patients.

Discussion

Progressive worsening of eosinophilia has been associated with the progression of critical illness in COVID-19 patients and with a higher risk of serious mortality. Eosinophilia has also been linked to damage in the liver, kidneys, and other tissues. As well as to coagulation disorder. Eosinophils, which have strong proinflammatory effects, are produces in bone marrow and defend against extracellular agents using toxic proteins in their granules. It has been reported that eosinophil counts decrease by 50-70% in severe COVID-19 patients (9).

Eosinophilia, or an increase in eosinophil count in the blood, is associated with parasitic infections and asthma. Some studies have shown that eosinophils, which protect against parasites, also have harmful effects in severe asthma patients. Eosinophils have been shown to have antiviral activity in studies with mice (7,10). Humanized anti-IL-5 monoclonal antibody (mepolizumab) has been shown to increase viruses in humans and mice (11,12) while reducing eosinophil counts and treating eosinophilic asthma. The capture function of eosinophils for viruses has been shown to be reduced in severe asthma patients (10). In asthma exacerbations related to viruses, it is thought that eosinophil counts and anti-viral function are important in fighting viruses. Eosinophils may contribute to antiviral immunity. When eosinophils are activated by the virus, they release neurotoxin/ribonuclease 2 and cationic proteins (which kill the virus) (13). Eosinophil interaction occurs with cluster of differentiation (CD) CD86 and CD80. When eosinophils are infected with Influenza A virus, they behave like professional antigen-presenting cells and elicit antiviral immunity through CD8+ T cell-associated in vivo (7). This is an important event because if eosinophils also play a role in immunity against SARS-CoV-2, correcting the eosinopenia present in COVID-19 patients could be a significant development in preventing mortality. Our study is a retrospective case-control study. 81% of patients with lymphopenia and marked eosinopenia died. The rate of marked eosinopenia in patients who died but were not lymphopenic was approximately 70%. In a retrospective study of COVID-19 patients by Chen et al., it was found that eosinophil counts significantly decreased in critically ill and fatal patients (14). In a study by Lu G et al., the eosinophil count in severe COVID-19 cases was significantly lower than in moderate cases (15,16). Zhao et al., have also found a significant relationship between eosinopenia and the severity of COVID-19 (17). In our study, there was also a significant relationship between the number of patients who recovered from COVID-19 and eosinopenia. The decrease in eosinophil levels (eosinopenia) was a significant finding between SARS- CoV-2 infection. The relationship between eosinopenia and the severity of COVID-19 has not been observed in previous studies (18). In this study, we found that eosinophil levels in patients with severe COVID-19 were significantly lower compared to those with moderate of milt disease. We also found that the progressive decline in eosinophil levels was associated with mortality in COVID-19 patients. These findings suggest that eosinopenia may be a guiding factor in the treatment of COVID-19. Additionally, our study demonstrated that the progressive decline in eosinophil levels was associated with mortality in COVID-19 patients, which was supported by other findings in this study. A study of critically ill COVID-19 patients showed that thrombotic disorders were also present (19). The numbers and ratios of eosinophils were inversely correlated with some biomarkers of tissue damage in patients with severe COVID-19. It thought that eosinopenia is associated with organ failure and tissue damage. The emerging concept that eosinophils support tissue repair supports this observation (20-22). In this study, we demonstrate that eosinophil levels in critically ill COVID-19 patients are significantly lower than in those with moderate or severe disease. We also found that the progressive decrease in eosinophil levels was associated with mortality

in COVID-19 patients. Our study suggests that eosinopenia may be a guide in the treatment of COVID-19. Additionally, our study has systematically analyzed the relationship between the severity of eosinopenia and the severity of COVID-19 disease. We believe that a detailed eosinophil analysis is necessary in COVID-19, as the importance of eosinophils in the body's immune response to viral infections is likely to be clearly demonstrated in the future research (13). It has been suggested that the dynamic changes identified in routine blood parameters and eosinophil studies may be indicators of the prognosis and treatment of COVID-19 (8). It has been claimed that there is a correlation between the increase in eosinopenia and the severity of COVID-19 disease and the increase mortality (23). In their study, Güneş et al., found that eosinophil counts were very important in the forecast made in COVID-19 cases with severe clinical features (24). In a study examining the clinical features of COVID-19 cases with severe mortality, eosinopenia was found to be a poor prognostic indicator (25). Recently, it has been stated that the number of eosinophils in the blood is a sufficient and effective indicator in the diagnosis, evaluation and prognosis of COVID-19 patients (8,26). It has been suggested that there is a correlation between the continuity of eosinopenia and the advanced severity of COVID-19 disease and the likelihood of recovery (23).

It has been suggested that the dynamic changes in the routine blood parameters can be used as indicators of the prognosis and effectiveness of treatment in COVID-19 patients (15). A decrease in eosinophil levels (eosinopenia) has been observed in SARS-CoV-2 infection (27). However, the results of some previous studies on the relationship between eosinopenia and COVID-19 disease severity were not consistent (28-29). In the study, there was no statistically significant difference in age and gender distribution between the population of survivors and those who died. 16.6% of the patients died. The mortality rate was higher in male patients, and when the eosinophil percentage dominance rates were evaluated, 81% of the lymphopenic and obvious eosinopenic patients lost their lives. Among the non- lymphopenic patients who died, the rate of obvious eosinopenia was approximately 70%.

There are some limitations to this study. The study population includes patients from a single hospital(City Hospital). It also includes only 1039 patients, which may not be sufficiently determinant for all analyses. In addition, we were unable to conduct studies in a longitudinal manner due to the availability of only single laboratory results. This study has not been published anywhere. There is no conflict of interest among the authors.

References

1. Al-Tawfiq, J.A. & Memish Z.A. 2014. Middle East respiratory syndrome coronavirus: epidemiology and disease control measures. Infect. Drug Resist. 7: 281–287.
2. Lippi G, Plebani M. The critical role of laboratory medicine during coronavirus disease 2019 (COVID-19)and other viral outbreaks. Clin Chem Lab Med.2020; 58: 1063-9.
3. Shimoni Z, Glick J, Froom P. Clinical utility of the full blood count in identifying patients with pandemic influenza A (H1N1). J Infect. 2013; 66:545-7.
4. Rothenberg ME, Hogan SP. The eosinophil. Annual review of immunology. 2006;24.
5. Flores-Torres AS, Salinas-Carmona MC, Salinas E and Rosas-Taraco AG: Eosinophils and respiratory viruses. Viral Immunol 2019;32(5):198-207,. PMID: 31140942. DOI: 10.1089/vim.2018.0150
6. Phipps S, Lam CE, Mahalingam S, Newhouse M, Ramirez R, Rosenberg HF, Foster PS and Matthaei KI: Eosinophils contribute to innate antiviral immunity and promote clearance of respiratory syncytial virus. Blood 2007;110(5):1578-1586,. PMID: 17495130. DOI: 10.1182/blood-2007-01-071340
7. Samarasinghe AE, Melo RC, Duan S, LeMessurier KS, Liedmann S, Surman SL, Lee JJ, Hurwitz JL, Thomas PG and McCullers JA: Eosinophils promote antiviral immunity in mice infected with influenza A virus. J Immunol 2017;198(8):3214-3226,. PMID: 28283567. DOI:0.4049/jimmunol.1600787
8. XieG, DingF, HanL, YinD, Lu Hand Zhang M: The role of peripheral blood eosinophil counts in COVID-19 patients. Allergy, 2020. PMID: 32562554. DOI: 10.1111/all.14465
9. Azkur AK, Akdiş M, Azkur D, Sookolowska M, van de Veen W, Brüggen MC. Immune response to SARS-CoV-2 and mechanisms of immunopathological changes in COVID-19. Allergy. 2020. https://doi.org/10.1111/all.14364. Online ahead of print
10. Percopo CM, Dyer KD, Ochkur SI Active mouse eosinophils protect against deadly respiratory virus infection. Blood. 2014; 123 :743–752.
11. Sabogal Pineros YS, Bal SM, van de Pol MA In mild asthma, Anti-IL-5 modifies rhinovirus-induced macrophage, B-cell and neutrophil responses (material). A placebocontrolled, double-blind study. J Respir Crit Care Med. 2019; 199 :508–517.
12. Ravanetti L., Dijkhuis A., Sabogal Pineros YS An innate early response underlies severe influenza-induced exacerbations of asthma in a new steroid-insensitive and anti-IL-5- responsive mouse model. Allergy. 2017; 72 :737–753.
13. Sabogal Pineros YS, Bal SM, Dijkhuis A. Eosinophils capture viruses with a defective capacity in asthma. Allergy. 2019; 74 :1898–1909.
14. Chen R, Sang L, Jiang M, Yang Z, Jia N, Fu W, Xie J, Guan W, Liang W, Ni Z, Hu Y, Liu L, Shan H, Lei C, Peng Y, Wei L, Liu Y , Hu Y , Peng P , Wang J , Liu J , Chen Z , Li G, Zheng Z , Qiu S , Luo J , Ye C , Zhu S , Zheng J , Zhang N , Li Y , he J , Li J , Li S and Zhong, N; Medical Treatment Expert Group for COVID-19: Longitudinal hematological and immunolog-

ical variations associated with progression of COVID-19 patients in China. J Allergy Clin Immunol 146 (1): 89 - 100, 2020 . PMID: 32407836. DOI: 10.1016/j.jaci.2020.05.003

15. Lu G and Wang J: Dynamic changes in routine blood parameters of a severe COVID-19 case. Clin Chim Acta 508: 98 - 102, 2020. PMID: 32405079. DOI: 10.1016/j.cca.2020.04.034

16. Wang C, Deng R, Gou L,Fu Z, Zhang X, Shao F, Wang G, Fu W, Xiao J, ding X, Li T, Xiao X, and Li C: Severe to moderate COVID-19 using combined hematology parameters preliminary study to identify cases. Ann Transl Med 8 (9): 593 , 2020 . PMID: 32566620. DOI: 10.21037/atm-20-3391

17. Zhao L, Zhang YP, Yang X, and Liu X: Eosinopenia is associated with greater severity in patients with 2019 coronavirus disease. Allergy , 2020 . PMID: 32544252. DOI: 10.1111/all.14455

18. Zhang JJ, Dong X., Cao YY Clinical characteristics of 140 patients infected with SARSCoV-2 in Wuhan, China. Allergy. 2020; 75 :1730–1741.

19. Zhang Y., Xiao M., Zhang S. Coagulopathy and antiphospholipid antibodies in Covid-19 patients. NEngl J Med. 2020; 382 :e38.

20. Todd R., Donoff BR, Chiang T. Eosinophils as a cellular source of transforming growth factor alpha in the healing of skin wounds. I am J Pathol. 1991; 138 :1307-1313

21. Gieseck RL, 3rd, Wilson MS, Wynn TA Tissue repair and Type 2 immunity in fibrosis. Nat Rev Immunol. 2018; 18 :62-76.

22. Furuta GT, Atkins FD, Lee NA, Lee JJ The changing roles of eosinophils in health and disease. Ann Allergy Asthma Immunol. 2014; 113 :3–8.

23. Tanni F, Akker E, Zaman MM, Figueroa N, Tharian B and Hupart KH: Eosinopenia and COVID-19. J Am Osteopath Assoc, 2020. PMID: 32672799. DOI: 10.7556/jaoa.2020.091

24. Sun S, cai X, Wang H, O G, Lin Y, Lu B, Chen C, Pan Y, and Hu X: Peripheral blood system abnormalities in patients with COVID-19 in Wenzhou, China. Clin Chim Acta 507:174 - 180, 2020. PMID: 32339487. DOI: 10.1016/j.cca.2020.04.024

25. Du Y, Tu L, Zhu P, mu M, Wang R, Yang P, Wang X, hu C, ping R, hu P, Li T, Cao F, Chiang Ç, Hu Q ,Jin Y and Xu G : Wuhan Clinical features of 85 fatal COVID-19 cases from A retrospective observational study. Am J Respir Crit Care Med 201 (11): 1372 - 1379, 2020 . PMID: 32242738. DOI: 10.1164/rccm.202003-0543OC

26. Vasiliki E., Kopoulou G., Garmpıs N., Damaskos C., Valsami S., Dimitroulis D. et al. The Impact of Peripheral Eosinophil Counts and Eosinophil to Lymphocyte Ratio (ELR) in the Clinical Course of COVID-19 Patients: A Retrospective Study. In Vivo 2021;35:641-648 doi:10.21873/invivo.12303.

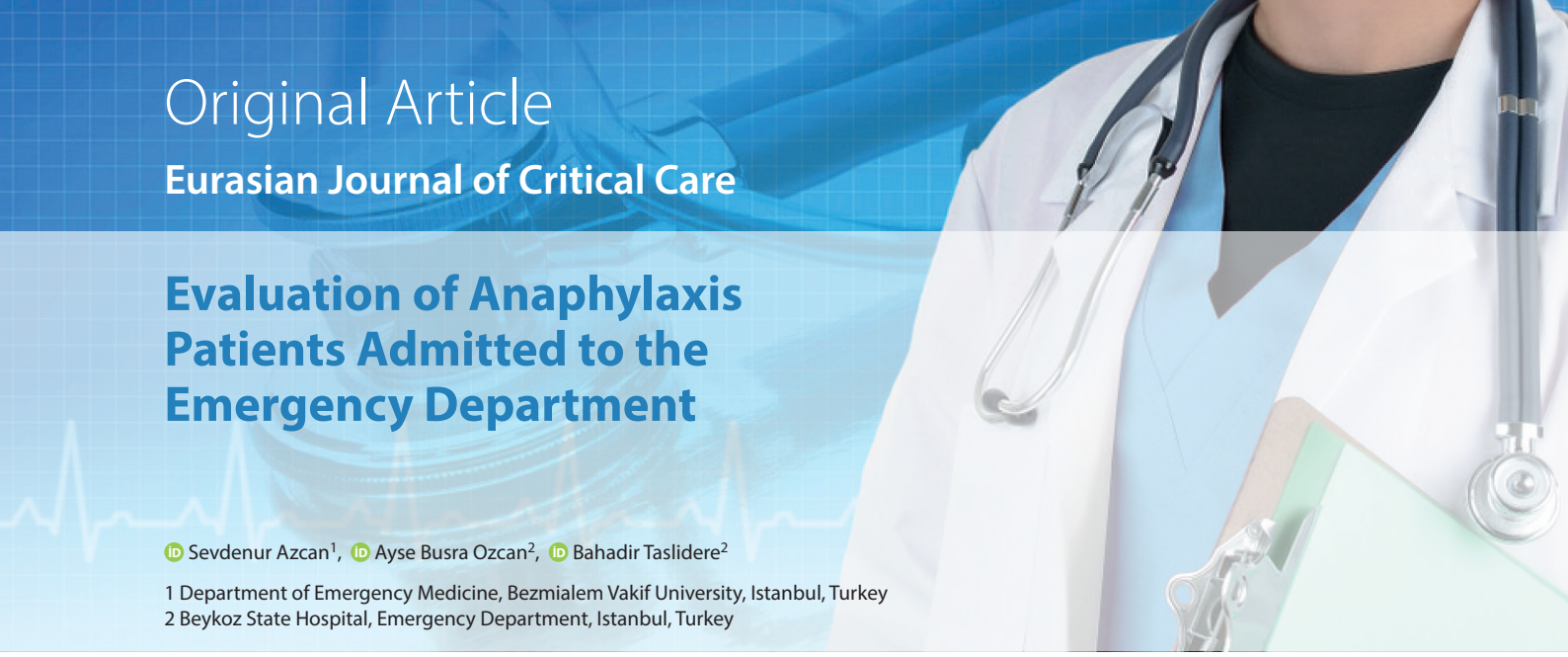
27. Lindsley AW, Schwartz JT, Rothenberg ME Eosinophil responses during COVID-19 infections and coronavirus vaccine. J Allergy Clinic Immunol. 2020; 146 :1–7.28. Qian GQ, Yang NB, Ding F. Epidemiological and clinical features of 91 hospitalized COVID-19 patients in Zhejiang, China: a retrospective, multicenter case series. QJM. 2020;113 :474–481.

29. Qin C., Zhou L., Hu Z. Dysregulation of immune response in patients with COVID-19 in Wuhan, China; Clinical Infectious Diseases Dis. 2020; 71 :762–768.

Original Article

Eurasian Journal of Critical Care

Evaluation of Anaphylaxis Patients Admitted to the Emergency Department



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Abstract

Anaphylaxis is a life-threatening allergic reaction requiring rapid diagnosis and treatment, with epinephrine being the first-line treatment to manage symptoms and prevent complications. This study aims to increase awareness by evaluating anaphylaxis cases in the emergency department to guide patients and physicians in managing the condition. This retrospective study, conducted at Bezmialem Vakıf University Hospital between 2018 and 2022, evaluated adult anaphylaxis patients using the National Institute of Allergy and Infectious Disease 2021 guideline. Patients' demographic and clinical data were analyzed, with ethics committee approval obtained for the study. Of the 77 patients studied, 9 required IV epinephrine treatment. More than half of the patients were started on epinephrine within 1 hour of exposure to the allergen. And the only person who was arrested had more than 1 hour to reach epinephrine treatment. When diagnosing anaphylaxis, we should not hesitate to start adrenaline and switch to IV infusion, and we should get the patient to the necessary care and treatment as soon as possible

Keywords: Anaphylaxis, Emergency, Epinephrine

Introduction

Anaphylaxis is a potentially life-threatening, multisystem allergic reaction that can cause airway, respiratory, or circulatory collapse. (1) It requires rapid evaluation, diagnosis, and treatment. Anaphylaxis is a common problem in the United States, with a reported general population incidence of 21 per 100,000 person-year. (2)

Epinephrine is the main treatment for anaphylaxis and is accepted as the first-line treatment in major guidelines. (1) Numerous studies have shown that timely administration of intramuscular epinephrine is the preferred treatment for controlling anaphylaxis symptoms, preventing biphasic reactions, maintaining blood pressure, and preventing deaths. (3,4) In this study, we aimed to increase awareness of anaphylaxis by evaluating anaphylaxis patients who presented to the emergency department and to help patients and physicians approach anaphylaxis.

Method

This study was conducted retrospectively in accordance with the Helsinki criteria. Our study was completed in the emergency department of Bezmialem Vakıf University Medical Faculty Hospital by examining patients aged 18 and over between 01.01.2018 and 31.12.2022.Patients under 18 years of age, those without a diagnosis of anaphylaxis, those with incomplete data, and those who had suffered trauma were excluded from the study.

Anaphylaxis was diagnosed according to the National Institute of Allergy and Infectious Disease 2021 guideline. Epinephrine was started intramuscularly in patients, and infusion epinephrine treatment was started in patients who did not respond to IM adrenaline. Demographic information, presentation, additional diseases, state of consciousness, and physical examination of the patients were recorded in the forms. Coronary artery disease, chronic renal failure, hypertension, and diabetes mellitus were defined as comorbidities. The approval of the Ethics Com-

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• **Received:** 13.12.2024 • **Revision:** 27.12.2024 • **Accepted:** 30.04.2025
DOI: 10.55994/ejcc.1600996
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Available online at https://dergipark.org.tr/tr/pub/ejcc

Cite this article as: Azcan S, Ozcan AB, Taslidere B. Evaluation of Anaphylaxis Patients Admitted to the Emergency Department. Eurasian Journal of Critical Care. 2025;7(1): 19-22

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Table 1. Anaphylaxis Criteria (National Institute of Allergy and Infectious Disease 2021)

Acute onset of illness involving skin, mucosal tissue, or both (hives, pruritis, flushing, swollen lips, tongue, uvula [including subjective symptoms of throat pain, itching, tightness]) and at least one of the following: • Respiratory compromise (dyspnea, wheeze, stridor, hoarseness, reduced peak expiratory flow, hypoxemia) • Reduced blood pressure (BP)b or associated symptoms of end-organ dysfunction (syncope, incontinence)
Two or more of the following that occur rapidly after exposure to a likely allergy: • Involvement of the skin-mucosal tissue (described above) • Respiratory compromise (described above) • Reduced BP or associated symptoms (described above) • Persistent gastrointestinal symptoms (crampy abdominal pain, vomiting)
Reduced BP after exposure to known allergen for that patient

mittee of the University (21/01/2020, issue 02/33) was obtained to conduct the study.

Outcomes

Outcomes were retrospectively assessed by reviewing of the hospital medical database. The primary study outcomes: IV adrenaline treatment should be started as soon as possible and any situations that may occur due to anaphylaxis should be intervened as quickly as possible. Secondary outcomes: To increase awareness of anaphylaxis.

Statistical analysis

The data were analyzed in the IBM SPSS Statics 22.0 package program. The mean differences of continuous variables between groups were examined with the T test, and the distribution of categorical variables between groups was examined with the chi-square test. As descriptive statistics, mean standard deviation r (relationship coefficient), frequency and percentage values were given.

Sample size determination

It was calculated online using the http://www.raosoft.com/samplesize.html program. The minimum number of patients was found to be 83, with a 97% confidence interval, a 5% margin of error, a standard deviation of 0.5 and a Z score of 1.96.

Results

A total of 77 patients were evaluated. Infusion was started in 9 of 77 patients (11.6%). Of the 68 patients who received IM adrenaline, 37 (54.4%) were female and 31 (45.6%) were male.

Of the patients who received infusion, 6 (66.7%) were female and 3 (33.3%) were male (p=723). The mean age was 49.28 ± 1.56 in the IM group and 55 ± 5.34 in the infusion group (p=0.09).

The most frequent visit time was between 18:00-24:00 with 29 people. The most frequent visit time of those in the IM group was between 18:00-24:00 with 26 people (38.2%). In the infusion group, 5 people (55.6%) applied between 12:00-18:00. (p= 0.340).

In our study, 38 people (49.4%) had anaphylaxis due to unknown causes, 12 people (15.6%) due to medication, 7 due to insect bites, and 9 due to food. Of the 9 patients who required IV infusion, 3 had anaphylaxis due to unknown causes, 4 due to medication, and 2 due to insect bites.

In our study, the number of patients applying with dermatological symptoms was found to be 60 (p=1.000). Of these, 53 (77.9%) were in the patient group that received only IM treatment, while 7 (77.8%) required IV infusion.

A total of 62 (80.5%) patients applied with respiratory symptoms. (p=0.680) 5 of these patients (79.4%) were in the group that received only IM treatment, and 8 (88.9%) were in the group that required IV treatment.Of the 51 individuals (66.2%) who presented with cardiovascular symptoms (p=0.259), 43 (63.2%) were in the group that received only IM treatment, while 8 (88.9%) were in the group that received IV treatment. GIS symptoms

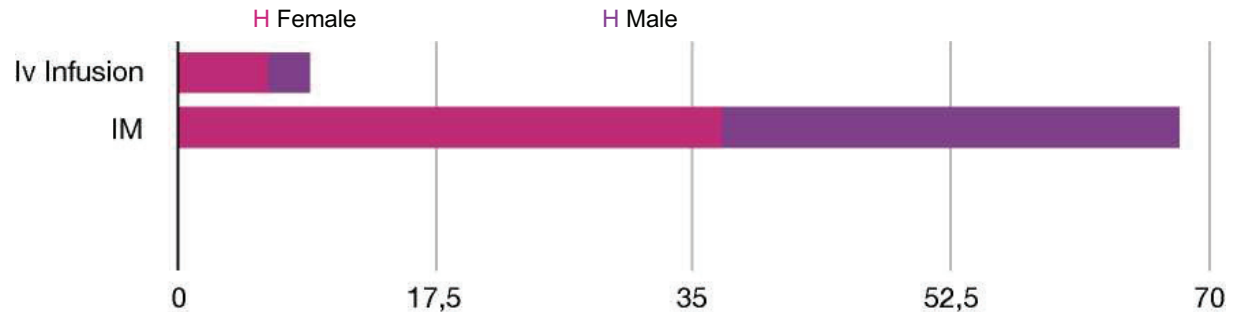

Figure 1. IV/IM Female/Male Ratio

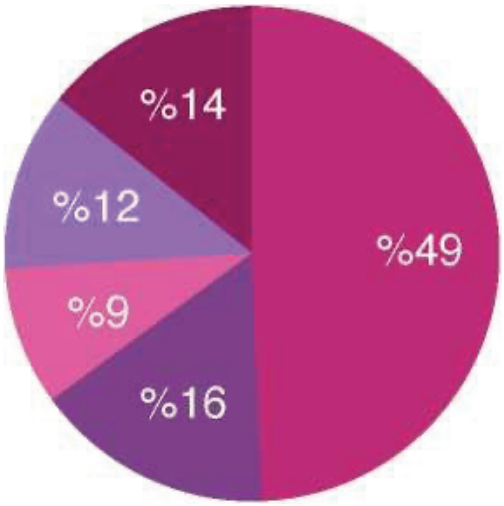

Figure 2. Causes of anaphylaxis

were present in 17 (22.1%) individuals (p=1.000). 15 of them received only IM epinephrine, while 2 required IV infusion.

A total of 10 patients presented with neurological symptoms (p< 0.001), 6 (66.7%) of whom required IV treatment, while 4 (5.9%) were from the group receiving only IM epinephrine. The rate of needing IV infusion was found to be dramatically higher in the group with neurological symptoms. For this reason, we should not forget that patients with neurological findings may have a severe course and require IV treatment at a higher rate, and we should take our precautions accordingly.

When we look at the comorbidity rates, 25 patients (36.8%) who received only IM treatment and 8 patients (88.9%) who required IV treatment had comorbid diseases. A total of 33 people (42.9%) had comorbidities (p=0.004). Coronary artery disease, chronic renal failure, hypertension, diabetes mellitus were defined as comorbidities.

In total, 57 patients (52 patients (76.5%) in the IM group and 5 patients (55.6%) in the infusion group received epinephrine treatment within 1 hour of symptom onset (p=0.01). Biphasic reactions were observed in 6 patients (p=1.00), all of whom were in the IM group. No biphasic reactions were observed in patients receiving IV infusion (p=0.004).

The number of patients requiring intensive care was 8 (10.4%), 6 of them (66.7%) were in the infusion group. (P<0.01). There was one person who died and that person was in the group requiring IV infusion. The total mortality rate was found to be 1.3%.

Discussion

In the emergency department, the diagnosis of anaphylaxis is often a critical decision and treatment should be started immediately. Timely intervention is life-saving. Initiating an infusion is the recommended approach after an inadequate response to the first two doses of intramuscular injection. Administering adrenaline in the form of an infusion provides a more stable hemodynamic response because it is continuous and titratable. The rate of patients with neurological complaints requiring IV infusion was found to be significantly higher. Initiating adrenaline infusion therapy in patients presenting with neurological symptoms may be a more effective approach. It is important for the follow-up of the disease that no biphasic reaction is observed in any patient receiving the infusion.

Rates of biphasic reactions and potential associated risk factors are not well understood. In a study of 430 patients 31 (7.2%) had biphasic reactions and 22 (5.1%) had clinically significant biphasic reactions.The median time from anaphylaxis onset to first epinephrine dose was longer for patients with biphasic (78 minutes) than uniphasic courses (45 minutes) (P = 0.005).

Biphasic reactions have been found to be related to the time from the first epinephrine administration. (5) In our study, there was only one person who died, and this patient's epinephrine treatment was initiated within a period longer than 1 hour. Among a cohort of patients in the United Kingdom with fatal anaphylactic reactions, the median time to respiratory or cardiac arrest was 30 minutes for foods, 15 minutes for venom, and 5 minutes for iatrogenic reactions. (6) This shows how important it is to start treatment early, to recognize patients with anaphylaxis as soon as possible, and how vital it is for individuals with a history of anaphylaxis to have personal epinephrine.

Of the 9 individuals who required IV treatment, 8 were individuals with comorbidities. Comorbidity can be seen as an important risk factor for the development of anaphylaxis. As a result of the data, it is thought that comorbidity increases the frequency of anaphylaxis.

The fact that 19.5% of patients who applied to our service were in poor general condition and 1.3% of patients

Table 2. IM/IV Symptoms

	Dermatological	Respiratory	Cardiovascular	Neurological	GIS
IM	53	36	43	4	15
IV	7	8	8	6	2

died showed that anaphylaxis is a reaction that should be given great importance. The fact that respiratory findings were more than dermatological findings drew attention. The fact that drug-related applications were more than food-related applications also showed that drug-related anaphylaxis is more common in adults.

Conclusion

Of the 77 patients studied, 9 required IV epinephrine treatment. More than half of the patients were started on epinephrine within 1 hour of exposure to the allergen. And the only person who was arrested had more than 1 hour to reach epinephrine treatment. When diagnosing anaphylaxis, we should not hesitate to start adrenaline and switch to IV infusion, and we should get the patient to the necessary care and treatment as soon as possible.

Limitation

One of the most important limitations of our study is that patient data were obtained retrospectively. Another important limitation is that data belonging to only one center are included in the study.

Declarations of Funding and Competing Interest
There are no conflicts of interest. The authors received no financial support for the research

References

1. Kelly McHugh, Zachary Repanshek, Anaphylaxis: Emergency Department Treatment Immunology and Allergy Clinics of North America Volume 43, Issue 3, 2023,Pages 453-466,ISSN 0889-8561,ISBN 9780443129759,https://doi.org/10.1016/j.iac.2022.10.002.
2. Yocum MW, Butterfield JH, Klein JS, Volcheck GW, Schroeder DR, Silverstein MD. Epidemiology of anaphylaxis in Olmsted County: A population-based study. J Allergy Clin Immunol. 1999 Aug;104(2 Pt 1):452-6. doi: 10.1016/s0091-6749(99)70392-1. PMID: 10452770.
3. Lieberman P. Biphasic anaphylactic reactions. Ann Allergy Asthma Immunol. 2005 Sep;95(3):217-26; quiz 226, 258. doi: 10.1016/S1081-1206(10)61217-3. PMID: 16200811.
4. Bock SA, Munoz-Furlong A, Sampson HA. Further fatalities caused by anaphylactic reactions to food, 2001-2006. J Allergy Clin Immunol. 2007 Apr;119(4):1016-8. doi: 10.1016/j.jaci.2006.12.622. Epub 2007 Feb 15. PMID: 17306354.
5. Liu X, Lee S, Lohse CM, Hardy CT, Campbell RL. Biphasic Reactions in Emergency Department Anaphylaxis Patients: A Prospective Cohort Study. J Allergy Clin Immunol Pract. 2020 Apr;8(4):1230-1238. doi: 10.1016/j.jaip.2019.10.027. Epub 2019 Nov 6. PMID: 31704438.
6. Pumphrey RS. Lessons for management of anaphylaxis from a study of fatal reactions. Clin Exp Allergy. 2000 Aug;30(8):1144-50.doi:10.1046/j.1365-2222.2000.00864.x. PMID: 10931122.

Research Article

Eurasian Journal of Critical Care

Reevaluation of Emergency Interventions From the Perspective of Health Law

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Abstract

The provision of healthcare services, like all procedures, may lead to legal consequences in cases of negligence, even in emergency situations, resulting in criminal proceedings. Emergency medical practices, due to their involvement in life-threatening situations, require quicker decision-making compared to elective procedures, emphasizing patient benefit and well-being. Despite the urgency of emergencies, a thorough examination, if possible, along with necessary tests and consultations, is essential before making a decision. It is crucial to decide in appropriate indications and provide adequate information to the patient. If a patient is unconscious and has a relative, the family member should be informed. If this is not possible, the authorities should be notified. In situations where a response from legal authorities cannot be awaited due to the urgency, procedures can be carried out without waiting for a response, with appropriate indications, and documented with record-keeping, especially if there is a life-threatening condition. Subsequently, when the patient regains consciousness, the procedures and reasons should be communicated to them. The aim of this study is to emphasize the importance of medical documentation, with clearly stated justifications and recorded indications in emergencies. In appropriate conditions, obtaining patient consent and providing information becomes crucial to mitigate potential legal consequences.

Keywords: Emergency medicine, health law, emergency health services, emergency medical ıntervention.

Introduction

Emergency Medicine, as defined by the International Federation for Emergency Medicine, is a medical specialty that encompasses the knowledge and skills required for the prevention, diagnosis, treatment, and management of acute and urgent conditions involving various physical and mental disorders in patients of all age groups (1). Additionally, the understanding and development of pre-hospital and in-hospital emergency medicine systems are crucial in the field of Emergency Medicine. This includes managing surgical and medical conditions that are life-threatening, limb-threatening, or carry a significant risk of death (2). This concept was first defined in the United States in the 1960s, though its practices date back to the ancient roots of medicine. It is known that emergency interventions, such as treatments for brain injuries called trepanation, were performed in ancient Egypt; these treatments aimed to reduce intracranial pressure (3).

The modern formation of emergency departments began during World War II with the emergence of small emergency care units known as accident rooms (3). In the United States, the American College of Emergency Physicians established Emergency Medicine as a specialty in 1968, and the first Emergency Medicine residency program was initiated at the University of Cincinnati in 1970 (4). In Turkey, the development of emergency medicine made significant progress in 1990 when American emergency medicine specialist Dr. John Fowler started working at the invitation of İzmir Dokuz Eylül University (1). These advancements raised the standards of emergency medical practices in our country, thereby enhancing the quality of healthcare services. By 1993, the establishment of a department under the name of Primary and Emergency Care Specialty was announced in the Official Gazette No. 21567 (5). Thus, emergency health services began to be provided at the specialist level.

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• **Received:** 02.02.2025 • **Revision:** 12.03.2025 • **Accepted:** 25.04.2025
DOI: 10.55994/ejcc.1631833
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Cite this article as: Baser HY. Reevaluation of emergency ınterventions from the perspective of health law. Eurasian Journal of Critical Care. 2025;7(1): 23-29

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Emergency Services and Medical Intervention

Emergency departments, which serve individuals of varying ages and income levels, are healthcare units that provide free and continuous 24-hour service (6). According to the Emergency Health Services Regulation, the emergency departments of public and private hospitals are required to accept every patient who presents themselves as an emergency case and to provide the necessary medical intervention. In this context, every patient presentation is considered an emergency, and the services provided continue until proven otherwise.

This situation can lead to patient-physician relationships that go beyond routine operations in emergency departments. During the provision of healthcare services, it may not be possible to obtain a sufficient medical history for diagnosis, or treatment may be initiated without performing necessary laboratory tests. Additionally, the presence of cases that are often of a forensic nature can complicate the physician's duties and responsibilities compared to other situations (7).

The increased expectation for healthcare standards in both diagnosis and treatment leads to the demand for timely diagnosis, necessary laboratory and radiological examinations, and the selection of appropriate treatment or interventional methods for patients presenting to the emergency department (8). This situation necessitates the establishment of standardized approaches in emergency medical service delivery and the implementation of necessary medical interventions specific to each case. Therefore, it ensures the use of all available resources in the emergency department and the formulation of the most suitable treatment plan for the patient's condition.

Medical intervention is defined as activities carried out by individuals authorized to practice medicine for the purpose of diagnosing, treating, or preventing diseases (9). According to this definition, medical intervention encompasses all types of invasive or non-invasive actions performed on the human body for the prevention, diagnosis, treatment, or reduction of effects of physical or psychological disorders, as well as non-disease conditions (10). Invasive interventions include physical procedures such as surgical operations, while non-invasive interventions encompass less invasive methods such as medication, physical therapy, or diet. Therefore, even in emergency interventions, the human body is a fundamental element of personal rights and is considered a "personal, inviolable, non-transferable, and inalienable" constitutional right. Medical intervention is essentially an action performed on the human body and, as such, can be seen as an act that might constitute an offense of bodily harm (11). However, medical interventions are regulated as exceptions to this general prohibition. Article 17/2 of the Constitution specifies that medical interventions are clearly outside the scope of prohibition with the phrase "except for medical necessities and situations specified by law." The same principle is detailed further in Article 5 of the Patient Rights Regulation (12).

Suitability of Medical Intervention in Emergency Services

Any intervention performed on a human being related to medical practices can be considered under the concept of medical intervention (11). This definition covers a wide range of activities, from life-saving emergency interventions to aesthetic or cosmetic procedures. The patient-physician relationship is typically examined within the concept of medical intervention, and within this context, the legal framework of medical intervention is subject to specific conditions, even in emergencies.

Among these conditions are informing the patient and obtaining their consent, having the authority to intervene, ensuring the intervention is for legal purposes, and adhering to medical standards (13). In certain situations, actions that might be considered illegal can be made lawful under specific conditions by the physician (14).

The first condition for legality is that the patient has been adequately informed and has given their consent voluntarily, which is known as informed consent (14). When the physician informs the patient about all the details of the treatment and possible outcomes, and obtains the patient's consent, the intervention on bodily integrity is legally appropriate. Additionally, the consent must comply with the law, ethics, and personal rights, and must specifically include the potential results and complications of the intervention before it takes place (15,16). Even when a medical intervention is technically correct, it may not be legally appropriate if these conditions are not met.

The patient's informed consent is as crucial as their understanding. Topics that need to be explained to the patient include the possible causes and progression of the illness, who will perform the medical intervention, where, how, and with what methods, the estimated duration of the intervention, alternative diagnostic and treatment options along with their potential benefits and risks, possible complications, risks and benefits of refusing the intervention, important characteristics of the medications to be used, critical recommendations for healthy living, and how to obtain emergency medical assistance for the same issue.

The second condition for the legality of a medical intervention is that it must be performed by authorized individuals. This authority belongs to persons known as physicians, and in Turkey, it is defined by the provisions of the 1219 Law on the Practice of Medicine and Medical Sciences and the 6023 Law on the Turkish Medical Association. Within this framework, the person performing the intervention must have a medical degree, possess expertise in the relevant field, and fulfill specific formalities (13).

The third condition for the legality of an intervention is that it must be aimed at legally prescribed objectives. Medical interventions are generally performed for the purpose of improving the patient's condition or protecting their health. Interventions carried out for unlawful purposes are not considered legal, even if other conditions are met (13). Therefore, it is crucial that there is a legitimate indication for performing the intervention. The physician can only intervene based on these indications (11).

The fourth and final condition for the legality of an intervention is that it must conform to medical principles and standards. The physician is required to apply treatments that are consistently used in similar situations and are considered standard medical practice (17). In this context, it is expected that the physician adheres to the current standards of medical science and observes medical ethical principles during the intervention. It is important to note that the physician is not obligated to use all new methods.

In emergency interventions, while the general conditions specified are required, there are also some regulations and exceptions:

- The **Convention on Human Rights and Biomedicine** stipulates that in emergencies, "medically necessary" interventions may be performed (18).
- Principle 4 of the **Lisbon Declaration** states that interventions may be carried out in cases where "emergency medical intervention is required" and the patient is unconscious (19).
- According to the **Medical Deontology Regulations**, in emergencies, the physician is obliged to perform the initial intervention regardless of their role and specialty (20).

However, these regulations emphasize that interventions exceeding the physician's knowledge and skills are restricted to emergency situations only (21). In this context, the necessity of emergency situations and the nature of interventions are considered to ensure that medical interventions are carried out within a legal and ethical framework.

In some significant medical interventions, the obligation of providing information can be more critical than the presence or absence of an indication (15). There are exceptions to this; especially in life-threatening patients and certain emergency situations, medical interventions may be carried out without informing the patient (22). Indication is a very important criterion in the health process. The physician decides whether a medical intervention is necessary based on the specifics of the case and, if so, which indication will be used (13). This indication can sometimes be medical, and other times social or psychological (13). From a legal and criminal responsibility perspective, the primary condition sought is the appropriateness of the indication. Legal responsibility typically arises in the form of compensation and may lead to the physician being required to provide material and moral compensation to the patient under general legal rules (13). While indication is a fundamental condition for the legality of a medical intervention, obtaining informed consent and other conditions, which mean obtaining the patient's informed consent, are also additional requirements 23). This is because informed consent obtained without a proper indication will be incorrect, and similarly, incorrect informed consent obtained with a correct indication can also lead to legal issues. In this context, incorrect determination of the indication is one of the most critical errors that can occur, particularly in emergency medicine practices. This situation can lead to interventions that could harm the patient's health and may have serious ethical and legal consequences.

In emergency medicine practice, there are two models: the Anglo-American Model and the Franco-German Model. The Anglo-American Model, preferred by countries with high levels of development, aims to transfer patients to the hospital as quickly as possible. This model is implemented in Turkey as well as in countries like the USA, Canada, New Zealand, and Australia (24). In contrast, the Franco-German Model, commonly practiced in European countries such as Germany, France, Malta, and Austria, involves emergency medicine specialists stabilizing patients at their location and providing active intervention (24). In an emergency medical practice following the Anglo-American Model, patients are brought to hospital emergency departments either by their own choice or by emergency intervention teams. The openness of emergency departments to outpatient visits results in non-emergency patients also seeking care, which increases the workload of emergency departments. This necessitates effective triage in emergency healthcare services. There is a crucial phase starting with the triage process in emergency interventions. The medical indication is determined based on the urgency and necessity of the patient's condition. During this process, the physician works in coordination with health personnel such as Emergency Medical Technicians (EMTs), nurses,

or health officers. However, it is necessary to dispel the misconception that medical interventions can only be provided by physicians. According to the relevant provisions of Law No. 1219, emergency medical technicians and paramedics can also intervene in patients as part of emergency medical assistance and care. These personnel can perform their duties within the framework of regulations set by the Ministry of Health, having completed specific training. Additionally, certain authorized individuals, such as personnel from the Turkish Armed Forces and the Special Operations Department of the General Directorate of Security, can perform emergency medical interventions in the absence of health personnel. These arrangements are made to meet the need for rapid intervention in emergencies. However, even in such cases, it is essential that interventions are carried out based on emergency medical indications and are appropriate to the patient's condition. For the legality of medical interventions, not only is the correct determination of indication important, but so are other legal and ethical requirements such as informing the patient and obtaining consent. In emergency situations, if no other options are available, even individuals without medical training can perform medical interventions. What is crucial here is the presence of an indication for the emergency intervention. The more urgent and necessary the indication, the more lenient the obligation to inform may be (25). This is particularly significant for unconscious patients, those without a guardian, legally incapacitated individuals, or very young children who cannot express themselves. The Biomedicine Convention provides guidance for physicians in this regard (18). To ensure legal compliance in medical interventions, certain conditions must be met: the intervention must be indicated, the patient must be informed, and consent must be obtained. According to Articles 18 and 22 of the Patient Rights Regulation, medical procedures cannot be performed without the patient's consent, except in exceptional cases. The patient should be informed and their consent obtained, and this process should generally be carried out with a reasonable time period provided to the patient, applicable to non-emergency cases. In emergency healthcare, obtaining consent for medical intervention can pose legal issues for physicians, especially if the patient is unconscious, lacks family, or requires rapid intervention. If the patient is not in a position to consent (for example, due to age, legal incapacity, or loss of consciousness), consent can be obtained from a relative. However, if there is no relative or guardian available to consent and emergency intervention is needed, permission is not required; medical interventions necessary for life are performed. If there are relatives or a guardian but they refuse consent, emergency intervention can be carried out with a court decision according to the relevant articles (346 and 487) of the Turkish Civil Code. In such cases, if the person's life is at risk and immediate intervention is necessary, the physician can proceed with the required emergency intervention (7).

When the patient regains consciousness, the procedures performed and their justifications should be communicated in detail. This notification is crucial for the patient to understand their treatment process and to be informed about their care. Below is a suggestion for how to communicate the reasons for the procedures performed when the patient regains consciousness:

- **Diagnosis Explanation:** The patient should be informed about what their condition is and how it was diagnosed. For example, information should be provided about the disease the patient has, its symptoms, and the diagnostic methods used.
- **Treatment Options:** Explanations should be given regarding the treatment methods applied, their purpose, and how they work. If alternative treatment options are available, their advantages and disadvantages should also be presented to the patient.
- **Need for Intervention:** Every medical intervention performed should be explained in detail regarding why and how it was necessary. For interventions performed urgently, the reasons for immediate action and the expected benefits should be described.
- **Probability of Adverse Outcomes:** The potential risks and possible side effects of each treatment or intervention should be communicated to the patient. This way, the patient can make an informed decision about whether to accept or refuse the treatment.
- **Questions and Answers:** The patient should have the opportunity to ask questions about the procedures or treatment options, and these questions should be answered satisfactorily.

The process of informing the patient when they regain consciousness allows for active participation in their treatment process and increases their trust in the treatment. Additionally, it contributes to the patient's decision-making process in their care and strengthens the patient-physician communication.Formun ÜstüFormun Altı

Given the legal importance of all these situations, it should be emphasized that official records must be made in the hospital information management system and emergency service observation forms. According to the Law on the Practice of Medicine and the Art of Medicine, physicians are required to keep medical records and protocol books for judicial cases, ensure that records are taken in a timely manner, and ensure that these records are not altered or destroyed (26). The necessity of collecting and preserving records related to patients, injured individuals,

emergency patients, and judicial cases is explicitly stated in the Regulations on Medical Record and Archive Services of Inpatient Care Institutions. According to this regulation, documents and records related to judicial cases must be preserved for a period of 20 years (27).

Emergency Medical Intervention: Complications and Malpractice

Even in emergency medical interventions, if there is negligence on the part of the physician at any stage of the physician-patient relationship (such as diagnosis or treatment), this can lead to legal responsibility. Even for emergency medicine physicians, negligence and causation are significant in issues arising during their professional activities. Generally, the following elements must be present to establish negligence: 1- An action or inaction, 2- Material and immaterial damage, 3- The result being foreseeable and preventable, 4- Causation between the action and the damage, 5- The result being unintended (28).

Negligence can occur at any stage of the diagnosis and treatment processes. In the diagnosis phase, negligence can manifest in the following ways: 1- Failure to conduct necessary tests or conducting them inadequately. 2- Lack of necessary consultations. The physician should seek consultations from other specialists when the patient's condition and suspected disease necessitate it. 3- Misinterpretation or inadequate evaluation of data despite performing necessary tests and consultations (28).

In the treatment phase, negligence can appear as follows: 1- Errors in choosing tools and methods: The physician should select the more reliable and less harmful method, but may resort to risky or dangerous methods in cases with difficult or life-threatening risks. 2- Errors in applying medical principles: The physician should apply generally accepted medical principles correctly (28).

The physician should act by being aware of, adopting, and adhering to the accepted knowledge and practices related to their profession or specialty. The physician must keep up with the level of development in national medicine and continuously update themselves in this field. Otherwise, professional errors may be considered as inexperience (28,29).

Emergency Department Patient Treatment/Doctor Refusal and Doctor-Patient Refusal

Up to this point, the discussion has predominantly focused on health law from the perspective of patients seeking medical care. But what happens if, even in an emergency, the trust between the patient and the physician is broken, and the physician refuses to treat the patient? How is this situation handled?

Article 18 of the Medical Deontology Regulation provides guidance for this scenario. According to this article, in mandatory and emergency situations, the physician is explicitly required to provide medical assistance. This obligation arises from the physician's professional responsibilities and is independent of whether the physician is a public or private practitioner. In an emergency, if a physician knowingly fails to assist a patient, fully aware that this could result in harm or death, such inaction may be considered intentional. In such cases, Articles 448 (manslaughter) or 456 (bodily harm) of the Turkish Penal Code may be applied. However, if there is no intent to cause harm or death, but the failure to assist is due to negligence or carelessness, this may constitute a negligent offense. Negligent offenses are defined as crimes resulting from a violation of attention and care obligations and are assessed differently in criminal law (28).

Therefore, a physician may refuse to treat a patient for professional or personal reasons, but this is only applicable outside of emergency, official, or humanitarian duties. This rule also applies to situations where an emergency consultation is required. For example, even if the physician is an official or in an emergency situation, if they intentionally refuse to provide medical intervention despite the patient being at risk of death, they could be penalized under Article 83 of the Turkish Penal Code. Even if the physician does not intentionally neglect, failure to assist someone in danger could result in responsibility under Article 98 of the Turkish Penal Code (25) Additionally, a consulting physician's failure to respond to an emergency call may also constitute a dereliction of duty.

According to the Emergency Health Services Regulation, the procedures for transferring patients from the emergency department to another facility are organized as follows: Initially, an emergency medical assessment and necessary intervention are provided for every patient. If advanced medical care and treatment are needed and the current facility lacks sufficient resources, the patient is transferred to another suitable hospital. During this process, all medical care provided is documented in writing by the responsible unit and sent along with the patient to the receiving hospital. However, the transfer is carried out if stabilization of the patient is achieved, or if it is determined that the current facility lacks adequate care and treatment resources in life-threatening situations.

What should be done if a patient wishes to leave the emergency department or change hospitals/doctors?

According to Article 8 of the Patient Rights Regulation (Right to Choose and Change Health Institutions), patients have the right to choose or change healthcare institutions in accordance with the procedures and conditions set forth by the legislation. Patients can change health institutions in accordance with the referral system defined by legislation. However, the physician must inform the patient about the potential risks and consequences of changing institutions or refusing treatment, and assess whether it is medically appropriate to change the health institution. If a patient wants to exercise their right to refuse treatment according to the Patient Rights Regulation, their refusal of emergency medical intervention should be recorded and signed. If the patient refuses to sign, this should be documented in a report.

Conclusion

Emergency medical practice involves non-elective and life-critical situations that require rapid and practical decision-making. However, it is crucial that these decisions are made in the best interest and benefit of the patient. Ideally, patients presenting in emergencies should undergo detailed examinations, necessary laboratory tests, and consultations. Yet, the nature of emergencies often makes this impractical.

In this context, it is essential to prioritize the training of emergency department physicians and the implementation of pre-planned diagnostic and treatment protocols to reduce the risk of professional errors. Additionally, meticulous recording of medical information and documents, even when emergency interventions are immediately performed, can serve as vital evidence in potential future legal cases.

Implementing these principles should be viewed as significant steps toward enhancing patient safety and ensuring the legal protection of physicians.

Author Contributions: The literature review, writing, editing, and revision of the manuscript were conducted by Hülya YILMAZ BAŞER.

Conflict of Interest: The authors declared that there is no conflict of interest.

Funding: None

Acknowledgments: None

References

1. Acilcinet. 2024. Acil Tıp Nedir? (cited 2024 Dec 20) Available from: http://www.acilci.net/acil-tip-nedir/
2. Yilmaz Baser H, Emet M, Serinken M. Properties of Turkey-related Publications in International Emergency Medical Journals. Eurasian Journal of Emergency Medicine. 2016;15(2):86-89.
3. Kaba H, Elçioğlu Ö. Acil Sağlık Hizmetlerinin Tarihsel Gelişimi Sürecinde İlk ve Acil Yardım Teknikerliği ve Acil Tıp Teknisyenliği Mesleklerinin Ortaya Çıkışı ve Gelişimi. Turkiye Klinikleri Journal of Medical Ethics-Law and History. 2013;21(3):128-129.
4. Bresnahan KA, Fowler J. Emergency medical care in Turkey: current status and future directions. Ann Emerg Med. 1995;26:357-360.
5. T.C. Resmi Gazete. Official Gazette of the Republic of Türkiye, dated 30 April 1993 and numbered 21567. (cited 2024 July 21) Available from:http://www.resmigazete.gov.tr
6. Oktay C, Cete Y, Eray O, Pekdemir M, Gunerli A. Appropriateness of emergency department visits in a Turkish university hospital. Croatian Medical Journal. 2003;44(5):585-591.
7. Tugcu H. Acil Olgularda Hekim Sorumluluğu. Klinik Gelişim Dergisi. 2009;22(13):85-88.
8. Türkan H, Tuğcu H. 2000-2004 yılları arasında yüksek sağlık şurasında değerlendirilen acil servislerle ilgili tıbbi uygulama hataları. Gülhane Tıp Dergisi. 2004;46(3):226-231.
9. Ayan M. Tıbbi Müdahalelerden Doğan Hukuki Sorumluluk. 1st ed, Ankara; Kazancı yayıncılık; 1991.
10. Ozanoğlu H S. Hekimlerin Hastalarını Aydınlatma Yükümlülüğü. Ankara Üniversitesi Hukuk Fakültesi Dergisi. 2003;52(3):55-77.
11. Hakeri H. Tıp Hukuku, 17th ed. Ankara; Seçkin Yayıncılık, 2019.
12. Hasta Hakları Yönetmeliği. T.C. Cumhurbaşkanlığı Mevzuat Bilgi Sistemi (Accessed 2024 July 21) Available from:https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=4847&MevzuatTur=7&MevzuatTertip=5.
13. Koru O. Tıbbi Müdahalenin Hukuka Uygunluğu: Endikasyon Şartı. *İnönü Üniversitesi Hukuk Fakültesi Dergisi*. 2021;12(2):491-500.
14. Güney Tunalı I. Hekimin Tıbbi Müdahalede Bulunma Yükümlülüğünün Sınırları. 1st ed, Ankara; Seçkin Yayıncılık; 2020.
15. Tandoğan H. Türk Mes'uliyet Hukuku. 1st ed. İstanbul; Vedat Kitapçılık; 2010.
16. Eren F. Borçlar Hukuku Genel Hükümleri. 22nd ed, Ankara; Yetkin Yayınları; 2017.
17. Gökcan HT. Tıbbi Müdahaleden Doğan Hukuki ve Cezai Sorumluluk. 3rd ed. Ankara; Seçkin Yayıncılık; 2017.
18. Hekimlerle Hukuksal Dayanışma Derneği. Biyoloji ve Tıbbın Uygulanması Bakımından İnsan Hakları ve İnsan Haysiyetinin Korunması Sözleşmesi: İnsan Hakları ve Biyotıp Sözleşmesi m.7-8. (Accessed 2024 July 21) Available from:https://hhdd.org.tr/wp-content/uploads/2022/01/Biyotip-Sozlesmesi.pdf
19. İstanbul İl Sağlık Müdürlüğü. 2024. Lizbon Bildirgesi, 1981 tarihli, İlke 4/b. (Accessed 2024 July 21). Available from:https://www.istanbulsaglik.gov.tr/w/hashak/belge/mevzuat/lizbon_bildirgesi1981.pdf
20. Mezuat.gov.tr. 2024. Tıbbi Deontoloji Nizamnamesi, 1960, m.3. (Accessed 2024 July 21) Available from:https://www.mevzuat.gov.tr/mevzuatmetin/2.3.412578.pdf.

21. Türk Tabipleri Birliği (TTB). 2024. Hekimlik Meslek Etiği Kuralları m.18. (Accessed 2024 July 21) Available from:https://www.ttb.org.tr/kutuphane/h_etikkural.pdf

22. Mehmet D. Hekimin Sözleşmeden Doğan Sorumluluğu. Ankara Üniversitesi Hukuk Fakültesi Dergisi. 2008;57(3):225-252.

23. Törenli Çakıroğlu M. Acil Tıbbi Müdahalelerde Aydınlatılmış Onam. Uluslararası Sağlık Hukuku Kongresi, 1 st ed. İstanbul; Legal Yayıncılık; 2018.

24. Dağlı R, Karabulut A, Karabeyoğlu M. Ambulans ve Acil Bakım Teknikerleri (Paramedik) için Temel Konular ve Tedavi Yaklaşımları. 1st ed, İstanbul; Ema Tıp Kitabevi; 2018.

25. Hakeri H. Acil sağlık hizmetlerinde hukuki sorunlar. (Accessed 2024 April 30) Available from:https://sdplatform.com/acil-saglik-hizmetlerinde-hukuki-sorunlar-2/

26. T.C. Sağlık Bakanlığı. Tababet ve Şuabbatı San'atlarının Tarzı İcrasına Dair Kanun, m:72-73. (Accessed 2024 July 21) Available from:https://www.saglik.gov.tr/TR,10385/sayisi1219--rg-tarihi04041928--rg-sayisi863-tababet-ve-suabati-sanatlarinin-tarzi-icrasina-dair-kanun.html

27. T.C. Sağlık Bakanlığı. 2024b. T.C. Sağlık Bakanlığı Yataklı Tedavi Kurumları Tıbbi Kayıt ve Arşiv Hizmetleri Yönergesi, 06/11/2001 Tarih ve 10588 sayılı Olur. Madde:15. (Accessed 2024 July 21) Available from:https://www.saglik.gov.tr/TR-11242/yatakli-tedavi-kurumlari-tibbi-kayit-ve-arsiv-hizmetleri-yonergesinde-degisiklik-yapilmasina-dair-yonergesi.html

28. Bengidal SM, Keskinkılıç B, Kuvan L, Odabaşı O, Begidal S. Acil Servislerde Hekimin Adli Sorumluluğu. Sürekli Tıp Eğitimi Dergisi (Sted). 2001;10(8):301-302.

29. Koç S. Yasal Düzenlemeler Çerçevesinde Hekim Sorumluluğu. Türkderm. 2007;41:33-38.

Case Report

Eurasian Journal of Critical Care

Axillary Hidradenitis Suppurativa Reconstruction with Thoracodorsal Artery Perforator Flap: A Case Report

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Abstract

Background: Hidradenitis suppurativa (HS) is a chronic condition affecting the pilosebaceous unit, characterized by nodules, abscesses, sinus tracts, and scarring, most commonly in axillary, inguinal, and inframammary regions. Medical treatments are first-line management; however, surgical interventions are necessary for resistant cases.

Case: A 52-year-old male presented with bilateral axillary swelling and discharge for four years. Classified as Hurley Stage II, his condition included nodules, sinus tracts, and purulent discharge. Conservative treatments failed to resolve symptoms. Surgical excision of right axillary lesions and reconstruction using a thoracodorsal artery perforator flap was performed. Postoperatively, the flap remained viable with rapid capillary refill and normalized without complications. The patient experienced complete symptom resolution, with no contractures or movement restrictions.

Discussion: HS presents significant diagnostic and therapeutic challenges, particularly in advanced cases. Surgical excision and flap reconstruction provide excellent functional and aesthetic outcomes in localized disease. The thoracodorsal artery perforator flap minimizes contracture risks, ensuring durable reconstruction. This case emphasizes the importance of early diagnosis and surgical intervention in resistant HS cases to prevent complications and improve outcomes. Further research is necessary to assess long-term effectiveness of flap-based methods.

Keywords: Hidradenitis Suppurativa, Thoracodorsal artery perforator flap, axillar reconstruction

Introduction

The term Hidradenitis suppurativa (HS) is derived from three components that aptly describe the disease: “Hydro” refers to sweat, “Aden” denotes gland, and “Suppurativa” means purulent. However, HS is not primarily a disorder of the sweat glands but rather a follicular unit abnormalityng[1,2]. HS affects the follicular portion of the pilosebaceous unit, presenting as a chronic disease that significantly reduces quality of life. It manifests with painful, suppurative lesions, including deep-seated nodules, abscesses, draining sinus tracts, and fibrotic scars. These lesions predominantly occur in regions with higher densities of androgen and sex hormone receptors, such as the axillary and inframammary regions or areas where two skin surfaces frequently rub against each other[3].

Although the exact pathogenesis of HS remains unclear, it is thought that follicular occlusion caused by infundibular keratosis and epithelial hyperplasia is the initiating event in the disease mechanism. Research has identified several factors that contribute to the development and exacerbation of HS. Among these, genetic predisposition is a key factor, with studies indicating that one-third of patients with HS have family members exhibiting similar symptoms. Another significant factor, particularly in women, is hormonal fluctuations. Many women report HS flares during premenstrual periods and remission during pregnancy. Before menopause, HS exacerbations are associated with decreases in progesterone and estrogen levels and increases in androgen levels. The premenstrual period is characterized by a sudden drop in estradiol and progesterone levels, suggesting that hor-

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• **Received:** 04.01.2025 • **Revision:** 12.03.2025 • **Accepted:** 02.04.2025
DOI: 10.55994/ejcc.1613104
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Cite this article as: Yavuz E, Cengiz IZ, Kapukaya R, Çakmak F. Axillary Hidradenitis Suppurativa Reconstruction with Thoracodorsal Artery Perforator Flap: A Case Report. Eurasian Journal of Critical Care. 2025;7(1): 31-34.

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monal changes during the menstrual cycle can influence the onset and severity of HS symptoms[3].

In addition to genetic and hormonal factors, lifestyle elements may also play a role in HS flares. Wearing tight clothing is believed to increase friction, while using tampons instead of sanitary pads may reduce skin friction. Moreover, the use of abrasive objects, such as loofahs, or shaving the affected areas can irritate the skin and trigger disease recurrence. While poor hygiene is not a causative factor for HS, excessive use of soaps, cleansers, or frequent shaving may activate the immune system and exacerbate the condition[4].

This comprehensive understanding of HS highlights the multifactorial nature of its pathogenesis and the importance of considering both biological and lifestyle factors in its management[5]painful, and malodorous abscesses and nodules predominantly in skin folds. HS is associated with substantial morbidity and poor quality of life. There are no curative therapies, and the only approved biologic drug has variable efficacy and requires high doses, making adjunct treatments crucial. An important risk factor for disease severity is obesity. Our primary objective was to conduct a systematic review examining weight loss and dietary interventions, in HS. Our secondary objective was to examine nutritional supplements in HS.A systematic literature search was conducted using Medline, EMBASE, and the Cochrane Database. We included all study types in adults (>18 years.

The prevalence of hidradenitis suppurativa (HS) in the general population is estimated to be around 1%; however, the actual percentage may be higher. Recent studies indicate that the incidence of HS has more than doubled from 1986 (4.0 patients per 100,000) and 2008 (10.0 patients per 100,000) to 2021, where the global prevalence is estimated to range between 0.00033% and 4.1% [6].

Hidradenitis suppurativa most commonly affects the axillary and breast regions, followed by the inguinal and inframammary folds, and least frequently the gluteal area. The typical clinical findings include recurrent and chronic nodules, abscesses, sinus tracts, and scars[7].

The clinical staging of hidradenitis suppurativa is performed using the "Hurley Staging System."

Hurley Staging System[8]:

- **Stage I:** Formation of single or multiple abscesses or scars without sinus tracts.
- **Stage II:** Recurrent abscesses, single or multiple lesions, tunnel formation, and/or scarring.
- **Stage III:** Diffuse involvement or interconnected sinus tracts and abscesses throughout the entire affected area.

Case

A 52-year-old male patient presented with complaints of bilateral axillary swelling and discharge that had persisted for the past four years. The patient reported that his symptoms initially started in the right axilla and later affected the left axilla as well. He also mentioned having recurrent pimples in the sternal region occasionally. The patient's family history was unremarkable. He was a farmer, a smoker, and had a medical history of hypertension and prediabetes, for which he was taking only 5 mg of amlodipine.

Physical examination revealed widespread scarring in the right axilla, along with nodular lesions on a reddened background, some of which were pustular and purulent. The lesions were painful upon palpation. Based on his clinical presentation, the patient was classified as Hurley Stage 2.

Laboratory findings showed hemoglobin of 14.3, CRP of 18, and sedimentation rate of 68. Superficial ultrasonography revealed dermal abscess foci with sinus tracts in some areas. Enlarged lymph nodes with a preserved fatty hilum and well-defined margins were noted in the axilla. A biopsy demonstrated follicular hyperkeratotic areas, subcutaneous fibrosis, and findings consistent with folliculitis. These results confirmed the diagnosis of hidradenitis suppurativa.

Figure 1. Surgical incision and flap planning

Figure 2. Postoperative flap viability

Figure 3. Healed axillary appearance

Informed consent was obtained from the patient, including permission to use her anonymized clinical data for scientific purposes in accordance with ethical principles.

Given the presence of predominantly painful and draining lesions in the right axilla, surgical intervention was recommended. The patient was scheduled for wide surgical excision and reconstruction using a thoracodorsal artery perforator flap (Figure 1).

On the first postoperative day, the thoracodorsal artery perforator flap exhibited rapid capillary refill but remained viable. In the subsequent days, the capillary refill rate normalized without any signs of venous insufficiency (Figure 2).

The postoperative course was uneventful, with no complications observed in the axillary region. There was no dehiscence along the suture line, and the patient experienced no restrictions in arm movements or contractures (Figure 3).

Discussion

Hidradenitis suppurativa (HS) is a disease where early and accurate diagnosis, followed by the rapid implementation of appropriate treatment, plays a crucial role in prognosis. Timely intervention can often prevent serious complications. Conversely, delayed diagnosis may lead to irreversible skin lesions, which can significantly impact the patient's physical and psychological well-being.

The typical clinical presentation of HS includes deep-seated nodules, abscess-like lesions with a tendency to soften, scars, fistulas, and secondary open comedones. According to Hurley's classification, the disease progresses through three clinical stages:

Stage I: Single or multiple lesions (inflammatory and/or non-inflammatory) without sinus tracts or scarring.

Stage II: Recurrent abscesses, single or multiple lesions with fistula and scar formation.

Stage III: Widespread scarring and interconnected sinus tracts or abscesses[8].

Bacteriological cultures of lesion contents may be sterile or may reveal mixed Gram-positive and Gram-negative bacterial flora (commonly Staphylococcus, Streptococcus, Escherichia coli, Proteus sp., and other anaerobic bacteria). However, it is essential to remember that bacterial infection plays a secondary role in the development of HS symptoms[9].

Several treatment modalities are available for HS. The most significant among these are topical and systemic antibiotics, intralesional steroid injections, monoclonal antibody therapies, laser and radiotherapy applications, and surgical interventions[10]with the prevalence of 0.05% to 4.10%, yet many patients receive inadequate treatment. OBJECTIVE: To review the diagnosis, epidemiology, and treatment of HS with an emphasis on advances in the last 5 years. EVIDENCE REVIEW: A literature search was conducted using PubMed, MEDLINE (Medical Subject Headings [MeSH]. In our case, topical and systemic therapies were attempted but proved ineffective. Consequently, surgical excision followed by reconstruction with a flap was performed to address the defect.

Although surgical approaches are often considered a last resort, they are highly effective for localized HS cases

with well-defined boundaries and in non-advanced stages. While graft applications are more frequently performed after excision, the risk of contracture formation makes flap techniques a more aesthetic and functional option.

Further studies evaluating the efficacy of different surgical techniques are warranted, particularly to assess the long-term outcomes of flap methods.

Conclusion

Hidradenitis suppurativa (HS) is a challenging dermatological condition where early diagnosis and timely intervention are critical to preventing serious complications and improving patient outcomes. While medical therapies remain the first line of treatment, surgical interventions are indispensable for localized cases resistant to other modalities. This study highlights the effectiveness of surgical excision and reconstruction with flap techniques, particularly for achieving both functional and aesthetic benefits in well-defined HS cases.

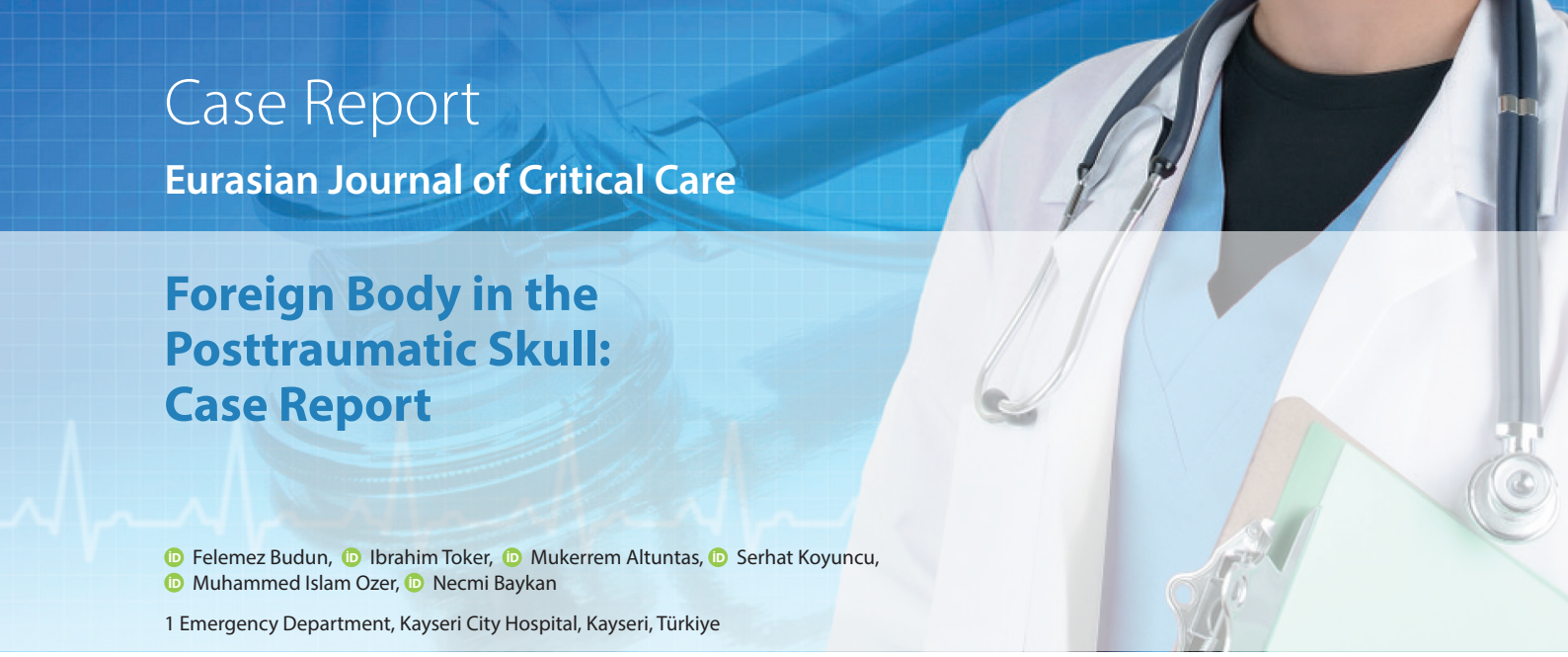
Although surgical approaches are often considered a last resort, our findings underscore their value in enhancing the quality of life for patients when applied appropriately. Flap techniques, in comparison to graft applications, provide superior outcomes by minimizing contracture risks and optimizing reconstructive results. Further research is essential to evaluate the long-term effectiveness and refinement of these surgical methods to develop comprehensive treatment protocols for HS.

References

1. Ingram JR. The epidemiology of hidradenitis suppurativa. *Br J Dermatol*. 2020;183(6):990-998. doi:10.1111/bjd.19435
2. Mohammadi S, Gholami A, Hejrati L, Rohani M, Rafiei-Sefiddashti R, Hejrati A. Hidradenitis suppurativa; classification, remedies, etiology, and comorbidities; a narrative review. *J Fam Med Prim care*. 2021;10(11):4009-4016. doi:10.4103/jfmpc.jfmpc_795_21
3. Riis PT, Ring HC, Themstrup L, Jemec GB. The Role of Androgens and Estrogens in Hidradenitis Suppurativa - A Systematic Review. *Acta Dermatovenerol Croat*. 2016;24(4):239-249.
4. Sabat R, Jemec GBE, Matusiak Ł, Kimball AB, Prens E, Wolk K. Hidradenitis suppurativa. *Nat Rev Dis Prim*. 2020;6(1):18. doi:10.1038/s41572-020-0149-1
5. Sivanand A, Gulliver WP, Josan CK, Alhusayen R, Fleming PJ. Weight Loss and Dietary Interventions for Hidradenitis Suppurativa: A Systematic Review. *J Cutan Med Surg*. 2020;24(1):64-72. doi:10.1177/1203475419874412
6. Nguyen T V, Damiani G, Orenstein LA V, Hamzavi I, Jemec GB. Hidradenitis suppurativa: an update on epidemiology, phenotypes, diagnosis, pathogenesis, comorbidities and quality of life. *J Eur Acad Dermatology Venereol*. Published online 2020. doi:10.1111/jdv.16677
7. Saginc H. Treatment of a patient with hidradenitis suppurativa. *Pamukkale Med J*. Published online 2021.
8. Hurley H. Hidradenitis suppurativa. In: Roenigk RK, Jr HHR, eds. *Dermatologic Surgery: Principles and Practice*. CRC Press; 1989:729-739.
9. Szulczyńska-Gabor J, Fuksiewicz W, Emerele A, Głośnicka M, Bowszyc-Dmochowska M, Żaba R. Hidradenitis suppurativa – the therapeutic possibilities – case report. *Adv Dermatology Allergol*. 2008;25(3):142.
10. Saunte DML, Jemec GBE. Hidradenitis Suppurativa: Advances in Diagnosis and Treatment. *JAMA*. 2017;318(20): 2019-2032. doi:10.1001/jama.2017.16691

Case Report

Eurasian Journal of Critical Care



Foreign Body in the Posttraumatic Skull: Case Report

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Abstract

Head traumas with penetrating injuries are among the most common reasons for presentation to the emergency department. Penetrating injuries to the head with a foreign body may sometimes heal without sequelae or with mild sequelae, but sometimes may result in severe disability and even death.

A 28-year-old male patient was brought to the emergency department unconscious as a work accident. According to the anamnesis obtained from the patient's relatives, the patient was cutting with a cutting instrument device and lost control of the cutting instrument device. In the computarized tomography imaging of the patient; a foreign body with a depth of 75 mm and a thickness of 20 mm and a shape of a quarter circle with a depth of 75 mm and a thickness of 20 mm, which disrupted the integrity of the lower wall of the orbit and extended to the right temporal lobe.

In this presentation, we tried to emphasize that mortality may be avoided with good care in patients who are predicted to have a high mortality rate in penetrating head trauma due to foreign body or bodies, which may be seen rarely.

Keywords: Head trauma, Penetrating injury, Foreign body

Introduction

Head traumas with penetrating injuries are among the most common reasons for presentation to the emergency department. Penetrating injuries to the head with a foreign body may sometimes heal without sequelae or with mild sequelae, but sometimes may result in severe disability and even death.[1,2] Many complications may be observed in penetrating foreign body injuries. These complications include intracerebral hematoma, cerebral contusion, intraventricular hemorrhage, pneumocephalus, brain stem damage and carotid cavernous sinus fistula.[3,4] Depending on the speed, penetrating sharps can damage an area in the brain tissue that is 3-4 times larger than the size of the wounding instrument. Glaskow Coma Score (GCS) score guides the evaluation of the prognosis of patients. Patients with a GCS score above 8 and pupillary response have a 25% mortality risk, while patients with a GCS score below 5 have a mortality risk of up to 100%. In penetrating head traumas admitted to the emergency department, intubation to protect the airway, intravenos (IV) fluid therapy to protect from hypovolemia, IV broad-spectrum antibiotic treatment should be started rapidly to prevent the development of infection.

We aimed to contribute to the literature with our management of this case, which we think is a different and uncommon phenomenon in daily life from a traumatic perspective.

Case Report

A 28-year-old male patient was admittied to the emergency department unconscious as a occupational injury. According to the anamnesis obtained from the patient's relatives, the patient was cutting with a cutting instrument

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• **Received:** 20.03.2025 • **Revision:** 02.04.2025 • **Accepted:** 25.04.2025
DOI: 10.55994/ejcc.1661983
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Cite this article as: Budun F, Toker I, Altuntas M, Koyuncu S, Ozer MI, Baykan N. Foreign Body in the Posttraumatic Skull: Case Report. Eurasian Journal of Critical Care. 2025;7(1): 35-37.

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Figure 1. Axial view – foreign body

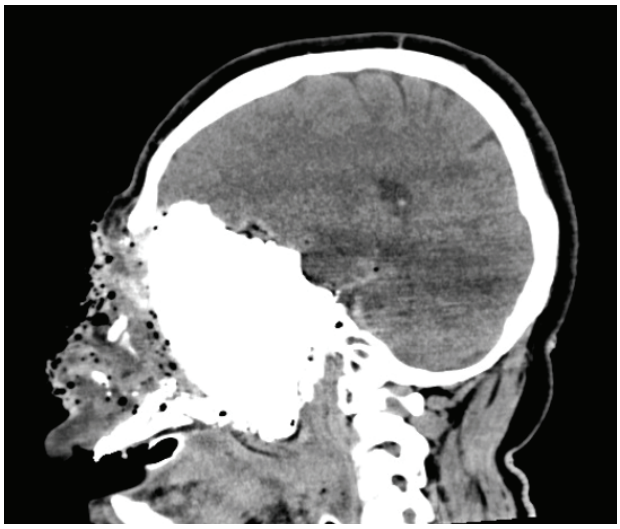

Figure 2. Coronal view – orbital damage

Figure 3. Sagittal view – intracranial extension

device and lost control of the cutting instrument device. Since the patient's vitals were stable and consciousness was not good at the time of admission, he was intubated to ensure airway safety. On initial examination, a disc fragment approximately 3*8*10 cm in size was observed penetrating the right nasal orbital pit and orbital wall and invading the brain. In the CT imaging of the patient; a foreign body with a depth of 75 mm and a thickness of 20 mm and a shape of a quarter circle with a depth of 75 mm and a thickness of 20 mm, which disrupted the integrity of the lower wall of the orbit and extended to the right temporal lobe and right frontal lobe inferior, disrupting the maxillary sinus in the midline and right side of the face was observed (Figure 1-3). The patient was evaluated by the relevant specialties and emergency surgical intervention was not planned, elective multidisciplinary surgery was planned and the patient was transferred to intensive care unit. After preoperative preparations were completed in the intensive care unit, elective surgeries were performed and the patient was followed up and treated.

Discussion

In daily life, craniocerebral injuries are usually caused by traffic accidents, falls from height or gunshot wounds. In addition to these, intracranial penetrating injuries due to foreign bodies can also be seen.[5] Factors such as the size, shape and elasticity of the foreign body are also important factors affecting the patient's clinical presentation.[6] Intracranial penetrating injuries may cause severe symptoms and even death by damaging vital structures and causing hematoma, thrombosis, vasospasm or infection. Patients must be closely monitored. In head traumas with penetrating sharps exposure, the patient may be brought to the emergency department by the teams as confused or unconscious. Since these injuries have a high mortality risk, the cases should be intubated to protect the airway. Complications that may occur in penetrating head trauma depend on the location of the foreign body, its relationship with important cerebral structures and the lesions it causes. Except for gunshot wounds, penetrating head traumas are very rare. Especially the bony structures in the head are the most important barrier for these traumas. The fact that the temporal bone is thinner than other bones makes this region more sensitive to trauma. However, fracture of other bones may be inevitable in severe traumas and penetrating traumas may occur as a result. When the literature is reviewed, intracranial foreign bodies are usually seen in the orbital, frontal sinus and nasal regions.[5,6] The mortality risk in patients ranges from 25% to 100%. The use of new generation antibiotics that

cross the blood brain barrier has significantly decreased the risk of infection after penetrating head trauma. In these patients, removal of foreign materials during surgery and excessive washing of the surgical field with saline are important to reduce the risk of infection.[7,8,9,10] The surgical treatment to be chosen in penetrating head trauma should be evaluated individually according to the pathologies and each patient. However, there are some features that may be a guide for the surgical procedure to be applied. These are; to comprehend the localization of the foreign body very well, to determine its relation with important cranial structures and then to remove the foreign body by performing a craniotomy or craniectomy around the foreign body without damaging the surrounding tissues.

Conclusion

In this presentation, we tried to emphasize that mortality may be avoided with good care in patients who are predicted to have a high mortality rate in penetrating head trauma due to foreign body or bodies, which may be seen rarely.

References

1. Bert F, Ouahes O, Lambert-Zechovsky N. Brain abscess due to Bacillus macerans following a penetrating periorbital injury. J Clin Microbiol. 1995;33:1950-3.
2. Fallon MJ, Plante DM, Brown LW. Wooden transnasal intracranial penetration: an unusual presentation. J Emerg Med. 1992;10:439-43.
3. Fujimoto S, Onuma T, Amagasa M, Okudaira Y. Three cases of intracranial wooden foreign body. No Shinkei Geka. 1987;15:751-6.
4. Hansen JE, Gudeman SK, Holgate RC, Saunders RA. Penetrating intracranial wood wounds: clinical limitations of computerized tomography. J Neurosurg. 1988;68:752-6.
5. Jooma R, Bradshaw JR, Coakham HB. Computed tomography in penetrating cranial injury by a wooden foreign body. Surg Neurol. 1984;21:236-8.
6. Markham JW, McCleve DE, Lynge HN. Penetrating craniocerebral injuries: report of two unusual cases. J Neurosurg. 1964;21:1095-7.
7. Di Roio C, Jourdan C, Mottolese C, Convert J, Artru F. Craniocerebral injury resulting from transorbital stick penetration in children. Pediatrics Child's Nerv Syst. 2000; 16:503-7.
8. Nakagawa A, Su CC, Yamashita Y, Endo T, Shirane R. A temporal head injury involving intracranial penetration by glass. No Shinkei Geka. 2002;30:529-33.
9. Reeves DL. Penetrating craniocerebral injuries: report of two unusual cases. J Neurosurg. 1965;23:204-5.
10. Alpaslan M, Özselçuk S. Analysis of patients consulted to the neurosurgery clinic from the emergency department and evaluation of mortality. HTD / HMJ. 2024;4(2):40-7.

Letter to Editor

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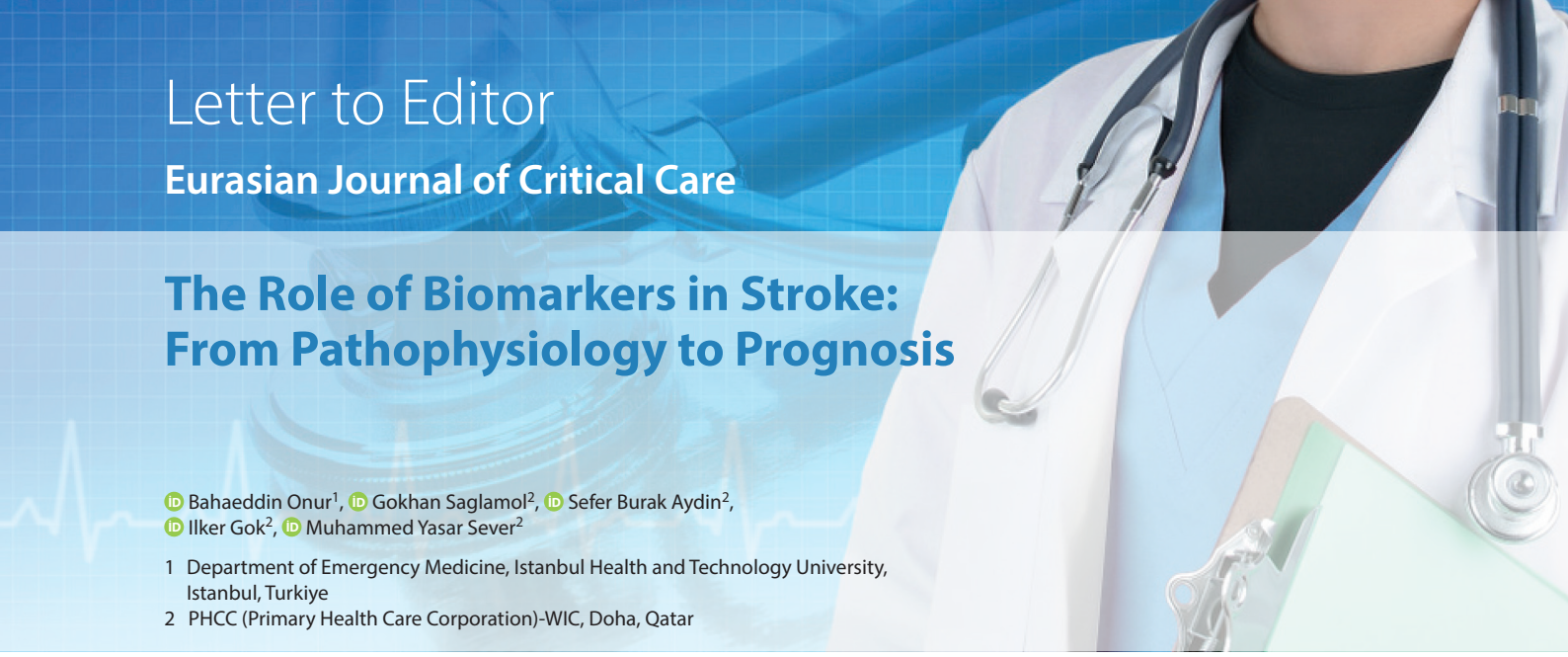

The Role of Biomarkers in Stroke: From Pathophysiology to Prognosis

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To the Editor,

Dear editor,

We read the article titled "Prognostic Value of Blood Parameters in Patients Diagnosed with Ischemic and Hemorrhagic Cerebrovascular Events" prepared by Ayten, published in the last issue of your journal in 2024, with great interest (1). We would like to thank the authors and the editorial board for the article evaluating the correlation between the neutrophil-lymphocyte ratios (NLR) in the blood samples taken at the time of admission and the length of hospital stay in patients presenting with stroke symptoms. However, we would like to mention other biomarkers to contribute to the discussion of the article.

Cerebrovascular events, including ischemic and hemorrhagic strokes, remain a leading cause of morbidity and mortality worldwide. Despite advancements in acute management and rehabilitation, predicting patient outcomes remains a critical challenge. Prognostic biomarkers have emerged as valuable tools for assessing disease severity, guiding therapeutic decisions, and estimating long-term neurological recovery.

Recent research has identified a range of biomarkers reflecting different pathophysiological processes in cerebrovascular events, including neuroinflammation, oxidative stress, endothelial dysfunction, neurodegeneration, and coagulation. Among these, glial fibrillary acidic protein (GFAP) and S100B serve as indicators of astrocytic injury, while neurofilament light chain (NFL) and tau protein reflect neuronal damage. Inflammatory cytokines such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α) have been implicated in stroke-related neuroinflammation, whereas oxidative stress markers like 8-isoprostanes provide insights into vascular integrity. Additionally, circulating microRNAs (miRNAs) have gained attention as potential molecular regulators of post-stroke recovery.

This review aims to provide a comprehensive overview of the prognostic value of these biomarkers in ischemic and hemorrhagic cerebrovascular events. By summarizing current evidence, we highlight their clinical relevance, potential limitations, and future directions in personalized stroke management.

Neuroinflammatory Biomarkers

Neuroinflammatory biomarkers have gained significant attention in recent years due to their potential role in diagnosing and predicting outcomes in cerebrovascular events, such as ischemic and hemorrhagic stroke (2). Among these biomarkers, **Glial Fibrillary Acidic Protein (GFAP)** stands out as a promising candidate, particularly in hemorrhagic stroke. GFAP is released by astrocytes in response to brain injury, and its elevated levels in the blood are strongly associated with the severity of intracranial hemorrhage. Studies suggest that GFAP can aid in the early differentiation between ischemic and hemorrhagic stroke, as well as provide prognostic information regarding patient outcomes (3,4). Its specificity for astroglial damage makes it a valuable tool in clinical settings.

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• **Received:** 15.03.2025 • **Revision:** 02.04.2025 • **Accepted:** 04.05.2025
DOI: 10.55994/ejcc.1656732
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Cite this article as: Onur B, Saglamol G, Aydın SB, Gok I, Sever MY. The Role of Biomarkers in Stroke: From Pathophysiology to Prognosis. Eurasian Journal of Critical Care. 2025;7(1): 39-45

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Another critical biomarker is **S100B**, a protein primarily expressed by astrocytes and Schwann cells (5). S100B is released into the bloodstream following neuronal injury and is widely studied in both ischemic and hemorrhagic stroke. Elevated levels of S100B correlate with the extent of brain damage and are associated with poor functional outcomes, including increased mortality and long-term disability. Despite its sensitivity, S100B is not entirely specific to brain injury, as it can also be elevated in extracranial conditions, which limits its standalone diagnostic utility (6-9). However, when combined with other biomarkers, S100B enhances the accuracy of prognostic models.

YKL-40, also known as chitinase-3-like protein 1, is another neuroinflammatory biomarker that has been linked to stroke severity and outcomes (10). YKL-40 is secreted by activated macrophages and astrocytes in response to inflammation and tissue injury. Elevated levels of YKL-40 are associated with increased neuroinflammation, larger infarct volumes, and worse functional recovery in stroke patients. Its role in modulating inflammatory pathways makes it a potential target for therapeutic interventions aimed at reducing secondary brain injury (11,14).

Biomarkers Related to Oxidative Stress and Endothelial Dysfunction

Oxidative stress and endothelial dysfunction play critical roles in the pathophysiology of stroke, and biomarkers associated with these processes provide valuable insights into disease progression and outcomes (14). **Asymmetric Dimethylarginine (ADMA)** is a key molecule that reflects endothelial dysfunction. ADMA inhibits nitric oxide synthase, leading to reduced nitric oxide production, which is essential for maintaining vascular homeostasis. Elevated levels of ADMA are associated with impaired endothelial function, increased oxidative stress, and a higher risk of stroke. In stroke patients, high ADMA levels have been linked to neurological deterioration, poor functional recovery, and increased mortality (15-18). Its role in endothelial dysfunction makes it a potential target for therapeutic interventions aimed at improving vascular health and stroke outcomes.

Another important biomarker is **8-isoprostane**, a product of lipid peroxidation that serves as a reliable indicator of oxidative stress (19). Oxidative stress, characterized by an imbalance between reactive oxygen species (ROS) production and antioxidant defenses, contributes to neuronal damage and inflammation following stroke. Elevated levels of 8-isoprostane in stroke patients are associated with larger infarct volumes, more severe neurological deficits, and worse long-term outcomes (19,20). Measuring 8-isoprostane levels can help assess the extent of oxidative damage and predict the risk of complications, such as recurrent stroke or post-stroke cognitive impairment.

Both ADMA and 8-isoprostane highlight the interplay between oxidative stress, endothelial dysfunction, and stroke progression. These biomarkers not only enhance our understanding of the underlying mechanisms but also offer potential targets for therapeutic strategies aimed at mitigating oxidative damage and improving endothelial function. Further research is needed to validate their clinical utility and explore their integration into multi-marker panels for more accurate risk stratification and personalized treatment approaches in stroke management.

Biomarkers of Neurodegeneration and Neuronal Damage

Neurodegeneration and neuronal damage are critical processes in stroke pathophysiology, and biomarkers such as **Neurofilament Light Chain (NFL)** and **Tau protein** provide valuable insights into these mechanisms. **NFL** is a structural component of neurons, and its release into the bloodstream or cerebrospinal fluid (CSF) indicates axonal damage. Elevated levels of NFL are strongly associated with the severity of stroke, larger infarct volumes, and poor long-term neurological outcomes. NFL is particularly useful in predicting post-stroke cognitive decline and functional disability, making it a promising biomarker for assessing the extent of neuronal injury and guiding rehabilitation strategies (21-23).

Tau protein, traditionally linked to neurodegenerative diseases like Alzheimer's, has also been studied in the context of stroke. Tau is involved in stabilizing microtubules in neurons, and its dysregulation leads to neuronal dysfunction (24,25). In stroke patients, increased levels of Tau are associated with post-stroke cognitive impairment and dementia. The accumulation of Tau following stroke may reflect secondary neurodegenerative processes triggered by ischemia or hemorrhage. Research suggests that Tau could serve as a biomarker for identifying patients at risk of long-term cognitive deficits, enabling early intervention and targeted therapies.

Immune Response and Cytokines

The immune response and cytokines play a pivotal role in the pathophysiology of stroke, influencing both acute injury and long-term recovery. Among the key biomarkers in this category, **Interleukin-6 (IL-6)** is a pro-inflammatory cytokine that has been extensively studied in stroke.

IL-6 is released in response to brain injury and contributes to the inflammatory cascade, exacerbating neuronal damage. Elevated levels of IL-6 are strongly associated with stroke severity, larger infarct volumes, and increased mortality. Additionally, IL-6 has been linked to post-stroke complications, such as infections and systemic inflammation, which can further worsen outcomes (26,27). Its role in modulating the inflammatory response makes it a potential target for therapeutic interventions aimed at reducing secondary brain injury.

Tumor Necrosis Factor-alpha (TNF-α) is another critical cytokine involved in neuroinflammation following stroke. TNF-α is produced by activated microglia and macrophages, and it promotes the release of other inflammatory mediators, contributing to blood-brain barrier disruption and neuronal apoptosis. High levels of TNF-α are associated with neurological deterioration, increased infarct size, and poor functional recovery. Inhibiting TNF-α signaling has shown promise in preclinical studies, suggesting its potential as a therapeutic target to mitigate inflammation and improve stroke outcomes (28-31).

C-Reactive Protein (CRP), particularly high-sensitivity CRP (hs-CRP), is a well-established marker of systemic inflammation. CRP levels rise rapidly in response to tissue injury and inflammation, making it a useful biomarker for assessing the inflammatory response in stroke patients (32-34). Elevated hs-CRP levels are associated with increased stroke severity, higher risk of recurrent stroke, and poor long-term outcomes. CRP is also linked to atherosclerosis and endothelial dysfunction, which are underlying mechanisms in ischemic stroke. Its ease of measurement and strong correlation with inflammatory processes make CRP a valuable tool for risk stratification and monitoring disease progression (35,36).

5. Coagulation and Platelet-Related Biomarkers

Coagulation and platelet-related biomarkers provide critical insights into the thrombotic and inflammatory processes underlying stroke. **D-dimer**, a fibrin degradation product, is a widely used biomarker that reflects coagulation and fibrinolysis activity. Elevated D-dimer levels are associated with increased thromboembolic risk, making it a valuable tool for predicting complications such as deep vein thrombosis (DVT) and pulmonary embolism (PE) in stroke patients. Additionally, D-dimer levels correlate with stroke severity and poor outcomes, as they indicate a hypercoagulable state and ongoing thrombotic activity. Its role in identifying high-risk patients underscores its utility in guiding anticoagulation therapy and preventing secondary complications (37,38).

Platelet activation markers, such as **P-selectin** and **CD40 ligand (CD40L)**, are also important in stroke pathophysiology. P-selectin, expressed on activated platelets and endothelial cells, promotes leukocyte adhesion and thrombus formation, contributing to inflammation and vascular occlusion. CD40L, released by activated platelets, enhances inflammatory responses and thrombotic processes. Elevated levels of these markers are associated with increased stroke severity, larger infarct volumes, and worse functional outcomes. They also play a role in predicting the risk of recurrent stroke and complications such as post-stroke cognitive impairment (39,40).

MicroRNAs (miRNAs)

MicroRNAs (miRNAs) are small, non-coding RNA molecules that play a crucial role in regulating gene expression and have emerged as important biomarkers and therapeutic targets in stroke. Among the miRNAs studied in stroke, **miR-124**, **miR-145**, and **miR-210** have shown significant associations with key pathophysiological processes, including neuronal damage, angiogenesis, and inflammation.

miR-124 is one of the most extensively studied miRNAs in stroke due to its neuroprotective effects. It is highly expressed in the brain and regulates genes involved in neuronal survival, inflammation, and apoptosis. Following stroke, miR-124 levels are often downregulated, contributing to neuronal death and inflammation. Experimental studies have demonstrated that restoring miR-124 levels can reduce infarct size, promote neurogenesis, and improve functional recovery, making it a promising target for neuroprotective therapies (41).

miR-145 is involved in vascular remodeling and angiogenesis, which are critical for post-stroke recovery. It regulates endothelial cell function and promotes the formation of new blood vessels, aiding in the restoration of blood flow to ischemic areas. Elevated levels of miR-145 have been associated with improved outcomes in stroke patients, highlighting its potential role in enhancing recovery (42).

miR-210, known as the "hypoxamiR," is upregulated in response to hypoxia and plays a role in angiogenesis and cell survival. It promotes the formation of new blood vessels and protects neurons from ischemic damage. Its expression levels correlate with stroke severity and recovery, making it a potential biomarker for prognosis (43).

Other New Biomarkers

Emerging biomarkers such as **UCH-L1 (Ubiquitin C-terminal Hydrolase-L1)** and **NRGN (Neurogranin)** are gaining attention for their potential roles in stroke diagno-

sis and prognosis (44-46). **UCH-L1** is a neuronal-specific protein involved in the ubiquitin-proteasome pathway, which regulates protein degradation and cellular homeostasis. Following stroke, UCH-L1 is released into the bloodstream due to neuronal damage, and its levels correlate with stroke severity, infarct volume, and functional outcomes (44). Elevated UCH-L1 levels are associated with worse neurological recovery and higher mortality rates, making it a promising biomarker for assessing the extent of brain injury and predicting prognosis. Its rapid release after stroke also suggests potential utility in early diagnosis and triage.

NRGN (Neurogranin), on the other hand, is a postsynaptic protein that plays a critical role in synaptic plasticity and cognitive function. It is primarily expressed in the brain and is involved in calcium-mediated signaling pathways. In stroke patients, reduced levels of NRGN have been linked to post-stroke cognitive impairment and dementia. This association highlights its potential as a biomarker for predicting long-term cognitive outcomes and identifying patients at risk of neurodegenerative complications. NRGN's role in synaptic function also makes it a potential target for therapies aimed at improving cognitive recovery after stroke (45,46).

Multi-Biomarker Panels

In recent years, the use of **multi-biomarker panels** has gained traction in stroke research, offering a more comprehensive approach to diagnosis and prognosis (47,48). By combining biomarkers such as **GFAP**, **NFL**, and **IL-6**, these panels provide a more accurate reflection of the complex pathophysiology of stroke, including neuronal damage, inflammation, and glial activation. Multi-biomarker panels improve risk stratification, enhance predictive accuracy, and enable personalized treatment strategies. This approach addresses the limitations of single biomarkers, such as lack of specificity, and holds great promise for improving stroke management and patient outcomes. Further research is needed to standardize these panels for clinical use.

Lactate, Hematological Inflammatory Indexes and Systemic Immuno-Inflammation Index

Combined indices, such as **lactate**, **lactate-to-albumin ratio**, **hematological inflammatory indices**, and **systemic immune-inflammation**, have emerged as valuable tools for assessing the severity and prognosis of various acute and chronic conditions, including stroke, sepsis, and trauma (49-53). These indices integrate multiple biomarkers to provide a more comprehensive evaluation of the patient's physiological state, reflecting underlying metabolic, inflammatory, and immune responses.

Lactate is a well-established marker of tissue hypoxia and metabolic stress. Elevated lactate levels are associated with poor outcomes in critically ill patients, including those with stroke, as they indicate inadequate tissue perfusion and anaerobic metabolism (54). The **lactate-to-albumin ratio** further refines this assessment by incorporating albumin, a marker of nutritional status and systemic inflammation. A high LAR has been shown to predict mortality and complications in sepsis and trauma patients, and recent studies suggest its potential utility in stroke prognosis (53).

Hematological inflammatory indices, such as the **neutrophil-to-lymphocyte ratio**, **platelet-to-lymphocyte ratio**, and **monocyte-to-lymphocyte ratio**, are derived from routine complete blood count parameters. These indices reflect the balance between pro-inflammatory and anti-inflammatory processes (53). For example, an elevated NLR is associated with increased inflammation and worse outcomes in stroke, myocardial infarction, and cancer (53,54). Similarly, the **systemic immune-inflammation index**, calculated as (platelets × neutrophils) / lymphocytes, provides a more integrated measure of systemic inflammation and immune response. High **systemic immune-inflammation index** values have been linked to poor prognosis in stroke, cancer, and cardiovascular diseases (56-59).

In conclusion, biomarkers are playing an increasingly important role in understanding the pathophysiology of stroke and predicting prognosis. Neuroinflammatory biomarkers (GFAP, S100B, YKL-40), molecules related to oxidative stress and endothelial dysfunction (ADMA, 8-isoprostane), markers reflecting neurodegeneration (NFL, Tau), immune response and cytokines (IL-6, TNF-α, CRP), coagulation and platelet activation markers (D-dimer, P-selectin, CD40L), microRNAs (miR-124, miR-145, miR-210), and other novel biomarkers (UCH-L1, NRGN) provide significant insights into the complex mechanisms of stroke. Additionally, combined indices such as lactate, lactate-to-albumin ratio, hematological inflammatory indices, and systemic immune-inflammation index offer a more comprehensive assessment than single biomarkers. These markers and indices can aid in early diagnosis, risk stratification, prognosis prediction, and the development of personalized treatment strategies for stroke patients. However, larger-scale, prospective studies are needed to integrate these biomarkers into routine clinical practice. In the future,

combining these biomarkers into multi-panel approaches could pave the way for more effective and precise stroke management.

References

1. Ayten S. Prognostic Value of Blood Parameters in Patients Diagnosed with Ischemic and Hemorrhagic Cerebrovascular Events. Eurasian j Crit Care. December 2024;6(3):119-122. doi:10.55994/ejcc.1608086
2. Chmielewska N, Szyndler J, Makowska K, Wojtyna D, Maciejak P, Płaźnik A. Looking for novel, brain-derived, peripheral biomarkers of neurological disorders. Neurol Neurochir Pol. 2018 May-Jun;52(3):318-325. doi: 10.1016/j.pjnns.2018.02.002. Epub 2018 Feb 13. PMID: 29478670.
3. Jurga AM, Paleczna M, Kadluczka J, Kuter KZ. Beyond the GFAP-Astrocyte Protein Markers in the Brain. Biomolecules. 2021 Sep 14;11(9):1361. doi: 10.3390/biom11091361. PMID: 34572572; PMCID: PMC8468264.
4. Lei J, Gao G, Feng J, Jin Y, Wang C, Mao Q, Jiang J. Glial fibrillary acidic protein as a biomarker in severe traumatic brain injury patients: a prospective cohort study. Crit Care. 2015 Oct 12;19:362. doi: 10.1186/s13054-015-1081-8. PMID: 26455520; PMCID: PMC4601141.
5. Bustamante A, Penalba A, Orset C, Azurmendi L, Llombart V, Simats A, Pecharroman E, Ventura O, Ribó M, Vivien D, Sanchez JC, Montaner J. Blood Biomarkers to Differentiate Ischemic and Hemorrhagic Strokes. Neurology. 2021 Apr 13;96(15):e1928-e1939. doi: 10.1212/WNL.0000000000011742. Epub 2021 Mar 5. PMID: 3367 4361.
6. Michetti F, D'Ambrosi N, Toesca A, Puglisi MA, Serrano A, Marchese E, Corvino V, Geloso MC. The S100B story: from biomarker to active factor in neural injury. J Neurochem. 2019 Jan;148(2):168-187. doi: 10.1111/jnc.14574. Epub 2018 Nov 12. PMID: 30144068.
7. Michetti F, D'Ambrosi N, Toesca A, Puglisi MA, Serrano A, Marchese E, Corvino V, Geloso MC. The S100B story: from biomarker to active factor in neural injury. J Neurochem. 2019 Jan;148(2):168-187. doi: 10.1111/jnc.14574. Epub 2018 Nov 12. PMID: 30144068.
8. Rossi R, Douglas A, Gil SM, Jabrah D, Pandit A, Gilvarry M, McCarthy R, Prendergast J, Jood K, Redfors P, Nordanstig A, Ceder E, Dunker D, Carlqvist J, Szikora I, Thornton J, Tsivgoulis G, Psychogios K, Tatlisumak T, Rentzos A, Doyle KM. S100b in acute ischemic stroke clots is a biomarker for post-thrombectomy intracranial hemorrhages. Front Neurol. 2023 Jan 23;13:1067215. doi: 10.3389/fneur.2022.1067215. PMID: 36756347; PMCID: PMC9900124.
9. Selçuk Ö, Yayla V, Çabalar M, Güzel V, Uysal S, Gedikbaşi A. The Relationship of Serum S100B Levels with Infarction Size and Clinical Outcome in Acute Ischemic Stroke Patients. Noro Psikiyatr Ars. 2014 Dec;51(4):395-400. doi: 10.5152/npa.2014.7213. Epub 2014 Dec 1. PMID: 28360660; PMCID: PMC5353176.
10. Connolly K, Lehoux M, O'Rourke R, Assetta B, Erdemir GA, Elias JA, Lee CG, Huang YA. Potential role of chitinase-3-like protein 1 (CHI3L1/YKL-40) in neurodegeneration and Alzheimer's disease. Alzheimers Dement. 2023 Jan;19(1):9-24. doi: 10.1002/alz.12612. Epub 2022 Mar 2. PMID: 35234337; PMCID: PMC9437141.
11. Xu Q, Sun L, Wang Y, Wang R, Jia Y, Guo D, Shi M, Yang P, Zhang Y, Zhu Z. Causal Effects of YKL-40 on Ischemic Stroke and Its Subtypes: A 2-Sample Mendelian Randomization Study. J Am Heart Assoc. 2023 Sep 5;12(17):e029000. doi: 10.1161/JAHA.122.029000. Epub 2023 Sep 1. PMID: 37655481; PMCID: PMC10547358.
12. Park HY, Jun CD, Jeon SJ, Choi SS, Kim HR, Choi DB, Kwak S, Lee HS, Cheong JS, So HS, Lee YJ, Park DS. Serum YKL-40 levels correlate with infarct volume, stroke severity, and functional outcome in acute ischemic stroke patients. PLoS One. 2012;7(12):e51722. doi: 10.1371/journal.pone.0051722. Epub 2012 Dec 14. PMID: 23272150; PMCID: PMC3522716.
13. Kjaergaard AD, Bojesen SE, Johansen JS, Nordestgaard BG. Elevated plasma YKL-40 levels and ischemic stroke in the general population. Ann Neurol. 2010 Nov;68(5):672-80. doi: 10.1002/ana.22220. PMID: 21031582.
14. Li J, Lin J, Pan Y, Wang M, Meng X, Li H, Wang Y, Zhao X, Qin H, Liu L, Wang Y; CNSR-III Investigators. Interleukin-6 and YKL-40 predicted recurrent stroke after ischemic stroke or TIA: analysis of 6 inflammation biomarkers in a prospective cohort study. J Neuroinflammation. 2022 Jun 6;19(1):131. doi: 10.1186/s12974-022-02467-1. PMID: 35761288; PMCID: PMC9235241.
15. Scioli MG, Storti G, D'Amico F, Rodríguez Guzmán R, Centofanti F, Doldo E, Céspedes Miranda EM, Orlandi A. Oxidative Stress and New Pathogenetic Mechanisms in Endothelial Dysfunction: Potential Diagnostic Biomarkers and Therapeutic Targets. J Clin Med. 2020 Jun 25;9(6):1995. doi: 10.3390/jcm9061995. PMID: 32630452; PMCID: PMC7355625.
16. Nishiyama Y, Ueda M, Katsura K, Otsuka T, Abe A, Nagayama H, Katayama Y. Asymmetric dimethylarginine (ADMA) as a possible risk marker for ischemic stroke. J Neurol Sci. 2010 Mar 15;290(1-2):12-5. doi: 10.1016/j.jns.2009.12.020. Epub 2010 Jan 8. PMID: 20060545.
17. Wanby P, Teerlink T, Brudin L, Brattström L, Nilsson I, Palmqvist P, Carlsson M. Asymmetric dimethylarginine (ADMA) as a risk marker for stroke and TIA in a Swedish population. Atherosclerosis. 2006 Apr;185(2):271-7. doi: 10.1016/j.atherosclerosis.2005.06.033. Epub 2005 Aug 1. PMID: 16055131.
18. Valkonen VP, Laaksonen R. Asymmetric dimethylarginine (ADMA) and acute vascular events. Clin Chim Acta. 2004 Oct;348(1-2):9-17. doi: 10.1016/j.cccn.2004.05.020. PMID: 15369730.
19. Mołek P, Chmiel J, Ząbczyk M, Malinowski KP, Natorska J, Undas A. Elevated 8-isoprostane concentration is associated with thromboembolic events in patients with atrial fibrillation. Int J Cardiol. 2022 Oct 15;365:1-7. doi: 10.1016/j.ijcard.2022.07.034. Epub 2022 Jul 20. PMID: 35868355.
20. Szczepańska-Szerej A, Kurzepa J, Wojczal J, Stelmasiak Z. Simvastatin displays an antioxidative effect by inhibiting an increase in the serum 8-isoprostane level in pa-

tients with acute ischemic stroke: brief report. Clin Neuropharmacol. 2011 Sep-Oct;34(5):191-4. doi: 10.1097/WNF.0b013e3182309418. PMID: 21897213.

21. Heshmatollah A, Fani L, Koudstaal PJ, Ghanbari M, Ikram MA, Ikram MK. Plasma β-Amyloid, Total-Tau, and Neurofilament Light Chain Levels and the Risk of Stroke: A Prospective Population-Based Study. Neurology. 2022 Apr 26;98(17):e1729-e1737. doi: 10.1212/WNL.000 0000000 200004. Epub 2022 Mar 1. PMID: 35232820.

22. Chen CH, Chu HJ, Hwang YT, Lin YH, Lee CW, Tang SC, Jeng JS. Plasma neurofilament light chain level predicts outcomes in stroke patients receiving endovascular thrombectomy. J Neuroinflammation. 2021 Sep 12;18(1): 195. doi: 10.1186/s12974-021-02254-4. PMID: 34511123; PMCID: PMC8436486.

23. Dhana A, DeCarli C, Aggarwal NT, Dhana K, Desai P, Evans DA, Rajan KB. Serum neurofilament light chain, brain infarcts, and the risk of stroke: a prospective population-based cohort study. Eur J Epidemiol. 2023 Apr;38(4): 427-434. doi: 10.1007/s10654-023-00978-6. Epub 2023 Mar 3. PMID: 36867286; PMCID: PMC10081967.

24. Yang J, Zhi W, Wang L. Role of Tau Protein in Neurodegenerative Diseases and Development of Its Targeted Drugs: A Literature Review. Molecules. 2024 Jun 13;29(12):2812. doi: 10.3390/molecules29122812. PMID: 38930877; PMCID: PMC11206543.

25. Holper S, Watson R, Yassi N. Tau as a Biomarker of Neurodegeneration. Int J Mol Sci. 2022 Jun 30;23(13):7307. doi: 10.3390/ijms23137307. PMID: 35806324; PMCID: PMC9266883.

26. Acalovschi D, Wiest T, Hartmann M, Farahmi M, Mansmann U, Auffarth GU, Grau AJ, Green FR, Grond-Ginsbach C, Schwaninger M. Multiple levels of regulation of the interleukin-6 system in stroke. Stroke. 2003 Aug;34(8):1864-9. doi: 10.1161/01.STR.0000079815.38626.44. Epub 2003 Jul 3. PMID: 12843357.

27. Simats A, Liesz A. Systemic inflammation after stroke: implications for post-stroke comorbidities. EMBO Mol Med. 2022 Sep 7;14(9):e16269. doi: 10.15252/emmm.202216269. Epub 2022 Aug 15. PMID: 35971650; PMCID: PMC9449596.

28. Gonzalez Caldito N. Role of tumor necrosis factor-alpha in the central nervous system: a focus on autoimmune disorders. Front Immunol. 2023 Jul 7;14:1213448. doi: 10.3389/fimmu.2023.1213448. PMID: 37483590; PMCID: PMC10360935.

29. Nagy EE, Frigy A, Szász JA, Horváth E. Neuroinflammation and microglia/macrophage phenotype modulate the molecular background of post-stroke depression: A literature review. Exp Ther Med. 2020 Sep;20(3):2510-2523. doi: 10.3892/etm.2020.8933. Epub 2020 Jun 24. PMID: 32765743; PMCID: PMC7401670.

30. Xue Y, Zeng X, Tu WJ, Zhao J. Tumor Necrosis Factor-*α*: The Next Marker of Stroke. Dis Markers. 2022 Feb 27;2022:2395269. doi: 10.1155/2022/2395269. PMID: 35265224; PMCID: PMC8898850.

31. Zhao Y, Zhu Q, Bi C, Yuan J, Chen Y, Hu X. Bibliometric analysis of tumor necrosis factor in post-stroke neuroinflammation from 2003 to 2021. Front Immunol. 2022 Oct 27;13:1040686. doi: 10.3389/fimmu.2022.1040686. PMID: 36389810; PMCID: PMC9661963.

32. Özdemir S, Akça HŞ, Algın A, Eroğlu SE. Can C-reactive protein-to-albumin ratio be a predictor of short-term mortality in community-acquired pneumonia? Ann Clin Anal Med 2021;12(9):1043-1048. Doi: 0000-0002-6186-6110

33. Özdemir S, Algin A. Evaluation of the ability of the C-reactive protein-to-albumin ratio to predict short-term mortality in patients with COVID-19. J CLIN MED KAZ. 2021;18(6):35-9. doi: 10.23950/jcmk/11324.

34. Özdemir S. Emergency Department Applications of Inflammatory Markers: A Narrative Review. Ibnosina Journal of Medicine and Biomedical Sciences. 2024; 16(04): 135-141 DOI: 10.1055/s-0044-1790509.

35. Zhou Y, Han W, Gong D, Man C, Fan Y. Hs-CRP in stroke: A meta-analysis. Clin Chim Acta. 2016 Jan 30;453:21-7. doi: 10.1016/j.cca.2015.11.027. Epub 2015 Nov 26. PMID: 26633855.

36. Luo Y, Wang Z, Li J, Xu Y. Serum CRP concentrations and severity of ischemic stroke subtypes. Can J Neurol Sci. 2012 Jan;39(1):69-73. doi: 10.1017/s0317167100012713. PMID: 22384498.

37. Abebe EC, Dejenie TA, Anley DT, Mengstie MA, Gebeyehu NA, Adella GA, Kassie GA, Tesfa NA, Gesese MM, Feleke SF, Zemene MA, Dessie AM, Bayih WA, Solomon Kebede Y, Bantie B, Seid MA, Enyew EF, Dessie G, Adugna DG, Ayele TM, Teshome AA, Admasu FT. Diagnostic performance of plasma D-dimer, fibrinogen, and D-dimer to fibrinogen ratio as potential biomarkers to predict hypertension-associated acute ischemic stroke. Heliyon. 2024 Feb 29;10(5):e27192. doi: 10.1016/j.heliyon.2024.e27192. PMID: 38486781; PMCID: PMC10937710.

38. Gorog DA, Storey RF, Gurbel PA, Tantry US, Berger JS, Chan MY, Duerschmied D, Smyth SS, Parker WAE, Ajjan RA, Vilahur G, Badimon L, Berg JMT, Cate HT, Peyvandi F, Wang TT, Becker RC. Current and novel biomarkers of thrombotic risk in COVID-19: a Consensus Statement from the International COVID-19 Thrombosis Biomarkers Colloquium. Nat Rev Cardiol. 2022 Jul;19(7):475-495. doi: 10.1038/s41569-021-00665-7. Epub 2022 Jan 13. PMID: 35027697; PMCID: PMC8757397.

39. Tanne D, Haim M, Goldbourt U, Boyko V, Reshef T, Adler Y, Benderly M, Mekori YA, Behar S. CD40 ligand and risk of ischemic stroke or coronary events in patients with chronic coronary heart disease. Int J Cardiol. 2006 Mar 8;107(3):322-6. doi: 10.1016/j.ijcard.2005.03.051. PMID: 16503253.

40. Davì G, Tuttolomondo A, Santilli F, Basili S, Ferrante E, Di Raimondo D, Pinto A, Licata G. CD40 ligand and MCP-1 as predictors of cardiovascular events in diabetic patients with stroke. J Atheroscler Thromb. 2009;16(6):707-13. doi: 10.5551/jat.1537. Epub 2009 Sep 16. PMID: 19755790.

41. Liu X, Feng Z, Du L, Huang Y, Ge J, Deng Y, Mei Z. The Potential Role of MicroRNA-124 in Cerebral Ischemia Injury. Int J Mol Sci. 2019 Dec 23;21(1):120. doi: 10.3390/ijms21010120. PMID: 31878035; PMCID: PMC6981583.

42. Yin KJ, Hamblin M, Chen YE. Angiogenesis-regulating microRNAs and Ischemic Stroke. Curr Vasc Pharmacol. 2015;13(3):352-65. doi: 10.2174/1570161113119990016. PMID: 26156265; PMCID: PMC4079753.

43. Aderinto N, Olatunji G, Kokori E, Sanker V, Yusuf IA, Adefusi TO, Egbunu E, Aboje JE, Apampa OO, Ogieuhi IJ, Obasanjo OM, Awuah WA. miR-210 in ischaemic stroke: biomarker potential, challenges and future perspectives. Eur J Med Res. 2024 Aug 23;29(1):432. doi: 10.1186/s40001-024-02029-6. PMID: 39180099; PMCID: PMC11342498.

44. Wang KK, Yang Z, Sarkis G, Torres I, Raghavan V. Ubiquitin C-terminal hydrolase-L1 (UCH-L1) as a therapeutic and diagnostic target in neurodegeneration, neurotrauma and neuro-injuries. Expert Opin Ther Targets. 2017 Jun;21(6):627-638. doi: 10.1080/14728222.2017.1321635. Epub 2017 Apr 27. PMID: 28434268.

45. Xiang Y, Xin J, Le W, Yang Y. Neurogranin: A Potential Biomarker of Neurological and Mental Diseases. Front Aging Neurosci. 2020 Oct 6;12:584743. doi: 10.3389/fnagi.2020.584743. PMID: 33132903; PMCID: PMC7573493.

46. Kuşdoğan M, Vural S, Albayrak L, Çaltekin İ, Gökçen E. The diagnostic and prognostic value of serum neurogranin in acute ischemic stroke. J Stroke Cerebrovasc Dis. 2023 Feb;32(2):106889. doi: 10.1016/j.jstrokecerebrovasdis.2022.106889. Epub 2022 Dec 5. PMID: 36481578.

47. Anwar L, Ahmad E, Imtiaz M, Ahmad B, Awais Ali M, Mahnoor. Biomarkers for Early Detection of Stroke: A Systematic Review. Cureus. 2024 Oct 1;16(10):e70624. doi: 10.7759/cureus.70624. PMID: 39493062; PMCID: PMC11529901.

48. Jickling GC, Sharp FR. Biomarker panels in ischemic stroke. Stroke. 2015 Mar;46(3):915-20. doi: 10.1161/STROKEAHA.114.005604. Epub 2015 Feb 5. PMID: 25657186; PMCID: PMC4342265.

49. Özdemir s, Altunok i, Eroğlu SE. Relationship Between Carbon Monoxide Poisoning, Lactate and Cardiac Marker. Van Tıp Derg. 2019;26 (3):285-288. DOI: 10.5505/vtd.2019.24993.

50. Mangalesh S, Dudani S, Malik A. The systemic immune-inflammation index in predicting sepsis mortality. Postgrad Med. 2023 May;135(4):345-351. doi: 10.1080/00325481.2022.2140535. Epub 2022 Nov 8. PMID: 36287784.

51. Özdemir S, Altunok İ, Özkan A, İslam MM, Algın A, Eroğlu SE, Aksel g. The role of the hematological inflammatory index and systemic immuno-inflammation index in acute cholecystitis. Eur J Clin Exp Med. 2022;20(3):330–335. doi: 10.15584/ejcem.2022.3.11.

52. Şeyhoğlu DT, Akdeniz YS, İpekci A, İkizceli İ. The Effect of Lactate and Lactate Clearance on Mortality in Sepsis Patients Admitted to the Emergency Department. Phnx Med J. 2022;4(1):5-12. Doi: 10.38175/phnx.1004552.

53. Özdemir S, Altunok İ. Comparison of the Predictive Ability of the Blood Urea Nitrogen/Albumin, C-Reactive Protein/Albumin, and Lactate/Albumin Ratios for Short-Term Mortality in SARS-CoV-2-Infected Patients. Avicenna J Med. 2023 Feb 23;13(1):43-48. doi: 10.1055/s-0043-1761471. PMID: 36969347; PMCID: PMC10038752.

54. Brouns R, Sheorajpanday R, Wauters A, De Surgeloose D, Mariën P, De Deyn PP. Evaluation of lactate as a marker of metabolic stress and cause of secondary damage in acute ischemic stroke or TIA. Clin Chim Acta. 2008 Nov;397(1-2):27-31. doi: 10.1016/j.cca.2008.07.016. Epub 2008 Jul 19. PMID: 18692033.

55. Song SY, Zhao XX, Rajah G, Hua C, Kang RJ, Han YP, Ding YC, Meng R. Clinical Significance of Baseline Neutrophil-to-Lymphocyte Ratio in Patients With Ischemic Stroke or Hemorrhagic Stroke: An Updated Meta-Analysis. Front Neurol. 2019 Oct 4;10:1032. doi: 10.3389/fneur.2019.01032. PMID: 31636598; PMCID: PMC678 7274.

56. Özdemir S, Altunok I, Algın A. Relationship of the systemic immuno-inflammation index and hematological inflammatory index with mortality and hospitalization in acute pancreatitis: a cross-sectional study. Front Emerg Med. 2023;7(2):e13. DOI: 10.18502/fem.v7i2.12765.

57. Huang YW, Yin XS, Li ZP. Association of the systemic immune-inflammation index (SII) and clinical outcomes in patients with stroke: A systematic review and meta-analysis. Front Immunol. 2022 Dec 15;13:1090305. doi: 10.3389/fimmu.2022.1090305. PMID: 36591305; PMCID: PMC9797819.

58. Özdemir S, Özkan A. Prognostic Value of the Systemic Immune-Inflammation Index in Acute Pulmonary Embolism. Eurasian j Crit Care. April 2023;5(1):22-23. doi:10.55994/ejcc.1242458.

59. Zhou YX, Li WC, Xia SH, Xiang T, Tang C, Luo JL, Lin MJ, Xia XW, Wang WB. Predictive Value of the Systemic Immune Inflammation Index for Adverse Outcomes in Patients With Acute Ischemic Stroke. Front Neurol. 2022 Mar 18;13:836595. doi: 10.3389/fneur.2022.836595. PMID: 35370926; PMCID: PMC8971364.

Letter to Editor

Eurasian Journal of Critical Care

Is the Professional Responsibility Board A True Lightning Rod in Malpractise Cases?

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To the Editor,

I am Dr. Ali Sarıdaş, an emergency medicine specialist. The increasing number of medical malpractice cases in Emergency Departments is a complex issue, involving the examination of mistakes and omissions made by physicians and other healthcare professionals during the practice of their profession. The intricate structure of healthcare services suggests that alleged errors and omissions should not only be evaluated in terms of individual responsibilities but also through the processes of healthcare service delivery. Therefore, in crowded places like Emergency Departments, it is essential to adopt a broader perspective when assessing medical malpractice cases, rather than solely focusing on the actions of physicians (1). In recent years, the number of criminal and compensation lawsuits filed against physicians and other healthcare professionals in Emergency Departments has rapidly increased, making it one of the chronic issues of the healthcare system in Emergency Departments. Due to the increasing number of lawsuits, prosecutors and courts in our country cannot perform a thorough investigation into medical malpractice cases, leading to the neglect of many important factors (2). For this reason, new legal regulations are being introduced to resolve disputes related to medical malpractice. One such regulation is the addition of Article 18 to the Health Services Basic Law by Law No. 7406, published in the Official Gazette on May 27, 2022. This article established the "Professional Responsibility Board" (MSK) within the Ministry of Health of the Republic of Turkey, enabling the investigation of disputes arising from medical activities performed by healthcare professionals working in both public and private healthcare institutions and foundation universities (3). The MSK consists of seven members, including a deputy minister and various healthcare administrators appointed by the Minister of Health. However, the presence of only two physicians in this board makes it difficult to make accurate decisions in a multidimensional event like medical malpractice. The absence of forensic medicine experts and relevant specialists in the board increases the likelihood of erroneous decisions (4). In the Supreme Court decisions, failure to obtain a report for investigation permission from the MSK is considered a reason for annulment. Searching for the key phrase "Professional Responsibility Board" on the official decision search site of the Supreme Court, "https://kararara-ma.yargitay.gov.tr/", the following example decision is found on January 31, 2025:

Decision

In the case of a patient who presented to the emergency department of a private hospital in Mersin with complaints of pain in the knees, shoulders, and arms, it was found that the patient was examined by the doctor in charge, given painkillers in an intravenous drip, kept under observation for one hour, and then discharged. Shortly after returning home, the patient became ill and was taken to another private hospital in Mersin where they died from cardiac and respiratory arrest. Since no autopsy was performed on the deceased, the cause of death could not be determined. According to the reports from both the Forensic Medicine 1st Specialization Board in Istanbul and the General Board of Forensic Medicine, it was considered a

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• **Received:** 31.01.2025 • **Revision:** 12.03.2025 • **Accepted:** 10.04.2025
DOI: 10.55994/ejcc.1630862
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Cite this article as: Sarıdas A. Is The Professional Responsibility Board A True Lightning Rod In Malpractise Cases? Eurasian Journal of Critical Care. 2025;7(1): 47-48

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medical shortcoming that an ECG was not performed after the initial examination. However, since the cause and mechanism of death were unknown, no assessment could be made regarding whether the failure to perform the ECG affected the outcome or whether the patient's fate would have changed if the ECG had been performed. The court accepted that there was a shortcoming in the doctor's duty but found no concrete and convincing evidence that would lead to the conclusion that the doctor's actions caused the death by negligence. Therefore, the defendant was acquitted of the charge of negligent manslaughter. In the reasoning and decision, following the crime date, Article 18 was added to the Health Services Basic Law by Law No. 7406, published in the Official Gazette on May 27, 2022. According to this article, "EXTRA ARTICLE 18 - Except for those subject to the investigation procedure defined in Article 53 of the Higher Education Law, investigations regarding medical procedures and practices performed by physicians, dentists, and other healthcare professionals in public or private healthcare institutions and foundation universities are governed by the provisions of Law No. 4483 on the Prosecution of Civil Servants and Other Public Officials." Investigation permission is granted by the Professional Responsibility Board, which can assign local health directorate presidents or deputies for preliminary examination in private healthcare institutions and foundation universities. The periods defined in Article 7 of Law No. 4483 for granting investigation permission will apply doubled. Decisions made by the Professional Responsibility Board may be appealed to the Ankara Regional Administrative Court." As per this regulation, the decision made by the Mersin 13th Criminal Court without requesting investigation permission from the MSK is unlawful, and as a result, the ruling was overturned unanimously on March 20, 2024. The case file was referred to the Chief Public Prosecutor's Office of the Court of Cassation for review (5). These deficiencies also appear in the decisions of the Supreme Court. The Constitutional Court, in its decision dated November 30, 2023, ruled that the establishment of this board, created with the article added to the Health Services Basic Law, is incompatible with the financial and administrative autonomy of universities (6). Furthermore, a regulation published on March 1, 2024, will require state universities to evaluate whether a healthcare professional acted in violation of their professional duties based on the MSK decision and, if applicable, the result of the criminal trial. After a final court decision, the administration will fulfill the compensation obligation (7). Another important institution in resolving medical malpractice cases is the Forensic Medicine Institution (ATK). This institution issues expert opinions on medical malpractice claims through the 7th and 8th Forensic Medicine Specialization Boards. The 8th Board deals with errors that result in death, while the 7th Board deals with errors that do not result in death (8). Reports obtained from the ATK play a crucial role in identifying medical practice errors. However, cases without investigation permission from the MSK are returned to the Public Prosecutor's Office (9). In conclusion, the current legal regulations are not sufficient for the fair resolution of medical malpractice cases in Emergency Departments. More effective involvement of emergency medicine specialists and relevant medical fields in malpractice cases in Emergency Departments could result in more accurate and timely decisions. Additionally, addressing deficiencies in the judicial process and creating a more transparent procedure will ensure the effective resolution of medical malpractice cases.

References

1. Koç S. Adli tedavi açısından malpraktis ve hekim sorumluluğu. *Göğüs Cerrahisi Bülteni/Toraks Cerrahisi Bülteni*. 2014;5(1).
2. Şahbaz G, Yücesoy H, Özlem A, Erbil N. Malpraktis ve sağlık profesyonellerinin sorumlulukları. *Sağlık Bilimleri Üniversitesi Hemşirelik Dergisi*. 2022;4(2):85–90.
3. Türkiye Cumhuriyeti. 7406 sayılı Kanun. *Resmi Gazete*. 2022;Sayı: 31848, Madde 14.
4. Ersoy AG. Tıbbi malpraktiste sorumluluk: 7406 sayılı yasa malpraktis açısından neler getirildi? *Türkiye Biyoetik Dergisi*. 2021;8(4).
5. Türkiye Cumhuriyeti Yargıtay. Yargıtay 2020-9508 esas, 2024-1345 karar. Erişim adresi: https://karararama.yargitay.gov.tr/
6. Türkiye Cumhuriyeti Anayasa Mahkemesi. E.2022/90, K.2023/201 sayılı karar. *Norm Kararlar Bilgi Bankası*. 2023; Erişim adresi: https://normkararlarbilgibankasi.anayasa.gov.tr/
7. Türkiye Cumhuriyeti. 7496 sayılı sağlıkla ilgili bazı kanunlarda ve 663 sayılı kanun hükmünde kararnamede değişiklik yapılmasına ilişkin kanun. *Resmi Gazete*. 2024;Sayı: 32476.
8. Türkiye Cumhuriyeti. 2659 sayılı Adli Tıp Kurumu Kanunu. *Resmi Gazete*. 1982;Sayı: 17670.
9. Beşkoç C, Şahin HÇ, Kestioğlu BN. Tıbbi malpraktis davalarında yeni bir dönem: Mesleki Sorumluluk Kurulu. *Adli Tıp Dergisi*. 2024;38(1):1-4.

Letter to Editor

Eurasian Journal of Critical Care

The Prognostic Value of Blood Parameters in Patients Diagnosed with Ischemic and Hemorrhagic

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To the Editor,

I have carefully reviewed the study titled "Prognostic Value of Blood Parameters in Patients Diagnosed With Ischemic And Hemorrhagic Cerebrovascular Events" by Sema Ayten, published in the Eurasian Journal of Critical Care, Volume 6, Issue 3, pages 119-122. The study retrospectively evaluates the relationship between the neutrophil-to-lymphocyte ratio (NLR) and hospital length of stay in patients with ischemic and hemorrhagic stroke. In this letter, I aim to discuss the strengths, methodological limitations, and contributions of the study to the literature. Additionally, I will provide a current evaluation of the clinical use of inflammatory biomarkers, share conflicting findings in this field, and offer suggestions for future research.

Strengths and Contributions to the Literature; The most notable aspect of the study is its separate analysis of the prognostic value of NLR in both ischemic and hemorrhagic stroke groups. Given the conflicting findings in the literature (e.g., studies showing NLR's association with mortality[1,2,3] and those indicating no such association[4,5]), the results of this study present an important point of discussion. The authors emphasize that there is no significant correlation between NLR and hospital length of stay, suggesting that NLR alone may have limited utility as a prognostic marker. This finding is particularly relevant in clinical practice, considering the heterogeneity of inflammatory processes.

However, the study has some limitations. First, only 16 patients were included in the hemorrhagic stroke group. This small sample size may weaken the statistical power and increase the risk of Type II error. Additionally, the retrospective design limits the control of potential confounding factors (e.g., comorbidities, treatment protocols). Measuring NLR at a single time point (upon admission) may also restrict the assessment of dynamic inflammatory responses. Future studies could benefit from serial measurements of NLR and its combination with other inflammatory biomarkers to yield more comprehensive results.

The Role of Inflammatory Biomarkers in Other Clinical Scenarios; The findings of the study by Ayten et al. suggest that NLR is not consistent across all clinical scenarios. However, other studies have demonstrated the significant role of NLR and similar biomarkers in various emergency conditions. For example, in distinguishing testicular torsion from epididymo-orchitis, the pan-immune inflammation value (PIV) showed excellent diagnostic power (AUC: 0.81), while NLR, systemic immune-inflammation index (SII), and systemic inflammation response index (SIRI) demonstrated acceptable performance[6]. Similarly, in patients with Stanford Type B acute aortic dissection, the monocyte-to-lymphocyte ratio (MLR) and NLR excellently predicted in-hospital mortality (AUC: 0.826-0.822)[7]. In incarcerated inguinal hernias, NLR, SII, SIRI, and PIV showed acceptable diagnostic performance (AUC: 0.738-0.765), reflecting dynamic inflammatory responses[8]. Furthermore, in acute cholecystitis patients, NLR and SII demonstrated superior predictive power for 30-day mortality (AUC: 0.87-0.78), supporting their use in critical clinical decisions[9].

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• **Received:** 12.03.2025 • **Revision:** 12.03.2025 • **Accepted:** 10.04.2025
DOI: 10.55994/ejcc.1656073
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Cite this article as: Uzun N . The Prognostic Value of Blood Parameters in Patients Diagnosed With Ischemic And Hemorrhagic. Eurasian Journal of Critical Care. 2025;7(1): 49-50

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Conflicting Findings and Limitations; Inflammatory biomarkers do not appear to be consistent across all clinical scenarios. As noted by Ayten et al., the lack of a significant relationship between NLR and hospital length of stay in stroke patients[1] suggests that these biomarkers may behave differently in heterogeneous pathophysiological processes. In distinguishing complicated appendicitis, the hemoglobin-albumin-lymphocyte-platelet (HALP) score showed limited diagnostic power (AUC: 0.64), indicating its inferior clinical utility compared to NLR and SII[10].

Clinical Recommendations and Future Studies; Common limitations of these studies include their retrospective design, small sample sizes, and single-center nature. Prospective, large-cohort studies are critical for standardizing these biomarkers and integrating them into clinical protocols. In particular, multidisciplinary approaches (e.g., combining imaging and biomarkers) could enhance diagnostic accuracy.

Conclusion: Inflammatory biomarkers such as NLR, SII, SIRI, and PIV can play a significant role in emergency departments due to their low cost and accessibility. However, further research is needed to clarify their context-specific performance and resolve conflicting findings.

Sincerely,

Financial Support: This research did not receive any specific financial support from public, commercial, or non-profit funding agencies.

Author Contributions: Concept, Supervision, Materials, Data Collection and/or Processing, Analysis and/or Interpretation, Writing – NU

Conflict of interest: No conflict of interest was declared by the authors.

References

1. Wang F, Hu S, Ding Y, et al. Neutrophil-to-lymphocyte ratio and 30-day mortality in patients with acute intracerebral hemorrhage. J Stroke Cerebrovasc Dis. 2016;25(1):182-187.
2. Tokgoz S, Kayrak M, Akpinar Z, et al. Neutrophil lymphocyte ratio as a predictor of stroke. J Stroke Cerebrovasc Dis. 2013;22(7):1169-1174.
3. Lattanzi S, Cagnetti C, Provinciali L, Silvestrini M. Neutrophil-to-lymphocyte ratio and neurological deterioration following acute cerebral hemorrhage. Oncotarget. 2017;8(34):57489.
4. Yilmaz E, Bayram Kaçar A, Bozpolat A, et al. The relationship between hematological parameters and prognosis of children with acute ischemic stroke. Childs Nerv Syst. 2018;34:655-661.
5. Arikan C, Çınaroğlu OS, Efgan MG, Kanter E, Bora ES. A new adjunct in the differentiation of encephalitis and meningitis after negative cerebrospinal fluid culture: systemic inflammatory immune index. Eur Res J. 2023;9(5):1129-1134.
6. Vural N, Duyan M, Sarıdaş A, et al. The Predictive Value of Inflammatory Biomarkers in Distinguishing Testicular Torsion and Epididymo-Orchitis in the Emergency Department. Med J West Black Sea. 2024;8(3):276-282.
7. Duyan M, Sarıdaş A, Vural N. Predictors of In-hospital Death in Patients with Stanford Type B Acute Aortic Dissection. Eurasian J Crit Care. 2022;4(3):96-100.
8. Vural N, Duyan M, Sarıdaş A, et al. Evaluation of Inflammatory Biomarkers in Predicting Strangulation in Incarcerated Inguinal Hernias. Med J West Black Sea. 2024;8(3):276-282.
9. Vural N, Duyan M, Sarıdaş A, et al. Evaluation of Inflammatory Biomarkers Affecting Mortality in Acute Cholecystitis. Bratisl Med J. 2024;125(6):365.
10. Sarıdaş A, Vural N, Duyan M, et al. Comparison of the Ability of Newly Inflammatory Markers to Predict Complicated Appendicitis. Open Med. 2024;19:20241002.