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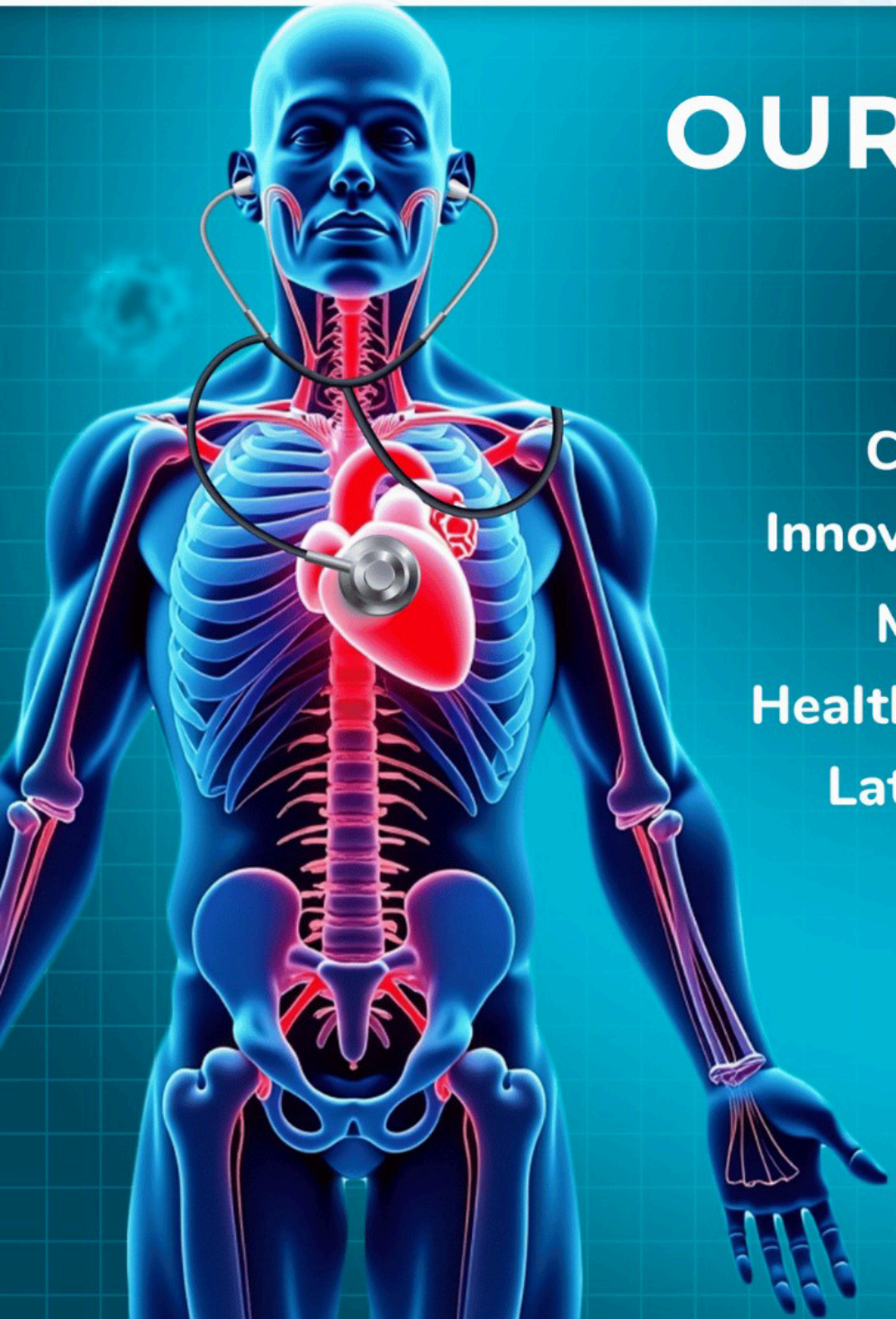

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Assessing the readability of responses produced by ChatGPT and Gemini when answering questions about the gastrointestinal system

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Abstract

The utilization of artificial intelligence has proven to be a pivotal element in the timely identification of gastrointestinal diseases, thereby markedly enhancing the detection of lesions and ensuring enhanced diagnostic accuracy. A comparison of the AI models, ChatGPT-4.0 and Gemini, revealed distinct strengths and applications across various fields. Although AI can significantly advance gastrointestinal pharmacological research, broader implications and challenges must be considered. The objective of this study was to compare the responses of AI models to questions on gastrointestinal system pharmacology and readability.

This study was conducted using 30 multiple-choice questions in the field of pharmacology. The questions were answered and evaluated using two LLMs: ChatGPT-4.0, developed by Open AI, and Gemini 2.0, developed by Google. The analysis of readability and comprehensibility values in English was compared using the Automated Readability Index (ARI), Flesch-Kincaid, Gunning Fog Index, Coleman-Liau Index, SMOG score, and FORCAST scores. The average score for responses provided by ChatGPT-4.0 was 26.78±0.41, whereas the average score for responses provided by GEMINI was 28.90±0.91. The number of correct answers provided by GEMINI was significantly higher than that provided by O ChatGPT-4.0 ($p=0.045$). A readability comparison of the 30 questions was performed. The average ChatGPT-4.0 score for ARI was 13.04±1.77, whereas the average score for GEMINI was 14.76±2.04, and a significant difference was observed between them ($p<0.001$).

The present study demonstrated discrepancies in the utilization of gastrointestinal system pharmacology by ChatGPT-4.0 and Google Gemini, in addition to alterations in the readability of the responses.

Keywords: ChatGPT, Google Gemini, readability, artificial intelligence

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1. Introduction

Gastrointestinal system pharmacology encompasses a broad spectrum of pharmaceutical agents and therapeutic modalities directed towards the management and treatment of pathologies affecting the gastrointestinal (GI) tract. These include, but are not limited to, peptic ulcers, gastroesophageal reflux disease (GERD), irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), and functional dyspepsia. Pharmacological approaches to these conditions involve various drug classes that target different aspects of GI physiology, such as secretion, motility, and inflammation [1,2]. Recent advancements in the field of artificial intelligence (AI) have precipitated the notable integration of this technology into the domain of gastroenterology. This integration has resulted in substantial progress in the diagnosis, management, and treatment of GI diseases. The utilization of artificial intelligence (AI) technologies, particularly machine learning and deep learning, has demonstrated potential in enhancing diagnostic accuracy, optimizing patient management, and facilitating the early detection of GI disorders. This integration is transforming traditional practices in gastroenterology and providing more efficient and accurate approaches to patient care [3,4]. The utilization of artificial intelligence has proven to be a pivotal element in the timely identification of gastrointestinal diseases, thereby markedly enhancing the detection of lesions and ensuring enhanced diagnostic accuracy. This is particularly evident in the use of AI for the analysis of endoscopic and radiological images, where AI systems have been trained to differentiate between benign and malignant lesions with a high degree of accuracy [5].

A comparison of the AI models, ChatGPT 4.0 and Gemini 2.0, reveals distinct strengths and applications across various fields, including healthcare, business management, and research. Both models are capable of providing accurate information and enhancing operational efficiency. However, they differ in their specific strengths and application areas [6]. The ensuing discourse aims to meticulously unravel the comparative performance, applications, and limitations of these technologies by drawing upon relevant research papers [7]. In the medical field, Gemini has been shown to outperform ChatGPT-4.0 in terms of the accuracy and comprehensiveness of its responses. For instance, in the context of sudden sensorineural hearing loss (SSHL), Gemini demonstrated higher levels of completion and accuracy, although the difference in accuracy was not statistically significant. In the field of urology, Gemini demonstrated proficiency in the identification of congenital penile curvature, whereas ChatGPT-4.0 exhibited a particular aptitude in the formulation of management strategies for renal artery aneurysms [8]. However, both models demonstrated deficiencies in diagnostic accuracy and the occurrence of hallucinations. Gemini demonstrated a higher level of accuracy in its responses when compared to ChatGPT, particularly in the context of multiple-choice questions [9]. However, ChatGPT-4.0 exhibited superior performance on open-ended and true/false questions. In a recent study, ChatGPT 4.0 demonstrated superior performance in the diagnosis of complex hematologic cases, both in terms of primary and differential diagnoses, when compared to Gemini Advanced [10].

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Although AI can significantly advance gastrointestinal pharmacological research, its broader implications and challenges must be considered. Integrating AI into healthcare requires careful consideration of data privacy, model interpretability, and robust validation across diverse populations.

This study aimed to evaluate the effectiveness of advanced AI models, such as ChatGPT 4.0, in improving diagnostic accuracy in complex hematologic cases and to explore the broader implications, challenges, and considerations involved in integrating AI technologies into gastrointestinal system pharmacology research and healthcare practice, with particular attention to data privacy, model interpretability, and validation across diverse populations.

2. Methods

This study was conducted by three experts in the field of pharmacology using 30 questions with answers. The questions were prepared using "Katzung's Basic & Clinical Pharmacology" as a reference [11]. The questions were designed by experts in groups of ten as easy, medium, and difficult. The questions were answered and evaluated using ChatGPT-4.0, developed by ChatGPT-4.0, and Gemini 2.0, developed by Google, both of which are large language models. As a result of the observation that this particular study did not involve the use of human subjects, animals, or living materials, the requirement for ethical committee approval was disregarded in this instance.

Accuracy Comparison

To compare the correct answers given to the questions by the LLMs, 30 questions were reanswered on 20 different days with the browser's cookies reset. The order in which the questions were asked varied.

Readability Comparison

An analysis of the ease and difficulty of reading and understanding English was conducted. The Average Reading Level Consensus calculates the average reading level by averaging other scales.

The automated readability index (ARI) is a measure that assesses the readability of a text. Although opinions differ regarding its accuracy compared to syllable/word and complex word indices, the character/word index is generally calculated faster because character counts are easier and more accurate for computer programs than syllable counts. In fact, this index was designed for the real-time monitoring of the readability of electric typewriters [12].

$$4.71\left(\frac{\text{characters}}{\text{words}}\right)+0.5\left(\frac{\text{words}}{\text{sentences}}\right)-21.43$$

Flesch-Kincaid readability tests are readability tests designed to show how difficult an English text is to understand. The "Flesch-Kincaid" (F-K) reading level was developed in 1975 by J. Peter Kincaid and his team under a contract with the US Navy. In the Flesch readability test, higher scores indicate material that is easier to read, whereas lower scores indicate text that is more difficult to read. The formula for the Flesch readability score (FRES) test is as follows [13,14]:

$$206.835-1.015\left(\frac{\text{total words}}{\text{total sentences}}\right)-84.6\left(\frac{\text{total syllables}}{\text{total words}}\right)$$

In linguistics, the **Gunning Fog Index** is a readability test for English writing. The index estimates the number of years of formal education required for a person to understand a text on the first reading. For example, a Fog Index of 12 requires a reading level of a high school senior in the United States (approximately 18 years old). The test was

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developed in 1952 by Robert Gunning, an American businessman active in newspaper and textbook publications. Furthermore, the Fog Index is primarily valid for English and may not accurately reflect readability in other languages [15].

- Select a passage of approximately 100 words (e.g., one or more complete paragraphs). Do not skip any sentences.
- Determine the average sentence length. (Divide the number of words by the number of sentences.);
- Count "complex" words consisting of three or more syllables. Do not include proper nouns, familiar jargon, or compound words. Do not count common suffixes (e.g., -es, -ed, or -ing) as syllables.
- Add the average sentence length and the percentage of complex words; and

The Coleman-Liau index is a readability test designed by Meri Coleman and T. L. Liau to measure the comprehensibility of a text. Similar to ARI, but unlike most other indices, the Coleman-Liau index is based on characters rather than syllables per word. The Coleman-Liau index is designed to be easily calculated mechanically from printed text samples. The Coleman-Liau index is calculated using the following formula [16]

$$CLI = 0.0588 \cdot L - 0.296 \cdot S - 15.8$$

The SMOG score is a readability measure that estimates the years of education required to understand a text. SMOG stands for "Simple Measure of Gobbledygook." The SMOG index has no statistical validity for languages other than English. SMOG formula [17,18]:

$$\text{grade} = 1.0430\sqrt{\text{number of polysyllables} \times \frac{30}{\text{number of sentences}}} + 3.1291$$

Linsear Write is a readability measure for English texts, allegedly developed to help the U.S. The standard Linear Write metric, Lw, operates on a 100-word sample: The standard Linsear Write metric, Lw, operates on a 100-word sample:

- One point was awarded for each "eawotorootorto defineword with two or fewer syllables.
- Three points were awarded for each "difficult word" defined as a word with three or more syllables.
- Divide the points by the number of sentences in the 100-word sample.
- Sprovidesnal resuIf if r > 20, then Lwr/2/ 2. If r ≤ 20, then Lw = r / 2 - 1.

The result is a "grade level" measure that reflects the estimated years of schooling required to read the text fluently [19].

The FORCAST note is a readability measure that indicates how difficult a text is to read based on the number of single-syllable "easy" words in a sample of 100–150 words. The values correspond to the number of years of schooling required to understand the text. For example, six years corresponds to readers aged 11–12, while 12 years corresponds to readers aged 17–18 [20].

Statistical Analysis

To evaluate the findings obtained in the study, the Statistical Package for the Social Sciences (SPSS) for Windows 27.0 program was used for statistical analyses. The data were then classified. Categorical data are defined as percentages and frequencies. Numerical data are defined, and distribution analysis is performed. Data that conform to a normal distribution are defined as the mean ± standard deviation (SD). Parametric tests (t-test and analysis of variance [ANOVA]) were used in the analysis of numerical tests that conform to a normal distribution. Subsequent analysis of the data was conducted using an unpaired t-test. The mean of repeated measures was calculated for each dataset. Findings with a p-value of < 0.05 were considered significant.

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3. Results

The average score for responses provided by ChatGPT-4.0 was 26.78±0.41, whereas that for responses provided by GEMINI was 28.90±0.91. The number of correct answers provided by GEMINI was significantly higher than that provided by ChatGPT-4.0 (p=0.045). The score comparisons are shown in Table 1. A readability comparison was performed for the 30 questions. The average ChatGPT-4.0 score for ARI was 13.04±1.77, whereas the average score for GEMINI was 14.76±2.04, and a significant difference was observed between them (p<0.001). The readability comparisons are shown in Table 2.

Table 1: Score comparisons

	Open AI (n=30)	GEMINI (n=30)	p-Value
Easy	8,78±0,78	9,50±0,51	0,002**
Modarate	9,00±0,66	9,65±0,48	0,001**
Hard	9,00±0,00	9,75±0,44	<0,001*
Total	26,78±0,41	28,90±0,91	0,045*

*1-tailed t-test, **2-tailed t-test

Table 2: Readability comparisons

	Open AI (n=30)	GEMINI (n=30)	p-Value
ARLCalc	13,41±1,29	13,98±1,05	0,23*
ARI	13,04±1,77	14,76±2,04	<0,001**
Flesch Reading Ease	24,07±12,13	24,53±7,86	0,121*
Gunning Fog Index	15,39±2,49	15,42±1,51	0,028*
Flesch-Kincaid Grade Level	13,27±1,93	14,57±1,71	0,008**
Coleman-Liau Readability Index	15,12±2,09	14,90±1,25	0,137*
The SMOG Index	11,31±0,97	12,97±1,45	0,003*
Original Linsear Write Formula	63,90±8,24	59,00±5,23	<0,001*
Linsear Write Grade Level Formula	12,23±2,81	13,33±2,95	0,338*
FORCAST Readability Formula	12,83±0,69	12,15±0,29	<0,001*

*1-tailed t-test, **2-tailed t-test

3. Discussion

The integration of artificial intelligence (AI) into the field of gastroenterology holds considerable promise for the diagnosis, treatment, and management of gastrointestinal (GI) diseases, with the potential for significant transformation. Recent advancements in AI technologies, with a particular emphasis on machine learning (ML) and convolutional neural networks (CNNs), have demonstrated considerable potential for enhancing diagnostic accuracy, improving patient outcomes, and optimizing clinical workflows. This integration is particularly impactful in areas such as endoscopy, pathology, and pharmacology, where AI is capable of processing and analyzing large datasets with greater precision than traditional methods [2-5]. The utilization of artificial intelligence (AI) has proven to be a pivotal element in the timely and accurate diagnosis of gastrointestinal diseases. This technological advancement has facilitated the precise identification of lesions and cancerous alterations, thereby contributing to the effective management and treatment of these conditions. For instance, AI systems have been developed to differentiate between benign and malignant lesions by analyzing endoscopic and radiological images, with the capacity to achieve optimal diagnostic outcomes [6,21]. In endoscopy, AI-driven image analysis has enhanced the detection of conditions such as Barrett's esophagus and esophageal squamous cell carcinoma, often

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outperforming human endoscopists in terms of accuracy and speed [22].

The integration of artificial intelligence (AI) models, such as ChatGPT and Gemini, in the field of gastrointestinal system pharmacology offers a promising avenue for enhancing both educational and clinical applications. These AI tools have been evaluated for their capacity to generate pharmacology-related content, assist in medical inquiries, and support pharmacometric tasks. However, the effectiveness of these devices varies across different applications, necessitating further refinement and expert oversight to maximize their utility in gastrointestinal pharmacology [20-22]. ChatGPT has been employed to generate multiple-choice questions for pharmacology education, demonstrating its capacity to adhere to structural guidelines and provide educational content. Nevertheless, ensuring medical accuracy and comprehensiveness remains challenging, as both are pivotal for reliable utilization in medical education [23]. In the context of gastrointestinal pharmacology, ChatGPT has been employed to generate questions and explanations for examinations, with findings demonstrating moderate to high agreement in terms of content accuracy and clinical relevance. However, issues with the cognitive level and quality of distractors have been identified, suggesting the need for expert review and improvement [24]. The evaluation of ChatGPT and Gemini was conducted to ascertain their capacity to generate non-model evaluation method (NONMEM) codes for pharmacometric tasks pertinent to clinical pharmacology settings. While these templates can provide a valuable starting point, the output frequently exhibits errors that require correction by experienced professionals [25]. In the domain of gastrointestinal diseases, the efficacy of ChatGPT in accurately diagnosing prevalent conditions, including irritable bowel syndrome and inflammatory bowel disease, has been assessed. The model has demonstrated the capacity to improve patient education and physician–patient communication. Nevertheless, its function as a tool to educate physicians requires further investigation [26]. In the field of gastroenterology, ChatGPT has demonstrated superior performance in terms of accuracy and reliability compared to Google Bard, particularly in medical management tasks. This lends credence to its potential as a reliable instrument in the field of study, although further research and development are necessary to enhance its capabilities [27]. In the present study, a higher number of correct answers were provided by GEMINI than those provided by ChatGPT-4.0. This discrepancy should be considered when assessing the applicability of AI technologies in pharmacology.

The readability and effectiveness of AI chatbots, such as ChatGPT and Google Gemini, in generating content for various medical and educational purposes have been subjects of extensive research. The prevailing focus of these studies is on the readability, accuracy, and appropriateness of information provided by AI models [28]. The following section presents the results of the readability scores. Google Gemini has been shown to generally produce content that is more legible than that generated by ChatGPT. For instance, in the context of emergency medical conditions, Gemini's brochures were slightly more accessible than those of ChatGPT, with a higher ease score. Similarly, in the domain of refractive surgery FAQs, Gemini was noted for its relatively superior readability, although all chatbots require a university-

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level understanding [29]. The present study examined the relationship between content quality and sentence counts in emergency medical brochures. Nevertheless, Gemini demonstrates a particular aptitude in producing succinct and legible responses, a skill that is of paramount importance for ensuring patient comprehension [29,30]. ChatGPT frequently demonstrates superior accuracy, particularly in intricate medical scenarios, such as retinal detachment and intraoperative decision support in plastic surgery. Nevertheless, Gemini has been observed to provide more suitable responses in specific contexts, including frequently asked questions (FAQs) in refractive surgery. In terms of appropriateness, Gemini demonstrated superior performance in providing suitable responses to FAQs concerning refractive surgery, thereby signifying its capacity to deliver contextually relevant information [30]. The potential of both AI models in the field of medical education has been rigorously evaluated. ChatGPT demonstrated marginally superior accuracy and comprehensiveness in patient education materials for local anesthesia in eye surgery. Conventional patient information leaflets (PILs) retain their overall superior performance [31]. In the context of end-of-life care, Google Gemini was demonstrated to have superior readability and actionability, although both models conveyed positive sentiments and high levels of accuracy [32]. In the present study, the mean ChatGPT-4.0 score for ARI was 13.04 ± 1.77, while the mean score for GEMINI was 14.76 ± 2.04. A significant difference was observed between them, which may be an important result in the context of evaluating the readability of AI models.

Our study had some limitations. First, it used only two AI tools. Better results can be obtained by evaluating other AI tools. Inclusion of a greater number of diseases would have provided greater clarity. Second, as chatbots are frequently updated, the use of an older version of AI may be necessary. In some cases, AI may not be able to provide up-to-date medical information because it may be difficult to access.

4. Conclusion

The present study demonstrated discrepancies in the utilization of gastrointestinal system pharmacology by ChatGPT and Google Gemini, in addition to alterations in the readability of the responses.

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Probable Type 2 Autoimmune Pancreatitis: A Case Report and Clinical Management

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Abstract *Autoimmune pancreatitis (AIP) is a rare type of chronic pancreatitis characterized by immune-mediated inflammation of the pancreas.It is often misdiagnosed due to non-specific symptoms such as abdominal pain, congestion , jaundice and radiographic findings that mimic pancreatic malignancy.Without appropriate treatment ,AIP can lead to endocrine and exocrine pancreatic insufficiency,biliary complications , and irreversible fibrosis(1).In this article, we aimed to increase awareness of the clinical approach to IgG4 –unrelated autoimmune pancreatitis that mimics pancreatic malignancy*

Keywords: Autoimmune pancreatitis, Steroid therapy, Type 2 AIP, Pancreatic inflammation

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1. Introduction

Autoimmune pancreatitis (AIP) is a form of chronic pancreatitis that develops as a result of an autoimmune inflammatory process characterized by dense lymphocytic infiltration and fibrosis leading to organ dysfunction (2). Autoimmune pancreatic disease is the only pancreatic condition treated effectively with corticosteroids. Three types of AIP are clinically recognized:

Type 1: IgG4 –related pancreatitis associated with a serum IgG4 concentration greater than twice the normal reference range in most affected individuals. The pancreas may be the only organ affected ,or there may also be other organs involved with corresponding clinical presentations ,including(3):

- Bile ducts (secondary sclerosing cholangitis)
- Retroperitoneal fibrosis
- Kidneys
- Lungs
- Submandibular and parotid glands (Sjogren disease)
- Sublingual glands (sclerosing sialadenitis)
- Orbits and lacrimal glands
- Joints (rheumatoid arthritis)

Type 2: Histologically this is idiopathic duct-centric pancreatitis with granulocytic epithelial lesions within the pancreatic duct, small numbers of IgG4 – positive plasma cells (fewer than 10/HPF) and no extra pancreatic involvement. Type 2 AIP is often associated with inflammatory bowel disease and is twice as common in patients with ulcerative colitis or proctitis as in those with Crohn disease (4). Unlike patients with type 1 AIP, about half of those with type 2AIP present with abdominal pain or acute pancreatitis.

Type 3: Immune checkpoint inhibitor –induced pancreatic injury is a type of progressive immune –mediated pancreatitis, an adverse effect of cancer treatment with immune checkpoint inhibitor drugs. The risk of this immune response is heightened when multiple immune checkpoint inhibitors are used (5). Most patients with type 3 AIP are asymptomatic.

Our clinical case involved a middle –aged patient in whom type 2 autoimmune pancreatitis with isolated pancreatic involvement was identified and a dramatic clinical response was achieved with steroid therapy.

2. Case Report

A 42 –year – old male patient presented to us with complaints of jaundice, band-like pain in the epigastric region and nausea. The patient had experienced epigastric pain lasting 2-3 days and diarrhea lasting one day approximately 1.5 months earlier. There is no history of significant comorbid disease or prior surgery. The family history is negative for autoimmune diseases. He does not smoke or consume alcohol.

On physical examination, the patient's general condition was assessed as moderately, severe. The skin and visible mucous membranes were icteric. On abdominal palpation there was marked tenderness in the epigastric region.

2.1. Laboratory findings

Test name	Result	Unit	Reference range
ALP	510	IU/L	41- 137
ALT	211	U/L	5-41

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AST	60	U/L	5-40
Total bilirubin	10.68	mg/dL	<1.2
Direct bilirubin	9.41	mg/dL	<0.2
Serum lipase	41.42	U/L	13-60
Pancreatic amylase	13.45	U/L	0-53
CRP	3.57	mg/L	0-5
CA 19-9	661.7	U/mL	<37
IgG4	1.20	g\L	0-1.25
WBC	6.22	k\mm^3	4.5-11
HGB	15.0	g\dL	13.5-17.5
MCV	87.8	pg	76-100
PLT	160	k\mm^3	140-400

EUS examination: A mass measuring 35 x 27 mm was identified in the pancreas; intrahepatic and extrahepatic bile ducts are dilated.

During gastroscopy, erosive gastritis was observed, duodenum appeared deformed and scarred.

On abdominal MRI, the pancreas is enlarged. On T2- weighted sequences, the pancreatic parenchyma is slightly hyperintense. Peripancreatic edema is present. Intrahepatic bile ducts are dilated. The common bile duct measures 16 mm; no stones are seen. The spleen is normal.

MRCP shows dilatation of the intrahepatic and extrahepatic bile ducts. The common bile duct is dilated with smooth distal narrowing. No stones are seen.

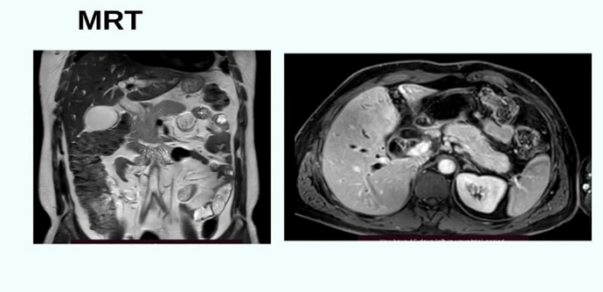

Image 1. Abdominal MRI

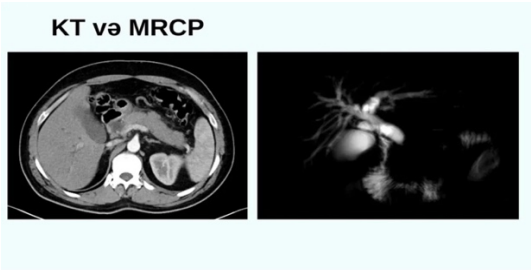

Image 2. Abdominal CT and MRCP

2.2. Treatment

Steroid therapy was initiated in the patient with suspected autoimmune pancreatitis.

1.Prednol 16 mg 1x2
2.Calcium 500 mg 1x2
3.PPI 40 mg 1x1
4. UDCA 500mg 1x2

The patient was scheduled for regular follow –up examinations. The steroid dose was gradually reduced after 1.5 months.

At 1.5 month after treatment, when the patient presented for follow –up, significant improvement was observed in clinical symptoms as well as in laboratory and instrumental findings. The results of the follow-up examinations performed two months later are summarized below.

Test name	**Result**	**Unit**	**Reference range**
ALP	95	IU/L	41-137

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ALT	48.2	U/L	5-41
AST	17.2	U/L	5-40
Bilirubin total	0.51	mg/dL	<1.2
Direct bilirubin	0.22	mg/dL	<0.2
GGT	29	U/L	3-60
CA19-9	9.82	U/ml	<37
WBC	7.4	k/mm^3	4.5-11
HGB	15.7	g/dL	13.5-17.5
PLT	250	Lk/mm^3	140-400
ESR	8	mm/h	0-15

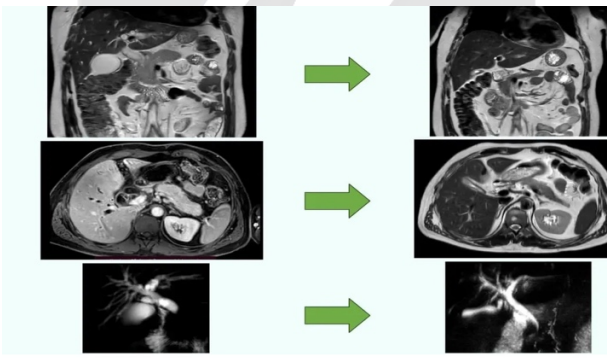

Image 3.The biliary ducts are within normal limits and the previously noted diffuse pancreatic enlargement has significantly regressed.

3. Discussion

Type 2 autoimmune pancreatitis (AIP-2) is a rare pancreatic disease characterized by normal IgG4 levels and usually without systemic organ involvement. Therefore, the diagnostic and therapeutic management of AIP -2differs from type 1 AIP.Steroid therapy is considered the main treatment for AIP -2 and allows patients to achieve rapid remission.

İn this case, the clinical presentation and imaging findings were consistent with autoimmune pancreatitis. However, due to the lack of histopathological confirmation, the diagnosis was considered probable. The rapid response to steroid therapy further supported this diagnosis.

Given the elevated CA19-9 levels and mass-line imaging findings, alternative diagnoses such as pancreatic malignancy and cholangiocarcinoma were considered. Careful evaluation and the patient's rapid response to steroid therapy supported the diagnosis of probable type 2 autoimmune pancreatitis.

In a study titled "Clinical features and long-term outcomes of patients with type 2 autoimmune pancreatitis", 88 patients were observed. Patients receiving steroid therapy had a 5-year relapse rate of approximately 13%, whereas those who underwent surgical intervention had a relapse rate of 33%. These results indicate that steroid therapy is effective not only in controlling the disease but also in reducing long –term relapse risk (6).

Another study," Type2 Autoimmune Pancreatitis (Idiopathic Duct –Centric Pancreatitis): A Single –Center Experience," analyzed 27 patients. Of these,96.3% received steroid therapy and almost all achieved remission. During a median follow –up of 32 months, only two patients experienced relapse, both of which responded effectively to retreatment with steroids (7).

In our case, a 42-year – old male patient was observed. He started steroid therapy at 32 mg and achieved remission within 1.5 months, with the dose gradually tapered after 1.5 months. No relapse was observed.

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Rapid achievement of remission, infrequent relapses and gradual tapering of steroids represent an effective clinical management strategy. The absence of comorbidities in our patient and his overall health support the favorable response to therapy.

4. Conclusion

This clinical case highlights the diagnostic challenges of autoimmune pancreatitis mimicking pancreatic malignancy. Isolated pancreatic involvement and the dramatic response to steroid therapy support the likelihood of type 2 autoimmune pancreatitis. Assessing clinical presentation, radiological findings and treatment response together plays a crucial role in establishing an accurate diagnosis. Early recognition of autoimmune pancreatitis can prevent unnecessary invasive procedures and allow for effective management.

Declaration of conflicting interests

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Türkiye'de Göğüs Cerrahisi Alanına Yönelik Hasta Şikâyetleri: Dijital Platformdaki Yorumlara Yönelik Bir Analiz

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Abstract

Patient complaints are an important source of feedback in assessing quality and safety in the healthcare system. This study aimed to examine patient complaints submitted to the "sikayetvar.com" website regarding Thoracic Surgery in Turkey. The study also aimed to identify common themes in patient complaints regarding Thoracic Surgery, better define the patient population submitting complaints, and systematically examine the reasons for complaints.

This retrospective study examined complaints submitted to the "sikayetvar.com" website using content analysis, a qualitative research method. The study examined 287 posts regarding Thoracic Surgery in Turkey made to the "sikayetvar.com" website between January 1, 2023, and August 15, 2025. Of these complaints, 89 were excluded due to their relevance to the wrong section and unclear content, leaving a total of 198 complaints for review. Complaints were categorized by gender, whether the institution was a public or private hospital, whether it was an inpatient, outpatient, or emergency room, the type of surgical procedure, whether the complaint was related to other departments, the number of times the complaint was viewed, and the subject of the complaint.

In the study, it was observed that 198 (68.91%) of the 287 complaints related to the Thoracic Surgery department were actually complaints related to thoracic surgery. Of the 198 individuals who complained, 117 (59.09%) were female and 81 (40.91%) were male. Of the 198 complaints related to thoracic surgery, 107 (54.04%) were related to procedures performed in thoracic surgery. Responses were received for 43 of the 198 complaints (21.72%). It was observed that

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complaints from all patients who underwent surgery were significantly higher than complaints from breast surgery outpatient clinic patients (p <0.05). Of the 198 complaints, 41 (20.71%) were related to the clinic, 72 (36.35%) to management, and 85 (42.94%) to communication. Of the complaint categories, 27 (12.54%) were related to lack of communication, 19 (9.60%) related to staff attitude, 16 (8.08%) related to patient-staff dialogue, 14 (7.07%) related to respect, sensitivity and compassion, and 14 (7.07%) related to access and admission.

Patient complaints remain a relatively underutilized resource for addressing the shortcomings of the Thoracic Surgery branch. Understanding the sources of patient dissatisfaction with Thoracic Surgery services can help reduce the number of patient complaints and improve patient care. These results are believed to guide healthcare facility managers in effective complaint management and help increase patient satisfaction.

Keywords: Thoracic surgery, patient complaints, digital platform

Özet

Hasta şikâyetleri, sağlık sisteminde kalite ve güvenliğin değerlendirilmesinde önemli bir geri bildirim kaynağıdır. Bu araştırmada, Türkiye'de Göğüs Cerrahisi branşına yönelik "şikâyetvar.com" internet sitesine yapılan hasta şikâyetlerin incelenmesi amaçlanmıştır. Çalışmada ayrıca Göğüs Cerrahisi branşı ile ilgili hasta şikayetlerindeki ortak temaları belirlenmesi, şikayette bulunan hasta popülasyonunun daha iyi tanımlanması ve şikâyet nedenlerini sistematik olarak incelenmesi amaçlanmıştır.

Retrospektif olarak yapılan bu araştırmada, "şikâyetvar.com" web sitesine yapılan şikâyetler nitel araştırma yöntemlerinden biri olan içerik analiz yöntemi kullanılarak incelenmiştir. Araştırma, 1 Ocak 2023 ile 15 Ağustos 2025 tarihleri arasında Türkiye'de Göğüs Cerrahisi branşı ile ilgili "sikayetvar.com" web sitesine yapılan 287 paylaşım incelenmiştir. Bu şikayetlerden 89'unun yanlış bölümle alakalı olması ve şikayetin içeriğinin belirsiz olması nedeniyle çalışma dışı bırakılmış ve böylelikle toplam 198 şikayet inceleme altına alınmıştır. Yapılan şikâyetler; cinsiyete, kurumun kamu ya da özel hastaneye ait olmasına, yatan hasta, ayakta hasta veya acil hasta olmalarına, cerrahi işlem türüne, diğer bölümlerle ilgili olma durumlarına, şikâyetin görüntülenme sayılarına ve şikâyet konularına göre sınıflandırılmıştır.

Araştırmada Göğüs Cerrahisi branşı ile ilgili 287 şikâyetin 198'inin (%68,91) gerçekten göğüs cerrahisi ile ilgili şikayetler olduğu saptandı. Şikayette bulunan 198 bireyin 117'si (%59,09) kadın ve 81'i (%40,91) erkekti. Göğüs cerrahisi ile ilgili 198 şikayetin 107'si (%54,04) göğüs cerrahisinde uygulanan işlemlerle ilgiliydi. 198 şikayetin 43'üne (%21,72) cevap aldıkları gözlendi. Tüm ameliyat olan hastalarından gelen şikayetlerin göğüs cerrahisi poliklinik hastalarından gelen şikayetlerden anlamlı derecede fazla olduğu gözlendi (p <0,05). 198 şikayetten 41'i (%20,71) klinik, 72'si (%36,35) yönetim, 85'i (%42,94) iletişim alanına ait olduğu

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gözlendi. Şikayet kategorilerinin 27'si (%12,54) iletişim eksikliği, 19'u (%9,60) personel tutumu, 16'sı (%8,08) hasta personel diyaloğu, 14'ü (%7,07) saygı, hassasiyet ve şefkatle ve14'ü (%7,07) erişim ve kabul ile ilgili olduğu gözlendi.

Hasta şikayetleri, Göğüs Cerrahisi branşının eksikliklerini gidermede nispeten az kullanılan bir kaynak olmaya devam etmektedir. Göğüs Cerrahisi branşının hizmetlerinde hasta memnuniyetsizliğinin kaynaklarını bilmek, hasta şikayetlerinin sayısını azaltmaya ve hasta bakımını iyileştirmeye yardımcı olabilir. Elde edilen bu sonuçların sağlık işletmesi yöneticilerine etkili şikayet yönetimi konusunda rehberlik edebileceği ve hasta memnuniyetini artırmaya yardımcı olabileceği düşünülmektedir.

Anahtar Kelimeler: Göğüs cerrahisi, hasta şikayetleri, dijital platform

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1. Giriş

Sağlık hizmetleri sektörü diğer hizmet sektörlerinden farklı olarak yoğun rekabetin yaşandığı, yüksek uzmanlaşma düzeyine sahip farklı meslek gruplarının üst düzeyde orkestrasyonuna ihtiyacı olan, tam zamanlı hizmetin sunulduğu, üretildiği anda tüketilen/depolanamayan, ikamesi olmayan ve karşılanmadığı müddetçe şiddetini daha fazla hissettiren, en basit bir hatanın dahi insan yaşantısına mal olabileceği, oldukça sofistike ve komplike bir yapıya sahiptir (1).

Teknolojinin ilerlemesiyle birlikte internet tüketicilerin günlük yaşamının bir parçası haline gelmiştir. 2025 yılı ilk yarı verilerine göre dünya nüfusu 8,2 milyara ulaşırken, Türkiye nüfusu 85,82 milyona ulaşmış durumdadır (2). Yapılan araştırmalara göre 2024 yılında dünya genelinde 5.16 milyar internet kullanıcısı bulunurken, Türkiye'de bu sayı 76,29 milyon (%88,9) kullanıcıya kadar ulaşmıştır (3). Sağlık hizmetlerinde ise online internet kullanımı her geçen gün artış göstermektedir. Türkiye'de internet kullanıcıları tüm cihazlardan günlük ortalama 7 saat 24 dakika internette zaman geçirmektedir. Kullanıcılar bu sürenin 4 saat 26 dakikasını cep telefonları üzerinden internete bağlanarak geçirmektedir. Türkiye'de internet kullanıcılarının temel internet kullanma nedenlerinden ilk sırada yer alan neden ise bilgi edinmektir (4). Sağlık hizmetlerinde, çevrimiçi internet kullanımı her geçen gün artmaktadır.

Şikayetler, sunulan hizmetlerin veya ürünlerin kalitesinin kabulündeki uyumsuzluklar nedeniyle müşterilerin tarafından yapılan duygusal ifadeleridir ve girdi olarak iyi bir ivmedir (5). Şikayetler, kuruluşların mevcut eksikliklerini belirlemeleri için fırsat yaratarak hizmet kalitesinin iyileştirilmesinde olanak yaratırlar. Doğru şekilde ele alınmayan müşteri şikayetleri, müşteri sadakati, kârlılık ve kurumsal imajı olumsuz etkileyebilmektedir (6). Reader ve ark. (2014) göre şikâyet, ihtiyaç, istek ve beklentilerin yerine getirilmemesinden kaynaklanan memnuniyetsizliğin yazılı veya sözlü olarak ifade edilmesidir ve genellikle zihinsel, fiziksel ve duygusal durumla ilgili olabilmektedir (7).

Globalleşen dünyada her şeyin değiştiği gibi şikâyet şekilleri de değişmiştir. Sağlıkta kalite öncesi bireylerin şikâyet etmede fazla seçeneği yokken, bugün ise hastanelerin dilek şikayet (istek) kutularına yazarak veya hasta hakları kurumlarıyla (halkla ilişkiler, müdürlükler) yazılı bildirimde bulunarak, telefonla veya yüz yüze görüşerek, hasta memnuniyet anketi vasıtasıyla e-posta göndererek, şikâyet paylaşım platformlarında tanımadığı kişilerle paylaşım yaparak, hastane sosyal medya uygulamalarını kullanarak veya kurumun web sayfasında paylaşmak gibi birçok alternatif araçlarla hasta veya hasta yakınları şikayetlerini dile getirebilmektedir (8).

Günümüzde, çevrimiçi forumlardaki e-şikayetler yeni nesil şikayetler olarak tanımlanmaktadır. Bu web siteleri aracılığıyla kuruluşlar, kendileri hakkındaki olumlu ve olumsuz eleştirilere ve şikayetlere ulaşabilmektedirler. Bu nedenle, e-şikayet forumları, kuruluşların hizmetlerini iyileştirmeleri ve marka imajlarını korumaları için önemlidir. Bilgiye erişim araçları geliştikçe, sağlık ve tedavi süreçlerine dahil olan hasta ve ailelerin sayısında artış görülmektedir. Bu

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durum, sağlık hizmetlerinin kalitesiyle ilgili şikayetlerde önemli bir artışa neden olmaktadır. E-şikayetler, kurumsal itibarı ve organizasyonun stratejisini etkilemede rol oynamaktadır (9). Şikayetlerin, hastanelerin imajlarına zarar verebilme potansiyeli bulunurken, diğer taraftan yapılan şikayetleri iyi yöneten kuruluşlar içinde olumlu etkilere sahip olabilir. Diğer yandan, hastaneler öğrenen bir kuruluş gibi davrandıklarında şikayetler yoluyla hizmetlerini iyileştirebilir ve kurumsal imajlarını destekleyerek tercih edilebilirliklerini artırabilirler (10).

Hasta şikayetleri, sağlık sektöründe uygulanan hizmetin kalitesinin iyileştirmesinde önemli bir kaynaktır (11). Bu amaçla Türkiye'de Sağlık Bakanlığı tarafından 1997 yılında hasta şikayetlerinin alınması amacıyla bir telefon ihbar hattı açılmış, hasta şikayetlerinin sistematik bir biçimde ulaştırılması maksadıyla 1 Ocak 2004'te Sağlık Bakanlığı İletişim Merkezi (SABİM) çalışmalarına başlamıştır. Sağlık Bakanlığı İletişim Merkezi (SABİM), sektörle ilgili olan taraflara katılım olanağı sunmuş ve bu yolla "interaktif yönetimi" olası kılmıştır (12,13).

Göğüs cerrahi alanında hasta şikayetleri nispeten çok az araştırılmış ve daha da önemlisi, bu alandaki eksikliklerin giderilmesinde yeterince değerlendirilmemiş bir kaynak olmaya devam etmektedir. Dünyadaki cerrahi departmanlar, küresel olarak hasta deneyimlerini iyileştirmeyi ve şikayetleri azaltmayı arzulamaktadırlar. Ancak, göğüs cerrahisi alanında hasta şikayetlerine yönelik yayınlanmış veriler sınırlıdır.

Uluslararası alanda, hasta şikayeti verilerinin ve buna bağlı olarak hasta memnuniyet skorlarının, değerlendirmede yararlı belirteçler olduğu giderek daha fazla kabul edilmektedir. Cerrahi sonuçlara ilişkin klinik olarak elde edilen verilerin, hastaların algıları ve bakım kalitesi puanlarıyla ilişkilendirilmesi gerektiğine dair farkındalık giderek artmaktadır. Bunun en önemli nedenlerinden birisi, cerrahların bu tür şikayetlerde ana hedefin olması ve cerrahlar tarafından uygulanan tedavilerin birçoğunun genellikle önemli riskler taşımasıdır. Ayrıca, cerrahların diğer branşlardaki meslektaşlarına göre hastalarla daha zayıf iletişim kurmaları diğer bir etkili faktördür (14).

Bu araştırmada, Türkiye'de Göğüs Cerrahi uzmanlık alanıyla ilgili olarak "sikayetvar.com" web sitesi üzerinden yapılan hasta şikayetlerini incelemesi amaçlanmıştır. Araştırmada ayrıca, Göğüs Cerrahisi branşı ile ilgili hasta şikayetlerindeki ortak temaları belirlenmesi, şikayette bulunan hasta popülasyonunun daha iyi tanımlanması ve şikâyet nedenlerini sistematik olarak incelenmesi amaçlanmıştır.

1. Materyal ve Method

Retrospektif olarak tasarlanan bu araştırmada, şikâyetvar.com sitesine yapılan şikâyetler nitel verilerin nicelleştirilerek analiz edildiği bir karma analiz yöntemi kullanılarak incelenmiştir. Araştırma öncesi etik kurul onayı alınmamıştır. Araştırma, 1 Ocak 2023 ile 15 Ağustos 2025 tarihleri arasında Türkiye'de Göğüs Cerrahisi branşı ile ilgili "sikayetvar.com" web sitesine yapılan 287 paylaşım incelemeye alınmıştır**.** Bu şikayetlerden 89'u göğüs cerrahisi uygulamaları ile doğrudan ilişkili olmayan şikayetler ile içeriği yeterli düzeyde tanımlanamayan veya değerlendirmeye uygun olmayan şikayetler olması nedeniyle

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çalışma dışı bırakılmıştır. Böylelikle araştırmamızda belirtilen tarihler arasında toplam 198 şikayet inceleme altına alınmıştır. Siteye kayıt için 18 yaş üzeri onayın alınması nedeniyle şikâyetlerin de 18 yaş üstü bireylerce yapılmış olduğu varsayılmıştır. Yapılan şikâyetler; hastanın cinsiyetine, kurumun kamu ya da özel hastaneye ait olmasına, yatan hasta, ayakta hasta veya acil hasta olmalarına, cerrahi işlem türüne, diğer bölümlerle ilgili olma durumlarına, şikâyetin görüntülenme sayılarına ve şikâyet konularına göre sınıflandırılmıştır.

Çalışmada elde edilen verilerin sınıflandırılması amacıyla içerik analizi yöntemi kullanılmıştır. İçerik analizi sonra elde edilen veriler nicelleştirilmiş ve SPSS 27 istatistik yazılım paketi kullanılarak analizleri yapılmıştır. Kodlama süreci, alanında deneyimli iki bağımsız araştırmacı tarafından gerçekleştirilmiştir. Kodlayıcılar, veri setini birbirlerinden bağımsız olarak incelemiş ve önceden tanımlanmış kodlama kriterleri doğrultusunda değerlendirme yapmıştır. Kodlama sürecinde ortaya çıkabilecek öznelliği azaltmak amacıyla standart bir kodlama kılavuzu oluşturulmuş ve tüm değerlendirmeler bu çerçevede yürütülmüştür. Kodlayıcılar arası uyum, Cohen’s kappa katsayısı kullanılarak değerlendirilmiş ve yüksek düzeyde uyum olduğu saptanmıştır (κ>0,80).

Hasta şikâyetlerine yönelik kodlama taksonomisi “klinik” (klinik bakımın güvenliği ve kalitesine ilişkin şikâyetler), “yönetim” (sağlık kuruluşunun yönetimine ilişkin şikâyetler) ve “ilişkiler” (sağlık personeli ile ilgili şikâyetler) bu üç alanı kullanmaktadır. Klinik alan "kalite" ve "güvenlik" kategorilerine, yönetim alanı "kurumsal sorunlar" ve "zamanlama/erişim" kategorilerine, ilişkiler alanı ise "iletişim", "insancıllık/ilgi" ve "hasta hakları" kategorilerine ayrılmıştır (7).

Araştırmada elde edilen veriler Reader ve ark. (2014) tarafından geliştirilen hasta şikâyet taksonomisi doğrultusunda içerik analizi türlerinden metin çözümleme yöntemi ile tümden gelimsel bir yaklaşım benimsenerek analiz edilmiştir (7).

Araştırma göğüs cerrahisi alanında sikayetvar.com web sitesine yapılan 198 hasta ve yakınlarının şikayeti ile sınırlıdır ve şikayetlerin doğruluğu bağımsız olarak doğrulanamamış olup, analizler bildirilen içerik üzerinden yapılmıştır. Veri toplama sürecinde elde edilen tüm şikayetler önceden tanımlanmış kriterler doğrultusunda sistematik olarak incelenmiştir. Bu kapsamda, göğüs cerrahisi uygulamaları ile doğrudan ilişkili olmayan şikayetler ile içeriği yeterli düzeyde tanımlanamayan veya değerlendirmeye uygun olmayan kayıtlar çalışma dışı bırakılmıştır.

İstatistiksel Değerlendirme

Araştırmada toplanan verilerin analizinde SPSS 27 istatistik yazılım paketi (Statistical Package for the Social Sciences – IBM®) kullanılmıştır. Araştırmada bağımsız değişkenlere verilen yanıtların dağılımına ilişkin tanımlayıcı istatistikler kategorik değişkenler için sayı ve yüzde. sayısal değişkenler için ise ortalama. standart sapma ve medyan olarak sunulmuştur. Sürekli değişkenlerin normal dağılım varsayımına uygunluğu Kolmogorov-Smirnow testi ile değerlendirilmiştir. İkili ve çoklu karşılaştırılmalarda niceliksel değişkenler için One Way Anova testi kullanılmıştır. Uygulanan göğüs cerrahi prosedürlerinin türüne göre şikayetlerin sıklığı Bonferroni düzeltmeli ki-kare testi

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kullanılarak karşılaştırılmıştır. Kodlayıcılar arası uyum, Cohen's kappa katsayısı kullanılarak değerlendirilmiştir. Sonuçlar %95 güven aralığında. $p<0.05$ anlamlı olarak değerlendirilmiştir.

2. Bulgular

Araştırmanın bu bölümünde, 1 Ocak 2023 ile 15 Ağustos 2025 tarihleri arasında Türkiye'de Göğüs Cerrahisi branşı ile ilgili "sikayetvar.com" web sitesine yapılan 198 şikayet incelenmiştir. Elde edilen veriler Reader vd. (7) tarafından geliştirilen hasta şikâyet taksonomisi doğrultusunda içerik analizi türlerinden metin çözümleme yöntemi ile tümden gelimsel bir yaklaşım benimsenerek analiz edilmiştir.

Araştırmaya dahil edilen 198 bireyin 117'si (%59,09) kadın ve 81'i (%40,91) erkekti. Şikâyet edilen hastanelerin 129'u (%65,15) kamu hastanesi iken, 69'u (%34,85) özel hastanelerdi. Şikâyette bulunan hastaların 10'u (%5,05) yatan hasta, 181'i (%91,41) ayaktan tedavi gören hasta ve 7'si (%3,54) acil servis hastası olduğu gözlendi. Şikâyetlerin 83'ü (%41,92) poliklinik hastaları, 106'sı (%53,54) cerrahi hastaları ve 9'u (%4,54) serviste tedavi gören hastalar tarafından yapıldığı saptandı. Göğüs cerrahisi ile ilgili 198 şikayetin 107'si (%54,04) göğüs cerrahisinde uygulanan işlemlerle ilgiliydi. 198 şikayetin 43'üne (%21,72) cevap aldıkları gözlendi. Göğüs cerrahi hizmetleri dışında kalan diğer şikayetlerin ise 47'sinin (%23,74) kalp ve damar cerrahisi, 29 'unun (%14,65) kardiyoloji, 7'sinin (%3,54) anestezi ve 8'inin (%4,04) göğüs hastalıkları ile ilgili olduğu tespit edildi. Şikayetlerin görüntüleme sayısının ortalama 7709,95±7273,51 (Min-Max: 63-36726) olduğu gözlendi (Tablo 1).

Araştırmadaki bireylerin demografik ve klinik özellikleri (n:198)

Tablo 1

Cinsiyet, *N* (%)	
Kadın	117 (%59,09)
Erkek	81 (%40,91)
Hastane Türü, *N(%)*	
Kamu	129 (%65,15)
Özel	69 (%34,85)
Hastanın hastane durumu, *N(%)*	
Yatan hasta	10 (%5,05)
Ayakta tedavi	181 (%91,41)
Acil servis	7 (%3,54)
Yapılan tedavi yerleri, *N(%)*	
Poliklinik	83(%41,92)
Cerrahi	106 (%53,54)
Servis	9 (%4,54)
Sadece Göğüs Cerrahi uygulamaları, *N (%)*	
Evet	107 (%54,04)
Hayır	91(%45,96)
Cevap, *N(%)*	
Var	43 (%21,72)
Yok	155 (%78,28)
Başka bölüm ilişkili (n:91), *N(%)*	
Kalp ve Damar Cerrahisi	47 (%23,74)
Kardiyoloji	29 (%14,65)
Göğüs Hastalıkları	8 (%4,04)
Anestezi	7 (%3,54)
Görüntüleme sayısı, Ort ±Std	7709,95±7273,51 (Min-Max: 63-36726)

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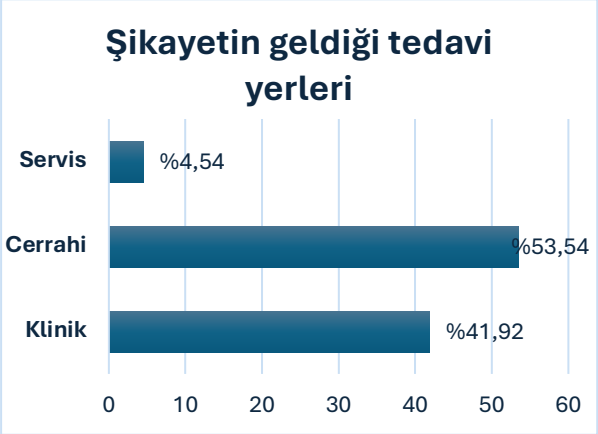
Tüm ameliyat olan hastaların şikayetlerinin göğüs cerrahisi poliklinik ve servis hastalarından gelen şikayetlerden istatistiksel anlamlı derecede fazla olduğu gözlendi (p <0,05) (Tablo 2).

Farklı müdahaleler arasında şikayet sıklığının ikili karşılaştırması

Tablo 2

	Polikl inik	*Cerrahi*	*Servis*
Poliklini k	-	p=0,043[a]	p=0,006[a]
Cerrahi			p=0,004 [a]
Servis			-

[a] Oranlar için z testi ve post hoc Bonferroni düzeltmesi ile hesaplanmıştır



Grafik 1.
Şikayetlerin geldiği tedavi yerleri

Reader ve arkadaşlarının hasta şikayeti taksonomisine göre şikayetlerin farklı alanlar, kategoriler ve alt kategoriler arasındaki dağılımını göstermektedir. Toplam 198 şikayetten 41'i (%20,71) klinik, 72'si (%36,35) yönetim, 85'i (%42,94) iletişim alanına ait olduğu gözlendi (Grafik 2).

Grafik 2.
Alan adlarına göre şikayetlerin dağılımı (%)

Şikayetlerin dağılımı incelendiğinde, en yüksek oranların iletişim temelli sorunlarda olduğu görülmektedir. İletişim eksikliği %12,54 (n=27) ile ilk sırada yer alırken, bunu personel tutumu %9,60 (n=19), hasta–personel diyaloğu %8,08 (n=16) ve saygı, hassasiyet ve şefkat eksikliği %7,07 (n=14) izlemektedir.

Yönetimle ilgili şikayetlerde erişim ve kabul süreçleri %7,07 (n=14) ve bürokrasi %6,57 (n=13) ile öne çıkarken, hizmet sorunları %4,55 (n=9) ve gecikmeler %4,04 (n=8) oranında saptanmıştır.

Klinikle ilgili şikayetler daha düşük oranlarda olup, muayene %5,56 (n=11), bakım kalitesi %4,55 (n=9) ve tedavi süreçleri %4,04 (n=8) olarak belirlenmiştir. Güvenlik olayları %2,53 (n=5) oranında bildirilirken, teşhis ve ilaç hataları %1,01 (n=2) düzeyinde kalmıştır.

Hasta haklarına ilişkin şikayetler ise oldukça sınırlı olup, gizlilik %0,51 (n=1) ve onam %2,02 (n=4) olarak saptanmış,

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suistimal ve ayrımcılık bildirimi yapılmamıştır (Tablo 3).

Şikayetlerin kategorilere göre dağılımı (n, %)

Tablo 3

			n	*%*
Klinikle İlgili Şikayetler	Kalite	Muayeneler	11	5,56
		Bakım Kalitesi	9	4,55
		Tedavi	8	4,04
		Hasta Transferi	2	1,01
	Güvenlik	Güvenlik Olayları	5	2,53
		Teşhisteki Hatalar	2	1,01
		İlaç Hataları	2	1,01
		Beceriler ve Davranışlar	2	1,01
Yönetim İlgili Şikayetler	Kurumsal Sorunlar	Bürokrasi	13	6,57
		Hizmet Sorunları	9	4,55
		Personel ve Kaynaklar	7	3,54
		Finans ve Faturalandırma	6	3,03
		Çevre	5	2,53
	Zamanlama/ Erişim	Erişim ve Kabul	14	7,07
		Gecikmeler	8	4,04
		Taburculuk	6	3,03
		Tavsiyeler	4	2,02
İletişimle İlgili Şikayetler	İletişim	İletişim Eksikliği	27	12,54
		Yanlış Bilgi	4	2,02
		Hasta-Personel Diyaloğu	16	8,08
	İnsancıllık/İlgili Olma	Saygı, Hassasiyet ve Şefkat	14	7,07
		Personel Tutumu	19	9,60
	Hasta Hakları	Suistimal	0	0,00
		Gizlilik	1	0,51
		Onay	4	2,02
		Ayrımcılık	0	0,00

4. Tartışma

Bu araştırmada göğüs cerrahisi branşında hasta ve yakınları tarafından "sikayetvar.com" web sitesine yapılmış olan 198 şikayetin nedenleri konusunda inceleme yapılmış, göğüs cerrahisi bölümü ile ilgili memnuniyetsizliklerini yetkili mercilere şikâyet eden bireylerin genel profilleri belirlemiş ve şikâyet sebepleri sistematik olarak değerlendirilmiştir. Literatürde hastaların ve yakınlarının göğüs cerrahi bölümünün hizmetlerine ilişkin şikâyetlerinin sıklığı ve nedenleri konusunda çalışmalar sınırlıdır. Bu nedenle araştırmamız özgün bir çalışmadır.

Çalışmamız sonucunda elde edilen bulgulara göre, **hastaların önemli bir kısmının şikâyetlerini iletişim sorunları (%42,94), yönetimsel süreçlerde yaşanan aksaklıklar** (%36,35) ve **klinik hizmet kalitesi (%20,71)** üzerinden şekillendirdiğini göstermektedir. Bu sonuçlar, göğüs cerrahisi hastalarının şikâyetlerinin önemli bir bölümünün **doğrudan sağlık profesyonelleriyle kurulan iletişim ve etkileşim süreçlerinden kaynaklandığını** ortaya koymaktadır. Literatürde araştırmamıza benzer biçimde, cerrahi branşlarda iletişim sorunlarının hasta şikâyetlerinin başlıca nedenlerinden

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biri olduğu belirtilmektedir (7,15). Hekim-hasta iletişimi, hasta güvenliği ve memnuniyetini doğrudan etkileyen temel bir unsur olup, iletişimdeki aksaklıkların hasta güveni üzerinde uzun vadeli olumsuz sonuçlar doğurabileceği bildirilmektedir (16). Literatürde Reader ve ark. (2014), hasta şikâyetlerinin %36'sının iletişim, %33'ünün yönetim, %31'inin klinik alanla ilişkili olduğunu saptamıştır (7). Bismark ve ark. (2013) cerrahi branşlarda yaptığı çalışmada da, hasta şikâyetlerinin büyük bölümünün cerrahi sonrası süreçte iletişim eksikliğine ve komplikasyon yönetiminde yetersiz bilgilendirmeye dayandığı bildirilmiştir (17). Skär ve ark. (2018) 337 hasta şikâyeti üzerinde yaptıkları analizde, olumsuz tutum, empati eksikliği ve iletişim sorunlarını vurgulamışlardır (18). Mann ve ark. (2012) yılında İngilterede bir üniversite hastanesinin cerrahi departmanına yapılan 360 şikayeti inceledikleri araştırmalarında şikâyetlerin %31'inin klinik, %19'unun iletişim, %8'inin kurumsal çevre/ortam, %6'sının ise kötü taburculuk ile ilgili olduğunu saptamışlardır. Şikâyetlerin %83'ünün telefon görüşmesiyle yada yanıt mektubuyla ve %13'ünün ise yüz yüze konuşmayla çözümlendiğini bildirmişlerdir (19). Chaulk ve ark. (2019) tarafından aynı taksonomi kullanarak 87 hasta şikâyetinin incelendiği araştırmalarında en önemli şikâyet ana temasının sırasıyla; Klinik (%66), İlişkiler (%60) ve Yönetim (%31) olduğu saptanmıştır (20). Çalışma sonuçlarımızla uyumlu Salazar ve ark. (2018) çalışmasında da en önemli şikâyet nedeninin Klinik (%52) kaynaklı olduğu, Yönetim (%24) ve İlişkiler (%24) olduğu (21); Harrison ve diğerlerinin (2016) çalışmasındaysa bu sıralamanın Klinik (%68), Yönetim (%19) ve İlişkiler (%13) şeklinde olduğu tespit edilmiştir (22). Van Den Berg ve ark. (2019) Hollanda'da bir Avrupa üçüncü basamak bakım merkezinin radyoloji bölümü tarafından 9 yıllık süreçte yapılan tüm yazılı hasta şikayetlerini inceledikleri çalışmalarında 94 şikayeti incelemişler ve çalışma sonucunda şikayetlerin Klinik (%56,4), İlişkiler (%23,4) ve Yönetim (%20,2) ilgili olduğunu saptamışlardır. Aynı taksonominin alt kategorileri açısından en fazla şikâyet nedenlerinin sırayla; hastanın yönlendirilmesi/takibi, hizmet alım süreçlerinin uzaması kaynaklı gecikmeler, iletişim sorunları, tanılama hataları, bakım kalitesi, hasta güvenliği vakaları ve tedavi olduğu sonucuna varmışlardır (23). Wei ve ark. (2018) Çin'in doğu bölgesinde yer alan bir üniversite hastanesine yapılan 821 şikayeti incelendikleri çalışmalarında en önemli şikâyet nedenlerinin; sağlık personelinin umursamaz tutumları, tedavi kalitesi ve mesleki beceriden/yetkinlikten memnuniyetsizlik, iletişim sorunları, bakım süreçleri ve ücretler-faturalandırma olduğu saptamışlardır (24). Kanada'da yapılan bir çalışmanın sonuçlarına göre (2012), alınan şikayetler arasında (1375) %41'inin idari performans, %9'unun tıbbi rapor, %9'unun etik şikayetler, %38'inin bakım kalitesi ve %2'sinin sınıflandırılmamış şikayetler olduğunu bildirmişlerdir (25). Karaduman ve ark. (2023) sağlık çalışanlarına yönelik hasta ve yakınlarının yaptıkları 1385 şikayeti inceledikleri çalışmalarında, hastalar ve/veya yakınlarının en sık şikayet ettikleri konuların %26,9 (n:372) ile kötü tavır ve %21,7 (n:300) ile uzun bekleme süresi olduğunu saptamışlardır (26). Gürlek, Kanber ve Çiçek tarafından 2011 yılında yapılan araştırmada, %45,0 ile saygı ve konfor eksikliği nedeniyle daha fazla başvuru yapılmıştır (27). Ayrıca, Türkiye bağlamında sağlık kurumlarında hasta bilgilendirme, uzun bekleme süresi, saygı ve kurum çalışanlarının yaklaşımı

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yönündeki memnuniyetsizlikler daha önce çalışmalarda da bildirilmiştir (28). Bu araştırmada iletişim kategorisinin oranının (%42,94) daha yüksek bulunması, Türkiye'deki hasta beklentilerinin özellikle **empati, bilgilendirme ve yaklaşım biçimleri** yönünden farklılaşabileceğini düşündürmektedir. Bu yönüyle, göğüs cerrahisi alanında iletişim ve bakım koordinasyonu konularında yapılacak iyileştirmelerin, hasta memnuniyetini artırmada belirleyici olacağı söylenebilir.

Araştırma bulgularımızdan bir diğeri en çok şikayetlerin kadın hastalar tarafından (%59,09) yapıldığı gözlenmiştir. Literatürde çalışmamıza benzerlik gösteren Alosaimi ve ark. (2018)'nin Suudi Arabistan'da farklı sağlık departmanlarına yapılan 672 şikâyeti değerlendirdikleri çalışmalarında, en fazla şikâyetin %63 ile kadınlar tarafından yapıldığı sonucuna varmışlardır (29). Araştırma sonuçlarımızdan farklı olarak Hoşgör ve Cengiz (2020) araştırmalarında sağlık hizmetlerinden şikâyetçi olan bireylerin genel profili ve şikâyet nedenleri incelemişler, araştırmada 15452 şikâyetçi ve 16489 şikâyet analiz etmişlerdir. Araştırma sonucunda en fazla şikâyet başvurusunda bulunan bireylerin lise mezunu, 41 yaş ve üzeri erkek hastalardan oluştuğunu bildirmişlerdir (30). McSweeney ve ark. (2021) Avustralya'da tek bölgede yer alan genel cerrahi departmanındaki 219 hasta şikayet verilerini retrospektif olarak değerlendirdikleri araştırmalrında en fazla şikâyetin %64 (n:139) ile kadınlar tarafından yapıldığını gözlemlemişlerdir (31).

Araştırmamızda, "sikayetvar.com" web sitesine kayıt olmak için 18 yaş ve üzeri olunduğunun onayı istendiğinden, şikayetlerin 18 yaş ve üstü kişiler tarafından yapıldığı varsayılmıştır. Karaduman ve ark. (2023) sağlık çalışanlarına yönelik hasta ve yakınlarının yaptıkları şikayetleri inceledikleri çalışmalarında en fazla şikâyet başvurusunda bulunan yaş grubunun %56,8 oran ile 20-40 yaş ve %36,3 oran ile 41-60 yaş aralığındaki hastalar olduğunu bildirmişlerdir (26). Lim ve ark. (1998) Singapur'daki Aile Hekimliği Hizmetleri'ne gelen şikayetleri inceledikleri çalışmalarında, 20-59 yaş grubundaki bireylerin 10-19 yaş grubundaki bireylere göre daha fazla şikayette bulunduklarını gözlemlemişlerdir (32). Önal ve Civaner (2015) ilerleyen yaşla birlikte bireylerin haklarını savunma konusundaki farkındalıklarının daha çok yükseldiği görüşünü bildirmişlerdir (28). Ayrıca yaşlı hastaların. kamu sağlık kurumlarından şikâyetçi olmaları sebebiyle hizmet alamayacaklarına ilişkin korkuyu daha az hissetmeleri de bu durumun bir nedeni olarak görülebilir.

Şikayet, bir kuruluşun ürün ve hizmetinin müşteri beklentilerinin altında performans gösterdiğini gösteren bir unsurdur. Bu açıdan bakıldığında, sağlık kuruluşlarında hasta ve yakınlarının memnuniyetsizliği, hasta sadakatini sona erdiren temel unsurdur. Sağlık kuruluşlarında hastane ya da doktorlara yönelik hasta sadakati, kurumsal itibar üzerinde etkisi olan bir kavramdır ve kurumsal itibar, sağlık kurumları için stratejik öneme sahip maddi olmayan bir kaynaktır. Bu nedenle sağlık kurumlarında hastaların şikayetlerine verilen cevaplar ve bilgilendirmeler, şikayetler aldıktan sonra bölümler tarafından yapılan son derece önemli bir

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eylemdir. Araştırmamızda 198 şikayetin 107'si (%54,04) sadece göğüs cerrahisinde uygulanan işlemlerle ilgiliydi ve şikayetin 43'üne (%21,72) hasta ve yakınlarının cevap aldıkları gözlendi. Araştırmamızın bulgularına paralel olarak Moghadam ve ark. (2010) İran'da, Taylor ve ark. (2002) ise Avustralya'da yaptıkları çalışmalarda şikâyetlerin büyük bir oranda (sırayla: >%90 ve >%73) açıklama ve/veya teşekkür ile çözüme kavuşturulduğu, diğer bir ifadeyle şikâyetlerin sağlık hizmet kullanıcılarının memnuniyetiyle sonuçlandığı rapor edilmiştir (33,34). Benzer şekilde, Chavan ve ark. Birleşik Krallık'taki bir göz hastanesinde, genel olarak şikayetlerin %84'ünün ilk aşamada uygun açıklama, değerlendirme veya özür yoluyla çözüldüğünü açıklamışlardır. Sadece %1'i yasal makamlara sevk edilmiştir (35). Diğer yandan, Wong ve ark. (207) Singapur'daki Ulusal Üniversite Hastanesi Acil Tıp Bölümüne yapılan 223 şikayetlerin %82,8'inin yerinde çözüldüğünü bildirmiştir (36). Hastaların hastane hizmet kalitesini anlamak (37) ve hasta şikayet yönetim sistemi (Worku, 2017) ile çevrimiçi problem çözme stratejisi (9) uygulamak, sadece hastaların memnuniyeti için değil, yönetim için de çok önemlidir.

Araştırmamızda yapılan şikâyetlerin 83'ü (%41,92) poliklinik hastaları, 106'sı (%53,54) cerrahi hastaları ve 9'u (%4,54) serviste tedavi gören hastalar tarafından yapıldığı saptandı. Literatürde çalışmamıza benzerlik gösteren Hoşgör ve Tosun (2020), tarafından yapılan çalışmada hasta ve hasta yakınları tarafından şikâyetlere en fazla neden olan tıbbi birimlerin; poliklinikler (%67,4), klinikler (%14,7), acil servis (%9,0), laboratuvar hizmetleri (%3,4), ameliyat hizmetleri (%2,2), görüntüleme hizmetleri (%2,2) ve yoğun bakım hizmetleri (%1,1) olduğu tespit edilmiştir (39).

Araştırmamızda şikayet edilen hastanelerin 129'u (%65,15) kamu hastanesi iken, 69'u (%34,85) özel hastanelerden oluşuyordu. Hoşgör ve Cengiz (2020) yaptıkları araştırmada en fazla şikâyet yapılan hastane türlerinin sırayla devlet (%42,1). üniversite (%26,2) ve özel (%10,5) hastanelerden oluştuğunu bildirmişlerdir (30). Asnawi ve ark. (2019) araştırması, hastane imajının hasta memnuniyeti üzerinde büyük bir etkisi olduğunu bildirmiştir (40). Özellikle özel hastanelerde hastalara uygulanan tedavi ve hastane yetkililerinin hastaları değer vermemesi ve ihtiyaçlarını dikkate almamasıyla ilgili e-şikayetler, hastaların memnuniyet düzeyini ve hastanenin imajını etkileyecektir. Bu durum Türkiye'de devlet ve üniversite hastanelerinin de tıpkı özel sağlık işletmelerinde olduğu gibi hasta/hasta yakını odaklı hizmet sunmayı önceledi̇ği, sağlık hizmet alıcılarının görüş-öneri beklentilerini önemsediği, onlar tarafından tekrar tercih edilmeyi arzu ettikleri şeklinde yorumlanabilir.

Sınırlılıklar

Bu çalışmanın başlıca sınırlılığı, verilerin yalnızca 1 Ocak 2023 ile 15 Ağustos 2025 tarihleri arasında Türkiye'de Göğüs Cerrahisi branşı ile ilgili "sikayetvar.com" web sitesine hasta ve yakınları tarafından yapılan 287 şikayet ile sınırlı olup, tek bir e-şikâyet platformundan elde edilmesidir. Yapılan tüm şikayetlerin doğruluğu bağımsız olarak doğrulanamamış olup, analizler bildirilen içerik üzerinden yapılmıştır. Bu nedenle sonuçlar tüm hasta popülasyonuna genellenemez. Ayrıca araştırmanın tek bir platformundan elde

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edilmesi sonuç yanlılığına sebep olabilecektir. Araştırmaların genele yakınında spesifik bir şikâyet taksonomisinin kullanılmaması, şikâyet nedenleriyle ilgili olarak tam bir tanım birliğine ulaşılmasını zorlaştırmakta ve bu da şikâyet nedenlerinin sınıflandırılması esnasında sübjektifliğe yol açabilmektedir. Ayrıca platformda kullanıcı kimlikleri doğrulanmadığından, şikâyetlerin gerçekliği ve özgünlüğü sınırlı ölçüde değerlendirilebilir. Bununla birlikte, bu tür veriler sağlık sistemine yönelik **toplumsal algının güçlü bir yansıması** olarak değerlendirilebilir.

5. Sonuç

Hasta şikayetleri, Göğüs Cerrahisi branşının eksikliklerini gidermede nispeten az kullanılan bir kaynak olmaya devam etmektedir. Göğüs Cerrahisi branşının hizmetlerinde hasta memnuniyetsizliğinin kaynaklarını bilmek, hasta şikayetlerinin sayısını azaltmaya ve hasta bakımını iyileştirmeye yardımcı olabilir. Elde edilen bu sonuçların sağlık işletmesi yöneticilerine etkili şikayet yönetimi konusunda rehberlik edebileceği ve hasta memnuniyetini artırmaya yardımcı olabileceği düşünülmektedir.

Gelecekte yapılacak araştırmaların farklı platformlardan (örneğin sosyal medya, e-Nabız hasta yorumları veya hastane içi şikâyet kayıtları) veri toplayarak **karşılaştırmalı analizler** yapması önerilmektedir. Ayrıca, e-şikâyet verilerinin **nicel memnuniyet anketleri** ve **hasta görüşmeleri** ile desteklenmesi, bulguların geçerliliğini artıracaktır. Bunun yanı sıra E-şikâyetlerin düzenli olarak analiz edilmesi, hasta deneyiminde sorunlu alanların erken tespit edilmesini ve kurumların **proaktif kalite iyileştirme stratejileri** geliştirmesini sağlayabilir. Bu tür sistemler, hasta güvenliği kültürünün güçlenmesine ve sağlık hizmeti kalitesinin sürdürülebilir biçimde artırılmasına katkıda bulunacaktır.

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Severe Hypermagnesemia Following Rectal Magnesium Laxative Use Complicated by Non-Occlusive Mesenteric Ischemia: A Case Report

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Abstract

Magnesium-containing laxatives are commonly used in elderly patients for the treatment of constipation; however, excessive magnesium absorption, particularly in individuals with impaired renal function, may result in severe hypermagnesemia that can lead to life-threatening complications. Non-occlusive mesenteric ischemia (NOMI) is a rare but often fatal condition characterized by intestinal hypoperfusion without major arterial occlusion and is typically associated with systemic hypotension and low-flow states. We report the case of an 83-year-old female with a history of hypertension and chronic neurological sequelae who presented to the emergency department with altered mental status, abdominal pain, hypotension, and bradycardia following rectal administration of a magnesium-containing laxative. Laboratory analysis revealed severe hypermagnesemia (8.56 mg/dL), acute kidney injury, metabolic acidosis, elevated lactate (10 mmol/L), leukocytosis, and markedly increased inflammatory markers. Contrast-enhanced abdominal computed tomography demonstrated diffuse small bowel wall thickening with decreased mural enhancement and mesenteric edema, while CT angiography showed patent mesenteric arteries without occlusion, findings consistent with non-occlusive mesenteric ischemia. Despite aggressive fluid resuscitation, vasopressor therapy, broad-spectrum antibiotics, and emergency surgical resection of necrotic bowel segments, the patient developed multiorgan failure and died on postoperative day nine. Severe hypermagnesemia in elderly patients with renal impairment may therefore lead to profound hemodynamic instability and systemic hypoperfusion, potentially contributing to the development of NOMI; early recognition of hypermagnesemia, prompt measurement of serum magnesium levels, and aggressive management are essential to reduce morbidity and mortality. In addition, the markedly elevated

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inflammatory markers raise the possibility of a mixed shock state, in which both hypermagnesemia-induced cardiovascular depression and a concomitant septic process may have contributed to systemic hypoperfusion and the development of non-occlusive mesenteric ischemia.

Keywords: Hypermagnesemia; Mesenteric Ischemia; Laxatives; Aged; Acute Kidney Injury

Introduction

Constipation is a common condition among elderly individuals and is frequently managed with osmotic laxatives, including magnesium-containing preparations due to their efficacy and accessibility. Magnesium oxide and other magnesium-based agents are widely prescribed for the treatment of chronic constipation (1). However, excessive magnesium intake or impaired renal excretion may result in hypermagnesemia, a potentially life-threatening electrolyte disorder characterized by neuromuscular, cardiovascular, and respiratory complications (2). Elderly patients are particularly vulnerable because of age-related decline in renal function, multiple comorbidities, and the frequent use of magnesium-containing medications or laxatives (3).

Magnesium plays an essential role in numerous physiological processes, including neuromuscular transmission, vascular tone regulation, and cardiac electrophysiology (4). Elevated serum magnesium levels exert calcium antagonist effects that can cause hypotension, bradycardia, and decreased myocardial contractility, potentially leading to cardiovascular collapse in severe cases (2,4).

Non-occlusive mesenteric ischemia (NOMI) is a subtype of acute mesenteric ischemia characterized by intestinal hypoperfusion in the absence of major arterial obstruction (5). It is typically associated with systemic hypotension, heart failure, sepsis, or other low-flow states that compromise mesenteric blood supply (6). NOMI accounts for approximately 20–30% of acute mesenteric ischemia cases and carries a high mortality rate, particularly when diagnosis and treatment are delayed (6,7).

Although hypermagnesemia has been reported following the use of magnesium-containing cathartics and enemas, reports describing severe hypermagnesemia associated with the development of NOMI are extremely limited. Here we present a fatal case of severe hypermagnesemia following rectal magnesium laxative use complicated by non-occlusive mesenteric ischemia in an elderly patient with acute kidney injury.

Case Presentation

An 83-year-old woman with a history of hypertension and chronic neurological sequelae presented to the emergency department. Her neurological deficits included permanent right-sided visual impairment and right upper extremity motor deficit secondary to a previous cerebrovascular event.

One week prior to admission, the patient had sustained a lumbar vertebral fracture following a fall and was advised bed rest with corset immobilization. She had a history of chronic constipation and intermittently used oral and rectal magnesium-containing laxatives.

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Shortly after rectal administration of a magnesium-containing laxative for constipation, she developed diffuse erythematous skin rash, abdominal pain, progressive weakness, and altered mental status.

Physical Examination

At presentation, the patient appeared confused and lethargic with slow responses to verbal stimuli.

Skin examination revealed diffuse erythematous rash. This rash may represent a systemic or hypersensitivity reaction following laxative administration. Abdominal examination demonstrated diffuse tenderness with guarding and rebound tenderness.

Vital signs were as follows:

Blood pressure: 88/59 mmHg

Pulse: 54 beats/min

Temperature: 35.5°C

Respiratory rate: 14/min

Oxygen saturation: 86% on room air

Blood glucose: 158 mg/dL

Electrocardiography demonstrated sinus rhythm with T-wave inversion in lead DIII.

Laboratory Findings

Laboratory tests revealed severe metabolic and inflammatory abnormalities (Table 1).

Table 1. Laboratory findings with reference values

PARAMETER	PATIENT VALUE	REFERENCE RANGE
MAGNESIUM	8.56 mg/dL	1.7–2.4 mg/dL
CREATININE	2.11 mg/dL	0.6–1.2 mg/dL
LACTATE	10 mmol/L	0.5–2.0 mmol/L
BICARBONATE (HCO_3^-)	14 mmol/L	22–28 mmol/L
WHITE BLOOD CELL COUNT	27.5 $\times 10^3/\mu L$	4.0–10.0 $\times 10^3/\mu L$
PROCALCITONIN	>100 ng/mL	<0.05 ng/mL
C-REACTIVE PROTEIN (CRP)	56 mg/L	<5 mg/L
D-DIMER	14,230 ng/mL	<500 ng/mL

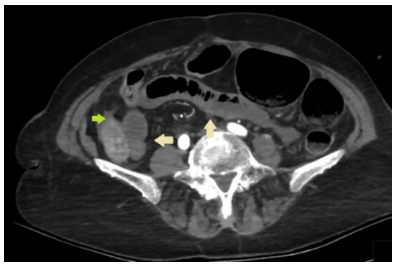
These findings were consistent with severe hypermagnesemia, acute kidney injury, metabolic acidosis, and systemic inflammatory response.

Imaging Studies

Contrast-enhanced abdominal computed tomography demonstrated diffuse circumferential wall thickening of proximal jejunal and ileal loops with reduced bowel wall enhancement and submucosal edema. Mesenteric fat stranding and interloop free fluid were also present.

CT angiography revealed diffuse atherosclerotic plaques in the abdominal aorta; however, the celiac trunk, superior mesenteric artery, and inferior mesenteric artery were patent without evidence of arterial occlusion (Figure 1).

Figure 1. Figure 1. Contrast-enhanced abdominal CT and CT angiography findings.



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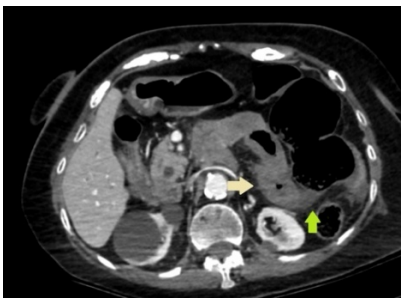

These findings were considered compatible with non-occlusive mesenteric ischemia.

Management and Clinical Course

The patient received aggressive intravenous fluid resuscitation, norepinephrine infusion for hemodynamic support, and broad-spectrum antimicrobial therapy including meropenem, teicoplanin, and fluconazole.

Supportive treatment for hypermagnesemia included intravenous hydration and diuretics to enhance renal magnesium excretion. Intravenous calcium gluconate 10% 20 mL was administered to counteract the cardiodepressant effects of hypermagnesemia.

Hemodialysis was also considered; however, it could not be performed due to the patient's rapidly deteriorating hemodynamic status and the need for urgent surgical intervention. Hemodialysis could not be initiated due to profound hemodynamic instability and the urgent need for surgical intervention.

Emergency exploratory laparotomy revealed extensive small bowel ischemia and necrosis. The affected intestinal segments were resected and an ileostomy was performed.

Despite intensive postoperative care, the patient developed progressive multiorgan failure and died on postoperative day nine due to cardiac arrest.

Discussion

Hypermagnesemia is an uncommon but potentially life-threatening electrolyte disorder that usually develops in patients with impaired renal excretion or excessive magnesium intake (2, 4). The kidneys play a central role in maintaining magnesium homeostasis, and decreased renal function significantly increases the risk of magnesium accumulation, particularly in elderly patients receiving magnesium-containing medications (3).

Magnesium acts as a physiological calcium antagonist and suppresses neuromuscular transmission as well as myocardial contractility (4). As serum magnesium levels

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rise, patients may develop hypotension, bradycardia, and cardiac conduction abnormalities. Severe hypermagnesemia, generally defined as serum levels exceeding 6 mg/dL, may lead to profound cardiovascular depression, respiratory failure, and cardiac arrest (2,4). In this case, the clinical picture likely represents a multifactorial mechanism, with both hypermagnesemia-induced cardiovascular depression and a concomitant septic process contributing to systemic hypoperfusion and the development of non-occlusive mesenteric ischemia.

Magnesium-containing laxatives and enemas are frequently used to treat constipation, especially among elderly or immobilized patients. However, several studies have documented severe hypermagnesemia associated with magnesium-based cathartics, particularly in individuals with impaired renal function. Rectal administration may result in significant systemic absorption, especially when large doses are used or when intestinal mucosal integrity is compromised (1-3).

In the present case, the patient developed severe hypermagnesemia accompanied by hypotension and bradycardia, suggesting significant cardiovascular depression. These hemodynamic disturbances may have contributed to systemic hypoperfusion and subsequent development of non-occlusive mesenteric ischemia.

NOMI occurs as a consequence of intestinal hypoperfusion without mechanical arterial obstruction. The underlying mechanism involves mesenteric vasoconstriction and reduced intestinal blood flow triggered by systemic hypotension, heart failure, or shock states (8,9). Early diagnosis is often challenging, and delayed recognition significantly increases mortality (9).

Another important consideration in this case is the presence of markedly elevated inflammatory markers including leukocytosis, elevated procalcitonin levels, and high lactate concentration. These findings raise the possibility of septic shock. It is therefore plausible that the patient developed a mixed shock state in which both hypermagnesemia-induced cardiovascular depression and systemic inflammatory response contributed to mesenteric hypoperfusion and intestinal ischemia (8,9).

Management of severe hypermagnesemia focuses on stabilizing cardiovascular function and enhancing magnesium elimination. Initial treatment typically includes intravenous calcium administration to antagonize the cardiac effects of magnesium, aggressive fluid resuscitation, and loop diuretics to promote renal magnesium excretion (4). In patients with severe hypermagnesemia or renal failure, hemodialysis is considered the most effective method for rapidly reducing serum magnesium levels.

NOMI remains a highly lethal condition with reported mortality rates exceeding 50%, particularly when diagnosis and treatment are delayed (6,7). Early recognition of hemodynamic instability and prompt restoration of mesenteric perfusion are therefore essential to improve patient outcomes.

This case highlights the importance of considering hypermagnesemia in elderly patients presenting with unexplained hypotension and bradycardia, especially in the setting of recent magnesium-containing laxative use.

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Conclusion

Magnesium-containing laxatives should be used with caution in elderly patients, particularly in those with impaired renal function. Severe hypermagnesemia may cause significant cardiovascular depression and systemic hypoperfusion, potentially contributing to the development of non-occlusive mesenteric ischemia.

Early recognition of hypermagnesemia, prompt measurement of serum magnesium levels, and aggressive hemodynamic management are essential for reducing morbidity and mortality in such patients.

Informed Consent

Written informed consent was obtained from the patient's legal representatives for publication of this case report and any accompanying images.

Financial Disclosure

The authors declare that no financial support was received for this study.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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Association of Intravenous Immunoglobulin Therapy with Coagulation Dynamics and Clinical Outcomes in Patients with ARDS: A Single-Center Study in Azerbaijan

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Abstract

Acute respiratory distress syndrome (ARDS) remains a severe clinical condition in intensive care practice, characterized by high morbidity and mortality. ARDS is not limited to respiratory failure alone but is also accompanied by a systemic inflammatory response, endothelial dysfunction, and activation of the coagulation system. Although intravenous immunoglobulin (IVIG) therapy has attracted attention as an immunomodulatory approach in critical illness, its relationship with coagulation dynamics in patients with ARDS has not been sufficiently investigated
This retrospective, single-center cohort study was conducted in the intensive care unit of the Baku Medical Plaza Babek branch. Patients aged 18 years and older who were diagnosed with ARDS according to the Berlin criteria and treated between January 1, 2015 and December 31, 2020 were included in the study. Patients were divided into two groups: those receiving standard treatment alone and those receiving IVIG in addition to standard treatment. IVIG was administered at a dose of 0.4 g/kg/day for 5 days. Coagulation parameters, including the international normalized ratio (INR) and D-dimer levels, were assessed at treatment initiation and on days 3, 5, 7, and 10. Survival was analyzed as an exploratory clinical outcome.
A total of 89 patients were included in the study (IVIG group n=26, control group n=63). At baseline, INR and D-dimer values were similar between the groups. From day 3 of treatment onward, the IVIG group demonstrated more stable and consistent changes in INR over time, with statistically significant differences observed at several consecutive time points. D-dimer levels showed a declining trend in both groups, but no statistically significant differences were recorded between the groups. Logistic regression analysis for survival showed a statistically non-significant association between IVIG therapy and an increased probability of survival.
In patients with ARDS, intravenous immunoglobulin therapy was associated with the temporal dynamics of coagulation parameters, particularly INR. Although the findings regarding D-dimer and survival were not statistically conclusive, the observed trends do not rule out a potential effect of IVIG on coagulation balance. These findings provide a basis for evaluating IVIG as an additional immunomodulatory approach in the treatment of ARDS and highlight the importance of future prospective studies. Although

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the observed INR changes did not exceed clinically critical thresholds, they may reflect a more stable course of coagulation balance.
Keywords: ARDS; intravenous immunoglobulin; coagulation dynamics; INR; D-dimer; intensive car

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1 | Introduction

Acute respiratory distress syndrome (ARDS) remains a severe clinical syndrome characterized by high mortality and morbidity in intensive care practice. ARDS is accompanied by diffuse alveolar injury, severe hypoxemia, and non-cardiogenic pulmonary edema, and often requires mechanical ventilation [1,2]. Despite modern intensive care approaches, clinical outcomes in patients with ARDS remain unsatisfactory, and there is still a need for new therapeutic strategies [3].

The pathogenesis of ARDS involves not only respiratory mechanisms but also a systemic inflammatory response, endothelial dysfunction, and activation of the coagulation system [4,5]. Studies conducted in recent years have demonstrated that microvascular and macrovascular thrombosis during ARDS may significantly affect the course and prognosis of the disease [6]. These findings indicate that ARDS is not merely a lung-limited process but a complex syndrome accompanied by systemic vascular and hemostatic disturbances.

Activation of the coagulation system in ARDS results in fibrin deposition, microthrombosis, and impairment of alveolar-capillary exchange [7]. In clinical practice, laboratory markers such as D-dimer and the international normalized ratio (INR) are used as indirect markers of these processes and have been associated with disease severity [8,9]. However, it is still not fully clear how the temporal changes in these parameters evolve in the context of therapeutic interventions.

Intravenous immunoglobulin (IVIG) preparations have long been used in the treatment of immunodeficiencies and autoimmune diseases. In recent years, the immunomodulatory and anti-inflammatory effects of IVIG have attracted interest in the context of critical illness [10–12]. However, data on the impact of IVIG therapy on the temporal dynamics of coagulation parameters and clinical outcomes in patients with ARDS are limited.

Therefore, the analysis of observational data obtained from real clinical practice may contribute to a better understanding of the potential role of IVIG in ARDS. Considering the scarcity of studies conducted on this topic in Azerbaijan, the aim of this study was to evaluate the association of intravenous immunoglobulin therapy with coagulation dynamics and clinical outcomes in patients with ARDS.

2 | Materials and Methods

2.1 Study design and setting

This study is a retrospective, single-center cohort study conducted in the intensive care unit of the Baku Medical Plaza Babek branch located in Baku. Patients treated in the intensive care unit between January 1, 2015 and December 31, 2020 with a diagnosis of ARDS according to the Berlin criteria were included in the study.

2.2 Patient selection

Patients aged 18 years and older with confirmed ARDS who were treated in the intensive care unit were included in the study. Chronic coagulopathy, active hematologic malignancy, long-term anticoagulant therapy before treatment, and incomplete laboratory data were accepted as exclusion criteria.

2.3 Treatment protocol

Patients selected for immunomodulatory treatment received intravenous immunoglobulin (IVIG). For this purpose, Panziga® (Octapharma AG, Switzerland), a human normal immunoglobulin preparation in the form of a 10% solution, was used.

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IVIG was administered intravenously at a dose of 0.4 g/kg/day for 5 consecutive days (total dose 2 g/kg), based on clinical decision. The preparation was stored and administered according to the manufacturer's recommendations. The assignment of IVIG therapy was not randomized and was based on the clinical decision of the intensive care physician. The preparation was mainly administered to patients with a severe inflammatory response, unstable clinical course, and inadequate response to standard treatment.

2.4 Data collection

Demographic data, clinical findings, and laboratory parameters were collected retrospectively from medical records. Coagulation parameters, including the international normalized ratio (INR) and D-dimer levels, were recorded at baseline and on days 3, 5, 7, and 10 of treatment. Survival was assessed as the clinical outcome.

2.5 Management of missing data

Due to the retrospective design, incomplete data were present for some clinical and laboratory variables. Analyses were performed based on the available observations for each variable, and no additional imputation methods were used. The presence of missing data particularly limited the complete comparison of baseline clinical characteristics and the construction of multivariable models

2.6 Statistical analysis

Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 29.0 (IBM Corp., Armonk, NY, USA). The distribution of continuous variables was assessed using the Shapiro–Wilk test. Continuous variables not conforming to a normal distribution were presented as median and interquartile range (Q1–Q3). The Mann–Whitney U test was used for comparison of continuous variables between groups. Categorical variables were compared using the chi-square test or Fisher's exact test when appropriate.

The effect of IVIG therapy on survival was evaluated using univariable logistic regression analysis, and results were presented as odds ratio (OR) and 95% confidence interval (CI). Statistical significance was accepted as $p < 0.05$. Since this study had a retrospective design and there were incomplete data for some clinical variables, the construction of multivariable statistical models was limited. Therefore, the analyses were mainly conducted using univariable approaches.

2.7 Presentation of results

Continuous variables were presented as median and interquartile range (Q1–Q3), while categorical variables were presented as number and percentage. All statistical tests were two-sided, and $p < 0.05$ was accepted as the threshold for statistical significance.

2.8 Ethical approval

This study was conducted based on the retrospective analysis of the medical data of patients who applied to the Baku Medical Plaza Babek branch. The study protocol was approved by the Ethics Committee of Baku Medical Plaza Medical Center (Protocol No: BPM-EK-2024-12, approval date: December 12, 2024). The study was carried out in accordance with the principles of the Declaration of Helsinki. Due to the retrospective design, written informed

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consent was not obtained from individual patients, and all data were anonymized.

3 | Results

In this retrospective single-center study, data from a total of 89 patients treated in the intensive care unit with a diagnosis of ARDS were analyzed. Patients were divided into two groups: a control group receiving standard treatment (n=63) and a group receiving intravenous immunoglobulin (IVIG) in addition to standard treatment (n=26). The results were systematically evaluated in terms of baseline demographic and clinical characteristics, temporal dynamics of coagulation parameters, and clinical outcomes.

3.1 Baseline demographic and clinical characteristics

The baseline demographic and clinical characteristics of the patients are presented in Table 1.

Table 1. Baseline demographic and coagulation characteristics of patients with ARDS

Variable	Control group (n=63)	IVIG group (n=26)	p
Age group <50 years, n (%)	10 (15.6%)	7 (28.0%)	0.232
Age group ≥50 years, n (%)	54 (84.4%)	18 (72.0%)	0.232
Arterial hypertension, n (%)	39 (60.9%)	19 (76.0%)	0.274
Diabetes mellitus, n (%)	45 (70.3%)	22 (88.0%)	0.143
Pulmonary pathology, n (%)	55 (85.9%)	24 (96.0%)	0.271
Smoking, n (%)	36 (56.3%)	19 (76.0%)	0.139
ICU stay, days, median (Q1–Q3)	12.0 (9.0–15.3)	12.0 (10.0–16.0)	0.498

Based on the available data, a statistically significant difference in sex distribution was observed between the groups. The proportion of male patients was higher in the control group than in the IVIG group. Due to incomplete data for some other baseline clinical variables, it was not possible to conclude that the groups were fully balanced across all important baseline characteristics. Therefore, subsequent associations should be interpreted with caution, and these results should be considered observational findings rather than evidence of causality.

3.2 Temporal dynamics of INR values

The temporal change in INR, one of the main indicators of the coagulation system, was compared between the groups, and the results are presented in detail in Table 2.

Table 2. Temporal dynamics of INR values

Time point	Control group, median (Q1–Q3)	IVIG group, median (Q1–Q3)	p
Baseline	1.31 (1.20–1.58)	1.50 (1.21–1.70)	0.204
Day 3	1.31 (1.17–1.50)	1.55 (1.27–1.79)	0.006
Day 5	1.30 (1.04–1.45)	1.48 (1.24–1.72)	0.008
Day 7	1.29 (1.01–1.46)	1.44 (1.21–1.74)	0.006
Day 10	1.29 (1.02–1.45)	1.49 (1.25–1.87)	0.0016

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At baseline, INR values did not show a statistically significant difference between the control and IVIG groups (p=0.204). This indicates that coagulation status was similar between the groups at the start of treatment.

From day 3 of treatment onward, consistent and sustained differences in INR values were observed in the IVIG group compared with the control group. On day 3, the median INR in the IVIG group was 1.55 (Q1–Q3: 1.27–1.79), whereas it was 1.31 (1.17–1.50) in the control group, and this difference was statistically significant (p=0.006). A similar trend continued on treatment days 5 and 7; p=0.008 on day 5 and p=0.006 on day 7, respectively.

On day 10 of treatment, the difference in INR values between the groups was expressed even more clearly. The median INR was 1.29 (1.02–1.45) in the control group and 1.49 (1.25–1.87) in the IVIG group, and this difference showed high statistical significance (p=0.0016). Overall, these results indicate that INR values in patients receiving IVIG changed more stably and consistently over time, and that the differences were not limited to a single time point.

3.3 Temporal changes in D-dimer levels

The temporal dynamics of D-dimer levels are presented in Table 3. At baseline, D-dimer values were similar between the groups (p=0.711). During treatment, a gradual declining trend in D-dimer levels was observed in both groups. In the IVIG group, this decrease was noticeable in the early period, but the between-group differences at various time points did not reach statistical significance.

On day 10 of treatment, the median D-dimer level was 1.72 (1.27–2.16) in the control group and 2.12 (1.57–2.41) in the IVIG group. At this stage, the between-group difference showed a trend close to the threshold of statistical significance (p=0.080). Overall, although the D-dimer findings suggested the presence of a declining trend in patients receiving IVIG, these changes did not allow a statistically definitive conclusion.

Table 3. Temporal changes in D-dimer levels

Time point	Control group, median (Q1–Q3)	IVIG group, median (Q1–Q3)	p
Baseline	2.26 (1.82–2.83)	2.26 (1.52–2.79)	0.711
Day 3	2.04 (1.61–2.78)	2.05 (1.60–2.73)	0.802
Day 5	2.08 (1.64–2.62)	2.20 (1.41–2.69)	0.582
Day 7	1.81 (1.37–2.39)	2.13 (1.28–2.40)	0.785
Day 10	1.72 (1.27–2.16)	2.12 (1.57–2.41)	0.080

3.4 Clinical outcomes

Survival as a clinical outcome was evaluated by logistic regression analysis, and the results are presented in Table 4. According to the analysis, the probability of survival was higher in patients receiving IVIG compared with those who did not receive it (OR=2.23; 95% CI: 0.83–5.96). However, this association did not reach statistical significance (p=0.11). Although these findings suggest that IVIG therapy may have a potential positive effect on survival, the available data are not sufficient to confirm this effect definitively.

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Table 4. Association between IVIG therapy and survival: univariable logistic regression

Variable	OR	95% CI	p
IVIG therapy (yes vs no)	2.23	0.83–5.96	0.11

4 | Discussion

The main finding of this single-center retrospective study is that intravenous immunoglobulin (IVIG) therapy in patients with ARDS was associated with the temporal dynamics of coagulation parameters, particularly INR. The results show that INR values in patients receiving IVIG differed consistently and continuously from those in the control group from the early phase of treatment onward. The observation of these differences at several consecutive time points reduces the likelihood of random variation and suggests a systematic trend. Since IVIG treatment was administered based on clinical decision, there is a risk of selection bias (indication bias). Therefore, the possibility that patients receiving IVIG had more severe clinical status at baseline cannot be excluded.

In the pathogenesis of ARDS, systemic inflammatory response, endothelial injury, and, consequently, activation of the coagulation system are considered key mechanisms [1–3]. Studies conducted in recent years have shown that microthrombotic and macrothrombotic processes during ARDS and severe critical illness may directly affect the clinical course and prognosis [4,5]. In this respect, temporal monitoring of coagulation parameters, rather than relying on a single measurement, is considered a more informative approach in evaluating the course of the disease [6].

The immunomodulatory effects of IVIG preparations have been widely described, and these effects are thought to be mediated through cytokine neutralization, blockade of Fc receptors, regulation of the complement system, and restoration of immune homeostasis [7–9]. More recent studies suggest that IVIG may also indirectly influence endothelial function and inflammation-related coagulation activity [10,11]. In our study, the more stable temporal changes in INR values in the IVIG group are consistent with these mechanisms and suggest that the effect of IVIG on coagulation balance may be indirect.

One of the important aspects of the findings is that the differences in INR were observed not only in the late stage of treatment but already from day 3 onward. These consistent changes correspond to the concept of "temporal consistency," which is frequently emphasized in high-level studies, and allow a more reliable clinical interpretation of biomarker changes [12]. At the same time, it should be noted that the observed INR values did not enter the range of clinically pathological prolongation and remained mainly at stable and manageable levels. This point is also important in terms of preserving the potential safety profile of IVIG.

The results regarding D-dimer should be interpreted more cautiously. Although a declining trend over time was observed in both groups, the between-group differences did not achieve statistical significance. Nevertheless, the presence of a near-significant trend on day 10 suggests that the potential effect of IVIG on thrombotic activity cannot be completely excluded. Previous studies have also reported that the relationship between D-dimer levels and clinical outcomes is heterogeneous and

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influenced by numerous confounding factors [13–15]. Therefore, D-dimer findings should be further investigated in prospective studies with larger sample sizes.

Survival analysis demonstrated an association between IVIG administration and increased probability of survival, but this result did not reach statistical significance. This finding is consistent with the existing literature; several observational studies and meta-analyses have emphasized that the effect of IVIG on mortality is uncertain and that the results are mainly related to patient selection, disease severity, and treatment timing [16–18]. In our study, the limited sample size may have prevented statistical confirmation of this association. One of the main limitations of the study is the lack of multivariable statistical models. Disease severity, comorbidities, and other potential confounding factors may have influenced the results. Therefore, the observed associations should be regarded not as causal relationships but as hypothesis-generating findings.

This study has several limitations. Due to its retrospective design, it was not possible to fully control for selection bias and confounding factors. In addition, the limited number of patients receiving IVIG makes generalization of the results difficult. Nevertheless, the strengths of the study include consecutive laboratory measurements obtained from real clinical practice and the systematic assessment of coagulation dynamics over time. These features make the study findings valuable from a hypothesis-generating perspective and provide a basis for future research [19,20].

The findings of this study may serve as a preliminary basis for prospective and multicenter investigations.

5 | Strengths and Limitations of the Study

The strengths of this study include its basis on real-world clinical practice data, the evaluation of coagulation parameters at several consecutive time points, and the investigation of possible clinical associations of IVIG therapy. At the same time, the retrospective and single-center design of the study, the limited sample size, the possibility of selection bias, and incomplete data for some baseline clinical variables limit the interpretation of the results. The non-randomized assignment of IVIG therapy based on clinical decision increases the risk of indication bias. Therefore, the obtained results are hypothesis-generating in nature and should be confirmed in larger, prospective, multicenter studies.

6 | Conclusion

The results of this single-center retrospective study show that intravenous immunoglobulin therapy in patients with ARDS is associated with the temporal dynamics of coagulation parameters, particularly INR. In patients receiving IVIG, INR values were observed to change more consistently and stably from the early phase of treatment onward. Although statistical significance was not achieved for D-dimer levels, the observed declining trend suggests that IVIG may potentially affect thrombotic activity. Although the observed INR changes did not exceed clinically critical thresholds, they may reflect a more stable course of coagulation balance.

Survival analysis suggested that IVIG therapy may be associated with an increased probability of survival, but this result was not statistically confirmed. Overall, the findings indicate that IVIG may play a role in regulating coagulation balance in patients with ARDS and provide a basis for

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considering this treatment approach as an additional therapeutic option. It should be noted that the observed changes in INR values did not fall within the clinically dangerous range of prolongation. However, the more stable course of these parameters over time suggests that IVIG may indirectly influence the regulation of coagulation balance in patients with ARDS. Studies with larger sample sizes and prospective designs are necessary to confirm these findings and to evaluate the possibilities for their application in clinical practice.

Declarations

Ethics Approval and Consent to Participate

The study protocol was approved by the Ethics Committee of Baku Medical Plaza Medical Center (Protocol No: BPM-EK-2024-12; approval date: December 12, 2024). The study was conducted in accordance with the Declaration of Helsinki. Because of the retrospective study design, written informed consent from individual patients was waived, and all patient data were anonymized prior to analysis.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are not publicly available due to institutional and patient confidentiality considerations but are available from the corresponding author on reasonable request, subject to ethical and institutional approval.

Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

KG conceived the study, contributed to study design, data interpretation, and drafting of the manuscript. GM and AM contributed to data collection and manuscript preparation. AA and VA contributed to clinical interpretation and critical revision of the manuscript. IB contributed to methodological oversight, interpretation of findings, and final review of the manuscript. All authors read and approved the final manuscript.

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