Treatment Options and Outcomes in Patients Presenting with Incarcerated Abdominal Wall Hernia at Our Clinic

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Abstract

Aim: The aim of this study is to evaluate the demographic characteristics, treatment methods, and outcomes of patients presenting with incarcerated hernia. This study investigates the rates of stoma and bowel resection application according to different types of hernia, as well as the effects of demographic variables such as age and gender on treatment options.

Methods: This study included 109 patients who were admitted to our clinic with incarcerated hernia between August 1, 2022, and August 1, 2024. Data such as age, gender, type of hernia, treatment method applied, and whether stoma or resection was performed were collected. Statistical analyses were conducted using SPSS 22.0 software, and the relationships between groups were evaluated using Pearson Chi-Square test, Likelihood Ratio test, and Linear-by-Linear Association test.

Results: Emergency surgical intervention was more frequently preferred in inguinal and femoral hernia cases, whereas follow-up treatment was more commonly applied in incisional hernias. The highest rate of stoma formation was observed in incisional hernias. A linear relationship was found between increasing age and the necessity for resection (p=0.022). A statistically significant relationship was observed between the type of hernia and the treatment method in certain cases (p=0.025).

Conclusions: Treatment approaches vary depending on hernia type and patient's age, with increased risk of complications in elderly patients. This study may contribute to the development of more appropriate treatment strategies.

Keywords: *Incarcerated hernia; emergency hernia repair; hernia-related complications; surgical outcomes in hernia; stoma and resection rates*

1. Introduction

Incarcerated hernia is a clinical condition that requires emergency surgical intervention and carries a high risk of complications. A hernia is defined as the protrusion of intra-abdominal organs through a defect or weak point in the abdominal wall. These organs can become trapped within the hernia sac, leading to incarceration, which can progress to strangulation and organ necrosis due to impaired circulation. This condition can lead to serious complications in the gastrointestinal system and potentially fatal outcomes[1]. Therefore, it is critical to determine a rapid and effective treatment strategy in patients diagnosed with incarcerated hernia.

Surgical intervention is generally the first choice in the treatment of incarcerated hernia, with emergency surgery being the most commonly applied method[2]. However, treatment options may vary depending on the type of hernia, the patient's overall condition, age, and comorbidities. In some cases, bowel resection or stoma formation may be required during surgery, and such procedures can directly affect the patient's short- and long-term prognosis. However, there is no consensus in the literature on which factors necessitate such additional surgical procedures in the treatment of incarcerated hernia[3]. Most existing studies are limited to small case series or retrospective analyses, and there is a need for more data on stoma and resection rates according to the type of hernia.

This study hypothesizes that there is a significant relationship between advanced age and the necessity for bowel resection in incarcerated hernia cases[3]. Additionally, it aims to investigate whether different hernia types influence treatment approaches and outcomes, particularly in terms of emergency surgery, stoma formation, and resection rates.

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The aim of this study is to evaluate the demographic characteristics, treatment processes, and outcomes of patients who presented to our clinic with incarcerated hernia. The study examines the rates of stoma and resection application by hernia type and the effects of demographic variables such as age and gender on treatment options and outcomes. These findings are expected to contribute to the development of more appropriate strategies in the treatment of incarcerated hernia and support clinical decision-making processes.

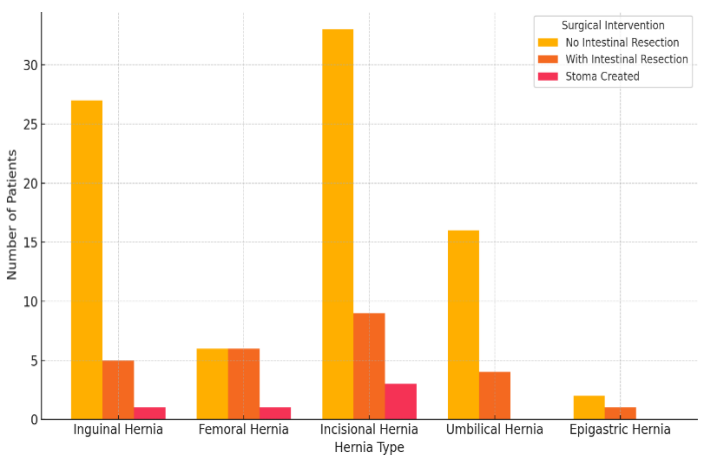
2. Materials and Methods

This study included 109 patients who presented to our General Surgery Clinic with a diagnosis of incarcerated hernia between August 1, 2022, and August 1, 2024. Data such as age, gender, type of hernia, treatment method applied (emergency surgery or follow-up), and whether a stoma or resection was performed were obtained from patient files. Patients who were not operated immediately underwent imaging studies, with IV contrast-enhanced abdominal CT being the preferred method to evaluate their condition. Clinically irreducible cases were taken directly to surgery. Additionally, patients managed with follow-up were later scheduled for elective surgery and underwent the procedure as planned. All patients included in the study were over 18 years of age, and their diagnosis and treatment processes were fully recorded. Rare types of hernia, such as obturator hernia, were excluded from the study. Patients with missing data were not included.

Patients with a history of previous hernia repair surgery were included in the study, provided that they presented with incarcerated hernia requiring urgent evaluation. Those with a history of prior intra-abdominal malignancy, advanced liver cirrhosis, severe coagulopathy, or end-stage renal disease were excluded.

Figure 1

Hernia Types Distribution Based on Surgical Interventions



The follow-up period for post-operative patients was at least 30 days, during which complications such as surgical site infection, bowel obstruction, and hernia recurrence were recorded.

All patients underwent a standardized diagnostic approach. Physical examination and detailed anamnesis were performed in all cases, followed by imaging. IV contrast-enhanced abdominal CT was the primary imaging modality used for incarcerated hernias, while bedside ultrasound was performed selectively in cases where immediate imaging was required.

The demographic and clinical data used in the study include variables such as age, gender, type of hernia (inguinal, femoral, incisional, umbilical, epigastric), stoma status (without stoma, with stoma), resection status (without resection, with resection), and treatment method applied (emergency surgery, follow-up). The data were obtained from the hospital information management system and patient files.

Statistical analysis was performed using SPSS 22.0 software. Descriptive statistics of demographic data were reported as mean, median, 25th and 75th percentiles for age, and frequency and percentage for categorical variables. Crosstab analyses were used to evaluate stoma and resection status by hernia type. Relationships between groups were evaluated using Pearson Chi-Square test, Likelihood Ratio test, and Linear-by-Linear Association test. Results with p-values below 0.05 were considered statistically significant. Fisher's Exact Test was used when the expected frequencies in the cells were less than 5.

3. Results

This study examined the demographic characteristics, stoma and resection application rates by hernia type, and treatment methods of patients presenting to our clinic with incarcerated hernia. A total of 109 patients were included in the study. The mean age was 68.64, and the median age was 70. The 25th percentile of ages was 61.50, the 50th percentile (median) was 70.00, and the 75th percentile was 77.00. The gender distribution showed that 40 of the 109 patients were male (36.7%), and 69 were female (63.3%). **Table 1** presents the demographic and clinical data of the patients.

Table 1

Demographic and Clinical Characteristics of Patients

Characteristics	%	n / Mean ± SD
Total Number of Patients		109
Female	63.3%	69
Male	36.7%	40
Average Age		68.64 years ± 11.20
Female Average Age		68.14 years ± 11.70
Male Average Age		69.5 years ± 10.36
Hernia Type		
Inguinal Hernia	29.4%	32
Femoral Hernia	11%	12
Incisional Hernia	38.5%	42
Umbilical Hernia	18.3%	20
Epigastric Hernia	2.8%	3

Among the patients diagnosed with inguinal hernia, 31 out of 32 were without a stoma, whereas only 1 patient presented with a stoma. Of the 12 patients presenting with femoral hernia, 11 did not have a stoma, while 1 patient had a stoma. Out of the 42 patients with incisional hernia, 39 were without stoma, and 3 had a stoma. In the umbilical hernia group, all 20 patients were without stoma. In the epigastric hernia group, all 3 patients were without stoma. Overall, 104 out of 109 patients were without stoma, and 5 had a stoma. These data indicate that stoma formation is rare in some types of hernia.

Figure 2

Age Group Distribution of Patients by Intestinal Resection Status with Chi-Square Analysis

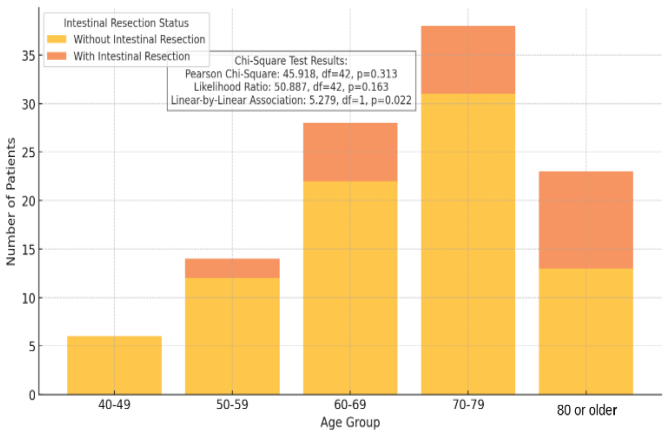


Table 2

Association Between Age and Resection Status in Incarcerated Abdominal Wall Hernia Patients.

Age	Non-Resection (n)	Resection (n)	Total (n)
40	1	0	1
42	2	0	2
43	1	0	1
44	1	0	1
46	1	0	1
49	1	0	1
50	1	0	1
52	0	1	1
53	3	0	3
54	1	0	1
55	1	0	1
56	1	0	1
57	2	0	2
58	2	1	3
59	3	0	3
60	1	0	1
61	3	0	3
62	3	1	4
63	1	0	1
64	3	1	4
65	2	0	2
66	3	0	3
67	1	3	4
68	2	1	3
69	3	1	4
70	3	1	4
71	5	1	6
72	4	1	5
73	4	1	5
75	3	0	3
76	2	2	4
77	4	0	4
78	3	0	3
79	3	0	3
80	1	4	5
81	2	4	6
82	1	0	1
83	1	0	1
85	2	0	2
86	1	1	2
87	0	1	1
89	1	0	1
91	1	0	1
Linear-by-Linear Association		P: 0.022	

When examining whether resection was performed by hernia type, 27 out of 32 patients with inguinal hernia were without resection, and 5 had resection. Among the 12 patients with femoral hernia, 6 were without resection, and 6 had resection. Out of 42 patients with incisional hernia, 33 were without resection, and 9 had resection. In the umbilical hernia group, 16 out of 20 patients were without resection, and 4 had resection. In the epigastric hernia group, 2 out of 3 patients were without resection, and 1 had resection. **Figure 1** graphically presents the patients who underwent resection and stoma.

In assessing the relationship between age and the performance of resection, most patients who underwent resection were 67 years or older. **Table 2** presents the age distribution of patients who required bowel resection compared to those who did not. **Figure 2** graphically presents the patients with and without bowel resection in hernias according to age. Chi-square tests were conducted to evaluate the statistical significance of this relationship. The Pearson Chi-Square test yielded a value of 45.918 (df = 42, p = 0.313), indicating no statistically significant association between age and the need for resection. Similarly, the Likelihood Ratio test resulted in a value of 50.887 (df = 42, p = 0.163). However, the Linear-by-Linear Association test showed a significant result (5.279, df = 1, p = 0.022), suggesting a potential trend where older patients may have a higher likelihood of requiring resection. Due to the low expected counts in some cells, these results should be interpreted with caution.

In the evaluation of treatment approaches based on hernia type, 25 out of 32 patients with inguinal hernia underwent emergency surgery, while 7 patients were managed with follow-up.

All 12 patients with femoral hernia underwent emergency surgery. Among the 42 patients with incisional hernia, 27 underwent emergency surgery, while 15 were followed up. In the umbilical hernia group, 15 out of 20 patients underwent emergency surgery, while 5 were followed up. In the epigastric hernia group, all 3 patients underwent emergency surgery. Overall, 82 out of 109 patients underwent emergency surgery, and 27 received follow-up treatment. **Table 3** shows the types of treatment by hernia type.

Table 3

Distribution of Hernia Types by Management Approach and Chi-Square Test Results

Hernia Type	Emergency Surgery (n, %)	Reduced Follow-Up (n, %)
Inguinal Hernia	25 (78.12%)	7 (21.87%)
Femoral Hernia	12 (100%)	0 (0%)
Incisional Hernia	27 (64.28%)	15 (35.72%)
Umbilical Hernia	15 (75%)	5 (25%)
Epigastric Hernia	3 (100%)	0 (0%)
Total Cases	82 (75.2%)	27 (24.8%)
Chi-Square Test Results	Value	p-value
Pearson Chi-Square	7.783	0.100
Likelihood Ratio	11.175	0.025
Linear-by-Linear Association	0.409	0.523
Number of Valid Cases	109	
Notes:	40% of cells have an expected count of less than 5. The minimum expected count is 0.74.	

When examining the statistical analysis results, the Pearson Chi-Square test value for the relationship between hernia type and stoma formation was 2.274 (p=0.686), indicating no significant relationship. However, a linear relationship was found between increasing age and the need for resection (p=0.022). For the relationship between hernia type and treatment method, the Likelihood Ratio test p-value was 0.025, indicating a statistically significant relationship in some cases.

4. Discussion

This study retrospectively evaluated the treatment methods and outcomes of patients diagnosed with incarcerated hernia. Our findings highlight the rates of various surgical interventions (e.g., bowel resection, stoma formation) according to hernia type and their association with demographic factors such as age. The analysis included patients with inguinal, femoral, incisional, umbilical, and epigastric hernias, and the results were compared with existing literature.

Emergency surgery was the predominant treatment approach for patients with inguinal hernia. In our cohort, 78.12% of patients underwent emergency surgery, while 21.87% were managed conservatively with reduction and follow-up. These findings align with the literature, which underscores surgical intervention as the primary treatment for inguinal hernias, with conservative management being less common [4,5]. Similarly, all cases of femoral hernia (100%) required emergency surgical intervention in our study. This observation is consistent with prior research highlighting the high risk of strangulation and necrosis in femoral hernias, necessitating urgent surgical treatment [6]. According to the European Hernia Society (EHS) guidelines, femoral hernias should be managed surgically as soon as possible due to their high risk of incarceration and strangulation [7]. Our findings support this recommendation and emphasize the need for prompt surgical intervention in these cases.

In patients with incisional hernias, 64.28% underwent emergency surgery, while 35.72% were followed up. This variability reflects the heterogeneous clinical course and complication potential of incisional hernias. The literature suggests that while follow-up may be appropriate in certain cases, emergency surgery is crucial for patients with high complication risks [5,8,9]. Our findings corroborate this variability, emphasizing the importance of individualized treatment strategies. The American College of Surgeons (ACS) suggests that incisional hernias with signs of incarceration or strangulation should be managed urgently to reduce the risk of complications[10]. Our study aligns with this recommendation, highlighting that a significant proportion of incisional hernias required emergency intervention.

The treatment distribution for umbilical and epigastric hernias also aligned with existing literature. Emergency surgical intervention was performed in 75% of patients with umbilical hernia, whereas 25% were managed conservatively. In contrast, all patients with epigastric hernia (100%) underwent emergency surgical intervention. These results suggest that although these hernia types are often less complex, their incarceration necessitates prompt surgical management. Clinical judgment remains critical in determining the appropriate treatment approach [11-113].

Our analysis of bowel resection and stoma formation rates by age revealed that bowel resection was more common in patients aged 67 years and older. While the association between age and bowel resection was not statistically significant (p:0.313), a linear trend was observed between increasing age and the need for resection (p:0.022). This outcome suggests that elderly patients presenting with incarcerated hernia are more likely to require intestinal resection, highlighting the importance of perioperative risk assessment and careful surgical planning in this population[14]. These results support the need for close monitoring and individualized management strategies in elderly patients to minimize morbidity and optimize postoperative outcomes[14]. This finding is consistent with previous studies reporting higher complication rates in elderly patients [14-16]. Considering these findings, early surgical intervention should be prioritized in elderly patients presenting with incarcerated hernia to potentially reduce the need for bowel resection and its associated morbidity[17].

Crucially, a statistically significant relationship was found between hernia type and treatment approach (p=0.025), suggesting that different hernia types may have a direct influence on the preferred management strategy. This result indicates that certain hernia types, particularly femoral and epigastric hernias, may require more aggressive surgical intervention due to their higher risk of strangulation and associated complications[7]. Understanding this relationship can aid in refining clinical decision-making and optimizing individualized treatment plans. Given the significant association between hernia type and surgical approach, future guidelines could incorporate stratification models to better define which patients benefit most from early surgical intervention[18].

Notably, stoma formation was more frequently required in patients with incisional hernias compared to other hernia types. This finding is in line with the literature, which identifies a higher complication risk in incisional hernias, often necessitating stoma formation. These results underscore the importance of heightened clinical vigilance in managing incisional hernias.

Differences in treatment methods were also observed across hernia types. A statistically significant relationship was found between hernia type and treatment approach in certain cases (p:0.025), suggesting that the clinical course and complication potential of specific hernia types influence treatment decisions. These findings advocate for more tailored treatment strategies for incarcerated hernias [19,20].

This study was conducted in a single center with a limited number of patients (n=109), which may restrict the generalizability of the findings to a broader population. Future multi-center studies with larger cohorts are needed to validate our results. As a retrospective study, our findings are subject to inherent limitations in data collection and potential selection bias. A prospective study design would provide more robust evidence regarding the causal relationship between hernia type, patient demographics, and surgical outcomes. The postoperative follow-up period in this study was at least 30 days, which may not be sufficient to assess long-term outcomes such as hernia recurrence and chronic complications. Future studies with longer follow-up durations are necessary. Although all patients underwent standardized diagnostic imaging (contrast-enhanced CT as the primary modality), variations in surgical techniques and perioperative management strategies may have influenced outcomes.

This study has several limitations. First, as a retrospective analysis, it is subject to inherent limitations in data collection. Additionally, being a single-center study with a relatively small patient population, the generalizability of the findings is limited. Future research incorporating data from multiple centers and larger cohorts is warranted to provide more robust evidence regarding the treatment options and outcomes for incarcerated hernias.

5. Conclusion

Our findings highlight the importance of considering hernia type, patient age, and general condition in determining treatment strategies for incarcerated hernias. The increased need for stoma in

incisional hernias and the higher risk of complications with advancing age emphasize the necessity of individualized approaches. Emergency surgical intervention remains crucial, particularly for femoral and epigastric hernias. These results contribute to improving clinical decision-making in the management of incarcerated hernias.

Statement of ethics

Ethical approval was obtained from the Erciyes University Faculty of Medicine local ethic committee with the number 2024/195. and the study was conducted by the principles of the Declaration of Helsinki. Informed consent forms were obtained from all patients and control subjects.

Author Contributions

All authors received no financial support for the research, authorship, and/or publication of this article, Concept: S.C., M.K. Literature Review: S.C., M.K. Design: S.C., M.K. Data acquisition: S.C., M.K. Analysis and interpretation: S.C., M.K. Writing manuscript: S.C., M.K. Critical revision of manuscript: S.C., M.K.

Source of Finance

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

Conflict of interest statement

The authors declare that they have no conflict of interest.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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