

A study of the clinical profile, risk factors, surgical management, and complications of patients with complicated abdominal hernia

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How to citation this article: Dr. Mohammad Riyaz, Dr. Anil S, Dr. Vinod, “A study of the clinical profile, risk factors, surgical management, and complications of patients with complicated abdominal hernia”, IJMACR– September – 2026, Volume – 9, Issue – 5, P. No. 861 – 868.

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Complicated abdominal hernias are important surgical emergencies that may present with incarceration, intestinal obstruction, strangulation, bowel ischemia, and gangrene. Delay in diagnosis and definitive treatment may increase the risk of bowel necrosis, infection, postoperative complications, and mortality.

Aim: To study the clinical profile, associated risk factors, surgical management, postoperative complications, and outcomes of patients presenting with complicated abdominal hernia.

Materials and Methods: A hospital-based observational study was conducted in the Department of General Surgery, Subbaiah Institute of Medical Sciences,

Shivamogga, Karnataka, from April 2025 to April 2026.

A total of 70 patients with complicated abdominal hernia were included. Demographic characteristics, presenting symptoms, associated risk factors, type of hernia, complications, investigations, operative findings, surgical procedures, postoperative complications, duration of hospital stay, and treatment outcomes were evaluated.

Results: Among 70 patients, 44 (62.9%) were males and 26 (37.1%) were females. The largest proportion belonged to the 40–49-year age group (25.7%). Painful hernia swelling (91.4%) and irreducible swelling (82.9%) were the commonest clinical presentations. Inguinal hernia was the most frequently observed type (41.4%). Incarceration was present in 40.0% of patients, followed

by intestinal obstruction (28.6%) and strangulation (21.4%). Bowel resection was required in 20.0% of patients. Surgical-site infection (12.9%) and postoperative ileus (11.4%) were the common postoperative complications. The mean hospital stay was 7.6 ± 3.4 days, and 90.0% of patients were discharged after recovery.

Conclusion: Complicated abdominal hernia requires early recognition, adequate resuscitation, assessment of bowel viability, and timely surgical intervention. Appropriate operative planning and vigilant postoperative care are essential for reducing morbidity and improving outcomes.

Keywords: Complicated Abdominal Hernia, Incarceration, Strangulation, Intestinal Obstruction, Bowel Ischemia, Emergency Hernia Repair, Postoperative Complications.

Introduction

Abdominal wall hernias are common surgical disorders characterized by protrusion of intra-abdominal contents through a defect or weakness in the abdominal wall. Although many hernias remain uncomplicated, incarceration and strangulation can convert a relatively common surgical condition into an emergency requiring immediate treatment.^{1,4}

Incarceration occurs when the herniated contents cannot be reduced into the abdominal cavity, whereas strangulation occurs when vascular compromise develops within the hernia sac. Progressive vascular compromise may result in bowel ischemia, gangrene, perforation, peritonitis, sepsis, and death.^{1,2} The World Society of Emergency Surgery (WSES) guidelines emphasize the importance of early diagnosis and emergency repair when strangulation is suspected.¹

The clinical presentation of complicated hernia commonly includes painful irreducible swelling, abdominal pain, vomiting, abdominal distension, and constipation or obstipation. Severe tenderness, skin discoloration, systemic toxicity, and features of intestinal obstruction may indicate advanced disease.^{1,5}

Imaging may be useful when the diagnosis is uncertain or when the extent of bowel involvement needs to be evaluated. Ultrasonography can assist in identifying hernia contents and complications, while computed tomography can provide additional information regarding bowel obstruction, ischemia, and other intra-abdominal findings.⁵

Emergency groin hernia repair is associated with higher postoperative morbidity and mortality than elective repair. Large population-based studies have demonstrated that emergency presentation, advanced age, comorbidities, and bowel resection are important factors associated with adverse postoperative outcomes.^{6,7}

The choice of operative technique depends on the type of hernia, condition of the herniated contents, bowel viability, degree of contamination, and condition of the patient. Viable bowel can generally be reduced, whereas ischemic or gangrenous bowel requires resection. The decision to use mesh should be individualized according to the degree of contamination and operative findings.^{1,2,8} Evidence from systematic reviews suggests that mesh repair may reduce recurrence in selected incarcerated and strangulated groin hernias, particularly when the operative field is clean; however, the risk of infection requires consideration in patients undergoing bowel resection or with contamination.^{8,9}

The international Hernia Surge guidelines provide evidence-based recommendations for groin hernia management, while their subsequent update incorporates

additional evidence regarding emergency presentations and surgical management.^{4,10} Long-term population-based studies have further demonstrated the importance of emergency presentation and perioperative factors in determining outcomes after groin hernia surgery.¹¹

Large prospective surgical registries have also demonstrated that emergency hernia repair carries greater morbidity than elective surgery, highlighting the importance of timely diagnosis and treatment.¹²

Therefore, the present study was undertaken to evaluate the clinical profile, risk factors, surgical management, postoperative complications, and outcomes among patients presenting with complicated abdominal hernia.

Materials and Methods

Study Design: This was a hospital-based observational study.

Study Setting: The study was conducted in the Department of General Surgery, Subbhaiah Institute of Medical Sciences, Shivamogga, Karnataka, India.

Study Duration: The study was conducted from April 2025 to April 2026.

Sample Size: A total of 70 patients with complicated abdominal hernia were included.

Inclusion Criteria

Patients were included if they:

- had a diagnosis of complicated abdominal hernia;
- presented with incarceration, obstruction, or strangulation;
- required surgical management; and
- were admitted during the study period.

Exclusion Criteria

Patients were excluded if they:

- had uncomplicated elective hernia;
- were managed conservatively;
- had incomplete clinical records; or

- did not undergo definitive surgical management.

Clinical Assessment

Detailed history was obtained regarding the onset and duration of symptoms, abdominal pain, painful swelling, irreducibility, vomiting, abdominal distension, constipation or obstipation, fever, previous abdominal surgery, previous hernia-related symptoms, and associated comorbidities.

Physical examination included assessment of the hernia swelling for site, size, tenderness, reducibility, skin changes, and evidence of intestinal obstruction or strangulation.

Investigations

Routine hematological and biochemical investigations were performed. Ultrasonography and computed tomography of the abdomen were performed whenever clinically indicated. Imaging findings were interpreted in conjunction with clinical examination.^{1,5}

Surgical Management

Patients requiring emergency surgery underwent appropriate preoperative resuscitation followed by operative intervention. The surgical procedure was selected according to the type of hernia, contents of the hernia sac, presence of obstruction or strangulation, bowel viability, and degree of contamination.

Procedures included hernia repair, mesh repair where appropriate, reduction of viable bowel, adhesiolysis, and bowel resection with anastomosis when nonviable bowel was identified.^{1,2,8}

Postoperative Assessment

Patients were monitored for wound and systemic complications, including surgical-site infection, wound dehiscence, seroma, hematoma, postoperative ileus, intra-abdominal collection, respiratory complications, urinary complications, readmission, and mortality.

Duration of hospital stay and final treatment outcome were also recorded.

Statistical Analysis

Categorical variables were expressed as frequencies and percentages. Continuous variables were expressed as mean $\pm$ standard deviation.

Results and Observations

Table 1: Age distribution

Age group	Number (n)	Percentage (%)
<30 years	7	10.0
30–39 years	13	18.6
40–49 years	18	25.7
50–59 years	17	24.3
≥ 60 years	15	21.4
Total	70	100.0

The largest proportion of patients belonged to the 40–49-year age group (25.7%), followed by the 50–59-year group (24.3%).

Table 2: Sex distribution

Sex	Number (n)	Percentage (%)
Male	44	62.9
Female	26	37.1
Total	70	100.0

Males constituted 62.9% of the study population, while females accounted for 37.1%.

Table 3: Clinical presentation

Clinical feature	Number (n)	Percentage (%)
Painful hernia swelling	64	91.4
Irreducible swelling	58	82.9
Abdominal pain	55	78.6
Vomiting	38	54.3
Abdominal distension	34	48.6
Constipation/obstipation	29	41.4

Fever	18	25.7
Skin discoloration	11	15.7

Painful swelling and irreducibility were the most frequent presenting features.

Table 4: Associated risk factors and comorbidities

Risk factor/comorbidity	Number (n)	Percentage (%)
Smoking	21	30.0
Previous abdominal surgery	18	25.7
Alcohol use	17	24.3
Hypertension	16	22.9
Chronic constipation	15	21.4
Diabetes mellitus	14	20.0
Obesity	13	18.6
Chronic cough	12	17.1
No identifiable factor	16	22.9

Multiple risk factors could be present in individual patients.

Smoking was the most frequently recorded associated factor, followed by previous abdominal surgery and alcohol use.

Table 5: Type of abdominal hernia

Hernia type	Number (n)	Percentage (%)
Inguinal	29	41.4
Incisional	15	21.4
Umbilical/paraumbilical	11	15.7
Femoral	7	10.0
Ventral	6	8.6
Other	2	2.9
Total	70	100.0

Inguinal hernia was the most frequently observed type, accounting for 41.4% of cases.

Table 6: Nature of complication

Complication	Number (n)	Percentage (%)
Incarceration	28	40.0
Intestinal obstruction	20	28.6
Strangulation	15	21.4
Bowel ischemia/gangrene	6	8.6
Perforation	1	1.4
Total	70	100.0

Incarceration was the most frequently recorded complication, followed by intestinal obstruction and strangulation.

Table 7: Investigations performed

Investigation	Number (n)	Percentage (%)
Complete blood count	70	100.0
Renal function tests	63	90.0
Liver function tests	59	84.3
Ultrasonography	48	68.6
CT abdomen	39	55.7
Serum lactate	22	31.4

Table 8: Surgical procedures performed

Procedure	Number (n)	Percentage (%)
Hernia repair without bowel resection	45	64.3
Mesh repair	27	38.6
Adhesiolysis	18	25.7
Bowel resection and anastomosis	14	20.0
Hernia repair with bowel resection	14	20.0
Other procedures	5	7.1

Some patients underwent more than one procedure.

Table 9: Intraoperative findings

Finding	Number (n)	Percentage (%)
Viable bowel	48	68.6
Obstructed bowel	21	30.0
Ischemic bowel	12	17.1
Adhesions	18	25.7
Gangrenous bowel	6	8.6
Peritoneal contamination	5	7.1

More than one finding could be present in individual patients.

Table 10: Postoperative complications

Complication	Number (n)	Percentage (%)
Surgical-site infection	9	12.9
Postoperative ileus	8	11.4
Intra-abdominal collection	5	7.1
Wound dehiscence	4	5.7
Seroma	4	5.7
Respiratory complications	4	5.7
Urinary complications	3	4.3
Hematoma	2	2.9

Some patients developed more than one postoperative complication.

Table 11: Postoperative recovery

Parameter	Mean $\pm$ SD
Time to oral intake	36.8 $\pm$ 15.4 hours
Time to ambulation	29.2 $\pm$ 12.1 hours
Duration of hospital stay	7.6 $\pm$ 3.4 days

Table 12: Final treatment outcome

Outcome	Number (n)	Percentage (%)
Recovered/discharged	63	90.0
Readmission	3	4.3
Referred	1	1.4
Mortality	3	4.3
Total	70	100.0

Discussion

The present study evaluated 70 patients presenting with complicated abdominal hernia over a one-year period. Complicated abdominal wall hernias can rapidly progress from incarceration to obstruction, strangulation and bowel ischemia. Consequently, emergency guidelines emphasize early recognition and timely surgical intervention.^{1,2}

In the present study, males constituted 62.9% of the study population, while females constituted 37.1%. Inguinal hernia was the most common type, accounting for 41.4% of cases. Groin hernias constitute a major proportion of abdominal wall hernias, and the international HerniaSurge guidelines provide specific recommendations for their management.^{4,10}

Painful hernia swelling and irreducibility were the predominant clinical findings. Vomiting, abdominal distension and constipation/obstipation were also common. These findings are consistent with the clinical manifestations expected in patients with incarceration and intestinal obstruction. Clinical evidence of strangulation requires urgent operative assessment because delay can result in bowel necrosis and sepsis.^{1,5}

Incarceration was identified in 40.0% of patients, followed by intestinal obstruction and strangulation. The progression of strangulation may result in vascular compromise and bowel necrosis, emphasizing the importance of early intervention.^{1,2}

Smoking, previous abdominal surgery, alcohol use, hypertension, chronic constipation and diabetes were among the associated factors observed. The presence of comorbidities may increase perioperative risk, while previous abdominal surgery is particularly relevant in the development of incisional hernia. Patient characteristics and comorbidities should therefore be considered during emergency surgical planning.^{4,10}

Bowel resection was required in 20.0% of patients. Resection is generally necessary when the herniated bowel is ischemic or gangrenous. Emergency groin hernia studies have identified bowel resection as an important factor associated with increased postoperative complications and mortality.^{6,7}

The choice of mesh in emergency repair depends on the degree of contamination and bowel viability. The WSES guidelines support mesh repair in selected clean emergency cases, while contaminated operative fields require individualized consideration.¹ Evidence from systematic reviews indicates that mesh repair may reduce recurrence in selected incarcerated or strangulated groin hernias, although infection risk must be considered, particularly when bowel resection is performed.^{8,9}

Surgical-site infection was the most frequent postoperative complication in the present study, occurring in 12.9% of patients, followed by postoperative ileus in 11.4%. Emergency hernia surgery has a greater risk of postoperative morbidity than elective repair because of acute presentation, bowel obstruction, contamination and the possibility of bowel resection.^{6,11}

The mean hospital stay was 7.6 ± 3.4 days. Patients with bowel compromise and postoperative complications may require prolonged hospitalization. Population-based studies have demonstrated that emergency presentation is

associated with worse short-term and long-term outcomes compared with elective groin hernia repair.^{6,11}

Mortality was observed in 3 patients (4.3%) in the present dataset. Emergency groin hernia repair has consistently been associated with higher mortality compared with elective repair. A systematic review and meta-analysis demonstrated a substantially increased mortality risk following emergency groin hernia repair.⁷ Large prospective registry data have similarly demonstrated the importance of emergency presentation and perioperative factors in determining outcomes.¹²

The present findings emphasize that early diagnosis, adequate resuscitation, prompt operative management and careful assessment of bowel viability are central to the management of complicated abdominal hernia. Current international guidelines and population-based evidence support an individualized approach based on hernia type, patient condition, bowel viability and degree of contamination.^{1,4, 10-12}

Conclusion

Complicated abdominal hernia is an important emergency surgical condition that may be associated with incarceration, intestinal obstruction, strangulation and bowel ischemia. In the present study, painful irreducible swelling was the predominant presentation and inguinal hernia was the most common type.

Early diagnosis, adequate resuscitation and timely surgical intervention are essential, particularly when strangulation is suspected. Intraoperative assessment of bowel viability should guide the need for bowel resection, while the choice of mesh should be individualized according to the operative field and degree of contamination. Appropriate postoperative monitoring is necessary to identify surgical-site infection, ileus and

other complications early and to improve overall patient outcomes.

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