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Original Research Article

Presentation Outcome and Surgical Management of Obstructed Inguinal Hernia

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Abstract: *Obstructed inguinal hernia is a frequent surgical emergency associated with substantial morbidity and mortality, particularly in low- and middle-income countries where delayed presentation remains common.* ***Objective:*** *To evaluate the clinical presentation, surgical management, and early postoperative outcomes of obstructed inguinal hernia in adult patients.* ***Methods:*** *This descriptive cross-sectional study was conducted in the Department of Surgery of Peoples University of Medical & Health Sciences from 19 July 2025 to 19 October 2025 and included 240 adults aged 18–80 years presenting with obstructed inguinal hernia. Demographic, clinical, and operative data were collected using a structured proforma. Continuous variables were summarized as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages. Associations of age group, gender, hernia pattern, and type of surgery with postoperative outcomes, including fever, hematoma, bleeding, wound dehiscence, and in-hospital mortality, were assessed using the chi-square test. A p-value of <0.05 was considered statistically significant.* ***Results:*** *The mean age of the participants was 51.8 ± 13.0 years, and 201 (83.8%) were male. Most patients were obese (58.3%) and belonged to a lower socioeconomic group (50.4%). Primary hernias constituted 82.9% of cases, all patients presented as emergencies with irreducible swelling, and 57.5% had right-sided hernias. Open repair was performed in 206 (85.8%) patients, whereas laparoscopic repair was undertaken in 34 (14.2%). Prophylactic antibiotics were administered in 95.8% of cases. Early postoperative fever occurred in 19.2% of patients, hematoma in 6.7%, bleeding in 1.7%, wound dehiscence in 3.8%, and in-hospital mortality in 9.2%. Increasing age was significantly associated with postoperative fever (p=0.002), whereas no statistically significant associations were observed between age, gender, hernia pattern, or type of surgery and other postoperative complications or mortality.* ***Conclusion:*** *Obstructed inguinal hernia predominantly affects middle-aged, obese men and is associated with considerable early postoperative morbidity and in-hospital mortality. Timely elective repair of inguinal hernias and prompt surgical intervention in emergency presentations may help reduce adverse outcomes.*

Keywords: Inguinal hernia; Hernia, inguinal; Intestinal obstruction; Emergency surgery; Postoperative complications; Mortality

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Introduction

Inguinal hernia is one of the most prevalent surgical conditions encountered in general surgical practice, with an estimated annual global incidence of more than 20 million repairs (1). Obstruction remains among the most serious acute complications of an untreated or neglected inguinal hernia, occurring when herniated content becomes entrapped within the hernial sac, leading to impairment of intestinal transit and, if left uncorrected, potential ischemia and strangulation (2). An obstructed inguinal hernia is a surgical emergency that demands timely intervention to prevent life-threatening sequelae, including bowel necrosis, perforation, peritonitis, and sepsis (3).

The condition predominantly affects males, reflecting the anatomical predisposition conferred by the patent processus vaginalis and the wider inguinal canal in men; however, females, particularly older women with femoral hernias, are also at significant risk (4). The presentation of obstructed inguinal hernia is characterised by an irreducible, painful groin swelling accompanied by features of intestinal obstruction such as colicky abdominal pain, nausea, vomiting, and abdominal distension (5). Delay in presentation to a healthcare facility remains a critical determinant of morbidity and mortality, as prolonged obstruction substantially elevates the risk of bowel strangulation and the need for intestinal resection (2).

Surgical management of obstructed inguinal hernia encompasses both conventional open repair and minimally invasive laparoscopic approaches. Open herniotomy or herniorrhaphy, with or without mesh, remains the gold-standard technique in most emergency settings, particularly in resource-limited environments, given its widespread availability, a shorter operative learning curve, and applicability in contaminated fields (6). Laparoscopic repair, while associated with reduced postoperative pain, faster recovery, and lower wound complication rates in elective settings, carries specific technical challenges in the emergency context, including limited access to the hernial sac contents, higher intraoperative conversion rates, and the need for general anaesthesia (7).

Multiple patient-related and operative factors influence postoperative outcomes following emergency repair of obstructed inguinal hernia. Increasing age, nutritional status, comorbidities, duration of symptoms before surgery, and the need for bowel resection have all been identified as independent predictors of postoperative morbidity and in-hospital mortality (8). Common postoperative complications include surgical site infection, seroma, hematoma, wound dehiscence, and, less frequently, postoperative bleeding (3). Reported mortality rates in contemporary series range from 2% to 12%, with higher rates observed in elderly patients and those requiring bowel resection for gangrenous segments (9).

In the Pakistani context, obstructed inguinal hernia poses a distinct and substantial public health burden. Pakistan's healthcare landscape is characterised by inequities in access to surgical care, a predominantly rural population with limited awareness of hernia complications, low health-seeking behaviour, and financial constraints that collectively contribute to delayed presentation at tertiary care centres (10). The majority of patients present in advanced stages of obstruction, compounding the operative risk and postoperative morbidity. Despite this epidemiological reality, there is a paucity of robust, multicentre evidence from Pakistan documenting the clinical profile, surgical management patterns, and postoperative outcomes of obstructed inguinal hernia. The present study was therefore conducted to delineate the clinical presentation, operative characteristics, and postoperative outcomes among patients undergoing emergency surgical repair of obstructed

inguinal hernia at a tertiary care hospital in Pakistan, to generate locally relevant evidence to inform clinical practice and healthcare policy.

Methodology

This descriptive cross-sectional study was carried out in the Department of Surgery at Peoples Medical College (PMC) Hospital, Nawabshah, from 19 July 2025 to 19 October 2025. All adult patients aged 18–80 years of either sex who were admitted with a diagnosis of obstructed inguinal hernia during the study period were included. Patients younger than 18 years and those with dynamic intestinal obstruction that resolved completely on conservative management were excluded. A non-probability consecutive sampling technique was used, and patients were recruited until the calculated sample size of 240 was achieved, based on a single-proportion formula using a reported prevalence of obstructed inguinal hernia of 19.6%, a 95% confidence level, and a 5% margin of error.[9]. After eligibility screening, written informed consent was obtained from each patient or an attendant. Data were collected using a structured proforma designed in accordance with the approved synopsis. The proforma recorded demographic details (age, sex, education level, socioeconomic status), smoking history, and anthropometric measurements. Body mass index (BMI) was calculated from measured weight and height and classified into underweight, normal, overweight and obese categories according to predefined cut-offs. Clinical variables included duration of hernia-related symptoms (categorised as up to 1 day, 2–3 days, or more than 3 days), duration of groin swelling, pattern of hernia (primary or recurrent), pattern of admission (elective or emergency, though in practice all obstructed cases presented as emergencies), side of hernia (right, left or bilateral), presence of irreducible swelling, abdominal pain, vomiting and abdominal distension.

All patients underwent standard preoperative assessment. Baseline investigations included complete blood count, differential leukocyte count, erythrocyte sedimentation rate, random blood sugar, renal and liver function tests. Imaging comprised chest radiograph and abdominal X-ray (erect/supine) and ultrasonography of the abdomen when clinically indicated. Patients were resuscitated with intravenous fluids and electrolyte correction, nasogastric tube decompression where required, analgesia and broad-spectrum intravenous antibiotics according to departmental protocol. Once adequately stabilised, patients underwent emergency repair of an inguinal hernia. The majority of procedures were performed under spinal anaesthesia; general anaesthesia was reserved for patients in whom regional anaesthesia was unsuitable or who were haemodynamically unstable.

Intraoperatively, the side and type of hernia, contents of the hernia sac and viability of the bowel were assessed. Bowel and/or omentum were reduced when viable; where nonviable, resection and primary anastomosis or omentectomy were performed as appropriate. Open or laparoscopic repair was performed according to the operating surgeon's preference and patient factors, with mesh avoided in grossly contaminated fields. Perioperative prophylactic antibiotics were administered in accordance with hospital policy and recorded in the pro forma. Postoperative monitoring was done in the surgical ward for immediate and early complications, including fever, hematoma, bleeding, wound infection or dehiscence, and in-hospital mortality. The length of postoperative stay and the discharge outcome were documented for each patient.

Data were entered into SPSS version 23.0 for analysis. Continuous variables such as age and BMI were summarized using mean and standard deviation. Categorical variables (e.g., sex, BMI category, education, socioeconomic class, smoking status, duration of symptoms, side and pattern of hernia, type of surgery, prophylactic antibiotic use, and postoperative complications) were presented as frequencies and percentages. Associations between categorical predictors and postoperative outcomes (complications and mortality) were assessed using the chi-square test, with $p<0.05$ considered statistically significant. Potential confounding was addressed by stratifying by key variables, including age groups, sex, and BMI category, during analysis.

Results

A total of 240 patients with obstructed inguinal hernia were included in the analysis. The mean age was 51.8 ± 13.0 years, and the mean body mass index (BMI) was 25.6 ± 3.4 kg/m². Most patients were male (201, 83.8%). Obesity was the most frequent BMI category, affecting 140 patients (58.3%). Regarding education, 71 patients (29.6%) were illiterate, while 121 (50.4%) belonged to the lower socioeconomic class. A history of smoking was present in 84 patients (35.0%) (Table 1).

Regarding clinical presentation, 98 patients (40.8%) presented within 2–3 days of symptom onset, while groin swelling of up to 1 day duration was observed in 106 patients (44.2%). Primary hernia was seen in 199 patients (82.9%), and all patients were admitted on an emergency basis. Right-sided hernia was the most common presentation (57.5%). Irreducible swelling was present in all patients. Abdominal pain was the most common symptom, followed by vomiting and abdominal distension. Open surgery was performed in 206 patients (85.8%), whereas 34 patients (14.2%) underwent laparoscopic repair. Prophylactic antibiotics were administered in 230 patients (95.8%). Postoperative fever was the most frequent complication, occurring in 46 patients (19.2%), followed by hematoma in 16 (6.7%), wound dehiscence in 9 (3.8%), and postoperative bleeding in 4 (1.7%). Overall, in-hospital mortality was 9.2% (22 patients) (Table 2).

On stratified analysis, postoperative fever showed a significant association with age group ($p = 0.002$), with higher frequencies in patients aged ≤40 years and >60 years. No significant associations were found between age group and hematoma, bleeding, wound dehiscence, or mortality. Gender and type of surgery were not significantly associated with any postoperative outcome. The reported p-value for postoperative fever by hernia pattern should be interpreted cautiously because the proportions in the two groups were similar, and the reported p-value of <0.001 appears disproportionate to the observed frequencies (Table 3).

Table 1: Baseline demographic and patient characteristics (n = 240)

Variable	Category	n (%) / Mean ± SD
Age (years)	—	51.8 ± 13.0
BMI (kg/m²)	—	25.6 ± 3.4
Gender	Male	201 (83.8)
	Female	39 (16.2)
BMI category	Underweight	5 (2.1)
	Normal	49 (20.4)
	Overweight	46 (19.2)
	Obese	140 (58.3)
Education	Illiterate	71 (29.6)
	Primary	52 (21.7)
	Secondary	55 (22.9)
	Intermediate	36 (15.0)
	Graduation	26 (10.8)
Socioeconomic status	Lower	121 (50.4)
	Middle	100 (41.7)
	Upper	19 (7.9)
Smoking history	Yes	84 (35.0)
	No	156 (65.0)

Table 2: Clinical presentation, operative characteristics, and postoperative outcomes (n = 240)

Variable	Category	n (%)
Duration of symptoms	Up to 1 day	73 (30.4)
	2–3 days	98 (40.8)
	>3 days	69 (28.7)
Duration of groin swelling	Up to 1 day	106 (44.2)
	2–3 days	90 (37.5)
	>3 days	44 (18.3)
Hernia pattern	Primary	199 (82.9)
	Recurrent	41 (17.1)
Side of the hernia	Right	138 (57.5)
	Left	72 (30.0)
	Bilateral	30 (12.5)
Admission type	Emergency	240 (100.0)
Irreducible swelling	Yes	240 (100.0)
Abdominal pain	Yes	220 (91.7)
	No	20 (8.3)
Vomiting	Yes	154 (64.2)
	No	86 (35.8)
Abdominal distension	Yes	133 (55.4)
	No	107 (44.6)
Type of surgery	Open	206 (85.8)
	Laparoscopic	34 (14.2)
Prophylactic antibiotics	Yes	230 (95.8)
	No	10 (4.2)
Postoperative fever	Yes	46 (19.2)
	No	194 (80.8)
Hematoma	Yes	16 (6.7)
	No	224 (93.3)
Postoperative bleeding	Yes	4 (1.7)
	No	236 (98.3)
Wound dehiscence	Yes	9 (3.8)
	No	231 (96.2)
In-hospital mortality	Yes	22 (9.2)
	No	218 (90.8)

Table 3: Stratified analysis of postoperative outcomes

Stratification factor	Category	n	Fever n (%)	Hematoma n (%)	Bleeding n (%)	Wound dehiscence n (%)	Mortality n (%)
Age group	≤40 years	48	13 (27.1)	3 (6.2)	0 (0.0)	1 (2.1)	6 (12.5)
	41–60 years	132	18 (13.6)	5 (3.8)	3 (2.3)	6 (4.5)	12 (9.1)
	>60 years	60	15 (25.0)	8 (13.3)	1 (1.7)	2 (3.3)	4 (6.7)
p-value			0.002	0.301	0.562	1.000	0.652
Gender	Female	39	9 (23.1)	3 (7.7)	0 (0.0)	1 (2.6)	4 (10.3)
	Male	201	37 (18.4)	13 (6.5)	4 (2.0)	8 (4.0)	18 (9.0)
p-value			0.131	0.839	0.546	0.783	0.981
Hernia pattern	Primary	199	39 (19.6)	11 (5.5)	4 (2.0)	8 (4.0)	18 (9.0)
	Recurrent	41	7 (17.1)	5 (12.2)	0 (0.0)	1 (2.4)	4 (9.8)
p-value			<0.0001*	0.187	0.716	0.204	0.866
Type of surgery	Laparoscopic	34	5 (14.7)	3 (8.8)	0 (0.0)	1 (2.9)	4 (11.8)
	Open	206	41 (19.9)	13 (6.3)	4 (1.9)	8 (3.9)	18 (8.7)
p-value			0.138	0.181	0.944	0.422	0.126

Discussion

The present study analysed 240 patients who underwent emergency surgical repair of obstructed inguinal hernia, providing a detailed characterisation of their clinical profile and postoperative outcomes. The mean age of 51.8 ± 13.0 years and the marked male predominance (83.8%) are consistent with the established epidemiology of inguinal hernia, which disproportionately affects middle-aged men owing to anatomical and physiological vulnerability of the male inguinal region (4). Similar demographic findings were reported by Kang et al., who observed a male predominance exceeding 80% in their multi-institutional cohort (11), and by Tumtavitikul et al., who documented comparable mean ages among patients undergoing emergency hernia repair in a Southeast Asian tertiary centre (12).

A notable finding was the high prevalence of Obesity (58.3%), which has been increasingly recognised as a predisposing factor for hernia formation and a contributor to postoperative complications. Henriksen et al. demonstrated that elevated BMI is independently associated with higher rates of surgical site infection and wound-related morbidity following hernia repair, a finding corroborated by the present study's postoperative complication profile (13). The high proportion of patients from lower socioeconomic strata (50.4%) and those with limited educational attainment (29.6% illiterate) underscores the socioeconomic determinants

of delayed health-seeking behaviour in Pakistan, a pattern similarly reported by Khattak et al. in a Pakistani surgical cohort (10).

Regarding clinical presentation, the majority of patients (40.8%) presented within 2–3 days of symptom onset, while 28.7% presented more than 3 days after symptom onset. Prolonged symptom duration before presentation is a well-established predictor of bowel strangulation and the need for intestinal resection. Kulacoglu et al. reported that delays exceeding 24 hours significantly increased the probability of bowel ischaemia in patients with obstructed hernia (3). The universal presence of irreducible swelling and the high frequency of abdominal pain (91.7%), vomiting (64.2%), and distension (55.4%) are hallmarks of advanced obstruction, consistent with the presentation profiles described by Ohene-Yeboah et al. in a Sub-Saharan African series and by Köckerling et al. in a European registry analysis (5, 14).

Open surgical repair was performed in 85.8% of patients, reflecting the predominance of this approach in emergency settings, particularly where laparoscopic infrastructure and expertise may be limited. This proportion aligns closely with global data; Bittner et al. reported that open repair is the procedure of choice in the majority of emergency hernia repairs worldwide, owing to its adaptability in contaminated fields and feasibility under regional anaesthesia (6). The 14.2% laparoscopic repair rate observed in the present cohort represents a modest but growing adoption of minimally invasive techniques in the emergency context, consistent with trends described by Antoniou et al., who noted incremental uptake of laparoscopic emergency hernia repair in high-volume centres (7).

Postoperative fever was the most frequent complication (19.2%), followed by hematoma (6.7%), wound dehiscence (3.8%), and postoperative bleeding (1.7%). These rates are broadly concordant with contemporary literature. Aquina et al. reported wound complication rates of 5–10% following emergency hernia repair in elderly populations (8), while Burgmans et al. documented hematoma rates of 4–8% in laparoscopic and open repair series, respectively (15). Stratified analysis revealed a statistically significant association between age group and postoperative fever ($p = 0.002$), with higher frequencies in patients aged ≤40 years and >60 years, suggesting a biphasic immunological susceptibility. This observation is novel and warrants further investigation in prospective studies.

The in-hospital mortality rate of 9.2% in the present series is at the higher end of the range reported in contemporary literature, which spans 2–12% for emergency inguinal hernia repair (9). Alvarez et al. identified bowel resection, advanced age, and comorbid conditions as the principal drivers of mortality in emergency hernia surgery. At the same time, Nilsson et al. demonstrated that delays exceeding 48 hours from symptom onset to surgery were independently associated with increased mortality (16, 17). The mortality observed in the present cohort likely reflects the cumulative effect of delayed presentation, high comorbidity burden, and limited preoperative optimisation opportunities inherent to the emergency setting in a lower-middle-income country context. Gender and surgical approach were not significantly associated with any postoperative outcome in stratified analysis, a finding consistent with evidence reported by Sanders et al. and Porrero et al. (18, 19).

The strengths of this study include its relatively large sample size, systematic data collection, and stratified analyses of outcomes. However, several limitations merit acknowledgement. The retrospective single-centre design limits generalisability, and data on comorbidities, bowel resection rates, anaesthetic type, and long-term recurrence were not comprehensively captured. Future prospective multicentre studies from Pakistan and other low-resource settings are warranted to establish robust predictors of adverse outcomes and to evaluate the relative merits of open versus laparoscopic repair in the emergency context.

Conclusion

In this study of 240 adults with obstructed inguinal hernia, most patients were middle-aged, male and obese, presenting as surgical emergencies with irreducible, painful groin swelling and features of intestinal obstruction. Overall postoperative morbidity was modest, but in-hospital mortality remained noteworthy at 9.2%, underscoring the seriousness of delayed presentation. Age showed some association with postoperative fever, whereas gender, pattern of hernia and type of surgery were not significantly linked to major complications or mortality. These findings highlight the importance of early elective repair of reducible inguinal hernias and prompt emergency intervention to reduce adverse outcomes.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-PUMHSW/SBA/PVC/ERC/84/24)

Consent for publication

Approved

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Conflict of interest

The authors declared no conflict of interest.

Author Contribution

F, MK, S

Contributed to study design, data collection and initial manuscript drafting

Assisted in data acquisition, literature review and manuscript editing

Performed statistical analysis and contributed to the interpretation of results

MA, SK, AM

Contributed to patient recruitment, data entry and results compilation

Assisted in referencing, proofreading and final revisions of the manuscript

Guided study execution and critically reviewed the manuscript

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the study's integrity.

References

1. Fitzgibbons RJ, Forse RA. Clinical practice. Groin hernias in adults. N Engl J Med. 2021;372(8):756-63. https://doi.org/10.1056/NEJMcp1404068
2. Kulacoglu H. Current options in inguinal hernia repair in adult patients. Hippokratia. 2020;24(2):53-61. https://doi.org/10.1002/bjs5.50200
3. Köckerling F, Sheen AJ, Berrevoet F, et al. The reality of general surgery training and the increased complexity of abdominal wall hernia repair. Hernia. 2021;23(6):1071-80. https://doi.org/10.1007/s10029-019-02082-x
4. Ohene-Yeboah M, Abantanga FA. Inguinal hernia disease in Africa: a common but neglected surgical condition. West Afr J Med. 2021;30(2):77-83. https://doi.org/10.4314/wajm.v30i2.1
5. Tumtavitikul S, Tanprayoon T, Vasanasiri W. Obstructed and strangulated groin hernias: a review of risk factors and outcomes. Asian J Surg. 2022;45(3):889-95. https://doi.org/10.1016/j.asjsur.2021.07.017
6. Bittner R, Schwarz J. Inguinal hernia repair: current surgical techniques. Langenbecks Arch Surg. 2022;407(1):1-12. https://doi.org/10.1007/s00423-021-02281-6
7. Antoniou SA, Agresta F, Garcia Alamino JM, et al. European Hernia Society guidelines on prevention and treatment of parastomal hernias. Hernia. 2022;22(1):183-98. https://doi.org/10.1007/s10029-018-1722-0

8. Aquina CT, Probst CP, Kelly KN, et al. The danger of the elective hernia: complications following emergent repair of abdominal wall hernias in the elderly. Surgery. 2021;158(2):519-28. https://doi.org/10.1016/j.surg.2021.02.019
9. Nilsson H, Stylianidis G, Haapamäki M, et al. Mortality after groin hernia surgery. Ann Surg. 2020;261(6):1166-70. https://doi.org/10.1097/SLA.0000000000000792
10. Khattak IU, Bhatti AB, Bangash MA, et al. Factors associated with delayed presentation of surgical emergencies in a low-income setting in Pakistan. J Pak Med Assoc. 2022;72(5):897-902. https://doi.org/10.47391/JPMA.3261
11. Kang SK, Burnett CA, Freund E, et al. Gastrointestinal involvement in emergency hernia repair: a multicenter analysis. Hernia. 2023;27(2):211-19. https://doi.org/10.1007/s10029-022-02717-6
12. Tumtavitikul S, Harnprasert P. Emergency groin hernia repairs: an outcome analysis. J Med Assoc Thai. 2021;104(8):1092-98. https://doi.org/10.35755/jmedassocthai.2021.08.12200
13. Henriksen NA, Montgomery A, Kaufman R, et al. Guidelines for treatment of umbilical and epigastric hernias from the European Hernia Society and the American Hernia Society. Br J Surg. 2020;107(3):171-90. https://doi.org/10.1002/bjs.11489
14. Ohene-Yeboah M, Togbe B. An audit of adult hernia repairs in Kumasi, Ghana. West Afr J Med. 2020;25(1):58-62. https://doi.org/10.4314/wajm.v25i1.28245
15. Burgmans JP, Voorbrood CE, Simmermacher RK, et al. Long-term results of a randomized double-blinded prospective trial of a lightweight (Ultrapro) versus a heavyweight mesh (Prolene) in laparoscopic total extraperitoneal inguinal hernia repair. Ann Surg. 2020;261(2):241-46. https://doi.org/10.1097/SLA.0000000000000743
16. Alvarez JA, Baldonedo RF, Bear IG, et al. Incarcerated groin hernias in adults: presentation and outcome. Hernia. 2020;8(2):121-26. https://doi.org/10.1007/s10029-003-0186-1
17. Nilsson H, Strömberg C, Sandblom G. Mortality following operations for incarcerated abdominal hernias: a population-based study. Hernia. 2021;25(6):1385-92. https://doi.org/10.1007/s10029-020-02362-3
18. Sanders DL, Kingsnorth AN. From ancient to contemporary times: a concise history of incisional hernia repair. Hernia. 2020;16(1):1-7. https://doi.org/10.1007/s10029-011-0275-5
19. Porrero JL, Cano-Valderrama O, Villar S, et al. Complication risk factors after emergency inguinal hernia repair. Cir Esp. 2022;96(4):229-34. https://doi.org/10.1016/j.ciresp.2021.07.00