



## Clinical Patterns of Abdominal Wall Hernias and Factors Associated with Inguinal Hernia in Afghanistan: A Single-Center Study

Fawad Ahmadzai <sup>1</sup>, \*Mohammad Esmail Ahmadyar <sup>1</sup>, Hamed Shams <sup>1</sup>, Abdulhai Rahmani <sup>1</sup>, Mohammad Tamim Faqiri <sup>2</sup>

1. Medical Sciences Research Centre, Ghalib University, Kabul, Afghanistan

2. Department of General Thoracic Surgery, 300-bed police specialized hospital, Kabul, Afghanistan

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\*Corresponding Author:  
Mohammad Esmail Ahmadyar

E-mail address:  
esmail.ahmadyar@ghalib.edu.af

### ABSTRACT

**Background:** We aimed to determine the data describing the clinical and operative patterns of abdominal wall hernias in Afghanistan.

**Methods:** This prospective hospital-based cross-sectional study with consecutive recruitment was conducted from March to August 2024 at a tertiary referral hospital in Kabul, Afghanistan. Adult patients undergoing surgical repair of abdominal wall hernias were enrolled. Data on sociodemographic characteristics, anthropometric measurements, clinical features, hernia-related characteristics, risk factors, and operative findings were collected using standardized case-report forms. Exploratory bivariate logistic regression was used to assess the factors associated with inguinal hernia compared with other abdominal wall hernia subtypes. Crude odds ratios (ORs) with 95% confidence intervals (CIs) were determined.

**Results:** A total of 91 patients were enrolled. The mean age was  $40.8 \pm 15.4$  years, and 69.2% were male. Inguinal hernia was the most common subtype, followed by incisional and paraumbilical hernias. Mesh repair was performed in 95.6% of cases. In bivariate analysis, male sex and constipation were associated with higher odds of inguinal hernia, whereas overweight/obesity, previous abdominal surgery, unemployment, and low socioeconomic status were associated with lower odds of inguinal hernia. No other variables showed statistically significant associations. Findings from regression analysis were interpreted cautiously due to small sample size.

**Conclusion:** This study provides prospective evidence on the clinical and sociodemographic profile of surgically treated abdominal wall hernias in Afghanistan. The predominance of inguinal hernia, prolonged symptom duration before surgery, and socioeconomic vulnerability of many patients might inform surgical service planning and future multicenter research in resource-limited settings.

### Keywords

Abdominal wall hernia; Inguinal hernia; Cross-sectional studies; Afghanistan; Surgical epidemiology

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## Introduction



Abdominal wall hernias are among the most common surgical conditions worldwide. The absolute numbers of prevalent and incident hernia cases have increased over recent decades despite declines in age-standardized rates, likely reflecting the combined effects of population growth and aging [1]. Hernias may present acutely with complications such as incarceration and strangulation, necessitating urgent surgical intervention and carrying an increased risk of morbidity and mortality [2]. In addition to acute complications, hernias may substantially impair health-related quality of life through pain, limitations in daily activities, reduced physical function, body image concerns, and psychosocial distress [3]. Surgical repair remains the mainstay of treatment for abdominal wall hernias routinely performed in both elective and emergency settings. Among abdominal wall hernias, inguinal hernia is generally the most common subtype, accounting for the majority of cases in population-based estimates [4].

Within Asia, substantial geographic variation in hernia epidemiology has been reported [5]. Afghanistan carries a relatively high hernia burden, indicating a potentially important unmet need for timely diagnosis and access to surgical care [5]. In low- and middle-income settings, this challenge may be compounded by delayed presentation, financial barriers, shortages of specialist services, and limited surgical system capacity [6, 7]. Consequently, patients may present after prolonged symptoms or with complications requiring urgent intervention. Understanding local patterns of presentation and operative management is therefore important for planning surgical services and improving access to care.

Published Afghan data on hernia surgery remain limited and are largely restricted to single-center descriptive studies focused on inguinal hernia [8]. Despite the likely burden of abdominal wall hernias in Afghanistan, broader data describing their clinical characteristics and

operative management are scarce. Locally generated evidence may help inform surgical practice and guide future research priorities.

Therefore, we aimed to describe the demographic, clinical, and operative patterns of abdominal wall hernias requiring surgical repair at a tertiary referral hospital in Kabul, Afghanistan. Besides we managed to explore factors associated with inguinal hernia relative to other abdominal wall hernia subtypes.

## Methods

### *Study design and setting*

This prospective hospital-based cross-sectional study with consecutive recruitment was conducted from March to August 2024 at a tertiary referral hospital in Afghanistan serving Kabul and surrounding provinces.

### *Study population and participant selection*

The source population comprised all adult patients presenting for operative management of abdominal wall hernia during the study period. Eligible participants were adults aged  $\geq 18$  years with a diagnosis of abdominal wall hernia confirmed by the attending surgical team who underwent operative repair during the study period. Patients managed non-operatively, those who declined participation, and those with incomplete data for key study variables were excluded. Participants were enrolled consecutively, i.e., all eligible patients undergoing hernia repair were invited to participate until completion of the recruitment period. No formal sample size calculation was performed, as all eligible cases presenting during the study period were enrolled.

During the study period, 1,377 surgical procedures were performed at the study center, of which 91 abdominal wall hernia repairs met the eligibility criteria and were included in the final analysis.

### ***Data collection and study variables***

Data were collected prospectively using standardized case-report forms by trained surgical staff under investigator supervision. Information was obtained through direct patient interview, physical examination, review of inpatient records, anesthesia charts, and operative notes. Completed forms were checked for completeness and consistency prior to database entry. There were no missing data among included participants for variables entered into the final analysis.

Collected variables included sociodemographic characteristics (age, sex, marital status, residence, employment status, and socioeconomic status), anthropometric data (body mass index [BMI]), clinical characteristics (symptom duration, previous abdominal surgery, hernia subtype, incarceration status), behavioral/risk factors (smoking, constipation, chronic cough, and heavy lifting), and operative variables (type of procedure performed).

BMI was calculated as weight in kilograms divided by height in meters squared ( $\text{kg}/\text{m}^2$ ) and categorized according to Centers for Disease Control and Prevention criteria [9]. Socioeconomic status was classified using locally relevant household income and living-standard indicators and dichotomized as poor or good. Smoking was defined as current tobacco use at the time of admission. Other behavioral exposures were self-reported.

Abdominal wall hernia subtype was classified according to operative findings as inguinal, incisional, paraumbilical, umbilical, epigastric, or Spigelian hernia.

### ***Statistical analysis***

Data were entered and analyzed using IBM SPSS Statistics for Windows, version 27.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized as means with standard deviations (SD), and categorical variables as frequencies and percentages.

The primary descriptive outcome was the frequency and distribution of abdominal wall hernia subtypes among surgically treated patients. For exploratory comparative analysis, the binary outcome variable was categorized as inguinal hernia versus other abdominal wall hernias combined (incisional, paraumbilical, umbilical, epigastric, and Spigelian).

Bivariate logistic regression was performed to explore factors associated with inguinal hernia relative to other hernia subtypes. Crude odds ratios (ORs), 95% confidence intervals (CIs), and *P*-values were reported. Given the modest sample size and exploratory nature of the analysis, multivariable modelling was not performed. All statistical tests were two-sided, and  $P < 0.05$  was considered statistically significant.

### ***Ethical considerations***

Ethical approval for this study was obtained from the Biomedical Research Ethics Committee of Ghalib University, Kabul, Afghanistan (Approval code: AF.GUK.REC.1403.006) prior to the commencement of the study. Written informed consent was obtained from all participants. All collected data were anonymized before analysis, and strict confidentiality was maintained throughout the study.

## **Results**

A total of 91 patients undergoing abdominal wall hernia repair were enrolled. The mean age was  $40.8 \pm 15.4$  years, and just over half of participants were aged  $\geq 40$  years. Participants were predominantly male, married, from rural areas, and of poor socioeconomic status. Most had normal BMI, although over one-third were overweight or obese.

Symptom duration was most commonly 2–6 months, while nearly one-third reported symptoms for more than 12 months. A history of abdominal surgery was uncommon, and five patients presented with incarcerated hernia requiring emergency repair.

Inguinal hernia was the predominant subtype, followed by incisional and paraumbilical hernias. Other subtypes were infrequent. Mesh-based repair was performed in nearly all cases. Smok-

ing and chronic cough were uncommon, whereas constipation was relatively frequent (Table 1).

**Table 1:** Socio-demographic and clinical characteristics of patients undergoing surgical repair of abdominal wall hernias (n=91)

<i>Variable</i>	<i>Category</i>	<i>n (%)</i>
Age (yr)	<40	43 (47.3)
	≥40	48 (52.7)
Gender	Female	28 (30.8)
	Male	63 (69.2)
Marital status	Single	19 (20.9)
	Married	72 (79.1)
Place of residence	Rural	55 (60.4)
	Urban	36 (39.6)
Employment status	Employed	43 (47.3)
	Unemployed	48 (52.7)
Socioeconomic status	Good	21 (23.1)
	Poor	70 (76.9)
BMI	Normal	59 (64.8)
	Overweight/Obese	32 (35.2)
Symptom duration (months)	≤1	1 (1.1)
	2–6	41 (45.1)
	7–12	21 (23.1)
	>12	28 (30.8)
History of abdominal surgery	No	76 (83.5)
	Yes	15 (16.5)
Type of hernia	Epigastric	5 (5.5)
	Incisional	15 (16.5)
	Inguinal	52 (57.1)
	Paraumbilical	10 (11.0)
	Spigelian	4 (4.4)
	Umbilical	5 (5.5)
Incarcerated hernia	No	86 (94.5)
	Yes	5 (5.5)
Smoking	No	82 (90.1)
	Yes	9 (9.9)
Constipation	No	54 (59.3)
	Yes	37 (40.7)
Chronic cough	No	81 (89.0)
	Yes	10 (11.0)
Heavy lifting	No	74 (81.3)
	Yes	17 (18.7)
Procedure performed	Tissue-based repair	2 (2.2)
	Mesh-based repair	87 (95.6)
	Other	2 (2.2)

**Abbreviations:** BMI, body mass index

In exploratory bivariate logistic regression comparing inguinal hernia with other abdominal wall hernia subtypes, male sex showed the strongest association with inguinal hernia in this analysis. Constipation was also associated with higher odds of inguinal hernia. Overweight/obesity, previous abdominal surgery,

unemployment, and poor socioeconomic status were associated with lower odds of inguinal hernia. No statistically significant associations were observed for age, marital status, residence, smoking, chronic cough, or heavy lifting (Table 2).

**Table 2:** Bivariate logistic regression analysis of factors associated with inguinal hernia versus other abdominal wall hernia subtypes

<i>Variable</i>	<i>Category</i>	<i>Inguinal N (%)</i>	<i>Other N (%)</i>	<i>OR (95% CI)</i>	<i>p-value</i>
Age(yr)	Continuous	38.9 ± 17.1	43.3 ± 12.7	0.98 (0.95–1.01)	0.173
Sex	Female	1 (1.9)	27 (69.2)	Ref	—
	Male	51 (98.1)	12 (30.8)	114.75 (14.16–930.21)	<0.001
Marital status	Single	14 (26.9)	5 (12.8)	Ref	—
	Married	38 (73.1)	34 (87.2)	0.40 (0.13–1.23)	0.108
Residence	Urban	19 (36.5)	17 (43.6)	Ref	—
	Rural	33 (63.5)	22 (56.4)	1.34 (0.58–3.13)	0.496
Employment status	Employed	31 (59.6)	12 (30.8)	Ref	—
	Unemployed	21 (40.4)	27 (69.2)	0.30 (0.13–0.72)	0.007
Socioeconomic status	Good	16 (30.8)	5 (12.8)	Ref	—
	Poor	36 (69.2)	34 (87.2)	0.33 (0.11–1.00)	0.050
BMI	Normal	43 (82.7)	16 (41.0)	Ref	—
	Over-weight/Obese	9 (17.3)	23 (59.0)	0.15 (0.06–0.38)	<0.001
History of abdominal surgery	No	50 (96.2)	27 (69.2)	Ref	—
	Yes	2 (3.8)	12 (30.8)	0.09 (0.02–0.43)	0.003
Smoking	No	45 (86.5)	37 (94.9)	Ref	—
	Yes	7 (13.5)	2 (5.1)	2.88 (0.56–14.70)	0.204
Constipation	No	26 (50.0)	28 (71.8)	Ref	—
	Yes	26 (50.0)	11 (28.2)	2.55 (1.05–6.16)	0.038
Chronic cough	No	48 (92.3)	33 (84.6)	Ref	—
	Yes	4 (7.7)	6 (15.4)	0.46 (0.12–1.75)	0.254
Heavy lifting	No	43 (82.7)	31 (79.5)	Ref	—
	Yes	9 (17.3)	8 (20.5)	0.81 (0.28–2.34)	0.698

**Outcome variable:** *Inguinal hernia (reference: other abdominal wall hernia types).*

**Abbreviations:** *OR, odds ratio; CI, confidence interval; BMI, body mass index*

Several estimates had wide confidence intervals, reflecting limited precision due to the modest sample size and sparse subgroup counts.

## Discussion

This study describes the demographic, clinical, and operative patterns of abdominal wall hernias requiring surgical repair at a tertiary referral hospital in Kabul and explored factors associated with inguinal hernia relative to other abdominal wall hernia subtypes. The age distribution was relatively balanced, with a slight predominance of patients aged  $\geq 40$  years, indicating that hernia repair was required across a broad adult age spectrum. The cohort overall was male-predominant, likely reflecting established sex differences in hernia epidemiology together with the high proportion of inguinal hernia repairs [10]. Inguinal hernia was the most common operative diagnosis, followed by incisional and paraumbilical hernias. Many patients reported prolonged symptom duration before surgery, and mesh-based repair was used in most cases.

The predominance of inguinal hernia is consistent with international literature, in which groin hernias represent the most common abdominal wall hernia subtype requiring operative management [11-13]. This pattern is commonly attributed to the anatomical vulnerability of the inguinal canal together with age-related weakening of fascial tissues and chronic increases in intra-abdominal pressure [14]. Our findings therefore align with broader epidemiological trends while providing locally relevant evidence from an underreported setting.

Although inguinal hernia was the leading subtype, non-inguinal abdominal wall hernias together accounted for a substantial proportion of the operative workload. Incisional hernia was the second most frequent subtype, with additional contributions from paraumbilical, umbilical, epigastric, and Spigelian defects. The

prominence of incisional hernia is clinically plausible given that this condition is a recognized long-term complication of prior abdominal surgery influenced by patient, wound-healing, and operative factors [15]. This distribution suggests that ventral abdominal wall pathology represents an important component of general surgical practice in this setting. These findings have practical implications for workforce training, operative planning, perioperative resource allocation, and reliable access to prosthetic materials suitable for a range of hernia repairs.

In this elective surgical cohort, prolonged symptom duration should not be interpreted as delay following acute complications such as incarceration or obstruction, particularly as only a small minority of patients required emergency repair for incarceration. Rather, it likely reflects the period of living with a symptomatic but non-emergent condition before accessing surgical care. This might indicate barriers to timely healthcare access, including financial constraints, geographic distance, competing work demands, fear of surgery, and delays in referral or initial clinical evaluation. A large international multicountry cohort study of more than 18,000 patients with inguinal hernia similarly reported a median delay of approximately 8 months from symptom onset to elective repair, with most delay occurring prior to diagnosis rather than during surgical scheduling [16], supporting the role of pre-diagnostic access barriers. Collectively, these findings suggest that prolonged symptom duration in our cohort was more likely driven by limitations in early healthcare access than by delays within tertiary surgical services.

The socioeconomic profile of this cohort is also informative. Most patients were from rural areas [60.4%], were classified as having poor socioeconomic status [76.9%], and a substantial proportion were unemployed. Although hospital-based data cannot determine population-level prevalence, these findings may reflect ei-

ther a higher burden of abdominal wall hernia among economically disadvantaged groups or delayed presentation among patients who seek care only once symptoms become functionally limiting. Similar socioeconomic disparities in hernia care have been reported elsewhere, where socially vulnerable populations were less likely to access elective repair and faced greater barriers within treatment pathways [17, 18]. Given that hernia disease could impair mobility and capacity for manual labor, delayed treatment may further worsen household financial hardship. Strengthening financial protection mechanisms and improving access to rural surgical services may therefore have both health and socioeconomic benefits.

Several patient factors commonly related to hernia formation were observed in this cohort. Constipation was relatively common and, in exploratory analysis, appeared more frequent among patients with inguinal hernia. Smaller proportions reported chronic cough, heavy lifting, smoking, or overweight/obesity, all of which have been described as potential contributors to hernia development [10, 19]. These exposures, including constipation, may increase intra-abdominal pressure or impair connective tissue integrity, thereby promoting hernia occurrence or progression [20]. Their documentation remains clinically relevant when evaluating symptom history, operative planning, and postoperative risk reduction.

Exploratory bivariate analyses should be interpreted cautiously but offer clinically plausible signals. Male sex showed the strongest association with inguinal hernia, consistent with established anatomical and epidemiological differences between men and women [14, 15]. A similar pattern was reported in a previous Afghan study from Khost, in which nearly all patients undergoing inguinal hernia repair were male [8]. In contrast, overweight/obesity and previous abdominal surgery were associated with lower odds of inguinal hernia, likely reflecting the greater representation of ventral and

incisional hernias in these groups rather than true protective effects against groin hernia. Similarly, unemployment and poor socioeconomic status were associated with lower odds of inguinal hernia relative to other hernia types, but these findings may reflect referral patterns, occupational exposures, or residual confounding. Because the comparison outcome was inguinal versus all other hernias combined, these estimates primarily describe differences in subtype distribution rather than causal risk factors. Mesh-based repair was performed in nearly all operations. This suggests broad adoption of contemporary repair standards at the study center, as mesh-based repair has been associated with lower recurrence rates in both groin and ventral hernia repair compared with non-mesh techniques, without an increase in major postoperative complications [21, 22]. Sustained access to affordable mesh, sterile operating environments, anesthesia capacity, and trained surgical teams remains essential for maintaining quality hernia care in Afghanistan. Future audit of postoperative complications, recurrence, chronic pain, and patient-reported outcomes would help assess long-term effectiveness.

This study had several limitations. First it was conducted at a single tertiary referral hospital and included only patients who underwent surgery; therefore, findings may not be generalizable to community populations or patients managed non-operatively. Then referral bias may have increased the proportion of complex or longstanding cases. The sample size was modest, limiting precision for subgroup comparisons, as reflected by wide confidence intervals. Combining all non-inguinal hernias into one comparator group may also have obscured subtype-specific associations. In addition, postoperative follow-up data were unavailable, precluding assessment of recurrence and longer-term outcomes.

Despite these limitations, the study provides prospective evidence from a country where published surgical epidemiology remains

sparse. Consecutive recruitment, inclusion of multiple abdominal wall hernia subtypes, and standardized data collection strengthen the internal validity of the descriptive findings. Some estimates were inflated by sparse subgroup counts, particularly for sex-specific comparisons. Future multicenter studies with larger samples and longitudinal follow-up are needed to define the national burden of hernia disease, identify determinants of delayed presentation, and evaluate outcomes after repair. In resource-constrained settings such as Afghanistan, improving timely access to elective hernia surgery may reduce avoidable emergency presentations and improve quality of life.

## Conclusion

Abdominal wall hernia surgery at this tertiary center was predominantly for inguinal hernia, with ventral and incisional hernias also contributing substantially to operative workload. Prolonged symptom duration before surgery was common, suggesting barriers to timely elective surgical care. Strengthening access to elective hernia repair, addressing modifiable risk factors, and improving multicenter data collection should be prioritized to optimize hernia care in resource-limited settings.

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## Conflicts of interest

The authors declare no conflicts of interest.

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