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The Risk Factors for Recurrence after Inguinal Hernia Surgery: A Prospective Study of a Tertiary Care Hospital in Bangladesh

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Abstract **Original Research Article**

Background*:** Inguinal hernia recurrence remains a significant clinical concern despite advancements in surgical techniques and patient care. Identifying risk factors associated with recurrence is crucial for improving patient outcomes**. Objective:** This study aims to evaluate the risk factors for recurrence after inguinal hernia surgery in a tertiary care hospital in Bangladesh**.** ***Methods: This prospective observational study was conducted at the surgical department of Mymensingh Medical College Hospital from July 2022 to December 2023. A total of 50 patients aged over 18 years with more than one recurrence were included. Patients with incisional hernias or a single recurrence were excluded. Data were collected via a questionnaire covering variables such as gender, age, smoking status, comorbidities (constipation, chronic obstructive pulmonary disease, coronary heart disease, diabetes, hypertension), medications, and family history. The influence of these factors on initial hernia onset, age at first recurrence, and recurrence rates was analyzed. Statistical analyses were performed using SPSS version 23.0, with Student's t-tests or Chi-square tests as appropriate, and odds ratios calculated for relative risk. ***Results*:** The majority of the patients 21(42%) belong to 61-70 age range, 11 (22%) belongs to 51-60 age range, 8 (16%) belongs to 71-80 age range, 6 (12%) belongs to 41-50 age range, 3 (6%) belongs to 31-40 age range and only 1 2%) belongs to 21-30 age range. Among the 50 patients' the highest number of the patients was male 37 (74%) and female were 13 (26%). As expected, more male patients had inguinal hernias but distribution of gender (p = 0.27), smoking habits (p = 0.45), comorbidity and medication did not vary when subgroups with or without affected relatives were compared. ***Conclusion*:** The findings underscore the importance of considering patient-specific risk factors, such as family history and age, in the management of inguinal hernia repairs. Further research is necessary to develop tailored strategies for preventing recurrence and improving long-term patient outcomes.

Keywords: Inguinal hernia, recurrence, risk factors, surgery, family history, Bangladesh.

INTRODUCTION

Inguinal hernia, characterized by the protrusion of abdominal contents through the muscle and fascial layers of the lower abdominal wall, is a prevalent condition across all age groups [1]. The lifetime risk of developing groin hernias, including both inguinal and femoral hernias, is estimated at 27% for men and 3% for women. Inguinal hernia repair is a common procedure among general surgeons, with over one million surgeries performed annually in the United States [2, 3].

The surgical repair of inguinal hernias carries both short-term and long-term risks. While watchful waiting may be a viable option for men with minimally symptomatic hernias, untreated cases can lead to severe medical complications such as bowel incarceration or strangulation, which constitute medical emergencies [4]. Emergency repair of inguinal hernias is associated with a significantly higher mortality risk, roughly double that of elective surgery [5]. A recent review of 25 studies encompassing 6,293 participants reported that 2–4% of patients experience hernia recurrence post-repair, regardless of whether mesh was used, and 5–10% suffer from chronic postoperative pain [6, 7]. Identifying and understanding the risk factors associated with inguinal hernia repair is crucial for preventing morbidity related to this condition.

The etiology of inguinal hernia development is multifactorial, involving a complex interplay of environmental, genetic, and behavioural factors [8, 9].

Despite the importance of epidemiological studies in identifying these risk factors, there have been relatively few investigations. Factors associated with an increased risk of inguinal hernia in adults include older age, male sex, chronic obstructive pulmonary disease (COPD), low body mass index (BMI), and a family history of hernias [10]. Notably, only one prior epidemiological study has examined the risk of inguinal hernia with race, focusing exclusively on black and white ethnic groups [11, 12].

OBJECTIVE

This study aimed to investigate factors associated with inguinal hernia recurrence incidence and to provide a foundation for better surgical preventive treatments.

METHODS

This prospective observational study was carried out in the surgical department of Mymensingh Medical College Hospital from July 2022 to December 2023. The study included a total of 50 patients, who were selected as the sample size. All participants provided written informed consent before participation. The study procedures were approved by the Institutional Review Board. The inclusion criteria were patients aged over 18 years with more than one hernia recurrence. Patients with incisional hernias or less than one recurrence were excluded from the study.

Data Collection and Analysis

Data was gathered using a questionnaire, with one researcher conducting all the interviews. Information collected included gender, age, smoking status, comorbidities (such as constipation, chronic obstructive pulmonary disease (COPD), coronary heart disease (CHD), diabetes, and hypertension), medications, and family history. Family history was considered if two or more parents, siblings, daughters, or sons were affected. Patients without a family history of hernia were classified separately from those with a family history. The study examined the influence of family history on the initial onset of hernia, the age at first recurrence, and recurrence rates, with recurrence rates defined as the rates of hernia reoperation. The results for risk factors in both categories were analyzed. Statistical analyses were conducted using SPSS software (version 23.0, Chicago, USA). Data were categorized by family history and other risk factors, and the appropriate statistical tests, including Student's t-tests or Chi-square tests, were applied. The odds ratio was calculated to determine the relative risk.

RESULTS

Table 1 shows that most of the patients 21(42%) belong to 61-70 age range, 11 (22%) belong to 51-60 age range, 8 (16%) belong to the 71-80 age range, 6 (12%) belongs to 41-50 age range, 3 (6%) belongs to 31-40 age range and only 1 2%) belongs to 21-30 age range.

Table 1: Age Distribution of the Patients

Age range	Frequency	Percentage
21-30	1	2.00%
31-40	3	6.00%
41-50	6	12.00%
51-60	11	22.00%
61-70	21	42.00%
71-80	8	16.00%
Total	**50**	**100%**

Among the 50 patients' highest number of patients was male 37 (74%) and female were 13 (26%) (Figure 1).

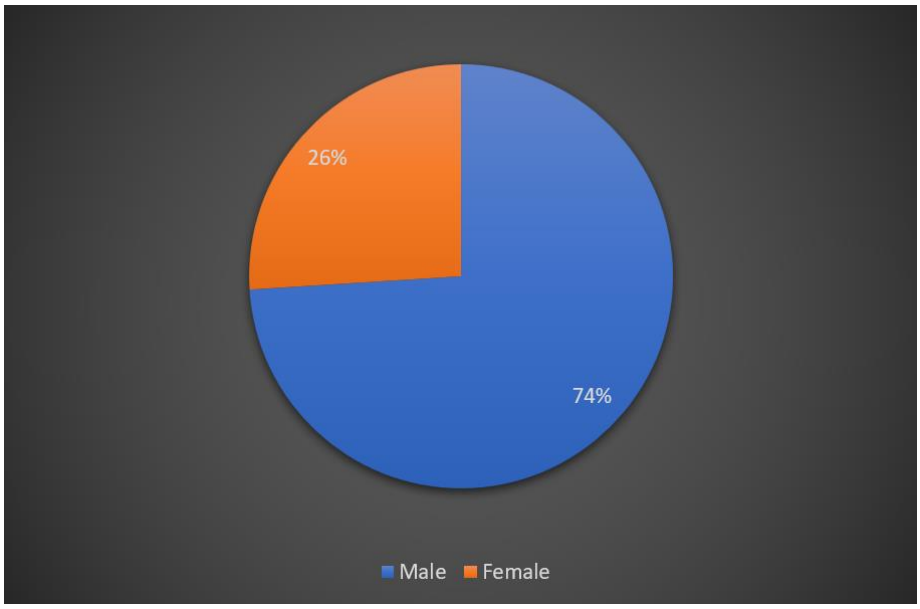

Figure 1: Gender Distribution of the Patients

According to Figure 2 right side hernia was reported at 65 %, left side hernia was reported at 28 % while bilateral hernia was reported at 7.%.

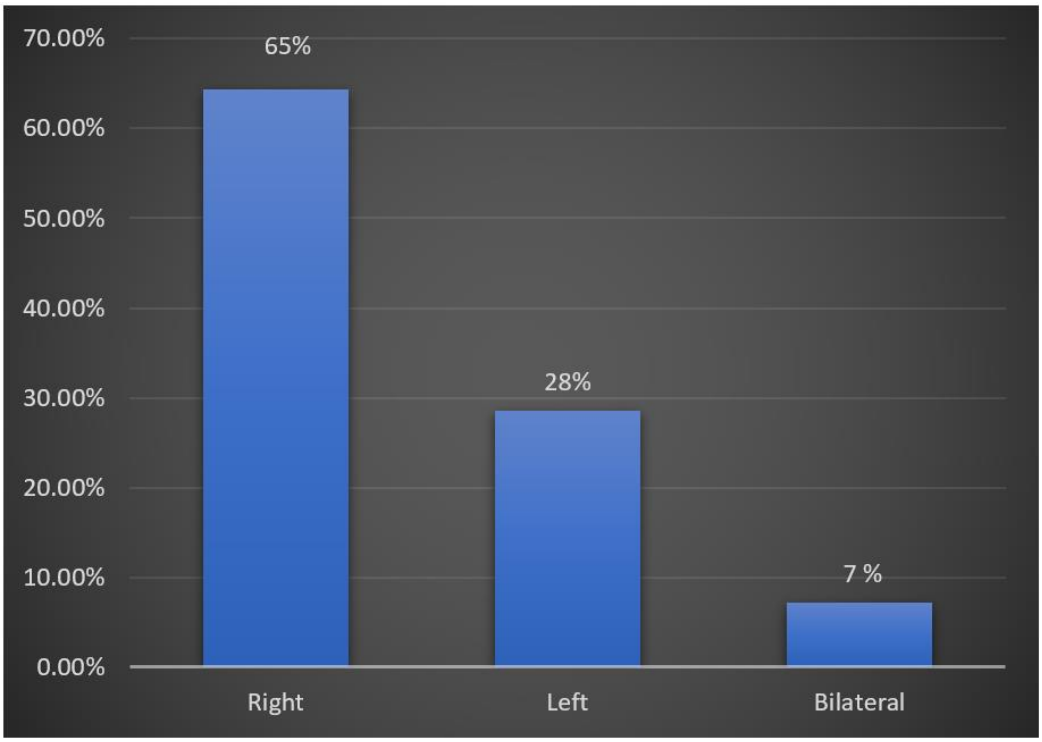

Figure 2: Distribution of Site of Hernia

According to Figure 3, early hernia was reported in 39 % while 61% was late hernia.

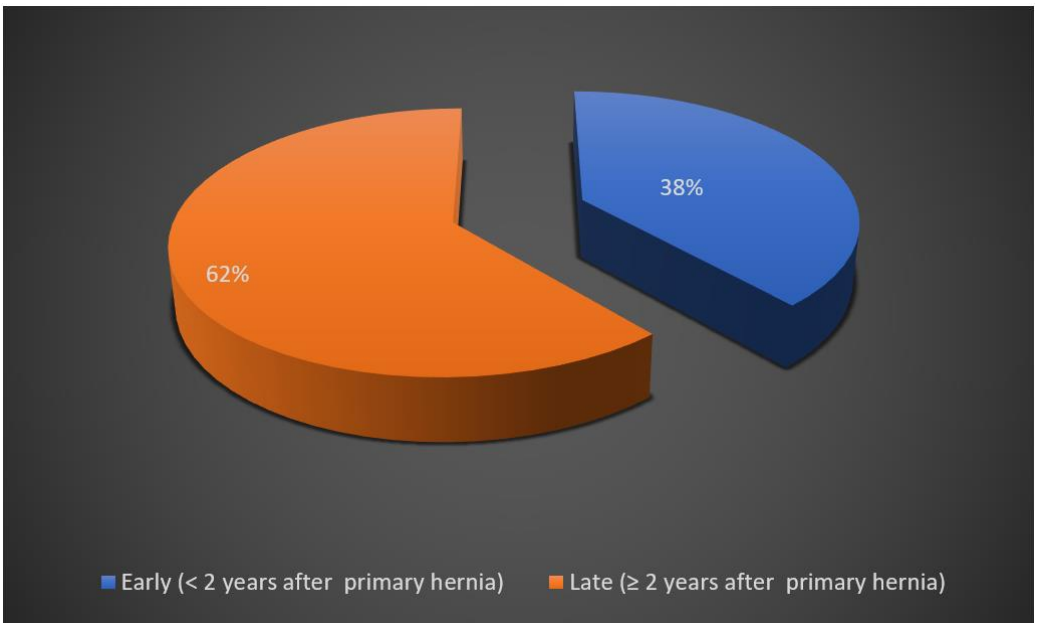

Figure 3: Types of recurrence

As expected, more male patients had inguinal hernias but distribution of gender (p = 0.27), smoking habits (p = 0.45), comorbidity and medication did not vary when subgroups with or without affected relatives were compared.

Table 2: Distribution of Risk Factors in 50 Patients with/without a Family History of Hernia Disease

Variable	Family history	Numbers of patients	P value	odds ratio
Smoking	no	13	0.45	1.45
	yes	13		
Constipation	no	3	0.85	0.84
	yes	2		
COPD	no	6	0.78	0.82
	yes	4		
Diabetes	no	5	0.70	0.74
	yes	3		
Coronary heart disease	no	3	0.68	1.32
	yes	5		
Hypertension	no	14	0.67	0.81
	yes	9		
Medication	no	22	0.08	0.44
	yes	11		

According to (figure 4) 75% operation method was open while 25 % was laparoscopic.

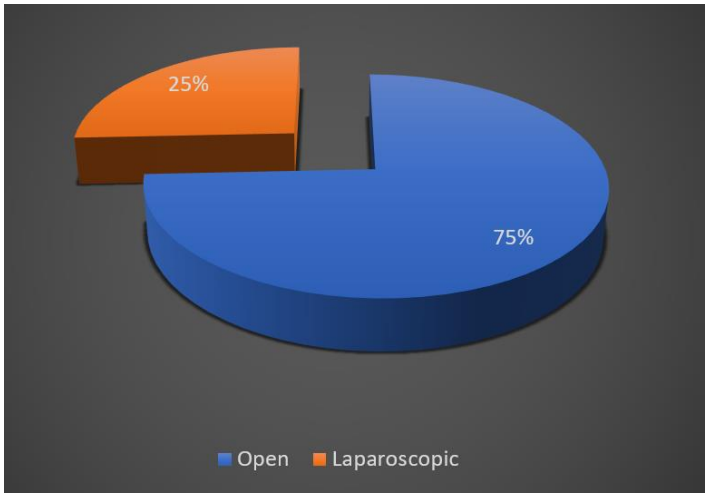

Figure 4: Operation Method of Hernia

According to the figure uses of mesh in the operation, 72% was reported yes while 28% was reported no (Figure 5).

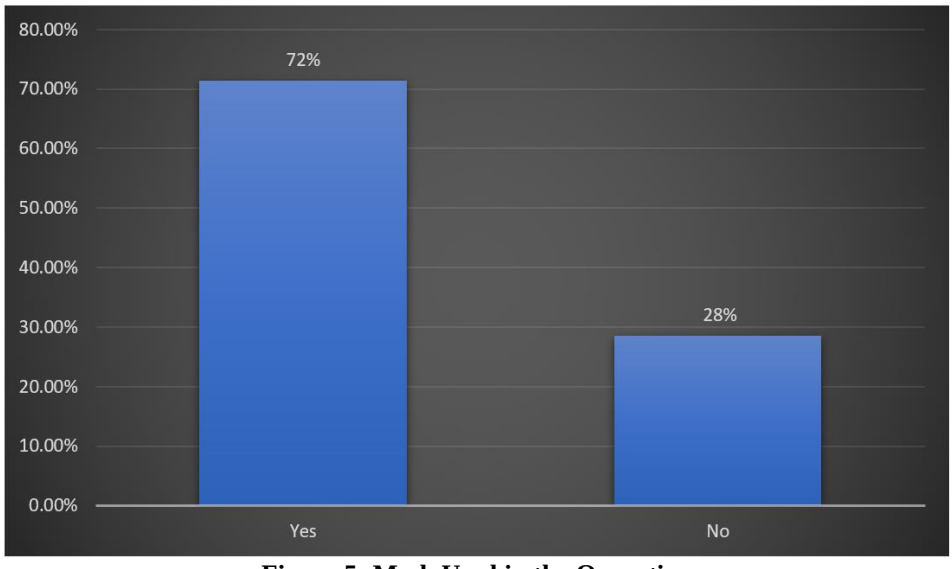

Figure 5: Mesh Used in the Operation

Open surgery for primary and recurrent hernia was reported 14(28%), Open surgery for a primary hernia and Laparoscopic surgery for recurrent hernia was reported 30 (60%) Laparoscopic surgery for a primary hernia and open surgery for recurrent hernia was reported 5 (10%) Laparoscopic surgery for primary and recurrent hernia was reported 1 (2%) (Table 3).

Table 3: Operation Method for Primary and Recurrence Hernia

Operation	Frequency	Percentage
Open surgery for primary and recurrent hernia	14	28%
Open surgery for primary hernia and Laparoscopic surgery for recurrent hernia	30	60%
Laparoscopic surgery for primary hernia and open surgery for recurrent hernia	5	10%
Laparoscopic surgery for primary and recurrent hernia	1	2%
Total	**50**	**100**

Table 4 provides an overview of the timing of hernia recurrence following primary inguinal hernia repair among the 50 patients included in the study. Early Recurrence occurs less than 2 years after the primary hernia repair. Out of the 50 patients, 19 experienced an early recurrence, accounting for 38% of the total cases. This indicates a significant proportion of patients had a relatively quick recurrence post-surgery, which could be attributed to factors such as surgical technique, patient comorbidities, or inadequate tissue healing. Late Recurrence occurring 2 years or more after the initial surgery. This category had 31 patients, representing 61% of the total cases. Late recurrences suggest that although the initial repair may have held for a longer period, other factors, possibly including lifestyle changes, additional strain, or ageing-related weakening of the abdominal wall, contributed to the hernia's return over time.

Table 4: Types and Timing of Recurrence

Recurrence Type	Frequency	Percentage
Early Recurrence (<2 years after primary hernia repair)	19	38%
Late Recurrence (≥2 years after primary hernia repair)	31	61%
Total	**50**	**100**

The table presents a detailed overview of the various causes contributing to the recurrence of inguinal hernia after surgical repair. The causes are categorized into surgical, patient-related, and postoperative factors, each influencing the likelihood of hernia recurrence.

Surgical Technique (28%): The table shows that the choice of surgical technique is a significant factor in hernia recurrence. Open surgery was associated with a higher rate of recurrence compared to laparoscopic methods. This suggests that the method of surgery plays a crucial role in the long-term success of hernia repair, possibly due to differences in how well the hernia defect is reinforced.

Type of Mesh Used (28%): Another major cause of recurrence is related to the type of mesh used in the repair. Recurrences were more frequent in cases where no mesh was used or where the type of mesh was not optimal. This underscores the importance of selecting the appropriate mesh material and placement technique to reduce the risk of recurrence.

Inadequate Repair or Tissue Weakness (20%): Recurrence can occur if the initial repair was incomplete or if the tissue surrounding the hernia is inherently weak. This category highlights that even with correct surgical technique, poor tissue quality or inadequate closure can lead to a higher chance of the hernia returning.

Patient Factors: Age (16%): The table indicates that older age is associated with a higher recurrence rate. This can be attributed to factors such as reduced healing capacity and the natural weakening of tissues with age, making older patients more susceptible to hernia recurrence.

Comorbidities (8%): Certain comorbid conditions like chronic obstructive pulmonary disease (COPD), chronic constipation, diabetes, and coronary heart disease contribute to the recurrence risk. These conditions may affect intra-abdominal pressure, wound healing, and overall patient resilience, thereby increasing the chances of hernia recurrence.

Postoperative Complications (6%): Complications occurring after surgery, such as infections or hematomas at the surgical site, can weaken the repair and predispose the patient to recurrence. Proper postoperative care is essential to prevent such complications and ensure robust healing.

Lifestyle Factors (14%): Lifestyle factors, including heavy lifting, smoking, and inadequate postoperative care, are also highlighted as contributors to recurrence. These factors can place additional stress on the repaired area, weakening it and increasing the risk of recurrence.

Table 5: Causes of Recurrence of Inguinal Hernia

Operation	Frequency	Percentage
Surgical Technique	14	28%
Type of Mesh Used	14	28%
Inadequate Repair or Tissue Weakness	10	20%
Patient Factors: Age	8	16%
Comorbidities	4	8%
Postoperative Complications	3	6%
Lifestyle Factors	7	14%
Total	**50**	**100**

DISCUSSION

The recurrence of inguinal hernias post-surgery remains a significant clinical issue, despite advances in patient care and treatment methodologies. The literature reports that up to 13% of all inguinal hernias recur after surgical intervention [13, 14]. Although tension-free mesh repair has been widely acknowledged for its success, it does not eliminate recurrence, as highlighted by the Nordic Hernia Register's findings indicating a persistently high recurrence rate of 16 to 17 percent, even with the increased use of mesh [15]. Furthermore, the actual recurrence rate might be underestimated due to the presence of asymptomatic cases or patients opting out of repeat surgical procedures [16, 17].

In our study, the age distribution of the 50 patients was as follows: 42% were aged 61-70, 22% aged 51-60, 16% aged 71-80, 12% aged 41-50, 6% aged 31-40, and only 2% aged 21-30. The majority of patients were male (74%), while females constituted 26%. Although a higher prevalence of inguinal hernias among males was expected, there were no significant differences in gender distribution ($p = 0.27$), smoking habits ($p = 0.45$), comorbidities, and medication use when comparing subgroups with or without affected relatives. A meta-analysis by Burchart *et al.*, [18] evaluated 40 observational studies and identified factors such as gender, hernia type, size, recurrence, bilateral occurrence, and hospitalization methods as influential in hernia recurrence risk. Specifically, while previous studies have identified female gender as a risk factor for recurrent inguinal hernias, our study exclusively involved male patients, with 81.43% being men. Ruhl and Everhart [19] reported that males had an increasing cumulative incidence of recurrent inguinal hernias, with rates of 7.3% from ages 24 to 39, 14.8% from ages 40 to 59, and 22.8% from ages 60 to 74.

Consistent with these findings, our study observed higher recurrence rates in the fifth and sixth decades of life, though statistical significance was not achieved. This may be attributed to age-related declines in immune response and wound healing, potentially mediated by tumor necrosis factor and fibroblast proliferation [20]. Ashcroft *et al.*, [21] also documented age-related increases in matrix metalloproteinase 2 and 9 immunostaining in normal skin and acute wounds, increasing susceptibility to infection and tissue degradation. Meyer *et al.*, [22] reported age-dependent changes in skin hyaluronan content, further implicating age in tissue vulnerability.

Regarding hernia location, Junge *et al.*, [23] found that 56.7% of patients had right-sided hernias. Similarly, in our study, 65% of hernias were right-sided, 28% were left-sided, and 7% were bilateral. For patients experiencing recurrence following primary open inguinal hernia surgery, laparoscopic repair is recommended [24]. However, our findings indicate that 75% of surgeons opted for open surgery instead of the recommended laparoscopic approach for recurrent cases.

CONCLUSION

Inguinal hernia recurrence is a complex phenomenon influenced by a multitude of patient-specific and technical factors. Our findings highlight the significance of patient-related variables, including age, hernia location, and type, in predicting recurrence. Notably, all male patients in our cohort who underwent surgical mesh repair experienced hernia recurrence. While mesh implantation is commonly employed to reduce recurrence rates, our results suggest a potential need for further investigation into its efficacy and safety in this context. Additional research is imperative to corroborate these findings and elucidate the underlying mechanisms contributing to hernia recurrence.

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