

Open hernia repair and risk factors of recurrence at hospitals in Aceh, Indonesia



Muhammad Sayuti^{1*}, Muhammad Khalilul Akbar²,
Ami Dhania Rovi Simanjuntak³, Rani Aprilita³

ABSTRACT

Background: Hernia is a condition involving bulging a whole or part of an organ due to defect on the abdominal wall. Inguinal hernia is one of the most common types of abdominal wall hernia. There are approximately 20 million cases of hernia repair surgery done annually. Hernia repair is deemed successful if there is no recurrence and complications at a relatively affordable cost, and patients can return to daily routine immediately. The incidence of recurrence is affected by many factors, such as, the knowledge and skills of surgeons, surgical procedures and type of mesh used, mesh fixation techniques, management of lateral and medial hernia sacs, sliding hernia, lipoma in inguinal canal, surgery time, type of anesthesia, post-surgery complications, and factors coming from patients. This study was done to assess the prevalence of inguinal hernia and its recurrence, surgical procedures, and the risk factors related to the recurrence.

Methods: This cohort retrospective study used a total sampling technique in inguinal hernia patients who had received surgery.

Result: There were a total of 1457 patients from 2018 – 2022 from 10 public and private hospitals in North Aceh Regency and Lhokseumawe city. The study found that most hernia patients were male under 60 years of age. The highest risk factors of inguinal hernia were seen in patients with history of vigorous physical activity, chronic cough, and constipation.

Conclusion: Open hernia repair with mesh graft was the most used surgical procedure and most inguinal hernia patients did not have recurrence.

Keywords: Inguinal hernia, open hernia repair, recurrence, risk factors.

Cite This Article: Sayuti, M., Akbar, M.K., Simanjuntak, A.D.R., Aprilita, R. 2024. Open hernia repair and risk factors of recurrence at hospitals in Aceh, Indonesia. *Bali Medical Journal* 13(1): 802-805. DOI: 10.15562/bmj.v13i1.5055

¹Surgery Department, Faculty of Medicine, Universitas Malikussaleh-Cut Meutia Hospital, Indonesia;

²Surgery Department, Faculty of Medicine, Universitas Malikussaleh, Indonesia;

³Faculty of Medicine, Universitas Malikussaleh, Indonesia.

*Corresponding author:

Muhammad Sayuti;
Surgery Department, Faculty of Medicine, Universitas Malikussaleh-Cut Meutia Hospital, Indonesia;
sayuti.md@unimal.ac.id

Received: 2023-12-03

Accepted: 2024-01-16

Published: 2024-02-10

INTRODUCTION

Hernia is a condition involving bulging a whole or part of an organ due to defects on the abdominal wall. There are a few types of abdominal wall hernia with inguinal hernia as the most found type contributing to 75% of hernia cases. It occurs as the bulging in the intestinal organ protruding to the cavity through defective or thin wall of the inguinal canal.^{1,2} The incidence of inguinal hernia is relatively high with 20 million of hernia repairs being done every year globally.^{3,4} The annual prevalence and number of hernia repair surgery in Indonesia have not yet been reported.²

The management of inguinal hernia is done through surgery. Hernia repair is deemed successful if there is no recurrence and complications at a relatively affordable cost, and patients can return to daily routine immediately.^{4,5} Despite the improvement of hernia surgical modality in recent years, the recurrence of inguinal hernia is still

an issue within the surgical communities, with proportion of 12-13%.⁶ The incidence of relapse is affected by various risk factors, such as the knowledge and skills of surgeons, surgical procedures and type of mesh used, mesh fixation techniques, management of lateral and medial hernia sacs, sliding hernia, lipoma in inguinal canal, surgery time, type of anesthesia, and post-surgery complications.^{7,8} Some of the risk factors might also arise from patients' negligence such as the increase in intraabdominal pressure due to lifting heavy loads, pregnancy, weak abdominal muscles, obesity, among others.⁹

The data on inguinal hernia prevalence, surgery, number of recurrences, and the factors affecting the recurrence of inguinal hernia in Indonesia are still very limited, thus, research on the risk factors for the recurrence of inguinal hernia is needed to allow early intervention so that the cases can be minimized.

RESEARCH METHODS

Before the research, ethical clearance and research permits were sent to all participating hospitals at North Aceh regency and Lhokseumawe city. This was a retrospective descriptive study using secondary data from medical records. Research samples were all inguinal hernia patients receiving treatment in the hospitals at Aceh Utara regency and Lhokseumawe city from 2018 to 2022, with 1457 samples. Data obtained were analyzed descriptively using statistical software SPSS version 25.0 for Windows. The chi-square test was used to evaluate correlation of characteristics towards hernia recurrence. All values considered significant if $p < 0.05$.

RESULTS

It can be seen from [table 1](#) that more than 50% of patients were under 60 years with

Table 1. Age distribution of inguinal hernia patients

Age	Frequency (n)	Percentage (%)
< 60 years	995	68.3
≥ 60 years	462	31.7
Total	1457	100

Table 2. Gender distribution of inguinal hernia patients

Gender	Frequency (n)	Percentage (%)
Male	1321	90.7
Female	136	9.3
Total	1457	100

Table 3. History of vigorous activity distribution in inguinal hernia patients

History of vigorous activity	Frequency (n)	Percentage (%)
Yes	1000	68.6
No	457	31.4
Total	1457	100

Table 4. History of chronic cough distribution in inguinal hernia patients

History of chronic cough	Frequency (n)	Percentage (%)
Yes	860	59
No	597	41
Total	1457	100

Table 5. History of urinary retention distribution in inguinal hernia patients

History of urinary retention	Frequency (n)	Percentage (%)
Yes	606	42
No	851	58
Total	1457	100

Table 6. History of constipation distribution in inguinal hernia patients

History of constipation	Frequency (n)	Percentage (%)
Yes	840	57.7
No	617	42.3
Total	1457	100

Table 7. Surgical procedures distribution in inguinal hernia patients

Surgical procedures	Frequency (n)	Percentage (%)
Open hernia repair non-mesh graft	261	17.9
Open hernia repair with mesh graft	1196	82.1
Total	1457	100

Table 8. Recurrence distribution in inguinal hernia patients

Recurrence	Frequency (n)	Percentage (%)
Yes	140	9.6
No	1317	90.4
Total	1457	100

995 patients while the remaining were more than 60 years with 462 patients (31.7%). Table 2 showed that most patients were male with 1320 patients (90.7%), while only 9.3% were female. Table 3 showed that most patients had a history of vigorous activity with 1000 patients (68.6%) while 457 patients (31.4%) did not. Fifty-nine

percent of the patients had a history of chronic cough, and 597 patients (41%) did not (Table 4). Table 5 showed that 606 patients (42%) had a history of urinary retention while 851 patients (58%) did not. A history of constipation was observed in 840 patients (57.7%) but not in the 617 patients (42.3%) (Table 6). Open hernia

repair with mesh graft was the most used surgical procedure as performed in 1196 patients (82.1%), while only 261 patients underwent the repair with non-mesh graft (17.9%) (Table 7). Table 8 showed 140 patients (9.6%) had recurrence and most patients (90.4%) did not after the open hernia repair. Surgical procedures with mesh graft were not associated with hernia recurrence (Table 9).

DISCUSSION

Inguinal hernia might occur due to various factors with age being the most common risk factor. Furthermore, inguinal hernia is often seen in older males with weak abdominal wall muscles.^{8,10} On the other hand, the incidence in productive adults and young adults between 20-40 years, is closely related to continued and prolonged physical activity. Most patients in this study were under 60 years with 971 samples (66.6%). This contradicts the study by Gede et al.¹¹ where 35.6% of the patients were elderly and mentioned that age is directly proportional to inguinal hernia incidence. However, hernia can also happen at younger age similar to this study, due to the increase in intra abdominal pressure, especially active workers who performed continued vigorous activity, thus increasing the risk of hernia.¹²

Most inguinal hernia patients in this study were male with 1321 patients (90.7%). This might be due to factors such as the higher work intensity and wider anatomical structure of the inguinal canal observed in males than females. This was in line with the study by Alfarisi et al. which also obtained a higher incidence in males (98%) than females.¹³ Similar result was also seen in Gede et al.¹¹ where subjects were dominated by male with 95.6%.

Occupation is one of the risk factors for inguinal hernia, especially the repetitive vigorous physical activity which can increase the intra abdominal pressure.¹⁴ Most patients in this study had a history of vigorous physical activity with 1000 patients (68.6%). Physical activity (specifically occupational) that causes the increase in intra abdominal pressure gives a big predisposition on inguinal hernia especially in males. This was in agreement with the study by Faridah et al.¹⁵ who

Table 9. Bivariate analysis on inguinal hernia recurrence using chi-square test

Characteristics	Recurrence				p	
	Yes		No			
	n	%	N	%		
Age	< 60 years	64	45.7	931	70.7	<0.001
	≥ 60 years	76	54.3	386	29.3	
Gender	Male	140	100	1184	89.9	<0.001
	Female	0	0	133	10.1	
Surgical procedures	Mesh graft	117	83.6	1091	82.8	0.8
	Non mesh graft	23	16.4	226	17.2	

mentioned the correlation between physical activity that involves lifting heavy loads and complaint of inguinal hernia. Physical activity might cause straining that might allow defect to appear in the musculoaponeurotic abdominal wall that could cause the bulging of the abdominal on normal cavity, which is hernia.¹⁵

A history of chronic cough is another risk factor for inguinal hernia. This study found that more patients with chronic cough had inguinal hernia, 860 patients (59%), compared to those without. The cough mechanism is initiated with maximum inspiration, glottic closure, and increased intrathoracic pressure, followed by the glottic opening and cough to release foreign objects in the respiratory tract. When coughing, inspiration is required to obtain maximum air volume to increase the intrathoracic pressure and closure of glottis occurs to maintain the lung volume during the increase in the intrathoracic pressure. This causes the muscle to contract during expiration due to the shorter expiration muscles, which causes the intra abdominal pressure to increase in addition to the intrathoracic pressure.¹⁶ Thus, when patients have prolonged chronic cough, there will be an increase in intra abdominal pressure that can cause the opening of inguinal canal which could create a defect on it. This causes chronic cough to be a risk factor for inguinal hernia, which aligns with the study by Qomariah et al.¹⁷ which stated the significant correlation between chronic cough and inguinal hernia. This is further supported by the study by Gede et al.¹¹ which mentioned that most inguinal hernia patients (68.9%) had a history of chronic cough.

A history of chronic or non-chronic constipation is also a risk factor for hernia.

This study indicated that most patients, 840 (57.7%) with a history of constipation had inguinal hernia, compared to those with no prior history. Patients with constipation tend to be straining when defecating. Straining causes the breathing process to stop temporarily and the diaphragm to contract, increasing the depth of the thoracic cavity. At the same time, diaphragm and abdominal wall muscles increase the intra abdominal pressure which causes the pushing of the abdominal wall to the inguinal canal.¹⁸

In this study, only 42% of the inguinal hernia patients had a history of urinary retention. Retention occurs when there is a difficulty in emptying the bladder. This causes the increase in intra abdominal pressure which could become the risk factor for hernia recurrence.

This study also found that 82.1% of patients underwent surgery using mesh grafts. The incidence of recurrence in this study was only 9.6%. The use of mesh graft can reduce the incidence of relapse from inguinal hernia by 2-3%. Some studies also mentioned that mesh graft can reduce relapse incidence by about 10%.

CONCLUSION

This study showed that most hernia patients in hospitals in Aceh were male (66%) under 60 years of age. The biggest risk factors for inguinal hernia were vigorous physical activity, history of cough and constipation. Open hernia repair with mesh graft was the most used surgical procedure and most patients did not have recurrence. Bivariate analysis using chi-square test found that age, gender, vigorous activity, history of constipation and relapse had a very close relationship with the surgical procedures used.

CONFLICT OF INTEREST

All authors declare there is no conflict of interest regarding publication of this article.

ETHICAL STATEMENT

This study has been approved by Ethical Committee Faculty of Medicine Universitas Malikussaleh with ethical clearance reference number 150/KEPK/FKUNIMAL-RSUCM/2023.

AUTHOR CONTRIBUTION

All authors had contributed to manuscript writing and agreed for the final version of manuscript for publication.

FUNDING

The authors would like to thank Universitas Malikussaleh for funding this research.

ACKNOWLEDGEMENTS

We would like to thank research staff, technicians, colleagues, and students from the Faculty of Medicine, Universitas Malikussaleh for the help provided during the research.

REFERENCES

1. Abebe MS, Tareke AA, Alem A, Debebe W, Beyene A. Worldwide magnitude of inguinal hernia: Systematic review and meta-analysis of population-based studies. *SAGE Open Med.* 2022;10:20503121221139150. doi: <https://doi.org/10.1177/20503121221139150>.
2. Burcharth J. The epidemiology and risk factors for recurrence after inguinal hernia surgery. *Dan Med J.* 2014 May;61(5):B4846.
3. van Veenendaal N, Simons M, Hope W, Tumtavitikul S, Bonjer J; HerniaSurge Group. Consensus on international guidelines for management of groin hernias. *Surg Endosc.* 2020;34(6):2359-2377. doi: <https://doi.org/10.1007/s00464-020-07516-5>.

4. Miller HJ. Inguinal Hernia: Mastering the Anatomy. *Surgical Clinics of North America*. 2018;98(3):607–21.
5. Lomanto D, Cheah WK, Faylona JM, Huang CS, Lohsiriwat D, Maleachi A, Yang GP, Li MK, Tumtavitikul S, Sharma A, Hartung RU, Choi YB, Sutedia B. Inguinal hernia repair: toward Asian guidelines. *Asian J Endosc Surg*. 2015;8(1):16–23. doi: <https://doi.org/10.1111/ases.12141>.
6. Campanelli G, Pettinari D, Cavalli M, Avesani EC. Inguinal hernia recurrence: Classification and approach. *Journal of Minimal Access Surgery*. 2006;2(3):147–50.
7. Campanelli G, Pettinari D, Nicolosi FM, Cavalli M, Avesani EC. Inguinal hernia recurrence: classification and approach. *Hernia*. 2006;10(2):159–61. doi: <https://doi.org/10.1007/s10029-005-0053-3>.
8. Niebuhr H, Köckerling F. Surgical risk factors for recurrence in inguinal hernia repair - a review of the literature. *Innov Surg Sci*. 2017;2(2):53–59. doi: <https://doi.org/10.1515/iss-2017-0013>.
9. Rahul B, Ravindranath G. Incidence of inguinal hernia and its type in a study in a semiurban area in Andhra Pradesh, India. *International Surgery Journal*. 2016;3(3):1946–9.
10. Sabiston D. *Textbook of surgery*. Jakarta: EGC; 2010.
11. Gede I, Wirajaya RW, Dewi R, Suriana SN, Kedokteran MF, Kesehatan I, et al. Description of Risk Factors in Inguinal Hernia Patients at Buleleng District Hospital 2019-2020. *Aesculapius Medical Journal*. 2023;3(1):101–5.
12. Rosenberg J, Andresen K. The Onstep Method for Inguinal Hernia Repair: Operative Technique and Technical Tips. *Surgery Research and Practice*. 2016;2016.
13. Alfarisi R, Erianto M, Chintiyani F. The Relationship Between Body Mass Index and Types of Inguinal Hernia. *Malahayati Nursing Journal*. 2021;1(1):115–23.
14. Sjahmuhidajat. *Textbook of surgery*. Jakarta: EGC; 2011.
15. Faridah U, Hartinah D, Nindiauwaty N. Relationship between type of work and hernia at Arafah Rembang Islamic Hospital in 2018. the 10th University Research Colloquium 2019. 2019;1:340–5.
16. Widdicombe J. *Cough: Causes, Mechanism, and Therapy*. Massachusetts USA: Blackwell Publishing; 2003.
17. Nur Qomariah S. Physical Workload and Age with the Incidence of Inguinal Hernia). *Journals of Ners Community*. 2016;7(1):33–8.
18. Omar F, Moffat D. *At Glance Anatomy*. Jakarta: Erlangga; 2004.



This work is licensed under a Creative Commons Attribution