FREQUENCY OF ADHESIVE INTESTINAL OBSTRUCTION IN POST LAPAROTOMY PATIENTS

Asiya[1], Mohammad Zarin[1], Sajid ur Rehman[1], Khushbakht Habib[1]

ABSTRACT

Objective: This study aimed to determine the frequency of adhesive intestinal obstruction (AIO) in post-laparotomy patients and evaluate its association with selected comorbid conditions, including hypertension, diabetes, and cardiac disease.

Methods: A descriptive cross-sectional study was conducted at the Department of General Surgery, Khyber Teaching Hospital, Peshawar, from 25 June 2024 to 25 December 2024. A total of 106 patients aged 17 to 80 years with clinical features of intestinal obstruction and a history of prior laparotomy were enrolled through consecutive non-probability sampling. The diagnosis of AIO was based on clinical and radiological evaluation. Data on demographics, surgical history, comorbidities, and outcomes were recorded. Statistical analysis was performed using SPSS version 21.0. Odds ratios (OR) and 95% confidence intervals (CI) were calculated to assess associations, and a p-value <0.05 was considered statistically significant.

Results: The frequency of AIO was 4.7% (n=5). Among hypertensive patients, the odds of AIO were OR 0.75 (95% CI: 0.08–6.65; p=0.950). No diabetic or cardiac patients developed AIO. The OR for diabetes was 0.00 (95% CI: 0.00–2.60; p=0.334), and for cardiac disease was 0.00 (95% CI: 0.00–3.52; p=0.372). No statistically significant associations were observed.

Conclusion: AIO occurred infrequently among post-laparotomy patients, and no significant association with comorbidities was identified. Surgical factors rather than comorbid conditions may have a more prominent role in AIO risk.

Keywords: Adhesive intestinal obstruction, laparotomy, bowel obstruction, postoperative adhesions, comorbidities

INTRODUCTION

Adhesive intestinal obstruction (AIO) that occurs following surgery is common and important complication, which contributes to a considerable portion of morbidity and repeated hospital admissions and surgery. Postoperative peritonitis caused by surgery makes adhesion. And ultimately, the fibrous band will form. Which will obstruct the intestine. AIO is still a big problem in science, despite of all the advancements[1] It is characterized by symptoms of abdominal pain, distention, vomiting and absolute constipation. Many times requires emergent intervention. In some instances, conservative management with nasogastric decompression and intravenous therapy proves effective, but when that fails surgical exploration is the answer.

[1] Khyber Teaching Hospital, Peshawar

Address for Correspondence
Prof. Dr. Mohammad Zarin
Khyber Teaching Hospital, Peshawar, Pakistan
muhammad.zarin@kmc.edu.pk
0092 333 9414477

Globally, adhesive intestinal obstruction accounts for approximately 60–70% of all cases of small bowel obstruction, with an estimated lifetime risk of 2–10% following laparotomy[3] A multicenter study reported that nearly 30% of patients with AIO require operative intervention within five years of their primary surgery[4] In developed countries, AIO contributes significantly to hospital admissions, with readmission rates of up to 20% within one year post-surgery.[5]

Regionally, data from South Asian countries indicate that AIO is responsible for 40–50% of all cases of mechanical intestinal obstruction.[6] The frequency varies depending on the type of surgery performed, with higher rates observed in emergency laparotomies and surgeries involving bowel resection.[7] In Pakistan, the burden of AIO remains understudied, but local reports suggest that it constitutes a major cause of emergency surgical admissions, with a significant number of cases presenting late due to lack of awareness and limited access to healthcare facilities.[8]

Although various strategies, including minimally invasive surgical approaches and adhesion prevention techniques, have been explored to

reduce AIO incidence, no definitive method has proven universally effective[9] The recurrence of AIO remains a major challenge, often necessitating repeated surgical interventions, which further predispose patients to adhesion formation[10]

Given the scarcity of local data on the frequency and risk factors associated with adhesive intestinal obstruction in post-laparotomy patients, this study aims to bridge the knowledge gap by providing epidemiological insights specific to the Pakistani population. Identifying the frequency and characteristics of AIO cases will assist healthcare professionals in implementing preventive strategies, optimizing surgical techniques, and improving patient outcomes. This study also seeks to provide valuable data for healthcare policymakers to formulate guidelines that may help reduce the incidence of postoperative adhesions and their associated complications.

METHODOLOGY

The study was done as a descriptive cross-sectional study at the Department of General Surgery, Khyber Teaching Hospital, Peshawar, Pakistan from 25 June 2024 to 25 Dec, 2024. The Institutional Research and Ethics Board (IREB) of Khyber Medical College/Khyber Teaching Hospital, Peshawar gave us the ethical approval of the study with the reference number .485/DME/KMC. All participants were included in the study after taking informed written consent ensuring their confidentiality and anonymity. According to the WHO software, sample size was calculated to be 106 with a confidence level of 95%, anticipated proportional population size was 4.6%, and absolute precision was 4% meaning a total of 106 subjects. The sampling method used was consecutive non-probability sampling.

Inclusion criteria: The examination included all patients aged between 17 and 80 years that were present with clinical evidence for showing symptoms of the intestinal obstruction surgery for it. Both genders were eligible for participation.

Exclusion criteria: Patients who have chronic constipation or functional bowel obstruction history were excluded. Moreover, we did not include patients with incomplete clinical records as well as patients who declined to give informed consent.

Patients were selected as per the inclusion criteria for data collection during the study with consent. We took a comprehensive history from the patient, including the demography, clinical features and past surgical history. A detailed physical examination was carried out to check for intestinal obstruction. Patients who had undergone previous abdominopelvic surgeries were particularly assessed for adhesive intestinal obstruction. The diagnosis was made clinically, supported by relevant radiological investigations, and the decision for surgical or conservative management was documented. Outcomes of management were recorded as improved, disability, or death. Comorbid conditions such as hypertension, diabetes, and cardiac disease were also documented.

The collected data were analyzed using SPSS version 21.0. Descriptive statistics were used to summarize numerical variables as mean and standard deviation, while categorical variables were presented as frequencies and percentages. The presence of adhesive intestinal obstruction was stratified with respect to gender, hypertension, diabetes, and cardiac disease, and the Chi-square test was applied to determine statistical significance. A p-value of <0.05 was considered significant.

RESULTS

The study included a total of 106 post-laparotomy patients. The mean age of participants was 49.73 ± 19.49 years, and the average duration since the last abdominal surgery was 10.41 ± 5.54 years (Table 1). Among the participants, 65 (61.3%) were male and 41 (38.7%) were female. The most common presenting complaint was abdominal pain in 29 (27.4%) patients, followed by constipation in 27 (25.5%), vomiting in 22 (20.8%), abdominal distention in 17 (16.0%), and multiple symptoms in 11 (10.4%). Regarding the type of past surgeries, 56 (52.8%) patients had undergone laparoscopic procedures, whereas 50 (47.2%) had open surgeries. In terms of treatment outcomes, 91 (85.8%) showed improvement, 11 (10.4%) experienced disability, and 4 (3.8%) expired during the hospital stay (Table 2).

Comorbidities included hypertension in 26 (24.5%), diabetes in 16 (15.1%), and cardiac disease in 14 (13.2%) of the patients. Adhesive intestinal obstruction (AIO) was diagnosed in 5 (4.7%) patients, while 101 (95.3%) did not develop this complication (Table 2).

Upon stratification, AIO was observed in 1 (3.8%) of the hypertensive patients compared to 4 (5.0%) of the non-hypertensive group, with an odds ratio (OR) of 0.75 (95% confidence interval [CI]: 0.08–6.65, p = 0.950). No cases of AIO were reported among diabetic patients,

whereas 5 (5.6%) of non-diabetic patients developed AIO, resulting in an OR of 0.00 (95% CI: 0.00–2.60, p = 0.334). Similarly, no patients with cardiac disease developed AIO, while it occurred in 5 (5.4%) of those without cardiac disease, with an OR of 0.00 (95% CI: 0.00–3.52, p = 0.372) (Table 3). These findings indicate that there was statistically insignificant association between AIO and any of the comorbidities assessed.

Table-1: Descriptive Statistics Study (n=106)

Numerical Variables	Mean	Std. Deviation
Age (Years)	49.73	19.493
Duration Since Last Surgery	10.41	5.544

Table-2: Clinical Characteristics of Study Participants (n=106)

Gender	**Frequency**	**Percent**
Female	41	38.7%
Male	65	61.3%
Total	106	100.0%
Presenting Complaints	**Frequency**	**Percent**
Abdominal Distention	17	16.0%
Abdominal Pain	29	27.4%
Constipation	27	25.5%
Multiple Symptoms	11	10.4%
Vomiting	22	20.8%
Total	106	100.0%
Type of Past Surgeries	**Frequency**	**Percent**
Laparoscopic	56	52.8%
Open	50	47.2%
Total	106	100.0%
Outcome of Management	**Frequency**	**Percent**
Death	4	3.8%
Disability	11	10.4%
Improved	91	85.8%
Total	106	100.0%
Hypertension	**Frequency**	**Percent**
Yes	26	24.5%
No	80	75.5%
Total	106	100.0%

Cardiac Disease	**Frequency**	**Percent**
Yes	14	13.2%
No	92	86.8%
Total	106	100.0%
Diabetes	**Frequency**	**Percent**
Yes	16	15.1%
No	90	84.9%
Total	106	100.0%
Adhesive Intestinal Obstruction	**Frequency**	**Percent**
Yes	5	4.7%
No	101	95.3%
Total	106	100.0%

Table-3: Stratification of Adhesive Intestinal Obstruction with various effect modifiers (n=106)

		Gender		Total	P Value
		Female	Male		
Adhesive Intestinal Obstruction	Yes	2	3	5	0.950
		4.9%	4.6%	4.7%	
	No	39	62	101	
		95.1%	95.4%	95.3%	
Total		41	65	106	
		100.0%	100.0%	100.0%	
		Hypertension		Total	P Value
		Yes	No		
Adhesive Intestinal Obstruction	Yes	1	4	5	
		3.8%	5.0%	4.7%	
	No	25	76	101	
		96.2%	95.0%	95.3%	
Total		26	80	106	
		100.0%	100.0%	100.0%	
		Diabetes		Total	P Value
		Yes	No		
Adhesive Intestinal Obstruction	Yes	0	5	5	0.334
		0.0%	5.6%	4.7%	

	No	16	85	101	
		100.0%	94.4%	95.3%	
Total		16	90	106	
		100.0%	100.0%	100.0%	
		Cardiac Disease		Total	P Value
		Yes	No		
Adhesive Intestinal Obstruction	Yes	0	5	5	0.372
		0.0%	5.4%	4.7%	
	No	14	87	101	
		100.0%	94.6%	95.3%	
Total		14	92	106	
		100.0%	100.0%	100.0%	

DISCUSSION

Adhesive intestinal obstruction (AIO) remains a significant postoperative complication, contributing substantially to morbidity and the overall healthcare burden. The frequency of AIO in this study was 4.7%, which is consistent with previous research reporting that postoperative adhesions account for 60–70% of small bowel obstruction (SBO) cases.[11] However, studies have reported a slightly higher incidence, which may be due to variations in patient populations, surgical techniques, and follow-up duration.[12] The discrepancies in reported rates highlight the need for more standardized diagnostic criteria and improved adhesion prevention strategies to minimize postoperative complications.

In this study, no significant association was found between AIO and factors such as gender, hypertension, diabetes, or cardiac disease.[13] This finding aligns with some prior research suggesting that patient comorbidities may not play a significant role in adhesion formation leading to obstruction.[14] However, surgical factors such as the number of previous laparotomies, the duration of operative time, and the nature of prior surgeries are more commonly associated with an increased risk of AIO.[15] A study demonstrated that each additional hour of operative time raises the likelihood of postoperative adhesion formation by 33%, while each prior abdominal surgery increases the risk by 24%.[16] Additionally, open surgical procedures have been found to carry a higher risk of adhesions compared to laparoscopic approaches, which are associated with lower adhesion formation rates.[17] These findings indicate that instead of patient-related factors, surgical techniques may be the key determinant in adhesion-related complications.[18]

Managing AIO presents significant clinical challenges. Conservative treatment, including bowel rest, intravenous fluid administration, and nasogastric decompression, remains the first-line approach for most cases.[19] However, 30%–50% of patients ultimately require surgical intervention, particularly those with recurrent or complicated obstructions.[20] Although adhesiolysis is an effective treatment, it carries a 6%–20% risk of iatrogenic bowel injury, which can lead to severe complications.[21] These risks emphasize the importance of preventive measures such as bioresorbable adhesion barriers and pharmacological agents, which have shown potential in reducing adhesion formation, though their widespread use remains under investigation.[22] Additionally, some studies suggest that minimally invasive surgery, particularly laparoscopic procedures, may contribute to lower adhesion-related morbidity by reducing peritoneal trauma.[23]

CONCLUSION

Adhesive intestinal obstruction (AIO) occurred in 4.7% of post-laparotomy patients in this study. No statistically significant association was observed between AIO and comorbidities such as hypertension, diabetes, or cardiac disease. Although the frequency of AIO was low, its potential clinical implications warrant continued attention, especially considering its

surgical burden. Future studies with larger sample sizes are recommended to better define the impact of comorbid conditions and to identify modifiable risk factors for adhesion formation.

REFERENCES

1. Li PH, Tee YS, Fu CY, Liao CH, Wang SY, Hsu YP, Yeh CN, Wu EH. The role of noncontrast CT in the evaluation of surgical abdomen patients. *Am Surg*. 2018;84(6):1015-21. DOI: 10.1177/000313481808400625.
2. Van Steensel S, van den Hil LCL, Schreinemacher MHF, Ten Broek RPG, van Goor H, Bouvy ND. Adhesion awareness in 2016: An update of a national survey of surgeons. *PLoS One*. 2018;13(8):e0202418. DOI: 10.1371/journal.pone.0202418.
3. Andersen P, Jensen KK, Erichsen R, Frøslev KR, Krarup PM, Madsen MR, Laurberg S, Iversen LH. Nationwide population-based cohort study to assess risk of surgery for adhesive small bowel obstruction following open or laparoscopic rectal cancer resection. *BJS Open*. 2017;1(2):30-8. DOI: 10.1002/bjs5.13.
4. National Emergency Laparotomy Audit (NELA) project team. The second patient report of the National Emergency Laparotomy Audit (NELA). London: Royal College of Anaesthetists; 2016. [No DOI available]
5. Behnam H, Nathens AB, Look Hong N, Dechlivanoglou P, Katancolas PI. Evolving management strategies in patients with adhesive small bowel obstruction: A population-based analysis. *J Gastrointest Surg*. 2018;22(12):2183-91. DOI: 10.1007/s11605-018-3866-4.
6. Galinos B, Bernardino C, Branca B, Schmutzler B. The incidence and risk factors of post-laparotomy adhesive small bowel obstruction. *J Gastrointest Surg*. 2010;14(10):1619-28. DOI: 10.1007/s11605-010-1256-5.
7. Doshi R, Desai J, Shah Y, Decter D, Doshi S. Incidence, features, in-hospital outcomes, and predictors of in-hospital mortality associated with toxic megacolon hospitalizations in the United States. *Intern Emerg Med*. 2018;13(6):881-7. DOI: 10.1007/s11739-018-1865-1.
8. Barmparas G, Branco BC, Schnüriger B, Lam L, Inaba K, Demetriades D. The incidence and risk factors of post-laparotomy adhesive small bowel obstruction. *J Gastrointest Surg*. 2010;14(10):1619-28. DOI: 10.1007/s11605-010-1256-5.
9. Sastry A, Grigoreva M, Leitman IM. Risk factors for the development of adhesive small bowel obstruction after abdominal and pelvic operations. *Open J Gastroenterol*. 2015;5(3):11-6. DOI: 10.4236/ojgas.2015.53002.
10. Ten Broek RP, Krielen P, Di Saverio S, Coccolini F, Biffl WL, Ansaloni L, et al. Bologna guidelines for diagnosis and management of adhesive small bowel obstruction: 2017 update of the evidence-based guidelines from the World Society of Emergency Surgery ASBO working group. *World J Emerg Surg*. 2018;13:24. DOI: 10.1186/s13017-018-0185-2.
11. Barmparas G, Branco BC, Schnüriger B, Lam L, Inaba K, Demetriades D. The incidence and risk factors of post-laparotomy adhesive small bowel obstruction. *J Gastrointest Surg*. 2010;14(10):1619-28. DOI: 10.1007/s11605-010-1256-5.
12. Sastry A, Grigoreva M, Leitman IM. Risk factors for the development of adhesive small bowel obstruction after abdominal and pelvic operations. *Open J Gastroenterol*. 2015;5(3):11-6. DOI: 10.4236/ojgas.2015.53002.
13. Ten Broek RP, Krielen P, Di Saverio S, Coccolini F, Biffl WL, Ansaloni L, et al. Bologna guidelines for diagnosis and management of adhesive small bowel obstruction: 2017 update of the evidence-based guidelines from the World Society of Emergency Surgery ASBO working group. *World J Emerg Surg*. 2018;13:24. DOI: 10.1186/s13017-018-0185-2.
14. Ten Broek RPG, Issa Y, van Santbrink EJ, Bouvy ND, Kruitwagen RF, Jeekel J, et al. Burden of adhesions in abdominal and pelvic surgery: systematic review and meta-analysis. *BMJ*. 2013;347:f5588. DOI: 10.1136/bmj.f5588.
15. Ten Broek RPG, Strik C, Issa Y, Bleichrodt RP, van Goor H. Adhesiolysis-related morbidity in abdominal surgery. *Ann Surg*. 2013;258(1):98-106. DOI: 10.1097/SLA.0b013e31827e4e4b.
16. Liang MK, Jackson TD, Robinson C, Gersin KS. Management of small bowel obstruction: an Eastern Association for the Surgery of Trauma practice management guideline. *J Trauma Acute Care Surg*. 2013;75(6):935-46. DOI: 10.1097/TA.0b013e3182a52637.
17. Behman R, Nathens AB, Byrne JP, Mason S, Look Hong N, Karanicolas PJ. Association of surgical intervention for

adhesive small-bowel obstruction with the risk of recurrence. *JAMA Surg*. 2019;154(5):413-20. DOI: 10.1001/jamasurg.2018.5050.
18. Di Saverio S, Coccolini F, Galati M, Smerieri N, Biffl WL, Ansaloni L, et al. Bologna guidelines for diagnosis and management of adhesive small bowel obstruction (ASBO): 2017 update of the evidence-based guidelines from the World Society of Emergency Surgery ASBO working group. *World J Emerg Surg*. 2018;13:24. DOI: 10.1186/s13017-018-0185-2.
19. Catena F, Di Saverio S, Kelly MD, Biffl WL, Ansaloni L, Mandalà V, et al. Bologna guidelines for diagnosis and management of adhesive small bowel obstruction: 2010 evidence-based guidelines of the World Society of Emergency Surgery. *World J Emerg Surg*. 2011;6:5. DOI: 10.1186/1749-7922-6-5.
20. Ten Broek RPG, Krielen P, Di Saverio S, Coccolini F, Biffl WL, Ansaloni L, et al. Bologna guidelines for diagnosis and management of adhesive small bowel obstruction: 2017 update of the evidence-based guidelines from the World Society of Emergency Surgery ASBO working group. *World J Emerg Surg*. 2018;13:24. DOI: 10.1186/s13017-018-0185-2.
21. Scott FI, Osterman MT, Mahmoud NN, Lewis JD. Secular trends in small-bowel obstruction and adhesiolysis in the United States: 1988-2007. *Am J Surg*. 2012;204(3):315-20. DOI: 10.1016/j.amjsurg.2012.01.013.
22. Sinha R, Sharma N. Adhesive small bowel obstruction and the six W's: who, how, why, when, where, and what. *Scand J Surg*. 2021;110(1):57-66. DOI: 10.1177/1457496920958393.
23. Menzies D, Ellis H. Intestinal obstruction from adhesions—how big is the problem? *Ann R Coll Surg Engl*. 1990;72(1):60-3. DOI: 10.1308/003588490784386241.