

Article

Obesity as a Predictor of Recurrence After Umbilical Hernia Repair: Evidence from a Rural Tertiary Care Hospital

Article History:

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Abstract: **Background:** Umbilical hernia repair is a common surgical procedure, yet recurrence remains a major challenge. Obesity has been consistently implicated as a key risk factor, but data from rural Indian populations are limited. **Objective:** To evaluate the association between obesity and recurrence rates after umbilical hernia repair in a rural tertiary care hospital. **Methods:** A cross-sectional study was conducted at Vedantaa Institute of Medical Sciences, Dahanu, Maharashtra, from January to March 2025, including 40 adult patients undergoing umbilical hernia repair. Patients were categorized into obese (BMI ≥ 30 kg/m²) and non-obese groups. Recurrence was assessed clinically and by ultrasonography. Statistical analysis included chi-square test and logistic regression. **Results:** Of the 40 patients, 16 (40%) were obese and 24 (60%) were non-obese. The overall recurrence rate was 22.5%. Recurrence was significantly higher among obese patients (37.5%) compared to non-obese patients (12.5%, $p=0.04$). Logistic regression confirmed obesity as an independent predictor of recurrence (OR 4.20, 95% CI 1.01–17.46, $p=0.048$). **Conclusion:** Obesity is significantly associated with increased recurrence rates after umbilical hernia repair. Weight management and patient optimization should be emphasized to improve surgical outcomes, particularly in rural and resource-limited settings.

Keywords: Umbilical hernia, Obesity; Recurrence, Risk factors, Rural India.

BACKGROUND

Umbilical hernia is a frequent abdominal wall defect encountered in adults, often requiring surgical intervention. While elective repair is generally straightforward, recurrence after repair remains challenging, with reported rates ranging from 2% to 20% depending on surgical technique, mesh use, and patient-related risk factors.[1,2] obesity has consistently been identified as one of the most important contributors to recurrence.[3]

Obesity increases intra-abdominal pressure, impairs wound healing, and predisposes to surgical site complications, all of which may influence long-term surgical outcomes.[4] Several studies have demonstrated that patients with body mass index (BMI) ≥ 30 kg/m² have significantly higher recurrence rates than normal-weight individuals.[5,6] Moreover, obesity is frequently associated with comorbidities such as diabetes and hypertension, which may further complicate recovery.

In India, the prevalence of obesity is increasing, particularly in urban and peri-urban areas, while rural regions continue to face dual burdens of undernutrition and obesity.[7] Despite this, literature on the association between obesity and hernia recurrence in rural Indian populations is scarce. Understanding this relationship in low-resource settings is vital, as recurrence increases patient morbidity, healthcare costs, and hospital workload.

Therefore, it is interesting to examine the association between obesity and recurrence rates after umbilical hernia repair in a rural tertiary care hospital in western India.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based, cross-sectional observational study in the Department of General Surgery at Vedantaa Institute of Medical Sciences, Dahanu, Palghar, Maharashtra. The study was conducted over three months from January 1 to March 31, 2025.

Study Population and Sample Size

A total of 40 adult patients who underwent surgical repair for umbilical hernia during the study period were included. The sample size was determined by the available cases within the timeframe.

Inclusion and Exclusion Criteria

Inclusion criteria were adult patients (≥ 18 years) undergoing elective or emergency repair for umbilical hernia. Exclusion criteria included patients with recurrent hernias at presentation, those with incisional hernias, patients with significant comorbidities contraindicating surgery, and those who did not provide informed consent.

Data Collection

Sociodemographic data, BMI, comorbidities, surgical details (open vs mesh repair), and postoperative outcomes were recorded. BMI was calculated as weight in kilograms divided by height in meters squared and categorized according to WHO criteria: non-obese (<30 kg/m²) and obese (≥ 30 kg/m²). Recurrence was defined as a clinically detectable or ultrasonographically confirmed hernia during follow-up within the study period at the repair site.

Ethical Considerations

Approval for the study was obtained from the Institutional Ethics Committee. Written informed consent was taken from all participants. Confidentiality and anonymity were maintained throughout.

Statistical Analysis

Data were entered into a secure database and analyzed using SPSS software. Continuous variables were summarized as mean $\pm$ SD, while categorical variables were presented as frequencies and percentages. The chi-square test was used to compare recurrence rates between obese and non-obese patients. Logistic regression was performed to identify independent predictors of recurrence. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 40 patients underwent umbilical hernia repair during the study period. The mean age of the cohort was 44.8 ± 11.6 years, with 26 males (65%) and 14 females (35%). Sixteen patients (40%) were classified as obese (BMI ≥ 30 kg/m²), while 24 (60%) were non-obese. The overall sociodemographic and clinical distribution is summarized in Table 1.

Table 1. Sociodemographic and clinical profile of study participants (n = 40)

Variable	Categories	Frequency (n)	Percentage (%)
Age (years)	<30	6	15.0
	31–50	20	50.0
	>50	14	35.0
Sex	Male	26	65.0
	Female	14	35.0
BMI Category	Non-obese (<30)	24	60.0
	Obese (≥ 30)	16	40.0
Comorbidity present	Yes	12	30.0
	No	28	70.0

Surgical details revealed that mesh repair was performed in 75% of patients, most undergoing open procedures. Emergency repair was required in 20% of cases (Table 2).

Table 2. Surgical details of patients undergoing umbilical hernia repair

Variable	Categories	Frequency (n)	Percentage (%)
Type of repair	Mesh repair	30	75.0
	Primary suture repair	10	25.0
Approach	Open	38	95.0
	Laparoscopic	2	5.0
Emergency repair	Yes	8	20.0
	No	32	80.0

When recurrence rates were compared according to BMI, obese patients had a significantly higher recurrence rate (37.5%) compared to non-obese patients (12.5%), with the difference reaching statistical significance ($p = 0.04$) as shown in Table 3.

Table 3. Recurrence rates according to BMI

BMI Category	Total (n)	Recurrence (n)	Recurrence Rate (%)
Non-obese (<30)	24	3	12.5
Obese (≥ 30)	16	6	37.5
Total	40	9	22.5

Further analysis of recurrence concerning perioperative factors demonstrated that while obesity was significantly associated with recurrence, comorbidities, type of repair, and emergency status were not statistically significant predictors (Table 4).

Table 4. Factors associated with recurrence after umbilical hernia repair

Factor	Recurrence Present (n=9)	Recurrence Absent (n=31)	p-value
Obesity (BMI ≥ 30)	6	10	0.04
Comorbidity present	4	8	0.42
Mesh repair	5	25	0.09
Emergency repair	3	5	0.18

On logistic regression, obesity emerged as an independent predictor of recurrence after umbilical hernia repair (OR 4.20, 95% CI 1.01–17.46, $p = 0.048$). Mesh repair showed a protective trend, though not statistically significant. Full multivariate results are presented in Table 5.

Table 5. Logistic regression analysis for predictors of recurrence

Variable	Odds Ratio (95% CI)	p-value
Obesity (BMI ≥ 30)	4.20 (1.01–17.46)	0.048
Mesh vs suture	0.32 (0.08–1.22)	0.09
Emergency repair	2.12 (0.49–9.08)	0.31
Comorbidity present	1.45 (0.33–6.41)	0.62

DISCUSSION

This study demonstrated that obesity was significantly associated with higher recurrence rates after umbilical hernia repair in a rural Indian cohort. Recurrence occurred in 37.5% of obese patients compared to 12.5% of non-obese patients, and logistic regression confirmed obesity as an independent predictor (OR 4.20, $p=0.048$). These findings are consistent with prior literature showing that increased body mass index contributes to raised intra-abdominal pressure, impaired wound healing, and greater tension at the repair site, predisposing to recurrence.[8,9] Similar associations have been reported in Western populations, where obesity is a well-established risk factor for hernia recurrence and postoperative morbidity.[10,11]

Our results also highlight that although mesh repair was protective, it did not eliminate recurrence in obese patients. Previous large-scale studies have confirmed that mesh reinforcement reduces recurrence rates compared with suture repair; however, obesity still undermines outcomes even with mesh use.[12,13] This underscores the need for comprehensive perioperative management in obese patients, including weight reduction strategies, optimization of comorbidities, and careful surgical planning. In LMICs, where laparoscopic options are less accessible, reliance on open mesh repair may be insufficient to counter the risks posed by obesity.[14]

From a public health perspective, the rising prevalence of obesity in India poses an increasing challenge for hernia management, especially in rural areas with limited surgical resources.[15] Recurrence adds to patient morbidity and increases healthcare costs and surgical workload. Therefore, integrating preoperative counseling on weight management, promoting lifestyle modification, and ensuring timely elective repair before hernias enlarge could mitigate recurrence rates. Although this study was limited by its small sample size and short follow-up, it provides valuable context-specific evidence supporting obesity as a modifiable risk factor for recurrence after umbilical hernia repair in low-resource settings.

CONCLUSION

This study found that obesity is a significant and independent predictor of recurrence after umbilical hernia repair in a rural Indian population. Recurrence rates were notably higher in obese patients despite the use of mesh repair, underscoring the physiological impact of increased intra-abdominal pressure and impaired healing in this group. These findings highlight the importance of incorporating weight management and optimization of comorbidities into preoperative planning, alongside timely elective repair, to reduce recurrence risk. Strengthening perioperative counseling and preventive strategies is essential, particularly in low-resource settings where recurrence burdens patients and healthcare systems.

REFERENCES

1. Kulaçoğlu H. Current options in umbilical hernia repair in adult patients. *Ulus Cerrahi Derg* [Internet]. 2015 Sep 1 [cited 2025 Sep 3];31(3):157–61. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4605112/>
2. Holt AC, Bamarni S, Leslie SW. Umbilical Hernia. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [cited 2025 Sep 3]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK459312/>
3. Ahmed SK, Mohammed RA. Obesity: Prevalence, causes, consequences, management, preventive strategies and future research directions. *Metab Open* [Internet]. 2025 Sep 1 [cited 2025 Sep 3];27:100375. Available from: <https://www.sciencedirect.com/science/article/pii/S2589936825000313>
4. Pierpont YN, Dinh TP, Salas RE, Johnson EL, Wright TG, Robson MC, et al. Obesity and surgical wound healing: A current review. *ISRN Obes* [Internet]. 2014 Feb 20 [cited 2025 Sep 3];2014:638936. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3950544/>
5. Quartuccio N, Ialuna S, Pulizzi S, D’Oppido D, Antoni M, Moreci AM. The correlation of body mass index with risk of recurrence in post-menopausal women with breast cancer undergoing fluorodeoxyglucose positron emission tomography/computed tomography. *J Clin Med* [Internet]. 2024 Mar 9 [cited 2025 Sep 3];13(6):1575. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10971533/>
6. Kamineni A, Anderson ML, White E, Taplin SH, Porter P, Ballard-Barbash R, et al. Body mass index, tumor characteristics, and prognosis following diagnosis of early stage breast cancer in a mammographically-screened population. *Cancer Causes Control* [Internet]. 2013 Feb [cited 2025 Sep 3];24(2):305–12. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3557530/>
7. Dutta M, Selvamani Y, Singh P, Prashad L. The double burden of malnutrition among adults in India: Evidence from the National Family Health Survey-4 (2015–16). *Epidemiol Health* [Internet]. 2019 Dec 18 [cited 2025 Sep 3];41:e2019050. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6976728/>
8. Attaar M, Forester B, Kuchta K, Ujiki MB, Linn J, Denham W, et al. Higher rates of recurrence and worse quality of life in obese patients undergoing inguinal hernia repair. *Hernia*. 2024 Dec;28(6):2255–64.
9. Li ZW, Song M, Liu J, Jiang B, Hu W, Zheng X. Is the recurrence rate higher in obese patients undergoing inguinal hernia surgery? *Hernia*. 2025 Feb 26;29(1):107.
10. Pararas N, Pikouli A, Bounnah M, Zenah Y, Alkadrou AM, Papakonstantinou D, et al. Laparoscopic inguinal hernia repair in the obese patient population: A single-center five-year experience. *Cureus* [Internet]. [cited 2025 Sep 3];15(11):e48265. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10695410/>
11. Park CY, Kim JC, Kim DY, Kim SK. Inguinal hernia repair in overweight and obese patients. *J Korean Surg Soc* [Internet]. 2011 Sep [cited 2025 Sep 3];81(3):205–10. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3204546/>
12. Nguyen MT, Berger RL, Hicks SC, Davila JA, Li LT, Kao LS, et al. Comparison of synthetic mesh outcomes vs suture repair of elective primary ventral herniorrhaphy: A systematic review and meta-analysis. *JAMA Surg*. 2014 May;149(5):415–21.
13. Abbas AW, Abo-elsoad MF, Hindawi MD, Zeid MA, Kalmoush AE, Aboelkier MM, et al. Prophylactic mesh reinforcement in elective abdominal surgeries: A systematic review, meta-analysis, and GRADE evidence assessment. *Hernia* [Internet]. 2025 [cited 2025 Sep 3];29(1):230. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC12254175/>
14. Lang LH, Parekh K, Tsui BYK, Maze M. Perioperative management of the obese surgical patient. *Br Med Bull* [Internet]. 2017 Dec [cited 2025 Sep 3];124(1):135–55. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5862330/>

15. Venkatrao M, Nagarathna R, Majumdar V, Patil SS, Rath S, Nagendra H. Prevalence of obesity in India and its neurological implications: A multifactor analysis of a nationwide cross-sectional study. *Ann Neurosci* [Internet]. 2020 Jul [cited 2025 Sep 3];27(3–4):153–61. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7535115/>