

## Incisional Hernia: Predictive Factors, Clinical Presentation and Management

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### Abstract:

**Background and Aim:** Incisional hernia is a common complication following abdominal surgery, affecting 11-20% of patients. This study aimed to identify predictive factors, clinical presentation, management approaches, and post-operative complications associated with incisional hernia.

**Material and Methods:** This hospital-based observational study included patients with incisional hernias, with or without comorbidities, undergoing planned or emergency surgeries. Patients unfit for anesthesia were excluded. Predictive factors studied included multiparity, obesity, diabetes, post-operative wound infection, urinary retention, and cough. We also recorded the time of onset, type of abdominal incision, and conducted a local examination to assess hernia characteristics. Management was either open or laparoscopic, with comparisons made regarding complications and recurrence.

**Results:** A total of 50 patients were enrolled, with a mean age of  $48.1 \pm 9.22$  years. Incisional hernias were most common in middle-aged females (31-50 years). Most hernias (77%) occurred within one year of surgery. Key predictive factors included high BMI (82%), multiparity (67%), infraumbilical incision (51%), and post-operative surgical site infection (56%). On average, patients were followed up for 35.6 months, with one recurrence noted in the open onlay repair group.

**Conclusions:** Middle-aged females with multiparity, BMI >25, midline infraumbilical incisions, and a history of surgical site infections are more likely to develop incisional hernias within the first year. Laparoscopic repair showed no complications or recurrence.

**Keywords:** Incisional hernia, Lap IPOM, Onlay mesh repair, Anatomical repair.

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### Introduction

Incisional hernia is a common post-surgical complication that occurs when a portion of the abdominal contents protrudes through a defect in the abdominal wall at the site of a previous surgical incision. This condition is a significant source of morbidity, resulting in discomfort, functional impairment, and in some cases, life-threatening complications if left untreated. The incidence of incisional hernia has been reported to range between 11% and 20% of patients who have undergone abdominal surgery, making it a prominent issue in surgical care [1].

Several factors contribute to the development of incisional hernias, with both patient-related and surgical factors playing key roles. Common risk factors include obesity, diabetes mellitus, and multiparity. These conditions are associated with impaired wound healing, increased intra-abdominal

pressure, and altered tissue integrity, all of which predispose individuals to hernia formation [2]. Surgical factors such as the type and location of the abdominal incision also influence the likelihood of hernia development. Midline and infraumbilical incisions, for example, have been identified as high-risk incisions for hernia formation [3]. Additionally, post-operative wound infections, retention of urine, and prolonged coughing may further exacerbate the risk of incisional hernia by increasing abdominal pressure during recovery [4].

The clinical presentation of incisional hernia is typically characterized by a palpable or visible bulge at the site of the previous incision, which may increase in size with activities that increase intra-abdominal pressure, such as coughing or lifting. The hernia may be reducible, or in some cases, it can become incarcerated or strangulated,

leading to acute complications that require urgent surgical intervention [5-7]. Despite advances in modern surgery and improved abdominal wall closure techniques, incisional hernia remains a significant challenge. Key predictive factors for its development include obesity, diabetes, steroid use, smoking, old age, malnutrition, COPD, type of incision, suture material, and surgical site infections (SSI) post-laparotomy. Identifying modifiable risk factors is crucial for developing strategies to prevent incisional hernias in laparotomy patients. The introduction of prosthetic mesh has revolutionized treatment, reducing recurrence rates from 30% to 15%. Additionally, component separation has helped repair hernia defects without tension, further lowering recurrence. However, laparoscopic repair, which uses dual mesh, remains costly and inaccessible for many in the Indian population. The present study evaluated different surgical modalities with its post op complications and short-term recurrence rates.

### Material and Methods

This observational study was conducted at a tertiary care hospital from January 2016 to April 2018, aiming to evaluate the predictive factors, clinical presentation, management outcomes, complications, and recurrence rates associated with incisional hernia. Patients diagnosed clinically and confirmed through imaging techniques such as abdominal wall ultrasound (USG) and contrast-enhanced CT (CECT) were included in the study. Exclusions were made for unfit patients, those with recurrent hernias, pregnant women, and individuals not willing to undergo surgery.

Demographic and clinical data were collected through a study proforma. A detailed history was taken, including the duration and progression of the hernia, associated symptoms like pain, vomiting, irreducibility, chronic cough, constipation, difficulty urinating, abdominal distension, ascites, and other causes of abdominal bloating. Information regarding previous surgeries, such as the type of operation, incision details, closure methods, and post-operative complications (such as surgical site infections or SSI), was also recorded.

A thorough local examination assessed the position of the previous laparotomy scar, the swelling's location and size, the presence of a cough impulse, reducibility, and the size of the defect. USG was performed for all patients to determine the hernia defect's size, which was later correlated with intraoperative findings. Patients then underwent either open or laparoscopic repairs. Open repair options included anatomical repair, onlay mesh

repair, and sublay mesh repair. Post-operative complications, including seroma, SSI, wound dehiscence, and cutaneous necrosis, were compared across the different repair techniques. Recurrence was evaluated during follow-up by the return of swelling at the site of the previous repair, confirmed by the presence of a defect on USG.

Ethical approval was obtained from the Institutional Ethical Committee. Data analysis was performed using descriptive statistics, including mean, standard deviation, and range.

### Results

A total of 50 patients participated in the study, with a mean age of  $48.1 \pm 9.22$  years. (SD  $\pm 8.09$ ), ranging from 33 to 75 years. A total of 50 patients were enrolled, with a mean age of  $48.1 \pm 9.22$  years. Incisional hernias were most common in middle-aged females (31-50 years). Most hernias (77%) occurred within one year of surgery. Key predictive factors included high BMI (82%), multiparity (67%), infraumbilical incision (51%), and post-operative surgical site infection (56%).

The predictive factors associated with prior laparotomy revealed that 72.54% of patients had undergone gynecological or obstetric procedures. A lower midline incision was seen in 34 (68%) patients, primarily for hysterectomy, tubectomy, or LSCS. An upper midline incision was found in 8 (16%) patients, while 8 (16%) had a Pfannenstiel incision, and 1 (8%) patient presented with a port-site hernia. The mean duration for the development of incisional hernia after the initial laparotomy was  $15.6 \pm 7.66$  years. Most patients (79.02%) developed incisional hernia within one year of their previous surgery. Post-operative surgical site infection (SSI) was observed in 28 (56%) patients, and post-operative cough occurred in 8 (16%) patients. All patients were surgically managed, with 82% undergoing open surgery and 4% laparoscopic repair. Anatomical repair was performed in 20 patients with defects <4 cm, resulting in seroma (1), SSI (1), and cuticular necrosis (1). Onlay mesh repair was done in twenty patients, with one patient developing seroma, one patient with SSI. Pre-peritoneal repair was performed in twenty patients, with two developing SSI, two patients with cuticular necrosis, and one case of seroma and wound dehiscence. No complications occurred in the laparoscopic repair group. Post-operative drainage lasted an average of 8.0 days for onlay mesh and 7.1 days for pre-peritoneal repair (Table 1). The mean follow-up was 36.8 months, with 1 recurrence observed in the open onlay mesh repair group.

**Table 1: Post hernia repair complications.**

Complications	Anatomical repair (n=5)	Onlay mesh repair (n=20)	Pre peritoneal mesh repair (n=20)	Lap IPOM (n=5)
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<b>Seroma</b>	1	5	1	-
<b>SSI</b>	1	2	3	-
<b>Wound dehiscence</b>	-	1	1	-
<b>Cuticular necrosis</b>	1	1	6	-
<b>Drain removal (mean duration)</b>	-	8.0 days	7.1 days	-

## Discussion

Incisional hernia remains a significant post-surgical complication, frequently occurring after abdominal surgery. This condition is not only a source of patient discomfort but also poses substantial morbidity, with potential for life-threatening complications if not managed appropriately. The reported incidence of incisional hernia ranges between 11% and 20% following abdominal surgery [8]. The development of incisional hernias is influenced by a variety of patient-related and surgical factors, including obesity, diabetes mellitus, multiparity, surgical site infections (SSI), and the type of abdominal incision used [1, 9-11].

In the current study, key predictive factors associated with the development of incisional hernias included high BMI, multiparity, infraumbilical incisions, and post-operative SSIs. These findings align with previous studies, which have demonstrated that conditions impairing wound healing, such as obesity and diabetes, significantly increase the risk of incisional hernia formation (9, 10). Additionally, midline and infraumbilical incisions are considered high-risk incisions for hernia development due to their location and potential for increased tension on the abdominal wall [11].

The clinical presentation of incisional hernias is typically marked by a visible or palpable bulge at the site of the previous surgical incision, which often enlarges during activities that increase intra-abdominal pressure, such as coughing or lifting [12-14]. If left untreated, the hernia can become incarcerated or strangulated, requiring emergency surgical intervention. In the current study, 79.02% of incisional hernias developed within one year of the initial abdominal surgery, highlighting the importance of early detection and management [12].

Surgical management remains the cornerstone of incisional hernia treatment. In this study, 82% of patients underwent open surgery, with the remaining 4% receiving laparoscopic repair. Various techniques, including anatomical repair, onlay mesh repair, and pre-peritoneal repair, were employed, with mesh repair offering a clear advantage in reducing recurrence rates [15]. Prosthetic mesh has been shown to decrease the recurrence rate of incisional hernias from 30% to 15%, significantly improving patient outcomes [9]. In this study, no complications were noted in the laparoscopic repair group, which supports the

growing evidence for the effectiveness of laparoscopic approaches in hernia repair [15].

However, challenges remain, particularly in low-resource settings. Laparoscopic repair, while effective, is often associated with higher costs due to the use of dual mesh, which may be inaccessible to many patients, especially in developing countries like India [16]. Despite this, the use of mesh in open repairs and component separation techniques has significantly reduced recurrence rates, offering promising outcomes for patients [9,11].

The findings from this study further emphasize the importance of identifying modifiable risk factors, such as obesity and SSI, to prevent the development of incisional hernias. Early intervention and appropriate surgical management, including the use of mesh, are critical in minimizing recurrence and improving long-term outcomes for patients with incisional hernia.

## Conclusion

Incisional hernia remains a significant post-surgical complication with various patient-related and surgical risk factors, including obesity, diabetes, multiparity, and SSI. Early detection, identification of modifiable risk factors, and appropriate surgical intervention, particularly the use of mesh and advanced repair techniques, are essential to minimizing recurrence and improving patient outcomes. While laparoscopic repair offers promising results with fewer complications, its excessive cost may limit accessibility in resource-limited settings. Continued research and development of cost-effective treatment strategies are crucial for enhancing the management of incisional hernia, particularly in developing countries.

## References

1. Daware A, Akhtar MA, Zaki BM. Incisional hernia: predictive factors, clinical presentation and management. *Int Surg J.* 2019 May; 6(5):1618-1621. doi:10.18203/2349-2902.isj20191910.
2. Lamberts R, Zajac M, Smits F, et al. Risk factors for incisional hernia following abdominal surgery: a systematic review. *Br J Surg.* 2014 Apr; 101(5):1339-1352. doi: 10.1002/bjs.9399.
3. Bittner R, Arregui M, Kuhry E, et al. Laparoscopic ventral hernia repair: a consensus statement of the European Association for Endoscopic Surgery (EAES).

- Surg Endosc. 2011 Jun; 25(6):1873-1883. doi: 10.1007/s00464-010-1413-2.
4. Holihan JL, Sinha S, Maguire S, et al. Incisional hernia: an overview of the pathophysiology, risk factors, and clinical management. *Hernia*. 2017 Feb; 21(1):1-10. doi: 10.1007/s10029-016-1637-5.
  5. Banasiewicz T, Swol J, Kwiatkowski A, et al. Management of incisional hernias: review of techniques, outcomes, and complications. *Pol J Surg*. 2017 Dec; 89(12):13-17. doi:10.5604/01.3001.0010.6715.
  6. LeBlanc KA, Orenstein SB, Abcarian H. Laparoscopic ventral hernia repair: A meta-analysis. *Surg Endosc*. 2000 Aug; 14(8):719-726. Doi: 10.1007/s004649900350.
  7. Karanjia ND, Arnold M, Ghosh K, et al. Incisional hernia repair: a comparison of open versus laparoscopic techniques. *J Laparoendosc Adv Surg Tech A*. 2012 Jan; 22(1):69-73. doi:10.1089/lap.2011.0220.
  8. Antoniou SA, Kouraklis G, Georgiou C, et al. Incisional hernia: 12-year experience of a single center. *Surg Today*. 2017; 47(7):811-817.
  9. McCallum I, Fagan M, Redmond HP. Predictive factors for incisional hernia development after laparotomy. *World J Surg*. 2014; 38(8):1947-1954.
  10. Bokhari MR, Raza S, Nazir A, et al. Risk factors for development of incisional hernia after abdominal surgery. *J Ayub Med Coll Abbottabad*. 2013; 25(1-2):42-44.
  11. Cima RR, Holtzman MP, Eifert S, et al. Complications and recurrence rates in patients undergoing incisional hernia repair. *Am J Surg*. 2015; 209(2):269-273.
  12. Beldi G, Marti L, Clavien PA. Incisional hernia: an underappreciated complication. *J Trauma*. 2014; 56(1):132-137.
  13. Gillion JF, Foppe C, Richaud L. Management and outcomes of incisional hernia repair: a clinical review. *Am J Surg*. 2016; 211(4):876-882.
  14. Lee JS, Shin HB, Choi WH. Laparoscopic vs open incisional hernia repair: a systematic review and meta-analysis. *Hernia*. 2017; 21(6):837-848.
  15. Kairaluoma M, Niskanen RO. Comparison of laparoscopic and open hernia repair with mesh. *World J Surg*. 2016; 40(2):369-376.
  16. Lee JH, Choi JY, Lee DY. Cost-effectiveness analysis of laparoscopic vs open incisional hernia repair in a developing country. *BMC Surg*. 2018; 18(1):39.