



SURGICAL AND PROCEDURAL RISK FACTORS ASSOCIATED WITH INCISIONAL HERNIA

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ABSTRACT

Background: Incisional hernia, a common complication of abdominal surgery, results from fascial dehiscence and impaired wound healing. Despite advances in surgical techniques, it continues to pose significant clinical and socioeconomic challenges. Identifying and analyzing surgical and perioperative risk factors is crucial for prevention and effective management, particularly in Tier II Indian populations where data remain limited.

Aim: To evaluate the impact of previous surgeries, incision type, surgical site infection (SSI), perioperative factors, and associated comorbidities on the development of incisional hernia.

Methodology: This prospective observational study was conducted over 18 months at Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun. Forty patients aged 18–70 years with clinically diagnosed incisional hernias were included. Data on prior surgeries, incision types, SSI, comorbid conditions, nutritional status, and suture materials used were collected through structured proforma and clinical examination. Statistical analysis was performed to assess associations.

Results: Most patients (87.5%) developed incisional hernia after a single surgery, with **exploratory laparotomy (42.5%)**, **abdominal hysterectomy (22.5%)**, and **open cholecystectomy (12.5%)** as common antecedents. **Lower midline incisions (47.5%)** and a history of **SSI (52.5%)** were predominant. Hernias developed most frequently within **1 year post-surgery (42.5%)**, with **chronic constipation (32.5%)** and **cough (15%)** as leading risk factors. Nutritional deficiencies were notable, with **anaemia in 40%**, **hypoproteinaemia in 15%**, and **85%** having undergone closure with non-absorbable sutures.

Conclusion: Incisional hernia is frequently associated with a single prior abdominal surgery, particularly exploratory laparotomy, and is significantly linked to lower midline incisions and SSI. Constipation and anaemia emerged as important modifiable perioperative risk factors. These findings highlight the need for targeted preventive strategies, optimized surgical techniques, and nutritional assessment to reduce hernia occurrence and recurrence.

Keywords: Incisional hernia, surgical site infection, lower midline incision, exploratory laparotomy, anaemia, constipation, risk factors, suture material, India, prospective study.

INTRODUCTION-

A hernia is defined as the abnormal protrusion of a viscus or part of it through a defect in the wall of the cavity that normally contains it, with the protrusion being the most clinically significant aspect of this definition [1,2]. Incisional hernia, also termed postoperative ventral hernia, occurs due to a defect in the musculoaponeurotic layer of the abdominal wall at the site of a previous incision, commonly resulting from impaired wound healing, fascial dehiscence, or weakening of scar tissue [1,3]. It is the second most common type of abdominal wall hernia after inguinal hernia, with an incidence of 11–20% following laparotomy [4]. Risk factors include poor surgical technique, wound sepsis, emergency laparotomy, and systemic conditions such as obesity, diabetes, malnutrition, smoking, chronic renal failure, and long-term steroid therapy [5]. The underlying mechanism involves inadequate collagen deposition, poor fascial healing, and increased intra-abdominal pressure, predisposing to development of a true hernia sac [6]. Clinically, patients present with a visible or palpable swelling at the scar site, often associated with discomfort or pain, while complications such as obstruction, incarceration, and strangulation can be life-threatening [7].

The mainstay of treatment is surgical repair, which may be performed as primary repair, mesh repair, or laparoscopic mesh repair. While primary closure is reserved for small defects, the recurrence rate is high, reaching 20–50% [8]. Mesh repair, most commonly using polypropylene, significantly reduces recurrence but carries risks of mesh infection, adhesion, and fistula formation [9]. Laparoscopic repair is increasingly adopted for its advantages of reduced pain, shorter hospital stay, and lower wound complications, though cost and technical demands limit its widespread use. Despite improvements in techniques, recurrence rates remain at 10–20% even after mesh reinforcement [10]. Incisional hernia thus represents not only a clinical but also a socioeconomic problem, causing significant morbidity and impaired quality of life for patients, while burdening health systems with repeated admissions and costly interventions [11]. Despite extensive literature, data specific to Indian populations—particularly in Tier II centres—remain limited. Understanding the distribution of these risk factors in local clinical settings is essential for designing preventive strategies, refining surgical techniques, and improving postoperative outcomes. This study, therefore, seeks to analyze the **surgical and perioperative determinants of incisional hernia** to provide evidence-based insights for optimizing patient care and reducing recurrence rates.

AIM- To evaluate the impact of previous surgeries, incision type, surgical site infection, perioperative factors, and associated comorbid conditions on the development of incisional hernia in patients presenting to a tertiary care centre.

METHODOLOGY-

This prospective observational study was conducted in the Department of Surgery at Shri Guru Ram Rai Institute of Medical and Health Sciences and its associated Shri Mahant Indires Hospital, Dehradun, over a period of 18 months. All patients admitted to the surgical wards with clinically diagnosed incisional hernia, aged between 18 and 70 years, were included after obtaining informed written consent. Both elective and emergency cases were considered, while patients with abdominal malignancy, cirrhosis with end-stage liver disease, pregnant women, and those with recurrent incisional hernia were excluded. Each eligible patient was counselled about the nature and purpose of the study, with assurance of confidentiality. Data were collected prospectively using a structured proforma which included sociodemographic profile, detailed history, and clinical examination. Particular attention was paid to the time of appearance and duration of swelling after index surgery, associated pain, type and indication of previous abdominal surgery, postoperative wound complications, and comorbid conditions such as chronic cough, constipation, prostatism, steroid use, or chemotherapy.

All patients underwent thorough physical examination to assess the characteristics of the hernia, associated complications, and to determine the appropriate management plan. Uncomplicated cases

were managed by mesh hernioplasty, while those presenting with intestinal obstruction or strangulation were subjected to emergency exploratory laparotomy following resuscitation, with hernia repair performed without mesh. Postoperative outcomes and complications were recorded meticulously. A total of 40 patients were included in the study during the stipulated period. All collected data were tabulated and subjected to detailed statistical analysis using standard methods to evaluate the clinical profile, predisposing factors, and outcomes in patients with incisional hernia.

RESULT-

FIGURE 1 demonstrates the role of prior surgical exposure in the development of incisional hernia. The majority of patients (87.5%) developed hernia following a **single prior surgery**, whereas only 12.5% developed hernia after two procedures. This finding emphasizes that even one major abdominal surgery is a sufficient risk factor, particularly when performed under emergency circumstances. When analyzing the type of surgery, **exploratory laparotomy** was the most common antecedent operation (42.5%), followed by **abdominal hysterectomy** (22.5%) and **open cholecystectomy** (12.5%). LSCS, appendectomy, rectopexy, tubectomy, nephrectomy, and stab injury repair together constituted <20% of the total.

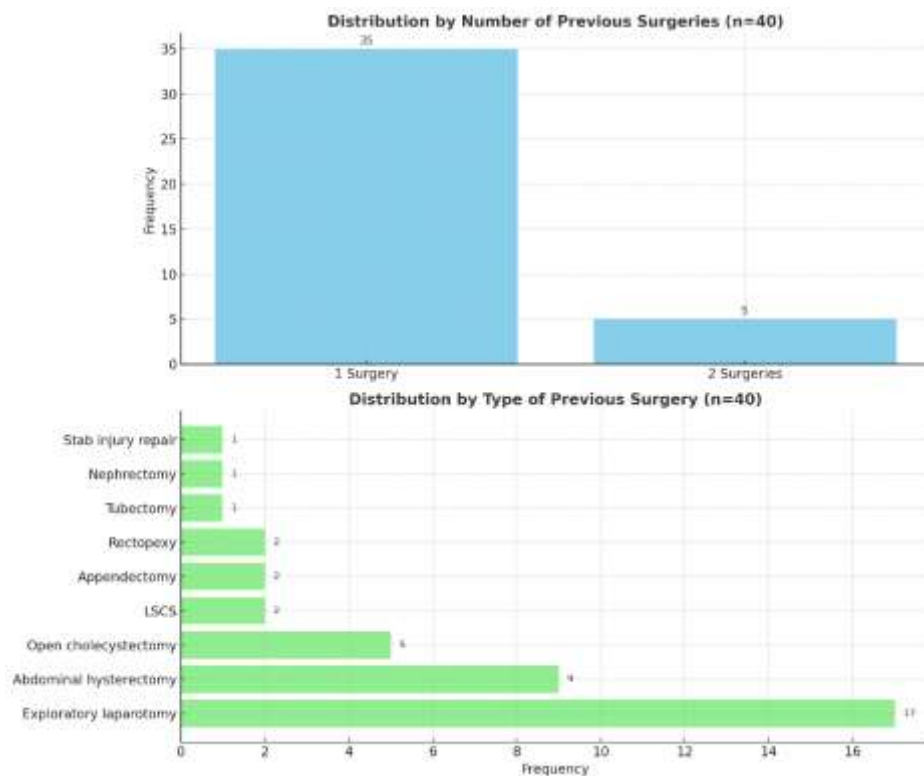


Table 2: Association of Incisional Hernia with Type of Incision and SSI (n=40)

Factor	Frequency	Percentage (%)
Type of Incision		
Upper midline	10	25.0%
Lower midline	19	47.5%
Right subcostal (Kocher's)	5	12.5%
Gridiron	2	5.0%
Paramedian	2	5.0%
Miscellaneous	2	5.0%
Post-operative SSI in Previous Surgery		
Yes	21	52.5%
No	19	47.5%

Lower midline incision was the commonest site (47.5%). Over half (52.5%) had a **history of SSI**, reinforcing its strong association.

Table 3: Time of Presentation and Associated Risk Factors (n=40)

Factor	Frequency	Percentage (%)
Duration Since Last Surgery		
0–3 months	1	2.5%
3 months–1 year	17	42.5%
1–3 years	15	37.5%
>3 years	7	17.5%
Associated Risk Factors		
Chronic constipation	13	32.5%
Chronic cough	6	15.0%
Both (cough + constipation)	2	5.0%
LUTS	2	5.0%
None	17	42.5%

Maximum incidence occurred within **1 year of surgery**, with **chronic constipation** as the leading contributory risk factor.

Table 4: Perioperative Factors during Previous Surgery (n=20*)

Factor	Frequency	Percentage (%)
Nutritional Status		
Anaemia only	8	40.0%
Hypoproteinaemia only	3	15.0%
Both Anaemia + Hypoproteinaemia	4	20.0%
None	5	25.0%
Suture Material Used		
Non-absorbable	17	85.0%
Absorbable (Vicryl)	3	15.0%

Anaemia was the most frequent perioperative comorbidity (40%), and **non-absorbable sutures** were predominantly used (85%).

DISCUSSION-

In our study, 87.5% developed hernias after a single prior surgery, most commonly exploratory laparotomy (42.5%), followed by abdominal hysterectomy (22.5%) and cholecystectomy (12.5%). Murali and Thakre (2015)[3] similarly found 76% cases after one surgery. Cuschieri et al. (2002)[4] identified midline laparotomies as the leading cause (36.1%). Our findings align with Bessa et al. (2007)[5], who reported abdominal hysterectomy in 27% and differ slightly from Dai et al. (2019)[7], who reported only 6.8% post-cholecystectomy. Krivan et al. (2019)[6] observed 58% following bariatric/GI surgeries. Tubre et al. (2018)[8] and Zucker et al. (2019)[9] highlighted the impact of postoperative infection and surgical technique, reinforcing our findings.

Lower midline incision (47.5%) was most commonly associated, with 52.5% having prior SSI. Murali and Thakre (2015)[3] reported 63% midline involvement. Our SSI rate (52.5%) is comparable to Mudge and Hughes (1985)[1] (50.2%). Williams et al. (2008)[2] also emphasized higher hernia risk with vertical incisions. Tubre et al. (2018)[8] and Zucker et al. (2019)[9] reaffirmed SSI as a major factor. Dai et al. (2019)[7] (37%) and Krivan et al. (2019)[6] (44.6%) had lower SSI rates, possibly due to elective settings.

42.5% presented within 3 months–1 year, and 37.5% within 1–3 years. Major risk factors were constipation (32.5%) and chronic cough (15%). Murali and Thakre (2015)[3] reported 41.6% between

6 months–2 years, mirroring our timeline. Cuschieri et al. (2002)[4], Bessa et al. (2007)[5], and Dai et al. (2019)[7] confirmed cough/constipation as contributing factors (15–32.5%). Tubre et al. (2018)[8] and Söderbäck et al. (2018)[10] highlighted early post-op period and intra-abdominal pressure as key risks, matching our findings.

Among 20 evaluated: anaemia in 40%, hypoproteinaemia in 15%, both in 20%. Non-absorbable sutures used in 85%. Our nutritional findings are in line with Murali and Thakre (2015)[3], Mudge and Hughes (1985)[1], and Williams et al. (2008)[2]. Krivan et al. (2019)[6] (47%) and Dai et al. (2019)[7] (34.6%) also highlighted nutrition-related complications. Suture use findings echo Tubre et al. (2018)[8] and Zucker et al. (2019)[9], with absorbable sutures linked to increased complications, validating our selective usage.

CONCLUSION-

In conclusion, the study highlights that incisional hernia commonly follows a single prior abdominal surgery—most often exploratory laparotomy—with lower midline incisions and post-operative SSI emerging as significant risk factors. The majority of cases presented within the first year, with chronic constipation as the leading associated comorbidity. Anaemia was the most prevalent perioperative nutritional deficiency, and non-absorbable sutures were used in most previous surgeries, collectively underscoring the multifactorial etiology of incisional hernia.

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