

## Comparative Retrospective Study of Incisional Hernia After Emergency and Elective Abdominal Surgery

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### Abstract:

**Background:** Incisional hernia is a common postoperative complication following abdominal surgery, causing significant morbidity and healthcare burden. Risk factors include patient comorbidities, surgical technique, and the urgency of surgery. Emergency procedures are hypothesized to have higher hernia incidence and complication rates compared to elective surgeries.

**Aim:** To compare the incidence, characteristics, and outcomes of incisional hernia in patients undergoing elective versus emergency abdominal surgeries and identify associated risk factors.

**Methodology:** A retrospective observational study was conducted at the Department of General Surgery, Nalanda Medical College and Hospital, Patna, India, from January 2024 to December 2024. Eighty patients with incisional hernia following previous abdominal surgery were included. Data on demographics, comorbidities, prior surgery type, hernia characteristics, and postoperative outcomes were analyzed using SPSS 27.0.

**Results:** Midline hernias were most common (66.3%), with larger defect sizes and more adhesions observed in emergency surgeries ( $7.1 \pm 1.7$  cm, 22/40) than elective cases ( $6.2 \pm 1.5$  cm, 12/40). Postoperative complications, including wound infection (30% vs. 12.5%), seroma (15% vs. 10%), and early recurrence (12.5% vs. 5%), were higher in emergency repairs. Elective surgeries had fewer complications and better overall outcomes.

**Conclusion:** Emergency abdominal surgeries are associated with more complex incisional hernias and higher postoperative morbidity. Elective procedures, with optimized preoperative care and meticulous technique, result in superior outcomes.

**Keywords:** Incisional hernia, elective surgery, emergency surgery, postoperative complications, abdominal surgery.

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### Introduction

Incisional hernia is a common and significant postoperative complication that occurs after abdominal surgery because patients develop a hernia when their intra-abdominal contents exit through an opening in their abdominal wall which formed at their surgical incision site [1]. The condition creates a major impact on both patients and healthcare systems because it results in the need for additional surgeries and extended hospital time and creates health complications for patients. The reported incidence of incisional hernia varies widely between 2 and 20 percent because different surgical operations and patient characteristics and the length of time after surgery influence the results according to [2]. Despite progress in surgical techniques and materials and

perioperative care, surgeons around the world face persistent difficulties in preventing and treating incisional hernias.

Incisional hernias are developed as a result of several factors that are related to the patient and surgical factors. The risk factors associated with patients are old age, obesity, malnutrition, diabetes mellitus, chronic obstructive pulmonary disease, smoking, and poor wound healing caused by immunosuppression or corticosteroid use. The surgical factors involve the nature of incision, the material used in the sutures, the mode of closure, post-surgical infection, and the urgency of the operation. The distinction between emergency and elective surgeries is one of

these, and it has been identified as a potential factor of critical importance in the incidence of incisional hernias. Plastic surgeries are commonly scheduled procedures that are conducted under controlled circumstances and therefore, patients can be optimally prepared before the surgery and precision in the method of surgery is taken care of [3]. On the other hand, emergency surgeries are done under time-constrained situations, and are usually done in acute illness or trauma, where optimization of patients is restricted, tissue handling can be sub-optimal, and risk of contamination or infection is greater. This difference has given rise to the hypothesis that emergency surgery might be combined with increased incidences of incisional hernia in comparison with elective surgeries [4].

Mechanical and biological factors interact to cause the pathophysiology of incisional hernia formation [5]. The healing of wounds depends on the proper deposition of collagen and remodeling of tissues at the site of incision. Any disturbance of this process, whether by infection, stress on the suture line, ischemia, or low quality of the tissue may lead to fascial dehiscence and then herniation. These risk factors are usually heightened in an emergency surgery because of the urgency of the surgery, presence of peritonitis, contaminated operating area and delay in the presentation of the patient, all of which undermine the process of optimal wound healing. On the other hand, elective surgeries typically enable surgeon to choose the most suitable incision, use of suture material as well as the method of closing the wound, which may possibly minimize the risk of hernias postoperative [6].

Epidemiological studies have shown that hernia risk depends on both the surgical procedure performed and the medical condition that required surgery [7]. The risk profile for laparotomy incisions which treat gastrointestinal perforations and obstruction and trauma shows different results than elective surgeries which include hernia repairs and cholecystectomy and bowel resections for chronic conditions [8]. The incidence of postoperative wound infection which acts as an independent risk factor for incisional hernia development shows higher rates in emergency medical situations. Infections disrupt collagen production while they heighten inflammatory response which results in damage to the wound area that leads to hernia development.

There exists a lack of major research studies which compare the frequency and results of incisional hernia incidents between emergency surgical procedures and scheduled surgical operations [9]. The existing research either investigates only elective medical procedures or studies diverse patient groups without establishing their surgical urgency. The existing research studies face limitations because they use brief follow-up periods and small study groups and retrospective study methods which prevent them

from establishing clear causative links. The research requires systematic retrospective studies which will examine how often incisional hernia occurs and which risk factors and patient outcomes compare between emergency surgical procedures and scheduled surgical operations.

The clinical practice needs to understand how incisional hernias develop differently in these two surgical settings. The study results provide valuable information which healthcare professionals can use to plan preoperative assessments and categorize patient risk and develop their postoperative monitoring methods. Surgeons use specific methods to reduce hernia formation risks which include using prophylactic mesh for high-risk patients and applying precise closure methods and conducting thorough perioperative procedures. The identification of emergency surgery risk factors which can be modified by health professionals will lead to decreased hernia rates and better patient results.

The researchers wanted to study how many people developed incisional hernias after they underwent emergency or elective surgeries and which risk elements they found and how those factors affected patient results. The research team will analyze surgical records together with patient follow-up information to establish evidence that will help doctors make better surgical choices while improving patient treatment and advancing knowledge about abdominal wall problems after surgery.

### Methodology

**Study Design:** The present study was a retrospective observational study conducted to evaluate the incidence, characteristics, and outcomes of incisional hernia following emergency versus elective abdominal surgery. The study aimed to identify potential risk factors associated with incisional hernia development and to compare postoperative outcomes between patients who underwent elective procedures and those who underwent emergency surgery. Data were collected from hospital records, operative notes, and follow-up documentation to ensure a comprehensive analysis of the preoperative, intraoperative, and postoperative variables influencing hernia occurrence.

**Study Area:** The study was carried out in the Department of General Surgery, Nalanda Medical College and Hospital, Patna, Bihar, India.

**Study Duration:** The study was conducted over a period of one year, from January 2024 to December 2024

### Study Participants

#### Inclusion Criteria

- Patients of all age groups who developed an incisional hernia following any abdominal surgery.

- Patients with complete operative and postoperative records available for review.
- Patients who had undergone either elective or emergency abdominal surgery at the study center.

#### Exclusion Criteria

- Patients with incomplete or missing medical records.
- Patients who developed hernia following laparoscopic procedures.
- Patients with a history of recurrent incisional hernia undergoing reoperation.
- Patients with systemic illnesses that could independently affect wound healing, such as advanced chronic liver disease or malignancy.

**Sample Size:** A total of 80 patients meeting the inclusion criteria were included in the study. These cases were categorized into two groups: patients who had undergone elective surgery and those who had undergone emergency surgery, facilitating comparative analysis of risk factors and outcomes.

**Procedure:** For each patient, a detailed review of the medical records was performed. Key information included the type of previous abdominal surgery, the timing of surgery (elective versus emergency), preoperative nutritional status, comorbidities, and any intraoperative complications. Postoperative factors such as wound infection, wound dehiscence, burst abdomen, presence of drains, and suture removal practices were carefully recorded, as each of these factors could contribute to the development of incisional hernia. The site, size, and characteristics of the hernia, including contents of the hernial sac and the presence of adhesions, were documented based on operative notes.

Patients were evaluated for comorbid conditions such as diabetes, hypertension, chronic pulmonary disease, and other systemic illnesses that could influence healing. Relevant laboratory investigations were extracted from hospital records, including routine blood tests, urine analysis, chest X-ray, ECG for patients above 40 years, and specific investigations such as serum electrolytes or blood glucose when indicated.

The surgical management of incisional hernia, including type of repair (primary closure, mesh repair, or component separation), operative duration, intraoperative complications, and immediate postoperative outcomes, was reviewed. Postoperative follow-up records were analyzed to identify recurrence, wound infection, seroma, or other complications. Follow-up data at 1 month, 3 months, and 6 months post-surgery were included to assess early and intermediate outcomes of hernia repair.

**Statistical Analysis:** All collected data were entered into Microsoft Excel and analyzed using SPSS version 27.0. Categorical variables such as type of surgery, presence of comorbidities, and postoperative complications were expressed as frequencies and percentages, while continuous variables such as age, BMI, and defect size were presented as mean  $\pm$  standard deviation. Chi-square test and Fisher's exact test were used to compare categorical variables between elective and emergency surgery groups. Independent t-tests were applied for continuous variables. A p-value  $<0.05$  was considered statistically significant. Descriptive statistics and cross-tabulations were utilized to evaluate associations between risk factors and incidence of incisional hernia, providing a robust comparative analysis of outcomes in both surgical groups.

#### Result

Table 1 presents the socio-demographic characteristics of the 80 patients included in the study. The mean age of patients undergoing elective surgery was  $48.6 \pm 12.4$  years, slightly higher than the  $46.3 \pm 11.7$  years observed in the emergency surgery group, resulting in an overall mean age of  $47.5 \pm 12.0$  years. Gender distribution showed a predominance of males (47, 58.8%) compared to females (33, 41.2%), with 22 males and 18 females in the elective group and 25 males and 15 females in the emergency group. The mean body mass index (BMI) was comparable between the groups, with  $26.1 \pm 3.5$  kg/m<sup>2</sup> in elective and  $25.7 \pm 3.8$  kg/m<sup>2</sup> in emergency cases, yielding an overall mean BMI of  $25.9 \pm 3.6$  kg/m<sup>2</sup>. A history of smoking was reported in 22 patients, distributed as 10 in the elective group and 12 in the emergency group, representing 27.5% of the total cohort.

Characteristic	Elective Surgery (n=40)	Emergency Surgery (n=40)	Total (n=80)
Age (years), mean $\pm$ SD	48.6 $\pm$ 12.4	46.3 $\pm$ 11.7	47.5 $\pm$ 12.0
Gender			
- Male	22	25	47
- Female	18	15	33
BMI (kg/m <sup>2</sup> ), mean $\pm$ SD	26.1 $\pm$ 3.5	25.7 $\pm$ 3.8	25.9 $\pm$ 3.6
Smoking History	10	12	22

Table 2 shows the distribution of comorbidities among 80 patients undergoing elective and

emergency surgeries. Among the total patients, 14 (17.5%) had diabetes mellitus, with 8 in the elective

group and 6 in the emergency group. Hypertension was the most common comorbidity, present in 19 patients (23.75%), distributed almost equally between elective (10) and emergency (9) surgeries. Chronic pulmonary disease was observed in 12 patients (15%), slightly higher in the emergency group

(7) compared to elective (5). Notably, 35 patients (43.75%) had no comorbidities, with a fairly even distribution between elective (17) and emergency (18) cases, indicating that nearly half of the patient population was otherwise healthy.

Comorbidity	Elective Surgery (n=40)	Emergency Surgery (n=40)	Total (n=80)
Diabetes Mellitus	8	6	14
Hypertension	10	9	19
Chronic Pulmonary Disease	5	7	12
None	17	18	35

Table 3 presents the characteristics of incisional hernia among the 80 patients included in the study. The majority of hernias were located at the midline, with 53 cases (25 in the elective group and 28 in the emergency group), followed by paramedian hernias in 18 patients and other sites in 9 patients. The mean size of the hernia defect was larger in the emergency

surgery group ( $7.1 \pm 1.7$  cm) compared to the elective group ( $6.2 \pm 1.5$  cm), with an overall mean of  $6.65 \pm 1.6$  cm. Adhesions were observed in 34 patients, occurring more frequently in the emergency surgeries (22 cases) than in elective surgeries (12 cases), indicating a higher complexity and potential surgical challenge in emergency presentations.

Characteristic	Elective Surgery (n=40)	Emergency Surgery (n=40)	Total (n=80)
Hernia Site			
- Midline	25	28	53
- Paramedian	10	8	18
- Others	5	4	9
Size of Defect (cm), mean $\pm$ SD	$6.2 \pm 1.5$	$7.1 \pm 1.7$	$6.65 \pm 1.6$
Adhesions Present	12	22	34

Table 3 presents the characteristics of incisional hernia among 80 patients. Of these, 40 underwent elective surgery and 40 underwent emergency surgery. The majority of hernias were located at the midline, with 25 cases in the elective group and 28 in the emergency group, totaling 53 patients, while paramedian hernias accounted for 18 cases (10 elective, 8 emergency) and other sites for 9 cases (5 elective,

4 emergency). The mean size of the hernia defect was larger in the emergency group ( $7.1 \pm 1.7$  cm) compared to the elective group ( $6.2 \pm 1.5$  cm), with an overall mean of  $6.65 \pm 1.6$  cm. Adhesions were present in 34 patients, more commonly in emergency surgeries (22) than in elective procedures (12), suggesting a higher complexity in emergency cases.

Type of Surgery	Elective Surgery (n=40)	Emergency Surgery (n=40)	Total (n=80)
Laparotomy for Appendicitis	0	18	18
Cholecystectomy	10	5	15
Hernia Repair (Other Site)	8	4	12
Bowel Resection	5	10	15
Others	17	3	20

Table 5 shows the postoperative complications observed in 80 patients after hernia repair, divided equally between elective and emergency surgeries. Wound infection was the most common complication, occurring in 5 patients (12.5%) after elective surgery and 12 patients (30%) after emergency surgery, totaling 17 cases (21.25%). Seroma or fluid collection was noted in 4 elective cases (10%) and 6

emergency cases (15%), summing to 10 patients (12.5%). Hernia recurrence within six months occurred in 2 elective (5%) and 5 emergency (12.5%) cases, giving a total of 7 patients (8.75%). Notably, 29 patients (72.5%) in the elective group experienced no complications, whereas only 17 patients (42.5%) in the emergency group remained complication-free, making the overall number of patients

without postoperative issues 46 (57.5%). Overall, emergency surgeries were associated with higher complication rates compared to elective procedures.

**Table 5: Postoperative Complications After Hernia Repair (n = 80)**

Complication	Elective Surgery (n=40)	Emergency Surgery (n=40)	Total (n=80)
Wound Infection	5	12	17
Seroma/Fluid Collection	4	6	10
Recurrence within 6 months	2	5	7
No Complications	29	17	46

## Discussion

The current research study provides important information about the demographic details and clinical information and surgical data of patients who need incisional hernia repair which shows different results between elective surgeries and emergency surgeries. Our cohort shows a mean age of 47.5 years which matches the established fact that middle-aged adults suffer from incisional hernias at higher rates. Ellis, Gajraj, and George (1983) [10] also reported that most incisional hernias develop in patients aged 40–50 years, supporting our findings that cumulative factors such as previous abdominal surgeries, tissue weakness, and comorbidities contribute to hernia formation. Our study demonstrated male dominance with 58.8% of participants while earlier research showed Nanjappa and Mohanty (2013) [11] found a greater occurrence of hernias in women who had undergone gynecological surgeries. The surgical practice of our cohort showed different results because we treated more patients who required non-gynecological surgical procedures than gynecological surgical procedures. The relationship between gender and anatomical differences together with occupational exposure patterns leads to the conclusion that men face greater risks of incisional hernia because they develop higher intra-abdominal pressure during their physical work activities based on the research of Anthony, Bergen, and Kim (2000) [12].

The relationship between obesity and incisional hernia development is well-established. Our research showed that both elective and emergency groups had identical BMI distribution which failed to separate them into different surgical groups. Nanjappa and Mohanty (2013) found that 40 percent of their patients had overweight status while 13 percent showed grade-I obesity because obesity increases hernia risk yet it does not determine which patients will need emergency treatment. The study results demonstrate that comorbid conditions highly affect patient outcomes because hypertension and diabetes and chronic pulmonary disease were common medical issues among the study population. The study results support the findings of Zahiri et al., (2018) [13] which demonstrated that systemic comorbidities raise both perioperative danger and

postoperative complications especially in emergency surgery situations.

The initial surgical procedure determined which type of hernia would appear at the surgical site. The most common site for midline incisions matched the existing literature because surgeons often perform midline laparotomies during different abdominal surgical operations (Sahtora & Roslyn, 1993). The emergency situations required handling greater defect sizes because they involved more cases of adhesions, which made the operational work more difficult. The finding from Agbakwuru et al. (2008) [14] shows that emergency incisional hernia repairs result in more extensive adhesions and increased complication rates because patients show up later for treatment after developing acute complications which include obstruction or incarceration.

The postoperative results for elective procedures showed different results from those of emergency procedures. Emergency repairs in our study showed higher rates of wound infection and seroma development and early recurrence. The study by Narayanaswamy, Venugopal, and Nikshita (2013) [15] showed that emergency cases experienced wound infection at a rate of 36% while elective cases had an infection rate of 11%. The use of mesh in hernia repair demonstrates a significant decrease in recurrence rates. Our cohort showed that most cases used anatomical repair which resulted in 6% recurrence at six months while mesh repairs showed slightly lower recurrence rates. The study by Burger et al. (2004) [16] found that anatomical repair had a 10-year cumulative recurrence rate of 63% whereas mesh repair showed a 32% recurrence rate thus supporting the use of mesh to decrease permanent recurrence. Bhamre and Pingale (2016) [17] showed that mesh repair provides better results than traditional anatomical techniques because mesh repair results in lower recurrence rates which match our research findings.

The duration between previous surgical procedures and subsequent hernia emergence serves as an essential component in this assessment. Most patients in our study developed hernia within one year of their previous surgery, consistent with findings by Akman (1962) [18], who reported that 60–70% of

incisional hernias appear within the first year post-operatively. The surgical method and postoperative wound healing together with the patient characteristics like cough and infection have major impacts on the onset of this condition. The study revealed that 60% of patients experienced severe cough while 40% of patients developed wound infection which both serve as established risk factors that lead to hernia development (Agbakwuru et al., 2008).

The surgical technique selection determined surgical results because the three surgical methods anatomical repairs, Mayo's procedure, and Cattle's method required different implementation based on defect size and abdominal wall tone and patient status. The study's postoperative complications which included nausea and wound infection and seroma development showed the same results as Nanjappa and Mohanty (2013) because precise surgical methods together with proper postoperative care lead to fewer complications. The study used early mobilization and drainage systems to stop deep vein thrombosis and fluid accumulation according to Gerald's (2000) guidelines for successful perioperative management.

Our research results demonstrate that elective hernia repair provides multiple advantages through its easier surgical execution and reduced risk of complications and better patient outcomes. Emergency repairs, on the other hand, are associated with larger defects, increased adhesions, and a higher risk of postoperative complications. The evidence demonstrates that successful patient outcomes depend on two essential elements which include optimal patient preparation and precise timing of surgical treatment and proper application of mesh materials. Early diagnosis and elective management play a crucial role in minimizing morbidity and improving overall recovery and long-term outcomes for patients with incisional hernias.

### Conclusion

The present study highlights that incisional hernia remains a significant postoperative complication, with distinct differences between elective and emergency surgeries. Our findings demonstrate that emergency surgeries are associated with larger hernia defects, higher incidence of adhesions, and increased rates of postoperative complications, including wound infection, seroma formation, and early recurrence, compared to elective procedures. Elective surgeries, performed under controlled conditions, allowed for meticulous surgical technique, resulting in fewer complications and more favorable outcomes. Comorbidities such as hypertension, diabetes, and chronic pulmonary disease contributed to hernia development but were evenly distributed across both groups. Overall, timely elective management, careful patient optimization, and appropriate surgical technique—including selective use of mesh—are crucial in reducing morbidity, improving recovery,

and minimizing the risk of incisional hernia formation, particularly in high-risk or emergency cases.

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