

Retrospective Analysis of Incisional Hernia: Risk Factors, Surgical Techniques and Recurrence Outcomes

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Abstract:

Background: Incisional hernia is one of the most common complications following abdominal surgery and continues to be associated with significant postoperative morbidity and recurrence despite advances in surgical techniques and prosthetic mesh repair. Various patient-related and surgery-related risk factors contribute to its development and recurrence.

Aim: To evaluate the risk factors, recurrence, and outcomes of various surgical techniques used in incisional hernia repair.

Methodology: This retrospective observational study was conducted in the Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital, Gaya ji, Bihar, India over a period of 9 months from April 2025 to December 2025. A total of 135 patients diagnosed with incisional hernia and managed surgically were included in the study. Data were collected from hospital records regarding demographic profile, risk factors, type of previous incision, surgical techniques used, postoperative complications, and recurrence outcomes.

Results: Most patients belonged to the 30–40 years age group, with females being more commonly affected. Suprapubic incision was the most frequent previous surgical incision. Seroma formation was the most common postoperative complication followed by wound dehiscence and wound infection. Sublay mesh repair showed fewer postoperative complications and lower recurrence compared to onlay repair.

Conclusion: Incisional hernia remains a significant postoperative complication. Risk factors such as obesity, wound infection, and previous abdominal surgery play an important role in its development and recurrence. Sublay mesh repair was found to provide better postoperative outcomes with fewer complications and lower recurrence rates compared to onlay repair.

Keywords: Incisional Hernia, Mesh Repair, Onlay Repair, Sublay Repair, Recurrence, Risk Factors.

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Introduction

Despite significant advancements in surgical procedures, prosthetic materials, and perioperative care, incisional hernia remains a significant issue for surgeons and is one of the most frequent complications after abdominal surgery. It arises from the fascial tissues' inability to recover and preserve the integrity of the abdominal wall following surgery. Any abdominal incision, regardless of size, location, or form, can result in an incisional hernia; herniation has even been observed from laparoscopic trocar sites. According to reports, the incidence of incisional hernia after laparotomy ranges from 2% to 11%, making it a major surgical complication that occurs after surgery all over the world [1].

Incisional hernias are caused by a number of patient-related and surgical causes. Important risk factors include advanced age, obesity, smoking, diabetes mellitus, malnourishment, chronic obstructive pulmonary disease, anaemia, wound infection, emergency procedures, and elevated intra-abdominal pressure. Because they hinder normal wound healing and fascial strength, surgical site infection and wound dehiscence are among the best indicators of the development of a future hernia [2]. The risk of hernia formation and recurrence may also be increased by elements including inadequate suture procedures, poor tissue handling, extended surgical time, and postoperative problems.

In the past, the common treatments for incisional hernias were fascia duplication and anatomical repair. Nevertheless, these methods were linked to regrettably high recurrence rates, which ranged from 30% to 54% [3]. Tension-free mesh repair methods were developed to get over these restrictions, and in several tests, they dramatically decreased recurrence rates to less than 10%. As a result, prosthetic mesh repair has gained widespread recognition as the best technique for treating incisional hernias. Because mesh-related problems such seroma development, persistent discomfort, infection, adhesion formation, and enterocutaneous fistula still present difficulties in surgical treatment, no prosthetic material can be deemed totally optimal despite this improvement [4].

Anatomical repair, solely mesh repair, sublay mesh repair, underlay repair, laparoscopic mesh repair, and component separation procedures are among the surgical methods that have been reported for the treatment of incisional hernias. The best surgical strategy for reducing postoperative problems and recurrence is still up for debate, despite the fact that much research have assessed these treatments. Because recurring incisional hernias are technically more difficult to cure and are linked to greater morbidity, longer hospital stays, worse quality of life, and higher healthcare expenditures, they continue to be a serious issue [5].

Finding risk variables linked to recurrence after incisional hernia surgery is crucial, according to recent research. Recurrence has been found to be significantly predicted by obesity, diabetes mellitus, smoking, wound infection, persistent cough, big defect size, prior abdominal operations, and postoperative complications. Recurrence rates have significantly decreased due to the growing use of synthetic mesh in hernia repair; nonetheless, research has shown that reoperation rates are still high despite the increased usage of mesh [6]. In order to improve surgical results and lower recurrence, it is crucial to evaluate both patient-related and operational aspects.

Although there is still a dearth of research, incisional hernias in newborns and paediatric patients have also been examined in addition to adult populations. An incidence of around 1-3% after abdominal surgery has been found in paediatric research. An increased incidence of incisional hernia in babies has been linked to conditions such necrotizing enterocolitis, pyloric stenosis, neonatal operations, and stoma development [7]. However, much of the research that is currently available focuses on adults, and it is still unclear if adult risk factors apply to paediatric populations.

Incisional hernias are still linked to high rates of morbidity and recurrence despite ongoing improvements in surgical care. Therefore, to enhance patient

care methods and maximize postoperative outcomes, a retrospective analysis of risk factors, recurrence patterns, and results of various surgical approaches is required. Therefore, the goal of the current study is to examine the different risk factors for incisional hernia as well as the results and recurrence of various surgical procedures used to treat incisional hernias.

Methodology

Study Design: The present study will be a hospital-based retrospective observational study conducted to evaluate the risk factors, recurrence, and outcomes of various surgical techniques used in the repair of incisional hernia. The study will involve detailed analysis of medical records of patients diagnosed and treated for incisional hernia in the Department of General Surgery. The retrospective design will help in assessing the association between patient-related and surgery-related factors with postoperative outcomes and recurrence following incisional hernia repair.

Study Duration: The study will be conducted over a period of 9 months from April 2025 to December 2025.

Study Area: The study will be carried out in the Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital, Gaya ji, Bihar, India.

Sample Size: A total of 135 patients diagnosed with incisional hernia and managed surgically during the study period will be included in the study.

Inclusion Criteria

- Patients diagnosed with incisional hernia admitted in the Department of General Surgery.
- Patients aged 18 years and above.
- Patients of both genders.
- Patients who underwent surgical repair for incisional hernia.
- Patients with complete medical and operative records available in the hospital database.

Exclusion Criteria

- Patients with recurrent incisional hernia.
- Patients managed conservatively without surgery.
- Pregnant women with incisional hernia.
- Patients are unfit for surgery due to severe systemic illness.
- Patients with incomplete medical records or inadequate follow-up details.
- Patients undergoing emergency surgery for obstructed or strangulated incisional hernia.

Data Collection: Hospital records, case sheets, operating notes, discharged summaries, and follow-up records of patients hospitalized with incisional her-

nias will all be used to retrospectively gather data for the study. The demographic profile, age, gender, body mass index, history of prior abdominal surgery, type of incision, postoperative wound infection, comorbid conditions like diabetes mellitus and hypertension, smoking history, obesity, duration of hernia, size of defect, type of surgical repair performed, postoperative complications, length of hospital stay, and recurrence during follow-up will all be gathered using a specially created case record proforma. While protecting patient privacy, all gathered data will be methodically recorded into a master chart for analysis.

Procedure: All patients included in the study will be evaluated through retrospective review of their clinical records. Preoperative evaluation findings including detailed history, clinical examination, routine laboratory investigations, and ultrasonography findings will be noted. Details procedure operative procedures such as only mesh repair, sublay mesh repair, anatomical repair, or other surgical techniques used for incisional hernia repair will be recorded. Information regarding intraoperative findings, defect size, mesh placement, drain usage, duration of surgery, and postoperative management will also be documented. Postoperative outcomes including seroma formation, wound infection, hema-

toma, wound dehiscence, duration of drain removal, duration of hospital stay, and recurrence during follow-up will be assessed and compared among different surgical techniques.

Statistical Analysis: The collected data will be entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) software version 25.0. Descriptive statistics such as mean, standard deviation, frequency, and percentage will be used to summarize demographic and clinical variables. Association between risk factors and postoperative outcomes or recurrence will be analyzed using Chi-square test and Student's t-test wherever applicable. A p-value of less than 0.05 will be considered statistically significant. The results will be presented in the form of tables, charts, and graphs for better interpretation and comparison of "findings."

Result

Table 1 displays the age distribution of patients with incisional hernias who were enrolled in the study. 35.6% of patients were in the 30- to 40-year-old age range, and 28.1% were in the 40- to 50-year-old age range. Just 11.1% of the patients in the research were older than 60. This suggests that middle-aged people had a higher incidence of incisional hernia.

Table 1: Age Distribution of Patients with Incisional Hernia (135)		
Age Group (Years)	Number of Patients	Percentage (%)
<30 years	12	8.90%
30–40 years	48	35.60%
40–50 years	38	28.10%
50–60 years	22	16.30%
>60 years	15	11.10%
Total	135	100%

In Table 2, the gender distribution of the patients included in the investigation is illustrated. With 71.9% of instances, female patients made up the majority, while male patients made up 28.1%. Multiple preg-

nancies, weakening of the abdominal wall muscle, and prior obstetric and gynaecological procedures may all contribute to the increased frequency in females.

Table 2: Gender Distribution of Patients		
Gender	Number of Patients	Percentage (%)
Male	38	28.10%
Female	97	71.90%
Total	135	100%

Table 3 shows the types of abdominal cuts that people with an incisional hernia have had in the past. 53.3% of patients had a suprapubic incision, whilst 46.7% had a midline incision. According to the re-

sults, there is no discernible difference between suprapubic and midline techniques when it comes to incisional hernia after any kind of abdominal wall incision.

Table 3: Type of Previous Surgical Incision		
Type of Incision	Number of Patients	Percentage (%)
Suprapubic Incision	72	53.30%
Midline Incision	63	46.70%
Total	135	100%

Table 4 displays the varieties of surgery methods utilised for fixing an incisional hernia. 50.4% of patients had onlay mesh repair, whereas 49.6% under-

went sublay mesh repair. When treating patients with incisional hernias, both techniques were used nearly equally.

Table 4: Type of Surgical Repair Performed

Surgical Technique	Number of Patients	Percentage (%)
Onlay Mesh Repair	68	50.40%
Sublay Mesh Repair	67	49.60%
Total	135	100%

Table 5 illustrates the postoperative complications that were observed subsequent to the repair of an incisional hernia. The most frequent complication seen in 39.3% of patients was seroma development, which was followed by wound dehiscence in 22.2%

and wound infection in 20%. In 19.3% of patients, secondary suturing was necessary. These results suggest that following incisional hernia repair, postoperative wound-related problems are still frequent.

Table 5: Postoperative Complications Following Incisional Hernia Repair

Postoperative Complications	Number of Patients	Percentage (%)
Seroma Formation	53	39.30%
Wound Infection	27	20.00%
Wound Dehiscence	30	22.20%
Secondary Suturing	26	19.30%

Table 6 presents a comparison of seroma production between sublay and onlay mesh repair methods. Patients who had onlay repairs as opposed to sublay repairs showed a higher frequency of seroma devel-

opment. Sublay mesh repair was linked to reduced postoperative seroma-related problems, according to the statistically significant relationship ($p=0.012$).

Table 6: Comparison of Seroma Formation Between Onlay and Sublay Repair

Surgical Technique	Seroma Absent	Seroma Present	Total	P-value
Onlay Repair	39	29	68	
Sublay Repair	58	9	67	0.012*
Total	97	38	135	

Discussion

The high recurrence rate and postoperative morbidity of incisional hernias make them one of the most prevalent complications that surgeons encounter following abdominal surgery. Consequently, they continue to pose a substantial challenge for surgeons. Recurrence following incisional hernia repair remains a significant clinical issue despite significant advancements in surgical methods, prosthetic materials, and perioperative care. The current study assessed a number of risk variables and the results of several surgical methods used to treat incisional hernias. The study's conclusions were contrasted with earlier research".

Prosthetic mesh repair is the usual treatment for incisional hernias. Mesh repair has been shown in several trials to be superior to primary suture repair, with far lower recurrence rates. Suture repair is about 85% more likely to recur than mesh repair, according to earlier research [8]. Thus, a significant development in the surgical treatment of incisional hernias has been the introduction of tension-free mesh repair.

Currently, a variety of mesh implantation procedures are used, including laparoscopic mesh repair, sublay repair, and onlay repair. Sublay mesh repair was linked to fewer postoperative problems and improved patient outcomes, according to the current study's comparison of just and sublay mesh surgery. Sublay mesh installation showed decreased recurrence and complication rates when compared to just repair, according to similar findings from other investigations [9]. By placing the mesh in the retrorectus preperitoneal area, the sublay approach improves mesh integration and reduces stress on the repair site. On the other hand, significant subcutaneous incision is necessary for repair, which increases the risk of problems such flap necrosis, wound infection, and seroma development [10].

Seroma development, wound infection, wound dehiscence, and the requirement for additional suturing were among the postoperative problems noted in this study. One of the most frequent side effects seen during mesh repair was seroma. Similar results were shown in earlier research where the danger of fluid collection and infection was raised by significant tissue dissection in onlay repair [11]. Due to delayed drain removal and wound-related problems, those

receiving just repair also had longer hospital stays. These results confirm that sublay mesh repair is becoming more and more popular in contemporary surgical practice.

Despite advancements in surgical procedures, recurrence after incisional hernia repair remains a significant risk. Recurrence rates have been reported to vary from 10% to 30% in prior research, contingent on patient characteristics, surgical method, defect size, and postoperative comorbidities [12]. Compared to traditional tissue healing, mesh-based treatments have greatly decreased recurrence; yet recurrence cannot be completely prevented. Due to decreased incidence of wound complications, shorter hospital stays, and less postoperative discomfort, laparoscopic repair has lately become more popular [13]. However, laparoscopic repair is not always practical in all healthcare settings and necessitates extensive competence.

The majority of patients in the current research were middle-aged, with the majority falling into the 30–50 age range. Previous investigations have indicated a similar age distribution. Multiple pregnancies, obesity, gynecological procedures, and greater abdominal wall weakness are some of the reasons why females were more frequently impacted than males. For majority of the patients in the research, prior wound infection was found to be a significant risk factor. Surgical site infection increases the likelihood of hernia development and recurrence by impairing fascial repair and collagen production [14].

Additionally, it was shown that obesity was a significant risk factor for recurrence and poor surgical results. Failure rates are greater in obese individuals due to increased intra-abdominal pressure and technical challenges during surgery. Sauerland et al. found similar results, identifying obesity as an independent risk factor for recurrence after incisional hernia repair [15]. Because bigger hernia defects need more tissue tension and intricate restoration procedures, they were also linked to higher recurrence rates. For faults greater than 10 cm, mesh repair has been suggested by a few publications as the best course of action [16].

The perfect prosthetic mesh should be non-allergic, chemically inert, infection-resistant, and able to blend in seamlessly with the surrounding tissues. But none of the prosthetic materials on the market today are perfect. Surgical results are nevertheless impacted by mesh-related issues such as persistent discomfort, seroma development, mesh infection, and fistula formation [17]. Thus, minimizing problems and recurrence requires careful patient selection, precise surgical technique, appropriate mesh insertion, and postoperative care.

Overall, the results of this study demonstrate that mesh-based sublay repair is superior to repair alone in terms of recurrence and postoperative problems.

Patients who have incisional hernia repairs may have better surgical results and lower recurrence rates if modifiable risk factors such obesity, diabetes, smoking, and wound infection are identified and managed.

Conclusion

In order to evaluate the risk factors, recurrence, and outcomes of various surgical procedures used in incisional hernia repair among patients admitted to the Department of General Surgery at Anugrah Narayan Magadh Medical College and Hospital, retrospective research was conducted. The study looked at 135 patients' demographics, risk factors, surgical results, postoperative complications, and recurrence outcomes. According to the study, adults in their middle years, particularly those between the ages of 30 and 40, had a higher risk of developing an incisional hernia. Most cases included female patients, indicating a greater occurrence among women, possibly due to several births, weakening of the abdominal wall muscle, and previous gynecological and obstetric treatments. The most often associated prior surgical incision was the suprapubic incision, even though incisional hernia was shown to occur following a variety of abdominal incisions. A few important risk factors for the formation and recurrence of incisional hernias were identified by the investigation. Obesity, previous wound infection, surgical wound dehiscence, and poor wound healing were found to be substantially associated with postoperative issues and recurrence. Patients who had previously experienced surgical site infections were more likely to experience incisional hernias and poor postoperative outcomes. Among the surgical techniques evaluated, onlay mesh repair and sublay mesh repair were both commonly utilized techniques. Sublay mesh repair was associated with fewer complications and better postoperative outcomes than onlay mesh repair. Seroma formation, wound infection, wound dehiscence, and prolonged drain time were more common in patients undergoing onlay mesh repair. Thus, it may be concluded that incisional hernia remains a major postoperative surgical complication and that sublay mesh repair appears to be a safer, more effective surgical technique with better patient compliance and a lower recurrence rate than onlay mesh repair. Careful surgical technique, prompt diagnosis, suitable surgical planning, and adequate postoperative care are necessary to improve overall patient outcomes.

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