

A Clinical Perspective of Etiology and Outcomes of Incisional Hernia Repair: A Prospective Study at Tertiary Care Center

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Abstract

Background: This study investigates the etiology, surgical management, and short-term outcomes of incisional hernias in a series of 50 patients.

Methods: We prospectively studied on patient demographics, hernia appearances, and surgical details, including the use of mesh or anatomical repair. Consequences evaluated included complications and recurrence.

Results: Our series observed a strong female dominance over males. The most common site was the infraumbilical midline (54%), with 65% of hernias appearing within one year. The primary risk factors were wound infection and emergency surgery. We performed 37 mesh repairs and 13 anatomical repairs. Complications were limited to wound infection and gaping, with no recurrence or mortality during follow-up.

Conclusion: The high incidence of incisional hernia in females and its association with wound infection highlight the need for careful surgical practice. Our initial results recommend the use of mesh repair for durable outcomes.

Keywords: Incisional Hernia, Gynaecological Surgery, Mesh Repair, Complications, Onlay Mesh.

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Introduction

Incisional hernia has followed abdominal surgery like a shadow for more than a century now. Incisional hernia is the one true iatrogenic hernia. Ian Aird defines incisional hernia as a diffuse extrusion of peritoneum and abdominal contents through a weak scar of an operation or accidental wound

An incisional hernia is a type of ventral hernia that occurs through a previously made incision in the abdominal wall, typically at the site of a prior surgical operation. It is characterized by the abnormal protrusion of abdominal contents, such as intestines or omentum, through a weakened area in the musculofascial layer of the abdomen. These hernias may manifest weeks, months, or even years after surgery and represent one of the most common postoperative complications, with an incidence ranging from 2% to 11% [1,2,3].

Incisional hernias often develop due to a failure in the healing process of the surgical wound, particularly the closure of fascial layers. Several patient-related and surgical factors contribute to this complication, including advanced age, obesity, malnutrition, diabetes mellitus, smoking, poor wound healing, and infections [1,2]. Surgical

technique also plays a key role—use of inappropriate suture material, faulty closure techniques, or excessive tension on the wound can all increase the risk [2,3].

Clinically, patients may present with a visible bulge or swelling at or near the surgical scar, which becomes more prominent on coughing, straining, or standing. Symptoms may include discomfort or pain, and in severe cases, complications such as incarceration, obstruction, or strangulation can occur—posing significant risk to life [1,3].

Historically, incisional hernias have challenged surgeons due to their high recurrence rates. Early anatomical repair methods had recurrence rates as high as 30–50% [3]. However, the introduction of prosthetic mesh has significantly improved outcomes. Mesh-based "tension-free" repairs, whether through open or laparoscopic approaches, have lowered recurrence to 1.5–10% and are now considered the standard of care [3]. Among the various mesh placement techniques, the sublay method offers advantages such as reduced infection risk and better reinforcement of the abdominal wall [3]. As a result of high recurrence rate in the repair of incisional hernia, various types of repairs have

been used both anatomical and prosthetic. But the results have been disappointing with a high incidence of recurrence of about 30-50% after anatomical repair [4] and 1.5-10% following prosthetic mesh repairs [5].

The introduction of prosthetics has revolutionized hernia surgery with the concept of tension free repair. Although a wide variety of surgical procedures have been adopted for the repair of incisional hernia, but the implantation of prosthetic mesh remains the most efficient method of dealing with incisional hernia [6].

In summary, incisional hernia remains a significant surgical issue, particularly in the postoperative population. Effective prevention relies on meticulous surgical technique and risk factor management, while treatment hinges on timely diagnosis and modern mesh-based repair strategies

Aims and Objectives

This study aims to address the following objectives:

1. To analyze the etiological factors associated with the development of incisional hernia.
2. To evaluate and compare the various open operative techniques for incisional hernia repair.
3. To determine the efficacy and complications associated with the use of prosthetic mesh.
4. To assess patient-reported outcomes following various modalities of incisional hernia repair.

Methods and Materials

This study is a clinical observational study that examined a set of 50 patients who presented with and were diagnosed with an incisional hernia. Subsequently, the data described in this paper examines a number of clinical parameters; it includes a detailed description of the demographic characteristics of the patients, a thorough history of their previous surgeries, the mode and timing of hernia presentation, their systemic and local risk factors for the hernia, and a detailed accounting of the surgical management of the patients and immediate outcomes. While it is an observational study design, the findings in this real-world study provide rich observations on the clinical profile of patients living with an incisional hernia in this locale.

Results

In our series of 50 patients, a strong female preponderance for incisional hernia was observed. Females accounted for 41 cases (82%) compared to

males, who accounted for 9 cases (18%), resulting in a male-to-female ratio of 1:4.55. The age of the patients ranged from 20 to 69 years, with the highest incidence occurring in the 30-50 year age group. [Table no.1]

The most common location for incisional hernia was the infraumbilical midline incision, which was present in 27 cases. This was followed by the upper midline and right upper paramedian incisions. A majority of hernias manifested relatively early in the postoperative period. Specifically, 76% of patients developed a hernia within the first year of their previous surgery, 12% within 1 to 1.5 years, and 12% after 5 years.[Table no.1]

The incidence of incisional hernia was found to be slightly higher in patients who had undergone emergency surgery compared to elective procedures. A significant association was also observed between incisional hernia development and infected surgical wounds, which was the most important causative factor. Other contributing factors included anemia and malnutrition.

The most common preceding surgeries were gynaecological procedures, accounting for 54% of cases. The most frequent among these were tubectomy, followed by LSCS and hysterectomy. Gastrointestinal surgeries made up 42% of cases, including exploratory laparotomy for intestinal obstruction, DU perforation, and appendectomy.

The most common chief complaint was abdominal swelling, which was reported by 36 patients (72%). A combination of swelling and pain was reported by 11 patients (22%), while three patients presented with pain alone. The majority of hernias were reducible, with 47 patients presenting with a reducible swelling. Only three patients had an irreducible swelling, which upon exploration, showed signs of congestion and strangulation. [Table no.1]

Regarding defect size, 32 patients had a hernial defect measuring up to 20 sq. cm. Defects between 20-40 sq. cm were found in 12 patients, while only 6 patients had a defect larger than 40 sq. cm.[Table no.1] Various surgical techniques were employed, with the choice of operation determined by the size of the defect. Anatomical repair with Onlay meshplasty [Image no. 1] was performed in 22 patients, Inlay mesh repair in 15, and anatomical repair in 9, and double breasting of the rectus sheath in 4. Postoperative complications were rare, with wound infection occurring in only two patients who underwent mesh repair. No postoperative deaths were observed in this series.

Table 1: Patient Demographics and Hernia Characteristics

Characteristic	Category	Number of Patients	Percentage (%)	Additional Details
Sex Distribution	Male	9	18%	Male to female ratio is 1:4.55
	Female	41	82%	
Age Distribution	0-10 years	0	0%	Youngest patient: 20 years
	11-20 years	1	2%	Oldest patient: 69 years
	21-30 years	10	20%	Maximum incidence: 30-50 years
	31-40 years	13	26%	
	41-50 years	14	28%	
	51-60 years	8	16%	
	61-70 years	4	8%	
Time of Onset from Initial Operation	0-6 months	11	22%	76% developed within 1 year
	6-12 Months	27	54%	Peak incidence
	1-1 1/2 years	6	12%	
	5 years onwards	6	12%	
Mode of Presentation	Swelling	36	72%	
	Swelling and Pain	11	22%	
	Pain	3	6%	Chief complaint for these patients
Size of the Defect	Up to 20 Sq. cm.	32	64%	
	20-40 Sq. cm.	12	24%	
	40-60 Sq. cm.	6	12%	



Figure 1: Anatomical repair with Onlay meshplasty

Discussion

50 cases of incisional hernia admitted for treatment between January 2010 to June 2011 are presented in this dissertation. This study may not reflect all the aspects of incisional hernia, as the series is small and follow up has been for a short period in most of the cases.

Sex distributions according to age in various series: In our series females show little higher preponderance for incisional hernia i.e. 41/50 i.e. 82% and the male and female ratio is 1:4.55 which corresponds with Parekh series. This is due to fact that most of the female patients met with L.S.C.S. and tubectomy, as these procedures were carried out much hurriedly and improper suture materials is used without much attention to future occurrence of incisional hernia. Also, the muscle tone in case of females is not healthy as compared to males.

In a study of 383 patients, Ellis, Gajraj, and George [7] observed that 64.6% of incisional hernia cases occurred in females. Conversely, the studies by J.B. Shah [8] and Goel & Dubey [9] showed a more balanced male-to-female ratio (1:1.17&1:1.25), respectively, though with a female dominance

Incidence of incisional hernia in various series according to age: In their respective studies Ellis, Gajraj, and George [7] observed a mean patient age of 49.4 years, while Ekbote et al [10] observed that the highest incidence of incisional hernias was in the 41-50 years age group, which closely aligns with the age group from our own study. However, Shah et al [8] and Goel et al [9] found that the prevalence was more in the reproductive age group (30-40years) & (20-40 years), respectively.

Incidence of incisional hernia according to the type of incision in various series: Studies conducted by A.B. Thakore et al. observed the highest incidence of hernia (67.1%) in lower midline incisions, which is comparable to our study's findings (54%) while the least incidence occurred at McBurney's incision. A similar observation was reported by Goel and Dubey, who found an incidence of 44.6%. This may be attributed to the following reasons:

- The intra-abdominal hydrostatic pressure is higher in the lower abdomen than in the upper abdomen when a person is in an upright position (20 cm of water compared to 8 cm of water, respectively).
- There is an absence of a posterior rectus sheath below the arcuate line.
- This type of incision is often used in gynaecological surgeries, which are performed on patients who may have weaker abdominal wall muscles.

- These operations are often performed as emergencies or with urgency.
- The linea alba is less vascular.

Over 54% of the cases in our study occurred following gynaecological procedures such as hysterectomy, tubectomy, and Caesarean sections which are performed through lower midline incisions. Goel and Dubey [9] noted a 28.76% incidence of hernias following gynaecological procedures.

Time of onset of incisional hernia from initial operation: In our series, in 65% cases, first appearance of incisional hernia occurred within 6-12 months of initial operation, the predominance of this duration also observed by Ekbote et al in 50% cases [10]. This nearly coincides with the standard series but not completely. Millbourn [12] found that more than 50% of the incisional hernias occurred within 1 year after previous surgery and with the majority occurring within two years. The late occurrence of incisional hernia in obese patients, which is likely to be missed during the earlier examination but which later on manifest as a result of increased size of by a complication [13]. We also observed the higher incidence of incisional hernia in emergency operations, which can be attributed to several factors including a lack of time for ideal pre-operative preparation and a greater risk of wound contamination and infection which was also observed in a study by Malviya et al in which 57.78% of the patients developed an incisional hernia after undergoing an emergency surgery

Risk Factors for Incisional Hernia: In our study, wound infection was a significant risk factor, accounting for 50% of cases while other risk factors were obesity (12%) and COPD (6%). These findings are similar to a study by Bose et al [15], in which wound infection accounted for 53.63% (59 out of 110 patients), obesity for 30% (33 out of 110), and COPD for 20.90% (23 out of 110). Additionally, three patients in our series (6%) had undergone more than one previous operation, which is also a known risk factor, comparable to Ponka's series (25%) [16]. Repeated wounds in the same or parallel regions often succumbed to hernia development [17]. In our study, clinical examination revealed a wide range of hernial defect sizes. We found that 32 patients (64%) had defects up to 20 sq.cm, while six patients had defects larger than 40 sq. cm. Our findings align with the perspectives of surgical experts who emphasize that the defect size and fascial integrity are crucial for determining the optimal repair method. Both Thomas A. Santora [18] and Jack Abrahamson [19] advocate for mesh repair as an excellent choice for large ventral hernias, acknowledging its superiority for larger defects.

Surgical Techniques and Materials: We primarily utilized a polypropylene mesh and corresponding suture material for incisional hernia repair in our study. The choice of a specific technique was guided by several patient and defect-specific factors, including the size of the hernia, abdominal muscle tone, the ability to achieve a tension-free approximation, and the patient's overall health. Of the 50 patients, 37 underwent a polypropylene mesh repair, while the remaining 13 were treated with an anatomical repair.

Complications and Patient Outcomes: In our series, complications were limited to wound infection and wound gaping, both of which were observed in the mesh repair group. We experienced no postoperative deaths, and there has been no recurrence to date. None of our patients required perioperative blood transfusions, although three patients did require preoperative management to address skin infections and COPD. Our findings are similar to a study by Khaira et al., which reported seroma formation and wound infection in their mesh repair group [20].

Recurrence and Mesh Superiority: Although we observed no recurrences in our study, the variable and short follow-up period limits our ability to draw definitive conclusions. Our zero-percent recurrence rate aligns with the findings of Usher [21], who also reported a similar outcome in patients treated with polypropylene mesh. While our short-term results are promising, longer-term studies, such as that by Jacobus et al [22], demonstrate the clear advantage of mesh repair, with a 10-year cumulative recurrence rate of 32% compared to 63% for anatomical repair

The superiority of mesh repair is widely attributed to two primary factors. First, it enables a tension-free repair for defects of any size. Second, the prosthetic mesh, particularly polypropylene, stimulates a localized inflammatory response that serves as a scaffold for collagen synthesis, leading to a stronger and more durable repair than traditional suture methods. The consistent success of mesh repair underscores the importance of a thorough patient evaluation, meticulous surgical technique, and proper perioperative care in achieving long-term success.

Conclusion

The use of midline incision should be restricted to operations in which unlimited access to the abdominal cavity is necessary.

Meticulous aseptic technique and careful closure of the abdominal wound is necessary to prevent incisional hernia.

Proper preoperative of the patients with high risk is an important factor in preventing recurrence of incisional hernia.

Mesh repair results in less post-operative complications than anatomical repair for incisional hernia provided drains are used. Thus, if mesh-based repair techniques, which, when coupled with meticulous perioperative care, will yield an admirably low occurrence of post-operative complications.

Suggestions: More prospective, larger-scale cohort are need to investigate deeper into the specific mechanisms and nuances linking gynaecological operations to incisional hernia formation, potentially investigating comparative differences in fascial closure techniques, suture materials, or post-operative activity restrictions in this specific patient population.

Ethical clearance: This study was approved by the institutional ethical committee for dissertation topic for the partial fulfilment of MS General Surgery.

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