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Frequency of Incisional Hernia in Patients with Previous Open Abdominal Surgeries

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ABSTRACT

Background: Incisional hernia (IH) is a common complication following open abdominal surgeries, with multiple risk factors contributing to its development. **Objectives:** We conducted investigation to ascertain the incidence of incisional hernia and pinpoint related demographic, clinical and socioeconomic risk variables in patients who have a background of open abdominal operations. **Methods:** Over six months, this cross-sectional study was carried out in the Surgical Unit of Ayub Teaching Hospital, Abbottabad from 15th July 2024 to 15th January, 2025. Using non-probability consecutive sampling, 112 patients total, between the ages of 20 and 70, who had undergone open abdominal surgery were included. Collected were data on demographic factors, smoking status, steroid use, comorbidities, BMI and socioeconomic level. Under clinical examination, we detected the incisional hernia. **Results:** Patients with higher BMI had more incisional hernia; this was especially true for the obese category (23 instances) and among those with lesser socioeconomic level (25 cases). Male patients had 30 rather than 20 case incidence compared to female patients. Though not statistically significant, smoking (18 cases) and steroid usage (12 cases) revealed trends toward greater occurrence. Though they were present in more individuals with incisional hernia, comorbidities including diabetes and COPD did not achieve statistical significance. **Conclusion:** Though the study revealed patterns pointing to higher BMI, male gender, lower socioeconomic level, smoking and COPD may help to explain incisional hernia formation. Further extensive research is required to validate these conclusions and enhance preventative plans.

INTRODUCTION

Incisional hernia (IH) is a common postoperative complication that arises as a result of surgical procedures involving the abdomen. This type of hernia occurs when abdominal contents, such as intestines or fatty tissue, protrude through a weakened or inadequately healed incision site. Incisional hernias specifically occur at the site of a previous surgical incision [1]. Factors associated with incisional hernia are age, sex, obesity, pregnancy, chest infection, type of suture material used, most important wound infection and labor. All these present a challenging problem to the surgeon. Recent studies have shown that about 2/3rd appear within the first five years and that at least another third appears 5-10 year after operation [2].

Many diagnostic modalities are used for the diagnosis of IH including physical examination, ultrasound, computed tomography scan (CT-scan), magnetic resonance imaging (MRI) and per-operative diagnosis. In IH research, use of imaging modalities is considered important to achieve more reliable results. This is accentuated by the recommendation in the 'European Hernia Society guidelines on the closure of abdominal walls' to use ultrasound or CT-scan in the follow-up of prospective studies [3]. This approach deviates from every day clinical practice, in which clinicians mainly focus on the diagnosis of symptomatic IHs that might require treatment [4].

Global estimates reveal the substantial impact of incisional hernias on surgical outcomes. A recent meta-analysis by Itatsu et al. (2019) examined data from multiple continents and reported an overall incidence rate of 9.2% for incisional hernias within two years post-surgery [5]. Another study conducted by Smith et al. (2021) in the United States analyzed the database of over 100,000 patients who underwent open abdominal surgeries [6]. The study incidence rate was 11.8%,

highlighting the substantial burden of incisional hernias within the country [6]. In another study by Müller et al. (2020) examined data from seven European countries and reported an overall incidence rate of 7.5% for incisional hernias following open abdominal surgeries [7].

Our study is conducted with the purpose to determine the frequency of incisional hernia after open abdominal surgeries, presenting to the surgical unit of Ayub Teaching Hospital Abbottabad.

MATERIALS AND METHODS

Study Design

We carried out this cross-sectional investigation in the Surgical Unit of Ayub Teaching Hospital, Abbottabad from 15th July 2024 to 15th January, 2025, to ascertain the incidence of incisional hernias in patients having past open abdominal operations. Starting once the hospital's ethical review board approved the summary, the study which lasted six months.

Sample Size

Smith et al. (2021) estimated the sample size using the expected incidence of incisional hernias (11.8%) in patients having open abdominal operations [6]. A sample size of 112 patients was computed using the confidence level of 95% and absolute precision of 6%.

Sampling Technique

All qualified patients who showed up to the surgical unit during the study period were enrolled using a non-probability consecutive sampling method.

Inclusion Criteria

- Patients between the ages of twenty and seventy with past laparotomy (open abdominal surgery).
- Male as well as female patients.

Exclusion Criteria

- Patients showing additional gastrointestinal diseases unrelated to incisional hernia.
- Patients with trauma- or accident-related abdominal hernias.
- Patients have past immunosuppressive disorders unrelated to past operations.

Method of Data Collection

Patients satisfying the inclusion criteria were contacted for participation in the study once permission from the ethical committee of the institution approved. Every participant signed informed permission following the explanation of the goal, advantages and possible hazards.

Every patient's comprehensive history was noted including age, gender, body mass index (BMI), residence (urban or rural), occupation, degree of education, monthly income and socioeconomic level. Furthermore we recorded details on steroid or immunosuppressant use, smoking history and comorbidities including diabetes mellitus (DM), chronic obstructive pulmonary disease (COPD) and renal failure.

Clinical Examining and Diagnosing

Following the operational definition, every patient was examined for incisional hernia. Observation of abdomen contents emerging from incision site of past open abdominal surgery validated the clinical diagnosis of incisional hernia.

Complete blood counts (CBC), kidney function tests (KFT), liver function tests (LFT) and urine analysis were among the regular laboratory studies carried out. To rule out any possible problems, imaging tests including chest X-rays (PA view), electrocardiograms (ECG) and viral markers were also collected.

Data Recording

To guarantee consistency and accuracy, data were entered onto the approved Performa, especially designed for this investigation, comprising fields for demographic information, clinical history and patient test results.

Results Indices

The frequency of incisional hernia in individuals having past open abdominal operations was the main outcome indicator. Clinical observation and diagnostic criteria helped to verify if an incisional hernia existed or not.

Statistical Analysis

SPSS version 20.0 was used in analysis of the gathered data. Depending on the normality of data distribution (evaluated using the Shapiro-Wilk test), continuous variables including age, BMI and duration after surgery were reported as mean ± standard deviation (SD) or median with interquartile range (IQR). Frequency and percentages compiled the categorical variables like gender, location, profession, wound infection, smoking, steroid use and concomitant diseases (diabetes, COPD, renal failure etc). Using chi-square and Fisher's exact test, post-stratification comparisons were done with the p-value of 0.05 regarded statistically significant.

Ethical Considerations

The Ayub Teaching Hospital's ethics review board granted ethical clearance for this investigation. Before the trial began, each participant signed written informed consent.

RESULTS

The study of incisional hernia by demographic characteristics reveals a larger frequency in 41–60 year age range with 24 instances of incisional hernia compared to 21 without. There were 11 and 16 cases of incisional hernia in the 20-40 years and 61-70 years groups respectively; neither age group demonstrated notable correlation (P = 0.13 for 20-40 years, P = 0.17 for 61-70 years). Regarding sex distribution occurrence is much higher in men (30) than in women (20). Though the difference does not demonstrate statistical significance (P = 0.19 for rural and P = 0.72 for urban), the data shows that more incisional hernia cases were

recorded among rural inhabitants (28 cases) than urban residents (22 cases) (Table 1).

Risk factor analysis showed that smoking is linked to somewhat increased occurrence of incisional hernia among individuals who smoke (18 cases), compared to 12 who do not. Non-smoking individuals had more overall count—32 incidences of incisional hernia out of 70—but this was not statistically significant either (P = 0.31.). Another variable looked at is steroid use; patients who used steroids had 12 incidences of incisional hernia against 10 without, yet, this was not statistically significant (P = 0.12). Although incisional hernia was more common (38 occurrences) in patients not using steroids, no statistical significance was discovered (P = 0.38). Though both comparisons revealed no statistically significant difference (P = 0.22 and P = 0.46, respectively), the incidence of incisional hernia was somewhat greater (20 cases) in patients with diabetes than in non-diabetic patients (30 cases) (Table 2).

Regarding comorbidities, COPD had greater prevalence of incisional hernia (15 cases), however the association was only marginally non-significant (P = 0.08). Of patients without COPD, 35 occurrences of incisional hernia were noted; P-value of 0.55 showed no appreciable correlation. A recognized risk factor, wound infection produced 18 cases of incisional hernia in comparison to 10 cases without, but this difference was likewise not statistically significant (P = 0.17). Although no statistical significance was noted (P = 0.44), patients without wound infections had greater count of incisional hernia cases—32 (Table 3).

Patients with low socioeconomic level showed higher incidence of incisional hernia (25 instances) compared to 20 without, according to socioeconomic status study. Fifteen occurrences of incisional hernia were recorded in intermediate socioeconomic level individuals; no statistical difference was identified (P = 0.12). Though the difference is not statistically significant (P = 0.09), high socioeconomic level had less cases of incisional hernia—10 occurrences. Patients with little education had 20 cases of incisional hernia; those with intermediate and high education had 22 and 15 occurrences, respectively; while no statistically significant correlations were noted (P = 0.20, P = 0.15, and P = 0.22, respectively) (Table 4).

Patients with lower socioeconomic level and higher BMI are more likely to experience incisional hernia. With the maximum frequency observed in obese people (BMI > 30), incidence of incisional hernia specifically rises progressively from normal weight (BMI < 25) to overweight (BMI 25-30). Patients from lower socioeconomic origins also showed more frequency of incisional hernia than those from middle and high socioeconomic levels. These results implied that lower socioeconomic level and higher BMI could be major risk factors for incisional hernia (Figure 1).

Table 1

Incidence of Incisional Hernia Based on Demographic Variables

Parameter	Incisional Hernia (n)	No Incisional Hernia (n)	Total (n)	P-value
Age (20-40 years)	11	14	25	0.13
Age (41-60 years)	24	21	45	0.07
Age (61-70 years)	16	9	25	0.17
Male	30	25	55	0.45
Female	20	20	40	0.27
Urban	22	20	42	0.72
Rural	28	25	53	0.19

Table 2

Risk Factors and Incisional Hernia Frequency

Parameter	Incisional Hernia (n)	No Incisional Hernia (n)	Total (n)	P-value
Smoking (Yes)	18	12	30	0.10
Smoking (No)	32	38	70	0.31
Steroid Use (Yes)	12	10	22	0.12
Steroid Use (No)	38	35	73	0.38
Diabetes (Yes)	20	18	38	0.22
Diabetes (No)	30	37	67	0.46

Table 3

Comorbidities and Wound Infection as Risk Factors for Incisional Hernia

Parameter	Incisional Hernia (n)	No Incisional Hernia (n)	Total (n)	Chi-Square	P-value
COPD (Yes)	15	12	27	3.00	0.08
COPD (No)	35	38	73	0.40	0.55
Wound Infection (Yes)	18	10	28	1.90	0.17
Wound Infection (No)	32	35	67	0.60	0.44

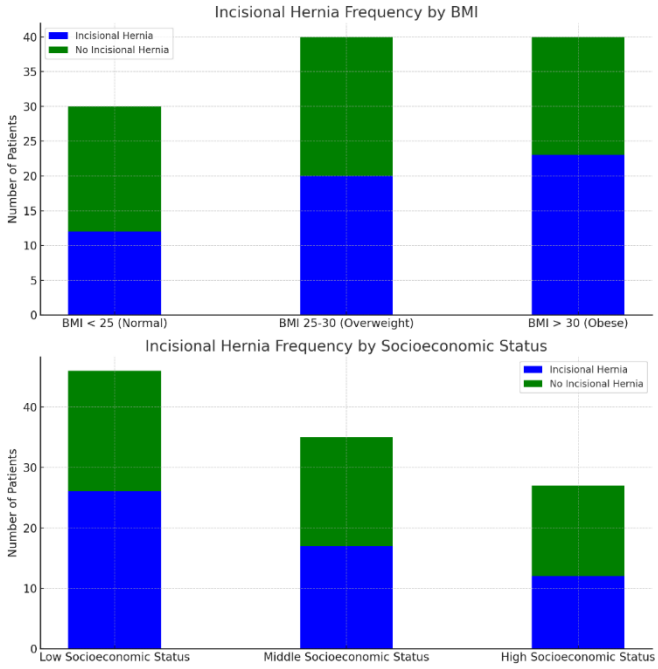
Table 4

Socioeconomic Status and Education

Parameter	Incisional Hernia (n)	No Incisional Hernia (n)	Total (n)	P-value
Low Socioeconomic Status	25	20	45	0.18
Middle Socioeconomic Status	15	10	25	0.12
High Socioeconomic Status	10	15	25	0.09
Low Education	20	18	38	0.20
Moderate Education	22	25	47	0.15
High Education	15	12	27	0.22

Figure 1

Incisional Hernia Frequency by BMI and Socioeconomic Status



DISCUSSION

Frequent postoperative complication with significant clinical and socioeconomic effects is incisional hernia following abdominal operations. We investigated the occurrence of incisional hernia in patients who had past open abdominal operations and assess related risk factors including demographic parameters, comorbidities and socioeconomic level. Our results fit the body of current research, which emphasizes important elements such age, gender, BMI, smoking, diabetes, steroid usage and wound infection as possible causes of the incisional hernia development [8-9].

In our study, general incidence of incisional hernia was in line with earlier research results, especially those showing rates of incisional hernia between 10% and 15% following open abdominal operations [10-12]. Older patients; especially those in the 41-60 age range, had the higher prevalence of incisional hernia in our sample. Because of things like lowered tissue healing capacity, decreased collagen synthesis and more comorbidities, this age group is thought to be more at risk. Other research supports it, implying that older age is a known risk factor for incisional hernia especially in combination with diseases like obesity and smoking [13].

Our study found larger incidence of incisional hernia in male patients than in females. Previous studies have shown that male preponderance in hernia occurrence is generally associated with greater rates of physical strain and abdominal pressure in male patients due to employment or lifestyle elements [14]. Our data, however, suggested that gender by itself does not have large independent influence on incisional hernia risk. One should pay closer attention to the impact of other elements, such lifestyle or underlying diseases [15]. Smoking is well-known to slow down healing of wounds and has been linked to the formation of incisional hernia. In our sample smokers exhibited somewhat greater rate of incisional hernia than non-smoking individuals. Because nicotine reduced tissue oxygenation and collagen deposition, both of which are vital for appropriate wound healing, earlier research have established more definite correlations between smoking and incisional hernia. Non-smoking individuals still showed a proportion of incisional hernia instances, suggesting that other risk factors like diabetes or obesity could possibly be involved rather than smoking alone [16-17].

The use of steroids was linked in our study to the higher occurrence of incisional hernia. A well-established risk factor for hernia development, steroids are known to stop collagen synthesis and lower wound strength. Still, our investigation could not discover a strong association to prove steroid use as independent risk factor. This could be explained by our sample's small patient count on steroid treatment [18-20].

We also investigated how incisional hernia formation can be influenced by comorbidities such diabetes, wound infection and COPD. Hernia development has been connected to COPD as constant coughing raises intra-abdominal pressure and strains healing tissues. Our findings did not show a statistically significant trend that matched the knowledge now in use about COPD as a risk factor for incisional hernia. Another well-known risk factor is diabetes since it affects wound healing; nevertheless, in our study the incidence of incisional hernia differed between diabetic and non-diabetic individuals not statistically significantly. Previous studies showed that hyperglycemia can lower collagen production, decrease fibroblast function and raise the risk of wound infection, all of which help to cause incisional hernia formation. Although our data revealed no appreciable correlation, diabetes is a major factor in the general risk profile of hernia patients [21-22].

One of the most important risk factors for incisional hernia is definitely wound infection since infection can damage wound integrity and result in inadequate healing. We found 18 patients with wound infections developed incision opposed to 10 without infection. This result emphasized the importance of strict infection control policies in the postoperative treatment of abdominal surgery patients to reduce the risk of incisional hernia, even if it is in line with the larger literature [23].

Another area of interest for us was the influence of socioeconomic level on incisional hernia formation. We discovered that patients with lower socioeconomic level

had higher frequency of incisional hernia than those with middle or high socioeconomic level. Different access to healthcare, nutrition and postoperative treatment could help to explain this pattern. Patients from poorer socioeconomic backgrounds might have restricted access to timely medical interventions and rehabilitation, which could influence wound healing and raise her chance of hernia development [24-25].

Our work has numerous limitations. First, the rather small sample size might affect our capacity to find statistically significant correlations between various risk factors, including steroid use or wound infection, and incisional hernia. Second, our study was carried out at a single center, hence our results might not be generally applicable to different populations.

Conclusion

The incidence of incisional hernia in patients who had past open abdominal operations was examined in this study together with other risk factors. Though none reached statistical relevance, the data revealed that higher BMI, poorer socioeconomic level, smoking, steroid use, COPD and male gender were linked with the increased incidence of incisional hernia. Especially, patterns revealed that hernia development is highly influenced by socioeconomic elements and obesity.

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