

A Prospective Study of Incisional Hernia with An Evaluation of Factors In Developing Post-Operative Complications

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Abstract: Incisional hernia is the most common long term complication associated with abdominal surgery. Repairing an incisional hernia is even more challenging to a surgeon as they tend to develop post operative complications such as wound infection and dehiscence quite easily which contributes to a dreadful event in the form of recurrence. Risk factors for incisional hernia formation and preventive strategies are not clearly defined. 37 patients who presented with incisional hernia were studied clinically and categorized according to various factors associated with it and the results obtained in each category were correlated and cross tabulated with a constant parameter in post operative complications by using fishers exact test and chi square test. P value <0.05 was considered to be significant. Predisposing factors (P value 0.006), associated diseases (P value 0.007), size of the defect (P value 0.004) and incisions used in previous surgeries (P value 0.036) showed a highly significant value in relation to developing postoperative complications. It was concluded that some factors included in this study are responsible in developing complications after an incisional hernia repair namely predisposing factors (wound infection, repeat surgeries), associated diseases(diabetes mellitus), size of the defect and incisions used for previous surgeries(midline laparotomy).

Keywords: Abdominal wall, postoperative complications, hernia, midline laparotomy, wound infection.

I. Introduction

The Incisional hernia, commonly termed as a postoperative ventral hernia, results due to failure of fascial tissues to heal following laparotomy and is regarded as one true iatrogenic hernia. It is defined as a diffuse extrusion of peritoneum and abdominal contents through a weak scar of an operation or accidental wound. The earliest detailed account about incisional hernia and its repair is credited to Celsus in the first century AD where his repair consisted of freshening of edges and utilizing them by sutures however no attempt to repair the defects were done till 19th century.^{1,2} As described by Ian Aird, it is the most common long term complication associated with abdominal surgery. In most cases it starts early after surgery because of failure of lines of closure in the abdominal wall. Any abdominal wall incision could subject the patient to a higher risk in developing incisional hernia although highest incidences were noted with transverse and midline incisions.³ Other incisions have also been mentioned in literature to have contributed in developing a post operative ventral hernia, namely McBurneys, paramedian, subcostal, pfannenstiel, flank incisions and laparoscopic port sites. There are numerous factors which are associated with incisional hernia like age, sex, obesity, chest infections, type of suture material used and most important wound infection⁴. As the approximated fascial tissue separates, the bowel and omentum herniates through the opening, which is covered by a peritoneal sac. These hernias can possibly increase in size to enormous proportions to giant ventral hernias which can hold a significant amount of small or large bowel as its contents and at the extreme end leads to loss of the abdominal domain, which occurs when the intra abdominal contents can no longer lie within the abdominal cavity and cites an important source of morbidity. A large proportion of patients with incarceration and strangulation require emergency surgery. Others may need to bring about lifestyle modifications, change or give up employment.

II. Methodology

A detailed history of 37 patients admitted to surgical ward of Justice K.S.Hegde Charitable Hospital, Deralkatte, Mangalore over a period of September 2014 to November 2016 for incisional hernia repair was taken pre-operatively after obtaining ethical committee approval. The age and sex of the patients, clinical presentation, site, size, duration of the swelling, pain and vomiting was noted. All patients were enquired about the history of cough, difficulty in micturition, chronic constipation and abdominal distension. Past history of previous operation were noted in detail and information especially the reason for operation, type of operation, whether emergency or elective, history regarding post-operative complications like wound infection, wound dehiscence, cough were asked for. History of hypertension, diabetes mellitus, chronic bronchitis etc. were noted. All patients were thoroughly examined and importance was given to the built of the patient, site and size of the scar, site and size of the swelling, presence or absence of impulse on coughing and reducibility. Predisposing factors at the time of repair such as obesity, respiratory diseases, general nutritional status and presence of other systemic illness were taken into account. The diagnosis was basically made by clinical skills and ultrasonogram of the abdomen. Routine investigations of blood, urine, X-ray chest, ECG were done to obtain fitness for surgery. In cases of diabetes and hypertension, suitable treatment was given to bring under control pre-operatively. The post-operative course and complications were noted in all patients. Factors predisposing to recurrence in post-operative period such as post-operative abdominal distension, wound infection, wound disruption, seroma, persistent cough, vomiting, urinary retention were documented. All 37 patients included in the study were called for personal follow-up over a period of 1 month, 3 months and 6 months after surgery.

This was an observational prospective study aimed at establishing the association of various factors such as ratios for sex, age incidence, mode of presentation, size of the defect, time of onset of hernia after previous surgery (TOHAPS),

predisposing factors, incisions used in previous surgeries, associated diseases, emergency vs. elective surgeries and post-operative complications in relation to all cases of incisional hernia. Furthermore the results obtained in each category were correlated and cross tabulated with a constant parameter in post operative complications and statistically analyzed by using fishers exact test and chi square test to evaluate the role of such factors contributing to the development of complications after an incisional hernia repair. P value <0.05 was considered to be significant.

III. Results

In this study of a total number of 37 cases were studied prospectively abiding with all the parameters mentioned previously. **Table 1** shows that incidence of incisional hernia is more common in females (27 cases 73.0%), than in males (10 cases, 27.0%).

Table 1: Distribution Of Patients According To Sex

| Frequency | Percent | |
|-----------|---------|-------|
| Female | 27 | 73.0 |
| Male | 10 | 27.0 |
| Total | 37 | 100.0 |

From **Table 2** its leant that the incidence of incisional hernia is maximum in the age group of 40-70 years (91.8%). In this study the youngest patient was 37 years and the oldest was 69 years.

Table 2: Age Incidence

| Frequency | Percent | |
|--------------|---------|-------|
| 40 and below | 3 | 8.1 |
| 41 - 50 | 14 | 37.8 |
| 51 - 60 | 10 | 27.0 |
| 61 - 70 | 10 | 27.0 |
| Total | 37 | 100.0 |

Table 3 shows 25 patients (67.6%) presented with only swelling, 9 patients (24.3%) presented with abdominal swelling and pain and 3 patients (8.1%) presented with pain abdomen alone as the chief complaint.

Table 3: Mode Of Presentation

| Mode of Presentation | Frequency | Percent | |
|----------------------|-----------|---------|--|
| Pain | 3 | 8.1 | |
| Swelling | 25 | 67.6 | |
| Swelling+Pain | 9 | 24.3 | |
| Total | 37 | 100.0 | |

Patients presented with larger defects more often through the course of the study(**Table 4**). Defects measuring over 4 cms stood out (81%).

TABLE 4:Size of the defect

| Size of the Defect | Frequency | Percent | |
|--------------------|-----------|---------|--|
| 1-4 | 7 | 18.9 | |
| >4-8 | 17 | 45.9 | |
| >8 | 13 | 35.1 | |
| Total | 37 | 100.0 | |

Table 5 shows 3 patients (8.1%) presented with incisional hernia within 3 months of the previous surgery, 6 patients (16.2%) within 3 months to one year of surgery and 8 patients (21.6%) within 1-3 years of surgery and 54% of them developed incisional hernia after 3 years of surgery.

Table 5: Time Of Onset Of Hernia After Previous Surgery

| Time of Onset of Henia After Previous Surgery (TOHAPS) | Frequency | Percent | |
|--|-----------|---------|--|
| 0-3 months | 3 | 8.1 | |
| 3 months-1 year | 6 | 16.2 | |
| 1 year-3 years | 8 | 21.6 | |
| >3years | 20 | 54.1 | |
| Total | 37 | 100.0 | |

Wound infection is the commonest predisposing factor(**Table 6**). Wound infection was present in 11 patients post operatively. The second most commonest risk factor was repeat surgeries in 8 patients.

Table 6: Predisposing Factors

| Predisposing Factors | Frequency | Percent | |
|----------------------|-----------|---------|--|
| Urinary Symptoms | 1 | 2.7 | |
| None | 14 | 37.8 | |
| Obesity | 4 | 10.8 | |
| Repeat Surgery | 3 | 8.1 | |

| | | |
|---------------------------------|----|-------|
| Repeat Surgery+Cough | 1 | 2.7 |
| Repeat Surgery+Cough+Obesity | 1 | 2.7 |
| Repeat Surgery+Obesity | 2 | 5.4 |
| Wound Infetion | 7 | 18.9 |
| Wound Infetion+Urinary Symptoms | 1 | 2.7 |
| Wound Infetion+Obesity | 2 | 5.4 |
| Wound Infetion+Repeat Surgery | 1 | 2.7 |
| Total | 37 | 100.0 |

Figure 1: Incisions used in previous surgeries

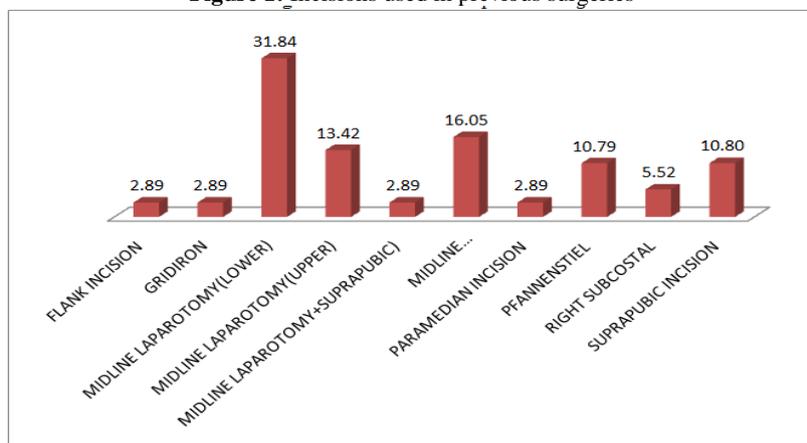


Figure 1 above shows patients who underwent a midline laparotomy were more prone to developing a post operative ventral hernia (24 patients), out of which the lower midline incision group had the highest number of patients.

Table 7 shows in patients who developed an incisional hernia the most commonly associated disease was systemic hypertension (5 patients) followed by diabetes mellitus (4 patients).

TABLE 7: Associated diseases

| Associated Diseases | Frequency | Percent |
|---------------------------------------|-----------|---------|
| Bronchial Asthma | 2 | 5.4 |
| Copd+Hypertension | 1 | 2.7 |
| Diabetes Mellitus | 4 | 10.8 |
| Hypertension | 5 | 13.5 |
| Hypertension+Diabetes Mellitus | 1 | 2.7 |
| Hypertension+Diabetes Mellitus+Asthma | 1 | 2.7 |
| Hypertension+Diabetes Mellitus+Copd | 1 | 2.7 |
| None | 25 | 67.6 |
| Total | 37 | 100.0 |

Majority of patients underwent elective surgery (36 patients) whereas only 1 patient underwent emergency surgery (Table 8).

Table 8: elective vs. Emergency

| Elective Vs. Emergency | Frequency | Percent |
|------------------------|-----------|---------|
| Elective | 36 | 97.3 |
| Emergency | 1 | 2.7 |
| Total | 37 | 100.0 |

Table 9 shows 9 patients developed postoperative complications whereas 28 patients did not develop complications post surgery. Wound infection was the most common complication.

Table 9: Post-Operative Complications

| Post Operative Complications | Frequency | Percent |
|--|-----------|---------|
| Death | 1 | 2.7 |
| None | 28 | 75.7 |
| Respiratory Complications | 2 | 5.4 |
| Respiratory Complications+Wound Dehiscence | 1 | 2.7 |
| Seroma | 1 | 2.7 |
| Wound Infection | 3 | 8.1 |
| Wound Infection+Respiratory Complications | 1 | 2.7 |
| Total | 37 | 100.0 |

The results obtained from all factors in this study were correlated and cross tabulated with a constant parameter in post operative complications using fishers exact test and chi square test to evaluate the role of such factors in relation to developing complications after surgery (Table 10).

Table 10: Final Crosstabulation Results(Sig=Significant;Hs=Highly Significant)

| Crosstabulation | Chi Square Test | | Fishers Exact Test | | |
|--|-----------------|------|--------------------|------|-----|
| | X2= | P= | | P= | |
| Age * post operative complication | . | . | | .177 | . |
| Sex * post operative complication | 1.829 | .176 | | | |
| Mode of presentation * post operative complication | . | | | .229 | |
| Predisposing factors * post operative complication | 7.239 | .007 | HS | | |
| Predisposing factors * post operative complication | . | | | .006 | HS |
| Associated diseases * post operative complication | 6.360 | .012 | Sig | | |
| Associated diseases * post operative complication | . | | | .007 | HS |
| Incisions used in previous surgeries * post operative complication | . | | | .036 | Sig |
| Emergency vs. Elective * post operative complication | . | | | .165 | |
| Size of defect * post operative complication | . | | | .004 | HS |
| Time of onset of hernia after previous surgery * post operative complication | . | | | .369 | |
| Time of onset of hernia after previous surgery * post operative complication | . | | | .221 | |

Predisposing factors shows a highly significant value in relation to developing postoperative complications with a P value of 0.006 on fishers exact test and a P value of 0.007 on Chi square test. Associated diseases also shows a significant value in relation to developing post operative complications with a P value of 0.007 with most patients presenting with diabetes mellitus and hypertension. Size of the defect was also found to be significant in developing post operative complications with a P value of 0.004. Incisions used in previous surgeries also shows significance in developing post operative complications with a P value of 0.036.

IV. Discussion

In this study of a total number of 37 cases it has been found that incidence of incisional hernia is more common in females (27 cases 73.0%), than males (10 cases, 27.0%) and the overall ratio for M:F is 1:3. The female preponderance in the occurrence of incisional hernia is probably due to laxity of abdominal wall due to repeated pregnancy and associated obesity which usually is associated with a higher incidence of post-operative infection.⁵ This data correlates with Regnad et al , in their study on incisional hernia found that the sex ratio of male to female was 1:5.⁶ Anemia, hypoproteinemia, lack of postoperative rest, early return to work are the other factors which give rise to an increased incidence of incisional hernia in female patients. It was also learnt that the incidence of incisional hernia is maximum in the age group of 40-70 years (91.8%). This is in agreement to Carlson et al who found that many patients with incisional hernia were between 25 and 90 years with mean age of 60.3 yrs.⁷ 25 patients (67.6%) presented with only swelling, 9 patients (24.3%) presented with abdominal swelling and pain and 3 patients (8.1%) presented with pain abdomen alone as the chief complaint. Swelling was visible on standing or exertion. The pain was intermittent colicky in nature. This is comparable to the

study of Bose who reported that most of his patients presented with abdominal swelling alone.⁸ Patients presented with larger defects through the course of the study. Defects measuring over 4cms stood out (81%). It can be said that longer incisions tend to be associated with infection. Infection can therefore be regarded as the most important risk factor for incisional hernia in this series. Wound infection is commonly cited as the most significant independent prognostic factor for incisional hernia.^{9,10,11} It can be concluded that wound infection is a predominant risk factor in the development of incisional hernia. Thus elimination of wound infection may lead to lowering of the incidence of incisional hernia. It is found that in this study 3 patients (8.1%) presented with incisional hernia within 3 months of the previous surgery, 6 patients (16.2%) within 3 months to one year of surgery and 8 patients (21.6%) within 1-3 years of surgery and 54% of them developed incisional hernia after 3 years of surgery. In a 10-year prospective trial involving 337 patients, Mudge and Hughes showed that of the 62 patients who developed an incisional hernia 56% did so after the first post-operative year and 35% manifested their hernia after 5 years which is not in agreement with the present study.¹² 64.9% of incisional hernias occurred in midline laparotomy scar showing a strong relation of developing hernias compared to the other incisions used previously. This is in agreement to a study conducted by Fassiadis N and Carlson MA where incisional hernias were more commonly associated with midline laparotomy incisions.^{13,14} All of the patients were followed up for a period of 6 months. The follow up period being very short, it is difficult to comment about recurrences. However one case showed recurrence within three months of surgery.

The results obtained after crosstabulation of postoperative complications with other parameters included in this study was done in an attempt to state the significance of various factors associated with incisional hernia in relation to developing complications postoperatively. Predisposing factors (wound infection, repeat surgeries) shows a highly significant value in relation to developing postoperative complications with a P value of 0.006 on fishers exact test; one of the predisposing factors being wound infection which is already a well established prognostic factor. Associated diseases also shows a significant value in relation to developing post operative complications with a P value of 0.007 with most patients presenting with diabetes mellitus and hypertension. Size of the defect was also found to be significant in developing post operative complications with a P value of 0.004. Incisions used in previous surgeries also shows significance in developing post operative complications with a P value of 0.036.

V. Conclusion

Incisional hernia still stands as a major obstacle for many surgeons till date even though surgery has evolved through the ages providing various techniques of abdominal closures. The mortality rate for incisional hernia surgery with adequate preoperative preparation, using modern anaesthetic agents and performed by an experienced surgeon should approach zero.¹⁵ Unfortunately, most incisional hernias post repair are prone to various post operative complications even after the most meticulous repairs. Hence, understanding the nature and history of a disease is very important. This study aims at analyzing the various factors that contribute to the development of an incisional hernia and also statistically analyzes various factors possibly contributing to post operative complications in the form of wound infection, dehiscence and which ultimately may result in a recurrence. After analysing the data in this study, it is understood that females are at a higher incidence of developing incisional hernias as compared to men. Incisional hernias occur more commonly after the fourth decade of life presenting more commonly as a painless swelling. Postoperative complications are influenced by various factors namely size of the defect, associated diseases, predisposing factors and incisions used in previous surgeries. This was an observational study with a limited sample size which aimed at serving as a pilot to assess and understand the constant difficulties associated with abdominal surgeries and their repair at a tertiary care institutional setting in India. Analyzing the risk factors and their contribution to developing post operative complications after an incisional hernia repair would help significantly in lowering the morbidity and repeated surgeries for the same condition.

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