

Short Term Incidence of Incisional Hernia after Emergency Midline Laparotomy

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ABSTRACT

BACKGROUND

Incisional hernia is defined by The European Hernia Society as "any abdominal wall gap with or without a bulge in the area of postoperative scar perceptible or palpable by clinical examination or imaging". Incisional hernia is the most frequent postoperative complication following general surgery. The cumulative incidence has remained constant despite several attempts to improve laparotomy closure. In addition to the surgical closure technique, individual biological and patient dependent risk factors play a key role.

METHODS

The present observational study was conducted in the Postgraduate Department of General Surgery, Government Medical College, Srinagar, at SMHS Hospital from August 2017 to March 2019 and included 120 patients. All patients were operated upon through a midline incision. The patients were divided into two groups. Group A included those patients who had peritonitis and Group B included those patients who had haemoperitoneum.

RESULTS

In our study it was found that wound infection developed in 19 patients in group A and 8 patients in group B. 11 patients in group A and 5 patients in group B developed wound hematoma. Wound dehiscence occurred in 5 patients in group A and 2 patients in group B. Re-exploration were needed in 1 patient in group A and 2 patients in Group B. Abdominal distention developed in 15 patients in group A and 9 patients in group B. Chest infection developed in 21 patients in group A and 11 patients in group B. At 1-year post-operative follow up, it was found that there was significant increase in incidence of incisional hernia in group A, i.e. 16.66% (10 patients) as compared to group B, i.e. 8.3% (5 patients) with p value of 0.025.

CONCLUSIONS

Midline laparotomy incision remains the best incision to assess and access the peritoneal cavity for emergency midline laparotomy with regard to septic or haemorrhagic peritonitis (generalized). Comorbidities increase the risk of developing incisional hernia, more so, in septic peritonitis than haemorrhagic peritonitis.

KEYWORDS

Hernia, Laparotomy, Peritonitis

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BACKGROUND

Incisional hernia is defined by The European Hernia Society as "any abdominal wall gap with or without a bulge in the area of postoperative scar perceptible or palpable by clinical examination or imaging".¹ Incisional hernia is the most frequent postoperative complication following general surgery. The cumulative incidence has remained constant despite several attempts to improve laparotomy closure. In addition to the surgical closure technique individual biological and patient dependent risk factor play a key role.² Literature searches reveal post laparotomy incisional hernia rate of 4-18% in series with follow up of 1-5 years³ with over 75% of these occurring within two years of initial surgery⁴ and 90% of incisional hernia occur during the first 3 years of surgery.⁵ Incisional hernias develop more commonly following midline incision than other incision sites.⁶ The rate of incisional hernia increased significantly from 12.6% at 1 year to 22.4% at 3 years after midline laparotomy.⁷ The development of incisional hernia is multifactorial and influenced by the patient-related factors, nature of primary surgery and biological factors.

We wanted to observe the short-term occurrence of incisional hernia in patients who undergo emergency midline laparotomy.

METHODS

After obtaining the ethical clearance from the Institutional Ethical Committee of Govt. Medical College Srinagar, the present observational study was conducted in the Postgraduate Department of General Surgery, Government Medical College Srinagar at SMHS Hospital from August 2017 to March 2019 and included 120 patients. A detailed clinical history was taken and patients were clinically examined in detail. After history and examination and all baseline investigations were done. All patients, both male and female, ≥20 years of age who underwent emergency midline laparotomy were included in the study.

Exclusion Criteria

1. Age <20 years.
2. Previous midline laparotomy.
3. Presence of mesh in abdominal wall in midline from previous surgery.
4. Pregnant females.
5. Patients on immunosuppressant/steroid therapy.
6. Elective patients undergoing laparotomy.

All the patients were operated upon through a midline incision. The patients were divided into two groups. Group A included those patients who had peritonitis and Group B included those patients who had haemoperitoneum. The following details were noted-

1. Age of patient
2. Sex of patient
3. Any comorbidity associated

4. Material used for closure of incision
 - a. Absorbable
 - b. Non-absorbable
5. Type of closure
 - a. Mass closure
 - b. Layered closure
6. Methods
 - a. Continuous sutures
 - b. Interrupted sutures
7. Postoperative wound complication, if any
 - a. Seroma
 - b. Hematoma
 - c. Superficial wound infection
 - d. Wound dehiscence
 - e. Enterocutaneous fistula
8. Other postoperative complications
 - a. Abdominal distension
 - b. Respiratory complications

Post-Operative Follow Up

Patients were followed up for a period of 2 years. The follow up was done on OPD basis at an interval of 3 months for a period of first 6 months and then every 6 monthly for next one and a half years. In some patients USG and CT scan were used to make the diagnosis, especially in patients in whom the diagnosis was clinically doubtful. Presence of incisional hernia was diagnosed both clinically and radiologically as under:

1. Presence of swelling / palpable defect at incisional site.
2. Reducibility of swelling / incarceration.
3. Cough impulse
4. Contents

RESULTS

The study population consisted a total of 120 patients divided into two groups (A & B), each having 60 patients. Group A had 48 males and 12 females whilst Group B had 45 males and 15 females (Table 1). The mean age of total study population was 34.04, while as the mean age in group A (septic peritonitis) was 40.03, and mean age in group B (haemorrhagic peritonitis) was 29.53, The age distribution shows that maximum patients in group A belonged to age group (31-40) years followed by age group (41-50) years. Similarly, in group B most patients belonged to age group (41-50) years followed by age group (21-30) years (Table 2).

Gender	Group A	Group B
Male	48 (80%)	45 (75%)
Female	12 (20%)	15 (25%)
Total	60	60

Table 1. Gender Distribution

Age (years)	Group A	Group B	Total
20-30	9 (15%)	14 (23%)	23
31-40	18 (30%)	9 (15%)	27
41-50	15 (25%)	22 (37%)	37
51-60	12 (20%)	6 (10%)	18
61-70	6 (10%)	9 (15%)	15

Table 2. Age Distribution

Pre-Existing Risk Factors

(A) Body Mass index: In our study of 120 patients we found that the number of patients who developed incisional hernia with BMI ≥ 25 in group A and B were 8 and 3 respectively and those with BMI < 25 were 2 in group A and 2 in group B. The difference was statistically significant with a p value of 0.003 (Table 3).

BMI	Group A	Group B	p Value
≥ 25	8	3	0.003
< 25	2	2	
Total	10	5	

Table 3. Relation of BMI with Development of Incisional Hernia

(B) Diabetes: In our study of 120 patients it was found that 6 patients in group A and 8 patients in group B were having diabetes, whereas 54 patients in group A and 52 patients in group B were non-diabetics (Table 4). When Diabetes was analyzed for the development of incisional hernia at 1 year follow up it was found that among 10 patients in group A and 5 patients in group B who developed incisional hernia, diabetes was present in 6 patients in group A and 2 patients in group B, where as 4 patients in group A and 3 patients in group B who developed incisional hernia were non-diabetic (Table 5).

	Group A	Group B	Total
Diabetic	6	8	14
Non-Diabetic	54	52	104
Total	60	60	120

Table 4. Diabetes Status in the Studied Subjects

	Total No. of Patients	Incisional Hernia		p Value
		Group A	Group B	
Diabetic	14	6	2	0.05
Non-Diabetic	106	4	3	
Total	120	10	5	

Table 5. Association of Diabetes with the Development of Incisional Hernia

(C) Levels of Serum Albumin in Group A: Out of 60 patients of Group A, it was found that 10 patients developed incisional hernia at 1 year followup. Out of these 10 patients, 7 patients were having serum albumin < 3 , where as 3 patients were having serum albumin ≥ 3 (Table 6).

Serum Albumin Levels	No. of Patients	Percentage
< 3	7	70.0
≥ 3	3	30.0
Total	10	100.0

Table 6. Association of Serum Albumin with Development of Incisional Hernia in Group A Patients

(D) Levels of Serum Albumin in Group B: Out of 60 patients of Group B, it was found that 5 patients developed incisional hernia at 1 year followup. Out of these 5 patients, 4 patients were having serum albumin < 3 , where as 1 patient were had serum albumin ≥ 3 (Table 7).

Serum Albumin Levels	No. of Patients	Percentage
< 3	4	80.0
≥ 3	1	20.0
Total	5	100.0

Table 7. Level of Serum Albumin in Group B

(E) Smoking: In our study of 120 patients 38 patients in group A and 27 patients in group B were smokers, whereas 22 patients in group A and 33 patients in group B were non-smokers (Table 8). In our study of 120 patients it was found that 10 patients in group A and 5 patients in group B developed incisional hernia at one year follow up. Out of the 10 patients of group A, 7 patients were smokers whereas 3 patients were non-smokers. In group B, out of 5 patients, 3 patients were smokers and 2 were non-smokers. In our study it was found that smoking is a significant risk factor for development of incisional hernia with a p value 0.05 (Table 9).

Smoking Status	Group A		Group B	
	No.	%	No.	%
Yes	38	63	27	43
No	22	37	33	57

Table 8. Smoking Status in Study Subjects

Smoking Status	Group A	Group B	p Value
Smokers	7	3	0.05
Non-Smokers	3	2	
Total	10	5	

Table 9. Association of Smoking with the Development of Incisional Hernia

Postoperative Complications		Group A	Group B	p Value
Wound Infection	Yes	19	8	0.035
	No	41	52	
Wound Haematoma	Yes	11	5	0.02
	No	49	55	
Wound Dehiscence	Yes	5	2	0.08
	No	55	58	
Re-exploration	Yes	1	2	0.054
	No	59	58	
Abdominal Distension	Yes	15	9	0.11
	No	45	51	
Chest Infection	Yes	21	11	0.01
	No	39	49	

Table 10. Postoperative Complications

Post-Operative Complications

In our study it was found that wound infection developed in 19 patients in group A and 8 patients in group B. 11 patients in group A and 5 patients in group B developed wound hematoma. Wound dehiscence occurred in 5 patients in group A and 2 patients in group B. Re-exploration were needed in 1 patient in group A and 2 patients in Group B. Abdominal distention developed in 15 patients in group A and 9 patients in group B. Chest infection developed in 21 patients in group A and 11 patients in group B (Table 10).

Incidence of Incisional Hernia on Follow Up

In our study it was found that at 6 months post-operative follow up incidence of incisional hernia in group A was 11.66% (7 patients) as compared to 5% (3 patients) in group B diagnosed with clinical method and radiological investigations. Similarly at 1 year post-operative follow up it was found that there was significant increase in incidence of incisional hernia in group A, i.e. 16.66% (10 patients) as compared to group B, i.e. 8.3% (5 patients) with P value of 0.025 (Table 11)

Follow Up	Group A	Group B	p-Value
At 6 months	7 (11.66%)	3 (5%)	0.035
At 1 year	10 (16.66%)	5 (8.3%)	

Table 11. Incidence of Incisional Hernia on Follow up

DISCUSSION

Incisional hernia remains the most frequent long term complication in visceral surgery after midline laparotomy, often requiring re-operation for repairing. The cause of incisional hernia is multifactorial and influenced by patient related and technical factors. Patient related factors include wound infection, obesity, diabetes mellitus, steroid, smoking etc. Technical factors however are directly controllable and amenable to action by the surgeon. This study was performed to determine the rate of development of incisional hernia after emergency midline laparotomy and to evaluate the prevalence of postoperative complications among the studied group.

The 120 patients included in our study were divided into two groups. Group A patients with septic peritonitis and Group B patients with haemoperitoneum, who underwent emergency midline laparotomy. It was found that out of 60 patients of Group A, 48 (80%) patients were males and 12 (20%) patients were females. While as out of the 60 patients of Group B, 45 patients (75%) were males and 15 (25%) patients were females. Our observations are supported by Saleem AA et al (2016)⁸ his study in which they found that 64 males and 16 females among 80 patients in septic peritonitis whereas 60 males and 20 females among 80 patients in haemoperitoneum.

The mean age of total study population was 34.04 years, while as the mean age in group A (septic peritonitis) was 40.03 years, and mean age in group B (haemoperitoneum) was 29.53 years. In our study maximum patients in group A belonged to age group (31-40 years) followed by age group (41-50 years). Similarly in group B most patients belonged to age group (41-50 years) followed by age group (21-30 years). Similar observations were made by Saleem AA et al (2016)⁸ who found mean age of 39.14 years in group A patients and 29.83 years in group B which is comparable with our study.

In our study of 120 patients, 10 patients in group A and 5 patients in Group B developed incisional hernia at one year follow up. Out of 10 incisional hernia patients of Group A, 8 patients had BMI levels of ≥ 25 and out of the 5 incisional hernia patients in Group B, 3 patients had BMI levels of > 25 . Our findings are comparable and supported by the study conducted by Sugerman HJ et al (1996)⁹ who enrolled a total of 968 patients. In their study, 198 (20%) patients developed incisional hernia on follow up and 60% of these patients were having obesity with body mass index of > 30 Kg/m².

On analyzing the relationship of diabetes with the development of incisional hernia we observed that out of the 10 patients of incisional hernia in Group A, 6 patients were diabetic whereas out of the 5 patients of incisional hernia in group B, 2 patients were diabetic.

Similar observation was made by Hoer J et al (2002)³ who enrolled a total of 2983 patients in a retrospective study over a 10 year period. They found that the incidence of incisional hernia for a period of 10 year follow up was 18.7%. In their study anaemia (Hb < 10 mg/dL), BMI (≥ 25 Kg/m²)

and diabetes mellitus were the significant risk factors for the development of incisional hernia.

In our study, out of the 10 patients of incisional hernia in Group A, 7 patients were having serum albumin < 3 , whereas 3 patients were having serum albumin ≥ 3 . In group B, 5 patients developed incisional hernia at one year follow up, out of these 5 patients 4 patients were having serum albumin < 3 , whereas 1 patient was having serum albumin ≥ 3 . Serum albumin was found to be a significant risk factor for the development of incisional hernia with a significant p value of 0.002. Similar findings were reported by Jargon D et al (2008).¹⁰ In their study they found that serum albumin is the major risk factor for development of incisional hernia.

In our study of 120 patients it was found that 10 patients in group A and 5 patients in group B developed incisional hernia at one year follow up. Out of 10 patients of group A, 7 were smoker whereas 3 patients were non-smokers. In group B, 5 patients developed incisional hernia at one year follow up, out of these 5 patients, 3 patients were smokers and 2 were non-smokers. In our study it was found that smoking is a significant risk factor with a p value 0.05. Similar observations were made by Sorensen LT et al (2012)¹¹ who found smoking as a major risk factor for the development of incisional hernia. In their study sample of 916 patients only 310 patients completed one year follow up. Out of these 310 patients, 81 (25.80%) patients developed incisional hernia. Of these 81 patients with incisional hernia 62 (74%) were smokers.

In our study it was found that wound infection was a major complication noted in both the groups and there was significant increase in the incidence of wound infection in group A compared to group B ($p=0.02$) which supports the findings of Israelsson LA et al (1998).¹² In their study, wound infection was found to be a major risk factor for development of incisional hernia post midline laparotomy. Besides wound infection other complications noted in our study where wound hematoma, wound dehiscence, re-exploration, chest infection and abdominal distention and it was found that these complications were more in group A patients compared to group B patients which supports the findings of Waldhausen JH et al (2000)¹³ as they found in their study that postoperative abdominal wound dehiscence was higher in patients undergoing emergency laparotomies with septic peritonitis.

In our study, at 6 months postoperative follow up the incidence of incisional hernia in group A was 11.66% (7 patients) as compared to group B, 5% (3 patients) diagnosed with clinical method and by radiological investigation. Similarly at one year postoperative follow up it was found that there was significant increase in incidence of incisional hernia in group A, i.e. 16.66% (10 patients) as compared to group B, i.e. 8.3% (5 patients) with P value of 0.025. In our study, overall incidence of incisional hernia after midline laparotomy was 8.3% at 6 months and 12.5% at one year follow up for all the studied patients. Our observations are comparable and supported by the study conducted by Saleem AA et al (2016)⁸ in their study of 160 patients. Incidence of incisional hernia in their study was

7.5% at 6 months and 17.5% at one year follow up. Incisional hernia was significantly increased in Group A (septic peritonitis) patients than in Group B (Hemoperitoneum) patients (12.5% versus 2.5%) at 6 months, and, (25% versus 10%) at one year follow up. Similar observations were also made by Fink C et al (2014),⁷ In their study the rate of incisional hernia was higher in septic peritonitis patients who underwent midline laparotomy. The rate of hernia was higher at one year and three year follow up as compared to six months follow up.

CONCLUSIONS

Midline laparotomy incision remains the best incision to assess and access the peritoneal cavity for emergency midline laparotomy with regard to septic or haemorrhagic peritonitis (generalized). Comorbidities increase the risk of developing incisional hernia, more so, in septic peritonitis than haemorrhagic peritonitis.

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