# **Original Research Article**

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# Post-operative wound complications following emergency and elective abdominal surgeries

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#### **ABSTRACT**

**Background:** The post-operative wound complications can be defined as any negative outcome as perceived either by the surgeon or by the patient. Objectives were to study the early and late post-operative wound complication of patients undergoing emergency and elective abdominal surgery, to find out and compare the incidence of post-operative wound complications following emergency and elective abdominal surgery and to find out and compare the factors associated with wound complications following elective and emergency abdominal surgery.

**Methods:** The study was conducted at Dr. D. Y. Patil Medical College and Hospital, DPU University, for a period of 2 years (from July 2015-September 2017) and is a prospective type of study using 100 cases (Group A: Elective and Group B: Emergency abdominal surgeries –50 each). The study was approved by the Institute's Ethics Committee.

**Results:** 100 patients were operated in our study. The type of collection from surgical site was seropurulent in 4 (8%) patients and purulent in 1 (2%) patient of Group A whereas it was seropurulent in 5 (10%) patients and purulent in 1 (2%) patient of Group B. The type of collection in Closed Suction Drain was Serous in 12 (24%) patients, Serosanguineous in 10 (20%) patients and Seropurulent in 1 (2%) patient of Group A whereas it was Serous in 13 (26%) patients, Serosanguineous in 10 (20%) patients and Seropurulent in 1 (2%) patient of Group B. The post-operative hospital stay for majority of the patients in Group A was  $\leq$ 10 days (82%) while it was 11-14 days for Group B (54%).

**Conclusions:** Possible complications following elective surgery and those following urgent/emergency surgery, a debatable issue was the possibility of significant differences between them. The emergency laparotomies are also more common than elective laparotomies especially at peripheral centers. These findings suggest that wound complications do occur in elective abdominal surgeries. These can be reduced to a certain extent by careful case selection, improving Hb levels prior to surgery, using adequate prophylaxis and better surgical practices.

Keywords: Elective abdominal surgery, Emergency abdominal surgery, Surgical practices, Wound complications

### INTRODUCTION

The post-operative wound complications can be defined as any negative outcome as perceived either by the surgeon or by the patient.<sup>1</sup> These complications can be encountered after any surgery, but the key to success is the early detection and the prompt management. Surgical

site infections and wound and tissue dehiscence are well-known postoperative complications in abdominal surgery. The severity of these complications embraces mild cases needing local wound care and antibiotics to serious cases with multiple reoperations and a high mortality rate. In most cases, such complications prolong hospitalization, with a substantial increase in cost of care.

In general, complications can be divided into intraoperative and postoperative complications. Occurrence of intraoperative complications such as bleeding, bowel injury, urethral lesions and bladder injuries are caused by intra-abdominal adhesions, anatomic problems, the experience of the surgeon and many other factors. Major postoperative complications include wound infection, anastomotic leakage, ileus and bleeding.<sup>2</sup>

The goal of an operative procedure is an early and complication free recovery. Post-operative pain, nausea, vomiting is common, but some patients develop short and long-term complications like fever, wound infection, wound dehiscence, anastomosis disruption, adhesive bowel obstruction, incisional hernia, etc. Such complications are more frequently seen after emergency surgeries, but they do occur in elective procedures also, which is a matter of concern.<sup>3,4</sup>

Traditionally, local factors such as the degree of contamination and the surgical technique have been regarded as strong predictors for surgical site infection and wound dehiscence.<sup>5</sup> More recent studies, however, have disregarded the significance of surgical technique, and others have identified systemic factors such as high age, gender, lifestyle, and coexisting morbidity as playing a significant role in the pathogenesis of these complications.<sup>6</sup>

Factors like site of surgery, size and depth of incision, antibiotic prophylaxis, instruments and suture material being used, wound closure technique, patient related factors like comorbidities and life style habits like smoking, have significant effect on occurrence of such events.<sup>7,8</sup>

Despite these activities, SSI remains a substantial cause of morbidity and mortality among hospitalized patients. This may be partially explained by the emergence of antimicrobial-resistant pathogens and the increased number of surgical patients who are elderly and/or have a wide variety of chronic, debilitating, or immune-compromising underlying disease.<sup>9</sup>

Hence the present study was done in our tertiary care centre to determine the incidence of post-operative wound complications in the abdominal surgeries and to identify risk factors associated with development of infection following emergency and elective abdominal surgery.

#### **METHODS**

The study was conducted at Dr. D. Y. Patil Medical College and Hospital, DPU University, for a period of 2 years (from July 2015-September 2017) and is a prospective type of study using 100 cases (Group A: Emergency and Group B: Elective (abdominal surgeries)

- 50 each). The study was approved by the Institute's Ethics Committee.

#### Selection criteria

- All patients aged 18 to 65 years for abdominal surgery under general anesthesia.
- Emergency surgeries open appendicectomy, Exploratory laparotomy
- Elective abdominal surgeries- Interval appendicectomy, open cholecystectomy, Exploratory laparotomy.

#### Exclusion criteria

Laparoscopic surgeries.

#### Method of collection of data

A detailed history of each patient will be obtained starting with history of presenting complaint. A thorough general physical examination will be done. All routine laboratory tests will be done which are as follows:

## Plan of study

All cases will undergo elective and emergency abdominal surgeries. All procedures will be done under General /Spinal anaesthesia.

## Preoperative preparations

Informed and written consent will be obtained. Shaving of parts on the morning of surgery with clipper will be done. Patient will be kept nil by mouth after 10 pm on previous night of surgery. Xylocaine sensitivity test will be done.

#### Peri-operative preparation

All cases will be operated under General or Spinal anaesthesia. Injection Cefotaxime 1gm iv given during induction of anaesthesia. Cleaning and painting is done by 10% povidone iodine solution. Draping is done using sterile linen drapes.

#### **Postoperatively**

- Patients will be kept NBM for 24 hrs.
- Oral liquids will be started after 24 hrs.
- Injection Cefotaxime 1 gm IV 12 hourly for 2 days.
- Injection Diclofenac Sodium 75 mg IV according to the complaints of patient.
- Tab. Cefixime 200mg BID started on 3rd postoperative day for next 3 days.
- Tab. Diclofenac 50 mg BID will be given according to pain.
- Drain will be removed after 48 to 72 hrs when drain is less than 10 ml.

- Wounds will be checked for infection on 2<sup>nd</sup> postoperative day in all patients and dressing will be done.
- Surgical Site infection if present will be treated with antibiotics according to the culture and sensitivity reports
- Patient will be discharged as per response to the procedure with suture removed on 14<sup>th</sup> postoperative day.

#### Follow up

Patient will be followed up on the 1<sup>st</sup> month, 3<sup>rd</sup> month and the 6<sup>th</sup> month. Detailed clinical and radiological examination will be done to look for any recurrences if present.

#### **RESULTS**

The present study was carried out with following two groups of 50 patients each:

- *Group A:* Patients that underwent elective abdominal surgery
- Group B: Patients that underwent emergency abdominal surgery

The mean age of the patients was 39.88±13.06 years (range 23-75).

Table 1: Distribution of patients according to age.

Age	Group A		Gro	up B	р
(years)	N	%	N	%	Value
18-20	1	2%	0	-	
21-30	14	28%	12	24%	
31-40	17	34%	11	22%	
41-50	6	12%	15	30%	>0.05
51-60	8	16%	9	18%	>0.03
61-65	4	8%	3	6%	
Total	50	100%	50	100%	
Mean±SD	39.88	8±13.06	41.6	6±12.1	

Table 2: Distribution of patients according to sex.

Sex	Grou	Group A		ир В	р
	N	%	N	%	value
Male	25	50%	24	48%	>0.05
Female	25	50%	26	52%	
Total	50	100%	50	100%	

The post-operative hospital stay for majority of the patients in Group A was  $\leq 10$  days (82%) while it was 11-14 days for Group B (54%).

It was observed that significantly larger number of patients in Group A was admitted for  $\leq 10$  days as compared to Group B. Similarly, the mean duration of

post-operative hospital stay was significantly less for Group A as per Student t-test (p>0.05)

Table 3: Distribution of patients according to BMI.

BMI	Group A		Group B	р	
$(kg/m^2)$	N	%	N	%	Value
Normal	19	38	19	38	
Overweight	27	54	27	54	
Obese	4	8	4	8	>0.05
Total	50	100	50	100	
Mean±SD	25.67±3.15		25.67±3.15		

29 (58%) patients in Group A underwent Open Cholecystectomy while 14 (22%) patients and 7 (14%) underwent Interval Appendectomy and Open Appendectomy respectively. 30 (60%) patients in Group B underwent Open Cholecystectomy while 16 (32%) and 3 (6%) patients underwent Interval Appendectomy and Splenectomy respectively. 1 (2%) patient underwent Excision. There was no significant difference between the groups as per Chi-Square test (p>0.05).

Table 4: Distribution of patients according to diagnosis.

Diagnosis	Group A		Group B		p
Diagnosis	N	%	N	%	Value
Cholelithiasis	29	58%	30	60%	
C. appendicitis	10	20%	16	32%	
Appendicitis	11	22%	0	-	> 0.05
Splenic cyst	0	-	3	6%	>0.05
Mesentric cyst	0	-	1	2%	
Total	50	100%	50	100%	

The most common bacteria isolated in Group A were *E. Coli, Pseudomonas* and *Staph aureus* (4%) whereas the most common bacteria isolated in Group B were *E. coli, Staph aureus* and *Enterococcus spp.* (4%) followed by Pseudomonas (2%). There was no statistical difference between the groups as per Chi-Square test (p>0.05).

Table 5: Distribution of patients according to usage of closed suction drain.

Usage of closed	Group A		Group B		p
suction drain	N	<b>%</b>	N	%	Value
Not Used	26	52%	25	50%	
Used	24	48%	25	50%	>0.05
Total	50	100%	50	100%	

Majority of cases of SSI was observed in the age group of 41-50 years in Group A (50%) and in the age group of 21-30 years in Group B (42.9%).

The association of SSI with Age was statistically not significant as per Chi-Square test (p>0.05). Male patients were mainly associated with SSI in both the groups (66.7% and 71.4% respectively). The association of SSI

with Sex was statistically not significant as per Chi-Square test (p>0.05).

Table 6: Distribution of patients according to type of collection from surgical site.

Type of	Gro	Group A		oup B	p Value
Collection	N	%	N	%	
Seropurulent	4	8%	5	10%	>0.05
Purulent	1	2%	1	2%	

There were more cases of SSI in Open Cholecystectomy procedure for both the groups (83.3% and 57.1% respectively). SSI was also observed in Interval Appendectomy procedure (16.7% and 42.9% respectively). The association of SSI with Operative procedure was statistically not significant as per Chi-Square test (p>0.05).

Table 7: Distribution of patients according to operative procedure.

Operative	Gro	Group A		up B	р
procedure	N	<b>%</b>	N	<b>%</b>	Value
Open cholecystectomy	29	58%	30	60%	
Interval appendectomy	14	28%	16	32%	
Open appendectomy	7	14%	0	-	>0.05
Splenectomy	0	-	3	6%	
Excision	0	-	1	2%	
Total	50	100%	50	100%	

#### DISCUSSION

Post-operative wound complications alter the outcome of surgery; hence they are of great importance to a surgeon. They complicate the post-operative course of a significant proportion of abdominal surgical patients, are associated with excessive health-care costs, increased morbidity and mortality, and may require further hospital admissions, IV anti-biotics and even surgical reintervention. Despite great progress made during recent times in the perioperative care, abdominal surgeries are sometimes marked by wound complications ranging from 2.8% - 40% depending on various factors. <sup>10,11</sup>

In the present study, majority of the patients in Group A were in the age group of 31-40 years (34%) followed by 21-30 years (28%), 51-60 years (16%), 41-50 (12%), 61-65 years (8%) and 18-20 years (2%). The mean age of the patients was 39.88±13.06 years. Majority of the patients in Group B were in the age group of 41-50 years (30%) followed by 21-30 years (24%), 31-40 years (22%), 51-60 (18%) and 61-70 years (6%).

The mean age of the patients was  $41.66\pm12.1$  years. There was no significant difference between the groups as per Student t-test (p>0.05).

There was equal distribution of male and female patients in Group A while there was 24 (48%) male and 26 (52%) female patients in Group B. There was no significant difference between the groups as per Fisher test (p>0.05).

Chauhan S et al reported 400 patients underwent laparotomy, of which 350 patients underwent emergency laparotomy and 50 patients underwent elective laparotomy. 270 (77.14%) patients were male and 80 (14.28%) were female. 12

Closed Suction drain was used in 24 (48%) and 25 (50%) patients of Group A and Group B respectively. The closed suction drain collection on post-operative days was lesser in Group B as compared to Group A however this difference was statistically not significant as per Student t-test (p>0.05). The type of collection in Closed Suction Drain was Serous in 12 (24%) patients, Serosanguineous in 10 (20%) patients and Seropurulent in 1 (2%) patients, Serosanguineous in 10 (20%) patients and Seropurulent in 1 (2%) patients of Group B. There was no significant difference between the groups as per Fisher test (p>0.05).

The type of collection from surgical site was seropurulent in 4 (8%) patients and purulent in 1 (2%) patient of Group A whereas it was seropurulent in 5 (10%) patients and purulent in 1 (2%) patient of Group B. There was no significant difference between the groups as per Fisher test (p>0.05).

Murtaza B et al in a comparative cross-sectional study observed patients who showed wound dehiscence had significant wound infection and their underlying diseases were sigmoid volvulus, gunshot wound abdomen with rectal injury, sigmoid perforation with faecal peritonitis and metastatic carcinoma colon. <sup>13,14</sup> Later, two of these developed incisional hernia, while the third case of incisional hernia was a patient with acute intestinal obstruction due to bands.

Sørensen LT et al in a study on risk factors for tissue and wound complications in gastrointestinal surgery reported incidence of tissue and wound complications was 6% following elective operation, and 44% of these patients (89/277) were admitted for more than 15 days after surgery. Following emergency operation, 16% had a tissue or wound complication, and 52% (159/348) were admitted for more than 15 days following surgery. Tissue and wound complications were not independently associated with postoperative mortality.

In the present study, the most common bacteria isolated in Group A were  $E.\ coli$ , Pseudomonas and  $Staph\ aureus$  (4%) whereas the most common bacteria isolated in Group B were  $E.\ coli$ ,  $Staph\ aureus$  and  $Enterococcus\ spp.$  (4%) followed by Pseudomonas (2%). There was no statistical difference between the groups as per Chi-Square test (p>0.05).

In present study, there were more cases of SSI in Open Cholecystectomy procedure for both the groups (83.3% and 57.1% respectively). SSI was also observed in Interval Appendectomy procedure (16.7% and 42.9% respectively). The association of SSI with Operative procedure was statistically not significant as per Chi-Square test (p>0.05).

Murtaza B et al in a comparative cross-sectional study observed that among the 83 cases, 73 postoperative complications were experienced in 28 (33.7%) patients, with 14 (17.0%) showing more than one. The commonest problem encountered was postoperative fever and wound infection which were noted in 18 (21.6%) cases each. The wound infection was seen in cases of acute perforated appendicitis (8 cases), intestinal perforations (8 cases), primary peritonitis (1 case) and post caesarean section acute peritonitis (1 case). Eleven (13.2%) patients showed postoperative nausea and vomiting and 2 (2.4%) had pneumonia after surgery. Four (4.8%) cases developed wound dehiscence and 3 (3.6%) had incisional hernia formation. <sup>16,17</sup>

Sharma AC et al in a study on Wound Complications in Elective Abdominal Surgery reported wound discharge in 10.8% was the commonest complication. It was purulent 9.1% in majority of such cases and was serous in 1.8% cases. Partial wound dehiscence occurred in 6.3% cases, all were infected wounds. Infection was treated with antibiotics according to sensitivity results and wounds gradually healed. No case of Burst Abdomen occurred. Incisional hernia was detected in 4.5% cases during the follow-up period. <sup>18,19</sup>

Ahmed M et al in a study on Postoperative Wound Infection reported overall infection rate of 11% while clean contaminated cases had 19.4% infection rate. 20,21 In superficial incisional surgical site infection in elective abdominal surgery study reported overall infection rate of 5%, while Satyanarayana V et al in a study of surgical site infections in abdominal sugeries reported a 7.6% infection rate in elective surgeries. 22,23 Saxena A et al in a study of Surgical Site Infection among Postoperative Patients observed an infection rate of 14.33%. 24,25

## **CONCLUSION**

Postoperative complications increase patient morbidity and mortality and are a target for quality improvement programs. Many complications may be prevented by thorough preoperative evaluation, sound surgical technique and careful follow-up care. Possible complications following elective surgery and those following urgent/emergency surgery, a debatable issue was the possibility of significant differences between them. The emergency laparotomies are also more common than elective laparotomies especially at peripheral centers.

These findings suggest that wound complications do occur in elective abdominal surgeries. These can be reduced to a certain extent by careful case selection, improving Hb levels prior to surgery, using adequate prophylaxis and better surgical practice.

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