

## ORIGINAL ARTICLE

## POSTOPERATIVE COMPLICATIONS IN EMERGENCY VERSUS ELECTIVE LAPAROTOMIES AT A PERIPHERAL HOSPITAL

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**Background:** Laparotomy is a commonly performed procedure in any surgical unit. Postoperative complications directly affect the outcome of the disease. The aim of the study was to evaluate and compare the postoperative complications in emergency versus elective laparotomies at a peripheral hospital. **Methods:** This comparative cross-sectional study was carried out at the Department of General Surgery, Combined Military Hospital, Bahawal Nagar Cantonment from Feb 2006 to May 2009. One hundred and four consecutive patients undergoing laparotomy were included. They were divided into two groups: emergency laparotomies (Group-A) and elective laparotomies (Group-B). They were followed up meticulously and the postoperative complications/sequel were recorded. **Results:** In Group-A there were 83 patients while in Group-B only 21 patients were recorded. A total of 73 postoperative complications were seen in 28 patients (33.7%) in Group-A, while 5 complications were seen in 3 patients (14.2%) in Group-B. The Group-A showed 21.6% postoperative fever and wound infection, postoperative nausea and vomiting was 13.2%, wound dehiscence 4.8%, incisional hernia 3.6%, pneumonia/anastomotic disruption 2.4% and duodenal fistula/peristomal excoriation/adhesive intestinal obstruction 1.2%. The septicaemia was seen in 6.0% and mortality in 8.4%. Group B showed 14.2% postoperative fever and 4.7% postoperative nausea and vomiting/wound infection. No case of septicaemia or mortality was seen. **Conclusion:** The postoperative complications are more common in emergency laparotomies as compared to the elective ones. Postoperative fever, wound infection, nausea and vomiting are the mostly encountered complications.

**Keywords:** Laparotomy, emergency, elective, postoperative, complications

### INTRODUCTION

The post-operative 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. Laparotomy is a major surgical undertaking, whether elective or emergency, always remains the bread and butter of a general surgeon. The Greek word *laparos* (soft or loose) was used for the soft part between the ribs and hip, thus the flanks or loins. There were objections in 1878, to the use of the term, laparotomy, for incisions through the anterior abdominal wall. Although the term defines only the incision, used on its own it often implies 'exploration of the abdomen'.

While conducting a laparotomy, a surgeon experiences a variety of problems intra-operatively and post-operatively. The outcome of the intervention is directly related to the underlying pathology. However the co-morbid conditions, technique or surgical expertise and post-operative care also contribute to the final results. The post-operative sequel can range from trivial wound infection to extremes like death. The emergency and elective laparotomies have different indications, but the principles of surgery remain the same. Adverse events that are closely related to processes of care, such as post-operative complications,

may be a better measure of quality than death rates or other intermediate outcomes.<sup>2,3</sup>

This study was carried out to highlight the post-operative complications encountered in emergency versus the elective laparotomies conducted at a peripheral hospital. The main aim was to encourage the early detection of these complications in susceptible cases at a satellite station where the ancillary medical care and intensive care facilities are usually lacking.

### PATIENTS AND METHODS

This comparative cross-sectional study was conducted at the Combined Military Hospital, Bahawal Nagar Cantonment, from Feb 2006 to May 2009, which is a fifty bedded hospital located in the remote district of Bahawal Nagar, with limited health care facilities. One hundred and four consecutive cases, irrespective of the age and sex, undergoing laparotomy, were included in the study. Routine cases requiring appendectomy, cholecystectomy and hysterectomy were not included.

All the cases were initially received in the general out doors/ emergency and later referred for surgical consultation. A detailed history and clinical examination was conducted. The patients were divided into two groups: Group-A were the patients undergoing emergency laparotomy and Group-B elective laparotomy. The data was noted on a

proforma. In the Group-A, patients had acute presentation and were subjected to immediate intervention. Baseline investigations like complete blood count, urinalysis, serum urea/ creatinine, serum electrolytes, chest radiograph, electrocardiograph, hepatitis B and C profile and blood sugar (random) were noted in the cases. Abdominal radiographs and ultrasonography was also done where required. Blood was also sent for grouping and cross matching. After initial intravenous fluid resuscitation with ringer's lactate solution/Foley catheterisation/nasogastric intubation, pre-anaesthetic assessment was made and written/ informed consent was taken after counselling regarding the condition of the patient and the possible outcomes. In Group-B, the patients required elective intervention. Preliminary baseline investigations were carried out. Complete blood count, urinalysis, serum urea/ creatinine, serum electrolytes, chest radiograph, electrocardiograph, hepatitis B and C profile and blood sugar (random) were noted in the cases. Ultrasonography was also done. Blood was also sent for grouping and cross matching.

Under general anaesthesia the operative field was prepared with povidone iodine and all the patients in Group-A were opened through a midline abdominal incision with No. 20 blade. In Group-B most of the patients were also opened through the midline except one case (cholecystohydatid cyst fistula) where a right subcostal incision was made and four cases (three ovarian cyst/one retroperitoneal Burkitt Lymphoma) where Pfannensteil incision was made. The surgical procedure was conducted according to the requirement of the underlying disease. In Group-A, after dealing with the primary pathology a thorough peritoneal lavage was performed with 12 litres of normal saline. Two drains were placed in the peritoneal cavity using 28Fr Foley catheter and brought out through separate stab incisions. In Group-B, the patients did not require peritoneal lavage, however one/ two drains were placed in the peritoneal cavity, as required. The wounds were closed accordingly.

In Group-A, the patients were kept on injectable ceftriaxone and metronidazole intravenously, except in cases with high risk/ complicated laparotomies where intravenous cefoperazone/salbactam was combined with metronidazole. In Group-B, the patients were given a perioperative cover with intravenous ceftriaxone.

The post-operative complications were documented in both the groups. Persistent post-operative fever (>48 hrs), post-operative nausea and vomiting (PONV) and respiratory tract infections (pneumonia) were monitored regularly. Examination of the wound was started from the second post-operative day. The clinical signs of redness, oedema,

serosanguinous discharge, presence of pus or discharge of intestinal contents (enterocutaneous fistula) were noted. The stomal orifices (colostomy/ ileostomy) were inspected from the first post-operative day and monitored regularly. The abdomen was also examined for early detection of any leakage from the site of intestinal repair. The 30 day mortality was recorded. The late complications like incisional hernia formation and post-operative adhesive intestinal obstruction were noted for 3-6 months after surgery.

Data was analysed using SPSS version 10.0. Descriptive statistics like frequency, percentage, mean and standard deviation were computed and association was determined between postoperative complications in emergency and elective laparotomies using Chi-square test,  $p < 0.05$  taken as significant.

## RESULTS

Among the 104 cases of laparotomy, 83 (79.80%) underwent emergency intervention (Group-A) and 21 (20.19%) were subjected to elective surgery (Group-B).

In Group-A, 43 (51.8%) were males and 40 (48.2%) were females. The age ranged between 2–80 years ( $36.31 \pm 17.74$  years). The majority (49, 59.0%) of cases were of Acute Abdomen/Acute Peritonitis, while others were Acute Intestinal Obstruction (16, 19.2%), Abdominal Trauma (11, 13.2%) and Iatrogenic Acute Peritonitis (7, 8.4%) (Table-1).

**Table-1: Group-A (Emergency Laparotomies) n=83**

Diagnosis	n (%)
<b>Acute abdomen/ acute peritonitis</b>	<b>49 (59.0%)</b>
Acute Perforated Appendicitis	12
Ruptured Ectopic Pregnancy	8
Perforated Duodenal Ulcer	8
Torsion/ Ruptured Ovarian Cyst	7
Mesenteric Vascular Occlusion	3
Primary Peritonitis	3
Enteric Perforation	2
Uterine Rupture with intra-uterine death	2
Others	4
<b>Acute intestinal obstruction</b>	<b>16 (19.2%)</b>
Bands/ Adhesions	7
Carcinoma Colon/ Metastatic Abdominal Tumour	4
Intestinal Tuberculosis	2
Volvulus ( Sigmoid/ Caecal)	2
Internal Hernia	1
<b>Abdominal trauma</b>	<b>11 (13.2%)</b>
Traumatic Ileal/ Jejunal Perforation	3
Gun Shot Wound Abdomen	3
Traumatic Sigmoid Perforation	2
Splenic Rupture	1
Paranephric Haematoma	1
Pelvic Haematoma (Polytrauma/ Head Injury)	1
<b>Iatrogenic acute peritonitis</b>	<b>7 (8.4%)</b>
Post Abdominal Hysterectomy Pelvic Haematoma	3
Uterine Perforation (Induced Abortion)	2
Post Caesarian Section Sigmoid Perforation	1
Post Caesarian Section Wound Infection causing Acute Peritonitis	1

The patients who showed wound dehiscence had significant wound infection and their underlying diseases were sigmoid volvulus, gun shot wound abdomen with rectal injury, sigmoid perforation with faecal peritonitis and metastatic carcinoma colon. Later, two of these developed incisional hernia, while the third case of incisional hernia was a patient with acute intestinal obstruction due to bands.

One (1.2%) case of a huge (3×3 cm) perforated duodenal ulcer developed duodenal fistula. The gut was exteriorised in seven cases (six colostomies and one ileostomy). The patient with ileostomy developed severe peristomal excoriation.

One (1.2%) case with an underlying pathology of intestinal tuberculosis showed adhesive intestinal obstruction after 6 weeks of surgery. Two (2.4%) developed anastomotic disruption, out of the 29 patients subjected to intestinal anastomosis/repair, both were suffering from mesenteric vascular occlusion and had a fatal outcome.

The other mortalities in the Group-A were, a 5 years old boy with polytrauma/pelvic haematoma/head injury, a 17 years old girl with sigmoid perforation and faecal peritonitis/septicaemia, a 65 years old male with advanced retroperitoneal liposarcoma with gut gangrene/septicaemia, a 60 years old lady with advanced metastatic carcinoma colon and a 62 years old lady with acute haemorrhagic pancreatitis/septicaemia. In Group-A, 5 (6.0%) developed septicaemia and all of them died. A total of 7 (8.4%) cases had fatality (30 day mortality).

In Group-B, 2 (9.5%) patients were males and 19 (90.4%) were females. The age ranged between 14–65 years (mean 37.1±18.13). The patients undergoing elective laparotomy included ovarian masses 14 (66.6%), uterine pathology 2 (9.5%), retroperitoneal masses 2 (9.5%) and others 3 (14.2%) as cholecystohydatid cyst fistula, urachal cyst and metastatic adenocarcinoma colon (Table-2).

Out of the 21 cases, 5 post-operative complications were seen in 3 (14.2%) patients with 1 (4.7%) showing more than one. The commonest problem again was postoperative fever which was seen in 3 (14.2%) cases. One (4.7%) patient had post-operative nausea and vomiting and also wound infection (Table-3). This patient had metastatic adenocarcinoma colon.

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 (Table-3).

Proportion test was applied taking  $p < 0.05$  as significant. There was significant higher percentage of postoperative complications in emergency laparotomies (73) as compared to elective laparotomies (5) ( $p < 0.0001$ ). Individual complications of postoperative fever, nausea and vomiting and wound infection were also higher in emergency than elective surgeries. Since the number of cases was less therefore individual complication rate cannot be assessed for each complication individually.

**Table-2: Group-B (Elective Laparotomies) (n=21)**

DIAGNOSIS	Number (%)
<b>Ovarian masses</b>	<b>14 (66.6%)</b>
a. Benign	
i. Benign Ovarian Cyst/Endometriotic Cyst	7
ii. Tubo-ovarian Mass (Tuberculous)	3
iii. Mucinous Cystadenoma Ovary	1
b. Malignant	
i. Recurrent Granulosa Cell Tumour Ovary	1
ii. Bilateral Krukenberg Tumour Ovary	1
iii. Metastatic Adenocystic Carcinoma Ovary	1
<b>Uterine pathology</b>	<b>2 (9.5%)</b>
a. Huge Pedunculated Uterine Fibroid	1
b. Bleeding Residual Cervical Stump (Post Abdominal Hysterectomy)	1
<b>Retroperitoneal masses</b>	<b>2 (9.5%)</b>
a. Retroperitoneal Tuberculous Mass	1
b. Huge Retroperitoneal Burkitt Lymphoma	1
<b>Others</b>	<b>3 (14.2%)</b>
a. Cholecystohydatid Cyst Fistula	1
b. Metastatic Adenocarcinoma Colon	1
c. Urachal Cyst	1

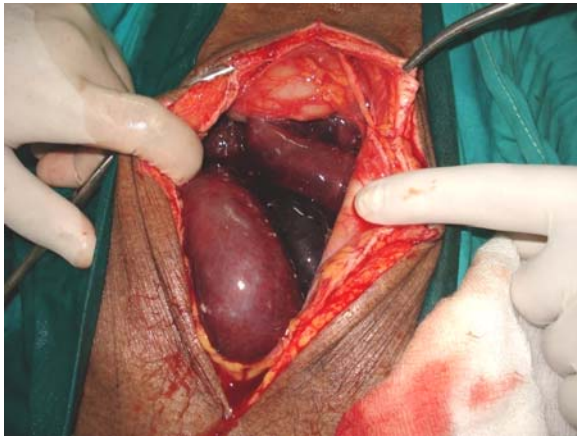
**Table-3: Comparison of Postoperative Complications in Emergency (Group-A) And Elective Laparotomies (Group-B)**

Complications	Group-A (Emergency) n=83	Group-B (Elective) n=21
Postoperative Fever	18 (21.6%)	3 (14.2%)
Postoperative Nausea and Vomiting	11 (13.2%)	1 (4.7%)
Pneumonia	2 (2.4%)	Nil
Wound Infection	18 (21.6%)	1 (4.7%)
Wound Dehiscence	4 (4.8%)	Nil
Incisional Hernia	3 (3.6%)	Nil
Duodenal Fistula	1 (1.2%)	Nil
Peristomal Excoriation	1 (1.2%)	Nil
Adhesive Intestinal Obstruction	1 (1.2%)	Nil
Anastomotic Dehiscence	2 (2.4%)	Nil
Septicaemia	5 (6.0%)	Nil
Mortality	7 (8.4%)	Nil



**Figure-1: Sigmoid Volvulus managed by Hartman's Procedure**

The patient developed postoperative wound infection followed by wound dehiscence and incisional hernia formation.



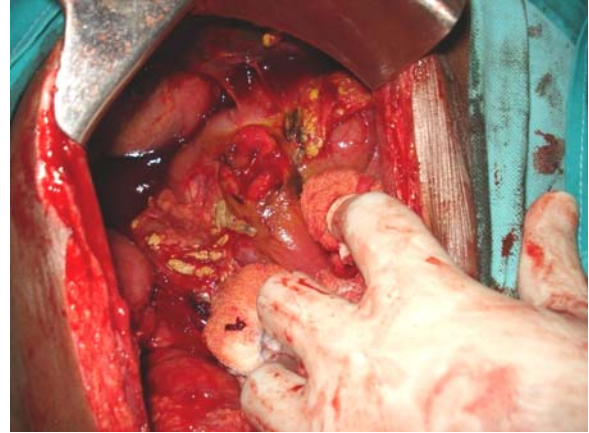
**Figure-2: Mesenteric Vascular Occlusion with extensive small gut gangrene**

This patient had anastomotic disruption and a fatal outcome.



**Figure-3: Adenocarcinoma Colon (Splenic Flexure) with acute intestinal obstruction and grossly distended caecum with impending perforation**

This patient developed postoperative peristomal excoriation around the ileostomy site.



**Figure-4: A large 3x3 cm duodenal perforation**

The patient later developed duodenal fistula which responded to TPN.



**Figure-5: Extensive wound infection with wound dehiscence**

This was seen in a case of advanced adenocarcinoma caecum which was subjected to palliative ileo-transverse anastomosis.

## DISCUSSION

The philosophy and tenets of safe abdominal surgery waited the waning years of the 19<sup>th</sup> century to be set forth. The introduction of safe anaesthesia<sup>4</sup> 30-40 years earlier had finally made intra-abdominal surgery possible, but until William Stewart Halsted at John Hopkins Hospital elucidated his triple approach of gentleness, asepsis and haemostasis, which was fundamental to his advanced surgical method. To Halsted, surgery meant physiological surgery, surgery of detail, and above all safe surgery. In this regard, he should be considered the Father of Safe Surgery.<sup>5</sup> Ironically, in 1922, William Stewart Halsted succumbed at the age of 70 due to the injurious effects of cholelithiasis.

Surgically treatable diseases are not as important as the great killer of small children in the developing world, i.e., malnutrition, pneumonia and diarrhoea. However as high as 10–20% of deaths are the results of conditions that would be amenable to surgery.<sup>4</sup> Laparotomies are performed electively and in emergency. The emergency laparotomy for acute abdomen, is a major test of the surgical skills of a surgeon. Postoperative care is as essential as the preoperative preparation for a successful outcome. Deficient care in either may produce unsatisfactory results irrespective of the standard of surgery.<sup>6</sup> The main aim of meticulous postoperative care is early detection and immediate treatment of postoperative complications.

In our study, 73 postoperative complications in emergency laparotomies and 5 postoperative complications in elective laparotomies were seen in 33.7% and 14.2% patients respectively. The group of emergency laparotomies had the commonest complications of postoperative fever (21.6%), wound infection (21.6%) and postoperative nausea and vomiting (13.2%), as compared to the group of elective laparotomies which showed 14.2% postoperative fever and 4.7% wound infection/postoperative nausea and vomiting. Jawaid *et al*<sup>2</sup> also documented postoperative fever as the commonest complication at 18.2% and a wound infection of 11.4% in his study. However this study did not separate emergency from elective cases.

Postoperative wound related complications have a major contribution to the postoperative morbidity of the patients. Wound infection, wound dehiscence and incisional hernia formation place a high burden on hospital resources,<sup>7</sup> by increasing the health care cost due to prolonged hospital stay. Wound dehiscence is a very serious complication of abdominal surgery, with high mortality rate and no single cause being responsible rather it is a multifactorial problem. In our study the wound dehiscence and incisional hernia were 4.8% and 3.6% respectively in emergency laparotomies, while no such cases were seen in the elective laparotomies. The results are similar to those documented by Waqar *et al*<sup>8</sup>, Buhler *et al*<sup>9</sup> and others<sup>10–16</sup>. In our study the four cases which developed wound dehiscence were secondary to wound infection, while two of them were also malnourished. Among the three cases which developed incisional hernia, two followed the wound dehiscence. The other two cases of wound dehiscence had a fatal outcome. In emergency cases, the international literature has reported the incidence of wound dehiscence varying from 1%<sup>17,18</sup> to 2.6%<sup>19,20</sup>, while local studies show a relatively higher incidence, up to 6%.<sup>21</sup> As many as 11% of laparotomies are complicated by the

development of incisional hernia.<sup>22–24</sup> This figure rises to 26% in those who develop wound infection.<sup>25–27</sup> Thus the wound infection, wound dehiscence and incisional hernia go side by side and controlling one, we can limit the incidence of the others, especially in the emergency cases.

The ultrasonography abdomen has a definitive role in detecting the postoperative intra-abdominal complications like haematoma or abscess formation.<sup>28</sup> No case of haematoma or abscess was seen in this study but in the group of emergency laparotomies two cases had anastomotic disruption which had fatal results. The other complications like postoperative pneumonia, duodenal fistula, peristomal excoriation, adhesive intestinal obstruction and septicaemia were only seen in the group of emergency laparotomies. The comparison of postoperative complications recorded in the groups of emergency laparotomies (Group-A) and elective ones (Group-B) is statistically significant ( $p=0.0001$ ).

Interestingly in this study, despite of the fact that we did not give any prophylaxis against deep vein thrombosis in any patient, we did not come across a single case of post-operative deep vein thrombosis or pulmonary embolism. The other interesting observation showed that the number of emergency laparotomies were about four times the elective laparotomies performed at our surgical unit.

## CONCLUSION

The postoperative complications are more common after emergency laparotomies as compared to the elective laparotomies. The commonest problems are the postoperative fever, wound infection and postoperative nausea and vomiting. The local wound complications apart from wound infections are the wound dehiscence and incisional hernia, which directly affect the outcome of the disease. The emergency laparotomies are much more than the elective ones especially working at a peripheral station.

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