ORIGINAL RESEARCH

A study to compare postoperative morbidity in elective and emergency laparotomy in a tertiary care hospital

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ABSTRACT
A prospective study was done to compare the postoperative morbidity and mortality in emergency and elective laparotomy in a tertiary care hospital. 72 patients were included in the study after having applied the inclusion and exclusion criteria. Out of total 72 patients 36 patients underwent emergency and 36 patients underwent elective laparotomy for gastrointestinal causes after taking the informed consent. Outcomes were assessed based upon - evaluation as well as the comparison of postoperative morbidity (complications) in elective and emergency laparotomy, to compare the mortality rate among elective and emergency laparotomy. Abdominal distension and guarding were among the symptoms and signs that were present more in cases of emergency laparotomy. Higher ASA grading of the patients were more seen in emergency laparotomy cases. Upper midline and lower midline (shorter length of incision) were more commonly performed in elective cases whereas midline incisions (lengthy incision) were more commonly performed in emergency cases depending upon the individual pathology. More number of patients following emergency laparotomy required to shift to ICU whereas spontaneous recovery was common in elective cases. In terms of complications, Grade I & II complications such as postoperative fever and wound infections were the most common complications after both elective and emergency laparotomies, but the percentage of complications was more in emergency. Grade III and IV complications were significantly higher in emergency, with wound dehiscence, sepsis and acute kidney injury being the major complications. Mortality (Grade V complication) was observed only in cases of emergency laparotomy, and postoperative stay was lengthy.

Key words*:* Emergency Laparotomy, Elective Laparotomy, Postoperative Complications

INTRODUCTION

An emergency laparotomy is a major operation that involves opening the abdomen. This allows the surgeon to view the organs inside and repair any emergency problems that have occurred. It is called "emergency" because it must be done very soon or even immediately and cannot wait until a later date.

Elective laparotomy implies that there is ample time for preoperative assessment and preparation of the patient [1]. Elective laparotomy is a planned surgical procedure for the specific treatment for the conditions like retroperitoneal mass, mesenteric cyst, gastric outlet obstruction or bowel tumour.

Postoperative complication may be defined as any negative outcome as perceived by the surgeon or by the patient. It may occur intraoperatively in the immediate postoperative period, or later on. Complications following abdominal surgery role a formidable challenge to surgeon in a general surgery unit, where abdominal surgery constitutes bulk of major operations. Postoperative complications may occur after laparotomy whether elective or emergency.[2]

This study includes a wide variety of patients admitted for conditions requiring laparotomy whether elective or emergency. The aim of this study is to review 1.5 year of experience in the knowing the postoperative morbidity in elective and emergency laparotomy and also the mortality associated with it. This study is important to carry out so that the data of study results can be compared with upcoming similar studies in our center in future.

MATERIAL AND METHODS

Inclusion Criteria: The inclusion criteria being patients of age 15 or more who require elective and

emergency laparotomy for cases admitted in the department of surgery.

Exclusion criteria: All the patients less than 15 years of age will be excluded in the study.

Setting: Hospital based study.

Study design: Observational

Time frame: This study was carried out after getting approval from the Research committee and Ethics committee for a period of 1.5 year from February 2021 to August 2022.

Population/ Participants: Patients were selected as and when they presented to Department of General Surgery after applying inclusion and exclusion criteria and after obtaining their informed written consent.

Sample - We have included the patients who had presented to us in the department of surgery and department of emergency with gastro intestinal pathology requiring laparotomy.

Sample size: Population size (for finite population correction factor or fpc) (N): 100 Hypothesized % frequency of outcome factor in the population (p): 68% +/-5 Confidence limits as % of 100 (absolute +/- %)(d):

Design effect (for cluster surveys-DEFF):

Sample size (n) for various Confidence levels

Confidence Level (%)	Sample size
95%	78
80%	60
90%	71
97%	81
99%	86
99.9%	91
99.99%	94

Equation:

Sample size $n = [DEFF*Np(1-p)]/ [(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1-p)]$

Results from OpenEpi, Version 3, open source calculator—SSPropor

DATA COLLECTION

The samples which were studied are the patients who were admitted, and taking in consideration the inclusion and exclusion criteria. Study was done for a period of 1.5 years after approval from the ethics committee. After taking informed and written consent, a detailed history, general and systemic examination was done.

Various details of the patients was studied regarding age of the patient, diagnosis, time of presentation, preoperative risk factors, ASA grading. Co-morbid illness were also reviewed by chest x ray, laboratory data including white cell count, haemoglobin, random blood sugar, liver function tests, clotting studies, Serum creatinine, Blood urea, serum electrolytes and ECG. A.S.A. status was assigned by anesthetists according to American society of anesthesiologists (A.S.A.). Risk factors were assessed before operation. Operative details in abdominal surgery were noted by name of operation, type of operation, type of anesthesia, type of incision, site of incision, length of incision, closure of abdomen, duration of operation, and time of recovery of patient after operation.

Patients of different age groups and sex were tabulated and the possible causes of laparotomy was noted. A detailed history on smoking, alcohol intake, intravenous drug users and any co morbidities like diabetes, tuberculosis, chronic obstructive pulmonary disease, acquired immune deficiency syndrome was noted. A clinical examination was conducted and all biochemical investigations required for pre anesthetic checkup along with other investigations required for making diagnosis were done.

Preoperative antibiotic prophylaxis was given at the time of induction of anesthesia included single dose cephalosporins.

Intraoperatively all patients under general anesthesia were subjected to exploratory laparotomy through midline incision. The operations were performed by a consultant surgeon or a senior resident under the direct supervision of a consultant surgeon. Operations notes were inspected for the type of surgery done, length of incision, technique of abdominal closure, suture material used and duration of operation.

Post operative recovery was noted in terms of spontaneous recovery or patient shifted to intensive care unit in intubated state. Postoperatively patients were kept nil per orally till the return of bowel sounds and nasogastric tube were kept in situ and were removed depending on the volume of nasogastric tube drainage. Intravenous fluid administration (replacement and maintenance) therapy was given and urine output was monitored in all the patients with urometer bag. Broad spectrum penicillin and betalactamase (piperracillin and tazobactam), Aminoglycosides (amikacin), and imidazoles (metronidazole) were given to all the patients.Other supportive treatment proton pump inhibitors (pantoprazole), serotonin 5HT3 receptor antagonist (ondansetron) were also given to all the patients. Round the clock postoperative analgesia were provided depending upon the severity according to visual pain analogue score. (injectables NSAIDS, opiods) Antipyretic (injection paracetamol) were given to all the patients.

Other supportive measures like nebulization, steam inhalation, chest physiotherapy were also given to all the patients in the intensive care units. Wound were inspected on postoperative day 2 for any discharge or soakage. In case of any pus discharge culture from the wound were sent and antibiotics were changed according to culture and sensitivity.

In case of minor wound infections (discharge+), wounds were opened partial or complete depending upon the condition of the wound and regular wound wash and dressings were done. Secondary suturing of the wound was done bedside when the wound became healthy under all aspetic precautions.

Strict perioperative control of blood sugar was ensured in diabetic patients with insulin preparations after consulting with medical specialists. Oral feeding was

resumed when bowel sounds return or when patient started tolerating water and liquid diets.

Early ambulation was encouraged in all the patients Incentive spirometry was started for all the patients on postoperative day 2 except those in intubated state. All the postoperative complications were managed at our centre apart from very few patients who demanded referral to government center due to financial constraints and for their own reasons.

Patients were discharged from hospital once oral feeding was tolerated and patient became freely mobile. All the patients were followed up for a period of one month.

DATA ANALYSIS

Data was compiled and analysis of data was done. Following parameters were accessed for the data analysis:

1. Percentage of postoperative complications related to laparotomy (emergency and elective).
2. Days of hospital stay after laparotomy.
3. Percentage of death in the laparotomy cases (elective and emergency).
4. Grading of the post-operative complications according to clavien-dindo system of classification.

GRADING OF SURGICAL COMPLICATIONS [3]

The Clavien-Dindo system, originally described in 2004, is widely used throughout surgery for grading adverse events (i.e., complications) which occur as a result of surgical procedures; it has now become the standard classification system for many surgical specialties. (Table 1)

Table 1: Standard grading system devised by the Clavien-Dindo fir grading adverse effects which comes as a result of surgical procedure

GRADE	DEFINATION
GRADE I	Any deviation from the normal post-operative course not requiring surgical, endoscopic or radiological intervention. This includes the need for certain drugs (e.g. antiemetics, antipyretics, analgesics, diuretics and electrolytes), treatment with physiotherapy and wound infections that are opened at the bedside
GRADE II	Complications requiring drug treatments other than those allowed for Grade I complications; this includes blood transfusion and total parenteral nutrition (TPN)
GRADE III	Complications requiring surgical, endoscopic or radiological intervention Grade IIIa - intervention not under general anaesthetic Grade IIIb - intervention under general anaesthetic
GRADE IV	Life-threatening complications; Grade IVa - single-organ dysfunction (including dialysis) Grade IVb - multi-organ dysfuncton
GRADE V	Death of the patient

Patients were observed for any grade I and grade II post-operative complications like fever, nausea and vomiting, respiratory infections, wound infections, paralytic ileus, stoma related complications and sepsis were monitored regularly and correspondingly noted for each patient. Gastrointestinal complications which required surgical, endoscopic or radiological intervention (grade III) were observed during post-operative period included wound dehiscence, Entero cutaneous fistula, Anastomotic leak and burst abdomen. Grade IV complications like single organ dysfunction or multiple organ dysfunction were also recorded. Mortality within 30 days (death of the patient) was graded as grade V complication according to clavien dindo classification system. All the patients were educated regarding chest physiotherapy and were encouraged to do respirometer. Early post op ambulation was encouraged.

RESULTS AND OBSERVATION

In this study, the study population was divided into six age groups. Most of the patients belong to 51-60 years of age accounting to 22.2%. Next is the age group 41-50 and 61-70 constituting around 18.1% respectively. The least affected age groups are those younger than 30 years (9.7%) and those in 31-40 years age group (15.3%). Out of 72 patients, 73.6% who require emergency or elective laparotomy were males and 26.3% were females. (Table 2)

Table 2: Age Distribution patients and the sex distribution in this study

Age group	No of patients	Percentage of patients
=<30	7	9.7
31-40	11	15.3
41-50	13	18.1
51-60	16	22.2
61-70	13	18.1
>70	12	16.7

The study analyzed symptoms and medical procedures for 72 patients. Abdominal pain was present in 62 patients (86.11%), vomiting in 46 patients (63.88%), constipation in 26 patients (36.11%), abdominal

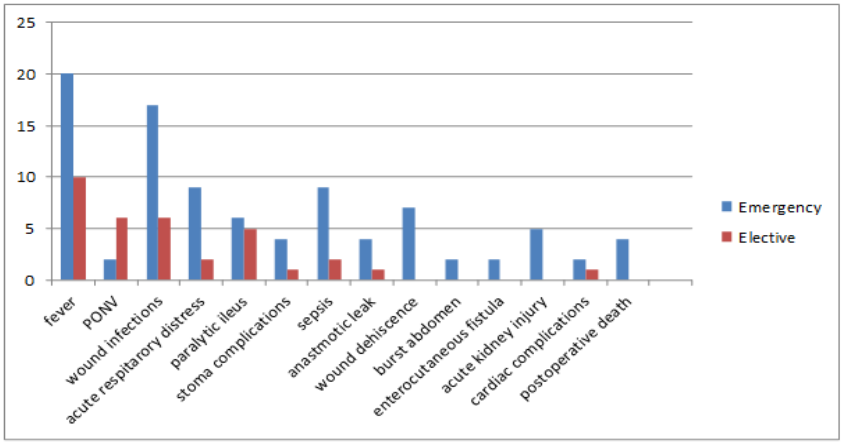
distension in 26 patients (36.11%), fever in 11 patients (15.2%), bleeding per rectum in 3 patients (4.16%), malena in 3 patients (4.16%), loss of appetite in 12 patients (16.66%), tenderness in 42 patients (58.33%), guarding in 12 patients (16.66%), rigidity in 6 patients (8.3%), and abdominal lump in 6 patients (8.3%). Out of 72 patients, 43 (59.7%) were grade III, 18 (25.0%) were grade II, and 6 (8.3%) were grade IV. 36 patients underwent emergency laparotomy, and 36 underwent elective laparotomy. Spontaneous recovery after operation took place in 47 (65.3%) patients. The study of 72 patients found that 36 had emergency laparotomy and 36 had elective laparotomy. Among the patients, 69.4% had midline incision, 18.1% had upper midline incision, and 12.5% had lower midline incision. Most patients had single-layer closure of the abdomen, and 65.3% of patients had a spontaneous recovery after the operation. However, 34.7% of patients were shifted to ICU post-surgery. The first dressing was healthy in 42 (58.3%) patients, and discharge from the wound was present in 27 (37.5%) of patients. Maximum drains were removed on postoperative day 5th and 7th, and maximum stitches were removed postoperatively between day 10th to day 15th. (Table 3)

Table 3: Distribution of complications in emergency and elective laparotomy

Severity	Postoperative Complications	Elective (36)	Emergency (36)
Mild (Grade I-Grade II)	Fever (POF)	10 (27.8%)	20 (55.6%)
	Wound infection	6 (16.7%)	17 (47.2%)
	Acute respiratory distress	2 (5.6%)	9 (25.0%)
	Postoperative nausea & vomiting (PONV)	2 (5.6%)	6 (16.7%)
	Paralytic ileus	5 (13.9%)	6 (16.7%)
	Stoma complications	1 (2.7%)	4 (11.1%)
	Sepsis	2 (5.6%)	9 (25.0%)
Moderate (Grade III)	Anastmotic leak	1 (2.8%)	4 (11.1%)
	Wound dehiscence	0 (0.0%)	7 (19.4%)
	Burst abdomen	0 (0.0%)	2 (5.6%)
	Enterocutaneous fistula	0 (0.0%)	2 (5.6%)
Severe (Grade IV)	Acute kidney injury	0 (0.0%)	5 (13.9%)
	Cardiac complications	1 (2.8%)	2 (5.6%)
Grade V	Death of the patient	0 (0.0%)	4 (11.1%)

The study analyzed the type of laparotomy (emergency or elective) in relation to age, gender, and symptoms such as abdominal pain, vomiting, constipation, abdominal distension, fever, bleeding per rectum, malaena, and loss of appetite. The age group of patients did not show any significant differences (p=0.125), while gender showed a statistically significant differentiation (p=0.16 Pearson chi-square, 0.013 Fisher's Exact test). Out of 19 female patients 5 underwent emergency laparotomy while 14 had elective laparotomy. The presence of abdominal pain, vomiting, constipation, fever, bleeding per rectum, malaena, and loss of appetite did not reveal any statistically significant differentiation in the type of laparotomy performed. However, abdominal distension showed a statistically significant differentiation (p=0.050 Pearson chi-square, 0.085 Fisher's Exact test), with more cases in the emergency laparotomy group. Out of 72 total patients, 9.7% were less than 30 years old. The study had 53 male and 19 female patients, with 31 male patients having emergency laparotomy, while 22 had elective laparotomy. Conversely, 5 female patients had emergency laparotomy, while 14 had elective laparotomy.

Figure 1: Complication:



COMPLICATIONS

The study compared the postoperative complications between emergency and elective laparotomy, and showed that emergency laparotomy had a higher incidence of wound infection, wound dehiscence, postoperative fever, acute respiratory distress, and sepsis. However, no significant difference was found in the incidence of paralytic ileus, postoperative nausea and vomiting, cardiac complications, and stoma-related complications between the two types of surgeries. (Table 4)

Table 4: Distribution of cases underwent emergency laparotomy and Elective Surgery

Emergency surgery			Elective surgery		
Diagnosis	**Total no. of cases (36)**	**Percentage**	**Diagnosis**	**Total no. of cases**	**Percentage**
Perforation peritonitis • Ileum perforation (6) • Gastric perforation (4) Duodenum perforation (4) • Jejunum perforation (1) Rectosigmoid perforation (3)	18	50%	Small bowel obstruction (sub-acute) with chronic constipation secondary to • Adhesions (5) • Band (1) Secondary to peritoneal Mets (1) • Acute on chronic (1)	8	22.2%
Carcinoma descending colon Closed loop obstruction (2) Locally advanced with ileal perforation (1)	3	8.3%	Gastric outlet obstruction • GOO benign (4) • GOO malignant (2)	6	16.6%
Mesenteric ischemia	3	8.3%	Adenocarcinoma colon	6	16.6%
Appendicular perforation	3	8.3%	Sealed off jejunal perforation (SAIO)	3	8.3%
Abdominal Tuberculosis	2	5.5%	Space occupying lesions • Liver Hamartoma (1) Spleen Lymphangioma (1) • Splenic abscess with Splenogastric fistula (1)	3	8.3%
Obstructed incisional hernia	2	5.5%	Enter cutaneous fistula repair ECF Post Iatrogenic injury to caecum ECF Post whipples surgery	2	5.5%
Traumatic injuries • Grade v splenic injury • Gunshot injury with left common artery tear	2	5.5%	Abdominal tuberculosis with SAIO	1	2.7%
Lower GI bleed with hemorrhagic shock	1	2.7%	Large bowel obstruction benign Sigmoid colon stricture	1	2.7%
Gall stone ileus with acute small bowel obstruction	1	2.7%	Recurrent retroperitoneal Sarcoma	1	2.7%
Volvulus	1	2.7%	Pelvic Collection with right adnexal mass (Post LSCS)	1	2.7%
			Metastatic Adenocarcinoma deposits	1	2.7%
			Adenocarcinoma small bowel	1	2.7%
			Gastrointestinal stromal tumour	1	2.7%
			Metastatic SCC recto sigmoid junction	1	2.7%

1. Postoperative fever: There is a statistically significant difference between emergency and elective laparotomy with respect to postoperative fever (p=0.005 Pearson chi-square, 0.011 Fisher's Exact test). More patients in the emergency

laparotomy group experienced postoperative fever.

2. Paralytic ileus: There is no statistically significant difference between emergency and elective laparotomy with respect to paralytic ileus (p=1.000 Pearson chi-square, 1.000 Fisher's Exact test).
3. Postoperative nausea and vomiting (PONV): There is no statistically significant difference between emergency and elective laparotomy with respect to PONV (p=0.134 Pearson chi-square, 0.260 Fisher's Exact test).
4. Anastomotic leak: There is no statistically significant difference between emergency and elective laparotomy with respect to anastomotic leak (p=0.164 Pearson chi-square, 0.357 Fisher's Exact test).
5. Acute respiratory distress: There is a statistically significant difference between emergency and elective laparotomy with respect to acute respiratory distress (p=0.0222 Pearson chi-square, 0.46 Fisher's Exact test). More patients in the emergency laparotomy group experienced respiratory distress.
6. Sepsis: There is a statistically significant difference between emergency and elective laparotomy with respect to sepsis (p=0.022 Pearson chi-square, 0.046 Fisher's Exact test). More patients in the emergency laparotomy group experienced sepsis.
7. Cardiac complications: There is no statistically significant difference between emergency and elective laparotomy with respect to cardiac complications (p=0.555 Pearson chi-square, 1.000 Fisher's Exact test).
8. Stoma-related complications: There is no statistically significant difference between emergency and elective laparotomy with respect to stoma-related complications (p=0.164 Pearson chi-square, 0.357 Fisher's Exact test).
9. Acute renal injury: There is a statistically significant difference between emergency and elective laparotomy with respect to acute renal injury (p=0.064 Pearson chi-square, 0.54 Fisher's Exact test). More patients in the emergency laparotomy group experienced acute renal injury.
10. Burst abdomen: There is no statistically significant difference between emergency and elective laparotomy with respect to burst abdomen (p=0.151 Pearson chi-square, 0.493 Fisher's Exact test).

In emergency laparotomy out of 36 patients, 35 patients had complications irrespective of the grade of the complications (97.2%) whereas in elective laparotomy out of 36 patients, 21 had postoperative complications (58.3%) irrespective of the grade of the complications. In elective laparotomy the most common complications were Grade I complications, Grade II, III, IV complications were minimal and No Grade V complications were observed whereas emergency laparotomy had significant level of Grade I, II complications and increase incidence of Grade III & IV complications compared to elective laparotomy. Death (Grade V complication) was seen only in cases of emergency laparotomy. (Table 5)

DISCUSSION

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 [4]. The aim of meticulous postoperative care is early detection and immediate treatment of postoperative complications.

In emergency laparotomy, most common complication found were Grade I complications like post-operative fever (POF) seen in 55.6% followed by wound infection in 47.2%. Grade II complication wound dehiscence was seen in 19.46% in emergency laparotomy. Elective laparotomy showed Grade I complications like showed postoperative fever in 27.8% followed by wound infection in 16.7%. there was no wound dehiscence in elective laparotomy. A study done by Masood, J. et al, also recorded postoperative fever in 18.2% as the commonest complication, postoperative nausea and vomiting in 11.6% cases and wound infection in 11.4% cases after emergency laparotomy.[5]

Different studies Garibaldi, R.A. et al and Galicier, C. et al show this the most common complication after emergency as well as elective laparotomy. In our study, fever following emergency laparotomy was seen in 55.6 % cases and in elective laparotomy fever was seen in 27.8% of cases. Bansal A.R. et al in 2019 reported 68% of fever following emergency laparotomy[3] which is consistent with our studies. Most early postoperative fever (temperature above 38ºC/ 100.4ºF) for 48 hours or more is caused by the inflammatory stimulus of surgery and resolves spontaneously[6,7]. However, postoperative fevers can also be a manifestation of a serious complication. Pyrexia within 48 hours of surgery is often due to pulmonary atelectasis. Between 48 hours and five days, pyrexia may be the result of thrombophlebitis or infection of the urinary tract or the chest, and, more than five days after surgery, a wound infection or anastomotic breakdown should be suspected.[26] Between 7 to 10 days deep venous thrombosis and pulmonary embolus were the common causes. A study in critically ill surgical patients (Barie P.S. et al) showed that 26% of patients developed postoperative fever [8]. A low percentage of fever in elective laparotomy may be because of fewer chances of wound infection, chest infection and less critically ill patients in this group.

Grade I complications like wound infection is a well-recognized complication of surgical treatment and sometimes places a high burden on hospital resources.[1] It is the most common nosocomial

infection, accounting for 38% of all such infections. Post-operative wound infections have a major contribution to the post-operative morbidity of the patients[9]. In our study, post-operative wound infection was seen in 17 out of 36 (47.2%) patients in emergency laparotomy and 6 out of 36 (16.3%) patients in elective laparotomy. This value is at par on comparing this with the study done at mysore medical college done by Gangamma,K et al. in 2022 which is reporting wound infection in 47.2% of patients [10]. Low rate of wound related complications in elective laparotomy may be because of less contamination of peritoneal cavity and wound site at the time of surgery and better nutritional status of patient undergoing elective laparotomy.

Desa, L. A. et al found overall 38.28% wound infection rate in clean contaminated cases compared with 10.48% infection rate in clean cases.[11]. Foothill hospital study demonstrated that clean cases were associated with 1.5% wound infection rate while clean contaminated; 7.7%, contaminated; 15.2%, highly contaminated cases were associated with 40.0% wound infection rate. 47.2% wound infection after emergency laparotomy and 16.7% after elective laparotomy is consistent with foothill hospital study[12].

Other Grade I complications like Postoperative nausea and vomiting (PONV) are among the most common adverse events after surgery and anaesthesia [13]. Most episodes of postoperative nausea and vomiting resolve within 24 hours. A study done by Masood, J. et al, also recorded postoperative nausea and vomiting in 11.6% cases after emergency laparotomy[5] which is slightly lower than our studies. But the overall incidence of PONV is about 30 per cent but can be as high as 70 per cent in high risk patients.[14] In present study PONV documented in 16.7% cases after emergency laparotomy and 5.6% after elective laparotomy. Low incidence of PONV in present study may be with fact that postoperatively nasogastric tube was kept in situ till the drainage of nasogastric tube become decreases.

The study found that the incidence of pulmonary complications (GRADE II COMPLICATION) in emergency laparotomy was 25.0%, while only 5.6% of patients had pulmonary complications following elective laparotomy. These complications included acute respiratory distress, pulmonary pneumonia, and basal atelectasis. The incidence of post-operative pulmonary complications following emergency laparotomy found in the study is consistent with Gangwal et al.'s (2018) findings, which reported an incidence of 30.2% in a tertiary care center in Madhya Pradesh, India. [15]. Our study is also comparable to the study by hemmes et al. conducted in 2014 which reports 20% of postoperative pulmonary complications in open abdominal surgeries[16]. The incidence of post-operative pulmonary complication varies from 5 to 60% as reported by L.G.G. Serejo et al and Deodhar [17,18]. Another study done by Smith et al. in 2010 reported 7 % of postoperative pulmonary complications following all laparotomies which shows less rate of pulmonary complications than our study [19].

Gangamma K. et al in 2022 reported incidence of local Local complications included post-operative ileus (GRADE II COMPLICATION) (12.8%), stoma complications (skin excoriation, retraction, prolapse, obstruction, and ischemia) (7.2%) [10]. Stoma related complications in our study was 11.1% following emergency laparotomy and 2.6% following elective laparotomy which is at par with the study done by Gangamma K. in 2022. Another study done by Bansal AR. Et al. in 2019 reported 26% incidence of paralytic ileus following emergency laparotomy which is higher than our study [2].

In our study, wound dehiscence (GRADE III COMPLICATION) rate was 19.4% following emergency laparotomy and no case of wound dehiscence reported after elective laparotomy. Talukdar *et al*. [2016], reported 12.6% of patients developed wound dehiscence in their study. (27/213 patients) results of which is almost at par with our studies[20]. Makela et al. reported an incidence of 10%; their series include 30% patients operated emergently. [21]. Riou et al. found that 16 (51.6%) of their 31 dehiscence patients had an emergency surgery [22]. In another study wound dehiscence rate was observed to be 12 % in emergency (5/62), and 4 % in elective laparotomies (2/55) by Waqar et al, which is almost similar to that reported by Hanif [23]. Patients who undergo emergency surgery are generally in worse condition and nutritional state (hypoprotinemia), and the chance of contamination of the surgical field is higher than in elective surgery. Wound dehiscence is associated with considerable morbidity and causes increase length of hospital stay and postoperative stay.

Incidence of burst abdomen (GRADE III COMPLICATION) following abdominal surgery has been variably reported by authors like Wolff; 2.6%, Efron; 2.3%, Lehman at al; 2.5%, Parmar G; 5%.[24]. In spite of advancement in surgical techniques, facilities for modern equipment's and personal experiences, burst abdomen still play an important role in postoperative morbidity and mortality. Incidence of burst abdomen varies with underlying general condition, the type of operation and presenting pathology [25]. Hegazy et al. (2020) reported an incidence of burst abdomen of 12.4% in emergency midline laparotomy [26]. In our study incidence of burst abdomen following emergency laparotomy was 5.5%, while no case of burst abdomen found after elective laparotomy in present study. A high percentage of burst abdomen in emergency laparotomy in our setup is due to many factors mainly patients poor hygiene and comorbidity, and no doubt the underline disease pathology found per operatively.

In our study, Among gastrointestinal complications (GRADE III COMPLICATIONS), 2 (5.5%) cases of

faecal fistula was observed following emergency laparotomy and no case of fecal fistula was seen following elective laparotomy. Hatchimonji et al in 2016 conducted a retrospective study of adults presenting for gastrointestinal (GI) surgery from National Readmission Database and reported 1.1% incidence of enterocutaneous fistula after emergency abdominal surgery [27]. Edmunds reported 1.4% incidence of fistula in his study [23]. Fischer et al. in 2009 reported 1.9% incidence of enterocutaneous fistula in his study [28]. Anastmotic leak was observed in 2.8% (1 out of 36 patients) in elective laparotomy and 11.1% (4 out of 36 patients) following emergency laparotomy in our study.

In our study incidence of septicemia (GRADE II COMPLICATION) following emergency laparotomy was 25 % (9 out of 36 patients) and 5.6% (2 out of 36 patients) in elective laparotomy. Green G. et al reported 42 % incidence of septicemia (19 out of 55 patients) following emergency laparotomy which is higher than our studies[29]. Chauhan et al. in 2015 reported incidence of toxemia and septicemia in 28 out of 350 (8%) cases which is less than our study[1]. Postoperative septicemia can be related to preoperative sepsis, delayed presentation, co morbid conditions, and dehydration with acute renal injury.

Dewi et al. (2018) found that acute kidney injury (AKI) (GRADE IV COMPLICATION) was common in patients undergoing emergency laparotomy, occurring in no fewer than two-fifths (40%) of patients, and was associated with a greater than six fold increased risk of in hospital mortality (33.7% in the presence of AKI compared with 4.9% in the absence of AKI)[30]. Mikkelsen et al. (2022) reported 122 out of 703 (17.4%) surgical patients had AKI following major emergency abdominal surgery[52]. O'Connor et al. in 2016 conducted a systematic literature review and metaanalysis from 19 articles. AKI outcomes in 82,514 patients undergoing abdominal surgery was included. Pooled incidence of AKI was 13.4 % (95 % CI 10.9–16.4 %)[31]. AKI is a common complication after abdominal surgery and is associated with an increased risk of further non renal post-operative complications, prolonged hospital stay and mortality. Therefore, AKI should be regarded as an important surgical outcome measure and potential target for clinical interventions. Kim et al. [11] reported an AKI incidence of 1.3% in an American cohort of 217,994 patients undergoing high-risk intra-abdominal general surgery. High-risk procedures were defined as those that did not meet the low-risk criteria of outpatient procedures, hernia repair, cholecystectomy, gastric bypass and appendectomy. The cohorts were not sub-classified according to emergency or elective surgery, and it is therefore difficult to draw comparisons with this study[32]. In our study incidence of acute renal injury following emergency laparotomy was 13.9%.

In our study, 4 cases (11.1%) died (GRADE V COMPLICATION) in postoperative period after emergency laparotomy and no mortality recorded after elective laparotomy. Septicaemia found to be most attributable factor for mortality in postoperative period following emergency laparotomy. Jansson et al. in 2021 reported 14.2% mortality following emergency laparotomy within 30 days postoperatively in a retrospective study done for a period of 38 months (2014-2017)[33]. Howes T. E. et al. reposted overall 28-day mortality incidence was 13.9% following emergency laparotomy in 2015[34]. Both the studies had similar results with our studies.

CONCLUSION

This study highlights that postoperative complications after abdominal surgeries can increase patient morbidity and mortality and that they are an important target for quality improvement programs. The study found that emergency laparotomy was more common in male patients, while elective laparotomy was more common in female patients. The majority of patients were in their 5th to 6th decade of life. The study also found that complications were more common in emergency laparotomy, particularly in cases of delayed presentation. The authors suggest that early detection, immediate intervention, and adequate health education are necessary to minimize complications. The study highlights that while some risk factors are not modifiable, prompt assessment, early resuscitation, timely access to surgery, senior staff involvement, and appropriate postoperative care can potentially improve patient outcomes. The study can serve as a database for future comparisons and can be useful for clinicians, individuals, and families facing the decision of undergoing emergency or elective abdominal surgery. However, the study has limitations, and future studies should focus on the effect of complications on outcomes that are important to the patient.

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