



# International Journal of Surgery Science

E-ISSN: 2616-3470

P-ISSN: 2616-3462

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2020; 4(2): 233-236

Received: 17-02-2020

Accepted: 19-03-2020

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## Comparative study of postoperative complications in elective versus emergency laparotomy at JSS hospital

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DOI: <https://doi.org/10.33545/surgery.2020.v4.i2d.423>

### Abstract

**Background:** Laparotomy is a commonly performed procedure in any surgical unit. The incidence of postoperative complications are higher after laparotomy particularly in emergency. In surgical language, “the word laparotomy explains exploration of the abdomen and proceed further according to the cause identified”. Postoperative complications directly affect the outcome of the disease.

### Aims & Objectives:

- To document the postoperative complications of laparotomy and its comparison between elective versus emergency laparotomy done at JSS hospital.
- To study the incidence of morbidity and mortality encountered after emergency and elective laparotomy.

**Methodology:** This is a prospective studies conducted at Department of General Surgery of JSS Hospital mysore, Karnataka during period of December 2017 to June 2019. All patients who underwent laparotomy (elective or emergency) were included in this study. Demographic data about patients were noted in performa, all the complications were compared according to nature of laparotomy and patients were followed for 30 days postoperatively.

**Result:** A total of 100 patients were undertaken, 50 patients in each group who underwent emergency and elective laparotomy respectively. Postoperative complications following emergency laparotomy included postoperative pain (72%), fever (50%), and postoperative nausea and vomiting (46%) followed by surgical site infection (38%), wound dehiscence (10%), respiratory tract infection (28%), cardiac complications (10%), renal complications (16%), gastrointestinal complications (16%), septicemia (14%) and mortality (10%). Postoperative complications in elective were minimum as compared to emergency laparotomy i.e postoperative fever (40%), postoperative nausea and vomiting (34%), surgical site infection (18%), respiratory complications (14%).

**Conclusion:** In comparison to elective laparotomy postoperative complications are more common in emergency laparotomy

**Keywords:** Complications, emergency, elective, laparotomy, postoperative

### Introduction

An explorative laparotomy is the surgical procedure performed with an objective of obtaining information that is not available via clinical and diagnostic methods. In surgical language, “the word laparotomy explains exploration of the abdomen and proceed further according to the cause identified” [1]. It is usually performed in patients with acute or unexplained abdominal pain, and in patients who have sustained abdominal trauma and occasionally for staging in patients with malignancy

Once the underlying pathology has been identified, “an explorative laparotomy may continue as a therapeutic procedure”; sometimes it serve as a means of confirming the diagnosis (as in the case of laparotomy and biopsy for intra-abdominal masses that are considered inoperable). These applications are different from laparotomy performed for the specific treatment, in which the surgeon plans and executes the therapeutic procedure.

Postoperative complications is defined “as any negative outcome as perceived by the surgeon or by the patient, and it directly affect the outcome of the disease” [2]. Post-operative pain, nausea, vomiting are 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,

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but they do occur in elective procedures also, which is a matter of concern.

Wound infection, wound dehiscence and incisional hernia remain challenging problems. "Preoperative antibiotic prophylaxis, effective and persistent skin antisepsis, avoidance of contamination and better surgical skills are most effective methods to reduce complications"<sup>[3]</sup>.

Wound infection is the most important single factor in the development of burst abdomen and incisional hernia<sup>[3]</sup>.

Ancient surgeons recognized that foreign bodies and dead tissue must be removed from wounds.<sup>[4]</sup> "Lister, Semmelweis, Ehrlich, Fleming and Foley realized that bacteria prevented healing and lead to sepsis and death, and their control by asepsis, antisepsis and anti-microbials heralded a new era in wound management".<sup>[5]</sup>

## Materials and Methods

### Description of study

- a) Study Design: Longitudinal observational studies
- b) Study place: Department of General Surgery JSS Hospital, Mysore
- c) Study Duration: One and half year
- d) Sample size: Assuming proportion of post-operative complication as 40% and alpha error of 5% sample size estimated in each group is 50.
- e) Sampling technique and study population:
  - Study populations are all cases admitted in general surgery for laparotomy.
  - The following determinants will be taken into consideration in formulating the risk factors in our patients.
    1. Age
    2. ASA score
    3. Systemic diseases eg: diabetes mellitus, severe anemia, hypertension etc
    4. Duration of postoperative stay in hospital wards.
- f) Inclusion criteria
  5. All emergency and elective laparotomy patients admitted in general surgery at JSS hospital.
- g) Exclusion criteria
  1. Age less than 12 yrs.
- h) Study setting and Method of collection of data:
  - This study is conducted at department of general surgery in JSS Medical College, Mysore a tertiary care teaching institute and hospital, the target population is patient undergoing emergency/elective laparotomy admitted in general surgery.
  - The data of patients who underwent laparotomy will be noted on a proforma. a detailed history and clinical examination will be conducted basic investigation like RBS, CBC, Urine Analysis, Serum Electrolyte Urea, Creatinine, Ecg, Serology and Blood Grouping and Cross Matching would be done. Patient who presented with acute abdomen and need of immediate surgery will be first resuscitated and would be taken for emergency laparotomy.
  - In elective group patients beside preoperative evaluation as done in emergency laparotomy correction of any comorbidities condition like anaemia, diabetes, hypertension, respiratory infection will be done before laparotomy.
  - Patients will be followed up for a period of one month duration through telephone. Patients who were admitted but were absconded or didn't come for follow up will be excluded from the study.

### Post-operative distribution of complication are

1. Post operative fever.
2. Post operative nausea vomiting
3. Wound related complication like wound infection, wound gaping, burst abdomen.
4. Respiratory complication like Atelacatsis, Tracheobronchitis Pneumonia, Pleural Effusion, ARDS, Pulmonary Embolism.
5. Toxemia and Septicemia
6. Faecal fistula
7. Post operative obstruction
8. Deep vein thrombosis.
9. Renal and urinary complication
10. Cardio vascular complication like Arrhythmias, Myocardial Ischemia.

### Statistical Analysis

Statistical analysis: Following statistical tests will be used to compare the results:

1. Diagrammatic presentation
2. Mean +SD, proportion
3. Z test or chi square test
4. Regression analysis (if necessary)

### Discussion

The philosophy and tenets of safe abdominal surgery waited the waning years of the 19<sup>th</sup> century to be set forth. "William Stewart Halsted at John Hopkins hospital introduced triple approach of gentleness, asepsis, and hemostasis<sup>[1]</sup>", which was a fundamental for advanced surgical method.

Laparotomy are performed as elective and emergency. The emergency laparotomy for acute abdomen is the major test of surgical skills of a surgeon. Postoperative complications is defined as any negative outcomes perceived by the surgeon or by the patient which is encountered after any surgery<sup>[3]</sup>, but key to success is the early detection and prompt management.

Postoperative care is as essential as the preoperative preparation for a successful outcome, lack in either can produce unsatisfactory result irrespective of standard surgery care. "The main aim of meticulous postoperative care is early detection and immediate response for postoperative complications<sup>[5]</sup>".

In this study complications after emergency laparotomy was recorded in 70% of patient whereas in elective it was in 40% of patient. In emergency laparotomy most common complications was found to be postoperative pain in 70% of patient, fever in about 50% of patient, postoperative nausea and vomiting in 46% of patient, septicemia in 14% of patient, surgical site infection accounting for 38% of patient, pulmonary complications in 18 % of patient. In elective laparotomy most common complications was found to be postoperative fever around 40%, PONV around 20% and hematoma collection were found more in elective group. Wound complications were on lesser side in elective group of patients due to proper surgical technique and preoperative care. Gastrointestinal complications were also lower in elective patients due to proper preoperatively bowel care

"A study done by International Surgery Journal Chauhan S *et al.* Int Surg J. 2017 Aug; 4(8):2730-2735 state that complication rate after emergency laparotomies is higher as compared to the elective laparotomies and the commonest problem being post operative fever and wound infection<sup>[9]</sup>".

Several studies shows that fever was among the commonest postoperative complications<sup>[6, 7]</sup>. In this study also fever is the most common complications accounting for 60% in emergency laparotomy and 40% in elective laparotomy. Early postoperative

fever (within 24hrs) are caused due to inflammatory stimulus of surgery and it resolves spontaneously [8, 9]. Fever within 48hrs are often due to pulmonary atelectasis. Fever at postoperative day 3 is mostly due to pneumonia or urinary tract infection. Fever on POD<sup>5</sup> results due to thrombophlebitis and pod<sup>7</sup> mainly due to pulmonary embolism and wound infection.

Postoperative nausea and vomiting (PONV) was the most common adverse events after surgery and anaesthesia [12]. Overall incidence of ponv is 30% to 70% of patients [23]. In present study PONV in emergency laparotomy are more in number around 46% as compare to elective that is 34%. Mostly Ponv resolves within 24hrs.

Another study done by “Deepak R. Chavan, B.B. Metan, Somani Rushabh, Bharat Shankar, this study state that lapratomy wound complications are multifactorial and demonstrated postoperative wound complication in emergency is (25%), and elective is (14%), and it mainly depends on higher ASA score, and condition of patient [11].”

“Postoperative wound infection ranges in severity from the minimal stitch abscess to the extreme virulent infection leading to generalised septicaemia or death in some cases”. S<sup>3</sup> wound infection is an important complications of surgical treatment and its huge burden on hospital resources [14]. “It is the most common nosocomial infection accounting for 2% to 38% according to national nosocomial infection surveillance system reports.” In present study surgical site infection accounts for 38% in emergency laparotomy whereas 18% in elective laparotomy. SSI is less common in elective due to less contamination of peritoneal cavity and wound site, and patient have better preop nutritional status. “Incidence of burst abdomen reported by different. Authors like Wolff 2.6%, EFRON 2.3%, Lehman *at al.* 2.5%”. Incidence of burst abdomen in this study shows 10% in emergency laparotomy as compared to elective which is 4 % [26].

This study of Postoperative Pulmonary Complications(PPC) after Laparotomy done by “Peter R. Smith a Muhammad A. Baig a Veronica Brito a Fayez Bader a Michael I. Bergman a Antonio Alfonso b a Division of Pulmonary Medicine, Department of Medicine, and Department of Surgery, Long Island College Hospital, Brooklyn, N.Y., USA published on 28<sup>th</sup> Oct 2009, The study state that the frequency of PPC after laparotomy and risk factor for occurrence, they found 7% incidence of PPC after laparotomy and mortality was also high approx 16% with PPC and 3% without PPC”.

In present study pulmonary complication after emergency surgery was around 28% whereas in elective was 8%. Respiratory complications can be lowered down by effective preop control of respiratory infection and early postop physiotherapy [14].

“Edmunds reported 1.4% incidence of fistulae in his study” [15], in this study intestinal fistulae was reported in 1% of emergency laparotomy and other complications like paralytic ileus with

abdominal distension occurred in around 8% of emergency laparotomy patient.

Septicaemia is a grave complications seen after emergency laparotomy accounting of 14% in emergency laparotomy compared to 4% in elective laparotomy [16].

Deep vein thrombosis is considered to be the significant cause of morbidity and mortality, in present study mortality rate was 4% in emergency laparotomy patient.

## Results

- In this study total 100 patient underwent for laparotomy, 50 patient were in each group of elective and emergency laparotomy. In emergency group 80% patient were male and mean age was 47 yr. The majority of cases in emergency group were acute abdomen /peritonitis. Peritonitis secondary to perforation were 52%, blaunt /penetrating trauma abdomen were 12%, acute intestinal obstruction 14%, appendicular abscess 10%, others were SMA thrombosis, volvulus and strangulated hernia.
- Most common complications evident was post operative pyrexia in 50% of patients, followed by wound related complications in 38% of patients, and postoperative nausea and vomiting accounting for 23%. Respiratory complications were seen in 28% of patients, toxemia and septicemia were seen in 14% of patients. Deep vein thrombosis was seen in 2 patients and total mortality in emergency laparotomy were seen in 10% of patients.
- In elective group 52% patient were male and mean age was 49 yr. The majority of cases in elective group were carcinoma colon accounting for 26%, Periapillary carcinoma were 20%, gastric outlet obstruction was around 8%, others were CBD malignancy/calculi, blaunt trauma abdomen and sub-acute intestinal obstruction.
- Most common complications evident was post-operative pyrexia in 40% of patients, followed by wound related complications in 18% of patients, and postoperative nausea and vomiting accounting for 17%. Respiratory complications were seen in 13% of patients, toxemia and septicemia were seen in 4% of patients. Deep vein thrombosis were not present and total mortality in elective laparotomy were seen in 2% of patients (majority due to septicemia).

**Table 1:** Emergency laparotomy cases

Stab Injury/ Blaunt Trauma	6	12.0	12.0	12.0
Mesenteric Ischemia/ Sma Thrombosis	3	6.0	6.0	18.0
Perforation	26	52.0	52.0	70.0
Intussusception/ Volvulus	3	6.0	6.0	76.0
Acute Intestinal Obstruction	7	14.0	14.0	90.0
Appendicular Abscess	3	6.0	6.0	96.0
Strangulated Hernia	2	4.0	4.0	100.0
Total	50	100.0	100.0	

**Table:** Elective laparotomy cases

Surgery	Frequency	Percent	Valid Percent	Cumulative Percent
Subintestinal obstruction	5	10.0	10.0	10.0
Carcinoma Colon	13	26.0	26.0	36.0
Periapillary Carcinoma	10	20.0	20.0	56.0
CBD Calculi/Malignancy	14	28.0	28.0	84.0
Blunt Trauma Abdomen	1	2.0	2.0	86.0
Gastric Outlet Obstruction	4	8.0	8.0	94.0
Ovarian Tumor	3	6.0	6.0	100.0

## Conclusions

- Postoperative complications increases 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. When we studied possible complications following elective and those following emergency surgery a debatable issue was the possibility of significant differences between them. In present study the complications rate after emergency laparotomies is higher as compared to elective laparotomies. The commonest problems being postoperative fever, wound infection and nausea and vomiting.

## Limitations

In this study, the late postoperative complication like was not included since the follow up period was only for one month Duration.

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