

Original article:

Factors affecting morbidity in patients undergoing emergency abdominal surgery

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Abstract:

Background: Emergency abdominal surgery adversely affects surgical outcomes. Predictors of increased morbidity and mortality of emergency abdominal surgery are known. We determined the predictors of post-operative complications of emergency abdominal surgery. Age, sex, blood urea, serum creatinine, total protein, serum albumin, surgery duration and smoking were independent predictors of morbidity.

Methods: We conducted prospective study at J.J.M. Medical College, Davangere, patients who had an emergency abdominal surgery procedure from November 2012 to October 2014. Who underwent emergency abdominal surgery within 12 hours of admission. Our primary outcome was post-operative complications within 30 days.

Results: Of 77 cases 33% had one or more complications with 6% mortality within 30 days. Common complications are surgical site infections and respiratory.

Conclusion: Emergency abdominal surgery patients with post-operative complications are likely to be older, male, smokers, have increased blood glucose and creatinine levels, lower serum albumin levels and longer surgical times. Fluid resuscitation and experienced surgical teams are putative targets to improve outcomes.

Key words: Emergency, Abdominal Surgery, Factors, Morbidity, Post-operative, Complications

Introduction:

Emergency surgery is defined as non elective surgery that is performed with the aim to prevent morbid or fatal health consequences of a surgically treatable disease.^{1,2}Emergency surgical presentation is one such situation where surgeon is faced with therapeutic dilemma. On the one hand, it is clear that most of these patients may have a limited life expectancy, while on the other surgical intervention appears to be unavoidable in these circumstances. Over past decade, there has been significant focus on reducing

postoperative complications.

Despite the focus on quality improvement in surgery, studies continue to show that emergency status contributes significantly to morbidity and mortality in patients undergoing abdominal surgery.^{3,4}The most common emergency abdominal surgical presentation is bowel obstruction, appendicitis, perforative peritonitis and bleeding. Emergency abdominal surgery patients who develop post-operative complications are more likely to be older,

male, smokers, have increased peri-operative blood glucose, creatinine levels and lower serum albumin levels.⁵ Those patients with complications also incur longer surgical times.⁶ Pre-operative intravenous fluid administration to adequately resuscitate patients, tighter glucose control and experienced surgical teams to decrease surgical times are putative targets to improve outcomes in patients undergoing emergency abdominal surgery.

Objectives:

- To determine the factors that contribute to morbidity associated with patients undergoing emergency abdominal surgery.
- To identify the risk factors that are potentially modifiable, which reduce post operative complications of emergency abdominal surgery

Methodology:

All patients coming to J.J.M. Medical college Davangere, in whom, emergency abdominal surgery was done within 12 hours of admission, studied over a period November 2012 to October 2014.

Inclusion criteria:

- All patients undergoing emergency abdominal surgery within 12 hours of admission in Chigateri General Hospital and Bapuji Hospital attached to J.J.M. Medical college Davangere, over a period of two years.

Exclusion criteria:

- Prior surgery within 30 days.
- Those patients who will leave the study in between, due to any reason.
- Age below 12 years.
- Immunocompromised patients

Method :

History of patients were noted.

APACHE SCORE calculation was done.

Post operative complications were noted which include bleeding, Surgical site infection(superficial, deep, organ space), sepsis, urinary(acute renal failure, urinary tract infection), cardiac, respiratory (pulmonary embolism, pneumonia), DVT. Broadly divided into two category i.e, patient with complications and without complications with factors which are sex, transfer (from home or other hospital), wound class, ASA class, DVT prophylaxis, antibiotic administration, sepsis, diabetes mellitus, steroid use, COPD, smoker. Investigations were done as per proforma.

Results:

Distribution of patients in our study is between 26 to 85 years, among which 23 patients are more than 55years and found to have more postoperative complications compared to young patients undergoing emergency surgery.

The number of male patients are high compared to females 33 (66%) are males and 17 (34%) are females.

In our study 31 patients were smokers among which 30 had postoperative complications, suggesting higher association between smoking history and postoperative complications. In our study 12 were coolie by occupation, 10 businessmen, 18 farmers and 10 were house wife respectively.

Distribution of patients belong to low to medium socioeconomic group.

Results:

Table – 1 : Diagnosis

Diagnosis	No of patients	Percent	Cumulative Percent
Acute appendicitis	11	22.0	22.0
Gangrene of jejunum	5	10.0	32.0
Gangrenous ileum	3	6.0	38.0
Gastroduodenal ulcer perforation	4	8.0	46.0
Ileal perforation	12	24.0	70.0
Intestinal obstruction due to adhesions	5	10.0	80.0
Peritonitis DU perforation	5	10.0	90.0
Strangulated inguinal hernia	5	10.0	100.0

21 patients presented with perforation (gastro-duodenal, ileal), 5 patients with small bowel obstruction , 8 patient with

gangrene of ilium and jejunum. Acute appendicitis in 11 patients and strangulated inguinal hernia in 5 patients.

Table – 2 : Distribution of clinical parameters (n=50)

Parameters	Mean	Std Deviation
Age	52.98	14.31
Pulse	99.6	11.84
SBP	122.72	18.29
DBP	76.2	12.4
Temperature	37	0.61
Respiratory Rate	21.28	2.09
Height	159.64	4.61
Weight	61.42	9.04

Table – 3 : Preoperative biochemical parameters

Parameters	Mean	Std Deviation
HB%	12.61	2.25
RBS	116.16	46.23
Blood Urea	41.18	19.27
Serum Creatinine	1.31	0.62
Total Protein	5.28	1.21
S Albumin	2.79	0.92

In our study 50 patients underwent emergency abdominal surgery among which 30 patients had postoperative complications.

Table 4 : Hb% and postoperative complications

Parameters		Complications		Statistical Analysis
		Yes N=30	No N=20	
HB% (gm/dl)	<11	25	4	$\chi^2=19.75, P<0.000$
	>11	5	16	

Anaemia is defined as Hb% <11 gm/dl. In our study chi-square values 19.75 with p-value <0.0000 i.e. higher association between Hb% and postoperative

complications is noted. Further from the table lower the Hb% has higher the postoperative complications.

Table 5 : RBS and postoperative complications

Parameters		Complications		Statistical Analysis
		Yes N=30	No N=20	
RBS (mg/dl)	<180	3	18	$\chi^2=31.52, P<0.000$
	>180	27	2	

Normal level of RBS is less than 180 mg/dl. RBS more than 180 mg/dl is called as hyperglycemia. In our study 29 patients have hyperglycemia among which 27 patients have postoperative complications,

chi-square values is 31.52 and p-value <0.000 i.e. higher association is noted with hyperglycemia and postoperative complications.

Table 6 : Blood urea and postoperative complications

Parameters		Complications		Statistical Analysis
		Yes N=30	No N=20	
Blood Urea (mg/dl)	<45	4	14	$\chi^2 = 29.17, P < 0.000$
	>45	26	6	

In this table 32 patients have increased level of blood urea of which 26 patients have postoperative complications. Chi-square value is 29.17 and p-value <0.000

i.e. higher association between increased blood urea and postoperative complications is noted.

Table 7 : Serum creatinine and postoperative complications

Parameters		Complications		Statistical Analysis
		Yes N=30	No N=20	
S. Creatinine (mg/dl)	<1.4	3	15	$\chi^2 = 22.0, P < 0.000$
	>1.4	27	5	

In our study 32 patients have increased level of creatinine i.e >1.4 mg/dl of which 27 patients have postoperative complications. Chi-square value is 22.0

and p-value is <0.000 i.e. significant association between increased level of creatinine and postoperative complications.

Table 8 : Serum albumin and postoperative complications

Parameters		Complications		Statistical Analysis
		Yes N=30	No N=20	
S Albumin (gm/dl)	<3	27	13	$\chi^2 = 8.95, P < 0.000$
	>3	3	7	

Serum albumin level <3 mg/dl is called as hypoalbuminemia. In our study 40 out of 50 patients have hypoalbuminemia of which 27 patient have postoperative

complications. Chi-square value is 8.95 and p-value is <0.000. i.e. there is higher association between hypoalbuminemia and postoperative complications.

Table 9 : Duration of procedure (min)

Duration of procedure	Complications		Statistical Analysis
	Yes N=30	No N=20	
< 60 min	2	3	$\chi^2 = 8.68,$ $P < 0.03$
60 - 90	4	1	
90 - 120	15	5	
> 120 min	9	11	

Chi-square value is 8.68, p-value <0.03 i.e. there is higher association between duration of procedure and complication. Further from table it is clear that greater the duration of procedure more is the postoperative complications.

This table shows distribution of postoperative complications. 14 patients have surgical site infection (SSI), 7 patients have multiorgan dysfunction syndrome (MODS), 1 patient have myocardial infarction (MI) and 2 patients have acute renal failure (ARF).



Fig. 1 : Acute appendicitis

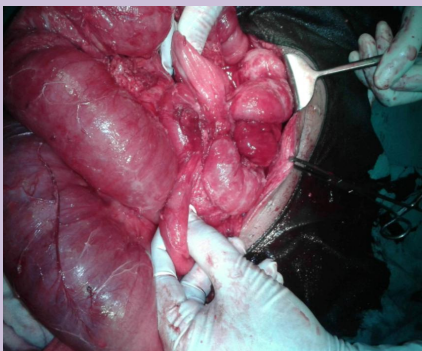


Fig 2: Intestinal obstruction due to adhesions

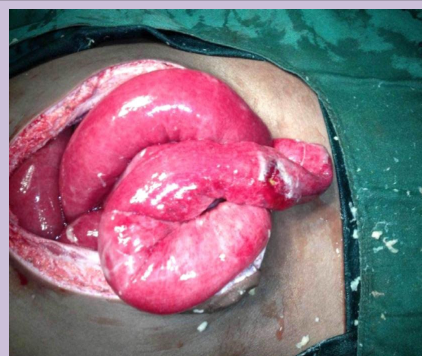


Fig. 3 : Ileal perforation



Fig. 4 : Gangrene of ileum

Discussion:

In our study 50 patients analysed of which 33(66%) patients were male and 17(34%) patients were female. In Akinbami et al¹ 42% were male and 58% were female. The patients in our study underwent emergency abdominal surgery were Appendectomy (11), Gastro-Duodenal ulcer perforation closure (4), Ileal Perforation closure (12), Resection anastomosis of Ileum (3), Resection anastomosis of Jejunum (4), Hernia surgery (5), Laparotomy with Adhesiolysis (5). Most of patients were Appendectomy and Gastro-Duodenal ulcer perforation.

Post operative complications in our study were identified in 30 patients (60%), in Akinbami et al¹ 202 (24.7%) cases were post operative complications within 30 days of procedure. 30 day mortality in our study were 3(6.0%) compare to Akinbami et al¹ 73(8.9%). Most common post-operative complications are surgical site infection and followed by respiratory complications. Mortality due to Multiple organ dysfunction syndrome, Acute renal failure, Myocardial infarction, Acute respiratory distress syndrome. Most of patients who underwent emergency surgery were 52(67%) patients less than 55 years and more than 55 years were 25(33%) patients. In out of 25 patients who more than 55 years, 16 patients have post operative complications and 4(80%) mortality in this patients. As increasing the age there is increased post-operative morbidity.

Patients who underwent emergency abdominal surgery, post

operative complications 76% were male and 24% were female, so morbidity is seen in our study more in male. The cause is still unknown.⁷ patients were smokers of which 30 patients have post-operative complications. Smoking causes reduce collagen synthesis and decreases oxidative killing mechanism of neutrophils. So smokers are increased susceptible for post operative complications.^{8,9} Hyperglycemia is known to have deleterious effect on wound healing. In our study only 29 patients had hyperglycemia and of which 27 patients have post-operative complications. So good glycemic control reduce the post-operative complications.

Increased blood urea when blood urea level more than 45mg/dl, 32 patients had increased blood urea level, 26 patients had post-operative complications. P value is 0.000 and chi square value is 29.17. So level there is higher association with postoperative complications. Increased blood urea level found in our study possibly due to hypovolemic, so patients may benefited by adequate intravenous fluid resuscitation. Which reduce the post-operative complications. Serum creatinine level more than 1.4mg/dl is called increased serum creatinine level. 32 patients had increased serum creatinine level, 27 patients had post-operative complications. Chi square value is 22.0 and p-value is 0.000. So there is higher association between increased serum creatinine level and postoperative complications.

Decreased serum albumin and total protein there is higher association

with post operative complications (p-value =0.000. In Golub's et al serum albumin level less than 3 have higher the post-operative complications. Post-operatively by giving intravenous supplementation of albumin or oral supplementation of protein will improve post-operatively.¹⁰

Duration of procedure also increases the post-operative complications. Finally composition of surgical team, that is taking care of emergency abdominal surgery may be modified. Recent support for acute care surgeons who address both trauma and emergent general surgery is an avenue that needs to be explored more rigorously. Such acute care surgeons may be able to potentially decrease the length of surgery and delays to surgery through their expertise.¹¹

Considerable progress has been made in surgical techniques, anesthesia procedures and post-operative patients care in terms of the results of surgical operation in the geriatric population, surgery remains a major cause of morbidity and mortality in elderly people due to their depleted physiologic reserves. It is an effort to decrease mortality rates, precautions should be taken beforehand

particularly to avoid complications observed in geriatric patients considering the high mortality rates observed in late stage complications. For instance, elderly patients with common conditions, such as acute cholecystitis incarcerated hernia, can be offered elective surgery to avoid emergency intervention.

Keeping systematic disease under control will render surgical operations safer.

Britt et al developed an acute care surgery model to decrease time delays to surgery by using daytime operating rooms and the experience of the surgeons to improve medical decision making.¹² Earley et al examined effects of this model on outcomes of patients undergoing appendectomies and found in decrease time to surgery, complication rate and length of stay.¹¹

Conclusions

By giving adequate intravenous fluid pre-operatively and post-operatively with tighter blood glucose and protein supplementation post-operatively will reduce postoperative complication so reduce the financial burden to the patients and hospital stay.

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