

Clinical Outcome of Emergency Laparotomy: Our Experience at tertiary care centre (A case series)

Vivekanand K.H^{*1}, Mohankumar K¹, Prakash Dave¹, Vikranth S. N¹ and T. N. Suresh²

¹Department of Surgery, Sri Devraj URS Medical College, Tamaka, Kolar, 563101 Karnataka, India

²Department of Pathology, Sri Devraj URS Medical College, Tamaka, Kolar, 563101 Karnataka, India

*Correspondence Info:

Dr. Vivekanand K.H

Department of Surgery,

Sri Devraj URS Medical College,

Tamaka, Kolar, 563101 Karnataka, India

E-mail: drvivekh74@gmail.com

Abstract

Introduction: Laparotomy is broadly used for any surgery requiring opening of abdominal wall and exploration of the underlying structures. Elective laparotomy indirectly implies that there is ample time for preoperative assessment and preparation of the patient. On the other hand, an emergency laparotomy is a lifesaving procedure, undertaken mostly in acute cases, without much preparation of the patient.

Materials and methods: This retrospective study included cases that underwent laparotomy for acute abdominal conditions between Jan 2013 to Jan 2014. We also studied the morbidity associated with each case and compared the results.

Results: Morbidity and mortality after emergency laparotomy is high. This incidence increases in cases with associated co morbidities like COPD, asthma, diabetes mellitus, hypertension, pneumonia, renal failure. Out of 100 cases of emergency exploratory laparotomy performed 56 cases were due to hollow viscus perforation in which duodenal perforation was most common accounting for 28 cases. However, the maximum mortality rate was seen with gastric (26%) followed by ileal (10.5%), duodenal (10.5%), and jejunal and colonic perforations (5.25%).

Conclusion: Most common condition for which emergency laparotomy was done was perforated peptic ulcer. The mortality and morbidity after emergency laparotomy is closely related to presence or absence of diabetes mellitus, hypertension, chronic renal impairment, cardiovascular disease (angina), asthma, liver disease, chronic obstructive pulmonary disease and metastatic disease and morbidity and mortality of patients who underwent emergency laparotomy is high when associated with these conditions.

Keywords: Emergency laparotomy, Acute abdomen, Clinical outcome, Associated co morbidities, Morbidity and mortality.

1. Introduction

The word laparotomy in Greek means 'soft or loose'. However Major indication for laparotomy can be divided into trauma and non-trauma depending upon the cause. Blunt trauma accounts for 80-90% of all civilian trauma cases, however, laparotomy is required in only 30-40% of such cases [1]. Emergency laparotomy is a commonly performed operation by general surgeons. It is frequently performed on with a variety of acute pathological disorders that render these patients dehydrated, hypovolemic, and suffering from a systemic inflammatory response often with incipient multiple organ failure [1,2]. Compared to elective surgery, emergency abdominal surgery is associated with a higher risk of morbidity and mortality, especially in patients over the age of 65 [3-

5], where 50% of these patients have significant associated comorbidities [6]. Mortality in such patients has been reported to be between 22-44% [3,5], and morbidity of 50% [7].

Mortality and complications in elderly patients undergoing emergency laparotomy depend on perioperative risk factors and delay in presentation and treatment. Patients with conditions that only permit palliative surgery such as cancer have particularly high mortality rates [5]. The acute physiological insult of abdominal pathology, added to chronic ill health, complicates the postoperative course [35].

Many scoring systems have been designed to predict mortality and morbidity in surgical patients;

however, these systems are complex and require the collection of several clinical and pathological parameters that may not be available before the patient is taken for emergency surgery [8-10]. As a result, none of these classification systems has found a place as a routine part of clinical practice in surgery.

It would therefore be very useful to have a classification system based on clinical and laboratory measures that is able to provide an objective assessment of morbidity and mortality before undertaking surgical management [11,12]. In the elective surgery setting, the ASA score is a commonly used system for prediction of morbidity and mortality; however, it is not specific to any particular procedure or specialty and does not allow for calculation of mortality and morbidity in emergency laparotomy [13,14]. It also is associated with a wide range of subjective judgments in its categorization [15].

The body's response to intra-abdominal pathology is known as systemic inflammatory response and this may lead to multiple organ failure. These conditions are common in emergency surgery and carry high mortality rates. The typical metabolic responses are characterized by increased oxygen consumption and demand, hyperglycaemia and accelerated protein catabolism, and subclinical perfusion deficits [16]. Many patients present with incipient multiple organ failure manifested by dysfunction of one or more organs. Thus any prognostic system must take into account both the pre-morbid condition and also the metabolic derangement induced by the acute abdominal pathology.

This study includes a wide variety of patients admitted for conditions requiring emergency laparotomy. The aim of this study was to review 1 year of experience in the knowing the most common conditions requiring emergency exploratory laparotomy.

2. Materials and methods

2.1 Sample

We divided cases for risk of morbidity and mortality following emergency laparotomy. The risk categorization was based on preoperative existing comorbidities and acute disturbances of physiological parameters. The risk categorization of morbidity and mortality was derived from multivariate analysis of pre-morbid conditions and acute physiologic parameters. These parameters were correlated with operative findings, and postoperative morbidity and mortality. We included patients who presented with acute abdominal pathology requiring midline laparotomy during their acute hospital admission.

2.2 Data collection

The samples which we studied are the patients who got admitted in R.L. Jallappa Hospital, Tamaka, Kolar, a rural tertiary centre; Study done in cases who got admitted in between Jan 2013 to Jan 2014.

Preoperative data collected included age, gender, blood pressure, heart rate, temperature and urine output. We also collected preoperative laboratory data including white cell count, haemoglobin, creatinine, urea and electrolytes (LFT, coagulation profile and acid-base status) we also collected data on associated comorbidities including chronic renal impairment, cardiovascular disease (hypertension, angina, cardiac failure, stroke, and coronary revascularization), asthma, chronic obstructive airway disease, liver disease, metastatic cancer, and diabetes mellitus.

Other data were collected to evaluate in-hospital outcome including type of surgical procedure, findings at laparotomy, final diagnosis, intensive care admission, in-hospital mortality and complications.

Associated medical comorbidities were recorded according to their systemic nature and severity. These were graded according to severity (0= no pathology, 1= mild disease, 2= moderate to severe disease). A grade two was given to patients with moderate to severe impairment of any system resulting in a clinically evident chronic physiologic impairment such as chronic obstructive pulmonary disease, end-stage renal failure, severe coronary artery disease requiring coronary artery bypass or resulting in moderate to severe left ventricular impairment. Patients with three or more comorbidities were also given a grade two.

Primary outcomes were major complications and mortality within 30 days. Major complications were defined as postoperative continued systemic sepsis, pneumonia, requirement for vascular or respiratory support in the intensive care unit, wound dehiscence, anastomotic leak, acute renal failure, myocardial infarction and venous thrombo embolization

Mortality and complication rates were calculated for different surgical diagnoses, procedures and associated comorbidities. Laboratory parameters, clinical pre-morbid conditions and surgical procedures were correlated with the risk of mortality and the rates of complications. Patients were finally divided into groups according to their acute physiologic status and chronic systemic condition to grade the likelihood of death or complications.

3. Results

Table 1: Mortality v/s sex

Sex	Survived	Expired	Total
Males	68(85%)	12(15%)	80
Females	13(65%)	07(35%)	20
Total	81	19	100

Females (35%) has the higher rate of mortality compared to males (15%)

3.1 Mortality v/s time of presentation

The time of presentation of patients ranged from < 24 hours to 4 days. Most of the patients presented in 1-3 days. Mortality increased correspondingly with delay in presentation. It was 2.38% for < 24 hours, 39.28% for 3 days and 62.5% for 4 days and above.

3.2 Mortality v/s site of perforation

Duodenal perforation was the commonest followed by gastric, ileac, jejunal and colonic perforations. However, the maximum mortality rate was seen with gastric (26%) followed by ileal (10.5%), duodenal (10.5%), and jejunal and colonic perforations (5.25%).

Table 2: Mortality v/s age group

Age group	<20 years	20-40 years	40-60 years	60 years and above
No of patients died	1	5	5	8
Total	11 (9%)	45 (11%)	34 (15%)	10 (80%)

As the patients age increases mortality rate increases, as seen above patients with 60 years and above has highest mortality of 80%, as age reduces mortality rate reduces.

Table 3: Causes of laparotomy

Cause	No. of patients	%
Duodenal perforation	28	28
Gastric perforation	22	22
Ileal perforation	07	07
Jejunal perforation	03	03
Colonic perforation	02	02
Acute intestinal obstruction	16	16
Subacute intestinal obstruction	02	01
Blunt trauma abdomen	10	10
Penetrating trauma abdomen	05	05
Appendicular abscess	02	01
Liver abscess	01	01
Pelvic abscess	01	01
Intussusception	01	01
Total	100	100

Out of 100 cases of emergency exploratory laparotomy performed 56 cases were due to hollow viscus perforation in which duodenal perforation was most common accounting for 28 cases. Next most common cause is acute intestinal obstruction

accounting for 16 cases out of which 08 cases were due to postoperative adhesions, 3 were malignant obstruction, 2 were TB abdomen, 2 were stricture causing obstructions and 1 was due to SMA occlusion.

Table 4: Outcome of exploratory laparotomy in form of complications

Complications	Number	%
Wound dehiscence	15	19.23
pneumoniae	04	15.38
Cardiac complications	08	10.25
Prolonged paralytic ileus	08	10.25
Enterocutaneous fistula	01	3.84
Anastomotic leak	01	3.84
Biliary peritonitis	03	3.84
Faecal peritonitis	01	1.28
Acute renal failure	03	3.84
Systemic sepsis	02	2.56
DVT and pulmonary embolism	01	1.28
DIC	01	1.28
Death	19	24.35
Total	67	100

Out of 100 laparotomy performed postoperative complications was found in 67 patients, wound dehiscence was the most common accounting for 15 cases, pneumonia was cause for wound dehiscence in 04 patients. Prolonged paralytic ileus was found in 8 patients all of whom recovered gradually. Pneumonia found in 12 patients leading to death in 4 patients. Cardiac complications were found in 08 patients in the form of cardiac arrest in 07 patients and M.I in 1 patient. Death occurred in 19 patients out of which 8 were due to cardiorespiratory

arrest, 4 were due to pneumonia coexisting with CRF in 1, 3 deaths were due to biliary peritonitis, 2 were due to septicaemic shock, 1 due to hypovolemic shock, 1 death due to anastomotic leak, 1 due to DVT and pulmonary embolism, 1 due to enterocutaneous fistula and 1 due to Disseminated intravascular coagulation and due to faecal peritonitis. Out of 19 deaths occurred preexisting medical comorbidity was found in 10 patients. Out of 19 mortality 12 patients was in ICU and 5 patients were shifted to ICU before mortality and 2 patients died in ward.

Table 5: Comorbidities associated

Comorbidity	No of patient	Percentage (%)
Asthma	06	12
COPD	24	48
Diabetes	08	16
Hypertension	05	10
ARF	03	06
CRF	04	08
Total	50	100

Out of 100 cases of Laparotomy performed medical comorbidity was found in 50 cases in which COPD was most common accounting for 24 cases, Diabetes in 08 cases and hypertension in 5 cases and together diabetes and hypertension found in 6 cases and Renal failure found in 07 patients and out of which 4 were due to chronic renal failure.

3.3 Evaluation of scoring system (Mannheim Peritonitis Index-MPI)

The minimum score of presentation was 10 while maximum was 30. Maximum patients were in

the range of 11 – 20. The mortality increased exponentially for score 26 and more. To evaluate mortality rate more analytically 86 patients were in score < 26 while 14 had more than 26.

The mortality rate was (93%) in patients with score more than 26 while it was 4.76% inpatients with scores b/w10-19and 13% b/w 20-25. By this we can predict that patient with MPI score of more than 26 has higher chances of mortality compared to patients with score of less than 26.

Studies by few authors, who found difference in mortality in different age groups

Study	Mean age of non survivors
Present study	60 years
Singh R, et al[31]	56.2 years
Yoshiko K, et al[30]	50 years
Wacha H, et al[32]	56.4 years
Rajesh V, et al[33]	60 years
Ozalp N et al[34]	64.8 years

Study Mortality	Females	Males
Present study	35%	15%
Yoshiko K, et al [30]	15.2%	5.3%
Wacha H, et al [32]	49.2%	0
Chandrashekar N, et al[35]	21.40%	0

MPI Parameter	P value	Significance
Age >50 years	0.0099 (<0.001)	Highly Significant
Sex- female	0.3434 (>0.001)	Not Significant
Organ failure	0.0001 (<0.001)	Highly significant
Duration >24hrs	0.0008 (<0.001)	Highly Significant
MPI score	0.0001 (<0.001)	Highly Significant

From the above table and the statistical analysis, four factors listed in the MPI seem to be highly significant for the prognosis of the patient and directly correlate with the outcome.

MPI Score	Expired	Survived	Total
20-25	3(13%)	20(87%)	23
MPI score 26 and more	13(93%)	01(7%)	14
Total	19	81	100

4. Conclusion

Most common condition for which emergency laparotomy was done was perforated peptic ulcer. The mortality and morbidity after emergency laparotomy is closely related to presence or absence of diabetes mellitus, chronic renal impairment, cardiovascular disease (hypertension, angina), asthma, liver disease, chronic obstructive pulmonary disease and metastatic disease and morbidity and mortality of patients who underwent emergency laparotomy is high when associated with these conditions.

MPI is a simple, useful prognostic index for Predicting the mortality of the patient. Proper awareness among the rural population, adequate health education to seek medical aid, proper referral mechanism and transportation can reduce the delayed presentation and in turn decrease both the mortality and morbidity.

References

- Zimmerman JE; Wagner DP; Draper EA; Wright L; Alzola C; Knaus WA. Evaluation of Acute Physiology and Chronic Health Evaluation III predictions of hospital mortality in an independent database. *Critical Care Medicine* 1998; 26: 1317-1326.
- Tekkis PP, Kocher HM, Bentley AJE, Cullen PT, South LM, Trotte GA, Ellul JPM. Operative mortality rates among surgeons. Comparison of POSSUM and p-POSSUM scoring systems in gastrointestinal surgery. *Dis Col Rectum* 2000; 43: 1528-1532.
- Cook TM, Day CJ. Hospital mortality after urgent and emergency laparotomy in patients aged 65 yrs and over. Risk and prediction of risk using multiple logistic regression analysis. *Br J Anaesth* 1998; 80: 776-81.
- Linn BS, Linn MW, Wallen N. Evaluation of results of surgical procedures in the elderly. *Ann Surg* 1982; 195: 90-6.
- Arenal JJ; Bengoechea-Beeby M. Mortality associated with emergency abdominal surgery in the elderly. *Can J Surg* 2003; 46: 11-116.
- Waldron RP, Donovan IA, Drumm J, Mottram SN, Tedman S. Emergency presentation and mortality from colorectal cancer in the elderly. *Br J Surg* 1986; 73: 214-6.
- Kettunen J, Paaajanen H, Kostiaainen S. Emergency abdominal surgery in the elderly. *Hepatogastroenterology* 1995; 42: 106-8.
- Copland GP, Jones D, Walters M. POSSUM: a scoring system for surgical audit. *Br J Surg* 1991; 78: 356-360.
- Knaus WA, Zimmerman JE, Wagner DP et al. APACHE - acute physiology and chronic health evaluation: a physiologically based classification system. *Crit Care Med* 1981; 9: 591-597.
- Mohil RS, Bhatnagar D, Bahadur L, Rajneesh, Dev DK, Magan M. POSSUM and P-POSSUM for risk-adjusted audit of patients undergoing emergency laparotomy. *Br J Surg* 2004; 91:500-3.
- Jones HJS, de Cossart L. Risk scoring in surgical patients. *Br J Surg* 1998; 86: 149-157.
- Fazio VW, Tekkis PP, Remzi F, Lavery IC. Assessment of operative risk in colorectal cancer surgery: the Cleveland Clinic Foundation colorectal cancer model. *Dis Colon Rectum* 2004; 47: 2015-24.
- Wolters U, Wolf T, Stutzer H, Schroder T. ASA classification and perioperative variables as predictors of postoperative outcome. *Br J Anaesth*.1996; 77: 217-22.
- Tiret L, Hatton F. Prediction of outcome of anaesthesia in patients over 40 years: a multifactorial risk index. *Statistics in Medicine* 1988; 41: 83-90.
- Owens WB, Felts JA, Sitznagel EL. ASA physical status classification: A study of consistency of ratings. *Anaesthesiology* 1978; 49: 239-243.
- Beal AL and Cerra FB. Multiple organ failure syndromes in the 1990s. Systemic inflammatory response and organ dysfunction. *JAMA* 1994; 271: 226-233.
- Rivers E, Nguyen B, Havstad S, Ressler J, Muzzin A, Knoblich B, Peterson E, Tomlanovich M, for the Early Goal-Directed Therapy Collaborative Group. Early goal-directed therapy in the treatment of severe sepsis and septic shock. *New Eng J Med* 2001; 345: 1368-1377.
- Awad SS. State-of-the-art therapy for severe sepsis and multisystem organ dysfunction. *The American Journal of Surgery* 2003; 186/5A: 23S-30S.
- Barlow AP, Zarifa Z, Shillito RG, Crumplin MKH, Edwards E, McCarthy JM: Surgery in a geriatric population. *Ann R Coll Surg Engl* 1989; 71: 110-4.
- Makela JT, Kiviniemi H, Laitinen S: Prognostic factors of perforated sigmoid diverticulitis in the elderly. *Dig Surg* 2005; 22: 100-106.

- [21] Prytherch DR, Whiteley MS, Higgins B, Weaver PC, Prout WG, Powell SJ. POSSUM and Portsmouth POSSUM for predicting mortality. Physiological and Operative Severity Score for the enumeration of Mortality and morbidity. *Br J Surg* 1998; 85: 1217-20.
- [22] Knaus WA, Draper EA, Wagner DP. APACHE II: a severity of disease classification system. *Crit Care Med* 1985; 13: 818-829.
- [23] Reiss R, Deutsch A, Nudelman I. Surgical problems in octogenarians: epidemiological analysis of 1083 consecutive admissions. *World J Surg* 1992; 16: 1017-21.
- [24] Playforth MJ, Smith GMR, Evans M, Pollock AV. Pre-operative assessment of fitness score. *Br J Surg* 1987; 74: 890-2.
- [25] Kennedy RH, al-Mufti RA, Brewster SF, Sherry EN, Magee TR, Irvin TT. The acute surgical admission: is mortality predictable in the elderly. *Ann R Coll Surg Engl* 1994; 76: 342-5.
- [26] Wacha H, Linder MM, Feldman U, Wesch G, Gundlach E, Steifensand RA. Mannheim Peritonitis Index – prediction of risk of death from peritonitis: construction of a statistical and validation of an empirically based index. *Theoretical Surgery* 1987; 1:169-77.
- [27] Goris RJA, teBoekhorst TPA, Nuytinck JKS, Gimbreere JSF. Multi-organ failure. Generalized autodestructive inflammation? *Arch Surg* 1985; 120: 1109-15.
- [28] LeGall J, Loirat P, Alperovitch A, Glaser P, Granthil C, Mathieu D. A simplified acute physiology scores for ICU patients. *Crit Care Med* 1984; 12: 975-977.
- [29] Elebute EA, Stoner HB. The grading of sepsis. *Br J Surg* 1983; 70: 29-31.
- [30] Yoshiko K, Masayuki N, Akihiko W, Hirofumi I, Teruyuki S, Takatsugu Y, et al. Study of Mannheim Peritonitis Index to Predict Outcome of Patients with Peritonitis. *Japanese J Gastroentero Surg* 2004; 37:7-13.
- [31] Singh R, Kumar N, Bhattacharya A, Vajifdar H. Preoperative predictors of mortality in adult patients with perforation peritonitis. *IJJCCM* 2011; 15:157-163.
- [32] Wacha H, Linder MM, Feldmann U, Wesch G, Gundlach E, Steifensand RA. Mannheim peritonitis index - prediction of risk of death from peritonitis; Construction of a statistic and validation of an empirically based index. *Theoretical Surgery* 1987; 1:169-177.
- [33] Rajesh V, Chandra SS, Smile SR. Risk factors predicting operative mortality in perforated peptic ulcer disease. *Trop Gastroenterol* 2003 Jul-Sep; 24(3): 148-150.
- [34] Ozalp N, Zulfikaroglu B, Bilgic I, Koc M. Evaluation of risk factors for mortality in perforated peptic ulcer in Ankara Numune Teaching Hospital, Ankara, Turkey. *East African Medical Journal* 2004; 8: 634-637.
- [35] Chandrashekar N et al., Prabhakar GN, Gurukiran CS, Shivakumarappa GM, Naveen H M. "Study of prognostic factors in perforative peritonitis". *Journal of Evolution of Medical and Dental Sciences* 2013; 2(30): 5568-5574.