



## Gastrointestinal Complication of Major Abdominal Surgeries and their Effect on Total Hospital Stay

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### Abstract

**Objective:** *This study sought to determine the influence of post operative gastrointestinal complication on the clinical outcome of the patients who underwent major abdominal surgeries.*

**Method:** *A prospective study was conducted on 100 patients who received major abdominal surgery due to emergency or elective cause admitted in surgical ward. Morbidity survey was used to evaluate the incidence of post operative complications. The influence of postoperative complications on both mortality and length of hospital stay was also assessed.*

**Results:** *Overall post operative gastrointestinal complication rate was 44% Post operative ileus and abdominal distension accounted for most of the complications. The incidence of post operative mortality was 10% being almost thrice with emergency operations as compared to elective operation<sup>5</sup>. The mean hospital stay was nine days for uncomplicated cases, 13 days for minor complication and 30 days for complication like enterocutaneous fistula.*

**Conclusions:** *Postoperative complication are frequent disorder that are associated with poor clinical outcomes; thus structural and procedural changes along with adequate preoperative preparation with risk assessment should be done to reduce postoperative morbidity and mortality.*

### Introduction

Recent estimates indicate that millions of major surgical procedures are performed worldwide each year<sup>1</sup>. The high risk non cardiac surgical population represents a major global healthcare challenge.<sup>2,3,4,5,6,7</sup>. The incidence of post operative complication and death over all is low, but the subgroup of high risk patients accounts for over 80% of postoperative deaths, even though these high risk patients account for fewer than 15% of in-patient procedures<sup>4,6</sup>. Advanced age, Co-

morbid disease, and major and urgent surgery are the key factors associated with increased risk<sup>4,6,7</sup>. Patients undergoing major abdominal surgeries are typical representation of such high risk patients. Despite strong evidence of their impact on poor surgical outcomes, our understanding of standards of postoperative care is limited. Many unnecessary avoidable complication can simply be eliminated by adequate preoperative work, meticulous examination and improvement of the pre-procedural medical condition of patient. Here

comes the concept of operative risk, which is defined as sum total of abnormalities of all organ system and their interactions, those determining the outcome of an operation. The approach for minimizing operative risk should be to identify the patient at risk, identify the system at risk, prevent and protect against complications and failure of that organ system, thus improving outcome. Postoperative complications are frequent events, particularly among patients at high risk<sup>8</sup>. These complication have both clinical effects during the immediate post operative period and long term effects on quality of life impairment and increased mortality<sup>9</sup>.

This study was designed keeping following objectives in mind:

1. To select the patients undergoing major abdominal surgery either in hepatobiliary or gastrointestinal system and urinary system.
2. Assessment of post operative course and complication in gastrointestinal system leading to their effect in increased duration of hospital stay.

### Material and Method

Present work is based on 100 cases submitted to various abdominal operations in general surgery department in J.A. Group of Hospital G.R. Medical College Gwalior from 1 Jan 2012 to 31 Dec 2012. Patients of all ages and sexes have been

### Observation

**Table 1** Age Distribution

Age Group	No. of Cases
Below 10 Yrs.	5
10-19 Yrs.	9
20-29 Yrs.	30
30-39 Yrs.	21
40-49 Yrs.	10
50-59 Yrs.	13
60 Yrs. and above	12

Maximum Number of cases was in age group 20-29 Yrs. youngest patient was 1 day old boy and eldest was a 90 years old male.

included in this study, who have undergone any intra-abdominal procedure emergency or elective, intra or extra peritoneal however patients having operations on parities and hernia have been excluded. Preoperatively proper history was elicited along with clinical examination followed by necessary laboratory and radiological investigation to confirm the diagnosis. Pre-operative correction of anemia and dyselectrolytemia was done. Adequate gastric lavage was done in elective pyloric stenosis cases and scrupulous bowel preparation was done in cases undergoing routine large bowel surgery. All patients submitted to emergency operations received Inj. Monocef amikacin and metronidazole. Almost all cases were operated under general anaesthesia except few undergoing prostatectomy in whom spinal anaesthesia was given. A classification put forth by Gordh<sup>10</sup> was followed to assess the degree of risk.

**GRADE I RISK** – A patient in whom pathology to be treated surgically is localized and is not causing systemic disturbance.

**GRADE II RISK** – A moderate but definite systemic disturbance caused either by condition to be treated surgically or by a preoperative complication elsewhere.

**GRADE III RISK** – Severe systemic disturbances from any cause.

**GRADE IV RISK** – A patient in extreme systemic disturbance.

**Table 2** Sex Distribution

Sex	No. of Cases
Males	74
Females	26

Males outnumbered the females in ratio of 3:1.

**Table 3** Associated Conditions Present

Associated Condition	No. of Cases
Anemia/Hypoproteinemia	42
Chronic Bronchitis	06
Pneumonitis	04
Pulmonary Tuberculosis	03
Bronchial Asthma	01

Out of 100 patients, 56 had a pre-existing complications as a result of primary disease itself while a number of patients had more than one such complications. Anemia/Hypoproteinemia was the most frequent associated conditions.

**Table 4** Distribution According to grade of Risk  
(As per Gordh's Classification 1949)

Risk	No. of Cases
Grade I	32
Grade II	50
Grade III	16
Grade IV	2

Maximum number of patients were in grade II risk. The main aim of this grading was to find out the relationship of patient's Pre-operative status with postoperative morbidity and mortality.

**Table 5** Duration of Operation and Anaesthesia

Duration in minutes	No. of Cases
Up to 60	16
61 to 120	63
121 to 180	17
Max. than 180	4

Out of 100 operative procedures, maximum numbers 63, lasted 1 to 2 hours. Only 4 cases lasted more than 3 hours.

**Table 6** Type of Anaesthesia

GA	96
SA	04

General anaesthesia was administered in 96 cases. Spinal anaesthesia was given only in 4 cases of BPH due to pre-existing respiratory disease.

**Table 7** Distribution According To Types Of Surgery In Relation To Over All Morbidity and Mortality.

Types of Surgery	No. of cases	With Complication	Deaths	Emergency	Elective
Gastroduodenal	11	4	1	7	4
Small Intestine/Appendix	50	25	4	45	5
Large Intestine	10	4	2	6	4
Hepato Biliary tract	18	7	1	6	12
Urinary System	7	2	1	3	4
Miscellaneous	4	2	1	2	2
Total	100	44	10	69	31

Out of 100 procedures performed, 31 were operated as elective and 69 as emergency

surgeries. Most of emergency surgeries was performed on small bowel and appendix while

open vesical and prostatic operations were most frequently under-taken amongst elective procedures. 44% of cases had one or more

complications in postoperative period while over all mortality was 10.

**Table 8** Incidence and pattern of gastrointestinal complication after various abdominal operations

Types of Surgery	No. of cases	Vomiting	Distension	Diarrhoea	Mechanical Obstruction	Ileus	Peritonitis	Gastrointestinal Fistula
Gastroduodenal	11	1	2	0	0	0	0	1
Small Intestine/Appendix	50	3	4	1	1	1	2	3
Large Intestine	07	1	1	0	0	0	0	1
Hepato Biliary tract	18	1	1	1	0	0	0	0
Urinary System	07	0	1	0	0	0	0	0
Miscellaneous	04	0	1	0	0	0	0	0
Total	100	06	14	5	4	8	2	5
Days of Occurrence		Within 6 hours	1-2 days	4-5 days	28-50 days	1-3 days	4-7 days	5-20 days

Post operative gastrointestinal fistulae and abdominal distension accounted for more than half complications. Most complications of

Gastrointestinal tract followed after surgery on small bowel and least occurred after surgery on urinary tract and appendix.

**Table 9** Incidence of GI Fistulae after various types of Gastrointestinal procedures.

Type of surgery	No. of Cases	With Fistulae
Gastroduodenal	11	1
Small bowel/Appdx.	50	3
Large Bowel	7	1

Maximum number of gastrointestinal fistulae followed small & large bowel surgeries.

**Table 10** Complications in cases of Gastrointestinal Fistulae

Nature of Complication	No. of cases with complication	Percentage
Infection (wound/peritonal)	4	80
Fluid and electrolyte imbalance	3	60
Malnutrition	4	80
Skin Excoriation	1	20
Intestinal Obstruction	2	40
Bed Sore	2	40
Septicemia	3	60
Thrombophlebitis	3	60

Out of the complication resulting directly from GI Fistulae, three main complications are infection, malnutrition and fluid and electrolyte imbalance. Table 9 also shows that amongst the complications resulting directly from fistulae, the commonest was malnutrition (80%) followed by septicemia 60%.

**Table 11** Causes of Death in 5 cases with external GI Fistulae

Cause of death	No. of cases	Percentage
Infection (wound/peritoneal)	4	80%
Electrolyte imbalance	5	100%
Malnutrition	3	60%

Electrolyte imbalance was invariably the most common complication leading to death resulting from GI fistulae followed by peritonitis and malnutrition

**Discussion**

Out of 100 cases of various abdominal surgeries, only 56 cases were discharged without any postoperative complication. Remaining 44 patients had one or more major or minor complications. Out of them 31 cases had only one complication while 17 cases had more than are postoperative gastrointestinal complications.

The high morbidity rate is explainable due to the fact that only 1/3rd of cases belonged to "Grade I risk" according to Gordh's classification. Moreover many patients with no definitive preoperative risk were kept in "Grade II or III" risk depending on nutritional status, anemia, cachexia, obesity, senility, infection etc.

**Morbidity**

**Table 1 :** Morbidity according to grade of risk

Risk	No. of cases	With complications	Percentage
Grade I	32	9	28.12
Grade II	50	19	38.00
Grade III	16	14	87.50
Grade IV	2	2	100.0
Total	100	44	37.00%

The incidence of morbidity increased steadily from "Grade 1 to Grade IV" risk. This is in accordance with Gordh's statement that the rate of

complications is directly proportional to the grade of surgical risk.

**Table 2 :** Distribution according to grade of risk

Age group (yrs)	No. of cases	With complications	Percentage %	Gr. I		Gr. II		Gr. III		Gr. IV	
				Number of cases	With complication	Number of cases	With complication	Number of cases	With complication	Number of cases	With complication
Below 10	5	3	50	2	1	2	1	-	-	1	1
10-19	9	3	77.7	5	1	2	1	2	1	-	-
20-29	30	10	68.2	10	2	15	6	5	2	-	-
30-39	21	9	71.8	6	2	13	5	2	2	-	-
40-49	10	6	83.3	2	1	7	4	1	1	-	-
50-59	13	5	85.3	3	1	8	3	3	1	-	-
60 and above	12	8	93.6	1	1	6	4	4	2	1	1

The incidence of morbidity increases with age, being maximum in the age group of 60 years and above. However, cases in younger age group of

10-19 years also had a high morbidity as many of them belonged to "Grade III risk", which itself had a high morbidity and mortality rate.

**Table 3 :** Morbidity according to sex

Risk	Males			Females		
	No. of cases	With complication	%	No. of cases	With complication	%
Grade I	20	10	50	10	4	40
Grade II	41	25	60.97	11	7	63.64
Grade III	12	8	66.66	4	2	50
Grade IV	1	1	100	1	1	100
Total	74	44	59.46	26	14	53.84

Sex per se does not seem to have any significant influence on the postoperative morbidity.

The incidence of morbidity was maximum after gastrointestinal operations mainly of large bowel followed by small bowel and gastroduodenal

region. The nature of primary disease and the severity of operations performed on gastrointestinal tract could be possible factors responsible for highest morbidity after these operations.

**Table 4 :** Morbidity according to duration of operation

Duration in minutes	No. of cases	Complication	Percentage
Up to 60	16	02	12.5%
61-120	63	27	42.85%
More than 120	21	15	71.42%

The patients who had longer duration of surgery suffered from higher percentage of morbidity because of the greater severity of operation and underlying pathology.

**Table 5 :** Morbidity according to urgency of operation

Type of surgery	No. of cases	With Complication	Percentage
Elective	31	9	29.03
Emergency	69	35	50.72%

Emergency operations had a higher rate of postoperative complications in concurrence with opinion of gordth's. It is also explained as emergency cases were high risk cases and had less time available for preoperative preparation

## Mortality

There were 10 deaths out of 100 cases giving an overall mortality rate of 10%.

**Table 6 :** Mortality according to grade of risk

Risk	No. of cases	With complications	No. of deaths	Percentage
Grade I	32	4	-	-
Grade II	50	29	03	10.34%
Grade III	16	13	05	38.46%
Grade IV	02	02	02	100%
Total	100	44	10	22.72%

Incidence of mortality was found to be directly proportional to the grade of risk. In our study mortality rate was 10%. But reported mortality rates after major abdominal surgery can be as high as 17%<sup>13</sup>, but are usually between 3% and 7%.<sup>14,15,16</sup>



**Table 7 : Mortality in relation to sex**

Sex	No. of cases	No. of death	%
Male	74	6	8.23
Female	25	4	15.34

Sex per se does not seem to play an important role in postoperative mortality. This greater percentage of mortality in females (3/4th) is due to fact that maximum of them belonged to grade II, III & IV in comparison to males, in whom only 2/3rd belong to the grade II, III and IV.

**Table 8 : Mortality according to age**

Age group (yrs)	No. of cases	No. of deaths
Below 10	5	2
10-19	9	1
20-29	30	1
30-39	21	1
40-49	10	1
50-59	13	2
60 and above	12	2
Total	100	10

There does not seem to be any definitive relationship between age and postoperative mortality. This ranging pattern in different age group is explainable on "grade of risk". High mortality in extremes of age group is because of the patients belonging to "grade III risk", while lowest mortality in age group 20-29 years can be explained du to maximum patients of this group belonging to "Grade I and II"

**Table 9 : Mortality according to duration of operation**

Duration in minutes	No. of cases	No. of deaths
Upto 60	16	1
61-120	63	3
More than 120	21	6
Total	100	10

The gravity of underlying pathology and severity of operation seem to have a direct influence upon mortality rate indirectly prolonging the duration of operation. Mortality was maximum in operations lasting for more than 2 hours.

The mortality was more in emergency operations (11.59% - 8 out of 69 cases) and less after elective procedures (6.4% - 2 out of 31 cases). Here also explanation lies in preoperative clinical status, underlying pathology severity, severity of operation and lack of adequate time for

preoperative preparation resulting in high mortality in emergency cases. It is also evident that maximum mortality was associated with small bowel surgeries followed by large bowel and gastroduodenal operations in that order.

**Table 10 Cause of postoperative mortality**

Cause of death	No. of cases
Gastrointestinal fistula	4
Peritonitis with toxemia	3
Renal failure	2
Haemorrhage	1
Total	10

Gastrointestinal fistula accounted for half of overall mortality due to severe electrolyte imbalance with or without sepsis. Peritonitis developed due to leak from anastomotic site, while renal failure developed due to prolonged pre-operative hypotension secondary to reactionary haemorrhage following traumatic spleen rupture.

Overall incidence of external gastrointestinal fistula was 5% in the present series. The incidence of gastrointestinal fistula following abdominal surgery in other studies have been ranging from 0-7% to as high as 19%<sup>12</sup>.

There were 4 cases of small bowel and colonic fistula out of 100 abdominal operations. Anastomotic breakdown was responsible for fistula formation. This is in accordance with Edmunds et.al<sup>11</sup> who stated that anastomotic

breakdown is the most common cause of postoperative gastrointestinal fistula. All cases developed external gastrointestinal fistulae

between 5th-21st postoperative days. The average day of occurrence of fistula is 9th Postoperative day.

**Table 11 : Mortality from Various Types of Gastrointestinal fistulae**

Type of fistula	No. of cases	No. of death	%
Duodenal	1	1	100
Small bowel	3	2	66.66
Large bowel	1	0	0
Total	5	3	60%

High mortality rate (60%) in present series is attributable to the fact that all cases to start with were bad cases belonging to "grade III risk". Mortality rate from duodenal fistula was highest followed by small and large bowel in that order. In literature, it has been reported upto 43%.<sup>11</sup>

There were 6 cases of intestinal obstruction (2 mechanical obstruction and 4 paralytic ileus) following 100 abdominal operations giving an overall incidence of 6%. In cases of mechanical obstruction, primary operation was either done for bowel perforation repair or adhesiolysis. In all these cases, adhesion or bands were the cause of obstruction. Mechanical obstruction presented between 28th-50th postoperative day in present series.

Postoperative vomiting was observed in 11 cases in present series (11%). It occurred within 6 hrs of operation and stopped within 24 hours, probably was due to after effect of anaesthesia.

Postoperative abdominal distension was noticed in 7 cases (7%). This however excludes distension associated with ileus or mechanical obstruction. It occurred mostly in extraperitoneal procedures like prostatic surgeries, suggesting the importance of nasogastric suction in peritoneal procedure. It was mainly gaseous appearing on 1st or 2nd postoperative day improving with conservative methods.

There was 2% incidence of diarrhoea in our study. It seemed to be of infective origin and responded to antibiotics and symptomatic measures.

Out of 100 patients, 3 (3%) developed postoperative peritonitis due to anastomotic leakage. All the cases presented between 4th to 7th postoperative day with high fever, abdominal distension, vomiting and absent bowel sounds.

Three (3%) cases postoperatively developed intraperitoneal collections. It was diagnosed with

postoperative ultrasonography. 2 cases developed subphrenic abscess and one developed pelvic abscess.

Amongst the miscellaneous complications, hyperpyrexia occurred in 5 cases and was contributory factor in causing death of all these patients. Enteric encephalopathy was observed in 3 cases all of which died. Other complications included jaundice, bed sores and hiccup.

The mean hospital stay was 9 days for uncomplicated cases, 13 days for minor complications and 30 days for complications like enterocutaneous fistula.

There is no single measure or "magic bullet" to decrease the postoperative complication rate or mortality after surgery. A multimodal approach is evidently needed. Applying ERAS (Enhanced Recovery After Surgery) Recommendation,<sup>17,18</sup> perioperative goal directed infusion therapy, and hemodynamic optimisation<sup>19,20</sup> and improving access to the intensive care or high dependency unit<sup>21</sup> have all shown to be of value in decreasing postoperative negative complications.

### Conclusion

The gastrointestinal complication rate after major abdominal surgeries is high. These postoperative complications significantly increase the hospital stay and mortality. Gordh's grading of risk assessment reflects the increased risk of postoperative complications including mortality and can be recommended as useful preoperative indices to identify high risk patients.



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