

# Abdominal Complications following Open Heart Surgery: A Study of Outcome and Variables in 3039 Cases

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This study was designed in order to determine the incidence and clinical variables affecting abdominal complications after open-heart surgery. We included all consecutive patients from 1<sup>st</sup> April 1997 to 31<sup>st</sup> March 1999 undergoing open-heart surgery in this study. Case notes of 76 patients who had abdominal complications were reviewed. Seventy-six patients (2.5%) had 80 abdominal complications, which included gastrointestinal bleeding (40%), hepatic failure (5%), ileus (8.8%), acute abdomen (22.5%), pancreatitis (7.5%), ischemic bowel (8.8%), bowel perforation (5%) and acute acalculous cholecystitis (1.3%). Overall mortality for patients with abdominal complications was 32.9%. Mortality for Ischemic bowel, bowel perforation and hepatic failure was 87.5%, 75% and 50% respectively. Of thirteen patients who underwent laparotomy, 3 had negative laparotomy, 2 had extensive irresectable ischemic bowel while 8 patients underwent definitive surgical procedures. Higher mortality for bowel perforation was attributed to delayed diagnosis. Out of 30 patients who had GI bleed only 3 had previous history of acid peptic disease. Patients on aspirin and warfarin together had a higher incidence of GI bleeding ( $p=0.05$ ). We conclude that abdominal complications following open-heart surgery are not rare and carry a very high mortality. Ischemic bowel and delayed diagnosis of bowel perforation remain important causes of mortality.

**Key words:** Abdominal complications, open-heart surgery

Cardiac surgery is the most frequently performed major surgical procedure in the developed world<sup>1</sup> and its number is rising in developing world. Major organ system failure including GI tract complications may occur during and following cardiac surgical procedures. GI symptoms often occur in benign forms such as nausea, vomiting, anorexia and abdominal distension<sup>2</sup>. However serious GI complications including intestinal ischemia, hepatic necrosis and bowel perforation can lead to higher mortality and morbidity<sup>3</sup>. The incidence (0.3-2.5%) and distribution of GI complications have remained steady over last fifteen years<sup>3,4,5</sup>. This suggests that improvements in perioperative care and better cardiopulmonary bypass techniques over last two decades have been offset by the increased proportion of elderly and sick patients and greater number of reoperations<sup>6</sup>. Egleston et al<sup>7</sup> reported that mean ICU and hospital stay increases by 17 and 4 times respectively in patients developing abdominal complication following cardiac surgery.

## Patients and Methods:

The Cardiothoracic center surgical database was reviewed for all patients undergoing open heart surgery from 1<sup>st</sup> April 1997 to 31<sup>st</sup> March 1999. All 3039 patients were included in this study. This database was filled in by the respective registrar looking after the patient prior to discharge and was validated by clinical audit department. Case notes of 76 patients who had abdominal complications were reviewed in detail. Nine patients who had descending thoracic aortic surgery during this period were excluded from this study as they had laparotomy and blood flow to abdominal organs was compromised due to operation or pathology itself. However 4 out of these 9 patients did develop abdominal complications.

For the purpose of this study GI complications were defined as follows:

- GI complication: any GI condition during hospitalization for open heart surgery requiring transfer to or prolonged stay in surgical ICU, surgical intervention, blood transfusion or prolonged hospitalization.
- GI bleeding: drop of Hb by 1.5 gram % in 24 hours with evidence of upper or lower GI bleeding.
- Hepatic failure: Raised LFTs with acute deterioration of the patient
- Pancreatitis: Hyperamylasaemia with acute deterioration of the patient
- Ileus: Ileus for 3-4 days requiring general surgical opinion / care
- Acute abdomen: Patients observed for or had laparotomy
- Ischemic bowel: Diagnosed on laparotomy or postmortem.

The clinical, operative and postoperative variables of these patients were compared with the patients who did not develop GI complications and were tested for statistical significance by the chi-square test. All variables are expressed as the odds ratio and p-values are calculated.

## Results

Seventy six out of 3039 patients developed 80 abdominal complications during postoperative period. Distribution & mortality of GI Complications following Cardiac surgery in our patients is given in table 1.

Most common GI complication was GI bleed, upper GI bleed being more common. Only 50% of these patients underwent endoscopy and definitive endoscopic treatment was carried out only in 2 patients. Three of these 31

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patients died in spite of adequate resuscitation

Acute abdomen was the next common diagnosis, which was more frequently associated with multisystem organ failure and was fatal in a third of the patients. Patients suffering from pancreatitis were diagnosed within three days of operation and had lower mortality (16.6 %) as compared to previous studies. Ischaemic bowel presented between 2—12 days after the operation and was associated with very high mortality (87.5%). Diagnosis of ischemic bowel, Ileus and bowel perforation was difficult and often delayed. One out of four bowel perforations was diagnosed on postmortem and another was diagnosed on a routine chest X-rays in a ventilated patient

Thirteen patients had surgical intervention. Three underwent negative laparotomy in whom diagnosis of ileus was confirmed. Two patients had extensive irresectible ischemic bowel, as whole gut was ischemic. Eight patients had definitive surgical procedures, which included repair of bowel perforation in 2 patients, resection of ischemic bowel in 4 patients, Hartman's procedure for lower GI bleeding in 1 patient and left hemicolectomy for lower GI bleeding in 1 patient.

Table 1. Distribution & Mortality of GI Complications following Cardiac surgery:

	Incidence	Mortality
GI Bleed	31( 40%)	9.3 %
Acute Abdomen	19 (23%)	31.6 %
Pancreatitis	7 (8%)	16.6 %
Ischemic bowel	7 (9%)	87.5%
Ileus	7 (9%)	57%
Bowel perforation	4 (5%)	75%
Hepatic failure	4 (5%)	50%
Acute acalculous cholecystitis	1 (1 %)	---

We looked at the clinical variables affecting the incidence of GI complications in our patient population.

Older age, cardiopulmonary bypass time, aortic cross-clamp time, level of hypothermia and use of intra-aortic balloon pump did not have adverse effect on the GI system in our patients in contrast to previous studies.

Table 2: Predisposing Factors On GI Complications:

	Odds ratio	P- value
Age > 65 years	0.0152	0.008
Left ventricular EF 30-50%	2.5583	0.001
Left ventricular EF < 30%	0.7190	0.513 NS
Coronary Artery Bypass operation	0.8168	0.510 NS
Cardiopulmonary bypass time	1.0009	0.828 NS
Aortic cross-clamp time	1.0102	0.108 NS
Normothermia	0.1828	0.001
Temperature between 25-34°C	0.1440	0.000
Temperature below 25 °C	0.2650	0.141 NS
Inotropes > 48 hours	10.246	0.000
Intra-aortic balloon pump	1.1003	0.821 NS
Perioperative Myocardial Infarction	4.2754	0.000

Moderate left ventricular function, use of inotropes for significant periods and perioperative myocardial infarction were associated with higher incidence of GI complications. Valvular and combined cardiac surgical procedures had slightly higher incidence of GI complications when compared with Coronary Artery Bypass operation but it did not reach statistical significance (Table 2 ).

Previous history of acid peptic disease was not correlated significantly with GI bleed (Table 3). Similarly use of low dose aspirin or warfarin did not increase incidence of GI bleed (P value: 0.58). However use of low dose aspirin and warfarin together had statistically significant correlation with GI bleed (P value: 0.05) (Table 4 ).

Table 3: Association of GI bleed with previous history of acid peptic disease:

History of Acid Peptic Disease	GI Bleed	
	No	Yes
No	37 (86.05%)	28 ( 90.32%)
Yes	6 (13.95%)	3 (9.68%)

Chi square = 0.31 P-value = 0.58

Table 4 :Association of GI bleed with Anticoagulation:

	No GI bleed	GI bleed
No Anticoagulation	9 (20.93%)	3 (9.68%)
Aspirin	14 (32.56%)	15(48.39%)
Warfarin	19 (44.19%)	9(29.03%)
Aspirin + Warfarin	1 (2.33%)	4 (12.90%)

Overall p-value 0.058 (NS) p-value for Aspirin & Warfarin=0.05 (S)

### Discussion:

Incidence and distribution of GI complications has remained constant over past 15-20 years<sup>8,10</sup>. However the mortality figures for individual complications like pancreatitis and GI bleed has decreased significantly. There seems to be a segregation between complications involving acid-pepsin processes causing GI bleed and other intraabdominal complications<sup>11</sup>. As in previous studies the most common group of abdominal complications was erosive GI bleed. Fear of pulmonary colonisation precludes from routine use of H-2 receptor blockers<sup>11</sup>, as was our practice in this group of patients. However all patients staying longer in surgical ICU or with previous history of acid peptic disease were given prophylactic H-2 receptor blockers. This could be the reason for the fact that in our patient population previous history of acid peptic disease did not affect the rate of GI complications.

In our patient population perioperative myocardial infarction, moderate left ventricular function (Ejection fraction 30-50%) and low cardiac output (use of inotropes for more than 48 hours ) were correlated with increased incidence of GI complications. However in contrast to previous studies<sup>6,8,9</sup>, poor left ventricular function (Ejection fraction < 30%), longer cardiopulmonary bypass

and aortic cross-clamp times and use of intra-aortic balloon pump in our patients was not associated with increased incidence of GI complications. This could be related to better haemodynamic and cardiopulmonary bypass management in this group of high risk patients. Similarly early use of intra-aortic balloon pump might be resulting in better haemodynamics and less number of GI complications.

One of the larger previous studies<sup>6</sup> showed a very high incidence of surgical intervention (63%) including GI bleeding group. In our patient population only 17% patients underwent surgical intervention. We recommend early surgical intervention if indicated as inappropriate delay in laparotomy is very poorly tolerated in this group of high risk patients. Delay in diagnosis can be a serious problem as manifestations are masked by postoperative analgesia / sedation, longterm ventilation and nonspecific / nonclassical presentation.

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