### **Original Research Article**

DOI: http://dx.doi.org/10.18203/2349-2902.isj20170198

## Our experience in gastrointestinal perforations: a retrospective study

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**Received:** 23 December 2016 **Revised:** 24 December 2016 **Accepted:** 16 January 2017

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#### **ABSTRACT**

**Background:** Peritonitis secondary to gastrointestinal perforation is still one of the commonest surgical emergencies in India and is associated with high morbidity and mortality. The present study examines the incidence of various types of gastrointestinal perforations, their complications and the management of patients with postoperative leaks in our surgical unit and compares our findings with those of previous studies performed between 1984 and 2014.

**Methods:** Retrospective study analyzing the case files of all the operated cases of gastrointestinal perforations in a single unit over the last 10 years from September 2005 to August 2015 by open procedure. A total number of 381 cases were studied. All cases with perforative peritonitis, whether spontaneous, infective, traumatic or of neoplastic pathology, were included in the study.

**Results:** Gastrointestinal perforations were common between the ages of 30-50 years; 82% were males. From July to October (rainy seasons) every year a higher number of perforations were noticed; 40% of patients had duodenal, 34% had ileal, 11% appendicular, 6% gastric, 6% jejunal and 3% had colonic perforations. Abdominal pain (100%) and vomiting (81%) were the most common symptoms while tachycardia (50%) and tachypnea (42%) were common signs; 15-20% presented late with features of shock.

**Conclusions:** Gastrointestinal perforations are one of the most common surgical emergencies. Duodenal perforations are most common. Ileal perforations secondary to enteric fever (typhoid) have highest morbidity and mortality. Most of the anastomotic leaks can be treated conservatively. Mortality depends on the general condition of the patient and associated pre-operative comorbidities.

Keywords: Anastomotic leak, Closure technique, Perforations, Peritonitis

#### INTRODUCTION

This study was done as a retrospective analysis of previous data of emergency surgeries; that of gastrointestinal (GI) perforation in a single unit in Bowring and Lady Curzon hospital in Bangalore, India. GI perforation is a complete penetration of the wall of the stomach, small intestine or large bowel, resulting in intestinal contents flowing into the abdominal cavity.<sup>1</sup>

Perforation of the intestines results in potential bacterial contamination of the abdominal cavity (a condition known as peritonitis). GI perforations include gastroduodenal, small-bowel, appendicular and colorectal perforations.<sup>2</sup>

Our objectives were to study the incidence of various types of gastrointestinal perforations, complications associated with it, and the management of patients with postoperative leaks in our Bowring and Lady Curzon Hospital in a city of southern India, Bangalore.

#### **METHODS**

Retrospective study analyzing the case files of all the operated cases of gastrointestinal perforations over the last 10 years in the department of surgery, in Bowring and Lady Curzon Hospital, Bangalore, Karnataka, India from September 2005 to August 2015 by open procedure. A total number of 381 cases were studied.

#### Inclusion criteria

- All cases presenting with signs and symptoms of perforative peritonitis
- All cases with spontaneous, infective, traumatic and neoplastic pathology were included

#### Exclusion criteria

- Oesophageal perforation
- Caustic injuries
- Iatrogenic
- Tertiary peritonitis
- Primary peritonitis

All patients following a clinical diagnosis of perforation peritonitis and adequate resuscitation underwent exploratory laparotomy in emergency setting. The pathology was sought for and treated with closure, resection with anastomosis or stoma formation. On table, thorough lavage was given and closure of the abdominal cavity done. Follow-up of these patients for morbidity and mortality was done.

#### **RESULTS**

#### Preoperative data

GI perforations were common in the age group of 30-50 years; with more than 84% being < 50 years of age; 82% were males. Co-morbidities were mainly in the form of respiratory disease (10%) followed by hypertension and diabetes mellitus (7%) each (Table 1).

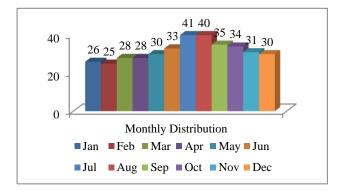


Figure 1: Monthly trends of perforations.

Seasonal variation was noted; every year a higher number of perforations was noticed in July to October (rainy seasons) (Figure 1). Abdominal pain (100%) and vomiting (81%) were the most common symptoms while tachycardia (42%) and tachypnea (52%) were common signs; 15-20% presented late with features of shock (Table 2).

Table 1: Pre-operative data of patients.

Age (years)				
No. of cases	(n=381) (%)			
< 50 years	319 (84)			
> 50 years	62 (16)			
Sex				
Male	311 (82)			
Female	70 (18)			
Pre-existing co-morbid conditions				
Respiratory disease	37 (10)			
Cardiac disease	11 (3)			
Renal disease	19 (5)			
Malignancy	15 (4)			
Hypertension	26 (7)			
Diabetes mellitus	27 (7)			

Table 2: Signs and symptoms on presentation.

Signs and symptoms	n (%)
Pain	381 (100)
Vomiting	307 (81)
Abdominal distension	278 (73)
Fever	194 (51)
Constipation	178 (47)
Diarrhoea	50 (13)
Tachycardia (pulse >110/min)	161 (42)
Tachypnea (RR > 20/min)	198 (52)
Hypotension (systolic BP<100 mmHg)	58 (15)
Urine output (<30 ml/h)	72 (19)

Seventy-five per cent of the patients had pneumoperitoneum and 36% had air-fluid levels on X-rays; 13% of them had serum creatinine of >1.7 and 45% had dyselectrolytemia (Table 3).

Table 3: Preoperative data.

Investigations	n (%)
Pneumoperitoneum on chest X-ray	286 (75)
Air-fluid levels on erect abdominal X-ray	137 (36)
Hyponatremia (Na < 130 mEq/L)	109 (29)
Hypokalemia (K < 2.7 mEq/L)	61 (16)
Blood urea > 45 mg/dl	80 (21)
Serum creatinine > 1.7 mg/dl	49 (13)

On laparotomy, gastroduodenal perforations accounted for 46%, of which 41% were due to acid peptic disease; 39% of perforations were in the small bowel, of which 34% were in the ileum due to typhoid; 11% were appendicular and 4% were colonic, of which 3% were traumatic.

Table 4: Operative data.

Aetiology	
Gastroduodenal	(n=174) (%)
Acid peptic disease	165 (95)
Trauma	5 (3)
Malignancy	4 (2)
Small bowel	(n=150) (%)
Typhoid	132 (88)
Traumatic	9 (6)
Tuberculosis	4 (3)
Strangulation of bowel	3 (2)
Unknown aetiology	2(1)
Large bowel	(n=15) (%)
Trauma	11 (73)
Malignancy	4 (27)
Appendicular	(n=42) (11%)

In the order of frequency, 40% of patients had duodenal, 34% had ileal, 11% appendicular, 6% gastric, 5% jejunal and 4% had colonic perforations. Appendicular perforations were common in patients presenting late. Colonic perforations were uncommon but associated with high mortality. The number of traumatic perforations has increased in the last few years, probably due to increased incidence of RTA's (Table 4).

Table 5: Operative data.

Surgical procedure	(n=381) (%)
Simple closure	252 (66)
Resection with anastomosis	42 (11)
Billroth I	4(1)
Billroth II	5 (1)
Resection (+/-) with diversion	33 (9)
procedure (ileostomy / colostomy)	33 (9)
Right hemicolectomy	4(1)
Appendicectomy	41 (11)

#### Routine pre-operative investigations

Routine investigations

Complete blood count, ESR, Platelet count, RFT, LFT, RBS, Serum electrolytes

Radiological investigation

Erect X- ray of the abdomen, chest X-ray, abdominal ultrasonography, CECT of the abdomen, peritoneal fluid aspiration (with or without USG guidance).

#### Operative data

The cases operated underwent simple closure in 66% (252), resection with anastomosis in 11% (42), gastrectomies 2% (9) in cases of gastric malignancies, resection with diversion procedures in 9% (33), right hemicolectomy in 1% (4) and appendicectomy in 11% (41). Simple closure of perforation showed good results (Table 5).

Post-operative complications

Wound infection (30%) was the major post-operative complication followed by pneumonia (21%) and anastomotic leak (21%) (Table 6).

**Table 6: Postoperative complications.** 

No. of cases	(n=381) (%)		
Wound infection	115 (30)		
Anastomotic leak	80(21)		
Pneumonia	79 (21)		
Electrolyte imbalance	24 (6)		
Septicaemia	10 (3)		
Burst abdomen	4 (1)		
Abdominal collection	6 (2)		
Acute renal failure	10 (2)		
Mortality	53 (14)		

The majority of the patients with leaks had small-bowel perforation due to infective pathology (Table 7). Conservative management in these patients had better outcome and low mortality (Table 8).

Table 7: Leak rates following surgery.

Type of perforation	No. of patients with leaks (n=80) (%)
Gastroduodenal	20 (24)
Small bowel	54 (68)
Appendicular (base / caecal leak)	2 (3)
Colonic	4 (5)

Table 8: Management of patients with leaks.

Type of management	Number of patients (n = 80) (%)	Number of deaths	Mortality rate (%)	Success rate (%)
Conservative	64 (80)	18	28	72
Re-do surgery (diversion procedure)	16 (20)	10	62.5	37.5

Risk factors were: elderly patients, late presentation, poor general condition (shock) and other co-morbid conditions. Post-operative complications were more frequent in patients with one or more risk factors. Mortality rate was 13.9%, the most common cause being septicemic shock. Mortality depends on the general condition of the patient, condition of the bowel, degree of peritoneal contamination and associated pre-operative co-morbid risk factors.

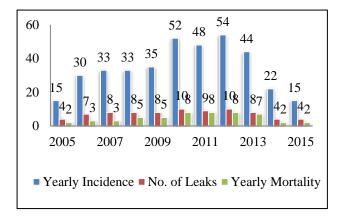


Figure 2: Yearly incidence, number of leaks and yearly mortality.

#### **DISCUSSION**

Perforation peritonitis is a frequently encountered surgical emergency in tropical countries like India, most

commonly affecting young men in the prime of life as compared to the studies in the West where the mean age is between 45 and 60 years. In the majority of cases the presentation to the hospital is late with well-established generalized peritonitis with purulent/faecal contamination and varying degree of septicaemia.

The signs and symptoms are typical and it is possible to make a clinical diagnosis of peritonitis in all patients. The perforations of proximal gastrointestinal tract were six times as common as perforations of distal gastrointestinal tract as has been noted in earlier studies from India which is in sharp contrast to studies from developed countries like United States, Greece and Japan which revealed that distal gastrointestinal tract perforations were more common. Not only the site but the etiological factors also show a wide geographical variation. 1-4

Khanna et al. from Varanasi studied 204 consecutive cases of gastrointestinal perforation and found that over half of them (108 cases) were due to typhoid. They also had perforations due to duodenal ulcer, appendicitis, amoebiasis and tuberculosis. These figures show the importance of infection and infestation in the third world which is also reflected in the high incidence of typhoid perforation in our study. At the other end of the spectrum, Noon et al. from Texas studied 430 patients of gastrointestinal perforation and found 210 cases to be due to penetrating trauma, 92 due to appendicitis and 68 due to peptic ulcer.

Table 9: Review of	divarious studies	regarding	gastrointestinal	perforations.

Author (Ref)	Total cases (n)	Gastro-duodenal (D+G)	Small bowel (I+J)	Appendicular	Colo- rectal	Mortality
Our study 2015	381	151+23 = 174 (46%)	127+23 = 150 (40%)	42 (11%)	15 (3%)	13.9%
Bali R et al <sup>7</sup>	400	150+29 = 179 (45%)	90+38 = 128 (32%)	74 (18%)	19 (5%)	7%
Jhobta R, et al <sup>8</sup>	504	289+42 = 331(65%)	76+16 = 92 (18%)	59 (11%)	19 (3%)	10.1%
Quereshi et al <sup>9</sup>	126	31	37	12	3	15%
Nishida et al <sup>10</sup>	229	92	71	0	66	13.1%
Chen et al <sup>11</sup>	98	57	6	13	14	NA
Dorairajan et al <sup>12</sup>	250	80	103	38	5	9.2%
Dandpat et al <sup>13</sup>	340	276	34	22	4	15.9%
Sharma et al <sup>14</sup>	155	47	62	23	2	8.4%
Shah et al <sup>15</sup>	110	51	16	31	3	6.4%
Kachroo et al <sup>16</sup>	90	15	13	37	2	8.8%

The above studies show us the variations in the various studies from all over the world. In our study, the perforations were mainly gastroduodenal and in the small bowel. Large bowel perforations are uncommon in the Indian scenario. We had a mortality of 13.9% in the 10 years of our study, which is comparable to the other studies available. Ours is a tertiary referral centre and so we have this high number of cases from a single unit.

#### **CONCLUSION**

GI perforations are one of the most common surgical emergencies. Duodenal perforations are most common. Ileal perforations have the highest morbidity and mortality. Most of the anastomotic leaks can be treated conservatively. Mortality depends on the general

condition of the patient and associated pre-operative comorbidities.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

institutional ethics committee

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**Cite this article as:** Kemparaj T, Narasimhaiah NK, Mayigaiah RK. Our experience in gastrointestinal perforations: a retrospective study. Int Surg J 2017;4:593-7.