International Surgery Journal
Goel A et al. Int Surg J. 2018 Aug;5(8):2836-2840
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20183200

Original Research Article

Outcome of gastrointestinal perforations due to blunt abdominal trauma

Anubhav Goel*, Ankur Bansal, Bhupesh Gogia

Department of Surgery, Sarojini Naidu Medical College, Agra, Uttar Pradesh, India

Received: 22 May 2018
Accepted: 27 June 2018

***Correspondence:**
Dr. Anubhav Goel,
E-mail: dranubhav1234@yahoo.com

ABSTRACT

Background: The most common injury during blunt abdominal trauma (BAT) is of solid organs. Hollow viscus injuries are much more uncommon compared to the non-hollow ones. The most important problem associated with these conditions that they are frequently remain undetected or diagnosed too late despite advanced techniques such as focussed abdominal sonography for trauma (FAST), computer tomography, and magnetic resonance imaging. This study evaluates gastrointestinal perforation following blunt abdominal trauma, their anatomical distribution, diagnosis, management, and outcome.
Methods: The study was a prospective observational study conducted after ethical clearance from hospital. The patients included were those presenting with features of peritonitis following blunt trauma, with isolated injury to abdomen and found to exhibit gastrointestinal perforation on exploratory laparotomy. Exclusion criteria were perforation was not detected at surgery, penetrating abdominal trauma. Data of each patient were collected into the Performa prepared for the study.
Results: During the study period, 32 patients underwent surgery for perforation following blunt abdominal trauma. Jejunum was the most common site of perforation in the study subjects followed by ileum than stomach. Among the procedures performed, simple closure of perforation with peritoneal lavage was the most commonly performed procedure in 24 patients (75.0%). Resection anastomosis was done in 3 (9.3%) cases, while stoma was fashioned in 5 (15.6%) patients. 5 (15.6%) patients developed complications in the postoperative period with chest infection being the most common. One patient died in the postoperative period leading to mortality rate of 3.1%.
Conclusions: To conclude, early diagnosis and treatment are of utmost importance. Most common site for perforation in blunt trauma is jejunum. Early surgery following adequate resuscitation in gastrointestinal perforation following blunt trauma abdomen is associated with a very a good outcome.

Keywords: Blunt trauma, Laparotomy, Perforations

INTRODUCTION

The most common injury during blunt abdominal trauma (BAT) is of solid organs. Hollow viscus injuries are much more uncommon compared to the non-hollow ones.

Geill in 1899, reported an 11% incidence of major intestinal injury among the study patients sustaining blunt abdominal injury.[1] It has been reported that small bowel is the most commonly injured hollow viscus and the third most commonly injured organ in BAT.[1,2] Bowel injuries may be caused by either a blunt or penetrating abdominal trauma. Blunt trauma causes injuries by either compression or by deceleration.

Compression or concussive forces may result from direct blows or external compression against a fixed object (e.g. lap belt, spinal column). These forces may deform hollow

organs and transiently increase intraluminal pressure, resulting in rupture. Deceleration forces cause stretching and linear shearing between relatively fixed and free objects.

As bowel loops travel from their mesenteric attachments, thrombosis and mesenteric tears, with resultant splanchnic vessel injuries can result.

Whatever the mechanism, early recognition of these lesions can be difficult. An overlooked bowel injury is very dangerous because of its tremendous infectious potential.[3,4]

The most important problem associated with these conditions that they are frequently remain undetected or diagnosed too late despite advanced techniques such as focussed abdominal sonography for trauma (FAST), computer tomography, and magnetic resonance imaging.

The present study evaluates gastrointestinal perforation following blunt abdominal trauma, their anatomical distribution, diagnosis, management, and outcome.

METHODS

This study was conducted in Department of General Surgery, Sarojini Naidu Medical College, Agra, during the period from January 2016 to December 2017. The study was a prospective observational study conducted after ethical clearance from hospital.

Inclusion criteria

- Patients included were those presenting with features of peritonitis following blunt trauma.
- Patients with isolated injury to abdomen and found to exhibit gastrointestinal perforation on exploratory laparotomy.

Exclusion criteria

- Perforation was not detected at surgery, penetrating abdominal trauma.

Data of each patient were collected into the Performa prepared for the study.

The study variables included sociodemographic data, clinical presentation, radiological findings, perforation-surgery interval, intraoperative findings, and surgical procedure performed, postoperative complications and mortality.

The development of complications was noted in postoperative period till the time of discharge, and, after that, the patients were called for follow-up every week up

to 1 months. The statistical analysis was performed using SPSS software, version 20.

RESULTS

During the study period, 32 patients underwent surgery for perforation following blunt abdominal trauma. Of them, 24 were male and only 8 were female.

Table 1: Demographic details.

Demographic feature	Male	Female	Total
Number of cases	24 (75%)	8 (25%)	32 (100%)
Age			
<20 years	1 (3%)	0	1 (3%)
20-40 years	23 (72%)	5 (16%)	28 (88%)
>40 years	2(6%)	1(3%)	3 (9%)
Presentation			
Acute (admission within 24 hours)	22 (69%)	6 (19%)	28 (88%)
Delayed (admission after 24 hours)	2 (6%)	2 (6%)	4 (13%)
Diagnosis			
X ray (free gas under diaphragm)	20 (63%)	6 (19%)	26 (81%)
USG	4 (13%)	2 (6%)	6 (19%)
CT Scan	Nil	Nil	Nil
Management			
Perforation repair only	21 (66%)	3 (9%)	24 (75%)
Resection and anastomosis	2 (6%)	1 (3%)	3 (9%)
Stoma formation	3 (9%)	2 (6%)	5 (16%)
Post-operative complication			
Chest infection	2 (6%)	3 (9%)	5 (16%)
Fecal fistula	1 (3%)	0	1 (3%)
mortality	0	1 (3%)	1 (3%)
Fever	0	0	0
Wound or anastomosis dehiscence	0	0	0
Basal lung atelectasis	0	0	0
DVT	0	0	0
UTI	0	0	0
Pressure sores	0	0	0
Keloid formation	0	0	0
Stomal hernia	0	0	0

Most of the patients in this study presented with abdominal pain, tenderness and distension. The incidence was more in younger age group with most patients between 20 to 40 years.

Three (9.3%), patients presented age > 50 years. Regarding the mechanism of injury: 18 (56.2%) showed history of road traffic accident (RTA), 6 (18.7%) patients received injury owing to fall from height, in 4 (12.5%) patients injury occurred as a result of heavy object hitting the abdomen and remaining 4 (12.5%) patients had a history of assault. 26 (81.2%) patients reported to hospital

within 24 hours of trauma. The average time to admission was 19 hours. Remaining 3 patients reported late with 2 patient reporting after 5 days traumatic event. Perforation was detected by presence of free gas under diaphragm in chest X-ray in 26 (81.2%) patients. In the remaining 6 patients, ultrasonography (USG) abdomen was done.

The features suggestive of perforation include fluid in peritoneal cavity, no solid organ injury, and dilated fluid-filled loops of bowel not exhibiting peristalsis. computed tomography (CT) abdomen was not done in any case.

Table 2: Patients details.

Age (Years)	SEX	Mode of Injury	Timing of presentation	X Ray - Erect Abdomen	Ultrasound Abdomen	Treament (Surgery)	Complications
24	M`	RTA*	A^	Pneumoperitoneum	Free Fluid	Repair	-
50	F``	RTA	D^^	Pneumoperitoneum	Free Fluid	Stoma	-
20	F	RTA	A	Pneumoperitoneum	NAD```	Stoma	Chest Infection
22	M	RTA	A	Pneumoperitoneum	NAD	Repair	-
32	F	FFH**	A	NAD	Free Fluid	Stoma	-
34	M	PA***	D	Pneumoperitoneum	Free Fluid	RA”	-
43	M	RTA	A	Pneumoperitoneum	Free Fluid	Repair	-
42	F	RTA	A	Pneumoperitoneum	Free Fluid	Stoma	Expire
28	M	FFH	A	Pneumoperitoneum	Free Fluid	Repair	Chest Infection
62	M	FFH	A	NAD	Free Fluid	Repair	-
21	F	RTA	A	Pneumoperitoneum	Free Fluid	RA	-
34	M	RTA	D	Pneumoperitoneum	Free Fluid	Repair	-
40	M	RTA	A	Pneumoperitoneum	Free Fluid	Stoma	-
54	M	PA	A	Pneumoperitoneum	Free Fluid	Repair	Fecal Fiscula
39	M	PA	A	Pneumoperitoneum	Free Fluid	Repair	-
22	F	FFH	A	NAD	Free Fluid	RA	-
26	M	RTA	A	NAD	Free Fluid	Stoma	Chest Infection
28	M	RTA	A	Pneumoperitoneum	Free Fluid	Repair	-
30	M	RTA	A	Pneumoperitoneum	Free Fluid	Repair	-
24	F	RTA	A	Pneumoperitoneum	Free Fluid	Stoma	Chest Infection
40	M	PA	A	Pneumoperitoneum	Free Fluid	Repair	-
60	M	FFH	A	Pneumoperitoneum	Free Fluid	Stoma	-
27	M	RTA	A	Pneumoperitoneum	Free Fluid	Repair	-
30	M	RTA	A	NAD	Free Fluid	Repair	-
38	M	PA	A	NAD	Free Fluid	Repair	-
24	F	RTA	D	Pneumoperitoneum	Free Fluid	Stoma	Chest Infection
44	M	FFH	A	Pneumoperitoneum	Free Fluid	Repair	-
34	M	PA	A	Pneumoperitoneum	Free Fluid	Repair	-
42	M	PA	A	Pneumoperitoneum	Free Fluid	Repair	-
21	M	FFH	A	Pneumoperitoneum	Free Fluid	RA	-
23	M	RTA	A	Pneumoperitoneum	Free Fluid	Repair	-
28	M	RTA	A	Pneumoperitoneum	Free Fluid	Repair	-

All the patients were posted for surgery following adequate resuscitation, and exploratory laparotomy was performed. Jejunum was the most common site of perforation in the study subjects followed by ileum than stomach.

Among the procedures performed, simple closure of perforation with peritoneal lavage was the most commonly performed procedure in 24 patients (75.0%).

Resection anastomosis was done in 3 (9.3%) cases, while stoma was fashioned in 5 (15.6%) patients. 5 (15.6%) patients developed complications in the postoperative period with chest infection being the most common.

One patients developed fecal fistula which had to be re operated. The average length of hospital stay was 14 days. One patient died in the postoperative period leading to mortality rate of 3.1%.

DISCUSSION

Traffic accidents are among the main causes of abdominal trauma in both Western and developing countries.

There are 3 basic mechanisms that govern injury to bowel and mesentery, and include direct crushing force, shearing force, and a sudden increase in intraluminal pressure that results in burst injuries.[5]

Blunt abdominal trauma is one of the leading causes of morbidity and mortality among all age groups. Identification of serious intra-abdominal pathology is often challenging. The most common cause of blunt injury abdomen leading to perforation was RTAs, followed by fall from height.

Trauma was observed more in male in comparison to female subjects.[6] Munns et al. showed that following blunt trauma, the most common small bowel injury was "blowout" perforation on the antimesenteric border of the bowel (55.5%), while the most common colonic injury was a serosal tear/bruise (62.2%).[7] The reason for delay in reporting includes a relatively feeble initial peritoneal irritation induced by the nearly neutral intestinal content, particularly those with perforation between the duodeno-jejunal flexure and the ileocecal junction; in small perforations, the mucosa may prolapse through the hole and partly seal it making early signs misleading.[8]

Diagnosis of perforation by free gas under right dome of diaphragm was positive in 81.2% of cases, which is consistent with other studies.[9] In suspicious cases with negative X-ray findings, ultrasonography was done. Ultrasonography is convenient, cheap, and noninvasive. Free peritoneal fluid without solid organ injury detected on ultrasound in a patient with trauma to the abdomen is suggestive of a significant injury requiring exploration.[10]

CT findings considered diagnostic for bowel injury are contrast extravasation and/or extraluminal air. Findings which are non-diagnostic but suggestive are; free fluid without solid organ injury, small bowel thickening and dilatation.[11]

Peritoneal fluid with no visible solid organ injury is an important sign of bowel injury; this finding has been replicated in several studies.[12] CT diagnosis for small bowel perforation has a sensitivity of 92% and specificity of 94%.[11] The role of laparoscopy in blunt abdominal trauma is mainly diagnostic. In the recent years, there have been reports on therapeutics laparoscopy and repair of bowel perforations.

In present study, jejunal perforation was more, followed by ileum and stomach. This finding is in contrast to other studies in which ileal perforations were more common. 9 Moreover, in some others, the incidence of jejunal and ileal perforations was almost same. 10

For hollow viscus perforation, the choice of surgical procedure is simple closure. This was the most commonly performed procedure in our study consistent with all other studies.[9,10]

For multiple perforations in a small segment, mesenteric injury causing ischemia of the bowel resection and anastomosis is the procedure of choice. Stoma surgery was done in our study in cases of late presentation and grade 4 peritonitis. Postoperative complications were seen in 15.6% patients, and most recovered with conservative methods.

CONCLUSION

To conclude, early diagnosis and treatment are of utmost importance. Most common site for perforation in blunt trauma is jejunum.

Early surgery following adequate resuscitation in gastrointestinal perforation following blunt trauma abdomen is associated with a very a good outcome.

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: Goel A, Bansal A, Gogia B. Outcome of gastrointestinal perforations due to blunt abdominal trauma. Int Surg J 2018;5:2836-40.