

Original Research Article

Clinical study of bowel injuries following blunt injury abdomen

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Abstract

Background: Blunt injury abdomen due to trauma is one of the most common surgical emergencies all over the world due to increased incidence of accidents. Intestine is the third most common injured organ following blunt injury abdomen.

Aim: To study the clinical presentation, management and outcome of intestinal injuries following blunt abdominal trauma.

Materials and methods: It was a prospective study of 60 patients who presented with intestinal injury due to blunt injury abdomen to our hospital. The study period was from January 2014 to December 2015. All the patients who underwent laparotomy and were diagnosed to have bowel injuries like intestinal perforation, transection, mesenteric injury leading to gangrene secondary to trauma were included in the study. Patients with simple mesenteric injuries without intestinal injury and simple serosal tears were excluded.

Results: 44.8% patients had perforations which were less than 1.5 cm in diameter. 34.4% patients had perforations which were more than 1.5 cm in diameter. 20.6% patients had complete transection. 6 patients had gangrene. 4 patients had multiple perforations.

Conclusion: Males are more commonly affected than females and age group of 20 – 35 years are affected. Small intestine is the most commonly injured part of bowel. Fixed portions of bowel to the parietes are more commonly injured.

Key words

Bowel injuries, Jejunal perforation, Caecal perforation, Clinical presentation.

Introduction

Trauma is now emerging as a frequent cause of preventable deaths. Abdominal trauma is often masked by associated injuries, mostly closed injuries, chest trauma or bone fractures [1-3]. Very often the victim is unconscious because of alcoholism, head injuries or drug abuse. Intestinal disruptions can be due to a variety of types of blunt trauma [4, 5]. Intestine is the third most commonly injured organ in blunt trauma [1]. Patient may present with severe peritonitis with rapidly progressing combination of hypovolemic and septic shock which can be lethal over a short period of time. Mortality increases with the number of associated injuries [6].

Materials and methods

60 patients who underwent laparotomy for bowel injuries due to blunt injury abdomen were studied over a period of 2 years. All had injuries like intestinal perforation, transection, and gangrene due to mesenteric tears secondary to trauma. Patients with simple mesenteric tears and serosal tears were excluded.

A standard proforma was used for all patients with blunt injury abdomen with bowel injuries which included:

- Patient's demographics
- Clinical details
- Laboratory and radiological investigations
- Final diagnosis
- Type of operation
- Intra operative findings
- Site of injury
- Contamination
- Associated intra abdominal injuries
- Duration of surgery
- Post operative complications
- Period of stay
- Mortality

Frequency of various clinical presentations was as per **Table – 1**.

Table – 1: Clinical presentation.

Clinical features	No. of cases	%
Shock	15	25
Pain and vomiting	58	96
Abdominal distension	38	63
Tenderness/guarding	57	95
Absence of bowel sounds	9	15

Pre-operative evaluation

A quick but complete clinical examination was done and all the injuries were examined. Vital data was recorded and patients presenting with shock were resuscitated first before contemplating investigations. Blood grouping and typing was done first followed by routine blood investigations. All the stable patients were subjected to radiological investigations. All the patients were subjected to X- ray erect abdomen, Ultrasound abdomen. Patients with air under the diaphragm were taken up for surgery. Those without air under the diaphragm were subjected for CT scan of abdomen. Decision to perform laparotomy was based on clinical and radiological findings.

Investigations

Plain X- ray films of abdomen

Plain flat and erect X- rays of abdomen provide no findings specific for bowel injury, but are valuable for assessment of the possibility of free intraperitoneal air. The finding of gas under diaphragm is indicative of hollow viscus perforation, stomach or intestine. Patients in whom films cannot be taken in upright position, left lateral decubitus films may be useful in detecting free air. A negative x-ray does not in any way eliminate the possibility of rupture of an intra abdominal viscus. In duodenal injuries, plain films of abdomen may show mild scoliosis, obliteration of right psoas shadow, absence of air in the duodenal bulb, or air in the retroperitoneum outlining the kidney.

Ultrasound

Ultrasound has been used more frequently in recent years for evaluation of blunt abdominal

trauma. Ultrasonography is convenient, cheap and non-invasive. A positive test is defined as evidence of free fluid or solid organ parenchymal injury. Though it can detect free intraperitoneal fluid, it is a poor tool for diagnosis of hollow viscus perforations.

CT scan

CT scan is the most frequently used method to evaluate a stable blunt abdominal trauma patient. Patient should be hemodynamically stable, cooperative and needs oral and IV contrast and enhancement. Its important role lies in the precise diagnosis and management of solid visceral injuries. The retroperitoneum is best evaluated by CT scan. CT findings considered diagnostic for bowel injury are contrast extravasation and/or extra luminal air. Findings which are non-diagnostic but suggestive are; free fluid without solid organ injury, small bowel thickening and dilatation. Peritoneal fluid with no visible solid organ injury is an important sign of bowel injury; this finding has been replicated in several studies. Presence of free intraperitoneal fluid on CT scan without solid organ injury should raise the suspicion of mesenteric, intestinal or bladder injury, and an exploratory laparotomy is often warranted.

Laparoscopy

The role of laparoscopy in blunt abdominal trauma is mainly diagnostic. In hemodynamically stable patients with blunt abdominal trauma, laparoscopy safely and effectively identifies bowel injuries. Early recognition of these injuries and timely surgical treatment offers the best prognosis.

Proctoscopy and sigmoidoscopy

If there is bleeding PR, proctoscopy/sigmoidoscopy may be helpful in diagnosis of colorectal perforations

Management

Resuscitation and initial management

As shock so frequently accompanies abdominal trauma, recognition of shock and its immediate treatment has priority in planning therapy for

abdominal injuries. All patients sustaining trauma should be resuscitated at the emergency room of casualty. This can be done simultaneously with a quick, brief and limited evaluation of the patient for assessment of injuries, the two questions that must be answered are does the patient need an abdominal operation? And will he tolerate the time required for diagnostic procedures before surgery is performed?

The resuscitation follows the ABC principles.

Restoration of airway: triple maneuver, throat suction, endotracheal intubation, needle cricothyroidotomy, or tracheostomy.

Breathing: tube thoracostomy to evaluate a pneumothorax or hemothorax may be necessary in patients with thoraco-abdominal injuries. Immediate thoracotomy may be indicated in massive hemothorax > 2000ml or ongoing bleed > 200ml/hr or associated tracheobronchial or great vessel injury and cardiac tamponade.

Circulation: hypovolemic shock is best prevented or treated by starting two wide bore IV lines. After blood is drawn for grouping, typing and cross matching, 2-3 liters of crystalloids (ringer lactate) is rapidly administered. If the patient remains hypertensive despite this infusion, blood transfusion is warranted and also likely an emergency surgery.

Nasogastric aspiration: aspiration is routinely performed except in patients with associated penetrating neck wounds, complex facial injuries or suspected cervical spine fractures. Bladder catheterization done for monitoring urine output. Conscious stable patients who can't void or in whom blood is noticed at the external urethral meatus coupled with significant perineal hematoma or a mobile prostate gland or rectal examination will need preliminary urethrogram before attempted insertion of Foley's catheter.

Antibiotics: Broad spectrum antibiotics should be given preoperatively intravenously in all patients with suspected gastrointestinal injuries [7-11].

Operative management

Management of bowel injuries was as per **Table – 2.**

Table – 2: Management of bowel injuries.

Mode of surgery	No. of cases	Mortality	Complications
Closure	31	8	7
Resection EEA	21	6	6
Exteriorisation	4	0	1
Resection EEA + exteriorisation	2	1	0
Gastrojejunostomy	2	1	1
Closure + exteriorisation	1	0	1

Results and Discussion

The mean age group of presentation was 32.92 years in our study compared to 33.2 years in Dauterive, et al. [1] series.

The male to female ratio was 7.5:1 in Dauterive, et al. [1] series and in our series it was 9:1. In any case series, males were outnumbered females. So above findings were suggestive of injuries being common in males around 30 years of age suggesting the active group.

In our study, there were 60 cases with 68 major injuries to bowel including 5 duodenal injuries and 7 colonic injuries rest of them being ileal or jejunal injuries (**Photo – 1** and **Photo – 2**). This also included 6 mesenteric injuries resulting in bowel gangrene, requiring resection anastomosis and one case of colon gangrene.

Out of 51 cases with perforations, free air under the diaphragm was shown in 62% cases. Small bowel was more commonly injured. The most commonly injured part was anti-mesenteric border of terminal ileum.

In 7 patients, laparotomy was done on the basis of clinical findings alone. Treatment consisted of simple closure of perforation or resection and anastomosis or repair followed by protective colostomy for colonic perforations.

16 deaths were recorded out of 60 patients (26%). In accordance with Dauterive, et al. [1] series which also showed 16 deaths out of 60 cases (26%).

Mode of injury

The most common mode of injury was road traffic accidents [1], mostly high speed vehicular injuries. In our study, it accounted for in 60% of the cases. Dauterive, et al. [1] showed in 80% cases RTA as the cause. Gas under the diaphragm was shown in 62% of cases in our study (**Table – 3**).

Table – 3: Comparison of mode of injury.

Mode of injury	Present series	Dauterive, et al. [1]
RTA	60%	80%
Fall from height	18.3%	-
Hit with heavy object	21.6%	-

Site of bowel injury

Most of the injuries were concentrated at parts of bowel that is fixed to the parietes that was at the duodenojejunal flexure and at the ileocaecal junction (**Table – 4**). Dauterive, et al. [1] found out in their study no such predilection but they did find that mesenteric injuries were more common near the DJ flexure and IC junction. Most of the bowel injuries were concentrated at the anti-mesenteric border of small intestine in our series.

Table – 4: Site of bowel injury.

Series	<2 ft of DJ flexure <3 ft of IC junction	>2 ft of DJ flexure >3 ft of IC junction
Present series	72%	28%

Associated intraabdominal injuries

Our study showed 20% patients with intra abdominal injuries, apart from mesenteric tears (Table – 5). Dauterive, et al. [1] showed 43% of associated intra abdominal injuries.

Table – 5: Intra abdominal injuries.

Organ	Present series	Dauterive, et al.
Liver	3	13
Spleen	1	15
RPH	5	7
Pancreas	2	2
Kidney	2	2
bladder	1	1

Apart from mesenteric tear, retroperitoneal hematoma was the most common associated injury in our study, followed by liver and urologic injuries. Dauterive, et al. [1] showed that spleen was the most commonly injured organ in association with bowel injuries.

One patient had both renal and liver injuries and one had both retroperitoneal hematoma and pancreas injury. So it was a total of 12 patients with 14 injuries.

Presence of associated injuries significantly increases the mortality [6], morbidity, length of hospital stay.

Major complications

The major complications that were included are anastomotic leakage, intra-abdominal abscess, post operative obstruction. The major complication rate was only 8% in our study. Minor complications that were observed were wound infection (26%) wound dehiscence (15%) respiratory infection (10%).

Mortality

Mortality rates were found to be 26% in our study, comparable to the study by Dauterive, et al. [1] which also showed a mortality of 26% (Table – 6). Most of the deaths in our study occurred in patients with associated intra

abdominal injuries, in those who presented late, and in patients with mesenteric tear causing gangrene bowel. 7 out of 16 patients died in immediate post operative period, owing to the associated intra abdominal injuries. Rest of the patients died within 10 days of surgery because of uncontrolled sepsis and MODS (multi organ dysfunction syndrome). These were the patients who presented late. Even in this modern era, there is 26% mortality because ours is a tertiary referral center for the entire state and some cases come as far as from Karnataka and Nanded and by the time they reach Gandhi hospital, it is too late and acute renal failure (ARF) and sepsis has already set in.

Table – 6: Mortality.

Series	Total cases	Mortality	Mortality (%)
Present series	60	16	26%
Dauterive, et al. [1]	60	16	26%

Photo – 1: Traumatic ileal perforation.



Conclusion

Males are more commonly affected than females. Most commonly those between the age group of 20 – 35 years are affected. Road traffic accident is the most common cause of blunt injury abdomen leading to bowel injuries. Small intestine is the most commonly injured part of bowel. Fixed portions of bowel to the parietes are more commonly injured. Terminal ileum is the most commonly injured part of small intestine.

Presence of other intra abdominal injuries influenced the mortality and morbidity adversely. Early diagnosis of intestinal injuries in blunt injury abdomen is difficult but important owing to its tremendous infectious potential. Duodenal and colon injuries are associated with worse prognosis.

Photo – 2: Traumatic jejunal perforation.



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