

A Clinical Study of Surgical Management and Outcome of Intra Abdominal Injuries Due To Blunt Injury Abdomen

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Abstract: This study aims to evaluate the aetiology, demographic distribution, the clinical presentation of various types of intra abdominal injuries due to blunt injury abdomen, their surgical management, and the clinical outcome. This study is a hospital-based prospective study that includes 60 patients clinically presented as blunt injury abdomen at Emergency Room, Government General Hospital, Guntur and got admitted to surgical ward from the period of September 2018 to August 2019. Data were collected in terms of the causative factor, clinical presentation, followed by appropriate investigations and their management, which included non-operative management or emergency laparotomy and appropriate surgical procedure. Post-operative complications were attended; patients were followed for six months postoperatively. Road traffic accidents were the most common cause of blunt injury abdomen, and pain abdomen was the most common presenting complaint in our study. The splenic injury was the most common intra-abdominal injury, and splenectomy was the most common surgical procedure employed. The most common postoperative complication was Surgical Site Infection (SSI).

Keywords: Intra-abdominal injuries; Blunt injury abdomen; Splenectomy; Non-operative management.

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I. Introduction

Injury or trauma is defined as cellular disruption caused by an exchange of environmental energy that is beyond the body's resilience. The abdomen is a commonly injured part following road traffic accidents and assaults. 85% of abdominal trauma is of blunt character¹. The evaluation and treatment of abdominal injuries are critical components in the management of severely injured trauma patients. Abdominal findings are absent in 40% of patients with hemoperitoneum². Because missed intra-abdominal injuries are a frequent cause of preventable trauma-related deaths and a high index of suspicion is warranted³. Blood loss into the abdomen can be subtle and there may be no clear signs⁴. Motor vehicle accidents account for 75 to 80% of blunt injury abdomen. Approximately 25% of all trauma victims will require an abdominal exploration. Blunt injury of the abdomen is also a result of falls from height, assault with blunt objects, industrial mishaps and sports injuries.

Plain x-ray erect abdomen, eFAST, Contrast enhanced CT scan abdomen are the most commonly performed radiological investigations in the evaluation of intra abdominal injuries. Contrast enhanced CT has become the gold standard for the intra-abdominal diagnosis of injury in stable patient⁴.

Non-operative management (NOM) for blunt abdominal trauma was found to be highly successful and safe. Management by NOM depends on the clinical and hemodynamic stability of the patient after definitive indications for laparotomy are excluded. NOM to be terminated and emergency explorative laparotomy to be performed if a patient develops hemodynamic instability and appearance of new peritoneal signs due to hollow viscus or missed solid organ injuries⁵. This study is undertaken to find out aetiology, age and sex incidence, various intra-abdominal injuries, surgical procedures for the same, and outcome in our setup.

II. Aims And Objectives

1. To study various causes of blunt injury abdomen.
2. To study age and sex incidence.
3. To study various types of intra-abdominal injuries associated with blunt injury abdomen.

4. To study the surgical procedures adopted for various types of intra-abdominal injuries.
5. To study the clinical outcome.

III. Materials And Methods

SOURCE OF DATA: Patients admitted with blunt injury abdomen in the surgical ward at Government General Hospital, Guntur, attached to Guntur Medical College, Guntur, during the period from September 2018 to August 2019. This study is a prospective study conducted over one year and included 60 cases.

METHODOLOGY: After initial resuscitation of the patients, data were collected through clinical history from patients or bystanders who witnessed the incident⁶, clinical examination, and relevant investigations to evaluate various types of intra abdominal injuries and their severity basing on which either non operative management or emergency explorative laparotomy was decided. Associated non abdominal injuries were noted and managed appropriately.

INCLUSION CRITERIA:

1. Patients presenting with blunt trauma abdomen and admitted to the surgical ward at Government General Hospital, Guntur.
2. Patients above the age of 12 years
3. Patients who were willing to participate in the study and given informed consent.

EXCLUSION CRITERIA:

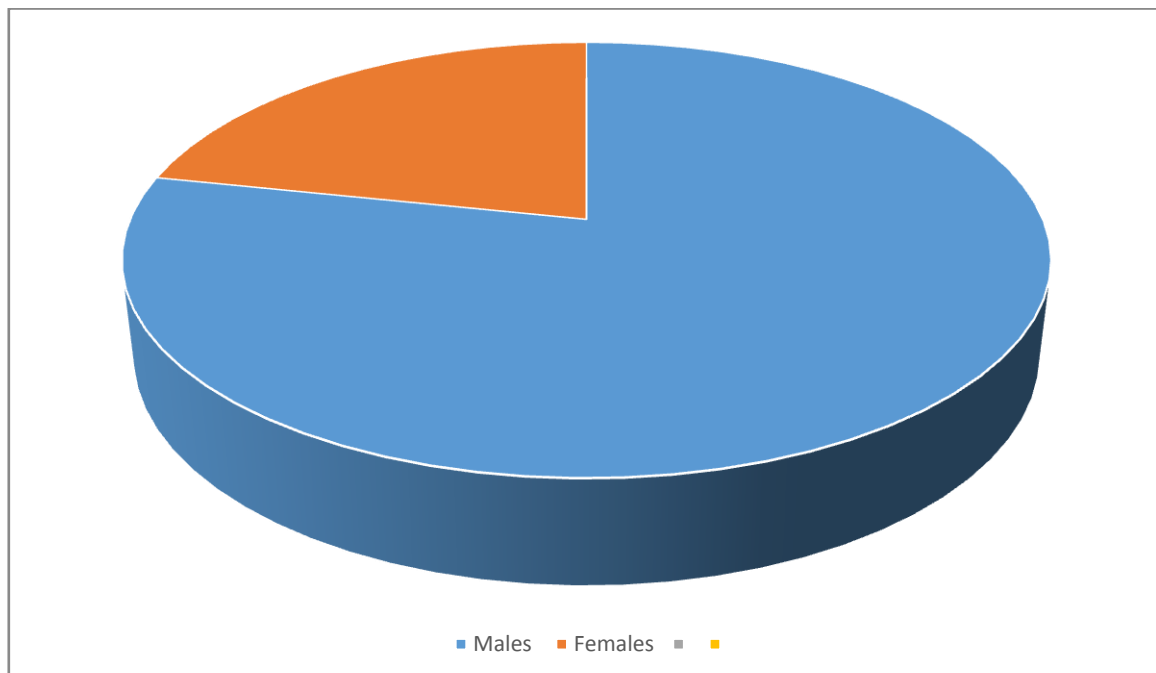
1. Patients below the age of 12 years.
2. Patients presenting to the emergency room with penetrating injuries to the abdomen.

IV. Observations And Results

This hospital-based prospective study includes sixty patients who presented to the Emergency Room with blunt injury abdomen and admitted to surgical wards at Government General Hospital, Guntur, from September 2018 to August 2019.

Table 1: Sex distribution of patients in the present study

Gender	Number of cases	Percentage %
Male	47	78.3
Females	13	21.7
Total	60	100



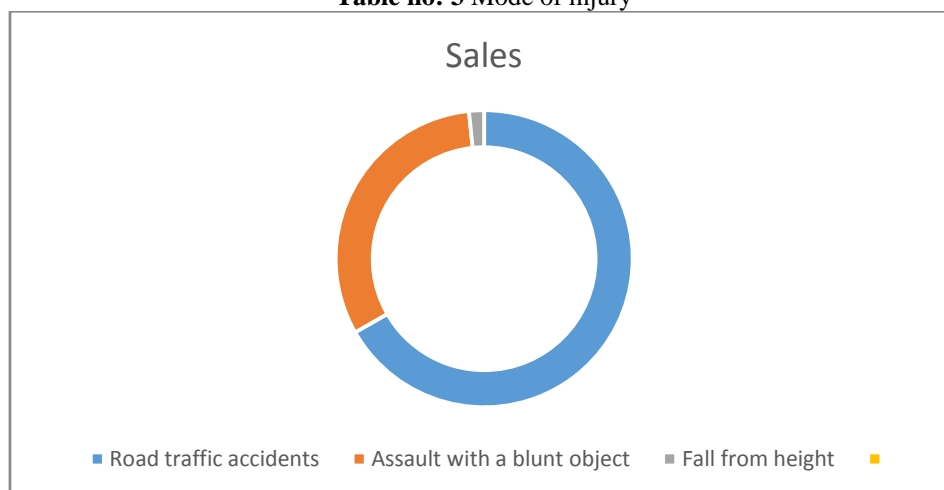
Majority of the patients admitted with blunt injury abdomen were males (78.3%), and females accounted for 21.7% of the cases.

Table 2: Age distribution

Age group	No of patients	Percentage%
13-20	5	8.33%
21-30	29	48.3%
31-40	14	23.3%
41-50	7	11.7%
51-60	3	5%
61-70	2	3.3%
Total	60	100%

The maximum number of cases were in the age group of 21-30 years, accounting for 48.3%.

Table no: 3 Mode of injury



In 57% cases, a road traffic accident was the mode of injury followed by assault with a blunt object in 27%. Least was fall from height in 16% of cases.

Table no 4: Clinical presentation

Presentation	No of cases	Percentage
Abdominal pain	60	100%
Abdominal distension	27	56.2%
Abdominal guarding and rigidity	31	51.6%
Shock	12	39.6%

Cause	No of cases	Percentage %
Road traffic accident	34	57%
Assault with a blunt object	16	27%
Fall from height	10	16%
Total	50	100%

Abdominal pain was the most common presenting complaint seen in 100% of the patients, followed by abdominal distension in 56.2% of patients.

Investigations:

Following were the investigations that were given particular emphasis in patients who presented with blunt injury abdomen

1. Haemoglobin
2. Hematocrit
3. X-ray erect abdomen
4. Four quadrant aspiration
5. e-FAST-extended focused assessment with sonography in trauma⁷
6. CECT abdomen
7. Chest x-ray

Table no 5: Haemoglobin

Hb%	No of cases	Percentage %
≥ 10 gm%	26	43.3%
8-10 gm%	21	35%
< 8 gm%	13	21.7%

Haemoglobin was above 10gm% in 43.3% of patients and was < 8gm% in 21.7% of patients.

Table no 6: Hematocrit

Hematocrit	No of cases	Percentage %
<30%	24	40%
30-45%	10	16.7%
>45%	26	43.3%

In 40% of cases, hematocrit was <30% of patients and 43.3% of cases hematocrit was >45%.

Table no 7: X-ray erect abdomen

X-ray erect abdomen	No of cases	Percentage %
Pneumoperitoneum	9	15%
Enlarged soft tissue shadow	14	23.3%
Ground glass appearance	6	10%
No radiological abnormality	25	41.7%

A plain x-ray of the erect abdomen was done in all the 60 cases. Pneumoperitoneum was found in 9 cases out of 11 bowel injuries detected at laparotomy.

Table no 8: Four quadrant aspiration

Result	No of cases	Percentage
Positive	33	60
Negative	22	40
Total	55	100

Four quadrant aspiration was done in 55 cases. Out of the 22 negative cases, 4 were false negative. On laparotomy, they were found to have hemoperitoneum.

Table no 9: Associated injury

Associated injury	No of cases	Percentage
Head	6	12%
Thorax	16	32%
Extremities #	10	20%
Pelvis #	3	6%
Soft tissue injury	2	4%
No association	18	36%

Table no 10: Organ wise injury

Organ	No of patients	Percentage
Spleen	25	42%
Liver	20	33.3%
Bowel injury	11	18.3%
Mesentery	5	8.3%

In our study, the spleen was the most commonly injured organ.

Table no 11: Multiple organs injury

Organs injured	Percentage
Spleen + liver	3
Bowel + mesentery	2
Bowel + liver	1

Table no 12: Operative vs non-operative management

	No of patients	Percentage
Operative	36	60
Non-operative	24	40

Table no 13: Type of surgery

Procedure	No of patients	Percentage
Splenectomy ⁸	12	20%
Bowel Resection & anastomosis	7	11.6%
Liver (peri hepatic packing) ⁹	7	11.6%
Closure of hollow viscus perforation	6	10%
Spleenorrhaphy	4	6.6%
Repair of mesentery	2	3.3%
Colostomy	1	1.6%

Table no 14: Immediate Postoperative complications

Post-operative complication	No of cases	Percentage
Respiratory complication	5	13.8%
Wound infection	12	20%
Wound dehiscence	3	8.3%
Anastomotic leak	1	2.7%

Table no 15: Complications during the 6months post-operative follow up

Post-operative complication	No of cases	percentage
Intestinal obstruction	2	5.4
Incisional hernia	5	8.3

V. Discussion

In our study, the majority of the patients were male in the age group 21-30 years. Road traffic accident was the most common cause of blunt injury to the abdomen, followed by assault with a blunt object to the abdomen. Abdominal pain was the common presenting complaint in all patients. The most common solid organ injured was spleen followed by liver. After initial resuscitation, detailed clinical evaluation and proper investigations, 36 patients with pneumoperitoneum or hemoperitoneum with hemodynamic instability underwent emergency explorative laparotomy and the appropriate surgical procedure. Twenty-four patients were under conservative management since they had no signs of peritonitis, or they had minimal hemoperitoneum without hemodynamic instability. Nonoperative management of solid organs injuries is pursued in hemodynamically stable patients who do not have overt peritonitis or other indications for laparotomy⁹. Out of the 24 patients, two patients required a delayed laparotomy after 48 hours due to deterioration of hemodynamic status and development of signs of peritonitis.

All bowel and mesenteric injuries were operated. Hemodynamically stable patients without any signs of peritonitis with Grade 1 and grade 2 liver and spleen injuries were managed conservatively. Among the 38 cases which needed surgical management spleen was the most common solid organ (14patients) injured, and splenectomy was done in 12 patients and spleenorrhaphy in 2 patients. Out of 14 patients of splenic injury 12 of them had associated trauma to the left lower chest including rib fractures/ hemothorax/hemopneumothorax and were managed conservatively. Patients with liver injury requiring surgical management perihepatic packing was the method employed. Out of 5 patients with mesenteric injuries, 3 of the patients had ischaemic changes in bowel wall needing resection and anastomosis, and two patients underwent primary repair. 11 out of 38 cases had bowel injuries, 2 of them had duodenal perforation and underwent modified Graham's omental patch repair¹⁰. Six patients had perforations in small bowel distal to DJ flexure out of which four patients underwent primary repair, and 2 of them needed resection anastomosis because of doubtful viability of bowel. 2 patients had transection of small bowel at two sites and underwent resection followed by anastomosis. Bowel resection with anastomosis is preferred surgery in cases with multiple perforations within a segment of bowel and when injuries involve more than 50% of intestinal wall circumference¹¹. One patient had sigmoid colon injury with more than 50% of the circumference of the colon got transected, and the patient underwent Hartmann's procedure. Out of the 38 patients who underwent surgery, 3 patients died on the first post-operative day due to continued hemodynamic instability and cardiac arrest despite resuscitation and inotropes. One of them presented on 5th day of splenic injury, and hemodynamic instability and patient went into cardiac arrest at the end of the surgery, he was resuscitated and kept on inotrope support, but the patient expired the next day. Another patient presented on 3rd day of bowel injury and sepsis, and the patient died on 1st post-operative day due to septicaemia and septic shock. One patient had multiple associated injuries involving the chest, head and fractures of extremities expired due to pulmonary embolism. The most common postoperative complication was surgical site infection¹². 12 patients developed surgical site infection around 3rd postoperative day, and 11 of them were managed with culture-sensitive IV antibiotics, wound toileting and secondary suturing of the wound after infection subsided. 1 patient developed burst abdomen on 9th post operative day and was treated with culture-sensitive antibiotics, wound toileting and tension suturing of the wound. One of the patients who underwent resection and anastomosis of small bowel developed an anastomotic leak on 7th postoperative day, nil by mouth was continued, the patient was kept on Total Parenteral Nutrition¹³ and IV amino acids and IV fluids following

which leak healed without the need of relaparotomy. Patients who underwent splenectomy were immunized against capsulated bacteria H.influenza, gonococci and meningococci within two weeks of surgery¹⁴

. Patients were followed up till 6months of the post-operative period. Two of the patients developed intestinal obstruction during the 6months of post-operative period due to adhesions. They underwent relaparotomy and adhesiolysis. 5 patients presented with an incisional hernia and underwent mesh repair in the later period after improving nutritional status.

Table no 16: Comparison of incidence of blunt abdominal injury in various age groups in present series to that of the Davis et al¹⁵

Age group	Present study	DAVIS ET AL
13-20	8.3%	18%
21-30	48.3%	24%
31-40	23.3%	15%
41-50	11.7%	13%
51-60	5%	6%
61-70	3.3%	3%

It can be seen from the above table that the majority of patients belonged to 21-30 years of age group, followed by 31-40 years age group in our study. In Davis et al. study the majority belonged to 21-30 years age group followed by 13-20 years age group and 31-40 years age group. Therefore it can be concluded that young and productive age group people are the usual victims of blunt abdominal injury.

Table no 17: Comparison of the sex-wise distribution of patients in the present study with that of Davis et al. study

Gender	Present study	Davis et al
Male	78.3	70
Female	21.7	30

From the above table, it can be seen that males are the most common victims of blunt trauma abdomen.

Table no 18: Comparison of the mode of injury in the present study with various studies

Causative agent	Present study	Davis et al	Khanna et al
Road traffic accident	57%	70	57
Fall from height	27%	6	15
Assault with blunt object	16%	17	33

The above table depicts that road traffic accident is the most common mode of injury leading to a blunt abdominal injury. This is due to rapid development in technology in the automobile industry, where priority has been given to speed rather than safety.

Table no 19: Comparison of the type of organ injury in the present study with other studies

Organ	Present study	Davis et al	Khanna et al ¹⁶
Spleen	42%	25	26
Liver	33.3%	16	37
Bowel injury	18.3%	8	57
Mesentery	8.3%	10	47

The above table compares the incidences of various organs involved in blunt abdominal injury in the present study to that of other studies. In the present study and Davis et al. study spleen was the most common viscera injured followed by liver. In Khanna et al. study bowel was the most common viscera to get injured, followed by the mesentery.

MORTALITY

A total of 3 patients died in the present study, cause of death being continued hemodynamic instability, peritonitis, septicemia and septic shock. All of them presented 24 hours after the onset of the injury. It shows that the severity of injury, presence of multiple associated injuries and delay in presentation from the time of onset of injury increased the risk of mortality. Other factors that increased the risk of mortality were old age, presence of comorbidities, the poor general condition of the patient. Early diagnosis and treatment of abdominal injury can decrease mortality by 50%¹⁷.

The mortality in the present study is 5% which is less than Davis et al. study which was 13.3%

VI. Summary

1. Males were affected nearly four times more than females.
2. Age groups between 21 and 30 followed by 31 and 40 were most commonly affected.
3. Pain abdomen was the constant presenting symptom followed by abdominal distension, guarding and rigidity.
4. In our study, the most common cause of blunt abdominal injury was a road traffic accident.
5. The most common viscera injured in our study was spleen.
6. Splenectomy was the most common surgical procedure employed.
7. Wound infection and wound dehiscence was the most common surgery-related post-operative complication.
8. In our study the mortality was 5%.

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