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Review of Conservative Management of Blunt Abdominal Trauma at a Tertiary Care Centre

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Abstract

Blunt abdominal trauma with solid organ injury is a frequent emergency and is associated with significant morbidity and mortality despite improved recognition, diagnosis and management. Trauma is the 2nd largest cause of disease in India accounting for 16% of the burden. Management of patients with blunt abdominal injury has evolved greatly over the last few decades from complete surgical management to present nonoperative management in most cases. To prospectively evaluate conservative management of solid organ injury in blunt abdominal trauma. To study the age and sex distribution of solid organ injury in blunt abdominal trauma. To study the common presenting complaints in patients presenting with solid organ injury in blunt abdominal trauma. To study the mode of injury in patients with solid organ injury in blunt abdominal trauma. To study the AAST grade in solid organ injury in blunt abdominal trauma based on Contrast-enhanced computed tomography findings. To observe the outcome of conservative management of solid organ injury in blunt abdominal trauma. This study endeavours to evaluate 72 cases of blunt abdominal injury with stress on early diagnosis and judicious use of nonoperative management. Prospective analysis of 72 patients with blunt abdominal trauma with solid organ injury admitted to Sir T Hospital, Bhavnagar within a span of 18 months was done. Demographic data, the mechanism of trauma, associated injuries, the success of conservative management and outcomes were studied. Patients with age >=18. Radiologically evident blunt abdominal trauma with solid organ injury to patient by any means. Pregnant women Radiologically evident hollow organ injury in blunt abdominal trauma Associated other injuries requiring surgical intervention. Radiologically confirmed isolated pancreatic injury. Most of the patients belonged to male sex (81.95%) and maximum cases were observed in the age group of 18-30 years (52.97%). Road traffic accident was the most common mode of injury which included 45 cases (62.5%). Total of 22 cases had splenic injury out of which 19 (86.36%) underwent nonoperative management and 3 (13.64%) underwent emergency splenectomy. Liver injury was present in 39 patients, all were managed conservatively. Nonoperative management was done in 68 (94.45%) of cases and surgical management was done in 3 (4.17%) of cases. All renal injuries were managed conservatively. Patient selection, early diagnosis, repeated clinical examination, and use of appropriate investigations form the key to nonoperative management of blunt trauma abdomen. 94.45% of splenic, liver and renal injuries can be managed conservatively. Early diagnosis and prompt treatment can save many lives and prevent unnecessary surgical interventions. Patient selection, early diagnosis, repeated clinical examination and use of appropriate investigations form the key to nonoperative management of blunt trauma abdomen. 92% of splenic, liver, pancreatic and renal injuries can be managed conservatively. Early diagnosis and prompt treatment can save many lives and prevent unnecessary surgical interventions.

OPEN ACCESS

Key Words

Blunt trauma abdomen, non-operative management, general surgery

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INTRODUCTION

Trauma is the leading cause of disability and death in the young population both in the western world and in developing nations[1,2]. Abdominal trauma represents a significant part of these injuries with the spleen and the liver being the most affected organs[3]. The introduction of computerized tomography (CT) scans into the management of patients with blunt abdominal trauma (BAT) in the 1980s improved assessment of intra-abdominal injuries providing a major step toward conservative management of blunt abdominal trauma[4]. At present conservative management of spleen and liver trauma is considered to be an initial treatment of choice which obviates nontherapeutic laparotomy and need for blood transfusion, reduces hospital cost and length of stay[3,5-7]. It is also recommended that conservative treatment of abdominal injuries be attempted in centers with experienced surgeons, the capability for precise diagnosing (CT scans), uninterrupted close monitoring in intensive care units and immediate access to the OT[5,7]. Despite the fact that a good proportion of blunt abdominal injury victims are usually admitted to the peripheral hospitals, the role of these hospitals in the management of abdominal trauma patients still remains unclear.

Non-operative treatment strategies are becoming more common. Conservative treatment experience is based more on experience in blunt abdominal trauma.

MATERIALS AND METHODS

Ethical Clearance: The study protocol was reviewed by The Institutional Ethical Committee of the institution and permitted by it.

Method of Study: This was an observational prospective study Carried out in Sir T Hospital Bhavnagar after approval from the Ethics Committee of Government Medical College Bhavnagar. A prospective study of 72 abdominal trauma patients presenting to Sir T Hospital, Bhavnagar from July 2021 to July 2022 was done.

All the enrolled patients/their relatives were explained about study related procedures in detailed which were mentioned in Patient Information Sheet and Informed Consent Form.

After initial resuscitation, detailed clinical history, physical examination, laboratory tests and x-rays and ultrasonography were done to arrive at the diagnosis. CT scan was done in all the cases.

Patients were categorized as stable vs unstable. The progress of patients was closely monitored and the decision was taken to either continue with conservative management or undertake laparotomy. Patients who did not respond to conservative management and were hemodynamically unstable and continued to deteriorate despite adequate resuscitation or who had evidence of bowel involvement were taken for immediate laparotomy.

Inferences were made for various variables like age, sex, cause of blunt abdominal trauma, time of presentation of patient, signs and symptoms, operative findings, various procedures employed, associated extra-abdominal injuries, postoperative complications, and mortality.

Type of Study: Prospective observational study.

Study Population: All cases presenting with blunt abdominal trauma in Sir T Hospital, Bhavnagar and diagnosed with solid organ injury within the duration of 2021 and 2022.

Sample Size: All diagnosed cases of blunt abdominal trauma with solid organ injury managed conservatively at Department of General Surgery, Sir T Hospital and Government Medical College, Bhavnagar.

Study Duration: 1 year

Inclusion Criteria:

- Patients with age >=18
- Radiologically evident blunt abdominal trauma with solid organ injury to patient by any means

Exclusion Criteria:

- Pregnant women
- Radiologically evident hollow organ injury in blunt abdominal trauma
- Associated other injuries requiring surgical intervention
- Radiologically confirmed isolated pancreatic injury

RESULTS AND DISCUSSIONS

A prospective observational study was conducted among 72 patients of blunt abdominal trauma in the Department of Surgery, Sir T Hospital, Bhavnagar and the following results were observed.

(Table 5) shows that the mean age of our study was 33.87 (+-10.12) years and study by Mohsin Raza *et al.*[8] observed that cases in the age group of 18-30 constituting 50% with a mean of 35.21 years.

The predominant age group was 18-30 years constituting 52.97% of patients.

(Table 6) shows that the study included 72 blunt trauma patients., 59 (81.95%) were males and 13 (18.05%) were females. Meanwhile, the study by J. Amuthan *et al.* had similar findings with 84 (84%) patients being male and 22 (22%) female, thus male to female ratio was 4:1. This suggests a very clear male dominance in cases of blunt abdominal trauma.

Table 1: Age Distribution

Age Group (years)	Current Study n = 72	Study by Mohsin Raza *et al.*[8] n = 1285
	No. of cases(percentage)	No. of cases(percentage)
18-30	38 (52.97)	642 (50)
31-40	16 (22.23)	271 (21.1)
41-50	8 (11.12)	172 (13.4)
51-60	6 (8.34)	84 (6.6)
61-70	4 (5.56)	116 (7.9)
Total	72 (100)	1285 (100)

Table 2: Sex Distribution

Sex	Current study n = 72	Study by J. Amuthan *et al.*[9] n = 100
	No. of cases(percentage)	No. of cases(percentage)
Male	59 (81.95)	84 (84)
Female	13 (18.05)	16 (16)
Total	72 (100)	100 (100)

Table 3: Etiological factors

Causes of blunt trauma	Current study n = 72	Study by J.Amuthan *et al.*[9] n = 100
	No. of cases(percentage)	No. of cases(percentage)
Road traffic accident	45 (62.5)	68 (68)
Fall from height	20 (27.78)	22 (22)
Assault	7 (9.72)	4 (4)
Hit by blunt object	0	6 (6)
Total	72 (100)	100 (100)

Table 4: Clinical features

Clinical Features	Current study n = 72	Study by J. Amuthan *et al* [9] n = 100
	No. of cases(percentage)	No. of cases(percentage)
Pain in abdomen	66 (92.95)	94 (94)
Vomiting	52 (73.23)	30 (30)
Guarding	50 (70)	48 (48)
Rigidity	4 (5.56)	6 (6)
Difficulty in breathing	16 (22.53)	20 (20)
Abdominal distension	8 (11.26)	16 (16)
Blood in urine	8 (11.26)	4 (4)
Hematemesis	5 (7.04)	4 (4)
Decreased blood pressure	24 (33.80)	31 (31)

Table 5: Associated Injuries

Associated Injury	Current study n = 72
	No. of cases(percentage)
Head injury	10 (13.89)
Haemothorax	10 (13.89)
Pneumothorax	4(5.56)
Rib Fracture	14 (19.45)
Femur fracture	7 (9.72)
Spine fracture	4 (5.56)
Pelvis Fracture	7 (9.72)
Retroperitoneal hematoma	14(19.45)

Table 6: Abdominal injuries

Organ Involved	Current study n=72	Study by M. Margret Kundson *et al.*[11] n = 1200
	No. of cases(percentage)	No. of cases(percentage)
Liver	39 (54.17)	672 (56)
Spleen	22 (30.56)	384 (32)
Kidney	11 (15.27)	144 (12)
Total	72 (100)	1200 (100)

Table 7: Severity of Solid organ injury on Contrast-enhanced computed tomography scan

Organ involved	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total
Liver	5	6	17	9	2	39
Spleen	4	5	8	3	2	22
Kidney	2	4	3	2	0	11

Table 8: Line of management and outcome

	Total in the current study	In study by Sudhir Mehta *et al.*[10]
	No of cases(percentage)	No of cases(percentage)
Successful Conservative Management	68 (94.45)	24 (96)
Operative Management	3 (4.17)	0
Failure of conservative management	1 (1.39)	1 (4)
Total	72 (100)	25 (100)

Table 9: Complications

PComplications	Total in the current study	In study by Beall *et al.*[13]
	No of cases(percentage)	No of cases(percentage)
Pneumonia	9 (12.5)	12 (12)
Urinary Tract Infection	7 (9.72)	10 (10)
Pseudoaneurysm	1 (1.38)	0

Table 10: Organ Injured in Different Modes of Injury

Mode of injury	No. of cases:			
	Liver Injury	Splenic Injury	Renal Injury	Total
Road Traffic Accident	22	16	7	45
Assault	12	5	3	20
Fall from height	5	1	1	7
Total	39	22	11	72

In another study by Ahmet Okus *et al.* of the patients were male and 17 female very closely correlating the findings of our study.

Road traffic accidents involving both pedestrians and vehicular accidents accounted for 65% majority of injuries, followed by fall from height (27.78%) and assaulted injuries accounting for 8.34% cases.

In study by J. Amuthan *et al.*[9] RTA comprised of higher number of cases at 68%, followed by fall from height (22%), hit by blunt object (6%) and assault (4%).

Another study by Sudhir Mehta *et al.*[10] the road traffic accidents were the most common mode of injury associated in 44% of patients (11 out of 24).

Majority of patients presented with pain abdomen (66) followed by vomiting in 52 patients. Difficulty in breathing was present in 16 patients and blood in urine in 8 patients. Among physical signs generalized abdominal tenderness and guarding were present in 50 (70%) patients where as 24 (33.80%) were in hypovolemic shock.

In the study by J. Amuthan *et al.*[9] the most common symptom was pain abdomen (94%). Next symptom was vomiting (30%) followed by distension (16%), urinary retention (8%) and haematuria (4%).

These results also correlate with the study of Sudhir Mehta *et al.*[10]. In their study most common clinical presentation was abdominal pain (66%) and tenderness (96%) following injury. Other clinical presentations were abdominal distension, vomiting, hypotension and hematuria.

Commonly associated with extra-abdominal injuries were soft tissue injuries including retroperitoneal hematoma 14 (19.45%), head injury 10 (13.89%) and hemothorax 10 (13.89%). Associated orthopedics injuries in our study were mainly rib fractures in 14 (20%).

Most of the associated injuries were treated conservatively whereas hemothorax and pneumothorax required intercostal drainage.

Time of Presentation: More than half of the (38) patients presented within 4h of the incident to us.

X-ray abdomen, ultrasound abdomen and CT scan abdomen and pelvis were done and multiple injuries were revealed. Splenic injury was observed in 30.56% cases, liver trauma in 54.17% of cases. Renal injury was less common with 15.27% incidence.

A patient had multiple injuries involving Grade 4 splenic injury and grade 2 renal injury on left side.

A large scale study by M. Margret Kundson[11] had similar findings with 56% cases presenting with liver injury followed by splenic(32%) and renal (12%) injuries.

Similar studies by Smith *et al.*[12] had findings supportive of the current study with maximum cases of liver injury (38.25%) followed by splenic and renal injuries.

The CECT finding of the patients showed that the majority of patients having Grade 3 injuries in liver (43.6%) and spleen (36.37%) while Grade 2 injuries were more common in the Renal trauma (37.1%).

In our study conservative management was attempted in 72 (98.59%) patients and was successful in 68 (94.45%) patients and 1 (1.39%) patient expired. The patient expired on post-trauma day 8 after tolerating liquid orally due to respiratory complications.

Three patients with grade 4 and 5 splenic injuries were taken up on 2nd post-trauma day for emergency splenectomy and all survived and were discharged uneventfully.

A similar study of BAT by Sudhir Mehta *et al.*[10] showed a similar high success rate of conservative management of blunt abdominal trauma with 96% successful conservative management of patients.

Commonest complication in our study was Pneumonia (12%) which in most cases were minor infections and were managed conservatively. This was consistent with studies conducted by Beall *et al.*[13].

Average Hospital Stays: Hospital stay was less in the conservatively managed group. The average stay in the hospital in the conservatively managed group patient was about 12 days and in the operative group patient was 20 days.

In all cases of RTA (48.89%), assault (60%) and fall from height (71.42%) liver injury was observed most commonly.

(Table 11) suggests that liver remains the most common solid organ injured in blunt abdominal trauma irrespective of the mode of injury followed by spleen and kidney.

Discussion Blunt abdominal trauma is an arduous task even to the best of traumatologists. Injuries ranging from single organ to mutilating multi organ trauma may be produced by blunt abdominal trauma. Abdominal findings may be absent in 40% of patients with hemoperitoneum. Sometimes, clinical evaluation of blunt abdominal injuries may be masked by other more obvious external injuries[6]. Non therapeutic

laparotomies have significantly reduced with proper and timely applications of imaging methods in BAT patients along with physical examination. Unrecognized abdominal injury is a frequent cause of preventable death after trauma.

The patients who had sustained blunt abdominal trauma may have sustained injury simultaneously to other systems and it is particularly important to examine for injuries of head, thorax and extremities. Vigilance and care of injuries in any of these systems may take precedence over abdominal trauma. Out of 71 cases in our study 40% of patients were in 21-30 years of age group. This goes in accord with studies of Davis *et al*.[6] and Lowe *et al*.7 79% cases were males and 21% were females with an M:F ratio of 3.7:1. The male preponderance in our study reflects that the greater mobility of males for either work, such as drivers and mechanics for automobiles or recreational activities may be resulting in a higher exposure to the risk of traffic injuries. Automobile accidents accounted for 53% of cases. This was equivocal with other studies conducted by Perry[14] and Morton *et al*.[15] Thus prevention of accidents can decrease fatality. Commonest intra-abdominal injury was liver injury in 53% followed by splenic injury. In blunt trauma surgeon's main concern is control of hemorrhage, but how it can be best done with safety and less morbidity, depends on grade, severity and site of injury. Hemodynamically stable patients were followed with series physical examinations., ultrasonography or CT scans thus avoiding unnecessary laparotomy. Kidney injuries were frequently associated with pelvic fractures. Renal injuries were treated conservatively. All patients of Blunt abdominal trauma trauma who were managed conservatively were followed with regular CT scans and all performed well in their course. Most grade I-IV renal injuries can be managed non-operatively. The absolute indications for surgery include pedicle injury, shattered kidney/liver/spleen, expanding hematoma and hemodynamic instability.

Surgeon should cautiously look for other sites of trauma to rule out extra-abdominal injuries. Abdominal injuries were associated with various extra-abdominal injuries amongst which most common were rib fractures (20%) and soft tissue injury (20%). Incidence of rib fracture was consistent with study conducted by Fazili[16] *et al.* but we accounted for higher amount of hemothorax and retroperitoneal hematomas. The higher amount of rib fractures were probably due to increase number of upper abdominal trauma. These injuries in any of the systems may take precedence over abdominal trauma. Non-recognition of an extra abdominal injury may contribute to the patients' death when a relatively simple procedure might otherwise have saved the patient's life.

Mortality rate in study for conservatively managed patient was 1 out for 67 patients managed conservatively. The reason for this was early presentation of patients in our study, early diagnosis and prompt resuscitation. The earliest presentation was at 30 min with one case presenting as late as 5 days after the injury. The early presentation of our patients helped us to start appropriate resuscitation at time and save many lives.

Commonest complication in our study was Pneumonia (12%) which in most cases were minor infections and were managed conservatively. This was consistent with studies conducted by Beall *et al*.[13] To conclude initial resuscitation measures and correct diagnosis forms the most vital part of blunt abdominal trauma management. Prompt evaluation of abdomen is mandatory to minimize preventable morbidity and mortality. Mortality is related to delayed presentation and diagnosis and associated injuries.

Clinical abdominal assessment is inaccurate of the BAT patients since there are often distracting injuries, altered levels of consciousness, nonspecific signs and symptoms, and large differences in individual patient reactions to intraabdominal injury. Out of multiple modalities available for evaluating stable patients; CT scan along with hemodynamical stability are best in evaluating which patient requires surgery or in deciding which patient can be safely discharged from emergency. The main drawbacks of CT scan are its cost, low sensitivity in detecting bowel injuries and hemodynamically unstable patients. Damage control laparotomy is a potentially life-saving procedure with the potential to mitigate the devastating clinical outcomes. Swift recognition, timely and proper application of imaging methods in BAT patients along with physical examination have significantly decreased the number of nontherapeutic and unnecessary laparotomies as a result and has increased NOM of solid organ injuries. It is the golden hour of injury when prior comprehensive action can save lives. Stitch in time saves nine.

CONCLUSION

In our present study of conservative management of blunt abdominal trauma male cases outnumbered female cases and the mean age was 33 years. The most common mode of injury was Road Traffic Accidents and the least common was assault. Majority of patients presented with abdominal pain with or without vomiting. Rib fracture being the most common associated injury with BAT. Liver (Grade III injury) was found to be the most common solid organ injured in blunt abdominal trauma followed by spleen (Grade III injury) and kidney (Grade II injury). Majority of patients with blunt abdominal trauma with solid organ injury with stable hemodynamics were managed conservatively with close monitoring of vitals, haematocrit, serial abdominal examinations follow-up USG and CECT imaging.

Overall present study suggests that the majority of patients with blunt abdominal trauma with solid organ injury from Grade 1-Grade 5 can be managed conservatively if they are hemodynamically stable without the need for operative intervention. Conservative management gives advantages of organ and function salvage, no post-operative complications, decreased morbidity, mortality and decreased hospital stay for patient with overall less consumption of human and material resources of the hospital.

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