

Original Research Article

Study of pattern and management strategies of solid visceral injuries in blunt trauma abdomen in tertiary care centre

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ABSTRACT

Background: Blunt trauma abdomen is a leading cause of morbidity and mortality among all age groups. In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality still remain large. The aim was to evaluate pattern and management strategies of solid visceral injuries in blunt trauma abdomen patients.

Methods: This was a prospective study on 100 consecutive patients admitted in Department of General Surgery at a tertiary care center with an antecedent history of blunt abdominal injury. All patients proven to have penetrating injury and hollow viscus injury were excluded. The pattern of injury, presentation and parameters associated with management strategies were evaluated.

Results: In the present study, solid viscera injury in blunt trauma abdomen is more common in age group 21-30 years (43%) with male predominance (92%). RTA (75%) were the most common mode of injury followed by fall. Most common clinical presentation was abdominal pain (86%) followed by tachycardia (34%) and hypotension (6%). Most common viscera injured is liver (48.2%) followed by spleen (36.7%), kidney (12.3%) and pancreas (2.8%). Majority of patients were managed conservatively (84%).

Conclusions: It was concluded from the study that irrespective of the solid organ injury in blunt trauma abdomen, patients can be managed conservatively due to aggressive resuscitation with supplement drug therapy, use of analgesia or sedation in ICU setup and close monitoring. Patients are grossly hemodynamically unstable at presentation do require intervention either immediate or in due course of time.

Keywords: Shock, Hemodynamic instability, Liver injury

INTRODUCTION

Blunt abdominal injuries due to road traffic accidents are the sixth leading cause of death in India.¹ Blunt abdominal trauma is usually not obvious and can be often missed. Delay in diagnosis and inadequate treatment of the abdominal injuries can be fatal. Our understanding in the management of blunt abdominal trauma is progressively increasing. In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality still remain large. Review of

literature suggest that in today's era, such deaths can become negligible if adequate identification of the problem is done and line of management is decided early. In recent past there is paradigm shift in the treatment of patients with blunt abdominal trauma, have been taking place. Traditionally, emergency laparotomy was the procedure of choice but now conservative management is the most common management strategy in particularly if the patients is not deranged much haemodynamically.²⁻⁴ Some surgeons are still suspicious of this approach because of the possibility of missed abdominal injuries,

delayed recognition of significant intra-abdominal bleeding and associated mismanagement of the patient.

It is appropriate for physicians and surgeons to have a healthy skepticism of new techniques until the value of a new approach have been documented and the appropriate patients for such therapies are clearly defined. Imaging modalities are widely used for the diagnosis of solid viscera injury in blunt trauma abdomen. Focused abdominal sonography for trauma (FAST) can quickly assess intra-abdominal hemorrhage and its bedside use is most suitable for hemodynamically unstable patient. FAST will generally document 400 ml or more intra-peritoneal fluid, and for this reason it is a useful investigation for deciding the intervention.⁵ Computed tomography (CT) is the most commonly used method for diagnosis of intra-abdominal solid organ injury.⁶

The spleen and liver are the most commonly injured organs as a result of blunt trauma. The kidney is also commonly injured. Treatment strategy mainly depends on clinical evaluation and grade of injury, hemodynamic states of patient. Clinical and radiological evaluation also play the pivot role in management.

In order to stratify the patterns of injury affecting liver, spleen and kidney and their management strategy, this prospective study has been planned.

METHODS

This was a prospective study on 100 patients admitted in Department of General Surgery over a period of one and a half year from 1 January 2017 to 30 June 2018 in a tertiary care centre with an antecedent history of blunt abdominal injury. All patients proven to have solid viscera injury (as confirmed by USG/CECT abdomen) were included in this study. All patients proven to have penetrating injury and hollow viscus injury were excluded from this study. Ethical clearance was obtained from the institutional ethical committee and informed consent was obtained from the patient/attendant.

Once the patient was enrolled into the study after above criteria detailed history and physical examination was done. Special attention was given to the cause of injury, gender of patient, direction of blunt force, the vitals particularly pulse, blood pressure were recorded and monitored. Investigations included complete hemogram, blood urea, blood Sugar, blood electrolyte and USG abdomen. If the patient was hemodynamically stable, CT scan was done to evaluate the extent of injury. On the basis of clinical and radiological findings the injury was graded according to AAST injury scale for liver, spleen, kidney and pancreas.

Hemodynamic instability and finding of shattered solid viscera on imaging and/or other injury requiring exploration was the criteria for surgical intervention. On exploration detailed intra operation findings were

recorded and solid viscera injury was managed as per standard guideline for various grade. These patients were followed up in post-operative period to note the outcome and complications. Patients kept on conservative management were also followed and all findings were recorded till the patient was discharged or whether decision of surgical intervention was taken at a later date. All findings were recorded and tabulated. Data was entered in excel spread sheet and was analysed in frequency, percentage and proportion.

RESULTS

The age ranges from 10 to 70 years with mean age of 29.3 years. It was found that majority of patients ranged from 21-30 years of age (Table 1). The majority of patient 92% were male and 8% were female. Road side accident as the most common mode of injury in these patients and was responsible for 75% of the patients. Fall from height accounted for 8 percent and accidental trauma under unknown circumstances accounted for also 8 percent cases. The most common presentation of patients was abdominal pain in 86 patients followed by tachycardia (pulse rate ≥ 100) in 34 patients, hypotension (systolic BP < 90) in 6 patients, chest pain in 3 patients and vomiting in 2 patients. The notable feature in abdominal trauma is presence of shock (systolic BP < 90). Shock was seen in 8% of cases while 94% had no shock practically. In 95% patient's single viscera was involved where as in 5% patients multiviscera were involved (Table 2). Most common viscera injured is liver (48.2%) followed by spleen (36.7%), kidney (12.3%) and pancreas (2.8%). Out of 106 organ injury evaluations, 95 organ injuries were diagnosed on CT whereas 7 organ injuries were diagnosed during operation without prior CT evaluation. In 4 patient's injury were diagnosed on postmortem examination. Patients who were hemodynamically stable were evaluated with CT scan to know patterns and grade of injury and the patients who were not hemodynamically stable were directly explored without CT evaluation, as a live saving procedure. Some patients who were highly hemodynamically unstable died before any evaluation could be done and got diagnosed on post mortem examination.

Study showed liver injury of grade I in 1 (2.22%) patient, grade II in 20 (44.44%) patients, grade III in 13 (28.89%) patients, grade IV in 10 (22.22%) patients, grade V in 1 (2.22%) patient, grade VI not in a single patient. Spleen injury of grade I in 0 patient, grade II in 14 (38.89%) patients, grade III in 15 (41.67%) patients, grade IV in 5 (13.89%), grade V in 2 (5.56%). Kidney injury of grade I in 0 patient, grade II in 2 (15.38%) patients, grade III in 5 (38.46%) patients, grade IV in 6 (46.15%) patients, grade V not even in a single patient. Pancreas of grade I in 1 (33.33%) patient, grade II in 1 (33.33%) patient, grade III in 1 (33.33%) patient, not even a single patient had a pancreatic injury of grade IV as well as grade V injury. In the present study in case of single visceral injury, patients with shock were 8.42% whereas remaining patients were

hemodynamically stable. In contrast to this in case of polyvisceral injury, 20% of patients were in shock at time of presentation. Out of 100 patients 84 patients (84%) were treated conservatively whereas 16 patients (16%) were managed by operation. In present study, among all cases in whom conservative and operative management was done, 4.8% patients and 12.5% patients were in shock respectively (Table 3).

Table 1: Age and sex distribution of patients.

Age group (in years)	Male	Female	Total
10-20	20	2	22
21-30	40	3	43
31-40	15	1	16
41-50	12	2	14
51-60	4	0	4
61-70	1	0	1
Total	92	8	100

Table 2: Pattern of injury and the organs involved.

Pattern of injury	With shock	Without shock	Total
Univisceral injury	8	87	95
Liver	2	46	48
Spleen	5	31	36
Kidney	0	10	10
Pancreas	0	0	0
Multivisceral injury	1	4	5
Liver and pancreas	1	1	2
Liver and spleen		1	1
Spleen and kidney	1	1	1
Spleen, kidney and pancreas		1	1

Table 3: Parameters associated with conservative and operative management.

Parameters	Values	Conservative (n=84) N (%)	Operative (n=16) N (%)
Pulse rate/min	<100	69 (82.1)	7 (43.8)
	≥100	15 (17.9)	9 (58.2)
BP (mm Hg)	Sys <90	4 (4.8)	2 (12.5)
	Sys ≥90	80 (95.2)	14 (87.5)
HB (gm%)	<7	6 (7.1)	1 (6.3)
	≥7	78 (92.3)	15 (93.7)
Per abdomen	Soft non tender	80 (95.2)	12 (75)
	Tense tender	4 (4.8)	3 (18.7)
	Distended guarding	0 (0)	1 (6.25)

Out of 16 patients managed operatively, 7 (43.75%) patients had pulse <100 and 9 (58.25%) patients had pulse ≥100. Similarly, 2 (12.5%) patients had systolic

blood pressure <90 whereas 14 (87.5%) patients had systolic blood pressure ≥90. Out of 16, 1 (6.25%) patient had Hb<7 whereas 15 (93.75%) patients had Hb ≥7. Out of 16 patients managed operatively, 12 (75%) patients had soft and non tender abdomen, 3 (18.75%) patients had tense and tender abdomen and 1 (6.25%) patient had distended and guarding abdomen. Out of 16 patients, 8 (50%) patients operated with prior CT evaluation and 8 (50%) patients were operated without prior CT evaluation. Among all, 94 patients were discharged, 4 patients expired whereas 2 went LAMA. The mortality rate in the study was found to be 4%. Out of 4 expired patients, 2 had liver injury whereas 2 had splenic injury found in post mortem. Out of 94 patients, 93 patients were regular in follow up. Only 1 patient lost to follow up.

DISCUSSION

Blunt trauma abdomen to solid organ is frequently encountered injury in emergency department of most hospitals. The incidence is rising day by day and so the mortality and the morbidity.

Assessment of hemodynamic stability is the most important initial concern in the evaluation of patients with blunt trauma abdomen. CT scanning often provides the most detailed images of traumatic pathology and may assist in determination of operative intervention. The management of blunt trauma abdomen is complicated and demands adequate pre-hospital care, a rapid diagnostic process and a high level of intensive care especially in cases with severe blunt trauma abdomen. The study was to evaluate various factors influencing management strategy and outcome in patients of blunt abdominal trauma like grade of injury, vitals of the patient (pulse rate and blood pressure), hemoglobin etc. Study was conducted on 100 patients admitted in Department of General Surgery Pt. BD Sharma PGIMS Rohtak with an antecedent history of blunt abdominal trauma were included in the study.

The age of the patients in present study ranged from 10-70 years. The mean age was 29.3 years. Majority (43%) of patients were within 21-30 year. Panchal et al observed mean age of 31.48 years.⁷ Musau et al observed mean age of 28.2 years.⁸ In a study by Smith et al mean age for abdominal trauma was 35.0 years.⁹ Involvement of young age group in various studies including the present study is possibility due to more outdoor activity in this group.

In present study majority of patients were male (92%). Panchal et al found 88% male. Musau et al observed 92.5% male in similar pattern. This is probably because males are more commonly drivers in India and are involved in outdoor activities. Males are also commonly involved in assault and violent crimes compared to females. Majority of patients in present study were from rural area since most females in rural area are housewives not getting exposed to external work involving

traffic/vehicle, there is less involvement of females in the present study and in rural area females are usually housewives. In present study road traffic accident (RTA) accounts for 75% cases of blunt abdominal trauma. In study done by Panchal et al and Aziz et al.¹⁰ RTA accounts for 48% and 58% respectively. Due to rapid and unprecedented motorization combined with the loose traffic control or discipline, road traffic accident is more common these days. Observation of present study was almost on similar pattern as of other studies. In present study majority of patients (86%) presented with abdominal pain. The notable feature in abdominal trauma is presence of shock (systolic BP <90). Shock was seen in 8% of cases while 94% had no shock practically. Solanki et al observed abdominal pain in 90% while shock was present in 10% patients.^{9,11} In present study, single organ injury was found in 95% patients whereas multiple organ injury was seen in just 5% patients. Panchal et al observed single organ injury 66% whereas multiple organ injury 30%. Ayoda et al found single injury 71.4% whereas multiple organ injury 23.3%.¹² As kidney and pancreas are retroperitoneal organs whereas major part of liver and spleen are present on opposite side of the abdominal cavity, so mostly the single organ injured is at the site of impact in case of blunt abdominal trauma.

In the present study in case of single visceral injury, patients with shock were 8.42% whereas remaining patients were hemodynamically stable. In contrast to this, in case of multi visceral injuries 20% of patients were in shock at time of presentation.

In present study commonly, liver was found to be commonest (53%) followed by spleen (39%), kidney (13%) and pancreas (3%). In study of Panchal et al liver (35.13%), spleen (40.54%), kidney (13.57%), pancreas (5.40%). Similarly, in Aziz et al found liver (28%), spleen (26%), kidney (4%), pancreas (2%).¹⁰ In study of Mehta et al liver (53%), spleen (35%), kidney (17%), pancreas (0%).¹³ Liver is commonly involved due to its anatomical location and relative immobility. Its sub diaphragmatic and subcostal location makes it more liable to injury due to compression or puncture by thoracic cage or broken ribs during blunt trauma.

Treatment strategy mainly depends on grade of injury, hemodynamic stability of patient, clinical and radiological findings. In present study 84% patients were managed conservatively whereas only 16% patients needed surgical intervention. Treatment strategy mainly depends on hemodynamic stability of patient, clinical and radiological findings. In present study maximum patients were managed conservatively because of proper patient monitoring, availability of experienced surgeon, radiologist and good infrastructure. It was observed that most of the patients who came to causality with blunt trauma abdomen to solid organs were managed conservatively because majority of the patients were hemodynamically stable at presentation and during the course in casualty due to dynamic control resuscitation.

Because of good infrastructure and availability of advanced monitoring, we succeeded to manage them conservatively. Whereas, whoever we managed operatively were hemodynamically unstable with all deranged parameters and severe grade of injury.

CONCLUSION

It is concluded from the study that irrespective of the grade of the injury to the solid organ in blunt trauma abdomen patients, by using adequate infrastructure and equipment and aggressive resuscitation with supplement drug therapy and by use of analgesia or sedation in ICU setup, it is possible to manage majority of the patients conservatively except for the patients with greater vessel injury of solid organ and resistant hemodynamic instability.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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