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Original Research Article

Management of solid organ injury in patient of blunt abdominal trauma

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ABSTRACT

Background: In this ongoing era of 21st century, trauma is the leading cause of death in individuals between age 1 and 44. In trauma, also road traffic accidents (RTAs) are the major cause of death. Blunt abdominal trauma is a frequent emergency and is associated with significant morbidity and mortality.
Methods: A prospective analysis of 50 patients of blunt abdominal trauma admitted in SMIMER hospital Surat within a span of 12 months was done. Unstable patients with initial resuscitation underwent focused assessment sonography for trauma (FAST). Failed resuscitation with free fluid in abdomen confirmed by FAST immediately shifted to operation theatre for laparotomy and proceed. Hemodynamically stable patients underwent computerized tomography of abdomen.
Results: Most of the patients in our study were in the age group of 21-45 years with M:F ratio of 4:1. RTAs (62%) was the most common mechanism of injury. Spleen (38%) was the commonest organ injured and the most common surgery performed was splenectomy. In total non-operative management (NOM) was done in 58% of cases and surgical management was done in 42% of cases.
Conclusions: Appropriate patient selection, early diagnosis and repeated clinical examination and use of appropriate investigations forms the key in management of blunt abdominal trauma. To conclude, initial resuscitation measures and correct diagnosis forms the most vital part of blunt abdominal trauma management.

Keywords: Blunt trauma, Kidney injury, Liver injury, Solid organ injury, Spleen injury

INTRODUCTION

During the past decades, management of blunt injury to abdominal organs has shifted from operative to selective NOM.[1] Trauma is the leading cause of death and disability in developing countries and the most common cause of death under 45 years of age. NOM is the standard of care for the hemodynamically stable patient with a blunt abdominal injury.[2] The management of patients with solid organ injuries has changed since the introduction of technically advanced imaging tools such as ultrasonography and multiple scan computerized tomography, interventional radiological techniques and modern intensive care units. There has been great improvement in the NOM of intra-abdominal solid organ injury in recent decades. Safe management of the patient with blunt abdominal injury requires careful selection for NOM, meticulous monitoring and follow up. Abdominal injuries require surgery in about 25% of cases. 85% of abdominal traumas are of blunt character.[3] The spleen and liver are the most commonly injured organs as a result of blunt trauma.[4] Clinical examination alone is inadequate because patients may have altered mental status and distracting injuries. Initial resuscitation along with FAST and computed tomography (CT) abdomen are very beneficial to detect those patients with minimal and

clinically undetectable signs of abdominal injury and are the part of recent management guidelines.[5] NOM can be divided in either observation alone or angiography and embolization followed by close observation. NOM is a standard protocol for hemodynamically stable solid organ injuries.[6] Pre-hospital transportation, initial assessment, thorough resuscitative measures and correct diagnosis are of utmost importance in trauma management. Patient developing sign and symptoms of hypovolemic shock and aggressive blood loss requires emergency laparotomy. The preference of a conservative treatment must be based on the hemodynamic stability indices as well as on the lesion severity and on the general trauma severity. Thus the main objective was to study the clinical presentations of blunt abdominal trauma and to identify the parameters most helpful to guide in conservative management, to identify the cases where conservative management can be implicated successfully and to study the cases where the operative line of management was mandatory.

METHODS

A prospective clinical study was undertaken of 50 patients for management of blunt trauma abdomen at SMIMER hospital, Surat. The study was conducted over a period of 12 months from January 2020 to December 2020. It was a prospective observational study. The patient selection was by convenience sampling.

During this study period 50 patients were admitted with blunt trauma to abdomen.

Each patient was evaluated clinically taking into consideration history, general examination, abdominal examination, investigations and analyzed according to data collected on a planned proforma.

Inclusion criteria

All patients of blunt abdominal trauma who were admitted to SMIMER hospital were included prospectively.

Exclusion criteria

Those who were hemodynamically unstable and had confirmation of intra-abdominal fluid were taken immediately for operation and the patients below 12 years were not included in present study.

Initial priority was given to maintain airway, circulation and breathing with emphasis on vitals like temperature, pulse rate, blood pressure and respiratory rate and resuscitative measures were done. After initial resuscitation, detailed clinical history, physical examination, laboratory tests and X-rays, ultrasonography (FAST) was done to arrive at the diagnosis. CT scan was done in most of the cases. Patients were categorized to stable versus unstable. The progress of patients was closely monitored by pulse, blood pressure, respiratory rate, SpO_2 monitoring and abdominal girth charting. With this decision was taken to either continue with conservative management or to 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 or free fluid in ultrasonography were taken for immediate laparotomy. Hemodynamically stable patients underwent CT scan of abdomen. Organ injuries were scaled according to the American association for the surgery of trauma (AAST) and these patients were managed conservatively after ruling out hollow viscus perforation and other system involvement.

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, post-operative complications and mortality. After ethical clearance, we had included only those patients who came in emergency department with blunt abdominal trauma.

Statistical analysis

All statistical analysis was performed using SPSS 25(statistical package for social science).

Quantitative variables were presented as means or as median (range).

RESULTS

Out of 50 patients, 14 (28%) patients were younger than 20 years of age, 8 (16%) were older than 44 years of age and 28 (56%) were between the age of 21-44 years. Mean age is 30.7 years (Table 1).

Current study constituted majority of male sex than female. Forty patients were male as compared to 10 female patients. Males are more vulnerable because they are more exposed to outdoor hazards of road traffic, industrial and sports accident (Table 2).

RTA was the commonest cause of blunt abdominal trauma in this study. One patient had fall of brick wall on abdomen (Table 3).

Spleen remains the most commonly injured organ in blunt trauma followed by liver (Table 4). In 11 (22%) patients, blunt abdominal trauma was associated with the extremities injury. 6 of them had upper limb injuries and 5 had lower limb injuries.

29 (58%) patients were underwent conservative NOM. Out of 19 patients with splenic injuries, 8 (42%) patients underwent exploration and splenectomy. 72% of the patients with liver injury were managed conservatively.

Table 1: Age-distribution of the patients.

Age (in years)	Male	Female	Total	Percentage
<20	13	1	14	28
21-44	22	6	28	56
>45	5	3	8	16

Table 2: Sex-distribution of patients.

Sex	Number	Percentage
Male	40	80
Female	10	20

Table 3: Mode of injury.

Modes	Number	Percentage
RTA	31	62
Fall	8	16
Assault	9	18
Industrial	1	2
Others	1	2

Table 4: Organ involved in trauma.

Organs	Number	Percentage
Spleen	19	38
Liver	18	36
Kidney	5	10
Intestine	5	10
Urinary bladder	1	2

Table 5: Operative versus NOM.

Management	Number	Percentage
Conservative	29	58
Operative	21	42

All 5 patients with intestinal injury were underwent exploration and repair. Three of them treated by primary perforation repair, one needed resection and anastomosis, and one underwent sigmoid loop colostomy (Table 5).

Out of 29 patients managed conservatively only 1 (3.4%) patient had developed complication in the form of pleural effusion, whereas 5 (23.8%) of all operated patients had developed complication in the form of surgical site infection and respiratory tract infection.

An average hospital stay of operated patients (10.6 days) was longer than the hospital stay of conservatively managed patients (4.4 days).

DISCUSSION

A prospective study entitled 'management of solid organ injury in patient of blunt abdominal trauma at SMIMER hospital, Surat' was undertaken in SMIMER hospital.

Blunt abdominal trauma was 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. Non therapeutic laparotomies have significantly reduced with proper and timely applications of imaging methods in blunt abdominal trauma patients along with physical examination. Unrecognized abdominal injury was a frequent cause of preventable death after trauma.[7]

The patients who had sustained blunt abdominal trauma may have sustained injury simultaneously to other systems and it was particularly important to examine for injuries of head, thorax and extremities.[8] Vigilance and care of injuries in any of these systems may take precedence over abdominal trauma.

In this prospective study, the predominance of young males had been observed as they are the most mobile population of the society. Male to female ratio was to be 4:1. Similar ratio has been observed in our reference studies Davis et al and Mehta et al.[3,11]

Mean age of patients was 30.7 years of the present study, which was similar to other studies Davis et al, Mehta et al and Bolton et al.[3,11,12]

Most common mode of blunt trauma in our study was RTA (62%) followed by assault (18%), fall from height (16%). According to Wiener and Barrett in civilians, blunt trauma is caused primarily by RTA (26%) and fall (10%). Similarly in our reference studies Mehta et al and Bolton et al RTA was also commonest mechanism of injury as compared to fall and blows to abdomen.[3,12]

Abdominal injuries are commonly associated with other injuries and these may complicate the management and affect the outcome. In this study, 27 (54%) patients had other associated injuries. The most common were the extremity injuries that occurred in 11 (22%) patients. Head injuries were the second commonest association and not the first. FAST was the commonest tool used to diagnose patients with abdominal injuries. The spleen was found to be the most commonly injured organ. Splenectomy was the commonest mean of treatment of splenic injuries.[9] The length of hospital stay has been reported to be an important measure of morbidity among trauma patients.[10] Prolonged hospitalization is associated with an unacceptable burden on resources for health and undermines the productive potential of the population through time lost during hospitalization. In this study, the hospital stay ranged from 1 to 19 days with mean stay of 5.03 days.[11]

Table 6: Comparison according to sex with other studies.

Sex	Present study (%)	Davis et al[11] (%)	Mehta et al[3] (%)
Male	80	70	79
Female	20	30	21

Table 7: Comparison according to age group with other studies.

Age (in years)	Present study (%)	Davis et al[11] (%)	Mehta et al[3] (%)	Bolton et al[12] (%)
<20	28	37	23	23
21-45	56	41	59	62
>45	16	22	18	15

Table 8: Comparison according to mode of blunt trauma with other studies.

Modes	Present study (%)	Mehta et al[3] (%)	Bolton et al[12] (%)
RTA	62	53	77
Fall	16	43	7

CONCLUSION

From this study, we would like to conclude that management of solid organ injury has changed by advanced imaging techniques and the evolution of NOM of blunt solid organ injury. Appropriate patient selection, early diagnosis and repeated clinical examination and use of appropriate investigations forms the key in NOM of blunt trauma abdominal cases. To conclude, initial resuscitation measures and correct diagnosis forms the most vital part of blunt abdominal trauma management. As the RTAs remained the commonest mode of blunt injury, awareness regarding traffic rules can reduce the burden. In the trauma center, FAST is a very helpful modality for detection of potentially life threatening emergencies for hemodynamically unstable patients. Clinical abdominal assessment is inaccurate of the blunt abdominal trauma patients since there are often distracting injuries, altered levels of consciousness, non-specific signs and symptoms and large differences in individual patient reactions to intra-abdominal injury. Swift recognition, timely and proper application of imaging methods in blunt abdominal trauma patients along with physical examination have significantly decreased the number of nontherapeutic and unnecessary laparotomies as a result and has increased non-operative management of solid organ injuries.

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