

SPECTRUM OF SOLID ORGAN INJURY IN BLUNT TRAUMA ABDOMEN: A CLINICAL STUDY OF 67 CASES

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ABSTRACT

BACKGROUND

Blunt trauma abdomen is one of the most common emergencies faced by surgeons all over the world. The leading cause of blunt trauma abdomen is road traffic accidents followed by assaults and fall from height. Approximately 10% of injuries requiring laparotomy are the result of blunt trauma abdomen. The emphasis in treatment of blunt trauma abdomen has gradually shifted from operative management to conservative management. This has been possible by the increased use of computerized tomography in the evaluation of blunt trauma abdomen as opposed to the bedside techniques like four quadrant aspiration and diagnostic peritoneal lavage. A positive diagnostic peritoneal lavage is no longer an indication for laparotomy. This study was conducted to know the pattern of solid organ injuries seen in patients with blunt trauma and also to evaluate their management.

MATERIALS AND METHODS

This is a prospective clinical, hospital-based study of 67 patients conducted in Pondicherry Institute of Medical Sciences for a period of 18 months. Patients less than 12 years of age and with penetrating injuries were excluded from the study.

RESULTS

A total of 67 patients presented with pain abdomen and were included in the study with clinical suspicion of blunt trauma abdomen. Of these 26 (39%) were found to have internal abdominal solid organ injury. Male was the predominant gender at 87%. Road traffic accident was the most common mode of injury at 87%. Spleen was the most common solid organ involved in blunt trauma 12 (46%). Followed by liver 6 (31%). Out of the 26 patients with solid organ injury, 7 (27%) patients underwent laparotomy and 19 (73%) were managed conservatively. There was one death in our study. The patient died soon after presenting in casualty with hypovolemic shock. Post mortem revealed liver laceration.

CONCLUSION

Spleen was the most common organ injured in blunt trauma abdomen. 73% of the patients with solid organ injury were managed successfully with conservative management which shows that conservative management is the preferred method of treatment in blunt trauma abdomen with solid organ injury.

KEYWORDS

Blunt Abdominal Trauma, Conservative Management.

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BACKGROUND

Blunt trauma abdomen due to road traffic accidents is one the leading cause of death in India. Based on many studies it is becoming evident that most of these injuries would 'heal themselves' and that operative intervention could interfere with this process. Inadequate treatment of the abdominal injuries can be fatal in most patients. The conservative management of blunt abdominal trauma is progressively increasing due to the in-patient data gathered from different

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parts of the world.¹ Traditionally patients suspected of blunt trauma abdomen would undergo a four-quadrant aspiration or Diagnostic peritoneal lavage (DPL) if they were unstable. However, DPL is oversensitive and can lead to many unnecessary exploratory laparotomies. CT is found to have a sensitivity of 97.7%, a specificity of 98.5%, and an overall accuracy of 99.4% in diagnosing hollow viscus injuries.^{2,3,4}

CT is also reliable in the evaluation of solid organ injury in patients with blunt abdominal trauma, with overall sensitivity of 97% and specificity of about 95%. Positive predictive value 82% and negative predictive value 100%.^{5,6}

This new approach to blunt trauma abdomen has decreased the number of patients undergoing laparotomy however one should be cautious of managing patients conservatively as it is a labour-intensive process involving intensive care with repeated investigations and constant monitoring. One exception to conservative management of solid organ injury is pancreatic injury.³

Concealed haemorrhage is the second most common cause of death after blunt trauma abdomen, and missed abdominal injuries is another cause of morbidity and late mortality in patients who survive the initial period after injury. Close supervision and early institution of proper management results in decreased morbidity and mortality.^{7,8}

Approach to trauma should be systemic and prioritized. About 10% of patients have persistent hypovolemic shock as a result of continuous blood loss in spite of aggressive fluid resuscitation and require an urgent laparotomy. Damage control laparotomy is a lifesaving procedure for such patients with life-threatening injuries and to control haemorrhage and sepsis.⁹

MATERIALS AND METHODS

This study was a cross-sectional, hospital-based study, conducted in Department of General Surgery, Pondicherry Institute of Medical Sciences for a period of 18 months. Total 67 patients with blunt injuries to solid abdominal organs are included in the study. Patients who are more than 12 years and did not sustain hollow viscus injury or other associated critical injuries were included in the study. On arrival of patient, initial evaluation and resuscitation with ABCDE (Airway, Breathing, Circulation, Disability and Exposure) and Advanced Trauma Life Support (ATLS) done. All patients were admitted in ICU and haemodynamic monitoring at hourly intervals was done. Serial haematocrit, haemoglobin estimation, blood grouping and cross matching and other appropriate laboratory investigations were performed. Diagnostic peritoneal lavage or four quadrant aspiration was not done in any of the patients. After focused abdominal sonography for trauma (FAST) all the patients were subjected to computerized tomography with IV contrast. Grading of the solid organ injuries was done based on the American Association for the surgery of Trauma. Conservative management was the treatment of choice in most of the patients however unstable patients and patients not responding to resuscitative measures were taken up for exploratory laparotomy.

RESULTS

Age Distribution

Total number of patients included in the study was 67 out of these patients 26 patients had solid organ injury.

Most of the patients were in the age group 21 years to 30 years of age. Mean is 32.5 and the standard deviation 12.960. Decision making in this age group of people is less when compared to other groups. 65% of the patients were between the ages of 21 and 40. 87% of the patients were males while the females made up only 13% of the patients. (Table 1)

Age Group	Male	Female	Number	Percent
15-20	9	2	11	16
21-30	25	3	28	43
31-40	13	2	15	22
41-50	6	1	7	10

51-60	3	0	3	4
61-70	1	1	2	4
71-80	1	1	1	1
Total	58(87%)	9(13%)	67	100%

Table 1. Age Wise and Gender Distribution

Mode of Injury in our Study- The most common mode of injury in blunt trauma abdomen was road traffic accident 87%. Most common vehicles involved were two wheelers. Four-wheeler hitting pedestrians was the next more common form of injury. The younger age was involved in causing the accidents while as the age increased the older patients were the pedestrians hit by the younger people. 2 patients presented with blunt trauma abdomen after being gored by bulls, luckily for them it was a blunt trauma and not penetrating injury. (Figure 1)

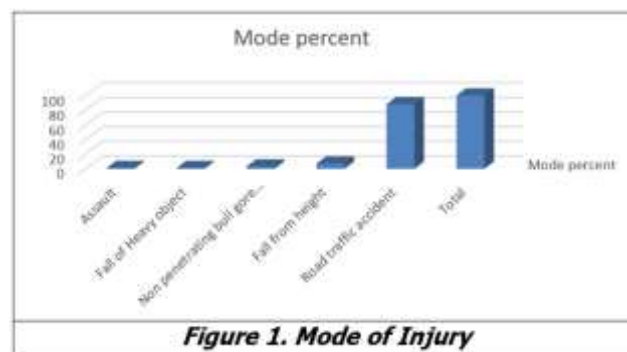


Figure 1. Mode of Injury

The most common organ injured in our study was the spleen 46% followed by liver 31%. Kidney trauma was seen in 23% patients Most of the patients with splenic injuries were managed conservatively. (Figure 2)

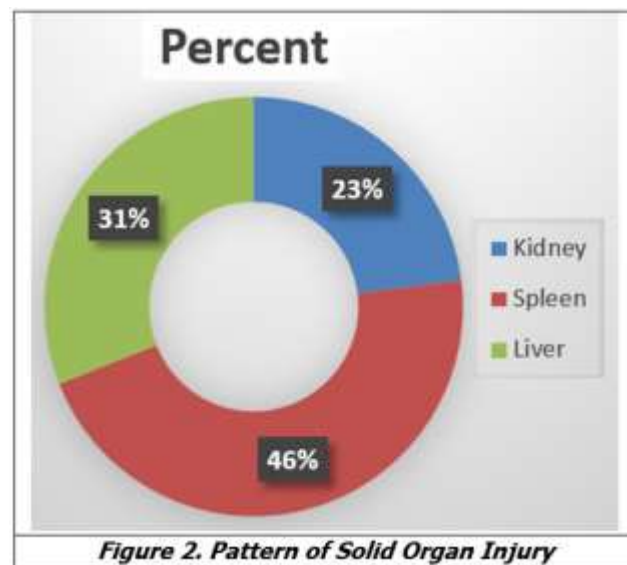


Figure 2. Pattern of Solid Organ Injury

The second most common organ injured in our study was liver. As per AAST grading grade 3 was the most common grade seen 62.5%. Only one patient who had grade III injury underwent laparotomy as the patient was hemodynamically unstable. Rest of the patients were managed conservatively. (Table 2)

American Association for the Surgery of Trauma CT-Grade	Number of Patients in That Grade	Management
Grade I	2	Conservative
Grade II	0	Conservative
Grade III	5	Conservative/Operative
Grade IV	1	Conservative
Grade V	0	Conservative

Table 2. Distribution of Liver Injury According to AAST

Splenic injury was the most common. 3 patients underwent laparotomy and splenectomy done for them. Out of 12, 9(75%) were successfully managed conservatively. 67% of the patients were grade I and II of AAST Grading. Patients of Grade IV and Grade V were operated as they were hemodynamically unstable. (Table 3)

American Association for the Surgery of Trauma CT-Grade	Number of Patients in That Grade	Management
Grade I	4	conservative
Grade II	4	conservative
Grade III	1	conservative
Grade IV	1	operative
Grade V	2	Operative

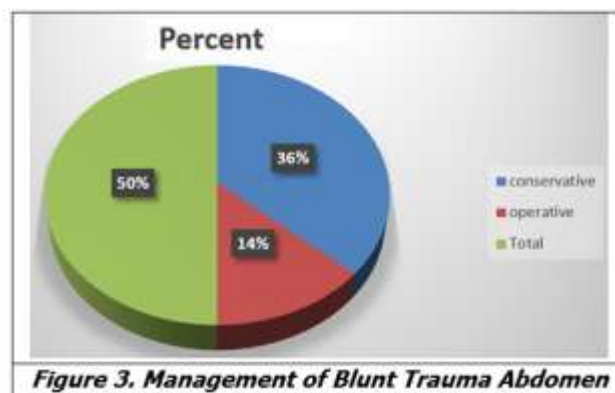
Table 3. Distribution of Splenic Injury According to AAST

6 patients presented with Renal injury and all were managed conservatively after consultation with the urologists. (Table 4)

American Association for the Surgery of Trauma CT-Grade	Number of Patients in that Grade	Management
Grade I	1	conservative
Grade II	3	conservative
Grade III	1	conservative
Grade IV	1	conservative
Grade V	0	Conservative

Table 4. Distribution of Renal Injury According to AAST

Out of 67 the total number of patients who had solid organ injury was 26(38%). 73% of these patients were managed conservatively while 27% were managed operatively. (Figure 3)



DISCUSSION

In the present study, 67 cases were studied who complained of abdominal pain following blunt trauma abdomen. Most of the patients were in the age group of 21 to 30 years of age (43%). Followed by 31 to 40 years of age patients. In Davis et al¹⁰ study it is mentioned that the majority of the patients belong to 21 to 30 years of age. B.C Jain et al¹¹ also mention similar results in their study.

2nd and 3rd decade age group are at the risk of road traffic accident, due to unawareness of the traffic rules and lack of experience. When this is compared to 4th decade of age the incidence was less, and this is due to experience and the feeling of responsibility.

Males were predominantly affected when compared to females (13%). In a study done by B.C. Jain et al study similar results were seen. In our study, most common mode of solid organ Injury in blunt trauma abdomen was road traffic accident (87%), followed by fall from height which accounts for 7% of Injury. Davis et al, Khanna et al¹² documented similar incidence.

Splenic Injury

Organ Injured	Our Study	Cusheri	Davis et al	Cox et al	Khanna et al
Spleen	46%	25%	25%	42%	26%

Table 5. Comparison of Present Study Results with Other Studies with Reference to Splenic Injury

The most common solid organ injured in our study was spleen (46%) followed by liver injury (31%). Similar incidence was reported by Cox, et al¹³ in splenic trauma. Cusheri¹⁴ and Davis et al had incidence of 25%. Cox et al and Khanna et al reported incidence of 46% and 26% respectively.

According to American Association for the Surgery of Trauma computerized tomography grading most of the patients had grade II splenic injury and all of them were managed conservatively.

Liver Injury

In our study liver injury was second most common solid organ injury, this accounts for 31%. Cox et al and Khanna et al reported incidence of 33% and 37% respectively. According to American Association for the surgery of Trauma

computerized tomography grading most of the patients had grade III Liver injury and all of them were managed conservatively.

Organ Injured	Our Study	Cusheri	Davis et al	Cox et al	Khanna et al
Liver	31%	15%	16%	35.6%	37%

Table 6. Comparison of Incidence of Liver Injury Present with Other Studies

Kidney Injury

In our study, kidney injury accounts for 23%. Michael L Nance et al¹⁵ reported incidence of only 1.9%. Most of the renal injuries were managed conservatively. According to American Association for the surgery of Trauma computerized tomography grading most of the patients had grade II Liver injury and all of them were managed conservatively.

Organ Injured	Our Study	Michael L Nance et al	Davis et al	Cox et al	Khanna et al
Kidney	23%	1.9%	16%	33%	37%

Table 7. Comparison of Incidence of Kidney Injury Present Study with Other Studies

Co-Morbid Condition

In the present study only two patients had hypertension out of 67 patients, and only 4 patients had diabetes out of 67 patients, so due to lack of period the significance cannot be determined.

Mortality

One patient died in casualty, he was hemodynamically unstable and had hemoperitoneum, initial resuscitation was done but he succumbed to his injuries. Post mortem showed liver laceration.

CONCLUSION

The commonest organ injured in blunt trauma abdomen is spleen. Road traffic accident is the cause for most patients having blunt trauma abdomen who present to surgical emergency. Conservative management is the preferred mode of treatment in blunt trauma abdomen. All renal injuries irrespective of grade can be managed conservatively.

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