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Study of splenic trauma and its management in adult trauma

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Abstract
Background: Abdominal trauma continues to account for a large number of trauma-related injuries and deaths. Motor vehicle accidents and urban violence, respectively, are the leading causes of blunt and penetrating trauma to this area of the body. So the aim of the study is to find out the incidence of splenic injury in adult abdominal trauma from March 2017 to August 2018. And to assess the efficacy of abdominal USG in grading splenic injury.
Materials and Methods: This prospective and observational based clinical study was carried out on patients admitted in Hamidia Hospital associated with Gandhi Medical College Bhopal. After admission, data for the study were collected by detailed history, thorough clinical examination, and relevant diagnostic investigations performed over the patient.
Results: In our study, 107 victims of abdominal trauma (blunt or penetrating) were observed. Out of them 13 patients suffered splenic trauma. USG grading splenic injury to be grade 1, 2, 3 were managed conservatively and higher grade were operated. There were 3 splenectomies and 1 splenorrhaphy done. Incidence of splenic injury was 13% and USG efficacy in grading splenic injuy was 100%. Patient who died in the study were due to associated trauma and no death occurred primarily due to splenic injury when mortality was 4.5% in the study. Also most common cause of abdominal trauma was road traffic accidents (RTA) 72% with 81% patients being males.
Conclusion: RTAs form the most common mode of injury; hence, measures should be taken to prevent these accidents and measures should be taken for immediate referral to the hospital and urgent USG and CT scan of the patient and appropriate management, to avoid any mortality of the patient.

Keywords: blunt injury abdomen, mortality, road traffic accidents

Introduction
Trauma load is on the increase worldwide accounting for high levels of mortality and morbidity [1]. WHO estimates that, by the year 2020, trauma will be first or second leading cause of "Years of productive years lost" for the entire world population in both developing and developed countries.
Although protected under the bony ribcage spleen remains to be the most commonly affected organ in the blunt injury to the abdomen in all age groups. Blunt injuries to the spleen are documented more frequently as a primary solid organ injury in the abdomen. These injuries are common in both rural and urban environment and result from road traffic accidents, domestic violence. Historical records are full of description of blunt abdominal trauma victims who have turned pale, cold and died without overt evidence of haemorrhage. Such undetected hemoperitoneum was the most common cause of death in injured patient which may frequently Preventable.
The clinical presentation examination and clinical signs that have relatively low diagnostic [2] accuracy especially when the patient has decreased conscious level, neurological deficiet or under the influence of medication.
Fast Ultrasound [7] has become a standard of care in most emergency departments as it is a non-invasive readily available and time saving option for patient with blunt abdominal trauma.
Diagnostic Peritoneal Lavage have high diagnostic accuracy but has disadvantage of being invasive technique, hence it is not suitable for conscious traumatic and paediatric patient.
Computed Tomography[5] of the abdomen and pelvis is the procedure of choice for hemodynamically stable patient who has sustained blunt or penetrating injury but it has a disadvantage of being expensive and the shifting the patient to scanner which may interfere with

ongoing resuscitation. And also not available at the peripheral centres.

Method

A Prospective Observational based study in Hamidia Hospital Bhopal (Madhya Pradesh) Upon arrival in the emergency department patient with suspected blunt or penetrating abdominal trauma were screened.

Blunt injury was defined as injury to intra-abdominal viscera as a result of non-penetrating object leading to abdominal tenderness with presence of abdominal bruises or abrasion. Or a visible penetrating deep wound over the abdomen.

Patient meeting the eligibility criteria were recruited and subsequently informed written consent were taken. All patient were adequately resuscitated and investigated as per standard of protocol.

History and physical examination were recorded on pre-coded questionnaires.

Ultrasound was the initial diagnostic in the maximum patients depending upon their hemodynamic condition. If the ultrasonography examination was negative, the patient were initially observed. If the patient showed no further blunt abdominal trauma related symptoms like hypotension, abdominal pain, hematuria the assessment was terminated.

Hemodynamically stable patient that develop hematuria, transient hypotension or abdominal pain during observation received a CT Scan. If a patient under observation developed persistent hypotension, a repeat ultrasound was performed.

If the initial ultrasonography was positive, stable patients received a CT examination to further evaluate and grade the injury, while in the case of hemodynamically unstable patients, they were taken for emergency therapeutic laparotomy. If a stable patient worsens and develops peritoneal signs during observation period they could be taken for laparotomy.

A cumulative sum of all parameters -Ultrasonography, clinical findings, pulse and blood pressure were used to assess the patient.

The grade of splenic injury assessed by the radiologist along with the abdominal finding like (tenderness, guarding, rigidity) and hemodynamic stability were the guide for conservative or operative management to be followed. Spleen is normally graded into 5 grades. The first three grades usually do not require any surgical intervention and are managed conservatively whereas grade four and five may require surgical intervention is patient is hemodynamically unstable. Presence of any free intraperitoneal fluid was regarded as positive scan. While absence of any intraperitoneal fluid or any splenic injury was considered as Negetive scan. No further investigations were warranted for negative scan, unless the patient deteriorates or experienced persistent abdominal pain.

Methods to confirm the grading of splenic injury and the ultrasound results were:

1. CT SCAN
2. Emergency Laparotomy
3. Clinical progress

Abdominal CT scan with contrast was considered as the gold standard for all of the patient with splenic injury. The CT scan result and patients clinical progress or emergency surgery if done were recorded by the researcher. Since some patients were directly taken for surgery and gone through laparotomies without undergoing CT SCAN, we used CT scan and laparotomy (if performed) in combination as the gold standards. Patients with USG results showing low grade [8] splenic injury but with recovering clinical examination and with conservative management were considerd as correct usg results. Nowadays diagnostic peritoneal lavage is obsolete and is completely replaced by FAST ultrasonography. All patients with abdominal injuries were followed for 3 days to know if patient managed conservatively or laparotomy was done.

Role of principal investigator: The principal investigator participated in the initial resuscitation of the patient with abdominal trauma and followed the patient for the Ultrasonography and subsequent GRADING of the splenic injury (if present) and to follow the patient if CT scan was done or the patient was managed conservatively or emergency laparotomy was done and to follow the patient for outcome, whether discharged or death or patient went lama.

Results

A total of 107 patients (87males and 20females) who undergone blunt or penetrating injury abdomen. The ages of these patients ranged between 14 to 72 yrs of age.

In this study we determined the incidence of splenic injury in all the cases of blunt and penetrating abdominal trauma. The incidence of splenic trauma came to be 12% and efficacy of USG in assessing and grading came to be 100%

Discussion

The study included all patients presenting with blunt abdominal trauma and penetrating trauma to Hamidia Hospital Bhopal (Madhya Pradesh) from the period March 2017 to August 2018.

The study sample size was 107 patients which was similar to sample size of previous studies.

In this study the overall males to females ratio was 4:1(87:20) showing that males are much more in comparison to the females. And if one compares young patient (13 to 39 yrs) to that of older patient (40-79 yrs) ratio is 7:1 Male to female ratio in young age group is 4.6:1 and male to female ratio in older age group is 3:1

This may be due to the fact that mostly in the Indian society women stays at the home and do not drive vehicles.

In the study we concluded that majority of injuries are due to road traffic accidents, assault, fall from height which are similar to other studies indicating that road traffic accident, assault and fall from height are major causes of injury in blunt abdominal trauma.

In the road traffic accidents -Motorcycle accidents are more common as this is a cheaper means of transport.

The mortality in the study was 4.5% mainly due to head injury with poor GCS and cardiovascular collapse during the management. Delay in reaching hamidia hospital may be the contributing factor because of the illiteracy of the patient and lack of proper transport facilities. So the patient could not reach hamidia hospital in time and probably causing deterioration of patient condition.

In this study we determined the incidence of splenic injury in all the cases of blunt and penetrating abdominal trauma. The incidence of splenic trauma came to be 13%.

Splenic injury were also graded in this study from grade1 to grade 5 by the FAST ultrasonography. And the efficacy of the ultrasonography in grading the splenic injury was assessed by the GOLD standard CT SCAN for abdominal trauma or the confirmatory therapeutic laparotomy.

Out of the 13 patient which were diagnosed as splenic injury by the FAST ultrasonography, 5 patient were directly taken for emergency therapeutic laparotomy due to poor hemodynamic condition so CT SCAN was not done in these patient.

Rest 8 patients which were also diagnosed as splenic trauma

were subjected to CT Scan and CT Scan also confirmed the splenic injury. Among these patients those who were diagnosed to have grade 1,2,3 splenic injury were managed conservatively.
Two patients with grade 5 splenic injury were subjected to therapeutic laparotomy. Three patients with grade 4 splenic injury were subjected to therapeutic laparotomy whereas 2 patients with grade 4 splenic injury were managed conservatively. Out of the above patients two patients with grade 2 splenic injury went LAMA only one patient with grade 5 splenic injury with associated severe head injury died.
Rest all the patients with diagnosed splenic injury were comfortably discharged. Out of the five therapeutic laparotomies performed there were 3 splenectomy[6] done and 1 splenoraphhy was done and 1 laprotomy was done for bowel perforation repair and spleen was managed conservatively there. All the patients with procedure of splenectomy were administered vaccination for H influenza, N Meningitis and pneumococcal [3, 4] vaccine and also antibiotics for the post splenectomy sepsis. Rest of the patients without splenic injury were managed accordingly.

Conclusion

We conclude that USG scan is a useful diagnostic investigation for the patient with blunt abdominal trauma. And it has got good sensitivity. Based on this study we can conclude that proper evaluation and management can prove vital for successful outcome of the patient with splenic injury. And there should be proper training of the emergency surgical resident along with the supporting technical staff for the betterment of the patient.
For effective application of AE as a treatment modality, CT scanning should be available 24 h per day to triage patients between observation, angio-embolization, and surgery. Early assessment using CT scanning in the emergency room may further improve these logistics. Also, the hospital interventional radiology suite and personnel should be set up for rapid response at any time.
The success rate of NOM [9] depends on the time between the initial intake at the emergency room and the AE, as a result of the decreasing clinical condition and coagulation state of the patient. Because embolization can be time-consuming and there is a risk for hemodynamic deterioration, the patient should be monitored carefully. Therefore, AE requires good teamwork among the trauma surgeon, the anesthesiologist, and the interventional radiologist.
Blunt trauma to abdomen causing splenic injury was predominantly most common in males and occurred mostly in second decade of life, and main mode was road traffic accident.
FAST USG is a portable and rapid non invasive bedside test that can be performed along with the ongoing resuscitation, so this should be the first technique of choice for investigation. USG can detect even 200 ml of free blood, however it is operator and experience dependent.
Ultrasonography was known to be more sensitive for detecting hemoperitonium and less sensitive for solid organ injury but in our study we found that all the cases of blunt abdominal trauma with splenic injury diagnosed with USG was correct and it was further confirmed by CT SCAN and laparotomy. So it has got a good sensitivity.
Ultrasonography has also shown good efficacy in the grading of splenic trauma. Because splenic injury graded on lower side (i.e. grade 1, 2 and 3) were managed conservatively and confirmed with ctscan whereas splenic injury graded on higher side (i.e. grade 4 and 5) were managed surgically depending upon their hemodynamic condition. Efficacy has come to be 100% in grading splenic injury.

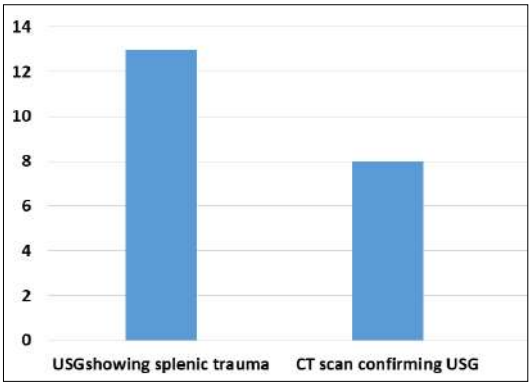

Fig 1: CT scan confirming USG

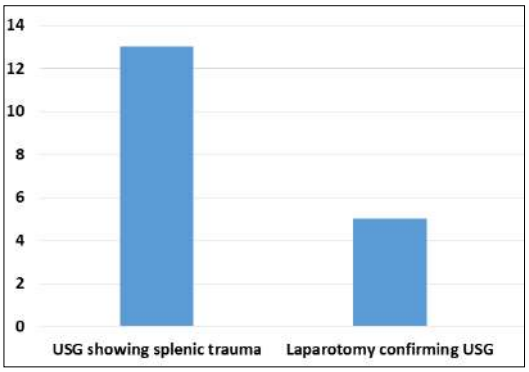

Fig 2: Laparotomy confirming USG

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