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BLUNT INJURY ABDOMEN AND THEIR IMPACT ON ABDOMINAL VISCERA

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ABSTRACT

Introduction: The care of the trauma patient is demanding and requires speed and efficiency. Evaluating patients who had sustained blunt abdominal trauma remains one of the most challenging and resource intensive aspects of acute trauma care. Blunt abdominal trauma is a leading cause of mortality and morbidity among all age groups. Identification of serious intra abdominal pathology is often challenging. Many injuries do not manifest during the initial assessment and treatment period. Missed intra abdominal injuries and concealed hemorrhage are the cause of increased mortality and morbidity especially in patients who survive the initial phase after an injury. **Aim Of The Study:** Based on this our study aimed to evaluate multiple factors as follow, First to study the effect of blunt injury abdomen and their impact on abdominal viscera, Also to evaluate factors like pattern of distribution as age , sex and organ involvement, To evaluate various associated injuires in blunt injury abdomen, To focus on clinical signs & prioritize them as the prime tool in early diagnosis, To Correlate the findings of abdominal sonography in trauma with laparotomy findings and finally to analyze mortality with regarding to individual visceral injury. **Materials And Methods:** Thirty Four cases of blunt abdominal trauma admitted in all surgical units at Tirunelveli Medical College Hospital, Tirunelveli during the period of December 2010 to November 2011 were taken for this study. The cases were selected in such a way that only those patients with definitive history and clinical findings suggestive of injury to Viscerae which were later confirmed by investigations, laparotomy and autopsy. Detailed history regarding the mode and nature of injury were taken, The clinical features were studies in details with special note to any associated injuries like head injury, chest injury and fracture limbs. Basic investigations viz. blood Hb, blood urea, blood sugar, serum creatinine and blood grouping were done in all cases. Plain X-ray of the abdomen in erect posture was taken in most of the cases expect in those who were admitted in a critically ill condition. Radiographs of other parts were also taken to find out associated injuries. Under aseptic precaution using sterile 18 G needle peritoneal tapping done in all the four quadrants, in all patients with the history of blunt abdominal trauma. Postoperative complications were specifically looked for, if present were treated appropriately. **Conclusion:** The most commonly injured organ is spleen in blunt abdominal trauma which is similar to other studies. RTA accounted for majority of cases of blunt injury abdomen which is around 64.70%. Similar to many large series males are more often affected in blunt abdominal injuries than females and middle aged persons are more often affected than extremes of age. Commonest associated injuries occurred in our study was chest injury in eight cases. FAST is rapid cheap noninvasive procedure used for screening in the emergency ward itself while the patient is resuscitated. Biochemical investigations are not of much help. The investigations only complimentary to clinical diagnosis. In the unstable trauma patient, a positive FAST eliminates the need for further tests and indicates the necessity for abdominal exploration the emergency ward itself while the patient is resuscitated. Diagnostic paracentesis is a rapid, bedside tool for diagnosis immediately at the bedside arrival of the patient. Thorough initial clinical evaluation, repeated clinical examinations monitoring vital signs are essential in minimizing the chance of missing life threatening intra abdominal injuries. The mortality in this study is related to severity of injuries. Severe the grading of injury more is the mortality.

INTRODUCTION

The care of the trauma patient is demanding and requires speed and efficiency. Evaluating patients who had sustained blunt abdominal trauma remains one of the most challenging and resource intensive aspects of acute trauma care. Blunt abdominal trauma is a leading cause of mortality and morbidity among all age groups. Identification of serious intra abdominal pathology is often challenging .Many injuries do not manifest during the initial assessment and treatment period.[8] Missed intra abdominal injuries and concealed hemorrhage are the cause of increased mortality and morbidity especially in patients who survive the initial phase after an injury. Physical signs are also often unreliable due to associated

injuries may divert the focus from abdomen and it may be diagnosed late also frequent accompanying of alcohol intoxication confuses the diagnosis Coordinating a trauma resuscitation demands a thorough pathophysiology of trauma and shock, excellent clinical and diagnostic acumen, skill with complex procedures, compassion and the ability to think rationally in a chaotic milieu. The number survivors of polytrauma have increased by 50% in recent years and this is attributed to prompt medical treatment and rapid transfer of patient's to major trauma centers.[9] Based on this our study aimed to evaluate multiple factors as follow, First to study the effect of blunt injury abdomen and their impact on abdominal viscera, Also to evaluate factors like pattern of distribution as age, sex and organ involvement, To evaluate various associated injuires in blunt injury abdomen, To focus on clinical signs & prioritize them as the prime tool in early diagnosis, To Correlate the findings of abdominal sonography in trauma with laparotomy findings and finally to analyze mortality with regarding to individual visceral injury

MATERIALS AND METHODS

Thirty Four cases of blunt abdominal trauma admitted in all surgical units at Tirunelveli Medical College Hospital, Tirunelveli during the period of December 2010 to November 2011 were taken for this study. Inclusion Criteria's for the study is Age limit >12 yrs, All patients with head injury, All patients with fractures and Patients below 12 yrs of age were excluded.

The cases were selected in such a way that only those patients with definitive history and clinical findings suggestive of injury to Viscerae which were later confirmed by investigations, laparotomy and autopsy. Detailed history regarding the mode and nature of injury were taken, The clinical features were studies in details with special note to any associated injuries like head injury, chest injury and fracture limbs. Basic investigations viz. blood Hb, blood urea, blood sugar, serum creatinine and blood grouping were done in all cases. Plain X-ray of the abdomen in erect posture was taken in most of the cases expect in those who were admitted in a critically ill condition. Radiographs of other parts were also taken to find out associated injuries.

Under aseptic precaution using sterile 18 G needle peritoneal tapping done in all the four quadrants, in all patients with the history of blunt abdominal trauma. At laparotomy a systematic approach with examination of all intra abdominal organs were made. After surgery the patients were continued on nasogastric, aspiration, antibiotics. Postoperative complications were specifically looked for, if present were treated appropriately.

OBSERVATION AND RESULTS

In our study conducted at Tirunelveli Medical college hospital for 34 cases of blunt injury abdomen, the following findings were noted, the most common organ injured was Spleen followed by liver, whereas other organs injured were bladder, kidney, bowel and mesentry.

Most common age group of patients who encountered blunt injury where 31-40 years followed by 21-30 years and coming to sex wise distribution except two patients all other patients were male among 34 patients. Coming to mode of injury as expected road traffic accident was the commonest cause.

Table 1: Mode of injury.

S. No	Mode of injury	No of cases
1	Road traffic accident	22
2	Fall from height	6
3	Bull Gore Injury	6

The commonest finding in all the patients was tenderness in the left hypochondrium which was present in nine patients. Most of the patients had contusions or abrasions over the left hypochondrium. Kehrs sign was present in 4 patients; ballance sign was present in none. Bowel sounds were present in 8 cases; hemodynamic instability was seen in 6 cases in our study.

Table 2: CLINICAL SIGNS.

Clinical Signs	Spleen	Liver	Renal	Mesentry	Bowel	Bladder
Tenderness	9	7	4	2	4	4
Guarding /Rigidity	5	4	1	1	4	1
Bowel Sounds	8	6	3	2	0	1
Pulse Rate> 100/min	11	8	4	1	4	2

Associated injuries include Rib fractures in 5 cases of liver laceration 62.5%, 3 rib fractures in spleen 27.27%, 1 rib fracture in mesenteric contusion 33.33%. Apart from that retroperitoneal hematoma and fracture suprapubic rami was seen in few cases.

Abdominal paracentesis was done in all cases and was positive in all cases. X-ray chest and abdomen was taken in all hemodynamically stable patients, free fluid was seen in most of the cases, except in 6 cases among 34 patients.

Table 3: DIAGNOSTIC PARACENTESIS.

ORGAN	FREE FLUID (+)	FREE FLUID (-)
Spleen	11	0
Liver	8	0
Kidney	2	2
Bladder	3	1
Bowel	4	0
Mesentry	1	3

USG correlation was done to rule out any false positive cases and there was only two false positive cases based on FAST evaluation.

Table 4: USG Correlation.

ORGAN	USG FINDING	NO OF CASES
Spleen	Laceration	10/11
Liver	Laceration	7/8
Kidney	contusion	4/4
Bladder	Free fluid abdomen	4/4
Bowel	Free fuid abdomen	4/4

DISCUSSION

In our study age wise distribution the age group of 31-40 is most commonly affected 35%. S.C Dwivedi et al[1] and B.C. Jain et al[2] reported similar results. This shows that persons in the active period of life are more susceptible for accidents and injuries. Sex wise male affection rate is 94%. B.C. Jain et al[2] and Connecticut society of surgeons study on abdominal trauma reported similar results. This increased incidence in males is probably due to outdoor nature of occupation and aggressive behaviour in males.

Diagnostic Four quadrant aspiration was done in all cases, and it was positive for presence of blood \ fluid in 28 cases 85.29%. Abdominal paracentesis when positive is highly predictive of significant intra-abdominal injuries but the accuracy varies from 50 % to 90 % in various studies, Anthony et al[3] Showed 90 % accuracy.

All the cases were resuscitated and subjected to FAST before exploratory laparotomy. Of these there were 3 cases where the FAST findings did not correlate with laparotomy findings .FAST missed a case of splenic laceration, a case of Liver laceration, and there was a wrong interpretation of a case of renal injury having associated liver injury.

The incidence of false positive was 2.94% and the incidence of False negative 5.88%. In cased of bladder injuries FAST revealed presence of clots and mesenteric and bowel injuries it revealed presence of free fluid. Perreira et al[4] showed a sensitivity of 95.5 % and specificity of 97.5 % hence ultra sonogram can be used as a initial imaging procedure.

Associated injuries include Rib fractures in 5 cases of liver laceration 62.5%, 3 rib fractures in spleen 27.27%, 1 rib fracture in mesenteric contusion 33.33%. There is a 20 % chance of splenic injury and10 % chance of liver injury with fracture ribs on the left or right lower six ribs (Graffin W.o et al[5], Moore E.E.[6]). Zone 2 RPH was present in all four cases of renal injury, the right kidney was injured in 3 cases and the left in one case, Zone 3 RPH was present in a case of mesenteric contusion. Fracture of both superior and inferior pubic rami was present in all four cases of bladder injury forearm was present in a case of mesenteric contusion; # tibia was present in a case of ileal perforation.

In our study there was no incidence of simultaneous two solid organ injuries. Total no of death in our study was two cases, A case of Grade IV liver laceration with massive hemoperitoneum and a case of Grade III laceration spleen. The mortality rate is 6%. Herman Hospital study[7] showed a mortality of 24%.

Splenic injury

Spleen is the commonest organ injured following blunt abdominal trauma. In our study 11 cases (32.35%) of cases presented with injury to spleen.The associated injuries included fracture of Left lower ribs in 3 cases .27.27%. this is similar to a study done on blunt injury where commonest organ involved was spleen spleen (Denver Hospital study, Herman Hospital[7])

Of the patients presented 3 patients were hemodynamically unstable with B.P systolic below 90 mm of Hg and pulse rate greater than 120\mt. They were resuscitated appropriately and taken up for laparotomy.

The commonest finding in all the patients was tenderness in the left hypochondrium which was present in nine patients. Most of the patients had contusions or abrasions over the left hypochondrium. Kehrs sign was present in 4 patients, ballance sign was present in none. Bowel sounds were present in 8 cases.

Abdominal paracentesis was done in all cases and was positive in all cases. X-ray chest and abdomen was taken in all hemodynamically stable patients. It showed fracture ribs 6-9 in two patients and # 9th rib in one patient.

The diagnosis of splenic injury was confirmed by clinical examination, the presence of haemoperitoneum which was confirmed by abdominal paracentesis and ultrasonogram.

At laparotomy all the cases which were operated upon had Grade III injuries in 7 cases Grade IV in 2 cases and Grade V in 1 case. Splenectomy was done in all cases, appropriate surgical procedures (ICD insertion) was done for cases with hemothorax.

One patient expired pre operatively .He was hemodynamically unstable at the time of admission and his condition was very poor and did not respond to resuscitation.

Liver Injury

Next to spleen liver is the commonest organ to be injured following blunt abdominal trauma. In our study the incidence of liver injury was 8 cases 23.52%. The association of rib # with liver injury was 5 cases 62.5%. Three patients were hemodynamically unstable. All patients were appropriately resuscitated and were taken for laparotomy.

Tenderness and guarding in Right hypochondrium was present in 7& 4 cases respectively. Bowel sounds were heard in 6 patients. Contusion or abrasions were present over right hypochondrium in all patients. Abdominal paracentesis was positive in all cases. FAST missed a case of Grade I liver laceration and wrongly attributed a case of renal injury having associated liver laceration.

All patients were taken for laparotomy. 3 patients had Grade I injury, 4 patients had Grade II injury, 1 patient had Grade IV injury. Suture packing with gel foam was done in all these 7 patients.

Postoperatively all patients with grade I, II injuries recovered well, except one case which had prolonged ooze for one week the ooze stopped gradually and he was doing well. Post operative fever was present in 6 patients who settled with antibiotic treatment and drainage.

Another patient with Grade IV injury was treated by Pringle manoevre, resectional debridement of the devitalized portion of the liver by finger fracture technique. Omental pack was placed over the defect in the liver and the peritoneal cavity was drained. Patient expired postoperatively due to severity of injuries.

Renal injuries

The total no of renal injuries was 4, right kidney was injured in three cases and the left kidney in one case, All four cases were associated with RPH. All patients presented with tenderness in flanks.Guarding \ Rigidity was present in one case. Hematuria was present in all cases. Paracentesis was positive in 2 cases. FAST revelaed Contusion of kidney in all cases & presence of free fluid in morrisons pouch in three cases. Hence to rule out any expanding hematoma and associated injuries patients were taken up for laparotomy.

At laparotomy all renal injuries were of minor nature being contusion involving the renal cortex. There was non expanding RPH in zone 2 right side for 3 cases and non expanding RPH zone 2 left for one case. Since it was not expanding Retroperitoneum was not opened. There was minor breach of peritoneum with minimal free fluid in the pelvis in all cases. There was no mortality in our study of four cases and in all cases hematuria settled after 2 weeks and renal parameters were normal.

Bladder Injuries

The total no of bladder injury in our study was 4. All cases were intraperitoneal rupture. These injuries were associated with fracture of superior and inferior pubic rami. Once case was associated to have a Zone 3 Retroperitoneal hematoma. Clinically patient presented with diffuse abdominal guarding and tenderness in supra pubic region. Hematuria was present in three cases. Diagnostic paracentesis was positive for turbid fluid in three cases. USG abdomen revealed presence of free fluid in all cases and presence of clots in the urinary bladder.

At laparotomy the findings included rupture of bladder fundus in a case and posterior aspect of bladder in two cases. In another case there was a small pin hole size laceration in posterior aspect of bladder about 1 cm size with non expanding zone 3 RPH. All cases were repaired using double layered closure and placing SPC via a separate opening.

Bowel Injuries

The total no of bowel injuries were 4 (11.76%). Of these one case had perforation of jejunum, two cases had perforation of ileum and one was a perforation of duodenum. A case of ileal perforation had an associated # of tibia.

All cases presented with guarding and rigidity at time of admission, tenderness was present diffusely in all patients, bowel sounds were absent in all patients. All patients were hemodynamically stable. Xray showed air under diaphragm in two cases (50%). USG revealed presence of Free fluid in all cases without any solid organ injury. Paracentesis was done and was positive for free fluid in all cases. At laparotomy the perforation of duodenum was closed with a live omental patch, the jejunal perforation was closed in two layers with inner

vicryl and outer silk. The ileal perforation margins were friable so resection anastamosis was done.

Mesenteric Injury

The mesenteric injuries were 4 cases in total. Mesenteric contusion in jejunum was present in three cases and ileum was present in one case. The mesenteric contusion in ileum was associated with Retroperitoneal hematoma in zone 3 which was non expanding. Clinically two patients presented with tenderness over umbilical and iliac regions.Guarding was present in one case. Bowel sounds were present in two cases. Diagnostic paracentesis was positive in one case for presence of blood. USG revealed presence of minimal free fluid in pelvis in all cases.

At laparotomy the contusion of mesentery in jejunum was not associated with any bowel pathology and the bleeding stopped spontaneously. Hence after securing perfect hemostasis closure with a tube drain was done. The contusion in ileum was associated with segment of gangrene of ileum hence resection anastamosis of ileum was done. The associated Retroperitoneal hematoma in zone 3 was non expanding and hence was left as such. All patients recovered well without any complications

CONCLUSION

The most commonly injured organ is spleen in blunt abdominal trauma which is similar to other studies. RTA accounted for majority of cases of blunt injury abdomen which is around 64.70%. Similar to many large series males are more often affected in blunt abdominal injuries than females and middle aged persons are more often affected than extremes of age. Commonest associated injuries occurred in our study was chest injury in eight cases. FAST is rapid cheap noninvasive procedure used for screening in the emergency ward itself while the patient is resuscitated. Biochemical investigations are not of much help. The investigations only complimentary to clinical diagnosis. In the unstable trauma patient, a positive FAST eliminates the need for further tests and indicates the necessity for abdominal exploration the emergency ward itself while the patient is resuscitated. Diagnostic paracentesis is a rapid, bedside tool for diagnosis immediately at the bedside arrival of the patient. Thorough initial clinical evaluation, repeated clinical examinations monitoring vital signs are essential in minimizing the chance of missing life threatening intra abdominal injuries. The mortality in this study is related to severity of injuries. Severe the grading of injury more is the mortality.

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