

Blunt Trauma Abdomen - Incidence of abdominal visceral injuries

ATIF PERVEZ, AZHAR BASHIR, MUHAMMAD USMAN CHEEMA, ABDUL RAUF

ABSTRACT

The history of mechanism of injury is important in predicting the likely pattern of internal damage. It is known however, that many injuries to liver, spleen, and kidney may bleed significantly initially and then stop and that no surgical intervention is required. A recognition of the typical patterns of injury coupled with a logical sequence for the initial assessment and management of trauma patients contribute to reductions in mortality and morbidity. The shift from routine operative to selective nonoperative management of blunt injuries to abdominal solid organs is one of the most notable trends in the care of trauma patients during the past 2 decades. In blunt trauma, the most commonly injured intra-abdominal organ is spleen but in our study small bowel was most commonly involved. This notable difference should be evaluated to assess the pattern of visceral injuries and their outcome in our country This finding has to be confirmed by the prospective studies and this will also probably find factors causing difference in the trend.

Key words: Blunt trauma abdomen, internal visceral injuries.

INTRODUCTION

Blunt trauma includes direct blows, crushing injuries, blast and deceleration forces. Any intraperitoneal organ may be ruptured without superficial evidence of trauma. The traditional teaching was that all penetrating trauma of the abdomen should be explored, whereas blunt injury could be observed as the incidence of bowel injury was much lower¹. It is known however, that many injuries to liver, spleen, and kidney may bleed significantly initially and then stop and that no surgical intervention is required^{2,3,4}. Incidence of blunt trauma is increasing because of increased automobile and motorcycle accident rate. The car remains the cause of non penetrating trauma in at least 70% of patients with this injury⁵ and many of patients have multisystem injuries. These polytrauma patients are most difficult to evaluate. Bowel injuries are still missed despite improved diagnostic techniques. Intestinal injury probably has more lethal potential than any other abdominal injury if not diagnosed on initial evaluation⁶. The shift from routine operative to selective nonoperative management (NOM) of blunt injuries to abdominal solid organs is one of the most notable trends in the care of trauma patients during the past 2 decades^{7,8,9}. Specific questions which have been asked include 1) What was the major indication for operation in each case 2) Did delays in getting the patient to the operating room affect the outcome 3) To what was the death attributable in fatal cases.

The incidence of specific organ injuries is as follows; Spleen 25%, Kidney 12%, Intestine 15%,

Liver 15%, Retro-peritoneal hematoma 13%, Mesentery 5%, Pancreas 3%, Diaphragm 2%, Urinary bladder 6%, Urethra 2%, Vascular 2%⁵.

Experience gained from the review has been of assistance in the evaluation and management of subsequent patients. We hope that it will make others more conscious of these injuries and therefore permit more expedient diagnosis and treatment.

AIMS AND OBJECTIVES

To see the incidence of internal visceral injuries as revealed on exploration in blunt trauma abdomen.

METHODS AND MATERIALS

This study was conducted in surgical unit 1 of Mayo Hospital, Lahore. Study Period was Jan 2007- Jan 2008. All the patients above 12 years of age with blunt abdominal trauma with associated injuries are included in this study as children under 12 year of age are dealt within department of Pediatric Surgery. After all routine lab investigations and additional investigations done in certain situations as follows:

Abdominal ultrasound, Diagnostic Peritoneal Lavage, CT scan (when available) was done in cases with equivocal abdominal signs especially in patients with altered sensorium due to head injury and in polytrauma with hypovolemia. In patients presenting with haematuria or suspected injury to the urethra and / or urinary bladder IV pyelography was done. Decision to perform laparotomy was based on following criteria: Progressive signs of peritoneal irritation, hypovolaemia not explained by any other extra-abdominal injury, any deterioration on serial

Department of Surgery, KEMU/Mayo Hospital, Lahore
Correspondence to Dr. Atif Pervez:
Email: dratifpervez@gmail.com

physical examination e.g. Tachycardia, Hypotension etc, +ve DPL, abdominal Sonogram showing solid visceral injury or free fluid i.e. blood in the peritoneal cavity.

INCLUSION CRITERIA

1. Injury of any abdominal viscus
2. A retroperitoneal hematoma more than 10 X 10 cms in any region
3. Hemoperitoneum of more than 50cc
4. A pelvic hematoma of any size with blood staining finger on digital rectal examination.

EXCLUSION CRITERIA

1. When none of the final inclusion criteria were present
2. When the patient did not survive upto the time the internal injuries could be evaluated
3. Where the associated extra-abdominal injuries had the strongest bearing on the prognosis.

RESULTS

We observed 207 patients with blunt abdominal trauma during the study period. 7 patients were excluded from study as they were expired prior or during surgery. 50 patients underwent surgical intervention for suspected intra abdominal injuries. The age range 13-65 years (mean of 28.5 years). Out of 50 patients, 40(80%) were males and 10(20%) were females. The mean time lapse between trauma and surgical intervention was 10.5 hours. 152(76%) cases were due to road traffic accidents and 48(24%) cases resulted from low velocity impaction. Only 4 patients underwent non therapeutic laparotomy due to positive DPL and 2 were found to have extensive retroperitoneal hematoma secondary to pelvic fracture. 20 patients had associated extra-abdominal injuries.

Table: Distribution of Abdominal visceral Injuries in 50 operated patients BAT and operations performed.

Organs	=n	%age	Procedures
Small intestine	25	50	15 Enteropathies 10 Resection anastomosis
Spleen	10	20	5 Splenectomy
Liver	10	20	10 Hepatorrhaphies
Colon and rectum	15	30	8 Primary Repair 5 Colostomy, 2 Hartmann
Pancreas	5	10	5 Minimal Debridement & Drainage
Retroperitoneal hematoma	5	10	4 Not Explored, 1 nephrectomy

Table : Distribution of sex in blunt trauma abdomen

Gender	=n	%age
Male	40	80
Female	10	20

It was observed that an increase in the time lapse before surgery adversely affected the prognosis of the patients in terms of both morbidity and mortality. Those patients who were operated within 24 hours of injury had a mortality of 4.4%, whereas if the operation was delayed further than 24 hours, mortality increased to 33.3%. Similarly early operation within 12 hours was associated with low morbidity of 20.7%. However, when the operation was further delayed, morbidity rose to 83.3%.

DISCUSSION

The primary survey of abdomen usually detects signs of major intra abdominal haemorrhage, but a secondary survey is essential to pick up continuing severe haemorrhage or further bleeding following the restoration of a normal blood pressure¹⁰. In the patient sustaining blunt abdominal trauma, physical signs of significant organ involvement are often lacking. If an unstable patient has multiple injuries and there is uncertainty about whether the abdomen is the source of shock, a FAST exam may be useful. If a patient is stable and access to CT is available, head and abdomen CT scan can be obtained. DPL may be useful in patients with head injuries requiring immediate operative therapy. In stable patients with multiple injuries, the abdomen may harbor occult organ involvement that is not immediately life threatening, a CT evaluation is necessary. Laparoscopy has also been proposed as an adjunct in this situation¹¹. Trauma laparoscopy is a safe method for the evaluation of selected patients with abdominal trauma and can reduce the number of negative and nontherapeutic trauma laparotomies performed¹². The most common reason for injuries to be missed is altered level of consciousness due to head injury or alcohol, severity of injury, instability requiring immediate operation, lack of symptoms at admission, technical problems, and low index of suspicion by the examiner¹³. Secondary trauma survey is not a definitive assessment and should be supplemented by tertiary trauma survey¹⁴.

The sudden application of pressure to the abdomen is more likely to rupture a solid organ than a hollow viscus, and this accounts for the greater incidence of solid organ injury. More elastic tissues of the young tolerate trauma better than the less resilient or fixed tissue of older people and this

accounts the difference in significant intra-abdominal injury following blunt trauma in children and adults⁵.

85-90% abdominal injuries can be managed non-operatively. Following Blunt trauma the most commonly injured intra-abdominal organ is spleen but in our study small bowel was most commonly involved i.e.50%.A hemodynamically unstable patient with suspected splenic injury should be subjected to laparotomy. Any patient selected for non-operative management must be carefully assessed and reassessed by an experienced practitioner. Approx 85% of all patients with blunt hepatic trauma are stable¹⁵. Injuries to the anatomical structures of the portal triad are rare and often lethal. Duodenal injuries are associated with pancreatic damage.Small bowel injuries need urgent repair. Large bowel injuries can be resected and stapled off in damage limitation surgery.Rectal injuries may be best managed initially with a defunctioning colostomy. Kidney and urinary tract damage is best diagnosed with enhanced CT scanning.Intra abdominal bladder tears need formal repair and drainage. Bile duct injuries should be identified by intraoperative cholangiography and repaired primarily or by enteric anastomosis . Intraoperative exsanguination is the primary cause of death, and hemorrhage control should be the first priority.

A review of the case histories of 29 patients with isolated rupture of the small bowel was undertaken to determine which diagnostic tests were most sensitive in the early diagnosis of this notoriously occult injury. Results indicate that peritoneal lavage was the most useful test for this purpose, clearly more sensitive than standard clinical or radiographic signs. All patients in this series had indications for peritoneal lavage, and 85% of the patients who underwent peritoneal lavage in the emergency department had positive results and prompt operation. Reliance on the development of clinical peritonitis or the detection of pneumoperitoneum leads to long delays before operation¹⁶. In hemodynamically stable patients , laparoscopy safely and effectively identifies small bowel injuries. Early recognition of these injuries and timely surgical treatment offer the best prognosis¹⁶.

The focused assessment for the sonographic examination of the trauma patient (FAST) is a rapid diagnostic test that sequentially surveys for hemopericardium and then the right upper quadrant (RUQ), left upper quadrant (LUQ), and pelvis for hemoperitoneum in patients with potential truncal injuries. The sequence of the abdominal part of the examination, however, has yet to be validated. Blood is most often found on the FAST in the RUQ area in patients with multiple intraperitoneal injuries or isolated injury to the liver, spleen, or retroperitoneum,

but not when there is injury to a hollow viscus¹⁷. Age > or =55 years is not a contraindication to nonoperative management of blunt splenic injuries. Children with blunt splenic injuries can be successfully managed nonoperatively by nonpediatric trauma surgeons¹⁸.

In the present study it was observed that hollow visceral injury is more common than the solid abdominal organ injury and in 50% of our cases there was isolated injury to small bowel. We cannot explain our findings on this basis because nature of our road traffic accidents, modes of transport,poor condition of our urban and rural road networks, education of traffic rules, lack of awareness of safety measures i.e., seat belts, helmets, air bags etc., is very much different from western countries and this largely effects the mode of roadside accidents in our country and their consequences. In our country , accidents mostly occur with use motorcycles,bicycles and autorickshaws and so their consequences are not same as compared to data obtained from standard textbooks and journals of western countries.This finding has to be confirmed by the prospective studies and this will also probably find factors causing differences in the trend.

With a careful history and an understanding of the injury mechanism it is often possible to predict the type of injury that might occur.For example in motor vehicle accidents , motor vehicle occupants , if unrestrained , suffer a classic triad of injury to face , chest , and knees. Pedestrians suffer injury to the lower legs and pelvis from the vehicle ,with an associated head injury from the impact with the ground. Injuries to the duodenum and/or pancreas can occur as a result of compression between , for example , the steering wheel or a seatbelt and the vertebral column.

In this study it was observed that an increase in the time lapse before surgery adversely affected the prognosis of the patients in terms of both morbidity and mortality. Those patients who were operated within 24 hours of injury had a mortality of 4.4%, whereas if the operation was delayed further than 24 hours, mortality increased to 33.3%. Similarly early operation within 12 hours was associated with low morbidity of 20.7%. However, when the operation was further delayed, morbidity rose to 83.3%.

CONCLUSION

The most important principle in the management of blunt abdominal trauma is repeated examination by an experienced surgeon. The challenge in future will be to refine the diagnosis of abdominal trauma to allow swift recognition of those injuries that

require surgical intervention. In order to improve the outcome in cases of blunt abdominal trauma following suggestions are made:

1. A detailed history should be taken from patients who present with blunt trauma abdomen in emergency to investigate mode of trauma.
2. There should be a high index of suspicion for visceral injuries even in cases of apparently trivial abdominal trauma.
3. Effective transport facilities should be planned for timely transfer of patient to appropriate place.
4. A fair policy should be devised regarding effective use of available investigations and criteria to decide about laparotomy so as to minimize the chances of missing an injury and doing a lion therapeutic laparotomy.

REFERENCES

1. Margaret Farquharson & Brendan Moran. Emergency Laparotomy, Farquharson's textbook of operative general surgery.9th Ed .2005 14;239.
2. Carrillo EH, Platz A, Miller FB, et al. Non-operative management of blunt hepatic trauma.Review.Br J Surg 1998;85:461-8.
3. Konstantakos AK, Barnoski AL, Plaisier BR et al. Optimising the management of blunt splenic injury in adults and children. Surgery 1999;126:805-13.
4. Morrow JW, Mendez R. Renal trauma.J Urol 1970;104:649-53.
5. David B. Hoyt, Raul Coimbra,Sandra Engelhardt et al. Trauma - Specific injuries ; Essential Surgical Practice. 4th Ed. 2002 ;1:17.
6. A H Dauterive, L F Ancbaun & E F Cox. Blunt intestinal Trauma-A Modern-day review.Ann Surg.1985,Feb;201(2):198-203.
7. Richardson JD, Franklin GA, Lukan JK, et al. Evolution in the management of hepatic trauma:a 25-year perspective. *Ann Surg.* 2000;232:324-330
8. Knudson MM, Maull KI. Nonoperative management of solid organ injuries: past, present, and future. *Surg Clin North Am.* 1999;79:1357-1371.
9. Pachter HL, Guth AA, Hofstetter SR, Spencer FC. Changing patterns in the management of splenic trauma: the impact of nonoperative management. *Ann Surg.* 1998;227:708-717.
10. Norman L. Browse, John Black. The symptoms, signs and emergency management of major injuries; Browse's :4th Ed .2005 2 ;43.
11. Kevin McConnell & Douglas J.E Schuerer. Trauma Surgery : The Washington Manual of Surgery.5th Ed . 2008; 22:373 .
12. Smith RS, Fry WR, Morabito DJ, et al. Therapeutic laparoscopy in trauma. *Am J Surg.* Dec 1995;170(6):632-6; discussion 636-7.
13. Jurkovich GJ, Hoyt DB, Moore FA, et al. Portal triad injuries. *J Trauma.*Sep 1995;39(3):426-34
14. Janjua KJ, Sugrue M, Deane SA. Prospective evaluation of early missed injuries and the role of tertiary trauma survey.*J Trauma.*Jun 1998;44(6):1000-6; discussion 1006-7.
15. Kenneth D.Boffard & Douglas N.G. Bowley. Accident & Emergency Surgery; Bailey & Love's Short Practice of Surgery .24th Ed 2004 : 286-287.
16. Burney RE, Mueller GL, Coon WW, et al. Diagnosis of isolated small bowel injury following blunt abdominal trauma.*Ann Emerg Med.* Feb 1983;12(2):71-4.
17. Rozycki GS, Ochsner MG, Feliciano DV, et al. Early detection of hemoperitoneum by ultrasound examination of the right upper quadrant: a multicenter study.*J Trauma* Nov 1998; 45(5):878-83.
18. Myers JG, Dent DL, Stewart RM, et al. Blunt splenic injuries: dedicated trauma surgeons can achieve a high rate of nonoperative success in patients of all ages.*J Trauma.* May 2000; 48(5):801-5; discussion 805-6.
19. Enderson BL, Reath DB, Meadors J, et al.The tertiary trauma survey: a prospective study of missed injury. *J Trauma.* Jun 1990;30(6):666-9; discussion 669-70.
20. Mathonnet M, Peyrou P, Gainant A, et al.Role of laparoscopy in blunt perforations of the small bowel. *Surg Endosc.* Apr 2003;17(4):641-5.