Basrah Journal Of Surgery

Bas J Surg, March, 14, 2008

PREVALENCE OF INTERNAL ABDOMINAL ORGANS' INJURIES IN PATIENTS OPERATED UPON AFTER BLUNT ABDOMINAL TRAUMA.

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Abstract

Blunt abdominal trauma may result in multiple severe injuries which make the abdomen difficult to assess and easy to overlook. Unrecognized intra-abdominal injury is a significant cause of preventable death in blunt trauma. This study aimed to find the frequency and features of lapratomy findings for different internal abdominal organs' injuries in patients subjected to blunt abdominal injury. A total of 450 patients subjected to blunt abdominal trauma were admitted to the emergency surgical department of Sulaimania Surgical Teaching Hospital following, 140 of them were decided to undergo exploratory laparotomy depending on their clinical and imaging findings that suggesting a visceral injury. Thirty one percent of the patients who subjected to blunt abdominal trauma need exploratory laparotomy, 80.7% of them were male, and 67.9% were young. The predominant causative factor of blunt abdominal trauma was the motor vehicle accidents. Spleen and liver were the frequent injured solid organs. Almost all of the patients had positive laparotomy results. Traumatic head and neck injuries were the most common associated non abdominal injuries. Morality rate was only 5% while complication rate was only 7%. It is concluded that males at young active productive age are the main persons suffer from blunt abdominal trauma. This has an important economic impact on the productivity of the community. Spleen injury being the most commonly intra abdominal solid injured organ followed by liver, other visceral structures are uncommonly involved.

Introduction

Blunt trauma is usually the consequence of high-energy impacts that result in multiple severe injuries which make the abdomen difficult to assess and easy to overlook. Abdominal injuries are the cause of considerable morbidity and mortality in both penetrating and blunt trauma. Following the immediate post injury phase; severe brain, heart and great vessels injuries are the predominant causes of death where the main concern is haemorrhage[1,2]. Unrecognized intra-abdominal injury is however a significant cause of preventable death in this group of patients[3].

The National Trauma Registry in USA (1985 -1991) showed that 86% of the abdominal injuries were secondary to blunt abdominal trauma, with mortality rate of 9%. While in Britain and Australia, the percentage of blunt abdominal trauma is higher since knife and gunshot injuries are less common[1]. Severe blunt injuries to abdominal wall and internal abdominal organs with death had also been reported in a substantial number of people who were shouted by rubber bullets used for crowd control, making them unsafe method[4].

Concerning the frequency of intra abdominal organ injuries, it seems that liver, spleen, and kidney injuries each occurred in about 30%, and the gastrointestinal tract was injured in about 15%[1]. Pleuro-pulmonary involvement however would be

observed in almost half of patients with blunt splenic trauma[5], while blunt traumatic injury to the abdominal aorta is considered as a relatively uncommon[6]. The incidence of hollow viscous injury should not be underestimated and a high index of suspicion needed[3], yet gastrointestinal tract injuries (GITI) are uncommon[1].

Although blunt abdominal trauma is the commonest cause of abdominal injury in children[7] children differed from adults in the etiology, longer presentation interval and fewer associated injuries. Still similarities in diagnostic parameters suggest that a single diagnostic approach could be taught for children and adults provided that the limitations of physical examination in small children are recognized[8].

Significant progress has been made in the past two decades in imaging children with blunt abdominal trauma and understanding its patho-physiology, leading to a sharp decline in the laparotomy rate[9]. Non-surgical management of blunt spleenic injuries (in haemodynamically stable children) is now the accepted method of care, with a success rate of more than 90%[10]. There appeared to be no benefits associated with repeated imaging following the diagnosis of splenic trauma[11]. The seat-belt sign is indicative of an increased risk of intestinal injury, which is difficult to detect with no single test providing reliable diagnosis. Other intra-abdominal and retroperitoneal injuries may also occur, which are more readily diagnosed on computed tomography scan (CT scan) or focused abdominal ultrasound when available, but are no more frequent in patients with the seat-belt sign than those without[12].

In fact, there is a significant shift in mechanism of injury and change in abdominal investigations and management of abdominal trauma patients. Abdominal trauma is indeed considered a disease in evolution. The introduction of focused abdominal sonography test (FAST) as a tool for detecting intra-peritoneal blood in the resuscitation room has revolutionized the investigation of abdominal trauma, although diagnostic peritoneal lavage (DPL) is now rarely practiced in most major trauma centers for patients with blunt abdominal trauma, it still plays a role in a selected group of patients, and perhaps it is used in combination with CT, to reduce the rate of non-therapeutic laparotomy[13]. For example the clinical diagnosis of injuries to the GIT can be difficult since the findings are often subtle and may take time to develop. In addition they unequivocally require operative intervention, have proved to be a stumbling block to the conservatism. Thus plain radiography and laboratory investigations have a low sensitivity for GITI and are not useful[14].The morbidity from GITI is significantly related to delays in diagnosis[1-3,7,15,16].

However, the main focus of recent abdominal trauma research has related to non-operative management of specific injuries and control of haemorrhage[17,18] with the new initiatives in angio-embolization and haemostatic control mechanisms[19]. Nevertheless, laparoscopy is a safe, effective, and minimally invasive treatment for haemobilious ascites following blunt hepatic trauma[20]. Furthermore, new scoring systems are published recently, beside the most commonly used one; the trauma and injury severity score (TRISS). These systems are applied for predicting trauma outcome. TRISS calculates the probability of survival as a function of age, type of injury [blunt or penetrating], the injury severity score and the revised trauma score of the patient[21].

Aim of the study

This study was done to address the frequency and characteristics of operative findings in patients who suffer from blunt abdominal injury and were decided to undergo exploratory lapratomy on the basis of their clinical and imaging findings that suggesting a visceral injury.

Materials and methods

This study was curried out in the emergency department of the Surgical Teaching Hospital in Sulaimania from the period of first August 1999 to the end of December 2005 on patients who were admitted to the hospital after they were exposed to a blunt abdominal trauma of various causes. One hundred forty patients who decided to undergo exploratory laparotomy on the basis of their clinical and imaging findings that suggesting a visceral injury were selected to participate in this study. Other remaining patients who kept under observation and treated conservatively without surgery were excluded.

Results

Regarding the frequency of blunt abdominal trauma in relation to the sex and age of the patients, it is general seemed that males were four times affected than females (113 versus 27, ratio 4.2:1). They were predominantly at (21-30) year's age group (31.9%). While most affected females were of younger age group (0-10) years (48%). Table I.

Table II, shows the relation between the mechanism of injury and affected organs, indicating that road traffic accidents are the most common mechanism of injury causing blunt trauma (82.1%). The laparotomy results of the traumatized patients showing that most of the patients (94.3%) were with positive findings (132 vs 8), Table III.

There were a total of 149 different external site injuries reported in the studied cases of the blunt abdominal traumatized patients. Head and neck injuries account (18.6% out of the total 140 patients), followed in descending manner by lower limbs (15.7%), chest (10%). The least frequent associated injuries were in the upper limb and pelvis and perineum (each occurs in 7.14%). However, 47.9% of the total cases did not have any associated injuries. Table IV.

The operative findings indicated that 192 organs were injured. Spleen was the most commonly affected one (25% out of the total 140 patients) followed by liver (24.3%) and retro-peritoneum (21.4%). And to lesser extent other organs were injured, as illustrated in table V.

The outcome of our treatment indicated that the mortality rate was 5% and that around 88% made uneventful recovery and only 7% had complicated course, Table VI.

Discussion

The results of this study indicate that abdominal blunt trauma is predominantly seen in males at young active productive age group (21–30) years suggesting that this type of trauma has an important economic impact on the productivity of the community. Furthermore, it was seen during childhood in females. However, a previous study showed the mean age of the affected patients was much younger (11 years), but similarly to our result these traumas were more predominant in males[22].

Regarding the types of mechanical injuries causing blunt abdominal trauma, similar to previous result[23] road traffic motor vehicle accidents were the commonest causative factor followed by falls then motor kick injuries.

The laparotomy results of the traumatized patients showing that

more patients were with positive findings. Although this exploratory is address as a non conservative management in such patients. This should be our first concern to change the trend in the future studies, and follow the international adopted recommendation[24] such as using other safer and accurate approaches with a high specificity to reduce the number of unnecessary laparotomies, like focused abdominal sonography[23],

The dominate associated injuries with the blunt abdominal trauma was the head and neck injuries, followed by the lower limbs, chest, pelvis and perineum. Blunt trauma is also a leading cause of intra-abdominal injuries[25] and similar to previous studies[15,16] the operative findings with the spleen injury being the most commonly intra abdominal solid injured organ followed by liver, retro-peritoneum,

According to our results the outcome of treatment in patients with blunt abdominal injuries indicating that the mortality rate was 5% and that around 88% made uneventful recovery and only 7% had complicated course. Reviews showed that blunt abdominal trauma is a leading cause of morbidity and mortality among adult and pediatric trauma victims[25,26].

Although pleuro-pulmonary involvement was observed in almost half of the patients with blunt splenic trauma as either early event of direct chest trauma or delayed[5], only 10 % of our patients suffered from such involvement. They were diagnosed after careful monitoring of body temperature and repeated chest X-ray studies.

On the other hand, pelvic fracture with perineal injury were observed in small percentage in this study, it should be kept in mind that in girls this may be associated with major urethral and vaginal injuries, beside traumatic 'degloving' of the colon[26]. 'Shock bowel' is a rare disorder of gastrointestinal physiology with characteristic radiological features, usually occurs in the setting of blunt abdominal trauma and hypovolaemia, with complete reversibility of these findings following resuscitation[27]. Blunt traumatic injury to the abdominal aorta is a relatively uncommon occurrence. However the present study reported 4 patients out of 140 with abdominal arterial and venal injuries which is considered to be higher than that reported by McEwan et al. (7 patients with aortic injury out of 5676 patients admitted with blunt force trauma)[6].

Table I: Frequency and percentage of organ injury in relation to age and sex variation

Age	Male	%	Female	%	Total	%
0-10	26	23	13	48.15	39	27.9
11-20	19	16.8	6	22.22	25	17.9
21-30	36	31.9	3	11.11	39	27.9
31-40	12	10.6	2	7.407	14	10
41-50	14	12.4	2	7.407	16	11.4
51-60	5	4.42	1	3.704	6	4.2
61-70	0	0	0	0	0	0
71<	1	0.88	0	0	1	0.7
Total	113	100	27	100	140	100

Table II: Frequency & percentage of the mechanisms producing blunt abdominal trauma

Mechanism of injury	No.	%
Road traffic accident	115	82.1
Fall from height	14	10
Kick or box	5	3.6
Others	6	4.3
Total	140	100

Table III: Frequency and percentage of laprotomy results

Lapratomy result	No.	%
Positive	132	94.3
Negative	8	5.7
Total	140	100

Table IV: Frequency and percentage of different site injuries associated with blunt abdominal trauma

Site of associated injuries	No.	%
Head and neck	26	18.6
Lower limbs	22	15.7
Chest	14	10
Upper limb	10	7.14
Pelvis and perineum	10	7.14
No associated injury	67	47.9

Table V: Frequency & percentage of different injured organs found during surgical operation

Organ injured	No.	%
Spleen	35	25
Liver	34	24.3
Retroperitoneal haematoma	30	21.4
Small intestine	19	13.6
Mesentry	17	12.1
Urinary bladder [Ureter and urethra]	14	10
Large intestine and rectum	10	7.14
Pancreas	8	5.71
Kidney	6	4.29
Vascular[arteries and veins]	4	2.86
Stomach	3	2.14
Diaphragm	3	2.14
Duodenum	2	1.43
Greater or lesser omentum	2	1.43
Genital organ	2	1.43
Abdominal wall haematoma	2	1.43

Table VI: Frequency and percentage of different out comes of the treatment

Out come	No.	%
Cure [uneventful]	123	87.9
Complication	10	7.1
Dead	7	5
Total	140	100

References:

1- Shackford SR, Mackersie RC, Holbrook TL *et al*.: The epidemiology of traumatic death. a population-based analysis.*Arch*.*Surg.*1993;128: 571–5.
2- Sauaia A, Moore FA, Moore EE *et al*.: Epidemiology of trauma deaths: a reassessment. *J. Trauma.*1995;38: 185–93.
3- Smith J, Caldwell E, D'Amours S *et al*: Abdominal trauma; a disease in evolution. *ANZ J. Surg.* 2005;75: 790–794.
4- Mahajna A, Aboud N, Harbaji I*, et al*: Blunt and penetrating injuries caused by rubber bullets during the Israeli-Arab conflict in October, 2000: a retrospective study The Lancet. 2002: 359, (25);1795-00.
5- Gorenstein A, Witzling M, Haftel LT, Mandelberg A *et al*: Pleuro-pulmonary involvement in children with blunt splenic trauma, *J. Paediatr. Child Health,* 2003:39, 282–285.
6- McEwan L, Woodruff P and Archibald C: Lap belt abdominal aortic trauma. *Australasian Radiology,* 1999, 43, 369–371.
7- Rance CH, Singh SJ and Kimble R: Blunt abdominal trauma in children, *J. Paediatr. Child Health:* 2000: 36, 2–6.
8- Hamill J, Paice R, Civil I. *et al*: Blunt traumatic small bowel, are children different? *Aust. N.Z. J. Surg.* 2000, 70, 795–799.
9- Godley CD, Warren RL, Sheridan RI, McCabe CJ: Non-operative management of blunt splenic trauma in adults: Age over 55 as a powerful indicator of failure. *J. Am. Coll. Surg.* 1996; 183:133–9.
10- Williams MD, Young DH, Shiller WR: Trend towards non-operative management of splenic injuries. *Am. J. Surg.* 1990;160: 588–93.
11- Thompson SR and Holland Andrew JA: Current management of blunt splenic trauma in children. *ANZ J. Surg*. 2006; 76: 48–52.
12- Wotherspoon S, Chu K and Brown AFT: Abdominal injury and the seat-belt sign, *Emergency Medicine*.2001:13, 61–65.
13- Davis JR, Morrison AL, Perkins SE, Davis FE, Ochsner MG: Ultrasound impact on diagnostic peritoneal lavage, abdominal computed tomography, and resident training. *Am. Surg.*1999; 65: 555–9.
14- Michael T, Hughes D: The diagnosis of gastrointestinal tract injuries resulting from blunt trauma. *Aust. NZ J. Surg.* 1999; 69, 770–777.
15- Marco GG, Diego S, Giulio A *et al*: Screening US and CT for blunt abdominal trauma: a retrospective study. *European Journal of Radiology*, 2005: 56: 97–101.
16- McKenney KL: Ultrasound of blunt abdominal trauma. *Rad. Clin. North Am*. 1999;37,(5):879–93.
17- Aseervatham R and Muller M: Blunt trauma to the spleen. *Aust. N.Z. J. Surg.* 1999; 69, 770–777.
18- Lucas CE: Splenic trauma. Choice of management. *Ann. Surg.* 1990; 213: 98–112.
19- Wasvary H, Howells G, Villalba M: Non-operative management of adult blunt splenic trauma: A 15-year experience. *Am. Surg.*1997; 63: 694–9.
20- Pilgrim CH and Usatoff V: Role of laparoscopy in blunt liver trauma. *ANZ J. Surg*. 2006; 76: 403–406.
21- Gabbe BE, Cameron PA *et al*: Predictors of mortality, length of stay and discharge destination in blunt trauma. *ANZ J. Surg.*2005;75: 650–656.
22- Roaten JB, Partrick DA, *et al*: Visceral injuries in non-accidental trauma, spectrum of injury and outcomes. *Am. J. Surg*. 2005; 190: 827-830.
23- Soundappan SVS, Holland AJA, Cass DT *et al*: Diagnostic accuracy of surgeon-performed focused abdominal sonography (FAST) in blunt paediatric trauma. *Injury. Int. J. Care Injured*; 2005,36, 970-975.
24- Gibson DE, Canfield CM and Levy PD: Selective non-operative management of blunt abdominal trauma. *Trauma Reports*; 2005; 1.
25- *ACEP Board of Directors Oct. 9, 2003.* Clinical Policy: Critical issues in the evaluation of adult patients presenting to the emergency department with acute blunt abdominal trauma, *Ann Emerg Med.* 2004;43:278-290.
26- Gilroy D: Deaths from blunt trauma after arrival at hospital:[plus c¸a change, plus c'est la meˆme chose]. *Injury Int. J. Care Injured*; 2005: 36, 47-50.
27- Ahmed S and Neel KF: Urethral injury in girls with fractured pelvis following blunt abdominal trauma. *Br. J. Urol.* 1996, 78, 450–453.
28- Koh ESC and Thomas R: Shocking abdominal trauma: Review of an uncommon disorder of small intestine perfusion, *Australasian Radiology.* 2004, 48, 71–73.