

ABDOMINAL TRAUMA – A REVIEW

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ABSTRACT

Trauma is a leading cause of death in the 1-44 age group. In our study, the most common cause is road traffic accidents followed by stab wounds and falls from height. Blunt abdominal trauma accounted for 79% of the cases. The spleen and liver were the most common organs involved in blunt abdominal trauma. Clinical assessment of blunt abdominal trauma is unreliable. The diagnostic peritoneal lavage is a useful triage tool in the initial assessment.

Keywords: abdominal trauma, peritoneal lavage

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INTRODUCTION

Blunt abdominal trauma accounts for about 10% of civilian injuries in the Western world⁽¹⁾. Clinical assessment of blunt abdominal trauma is notoriously unreliable and unrecognised injury to intraabdominal contents remains a major cause of preventable death⁽²⁻⁴⁾. Abdominal signs are often masked by the effects of alcohol, head injuries and major fractures.

Most of the studies on abdominal trauma have been conducted in the Western countries. We decided to review our local figures with a view to shedding some light on the mortality from abdominal trauma and at the same time, reviewing the subject of assessment of blunt abdominal trauma.

MATERIALS AND METHODS

From 1st January 1991 till 31st December 1991, all cases of trauma that were resuscitated successfully enough to arrive alive in the operating theatre were reviewed. This study was undertaken at the National University Hospital, Singapore.

We elected to exclude:

1. all deaths on arrival,
2. cases who were so severely injured they did not survive attempts at resuscitation in the Accident & Emergency Department,
3. minor injuries eg superficial stab wounds, cases admitted for toilet and suture.

There were 54 cases in all, comprising 45 males and 9 females. The age distribution was in the range of 10-77 years of age. The mean age of the patients was 33.5 years.

RESULTS

Table I shows the distribution of the injuries according to the main anatomical region involved. The most common site of injury requiring operative intervention is the face and neck region with 20 cases. These are mainly facial fractures requiring reduction and fixation. The next most common site is the abdomen and

these comprise 19 out of the 54 cases. These 19 cases are the main subject of this study.

Table I – Main anatomical region involved

Region	Number	Percentage
Head	8	14.8
Face and neck	20	37.0
Chest	4	7.4
Abdomen	19	35.2
Perineum	3	5.6
Total	54	100

Table II shows the organ systems involved in abdominal trauma. The liver and the spleen were the most frequently injured organs followed by the small bowel. Small bowel injuries were bowel proper in two cases and a mesenteric tear in the other.

Table II – Distribution according to organs involved

Organ	Number	Percentage
Liver	4	21.0
Spleen	4	21.0
Small bowel	3	15.8
Colon	1	5.3
Pancreas	1	5.3
Diaphragm	1	5.3
Type III RPH	3	15.8
Combined injuries	2	10.5
Total	19	100

Eleven of our cases were due to road traffic accidents (Table III). Assault was responsible for 4 cases. Work place injuries were responsible for another 2. The last two cases were due to falls from a height. One was a successful suicide attempt and the other was a drug addict attempting to escape from law enforcement officers.

Table III – Distribution according to aetiology

Aetiology	Number	Percentage
Road traffic accident	11	58.0
Stab wounds	4	21.0
Work place injuries	2	10.5
Fall from height	2	10.5
Total	19	100

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Most of the injuries sustained were quite severe necessitating massive blood transfusions. The average blood requirements per case was 4.1 litres. This was the transfusion requirement during the resuscitative period as well as during the operation.

The first case was a 25-year-old Chinese female who jumped from a height of seven storeys in a suicide attempt. She suffered severe craniofacial injuries in addition to multiple long bone fractures as well as a fractured pelvis. She was laparotomised for suspected intraabdominal viscus injuries. A Type III retroperitoneal haematoma was found and the abdomen was closed.

The second case was a young Indian male who was stabbed in the epigastrium. He suffered lacerations to the pancreas as well as the inferior vena cava. He had a Type I retroperitoneal haematoma and a Whipple's type operation had to be done for him but he continued to bleed from his injuries compounded by disseminated intravascular coagulopathy and he died.

The third death was the only case that was probably salvageable. This was a 44-year-old Chinese female who suffered blunt abdominal trauma from a road traffic accident. She had a lacerated pancreas, liver and superior mesenteric vein. She died from massive bleeding.

DISCUSSION

Trauma accounts for the greatest number of deaths in the 1-44 years age group⁽⁵⁾. Because trauma primarily affects young people, it accounts for more years of lost life than cancer and heart disease put together. In the United States, trauma accounts for a staggering US\$88.4 billion per year or US\$240 million a day⁽⁶⁾.

In the National University Hospital, there were 25 deaths from trauma during the year 1991. Two were dead on arrival at the Accident & Emergency Department, twenty died in the Accident & Emergency Department and three died in the operating room, after being successfully resuscitated initially in the Emergency Room. These three were included in our study and the rest were excluded on the basis of the criteria listed initially.

All three who died had multiple injuries and they all died from uncontrollable bleeding. Two of them were probably unsalvageable from the time they arrived in the Accident & Emergency Department.

Stab wounds accounted for 4 out of the 19 cases (21%). We routinely laparotomised stab wound cases where the wound has penetrated beyond the peritoneum. Exploration of the wound is performed under general anaesthesia and a formal laparotomy is undertaken if the peritoneum is breached.

In the United States, blunt abdominal trauma accounts for about 10% of all civilian injuries that require operations⁽¹⁾. In our series, blunt trauma accounted for 15 cases (79%). Most of these are the result of road traffic accidents although industrial accidents such as falls from heights also contribute. We have a much lower incidence of penetrating injuries compared to the United States. This is probably due to the scarcity of firearms in this country as a result of law enforcement. The penetrating injuries that we have encountered have all been the result of knifing.

The appropriate management of blunt abdominal trauma depends on a careful clinical evaluation and the timely use of diagnostic procedures. In contrast to penetrating abdominal trauma, the decision to perform laparotomy for blunt abdominal trauma is far more complex because structural injury is less obvious and usually, the abdominal injuries are associated with other injuries. As many as one-third of patients with an initial benign abdominal assessment will eventually require laparotomy⁽⁷⁾.

The spleen was the most common organ involved, followed by the liver, the mesentery, urologic structures and the pancreas in a study conducted by McAnena et al⁽¹⁾. Our pattern of injury is similar with the solid organs, the spleen and the liver, accounting for 8 out of 19 cases seen (42%).

A variety of diagnostic procedures were used in those cases where the indications for laparotomy were in doubt. Seven out of the 19 had obvious indications on clinical assessment. Six had a diagnostic peritoneal lavage, three had a CT scan of the abdomen, two had plain radiography (a case of diaphragmatic rupture and a case of jejunal rupture) and one had unexplained acidosis (pH 7.263, pO₂ 156.7, pCO₂ 41.8) and eventually had a positive lavage (Table IV).

Table IV – Basis on which decision for laparotomy made

Method	Number	Percentage
Clinical assessment	7	36.8
Diagnostic tap	2	10.5
Peritoneal lavage	4	21.0
CT scan abdomen	3	15.8
Plain radiology	2	10.5
ABG + DPL	1	5.3
Total	19	100

Unrecognised injury to the intraabdominal viscus remains a distressingly frequent cause of preventable deaths⁽²⁻⁴⁾. The symptoms and signs of these injuries are notoriously unreliable and are often masked by other injuries and intoxication with alcohol. It is to be noted that as many as 12 out of the 19 cases (63%) required ancillary aids before a decision could be reached for laparotomy. All cases were assessed by at least a surgical registrar.

We have come to realise the importance and usefulness of the peritoneal lavage as a triage tool⁽⁸⁾. It is cheap, fast, safe and accurate. False negatives are uncommon, approximately 2% or less in some studies^(9,10). There is a relatively high rate of false positives but this is usually in the setting of pelvic fractures where a Type III retroperitoneal haematoma often tracks anteriorly and may be punctured with a lavage catheter placed too low. With pelvic fractures, the false positives rate may be as high as 28%⁽¹¹⁾.

CT scan of the abdomen has not been useful as the initial triage tool⁽¹²⁾. It is not readily available; the average time required for a CT scan is in the region of 40-60 minutes. It is costly, averaging about S\$450 per examination in our institution. Unstable patients and confused uncooperative patients may preclude study.

Both the peritoneal lavage and the CT scan are complementary investigations. The unstable patient with a positive lavage requires urgent laparotomy. When the lavage is positive but the patient is stable or when the lavage has been indeterminate, CT has the potential to delineate specific viscus damage.

REFERENCES

- McAnena OJ, Moore EE, Marx JA. Initial evaluation of the patient with blunt abdominal trauma. *Surg Clin North Am* 1990; 70: 495-515.
- Foley RW, Harris LS, Pilcher DB. Abdominal injuries in automobile accidents: Review of care of fatally injured patients. *J Trauma* 1977; 17: 611-5.
- Neuman TS, Bockman MA, Moody P, Stanford JV, Griffith LP, Guber SC, et al. An autopsy of traumatic deaths: San Diego 1979. *Am J Surg* 1982; 144: 722-7.
- West J, Trunkey DD, Lim RC. Systems of trauma care: A study of two countries. *Arch Surg* 1979; 114: 455-60.
- Shackford SR, Hoyt DB. Trauma – general considerations. In: Cuschieri A, Giles GR, Moosa AR. eds. *Essential Surgical Practice*. UK: Butterworth & Co Ltd. 1988: 263.
- Oreskovich MR, Carrico CJ. Trauma: Management of the acutely injured patient. In: Sabiston Jr DC. ed. *Textbook of Surgery*. US: Igaku-Shoin/Saunders. 1990: 294.
- Davis JJ, Cohn I, Nance FC. Diagnosis and management of blunt abdominal trauma. *Ann Surg* 1985; 183: 672-8.
- Root HD, Hauser CW, McKinley CR, La Fave JW, Mendiola RP. Diagnostic peritoneal lavage. *Surgery* 1965; 57: 633-7.
- Hawkins ML, Bailey RL, Carraway RF. Is diagnostic peritoneal lavage for blunt abdominal trauma obsolete? *Am Surg* 1990; 56: 96-9.
- Cox EF. Blunt abdominal trauma. *Ann Surg* 1984; 199: 467-74.
- Gilliland MG, Ward RE, Flynn TC, Miller PW, Ben Menachem Y, Duke Jr JH. Peritoneal lavage and angiography in the management of patients with pelvic fractures. *Am J Surg* 1982; 144: 744-7.
- Kearney PA, Vahey T, Burnery RE, Glazer G. CT and DPL in blunt abdominal trauma. *Arch Surg* 1989; 124: 344-7.