ORIGINAL ARTICLE

Management of Blunt Abdominal Trauma in Maiduguri: A Retrospective Study

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ABSTRACT

Background: *Blunt abdominal trauma (BAT) presents special surgical problems and is a continuous challenge to the surgeon's ability to make an early diagnosis and provide adequate treatment. The aim of this paper is to study retrospectively the patterns, surgical management and outcome of treatment among patients with BAT.*

Methods: *The records of BAT patients managed at the University of Maiduguri Teaching Hospital (UMTH) between January 1998 and December 2000 were studied. Information about the age, sex, cause of injury, main investigations, diagnostic procedures and treatment of these patients were extracted from the files and analysed.*

Results: *There were 48 males and 10 females. The mean age was 25.17 years, and the patients ranged between 8 and 50 years in age. Incidence of BAT was most prevalent in the 20 – 40 year age group (68.96%). Road traffic injuries (RTI) accounted for majority of injuries. The main findings at presentation were abdominal pain, abdominal tenderness and hypovolaemic shock. The spleen and the liver were the most frequently injured solid organs while the small intestine was the most frequently injured hollow viscus. 28 of the patients had associated injuries involving the extremities, chest and head. Fifty patients underwent exploratory laparotomy where definitive management depended on findings. Complications included wound infection, pneumonia, and intra – abdominal abscesses. The mortality rate was 17.24%. Non-operative management was possible in 8 patients.*

Conclusion: *BAT affects mainly the young people below 40 years of age. Definite preoperative diagnosis and the decision to operate was based on clinical assessment and some diagnostic procedures. 20.68% of patients were subjected to non-therapeutic laparotomies. This could be reduced by routine use of modern imaging techniques and thus avoiding unnecessary laparotomies and promoting non-operative management of BAT.*

KEYWORDS: *Blunt; Abdominal; Trauma; Management.*

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INTRODUCTION

Blunt abdominal injuries (BAT) are common in our environment and constitute a continued challenge to the trauma Surgeon. An important task is to recognize an intra-abdominal visceral injury and to determine whether an emergency laparotomy will be necessary[1,2].

To achieve this, a thorough history and repeated physical examinations remain the most reliable diagnostic modality. Diagnostic peritoneal lavage, plain radiographs and needle paracentesis are additional modalities presently. Recently, abdominal ultrasound (AUS) and Computerized Tomography (CT) have become popular in the accident and emergency units of some centres[3,4]. These two imaging modalities have considerably reduced the incidence of unnecessary laparotomies and popularized the non-operative management of BAT especially in children[5,6]. This study retrospectively documents the experience in Maiduguri in the management of BAT with the minimum of facilities.

MATERIAL AND METHODS

The case records of patients who presented in University of Maiduguri Teaching Hospital from January 1998 to December 2000 with BAT were retrieved from the medical records central library. Data extracted included age, sex, causes of injuries, main investigations and diagnostic procedures, initial findings on physical examination, resuscitative measures and where possible treatment

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outcome, and formed the basis of this study. For this study BAT was considered as a closed injury to the abdomen.

RESULTS

There were 58 patients in the study comprising 48 males and 10 females. The male: female ratio was 4.8:1 and the age range was 8-50 years with a mean of 25.17 years. Majority of injuries [40 (68.96%)] occurred between the ages of 20 and 40 years. The commonest cause of BAT was road traffic injuries (RTI) in 40 (68.96%) of the patients. Most were occupants of vehicles and the mechanism of injury was mainly severe deceleration (Table I). Other causes included falls from heights 6, (10.34%) and assault in 3, (5.17%). A 9-year-old boy was trampled upon by a horse and sustained splenic rupture and fracture of the lower ribs.

The main presenting clinical features were abdominal pain, abdominal distension, fever and abdominal tenderness (Table II). Rapid thready pulse of more than 100 beats per minute, systolic blood pressure of less than 80mm Hg and other features of shock were seen in 28 patients (48.27%). The less common symptoms were haematuria in 4 and haematemesis in 5. The packed cell volume (PCV), was less than 30% in 30 patients. Electrolyte derangements, hyperkalaemia, acidosis and uraemia were noticed in those with bowel perforation. Chest radiographs revealed associated lower rib fractures in 18 patients and gas under the diaphragm and pneumoperitoneum in 8 patients while abdominal radiographs showed features of bowel distention with multiple air-fluid levels in 5 patients.

Four-quadrant abdominal paracentesis was done using 10mls syringe and 18-gauge long (spinal) needle in all cases. The result was positive in 40 patients, that is, non-clotting blood was obtained. The physical findings were highly suggestive of intra-abdominal visceral injury in these 40 and they underwent laparotomy, where 30 were found to have haemoperitoneum and varying degrees of intra-abdominal injuries. In the remaining 10, bleeding had either stopped or there were minor injuries and the patients had non-therapeutic laparotomies and an uneventful period of observation followed.

Eighteen patients had negative results on 4-quadrant tap and underwent diagnostic peritoneal lavage (DPL). A peritoneal dialysis catheter, (when available) was inserted through an incision mid way between the umbilicus and symphysis pubis. A urethral catheter was first passed to empty the bladder and a nasogastric tube the stomach. A litre of normal saline was infused and recollected by gravity. A positive result was considered as frank blood up to 10mls before lavage or > 100,000 red blood cells (RBCs)/mm^3 of effluent. Of the 18 patients that underwent DPL 10 had positive results. The 10 had exploratory laparotomy and 8 had visceral injuries two had stopped bleeding and therefore required no further treatment. The 8 with negative DPL were haemodynamically stable and were observed. AUS in those patients showed minor injuries to the liver (3) and spleen (5) which were managed successfully non-operatively. Eight patients with positive DPL had significant intra-abdominal visceral injuries at laparotomy. The sensitivity of the test was 80%. None of those with negative DPL required laparotomy. The specificity of the test was 100%. There were no complications from the procedure.

Tables III and IV present the organs involved in intra-abdominal injuries. There were 78 injuries of which 46 were isolated. There were no major vascular injuries. The spleen was the commonest solid organ injured (n = 24), followed by the liver (n = 14). The pancreas was bruised in 2 cases and both were associated with some retroperitoneal haematoma. There were 34 hollow visceral injuries, the small intestine and its mesentery accounting for most (n = 14). The stomach, urinary bladder and transverse colon were injured on six occasions each. These injuries occurred in various combinations. The extra-abdominal associated injuries were mainly thoracic (thoraco-abdominal), (n = 18), limb fractures (n = 9) and cranio-cervical (n = 5). Of the splenic injuries 21 warranted splenectomy only 3 had splenorrhaphies. Most of the liver injuries had stopped bleeding at the time of laparotomy and required no further treatment. Six cases required minor debridement and primary suture. The kidney was injured in 4

patients all presenting with haematuria but none required surgical intervention. Injuries to the small intestine were repaired by primary closure after ascertaining viability and excision of edges of rents in 10 cases.

Resection and end-to-end anastomosis of the small intestine was done in 4 cases. There were two cases of duodenal injuries that were closed primarily. Injuries to the stomach (n = 6), were repaired in two layers followed by a period of nasogastric tube drainage (range 3 – 5 days). There were 6 urinary bladder injuries, 1 contusion, 2 lacerations and 3 perforations. The 3 perforations of the urinary bladder were associated with stable pelvic fractures. The perforations were repaired in 2 layers of chromic catgut – 1 followed by a period of bladder drainage (range 7-10 days). The injuries to the transverse colon were associated with minimal spillage of faecal matter and were closed primarily in two layers without colostomies.

The most frequent complications were surgical site infections, (n = 7), 5 in the skin and 2 intra-abdominal abscesses that warranted surgical drainage and antibiotics. Pneumonia occurred in 3 cases. There were 10 deaths in this series mortality rate of 17.2%. These occurred in those with multiple system injuries (n = 5), profound shock (haemodynamic instability), (n = 3) and septicaemia (n = 2).

Table I. Causes of Blunt Abdominal Trauma in 58 Patients

Cause/Mode of Injury	No.	(%)
Road Traffic Accidents (RTA)	40	(68.98)
Falls from height	6	(10.34)
Assault (Blows, kicks, etc)	6	(10.34)
Impalement by blunt objects	2	(3.45)
Sports injuries	2	(3.45)
Others	2	(3.45)
Total	58	(100)

Table II. The Main Findings on Admission amongst the 58 Patients with Blunt Abdominal Trauma

Symptoms	No.	%
Abdominal pain	40	68.96
Abdominal distension	18	31.03
Fever	18	31.03
Haematemesis	5	8.62
Haematuria	4	6.89
Others	10	17.24

Most of the symptoms occurred in combination.

Table III. Distribution of Solid Visceral Injuries in the 58 Patients

Solid Viscus Injured	No.	(%)
Spleen	24	41.37
Liver	14	24.13
Kidneys	4	6.89
Pancreas	2	3.44
Total	44	75.83

These were injuries detected at laparotomy.

Table IV. Hollow Visceral Injuries in the 58 Patients with Blunt Abdominal Trauma

Hollow Viscus Injured	No.	(%)
Small intestine and mesentery	14	24.13
Stomach	6	10.34
Transverse colon/mesocolon	6	10.34
Duodenum	2	3.44
Urinary bladder	6	10.34
Total	34	58.59

DISCUSSION

This study reviews the experience with blunt abdominal trauma in this centre, highlighting difficulties in diagnosis and treatment. The mean age of 25.17years in this study reflects the segment of our society that is very actively mobile and involved in out door activities. Most of the patients were involved in road traffic accidents (68.96%) and there is a preponderance of males (M: F ratio = 4.8:1). This trend has been reported in other parts of Nigeria[7,8].

Thorough clinical assessment looking out for abdominal pain, distention, fever and tenderness, repeated over time by the same examiner suggests the diagnosis in many cases[9]. These clinical signs and symptoms are complemented by conventional diagnostic procedures; 4 quadrant abdominal

paracentesis or DPL. Sampling the abdominal cavity for blood after blunt trauma by needle paracentesis was reported nearly 50 years ago and has been known to increase the accuracy of diagnosis of intra-abdominal visceral injuries[8]. The validity and limitations of needle paracentesis are well established[10]. However, it is rapid, safe and extremely reliable if non-clotting blood is aspirated from the peritoneal cavity. DPL was the first well established, reliable and objective method of diagnosis for such injuries. This technique was introduced by Root and colleagues[11] in 1965. While it is primarily helpful in diagnosing haemoperitoneum, it can also reveal hollow viscus injury with enteric contamination. Plain abdominal radiographs are useful, they suggest hollow visceral injury if there is free peritoneal gas, gas under the diaphragm or features of small intestinal ileus. They are of limited use in the diagnosis of solid visceral injuries. Plain radiographs are also useful in extra-abdominal associated injuries to the limbs, thoracic cage and craniocervical region. Modern imaging modalities (CT and AUS Scan), have considerably improve the speed and accuracy of initial (preoperative) evaluation of patients with BAT[12-14].

The packed cell volume (PCV) of less than 30% (HB < 10g/dl) in up to 51.72% of patients in this study and the presence of electrolyte derangements may be due to some delay in reaching hospital after injury.

The fifty-eight (58) patients in this study were mainly managed by exploratory laparotomy based on detection of haemoperitoneum by clinical assessment and needle paracentesis or DPL. Fifty laparotomies were carried out in this series (86.2%), at which 78 significant solid and hollow visceral injuries required treatment.

The spleen as in other studies is the most frequently injured solid organ[15,16]. Most of the injured spleens were removed, this corroborate with reports from Benin City Nigeria where splenic conservation has been little practised. This is because the majority of splenic injuries in these environments were severe[17]. Most injuries to the liver were minor and required minimum intervention. Injuries to the kidney are common following BAT. It occurs in 5-10% of patients with significant abdominal trauma[18,19]. Four patients (6.89%) sustained blunt injury to the kidney and presented with haematuria. Most renal injuries are minor, including contusions, subcapsular and perinephric haematomas and superficial lacerations most are managed conservatively[19]. More significant injuries, deep lacerations, shattered kidney, active haemorrhage, infarctions, vascular pedicle and pelviureteric junction injuries, are more likely to need surgery.

Over the past several years, non-operative management has increasingly been recommended for the care of selected blunt abdominal solid organ injuries[20,21]. This method is reserved for patients that are haemodynamically stable and without abdominal findings requiring laparotomy. The incidence of such non-operative management for both hepatic and splenic injuries have increased significantly in developed countries and especially in trauma centres than in the non-trauma centres[22].

The small intestine like in other series[23] is the most frequently injured hollow viscus and the lower jejunum and ileum and their mesenteries are most frequently affected because of their mobility. The duodenum in its partial retroperitoneal position is susceptible to bruises, and rupture in severe deceleration injuries[24]. The incidence of duodenal injury following BAT is less than 1% and is associated with a high incidence of intra-abdominal associated injuries[24]. Missed duodenal injuries, mostly a draw back of non-operative management of BAT is common. To avoid this, the index of suspicion for duodenal injury should be kept high and adequate exposure of the duodenum should be obtained at laparotomy[25].

The stomach is also susceptible to similar injuries and may occur in combination with duodenal injuries as in one of our patients. A plain abdominal radiograph or contrast enhanced CT scan showing extensive retroperitoneal and sub-diaphragmatic air is highly suggestive and may only be evident in delayed films[25]. Laparoscopy has also found some use in diagnosis of both hollow and solid visceral injuries[26,27]. Colonic injuries in this series affected the transverse colon with minimal faecal contamination. Other parts of

the colon especially the sigmoid are equally susceptible. Injuries to the urinary bladder following BAT are infrequent because of the protection of the pelvic skeleton. Fractures of the pelvis and a full bladder are predisposing factors. Such injuries present as gross haematuria or extravasations of urine. The surgical approach depends on whether the rupture is intra or extra-peritoneal. The former groups are managed by exploratory laparotomy, primary repair and urethral catheter drainage, while the extra peritoneal rupture resolves with suprapubic catheter and conservative management[28].

The pattern of extra abdominal associated injuries varies according to aetiology and mechanisms of injury. Multi – system injuries increase the mortality following BAT. There were 10 deaths (mortality rate = 17.24%) in this series. This is higher than 10.8% and 8.9% reported in other parts of Nigeria[7,16]. The difference in mortality rate may be due to differences in severity of injuries and composition of patients. Most of the deaths were accounted for by multiple system injuries (n = 5), profound haemorrhagic shock (n = 3) and septicaemia (n = 2).

In conclusion, BAT is a fairly common form of injury in our environment. The most important cause is RTA. Recognition of intra-abdominal visceral injury is based on thorough clinical assessment complemented by conventional diagnostic procedures. Modern imaging modalities have significantly improved diagnosis but are not widely available. There is a general trend towards non-operative management of blunt solid organ injuries, supported by a formulated protocol, repeated physical examination and surveillance with CT scan of the abdomen, AUS, diagnostic laparoscopy, radioisotope scanning and other imaging modalities.

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