GASTROINTESTINAL PERFORATION FOLLOWING BLUNT ABDOMINAL TRAUMA

A.Z. Sule, FMCS, FWACS, FICS, A.T. Kidmas, FRCS (Glasg), FWACS, K. Awani, FWACS, F. Uba, FMCS, FWACS and M. Misauno, FWACS, Department of Surgery, Jos University Teaching Hospital, P.O. Box 297, Jos, Nigeria

Request for reprints to: Dr. A.Z. Sule, Department of Surgery, Jos University Teaching Hospital, P.O. Box 297, Jos, Nigeria

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ABSTRACT

Objective: To highlight the pertinent management problems of bowel perforation following blunt abdominal trauma.

Design: A prospective descriptive study.

Setting: Hospital-based cohort over a nine year period in Jos University Teaching Hospital, Jos, Nigeria.

Subjects: A total of 23 patients with bowel perforation out of 8,970 trauma victims with a mean age of 28.5 years.

Intervention: Exploratory laparotomy, drainage of septic peritoneal fluid and wound saline lavage and closure of perforations were performed in all the 23 patients with clinical features and imaging signs suggestive of bowel perforation following blunt abdominal trauma. Femoral fractures were splinted and tube thoracostomy were carried out in four and two patients respectively.

Main outcome measures: There is an apparent delay in presentation and diagnosis of traumatic bowel perforation following blunt abdominal trauma. Signs of peritoneal sepsis remain the most consistent findings in our environment. The morbidity and mortality following blunt abdominal trauma and bowel perforation are high because of established peritonitis. Delayed presentation or large leakage of bowel content into the peritoneal cavity and the attendant ease with which peritonitis develops in the latter are factors responsible.

Results: Delayed presentation (mean 3.05 days) was observed in seven of 23 patients. Eight patients had concomitant injuries; two to the head, four had right femoral fracture and two blunt chest injury. Features of peritonitis were present at initial evaluation in 19 patients. Seventeen patients were victims of motor vehicle accident. Radiological evidence of perforation (pneumoperitoneum) was present in only two of four patients with difficult diagnosis. Free peritoneal fluid without solid organ injury was detected in two patients with ultrasound. Diagnostic peritoneal lavage was, therefore, not used in any of our patients. The mean time from admission to laparotomy was six hours. Sites of perforations were: stomach (2), jejunum (9), ileum (8), jejunum/ileum (2) and colon (2). Sepsis originating from the perforated bowel was responsible for mortality in our patients who died in the perioperative period with concomitant injury playing significant role in three of 11 patients with such injuries.

Conclusion: Peritonitis following a bowel perforation after blunt abdominal trauma is often present at the time of presentation and diagnosis is usually made. In the few doubtful cases, often in patients presenting soon after trauma, X-ray and trans-abdominal ultrasonography will assist in making a diagnosis. Delayed presentation still accounts for a high mortality in bowel perforation following blunt abdominal trauma.
INTRODUCTION

Injuries especially as a result of blunt trauma, now constitutes one of the major causes of death in our society. The frequency of trauma to the abdomen may be increasing in almost geometric proportion as the number and speed of highway vehicles, civil unrest and terrorist attack rises (1-3).

In some cases of these abdominal injuries, blunt trauma of the gastrointestinal tract are occasionally found. Perforations of the gastrointestinal tract compared to solid organ injuries, are a relatively infrequent sequelae of blunt abdominal trauma (1-4). The difficulty with these injuries lies in establishing the diagnosis (6-8).

Gastrointestinal tract lesions following blunt abdominal trauma (BAT) frequently remained undetected or are diagnosed too late despite advance in medical imaging with techniques such as sonography, computer tomography and magnetic resonance imaging (6,8). Though peritoneal lavage has a high diagnostic sensitivity for gastrointestinal perforation (GIP) compared to other diagnostic modalities, nonetheless it does not allow reliable prediction of injuries of the gastrointestinal tract (9). Consequently, serious complications such as peritonitis and even cases resulting in death are sometimes encountered.

The present trend toward conservative management of haemodynamically stable trauma patients may be increasing the risk of delay in the diagnosis of traumatic gastrointestinal perforation following BAT. The study looked at gastrointestinal perforation following BAT and highlights pertinent management problems in a centre in a developing country.

MATERIALS AND METHODS

Trauma admissions between May 1994 and May 2002 at the Jos University Teaching Hospital (JUTH) in consecutive patients presenting with features of peritonitis and suspected to have gastrointestinal perforations caused by blunt abdominal trauma formed the basis of our report. Those in whom bowel perforations were not found at surgery to be responsible for peritoneal irritations were excluded from the study. Data collected were mechanisms of injury, results of admissions and serial clinical examinations, results of radiologic imaging, associated injuries, operative findings, treatment and outcome. Follow up was obtained on all patients. The results were then analysed.

RESULTS

A total of 8,970 trauma cases were seen during the period under consideration. Twenty three of them had gastrointestinal perforation. Their ages ranged from one and a half years to sixty years with a mean of 28.5 years. All were males. The age distribution is shown in Table 1.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 10</td>
<td>4</td>
</tr>
<tr>
<td>11–20</td>
<td>4</td>
</tr>
<tr>
<td>21–30</td>
<td>6</td>
</tr>
<tr>
<td>31–40</td>
<td>5</td>
</tr>
<tr>
<td>41–50</td>
<td>1</td>
</tr>
<tr>
<td>51–60</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23</strong></td>
</tr>
</tbody>
</table>

Mechanism of injury: Seventeen patients were involved in road traffic accidents and in one, the wheel of a car went over his abdomen. One patient had a kick to the abdomen at play. A blow to the abdomen with a piece of wood accounted for four cases; two at play and the other two during a fight. A falling gear box on the abdomen of an automobile mechanic was responsible for one case. Fifteen of these patients had symptoms and signs confined to only the abdomen. Injuries to multiple organ systems were present in eight patients all of whom were victims of road traffic accidents. A combination of blunt abdominal injury and head injury were present in two patients; abdominal injury and right femoral fracture in four patients and abdominal injury and chest injury with infected left haemothorax was present in two patients.
Results of clinical evaluation and radiologic imaging: The symptoms were severe enough to allow presentation soon after the accident in sixteen (69.5%) patients while it was delayed in seven patients (30.4%). Diagnosis of peritonitis was obvious at presentation in twelve (75%) of these patients and in the remaining four (25%) diagnosis of peritonitis was not certain on admission. These four patients had erect chest X-ray and in two of them air was present under the diaphragm. Abdominal sonography in two of the four patients with no gas under the diaphragm revealed fluid in the peritoneal cavity, no solid organ injury, and dilated fluid loaded loops of bowel exhibiting no peristalsis. We did not, therefore, proceed to do diagnostic peritoneal lavage in these patients who had exploratory laparotomy based on the above findings. Four-quadrant abdominal tap done at presentation in the four doubtful cases were negative.

All the seven of 23 patients presenting late did so within an average of three days after the trauma and had features of peritonitis and sepsicaemia. They had abdominal pain at the time of trauma that they thought was minor and, therefore, ignored. A patient with femoral fracture had been with a traditional bone setter. All the seven patients presenting late and 12 of those presenting on the day of trauma had cardiovascular instability with low blood pressure and a pulse of over 100 beats per minute.

Operative findings and treatment: Our patients with clinical and radiological signs suggestive of bowel perforation were resuscitated and offered exploratory laparotomy. General anaesthesia was used. Established peritonitis with loculated abscesses were the main features in those presenting late while large sequested peritoneal fluid and mild to moderate blood loss giving it a dark-brown colour were the features in early presenters. The bowels were generally not inflamed in this latter group. The ileum alone was perforated in eight patients; ileum and jejunum in two; jejunum alone in eight; stomach alone and colon two. Septic peritoneal exudates was found in both sides of the scrotum between the layers of the tunica vaginalis that communicated freely with the peritoneal cavity in four. These patients did not have a hydrocoele or inguinal hernia before the accident.

The septic peritoneal exudates were evacuated, edges of perforations excised and primary closure done. Peritoneal cavities were copiously lavaged and closed. Partial closure of skin and subcutaneous tissues were done after a lavage with saline. One patient had a tube thoracostomy. All femoral fractures were initially treated by skeletal traction and ultimately sent to the orthopaedic surgeons for definitive treatment. Head injuries were mild and managed conservatively with good outcome.

<table>
<thead>
<tr>
<th>Mechanism of injury</th>
<th>No. of patients</th>
<th>Number of organ system involved</th>
<th>Mortality</th>
<th>Delayed diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road traffic accidents (RTAs)</td>
<td>17</td>
<td>9</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Kick to the abdomen (feet)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blow to the abdomen (wood, fist, etc.)</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Falling object</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>15</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 2

Table 3

Regional distribution of gut and other intra-abdominal viscera involved

<table>
<thead>
<tr>
<th>Region of the gut/viscera involved</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ileum</td>
<td>8</td>
</tr>
<tr>
<td>Jejunum/ileum</td>
<td>2</td>
</tr>
<tr>
<td>Jejunum</td>
<td>8</td>
</tr>
<tr>
<td>Stomach/Liver lacerations</td>
<td>2</td>
</tr>
<tr>
<td>Colon/Spleen</td>
<td>2</td>
</tr>
</tbody>
</table>
**Morbidity/Mortality:** Two patients with ileal perforations had faecal fistula while superficial wound infection complicated six procedures. One patient with ileal faecal fistula required a second surgery for the construction of another anastomosis. Both fistulae closed while the superficial wound infections were treated successfully with antibiotics and daily wound dressing.

We recorded a total of eleven deaths that occurred within an average of 25 hours post surgery. Three belong to the group of seven patients with delayed presentation who had established peritonitis and septicaemia. Eight of the remaining deaths were in patients who presented on the day of accident and diagnosis of peritonitis was certain at presentation. Three of the eight patients had other organ system injuries following road traffic accident in addition to bowel perforation.

**DISCUSSION**

Gastrointestinal perforation with spillage of bowel contents into the general peritoneal cavity quite often manifest with features of peritoneal irritation and septicaemia. Diagnostic difficulty does not usually exist. However, in some few categories of patients, particularly those with blunt injury to the abdomen, diagnosis may be difficult resulting in delayed treatment, poor surgical outcome and sometimes avoidable deaths. Most of our patients were relatively young males, a reflection of a mobile age group exposed to a relatively increased risk of trauma commonly due to road traffic accidents (RTAs).

One-third of our patients did not present to the hospital until after an average of three days with advanced peritonitis. Reasons put forward to explain such delay include:

(i) Relatively feeble initial peritoneal irritation induced by the nearly neutral intestinal content particularly those with perforation between the duodeno-jejunal flexure and the ileocaecal junction (1).

(ii) In small perforations the mucosa may prolapse through the hole and partly seal it making early signs misleading (1,2).

(iii) The entity of a delayed perforation caused by an evolving injury. These patients have an initial contused bowel wall at the time of trauma that ultimately gives way after a variable period with resultant peritonitis (10).

Abdominal pain, the usual symptom indicating abdominal injury was not severe in seven of 23 patients and therefore the patient did not seek hospital care soon after the injury most probably due to the above reasons. These victims resorted to taking regular analgesics (Paracetamol) to relieve what they thought were minor symptoms with consequent delayed presentation. Enlightenment campaign directed at the medical and general public should be encouraged to raise the awareness that no abdominal symptom is minor to be ignored and that initial hospital check-up is necessary after significant trauma to the abdomen to avoid missing potentially serious injuries. However, where multiple perforations or large perforations of the gut were noted at surgery, the peritoneal spillages were also large and associated with early peritonitis prompting early presentation as it was the case in the 14 patients (87.5%) who came to the hospital soon after trauma to the abdomen.

Four of sixteen patients seen on the day of trauma (RTA) could not be established to have significant abdominal hollow visceral injury. Close surveillance supplemented by radiological investigations and timely surgical intervention saved the lives of the four patients. The presentation in these four patients indicates that initial clinical and radiological evidences of bowel perforation can be misleading and reliance on such indicators may result in significant diagnostic delay. However, we did find plain X-ray and abdominal sonography useful in establishing diagnosis in these four patients and therefore diagnostic peritoneal lavage which has a high diagnostic sensitivity for hollow visceral perforation compared to other diagnostic modalities was not employed in the four cases with uncertain bowel perforation. The value of this method in the diagnosis of blunt abdominal trauma and possible lesions of the gastrointestinal tract, though not absolute, is indisputable and clinician should adopt this technique where diagnosis is in doubt (11), particularly in centres that lack X-ray facilities and other modern imaging techniques. Although, abdominal sonography is becoming increasingly important in the diagnosis of abdominal trauma, lesions of the gastrointestinal tract frequently remained undetected or are diagnosed too late where this method of examination is used exclusively (8). However, free peritoneal fluid without solid organ injury detected on ultrasound in a patient with
trauma to the abdomen will suggest a significant injury requiring exploration.

Three deaths were the result of sepsis originating from perforated bowel occasioned by delayed presentation and treatment. Severe primary intra-abdominal visceral injury, hypovolaemia and sepsis as observed previously (12) were also factors related to deaths in the remaining eight patients who presented on the day of trauma. Large sequestration of fluid in the peritoneal cavity was common operative findings. These combinations of risk factors, particularly sepsis and hypovolaemia put these patients in a non-ideal condition for surgery. Under such circumstances a quick surgery limited to containing continuous soilage and evacuation of pus becomes necessary. An anaesthetic technique utilising local infiltration and sedation (13) with adequate transfusion of blood to maintain blood pressure seems necessary. This was employed in some of our patients with good outcome.

Postoperative complications were limited to faecal fistula, pelvic abscess and superficial wound infection. Thorough lavage of peritoneal cavity and wound allowing septic fluid to exude from wound before final closure are essential.

Blunt abdominal trauma with bowel perforation is occasionally difficult to diagnose particularly in those with multiple injuries or evolving peritonitis in our environment (16). Thorough clinical assessment complimented with investigative modalities such as X-ray and ultrasonography will help to resolve this occasional diagnostic conundrum most times. Where these investigations cannot be carried out, especially at the level of the district hospitals, diagnostic peritoneal lavage (DPL) will reveal a significant intraperitoneal injury (11). Patients with bowel perforation following blunt abdominal trauma present late with established peritonitis. Very few presenting early with doubtful diagnosis of significant bowel injury will require additional investigations to confirm its presence. Late presentation still account for a high mortality in bowel perforation after BAT.

 Provision of accessible and affordable health care facilities and health education are measures that will encourage accident victims to seek help in hospital rather than in non-orthodox health centres. These above measures will certainly reduce morbidity and mortality directly linked with late presentation in patients with blunt abdominal trauma.

REFERENCES