Injury, Int. J. Care Injured 45 (2014) 1378–1383

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

The management of retroperitoneal haematoma discovered at laparotomy for trauma☆

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ARTICLE INFO

Article history:
Accepted 25 January 2014

Keywords:
Retroperitoneal
Haematomas
Blunt trauma
Penetrating trauma

ABSTRACT

Aim: To review our local experience with presentation and management of retroperitoneal haematomas (RPH) discovered at laparotomy and factors affecting outcome.
Methods: Patients with retroperitoneal haematomas (RPHs) were identified from a prospective database. Data collected included demographics, clinical presentation, zones and organs involved, management and outcome.
Results: Of a total of 488 patients with abdominal trauma, 145 (30%) with RPH were identified 136 of whom were male (M:F = 15:1). Mean age was 28.8 (SD 10.6) years and median delay before surgery was 7 h. The injury mechanisms were firearms (109), stabs (24), and blunt trauma (12). Twenty-four patients (17%) presented with shock. There were 58 Zone I, 69 Zone II, and 38 Zone III haematomas. The median injury severity score (ISS) was 9. Fifty-two patients (36%) developed complications and 26 (18%) patients died. Sixty-four (44%) patients required ICU with median ICU stay of 3 days. All Zone I injuries were explored; Zones II and III were explored selectively. The mortality for Zones I, II, III and IV was 14%, 4%, 29% and 35%, respectively. Mortality was highest for blunt trauma and lowest for stabs ($p = 0.146$). Twelve of 24 patients with shock died (50%) compared to 14 of 121 (12%) without shock ($p < 0.0001$). Eighteen of 64 patients with <6-h delay before surgery died (28%) compared to 8 of 81 (10%) with >6-h delay ($p < 0.017$). Mortality increased with increasing ISS. Median hospital stay was 8 days.
Conclusion: RPH accounted for 30% of abdominal trauma. Injury mechanism, presence of shock, delay before surgery and ISS showed a significant association with mortality.

Introduction

The retroperitoneal area is a wide space lying posterior to the peritoneal cavity and contains completely or envelops anteriorly a number of visceral and vascular structures in the gastrointestinal, genitourinary, vascular, musculoskeletal, and nervous systems [1]. It is bounded posteriorly by the transversalis fascia and extends from the diaphragm to the pelvic inlet. A retroperitoneal haematoma (RPH) results from injury to gastrointestinal, genito-urinary, vascular and muscular structures within this space [1,2].

Kudsk and Sheldon [3] first introduced a location-based classification of traumatic RPH as central–medial (Zone I), flank or peri-renal (Zone II), and pelvic (Zone III). This principle was immediately accepted and became a standard treatment policy for RPH [4]. A Zone I haematoma is bounded superiorly by the central diaphragm, by the medial borders of the psoas muscles at its sides and the pelvis inferiorly. Injuries of the great vessels of the abdomen, pancreas and duodenum are the commonest aetiologies [5]. A Zone II haematoma lies lateral to the psoas muscles, above the iliac wings and under the diaphragm and may result from injuries to the ascending or descending colon, duodenum, kidney, genito-urinary vascular structures, ureters and muscular vessels [5,6]. A Zone III haematoma is located in the pelvis limited with the dome of the bladder at the front, sacral promontory at the rear and iliac wings at both sides [5]. The majority of pelvic haematomas arise from injury to the pre-sacral or pre-vesical veins; other less common causes include arterial bleeds and haemorrhage from a variety of pelvic fracture sites [1,7]. Bleeding of venous origin may stop spontaneously when local venous pressure and the pressure of the retroperitoneal space equalise [7]. Fig. 1 shows a CT scan of a patient with a Zone II retroperitoneal haematoma with medial extension in to Zone I area.

Despite adequate data regarding the management of RPH in developed countries, data emanating from developing countries are scarce. We hypothesised that this condition occurs with equal

☆ Presented at Congress of the Surgical Research Society of Southern Africa, Stellenbosch, 12–13 July 2012.

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0020–1383/$ – see front matter © 2014 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.injury.2014.01.026

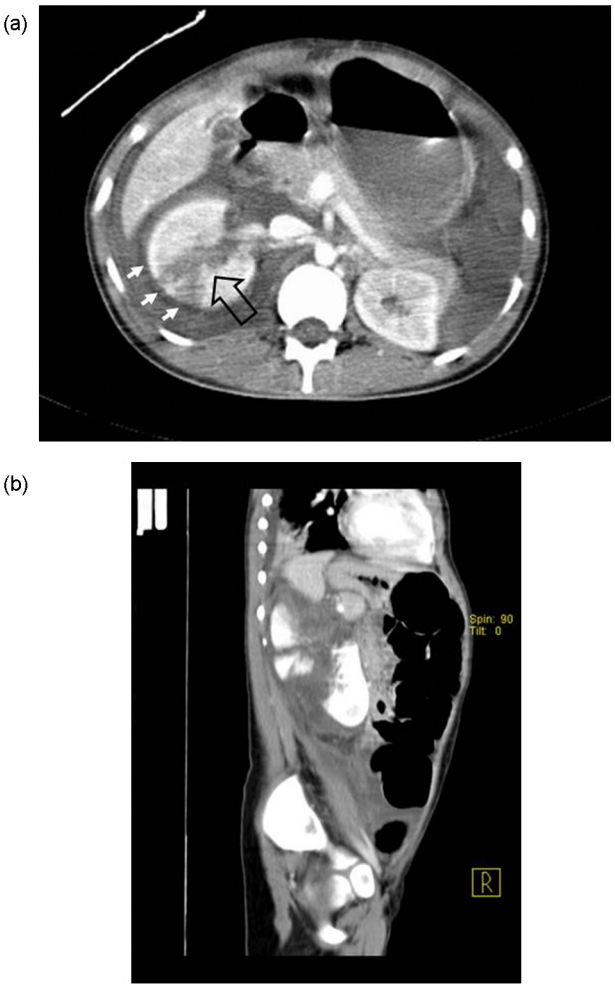

Fig. 1. CT scans showing retroperitoneal haematoma. (A) An axial CT scan with the haematoma designated by solid arrows. The hollow arrow shows traumatic injury to the right kidney. (B) is a sagittal CT scan of the same patient.

frequency regardless of income level and that management principles are the same. The purpose of the study therefore was to document local experience with traumatic retroperitoneal haematomas discovered at laparotomy and to establish factors that may affect outcome.

Patients and methods

Ethics approval was attained from the University of KwaZulu-Natal's Biomedical Ethics Research Committee (E057/98). A database of patients with abdominal trauma [8] was established in 1998 in a single surgical ward at King Edward VIII Hospital, a tertiary hospital with three surgical wards, situated in Durban, on the south coast of the KwaZulu-Natal Province of South Africa. The database spanned a period of seven years (1998–2004) and excluded all paediatric patients (age < 12 years) as they are managed separately by the paediatric surgeons. From a dedicated proforma data were subsequently transferred onto an Excel database and included demographics, clinical presentation, findings at surgery, management and outcome. Patients who were found to have retroperitoneal haematoma at laparotomy were extracted and analysed for the purpose of this study.

The management of abdominal trauma in our institution adheres to the following protocol. All patients with trauma are resuscitated according to Advanced Trauma Life Support principles. Computed Tomography (CT) scan is the first investigation employed in stable patients following blunt trauma. Haemodynamic instability or shock is defined as systolic blood pressure below 90 mmHg despite administration of 2000 ml crystalloids or 2 units packed red blood cells [7]. All haemodynamically unstable patients are resuscitated; if they respond to resuscitation they are assessed regarding the need for emergency laparotomy. Patients with equivocal signs are managed by regular clinical evaluation and CT scan where indicated. Patients who do not respond to resuscitation undergo emergency laparotomy. This study therefore includes patients with refractory shock or haemodynamic instability, and stable patients with signs of intra-peritoneal haemorrhage or injury who require immediate laparotomy. The severity of injuries was measured using the injury severity score (ISS) [9]. The severity of organ injury was graded according to American Association for the Surgery of Trauma [10].

The management of RPH at laparotomy depended on the site and behaviour of the haematoma, and the haemodynamic status of the patient. All Zone I injuries were explored by 'opening' the haematoma after vascular control was achieved and the various organs were managed on their merit. Zones II and III haematomas were selectively explored, the indications for exploration being a pulsating or expanding haematoma, overt bleeding and evidence of hollow visceral injury. If the patient was unstable and there was no other identifiable cause of bleeding, the haematoma was explored regardless of the site. The management of all injured organs followed standard management protocols for the various organ injuries.

Data were collected on a proforma datasheet and were subsequently transferred into a Microsoft Excel® spreadsheet. Fractions were rounded off to one decimal place. Percentages were rounded off to the nearest whole numbers. Statistical analysis was carried out using the Statistical Package for the Social Sciences version 21 (SPSS-SA, Cape Town, South Africa). The chi-squared test with Yates' continuity correction was used for shock, hollow visceral injury and delay. The chi-squared test was used for type of trauma, ISS category and zone.

Results

There were 488 patients with abdominal trauma of whom 145 (30%) had RPH, with 136 males giving a male: female ratio of 15:1. The mean age was 28.8 (SD 10.6) years. One hundred and thirty three injuries were due to penetrating trauma (firearms 109, stabs 24) and 12 were due to blunt trauma. Twenty-four patients (17%) presented with haemorrhagic shock. The median delay before surgery was 7 h with an interquartile range (IQR) of 5.5 (the 25th centile was 4.5 and the 75th centile was 10).

There were 58 Zone I, 69 Zone II, 38 Zone III haematomas. Twenty of these patients had involvement of more than one zone (Zone IV). The median ISS was 9 with an interquartile range of 7 (25th centile was 9 and the 75th centile was 16). The individual organ injuries and their management are shown in Table 1. The most commonly injured organs were the colon, kidney, duodenum, pancreas, urinary bladder, and rectum in that order. Twenty-one (64%) of 33 injured kidneys were salvaged with only 12 (36%) undergoing nephrectomy. Eleven nephrectomies (41%) followed firearms injuries. Twenty-two (96%) of 23 pancreatic injuries were managed by simple drainage. Sixty-one of 64 injuries in Zone I (95%) required some form of surgical intervention such as repair, drainage or ligation. Sixty of 75 injuries in Zone II (80%) required surgical intervention and all Zone III injuries (100%) required intervention.

Fifty-two (36%) patients developed complications (Table 2). There were eleven patients with fistulae [pancreatic (4), entero-cutaneous (3), colo-cutaneous (1), gastro-cutaneous (1), recto-vesical (1) and colo-vesico-cutaneous (1)]. Six patients developed