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CHALLENGES OF MANAGING PAEDIATRIC ABDOMINAL TRAUMA IN A NIGERIAN SETTING

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ABSTRACT

Background: The management of abdominal trauma (particularly blunt trauma) has undergone tremendous revolution in the last 30 years with significant reduction in morbidity and mortality in developed countries. The aim of this report is to highlight the challenges of managing abdominal trauma in children in Nigeria based on our experience in Zaria, northern Nigeria.

Method: This is a retrospective review of 82 children managed for abdominal trauma from 1991 2002 at the Ahmadu Bello University Teaching Hospital, Zaria, Nigeria. Information regarding demographics, mechanism of injury, haemodynamic status at presentation, clinical and radiologic evaluation, management, intraoperative findings and outcome, were extracted from case notes, operation notes and discharge summary notes.

Results: Fifty seven (69.5%) children had blunt trauma, mostly from traffic accidents (32, 57%) and falls (20, 36%), and 25 (30.5%) penetrating trauma mainly from falls onto sharp objects (7 of 18 patients) and animal-related injuries (5 of 18 patients). In the management of those with blunt trauma, advanced imaging modalities were usually not available and this resulted in an unnecessary laparotomy rate of 51% (laparotomy considered unnecessary because the patients remained haemodynamically stable after resuscitation and any intraperitoneal bleeding had stopped by the time of laparotomy and no active operative measure was required to control bleeding). The management of penetrating trauma was more straightforward as this was guided by evidence of peritoneal penetration. Mortality from blunt trauma was 14.5% (8 of 55 patients) from exsanguinations before surgery 2, gastric perforation 3, hepatic laceration 2 and splenic injury one. Mortality from penetrating trauma was 12% (3 of 25 patients) from tetanus, overwhelming infection and haemorrhage respectively. The overall mortality from abdominal injury was 13.8% (11 of 80 patients) and were mostly avoidable if the patients presented early, and received some resuscitation before arrival at our hospital.

Conclusion: The management of blunt abdominal trauma in children in Nigeria is faced with several challenges, which are mainly absence of an organised trauma system and lack of appropriate facilities. These need to be addressed in order to improve the care of these injuries.

Key Words: Abdominal trauma, paediatric, blunt, trauma system, imaging modalities, unnecessary laparotomy.
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INTRODUCTION

Trauma is now an important cause of childhood morbidity and mortality in developing countries, including Nigeria. [1] Abdominal trauma is about the 3rd leading component of paediatric trauma worldwide. Since the initial observation in 1971 that splenic injury in children can be safely managed nonoperatively, [2] the care of children with blunt abdominal trauma has undergone tremendous revolution. In more developed environments, morbidity and mortality from abdominal trauma has been reduced by availability of advanced imaging modalities and well-developed trauma systems. [2, 3] The aim of this report is to highlight the challenges of managing abdominal trauma in children in Nigeria based on the experience in Zaria, northern Nigeria.

PATIENTS AND METHODS

In the period 1991-2002, a total of 82 children =15 years were managed for abdominal trauma at the Ahmadu Bello University Teaching Hospital, Zaria, Nigeria. The hospital records of these patients (operation registers, operation notes, case notes and discharge summary sheets) have been retrospectively reviewed as available. It must be noted that some of the patient were included in previous reports, but those reports covered different periods as follows: 1987 -1996[5], 1987 -1996[6], 1987 -1998[7].

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RESULTS

Fifty seven (69.5%) of these patients had blunt trauma while 25 (30.5%) had penetrating trauma. During the period of study, functioning CT scan facility was not available most of the time and ultrasound services were available only during normal working hours.

BLUNT TRAUMA

There were 45 boys and 12 girls, aged 1-15years (mean 9 years) (Figure 1).

Mechanism of injury (56 patients, information not available in one patient)

Majority of the children (32, 57%) were injured from road traffic accidents, mostly as pedestrians, while 20 (36%) fell from heights; the falls were usually from trees. Injury during sports was not common (Figure 2).

Evaluation

This was mostly based on clinical findings and evaluation of haemodynamic stability; 54% were in shock at the time of presentation. Repeated abdominal examination was performed where initial findings were inconclusive. Diagnostic peritoneal lavage or abdominal paracentesis was done in some patients, but only helpful in suggesting presence of intraperitoneal bleeding. Plain abdominal radiographs were done when practicable. Abdominal ultrasonography was done in a small number of patients, who presented during working hours.

Management

Two patients died from exsanguination before surgery (within 4 hours of arrival in hospital while being resuscitated) and one was taken away from hospital by the parents. Two patients in whom ultrasonography identified the nature of injury (grade II splenic injury 1, hepatic injury 1) were managed nonoperatively; this was abandoned in the child with hepatic injury due to progressive deterioration. Following resuscitation, all other patients had laparotomy due to uncertainty regarding the nature and extent of injury.

Pattern of organ injury and treatment

In 43 patients the injury was isolated, but multiple in 11. The pattern of organ injury is shown in figure 3. The spleen was injured in 34 patients, 30 of which were isolated injuries. In 18 patients with grades II or III injury, splenorrhaphy was performed in 14 and partial splenectomy in 4. In 2 patients the non-bleeding spleen was left alone. Total splenectomy was performed in 13 patients with grades IV or V injury. On child with grade II injury diagnosed by ultrasonography was managed non-operatively. Nine patients had hepatic injury, 4 of which were isolated injuries. Four of the lacerations had stopped bleeding at the time of surgery. Injuries to other intraabdominal organs in the 11 patients with multiple injuries were treated on their merit.

Associated extraabdominal injuries

Nine patients (16%) had 13 extraabdominal injuries consisting of limbs fractures 8 and head injury 5. These injuries were treated accordingly.

Morbidity and mortality

One patient who had splenorrhaphy developed an intraabdominal abscess requiring open drainage. Eight of 55 (14.5%) (one patient was taken away by the parents and the outcome are not known, and information on outcome was not well documented in one other patient and these two were excluded from mortality analysis) patients died from gastric perforation 3, hepatic injury 2, splenic injury one; in 2 patients who died before surgery, the nature of intraabdominal injuries could not be identified. Post mortem examination was not done in any of the deaths as consent was not given by the relations. Overall, 51% of patients would have been treated non-operatively if the nature and extent of intraabdominal injury could be ascertained pre-operatively.

PENETRATING TRAUMA

There were 19 boys and 6 girls, aged 39 days -15 years.

Mechanism and nature of injury (18 children) Information on mechanism of injury was available in 18 children (Table 1). The 7 falls were onto sharp objects, 6 of which occurred in the home environment. The 5 Animal related injuries were from cow and ram horns. There were 27 injuries in the 25 children, consisting of intestinal ***e***visceration only 17, small intestine perforation 3, large intestinal perforation 2, gastric perforation 2 and bladder laceration 1. In 2 patients, the injury did not go beyond the anterior abdominal wall.

Treatment and outcome

The patients were resuscitated and tetanus prophylaxis given. Broad spectrum antibiotics (usually a combination of ampicillin or ampiclox, gentamicin, and metronidazole) were also given. The injuries were treated based on their merit, according to findings at examination under general anaesthetic: those with peritoneal penetration (23 patients) had laparotomy through a separate incision and appropriate treatment of the organs injured and debridement of the entry wound; those without peritoneal penetration(2 patients) had debridement of the abdominal wound. Three patients (3/25, 12%) died from tetanus, overwhelming infection and haemorrhage respectively.

Table 1: **Mechanisms of Injury in Penetrating Abdominal Trauma in 18 Children**

Mechanism of injury	No.
Fall onto sharps	7
Animal related	5
Sports	3
Traffic accident	1
Gunshot	1
Child abuse	1
Total	**18**

Figure 1: **Age of 57 Children with Blunt Abdominal Trauma.**

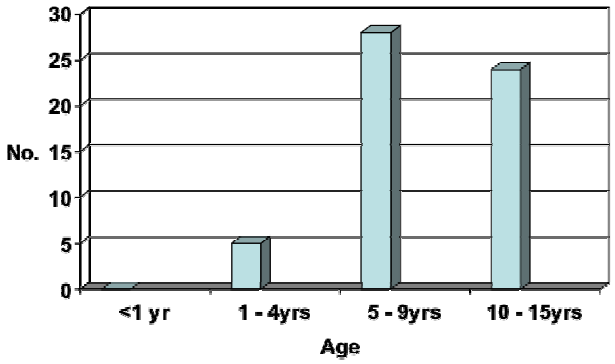

Figure 2: **Mechanism of Injury in 56 Children with Blunt Abdominal Trauma.**

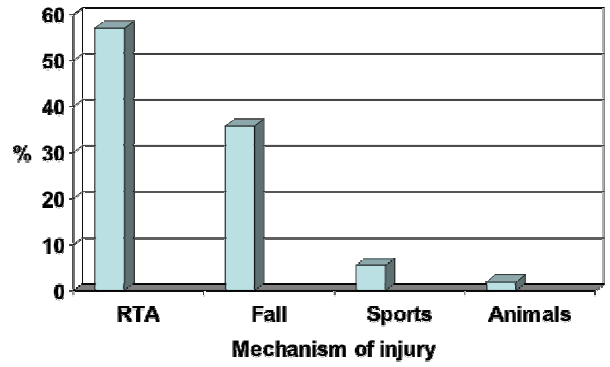

Figure 3: **Pattern of Organ Injury in Children with Blunt Abdominal Trauma (**GIT= Gastrointestinal Tract; HBT= Hepatobiliary Tract; UT= Urinary Tract).

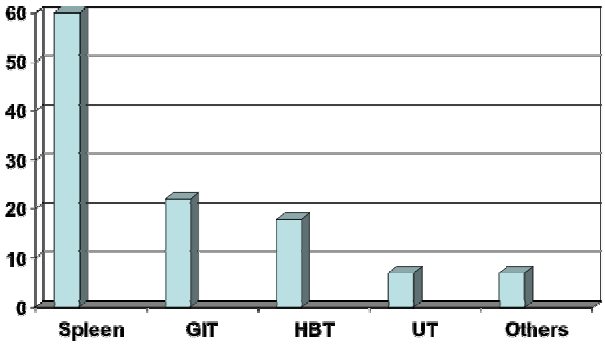

Table 2: **Challenges of Managing Abdominal Trauma in Children in Nigeria.**

Non-existent trauma system
Lack of trauma registry
Lack of appropriate diagnostic (imaging) modalities
Inadequate funding for research

Figure 4: **Age of 25 Children with Penetrating Abdominal Trauma.**

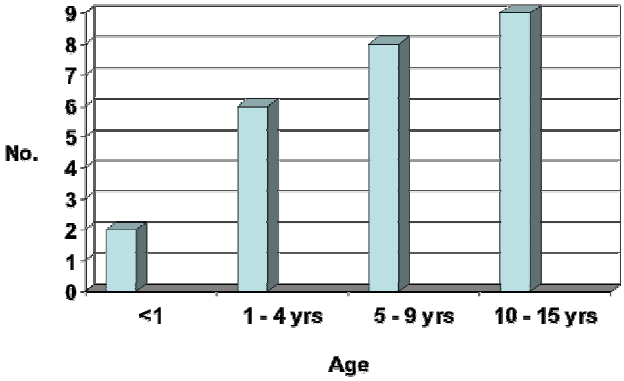

Table 3: **What Needs to be Done to Improve Paediatric Trauma Care in Nigeria.**

Develop trauma system
Develop efficient trauma registry
Designate trauma centres with appropriate facilities
Develop standards and levels of care
Adequate training of all staff
Improve funding for care and research
Conduct effective research to generate data and evaluate care
Develop appropriate preventive and control measures

DISCUSSION

In most developing countries, there are several barriers to providing efficient care to the injured. [8] In our experience with abdominal trauma, we have identified several problems and challenges (table 2). Trauma systems have helped a great deal in the organization and modernization of trauma care in developed countries, resulting in reduction of morbidity and mortality in children. [4] Such systems do not exist in this country and the care of injured children is poorly organized. There is no pre-hospital care, and the referral system and communication between hospitals is poor. [8] As there are only a few paediatric surgeons, [9] it means that a large majority of injured children are treated by those with little or no training in the care of injured children. Due to the lack of organized trauma system, written standards of care to guide those managing these children are not available. There is no uniformity in care and comparison of results is hardly possible.Trauma registries have also helped in the organization of trauma care in developed countries. In Nigeria, registries, if they exist at all are rudimentary. Most available information and data are hospital based, and even in the hospitals, information and data is often incomplete. Moreover, only patients who survive to reach hospital and those who seek hospital care are captured by such hospital-based records. Population-based information is therefore not available to ascertain the overall burden of trauma.

Planning of appropriate prevention and control programmes is difficult as a result, and policy makers remain unconvinced that trauma is an important health problem in children. In our centre, as in other centres in Nigeria, [10, 11] appropriate imaging modalities such as CT scan are not readily available. Ultrasound facilities are frequently available only during normal working hours. This means that virtually every child with blunt abdominal trauma is subjected to laparotomy, [10] and unnecessary laparotomy rate is high (51% in our experience) as in another report from Kenya. [12] This is despite the high success rate of non-operative management of blunt abdominal trauma in children.

In our experience, there is little or no funding for research. Any research work on trauma in children has to be funded out-of-pocket. This greatly limits the development and evaluation of appropriate measures relevant to this environment. Developing an appropriate and adequate paediatric trauma database is also problematic. In order to improve the management of abdominal trauma and care of the injured child in Nigeria, the issues raised above need to be addressed appropriately (Table 3). As paediatric and trauma surgeons, we need to generate the data necessary to draw attention to the problems. We need to develop management protocols based on our experiences and peculiarities, to guide the care of these children. It is our responsibility to raise awareness about the problems and challenges of paediatric trauma care among our surgical and medical colleagues, as well as policy makers, so as to generate the necessary support to address these issues. Finally, the ultimate goal should be geared towards developing appropriate preventive and control measures, which need to be continuously monitored and reviewed to ensure efficiency.

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