Case Report

Blunt Abdominal Trauma in Children: A Two Years Experience at Pediatric Surgery Centre in A Developing Country National Centre for Pediatric Surgery – Sudan From March 2014 – Feb 2016

Zulikha Ali Osman Alzain1[1]. Dr : Fasial Abdel Galil Nugud[2]

1. Dr. Zulikha Ali Osman Alzain, Sudan Medical Specialization Board, Department of General surgery, Faculty of Medicine, University of Gezira 2011.
2. Dr : Fasial Abdel Galil Nugud, associated professor, Department of General surgery, Faculty of Medicine, University of Gezira

Correspondence:
Dr. Zulikha Ali Osman Alzain, zulikhaali2019@gmial.com

Abstract:

Background: Blunt abdominal trauma in pediatric is a common problem and is a cause of morbidity and mortality. The objectives of this work was to study blunt abdominal trauma, the most affected age group and gender, mode of trauma, common presentations most diagnostic tools, options of management and final outcome.

Patients and Methods: This was retrospective and prospective descriptive hospital based study, conducted over 2 years (March 2014 – Feb 2016) in Gezira National Center for Pediatric Surgery. It was a total coverage sampling. including Fifty patients who were studied. Data was collected using a questionnaire (demographic data, age group, gender, residence, mode of trauma, time lapse between trauma and hospital arrival, common presentation, associated injury, diagnostic tools, initial management, the treatment option, duration of hospital stay and final outcome.

Results: The most affected age group were 6 -10 years (52%), (11-15) years 22%; to less than 5 years 26%. Males 70% and females 30%. Mode of trauma; RTA 32%, non-intentional 48%, intentional 20%). Time lapse between trauma and arrival (4-8 hours 36%, less than 4 hours 28%, 8-12 hours 8% more than 12 hours 28%. Presentation; abdominal pain, abdominal distention+ others 26%),

(abdominal pain + abdominal distention 22%), (abdominal pain, abdominal distention+ pallor 14%), (abdominal pain + abdominal distention+ pallor + laceration 12%), (all mentioned 18%). Associated injuries (isolated abdominal injury 38%, chest trauma 34%, head trauma12%, lower limb 10%), The diagnostic tools; (Clinical diagnosis 40%, Clinical diagnosis and FAST scan 36%, Clinical diagnosis and others (x ray -CT) 24%). The treatment option, (Conservative 56 %, Surgical intervention 40%, Surgery after failure of conservation 4%). The intra-operative findings splenic injury 20%, small bowel injuries 8%. The duration of hospital stay, (1week 12%,1– 2 weeks 40%, more than 2 weeks 48%). Final outcome cured 78%, death 12%.

Conclusion: Blunt abdominal trauma in pediatric is common problem(90%) and (10% penetrating) and is a cause of mortality (12%). It was mainly due to non-intentional trauma (48%). The most affected age group 6 -10 years (52%), males (70%) females (30%), no specific presentation, diagnosis by Clinical, FAST, CT, and others. Managed mainly conservative.

Keywords: Blunt Abdominal Trauma, Children , GNCPS

Introduction:

Trauma is the leading cause of morbidity and mortality in the pediatric population. The abdomen is the third most commonly injured anatomic region in children, after the head and the extremities. Abdominal trauma can be associated with significant morbidity and may have mortality as high as 8.5%. The abdomen is the most common site of initially unrecognized fatal injury in traumatized children.

Patients and Methods: This was retrospective and prospective descriptive hospital based study, conducted over 2 years (March 2014 – Feb 2016) in Gezira National Center for Pediatric Surgery. It was a total coverage sampling. including fifty patients who were studied. Data was collected using a questionnaire (demographic data, age group, gender, residence, mode of trauma, time lapse between trauma and hospital arrival, common presentation, associated injury, diagnostic tools, initial management, the treatment option, duration of hospital stay and final outcome.

Results:

The most affected age groups were 6 -10 years were 26 cases (52%), <5 years were 13 cases (26%), 11- 15 year were 11 cases (22%) shown in table (1). Male were 35 cases (70%), Female 15 (30%) shown in table (2). The residence, Rural was 27 cases (54%), and Urban 23 (46%). The mood of Trauma was Road traffic accident 16 cases (32%), no intentional was 24 cases (48%), intentional was 10 cases (20%) shown in table (4). Time lapse between Trauma and hospital arrival less than 4 hours were 14 (28%), and 4 -8 hours were 18 (36%), 8- 12 hours were 4 cases (8%), more than 12 hours were 14 (28%). Presentation was 11 cases presented with Abdominal pain and abdominal distension (22%), 7 cases presented with Pallor, abdominal pain and abdominal distension (14%), 6 cases presented with Pallor, abdominal pain, abdominal distension and anterior abdominal wall laceration (12%), 4 cases presented with Pallor and abdominal pain (8%), 13 cases presented with Abdominal pain, abdominal distension and other (26%), Al l mentioned 9 cases (18%). The Associated injuries was 6 cases with head trauma (12%), Chest Trauma was 17 cases (34%), Upper limb trauma 3 cases (6%), Lower limb trauma 5 cases (10%), isolated abdominal trauma 19 cases (38%) and no association with Cervical trauma (0%) shown in table (7)

The diagnostic tools were Clinical diagnosis 20 cases (40%), Clinical diagnosis and FAST scan 18 cases (36%), Clinical diagnosis and others (x ray-CT) 12 cases (24%). The initial management, NPO, IV fluid, Blood transfusion and IV antibiotics were 8 cases (16%), NPO, IV fluid, IV antibiotics and Urinary catheter were 10 cases (20%), NPO, Iv fluid and Iv antibiotics 20 cases (40%), NPO, IV fluid, Blood transfusion, IV antibiotics NG tube and suction and urinary catheter were 8 cases (16%), NPO, IV fluid, IV antibiotics, NG tube and suction and urinary catheter were 4 cases (8%). The treatment options, conservative in 28 cases (56%), Surgical intervention in 20 cases (40%), Surgery after failure of conservation in 2 cases (4%) shown in table (10). The intra operative findings were small bowel injury in 4 cases (8%), splenic injury in 10 cases (20%), liver injury 2 cases (4%), small bowel injury, large bowel injury and liver injury 2 cases (4%), small bowel injury and splenic injury 4 cases (8%), Non-surgical 28 cases (56%) as shown in table (11). The duration of hospital stay was 1 week 6 cases (12%), 1-2 week were 20 cases (40%), more than 2 weeks was 24 (48%). The final outcome was cured 39 cases (78%), re-exploration in 4 cases (8%), postoperative complications were 1 (2%), death in 6 cases (12%) shown in table (13).

Table (1): Distribution of patients by age(no=50)

	Frequency	**Percent**
< 5 year	13	26%
6 – 10 year	26	52%
11- 15 year	11	22%
Total	50	100%

Table (2): Distribution of patients by sex(no=50)

	Frequency	**Percent**
Male	35	70%
Female	15	30%
Total	50	100%

Table (4): Distribution of patients by The mood of trauma(no=50)

	Frequency	**Percent**
Road traffic accident	16	32%
Non - intentional	24	48%
Intentional	10	20%
Others	0	0%
Total	50	100%

Table (7): Associated injuries

	Frequency	**Percent**
Head trauma	6	12%
Cervical trauma	0	0%
Chest Trauma	17	34%
Upper limb trauma	3	6%
Lower limb trauma	5	10%
Isolated Abdominal trauma	19	38%
Total 50 100%		

Table (10): The treatments options

	Frequency	Percent
Conservative	28	56%
Surgical intervention	20	40%
Surgery after failure of conservation	2	4%
Total	50	100%

Table (11): The intra-operative findings(n=22)

	Frequency	Percent
Small bowel injury	4	8%
Splenic injury	10	20%
Liver injury	2	4%
Small bowel injury, large bowel injury and liver injury	2	4%
Small bowel injury and splenic injury	4	8%
Non-surgical	28	56%
Total	50	100%

Table (13): Final outcome

	Frequency	Percent
Cured	39	78%
Re-exploration	4	8%
Postoperative complication	1	2%
Death	6	12%
Total	50	100%

Discussion:

Pediatric injuries are the major causes of mortality and disability worldwide and account for a significant burden on countries with limited resources[1] . About 5 million children die from trauma each year [2]. Blunt abdominal trauma in pediatric population is a common problem and is a cause of morbidity and mortality. This study was conducted at GNCPS included 50 cases. Gezira National Centre for Pediatric Surgery is the only single – specialty pediatric surgery hospital in Sudan . The location of the centre at the confluence of high ways connecting different parts of Sudan offers it the unique feature of seeing patients from different and distant locations. In this study about three quarters of BAT patients were in the age group between six and fifteen years and over two thirds of them were males and 54% of the 50 patients were from rural locations. These results support the finding reported elsewhere[5-6]. Male gender at this age group is particularly vulnerable to trauma for a variety of reasons. Sudan is known to have witnessed civil wars and conflicts that resulted in significant displacement and resettlement in the outskirts of big cities .

This resulted in child labor , child abuse, violence , crime and child neglect . Urbanization in the face of poor indoor and outdoor safety measures risks children and makes them vulnerable to trauma . All these factors are certainly reshaping the epidemiology of pediatric trauma in Sudan. Childhood injuries arise from a large range of mechanisms involving both unintentional (motor vehicle injury, falls, burns, sport injury, animal-related injury, drowning) as well as intentional injuries because of wars and civil conflicts, suicide, child abuse and neglect, and crime and violence. In West Africa, pediatric trauma is the leading cause (47%) of childhood hospital admissions.

In this study the mode of trauma was found to be accidental in 80% and intentional in 20% of cases . RTA was responsible for 32% of BAT cases in this series. Within the subset of MVC, death rates begin to climb steeply in children 13 years of age and beyond. MVC mortality statistics demonstrate that the youngest occupant in the vehicle is the most vulnerable to injury. Within the school-age group of 5 to 9 years old, pedestrian injuries and bicycle crashes predominate**.** In recent times, intentional injuries have become a significant cause of childhood trauma in Africa because of increasing civil conflicts and wars as seen in many hot spots across the continent. The effects of war on children are

disastrous and include severe negative effects on general pediatric health status [17]. Most of Africa, especially sub-Saharan Africa, still lacks organized trauma care units, even with basic amenities for the care of pediatric surgical cases, and there is low patronage of health facilities by the victims. Abdominal injuries continue to represent diagnostic and surgical problems in children and constitute a challenge to the managing surgeon's ability to make an early diagnosis and provide appropriate care in the absence of ancillary diagnostic facilities. Signs and symptoms of abdominal injuries (Table 6) in children include tachypnea from impaired diaphragmatic excursion, abdominal tenderness, ecchymosis, and signs of shock. Abdominal distension is a common nonspecific later finding, often the result of air swallowing subsequent to a painful event. Children with hepatic and splenic injuries may have trouble localizing their pain. Thus, any abdominal tenderness on examination should prompt evaluation of the abdomen. Vomiting is usually a late sign or one associated with 8 duodenal hematoma or traumatic pancreatitis. Signs of small bowel injury may be delayed and only noted clinically with serial examinations. Pelvic bone stability and a rectal examination looking for signs of urethral injury (rare) in boys or blood in the stool (both girls and boys) needs to be performed in all cases of serious trauma. Proper physical examination yielded the need for surgical exploration in 40 % in this series , however organ specific injuries could only be achieved with FAST and CT scans . The FAST examination is performed immediately after the primary survey of the ATLS protocol. Ultrasound is the ideal initial imaging modality because it can be performed simultaneously with other resuscitative measures, providing vital information without the time delay frequently encountered with radiographs or CT. The FAST examination has essentially replaced diagnostic peritoneal lavage (DPL) in the algorithm of investigation of abdominal trauma for free fluid because it is noninvasive, is easily repeatable, and does not interfere with future imaging. Computed tomography continues to be the gold standard for imaging in blunt abdominal trauma. Although CT scanning provides excellent and detailed evaluation of solid organs, it often requires transportation of the patient to a less monitored setting and may require sedation and injection of intravenous contrast. From a payer perspective and in the context of increased use of non-operative management in children compared with adults, CT is more expensive and less cost-effective than ultrasound and this explains the limited use of CT in our series. In this study 56% children with BAT were managed successfully. The remainder

needed surgical exploration and the findings are shown in table 11. Children frequently have multisystem trauma because of their small size, increase force per body area ,decrease fat layer and organs lie in closer proximity. Table (7) shows the associated injuries. The considerable management was:nothing per mouth (NPO), IV fluid, IV antibiotics and urinary catheter 20%), (NPO, Iv fluid and Iv 9 antibiotics 40%), (NPO, IV fluid, Blood transfusion, IV antibiotics NG tube and suction and urinary catheter 16%),(NPO, IV fluid, IV antibiotics, naso-gastric (NG) tube and suction and urinary catheter 8%) this mean conservative management is effective.

The treatment options, Conservative56 %, Surgical intervention 40%, Surgery after failure of conservation4%. These results support the findings reported elsewhere[7-8]. The intraoperative findings: splenic injury 20%, small bowel injuries 8%, this mean that solid organ injury is commonest and this agrees with international and local studies [10-11]. Duration of hospital stay: 1 week 12%, 1–2 weeks 40%, more than 2 weeks 48%, this means prolonged hospital stay. Final outcome: cured 78%, death 12%, this agrees with international studies that they found mortality about 9%[16-17].

References:

1. APLS: The Pediatric Emergency Medicine Resource. January 25, 2005 | ISBN-10: 0763733164 | ISBN-13: 978-0763733162 | Edition: 4th

2. Centraal Bureau voor de Statistiek, Den Haag/Heerlen 22-1-2011.

3. Larimer EL, Fallow SC, Westfall J, et al. The importance of surgeon involvement in the evalua- tion of non-accidental trauma patients. J Ped Surg 2013: 48: 1357-62

4. Lane WG, Lotwin I, Dubowitz H, et al. Outcomes for children hospitalized with abusive versus noninflicted abdominal trauma. Pediatrics 2001; 127: e1400-5

5. ATLS; student course manual, American College of Surgeons, ninth edition, 2012

6. Yen K, Kuppermann N, Lillis K, et al. Interobserver agreement in the clinical assessment of children with blunt abdominal trauma. Acad Emerg Med 2013; 20: 426-32 10

7. Cullen PM. Pediatric trauma. Contin Educ Anaesth Crit Care Pain 2012;157-161.

8. Karam O, Sanchez O, Chardot C, La Scala G. Blunt abdominal trauma in children: a score to predict the absence of organ injury. J Pediatr. 2009;912-7.

9. Holmes JF, Lillis K, Monroe D et al. Identifying children at very low risk of clinically important blunt abdominal injuries. Ann Emerg Med. 2013 ; 62; 107-16

10. Dehmer JJ, Adamson WT. Massive transfusion and blood product use in the pediatric trauma patient. Semin Pediatr Surg. 2010; 19: 286-91.

11. Stylianos S. Evidence-based guidelines for resource utilization in children with isolated spleen or liver injury.J Pediatr Surg. 2000; 35: 164-7.

12. Nellensteijn DR, ten Duis HJ, Oldenziel J, Polak WG, Hulscher JBF. Only moderate intra- and inter-observer agreement between radiologists and surgeons wshen grading blunt paediatric hepatic injury on CT scan. Eur J Pediatr Surg. 2009; 19: 392-4
13. Plato,The allegory of the cave, Republic, VII 514 a, 2 to 517 a, 7
14. Holscher CM, Faulk LW, Moore EE, et al. Chest computed tomography imaging for blunt pediatric trauma: not worth the radiation risk. J Surg Res. 2013; 184: 352−7.