

Conservative Management of Blunt Abdominal Trauma in Paediatric Population – An Experience in Interior Sindh

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ABSTRACT

Objective: To evaluate the management of blunt intra-abdominal trauma in the paediatric population
Methodology: Between May 2019 and May 2020, a 12-month prospective observational study was conducted in the departments of Paediatric Surgery at Ghulam Muhammad Mahar Medical College, Sukkur and Shaheed Mohtarma Benazir Bhutto Medical University, Larkana. All children under the age of 18 years presenting with blunt abdominal trauma at our set up, irrespective of the cause of injury, were included in the study. Those who presented with polytrauma, hollow viscus injury, and older than 18 years were not included in the study.

Results: A total of 1,459 patients with trauma presented out of whom 90 (6.1%) were diagnosed with abdominal trauma. The majority of the patients were male i.e. 70 (77.77%). The mortality rate was 10%. Spleen was the most frequently wounded organ in 50 (55.5%) patients followed by liver injury in 30 (33.3%) patients and trauma to the kidney in 10 cases (11.1%). It was found that the higher the grade or more severe the organ injury, the poorer the prognosis of the patient. Fluid resuscitation or blood transfusion were necessary in the majority of patients with grade IV and V organ damage. Similarly, mortality rate was higher in patients with grade III, IV, and V injuries.

Conclusion: Satisfactory results were achieved in the paediatric population managed conservatively for blunt abdominal trauma. Further studies need to be conducted in order to determine the management in Grade V injuries.

Key Words: Abdominal trauma, Blunt trauma, Paediatric population, Splenic injury

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INTRODUCTION

Trauma is among the main causes of death among children aged one to eighteen. Every year, over 20,000 children die as a result of injuries, with another 120,000 becoming permanently crippled^{1,2}. Ninety percent of childhood injuries are caused by blunt trauma, with falls and motor vehicle accidents being the most common mechanisms of harm³. Children are more

likely to develop injuries to intra-abdominal organs after blunt abdominal trauma because of their body habit and undeveloped musculoskeletal system. The intra-abdominal organs of a child are proportionally larger than those of an adult patient and are located in close proximity to one another. Because of a child's small size, he or she is subjected to more force per unit of body surface area, which can cause serious injury to many organs⁴. Trauma has been a leading cause of death in both the developing and developed countries¹. A study conducted in Japan reported a prevalence for 52% and 47% of all traumas in the <1 year and 1≤5 years age groups respectively³.

Because these injuries can be life-threatening, they require a methodical strategy for identifying and treating them⁵. Abdominal trauma caused by motor vehicle collisions (MVCs), falls, sports-related injuries, or other causes can result in significant mortality due to solid organ or hollow viscus injury^{5,6}. Despite the fact that abdominal trauma happens often in children, there

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is still debate on the best treatment technique. In most cases, blunt abdominal trauma in children is treated conservatively⁷. Perforation of the gastrointestinal tract as a result of acute abdominal trauma is rather infrequent. However, perforation can occur in some cases, and a delay in detection can increase morbidity and mortality. Early detection is challenging because clinical, biochemical, and radiographic indications of intestinal perforation in a polytrauma patient might be deceiving⁸.

Previously, blunt trauma was followed by laparotomy however, with the use of advanced imaging techniques which confirm the exact location and severity of the abdominal injuries, the rate of exploratory laparotomy has been significantly reduced^{9,10}. The aim of this study was to assess the local statistics of blunt abdominal trauma among paediatrics population. In addition, this study was also helpful in audit of conservative management in our setup among patients presenting with blunt abdominal trauma.

METHODOLOGY

Between May 2019 and May 2020, a 12-month prospective observational study was conducted in the departments of paediatric surgery at Ghulam Muhammad Mahar Medical College, Sukkur and Shaheed Mohtarma Benazir Bhutto Medical University, Larkana. All children under the age of 18 years presenting with blunt abdominal trauma at our set up, irrespective of the cause of injury were included in the study after taking informed consent from participants. Ethical approval was obtained from the Institutional Review Board (IRB No. PS/CMCH/42). Those who presented with polytrauma, hollow viscus injury, and were older than 18 years were excluded from the study. All patients who presented to the set up with suspected abdominal injury were examined properly. Short clinical history was obtained from the guardians. Cause of abdominal trauma was documented. Diagnosis of intra-abdominal injuries was based on the findings of CT scan which is considered as the gold standard. All vitally stable patients were managed conservatively. Patients were kept nil per oral till further orders. Laboratory investigations were immediately sent. Abdominal Ultrasounds and CT scans were advised for all patients. Patients who were vitally unstable i.e. had low systolic blood pressure, were immediately resuscitated with normal saline and blood transfusions. All patients were monitored for 48 hours and then, if vitally stable, were discharged. Follow-up with the patients was maintained in the outpatient’s department. Data was analyzed using Statistical Software for Social Sciences (SPSS) software version 26. For continuous variables, mean with standard deviation (Mean±SD)

was determined while categorical variables including the gender, mode of injury, organs injured, were presented using frequency and percentages.

RESULTS

A total of 1459 trauma patients were seen, with 90 (6.1%) of them being diagnosed with abdominal trauma. The majority of the patients were male i.e. 70 (77.77%) while only 20 (22.22%) were female patient. Out of the 90 patients with blunt abdominal trauma, 9 (10%) died. Patients ranged in age from 14 months to 15 years. The patients' mean age was 7.2 (4.63) years.

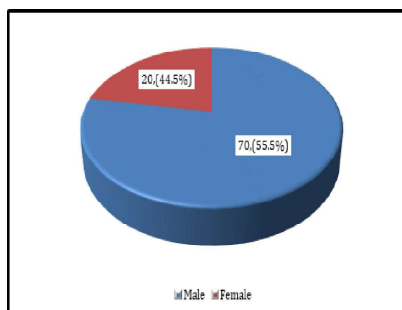


Figure 1: Gender disparity in Study Population (n=90)

The most frequently injured organ was the spleen in 50 (55.5%) patients followed by liver injury in 30 (33.3%) patients and trauma to the kidney in 10 cases (11.1%).

Upon assessing the mechanism of injuries, it was found that 65 (72.22%) children suffered the trauma from road traffic accident, 20 (22.22%) experienced a fall, while the remaining five children had a sports injuries. See Table 1.

Table 1. Demographic and Baseline Characteristics

Mean Age± SD (years)	7.2 ± 4.63
Body Mass Index (kg/m ²)	25.32 ± 6.4
Mean Haemoglobin ± SD (g/dL)	12.9 ± 2.4 (4.1-15.7)
Mean Platelet Count (10 ³ /lL)	257.4 ± 85.6 (125-450)
Systolic Blood Pressure (mmHg)	94.2 ± 14.3
Diastolic Blood Pressure (mmHg)	67.3 ± 7.9
Mechanism of Injury	
Road Traffic Accident (RTA)	65 (72.22%)
Fall	20 (22.22%)
Sports injuries	5 (5.55%)
Injury localization	
Spleen	50 (55.5%)
Liver	30 (33.3%)
Kidney	10 (11.1%)

It was found that the higher the grade or more severe the organ injury, the poorer the prognosis of the patient. Fluid resuscitation or blood transfusion were necessary in the majority of patients with grade IV and V organ damage. Similarly, mortality rate was higher in patients with grade III, IV, and V injuries. See Table 2.

were the most commonly injured organs in the paediatric population. This finding was in accordance with the previously published data on the subject. Wan et al., reported that the most frequent organs injured as a result of sports injuries in the adolescent population were kidney, spleen, and liver¹⁷.

Table 2. Treatment and Management with Final Outcomes of Patients According to Severity of The Solid Organ Injury

Injury Localization and Injury Severity/Grade	Blood transfusion or Fluid Resuscitation n (%)	Ventilator support n (%)	Conservative treatment n (%)	Surgical Management n (%)	ICU hospitalization n (%)	Mortality n (%)
Spleen	-	-	10 (100)	-	-	-
Grade II			25 (100)	-	-	1 (4)
Grade III			-	-	5 (33.3)	4 (26.6)
Grade IV	15 (100)					
Liver			20 (100)	-	-	-
Grade III	-	-	-	3 (30)	3 (30)	2 (20)
Grade IV	10 (100)	-				
Kidney	5 (100)	-	-	3 (60)	3 (60)	1 (20)
Grade IV	5 (100)	-	-	4 (80)	5 (100)	2 (40)
Grade V						

DISCUSSION

We reported 90 (6.1%) cases with blunt trauma injury in the paediatric population. The majority were male children. Road traffic accidents were the most common cause of injury, followed by falls. These findings were comparable to previously published literature^{11,12}. Literature shows that the paediatric population is at higher risk of attaining intra-abdominal injuries because of lesser subcutaneous fat and around the viscera, smaller body sizes, and comparatively immature musculoskeletal system⁶.

According to recent findings conducted by Valentino M, et al and Garvey EM, et al, physical examination and laboratory studies, in addition to computed tomography and focused assessment with sonography for trauma (FAST), remain the most valuable diagnostic modalities in patients presenting with abdominal trauma^{13,14}. Raised liver enzymes aid in the evaluation of occult abdominal organ injuries in the paediatric population. It is recommended that patients with suspected abdominal trauma who are vitally stable at presentation should be admitted with subsequent abdominal imaging and examination^{15,16}. In our study, patients with suspected injury to abdomen were monitored for 48 hours, their vitals were regularly monitored, and abdomen was comprehensively examined multiple times to look for tenderness and other signs of trauma. Furthermore, the current study found that the spleen followed by liver, and kidney

Sjoval and Hirsch have reported that conservative management in patients with suspected abdominal injury may lead to complications later on in the clinical course¹⁸. There is a risk of rebleeding or misdiagnosis in case of non-operative management. In our study, the majority of the patients were managed conservatively. Only Grade III and Grade IV required operative management in certain cases. Patient follow-up was uneventful in the present study.

In short, all patients with a history of blunt trauma must be comprehensively examined at regular intervals to detect any abdominal tenderness. Vital monitoring and laboratory investigations must be sent if concern is for internal injuries. Patients follow up should be vigilantly done to prevent worsening clinical course of trauma in the paediatric population.

CONCLUSION

Conservative therapy of solid organ damage in blunt abdominal trauma yielded satisfactory results. However, patient follow up must be thorough. Grade III and IV solid organ injuries secondary to blunt abdominal trauma can be managed conservatively and most common injured organ is the spleen. Lastly, relatively low number of sample population was involved taken from a single hospital, which can limit the conclusiveness of our results.

Authors' contribution: IM, NAS, NBN and SS worked on introduction, methodology, proof reading and data collection and statistical analysis. IM, ZB, and SS worked on discussion.

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