

Penetrating Trauma in Children, Our Experience

Muhammad Ramzan¹, Abid Hameed Sheikh¹, Sofia Mustafa¹, Faseeh Abid² and
Muhammad Zubair¹

ABSTRACT

Objective: To study the characteristics of patients, management, and outcomes of penetrating thoracic and abdominal trauma in children.

Study Design: Descriptive case series study.

Place and Duration of Study: This study was conducted at the Paediatric Surgery Department Bahawal Victoria Hospital Bahawalpur, from April 2016 to April 2020.

Materials and Methods: A total of 93 patients with penetrating to abdomen and thorax were admitted in pediatric surgery department from April 2016 to April 2020. These patients were evaluated with reference to patient's biodata, their clinical presentation, mode of trauma, management and their outcome.

Results: Out of 93 patients admitted to pediatric surgery department with penetrating thoraco abdominal trauma 37 were due to fall from height especially from trees, 27 due to road traffic accidents, 13 because of stabbing and 16 due to firearm injuries. The mean age was 9.73 ± 4.31 [1–16] years. sixty-four were wounded in abdomen, 19 in thorax and 10 in both the abdomen and thorax. Fifty-six patients underwent some sort of surgical intervention and remaining 37 patients were conservatively managed. The hospital stay on a mean was 2.47 ± 3.13 days for pts managed conservatively and 7.37 ± 11.43 days for pts with surgical intervention.

Conclusion: The penetrating trauma to abdomen and thorax significantly differ in incidence being more in abdomen. surgical management is the main management option though; conservative may be the other option but with vigilant monitoring. Along with development of management strategies, emphasis on prevention of trauma must be considered.

Key Words: penetrating injury, abdomen, thorax

Citation of article: Ramzan M, Sheikh AH, Mustafa S, Abid F, Zubair M. Penetrating Trauma in Children, Our Experience. Med Forum 2020;31(9):5-8.

INTRODUCTION

Trauma is considered the major cause of pediatric morbidity, and mortality¹. The majority (80-90%) of injuries in pediatric patients are because of blunt trauma whereas penetrating injuries are (10 – 20%) very less^{2,3}. However, the penetrating injuries result in increased mortality as compared to blunt trauma among all ages⁴. Recently, the incidence of penetrating trauma is increasing among all age groups and children⁵. As the children has thin body wall and smaller size the injuries to internal organs are more serious³. The penetrating injuries to abdomen are more frequent as compared to

thorax but the mortality is more in thoracic trauma^{6,1}. The assessment and managing a penetrating trauma is challenging and it needs rapid action in assessing and doing some intervention².

Penetrating injury may be defined as, an injury caused by physical trauma to the skin and tissues by a foreign object like gun, knife or some sharp object by mechanical penetration^{3,5,6,7}. Penetrating injury to abdomen may involve some breach in peritoneal cavity, like gunshot and stabbing wounds and fall from height and road traffic accidents⁸.

As with the rest of the world, possession of guns and stabbing objects by children is also increasing in Pakistan⁸. A poor socioeconomic status, lack of education, exposure to the exaggerated media, and the increased availability of these objects (motor vehicles especially motor bikes to children) may be the reason for increased number of penetrating injuries⁵.

MATERIALS AND METHODS

After taking approval from hospital ethical committee all the patients with penetrating injuries to abdomen and thorax admitted to pediatric surgery departments were included in the study. Patients with poly trauma and blunt trauma abdomen/thorax were excluded. All patients (both male and female) with age upto 16 years

¹. Department of Paediatric Surgery, Quaid-e-Azam Medical College Bahawalpur.

². Bahawal Victoria Hospital Bahawalpur.

Correspondence: Muhammad Ramzan, Assistant Professor of Paediatric Surgery, Quaid-e-Azam Medical College Bahawalpur.

Contact No: 0321-0801203

Email: mramzanbhutta@gmail.com

Received: June, 2020

Accepted: August, 2020

Printed: September, 2020

were included in study. A total of 93 patients met the criteria between April 2016 to April 2020. all the record of patients, mode of trauma, investigations and management plan (conservative / surgical exploration), duration of hospital stay and outcome were noted. After resuscitation and initial management, patients were immediately evaluated by radiological department for X-ray abdomen (supine/ erect), FAST (focused abdominal sonography for Trauma), x-ray chest antero posterior and lateral view and abdomen / thoracic computed tomography (CT) scan as needed.

Data regarding findings of physical examination, blood tests, and/or results of radiologic study were obtained. If the patient had only superficial injury, means, did not breach peritoneum and pleura, they were managed by wound care and wound closure. Rest of the patients were prepared for exploration .in cases of abdominal trauma exploratory laprotmy was performed. Whereas in thoracic trauma initial tube thoracostomy performed for pneumothorax/ hemothorax/hemopneumothorax. Formal thoracotomy was reserved for ongoing blood loss in thoracostomy tube. findings of visceral injuries i.e. liver, spleen pancrease, mesentry bowel (small/large) and stomach were noted and recorded. All patients were monitored post operatively for outcome and duration of hospital stay. Statistical analysis was done by using SPSS version 11.5 software. Analysis done regarding injurries type, demographic characteristics i.e. age of patients and gender, clinical presentations of patients, their management and outcome the expression of data was as mean \pm SD with a confidence interval of 95%. Further analysis done by using t test, Chi square test. P value of \leq 0.05 considered to be significant.

RESULTS

Data of 93 patients was analyzed. The mean age of patients was 9.73 ± 4.31 [1–16] years. pts with abdominal injured have a mean age 9.98 ± 3.74 (1-16), whereas in thoracic trauma mean age was 9.58 ± 3.83 (1-16) and in both abdomino thoracic pts age was 9.87 ± 4.17 (1-16). There was no statistical difference in age group of patients. As regards the gender, male patients were 78(84%) and female were 15(16%) with a significant statistical difference. Stabbing (trauma due to knife, penetrating trauma by sharp devices and falling over some sharp object) was the reason in majority of patients i.e. 64 (69%). Twenty patients (21.9%)were due to accidental injuries i.e. road traffic accidents, and 9 (9%)patients were due to gunshot injuries (table 1). Thirty-seven (40%) patients were managed conservatively and rest 56(60%) patients underwent surgical exploration.

All the patients were investigated as complete blood count, x- ray imaging and cat scan as required among all patients. Cat scan was done in 54% patients among whole study group of thoracic injury, 65% of patients

with abdominal injury and 68% of both abdomen and thorax injury. USG imaging were done from 64 % of patients among whole study group,29% of patients with thorax trauma, 57 % of patients with trauma to abdomen, and 39 % of patients having both thoracic and abdominal trauma.

In patients of thoracic trauma, 10 were managed by tube thoracostomy only, two patients underwent thoracotomy with one having gunshot injury having bleeding, found lung parenchymal injury and 2nd due to foreign body lying inside thoracic cavity. Seven patients managed conservatively having rib fractures, minimal surgical emphysema and a patient with flail segment.



Figure No. 1: Different cases of penetrating wounds presented at the hospital with and surgical interventions

Table No.1: The characteristics of penetrating trauma in abdomen and thorax

	Abdominal	Thorax	Abdominothoracic
Gender			
Male	55	15	8
Female	9	4	2
Age (Year)	9.98 \pm 3.74(1-16)	9.58 \pm 3.83(1-16)	9.87 \pm 4.17(1-16)
Mechanism of Injury			
Accidental	13	4	3
Stabbing	44	13	7
Gunshot	7	2	0
Management			
Conservatively	27	7	3
Surgery	37	12	7
Stay at Hospital (Days)	5.33 \pm 7.74 (1-23)	3.63 \pm 4.11(1-13)	3.47 \pm 4.11(1-14)

In patients of abdominal and abdominothoracic injuries, thirty patients were managed conservatively by wound care, and vital monitoring. Forty-four patients underwent surgical exploration (Figure 1).

Stabbing (trauma due to knife, penetrating trauma by sharp devices and falling over some sharp object)

Among these 11 were having intestinal perforations with mesenteric bleed, 7 liver injuries, 4 spleens, 1 gallbladder and 1 with intraperitoneal urinary bladder injury and 1 patient with diaphragm rupture (Table 2). Nineteen patients had no visceral injuries, only hemoperitoneum and peritoneal breach.

Table No. 2: Frequency of organs affected

Organs affected	No. of Patients
Liver	7
Bowel	11
Gall bladder	1
Spleen	4
Urinary Bladder	1
Diaphragm	1
Unaffected organs	19

Table No. 3: Duration of hospital stay

	Conservative	Surgical Intervention
Duration (days)	2,47± 3.13	7.37±11.43

The mean duration of hospitalization was 4.77 ± 6.84 (1–23) days for whole study patients, 3.63 ± 4.11 (1-13) days for thoracic trauma, 5.33 ± 7.74 (1–23) days for abdominal trauma. And 3.47 ± 4.1 ¹¹⁻¹⁴ days for both abdomino thoracic trauma. There was no statistical difference in hospital stay among different groups however when compared to hospital stay among conservative and surgical intervention the findings were as under i.e. with conservative treatment $2,47 \pm 3.13$ days and surgical intervention was 7.37 ± 11.43 days which was quite significant ($P < 0.013$) table 3. the study group with operation had a longer hospitalization as compared to conservative group.

DISCUSSION

Though a lot is being done to educate masses regarding children protection from trauma, still trauma is the main cause of mortality and morbidity¹. The majority (80-90%) of injuries in pediatric patients are because of blunt trauma whereas penetrating injuries are (10 – 20 %) very less^{2,3}. with increased number of motor vehicles and heavy traffic in use the road traffic accidents has increased¹⁰.

In our study male population was more affected than female. Same is the case in a study conducted by Abri B et al¹⁰ and Bolekon ME et al i.e. the incidence due to penetrating injuries was found to be six fold greater in males than that in females¹¹. This shows that boys are more indulged in such activities like violence and other

such activities resulting in injuries. Most of the fatal cases are due to children, mainly males, below 16 years of age⁷.

Penetrating abdomen / thorax trauma is commonly seen among teenagers and adolescent and is mostly intentional (e.g., gunshot /knife wounds)^{1,2}. In our study it is a bit different which show stabbing due to fall from height and accidental trauma are more common (> 70 %). While bowel was most often traumatised in our study, Abri et al. reported liver, and spleen were injured more often⁷ bryan A Cotton et all in his study noted the bowel affected the most followed by liver and spleen¹². Ct scan was done in most of the patients in our study to find the solid organ injury. Similarly, Bryan A Cotton stated in his study that CT scan was advised the most often for evaluation of wounds in the hepatic region to decide about exploration². Forty percent of patients in our study was managed conservatively. Similarly, a study conducted showed successful management by conservative approach in thoracic and abdominal trauma in majority of patients^{12,13}. The hospital stay was very less in conservative approach as compared to surgical intervention with significant p-value in our study. This approach was in accordance with another study showing shorter hospital stay^{2,12}.

CONCLUSION

The penetrating trauma to abdomen and thorax significantly differ in incidence being more in abdomen. surgical management is the main management option though; conservative may be the other option but with vigilant monitoring. Alongwith development of management strategies, emphasis on prevention of trauma must be considered.

Author's Contribution:

Concept & Design of Study:	Muhammad Ramzan
Drafting:	Abid Hameed Sheikh, Sofia Mustafa
Data Analysis:	Faseeh Abid, Muhammad Zubair
Revisiting Critically:	Muhammad Ramzan, Abid Hameed Sheikh
Final Approval of version:	Muhammad Ramzan

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Wessen DE, Stylianos S, Pearl RH. Thoracic injuries, abdominal trauma. Pediatric Surgery., Philadelphia, Pennsylvania. Mosby Inc 2006;6:275.
2. Cotton BA, Nance ML. Penetrating trauma in children. In Seminars in pediatric surgery. 13th ed. WB Saunders; 2004.p. 87-97.
3. Sandler G, Leishman S, Branson H, Buchan C, Holland AJ. Body wall thickness in adults and

- children—Relevance to penetrating trauma. *Injury* 2010;41(5):506-9.
4. Ottochian M, Salim A, DuBose J, Teixeira PG, Chan LS, Margulies DR. Does age matter? The relationship between age and mortality in penetrating trauma. *Injury* 2009;40(4):354-7.
 5. Schechter SC, Betts J, Schechter WP, Victorino GP. Pediatric penetrating trauma: the epidemic continues. *J Trauma and Acute Care Surg* 2012;73(3):721-5.
 6. Adorasio O, Elia A, Pinzauti E, Pancani S, Mirabile L, Lenares E, Danti DA. The importance of a multidisciplinary approach in a child with major abdominal penetrating trauma. *Pediatr Emerg Care* 2008;24(1):34-6.
 7. Moore K. The knife and gun club just adjourned: managing penetrating injuries in the emergency department. *J Emerg Nurs* 2012;38(1):102-3.
 8. Naeem BK, Perveen S, Naeem N, Ahmed T, Khan I, Khan I, Tahir M, Iqbal M. Visceral injuries in patients with blunt and penetrating abdominal trauma presenting to a tertiary care facility in Karachi, Pakistan. *Cureus* 2018;10(11).
 9. Curtis K, Caldwell E, Delprado A, Munroe B. Traumatic injury in Australia and New Zealand. *Aust Emerg Nursing J* 2012;15(1):45-54.
 10. Abri B, Vahdati SS, Paknezhad S, Alizadeh S. Blunt abdominal trauma and organ damage and its prognosis. *J Res Clin Med* 2016;4(4):228-32.
 11. Boleken ME, Cevik M, Yagiz B, Ter M, Dorterler ME, Aksoy TR. The characteristics and outcomes of penetrating thoracic and abdominal trauma among children. *Pediatr Surg Int* 2013;29(8):795-800.
 12. Melling L, Lansdale N, Mullassery D, Taylor-Robinson D, Jesudason EC. Penetrating assaults in children: often non-fatal near-miss events with opportunities for prevention in the UK. *Injury* 2012;43(12):2088-93.
 13. Morrison JJ, Clasper JC, Gibb I, Midwinter M. Management of penetrating abdominal trauma in the conflict environment: the role of computed tomography scanning. *World J Surg* 2011; 35(1):27-33.