

Blunt Chest Trauma; Differences Between Children and Adult in Menoufia University Emergency Hospital

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ABSTRACT

Background: Trauma is a leading cause of mortality globally. Thoracic trauma is a significant cause of morbidity and mortality in both children and adult.

Objective: To compare between children and adult after exposure to a blunt chest trauma according to incidence, mechanism of injury, effect of trauma on lung, pleura and ribs and in hospital mortality rate.

Patients and methods: A prospective, comparative study included patients with blunt chest trauma attending to the Emergency Department, Menoufia University during the period from November 2019 to April 2020.

Results: The outcomes of the study were in the form of incidence, mechanisms of injury, effect of trauma on lung, pleura and ribs and hospital mortality rate in adult and children. There was difference in incidence in studied groups as adult has higher incidence, according to mechanism of injury, motor traffic accident was the main cause of trauma in both groups. Pulmonary contusion was the most common chest injury in both groups but more in children (71%) than in adult (66.7%), chest wall fracture was more in adult (33.3%) than in children (7.1%) and pneumothorax was more in adult (27.3%) than in children (7.1%) exactly as hemothorax. Mortality was observed mainly in adult group (36.4%), while it was (21.4%) in pediatric group.

Conclusion: There were differences between children and adult exposed to blunt chest trauma in incidence, effect of trauma on lung, pleura and ribs, and in mortality

Keywords: Chest trauma, Emergency department, Outcomes, Blunt, Adult, Children.

INTRODUCTION

Trauma is a leading cause of mortality globally; chest traumas account for 10% to 15% of all traumas and are the cause of death in 25% of all fatalities resulting from trauma⁽¹⁾. It's the leading cause of death from trauma after head and spinal cord injury⁽²⁾. Traffic related injuries present in 63% of blunt trauma patients⁽³⁾.

The aim of this study was to compare between children and adult after exposure to a blunt chest trauma according to incidence, mechanism of injury, effect of trauma on lung, pleura and ribs, thoracic trauma severity score and hospital mortality rate at Emergency Department, Menoufia University.

PATIENTS AND METHODS

A prospective, comparative study that included patients with blunt chest trauma attending to the Emergency Department, Menoufia University during the period from November 2019 to April 2020.

Inclusion criteria: 1 – Blunt chest trauma. 2- Children from 1 year to 18 years old. 3- Adult above 18 years. 4- Both sex.

Exclusion criteria: 1- Penetrating trauma. 2- Need for immediate surgical or neurosurgical interventions. 3- Infant < 1 year. 4- Lack of required information. 5- Pregnancy.

All patients were examined according to advanced trauma life support guidelines with primary

survey by (ABCD) approach, laboratory tests that include arterial blood gas analysis, CBC and ABO cross-matching. Imaging studies: Upright chest x-ray film, abdominal FAST or Extended FAST. Secondary survey, which include head to toe examination and AMPLE history.

Ethical approval:

An approval of the study was obtained from Menoufia University Academic and Ethical Committee. Every patient signed an informed written consent for acceptance of the study. This work has been carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis:

Data were collected, tabulated and statistically analyzed using an IBM compatible personal computer with Statistical Package for the Social Sciences (SPSS) version 23 (SPSS Inc. Released 2015. IBM SPSS statistics for windows, version 23.0, Armonk, NY: IBM Corp.). Chi-square test (χ^2) was used to study association between qualitative variables. Student t-test: is a test of significance used for comparison between two independent groups of normally distributed quantitative variables. Mann-Whitney test



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(non-parametric test): is a test of significance used for comparison between two groups of not normally distributed quantitative variables. Significant test results were quoted as two-tailed probabilities. Significance of the obtained results was judged at the 5% level ($P > 0.05$).

RESULTS

Out of 123 patients presenting with blunt chest trauma, 81 were adult (65.9%), 42 were children (34.1%). In children suffering from blunt chest trauma, 10 (23.8%) were females, 32 (76.2%) were males. Female to male ratio was 1:3.2. The mean age was 8.9 ± 5.2 . (**P value 0,001**). On the other hand, in adult suffering from blunt chest trauma, 14 (17.3%) were females, 67 (82.7%) were males. Female to male ratio

was 1:4.8. The mean age was 42.9 ± 14.7 (**p value 0,001**). 100 % of children did not have past medical history, 18.5% of adult were suffering from chronic disease (**P value 0,003**). In children, 54.8 % of blunt chest trauma were induced by road traffic accident, 42.9% of trauma were induced by fall from height, and only 2.4% were caused by local trauma.

In adult, 71.6 % of blunt chest trauma were induced by road traffic accident, 23.5% of trauma were induced by fall from height and only 4.9% were caused by local trauma. Among 42 child patients presented with blunt chest trauma, chest injury was present in 14 patients (33.3 %), while 28 patients (66.7%) did not have chest injury. In adult, chest injury was present in 33 patients (40.7%), while 48 patients (59.3 %) did not have chest injury (tables 1 & 2 and Figure 1).

Table (1): Demographic characteristics and history of diseases and trauma of the studied groups

	Child (n= 42)		Adult (n=81)		Test of sig. (X ²)	P-value
	No	%	No	%		
Age (in years): Mean \pm SD Median Range	8.9 ± 5.2 7 2-17		42.9 ± 14.7 40 19-70		U= 9.077	> 0.001**
Sex: Female Male	10 32	23.8 76.2	14 67	17.3 82.7	0.75	0.386
Presence of past medical history: No Yes	42 0	100 0	66 15	81.5 18.5	8.86	0.003*
Mode of trauma: FFH Local RTA	18 1 23	42.9 2.4 54.8	19 4 58	23.5 4.9 71.6	5.097	0.078
Chest affection: No Yes	28 14	66.7 33.3	48 33	59.3 40.7	0.643	0.423

U: Mann-Whitney test, X²: Chi square test, **Highly significant (P-value > 0.001), *Significant (P-value > 0.05).

Table (2): Type of chest affection of the studied groups

	Child (n= 14)		Adult (n= 33)		Test of sig. (FE)	P-value
	No	%	No	%		
Lung contusion: Bilateral Unilateral Absent	3 7 4	21.4 50.0 28.6	16 6 11	48.5 18.2 33.3	X ² 5.448	0.066
Pneumothorax: Present Absent Tension	1 13 0	7.1 92.9 0	9 24 1	27.3 72.7 3	2.378	0.242
Hemothorax: Present Absent	1 13	7.1 92.9	9 24	27.3 72.7	2.378	0.242
Rib fracture: Single Multiple	1 0	7.1 0	5 4	15.2 12.1	X ² 4.722	0.094
Flail chest: Present Absent	0 14	0 100	2 31	6.1 93.9	0.886	1
Pneumatocele: Present Absent	2 12	14.3 85.7	0 33	0 100	4.924	0.084

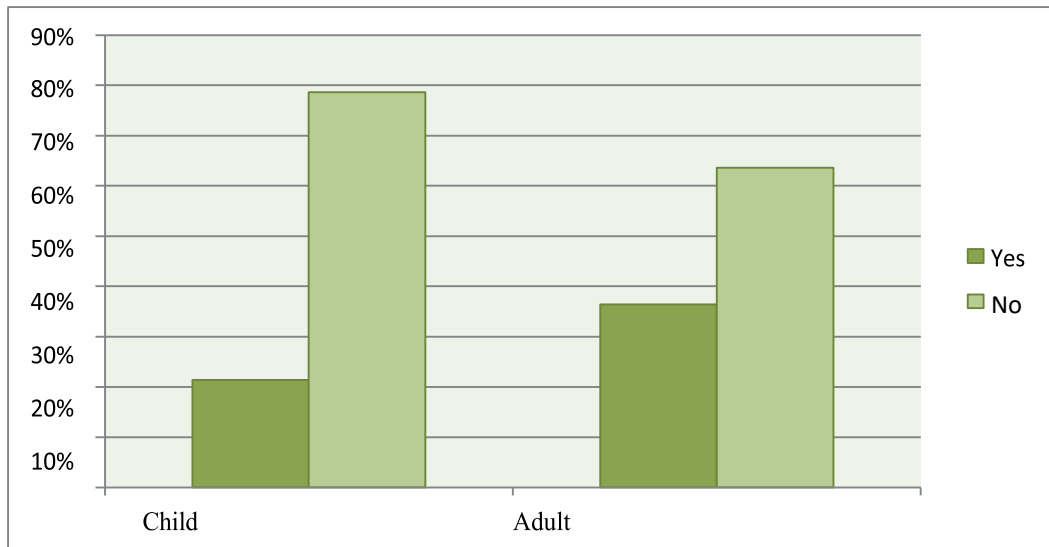


Fig. (1): Mortality of the studied groups

DISCUSSION

In the present study, out of 123 patients with blunt chest trauma, 42 (34.1%) were children while 81 (65.9%) patients were adults. This is in agreement with **Skinner et al.** ⁽⁴⁾ who studied 415 patients admitted to trauma unit, 331 (79.7%) were adults and 84 (20.2%) children aged < 18 years.

In the present study, males predominates females with either children [(32 male out of 42 patients) (76.2%) (male: female 3.2:1)]. For adults, 67 male out of 81 patient [(82.7%) (Male: female 4.8:1)]. This is in accordance with **Ekpe and Eyo** ⁽⁵⁾ who studied 149 patients with chest trauma. They were 121 males and 28 females (81.2% vs. 18.8%; male: female = 4:1).

Regarding mode of trauma in the present study, MVA (all traffic related accidents) was the most common cause of blunt chest trauma in 54.8 % of children and in 71.6 % of adult exposed to blunt chest trauma, road traffic accident was the mode of trauma. This is in accordance with **Quistberg et al.** ⁽⁶⁾ who stated that over all motor vehicle accidents is the leading cause of trauma.

In the current study, it was found that pulmonary contusion (PC) is the most frequent chest injury. Incidence of lung contusion among children with chest injury was higher than it was in adult. Lung contusion was found in 71.4% of children with chest injury and in 66.7% of adult. This is in accordance with **Mahmood et al.** ⁽⁷⁾ who stated that pulmonary contusion is the most frequent chest injury (25–80%) and **Skinner et al.** ⁽⁴⁾ stated that children suffer more lung contusions.

In the current study, it was found that there was a difference between children and adult exposed to blunt chest trauma. Regarding thoracic cage fracture and rib fracture, they were present in 11 adult patients (33.3%), 2 of them were flail chest in comparison with only one child (7.1%) with rib fracture and absence of

flail chest. This is in accordance with **Kapicibasi** ⁽⁸⁾ who stated that rib fracture and flail chest were significantly more frequent in the elderly group compared to the younger patients.

In this work, pneumothorax was in 7.1% of pediatric patients with chest affection. In addition, hemothorax and hydropneumothorax were found by the same percentage. In adult, pneumothorax was found in 27.3% of patients with chest affection, hemothorax in 27.3% of patients and hydropneumothorax was found in 9.1% of adult group. In **Hall et al.** ⁽⁹⁾ study, in 137 children with blunt thoracic injury, pneumothorax was present in 13.1% of patients and hemothorax in 18.2% of patients. Of 2,109 patients included from the trauma registry, 236 (11.2%) were diagnosed with pneumothorax. The majority of them ranged from 19 to 49 years ⁽¹⁰⁾.

In present study, children, mortality percent was 21.4 %, while adult mortality percent was 36.4 %. In **Eraslan et al.** ⁽¹¹⁾ study, mortality rate was 15.8% (6/38 case) for injured children.

Limitation: Small number of the patients, lack of information, immature recording system.

CONCLUSION

The following conclusions can be drawn from the current study:

- The incidence of blunt chest trauma was higher in adult than in children.
- The incidence of chest trauma was higher in males than in females.
- Motor vehicle accidents was the most common mode of blunt chest trauma.
- Pulmonary contusion is the most frequent chest injury.
- Pulmonary contusion is more common in children than in adult.

- Rib fracture was the second most common chest injury in adult.
- Rib fractures were more common in adult than in children.
- Pneumothorax was more common in adult than in children.
- Mortality was more in adult than in children.

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