Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/19725
DOI URL: http://dx.doi.org/10.21474/IJAR01/19725

RESEARCH ARTICLE

PREVALENCE OF PENETRATING TRAUMA IN EMERGENCY DEPARTMENT FACULTY OF MEDICINE, SUEZ CANAL UNIVERSITY HOSPITAL

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Manuscript Info

Manuscript History
Received: 24 August 2024
Final Accepted: 28 September 2024
Published: October 2024

Key words:-
Emergency Department, Polytraumatized Patients, Penetrating Trauma

Abstract

Aim of the work: To assesses the Prevalence of penetrating trauma in Emergency Department. Faculty of Medicine, Suez Canal University Hospital.

Introduction: Trauma is an injury to human tissues and organs that result from transfer of energy from environment. Injuries are caused by some form of energy that beyond body's resilience and tolerate. Trauma is the third highest cause of death in all age group in the developed world and the first cause of death in those persons between 1-44 years old. According to the World Health Organization (WHO), by the year 2020, trauma will be the leading cause of years of life lost in both developed and developing countries. With road traffic injuries, violence, and falls account for the primary mechanisms of injury. Where it was found that there is a decrease in the mortality rate of multiple trauma patients over the past two decades (1972–1991), but does not mention potential causes. However, many reports (2000–2005) appear to confirm these improved mortality rates.

Patient and Method: Descriptive observationstudy.From the period 1/1/2012 to 1/4/2013 included 282 Polytraumatized adult patients with injury to several physical regions or organ systems, where at least one injury or the combination of several injuries are life threatening with the severity of injury being equal or above 16 on the scale of the Injury Severity Score (ISS) attended to the Emergency Department (ED) of the Suez Canal university Hospital. The study excluded:

1- Patients transferred from other hospitals after performing any medical or surgical procedure
2- Patient who died on arrival before initial assessment.
3- Burn patients.
4- Patients discharge on his demand, transferred to other hospitals or escaped.
5- Patients with ISS 16 or more with single body region trauma.
6- Patients with two or more body regions trauma with ISS less than 16.

Results: In our study, out of 282 patients 228 were discharge alive, while 39 patients died (13.83%). 30.85% of patients had penetrating trauma in which 20.92% were Firearm injuries, and 9.93% were due to stab injuries, with overall mortality of penetrating trauma of 10.3%.

Conclusion: According to our results we have an increase in the prevalence of penetrating trauma in general and in firearm injuries in specific in the last few years, and an increase in the mortality rates among Polytraumatized patients.

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Introduction:-

Trauma is the third highest cause of death in all age group in the developed world and the first cause of death in those persons between 1-44 years old. According to the World Health Organization (WHO), by the year 2020, trauma will be the leading cause of years of life lost in both developed and developing countries. (1)It is a leading cause of death for Americans of all ages, regardless of gender, race or economic status. But injury deaths are only part of the picture. Millions of Americans are injured each year and survive. For many of them, the injury causes temporary pain and inconvenience, but for some, the injury leads to disability, chronic pain, and a profound change in lifestyle. (2)

The situation in developing countries is alarming due to lack of resources, organization and integration in trauma care. (1)Injuries are the leading cause of hospitalization in Indonesia. (3) In India, for example, approximately 3.2 million people are injured in road traffic accidents every year, of these, about 48,000 dies. (4)

In Egypt, injuries are a significant source of morbidity and mortality. They are the fifth leading cause of death and the leading cause of hospitalization, and account for at least one-quarter of all outpatient visits. (5)

With road traffic injuries, violence, and falls account for the primary mechanisms of injury. (6) Where it was found that there is a decrease in the mortality rate of multiple trauma patients over the past two decades (1972–1991), but does not mention potential causes. However, many reports (2000–2005) appear to confirm these improved mortality rates (7,8)

Polytrauma can be defined as injury to several physical regions or organ systems, where at least one injury or the combination of several injuries are life threatening with the severity of injury being equal or > 16 on the scale of the Injury Severity Score (ISS). To be differentiated from multiple injuries, which is not life threatening or a severe, life-threatening single injury.(9)

In severely injured patients, care in the acute phase focuses particularly on ensuring that the time spent at the scene of the injuries is as short as possible, as well as on rapid and adequate oxygenation and improving organ perfusion to increase the chances of survival. On the basis of data from the Vietnam War, the generally accepted policy is that severely injured trauma patients must undergo definitive treatment in hospital within 1 h of the injury (the golden hour) to optimize the chances of survival. (9)

Patients and Methods:-

Descriptive observation study was conducted. From the period 1/1/2012. To 1/4/2013 included 282 Polytraumatized adult patients with injury to several physical regions or organ systems, where at least one injury or the combination of several injuries are life threatening with the severity of injury being equal or above 16 on the scale of the Injury Severity Score (ISS) attended to the Emergency Department (ED) of the Suez Canal university Hospital. The study excluded:

1- Patients transferred from other hospitals after performing any medical or surgical procedure
2- Patient who died on arrival before initial assessment.
3- Burn patients.
4- Patients discharge on his demand, transferred to other hospitals or escaped.
5- Patients with ISS 16 or more with single body region trauma.
6- Patients with two or more body regions trauma with ISS less than 16.

Methods:-

In each patient the following data were studied: -

Full history (from patient or relative) including:

1. Patient personal data: Age, Sex, Occupation and residence.
2. Timing of injury and timing of admission.
3. Mechanism and type of injury according to CDC classification.

Clinical examination:

Vital sign, Glasgow Coma Scale and Patients' anatomical injury coded according to the Abbreviated Injury Scale (AIS).

Results:-

The data of the 282patients included in this study was collected in the period from 1/1/2012. To 1/4/2013. All Polytraumatized patients attending to the Emergency Department (ED) of the Suez Canal university Hospital was included.The majority of our patients were males 228 (80.85%) and female only 54 (19.15%).

Table 1 shows that mean age was 31.09 years with highest frequency in **the third decade age group (39.36%).**

Table 1:- Age distribution among the studied patients.

		Number	**Percentage**
Age	**< 20**	36	12.77%
	20 –	111	39.36%
	30 –	87	30.85%
	40 –	24	8.51%
	50 –	6	2.13%
	60 – 70	18	6.38%
	Range	18 – 68	
	Mean ± SD	31.09 ± 11.7	
Total		**282**	**100%**

Table 2 shows that most of the patients arrived to the hospital within 30 – 60 minutes from trauma (48.94%).

Table 2:- Delay from trauma to hospital arrival.

		Number	**Percentage**
Time interval between trauma and hospital arrival (minutes)	**< 30**	69	24.47%
	30 –	138	48.94%
	60 – 120	48	17.02%
	> 120	27	9.57%
	Range	13 – 220	
	Mean ± SD	56.02 ± 47.03	
Total		**282**	**100%**

Table 3 shows that the most common cause of injury was road traffic accident (RTA) (61.7%). Blunt trauma was the most common type of trauma (69.15%).

Table 3:- Mechanism and type of trauma among the studied patients.

		Number	**Percentage**
Mechanism of injury	**Motor car accident**	174	61.7%
	Falling from height	21	7.45%
	Violence	87	30.85%
Type of trauma	**Blunt trauma**	195	69.15%
	Firearm injury	59	20.92%
	Stab wound	28	9.93%
Total		**282**	**100%**

Table 4 shows that most of patients have been resuscitated after 60 – 120 minutes (58.51%) from time of hospital arrival.

Table 4:- Resuscitation time in hospital among the studied patients.

	Number	**Percentage**
< 30	12	4.26%
30 –	78	27.66%
60 – 120	165	58.51%
> 120	27	9.57%
Range	20 – 240	
Mean ± SD	86.7 ± 50.13	
Total	**282**	**100%**

Table 5:- Vital signs among the studied patients.

		Number	Percentage
Heart rate (beat/min)	**< 100**	201	71.28%
	100 –	43	15.25%
	120 –	30	10.64%
	≥ 140	8	2.84%
	Range	50 – 145	
	Mean ± SD	83.8 ± 24.3	
Systolic BP (mmHg)	**≤ 90**	118	41.84%
	> 90	164	58.16%
	Range	50 – 160	
	Mean ± SD	101.7 ± 19.8	
Respiratory rate (cycle/min)	**≤ 20**	120	42.55%
	> 20	162	57.45%
	Range	12 – 29	
	Mean ± SD	20.58 ± 4.45	
GCS	**3 – 8**	42	14.89%
	9 – 12	18	6.38%
	13 – 15	222	78.72%
	Range	3 – 15	
	Mean ± SD	12.95 ± 3.5	
Total		**282**	**100%**

Table 6 shows that majority of the studied patients (71.28%) have had class I hemorrhage while only eight patients (2.84%) have had class IV hemorrhage.

Table 6:- Grade of hemorrhage according to heart rate among the studied patients.

	Number	Percentage
Class I (HR < 100)	201	71.28%
Class 2 (HR 100 -<120)	43	15.25%
Class 3 (HR 120 -<140)	30	10.64%
Class 4 (HR ≥ 140)	8	2.84%
Total	**282**	**100%**

Table 7 shows that there was no blood transfusion in 144/282 (51.1%) of patients with mean amount of blood transfused was 833.3 ml.

Table 7:- Amount of blood transfusion among the studied patients.

		Number	Percentage
Amount of blood transfused	Range	0 – 5000	
	Mean ± SD	833.3 ± 1047.2	

Table 8:- Type of treatment among the studied patients.

		Number	Percentage
Type of treatment	**Operative**	123	43.62%
	Conservative	159	56.38%
Total		**282**	**100%**

Table 9:- Baseline laboratory characteristics among studied patients.

	N	Range	Mean ± SD
Hemoglobin (gm/dl)	282	7 – 16	11.42 ± 2.38
Hematocrit (%)	282	21 – 46	35.25 ± 5.55

Table 10:- Comparison between dead and Survived patients according to vital signs.

		Died (n=39)		Survived (n=243)		p-value
Heart rate (beat/min)	**< 100**	13	33.33%	188	77.37%	X^2 0.001*
	100 –	7	17.95%	36	14.81%	X^2 0.8 (NS)
	120 –	12	30.77%	18	7.41%	X^2 0.001*
	≥ 140	7	17.95%	1	0.41%	X^2 0.001*
Systolic BP (mmHg)	**≤ 90**	28	71.79%	90	37.04%	X^2 0.001*
	> 90	11	28.21%	153	62.96%	
Respiratory rate (cycle/min)	**≤ 20**	13	33.33%	107	44.03%	X^2 0.2 (NS)
	> 20	26	66.67%	136	55.97%	
GCS	**3 – 8**	18	46.15%	24	9.88%	X^2 0.001*
	9 – 12	3	7.69%	15	6.17%	X^2 0.9 (NS)
	13 – 15	18	46.15%	204	83.95%	X^2 0.001*

*Statistically significant difference.
NS: no statistically significant difference

Table 11:- Comparison between dead and survived patients according to mechanism and type of trauma.

		Died (n=39)		Survived (n=243)		p-value
Mechanism of injury	**Motor car accident**	21	53.85%	153	62.96%	X^2 0.4 (NS)
	Falling from height	9	23.08%	12	4.94%	X^2 0.002*
	Violence	9	23.08%	78	32.1%	X^2 0.3 (NS)
Type of trauma	**Blunt trauma**	30	76.92%	165	67.9%	X^2 0.3 (NS)
	Firearm injury	9	23.08%	50	20.58%	X^2 0.9 (NS)
	Stab wound	0	0%	28	11.52%	X^2 0.05 (NS)

*Statistically significant difference.
NS: no statistically significant difference

Discussion:-

It is a well-known fact that trauma mostly affects the youth, particularly the third and fourthdecades. (10-12) In our study, the mean age was 31.09 years with highest frequency in the third decade (39.36%), males comprised (80.85%) of the patients. Our results are comparable with another study done in India. (13) in which most of the patients were men (84%) and the average age was 31 years. This agrees with a study published by Singh **J et al,** in which 50% of the patients were between the age group 20–40 years and males comprised 83.7% of the patients.(14)

In our study, we found that blunt trauma was the most common type of trauma (69.15%) with Road traffic injuries being responsible for 61.7%% of all cases. This agrees with most studies on trauma epidemiology, where the majority of cases were due to road side collisions..(10-12)

At 2011, Singh **J et al** had found thatRoad traffic collisions were the most common cause of trauma (72%).(14)Although **Josep C et al** had found similar results, yet the percentage was less (motor vehicle injury constituted only 41 %)(15). This might be due to lack of safety measures in our roads and ignorance of safety instruction.

In our study, although blunt trauma was common than penetrating, yet there was no statistically significant difference between dead and survived patients in both groups. This comes in concordance with the study by **Guyette f et al,** in which they found that blunt trauma is more common than penetrating with no statistically significant difference between dead and survived patients.(16)This also corresponds with the study conducted by **Minei J et al,** in which they found that the median incidence of severe trauma due to a blunt mechanism, transported to hospital, was 25 which is about ten folds more than median incidence of severe penetrating trauma: 2.6.(17)

Although Motor Vehicle Collisions (MVC) were more common than falls (61.7 versus 7.45) in our study, the later showed statistically significant difference between survived and dead patients. Mortality due the fall was higher 23.08%. This coincide with the results of **Guyette**who observed that although falls were only 25% and MVC was 65%, mortality due to falls was higher (43% versus 42%) with a statistically significant difference. (16)

In our study, 30.85% of patients had penetrating trauma in which 20.92% were Firearm injuries, and 9.93% were due to stab injuries, with overall mortality of 10.3%. This is discordant with **Guyette**study(16)**,**with only 10% had penetrating trauma, and with Tehran University, in which only 13% were penetrating trauma. (18) This could be explained by the fact that these are hospital records; meaning that those who died before reaching the hospital were not included. Also, might be due to the increased rate of violence in Egypt and the spread of weapons, during the last few years.

A retrospective review was conducted to identify all patients who sustained stabbing or shooting injuries over a 16-year period between 1991 and 2006 in London and concluded that 14,504 (90.3%) blunt trauma and 1564 patients (9.7%) sustained penetrating injury; from whom, 1358 patients (86.8%) sustained stabbing injuries while 206 patients (13.2%) had been shot, these results were against our result as firearm injuries are more common than stabbing injuries. (19)

An in-hospital study, conducted at the Royal London Hospital, recorded an increase in the amount of penetrating trauma managed by the emergency department from 2004 to 2006. (20)

A trial to study Outcomes and costs of penetrating trauma injury in England and Wales using the Trauma Audit Research Network (TARN) database was done to examine the records of patients aged more than 18 years who were hospitalized for penetrating trauma injury between January 2000 and December 2005. The trial revealed that over 90% of the injuries occurred in alleged assaults. Stabbings were the most common cause of injury (73%), followed by shootings (19%). The overall mortality rate among the 1365 penetrating trauma patients was 8.3 %. (21)

The picture of penetrating trauma in America was different from European countries; this may be due to increase homicides. In a study published in the Journal of the American College of Surgeons, estimation of the epidemiology of major trauma and trauma deaths in Los Angeles revealed that the most common cause of injury was traffic accidents. As they were responsible for 45.7% of all cases. Assaults followed closely with 36.2% of all cases. Overall, 2895 victims of trauma died (mortality 20.6%). Homicides were the leading cause of death and were responsible for 45.3% of all trauma deaths; traffic accidents were next with 31.9% of all deaths. (22)
In our study out of 282 patients 228 were discharge alive, while 39 patients died (13.83%). Although this rate comes in concordance with that of Benha University (11.4) (23)**,** both are very far from mortality rates mentioned in international studies (4-6%). (10-12) This is due to the difference in the trauma management strategies starting from first aid to definitive management and lack of understanding and application of the trauma protocols in Egypt.

Conclusion:-

According to our results we have an increase in the prevalence of penetrating trauma in general and in firearm injuries in specific in the last few years, and an increase in the mortality rates.

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