

Management of Traumatic Hemothorax a Retrospective Study of 165 Cases in AL-Jamhoori Teaching Hospital in Mosul

Rabea Salim Abd Aljabbar Alsofi*, Saad Muwafaq Attash**,
Omer mothafar Hammodat***

ABSTRACT:

BACKGROUND:

Traumatic hemothorax is one of the most common thoracic injuries in the world. There are a lot of debates about the best method of management because of the possible risk of death and development of subsequent complications.

OBJECTIVE:

The objective of this study is to decide the best type of management of traumatic hemothorax (thoracostomy tube drainage versus thoracotomy) for life saving and prevention of subsequent complications such as trapped lung with fibrothorax, and empyema.

METHODS:

This is a retrospective study of 165 consecutive patients with traumatic hemothorax admitted to Al-Jamhoori teaching hospital in Mosul from 1st January 2010 to 1st January 2012. The parameters that were used in this study were sex, age group, mechanism of injury, hemodynamic state at time of according to volume of blood in the drainage bottle into 5 groups. The patients were also classified into 4 groups depending on their hemodynamic state at time of presentation.

RESULTS:

Thoracostomy tube drainage was done in the majority of cases as the mainstay of treatment, in minority of cases it was followed by thoracotomy for those with massive hemothorax, severe hypovolemic shock, associated thoracic injuries, or those with complications.

CONCLUSION:

Traumatic hemothorax should be treated initially by thoracostomy tube drainage except in very urgent cases, and the decision for thoracotomy should be based on the hemodynamic state, the volume of drained blood and the presence of associated thoracic injuries. A good initial care and proper drainage of collected intrathoracic blood reduces the development of late complications and the subsequent need for thoracotomy.

KEYWORDS: traumatic hemothorax, thoracostomy tube, thoracotomy.

INTRODUCTION:

Although it is one of the most common types of thoracic injuries, incidence rates of traumatic hemothorax are difficult to determine. Mild cases of hemothorax causes few symptoms and minimal chest pain that may not require treatment. It's quite possible for a person to develop and heal a mild case of hemothorax without being aware of its presence.

Based on rates of trauma nationwide, an estimated 300,000 cases of hemothorax are treated every year in the United States.⁽¹⁾ Over 70% of thoracic injuries result from blunt trauma,

most of which are caused by automobile accidents in the US.⁽²⁾ Penetrating injuries are uncommon in either elderly or pediatric patients, but they remain one of the most common causes of death from trauma in persons up to 40 years of age.

Hemothorax following penetrating and non penetrating trauma maybe the result of cardiac, great vessels, pulmonary parenchymal, or chest wall injury. The rate of cessation of bleeding is dependent on the site and size of bleeding wound. Bleeding from lung parenchyma or other small veins is usually self limited, whereas cardiac, great vessels, or other arterial bleeding require surgical control.⁽³⁾ Complications of traumatic hemothorax includes :

Retained clot.

Empyema.

Fibrothorax.⁽³⁾

* Cardiovascular & Thoracic Surgeon, Al-Jamhoori Teaching Hospital

** General Surgeon, Lecturer, Surgery Department, Nineveh Medical College, Ninevah University

***Cardiovascular & Thoracic Surgeon Al-Jamhoori Teaching Hospital

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Initial treatment :

Stabilize the patient.

Locate the source of bleeding and stop it. Antibiotics should be started initially and continued for variable periods according to the cause, type and severity of injury, and the presence of other associated injuries.⁽¹⁾

Tube thoracostomy :

For acute traumatic hemothorax, unless it is very minimal and not increasing, tube thoracostomy is the initial management of choice. The amount of blood draining from the pleural space should be monitored frequently-at first every 15 to 30 minutes and every hour thereafter, depending on the rate of bleeding. The chest tube is left in place for several days to re-expand the lung.⁽⁴⁾ Less than 10% of individuals will require thoracotomy for the purpose of removing blood clots or repairing muscles, blood vessels, or internal organs.⁽⁵⁾ The blood must be effectively evacuated to prevent complications such as fibrothorax and empyema, and more than one tube maybe placed.⁽⁴⁾

Thoracotomy :

Indications :

Massive hemothorax : evacuation of more than 1000 ml of blood immediately after tube thoracostomy.⁽⁴⁾

Drainage of more than 300 ml / hour during the first 3 – 4 hours after injury.⁽²⁾

Repeated blood transfusion is required to maintain hemodynamic stability.⁽⁴⁾

Delayed thoracotomy after development of complications of hemothorax : Retained clot, empyema, fibrothorax.⁽⁴⁾

Video-Assisted Thoracoscopic Surgery: (VATS)

It has a limited role in acute traumatic hemothorax because bleeding will preclude the

visualization during the procedure, but it can be used to evacuate a retained clot.⁽⁴⁾

Intrapleural Fibrinolysis :

It is used in some centers for evacuation of residual hemothorax in cases in which initial tube thoracostomy drainage is inadequate.⁽⁶⁾

PATIENTS AND METHODS:

This is a retrospective study of 165 patients presented with traumatic hemothorax admitted to Al- Jamhoori Teaching Hospital in Mosul from 1st of January 2010 to 1st of January 2012.

The data regarding the details of injuries were collected from the victims or their relatives as well as from their case sheets.

The parameters used in this study are sex, age, mechanism of injury, hemodynamic state at time of arrival, volume of drained blood and the presence of associated injuries.

Sex distribution :

- 136 Males (82.4%).
- 29 Females (17.6%).

The mechanism of injury :

- Penetrating injury in 129 patients (78.2%).
- Blunt injury in 36 patients (21.8%).

Note : Post-thoracotomy hemothorax was not included in this study.

Distribution of patients in relation to the volume of blood loss is

shown in figure(1)

- Patients with blood volume less than 500 ml : 38 patients (23.1%).
- Patients with blood volume 500 – 1000 ml : 57 patients (34.5%).
- Patients with blood volume 1000 – 1500 ml : 41 patients (24.9%).
- Patients with blood volume 1500 – 2000 ml : 21 patients (12.7%).
- Patients with blood volume more than 2000 ml : 8 patients (4.8%).

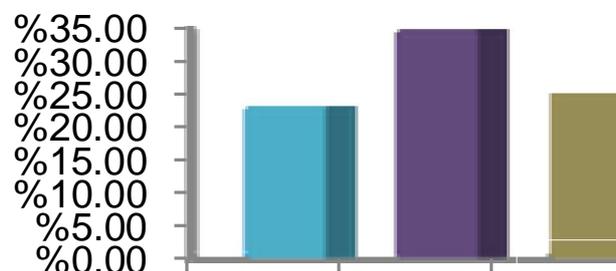


Figure 1: A histogram showing distribution of patients in relation to the volume of blood loss
Classification of patients according to the hemodynamic state.

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The vital signs routinely checked at the time of presentation and the patients were classified into 4 groups depending on their haemodynamic state (degree of hypovolemic shock) at time of arrival as shown in table (1)

Table 1: Haemodynamic state of patients at time of arrival.

Patient group	No.	%	Pulse rate	Systolic Bd. pressure	Pulse pressure
Group A*	36	21.8%	<100	Normal	Normal
Group B*	71	43.1%	>100	Normal	□ (□ Diastolic BP)
Group C*	39	23.6%	>120 weak	□	□
Group D*	19	11.5%	>140 not palpable	Marked□	Marked□
Total	165	100%			

* Group A = Grade I shock, Group B = Grade II shock, Group C = Grade III shock, Group D = Grade IV shock

Evaluation of the associated thoracic injuries : Some patients were shown to have associated injuries (one patient may have more than one associated injury) as shown in table (2).
Evaluation of the injured patients immediately established by taking the history and doing physical examination and preliminary investigations.

Table 2: Associated thoracic injuries. *

Associated injuries	No. of patients	%
Diaphragmatic injury	11	6.7%
Tracheobronchial injuries	7	4.2%
Esophageal injury	4	2.4%

*The patients with cardiac & great vessels injuries are not included in this table because they are causes of hemothorax.

Diagnostic tests :

Plain chest radiography was the main diagnostic tool for the majority of patients, confirmed by thoracocentesis. In minority of patients CT scan used to confirm the diagnosis mainly for delayed cases with lung entrapment & fibrothorax which required thoracotomies for removal of clot & release of trapped lung.

Management of these patients was carried throughout their hospitalization and follow up was conducted for most of them after discharge. Chest tube was placed for all patients except 2 patients who were taken directly to theatre for life saving exploration

The decision for exploration or observation was made depending on clinical features, volume of blood in the drainage system, chest X-ray findings and the presence of associated thoracic injuries that need exploration.

The associated injuries are dealt with according to the guidelines of each type of injury.

RESULTS:

Age distribution :

The age of patients ranged from 3 to 68 years (Figure 1).

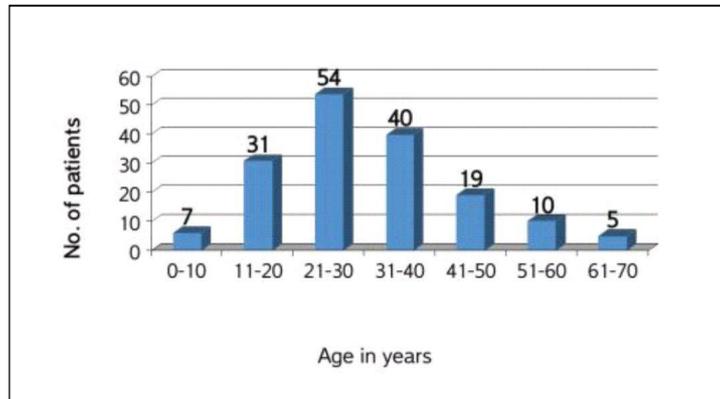


Figure 1: A histogram showing age distribution of patients.

Analysis of data defined 5 separate patient groups based upon the volume of blood in the drainage system during the first 24 hours as shown in table(3)

Table 3 : Presentation of patient with traumatic hemothorax according to the volume of blood in the drainage bottle during the 1st 24 hours.

Volume of blood	Variable	Grade I shock	Grade II shock	Grade III shock	Grade IV shock
Less than 500 cc.	No.	38	29	9	-
	%	23.1%	17.6%	5.5%	-
500-1000 cc.	No.	57	7	42	8
	%	34.5%	4.3%	25.5%	4.9%
1000-1500 cc.	No.	41	-	18	21
	%	24.9%	-	10.9%	7.3%
1500-2000 cc.	No.	21	-	2	10
	%	12.7%	-	1.2%	6.1%
More than 2000 cc.	No.	8	-	-	8
	%	4.8%	-	-	4.8%

Treatment :

The methods of treatment of our patients were mainly thoracostomy tube drainage (133

patients), & thoracotomy in minority of cases (32 patients) (Figure 2).

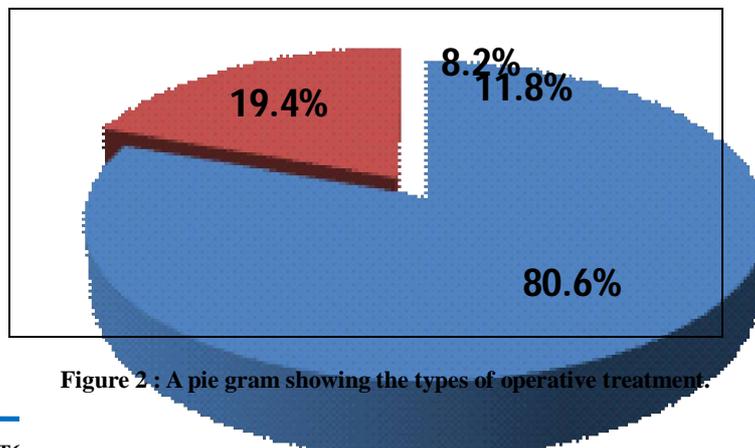


Figure 2 : A pie gram showing the types of operative treatment.

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Thoracotomy done mainly for those patients with chest tube drainage more than 1500 cc during the first 24 hours (Table 4), patients received with grade 4 hypovolemic shock (Table 5), patients

with associated thoracic organs injuries (Table 6), and later on those with complications of hemothorax (Table 7).

Note : there maybe more than one indication for thoracotomy in the same patient.

Table 4: The need for thoracotomy in traumatic hemothorax according to blood volume in the drain during the 1st 24 hours.

Volume of blood in the drain in 1 st 24 hours	Total No. of patients	No. of patients who needed thoracotomy
less than 500 ml	38	-
500 – 1000 ml	57	2
1000 – 1500 ml	41	5
1500 – 2000 ml	21	18
more than 2000 ml	8	7

Table 5 : The need for thoracotomy in traumatic hemothorax according to hemodynamic state at time of arrival.

Hemodynamic state at time of arrival	Total No. of patients	No. of patients who needed thoracotomy
Group A*	36	-
Group B*	71	3
Group C*	39	13
Group D*	19	16

* Group A = Grade I shock, Group B = Grade II shock, Group C = Grade III shock, Group D = Grade IV shock

Table 6: Indications for thoracotomy in traumatic hemothorax according to the presence of associated thoracic injuries.

Associated injuries	No. of patients	No. of patients who needed thoracotomy
Diaphragmatic injury	11	8
Tracheobronchial injuries	7	5
Esophageal injury	4	3

Table 7: Indications for thoracotomy in traumatic hemothorax according to the presence of complications of hemothorax.

Complications of hemothorax	Total No. of patients	No. of patients who needed thoracotomy
Empyema thoracis	21 (12.7%)	17 (10.3%)
Retained clot	16 (9.9%)	7 (4.2%)
Fibrothorax	11 (6.7%)	9 (5.5%)

DISCUSSION:

The males percentage was 82.4% and females was 17.6%. in other studies males percentage was 87.9% and females percentage was 12.1%.⁽⁷⁻¹¹⁾

The main age group affected was those in the third decade (20-30 year) These results are close to the results in other studies.⁽⁷⁻¹¹⁾

Penetrating injury constituted 78.2% while blunt injury constituted 21.8% of traumatic hemothorax. In other studies over 70% were due to blunt injury, and less than 30% due to penetrating injury.⁽⁴⁻¹¹⁾ This high percentage of penetrating injury in our study may be due to the

increased use of machineguns & shells from explosions in our country.

Patients in shock state { group C & D } represented 35.1% of total number, (the majority of them are those patients with underwater seal drain of 1000 ml or more). The rest 64.9% of patients presented with normal hemodynamics or compensated shock state { group A & B }, (the majority are those patients with underwater seal drain of less than 1000 ml). In other studies , 21% of patients presented with shock state ⁽²⁾, this is probably due to proximity of hospitals to scene and quick transport systems in western countries⁽²⁻¹¹⁾.

Fifty-seven patients (34.5%) had underwater seal blood drain of 500 - 1000 ml during the 1st 24 hours : This is close to the results of other studies.⁽³⁻⁹⁾ . The reason for this is probably due to under estimation to those with mild traumatic hemothorax (less than 500 ml (23.1%)), because about 500 ml is needed to obliterate the costophrenic angle.⁽⁸⁾

The presence of associated thoracic injuries is one of important factors that must be taken into consideration when dealing with traumatic hemothorax. The commonest associated thoracic injuries were diaphragmatic injuries (6.7%), these results are close to other studies.⁽¹⁻⁹⁾. Eight of them required thoracotomy while thoracostomy tube drainage was enough for the other three patients with minor injuries.

The main complications of traumatic hemothorax were respectively empyema thoracis (12.7%), retained clot (9.9%) & Fibrothorax (6.7%). This is different from other studies in which retained clot was the highest complication.^(2,4) this is probably due to the difference in the mechanism of injury, because the main type of injury in our study was penetrating injury (which introduce contaminated substances to the chest) while in others was blunt injury.^(2,4)

The methods of treatment of our patients were mainly thoracostomy tube drainage (80.6%), and thoracotomy in minority of cases (19.4%). In other studies thoracotomy were indicated in less than 10% of cases.^(5,10) this is also due to the difference in the mechanism of injury.

Most of patients with chest tube drainage more than 1500 ml. during the 1st 24 hours (86.2% of this group). Some studies suggest 1000 ml. as an indication for thoracotomy.⁽¹¹⁾

Most of patients with grade IV hypovolemic shock (84.2% of this group) & some of the patients received with grade III hypovolemic shock (33.3% of this group). This is consistent with the results in other studies.⁽⁴⁾

Patients with associated thoracic organs injuries, mainly esophageal & Tracheobronchial injuries (84.2% of this group), & diaphragmatic injuries (27.3% of this group, mainly those due to blunt trauma).⁽²⁾

Patients with complications of hemothorax including those with empyema thoracis (80.95% of this group), retained clot (43.8% of this group) & Fibrothorax (81.9% of this group). This is close to other studies.⁽⁴⁾ Thirty three patients needed subsequent thoracotomy later on to deal with these complications.

CONCLUSION:

Traumatic hemothorax is one of the common types of thoracic injuries affecting males (82.4%) more than females (17.6%) & mainly affects young adults (20-30 year). The main cause in Iraq is penetrating injury (78.2%).

Traumatic hemothorax should be treated initially by thoracostomy tube drainage except in very urgent cases, and the decision for thoracotomy should be based on the hemodynamic state, the volume of drained blood and the presence of associated thoracic injuries. A good initial care and proper drainage of collected intrathoracic blood reduces the development of late complications and the subsequent need for thoracotomy.

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