

FACTORS PREDICTING CLOTTING OF POST TRAUMATIC HEMOTHORAX IN MOROCCAN PATIENTS

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ABSTRACT

Introduction: Blood retained after thoracic drainage for hemothorax undergoes physiological fibrinolysis but for unknown reasons, this fibrinolysis does not always occur. In order to determine the predictive factors for clotting of post-traumatic hemothoraces, we conducted this retrospective study. **Patients and methods:** This is a retrospective mono-centric analytical study, carried out over a period of 4 years, involving 52 patients who presented with post-traumatic hemothorax. In view of the persistence after pleural drainage of an opacity on the chest X-ray, a chest CT scan is performed to confirm the diagnosis of the hemothorax. The surgical indication had been made without the need for a second drainage. **Results:** We identified 26% clotted hemothorax. Blunt chest trauma as a mechanism of occurrence was found in 22 patients (42.3%), while 30 patients (57.7%) were victims of an open chest trauma. The interval between the day of the trauma and the drainage was 5.3 days on average. Video-assisted mini-thoracotomy had been performed in a single patient, while two patients had undergone thoracoscopy and for the remainders patients, surgical approach was a conservative postero-lateral thoracotomy. The statistically significant predictive factors that emerge from our study are, on the one hand, young age but also the average interval between thoracic trauma and thoracic drainage. **Conclusion:** The predictive factors identified reflect the delay in referral and / or consultation of patients and in particular in young subjects.

Keywords: Chest trauma; Chest drainage; Hemothorax; Morocco.

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INTRODUCTION

Post traumatic hemothorax is a life-threatening medical and surgical emergency. He also presents, a frequent reason for emergency room visits in view of the strong growth in road accidents and social violence.

Normally the blood retained in the pleura after thoracic drainage undergoes physiological fibrinolysis but for unknown reasons, this fibrinolysis does not always occur. Thus, the retained or clotted hemothorax can subsequently

lead to complications such as thoracic empyema, ventilatory failure, and therefore a longer hospital stay with often significant morbidities. We conducted this retrospective study in order to determine the predictive factors of clotting in post-traumatic hemothoraces.

PATIENTS AND METHODS

This is a retrospective mono-centric and analytical study, carried out over a period of 4 years (2014-2017) involving 52 patients who presented with post-traumatic hemothorax.

In all patients, thoracic drainage has been performed by a resident doctor from the thoracic surgery department after a learning period of at least 3 months and assisted by a senior in case of problem. All the cases were studied in a daily emergency staff. All patients benefited from a unique chest drainage connected to water-seal bottle without active aspiration of the pleural cavity. The clinical files were then presented and discussed in a multidisciplinary staff in order to evaluate the effectiveness of the thoracic drainage. Thus, in the event of persistence after pleural drainage of an opacity on the chest x-ray (**Figure 1**), a chest computed tomography was performed to confirm the diagnosis of the hemothorax (**Figure 2**).

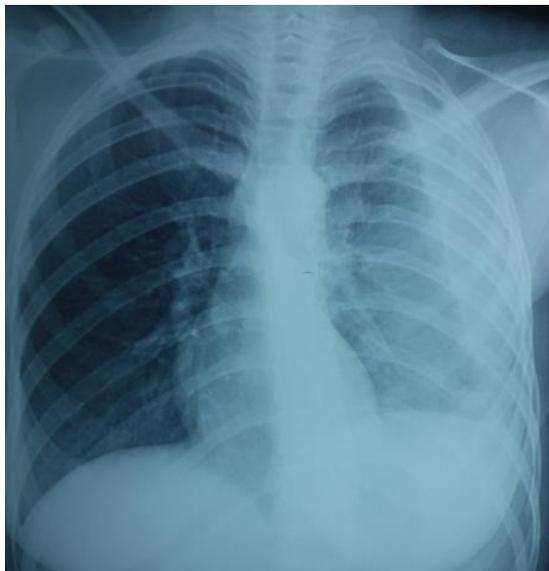


Figure 1: chest X-ray after pleural drainage showing a fluid pleural effusion (chest tube was removed accidentally)



Figure 2: chest CT scan confirming the diagnosis of a fluid loculated pleural effusion

The surgical indication for clots evacuation was made without need to a second drainage.

The descriptive and analytical statistical analysis was carried out using Epi-info software version 2000 version 3.5.4 and Excel from Pac office 2016 for Mac. Fischer's exact test represented the tool in association measurements. The significance level of "p value" was 0.05.

RESULTS

During the period of the study, 52 patients were treated for post traumatic hemothorax, of which 26% (n = 14) progressed to clotting. For clotted hemothoraces, there were 13 men (25%) and 1 women (1.92%) with a sex ratio of 4 in favor of men. The average age was 39.44 year-old [17- 84]. Blunt chest trauma (BCT) as an onset mechanism was found in 22 patients (42.3%), while 30 patients (57.7%) were victims of penetrating chest trauma (PCT). The left side was affected in 36 cases (69%). The interval between the day of the trauma and the drainage was 5.3 days on average with an average volume of drained blood equal to 525cc. Video-assisted mini-thoracotomy was performed in one case, while two patients underwent thoracoscopy and for all other patients, surgical approach was a conservative postero-lateral thoracotomy (**Figures 3 and 4**).

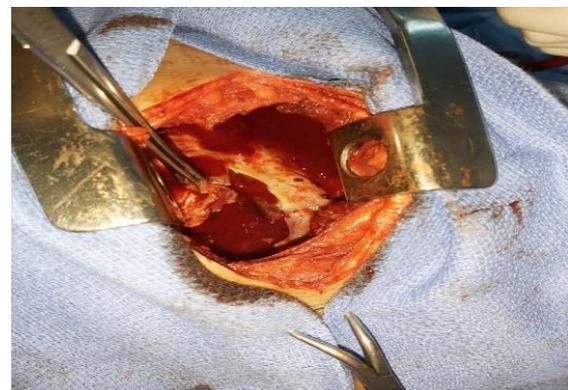


Figure 3: intraoperative image of surgical clots evacuation through thoracotomy approach.



Figure 4: intraoperative image of a diaphragmatic wound discovered during surgical clots evacuation.

We analyzed the occurrence of clotting according to age, gender, trauma mechanism (penetrating or blunt trauma), delay between trauma and placement of the chest tube as well as the volume of the hemothorax through the drain. Tables I, II and III summarize all of these analytical results into 2 groups of patients: Group A represents patients with clotted hemothorax

(C) while group B represents patients with non-clotted hemothorax (NC).

It appears that, young age, and the interval between trauma and drainage, are predictive factors for the occurrence of post traumatic clotting with respective "p values" of 0.0035 and 0.0089.

Table I: Analytical results in groups A and B.

	Group A (C)	Group B (NC)	p value
Mean age	27	44	0,0035
Gender	men (13) women (1)	men (33) women (2)	0,2911
Mechanism of Trauma	Blunt trauma (9) penetrating trauma (5)	Blunt trauma (21) penetrating trauma (17)	0,2911
Delay from Trauma to Drainage (days)	12	2,9	0,0089
Volume of blood drained (cm³)	569	523	0,7124

Group A represents the cases of clotted hemothorax (C) while group B represents the cases of non-clotted hemothorax (NC)

Table II: The distribution of the delay between thoracic trauma and thoracic drainage according to age

	Group A (C)	Group B (NC)
> 30 years	1, 75 days	3,6 days
≤ 30 years	16, 2 days	1,6 days

Table III: Distribution of the type of thoracic trauma according to age

	PCT	BCT
> 30 years	14	15
≤ 30 years	16	7

DISCUSSION

The clotted hemothorax is defined in the literature, as a collection of blood greater than 500ml retained in the pleural space, occupying more than a third of the thoracic cavity. Another definition considers the clotted hemothorax to be any collection of blood in the pleural space that could not be drained through a thoracic drain within 72 hours, regardless of its volume. In our current practice, this 2nd definition is considered and seems convenient.

Chest x-ray can be considered as a first line examination in the diagnostic management of a clotted hemothorax. However, several studies have demonstrated the limits of this examination in the detection of clotted hemothoraces; the thoracic computed tomography made it possible to highlight clotted hemothoraces, diagnosed at the beginning by chest radiography as being contusions or parenchymal lesions. In another hand, chest CT scan was the basis for a change in therapeutic attitude in 31% of patients [1, 2]. The use of a continuous suction system at low pressure accelerates the evacuation of blood and a complete pulmonary expansion. According to Majumdar's study, 97.7% of patients on aspiration had complete pulmonary re-

expansion, with only a prevalence of 3.3% of clotted hemothoraces versus, versus 23.3% observed in patients who were not put on aspiration [3, 4]. Another prospective study by the University of Indiana [5] evaluated the relation between aspiration and the occurrence of complications after chest trauma. Thus, it doesn't show a significant impact of aspiration and its role in preventing the occurrence of clotted hemothorax and its consequences such as: empyema, need for surgery, length of hospital stay and death rate. It should be noted that in our series, no patient benefited from a suction system after the placement of the thoracic drain.

The statistically significant predictive factors which emerge from our study are on the one hand the delay between the thoracic trauma and the thoracic drainage raising the problems of collection and time of referral of the patients towards the competent hospitals. These factors were found in several studies including that of Villegas et al. [6].

Young age, which emerges as a significant predictor in our series, has never been reported in others studies. This could be explained in our context by the fact that in the majority of cases, patients are mostly younger and presented harmless chest traumas which leads to late medical consultation

with an interval between the trauma and the thoracic drainage of 16.2 days in patients under 30s against 1.75 in the over 30s population. Indeed, younger patients are mostly victims of harmless penetrating chest traumas; they consult only after the progressive constitution of a hemothorax and associated clinical expressions, while the elderly patient present a higher proportion of BCT responsible for costal fractures causing chest pain inducing earlier consultation [7]. In addition, this delay before medical consultation for young subjects may also be a consequence of an underestimation of the lesions by emergency physicians who do not properly assess the severity of chest wounds using only the palpation of the wound to know its depth its depth and by inserting a syringe through its edges.

It should be remembered, however, that the severity of any chest wound must be assessed by the evaluation of its clinical and radiological impact and any diagnosed hemothorax must involve a close clinical and radiological monitoring even with minimal volume.

Recently, several studies have recommended thoracoscopy in the initial management of post-traumatic hemothorax [8, 9]. In the study of Villegas et al [6], an early thoracoscopy within 24 hours of the trauma in hemodynamically stable patients not only reduced the incidence of clot hemothorax in 50% of patients but also the surgical time was reduced with less post-operative pain and a shorter hospital stay. The Video-assisted thoracoscopic surgery (VATS) also makes it possible to visualize and repair the pulmonary lacerations which can be sources of bleeding as a cause of clotted hemothoraces [10]. However, some scientific societies as The American Association for the Surgery of Trauma Retained Hemothorax Study Group recommend simple monitoring with medical management of post traumatic clot hemothoraces when their volume is less than 300 cm³, evacuation by VATS if the volume of the hemothorax is between 300 and 900 cm³, and exploration by thoracotomy in the event of a volume of the hemothorax greater than 900 cm³ [11]. We are rather followers of this 2nd behavior to be held (**Diagram**).

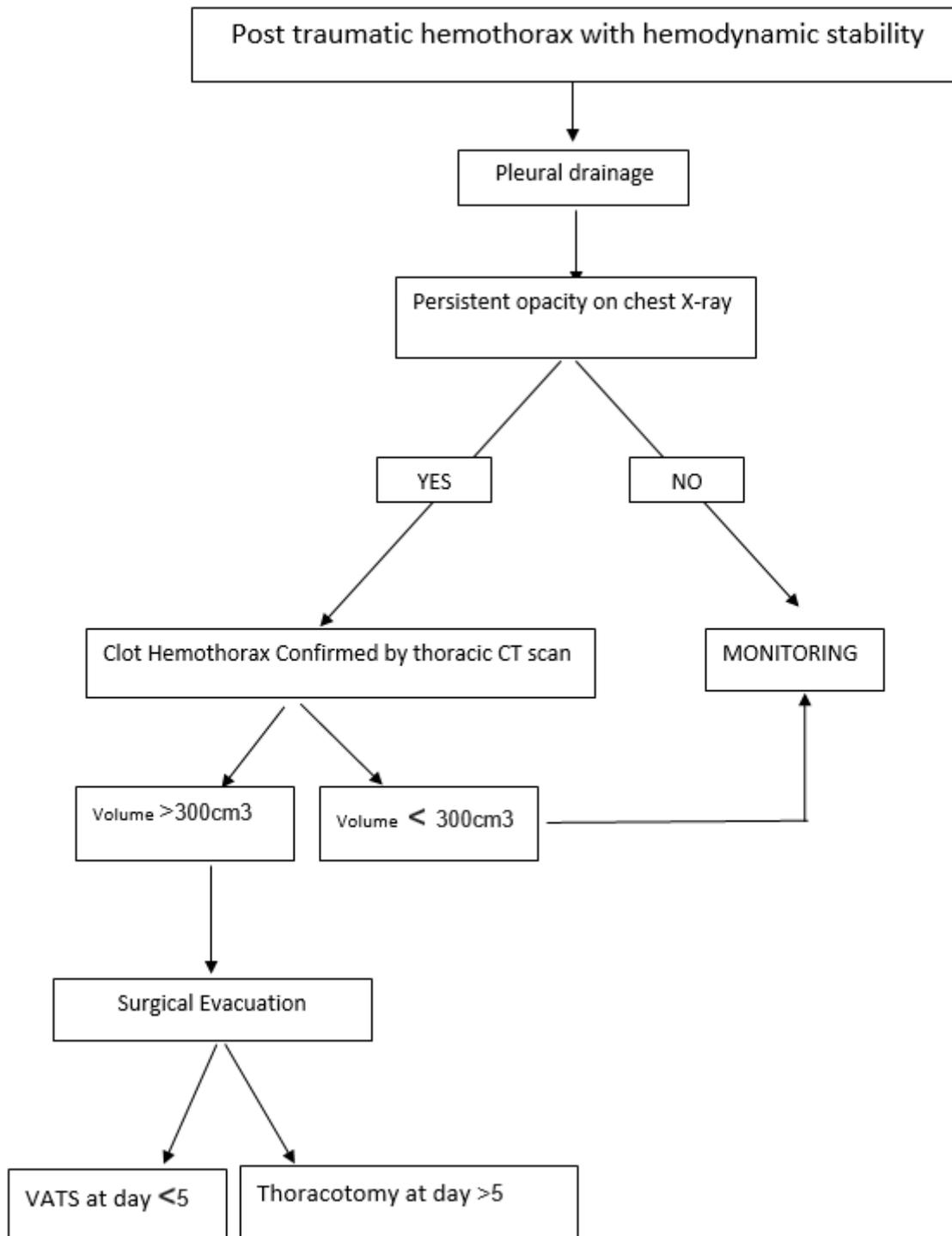


Diagram : Management of a clot post traumatic hemothorax

CONCLUSION

In our context, clotted hemothoraces are a frequent reason for admission to the emergency room. The predictive factors identified are the delay in referral and / or consultation of patients and in particular in young subjects. VATS should have a prominent place in the initial management of post-traumatic hemothoraces.

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CONFLICT OF INTEREST:

Authors declare no conflict of interest.

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