

## Laceration of Superior Vena Cava Revealed by Tamponade Caused by Blunt Trauma: A Case Report

Hicham Wazaren<sup>1\*</sup>, Abdelmalick Idrissa<sup>2</sup> and Jaafar Rhissassi<sup>2</sup>

<sup>1</sup>Department of Cardiovascular Surgery A of Ibn Sina University Hospital Center, Morocco

<sup>2</sup>Department of Cardiovascular Surgery A of Ibn Sina University Hospital Center, Mohammed V University of Rabat, Morocco

\*Corresponding Author: Hicham Wazaren, Department of Cardiovascular Surgery A of Ibn Sina University Hospital Center, Morocco.

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### Abstract

The intra-pericardial rupture of the superior vena cava due to blunt thoracic trauma is a rare and life-threatening situation. It that has to be searched for signs of cardiac tamponade; with of blunt chest trauma history. We report the case of a superior vena cava laceration caused by road traffic accident in a 32 year-old patient revealed by cardiac tamponade. We focus on the need of urgent surgical exploration in all patients whose condition is unstable in the setting of blunt chest trauma.

**Keywords:** Blunt Trauma; Laceration; Tamponade; Superior Vena Cava

### Introduction

Cardiovascular trauma includes a large number of lesions of a variable nature, of which tamponade is the most common complication.

We differentiate closed trauma that can cause damage to the heart and large vessels, including the chest aorta, and penetrating chest trauma which display at the risk of cardiac wound.

Injuries to the great vessels are frequently associated with severe blunt chest trauma, mostly in high-speed deceleration. Traumatic laceration of the superior vena cava is rare and often fatal.

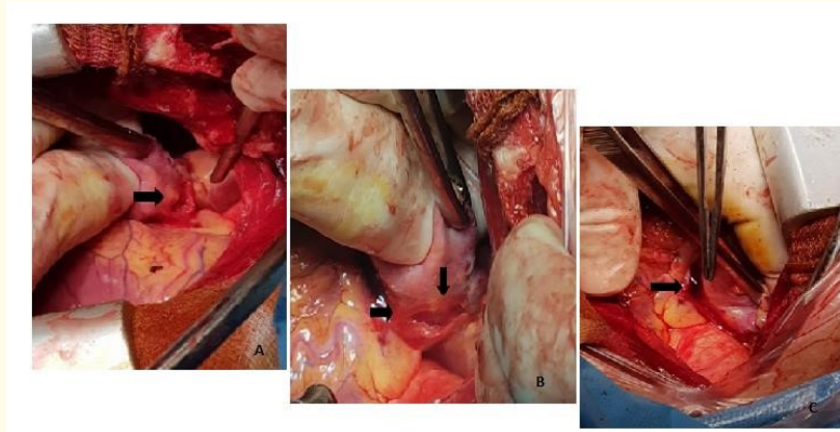
### Case Presentation

This is a 32-year-old patient who was the victim of a road accident; pedestrian struck by a car. The patient presented a thoracic and cranial impact point.

The admission examination found a patient confused, haemodynamically unstable requiring filling and immediate admission to the operating unit with invasive conditioning and monitoring.

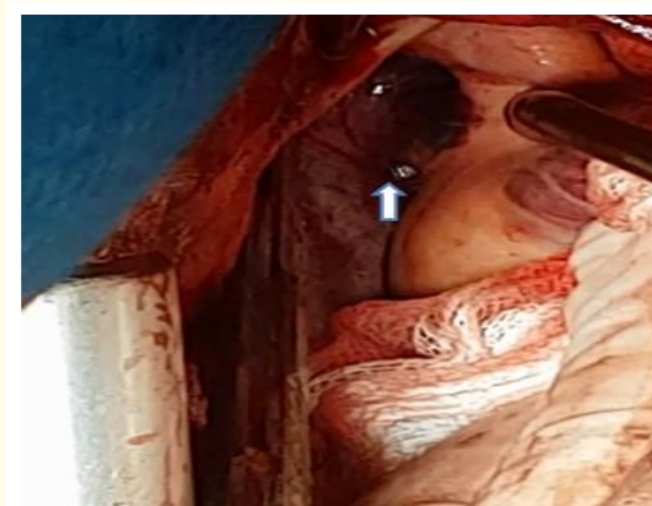
Trans-thoracic echocardiography applied a 12 mm pericardial effusion. Faced with haemodynamic instability and hemopericarde, it was decided to explore the patient surgically.

The approach was a rescue sternotomy, opening of the tensed pericardium with evacuation of 200 ml of venous blood with prompt hemodynamic stabilization. Surgical inspection revealed the source of hemorrhage as a misdiagnosed 2 cm - 2.5 cm laceration of the superior vena cava at the atricaval junction with a haematoma of 2 cm \* 1 cm in relation to the right auricle. The repair consisted of a simple suture by a 5-0 braided (Figure 1). No cardiopulmonary bypass was required.



**Figure 1:** Surgical views showing the superior vena cava laceration (A and B) and the haematoma of the right auricle (C).

There was also a 3 cm - 2 cm adventitial haematoma plaque from the wall of the right superior pulmonary vein that was respected (Figure 2). Then, adequate hemostasis was achieved.



**Figure 2:** Surgical view showing a right upper pulmonary vein haematoma.

Exploration of the sternum showed several fractures in relation to the 3<sup>rd</sup> and 5<sup>th</sup> left ribs (Figure 3). A frame was set up by two steel wires and the sternum was closed with five X-shaped steel wires.



**Figure 3:** Surgical view showing sterna fractures.

During the procedure, blood transfusion was necessary. The patient benefited from a postoperative body scan showed a stage II non-surgical splenic contusion on the advice of the visceral surgery team. The duration of postoperative intubation was 4 hours. The use of positive inotropic drugs was transient.

The stay in intensive care was 24 hours. The suites were simple. The patient was independent after 5 days with a follow-up of 48 months.

### Discussion

Post-traumatic tamponade is a vital emergency. The diagnosis of tamponade and the decision of surgical exploration remain essentially clinical. Nevertheless, in the wounded who present with trauma penetrating the precordium and which remains haemodynamically stable, echocardiography is the complementary examination of choice in search of a hemopericard. In this context, surgical exploration in search of an underlying heart sore is always warranted [1,2].

The severity of the haemodynamic consequences of a pericardial effusion is more related to the speed of its constitution than to its volume [3]. Because of the structure of the pericardium, large amounts of fluid can accumulate gradually before clinical signs appear. On the other hand, rapidly formed effusions (a few minutes to a few hours) exceed the ability of the pericardium to adapt, which does not have time to stretch, and the rapid increase in intra-pericardial pressure compromises the filling of the heart cavities and causes a dramatic drop in cardiac output [4].

Closed chest trauma can lead to damage to the heart and large vessels, and penetrating chest trauma can be at risk of heart damage. In this context, tamponade is a common complication that requires its evacuation and surgical exploration in search of an underlying heart sore [5,6]. In some cases percutaneous pericardiocentesis drainage may relieve the patient while waiting for urgent surgical exploration if one is at a distance from an operating unit [7].

In contrast to the hilar vessels, which are well protected, the superior vena cava is about as exposed as the aorta; but it also has another disadvantage, which is to be a very large vessel with relatively thin walls, which explains the possibility of injury during closed chest trauma.

Traumas to the superior vena cava are, in most cases, of iatrogenic origin and result from the multiplication of central catheterization gestures. Iatrogenic sores can also complicate iterative sternotomy in cardiac surgery. Closed traumas of the superior vena cava are rarely isolated, but are part of a severe trauma that combines other vascular and visceral intrathoracic lesions. Upper vehicle wounds by stab or firearm are rarely isolated and often associated with brachiocephalic artery and brachiocephalic veins wounds.

In our case, the clinical picture was worrisome while the pericardial effusion was of low abundance. It was justified to explore the patient in the operating theatre with the discovery of a wound of the upper vena cava that was sutured.

### Conclusion

Traumatic laceration of the superior vena cava is rare and often fatal. It is a challenging diagnosis that has to be ruled out in the setting of cardiac tamponade complicating chest trauma with severe deceleration. Surgical exploration is urgent for patients in unstable condition.

### Ethical Approval and Consent to Participate

Not applicable.

### Consent for Publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

### Availability of Data and Materials

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

### Competing Interests

Authors declare they have no competing interests.

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### Authors' Contributions

All authors have read and approved the manuscript. HW: Main authors managed the patient. AI: Co-author analyzed the patient data and was a major contributor in writing the manuscript. JR: Supervised the management of the patient, and revised the manuscript.

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