

## A case Report of a Right Ventricle Wound: Fatal Complication of Sternal Puncture

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### ABSTRACT

The myelogram is an essential tool for the diagnosis of haematological disorders. The sternal puncture is the gesture that allows the extraction of the spinal cord. This invasive technique is achievable by practitioners outpatient but is not devoid of life-threatening complications. We report the case of a patient hospitalized for etiological assessment of a myelodysplastic syndrome, sent in cardio-respiratory arrest state after sternal puncture. The echocardiography performed concomitantly with cardiopulmonary resuscitation was able to demonstrate cardiac tamponade by hemopericardium. Following an unsuccessful xiphoidal puncture attempt, a rescue thoracotomy was performed. The thoracotomy revealed a wound in the anterior wall of the right ventricle. Complications of sternal punctures can be fatal. The choice of the material used, the learning curve of the gesture itself, the early detection of complications are necessary elements to consider.

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### Introduction

Many original hematopoietic disorders involve making a sternal puncture with bone marrow biopsy to make a positive diagnosis of spinal disorders.

This simple gesture of realization at first glance, under local anesthesia, remains an invasive gesture: it is important for the practitioner to know the indications, but especially the most secure implementation protocol.

Rare complications are highly morbid and our clinical case illustrates a rather rare localization of cardiac wounds.

### Observation

We report the case of a 45-year-old woman without cardiovascular risk factors, admitted to the internal medicine department for myelodysplastic syndrome with anemia at 8.6g/dl and thrombocytopenia at 89 000 elements/mm<sup>3</sup>.

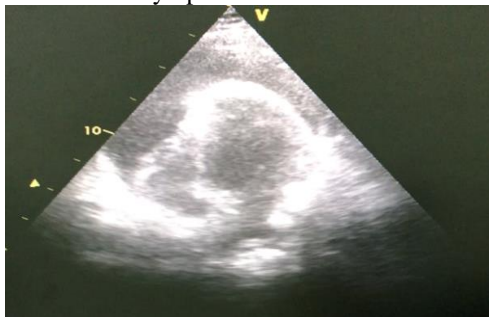


Figure n°1. Transthoracic echocardiography : apical position four-chamber view showing the collapse of the right ventricle and the massive pericardial effusion before ultrasound-guided xiphoidal puncture.

The indication of a bone marrow aspiration was raised and sternal puncture was performed according to the conventional procedure at the manubrium.

The patient had a hemodynamic instability with rapid deterioration of consciousness at the time of the puncture. The patient was immediately rushed to the emergency room of the hospital.

At admission, the examination finds a patient in a systole. Cardiopulmonary resuscitation (CPR) immediately started: external cardiac massage (ECM) by Lucas\*system, adrenaline (1mg / 2min), intubated / ventilated patient.

During ECM, echocardiography was performed (Figure n°1) showing a pericardial effusion with collapse of the right cavities. The diagnosis of cardiac tamponade on probable hemo-pericardium was retained.

An infusion of 500 ml of Macromolecules was administered in flash (packed red blood cells in transit to us), with attempted ultrasound-guided xiphoidal puncture failure.

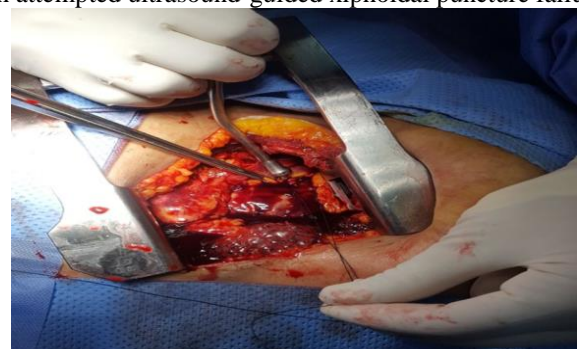


Figure n°2. Left thoracotomy showing the suture of the wound of the right ventricle.

Sinus rhythm was restored after 20 minutes of CPR and the patient was sent to the operating room for rescue thoracotomy. A wound of the right ventricle was found with suture of the perforation site (Figure n°2). The patient died despite the collective efforts.

### Discussion

The anatomy and intimate relationships of the posterior surface of the sternum to the anterior mediastinum, especially the heart and large vessels (ascending aorta, pulmonary artery, superior vena cava), [1] explain the immediate impact and often fatal consequences of a poorly executed sternal puncture.

In adults, it is recommended to perform sternal puncture at the second intercostal space; and at the level of the manubrium in the child, without exceeding 4mm of depth [2].

This invasive examination is primarily a diagnosis, and if the criteria described above are not respected, varying complications may occur, from the least serious to the fatal incident: sternal perforation, fracture of the sternum, manubrio-corporeal disjunction, trocar rupture, pneumothorax, hemo-mediastinum, pneumo-pericardium, large vessel wound, cardiac wound with hemo-pericardium and cardiac tampon de [3].

In the literature, complications involving cardiac wounds and those of large vessels remain rare: we find wounds of the ascending aorta [4], the superior vena cava, the pulmonary artery, the internal mammary artery. But the wound of the anterior wall of the right ventricle would be the purveyor of mortality [5], as unfortunately illustrates our clinical case.

Echocardiography is appropriate for the rapid diagnosis of cardiac tampon de [6], to speed up rescue management and rescue thoracotomy. Moreover, many recent studies emphasize the diagnostic value [7, 8], the low and non-fatal complication rate of the iliac crest biopsy compared to the sternal puncture.

Thus, given the incidents, precautions should be suggested:

1. The iliac puncture, postero-superior, should be more easily proposed as a less dangerous alternative, especially for practitioners in the process of learning.
2. If the sternal puncture is necessary and can't be replaced, it should be done by an experienced practitioner, on a patient aware of the likely complications.
3. For this purpose, appropriate puncture equipment should be used according to the age of the patient, taking into account the subcutaneous adipose tissue to set the maximum penetration limit of the puncture material.

4. This procedure should be performed only if the patient is under surveillance with monitoring of his blood pressure in order to detect signs of collapse very quickly, and thus urgently trigger the procedure of surgical management after a FAST-ECHO.

5. The legal consequences are not to be neglected, hence the need to sensitize the medical profession to the consequences of medical diagnostic procedures called "innocuous" and which are far from it.

### Conclusion

The complications of sternal punctures are often fatal and are sometimes not detected until late. Despite rapid management in a specialized environment, the outcome is often fatal.

The case of our patient is not isolated, and shows the need to train practitioners in early detection and setting rules to secure the gesture.

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