

# Adventitial Rupture of the Ascending Thoracic Aorta Extended to the Buttock by Thoracic Crushing between Two Tanks at the Thoracic and Cardiovascular Surgery Department at the Besançon CHRU

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## Abstract

Traumatic rupture of the ascending aorta is rare. We report the case of a 23-year-old man who suffered a service accident by crushing the thorax between two tanks during army maneuvers that resulted in an adventitial rupture of the ascending thoracic aorta extending to the Crosse. Treatment consisted of replacement of the ascending aorta with a 24 mm Hemashield straight tube and re-implantation of supra-aortic vessels at the dome of the prosthesis.

## Keywords

Traumatic Rupture, Ascending Aorta Extended to Lacrosse, Service Accident

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## 1. Introduction

The traumatic rupture of the aorta is a very serious event, occurring in a context of violent trauma with strong deceleration. Its morbidity rate remains high de-

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spite significant progress [1]. Rupture of the thoracic aorta usually occurs at the level of the isthmus in 90% of cases, but in rare cases it can be extended from the ascending aorta to the buttock. We must think about it and systematically analyze the thoracic aorta so as not to underestimate the extent of the lesion. We report the case of a 23-year-old man, a victim of an accident of service by crushing of the thorax between two tanks during operations of the army having caused a break under adventicielle of the ascending thoracic aorta spread to the butt.

## 2. Observation

This is a 23-year-old man with no particular background, a volunteer in the army, who suffered a service accident by crushing the thorax between two tanks during army maneuvers.

A thoraco-abdominopelvic CT scan with and without contrast injection revealed a diastasis of 3 cm at the Louis angle, a sternal fracture associated with a sub-lethal rupture of the ascending aorta with lacrosse (**Figure 1**). Faced with this post-traumatic rupture of the ascending aorta extending to the buttock, surgical treatment with sternotomy was considered urgently. Per operating the exploration highlighted: a diastasis of 3 cm at the level of Louis's angle, and a hemo pericardium not compressive; a break under adventicielle of the ascending aorta in the junction enters the ascending aorta intra-pericardial and the ascending aorta extra-pericardial which continued until the level of the aortic butt and isolated the brachio-cephalic arterial trunk and the left primitive carotid.

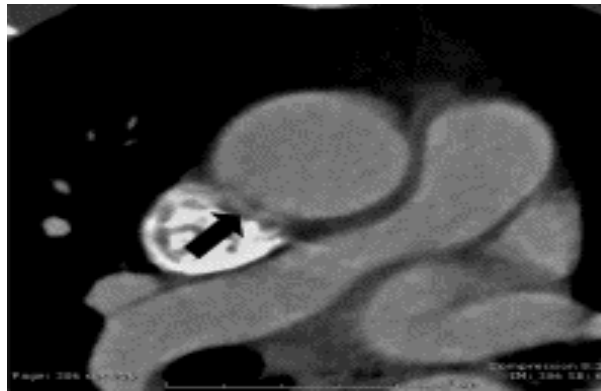
We performed under deep hypothermia, antegrade cerebral perfusion (**Figure 2**):

- Complete removal of the entire area with adventitial rupture;
- Section between two ligatures of the venomous venous trunk;
- Isolation of the brachiocephalic arterial trunk and left primary carotid artery;
- A transverse section of the intra-pericardial ascending thoracic aorta above the sinotubular junction, replaced by a 24 mm Hemashield straight tube whose distal anastomosis with descending thoracic aorta was made by a single overlock of prolene 4/0;
- Re-implantation of supra-aortic vessels at the dome of the prosthesis;
- Proximal anastomosis of the tube on the intra-pericardial ascending aorta by two hemisurits of prolene 4/0;
- Synthesis of the sternal diastasis by two sternum threads passed on both sides in the longitudinal direction to bring the diastasis closer and closure of the sternum by four steel wires.

The total time of the CPB was 292 minutes, the duration of the aortic clamping of 46, circulatory arrest of 48 minutes and the lowest temperature of 17° 5.

The postoperative course was haemodynamically sequential. However the patient presented in the suites:

- a syndrome of lodges at the level of the left lower limb due to a long operation with cannulas obstructing the femoral artery, which required aponeurotomy of discharge;



**Figure 1.** Thoracic CT after injection of the contrast product in axial and sagittal section showing a traumatic aneurism image of 2.2 cm at the posterior wall of the ascending aorta.



**Figure 2.** Intraoperative image.

- edema of the left upper limb in relation to ligation of the venous trunk;
- acute renal failure on rhabdomyolysis;
- a pericardial effusion tamponade with 10 minutes cardiac arrest recovered after evacuation and pericardial drainage;
- a left partitioned hemothorax removed by thoracotomy; infectious complications in *E. coli*, *S. Maltophilia* and *A. Baumannii*.

### 3. Discussion

Traumatic fractures of the aorta are the most frequent lesions of the large vessels of the mediastinum [1]. The only prospective study conducted by Fabian et al [2] showed that approximately 15% to 23% of road accident victims die each year from a traumatic rupture of the aorta. A percentage of 80 to 85 died immediately at the scene of the accident, during transportation or emergencies [3] [4].

The mechanisms involved in traumatic lesions of the thoracic aorta are mainly related to deceleration or acceleration resulting in laceration of the wall at the transition zones between a mobile aorta and the aorta is fixed or more rigid [5]

[6]. Thus, the aortic isthmus is the most frequent location of traumatic rupture of the aorta; it represents 90% to 98% in the surgical series and 40% to 45% in the autopsy series [7] [8]. The distal descending thoracic aorta is the second location in frequency 7% to 12%, the ascending thoracic aorta 0% to 3%. Multiple localizations: isthmus + descending thoracic aorta, isthmus + aortic arch are also possible.

The rupture of the ascending thoracic aorta extended to the aortic arch is exceptional and has not been described in the literature to our knowledge. In this case, our patient had a rupture of the ascending thoracic aorta extended to the butt. The challenge is not to ignore or underestimate this exceptional form of post-traumatic rupture of the thoracic aorta by systematically analyzing the entire aortic axis. The diagnosis of RTA has largely benefited from the generalization of computed tomography (CT). The direct signs of rupture of the aorta whatever the location are: the mediastinal hematoma in continuity with the aorta, the false aneurysm, and the irregularity of the aortic contour, the intimal flap [9]. In our observation we had a champagne cork image at the level of the ascending aorta extended to supra-aortic vessels. Due to the hemodynamic instability at admission, surgical treatment with sternotomy was performed urgently by the placement of an aortic prosthesis (right tube + butt) with reimplantation of the brachiocephalic arterial trunk and left carotid with good evolution on a decline of 10 years.

#### 4. Conclusion

The post-traumatic rupture of the ascending thoracic aorta extended to the butt is exceptional but should not be ignored and should be systematically sought. His diagnosis has been improved by advances in radiology, including CT angiography and prognosis, thanks to the speed of transport to specialized hospital facilities and early management.

#### Conflicts of interest

We authors of this article declare that there is no conflict of interest.

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