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Case Report

Extraction through Minimal Invasive Partially Video-Assisted Anterolateral Right Thoracotomy of a Voluminous Left Atrial Thrombus Due to Unregulated Warfarin Treatment

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ABSTRACT

A 62-year-old female patient with history of atrial fibrillation and protein C and S deficiency was admitted for acute dyspnea. Laboratory control demonstrated an unregulated warfarin treatment. Transthoracic echocardiography and computed tomography revealed a giant left atrial thrombus and a severe mitral stenosis. The day after admission a full body tomography revealed spleen emboli and non-violation of hematoencephalic barrier. Surgical thrombus extraction and mitral valve replacement were successfully performed by minimal invasive, partially video-assisted, right anterolateral thoracotomy. Echocardiographic control after two months showed no evidence of residual thrombus. Massive left atrial thrombosis must be operated urgently because of the imminent risk of embolization. The described technique represents a good compromise between full video-assisted port-access surgery and traditional midline sternotomy.

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Introduction

The presence of a left atrial thrombus in patients with atrial fibrillation is relatively common (5-15%) and in most of the cases it does not necessitate a special treatment except anticoagulation therapy [1-4]. However, there is evidence that giant and mobile thrombi are of increased risk of thromboembolisation. In these cases, urgent surgical extraction of atrial thrombus is recommended [4].

Case Report

We report the case of a 62-year-old woman with history of atrial fibrillation and protein C and S deficiency. She was referred to our hospital for investigation of fatigue and progressive dyspnea. From her medical history a pulmonary embolism, a fully recovered stroke, an arterial hypertension and an insufficiently anticoagulated atrial fibrillation are to be retained. On her arrival she had normal hemodynamic parameters. The physical examination revealed a cardiac diastolic murmur. Pulmonary auscultation was normal. Electrocardiography confirmed the atrial fibrillation. Transthoracic echocardiography revealed a mitral valve stenosis with a mitral

estimated surface of 1.1cm² and a voluminous left atrial thrombus which was attached on the atrial wall. A whole-body CT-scan confirmed an enormous left atrial thrombus (7x5cm) with asymptomatic spleen emboli. The thrombus occupied more than half of the volume of the dilated left atrium (11 x 7cm) and it was attached to its posterior wall (Figure 1). No cerebral embolization was revealed and the hematoencephalic barrier was intact. Given the impressive volume of the thrombus and the presence of spleen emboli a surgical extraction of the thrombus was decided in a semi urgent procedure. Surgical thrombus extraction, mitral valve replacement and a simplified MAZE procedure (Figure 2) for the control of atrial fibrillation were successfully performed by a minimal invasive, partially video-assisted, right anterolateral thoracotomy on cardiopulmonary bypass (Figure 1d, 1e & 1f). Given her thromboembolic medical history a biological mitral valve was placed. On the exit from the operating theatre the patient had a normal sinus rhythm, however, during hospitalization she returned to atrial fibrillation. The patient was discharged from the hospital uneventfully 11 days after the intervention after optimization of her oral anticoagulation therapy. The control transthoracic echocardiography 2 months after surgery revealed no residual atrial thrombosis (Figure 1c).

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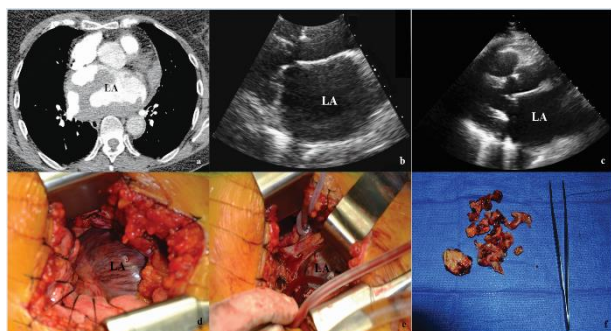


Figure 1: **a)** Admission thoracic computed tomography revealing a voluminous thrombus in a dilated LA. **b)** Transthoracic echocardiography revealing a thrombus in the LA. **c)** Transthoracic echocardiography 2 months after the thrombus extraction showing no residual LA thrombosis. **d)** LA exposure after right thoracotomy. **e)** LA after-thrombus extraction. **f)** Anatomic pathology specimen of LA thrombus. LA= Left Atrium.

Surgical Technique

Concerning our surgical access attitude, we opted for a 10cm right anterolateral thoracotomy. Cardiopulmonary bypass was assured by a right femoro-femoral arteriovenous cannulation. Placement of the aortic cross clamp and introduction of the needle for cardioplegia was assisted by a videoscope placed through the main incision for better vision of the ascending aorta. Moreover, aortic clamp was placed through a separate skin incision of 1.5cm in the second intercostal space. The main operation was performed on direct vision using long instruments. After the mitral valve replacement, a modified Cox's Maze procedure was performed. An ischemic, over-locked, suture was performed as demonstrated in Figure 2 which isolates the left pulmonary veins, occludes the left auricle and partially isolates the mitral orifice from the right pulmonary veins. We believe that it is a good alternative to a traditional Maze procedure. Its advantage is that it is less time consuming (6-10 minutes of complementary extracorporeal circulation) and it is feasible through a minimal invasive right thoracotomy. We use this technique in patients on atrial fibrillation who do not accomplish the criteria of reimbursement for the relatively expensive material of ablation of atrial fibrillation. The time on cardiopulmonary bypass was 153 minutes and the cross-clamp time 97 minutes. This approach permits an excellent exposure of the left atrium and the mitral valve with an excellent esthetic result.

Discussion

Left atrial thrombus is a relatively frequent complication of atrial fibrillation (5-15%). Bibliography demonstrates a correlation between thrombus' size and mobility and the embolization risk. More voluminous and mobile thrombi are accompanied by higher embolization rate [2, 4]. The place of surgical excision of atrial thrombi is unclear and no specific guidelines exist. In a recent study [4], patients with atrial fibrillation and previous embolic history were followed by transoesophageal echocardiography. In these patients, authors found a 10% rate of atrial thrombosis. Thrombi were classified in terms of their mobility. A strong correlation was found between mobile ball type thrombus and embolization. Forty percent of patients with this type of thrombus presented an embolization within a year. The overall one-year embolization risk in this series was 15%. Authors found that

demographic risk factors for embolization were smoking history, congestive heart failure and the presence of rheumatic disease. In their conclusions, they proposed a surgical approach in patients with ball type mobile atrial thrombi [4].

In our opinion, every surgical approach must be as less invasive possible, as long as there is no compromise in terms of surgical efficiency. The advantage of the described technique compared to the total video-assisted port-access technique is that there is no need for lung exclusion, no need for extra incisions to place any trocar and it is less time consuming [5]. As a result, it can be used in centers of cardiac surgery which do not have the critical number of mitral valve procedures per year to support a full port-access technique. Moreover, direct manipulation of the thrombus through a slightly longer main incision reduces the risk of thrombus fragmentation which increases the perioperative embolization risk. Through this access the same procedure can be performed as through a midline sternotomy except for a complete Cox's Maze procedure. However, in our institution we have abandoned this technique because of its complexity. Instead, we perform a modified technique as described in the surgical technique part of the article.

In conclusion, we believe that the above-mentioned surgical technique represents a good compromise between a classic midline sternotomy and a full video-assisted port-access right thoracotomy for the surgical extraction of left atrial thrombus and mitral valve replacement. Moreover, the surgical exposure through this approach is better than a midline sternotomy when the mitral and tricuspid valve has to be approached, especially when the left or right atrium is not dilated. It is a safe, reproducible surgical technique, with no need for special surgical equipment. It permits a minimal invasive approach with no compromise on the quality of the surgical procedure even in centers of cardiac surgery that have not the possibility or the critical number of patients to develop a full port access approach. Furthermore, it might be a good intermediate step between classic thoracotomy and the through port technique.

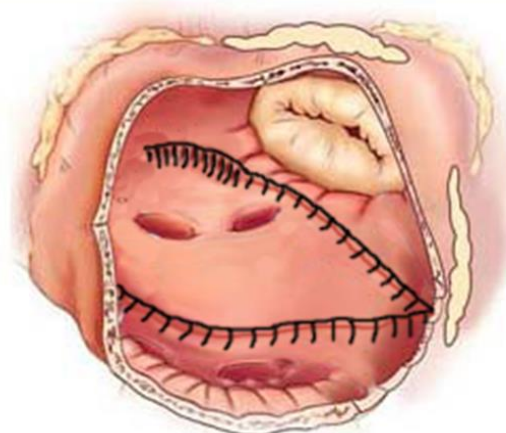


Figure 2: Modified technique of MAZE procedure through right anterior minithoracotomy. An ischemic suture isolates the left pulmonary veins, occludes the left auricle and partially isolates the mitral orifice from the right pulmonary veins.

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