

Figure 2. Histopathologic findings of myxomas.

the inflow of the right ventricle and produces right ventricular outflow obstruction, is rare,⁴ and the presence of 2 myxomas originating in the right ventricle involving both right ventricular inflow and outflow tract has never been reported. Symptoms may be variable and are determined by the tumor location and size.

Inflow or outflow obstruction, embolism, syncopal episodes, and arrhythmias are the most common.⁵ After the diagnosis of acute right ventricular obstruction resulting from a cardiac mass, prompt surgical resection is indicated because of imminent embolization and inflow or outflow obstruction, resulting in sudden death. Several surgical techniques have been suggested, but in each case it depends on the site of the tumor.

This case report highlights the fact that right ventricular outflow obstruction associated with episodes of syncope during exercise may be related to a cardiac myxoma, despite the right-sided, very low incidence of this tumor. Transesophageal echocardiography accurately identifies the presence of right ventricular multiple tumors and aids the surgical procedure.

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Origin of atrial fibrillation from the pulmonary veins in a mitral patient

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In mitral patients the origin and mechanisms of atrial fibrillation are largely unknown. Even though several theories have been postulated for its origin, there is scarce evidence to support them. Surgical procedures that electrically isolate the pulmonary veins from the left atrial chamber are associated with a very high success rate. We report a case of a mitral patient with permanent atrial fibrillation who underwent mitral valve replacement and extended bilateral isolation of the pulmonary veins using intraoperative radiofrequency ablation. After surgery,

bidirectional electrical block from the right pulmonary veins was documented.

Postoperative epicardial recordings and Holter monitoring showed paroxysmal tachycardia limited to the atrial cuff of the right pulmonary veins while the patient remained in stable sinus rhythm.

Clinical Summary

This 56-year-old female patient had severe mitral valve stenosis with moderate regurgitation, tricuspid regurgitation, and permanent atrial fibrillation of 10 months' duration. She was in New York Heart Association class functional II, with a peak systolic pulmonary artery pressure of 50 mm Hg and moderate tricuspid regurgitation.

Under cardiopulmonary bypass and moderate hypothermia, the mitral valve was replaced, preserving the posterior leaflet, with a St Jude Medical 27 prosthesis (St Jude Medical, Inc, St Paul, Minn), and the tricuspid valve was repaired with a Kay annuloplasty.

Myocardial protection was achieved with antegrade and retrograde blood cardioplegia. Before the valve procedure, extended bilateral isolation of pulmonary veins as previously described by

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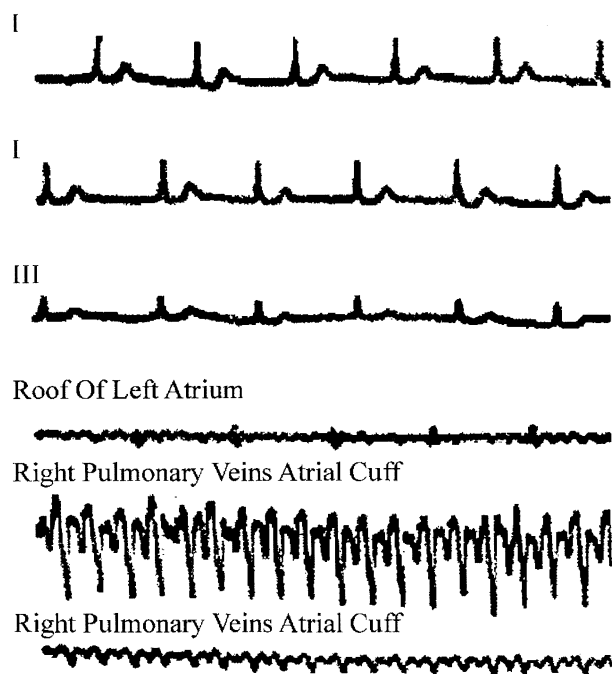


Figure 1. Second postoperative day recording. The first 3 upper traces are surface electrocardiograms (DI and DIII), and the next 3 are epicardial. The fourth is from the left atrium, and the fifth and sixth are from the right pulmonary veins.

some of us¹ was performed using radiofrequency ablation with a temperature-controlled catheter (Cobra, Boston Scientific, San Jose, Calif). The left atrial appendage was suture-closed from inside the atrium. Crossclamp and cardiopulmonary bypass durations were 122 and 102 minutes, respectively. Prophylactic treatment with amiodarone was initiated during surgery.

Before closing the chest, 3 bipolar temporary pacing wires (Streamline 6495; Medtronic, Minneapolis, Minn) were inserted: one in the roof of the left atrium, one in the midpart of the right atrium, and the last inside the encircled portion of the right pulmonary veins.

Bipolar pacing thresholds from the right atrium and left atrium were 0.8 and 0.6 mAmp, respectively. From the right pulmonary veins cuff, using a maximum output of 20 mAmp, pacing was not possible. The postoperative course was uneventful; the patient required assisted ventilation for 12 hours and blood drainage was 500 mL. The patient regained and maintained sinus rhythm after surgery.

Thirty-six hours after surgery, recordings using the wires connected to 3 different epicardial locations were performed (Figure 1). The patient was in normal sinus rhythm, but still the right pulmonary veins cuff was in atria tachycardia/atrial fibrillation. From the third to the fifth postoperative day, Holter monitor recording using the epicardial wires was performed. Except for a short period of similar tachycardia in the right pulmonary veins cuff, the patient remained in sinus rhythm all the time (Figure 2).

The patient was discharged on the sixth postoperative day and 3 months after surgery remains in sinus rhythm.

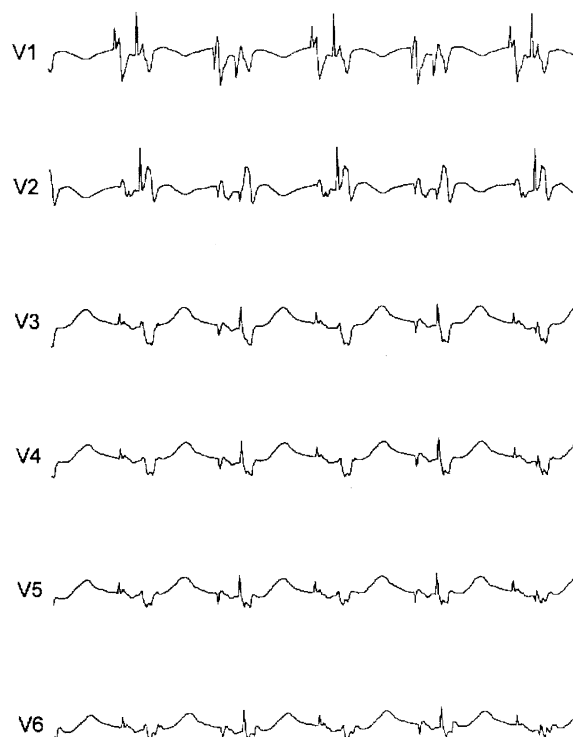


Figure 2. Extracts from 6-lead ambulatory electrocardiogram on the fifth postoperative day. V1 and V2 leads are connected to wires, which are connected into the encircled portion of the right pulmonary veins.

Discussion

The mechanisms underlying the origin of atrial fibrillation remain to be fully understood. Observations from the last 5 years challenge the dominant concept of multiple wavelet reentry mechanisms of the early 1990s.² Interestingly, in mitral patients, these mechanisms have never been fully investigated. The pulmonary veins as the point of origin or perpetuation of atrial fibrillation was postulated in 1924³ and clinically evident in 1998.^{4,5} Still there has been no report on the specific events leading to atrial fibrillation in mitral patients. Using direct epicardial readings from the 2 atria, after radiofrequency ablation we documented an electrical block line around the right pulmonary veins. The excluded area of the atria showed self-terminating episodes of pulmonary vein tachycardia with no effect on the heart rhythm.

These findings prove that in selected patients, the connection of the right pulmonary veins to the atria is responsible for an increased excitability, likely related to the presence of much shorter refractory periods of the myocytes in the area.

Further studies are required to fully understand the role of the contralateral pulmonary veins and additional mechanisms that may be present, either in patients with lone atrial fibrillation or with atrial fibrillation and concomitant heart disease.

Atrial readings from the epicardium are easy and useful; they will help improve our knowledge of the origin and maintenance of atrial fibrillation in patients undergoing cardiac surgery. The data obtained from these patients are of utmost importance as they will

lead to better understanding of the current concepts about atrial fibrillation.

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Combined repair of an aortic arch aneurysm by sequential transposition of the supra-aortic branches and endovascular stent-graft placement

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Surgical repair of aortic arch aneurysms still is an invasive procedure requiring arch replacement during deep hypothermic circulatory arrest.^{1,2} Endovascular stent-graft placement is a safe and effective treatment modality in various diseases of the descending aorta.³⁻⁷ However, if supra-aortic branches are involved, the application of endovascular stent-graft placement requires sophisticated surgical approaches to maintain cerebral perfusion.⁸⁻¹¹ We report an 80-year-old man who had a contained rupture of an aortic arch aneurysm involving the origin of the left carotid artery. The patient was treated by sequential transposition of the left carotid artery into the brachiocephalic trunk and the left subclavian artery into the previously transposed left common carotid artery, with subsequent endovascular stent-graft placement into the aortic arch.

Clinical Summary

An 80-year-old man was admitted to our department with a contained rupture of an aortic arch aneurysm. A preoperative 3-dimensional computed tomography (CT) scan revealed that the aneurysm had a maximum diameter of 8 cm (Figure 1, A). In the operating room, a median sternotomy was performed and the pericardium opened. We found a hemorrhagic pericardial effusion,

indicating the development of a retrograde hematoma within the ascending aorta. To keep the procedure as minimally invasive as possible, the concavity of the aortic arch was sealed with local hemostyptic agents. After systemic heparinization with 5000 IU, the left common carotid artery was dissected free and clamped. The vessel was divided transversely. The proximal portion was closed with a 4-0 Prolene running suture (Ethicon, Inc, Somerville, NJ). At the next step, the brachiocephalic trunk was partially clamped and longitudinally opened, and a side-to-end anastomosis was performed. After flushing and deaeration, blood flow was restored. A similar procedure was performed between the left subclavian artery and the previously transposed left common carotid artery. A chest tube was inserted and the wound was closed in layers. The patient recovered uneventfully without any signs of neurologic injury.

The next day the patient was taken to the interventional radiologists' suite. General anesthesia was administered and the common femoral artery was dissected free. A 5F-calibrated angiographic pigtail catheter was advanced via the right brachial artery into the aortic arch to reconfirm the morphology and extent of the aneurysm (Figure 1, B). After systemic heparinization with 5000 IU, a common femoral artery arteriotomy was performed and the delivery system was advanced under fluoroscopic guidance until the tip reached the origin of the brachiocephalic trunk. Thereafter, 3 Talent stent grafts (Medtronic, Sunrise, Fla) were inserted into the aortic arch. The stent grafts were deployed by quick withdrawal of the outer sheath while the pusher mandrel was held firmly. At the final angiography, a small type 1 endoleak was observed. The procedure was discontinued and the endoleak was monitored. After 1 week the patient was readmitted for the final 3-dimensional CT scan and angiography. Interestingly, the leak had occluded spontaneously (Figure 2, A and B).

Comment

This is the first clinical report of a combined sequential autologous transposition of the left common carotid artery into the brachio-

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