surgeon to work with confidence so blood vessel size does not limit surgical options [5]. Microbipolar electrocautery technique (Codman/Malis Microbipolar Electrocautery System; Codman & Shurtleff, Inc, Division of Johnson & Johnson Co, Inc, Randolph, MA) using a highly controlled power source permits microdissection, tumor desiccation, tumor shrinkage, and microhemostasis to be accomplished with one instrument. The Cavitron Ultrasonic Tissue Aspirator (CUSA System 200 Ultrasonic Dissection; Cooper Medical Corp, Mountain View, CA) integrates a tumor morcellizer and an irrigation/aspiration device into a single angled handpiece that can be used in the microsurgical field. Use of CUSA allows extremely precise definition of surgical planes, reduces resection time, and causes minimal trauma to surrounding critical structures [6].

Our experience with the application of microneurosurgical dissecting equipment indicates that these instruments offer advantages in the surgical treatment of cardiac tumors. The operating microscope provided us unparalleled clarity of cardiac anatomy, maximizing the ability of the ultrasonic tissue dissector/morcellizer to delineate blood vessels and tissue planes. Microbipolar electrocautery was extremely important in the acquisition of hemostasis. Our experience supports further use of this instrumentation for accurate visualization, reduced resection time, and minimal trauma to surrounding critical structures.

References


Schwannoma of the Left Atrium: Diagnostic Evaluation and Surgical Resection

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A case of primary benign schwannoma of the left atrium is reported. A 35-year-old man presented with new onset atrial fibrillation. Noninvasive evaluation revealed a 4 × 7-cm mediastinal mass either directly posterior to or involving the left atrium. The histologic diagnosis and specific location of the mass were established by incisional biopsy through a left thoracotomy. On cardiopulmonary bypass the tumor was resected by widely excising the posterior left atrium. The residual 20-cm² left atrial defect was patched with pericardium. This unusual case illustrates that left atrial tumors originating near the pulmonary veins may be nonmyxomatous neoplasms of neural origin. Diagnosis may be difficult and require a surgical transthoracic approach.


Benign nonmyxomatous tumors are uncommon cardiac neoplasms. Fibromas, rhabdomyomas, hamartomas, papillomas, teratomas, lipomas, and mesotheliomas have all been reported [1-4]. Most of these tumors present in infants or young children. Their main anatomic feature is involvement of the atrioventricular valves or ventricular myocardium, and their main clinical feature is resolution without surgical intervention. Nerve sheath neoplasms of the heart are extremely rare. There are several individual accounts of malignant cardiac neurilemomas, but only 3 cases of benign schwannoma of the heart have been reported [5]. Recently, we encountered a benign schwannoma of the posterior left atrium that posed unusual diagnostic and therapeutic challenges.

A 35-year-old healthy nonsmoking man presented with a history of exertion-related paroxysmal atrial fibrillation.
Digoxin failed to control the fibrillation and attempts at treatment with other antiarrhythmic drugs were complicated by ventricular dysrhythmias. Initial transthoracic echocardiography revealed a bicuspid aortic valve but no other abnormalities. The patient's atrial fibrillation resolved with β blockade. Fourteen months later atypical chest pain developed in the patient. Exercise electrocardiogram revealed no ischemia. Transthoracic and transesophageal echocardiography now revealed a 5-cm mass posterior to or possibly involving the left atrium. Magnetic resonance imaging confirmed these findings but the location of the mass relative to the esophagus and posterior wall of the left atrium could not be discerned (Fig 1). Contrast esophagogram revealed extrinsic compression but no abnormalities within the esophageal lumen.

Esophagoscopy and bronchoscopy in the operating room revealed no identifiable intrinsic or extrinsic abnormalities. A small posterolateral left thoracotomy was performed, and the mass was found to be intrapericardial. The pericardium was opened posterior to the phrenic nerve and the protruding tip of a solid tumor was found originating from the posterior left atrium. Frozen section of a 1-cm² incisional biopsy specimen showed a spindle cell neoplasm. The operation was terminated to await final pathologic diagnosis and plan for definitive resection with cardiopulmonary bypass.

Pathologically, most of the tumor consisted of monotonous, bland, spindled-shaped cells that were separated from each other by abundant extracellular matrix material (Fig 2A). Some regions were more cellular and displayed nuclear palisading (Antoni type A; Fig 2B). The immunophenotype of the cells was consistent with that of a schwannoma (positive with antibodies for S-100, nerve growth factor receptor, type IV collagen, and vimentin; negative for cytokeratins and muscle-specific actins). The ultrastructural features were also those of a schwannoma (Fig 2C). The cells were invested in basal lamina and exhibited numerous cell processes. The tumor infiltrated focally the myocardium adjacent to normal epicardial peripheral nerve twigs. It was considered benign based on the absence of cytological atypia, mitotic figures, and necrosis.

Three weeks after the biopsy the patient underwent median sternotomy and resection of the tumor on cardiopulmonary bypass. A 5-cm oval solid mass was found originating from the posterior left atrium between the inferior pulmonary veins and adjacent to and distorting the coronary sinus. To prevent injury, the coronary sinus was stented with a coronary sinus cardioplegia catheter (DLP, Grand Rapids, MI). After cardioplegic arrest was accomplished, the apex of the heart was retracted cephalad and the entire tumor was resected from the left atrium posteriorly by incising normal atrium outside the apparent base of the tumor. The tumor was broad-based and occupied most of the posterior wall of the left atrium without clearly involving the pulmonary veins. The defect in the posterior wall of the atrium was replaced with a 20-cm² patch of pericardium. Final pathologic examination showed benign schwannoma with extension in one area to the resected margin. The patient recovered and was discharged 6 days postoperatively. Beta blockers were discontinued at 1 month and atrial fibrillation has not recurred in 8 months. Six months postoperatively, magnetic resonance imaging and transthoracic echocardiogram showed no evidence of tumor recurrence.

**Comment**

Surgical resection is usually indicated only for symptomatic valve or chamber obstruction for nonmyxomatous benign tumors in children, but in adults, a more aggres-
sive surgical approach is warranted [1]. Both myxomatous and nonmyxomatous benign tumors may continue to grow and compress or occupy the cardiac chambers. Thromboembolism, congestive heart failure, or sudden death may occur. For this reason, complete excision should be performed soon after diagnosis regardless of symptoms.

This tumor originated from the left atrium and extended outside rather than inside the atrial chamber. As a consequence, neither systemic embolization of tumor fragments nor atrioventricular valve obstruction occurred. Instead, the tumor caused abnormal left atrial conduction that set the stage for paroxysmal atrial fibrillation. Therefore, careful evaluation of any young adult with atrial fibrillation should be considered so that curable lesions of the heart may be found before life-threatening complications occur.

Despite the use of transesophageal echocardiography, magnetic resonance imaging, bronchoscopy, and esophagoscopy, the relationship of this tumor to the left atrium anteriorly and the esophagus posteriorly could not be discerned. To determine the location of the mass, to obtain adequate tissue for histologic diagnosis, and possibly to provide a route for surgical resection if the tumor did not involve the heart, a thoracotomy approach was used initially. Recent reports have shown that video thoracoscopy can be used safely for pericardial drainage and biopsy of intrapericardial masses [6]. In this case thoracoscopy would have allowed adequate localization and biopsy with less morbidity than a thoracotomy; thoracoscopy will be our preferred approach to similar patients in the future.

The goal of therapy for benign posterior left atrial tumors in adults is complete resection of tumor followed by appropriate surgical reconstruction of the heart with autologous pericardium or synthetic patch. Careful pre-operative and intraoperative assessment must be done to determine if there is involvement of the atrioventricular valves, coronary arteries, coronary sinus, or pulmonary veins. This may complicate resection and require that a more complex reconstruction, such as aortocoronary bypass graft or coronary sinus repair, be performed. Extensive involvement of the coronary sinus or atrioventricular valves might preclude resection, and may require orthotopic transplantation for cure.

We did not use the classic left atrial incision in Sonnegaard groove. Instead, the anatomic relationship of the tumor to the coronary sinus and the atrioventricular groove was easier to identify by tilting the heart cephalad and performing the resection from outside the left atrium. Inferior vena cava or pulmonary vein disconnection may be required to facilitate this exposure but was not necessary in this case. Cardiac explantation followed by resection and reimplantation has been reported for large posterior left atrial tumors but should be used only in unusual circumstances where exposure in situ is inadequate [1, 3].

Because the tumor was a benign, discrete mass, we based our resection on gross visual margins. Given its precarious location, we elected not to re-resect the left atrial margin that was found abutting the tumor on the final histologic examination. Despite the fact that there was no evidence of recurrence at 6 months postoperatively, long-term surveillance with echocardiography is essential, and if a local tumor recurrence is ever found, a treatment strategy of re-resection versus transplantation must be considered.

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Mitral Valve Replacement Using a Cryopreserved Mitral Homograft

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Mitral valve replacement, using a cryopreserved mitral homograft, was performed in a 49-year-old patient with calcified mitral stenosis. Postoperative course was uneventful. Transesophageal echocardiography performed 6 months later showed normal function of the mitral homograft.


The use of valvular homografts to replace the aortic valve has been developed with excellent long-term results [1]. Conversely, homografts in the mitral position have not led to a similar success. Encouraging studies were achieved in animals [2-4]. However, sporadic clinical cases in the literature usually report early failures that could be attributed to inadequate preservation methods or operative technical problems [5,6]. Recently, progress has been achieved in these two fields. The technique of cryopreservation has emerged as a superior procedure providing optimal viability of the valvular homografts [1]. Simultaneously the refinements made in mitral valve repair have enabled the surgeons to become familiarized with the reconstructive techniques involving the subvalvular apparatus of the mitral valve [7]. Preliminary experience of mitral valve replacement using a homograft in goats enabled us to develop a reliable technique of implantation. This case report describes a technique of mitral valve replacement using a cryopreserved mitral homograft in a patient.

A 49-year-old Algerian woman was hospitalized at Broussais Hospital for calcified mitral valve stenosis with a recent atrial fibrillation. Valve repair was attempted but was abandoned because of the rigidity of the valvular apparatus. Valve replacement using a homograft was thought to be possible because of a small ventricle and indicated as the patient could not be submitted to anticoagulation. The graft came from a heart explanted during a transplantation 4 months earlier. The whole mitral valve apparatus, comprising the papillary muscles (PM), the chordae tendineae, the leaflets, and the supporting muscular wall, had been removed and cryopreserved at the Assistance Publique’s tissue bank of St. Louis Hospital.