

## Resection of a Large Atrial Hemangioma Using a Bloodless Surgical Technique: A Case Report

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### ABSTRACT

We present a biatrial hemangioma in a Jehovah's Witness patient. Hemangioma is extremely rare, accounting for 1% to 2% of benign cardiac tumors. Complete resection of a large hemangioma is mandatory due to its potentially life-threatening risk. In Jehovah's Witness patients, it is necessary to employ bloodless surgery protocols to maximize the patient's outcome. Our patient had undergone 6 weeks of monitoring and erythropoietin therapy prior to surgery, raising her hemoglobin level from 11.6 g/dL to 16.8 g/dL. Intraoperative bloodless surgical protocols as well as a continuous blood circuit were utilized. The patient's hemoglobin level on postoperative day one was 14.5 g/dL; one year postsurgery, the patient was symptom free.

### INTRODUCTION

Primary neoplasms of the heart are rare, and three quarters are benign. Myxomas account for about half of all benign cardiac tumors. Hemangioma is extremely rare, accounting for 1% to 2% of benign cardiac tumors, with an incidence rate of 0.0017% reported in an autopsy series [Strauss 1945]. Hemangioma can occur at any age and at any location in the heart, most commonly arising from the left and right ventricles. Patients may be asymptomatic, and symptoms that do occur depend on the location, size, and mobility of the tumor and include dyspnea, arrhythmias, angina, pericarditis, congestive failure, or sudden death. Diagnosis is usually made by echocardiogram or computed tomography scan. Coronary angiography may reveal a characteristic "tumor blush." Although spontaneous resolution or regression has been reported [Palmer 1986; Chang 1992], complete resection is usually needed for symptomatic patients because of the potentially life-threatening

risk. The results and prognosis have been favorable with a low recurrence rate, even with incomplete resection. We report a challenging case of a Jehovah's Witness with a large biatrial hemangioma that was successfully resected using a bloodless technique.

### CASE REPORT

A 69-year-old Jehovah's Witness woman complained of palpitations and mild dyspnea on exertion. Physical examination was significant only for a blood pressure of 140/90 mmHg and a regular heart rate of 80. Electrocardiogram showed normal sinus rhythm. Chest roentgenogram was normal. A computed tomography scan and transthoracic and transesophageal echocardiograms showed compression of the right atrial lumen by a large cystic mass associated with the right atrial wall (Figure 1). Her left ventricular function was normal. Results of coronary angiography were normal. She was referred for tumor resection. A bloodless surgical technique was utilized. Her initial preoperative hemoglobin level was 11.6 g/dL. Her ferritin was 307 ng/mL, and she did not require iron supplementation. She underwent 6 weeks of preoperative erythropoietin injection therapy (40,000 units/week for 3 weeks, then 60,000 units/week for 3 weeks), which brought her hemoglobin level to 16.8 g/dL preoperatively.

Intraoperative blood conservation techniques utilized included full-dose aprotinin, autologous normovolemic hemodilution with sequestration of 3 units of whole blood prior to cardiopulmonary bypass (CPB), intraoperative cell saver with salvage of pump blood, retrograde autologous priming of the CPB circuit, and use of 3/8-inch tubing for venous return.

The autologous blood is drained from the cordis introducer into citrate hematologic bags with the aid of gravity and placed below the patient. The blood is returned to the patient without ever breaking the circuit by elevating the bags above the patient and transfusing through the same drainage line. The patient is given crystalloid to maintain hemodynamic stability. The intraoperative bloodless surgical technique includes the use of only a single gauze sponge throughout the surgery to limit blood loss due to absorption; meticulous surgical technique; and application of thrombin and collagen sealants to the sternal bone marrow to limit

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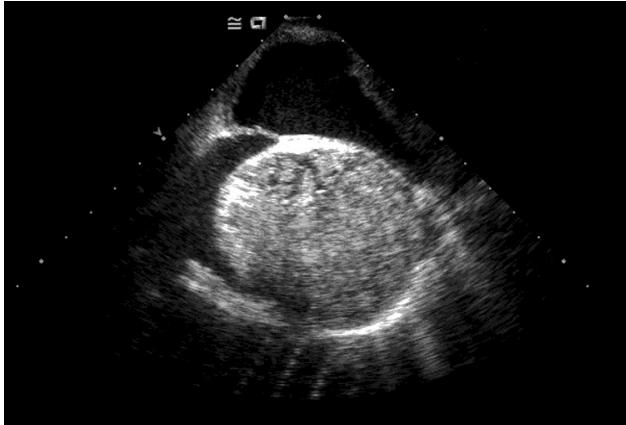


Figure 1. Transesophageal echocardiogram demonstrating a 6.0 × 5.0 × 3.1 cm hemangioma arising from the right atrium and involving the left atrium and atrial septum.

sternal bleeding. After median sternotomy, the patient was placed on bypass with the superior and inferior vena cava cannulated separately. The myocardium was protected using antegrade cold blood cardioplegic arrest initially cooled to a mixed venous temperature of 32°C. A reddish oval-shaped large tumor was found arising from the right atrial wall. Excision required removal of the sinus venosus portion of the interatrial septum, most of the lateral wall and inferomedial wall of the right atrium, and the roof of the left atrium. A partial neo-atrial septum was created by reapproximation of the roof of the left atrium to the medial wall of the right atrium, and we closed the remaining defects in the atrial septum and lateral wall of the right atrium with separate bovine pericardial patches. The tumor measured 6.0 × 5.0 × 3.1 cm. Sectioning revealed soft spongy dark-red tissue that exuded a marked amount of blood and some firm tan areas. The final pathological report incated that it was a cavernous hemangioma involving the pericardium and myocardium (Figure 2). The total estimated blood loss was 100 mL. Total intravenous Lactate Ringer's fluid given during the surgery was 4200 mL, cell saver was 750 mL, and total urine output was 2600 mL. The bypass time was 142 minutes and cross-clamp

time was 112 minutes. On the first postoperative day, the patient's hemoglobin level was 14.4 g/dL. Vital signs were stable, and she was extubated; the total volume input was 1157 mL and total volume output was 3380 mL, including a chest tube output of 240 mL. The patient's chest tube and pacing wires were removed on postoperative day 2. Postoperative phlebotomy was minimized in frequency and pediatric blood tubes were used exclusively. The patient had an uncomplicated recovery postoperatively and was discharged home on postoperative day 8. At one-year follow-up, the patient's echocardiogram revealed she was symptom free with no tumor recurrence.

## DISCUSSION

Nearly 20% of blood transfusions in the United States are associated with cardiac surgery [Shander 2005]. With increasing awareness of the risks associated with blood transfusion, bloodless surgical techniques have gradually gained in popularity and importance due to both increasing patient demand for personal and religious reasons and pressure to preserve the dwindling blood supply.

Bloodless cardiac surgery involves a multidisciplinary approach, institutional support, and coordinated teamwork involving perfusionists, anesthesiologists, hematologists, nurses, and surgeons. Bloodless surgery usually consists of perioperative blood conservation and intraoperative bloodless surgical techniques [Rosengart 1997; Alexi-Meskishvili 2004; Sutton 2004]. All our patients are seen by a hematologist preoperatively as part of a comprehensive bloodless surgery program to optimize the patient's hemoglobin level with a 6-week high-dose erythropoietin injection and iron supplement. Many patients also receive erythropoietin therapy postoperatively if needed. Our strategy is to achieve a hemoglobin level of approximately 16 g/dL prior to surgery in adult patients. Intraoperative prime normovolemic hemodilution prior to CPB, cell saver "maximal" volume autologous blood donation, rapid autologous priming of the CPB circuit using a low prime miniature perfusion circuit, and aprotinin are also routinely used. Postoperative limited blood sample drawing with pediatric blood tubes also helps to decrease

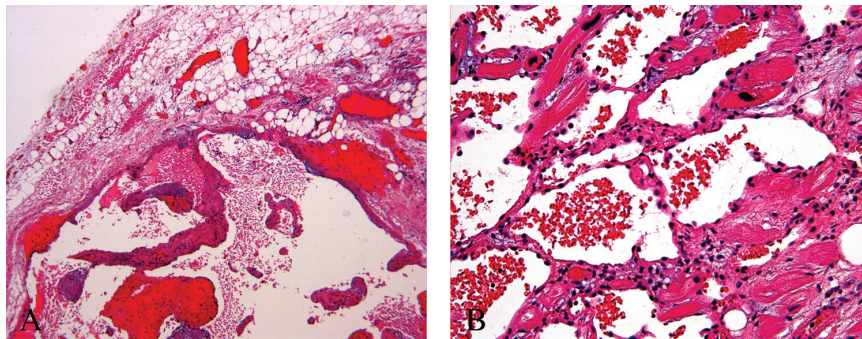


Figure 2. A, Large irregular endothelial-lined vascular channels consistent with cavernous hemangioma pushing against the epicardial fat. B, Cavernous hemangioma spaces are found between myocytes.

some unnecessary blood loss. Intraoperative single-gauze technique and meticulous surgical dissection not only help to avoid unnecessary blood loss during the surgery, but also reduce the risk of postoperative internal bleeding, thus hastening the patient's recovery. With increasing application of blood conservation techniques, complex open heart surgery can be safely performed without homologous transfusion in an increasing proportion of patients.

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