

## CASE REPORT

# Giant Right Atrial Myxoma: The Importance of Transesophageal Echocardiography during Diagnosis, Evaluation, and Resection

<sup>1</sup>Elizabeth Ungerman, <sup>2</sup>Wendy Haft**ABSTRACT**

Most cardiac tumors are benign myxomas, and are most commonly found in the left atrium. Such tumors are identified either during symptomatic workup or found incidentally. We present a case in which a patient with recurrent transient ischemic attacks and syncope was found to have a giant right atrial myxoma with subsequent right atrial outflow obstruction. The mass was initially diagnosed on transthoracic echocardiography and its full scope was detailed utilizing transesophageal echocardiography (TEE). With swift intervention, the mass was successfully removed with the help of TEE guidance and the patient made a full recovery. The importance of TEE both preoperatively and intraoperatively during resection of giant cardiac masses is highlighted.

**Keywords:** Atrial masses, Cardiac tumors, Myxoma, Transesophageal echocardiography.

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**INTRODUCTION**

Cardiac tumors are uncommon with an overall frequency of 15% when found with echocardiography and 0.002 to 0.3% with autopsy.<sup>1</sup> Over 50% of cardiac masses diagnosed are benign myxomas, with the highest incidence in young females and in the left atrium. Most myxomas arise from the interatrial septum and are asymptomatic. However, some patients do experience symptoms, such as arrhythmias, syncope, congestive heart failure, fatigue, or emboli to distant sources. Additionally, some myxomas have been associated with interleukin-6 release, which can lead to an inflammatory response and subsequent

hemodynamic instability.<sup>2</sup> Primary benign tumors generally have a good prognosis and low mortality rate following surgical removal. Our case report presents the findings of a patient diagnosed with a primary giant right atrial myxoma and the echocardiographic findings.

**CASE REPORT**

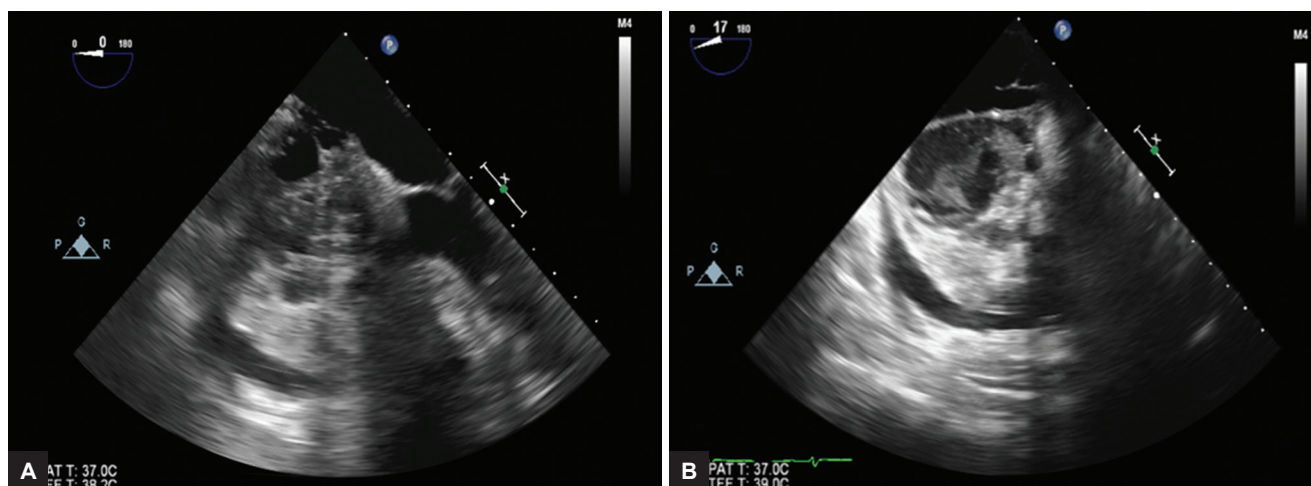
A 72-year-old male with multiple comorbidities presented with repeated falls, syncope, and transient ischemic attacks. Subsequent workup revealed no coronary artery or cerebrovascular disease. Transthoracic echo revealed a left ventricular ejection fraction of 60% and a large right atrial mass attached to the inferior portion of the right atrial free wall that was intermittently traversing the tricuspid valve. Cardiac magnetic resonance imaging (MRI) illustrated a large mass occupying 80% of the right atrium and confirmed involvement of the inferior free wall.

Given these findings, the patient was scheduled to undergo right atrial mass excision and possible tricuspid valve replacement. The patient was given a 1 L fluid bolus preoperatively in order to optimize preload prior to induction in the setting of a large right atrial mass causing right atrial outflow obstruction. He tolerated a slow, titrated induction. A transesophageal echocardiography (TEE) probe was placed following induction and used for guidance in obtaining vascular access. An introducer was placed in the right internal jugular vein under ultrasound and TEE guidance in order to avoid disruption of the mass by the guidewire or introducer. A Swan-Ganz catheter was placed for central venous pressure monitoring, and later pulmonary artery pressure monitoring, but was not advanced past 20 cm until mass removal. The precardiopulmonary bypass (CPB) TEE examination showed an 8.5 × 6 cm multilobulated right atrial mass adherent to the coronary sinus and interatrial septum and abutting the inferior vena cava (Figs 1A and B). The mass consisted of both solid and cystic components. Additionally, the mass was found to obstruct tricuspid valve outflow. The TEE also uncovered a dynamic patent foramen ovale with right-to-left atrial shunting that was dependent upon mass positioning.

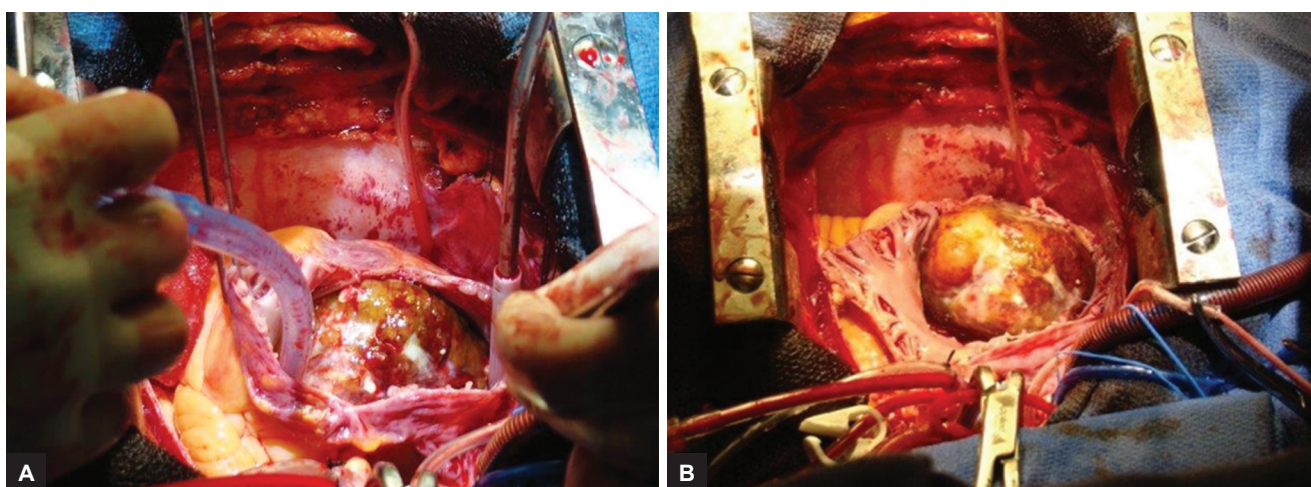
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**Figs 1A and B:** The TEE midesophageal four-chamber view of the giant right atrial mass comprised of cystic and solid components and causing obstruction of tricuspid valve inflow



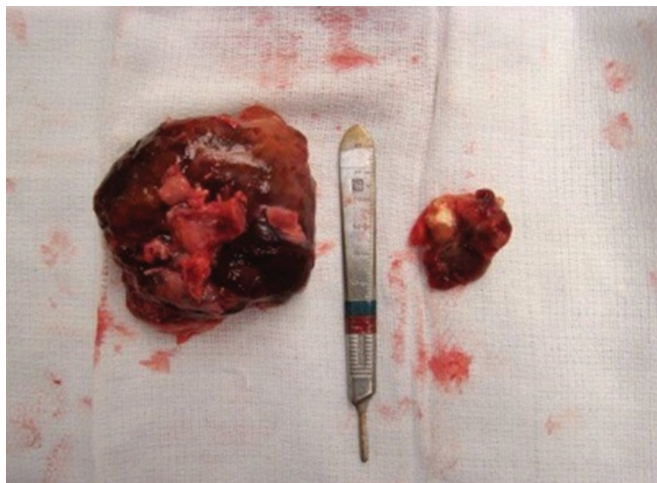
**Figs 2A and B:** View of the mass within the right atrium prior to complete excision

Following sternotomy and dissection, initiation of CPB was uneventful with bicaval cannulation. Surgical exploration of the right atrium revealed an  $8 \times 8 \times 10$  cm mass, which was resected (Figs 2A, B and 3). The tricuspid valve was spared. Total CPB time was 143 minutes, and aortic cross-clamp time was 97 minutes. The patient required a loading dose of milrinone and mild inotropic support during separation from bypass for right ventricular dysfunction. Initially, the patient's post-CPB rhythm displayed junctional tachycardia, but after chest closure, he converted to normal sinus rhythm. Postoperatively, vitals were stable and inotropic support was discontinued. He was discharged on postoperative day 7 without complications. Many characteristics of this mass were atypical for myxoma, including location, patient age, the glandular and cystic composition, and outside spread of the atrium itself. However, pathology returned showing this mass was, in fact, a benign myxoma (Fig. 4).

## DISCUSSION

Cardiac tumors are classified as primary or secondary. Secondary tumors, typically from metastatic disease, are diagnosed approximately 20 times more frequently.<sup>3</sup> There are many types of primary tumors, including myxomas, papillary tumors, rhabdomyomas, lipomas, fibromas, teratomas, rhabdomyosarcomas, angiosarcomas, and fibrosarcomas. Frequently, benign tumors are found incidentally during workup for metastatic disease or systemic symptoms. Such symptoms can include heart failure, newly diagnosed heart murmurs, arrhythmias, syncope, superior vena cava syndrome, embolism, and angina. The cornerstone for cardiac mass evaluation is echocardiography, as it provides a quick and noninvasive diagnosis that can be supplemented with imaging modalities of cardiac computed tomography, MRI, or positron emission tomography scan. The TEE can provide in-depth analysis of intra-cardiac structures, detect tumor infiltration with high





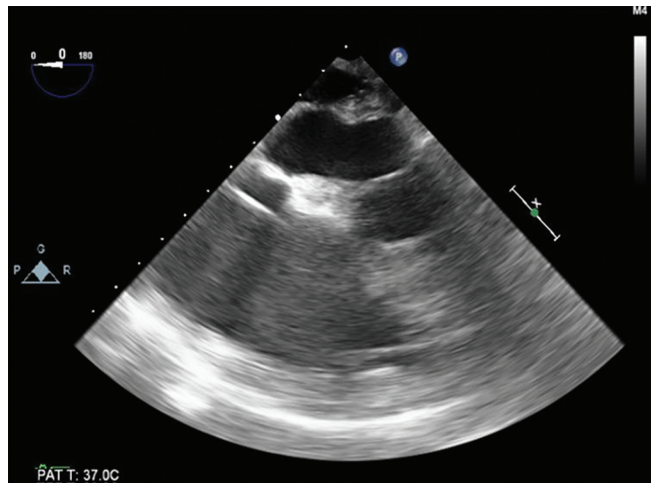
**Fig. 3:** View of the mass following resection. The smaller section to the right of the scalpel was excised from the interatrial septum

**Pathology Report:** The tumor is extraordinary for three reasons: The degree of glandular change, the cystic dilatation (>1 cm) of some of them, and the extra-atrial spread. Much of the tumor is nevertheless typical myxoma. There appear to be areas where the glands merge with the myxoma cell nests excluding a metastatic lesion, and the glands are typical of what are seen (to a far lesser extent) in about 2% of myxomas. Invasive myxomas are very rare, and there is no evidence that invasion portends a bad prognosis, but data are limited in this regard

sensitivity, and visualize tumors affecting the great vessels and mediastinum.

It is imperative for the provider to be able to recognize key characteristics of cardiac echogenicities in order to distinguish and evaluate them. First and foremost, the ability to appreciate normal cardiac structures and structures that are frequently mistaken for pathology (i.e., the Eustachian valve, trabeculations, crista terminalis, and interatrial septal aneurysm) is of utmost importance. Additionally, ruling out alternative diagnoses, such as thrombi or vegetations will allow for a more accurate assessment of the intracardiac pathology. Myxomas typically have much variation in their appearance, but are conventionally described as smooth, polypoid, pedunculated, and may be covered in thrombi.<sup>4</sup> This is quite different in comparison with the homogeneous, hyperechoic lipoma or the shimmering finger-like projections of a fibroelastoma.<sup>5</sup> Invasive sequelae of metastatic tumors, such as epicardial invasion or a malignant pericardial effusion can help determine a metastatic origin.

Myxomas are the most common benign pathologies encountered in heart tissue. They frequently arise from the interatrial septum near the fossa ovalis. Rarely, they have the potential to invade into other cardiac structures and cause hemodynamic compromise. The only curative treatment of these tumors is surgical resection. Resection should be expedited in symptomatic patients as there is an 8% associated mortality while awaiting removal.<sup>6</sup>



**Fig. 4:** The TEE midesophageal four-chamber view following resection of the giant right atrial mass. Pulmonary artery catheter can now be seen in the right atrium traversing the tricuspid valve

Anesthetic considerations for surgical removal of atrial myxomas depend on the patient's clinical presentation and tumor characteristics. In this case, there was significant compromise in tricuspid inflow and right ventricular filling, given the size of the myxoma and its proximity to the tricuspid valve. Maintaining adequate preload is of utmost importance in preserving ventricular filling and stroke volume, and in avoiding hypoxemia from subsequent ventilation-perfusion mismatching. Avoiding large tidal volumes in these patients is also critical in maintaining preload and optimizing stroke volume. Additionally, central venous catheter placement, particularly from the right internal jugular site, should be done under TEE guidance to avoid disruption of the mass, embolization, and excessive bleeding. Femoral vein access may be necessary depending on the characteristics of the mass. Additionally, for right atrial masses, a Swan-Ganz catheter should be avoided completely or only placed following removal of the mass. In our case, having pulmonary artery pressures following separation from CPB and mass removal was helpful in the setting of right ventricular dysfunction.

The gold standard for diagnosis and evaluation of cardiac myxomas is TEE. In 2010, Oliveira et al<sup>7</sup> published a 13-year review that focused on diagnosis, evaluation, characterization, and follow-up of myxomas. This review illustrates the substantial impact that the use of TEE has on managing this pathology. In addition, intraoperative use of TEE helps to guide the surgical plan, helps prevent damage to healthy myocardium, and avoids unintended tumor dissection. Given the high prevalence of myxomas in the atria, they may be in close proximity to nodal foci, creating further need for TEE visualization of the tumor. Postresection, TEE visualization allows for confirmation of complete resection, atrial assessment following

reconstruction, and evaluation of valvular competency. Furthermore, TEE provides a more complete assessment that can help anticipate postoperative complications.<sup>8</sup> Continued surveillance of these patients is imperative, as recurrence can occur in approximately 3% of cases.<sup>9</sup>

## CONCLUSION

Cardiac myxomas, though benign, can have a significant impact on the patient's hemodynamic stability. The TEE assessment helps guide both anesthetic management and surgical resection. The TEE is an invaluable resource in the preoperative, intraoperative, and postoperative assessment of these patients.

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