NAVIGATING THE COMPLEXITY: SUCCESSFUL SURGICAL MANAGEMENT OF CARDIAC MYXOMA IN THE EARLY SECOND TRIMESTER

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Abstract

Cardiac myxoma poses unique challenges during pregnancy, emphasizing the critical interplay between maternal and fetal well-being. This study aimed to discuss the successful surgical management of a large cardiac myxoma with functional mitral stenosis encountered during the second trimester of pregnancy. We report a case of a 38-year-old woman with a history of hypertension, who initially declined recommended surgery. Two years later, she presented with exacerbated symptoms and was found to be 18 weeks pregnant. Despite the complexity of severe left heart obstruction and potential maternal-fetal complications, a well-coordinated, multidisciplinary approach was used to ensure the successful removal of the myxoma, highlighting the viability of surgical intervention during the second trimester. The case emphasizes the importance of proactive surgical considerations in addressing life-threatening cardiac conditions in pregnant women.

Keywords**:** Myxoma, Cardiac, Pregnancy, Left Atrial Mass, Mitral Stenosis

Introduction

Cardiac myxoma is a rare and benign tumor originating within the heart. It poses unique challenges during pregnancy. Its incidence is 0.5 per 1 million people (1). Symptoms may vary depending on their location and size, encompassing constitutional and heart-related issues. The intricate interplay between maternal and fetal well-being necessitates a careful examination of diagnostic, therapeutic, and management strategies. In this context, the delicate balance between ensuring optimal cardiac function for the mother and safeguarding the developing fetus demands a nuanced approach. Urgent surgical removal is crucial for high-risk patients to prevent potential complications. We present a case in which a large cardiac myxoma with functional mitral stenosis was successfully surgically removed during the second trimester of pregnancy. A well-coordinated, multidisciplinary approach was used to ensure the safety of the mother and the fetus. This case serves as a testament to the viability of surgical intervention for life-threatening cardiac conditions during the second trimester.

Case presentation

A 38-year-old Malay lady, para 4, with a history of hypertension and employed as a culinary assistant, presented to the emergency department due to recurrent syncopal episodes accompanied by intermittent vomiting. Her vital signs were within normal limits: blood pressure, 130/80 mmHg; pulse rate, 62 beats per minute (bpm); respiratory rate, 16 breaths per minute; and temperature, 36.7°C. Physical examination revealed no jugular venous distension. Clear lung sounds were detected upon bilateral auscultation, with no wheezing. The cardiovascular examination revealed a loud S1 with an early diastolic murmur graded as 3/6. The abdomen was soft, nontender, and nondistended, with normal bowel sounds in all four quadrants. Peripheral pulses were intact in both upper and lower extremities, and there was no evidence of cyanosis or digital clubbing.

Laboratory findings were as follows: white blood cells, 8.51; hemoglobin, 11.1 g/dl; hematocrit, 36.8%; platelets, 198 K/ul; sodium, 136 mmol/L; and potassium, 3.7 mmol/L. Transthoracic echocardiography revealed a moderately

dilated left ventricle with borderline systolic function and a dilated left atrium. A large atrial mass measuring 9 × 4 cm was identified, attached to the interatrial septum by a stalk. This mass obstructed the mitral valve inflow, resulting in a mean diastolic mitral valve gradient of 17 mmHg with associated mitral regurgitation. The estimated right ventricular systolic pulmonary pressure was 65 mmHg, and right ventricular systolic function was borderline (Figure 1).

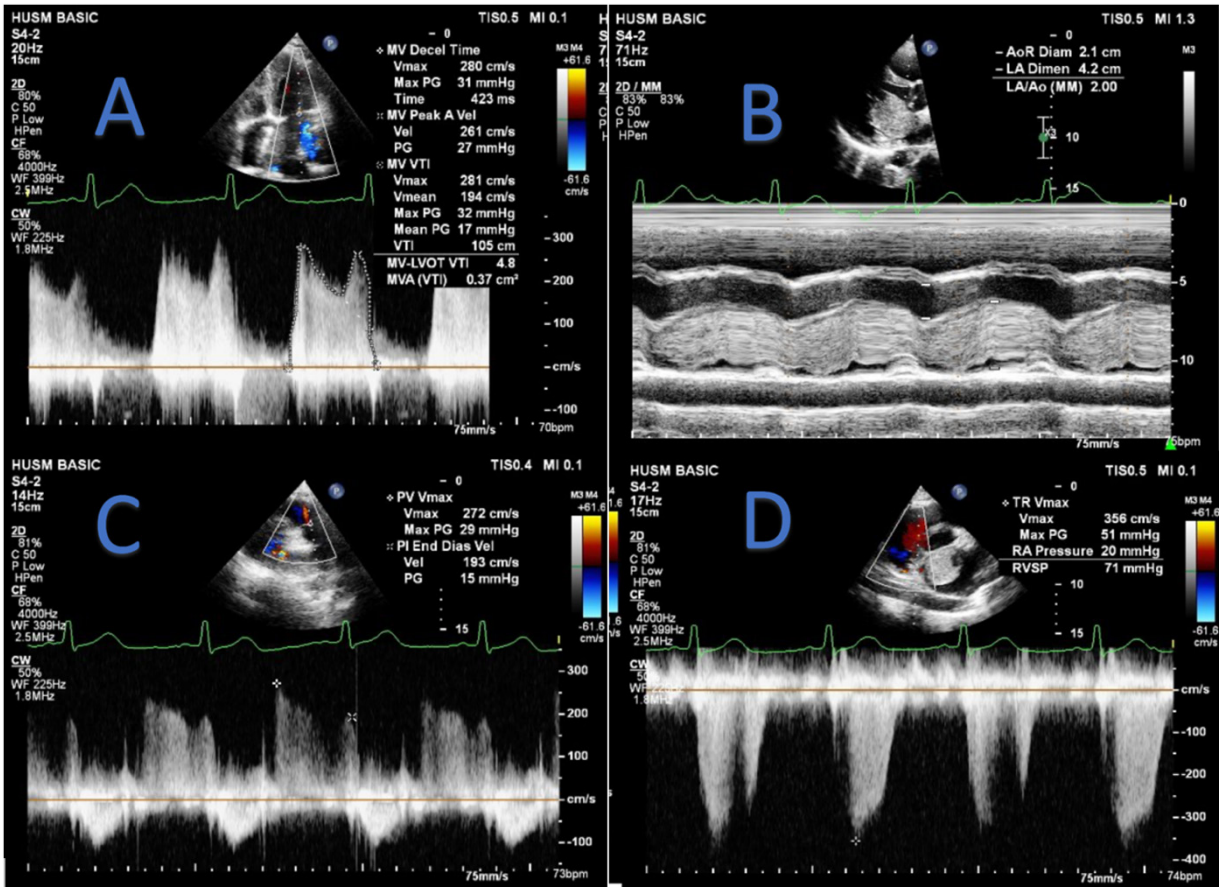


Figure 1: (A) Spectral Doppler shows a very high transmitral gradient with mean PG 17 mmHg consistent with severe stenosis; **(B)** M-mode shows mass occupying almost whole of the left atrium; **(C)** spectral Doppler shows moderate pulmonary regurgitation with end-diastolic velocity 1.9 m/s; **(D)** spectral Doppler shows severe tricuspid regurgitation with a Vmax of 3.56 m/s and a right ventricular systolic pressure of 71 mmHg

The patient declined to undergo the recommended surgical procedure for the removal of the myxoma. However, 2 years later, she presented with aggravated exertional dyspnea and recurrent syncope episodes and was subsequently found to be 18 weeks pregnant during a routine follow-up at the cardiology clinic. Her maternal condition was classified as World Health Organization (WHO) Class III. Her medical history was unremarkable except for concurrent chronic hypertension and the use of a mechanical contraceptive method. She was admitted to the hospital for a multidisciplinary assessment.

Her vital signs during clinical examination were as follows: blood pressure, 132/65 mmHg; pulse rate, 71 bpm; temperature, 37°C; and oxygen saturation under room air, 97%. Physical examination revealed an elevated jugular venous pressure and a loud S1 with an early diastolic murmur. Other systemic examinations were unremarkable.

Her initial electrocardiogram showed sinus rhythm, P mitrale, and left-axis deviation. The fetal assessment indicated parameters corresponding to 19 weeks and 6 days of gestation, with an estimated fetal weight of 347 ± 51 g. Echocardiography revealed a dilated left atrium and left ventricle. A pedunculated mass measuring 18–20 cm², with an echo-lucent interior, was observed protruding through the mitral valve. There was evidence of stenosis jet with moderate tricuspid regurgitation and moderate pulmonary regurgitation. The cardiac index was reduced at 1.7 L/m/m², while the right ventricular systolic pressure was elevated at 71 mmHg. The mitral valve area was measured at 0.38 cm², with a mean gradient of 17 mmHg. The pulmonary valve systolic/diastolic ratio was less than 1. The MV E (E wave velocity) and MV A (A wave velocity) were measured at 2.6 m/s and 2.8 m/s, respectively (Figure 2).

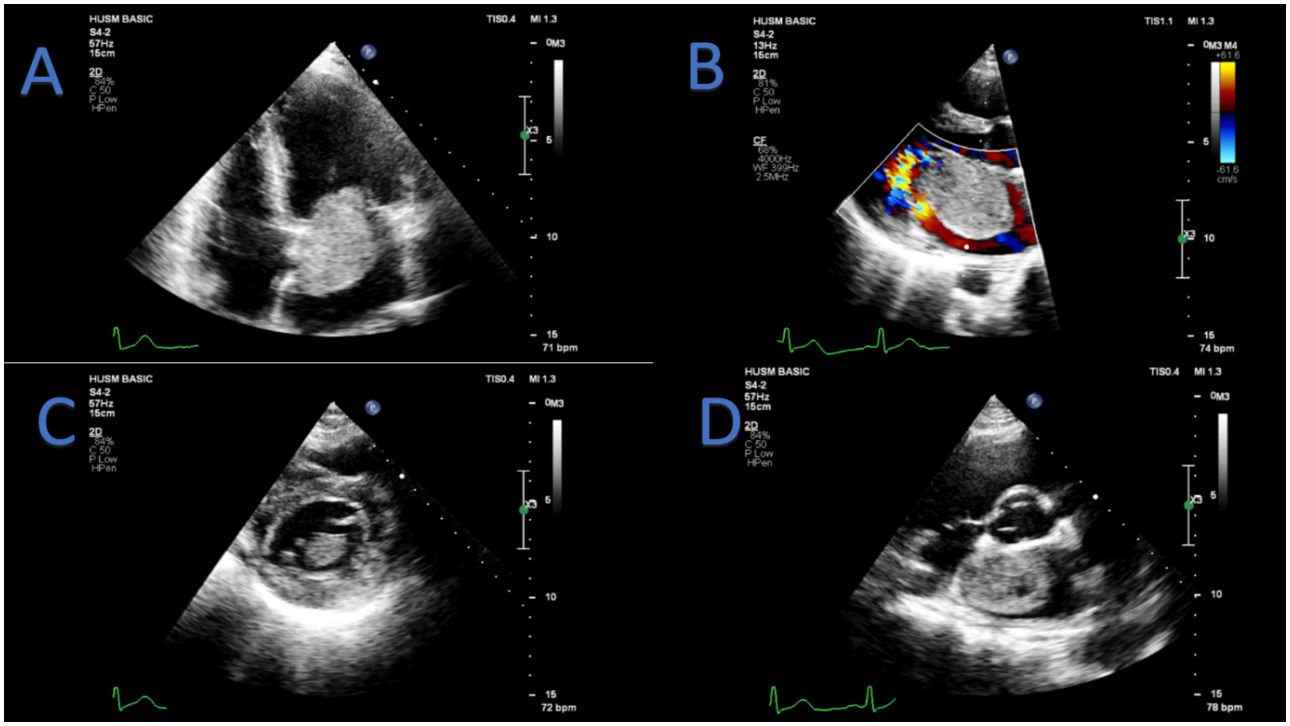
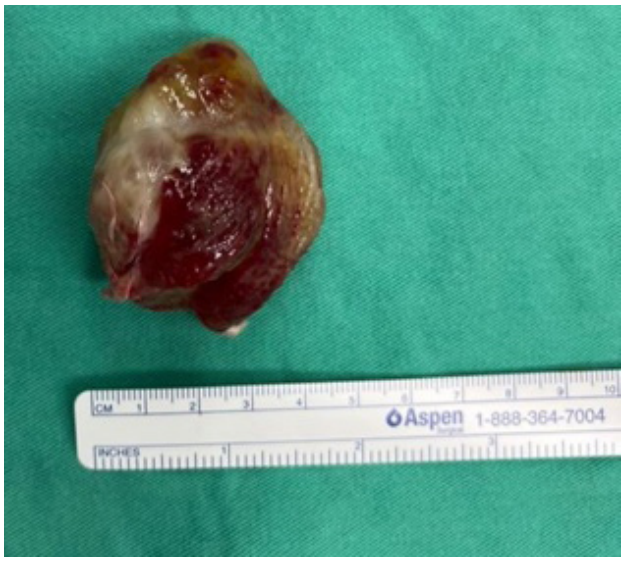


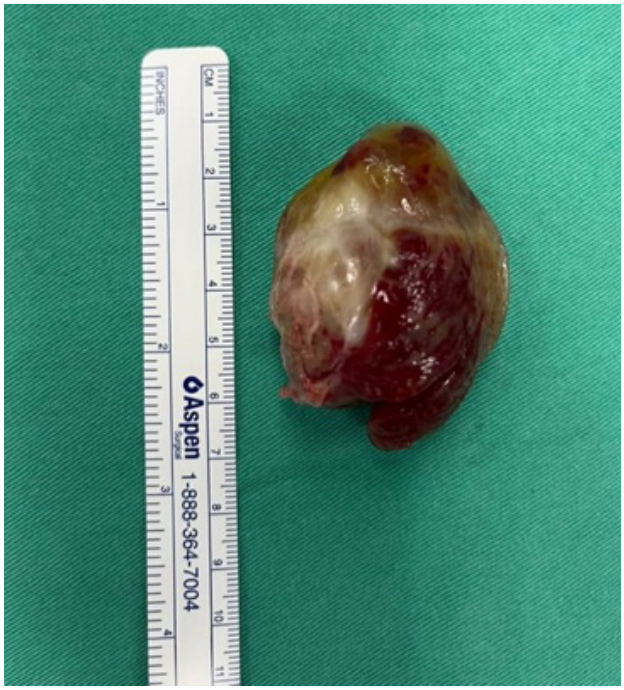
Figure 2: (A) Apical 4 chamber view showing mass protruding through mitral valve; **(B)** apical 4 chamber zoomed; stenosis jet seen through the mitral valve; **(C)** parasternal short axis; mass seen through the mitral valve leaflet; **(D)** parasternal short-axis view; mass is seen at the left atrium

The patient was scheduled for surgical resection with informed consent and agreement between the Cardiothoracic, Cardiac Anesthesia, and Obstetrics and Gynecology teams. Intraoperatively, her blood pressure was measured at 112/69 mmHg, and the heart rate was recorded at 101 beats per minute. Premedication, such as intravenous midazolam (1.5 mg), fentanyl (50 mcg), propofol (30 mg), and rocuronium (100 mg), was administered. The surgical procedures were sternotomy, aortic and venous cannulation, and setting up a circuit that was primed with 1500 ml of solution (Hartman's solution, Gelafusine, and Mannitol). Cardiopulmonary bypass was safely initiated after the procedure's completion. The aorta was cross-clamped, and retrograde cold crystalloid cardioplegia was administered. The cross-clamp time lasted only 22 min, during which the patient was rewarmed to a temperature of 37°C. After rewarming, the cardiopulmonary bypass was terminated without any difficulty, with the total bypass time being 55 min.

Anesthesia was maintained using morphine, propofol, and a fraction of inspired oxygen (FiO_2) of 0.7%. Intraoperative monitoring included an electrocardiography, a pulse oximetry, an end-tidal carbon dioxide measurement, a nasopharyngeal temperature probe, a urinary catheter for fluid balance, an intra-arterial blood pressure monitoring, and a central venous pressure measurement. Protamine was administered after cardiopulmonary bypass.

She underwent resection of the left atrium mass and left atrial wall with pericardial reconstruction. The mass was firm in consistency with a regular border. Intraoperatively, the mass is a well-circumscribed grayish tissue measuring 60 × 35 × 35 mm. The outer surface is gelatinous-like and smooth. Serial cut sections show yellowish soft to firm cut surface with hemorrhagic areas and cystic spaces (Figure 3). Microscopically, the mass sections showed tumor cells within a myxoid stroma. These tumor cells were polygonal and stellate in shape, arranged in cords and nests, with some surrounding the vessels forming a ring-like structure. These cells contained oval nuclei with a moderate amount of cytoplasm. There were chronic inflammatory cells and hemosiderin deposits. However, there were no mitoses, cellular atypia, necrosis, or evidence of malignancy found.





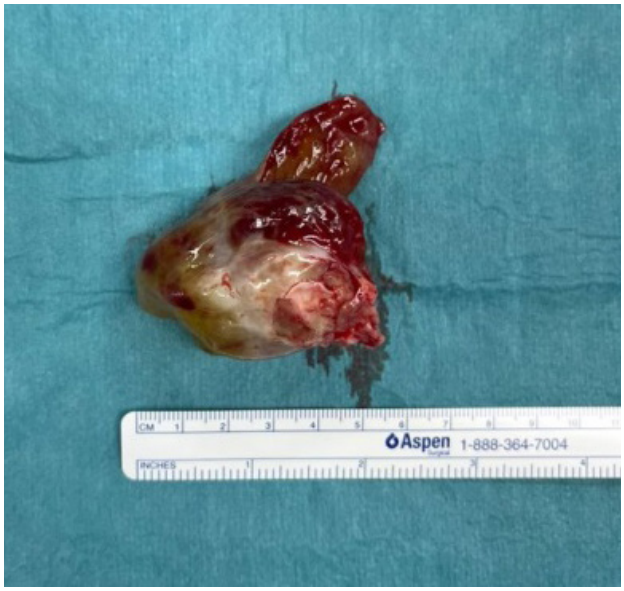


Figure 3: Intraoperatively, the mass is a well-circumscribed grayish tissue measuring 60 × 35 × 35 mm. The outer surface is gelatinous-like and smooth. Serial cut sections show yellowish soft to firm cut surface with hemorrhagic areas and cystic spaces

The patient was successfully weaned from the ventilator within 24 hours and gradually transitioned to a nasal cannula with nasal prong oxygen. A fetal scan showed a clear fetal heartbeat, indicating a viable fetus. Her overall condition improved. Postoperatively, repeated echocardiography demonstrated a significant improvement in echodynamic function, with a good ejection fraction and similar dimensions to those observed preoperatively. There were no valvular lesions, and the transmitral E velocity showed a remarkable reduction to 0.3 m/s. She successfully recovered and continued the course of her pregnancy without complications, ultimately being discharged home.

Discussion

Cardiac myxomas are predominantly sporadic and may occasionally recur, most (90%) of which are found in the atria and most (75%–80%) are localized on the left side. Surgical resection during pregnancy is generally considered safe, as evidenced by a comprehensive review, possibly attributed to the relatively short operative time (2).

Maternal outcomes are similar regardless of treatment, timing of cardiac surgery, or delivery mode. Perinatal mortality rises with early trimester cardiac surgery, attributed to placental insufficiency and premature delivery, urging a delay in fetal maturity. However, embolic episodes prompt early trimester urgent tumor removal in 30%–40% of cases (3).

The optimal timing for cardiac surgery during pregnancy remains unclear due to the lack of data. Often, pregnancy interruption precedes myxoma surgery (4).

Timely surgical intervention is crucial for maternal and fetal safety. Early second-trimester cardiac surgery is recommended for first-trimester diagnoses, while prompt intervention is advised for second-trimester cases. Late third-trimester cases should opt for cesarean delivery followed by tumor excision postpartum (4). The stage of the trimester does not impact fetal mortality when a cesarean section is not feasible (4).

In this case, Doppler echocardiography revealed a transmitral gradient of ≥ 10 mmHg and a mitral valve area of 0.35 cm^2. The myxoma's prolapse through the mitral valve during diastole induces a partial impediment to blood flow, consequently leading to functional mitral stenosis or "mitral pseudo-stenosis" (5). Therefore, we consider this patient high risk if pregnancy progresses.

The management of our patient entailed several components, such as surgical resection of the cardiac myxoma and vigilant postoperative monitoring of the mother. The case posed unique challenges, primarily due to the potential development of cardiac failure and pulmonary edema compounded by severe left heart obstruction. To address these concerns, we decided on early intervention with regular fetal monitoring, electing to proceed with the operation during the second trimester instead of deferring it to the third trimester. The primary concern was the potential for the mother to experience decompensation during the later trimester, which could endanger both.

The mother had the highest risk of complications throughout the pregnancy, including the possibility of a disabling stroke. The fetus may suffer from immediate complications, such as fetal bradycardia, or late complications, such as intrauterine growth restriction, low postnatal birth

weight, and congenital malformations. These issues can be attributed to multifactorial factors, such as intraoperative anesthetic drugs, anticoagulation, and sustained uterine contractions.

There are limited data on antenatal risk in non-cardiac surgery during pregnancy. This study analyzed surgeries in 79 patients, mainly for acute appendicitis, adnexal pathology, cholecystolithiasis, and other similar conditions. Most of these surgeries were urgent, with complications occurring in five cases, three of which were oncological (6).

Despite relatively few adverse events in non-cardiac surgery, second-trimester cardiopulmonary bypass surgery is rare, with potential risks to maternal and fetal health. A meta-analysis shows a 7% and 26% maternal and fetal mortality rates, respectively (4). Delivery before cardiac surgery may reduce the risk of fetal mortality.

There was a reported case of a 28-year-old woman with a left atrial myxoma who opted for vaginal delivery at 32 weeks, followed by myxoma removal and mitral valve repair 2 weeks later, with a favorable outcome (2). Conversely, there was a reported case of a 29-year-old woman who had a successful open surgical resection of a left atrial myxoma during her 30th week of pregnancy, with good maternal and fetal outcomes. She later delivered a healthy baby via cesarean section at 41 weeks, and both were discharged in stable condition (1). However, there were also reported cases where cardiac surgery was conducted at 28 weeks of gestation, resulting in intraoperative fetal bradycardia; nevertheless, favorable outcomes were achieved for both the fetus and the mother (1).

Interestingly, a huge cardiac myxoma was operated on at 15 weeks of gestation with a favorable outcome for both the mother and fetus, which shares similarities to our case (7). The primary distinction lies in the severity of maternal symptoms and echodynamic status, which, in our patient, pose a significant risk if the pregnancy is allowed to progress.

Conclusion

Proactive surgical intervention for pregnant women with symptomatic heart disease is crucial, as exemplified by this early second-trimester atrial myxoma surgery, resulting in favorable maternal and fetal outcomes.

Acknowledgment

Nil

Competing interest

The authors declare no competing interests.

Informed consent

Verbal and written informed consent were obtained from the patient.

Financial support

The authors received no financial support.

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