
Deterioration of left atrioventricular valve regurgitation after the second delivery in a patient with repaired atrioventricular septal defect: A case report

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Abstract

A 30-year-old primiparous woman was referred to our institute at 8 weeks of gestation. She had a history of surgical repair for incomplete atrioventricular septal defect (AVSD) and persistent mild left atrioventricular valve regurgitation (LAVVR). For her first pregnancy, she delivered at 41 weeks of gestation without any cardiac complications. Echocardiographic monitoring during the first pregnancy showed transient progression to moderate LAVVR, which recovered to mild LAVVR after delivery. Two years later, at 16 weeks of gestation during a subsequent pregnancy, she developed palpitations due to paroxysmal supraventricular tachycardia (PSVT), which was treated with intravenous adenosine. Echocardiography showed moderate-to-severe LAVVR with left atrial and ventricular dilatation. Late in the pregnancy, she frequently had PSVT with hypotension. She delivered at 38 weeks of gestation. Follow-up echocardiography showed persistent moderate LAVVR. Increased blood volume and an enhanced sympathetic nervous system during pregnancy might cause an arrhythmia such as PSVT or worsening of pre-existing LAVVR. In this case, the index pregnancy might have increased the risk of cardiac complications during a subsequent pregnancy. Multiparous women with repaired AVSD and residual LAVVR might need meticulous care during pregnancy.

Key words : atrioventricular septal defect, atrioventricular valve regurgitation, supraventricular tachycardia, subsequent pregnancy

Introduction

Congenital atrioventricular septal defect (AVSD) has an incidence of 4–5.3 per 10,000 live births¹⁾. After surgical repair, 10-year survival for AVSD improves to approximately 90%²⁾. Women with repaired AVSD are more likely to reach child-bearing age. Pregnancy in women with surgically repaired AVSD is thought to be extremely tolerable when ventricular function is preserved and valve regurgitation is not severe³⁾. We report a case of a surgically repaired AVSD complicated with paroxysmal supraventricular tachycardia (PSVT) during pregnancy with deterioration of left atrioventricular

valve regurgitation (LAVVR) after the postpartum period.

Case Presentation

A 30-year-old primiparous woman with a history of surgical repair for incomplete AVSD was referred to our institute at 8 weeks of gestation. At age 3, she had been diagnosed with incomplete AVSD, which was identified through a heart murmur and cardiomegaly on chest radiography. She underwent atrial septal defect (ASD) patch closure and LAVV cleft closure, but mild LAVVR persisted. After surgery, she was asymptomatic, with New

York Heart Association (NYHA) functional class 1 status. She was not taking medications before the first pregnancy. Although she had a strong family history of ASD (mother, brother, sister, and nephew), she refused genetic counseling. During her first pregnancy, she did not have shortness of breath, chest pain, palpitations, or edema; she had NYHA functional class 1 status. Although her echocardiograms showed transient worsening from mild

to moderate LAVVR during late pregnancy, she did not have any cardiac adverse events such as heart failure and arrhythmias. She delivered a newborn vaginally with epidural anesthesia at 41 weeks of gestation. After the postpartum period, her LAVVR decreased, and remained mild on follow-up examinations.

However, in a subsequent pregnancy 2 years later, she presented to our emergency department with palpitations at 16 weeks of gestation. An electrocardiogram revealed PSVT with mild hypotension (**Figure 1**). She did not respond to a vagal maneuver and was treated with intravenous adenosine. A chest radiograph showed exacerbation of left atrial (LA) dilatation (**Figure 2**). An echocardiogram revealed moderate-to-severe LAVVR, with left LA and left ventricular (LV) dilatation (**Figure 3**). During late pregnancy, she had frequent episodes of PSVT, which resolved spontaneously or responded to intravenous adenosine infusion. She was referred to another facility because of fetal tachyarrhythmia at 30 weeks of gestation. She delivered an infant vaginally at 38 weeks of gestation. The infant was admitted to the neonatal intensive care unit and diagnosed with ASD and PSVT. After the postpartum period, the patient's echocardiogram showed persistent moderate LAVVR. The patient was prescribed oral enalapril.

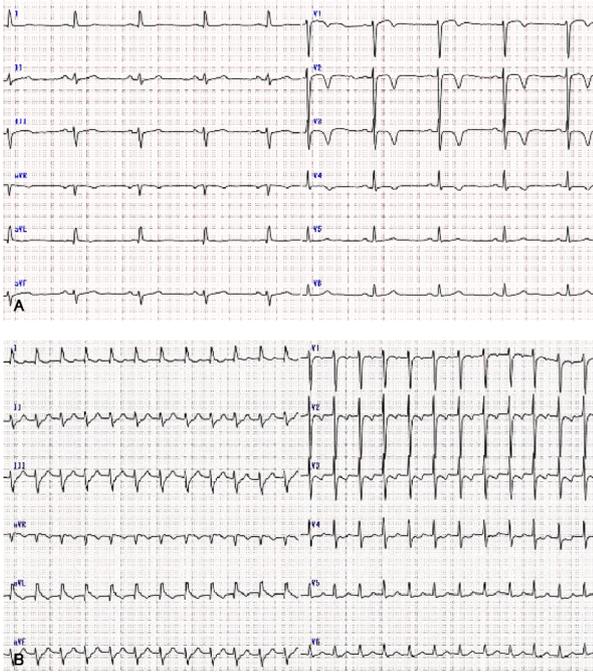


Fig. 1 Electrocardiograms (ECGs). (A) is the patient's baseline ECG, which shows first-degree atrioventricular block with left axis deviation and isolated inverted T waves. (B) shows paroxysmal supraventricular tachycardia at 16 weeks of gestation. The heart rate was 145 bpm.

Discussion

We found two important clinical implications from this case. First, the cumulative impact of pregnancy

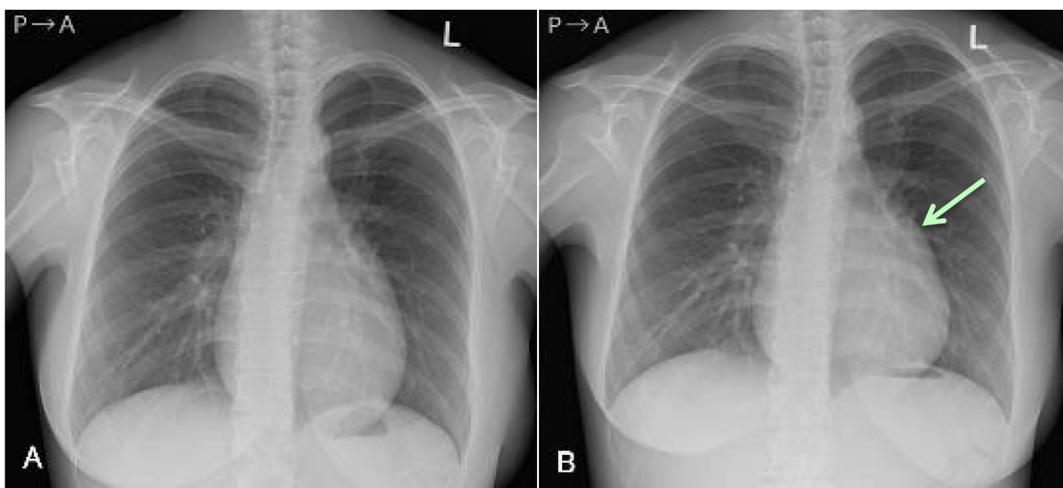


Fig. 2 Chest radiographs (A) prior to the second pregnancy and (B) during the second trimester of the second pregnancy. (B) shows increased left atrial dilatation (arrow). The cardiothoracic ratio is $<50\%$ at both time points.

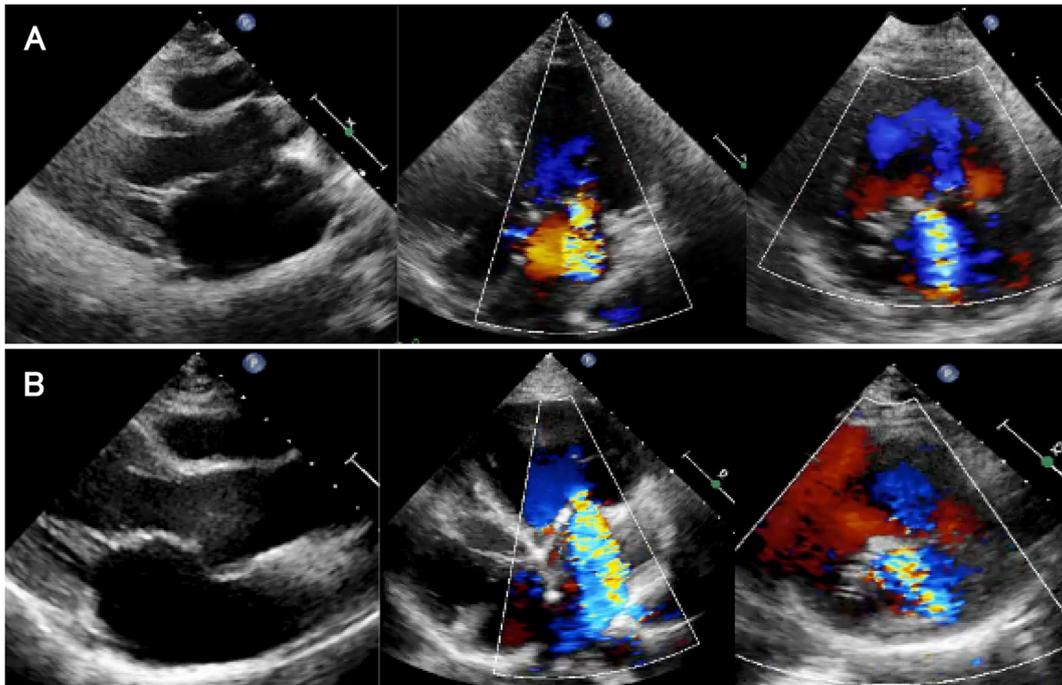


Fig. 3 Echocardiograms (A) during the third trimester of the first pregnancy and (B) during the second trimester of the second pregnancy. Each view shows exacerbation of left atrial dilatation and left atrioventricular valve regurgitation during the second pregnancy compared to the first pregnancy. (Left: parasternal long axis view. Middle: apical four chamber view. Right: short axis view at level of the atrioventricular valve.)

Table 1 Echocardiographic parameters during the first pregnancy, second pregnancy, and postpartum period.

First pregnancy	First trimester	Second trimester	Third trimester	Postpartum
LAD [mm]	24	36	36	Slightly dilated
Max LAV [mL]	NA	67	78	NA
Max LAVI [mL/m ²]	NA	48	52	NA
LVDd/Ds [mm]	50/33	57/35	56/35	NA
LVEF [%]	Preserved	64	62	Preserved
LAVVR	Mild	Moderate	Moderate	Mild
NT-pro BNP [pg/mL]	81.8	NA	NA	NA

Second pregnancy	First trimester	Second trimester	Third trimester	Postpartum
LAD [mm]	38	30	31	Slightly dilated
Max LAV [mL]	61	100	75	NA
Max LAVI [mL/m ²]	43	68	49	NA
LVDd/Ds [mm]	57/39	59/38	59/39	NA
LVEF [%]	63	65	59	Preserved
LAVVR	Moderate	Moderate to severe	Moderate to severe	Moderate
NT-pro BNP [pg/mL]	56.7	187.1	NA	NA

Abbreviations: LAD, left atrial dimension; LAV, left atrial volume; LAVI, left atrial volume index; LVDd, left ventricular end-diastolic diameter; LVDs, left ventricular end-systolic diameter; LVEF, left ventricular ejection fraction; LAVVR, left atrioventricular valve regurgitation; NT-pro BNP, N-terminal pro-B-type natriuretic peptide; NA, not applicable.

may increase the risk of cardiac complications in women with repaired AVSD. In general, pregnancy in women with repaired AVSD is thought to be quite tolerable if ventricular function is preserved and valve regurgitation is not severe¹⁾. Moreover, systemic AV valve regurgitation during pregnancy is not generally thought to confer an increased risk for cardiovascular events because it is associated with decreased systemic vascular resistance. She had been in good health with NYHA functional class 1 status prior to each pregnancy, without any of the risk factors proposed by the ZAHARA or CARPREG study investigators^{4, 5)}. During the first pregnancy, she had no evidence of LAVV failure or arrhythmias such as PSVT or atrioventricular block, which are well-known long-term complications in patients with repaired AVSD⁶⁾. Although LAVVR worsened and cardiac size increased mildly during the first pregnancy, they recovered after delivery (Table 1). She was asymptomatic throughout the first pregnancy. Therefore, it was conceivable that she did not require intervention on the valve before the second pregnancy. However, during the second pregnancy, she developed recurrent PSVT and persistent exacerbation of LAVVR with LA and LV dilatation (Table 1). Niwa et al. reported that the incidence of tachyarrhythmia during pregnancy in a patient with repaired congenital heart disease (CHD) is higher than during the postpartum period and in healthy pregnant women⁷⁾. The underlying mechanism is hypothesized to be an impaired autonomic response to the increase in blood volume during pregnancy in a patient with repaired CHD; hormones and surgical damage might play a role⁷⁾. Furthermore, cardiac function might worsen after each pregnancy among patients with CHD⁸⁾. Therefore, each pregnancy might increase the risk of cardiac complications.

Second, regarding the management of PSVT during pregnancy, adenosine is recommended as the first-line medication after vagal maneuvers⁹⁾. She had frequent episodes of PSVT with mild hypotension during the second pregnancy, which required intravenous adenosine almost every time. Although catheter ablation to treat PSVT during pregnancy was considered, we were concerned about the risk of radiation exposure to the fetus and had rarely performed this procedure in pregnant patients in our clinical practice. However, successful ablation

using minimal or no fluoroscopy has been reported in recent years¹⁰⁾. Thus, catheter ablation for recurrent or refractory PSVT during pregnancy might be considered to be an alternative option.

In summary, in women with repaired AVSD and residual LAVVR, even though the risk of cardiovascular events during pregnancy is thought to be low, subsequent pregnancies might impact cardiac function. In the case of recurrent or refractory PSVT, catheter ablation with minimal or no fluoroscopy might be a reasonable option.

Conclusion

Women with repaired AVSD might require meticulous management during pregnancy.

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Disclosure: None of the authors have any conflicts of interest to report.

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