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CASE REPORT

HEART CARE TEAM/MULTIDISCIPLINARY TEAM LIVE: CARDIO-OBSTETRICS 2023

A Triple Threat

Takayasu Arteritis, Bicuspid Aortic Valve, and Triplets

Aditi Shankar, MD, Ribesh Shrestha, DO, Aditi Sharma, MD, Daniela Rosu, MD, Janet V. Hays, MD, Ildiko Agoston, MD

ABSTRACT

Takayasu arteritis is a vasculitis affecting women of reproductive age. Appropriate care of these patients requires a multidisciplinary approach and close monitoring. We present the case of a woman with a triplet gestation and Takayasu arteritis complicated by an ascending aortic aneurysm, aortic regurgitation, and bicuspid aortic valve. (J Am Coll Cardiol Case Rep 2023;28:102135) © 2023 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

CASE PRESENTATION

A 29-year-old Hispanic primigravida woman at 15 weeks gestation of triplets was referred by the obstetrics and gynecology (OB/GYN) department for management of Takayasu arteritis (TA), congenital bicuspid aortic valve (BAV), and aortopathy. Physical examination was significant for a 40-mm Hg blood pressure difference between her arms, an early diastolic murmur, and a diminished left radial pulse. Findings were consistent with severe left subclavian artery involvement caused by TA. As a result, right arm blood pressure was used for monitoring throughout her pregnancy. Prior computed tomographic angiography revealed a 4.1-cm ascending aortic aneurysm, penetrating ulcer of the descending aorta, and diffuse thickening of the thoracic aorta (**Figures 1 and 2**). Transthoracic echocardiogram (TTE) showed a left ventricular ejection fraction of 60%, mild concentric left ventricular hypertrophy, and BAV with mild aortic regurgitation (AR).

She had been diagnosed with TA 10 years earlier and subsequently developed aortopathy as described. Remission was achieved with methotrexate and prednisone, but she developed vascular hypertension requiring infliximab. Her prior cardiologist advised her to avoid pregnancy, but she was lost to follow-up because of lack of insurance. After entering remission, the patient made the decision to achieve pregnancy via intrauterine insemination.

Because of this high-risk pregnancy, a multidisciplinary team consisting of OB/GYN, cardiology, rheumatology, and cardiothoracic surgery specialists was involved. She was followed by cardiology and OB/GYN specialists every 2 weeks during pregnancy. The rheumatology specialists recommended continuing prednisone and adalimumab during pregnancy. Serial monitoring with TTE was preferred because of the radiation associated with other imaging modalities. TTE at 20 weeks gestation demonstrated a stable ascending aorta with moderate AR.

LEARNING OBJECTIVES

- To identify vascular comorbidities that may affect a patient's pregnancy risk.
- To emphasize the importance of a multidisciplinary team for patients with Takayasu arteritis.

From the Division of Cardiology, Department of Medicine, University of Texas Health San Antonio, San Antonio, Texas, USA.
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ABBREVIATIONS AND ACRONYMS

AR = aortic regurgitation

BAV = bicuspid aortic valve

OB/GYN = obstetrics and gynecology

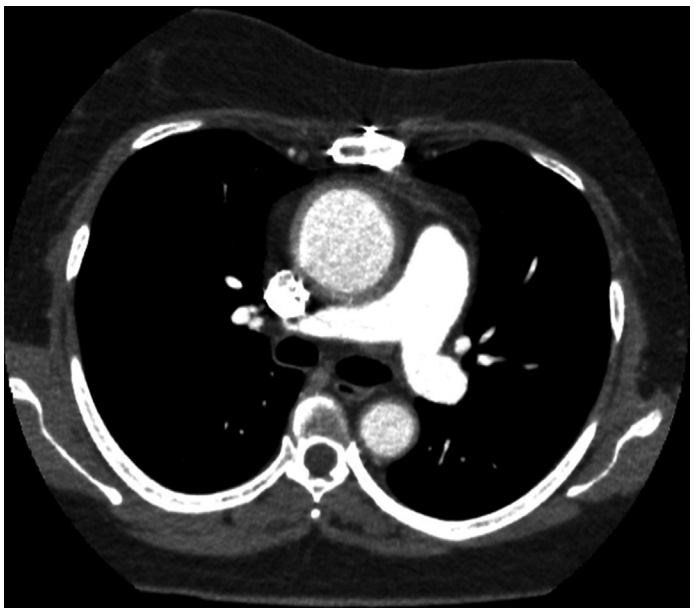
TA = Takayasu arteritis

TTE = transthoracic echocardiogram

At 30 weeks gestation, the patient was admitted for severe pre-eclampsia following the development of hypertension, proteinuria, and pulmonary edema. An emergent C-section was recommended to reduce the shear forces exerted on the aorta. She underwent delivery of triplets via C-section under spinal anesthesia. A hysterectomy was also performed to prevent future pregnancies. The triplets weighed 3 lb at birth but had a prolonged NICU stay because of prematurity and respiratory distress. The babies were weaned off the ventilator at 3 weeks of life and continued to improve. Postpartum TTE revealed worsening AR (Videos 1 and 2). Given her high risk of dissection, cardiac intensive care unit monitoring was required for strict blood pressure control (goal: <120/80 mm Hg). Her proteinuria and pulmonary edema resolved, but she continued to require antihypertensives. Because the patient opted not to breastfeed, blood pressure was treated with metoprolol and lisinopril. Her postoperative course was complicated by computed tomography showing constriction of celiac and mesenteric arteries, prompting an exploratory laparoscopy, which excluded ischemic bowel disease. After aggressive blood pressure control, she was discharged with close follow-up.

Over the next several months, she continued to experience shortness of breath and fatigue and then eventually underwent elective aortic valve replacement. Her native valve was replaced with a 23-mm Bioprosthetic CE Magna TFX valve (Videos 3 and 4). The decision for a bioprosthetic valve was driven by lack of insurance and inability to follow up for laboratory monitoring. The surgery was uncomplicated, and the postoperative TTE showed a well-functioning valve without residual perivalvular leak. The patient has been doing well, and her triplets are now in school.

FIGURE 1 Axial View of the Thoracic Aorta Angiogram Showing the Dilated Ascending Aorta Measuring Approximately 4.1 cm in Diameter



QUESTION 1: HOW DOES TA IMPACT MATERNAL AND FETAL OUTCOMES IN PREGNANCY?

TA is a vasculitis affecting women of childbearing age and often manifests during pregnancy. Limited research exists regarding TA in pregnancy; however, multiple studies have been examined in case reports. Frequency and onset of complications are noted to be variable even by location. Patients with TA often have severe hypertension and/or pre-eclampsia.[1] Newborn complications reported include preterm delivery, neonatal death from prematurity, and low birth weight.[1] Risk factors for increased adverse outcomes are a history of hypertension, renal artery involvement, and high disease activity. Other factors include vascular damage, which is associated with a new diagnosis of TA at the time of conception or in the early pregnancy.[2] Lower risk for adverse outcomes corresponds to lower disease activity at the time of conception.[3] Vaginal delivery is preferred in patients with TA to avoid labile blood pressure during C-section; however, there are no clear guidelines. Planned elective C-section is indicated in patients with severe valvular disease, dilated ascending aorta of >4.5 cm, or prior dissection.[4]

QUESTION 2: WHAT ARE THE RECOMMENDATIONS FOR MANAGING AORTIC INSUFFICIENCY IN PREGNANCY?

Mild to moderate regurgitant lesions are not absolute contraindications for pregnancy and are well tolerated in the setting of normal left ventricular function. Severe regurgitant lesions, however, pose the risk of volume overload, pulmonary edema, and heart failure exacerbated by the hemodynamic changes in pregnancy.[5] Physiologic changes relating to the circulatory system in pregnancy include increased plasma volume and heart rate with subsequent decrease in systemic vascular resistance. These changes can increase the severity of regurgitant lesions. Volume overload during the third trimester,

where fluid shift is maximum, can be managed with diuretics.[6] Preconception counseling in patients with severe regurgitant lesions who are symptomatic with depressed ventricular function and referral for valve repair before pregnancy is recommended.[7] Our patient posed a unique challenge given her history of congenital BAV with AR and aortopathy from TA. She did not have significant aortic stenosis from the bicuspid valve but was at increased risk of dissection and worsening regurgitation from her aortopathy. Pregnancy is contraindicated in patients with isolated bicuspid valve with ascending aortic diameter of >5 cm as well as in patients with BAV with Marfan syndrome and other connective tissue diseases with an ascending aortic diameter of >4.5 cm.[4] Because the patient's aortic diameter was <4.5 cm without significant stenosis, pregnancy was not contraindicated, but close monitoring was required with a multidisciplinary approach.[3]

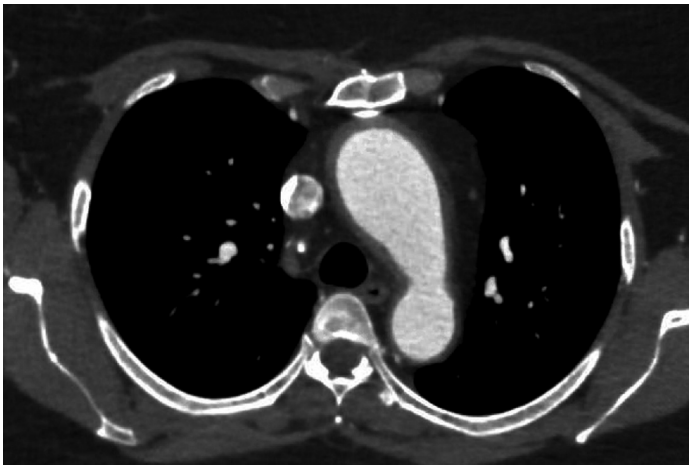
QUESTION 3: WHAT IS THE MAINSTAY OF TREATMENT OF TA IN PREGNANCY?

TA in remission appears to allow successful pregnancy without complications. However, it is often difficult because the disease onset is without obvious signs in young women of childbearing age and before pregnancy. Medications used to treat and suppress inflammation include steroids and immunosuppressants. Outside of immunosuppressants, the mainstay of treatment is optimal blood pressure management to prevent adverse outcomes.[2] Adalimumab is a category B medication during pregnancy and is excreted in breast milk. Studies have not shown an increased risk in maternal and fetal adverse outcomes on adalimumab exposure compared to infliximab.[8] This patient was treated with prednisone, adalimumab, and metoprolol throughout her pregnancy.[1] Although the patient had a premature delivery, the typical gestational age at delivery in triplet pregnancy is 31 weeks.[9]

QUESTION 4: WHAT IS THE IMPACT OF CONGENITAL BAV ON PREGNANCY?

BAV is the most common congenital aortic valve disorder and affects 1% to 2% of the population.[10] Complications associated with BAV include aortic stenosis, regurgitation, endocarditis, and dissection. Data on the impact of BAV on maternal and fetal outcomes is scarce. Expert consensus guidelines on the management of aortic disease in pregnancy, particularly BAV, come from meta-analyses and case reports.[10] Per the European Society of Cardiology guidelines, the presence of BAV in pregnancy is considered a moderate risk even without the presence of aortic dilation.[4] Adverse event rates without dilation are estimated at 10% to 19%, which increases to more than 40% in the presence of aortic root dilation of more than 4.5 cm.[4] Higher complication rates are reported in patients with moderate to severe aortic stenosis, with maternal mortality as high as 11%.[10] Aortic root dilation with a mean of 0.52 cm (compared to 0.4 cm in nonpregnant patients) per year has been seen.[11] Surprisingly, the rate of aortic dissection was comparable to that in the nonpregnant population, and 25% of patients developed some degree of AR.[11] In our patient, aortic root diameter remained stable, but her AR progressed from mild to severe.

FIGURE 2 Axial View of the Thoracic Aorta Angiogram Showing Circumferential Wall Thickening of the Ascending Aorta Secondary to Takayasu Arteritis



CONCLUSIONS

TA complicated by aortopathy and congenital BAV can result in a high-risk pregnancy. However, the severity of risk depends on disease burden and the anatomy of the BAV at the time of pregnancy. The biggest risk with TA is seen in patients with no previous diagnosis or treatment presenting with severe inflammation or progression at the time of pregnancy. A BAV associated with AR rather than stenosis is often better tolerated. During pregnancy, a multidisciplinary team is required for proper management of this high-risk patient population.

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The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

ADDRESS FOR CORRESPONDENCE: Dr Aditi Shankar, Division of Cardiology, Department of Medicine, University of Texas Health San Antonio, 7703 Floyd Curl Drive, San Antonio, Texas 78229, USA. E-mail: shankara@uthscsa.edu.

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KEY WORDS aortic insufficiency, congenital bicuspid aortic valve, pregnancy, Takayasu arteritis

APPENDIX For supplemental videos, please see the online version of this paper.