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VALVULAR HEART DISEASE

CASE REPORT: CLINICAL CASE

First Percutaneous Balloon Mitral Valvuloplasty in a Pregnant Patient in Tanzania

Reuben Kato Mutagaywa, MD, MMED, MSC, PHD,[a,*] Saleh Hamisi Mwinchete, MD, MMED, MSC,[a,*] John D. Calori, MD, MMED, MSC,[a] Mazen Albaghdadi, MD, MMED, MSC,[b] Edna Kajuna, BSCN, MSCPN,[a] Polycarp France, BSCMT,[a] Keyness Mg'anya, BSCN,[a] Tatizo Waane, MD, MMED, MSC,[a] Godfrey Bagenda, BSCMT,[a] Peter Richard Kisenge, MD, MMED, MSC[a]

ABSTRACT

Percutaneous balloon mitral valvuloplasty (PBMV) is a safe alternative to management of a pregnant woman with mitral stenosis. We report the first successful PBMV in a 27-year-old pregnant patient in Tanzania at 32 weeks gestation with NYHA functional class III symptoms. PBMV yielded excellent results. (JACC Case Rep. 2024;29:102624) © 2024 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/).

HISTORY OF PRESENTATION

A 27-year-old woman, third pregnancy with two live births, from Southern highland (Iringa) Tanzania came to the Jakaya Kikwete Cardiac Institute (JKCI) at 32 weeks' gestational age with dyspnea that worsened since 4 months of pregnancy. The symptom was accompanied by orthopnea, paroxysmal nocturnal dyspnea, palpitations, dizziness, and bilateral lower limbs swelling. She denied fever, chest pain, and syncope. On noticing those symptoms she attended a nearby clinic from which she was referred to Iringa regional hospital because she was not symptomatically improving. At a regional hospital she was diagnosed as having rheumatic heart disease (RHD) and was initiated on tablets of furosemide and clopidogrel and was then referred to JKCI where she was admitted for further management.

LEARNING OBJECTIVES

- To understand that severe MS is poorly tolerated in pregnancy, and warrants a multidisciplinary approach for management.
- To learn that PBMV can safely be performed even in the third trimester of pregnancy using fluoroscopic guidance and avoidance of general anesthesia.

On examination she was conscious and afebrile, with normal blood pressure, low volume with normal rate pulse, and not tachypneic. She was anemic, and had mild bilateral lower limb edema. The jugular venous pressure was normal, she had hyperactive precordium, no cardiomegaly, there was heaving at the left lower sternal border and at the apex, and a tapping apex. S1 and S2 were heard with a loud P2 and

From the [a]Jakaya Kikwete Cardiac Institute, Department of Adult Cardiology, Dar es Salaam, Tanzania; and the [b]Naples Comprehensive Health Heart Institute-Naples Comprehensive Health Healthcare System, Florida, USA. *Drs Mutagaywa and Mwinchete contributed equally to this work as co-first authors.

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ABBREVIATIONS AND ACRONYMS

HF = heart failure

JKCI = Jakaya Kikwete Cardiac Institute

MS = mitral stenosis

MV = mitral valve

PBMV = percutaneous balloon mitral valvuloplasty

RHD = rheumatic heart disease

a mid-diastolic murmur at the mitral area. Examination results of the lungs were normal. Abdominal examination revealed a gravid uterus. Other systemic examinations were normal.

MEDICAL HISTORY

Her past medical history was not eventful. Her first and second deliveries were in 2017 and 2022, respectively, both of which were normal delivery at the hospital and with no complication.

DIFFERENTIAL DIAGNOSIS

We made a provisional diagnosis of RHD with a differential of atrial septal defect.

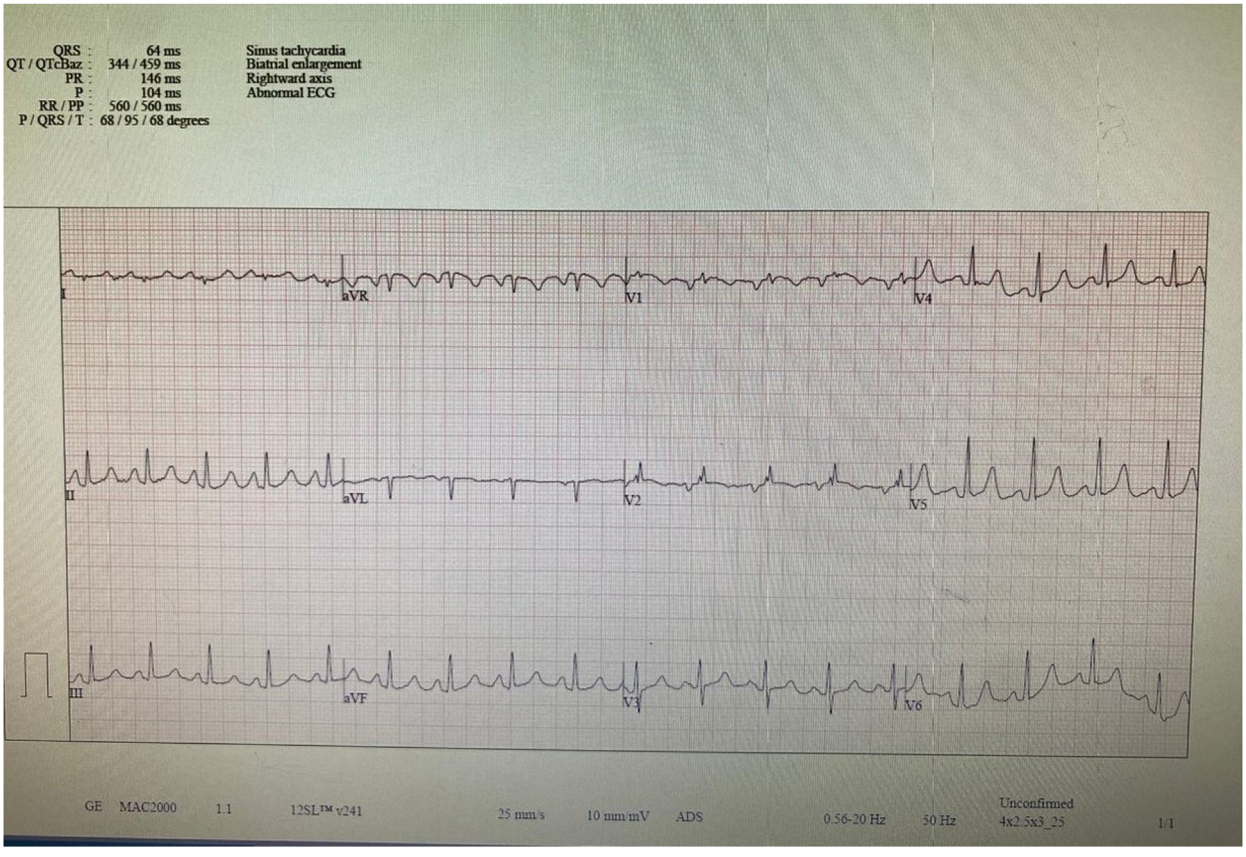
INVESTIGATIONS

Electrocardiogram showed sinus tachycardia with a rate of 107 beats/min, biatrial enlargement, and right-axis deviation as shown in **Figure 1**.

Echocardiography depicted thickened anterior and posterior leaflets of mitral valve (MV) with hockey stick appearance during diastole and dilated left atrium, with left ventricular ejection fraction of 58%. MV area was 0.85 cm^2 by planimetry, with a mean MV gradient of 24.2 mm Hg. There was no mitral regurgitation. Wilkin score was 11. The aortic, tricuspid, and pulmonary valves were normal and the right ventricular systolic pressure was 10.9 mm Hg. There was no thrombus and no congenital defects (**Figures 2A and 2B**).

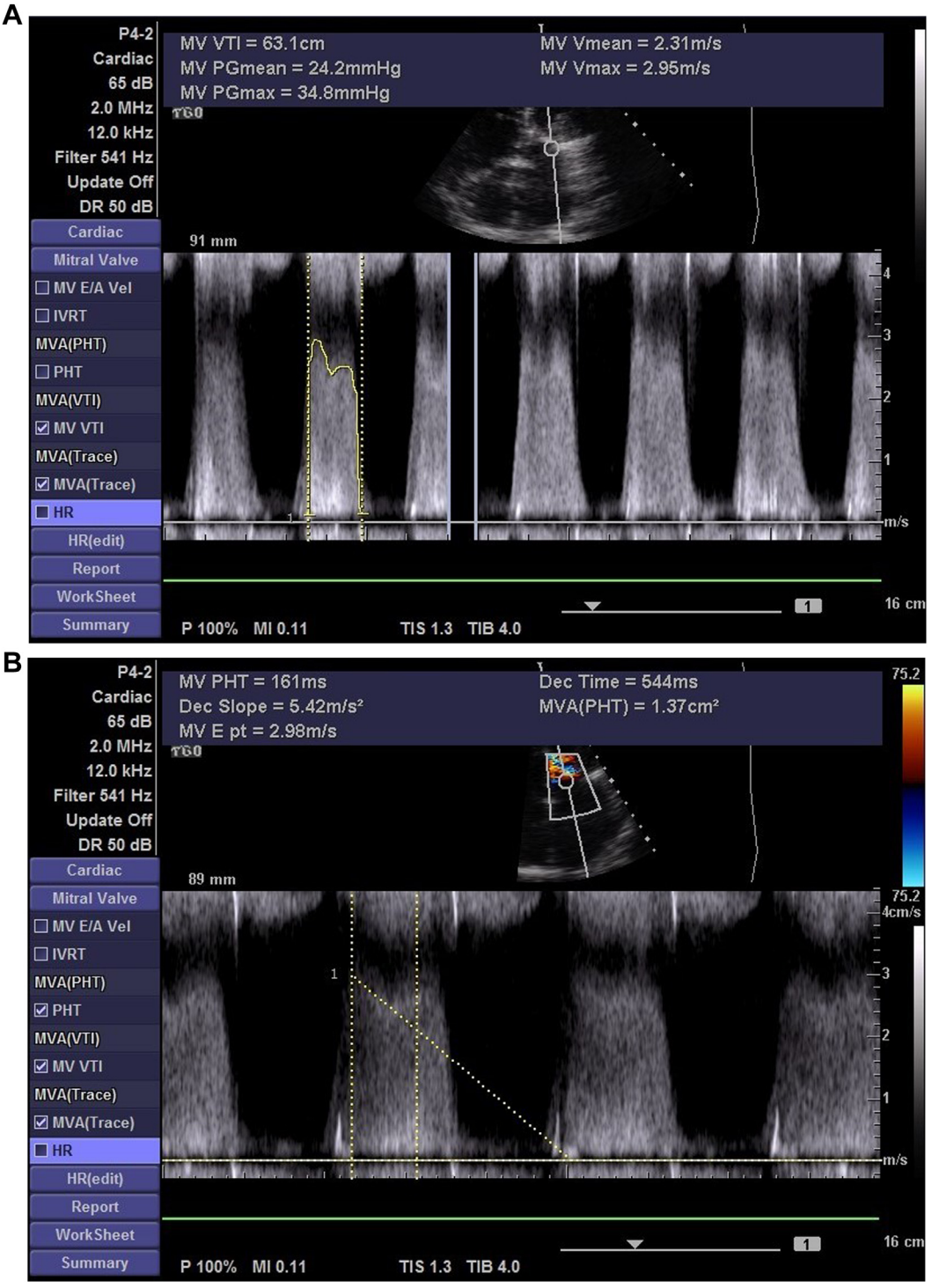
Laboratory investigations revealed hemoglobin of 9.6 g/dL, leucocytes of 6.7 $\times$ 10^3/UL, creatinine of

FIGURE 1 Electrocardiogram



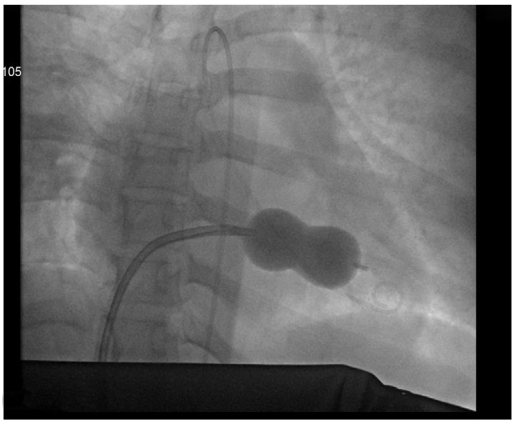
Electrocardiogram showed sinus tachycardia, biatrial enlargement, and right-axis deviation.

FIGURE 2 **Transthoracic Echocardiography**



(A) Transthoracic echocardiography showing severe MS with a mean MV gradient of 24.2 mm Hg. (B) Transthoracic echocardiography showing severe MS with a MV area of 1.37 cm^2 by pressure half time. MS = mitral stenosis; MV = mitral valve.

FIGURE 3 The Balloon



The balloon is inflated across a stenosed rheumatic MV. Abbreviation as in Figure 2.

63.7 μmol/L, urea of 3.14 mmol/L, sodium of 138.1 mmol/L, potassium of 3.7 mmol/L, activated partial thromboplastin time of 24.2 s, and international normalized ratio of 1.03; serology for human immunodeficiency virus, hepatitis B and C, and syphilis were negative.

MANAGEMENT

The patient was diagnosed with heart failure (HF) NYHA functional class II-III secondary to rheumatic severe mitral stenosis (MS) and was scheduled for percutaneous balloon mitral valvuloplasty (PBMV). The procedure was performed under local anesthesia and conscious sedation, using fluoroscopy. The fetus was protected from radiation by using a protective apron. Vascular accesses were right femoral vein for the Inoue balloon and left femoral artery for angiographic pigtail catheter. Trans-septal puncture was done using a Brockenbrough needle. Intravenous heparin was given immediately after septal puncture. The Inoue balloon stepwise technique was used. A successful PBMV was achieved (Figure 3). Post-PBMV MV mean gradient was 10.7 mm Hg, with no mitral regurgitation and no pericardial effusion. The patient was discharged on the third day postprocedure, on oral furosemide 40 mg once daily. She was referred back to Iringa and advised to continue with antenatal clinic appointments.

DISCUSSION

In Tanzania, RHD is the third leading cause of HF.[1] Rheumatic MS in Africa shows a female predominance.[2] Patients present with NYHA functional class II-III, atrial fibrillation (28%), and thromboembolic events (3.2%), indicating late presentation.[3] Similar to this case, it is not uncommon for women to be diagnosed with RHD for the first time when they become pregnant. The late presentation to hospital is attributed to poor knowledge of the disease among healthcare workers/patients, lack of appropriate diagnostic equipment, and poor health-seeking behaviors.

The risk imposed by RHD to a pregnant women, to the pregnancy itself, and in management is immense.[4] Recently, we published a paper from our RHD cohort that showed that the majority of women of reproductive age were at increased pregnancy risk based on World Health Organization classification and few of them were on contraceptive methods.[4] This calls for strategies aiming at reducing these risks that include the provision of prepregnancy advice and family planning for women with RHD.

PBMV or MV surgery are guideline-recommended therapies for significant MS.[5] Due to limited access to these interventions in developing countries, most of these patients are managed medically.[2] PBMV is a treatment of choice for suitable candidates offering symptomatic relief lasting up to 20 years[1] and a success rate of about 95% in pregnant patients.[6] Currently, in sub-Saharan African countries, access to cardiac catheterization laboratory is on the rise and, therefore, PBMV is a possibility. However, the uptake of these interventional procedures is low due to several reasons including lack of expertise in most of the countries.[1,2] In Tanzania, we started PBMV services in 2019 and until today we have performed 24 PBMV procedures of which 18 of the patients were females.[1,2] JKCI is the only institute offering PBMV services in the country and this recently performed PBMV in a pregnant woman is the first. We recommend that with a well-planned program, this service is feasible in developing countries.

FOLLOW-UP

The patient was on regular antenatal clinic visits at Iringa hospital with no HF symptoms. At a gestation age of 37 weeks she went into spontaneous labor and eventually she uneventfully delivered a female baby weighing 2.8 kg with Apgar score of 9 and 10 at first and 5 minutes, respectively. The mother and baby are all healthy. The patient gave consent for publication of this case.

CONCLUSIONS

A 27-year-old woman from rural Tanzania presented at JKCI at 32 weeks' gestation age with HF symptoms. Echocardiography revealed severe MS with favorable anatomy for PBMV. The procedure was performed with excellent results. After the procedure, the mother progressed well to term and delivered a healthy baby.

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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: Prof Reuben Kato Mutagaywa, P.O. Box 65141, Dar es Salaam, Tanzania. E-mail: reubenmutagaywa@yahoo.com. X handle: @reubenmutagaywa.

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KEY WORDS mitral stenosis, percutaneous balloon mitral valvuloplasty, pregnancy