Case Report

Percutaneous Mitral Valvuloplastry in a Pregnant Woman Guided only by the Transesophageal Echocardiography

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Mitral valve stenosis is the most common valve lesion in pregnancy. In spite of an optimized clinical treatment and a favorable valve anatomy according to Wilkins and Block score, in symptomatic patients, percutaneous intervention is shown to be of great importance. In these patients, avoiding x-ray exposure as much as possible is recommended so as to protect the fetus from the deleterious effects of ionizing radiation. In this case report, a 24-year old pregnant patient with severe mitral stenosis (valve area of 0.9 cm^2) was successfully submitted to a TEE-guided percutaneous treatment, without the use of x-ray.

Introduction

Fluoroscopy-guided balloon valvuloplasty is known to be safe and effective in pregnant patients with symptomatic mitral stenosis, and its role is well established in the literature worldwide[1-3]. However, the fetus is exposed to the harmful effects of ionizing radiation. The lack of case reports in the literature on the use of transesophageal echocardiography as a guide to valvuloplasty in pregnant patients, and the elimination of fetal exposure to the harmful effects of ionizing radiation encouraged us to publish this article.

Case Report

Patient, 24 years old, Caucasian, married, primigravida, born and residing in Porto Velho – State of Rondônia, Brazil, was admitted in our service in October, 2005 with rheumatic mitral stenosis and NYHA (New York Heart Association) functional class III, despite the use of propranolol (120mg/day) and hydrochlorothiazide (25mg/day).

Her physical examination revealed good general conditions: weight - 64Kg, height – 1.65 m, heart rate – 68 bpm, regular heart rhythm with no extra sounds, accentuated S1, grade 4/6 diastolic murmur in the mitral area and the presence of thrill. She had vesicular breath sounds and a pregnant abdomen.

Key words

Mitral valve stenosis; balloon dilatation; pregnancy.

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Manuscript received May 3, 2006; revised manuscript received June 1, 2006; accepted June 1, 2006.

The electrocardiogram showed p-wave duration at the upper limit of normal (Figure 1).

The transthoracic echocardiogram at admission revealed a mitral valve area of 0.9 cm^2 with a mean gradient of 15 mmHg and a Wilkins and Block score[4] of 9 points (3 mobility, 3 thickening, 1 calcification, and 2 subvalvular apparatus); mild mitral regurgitation; left ventricular (LV) diastolic diameter of 48 mm; LV ejection fraction of 0.81; left atrium (LA) with 49 mm (significant enlargement); mild tricuspid regurgitation; and systolic pulmonary artery pressure estimated at 50 mmHg, without further significant alterations.

Based on the patient's clinical status and on the favorable morphology of the mitral valve apparatus as described in the echocardiographic study, the decision was to treat the mitral stenosis percutaneously using the Inoue technique[5], guided only by transesophageal echocardiography, so as to prevent fetal exposure to the potentially harmful effects of ionizing radiation[6].

A gynecological and obstetric evaluation was performed prior to the procedure. The ultrasonography revealed a single fetus, fetal biometry estimated at 24 weeks and two days, adequate development and fetal heart rate of 154 bpm, anterior grade 0 placenta, cephalic presentation, longitudinal lie, normal amniotic fluid volume, and a three-vessel umbilical chord.

The procedure was carried out in the presence of the obstetric and echocardiography teams in the catheterization laboratory. The patient underwent conscious sedation and analgesia with intravenous midazolam (6mg) and meperidine (15mg), not requiring orotracheal intubation. The right femoral artery and vein were punctured and cannulated with 6F and 7F introducers, respectively.

We positioned the guidewire at the superior vena cava using the subcostal bicaval longitudinal view (90º). Transeptal puncture was performed with the Brockenbrough technique[7] utilizing a Mullins catheter after visualization of the interatrial septum using the same view (Figure 2). After puncture, IV heparin was given at 70U/kg. The guidewire was positioned in the left atrium (LA) (Figure 3), and the dilation of the interatrial septum was performed with a 14F dilator. A 26-mm Inoue balloon (calculated with the formula: balloon diameter = [height (cm) /10] + 10) was introduced up to the left ventricle (LV). After making sure that the balloon was free in the left ventricular chamber, it was inflated in its distal portion and anchored at the mitral annulus, and valve dilation was performed with a 25-mm-diameter balloon for approximately 5 seconds (Figure 4).

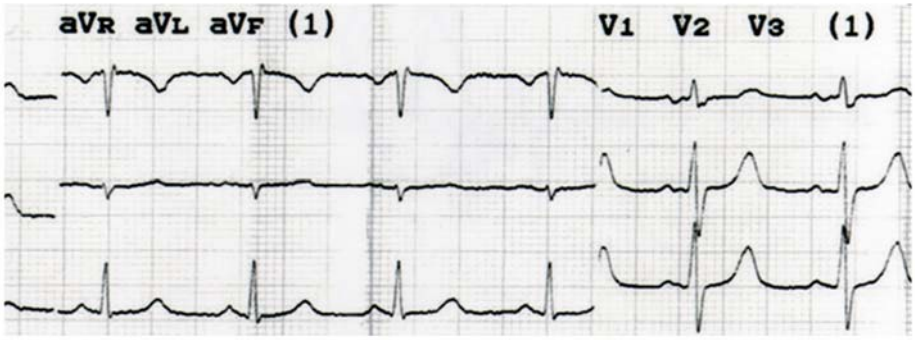

Fig. 1 - *Resting electrocardiogram.*

Fig. 2 - *Bicaval longitudinal view (90º): Puncture of interatrial septum with a Brockenbrough needle.*

Fig. 3 - *Four-chamber view – lower esophagus: guidewire placement inside the left atrium.*

After the first inflation, the echocardiographic result obtained was not considered satisfactory (valve area of 1.6 cm^2), so we decided to perform a second inflation, with a 26-mm-diameter balloon, with a resulting valve area of 2.2 cm^2 and mild mitral regurgitation. The Inoue balloon was removed, and no left-to-right shunt was detected at the interatrial septum. (Figure5).

The procedure was uneventful and had a total duration of 25 minutes as of the femoral puncture.

The patient remained in the Intensive Care Unit for 24 hours under observation, after which she was discharged.

Discussion

Mitral valve stenosis is the most common valve disease in pregnancy[8,9]. In Brazil, it accounts for 50% of all heart valve diseases in pregnant women[10]. During pregnancy, most patients with moderate to severe mitral stenosis progress with a deterioration of one or two NYHA functional classes[8,11]. The physiological alterations (increased cardiac output, blood volume and heart rate) worsen the hemodynamic status resulting from the obstruction during left atrial emptying, which causes a pressure increase in the LA and in the pulmonary region.

In addition to the repercussions for the mother, mitral stenosis is related to a significant increase in prematurity, fetal growth retardation and low birth weight[11,12].

Clinical stabilization of pregnant women with mitral stenosis can be obtained, in most cases, with heart rate control and left atrial pressure reduction, by means of limited physical activities and the use of beta-blockers and diuretics. Nevertheless, the latter two must be used with great caution so as to avoid a significant reduction in placental blood flow. In patients who persist with significant symptoms despite adequate clinical therapy, percutaneous or invasive surgical treatment is indicated.

It is important to note that even functional class I and II patients may have an unfavorable outcome because they may present an obstructive valve disease. Functional class III and

Fig. 4 - *Longitudinal two-chamber view: Inoue balloon inflation with mitral valve opening.*

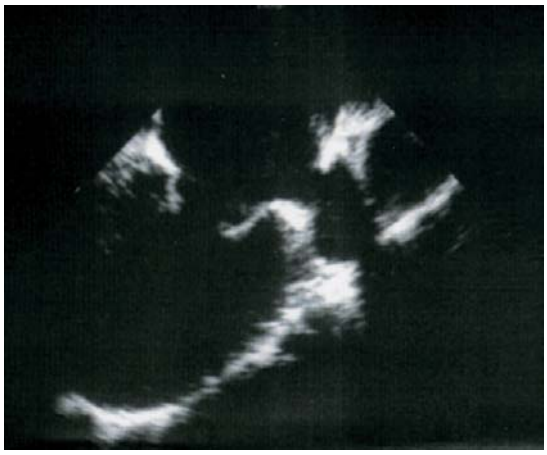

Fig. 5 - *Longitudinal two-chamber view: mitral valve with good opening at the end of the procedure.*

IV patients usually have an unfavorable outcome. Therefore, invasive therapies have proven to be of great value for the adequate clinical control of these patients.

However, open or closed surgery are related to high fetal and maternal mortality and morbidity rates, which limit their use[13,14].

Several studies[1-15] have shown favorable immediate results with percutaneous treatment in these patients, with a significant increase in valve area and low complication rates.

So far, the children's clinical follow-up has been favorable, with normal development and no adverse effects resulting from ionizing radiation[3,16]. However, these patients are advised to avoid x-ray exposure as much as possible, particularly in the first trimester of pregnancy, when fetal organogenesis occurs. Although after this period the risks are minimized, radiation exposure is associated with harmful effects. Intrauterine growth retardation, central nervous system abnormalities and increased incidence of childhood cancer, such as leukemia, are reported[6].

The most commonly used form of fetal protection during PMV includes the shortest possible time of fluoroscopy and the placement of a lead apron on the mother's abdominal and pelvic regions.

In an attempt to completely eliminate the possible risks associated with the use of ionizing radiation, valvuloplasty was performed using only transesophageal echocardiography, which made the procedure easy and safe. This option should be encouraged in pregnant patients, particularly with the use of the Inoue technique, because of its greater simplicity, and performed by teams experienced in the percutaneous treatment of mitral stenosis.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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