Year 2003 Paper two: Questions supplied by Tricia

**Question 17**
A 28-year-old woman, who emigrated from Cambodia 10 years ago presents to the emergency department with a three-week history of increasing shortness of breath, orthopnoea, nocturnal dyspnoea and ankle oedema. She is 25 weeks pregnant and has no significant past medical history.

The presence of pulmonary oedema is confirmed clinically and radiologically. She responds well to intravenous frusemide but remains tachypnoeic with a heat rate of 120/minute in sinus rhythm. Her blood pressure is 125/85 mmHg.

Echocardiography demonstrates mitral stenosis with an estimated valve area of 1.3 cm² and a left atrial diameter of 50 mm [less than 40]. There are no other abnormalities.

What is the most appropriate next step in management?

A. Balloon valvotomy
B. Surgical valvotomy
C. Digoxin therapy
D. Beta-blocker therapy
E. Angiotensin converting enzyme (ACE) inhibitor therapy.

**Answer D**

Key points
- She does not have valve area less than 1.0 although it's difficult to gauge from history what NYHA CHF class she fits but probably not IV
- She has already commenced diuretic therapy so the next medical therapy is control heart rate
- There is no mention of AF

Valvular Heart Disease in Pregnancy  Sharon C. Reimold, M.D., and John D. Rutherford, M.B., Ch.B.

Valvular heart disease in young women is most commonly due to rheumatic heart disease, congenital abnormalities, or previous endocarditis and may increase the maternal and fetal risks associated with pregnancy. The likelihood of an adverse outcome is related to the type and severity of maternal valvular disease and the resulting abnormalities of functional capacity, left ventricular function, and pulmonary pressure. Clinical recommendations concerning valvular heart disease and pregnancy are based on limited data from case reports and observational studies or on inferences from data for other groups of patients.

**Cardiovascular Physiology of Pregnancy**

Normal pregnancy is associated with an increase of 30 to 50 percent in blood volume and a corresponding increase in cardiac output. These increases begin during the first trimester; the levels peak by 20 to 24 weeks of pregnancy and then are either sustained until term or decrease. Concurrently, the heart rate increases by 10 to 20 beats per minute, the stroke volume increases, and there is a substantial reduction in systemic vascular resistance, with decreases in blood pressure. During labor, cardiac output increases; the blood pressure increases with uterine contractions. Immediately after delivery, the cardiac filling pressure may increase dramatically due to the decompression of the vena cava and the return of uterine blood into the systemic circulation. The cardiovascular adaptations associated with pregnancy regress by approximately six weeks after delivery.

Murmurs develop in nearly all women during pregnancy. These murmurs are usually soft, midsystolic, and heard along the left sternal border. Their intensity may increase during pregnancy as cardiac output increases. Cervical venous hums and a continuous murmur due to increased mammary blood flow may also be heard. Echocardiography is warranted when diastolic murmurs, continuous murmurs, or loud systolic murmurs (louder than grade 2 on the 6-point scale) are detected or when murmurs are associated with symptoms or an abnormal electrocardiogram. In normal pregnant women, serial echocardiography usually demonstrates minor increases in
the left and right ventricular diastolic dimensions, which remain within the normal range, with a slight decrease in the left ventricular end-systolic dimension and a minimal increase in the size of the left atrium. The state of increased volume also results in increased transvalvular flow velocities. Minor degrees of atrioventricular valve regurgitation are normal.

**Mitral Stenosis**

Rheumatic mitral stenosis is the most common clinically significant valvular abnormality in pregnant women and may be associated with pulmonary congestion, edema, and atrial arrhythmias during pregnancy or soon after delivery. The increased volume load and increased cardiac output associated with pregnancy lead to an increase in left atrial volume and pressure, elevated pulmonary venous filling pressures, dyspnea, and decreased exercise tolerance. Increases in the maternal heart rate decrease the diastolic filling period, further increasing left atrial pressure. Mortality among pregnant women with minimal symptoms is less than 1 percent. In a study of women with mitral stenosis, predictors of adverse maternal outcomes included a reduced mitral-valve area (less than 1.5 cm\(^2\)) and an abnormal functional class before pregnancy. Fetal mortality increases with deteriorating maternal functional capacity; fetal mortality is 30 percent when there is NYHA class IV disease in the mother.

For women with mild or moderate symptoms during pregnancy, medical therapy is directed at the treatment of volume overload and includes diuretic therapy, the avoidance of excessive salt, and the reduction of physical activity. Beta-blockers attenuate the increases in heart rate and prolong the diastolic filling period, which provides symptomatic benefit. Development of atrial fibrillation requires prompt treatment, including cardioversion. Beta-blockers and digoxin are used for rate control. If suppressive antiarrhythmic therapy is needed, procaainamide and quinidine are the drugs with which we have the most extensive experience. Because of the increased risk of systemic embolism in patients with mitral stenosis and atrial fibrillation, anticoagulant therapy is indicated.

Patients with severe symptoms (NYHA class III or IV) or tight mitral stenosis (a valve area of less than 1.0 cm\(^2\)) who undergo balloon mitral valvuloplasty or valve surgery before conceiving appear to tolerate pregnancy with fewer complications than similar women who are treated medically. In patients who present with severe symptoms during pregnancy, successful percutaneous balloon mitral valvuloplasty, performed during the second trimester, has been associated with normal subsequent deliveries and excellent fetal outcomes. Risks to the fetus associated with exposure to radiation may be reduced by avoiding exposure to radiation during the first half of pregnancy. Pregnant women who are to be exposed to radiation should have the uterus shielded and should be informed about the possible risks. Mitral valvuloplasty has also been performed under transesophageal echocardiographic guidance, eliminating these risks. Open cardiac surgery has been performed during pregnancy for severe mitral stenosis. Maternal outcomes are approximately the same as those among nonpregnant patients, but there is fetal loss in 10 to 30 percent of cases.

Vaginal delivery is the usual approach, with the use of epidural anesthesia to achieve effective pain control and with the use of assisted-delivery devices during the second stage of delivery (eliminating the need for pushing). Cesarean section should be performed when there are obstetrical indications for it. Labor is associated with an increase of 8 to 10 mm Hg in the left atrial and pulmonary wedge pressures. Pulmonary arterial catheters have been used successfully before and during delivery to facilitate the management of hemodynamics in women with advanced disease.