Internal and External Phonocardiography

Mitral Stenosis, Pulmonary Hypertension, Pulmonary and Tricuspid Insufficiency*

Aldo A. Luisada, M.D., F.C.C.P.

This patient, a 43-year-old woman, had been known to have rheumatic heart disease since childhood in spite of the lack of any history of rheumatic fever. She had been complaining of exertional dyspnea and ankle edema for some time.

Physical examination revealed moderate cyanosis and orthopnea. The pulse was irregular at a rate of 75/min. The blood pressure was 120/70. The heart was markedly enlarged to the right on percussion. The apical impulse was in the 5th interspace, 2 cm outside the midclavicular line. There was a grade 2 systolic murmur and a grade 3 diastolic rumble at the apex; an opening snap was audible in the 3rd and 4th interspaces; and a grade 3 soft, blowing, decrescendo murmur was audible over the 2nd and 3rd interspaces close to the sternum. The liver was markedly enlarged being palpable 7 cm below the costal margin and had a systolic pulsation. There was a grade 2 pitting edema of the legs.

The ECG showed atrial fibrillation, marked right ventricular hypertrophy (or incomplete right bundle branch block), and digitalis effect.

The PCG showed a decrescendo systolic murmur, a mitral opening snap, and a low pitched diastolic rumble at the apex (Fig. 1) caused by mitral stenosis and possible minimal insufficiency. Over the pulmonic area, the most salient finding was a large pulmonary (P) component of the II sound and a decrescendo, high-frequency murmur that seemed to start after the P component (Fig 2). The hepatic tracing revealed a large positive systolic wave in form of a plateau (Fig 2) that was interpreted as evidence of tricuspid regurgitation.

The x-ray film showed marked enlargement of the left atrium and of the right ventricle, and a dilated pulmonary arch.

At this point, the following diagnosis was made: mitral stenosis, pulmonary hypertension, pulmonary insufficiency (relative), tricuspid insufficiency (rel-
Figure 3. External (above) and right ventricular intracardiac phonocardiograms. Diastolic murmur starting with the pulmonary component of the II sound. Right ventricular pressure higher than aortic pressure.

ative). As the interval between aortic component of the second sound and opening snap varied from 0.07 to 0.08 sec, mitral stenosis was considered to be of medium severity.

Cardiac catheterization gave the following pressures: right atrium (mean), 23; right ventricle, 34; left ventricle, 126/24; the pulmonary artery was not entered. Cardiac output was 2.6 liters/min and cardiac index was 1.8.

An intracardiac phonocardiogram of the right ventricle revealed the aortic and pulmonary components of the second sound, then the opening snap; there was a small systolic murmur in decrescendo, and there was a diastolic murmur that started after the P component but before the opening snap. An angiocardiogram revealed the existence of minimal aortic regurgitation.

The final diagnosis was: mitral stenosis, medium; aortic insufficiency, minimal; pulmonary insufficiency; tricuspid insufficiency; left and right ventricular failure.

Even though the phonocardiogram had allowed us to make a correct diagnosis, the problem of whether aortic or pulmonary regurgitation was present and the evaluation of mitral stenosis required cardiac catheterization. In spite of the evidence of minimal aortic insufficiency (angiocardiogram), the finding of a high-pitched diastolic murmur starting after the pulmonary component was accepted as evidence of pulmonary insufficiency. It is unfortunate that, not having entered the pulmonary artery, we could not document a low diastolic pressure in this vessel.

Mitrail stenosis was less severe than indicated by the level of left atrial pressure because left ventricular failure already had raised the end-diastolic pressure of this chamber. Pulmonary insufficiency was considered to be "relative" being caused by severe pulmonary hypertension, and so was the tricuspid insufficiency.

The pulmonary diastolic murmur thus was a Graham Steell murmur.

References


Reprint requests: Dr. Luisada, 2020 West Ogden, Chicago 60612