Intracardiac Phonocardiography in Mitral and Aortic Value Lesions

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Intracardiac phonocardiography (i.e., phono.) is a recently described technic. Right heart i.e. phono was independently described by Soulié,1 Lewis et al.2 and Moscovitz et al.3 Left heart i.e. phono was described by Luisada and Liu4-6 who use an entirely different principle which can be applied to either side of the heart.

Methods

Intracardiac phonocardiograms were recorded, according to previous descriptions, by connecting the strain gage channel, by means of a short cable, to the phono channel. The medium and high frequency vibration of the gage were differentiated, amplified, and filtered, then recorded by the phono channel. This system allows one to register the vibrations of the blood within the various chambers without introducing any additional device into the heart.

The intracardiac phonocardiogram was recorded in the bands 60-110, 60-250, or 60-500. Occasionally, the band 30-110 was also used.

Results

Subjects with Normal Valves. Two patients presenting no murmurs were submitted to both right and left catheterization. The pressure tracings revealed no valvular lesions.

Severe Mitral Stenosis. Tracings recorded in the left atrium revealed no systolic murmur in 2 and a few, low frequency, systolic vibrations in decrescendo in 1 case. A third case had an opening snap of the mitral valve. Tracings recorded in the left ventricle of one case (fig. 1) revealed an opening snap of the mitral valve, the largest vibration of which followed the aortic component of the second sound by 0.05 second. Following this snap, a diastolic rumble with presystolic accentuation was clearly visible.

Mitral Stenosis and Insufficiency. The left ventricular tracings revealed abnormalities which were similar to those described for pure stenosis.

The left atrial tracings revealed an opening snap of the mitral valve in 4 cases out of 7. They also revealed the vibrations of a systolic murmur in 5 out of 7 cases.

Mitral Insufficiency. Left ventricle: In two cases, a systolic murmur was recorded. In one, a short and small diastolic rumble was recorded. Left atrium: The left atrium of 3 cases (as well as that of 5 cases with mitral insufficiency and stenosis) revealed the vibrations of a systolic murmur. This was usually shorter and of smaller amplitude after a short diastole. It was better recorded through the catheter than through the needle and became particularly large when the tip of the catheter approached the mitral valve (fig. 2).

Aortic Stenosis and Insufficiency. The tracings of the left ventricle revealed an opening snap of the aortic valve in 3 cases (fig. 3). The murmur was recorded in the left atrium in 2 cases. It was transmitted to the left ventricle in one case. The vibrations of the murmur were particularly large in case 3, the murmur was transmitted to the left atrium in one case, and the vibrations were largest in case 2.

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Fig. 1. Case of mitral stenosis. Left ventricular tracings. From above: i.e., phono, pressure, external phono, ECG. Diastolic-presystolic murmur.
ings recorded in the ascending aorta chiefly revealed the systolic murmur (fig. 3). A diastolic murmur was apparent in cases with severe insufficiency while it was nonexistent in the others.

At the present stage of our study, we consider that the importance of the various methods in left heart catheterization is as follows: (a) pressure gradients (stenosis), (b) pressure patterns (insufficiency), and (c) sound vibrations (stenosis or insufficiency).

The third method is still being investigated and a complete evaluation will be possible only on the basis of a large number of cases.

ADDENDUM

Since presentation of this paper, the number of cases studied by i.e. phonocardiography of the left heart has reached the number of 45. The interest of the method becomes more and more apparent through a more extensive study.

REFERENCES


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