Present Status of Intracardiac Phonocardiography

By David H. Lewis, M.D., George W. Deitz, M.D., John D. Wallace, A.B. and James R. Brown, Jr., B.S.E.E.

The most important aspect of our studies has been the observation that this technic, using the underwater, barium titanate microphone, provides an exact localization of the production of heart sounds and murmurs.

Figure 1 illustrates the normal intracardiac phonocardiogram from the various chambers of the heart and from the great vessels. Several points may be made:

1. Comparison of similar locations reveals that the sounds from the left side are of greater intensity than those from the right.
2. The first sound is heard throughout and is of greatest intensity in the ventricle.
3. In the ventricle the first major component of the first heart sound is loudest, while in the pulmonary artery and aorta the later components are of greatest intensity.
4. The second sound is heard throughout and is of greatest intensity in the pulmonary artery and aorta.
5. In the aorta and pulmonary artery the second sound represents closure of the respective semilunar valve.
6. The third sound has been observed infrequently and is of greatest intensity in the ventricle; in the right ventricle it is more pronounced in the inflow tract and while this would appear to be the case also for the left ventricle, further studies are needed to be certain about this point.
7. The fourth sound is of greatest intensity in the atrium but may also be heard in the ventricle; it has not been seen in the presence of atrial fibrillation.
8. A systolic murmur is routinely observed in the pulmonary artery but not in the aorta.

In disease states the ability of this technic to localize very precisely the origin of abnormal sounds and murmurs has made it a very valuable diagnostic tool. For example, in left-to-right shunts the sharp localization of the characteristic murmur provides information as to the exact site of the defect, and will do this even when the oxygen studies are equivocal. Conversely, it is also of value in ruling out the presence of suspected intracardiac shunts. In valvular disease, stenosis and/or insufficiency, this technic provides exact information as to the valve or valves involved and will do this even when the hemodynamic data are equivocal.

In summary, the status of our studies at present indicates that intracardiac phonocardiography is an extremely valuable diagnostic tool in addition to its potentialities in a further understanding of the genesis of heart sounds.
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DAVID H. LEWIS, GEORGE W. DEITZ, JOHN D. WALLACE and JAMES R. BROWN, JR.

Circulation. 1958;18:991
doi: 10.1161/01.CIR.18.5.991

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