Effect of Atrial Fibrillation on Left Atrial Pressure and Distensibility of Pulmonary-left Heart Vascular Segment.* (26017)

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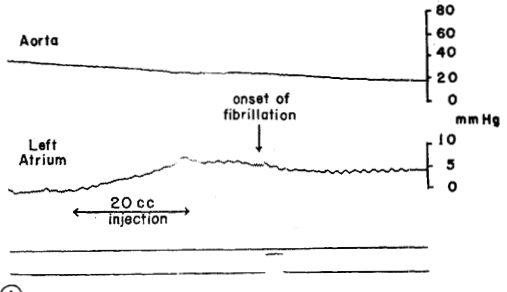
Volume-pressure relationships for the pulmonary-left heart vascular segment of the dog have recently been reported(1). The experimental preparation utilized in that study has been modified to investigate the effect of atrial fibrillation on this parameter of the cardiovascular system. The results are presented here.

Method. The basic experimental preparation utilized in this study is described briefly here and appears in detail elsewhere(1). The pulmonary-left heart segment was isolated by occluding the pulmonary artery during short periods of cardiac standstill produced by left vagus stimulation. During this interval of ventricular asystole, a measured volume of saline or blood was injected into the left atrium and the change in pressure recorded. When ventricular escape occurred, the tapes occluding the pulmonary artery were removed and the circulation permitted to return to normal. In this manner a number of different injections were made in the same animal.

Atrial fibrillation was produced electrically by stimulating the atrial appendage with a laboratory stimulator. In most experiments atrial fibrillation was produced following injection; in other animals atrial fibrillation was produced before injection was made. In both cases atrial fibrillation was continued until ventricular escape occurred.

Results and discussion. A typical record of left atrial and aortic pressure during an injection of 20 cc of saline into the relaxed left atrium during a short period of ventricular asystole is shown in Fig. 1. Left atrial pressure rose rapidly during injection and remained constant at its higher level until onset of atrial fibrillation. With onset of atrial fibrillation the pressure fell, then was main-



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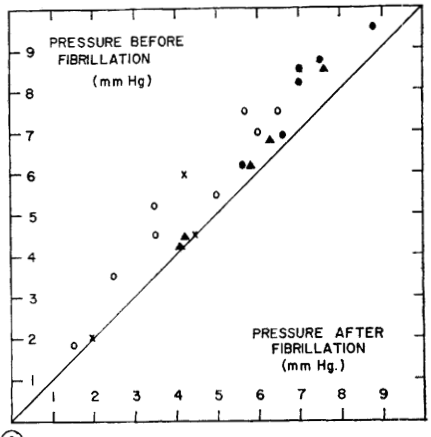

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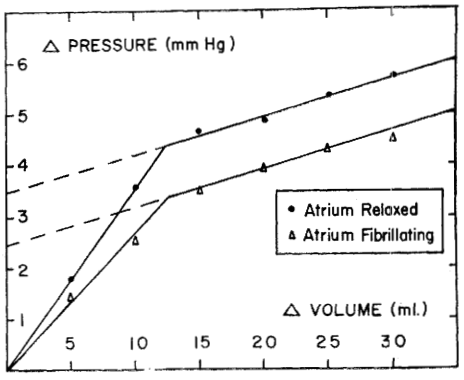

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FIG. 1. Record of aortic and left atrial pressure during inj. of 20 cc of saline into left atrium during ventricular asystole. Onset of atrial fibrillation is indicated.

FIG. 2. Relationship between left atrial pressure before and after onset of atrial fibrillation. Each symbol represents a different animal.

FIG. 3. Volume-pressure relationship shown by plotting change in pressure against change in volume before and after onset of atrial fibrillation.

* This work was supported in part by a grant from Am. Heart Assn.

tained at the lower level for the duration of ventricular standstill. This drop in pressure, while moderate in amount, occurred in all experiments.

Fig. 2 shows pre-fibrillation pressure in the left atrium plotted against pressure after onset of atrial fibrillation for 23 observations in 4 dogs. The data indicate that intracardiac pressure decreased with atrial fibrillation in the order of 1 mm Hg over the entire range of pressure tested. These findings were confirmed in an additional animal where duplicate injections were made over a range of volumes. The first injection of each pair was made into the non-fibrillating atria and the second after atrial fibrillation was produced. In each case the pressure was lower after second injection.

Volume-pressure plots were made for each heart before and after onset of atrial fibrillation by plotting change in pressure against change in volume. All pre-injection pressures agreed within ± 0.5 mm Hg. Fig. 3 shows a typical plot of the data from one animal.†

The shift of the curve toward the volume axis with atrial fibrillation occurred in all experiments. This was an unexpected finding as *a priori* reasoning might suggest that atrial pressure would rise with atrial fibrillation. Displacement of the curve is apparently not due to a change in elasticity of the atrium as the slope of the two curves is essentially the same.

The mechanism responsible for lower intracardiac pressure with atrial fibrillation is not clear. If one assumes that the atria are roughly ellipsoid in shape, it could be further assumed that they would become more spherical in form with fibrillation due to the increase in wall tension. If this change in shape occurred, the internal volume would increase, thereby lowering intracardiac pressure. However, this explanation does not seem entirely adequate. Inspection of the volume-pressure plots indicates that a drop of 1 mm of Hg pressure would require an increase in volume of about 12 cc. A volume change of this magnitude seems too great to be accomplished by variations in atrial geometry. Furthermore, increasing the internal volume would tend to change the slope of the volume-pressure curve which does not occur.

Summary. The effect of atrial fibrillation on left atrial pressure was studied in the living dog during brief periods of ventricular standstill. The data indicate that left atrial pressure decreases with atrial fibrillation in the order of 1 mm Hg. This decrease causes a shift of the volume-pressure plot for the pulmonary-left heart segment toward the volume axis without change of slope. The mechanism of this shift is not clear.

† The break in the plot at a volume change of 12 ml has been described elsewhere(1).

1. Little, R. C., *Circulation Res.*, 1960, v8, 594.

Received July 5, 1960. P.S.E.B.M., 1960, v105.

Ethionine-Induced Resorption of the Rat Conceptus.* (26018)

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Various investigators have reported that amino acid analogues have specific detrimental effects on growth and differentiation of embryonic primordia in the chick(1,2). It has been proposed that the effect is primarily on the protein of the embryonic cell. In light of this, we have established a program to determine effects of amino acid analogues on the rat embryo.

Ethionine, the amino acid analogue of me-

* This project was initiated at Univ. of Oregon; it has been supported by U. S. Public Health grants and by funds from the Graduate School, University of Oregon.