hypotensive animals. The advantages and limitations of the visual method have been discussed. The effect of cuff size and preliminary warming of the whole animal or only the tail have been studied.

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An Experimental Aortic Valve. (22949)

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The correction of aortic valvular insufficiency remains a problem that has not been adequately solved. The insertion of a plastic ball valve by Hufnagel(1) has received the greatest trial, both experimentally and clinically. More recently Silen and his associates (2) attempted to create a competent aortic valve in experimental animals by intussusception of the aorta in its thoracic portion. However, this ingenious method seems to create some degree of constriction. The present report describes experiments in animals, attempting to produce an aortic valve by creation of a flutter valve in the thoracic aorta.

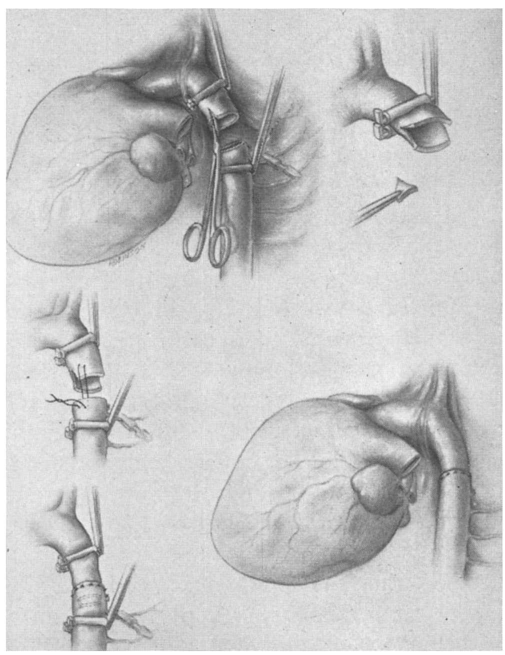

FIG. 1. Steps utilized to create aortic valve.

Methods. Mongrel dogs weighing 14-25 kg were anesthetized with nembutal or with ether. Hypothermia (rectal temperature 22-28°C) was induced with an ice bath. Aseptic technics were employed. The left thoracic cage was opened through the fifth intercostal space and the aorta mobilized from the left subclavian artery to the diaphragm. The ad-

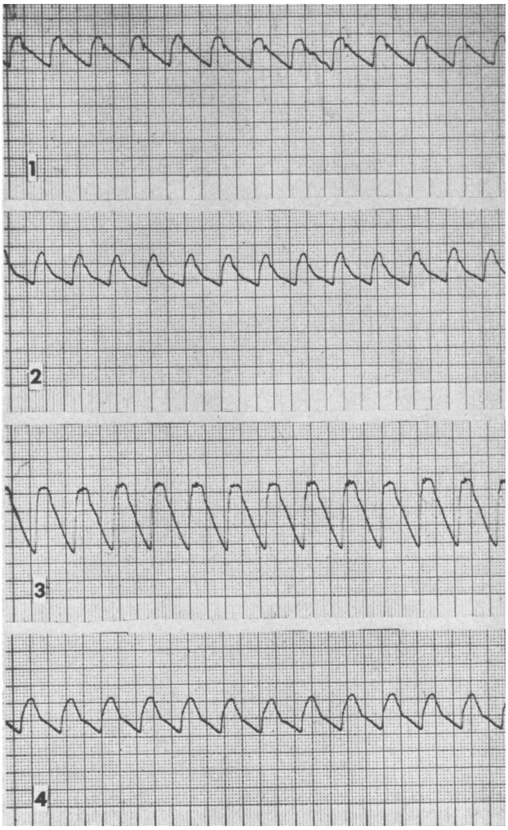

FIG. 2. Tracings of arterial blood pressure were obtained from sixth animal (Table I). 1 is from aortic arch above the newly created valve, 2 was obtained by insertion of catheter through the femoral artery to lower thoracic aorta below the valve. 3 and 4 were taken proximal and distal to the new valve immediately after the cardiac aortic valve had been avulsed.

ventitial covering of the aorta was dissected from a segment approximately 5 cm in length, and Blalock clamps used to occlude the aorta just below the subclavian artery and above the third pair of intercostal vessels. The aorta was occluded for as long as 55 minutes without apparent adverse effects. The intercostal arterial tributaries were controlled by bulldog clamps and the fourth pair of intercostal arteries was divided and ligated. The aorta was transected and the proximal portion bivalved (Fig. 1). Incision along the wall of the aorta was measured to equal the diameter of the vessel. The upper bivalved end was inserted into the lumen of the open distal end and was secured with 4-0 lubricated arterial silk sutures. Occluding clamps were slowly released and the chest closed without drainage. A recovery period of 4 to 7 days was allowed, and left thoracotomy was again performed. Body temperature was not reduced for this procedure. Pressures in the aorta, proximal and distal to the valve, were recorded with Sanborn manometer. In 6 animals the posterior cusp of the cardiac aortic valve was avulsed by a hooked knife through a left ventriculotomy. In these animals pressure recordings were repeated in the same locations following avulsion of the aortic valve. The chest was closed and animals were given digitalis and antibiotics after operation. In 2 animals angiocardiography was performed after creation of the thoracic aortic valve. Intravenous nembutal anesthesia was employed, and 20 cc of 70% Urokon was injected through right jugular vein. One of the animals expired during this procedure.

Results. Four animals died of empyema during postoperative period after pressure recordings had been obtained. Ventricular fibrillation occurred during operation in two. Pressure recordings were obtained in 11 dogs, and in 6 of these, records were made of pressures following avulsion of cardiac aortic valve (Fig. 2). The pressure changes are recorded in Table I. The difference between systolic pressures in the aortic arch and the aorta below the valve varied from zero to 60 mm of mercury, average of 21 mm.

TABLE I. Arterial Pressure Records following Creation of Thoracic Aortic Valve in 11 Dogs.

Aortic arch pressure	Aortic pressure below valve	Systolic pressure differential	Aortic pressure after cardiac aortic valve avulsion: Aortic arch	Aortic pressure after cardiac aortic valve avulsion: Aorta below valve
mm Hg				
195/145	160/130	35	145/55	160/130
165/135	105/ 70	60	160/40	105/ 70
130/ 90	100/ 75	30	130/40	100/ 75
150/110	130/110	20	150/45	130/ 85
140/125	140/125	0	140/90	140/ 90
175/105	165/120	10	130/40	130/ 80
185/145	175/135	10		
135/ 85	110/ 70	25		
110/ 80	105/ 55	5		
70/ 40	60/ 40	10		
210/125	185/135	25		

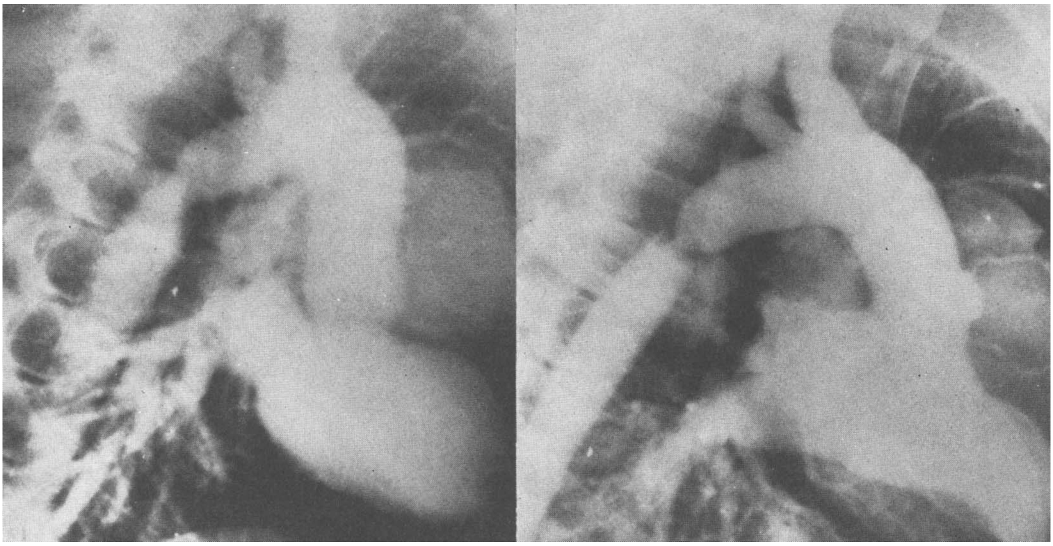

FIG. 3. Aortic phase of the angiocardiograms is presented. Aortic pressure recordings were not determined in these animals.

In the 6 animals in which the aortic valve was avulsed, a satisfactory diastolic pressure was maintained distal to the valve. Elevation of the systolic pressure was not found proximal to the thoracic aortic valve. In each of the 6 animals a marked fall in aortic diastolic pressure was obtained proximal to the valve. In both animals in which angiocardiographic studies were obtained, narrowing at site of creation of the valve was noted (Fig. 3).

Discussion. Construction of a competent aortic valve from autogenous body tissues would be preferrable to employment of plastic materials. Plastic materials have the potential danger of creating foreign body reactions, erosion of vessel wall, dislodgement and thrombosis. The method we have described appeared to produce a competent valve. There was little functional evidence of constriction of the lumen of the aorta with the animal at rest. However, in some animals that failed to survive long enough to have pressure recordings made, the valve did not appear competent and thrombus was present upon the leaflets. A major objection to the current method is the location of the valve distal to the coronary orifices. It is obvious that a longer period of observation is required to determine the effectiveness of this type of valve, particularly in association with avulsion of the cardiac aortic valve.

These preliminary results are believed sufficiently encouraging to warrant further investigation.

Summary. A method has been described for experimental production of an aortic flutter valve. Evidence of competency of the valve has been obtained in 6 animals by means of direct arterial pressure recordings above and below the valve in association with avulsion of the cardiac aortic valve.

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