

Blood flow in the fetal descending aorta during fetal cardiac arrhythmia.

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Ultrasound studies on fetal cardiovascular structure and dynamics were carried out in 6 pregnant women who were referred for evaluation of fetal cardiac rhythm disturbances between 28 and 36 weeks of gestation. On each of these patients the following examinations were carried out:

- assessment of fetal size and structure, and amount of amniotic fluid by means of a 2-dimensional phased array real-time system (Hewlett Packard, 770204 A), with particular attention to cardiac structure as well as rate and regularity of cardiac activity.
- analysis of atrial and ventricular rate and regularity by means of simultaneous time-motion recording of atrial and ventricular activity (Hewlett Packard, 770204 A).
- recording of fetal ECG from abdominal leads for calculation of fetal heart rate (FHR; bpm).
- measurement of the mean blood flow velocity and pulsatile vessel diameter changes, during periods of fetal apnoea, at the lower thoracic level of the fetal descending aorta. The methods used were identical to those described in a previous study (2). The same parameters were also established (2).

Three cases of fetal complete heart block, one case of fetal bradycardia and two cases of fetal supraventricular tachycardia were studied.

Despite alterations in rhythm, the blood flow in the aorta descendens was maintained within normal range. With a reduced heart rate, there was an increase in stroke volume, blood flow velocity, acceleration of blood flow velocity and maximum diameter change, conversely with an increased heart the same four parameters were lowered.

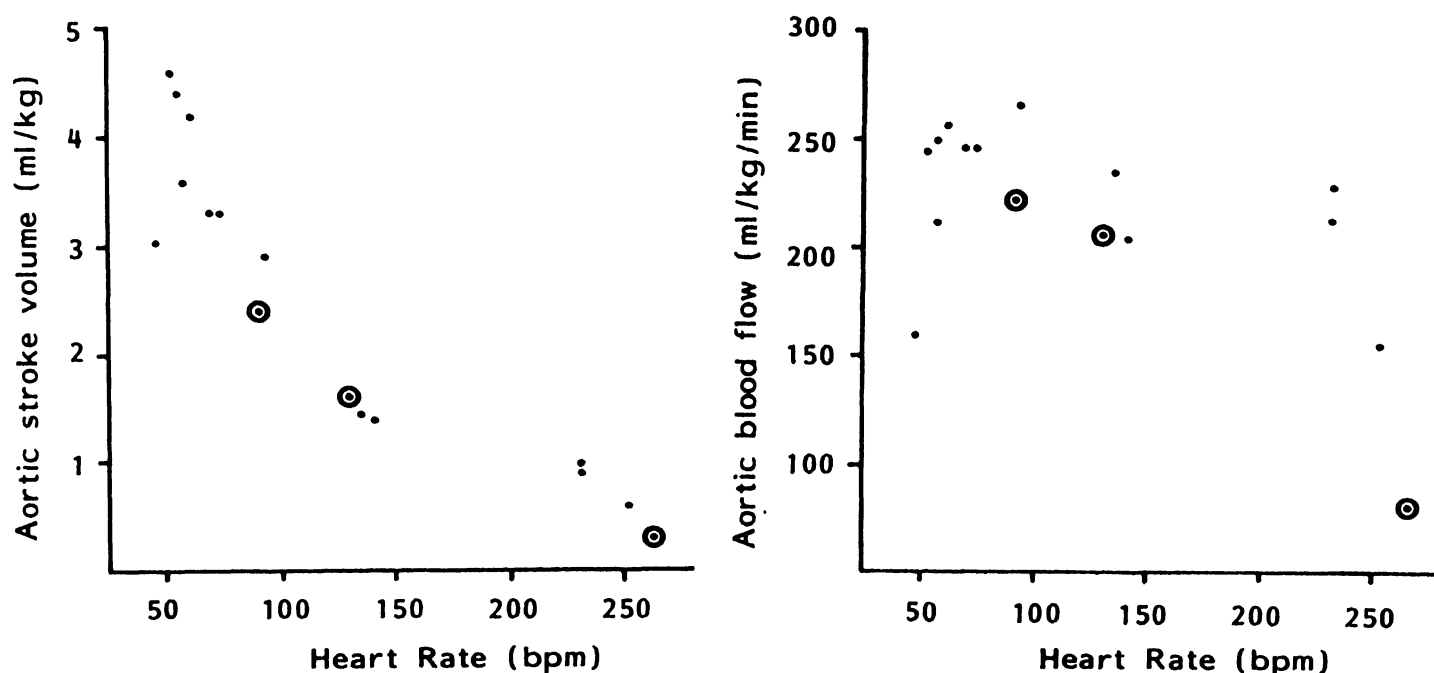
These changes are similar to those found in other studies (1).

The alterations reflect changes in cardiac contraction force, and illustrate the ability of the fetal myocardium in maintaining blood flow in the growing fetus (Fig.1).

Figure 1: Left: the relationship of aortic stroke volume (ml/kg) in the lower thoracic level of the fetal descending aorta to heart rate (bpm).

Right: the relationship of blood flow (ml/min/kg) in the lower thoracic level of the fetal descending aorta to heart rate (bpm).

The open circles represent a case of atrial flutter (460-470 bpm) resulting in variable ventricular rate (92, 131 en 264 bpm) at 36 weeks gestation, which is published elsewhere (3).



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