

TITLE

The clinical usefulness of measuring ventricular elastance and arterial elastance during cardiac surgery.

RESEARCHERS

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BACKGROUND

Vasoplegia following cardiopulmonary bypass, is not uncommon. Myocardial dysfunction can occur following cardiac surgery. The position of the cardiac function curve depends on the preload, and afterload. In the presence of vasoplegia, the severely reduced afterload, would make the cardiac function curve shift upwards and to the left. This would make the heart appear to be contracting normally or even supra normally even in the presence of myocardial depression. Under these circumstances, the ejection fraction can be misleading and inaccurate. The ventricular elastance is a load independent measurement of myocardial contractility. Arterial elastance is a measurement of the state of the peripheral circulation. The relationship between the arterial elastance and ventricular elastance is the ventricular arterial coupling, which has to be maintained for optimal myocardial energetics. There are several inherent errors in the analysis of the pressure volume curve which may have an impact clinically.

OBJECTIVES

This study assessed the clinical usefulness of measuring ventricular elastance. It was done to assess, whether there is any correlation between the ventricular elastance and the ejection fraction which could be made use of in daily clinical practice. It was also studied whether, myocardial dysfunction and severe vasodilatation could be identified clinically with these measurements.

METHODS

These measurements were made in consecutive patients presenting for CABG. The end systolic volume and the end diastolic volume of the left ventricle were measured in the four chamber view. The systolic blood pressure was measured from the arterial line. The ventricular elastance, arterial elastance, and ventricular arterial coupling were measured and graphs plotted of all the measurements.

RESULTS

A normal ventricular elastance reflects a good ejection fraction . When the ejection fraction is supra normal, the arterial elastance is low. There was a relationship between ventricular elastance and arterial elastance..

CONCLUSION

When the ventricular elastance is less than 4 it is not related to the ejection fraction.. A discrepancy between the venricular elastance and ejection fraction measurements, should lead to an assessment of the the state of the vascular system,. A very high ejection fraction is associated with a low arterial elastance. Therefore in these patients ventricular elastance should be measured. The relationship between the ventricular and arterial elastance could be a guide to the appropriate use of inotropes and vasopressors.

The measurement of ventricular and arterial elastance is a clinically useful method of assessing ventricular function and diagnosing abnormalities in the vascular system. The inherent errors in the method, do not seem to affect its clinical usefulness.