

Abnormal right heart filling after cardiac surgery: time course and mechanisms

Heart 1991;66:435-442

Authors

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Abstract

Objective

To study the time course and underlying mechanisms of right heart filling after cardiac surgery.

Design

A prospective observational study of adult patients undergoing cardiac surgery.

Setting

Echocardiography laboratory of the Stanford University Medical Center.

Patients

Twenty six patients (mean age 54.9) undergoing cardiac surgery were studied before and two days, one week, six weeks, and six months after cardiac surgery.

Main outcome measures

Flow in the hepatic veins and superior vena cava, tricuspid and mitral annulus motion, signs of tricuspid regurgitation, and right ventricular size were assessed by echocardiography.

Results

Right heart filling, expressed as the ratio of systolic to diastolic forward flow Doppler velocity integrals in the superior vena cava and by tricuspid annulus motion, decreased in parallel from before surgery baseline values of 3.5 (SD 3.1) and 21.9 (3.4) mm, respectively to 0.2 (0.1) and 8.1 (2.3) mm two days after operation. A gradual increase towards baseline values was noted after six months, to 1.4 (1.3) and 15.1 (2.3) mm respectively; however, these values were still significantly less than those before operation. Similar changes were seen in the hepatic venous flow pattern. The decrease in total tricuspid annulus motion was most pronounced in its lateral segment and the atrial component of the tricuspid annulus motion showed similar changes.

Conclusions

The pronounced decrease in tricuspid annulus motion during the early postoperative period suggests right atrial and right ventricular dysfunction as mechanisms responsible for the early changes seen. The progressive return to a normal venous filling pattern and the partial recovery of annular motion six months after operation further support the influence of the above mechanisms, as well as their resolution with time. The persistent flow abnormalities and compromised motion of the free aspects of the tricuspid annulus, however, suggest long term tethering of the right heart wall.