

Cirrhotic cardiomyopathy: a reversible condition after liver transplantation

Background

The hyperdynamic circulatory syndrome in patients with liver cirrhosis is associated with a variety of cardiovascular alterations known as cirrhotic cardiomyopathy.

Aims

We aimed to define cardiac alterations in cirrhosis and assess their reversibility after transplantation.

Patients and methods

40 patients with liver cirrhosis were included, 20 had alcoholic liver cirrhosis and 20 had nonalcoholic liver cirrhosis and 15 controls. They underwent two cardiac explorations: an echocardiography and a radionuclide stress ventriculography. A subgroup of 15 cirrhotic patients was reevaluated between 6 to 12 months after liver transplantation.

Results

The findings of patients and controls demonstrated a basal hyperdynamic state in the cirrhotic group with higher heart rate, stroke volume index, left ventricular ejection fraction, and cardiac index and lower mean arterial pressure and systemic vascular resistance index ($P < 0.05$ for all). Compared to controls, cirrhotics had higher left ventricular wall thickness (9.6 ± 1.2 vs. 8.8 ± 1.2 mm; $P < 0.05$). Basal diastolic function was similar in two groups. In response to physical stress, cirrhotic patients failed to respond adequately; they presented an insufficient increase in heart rate, stroke volume index and cardiac index ($P < 0.05$ for all). Moreover, cirrhotic patients showed a mean negative increase in left ventricular ejection fraction ($P < 0.03$) and an important diastolic dysfunction with lower left ventricular peak filling rate ($P = 0.001$) under stress conditions. Exercise capacity was reduced (48 ± 21 vs. 76 ± 24 watts; $P < 0.001$) in cirrhotic patients. Cardiac alterations were independent of the etiology of cirrhosis.

Ascitic patients exhibited more diastolic dysfunction at rest and during stress compared to nonascitic patients. The chronotropic response to stress was worse in ascitic patients ($P = 0.01$) with a consequent insufficient nonsignificant increase in cardiac index.

Liver transplantation was followed by a significant improvement in the basal hemodynamic status. At the same time, left auricular diameter showed a significant decrease ($P = 0.04$) and left ventricular thickness (10.2 ± 1.3 mm vs. 9.5 ± 1.2 mm; $P < 0.05$) and left ventricular mass (115 ± 7.8 g/m² vs. 97 ± 4.9 g/m²; $P = 0.002$) also diminished after liver transplantation. The response to physical stress was greatly

improved during the postrasplant period as compared to the pretrasplant situation. Normalization of systolic response and exercise capacity during physical stress was observed with significant increases in heart rate, left ventricular ejection fraction, stroke volume index and cardiac index ($P < 0.05$ for all) and also, an improvement of diastolic function. When the 15 patients evaluated in the postrasplant period were compared with the control group no differences were found in any of the parameters evaluated.

Conclusions

Cirrhotic cardiomyopathy is a mild condition characterized by a basal hyperdynamic status, an abnormal systolic response to physical stress which limited exercise capacity, a diastolic dysfunction that worsens in exercise and in ascitic patients and an increase in ventricular wall thickness. These alterations are independent of the etiology of cirrhosis and are reversible after liver transplantation.