TRANSPLANTATION

Long-term changes in brain volume and cognitive function after liver transplantation

Liver transplantation has a beneficial effect on cognitive function in patients with cirrhosis, according to the results of a recent study investigating the long-term effects of liver transplantation on brain volume and neurologic function.

It is well established that liver transplantation improves survival and quality of life in patients with end-stage liver disease. Previous studies have demonstrated that low-grade brain edema and other abnormalities linked with hepatic encephalopathy normalize after liver transplantation, with an associated improvement in cognitive function in the short term. “However, persistent cognitive deficits have been documented in patients with cirrhosis after liver transplantation,” notes Juan Cordoba, one of the authors of the study. “On the other hand, some degree of brain atrophy has been reported in neuroradiological studies in patients with cirrhosis—even in those without a history of alcohol abuse.”

These data led Cordoba and colleagues to wonder whether cirrhosis and hepatic encephalopathy could lead to permanent sequelae after liver transplantation. The authors also hypothesized that vascular risk factors (including hypertension, diabetes mellitus and hyperlipidemia) could cause small vessel cerebrovascular disease, potentially leading to neurologic injury in the long term. “We wanted to determine short-term and long-term neurological outcomes in a cohort of liver transplant recipients,” explains Cordoba. As such, the authors believe that their study is the first long-term neuroradiological study in a group of liver transplant patients.

All 22 patients enrolled in the study had cirrhosis and underwent liver transplantation between 1998 and 2001. MRI was used to determine the volume

Fast-FLAIR (left) and T1-weighted (right) transversal images in a patient before (top) and 1 year after (bottom) liver transplantation. The image shows a decrease in the volume of white matter lesions (black arrow) and an enlargement of ventricles (white arrow). Courtesy of J. Cordoba.

of lateral ventricles (an indirect and inverse measure of brain volume) and the volume of white matter lesions (an indirect index of small vessel cerebrovascular disease). In addition, patients underwent a neuropsychological assessment to test memory, attention, executive function (that is, cognitive control), psychomotor function and visuosperceptive function.

Patients were evaluated at baseline (1–2 months before transplantation), shortly after transplantation (6–12 months) and in the long term after transplantation (6–9 years). 13 healthy controls matched by age and gender were also included in the study.

An increase in ventricular volume was observed in the short term and long term after liver transplantation, and the size of ventricles was larger in patients who underwent transplantation than in healthy controls. The volume of white matter lesions decreased in the short tem

but increased in the long term in patients who underwent liver transplantation. Cognitive function improved in the long term after liver transplantation. There was no relationship between the volume of ventricles or presence of white matter lesions and neuropsychological assessment.

“Liver transplantation has a beneficial effect on cognitive function in patients with cirrhosis, an effect that persists for many years,” the authors conclude. “However, cirrhosis is associated with some degree of brain atrophy that persists after liver transplantation and that may be indicative of an irreversible deterioration secondary to liver failure.”

According to Cordoba, another important finding is that “the brain ages more rapidly after liver transplantation, probably in proportion to vascular risk factors in this population.”

The authors plan to conduct further studies to investigate the long-term effects of hepatic encephalopathy and confirm the presence of brain atrophy in patients with cirrhosis. “The relationship between episodes of hepatic encephalopathy and persistent neurological damage (brain atrophy and loss of neurological abilities) may have important implications, especially in patients with other neurological comorbidities and patients awaiting liver transplantation,” says Cordoba. The authors suggest that attempts to minimize brain injury and vascular risk factors before transplantation could help to prevent neurologic impairment after transplantation.

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