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Postoperative delirium is associated with increased intensive care unit and hospital length of stays after liver transplantation

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ABSTRACT

Background: Delirium is increasingly recognized as a common and important postoperative complication that significantly hinders surgical recovery. However, there is a paucity of data examining the incidence and impact of delirium after liver transplantation.
Methods: Retrospective case series in a tertiary care center examining all ($n = 144$) adult patients who underwent liver transplantation during a 6-y period.
Results: Delirium occurred in 25% of the patients with an average duration of 4.56 d. Patients who developed delirium were older ($P = 0.007$), had higher preoperative model for end-stage liver disease score ($P = 0.019$) and longer pretransplant hospital length of stay (LOS; $P = 0.003$). Patients with delirium were also more likely to have alcohol ingestion as an etiology of the liver failure ($P = 0.033$). Delirious patients had a trend toward increased ventilator days ($P = 0.235$) and significantly longer postoperative hospital ($P = 0.001$) and intensive care unit LOS ($P = 0.001$). Delirium was also associated with an increased frequency of hospital acquired infections including urinary tract infections ($P = 0.005$) and pneumonias ($P = 0.001$).
Conclusions: Delirium is a common occurrence among liver transplant patients associated with increased complications and LOSs. Further prospective studies are needed to determine the specific risk factors in this complex population and to determine if delirium has an impact on long-term outcomes.

Introduction

Liver transplantation is the treatment of choice for patients with end-stage liver disease.[1] Liver recipients, who often have multiple comorbidities, are typically admitted to the surgical intensive care unit (SICU) for the immediate postoperative recovery period. In recent years, there has been a growing awareness of the prevalence of ICU delirium and its impact on patient's recovery.[2-4] ICU delirium, an acute mental disorder characterized by disturbances in consciousness and cognition

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that fluctuate over time, is a common diagnosis with an estimated incidence of 82%.[5] Among medical ICU patients, delirium has been shown to not only have short-term consequences with increased ventilator days and ICU length of stay (LOS) but also long-term sequelae including increased hospital LOS, hospital costs, and mortality as well as long-term cognitive impairments.[2,3] Although several studies have investigated patient factors that are associated with ICU delirium,[2,6] few investigations to date have specifically looked at the liver transplant population during the postoperative period in the SICU.[7,8] In this study, we investigated the prevalence of delirium, the patient characteristics associated with it and whether patient outcomes were affected by development of delirium after liver transplant surgery.

Methods

After obtaining approval from the Yale University Human Research Protection Program, we retrospectively reviewed the charts of all adult patients who underwent liver transplantation at Yale New Haven Hospital during a 6-y time period (2009-2014). Data abstracted include patient demographics, natural model for end-stage liver disease (MELD) score, and operative details, including type of graft (extended criteria donor, standard donor, and living-related donor) and operative time. Medical history abstracted include history of smoking, hypertension, etiology of liver failure (alcohol-related liver disease, biliary cirrhosis, acute liver failure, hepatitis C cirrhosis, hepatocellular carcinoma, autoimmune hepatitis, Wilson's disease, nonalcoholic steatohepatitis, biliary atresia, sclerosing cholangitis, and others) and inpatient status at time of transplant surgery. The SICU course was investigated for the incidence of hyponatremia, hypoalbuminemia, and total doses of fentanyl and midazolam administered. Delirium was screened retrospectively using a validated nursing tool, the Delirium Observation Screening scale 8.[9] Outcome parameters investigated include SICU LOS, ventilator days, and hospital days. The incidence of postoperative complications of pneumonia and urinary tract infections were also abstracted. Statistical analysis was performed using IBM SPSS Statistics 21 (IBM Corporation, Somers, NY) using a two-tailed Student's *t*-test and chi-square test as appropriate; statistical significance was assumed for $P < 0.05$.

Results

A total of 144 patients were included in this study. Most patients were male (66.7%) with a mean age of 51.8 y. Forty-one patients had hepatitis C as the etiology of liver failure, 22 patients had alcohol use as the etiology of liver failure of which seven had additional etiologies as well. A total of 21 patients had more than one etiology for liver failure. Thirty-six patients (25%) experienced delirium during the postoperative SICU stay with an average duration of 4.56 d of delirium (interquartile range, 3-5.75; Figure). On univariate analysis, patients who developed delirium were slightly older (56.7 *versus* 50.1 y, $P = 0.007$) and had increased MELD score (26.8 *versus* 20.8, $P = 0.017$), as well as longer pretransplant hospital LOS (20.9 *versus* 6.4 d; $P = 0.003$; Table 1). They were also more likely to have alcohol-related liver disease as the etiology of liver failure ($P = 0.033$). Delirious patients had a trend toward increased ventilator days (8.2 *versus* 3.8 d, $P = 0.235$) and had longer postoperative hospital LOS (27.6 *versus* 14.4 d, $P = 0.001$) and ICU LOS (9.5 *versus* 4.5 d, $P = 0.001$; Table 1). Delirium was

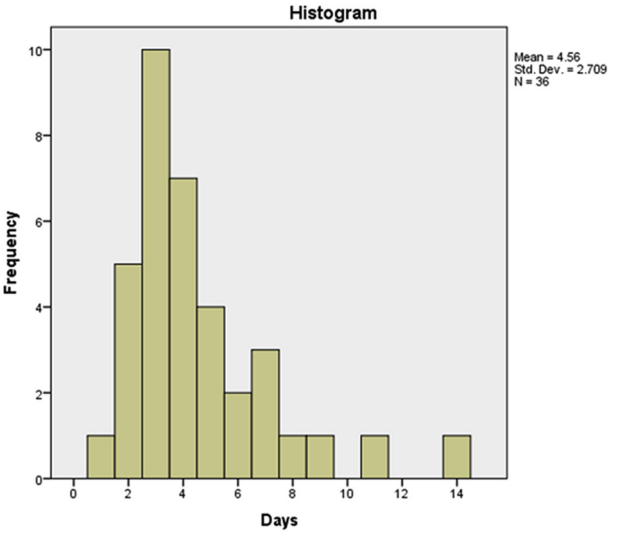

Figure – Distribution of delirium. (Color version of figure is available online.)

Table 1 – Patient characteristics and outcome.

	Delirium, $n = 36$	Non-delirium, $n = 108$	P value
Age (y)	56.7 ± 11.8	50.2 ± 12.7	0.007
Gender % male	69.4	65.7	0.683
MELD score	26.8 ± 13.4	20.8 ± 12.1	0.017
Operating time (min)	590.3 ± 178.0	550 ± 164.4	0.243
Inpatient days before transplant	21.0 ± 25.4	6.4 ± 11.9	0.003
Ventilator (d)	8.2 ± 20.2	3.8 ± 15.4	0.235
Fentanyl (mcg)	9444.1 ± 14,214.7	4943.6 ± 8585.4	0.026
Midazolam (mg)	52.5 ± 99.3	42.9 ± 81.7	0.608
Hypoalbuminemia (%)	38.9	50	0.242
Abnormal Na (%)	63.9	63.0	0.921
Alcohol etiology of liver failure	33.3	16.7	0.033
Sepsis (%)	2.8	1.9	0.207
Urinary tract infection (%)	22.2	6.5	0.005
Pneumonia (%)	27.8	4.6	0.001
ICU LOS (d)	9.5 ± 10.1	4.5 ± 6.3	0.001
Hospital LOS (d)	47.4 ± 38.9	20.2 ± 25.3	0.001
LOS after transplant	27.6 ± 19.9	14.1 ± 17.4	0.001

ICU = intensive care unit; LOS = length of stay; MELD = model for end-stage liver disease.