

# Metabolic syndrome in liver transplantation: A preoperative and postoperative concern



Alex L. Chang, MD, Alexander R. Cortez, MD, Alexander Bondoc, MD, Daniel P. Schauer, MD, Angela Fitch, MD, Shimul A. Shah, MD, Steve E. Woodle, MD, and Tayyab Diwan, MD, Cincinnati, OH

**Background.** Metabolic syndrome is increasing among patients undergoing liver transplantation. Nonalcoholic steatohepatitis is a manifestation of metabolic syndrome and is an increasingly common cause of end-stage liver disease necessitating orthotopic liver transplantation. We sought to determine the effect of preoperative risk factors on the development of post-transplant metabolic syndrome, complications, readmissions, and mortality.

**Methods.** We conducted a review of 114 orthotopic liver transplantations at our institution from May 2012 to April 2014.

**Results.** Patients with ( $n = 19$ ) and without ( $n = 95$ ) metabolic syndrome were similar with regard to age, race, and model for end-stage liver disease at time of transplant. Donor and operative factors also were similar between the groups. Preoperative diabetes was found to be associated with an increased rate of readmission (odds ratio 3.45,  $P = .03$ ). While preoperative metabolic syndrome itself was not a significant predictor of worse outcomes, postoperative metabolic syndrome was associated with significantly greater readmissions in the first year. Major predictors of new onset metabolic syndrome after orthotopic liver transplantation included preoperative diabetes and obesity (odds ratio 8.54 and odds ratio 5.49,  $P < .01$  each).

**Conclusion.** Efforts to decrease the incidence of postoperative metabolic syndrome after orthotopic liver transplantation may decrease readmissions and improve outcomes, along with decreasing resource utilization. (*Surgery* 2016;160:1111-7.)

From the Department of Surgery, Division of Transplantation, CCORE (Cincinnati Collaborative for Obesity Research), University of Cincinnati College of Medicine, Cincinnati, OH

LIVER TRANSPLANTATION (LT) offers the only means of curing cirrhosis from end-stage liver disease and is also necessary in many patients with acute liver failure. In patients with end-stage liver disease and cirrhosis, 3-month mortality is high, and mortality while on the liver transplant waitlist is common.<sup>1</sup> While the most frequent indication for LT is currently hepatitis C, nonalcoholic steatohepatitis (NASH) is becoming increasingly more common.<sup>2</sup> As medical urgency governs organ allocation in LT, appropriate patient selection is critical in order to minimize wait times and avoid futile transplants.<sup>3</sup>

As the practice of LT has improved, the epidemic of metabolic syndrome (MetS) has become a substantial clinical problem before and after transplantation.<sup>4</sup> Widely adopted definitions of MetS include criteria encompassing a number of cardiovascular risk factors, namely insulin resistance, dyslipidemia, hypertension, and obesity. MetS and concurrent obesity are important risk factors for postoperative complications, duration of stay, and hospital costs after orthotopic LT.<sup>5</sup> Large, single center experiences with LT in obese patients have shown greater rates of wound infections, organ failure, and decreased 1-year graft survival in the severely obese LT recipient.<sup>6</sup>

Supported by the University of Cincinnati Department of Surgery.

Presented at the 73rd Annual Meeting of the Central Surgical Association, March 10–12, 2016, Montreal, Quebec.

Accepted for publication June 14, 2016.

Reprint requests: Tayyab Diwan, MD, Assistant Professor of Surgery, Division of Transplantation, University of Cincinnati School of Medicine, Cincinnati Collaborative for Obesity Research (CCORE), OH 45267. E-mail: [diwantb@ucmail.uc.edu](mailto:diwantb@ucmail.uc.edu).

0039-6060/\$ - see front matter

© 2016 Elsevier Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.surg.2016.06.015>

Although prevalence of MetS is approximately 20% in all cirrhotic patients compared with >24% in the general population,<sup>7</sup> it has been postulated that cirrhotics are predisposed to MetS as a result of low lipid levels associated with chronic liver disease.<sup>8</sup> Furthermore, obesity and type 2 diabetes are more common in cryptogenic cirrhosis compared with other causes, possibly due to an unrecognized contribution of NASH in these patients.<sup>9</sup>

The impact of metabolic diseases continues to be a problem after LT and much effort is being

invested into further understanding this phenomenon. Liver transplant recipients have exceptionally high rates of metabolic derangement with an incidence of hypertension seen in 85% of patients, dyslipidemia in 66%, obesity in 40%, and hyperglycemia in 51%.<sup>10</sup> It is known that certain immunosuppressive medications, such as cyclosporine and tacrolimus, are associated with the development of hypertension, hyperglycemia, and dyslipidemias.<sup>11</sup> Whether the development of metabolic derangements is the result of iatrogenic interventions or patient factors, the underlying disease processes remain unclear. However, it is becoming increasingly recognized that PT-MetS is a significant factor in morbidity in LT recipients and is tied closely to post-transplant weight gain.<sup>10</sup>

While there is a close relationship between obesity and MetS, it is not known to what degree the individual components of MetS in both the pre- and postoperative setting affect outcomes after LT. Furthermore, reversible factors that contribute to the development of MetS in LT patients are not well defined. In this study, we hypothesize that preoperative metabolic risk factors in LT candidates have a direct impact on LT outcomes and development of PT-MetS.

## STUDY DESIGN AND METHODS

**Definitions.** MetS is a diagnosis applied to individuals with distinct risk factors for cardiovascular disease. The National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP-III) guidelines are used commonly to make the diagnosis of MetS and require 3 of the 5 following risk factors: (1) waist circumference >102 cm in males or >88 cm in women, (2) triglycerides  $\geq$ 150 mg/dL, (3) HDL-C <40 mg/dL in men or <50 mg/dL in women, (4) hypertension  $\geq$ 130 systolic or  $\geq$ 85 diastolic, or (5) insulin resistance demonstrated by a fasting glucose  $\geq$ 110 mg/dL.<sup>12</sup>

Practical extensions to the NCEP ATP-III definition were published in a consensus paper by Alberti et al.<sup>13</sup> These guidelines allowed us to determine retrospectively the presence of insulin resistance, dyslipidemia, and hypertension by identifying those patients taking antihyperglycemic agents, statins, or antihypertensive medications (excluding those used commonly for control of variceal disease) as meeting each criteria respectively. In addition, we considered body mass index (BMI)  $\geq$ 30 as a surrogate for waist circumference.

**Study design.** The medical records of all patients undergoing orthotopic LT at the University of Cincinnati Medical Center between May 1, 2012, and

April 30, 2014, were reviewed through the Cincinnati Collaborative for Obesity Research. Data from these patients were collected in a retrospective manner from both inpatient and outpatient encounters.

Patients were divided into 2 cohorts based on the preoperative presence or absence of MetS (MetS and non-MetS) as defined above. All patients with insulin resistance were diagnosed based on active therapy with insulin or oral antihyperglycemic medications immediately prior to LT. A diagnosis of hypertension was made if the patient met the NCEP ATP-III criteria or was previously on antihypertensive medication prior to LT. Dyslipidemia was identified by serum triglycerides when possible, or by use of statin therapy.

Patient age, pretransplant BMI, operative times, model for end-stage liver disease (MELD) score (with and without exception points), and the extent of microsteatosis and macrosteatosis on explant pathology were treated as continuous variables. Other preoperative factors including sex, race, presence of insulin resistance, dyslipidemia, hypertension, obesity, MetS, hepatocellular carcinoma, and hepatitis C were treated as ordinal and categorical variables. Additional clinical data, such as preoperative dialysis, blood product transfusion volumes, donor age, and donor BMI, were included in our univariate analysis but excluded ultimately due to nonsignificance. Our primary end point was the development of PT-MetS. Secondary end points included short-term complications, duration of stay, readmissions in the first year, and 1-year all-cause mortality.

**Analyses.** Statistical analysis was performed using the Student *t* test for continuous variables, the Wilcoxon rank sum test for ordinal variables, and the  $\chi^2$  test for categorical variables. All statistical analyses were performed using SAS software (version 9.2; SAS Institute, Inc, Cary, NC). Odds ratios (OR) and 95% confidence intervals are reported from multivariate mode. This study was approved by the University of Cincinnati Institutional Review Board.

## RESULTS

Our center performed a total of 114 orthotopic LTs during the study period. Nineteen orthotopic LT recipients met preoperative inclusion criteria for MetS (16.7%). The rate of preoperative diabetes was greater in the cohort with MetS (90% vs 20%,  $P < .01$ ). This cohort also had a greater incidence of hypertension (90% vs 33%,  $P < .01$ ). All MetS patients were obese with BMI >30, while only 40% of patients without MetS were obese (Table 1).

Download English Version:

<https://daneshyari.com/en/article/4306388>

Download Persian Version:

<https://daneshyari.com/article/4306388>

[Daneshyari.com](https://daneshyari.com)