

Impact of Cardiovascular Disease on Transplant Candidacy and Mortality During Liver Transplant Evaluation in a US Center With Highest National Obesity Prevalence

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INTRODUCTION :

There are no extensive studies that examined the impact of obesity and cardiovascular disease in patients undergoing evaluation for orthotopic liver transplantation (OLT)

METHODS :

We retrospectively analyzed the cardiovascular profile of patients undergoing OLT evaluation between Jan 2012 and Nov 2021 in a liver transplant center in the Mid-West United States.

RESULTS:

912 patients underwent OLT evaluation (59% males, mean age 57.4 ± 10.5 years, Mean Na-MELD 18.7 ± 8.7 , 82% Caucasian and 8.6% African Americans), and predominant etiologies of cirrhosis were NASH (48.1%), alcohol (37.7%), and hepatitis C (18.5%).

31.8% and 41.7% were overweight and obese, respectively. 261 (31.8%) underwent OLT, 554 (60.7%) were denied listing, and 51(5.6%) died during evaluation.

224 patients had evidence of coronary artery disease (CAD), and 50% were denied OLT. Of all the patients denied listing, 32% were denied OLT due to CAD.

Comorbid medical conditions (30%), substance use (15%), and socioeconomic conditions (19.3%) were other common causes for denial of listing. 239 (26.2%) had metabolic syndrome (MS), of which 143 (59.8%) were denied OLT. Among patients denied, 55 (10%) were morbidly obese (BMI >40).

Univariate Analysis for Predictors of Liver Transplant Denial and Death in Waiting List

	Transplant denial (p value)	Death during evaluation (p value)
Gender	0.09	0.04*
Ethnicity	0.03*	0.21
Location (rural v/s urban)	0.15	0.50
Hypertension	0.86	0.41
Diabetes	0.81	0.98
BMI	0.04*	0.59
CAD	0.55	0.42
Chronic kidney disease	0.06	0.16
Atrial fibrillation	0.73	0.96
Hyperlipidemia	0.66	0.22
Metabolic syndrome	0.68	0.77
Vitamin-D deficiency	<0.01*	<0.01*
6 Minute Walk Test (6MWT)	0.67	0.56
BNP levels	0.19	0.65
Cardiac ejection fraction on echocardiography		0.58
Elevated estimated PAP		0.81
Elevated mean PAP		0.12
Computed tomography calcium score		0.35
Positive dobutamine stress echocardiography		0.68
Significant coronary obstruction in left heart catheterization		0.44

* P value is significant

Gender, residential location (urban v/s rural), hypertension, diabetes, CAD, BNP levels, presence of atrial fibrillation, chronic kidney disease, hyperlipidemia, MS, 6-minute walk test (6MWT) did not correlate with transplant denial on univariate analysis (table).

Ethnicity (African American, p=0.03), vitamin D deficiency (<30 ng/ml), and BMI (p=0.038) had significant correlations. However, on multivariate analysis (MVA), BMI (>30), (OR 0.71 [0.51-0.98], p = 0.04) and vitamin D deficiency (OR 0.21 (0.15-0.29), p <.01) were independent predictors of denial. For predicting death during OLT evaluation, on univariate analysis, a 6-minute walk test (6MWT), estimated pulmonary artery pressure (PAP) on transthoracic echocardiography, mean PAP on right heart catheterization, significant coronary obstruction on left heart catheterization were not predictors. However, female gender and vitamin D deficiency were predictors.

On multivariate analysis, vitamin D deficiency was an independent predictor of death during OLT evaluation (OR 0.13 (0.05-0.34), p <.01). On stratified analysis of patients denied listing due to CAD, the presence of MS (OR 2.1(1.3-3.5), p =0.003) was an independent predictor of denial for listing, and normal BNP levels (<100pg/ml) significantly lowered the risk of denial (OR 0.42 (0.20-0.88), p=0.02)

DISCUSSION :

Obesity (BMI >30) and vitamin-D deficiency increased the risk of denial for transplant listing and vitamin-D deficiency increased risk of death during liver transplant evaluation. The presence of metabolic syndrome increased the risk of denial for listing due to CAD and normal BNP levels (<100pg/ml) significantly lowered the risk of denial from CAD.