The Impact of Functional Status on Risk of Waitlist Death Among Patients with Autoimmune Liver Diseases

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Background: The imbalance between number of patients in need of liver transplantation (LT) and availability of donor organs contributes to significant waitlist (WL) mortality. While frailty is an increasing area of interest, few studies have focused on the impact of functional status on WL survival, particularly among patients with autoimmune-related liver diseases. We aim to evaluate the impact of functional status on WL survival among U.S. adults listed for LT, focusing specifically on patients with autoimmune hepatitis (AIH), primary sclerosing cholangitis (PSC), and primary biliary cholangitis (PBC).

Methods: We retrospectively evaluated U.S. adults listed for LT using 2004-2017 United Network for Organ Sharing LT database focusing on patients with AIH, PSC, and PBC. Functional status at time of LT WL registration was evaluated using the Karnofsky Performance Status (KPS) categories (KPS-1 = functional status 80-100%, KPS-2 = 60-70%, KPS-3 = 40-50%, KPS-4 = 10-30%). Overall WL survival was stratified by KPS category and liver disease etiology, and evaluated with Kaplan Meier methods and multivariate Cox proportional hazards models.

Results: Among 11,733 patients with autoimmune-related liver diseases listed for LT (64.9% female, 2.3% HCC), 32.7% had AIH, 32.8% PSC, and 34.6% PBC. PSC patients were significantly older at time of LT WL registration (58.2 y vs. 51.4 y in AIH and 48.1 y in PBC, $p<0.01$). AIH patients had significantly worse functional status compared to PSC and PBC (%KPS-4: 47.7% AIH vs. 29.4% PSC vs. 22.9% PBC, $p<0.001$). Worse functional status at time of LT WL registration was associated with worse WL survival, which was observed across all etiologies (90-d WL survival: 82.7% (AIH/KPS-1) vs. 11.5% (AIH/KPS-4), $p<0.01$; 88.3% (PSC/KPS-1) vs. 16.9% (PSC/KPS-4), $p<0.01$; 81.6% (PBC/KPS-1) vs. 25.0% (PBC/KPS-4), $p<0.01$). On multivariate regression, the impact of worse functional status on overall risk of WL death was greatest among AIH and PBC patients (KPS-4 vs. KPS-1: AIH, HR 2.38, 95% CI 1.58–3.60, $p<0.001$; PBC, HR 2.10, 95% CI 1.20–3.52, $p<0.001$; PSC, HR 1.85, 95% CI 1.24 – 2.76, $p<0.05$).

Conclusion: Among U.S. adults with autoimmune-related liver diseases listed for LT, AIH patients had significantly worse functional status at time of LT WL registration compared to PSC and PBC patients. While worse functional status was associated with higher risk of WL mortality, this detrimental impact of functional status seemed to have the greatest impact on AIH patients.