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**Sarcopenia in Cirrhotic Patients: Does Frailty Matter While Waiting for a Liver Transplant?**

Sarcopenia in Cirrhotic Patients

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**Abstract**

Sarcopenia reflects patient frailty and should be routinely assessed due to its high prevalence in cirrhotic patients awaiting liver transplants. Pre-transplant nutritional optimization should be tailored for patients with a definitive diagnosis of sarcopenia, therefore improving functional status at transplant and reducing post-transplant mortality. Hepatologists and transplant surgeons should have raised awareness regarding sarcopenia and the reflected frailty that hinder posttransplant outcomes. The policymakers should also take into account when modifying the organ allocation model that sarcopenia or frailty might become a decisive factor in allocating organs for cirrhotic patients, in order to ensure post-transplant survival and quality of life.

**Key Words:** Sarcopenia; Liver Transplant; Organ Allocation Policy; Cirrhosis; Frailty

Li X, he K. Sarcopenia in Cirrhotic Patients: Does Frailty Matter While Waiting for a Liver Transplant? *World J Gastrointest Surg* 2023; In press

**Core Tip:** Sarcopenia is an independent risk factor for mortality in cirrhotic patients waiting for a liver transplant. It is important to recognize sarcopenia at pre-transplant

evaluation, provide supportive management and optimize patient conditions prior to the transplant. Also, the future organ allocation policymakers should take into account that cirrhotic patients with sarcopenia carry a potentially higher mortality than reflected by the current MELD-Na model and therefore in a more urgent need of a liver transplant.

### **TO THE EDITOR**

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We read with great interest an original research paper by Yin *et al*, who performed a retrospective case-control study on patients who received a transjugular intrahepatic portosystemic shunt (TIPS) procedure between January 2020 and June 2021 at their center. It was evidenced that myosteatorsis and sarcopenia were associated with a high incidence of overt hepatic encephalopathy (HE) in patients after the TIPS procedure<sup>1</sup>.

We appreciate and agree with the authors' findings and would like to further investigate into the effects of sarcopenia, a reflection of patient frailty, on cirrhotic patients listed for a liver transplant. By definition, sarcopenia refers to a decline in both quantity and quality of the skeletal muscle, presented clinically with corresponding decline in muscle strength, therefore the ability to carry out physical activity<sup>2</sup>. It is associated with an increased likelihood of adverse outcomes. In cirrhotic patients, the prevalence of sarcopenia range between 30% and 70%, with a higher proportion in males, low BMI patients and patients with alcoholic liver diseases<sup>3</sup>. The pathogenesis is not clear, but it was postulated that most cirrhotic patients had been suffering from chronic decompensated end-stage liver disease with an altered catabolism, direct myotoxicity from systemic ammonia, poor nutrition status and long-term physical inactivity<sup>4</sup>.

A meta-analysis from Tantai *et al* reported an ~2-fold higher mortality among all subgroups of cirrhotic patients with sarcopenia, comparing to those who don't<sup>5</sup>. To be noticed, the results also applied to patients with low <sup>2</sup>Model for End-Stage Liver Disease-Sodium (MELD-Na) score, which is a predictor of three-month mortality of

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cirrhotic patients and the current modality of prioritizing liver allocation. It is calculated based on the parameters of serum creatinine, bilirubin, international normalized ratio (INR) and serum sodium, ranging from 6 to 40. However, sarcopenia, as an independent risk factor for mortality in post-transplant patients, has not been integrated into the MELD-Na score, nor has it been accepted as an exception score. In the study by Montano-Loza *et al*, a modified MELD-sarcopenia score was proposed<sup>6</sup>. The patients with lower MELD scores particularly benefit from the novel model because they were traditionally deemed of low risk. It requires multicenter study with higher case number to validate a reliable and predictive model and implicate it in the clinical setting, but we do believe sarcopenia should be considered during listing and organ allocation, to prioritize patients who have poor performance status not properly reflected by MELD-Na score.

Therefore, it is of vital importance to recognize sarcopenia at listing and during pre-transplant surveillance. 3  
The gold standard for sarcopenia diagnosis is psoas muscle cross-sectional area normalized for stature ( $\text{cm}^2/\text{m}^2$ ) at the level of L3 on abdominal CT scan, also known as the L3 skeletal muscle index (SMI), although different cutoffs have been applied in previous studies<sup>3,4</sup>. As abdominal CT scan is routinely performed in cirrhotic patients at transplant evaluation for either cancer screening or anatomical mapping, it enables a qualitative measurement and a definitive diagnosis of sarcopenia concurrently at no additional costs. Once the diagnosis is made, pre-transplant management should be advocated for to optimize those cirrhotic patients for an upcoming transplant, including nutrition clinic visits and physical therapist appointments for individualized counseling if available<sup>7</sup>.

As mentioned above, sarcopenia is a reflection of patient frailty. While it may be logistically unrealistic to repeat an abdominal CT scan at every follow-up visit with no other clinical indications, there are various well-developed clinical assessment tools for frailty. The Liver Frailty Index (LFI) is an objective measurement specifically developed for cirrhotic patients, which involves three easily assessed aspects of grip strength, timed chair stands, and balance testing. With a well-established cutoff, LFI significantly

improves mortality prediction in cirrhotic patients compared to subjective assessment solely (0.74 vs. 0.68;  $P = 0.02$ ) and is further implicated with great reproducibility in noncirrhotic populations<sup>8,9</sup>.

We would like to emphasize that sarcopenia and frailty are both dynamic processes rather than a static status, in which continuous interval monitoring, documentation, and management could potentially optimize the overall condition of a cirrhotic patient prior to receiving an organ<sup>10</sup>.

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