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The Presence of Sarcopenia (Muscle Wasting) in Patients with Nonalcoholic Steatohepatitis

Danny Issa,

Fairview Hospital Cleveland Clinic, Internal Medicine Residency

Naim Alkhouri,

Cleveland Clinic, Department of Pediatric Gastroenterology

Cynthia Tsien,

Cleveland Clinic, Digestive Disease Institute

Shetal Shah,

Cleveland Clinic, Department of Diagnostic Radiology

Rocio Lopez,

Cleveland Clinic, 4 Quantitative Health Sciences

Arthur McCullough, and

Cleveland Clinic Foundation, Digestive Disease Institute

Srinivasan Dasarathy

Cleveland Clinic, Digestive Disease Institute

To The Editor:

We read with great interest the article by Hong et al. published in August 2013 in the online version of Hepatology. Hong et al. report an increased risk of nonalcoholic fatty liver disease in patients with lower muscle mass. Here we take the chance to share the results of a study we conducted to investigate the presence of sarcopenia in patients with Nonalcoholic steatohepatitis "NASH" and NASH-related cirrhosis.

NASH is an aggressive form of nonalcoholic fatty liver disease. It is widely accepted now that NASH is associated with insulin resistance(1), and can progress to cirrhosis in 21–28% of patients(2). Pro-inflammatory cytokines and insulin resistance result in muscle catabolism leading to muscle wasting "sarcopenia" in obese patients(3). In addition, sarcopenia is being more frequently described and addressed in cirrhotic patients(4).

In our study, we divided the subjects into three groups, each one included 25 individuals; control group, NASH and NASH-cirrhosis groups. The diagnosis of NASH was proven by liver biopsy. To assess the presence of sarcopenia, we evaluated the muscle mass by measuring the cross-sectional area of the psoas and paraspinal muscles at the level of the midpoint of L4 vertebra on computed tomography (CT) scan (5). Total psoas and paraspinal

muscles densities were also measured. Analysis of covariance was performed to assess differences in muscle area while adjusting for age and gender.

Our results showed that patients with NASH and NASH-related cirrhosis were older and had higher body mass index than the control group. There was a stepwise significant decrease in total psoas area "TPA" from the control group to NASH group to cirrhosis group ($29.3 \pm 0.88 \text{ cm}^2$, $24.8 \pm 0.8 \text{ cm}^2$, and $19.3 \pm 0.93 \text{ cm}^2$, respectively, $p < 0.001$). This difference remained significant after adjusting for age, gender and height(Figure). Similar findings were noted for the paraspinal muscle area. The density of the muscles as assessed by Hounsfield units was lower in patients with NASH or cirrhosis suggesting fatty infiltration (controls $36.9 \pm 2.6 \text{ HU}$, NASH 31.2 ± 2.3 , cirrhosis 18.5 ± 2.7).

In conclusion, our data suggest that there is progressive muscle wasting in patients with NASH that precedes the development of cirrhosis and worsens with progression to cirrhosis.

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Figure.
Age and Gender Adjusted Means (95% Confidence Limits) for TPA/Height² and Paraspinal Muscle Area/Height²