



ARTICLE OF THE MONTH

Morkane CM, Kearney O, Bruce DA, Melikian CN, Martin DS. An Outpatient Hospital-based Exercise Training Program for Patients With Cirrhotic Liver Disease Awaiting Transplantation: A Feasibility Trial. *Transplantation*. 2020;104(1):97-103.

Abstract:

Background. Time spent on the waiting list before liver transplantation (LT) provides an opportunity to optimize recipient fitness through prehabilitation, potentially reducing the physiological impact of major surgery. We assessed the feasibility and effectiveness of a 6-week exercise program in patients with cirrhotic liver disease awaiting LT. **Methods.** This single-center, prospective cohort, feasibility study, enrolled patients awaiting LT to a 6-week period of thrice weekly, supervised exercise on a static bike. Cardiopulmonary exercise testing (CPET) was used to objectively assess cardiopulmonary fitness at baseline and after 6 weeks of exercise. A follow-up CPET was performed at 12 weeks. CPET-derived measures were used to guide prescription of the training program. A nonrandomized control cohort of LT patients were selected to match the exercise group based on specific demographic data. Allocation to study arms was primarily based on the distance participants lived from the hospital where training occurred. Both groups received structured nutritional advice. **Results.** The exercise program was feasible, with 9 of 16 (56%) patients completing the full program of 6 weeks. Peak oxygen consumption (VO_{2peak}) in the exercise group rose from a mean (SD) of 16.2 (± 3.4) mL/kg/min at baseline to 18.5 (± 4.6) mL/kg/min at week 6 ($P = 0.02$). In the control group, VO_{2peak} decreased from a mean (SD) of 19.0 (± 6.1) mL/kg/min to 17.1 (± 6.0) at week 6 ($P = 0.03$). **Conclusions.** We have demonstrated that it is feasible to engage patients awaiting LT in an intensive aerobic exercise program with a signal of improvement in fitness being detected.

COMMENTS MADE BY SCHLICHTING, NICOLETTE MD

Summary:

This feasibility study from the January issue of *Transplantation* evaluates the implementation of an exercise program for patients with end-stage liver disease (ESLD) awaiting transplantation. Patients on the waiting list for liver transplant often have diminished appetites, alterations in

metabolism, and poor exercise tolerance. This leads to decreased muscle mass and strength and ultimately to frailty syndrome, “characterised by a decline in functioning across multiple physiological systems, accompanied by an increased vulnerability to stressors.”² Frailty is an independent predictor of mortality in ESLD patients. As more literature is published on frailty, clinicians are focusing on the creation of “prehabilitation” programs, whereby patients undergo nutritional and physical fitness interventions prior to surgery with the goal of improving outcomes.

In this single-center, prospective cohort feasibility study by Morkane et al 31 demographically similar patients awaiting liver transplantation were divided into two groups, the exercise group (16 patients), and the control group (17 patients) based on how close they lived to the hospital. The exercise group were assigned to three 40-minute moderate-intense biking sessions per week for 6 weeks. Both groups received nutritional counseling. About half of the patients did not complete the program because they were transplanted or their clinical status deteriorated, however none left the study because they could not complete the exercise and no decompensation occurred a result of exercise. While the study was not meant to evaluate differences in secondary outcomes, both peak oxygen consumption and hand grip strength improved in the exercise group. Additionally, the patients who completed the exercise program had a shorter length of hospital stay following transplantation. While this study has many limitations including lack of blinding, not being powered to detect secondary outcomes, and high dropout rate, it does demonstrate that patients with ESLD awaiting transplantation are willing and able to participate in an exercise program. The data gathered in this study will be useful for designing future investigations.

Given the high rates of frailty and associated morbidity and mortality in our ESLD patients, the possibility that their physical deconditioning and strength may be improved through pre-transplant exercise programs and nutrition counseling with a subsequent improvement in outcomes is very exciting. We encourage transplant anesthesiologists to take an active role in promoting further research in this area so that we may determine the best way to optimize our patients prior to transplantation.

References:

1. Morkane CM, Kearney O, Bruce DA, Melikian CN, Martin DS. An Outpatient Hospital-based Exercise Training Program for Patients With Cirrhotic Liver Disease Awaiting Transplantation: A Feasibility Trial. *Transplantation*. 2020;104(1):97-103.
2. Hoogendijk EO, Afilalo J, Ensrud KE, Kowal P, Onder G, Fried LP. Frailty: implications for clinical practice and public health. *Lancet (London, England)*. 2019;394(10206):1365-1375.

Please email Library@transplantanesthesia.org with future article suggestions!

