Early Mobilization of LVAD Recipients Who Require Prolonged Mechanical Ventilation
Perme CS, Southard RE, Joyce DL, Noon GP, Loebe M. Early mobilization of LVAD recipients who require prolonged mechanical ventilation. Tex Heart Inst J. 2006;33:130–133.

Introduction
Patients receive left ventricular assist devices (LVAD’s) due to long-term, end-stage heart failure. Some of these patients remain ventilator dependent for quite some time after device implantation. When an LVAD recipient receives physical therapy focused on early mobilization it can:
- Improve that patient’s functional mobility
- Increase overall strength and endurance
- Facilitate weaning from mechanical ventilation
- Improve quality of life

Purpose
To demonstrate how physical therapy interventions that highlight early mobilization and ambulation can significantly improve functional outcomes of LVAD patients.

Methods
Case Study. Patient description:
- 51-year old man
- Admitted to the hospital due to dilated cardiomyopathy
- During the 5 weeks after hospital admission, patient’s condition worsened and he developed renal insufficiency and respiratory failure that required mechanical ventilation
- Patient underwent insertion of LVAD
- Patient was referred to physical therapy on postoperative day 7, after the first ventilator weaning trial failed

Physical Therapy Interventions (Table 2):
- Positioning
  - Exercises
    - Muscle strengthening
    - Breathing
  - Bed mobility activities
    - Sitting on edge of bed, in association with exercises, trunk control, unsupported sitting, and ADLs
    - Turning sides to side
  - Transfers from bed to
    - Stretcher/chair
    - Chair
    - Commode
  - Gait
    - Pronegait activities: weight shifting, stepping in place and sidesteps
  - Gait training with rolling walker
  - Patient education
  
ADLs = activities of daily living

Results
Postop, the patient stayed in the ICU for 49 days and was ventilator dependent for 48 days. The patient received 25 physical therapy sessions that included:
- 17 sessions of lower-extremity exercises
- 22 sessions of sitting on edge of bed
- 21 sessions of standing
- 18 sessions of gait training with walker

Used a portable ventilator in 4 gait-training sessions. Subsequently tolerated ambulation without ventilatory support and progressed rapidly with the ventilator-weening process. Upon transfer from the ICU, the patient required minimal assistance for out-of-bed activities and was able to walk 600 feet with the aid of a rolling walker and supervision. After 6 weeks in acute care, the patient underwent successful heart implantation.

Discussion
The implementation of an early physical therapy program with focus on early mobilization and ambulation is essential to minimize functional decline in LVAD recipients. Limitation: article is a case study and therefore a low level of evidence.

Clinical Significance
Demonstrates how physical therapy can improve an LVAD recipient’s functional outcome, improve overall strength and endurance, help wean the patient from mechanical ventilation, and improve QOL.

Shows the physical therapy interventions that were used on an LVAD patient, which could be very helpful for a PT that has never worked with that type of patient before and wants to know how to treat him/her effectively.

Conclusions
Although this article analyzes a subject that the authors claim has never been examined before, it is limited due to its small sample size and lack of a control group. However, the authors make a compelling argument for early mobilization to improve functional outcomes in LVAD recipients and based on this case study, further research into this subject would be warranted.

Summary
When working with an LVAD patient, get that patient ambulating and exercising early on. It will likely improve that patient’s aerobic capacity, strength, quality of life, and it can also help facilitate weaning from mechanical ventilation.

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Fig. 1 A portable ventilator, used in the intensive care unit, enabled a significant increase in distance walked and activity tolerance.

Fig. 2 Before transfer to a nursing floor, the patient was weaned from the ventilator and was able to walk 600 feet with the aid of a rolling walker and supervision.

Article #1

Supports the original article.

Showed that exercise training may result in improved exercise capacity, inspiratory muscle function, and QOL in patients with VAD’s.

Found that aerobic training increased exercise tolerance and improved self-reported status in patients with heart failure.

9/10 patients in the training group (received exercise training) improved their peak VO2.

Article #2

Supports the original article.

Found that aerobic training reverses LV remodeling, which is the progressive chamber dilation and deterioration in pump dysfunction that commonly occurs in heart failure.

Found that aerobic training also improves VO2 max in clinically stable patients with heart failure and LV systolic dysfunction.

Article #3

Supports the original article.

Shows that exercise training improves cardiac function and QOL.

Found that aerobic training improves aerobic capacity, strength, and QOL.