

Case Description

Course

- 60 year old male with NICM, DM II, CKD who was successfully trained with a K3 level prosthesis with an LVAD after multiple acute care and inpatient rehabilitation courses
- First stay in acute inpatient rehabilitation (AID) was for 3 weeks after left below knee amputation for mobility and ADLs
- Second stay in AIR after placement of LVAD focused on LVAD management, mobility, ambulation with sternal precautions
- Third stay in AIR for debility and deconditioning, after complex acute care stay focused on improving mobility, and prosthetic training.
- Upon discharge from the third stay, he was functioning at the supervision level for ambulation
- Continued progress with prosthesis training at Day Rehab program, and eventually was functioning at the modified independent level prior to his simultaneous heart and kidney transplant

Rehabilitation Focus

- Multiple inpatient stays focused on different aspects of ADLs and mobility.
- Due to complex cardiovascular history and comorbidities, training with a prosthetic limb was deemed to be necessary with inpatient care
- He was fit for K3 level prosthesis as he was previously very active, and had goals to return to work and community activities
- Of note, he did suffer from anxiety and was very motivated even though medical course was over 2 year span

Therapy Monitoring

- LVAD parameters were strictly monitored for speed, flow, pulsatility index, and power.
- Along with vital signs and LVAD parameters, Borg RPE scale was used during therapy sessions to monitor for energy expenditure subjectively

LVAD and Parameters

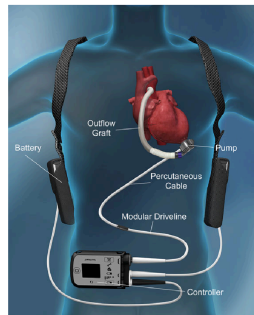


Figure 1: The HeartMate 3 LVAD with the pump in the pericardial space. the

Medicare Functional Levels of Ambulation

FUNCTIONAL LEVEL	DEFINITION	PROSTHESIS COMPONENT(S) ALLOWED
K0	Nonambulatory (bedbound)	No prosthesis allowed
K1	Limited to transfers or limited household ambulator	Manual lock or stance-control knee, SACH or single-axis foot
K2	Unlimited household but limited community ambulator	Pneumatic or polycentric knee, multi-axis foot
K3	Unlimited community ambulator	Hydraulic knee, energy-storing foot
K4	High energy activities (sports, work)	

Borg Rating of Perceived Exertion Scale

How you might describe your exertion	Borg rating of your exertion	Examples (for most adults <65 years old)
None	6	Reading a book, watching television
Very, very light	7 to 8	Tying shoes
Very light	9 to 10	Chores like folding clothes that seem to take little effort
Fairly light	11 to 12	Walking through the grocery store or other activities that require some effort but not enough to speed up your breathing
Somewhat hard	13 to 14	Brisk walking or other activities that require moderate effort and speed your heart rate and breathing but don't make you out of breath
Hard	15 to 16	Bicycling, swimming, or other activities that take vigorous effort and get the heart pounding and make breathing very fast
Very hard	17 to 18	The highest level of activity you can sustain
Very, very hard	19 to 20	A finishing kick in a race or other burst of activity that you can't maintain for long

Discussion

- Advanced heart failure from either ischemic or non-ischemic factors significantly affects quality of life for patients
- LVAD are becoming mainstay treatments either as definitive management or as a bridge to transplant
- To date, we could not find literature advocating for trial of K3 level prosthesis in this patient population.
- 40% more energy expenditure for prosthetic ambulation in transtibial amputee
- This also opens the discussion to patients who are awaiting heart transplants to help with conditioning to help post-transplant outcomes

Conclusion

- We present the case to show the successful prosthetic training of a patient with compensated heart failure with LVAD placement
- Physical activity prior to amputation, cognitive function, and psychological factors such as motivation, optimism are factors that favor the probability of successful prosthetic training
- This case can lead by example that an appropriately identified patient can ambulate with a K3 level prosthesis, with training conducted under the optimal settings and supervision.

References

1. Borg G.A. Psychophysical bases of perceived exertion. *Medicine and Science in Sports and Exercise*. 1982; 14:377-381.
2. Cucurullo, Sara. (2015). Energy Expenditure of Different Levels of Amputation. *Physical Medicine and Rehabilitation Board Review*, 3rd Edition (633). New York.
3. Cucurullo, Sara. (2015). Physiologic Response After Heart Transplant. *Physical Medicine and Rehabilitation Board Review*, 3rd Edition (901-902). New York.