A Comprehensive PT Exercise Program for a Patient with Bilateral Transtibial Amputations: A Case Report

Erin Fusting, BS, Doctorate of Physical Therapy Student and Kirsten Buchanan PhD, PT, ATC
Department of Physical Therapy, University of New England, Portland, Maine

Background

- The most common reason for lower extremity amputation (LEA) is from complications from Diabetes Mellitus (DM). [1,2]
- Patients with DM are 10x more likely to have an amputation then someone without the disease. [3]
- 50% of those with DM with a LEA will have an opposite foot or leg amputated in approximately 3 years or less. [4]
- Transtibial amputations (TTA's) also known as below knee amputations are the most common amputation.
- There is good evidence that physical therapy can help patients with one LEA to regain strength and functional independence but, there is limited information on the most effective PT plan of care for patients with two amputations.

Purpose

- The purpose of this case report was to investigate a comprehensive physical therapy plan of care for a patient with bilateral transtibial amputations.

Case Description

Patient:
- 44 year old caucasian male
- Seen in inpatient rehab 7 days after a left TTA surgery
- Patient underwent a right TTA in in 2014, with successful prosthetic training
- Unable to wear prosthesis at this time due to right sided skin breakdown at prosthetic site
- History of DM, MRSA, acute kidney injury, and gastroparesis
- Going through a divorce at the time
- Cares for his daughter who has Down Syndrome

Chief Complaint:
- Left calf pain and phantom limb pain

Goals:
- Improve global strength and ROM in order to return to walking with prosthetic limbs
- Improve daily independence with transfers, wheel chair propulsion
- Complete 8 days of PT for 1.5 hours daily

Examination

Test	Initial		Final	
Hip Flexion AROM	R= 69°	L=76°	R= 95°	L= 93°
Hip Extension AROM	R= 5°	L= 3°	R= 7°	L= 4°
Knee Flexion AROM	R= 100°	L= 102°	R= 120°	L= 112°
Hip Flexion strength MMT	R= 4/5	L= 4-/5	R= 5/5	L= 5/5
Hip Extension strength MMT	R= 2/5	L= 2/5	R= 3+/5	L= 3+/5
Hip Abduction strength MMT	R= 2+/5	L= 2+/5	R= 4-/5	L= 4-/5
Knee Flexion strength MMT	R= 4+/5	L= 2+/5	R= 5/5	L= 4-/5

Interventions

Active Range of Motion
- Supine straight leg raise
- Knee flexion & extension
- Glut & quad sets
- Bridges over a bolster
- Side lying hip abduction and extension

Core and Balance Exercises
- Ball toss in unsupported sit
- Bag toss while sitting on a dynadisc (figure 1)
- Wood chops with a 5lb. weight
- Resisted trunk extension with a theraband

Aerobic Exercises
- Seated marching
- Prone swimming (figure 2)
- Wheelchair propulsion

Stretching
- Contract relax method of hamstrings and quadriceps

Functional Activities
- Transfers, bed mobility, bumping up a step on buttocks

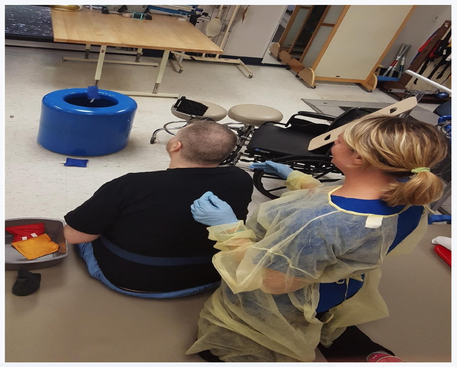
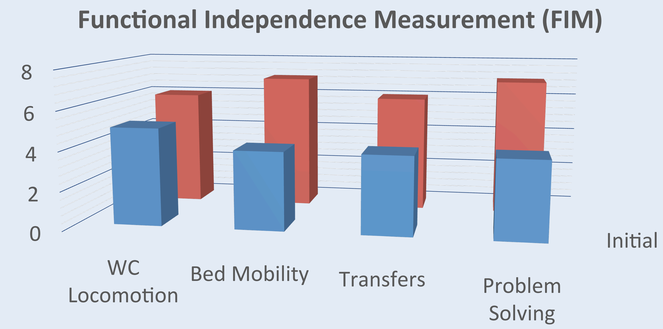


Figure 1: Bag toss sitting on a dynadisc

Figure 2: Prone swimming

Outcomes



Discussion & Conclusion

- This comprehensive PT exercise program improved the patient's range of motion, strength, and functional independence over 8 days.
- While gains were made, limitations to progress included a short stay in inpatient rehab and minimal improvement of pain reduction.
- Future research might consider investigating the influence of psychosocial factors such as divorce and return to independence with bilateral TTA's.

Acknowledgements

The author acknowledges Kirsten Buchanan, PhD, PT, ATC for assistance with case report, conceptualization, the clinical instructor Mitchum Warren, PT, for supervision on the case, and the patient for willingness to participate in the data collection of the case report.

References

1. Ziegler-Graham K, MacKenzie EJ, Ephraim PL, Travison TG, Brookmeyer R. Estimating the Prevalence of Limb Loss in the United States: 2005 to 2050. *Archives of Physical Medicine and Rehabilitation*. 2008;89(3): 422-429. http://www.sciencedirect.com.une.idm.oclc.org/science/article/pii/S0003999307017480. doi: //dx.doi.org.une.idm.oclc.org/10.1016/j.apmr.2007.11.005.
2. Varma P, Stineman MG, Dillingham TR. Physical Medicine and Rehabilitation Clinics of North America Epidemiology of Limb Loss. *Physical Medicine and Rehabilitation Clinics of North America*. 2014;25(1):1-8. doi:10.1016/j.pmr.2013.09.001.
3. Foot Complications. American Diabetes Association. http://www.diabetes.org/living-with-diabetes/complications/foot-complications/?referrer=https%3A%2F%2Fwww.google.com%2F. Accessed July 14, 2017.
4. Aulivola BB. Major Lower Extremity Amputation: Outcome of a Modern Series. *Journal of Vascular Surgery*. 2004;139(4):395-399. doi:10.1001/archsurg.139.4.395.