Assessment of Performance Measures, Gait, and Rehabilitation of a 68- year old Female with a Transtibial Amputation: A Case Report.

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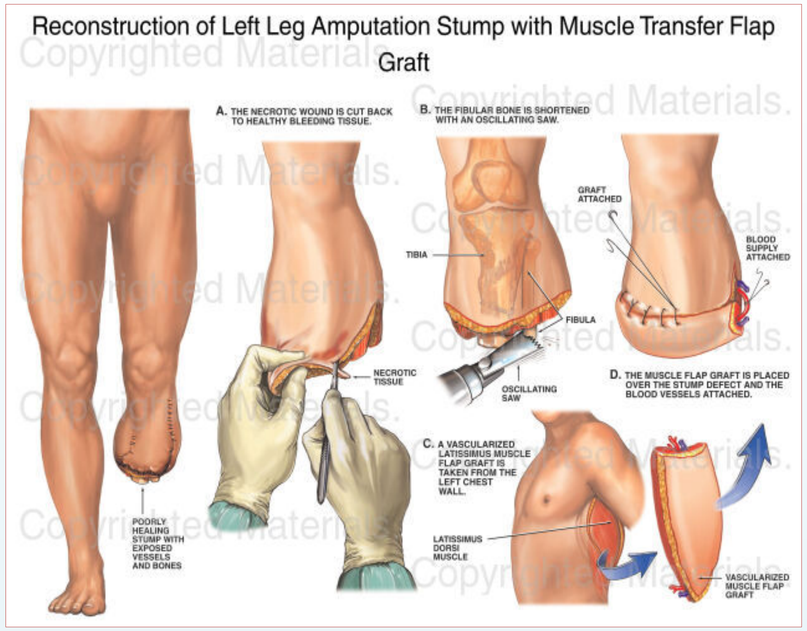
Background & Purpose

Currently in the United States, 1.6 million individuals live with limb loss from trauma or vascular compromise.[1]

The most frequent cause of amputation in developed countries is related to vascular etiology, such as diabetes mellitus, and accounts for 82% of all forms of amputations.

Transtibial amputations are the most common type of amputation below the knee.[1]

Patients may develop OA in the intact limb, low back pain, motor control impairments, gait compensations, increased fear of falling, and reduced community ambulation as a result of a TTA.[6,7,8]



The **purpose** of this report was to describe the use of specific functional outcome measures, gait analysis, and PT intervention for functional mobility of a 68-year-old female following a TTA.

Case Description

- 68-year old retired female with right TTA due to bone infection and underlying diabetes mellitus.
- Past medical history included insulin-dependent Type-II diabetes, lymphedema, Left tibial fracture, Left peripheral neuropathy, and chronic low back pain.
- Received inpatient rehabilitation for two weeks following amputation then fit for prosthetic two months following surgery.
- Presented to outpatient PT unable to independently ambulate with her prosthetic and phantom leg pain in residual limb. She had increased pain, swelling, and decreased sensation in the left lower leg.
- Received skilled PT two days a week for one hour to increase strength, balance, and ambulate with a prosthetic.

Timeline

The patient is a 68-year- old female with a past medical history of R LE bone infection and diabetes mellitus.

Operation Day	Right Transtibial amputation
1-week post-op	Inpatient rehabilitation for 2 weeks
3 weeks post-op	Patient returned to ranch style home
2 months post-op	Patient received her prosthetic
3 months post op. **Day 0**	Initial evaluation at outpatient physical therapy clinic
Week 1-2	Intervention to increase bilateral LE strength, balance, ambulation within parallel bars and w/ AD
Week 3-6	Intervention to advance bilateral LE strength, improve balance, ambulation with a front wheeled walker
Week 7-13	Progress note and continued PT services

Patient to continue plan of care focusing on ambulating with lofstrand crutches, core strengthening, postural control, balance training.

Case Description

Systems Review	
Cardiovascular/Pulmonary	
Impaired	High Blood Pressure medication
Musculoskeletal	
Impaired	Gross range of motion impairments of bilateral hip and knee
	Gross strength impairments of bilateral hip and knee
	Gait impaired due to R leg prosthetic
Neuromuscular	
Impaired	Limited bilateral standing balance due to R leg prosthetic and L knee and low back pain.
Integumentary	
Impaired	Incision on anterior aspect of the R knee Figure 1.
	Increased swelling on L LE
Communication	
Not Impaired	
Affect, Cognition, Language, and Learning Style	
Not Impaired	

Tests & Measures	Initial Evaluation Results:
Skin Integrity:	
R LE	Incision well healed and mobile.
	Residual limb bulbous in shape
Motor Function:	
Motor Planning	Sitting balance unimpaired. Significant use of upper extremity for sit to stand. Limited standing tolerance.
Sensory Integrity:	
9 site monofilament test	Protective sensation impaired on L foot.
	8/9 correct on R residual limb.
Goniometric AROM/PROM	
Knee	Knee AROM: R: 9-114 deg L: 17- 104 deg
	Knee PROM: R: 9-116 deg L: 15-111deg
Hip	Hip Flexion: WNL; PF bilaterally Hip Internal Rotation: Limited bilaterally Hip Extension: R: 0 deg L: lacking 8 deg
Manual Muscle Testing	
Hip	Hip Extension: 3-/5 bilaterally Hip Abduction: R: 4/5 L: 4-/5
Functional Outcome Measure:	
LEFS	34/80, 57.5% disabled
L-Test	N/A

Interventions and POC

Manual Therapy

- Scar cross friction massage
- Soft tissue mobilization
- Patellar mobilization
- Short axis traction

Therapeutic Exercise

- Bilateral lower extremity strengthening
- Balance training

Gait Training

- Parallel bars
- Front wheeled walker
- Lofstrand crutches

Outcomes

Tests & Measures	Initial Evaluation Results:	Progress Note: Week 7
Skin Integrity:		
R LE	Incision well healed and mobile.	Incision well healed and mobile.
	Residual limb bulbous in shape	Residual limb bulbous in shape
Motor Function:		
Motor Planning	Sitting balance unimpaired. Significant use of upper extremity for sit to stand. Limited standing tolerance.	Decreased use of UE for sit to stand. Standing tolerance improved with less reliance on parallel bars for support
Sensory Integrity:		
9 site monofilament test	Protective sensation impaired on L foot.	Protective Sensation impaired on L foot.
	8/9 correct on R residual limb.	8/9 correct on residual limb
Goniometric AROM/PROM		
Knee	Knee AROM: R: 9-114 deg L: 17- 104 deg	Knee AROM: R: 9-120 deg L: 9-105 deg
	Knee PROM: R: 9-116 deg L: 15-111deg	Knee PROM: R: 9-122 deg L: 15-112 deg
Hip	Hip Flexion: WNL; PF bilaterally Hip Internal Rotation: Limited bilaterally Hip Extension: R: 0 deg L: lacking 8 deg	Hip Flexion: WNL Hip Internal Rotation: Limited bilaterally Hip Extension: R: 3 deg L: Lacking 5 deg
Manual Muscle Testing		
Hip	Hip Extension: 3-/5 bilaterally Hip Abduction: R: 4/5 L: 4-/5	Hip Extension: 4/5 bilaterally Hip Abduction: R: 5/5 L: 4+/5
Functional Outcome Measure:		
LEFS	34/80, 57.5% disabled	35/80, 56.5% disabled
L-Test	N/A	Trial 1: 1.22 seconds Trial 2: 1.31 seconds

Outcomes

Range of Motion

- Increased R knee flexion: 114-120 degrees
- Increased L knee extension: 17- 9 degrees
- Increased R hip extension: 0-3 degrees
- Increased L hip extension: lacking 8- 5 degrees

Strength

- Increased R/L hip extension: 3-/5- 4/5
- Increased R hip abduction: 4/5 - 5/5
- Increased L hip abduction: 4-/5 - 4+/5

Gait

- L-test: 1.22sec, 1.31sec
- Increased ambulation: 5ft- 50ft.
- Decreased knee valgus, controlled step length

Short term goal: Ambulate 50 feet with front wheeled walker

Discussion

Conclusion

- Improved tolerance to strength exercise progressions and LE strength over the span of 7 weeks
- Progressed from ambulating within parallel bars to using lofstrand crutches by week 7
- Short-term goal met to ambulate 50-feet with a front wheeled walker without increased low back and L knee pain.
- Decreased knee valgus and controlled step length to create a more stable base of support

Future Direction

- Effect of long-term ambulation outcomes of patients with TTA and associated prosthetics.
- Long-term effects of knee OA on residual limbs of individuals with TTA.

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