# ALTER G® Case Study

# Below Knee Amputation

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**Who:** 71-year-old male Below Knee Amputee.

**What:** Walking program in the AlterG Anti-Gravity Treadmill™ was used to help improve walking speed, endurance, and gait mechanics while training a patient to use his new below knee prosthesis.

**Why:** Body weight support allows patient to begin gait training with less weight on the prosthesis, decr. sensitivity to residual limb and decr. energy expenditure to allow for longer sessions to work on mechanics.

## Introduction

Patient is a 71 year old male s/p L BKA who presented to OP PT five months after his amputation. PMH includes osteoarthritis, L BKA: 3/10/10, L TKR: 1/15/10. Please note that this patient did not have any pain complaints throughout his OP PT sessions, although he did have one episode of L knee catching sensation and often commented about fatigue and/or a heaviness in his L LE during ambulation.

## Goals

**Patient had ROM goals established at the time of his initial evaluation (8/9/10):**

- Increase L knee extension flexibility to -63 degrees supine to optimize LE alignment for improved fit of prosthesis
- Increase L hip extension flexibility to - 20 degrees side lying to optimize LE alignment for improved fit of prosthesis
- Pt able to perform LE stretching therex frequently throughout the day with assist of family members as needed

**Progressed to the functional goals below when prosthesis was ready (10/26/10):**

- Patient will perform sit to stand from 18" chair without arm support with modified independence with LBQC with equal foot position (L/R)
- Patient will ambulate for 6 minutes for total of 500 feet with LBQC with supervision on level surfaces with L LE prosthesis
- Patient will perform Four Square Step Test with LBQC in 1 minute
- Patient will perform timed up and go with LBQC in 20 seconds

**Functional outcome measures noted below were tracked pre-, 4 weeks post- and 6 weeks post-initiation of AlterG during OP PT:**

- Timed Up and Go
- 6 Minute Walk
- Amputee mobility predictor
- Four Square Step Test
- Patient-Specific Functional Scale

## History

Patient was initially seen in OP PT for approximately two times per week for eight weeks with emphasis on increasing PROM/AROM of L hip extension and L knee extension to decrease contractures, improve fit of prosthesis, and increase performance and independence with functional mobility at an ambulatory level. The patient's OP PT was transitioned to more functional mobility once patient's L LE below knee prosthesis was ready at seven months post-op. Patient initiated ambulation with AlterG the following weeks and was intended to continue AlterG two times per week for four weeks with the goals of increased gait speed, improved endurance/tolerance for ambulation, and better gait mechanics on level surfaces. Due to weather and a scheduling error, patient completed eight sessions on AlterG within six weeks and was extended for four additional sessions on AlterG within three weeks for a total of 12 sessions on AlterG. See table below for details re: AlterG parameters utilized during OP PT sessions.

The patient was seen for a total of 11 physical therapy sessions for the above described treatment, 1-on-1 with the physical therapist. In addition, he attended 7 sessions for exercise and AlterG walking. He achieved post-operative knee ROM of 0/125. He had a good gait pattern and good strength of his R LE after physical therapy. He was able to climb stairs with proper gait mechanics. He was able to work without increased in pain or swelling. Pain level at initial evaluation was 4/10 and decreased to 0/10 upon discharge. He felt ready to begin his return to the golf course at 8 weeks post-op. The rehabilitation program incorporating the AlterG enabled this patient to return to golf and pain-free function faster than similar patients on a traditional rehabilitation program.

## Results

This patient did demonstrate substantial improvement in the majority of his outcome measures in eight sessions at which point it was decided to offer the patient four additional sessions on the AlterG at one to two times per week; additional gains were obtained in the last four sessions. All outcome measures were tracked with ambulation on level surfaces in order to ensure that changes noted on the AlterG translated to functional mobility changes over ground for the patient.

He improved his gait speed as evidenced by an increase of 163 feet in the 6 Minute Walk test after eight sessions and 233 feet from baseline after 12 sessions. He also decreased his time to complete the Timed Up and Go from 26 seconds at baseline to 23 seconds at eight sessions and 16 seconds after 12 sessions. Not only was ambulation along a straight path improved, but also negotiation of obstacles during ambulation as noted by his decreased time to perform the Four Square Step Test by 34 seconds after eight sessions and 44 seconds from baseline after 12 sessions.

His transfers also improved as he was unable to attain standing without arm support from a standard 18 inch chair at baseline; however, he was able to perform this task after eight and 12 sessions of AlterG. The patient's score on the Amputee Mobility Predictor did not change substantially although his ability to perform sit to/from stand without arm support increased his score by two points and he did have a one point increased related to increased stride length on his sound limb during gait. The Patient-Specific Functional Scale allowed this patient to rate three activities that were important to him, but initially unable to be performed or the patient had difficulty performing as a result of his L BKA. This 10 point scale is scored from 0 (unable to perform activity) to 10 (able to perform activity at the same level as before injury or problem). The patient chose 1) gait speed and rated this category 6/10 initially, 8/10 after eight sessions and 8.5/10 after 12 sessions; 2) negotiating 6" stairs with prosthesis without device and rated this category a 0 at all time frames; 3) sit to stand without arm support and rated this category 0/10 initially, 4/10 after eight sessions and 8/10 after 12 sessions.

| Days | Body weight | Speed (mph) | Incline | Time (mins.) | Rest Breaks | Frequency | Comments |
|---|---|---|---|---|---|---|---|
| Week 1 | 70% | 1.0-1.2 | 0% | 15.0 | 2 | 1 | Rest Break Fatigue |
| Week 2 | 70% | 1.2 | 0% | 15.0 | 2 | 2 | Rest Break Fatigue |
| Week 3 | 70% | 1.3 | 0% | 11.0 | 2 | | Rest Break Fatigue |
| Week 4 | 70% | 1.3 | 0% | 16.0 | 2 | | Not seen |
| Week 5 | 70% | 1.0-1.3 | 0% | 18.5 | 2 | 2 | Rest Break Fatigue |
| Week 6 | 70% | 1.0 | 0% | 10.0 | 0 | | Rest Break Fatigue |
| Week 7 | 70% | 1.0-1.3 | 0% | 15.0 | 1 | 1 | Catching sensation L knee |
| Week 8 | 70% | 1.0-1.3 | 0% | 15.0 | 1 | | Heaviness LLE |
| Week 9 | 70% | 1.3 | 0% | 10.0 | 0 | 1 | Limited time |
| Week 10 | 70% | 1.3 | 0% | 28.0 | 1 | 2 | Heaviness LLE |
| Week 11 | 70% | 1.3-1.4 | 0% | 22.0 | 1 | | Heaviness LLE |
| Week 12 | 70% | 1.0-1.3 | 0% | 20.0 | 0 | 1 | None |