A Comparison of Prosthetic Mobility in Amputees with Osseointegration versus Traditional Amputation and Socket

Gailey RS,[1,2] Lucarevic JL,[1,2] Clemens SM,[1,2] Agrawal V,[1] Bennett C,[1] Muderis MA[3], Gaunaurd IA,[1,2]

[1]University of Miami Miller School of Medicine, Department of Physical Therapy, Coral Gables, FL;
[2]Miami Veterans Affairs Health Care System, Miami, FL, [3]Osseointegration Group of Australia, Sydney Australia

INTRODUCTION

The Osseointegration (OI) limb reconstruction surgical procedure for people with lower limb amputations (LLA) has been performed in Sweden since the 1990's and is performed in Germany, England, Australia and most recently the United States. Presently, there are variations with the two-stage surgical procedure. Published outcomes for people who have had osseointegration reconstruction report improvements within subjects when comparing pre to post-surgical mobility or quality of life. [1,2,3] To date no studies have compared prosthetic mobility in people with LLAs who use an osseointegration prosthesis (OIP) to a traditional socket prosthesis (TSP).

METHOD

Subjects: A convenience sample of 28 community ambulators with unilateral LLA, 14 who had an OIP and 14 age and level of amputation matched LLA with TSP with a mean age of 46 ±13 and 48 ±15 years respectively, were recruited at the Amputee Coalition conference. All OIP subjects had the same surgeon, Munjed Al Muderis, MD, with their surgery performed in Sydney, Australia.

Procedures: Subjects competed Prosthetic Limb Users Survey of Mobility™ (PLUS-M) short form, 12 questions. In addition, subjects performed 2 trials of the 10 meter walk test (10MWT), component Timed Up and Go (cTUG) test at self selected and fast walking speeds. A custom mobile software application was used to capture all data.

Data analysis: SAS Version 9.4 statistical software was used to provide descriptive statistics of the sample. Paired t-tests was performed to compare differences in group performance.

RESULTS

The OIP transfemoral (TFA) group was found to have significantly better mobility as measured by the PLUS-M ($p<0.02$). However, differences were not found with the PLUS-M with the transtibial (TTA) group. No other differences in mobility were detected in mobility as measured by the 10 MWT, TUG and TUG-fast.

Measures (N=28)	OIP (n=14)	TSP (n=14)	p
Age (years)	45.7 ± 13.5	48.3 ± 15.1	.64
Time amp (mths)	94.3 ± 97.8	142.1 ± 175.5	.38
PLUS-M12 (t-score)	60.3 ± 6.1	54.1 ± 7.6	.02
10 MWT (m/sec)	.87 ± .16	.90 ± .18	.64
TUG (sec)	11.5 ± 2.8	11.6 ± 2.1	.92
TUG –Fast (sec)	9.1 ± 2.0	9.5 ± 2.2	.59

Measures (N=28)	TTA OIP (n=5)	TTA TSP (n=5)	p
PLUS-M12(t-score)	61.7 ± 7.1	58.1 ± 9.1	.5
10MWT (m/sec)	.98 ± .14	.82 ± .22	.2
TUG (sec)	9.9 ± 2.4	12.2 ± 2.7	.2
TUG -fast (sec)	7.99 ± 2.3	9.7 ± 2.9	.35
	TFA OIP (n=9)	**TFA TSP (n=9)**	**p**
PLUS-M12(t-score)	59.6 ± 5.8	51.9 ± 6.1	.02
10MWT (m/sec)	.81 ± .15	.95 ± .17	.09
TUG (sec)	12.4 ± 2.8	11.3 ± 1.8	.35
TUG -fast (sec)	9.6 ± 1.8	9.4 ± 1.8	.76

DISCUSSION

Osseointegration surgical procedures are currently indicated for LLAs who have difficulty or cannot wear a traditional socket and are relatively healthy. Prior published research has reported significant differences between TSP versus OIP when using within subject designs comparing their mobility prior to OI surgery in their existing prosthesis to their post-surgical capabilities.[1,2,3] This small study found that the LLA with OIP were able to demonstrate mobility similar to LLA with TSP and were similar to previous reports post-OI surgery.[1,3] Moreover, OIP TFAs self-report significantly better mobility. Further research with a larger sample and other measures of mobility would provide greater insights to similarities and differences between the two groups.

CONCLUSION

This study suggests that osseointegration surgical procedure enables people with LLA to have mobility equal to those LLAs who are comfortably fit in a traditional socket.

CLINICAL APPLICATIONS

The osseointegration surgical procedure enables LLAs to benefit from a prosthesis and enjoy the level of mobility that LLAs a comfortable socket fit demonstrate.

REFERENCES

1. Muderis MA, Tetworth K, et al. The Osseointegration Group of Australia Accelerated Protocol (OGAAP-1) for two-stage osseointegrated reconstruction of amputated limbs. Bone Joint J. 98-B(7):952-60;2016.
2. Hagberg K, Hansson E, Branemark R. Outcome of percutaneous osseointegrated prostheses for patients with unilateral transfemoral amputation at two-year follow-up. Arch Phys Med Rehabil. 95(11):2170-7;2014.
3. Van de MeentH, Hopman M, Frolke J. Walking ability and quality of life in subjects with transfemoral amputation: a comparison of osseointegration with socket prostheses. Arch Phys Med Rehabil. 94(11):2174-8;2013.

American Academy of Orthotists & Prosthetists
43rd Academy Annual Meeting & Scientific Symposium
March 1-4, 2017