Classification of the Floor-to-Stand Transition in Individuals with unilateral Transfemoral Amputation: A Case Series

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Summary

The floor-to-stand transition (FTST) is a crucial task for individuals with unilateral transfemoral amputation (uTFA) for recovering after falling. This study aimed to classify FTST patterns in individuals with uTFA and clarify their movement characteristics. Four individuals with uTFA performed the FTST naturally without using a transfemoral prosthesis. FTST completion time and hand/foot contact time were measured using video analysis. We found one participant utilized quadruped push-off pattern, whereas three participants adopted Squatting to standing. The results of this study suggest that FTST in individuals with uTFA can be categorized into two distinct patterns. To confirm the validity of the identified FTST strategies and develop effective rehabilitation methods, future research should involve a larger sample size.

Introduction

Floor-to-stand transition (FTST) is a crucial task for individuals with unilateral transfemoral amputation (uTFA) to recover after falling. However, a previous study revealed that approximately 50 % of individuals with lower limb amputation could not stand up from the floor by themself [1]. Despite there were three distinct FTST patterns among elderly people [2], the pattern classifications have not yet been clarified in individuals with uTFA. Clarifying the FTST pattern may be a practical movement strategy for prosthetic rehabilitation in individuals with uTFA. Therefore, this study aimed to classify the FTST patterns in individuals with uTFA and clarify their movement characteristics.

Methods

We recruited 4 individuals with uTFA (4 males, 37.3 ± 7.5 years old, 1.68 ± 0.04 m, 72.4 ± 6.9 kg). First, all participants were instructed to be in long sitting position. Then, they were asked to perform the FTST once as naturally as possible without using a transfemoral prosthesis. FTST completion time and hand/foot contact time were measured for each participant using video analysis (60 Hz). Initiation of the FTST was defined as the timing when any part of the body first began to move. The completion was judged when each participant maintained an upright posture with arms at their sides.

Results and Discussion

We found that the FTST in individuals with uTFA was classified into two patterns (Figure 1). The first pattern (No.1) was ‘quadruped push-up’ pattern, where one participant used roll-over the trunk to be prone position with push-up support by two upper limbs. Second (No.2 - 4) is ‘squatting to standing’ pattern, which is a continuous motion from knee flexion of their intact limb and stand-up with arm supports.

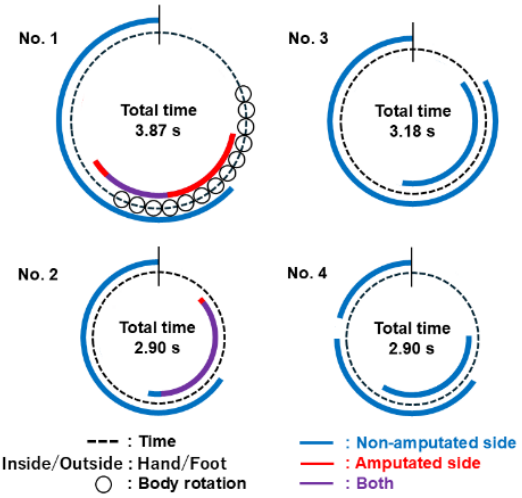

Figure 1: The result of the completion time of FTST task and hand/foot contact time of each participant.

A previous study demonstrated that the elderly group employing the quadruped push-off pattern required a significantly longer FTST duration and exhibited a higher BMI compared to those utilizing the squatting-to-standing pattern [2]. Thus, participant’s BMI and other demographic factors may also be associated with the FTST strategies in individuals with uTFA.

Conclusions

The FTST pattern in individuals with uTFA can be classified into two patterns. To verify the effectiveness of the FTST strategies and establish practical rehabilitation methods, future research should include a larger sample size.

References

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