P-161 A Study of the Intent Detection Robotic Prosthesis for a Patient with Transfemoral Amputation

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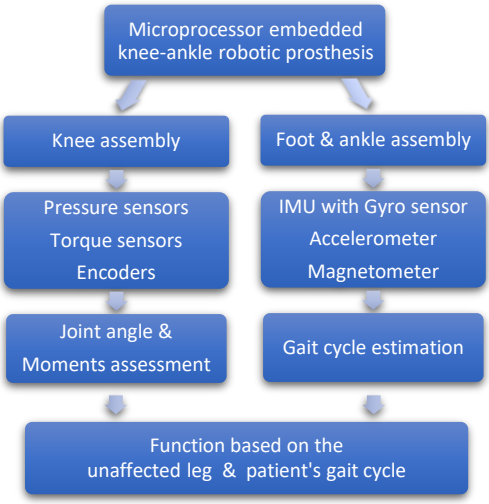
INTRODUCTION

In this clinical study, we investigate the use of a novel knee-ankle-foot robotic prosthesis in a 55-year-old male patient with transfemoral amputation due to vascular disease.



METHODS

Comprehensive gait analysis was performed using a 12 camera Vicon system integrated with force plates. Joint range of motion (ROM) and joint moments were measured during the gait cycle with both the mechanical and robotic prostheses.

Result

The pattern of hip, knee, and ankle joint motion during the gait cycle was similar with both prosthetic devices. The joint moments were generally lower than those of the unaffected leg, which may clinically imply that the prostheses generated lower power. However, there was no significant difference in the pattern of joint moments between the mechanical and robotic prostheses (Figure2,3). Korean Prosthesis Evaluation Questionnaire (KPEQ) showed that the patient felt lighter during walking with robotic prosthesis, even though it was actually much heavier than the mechanical prosthesis

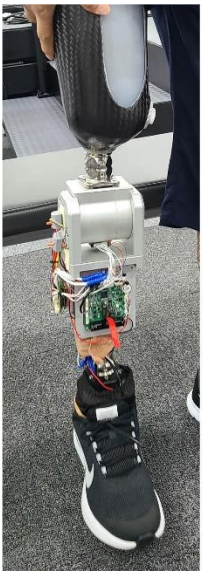
CONCLUSIONS

This improved comfort may be attributed to the reduced energy expenditure by the synchronized movement of the knee and ankle joints, facilitated by the integrated sensors and motors in the prosthesis.

Future research is needed to evaluate the long-term benefits of the new prosthesis in larger patient populations and to determine its efficacy in situations such as climbing stairs or slopes.

The patient felt much lighter and comfortable with the new robotic prosthesis while objective gait analysis showed similar joint ROM &moments compared with mechanical prosthesis

Scan here for a video of patient's gait!



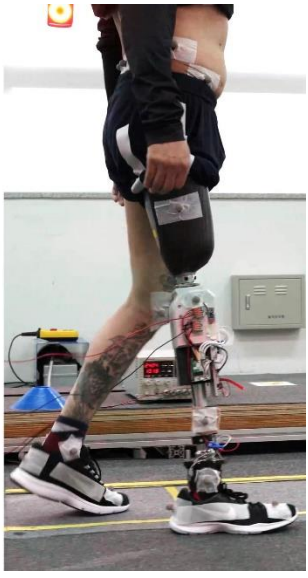


Figure1. The new robotic knee-ankle-foot robotic prosthesis which includes microprocessors that control the knee and ankle joints.

ROM and joint moments of knee, ankle and hip joint

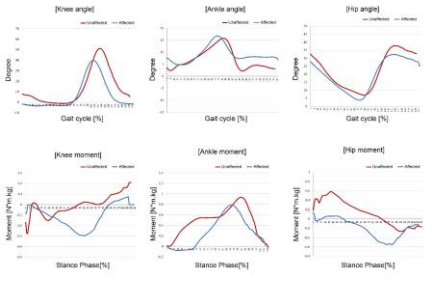


Figure 2. Mechanical prosthesis

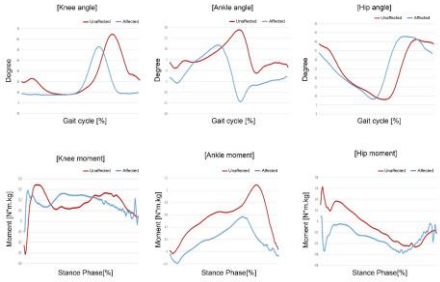


Figure 3. Robotic prosthesis