

A Comparative Evaluation of Oxygen Consumption and Gait Pattern in Amputees Using Intelligent Prostheses and Conventionally Damped Knee Swing-Phase Control

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OBJECTIVE

To compare the gait of amputees wearing conventionally damped pneumatic swing-phase control knees and microchip-controlled Intelligent Prostheses. **DESIGN**

Crossover trial.

SETTING

An amputee rehabilitation centre in a teaching hospital.

PARTICIPANTS

Ten established unilateral transfemoral prosthetic users were asked to participate in the trial; all agreed.

INTERVENTIONS

The amputees were assessed wearing pneumatic swing-phase control knees and then with the Intelligent Prosthesis.

MAIN OUTCOME MEASURES

Oxygen consumption while walking at different speeds on a treadmill, video-recording of gait assessed by a panel and temporal-spatial parameters of gait whilst walking at slow, fast or normal speeds in a gait laboratory. **RESULTS**

Mean oxygen cost for all subjects at 0.69 m/s was 0.33 ml/kg.m with the conventional limb and 0.30 ml/kg.m with the Intelligent Prosthesis ($p = 0.01$). At 1.25 m/s the mean oxygen cost for the conventional limb was 0.24 ml/kg.m and for the Intelligent Prosthesis was 0.22 ml/kg.m (not significant). The ANOVA analysis showed that oxygen cost was similar at normal walking speeds but increased more at lower speeds for the pneumatic swing-phase control leg compared to the Intelligent Prosthesis ($p < 0.02$). There were no significant differences in subjective gait evaluation or temporal and spatial gait parameters.

CONCLUSION

At lower speeds oxygen cost was lower with the Intelligent Prosthesis. Gait analysis detected no significant changes between the two legs.

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