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Background:

Following resection of bone tumors around the knee joint the defect often is reconstructed by tumor endoprosthesis. A common reason for early stem loosening and bushing wear could be caused by hyperextension. By gait analysis using a real time force plate we could show in a first study very high forces and torque levels to the joint and bushing caused by hyperextension of the knee in the initial stance phase in patients with early bushing wear.

Question:

Is it possible for patients to avoid gait patterns with knee hyperextension in the operated extremity by using real time gait analysis and using bio feed back ?

Patients and Methods:

With instrumental gait analysis using motion analysis system based on 8 real time cameras and a motion capture software joint angles of the knee endoprosthesis was measured. The patient was shown real time the gait and angles. By visual control of current status and target status patient could adapt and normalize his gait under visual control (bio feed back). 15 patients with knee tumor endoprosthesis after resection of a malign bone tumor were enclosed in the study.

Results:

Feed back based gait training improved joint angles and gait in a significant way. Median flexion in standing phase without feed back showed hyperextension of -0.82° , with feed back $+3.36^{\circ}$. Deviation from normal knee kinematics could be significantly reduced by the patient via bio feed back.

Conclusions:

By feed back based gait training destructive angles and forces on the knee endoprosthesis could be significantly reduced. This could lead to a reduced rate of bushing revisions.