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Instrumented gait analysis in patients with medial osteoarthritis of the knee after mobile-bearing unicompartmental knee arthroplasty

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ABSTRACT

Background: Unicompartmental knee arthroplasty (UKA) is an effective treatment for patients with medial osteoarthritis of the knee joint. Instrumented gait analysis provides an objective measure to quantify and qualify postoperative changes of gait. The purpose of this study was to evaluate standardized instrumented gait analysis for functional recovery and gait as an outcome of mobile-bearing UKA in patients with medial osteoarthritis of the knee.
Methods: Twenty-one patients with isolated medial osteoarthritis of the knee joint received mobile-bearing UKA. They were examined by a gait analysis before surgery and after an average follow-up time of seven months. Gait analysis was performed on a treadmill with six infrared-cameras to identify changes of gait characteristics (e.g., velocity, stride time, stride length, knee adduction and hip abduction).
Results: Mean velocity (chosen by individuals) increased from 0.61 to 0.76 m/s and further significant advancements, particularly in the knee adduction and the hip abduction were detected. Time and length of strides improved significantly as well as the clinical scores American Knee Society Score (AKSS), Oxford-12, Hannover Functional Ability Questionnaire for Osteoarthritis (FFbH-OA) Score and Devane Score.
Conclusion: Mobile-bearing UKA can restore physiological axis of the leg and improve gait and function of the knee joint. The combination of instrumented gait analysis with clinical scores constitutes an eligible measuring instrument to quantify and qualify changes in patients' gait patterns.

1. Introduction

Osteoarthritis is a well-known disease of the knee joint [1] with a location nine-times more common in the medial than in the lateral compartment [2]. Medial unicompartmental knee arthroplasty (UKA) with mobile bearing shows excellent clinical outcomes [3–5] preserving the cruciate ligaments and providing a better range of motion and more physiological function [3,6]. Advantages are less blood loss, minimal invasive incision, faster rehabilitation and fewer costs compared to total knee arthroplasty (TKA) [7].

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Gait analysis provides an objective measuring instrument of a patient's functioning following total knee replacement with a particularly accurate measurement of sagittal plane kinematics and kinetics [8]. It is described in patients with opening wedge high tibial osteotomy [9], UKA [10], TKA [8] as well as limb-preserving surgery [11]. Fuchs et al. [12] performed gait analyses in patients after an implantation of a fixed-bearing UKA. Self-selected walking speed, single limb support, and step length have been shown to increase after unicompartmental arthroplasty [10,13]. Instrumented gait analysis is a well-established process to assess gait, but the use of this technique is rarely reported before and after implantation of medial mobile-bearing UKA. The aim of this study was to evaluate standardized instrumented gait analysis for functional recovery and gait as an outcome of medial mobile-bearing UKA in patients with medial osteoarthritis of the knee. Our hypothesis was that gait analysis could demonstrate the difference in functional gait before and after medial mobile-bearing UKA and correlates in combination with corresponding clinical results.

2. Material and methods

2.1. Patient selection

Between May 2007 and November 2008, 32 consecutive patients suffering from medial osteoarthritis of the knee joint underwent medial Oxford® (Biomet UK Ltd., Swindon, UK) UKA with mobile-bearing at the Orthopaedic University Hospital in

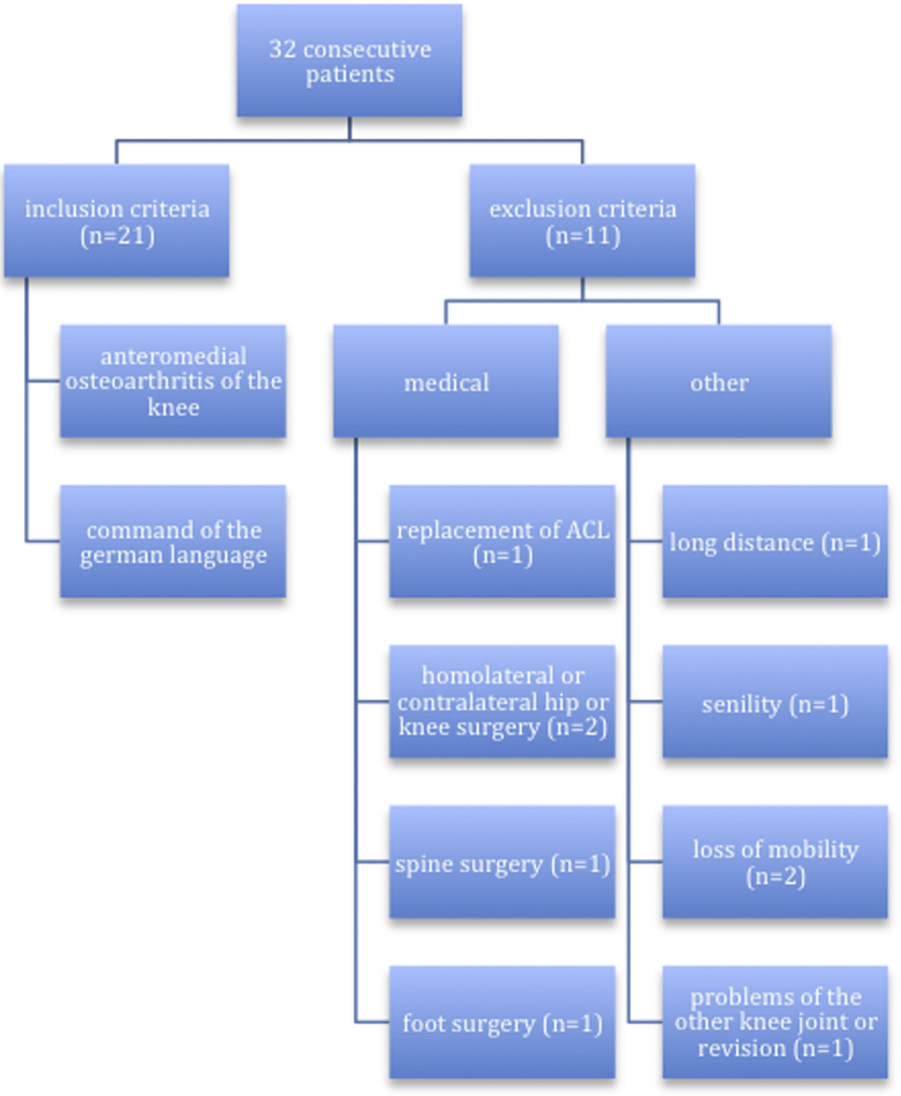

Figure 1. Patient inclusion and exclusion criteria.

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