Revision THA patients with large acetabular impaction bone grafting perform the sit-to-stand as good as primary THA patients.

1Boonstra, M C; 2Schreurs, B W; 3Verdonschot, N
+1 Orthopaedic Research Lab, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands
2Department of Orthopaedics, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands
3Laboratory for Biomechanical Engineering, University of Twente, Enschede, The Netherlands
n.verdonschot@orthop.umcn.nl

INTRODUCTION

The total hip arthroplasty (THA) is designated as the operation of the century1. However, revision rates are increasing, and 17.5% of all THA procedures are revision surgeries2. The revision procedure is regarded to be less successful than the primary THA in terms of clinical survival1 and perceived functional level3. A revision method is bone impaction grafting (BIG) with a cemented cup. However, surprisingly little data about the functional performance of these revision patients is reported.

Therefore, in this study, we analyzed the functional performance of the BIG revision THA patients versus primary cemented THA, using the sit-to-stand movement (STS). The STS has proven to be a sensitive and objective performance-based measure4, and as far as we know it has not yet been used on revision THA patients. We hypothesized that revision patients perform the STS inferiorly as compared to primary THA patients.

METHODS

10 primary (age=57.2 years, Body mass index, BMI=24.9, 2 females/8 males) and 10 revision (age=59.0, BMI=27.7, 3 females/7 males) unilateral THA patients were included in this study. All revision patients had acetabular impaction bone grafting reconstruction. Five patients had cup revision only and five had cup and stem revision.

According to the acetabular defect classification system of Paprosky4, 7 patients had the largest defects, 3A(1) and 3B(6), and 3 patients medium defects, 2A(2) and 2B(1). During the STS we measured the following valid and reliable parameters5:

a. Maximal knee extension angular velocity (knee velocity)
b. Maximal hip extension angular velocity (hip velocity)
c. Loading symmetry ratio (ratio)

Velocity was measured with combination of bi-axial accelerometer and gyroscope (see Fig. 1). Loading symmetry ratio is the ratio of the peak vertical ground reaction force in the THA leg and the contralateral leg and is measured with two force plates.

The chair was adjustable in height and depth and the starting position was 90° knee flexion. The subjects rose 10 consecutive times, and the outcomes were averages of these 10 trials. The study was approved by the institutional review board and all subjects signed an informed consent.

RESULTS SECTION

The subjects did not differ in age (p=0.72), BMI (0.13) and gender (p=0.73). Relative to the outcome parameters, we did not detect differences between the primary and revision group for knee velocity (p=0.47), hip velocity (p=0.66, Fig. 2), nor for loading symmetry ratio (p=0.95, Fig. 3).

DISCUSSION

Revision THA surgery is associated with higher mortality rates, more hospital readmissions, hip dislocations and infections than primary THA6. Also, as measured with questionnaires, revision THA patients perceive their functional performance as lower than primary patients7. However, in this study we have shown that revision THA patients with BIG perform the sit-to-stand with the same knee and hip velocity and loading symmetry ratio as primary patients, which indicates that revision patients after bone impaction grafting can perform a certain task as well as primary THA patients.

In an earlier study6, we have shown that patients with a total knee prosthesis have a loading symmetry ratio of 1.0, indicating that they load both legs evenly. In contrast to TKA patients, THA patients (primary as well as revision) have a loading symmetry of 0.83, meaning that they unload their operated leg by 17 %. Subjects with a THA (primary and revision) shift the load to their contralateral leg during the rising movement. This might be due to the proximo-distal muscle activation pattern; the hip extensors are activated early in the movement and due to muscle weakness, THA patients change their rising strategy. By shifting the load to the contralateral side, this side might become overloaded and evolve hip osteoarthritis.

This study has shown that THA patients after revision surgery using a biological reconstruction technique do not necessarily decline in their functional performance despite the fact that they had undergone considerable reconstructions of bony defects using the impaction bone grafting technique. More functional research is needed on revision THA patients, to be able to get a more detailed picture of the functional possibilities of the revision patients.

REFERENCES

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