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Theme:
Bridging the gap between innovation and evidence-based practice in Arthroplasty

Location:
Concert Building, Bruges (Brugge), Belgium, Europe

Important deadlines:

Submission of abstracts: **May 15th, 2011**
Submission of full papers for the awards: **May 15th, 2011**
Notification of acceptance of the abstract for the program: **June 15th, 2011**
Discounted early registration: **July 15th, 2011**

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Anteversion was in average 10 degree overestimated in the surgical view. Only one case was considered to have impingement risk and reduction of the anteversion was performed using custom stem.

Discussion

In real surgical view, the anteversions are often observed to be more. In the present study instability of the knee was not considered. If the surgeon has performed inappropriate modification of the stem and cup anteversion, it can increase the risk of the dislocation and worse mechanical conditions. The in vivo prosthesis alignment should not be discussed with the angles from surgical view, but should be well planed 3 dimensionally preoperatively.

Figures

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Figure 1

Influence of Design on Potential Periprosthetic Stress Shielding: A Finite Element Analysis

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INTRODUCTION:

Patellofemoral joint (PFJ) replacement is a successful treatment option for isolated patellofemoral osteoarthritis. With this approach only the involved joint compartment is replaced and the femoro-tibial joint remains intact. Minimizing periprosthetic bone loss, which may occur due to the stress shielding effect of the femoral component, is important to insure long-term outcomes. The objective of this study was to investigate, using finite element analyses, the effects of patellofemoral replacement on the expected stress distribution of the distal femur eventually leading to changes in bone density.

METHODS:

MRI images of a healthy knee were acquired, segmented and reconstructed into a 3D physiological model of the bony and cartilaginous geometries of distal femur and patella with patellar tendon and insertion of the quadriceps tendon. This model was modified to include PFJ replacements with either a Journey PFJ or a Richards II PFJ prosthesis, and a Genesis II TKA (Smith&Nephew, Memphis, TN). The prosthetic components were incorporated in the intact model based on the manufacturer's instructions or previously described surgical techniques (Figure 1).

Cortical bone was modeled with orthotropic properties, while homogeneous linear isotropic elasticity was assumed for trabecular bone, cartilage, cement and femoral components materials. The patellar tendon was given Neo-Hookean behavior. UHMWPE patellar buttons for all designs were assigned non-linear elasto-plastic material.

The simulated motion consisted of a 10 second loaded squat, starting from 0° until a flexion angle of 120° matching experimental kinematics tests performed in previous in-vitro analysis on physiological cadaveric legs [1-2]. The patella model was constrained fixing the distal part of the patellar ligament and applying a quadriceps force distributed on the quadriceps insertion on the proximal surface of the patella.

During the dynamic simulation the average Von Mises stress was calculated in two regions of interest (ROI) defined in the femoral bone: one anterior and one proximal. The location of the ROIs was defined to fit the same regions as used in a previous bone mineral density analysis following patellofemoral arthroplasty (height 1cm, length 1cm).

RESULTS AND DISCUSSION:

Overall, the average bone stresses in both ROIs increased with flexion angle. Maximal stresses during squat were reached at 90° flexion angle, (2.8-3.8 MPa for the anterior ROI and 1.4-1.6 MPa for the proximal ROI). Mean stresses in the proximal ROI were similar for both PFJ designs and the physiological model, and slightly lower

for the TKA. Between 80° and 120°, anterior ROI bone stresses for Journey PFJ design were comparable to the physiological knee, while reduced by almost 25% for the other designs (Figure 1).

These results suggest a different stress-shielding behavior depending on design geometry and material properties.

CONCLUSIONS:

This study evaluated periprosthetic bone stress distributions of different patellofemoral replacements. The numerical analyses of physiological and replaced knee models predicted a decrease in stress behind the anterior flange of the femoral component for some designs. This reduction was dependent on prosthesis design geometry and materials properties.

Reference

1) Victor et al., AJSM 2009.

2) Victor et al., JOR 2010.

Figures

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Figure 2

12B : Hip arthroplasty: #522 September 23rd, 2011, 8:30-9:35

Intraoperative Radiography to Avoid Incomplete Seating of Trident Acetabular System Ceramic Liners

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Introduction

Alumina-on-alumina bearings exhibit low wear rates in vitro and one commonly used ceramic implant is the Trident system (Stryker, Mahwah, NJ). There are some reports of incomplete seating of the ceramic liner in the Trident acetabular shell. However, it is often difficult to detect incomplete seating intraoperatively. We sought to prevent incomplete seating using intraoperative radiography.

Materials and Methods

We retrospectively reviewed 19 hips in 17 patients who had undergone primary total hip arthroplasty using a Trident shell with a metal-backed alumina liner between 2007 and 2010. There were 16 women and 1 man, with an average age of 45.7 years. Preoperative diagnosis revealed 14 cases of osteoarthritis and 5 cases of osteonecrosis. All procedures were performed using a posterolateral approach with PSL cups. The minimum follow-up time was 12 months (average 28 months). All procedures included an intraoperative anteroposterior view radiograph to evaluate cup seating. If incomplete seating was recognized we reinserted the liner. Postoperatively, radiographs (supine anteroposterior and cross table lateral views) and computed tomography were performed in all cases in order to assess any residual incomplete seating. We investigated whether it was possible to avoid incomplete seating using intraoperative radiography.

Results

Six (32%)of 19 hips had evidence of incomplete seating. Of these, 3 revealed incomplete seating on intraoperative radiography, 2 were reinserted adequately, and the liner was replaced with a polyethylene liner in one case. Postoperative radiography revealed incomplete seating in 3 cases. One hip had become correctly seated as shown by follow-up radiography at 3 months and the other hips remained incompletely seated for the follow up period. The location of the gap between the socket and liner caused by incomplete seating was inferomedial in all cases, as seen on the intraoperative anteroposterior view radiographs. We were able to avoid incomplete seating in all of