Migration Analysis of a Monoblock Resurfacing Acetabular Component for Hip Resurfacing.

The fate of the unseated cup

Lee, J K L; Soudi, N; White, C; Lopez-Casterllaro J; Kim, P R; Beaulé P E
Division of Orthopedics, The Ottawa Hospital – General Campus, Ottawa, Ontario, Canada
pbeaul@ottawahospital.on.ca

INTRODUCTION

The use of modern metal-on-metal bearing and monoblock cementless acetabular components has led to the reintroduction of hip resurfacing. Because of its rigidity and absence of screw holes, unseating of these components can occur and could affect initial implant stability.

The purpose of our study was to evaluate the initial fixation of monoblock acetabular components as well as determine the fate of unseated acetabular components using migration analysis.

METHODS

From a prospectively collected database of 545 hip resurfacings performed by two experienced surgeons, which has been approved by our institutional review board. We identified 130 consecutive hip resurfacing procedures with two-year digitized radiographic and clinical follow-up. Forty-nine hips in 45 patients had a sufficiently comparable two-year series of radiographs for inclusion in the study. There were 35 males and 10 females, with a mean age of 37 years (35.3-66.2). The average body mass index (BMI) was 27.6kg/m² (18.7-48.8). The primary diagnosis in all patients was osteoarthritis. The posterior approach was utilized in 30 hips (61%), anterior in 10 (20%) and trochanteric hip osteotomy in a further 19 (39%).

All operations were performed in an ultra-clean operating room and all patients were implanted with Conserve Plus (Wright Medical, Arlington, TN, USA) hip resurfacing components. Standard anteroposterior (AP) and lateral digitized radiographs were obtained within the first three post-operative days and then at six weeks, three months and six months and then annually. Clinical outcome was evaluated with the WOMAC scoring system.

An unseated cup was defined as a maximal reamed bone to cup gap distance greater than 2mm on either the AP or lateral post-operative radiograph. Follow-up radiographs were reviewed to observe the fate of the gaps.

Migration analysis was performed using EBRA, with a comparability limit of 3mm. Total migration was calculated from the horizontal and vertical migration using the Pythagorean theorem and early loosening was defined as total migration of greater than 1.2mm at two years.

Statistical Methods

Statistical analysis of the data was performed using SAS software (SAS Institute Inc., Cary, NC, USA). General linear modelling was used to calculate correlations and chi-square and t-test performed for comparison between groups. A p value of <0.05 was considered to be significant.

RESULTS

At two years, the average total migration was 0.9mm in the superomedial direction and 12 (24%) of cups had reached the migration threshold. There was no statistically significant association between migration and age, gender, BMI, cup size, inclination or anteversion angle.

Thirteen (26%) cups were found to be unseated post-operatively, and there was no difference in demographic parameters compared to the seated group. There was no difference in migration between the seated and unseated cups (mean total migration 0.87mm vs 0.96mm (p=0.25)). There was no difference in clinical outcomes for both groups in either the pain, stiffness, function components or total WOMAC scores.

All post-operative bone-cup gaps seen with unseated cups were no longer visible at an average of 8 months post-operatively (4-28 months) (Fig1).

There was no difference between cups that migrated beyond the two-year threshold and those that had not in terms of demographic data. In addition there was no difference between the two groups in regards to total WOMAC scores. Though the difference in the pain component approached statistical significance (6.5 vs 7.0 (p=0.09)).

DISCUSSION

Acetabular component position and fixation are increasingly being recognized as causes of mid-term failure for hip resurfacing. Migration studies have shown increased early migration and loosening with incomplete seating of acetabular components in total hip arthroplasty. In this study we have shown that a relatively high proportion (24%) of Conserve Plus resurfacing cups have migrated above the 1.2mm threshold with two of them having already been revised for aseptic loosening of the cup at 36 months. This raises concerns over the long-term performance of this monoblock cobalt-chrome beaded acetabular component, though this prosthesis has shown good results in the mid term in regards to radiographic loosening. There is the possibility that mono-block resurfacing cups may exhibit different migration patterns to modular uncemented cups and that they may secondarily stabilize despite the increased early migration, however longer follow-up will be needed to show this.

There is some debate over the significance of radioluencies around uncemented cups on post-operative radiographs. It has been shown that post-operative radioluencies tend to resolve which could be due to bone filling, cup migration or just radiographic projection. Most likely, high resolution computer tomography would be necessary to provide some insight into the remodeling occurring with modern acetabular components.

In regards to long-term fixation, migration studies have been conflicting. Stoeckl et al demonstrated increased early migration and loosening associated with unseated cups, whereas Macheras et al saw no difference in migration between unseated and seated cups. In our series we found that 26% of cups were unseated which is comparable to a study by Naudie et al, which showed 29% of resurfacing cups were unseated.

Twenty five percent of our cups showed increased early migration >1.2mm, though there was no difference in the total WOMAC score (p=0.83), there was a trend towards an increase in the pain component for unseated cups versus seated cups (7.0 vs 6.5 (p=0.09)). There have been recent reports showing an increased proportion of patients who experience groin pain post hip resurfacing compared to total hip replacements at around 18%, which could be due to impingement of bone or soft tissues or potentially poor osteointegration of the cup.

SIGNIFICANCE

This study shows that there is no difference in the early migration or clinical outcomes between unseated and seated monoblock hip resurfacing. There was an increased early migration rate for the whole study group, which does raise concerns over the initial stability of this implant and its longer term performance.