Early Results of 827 Trabecular Metal Revision Shells in Acetabular Revision

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Abstract: We evaluated the survival of 827 acetabular revisions with Trabecular Metal Revision Shell using data from a nationwide arthroplasty register. The mean age of the patients was 69.1 years. The 3-year overall survivorship was 92% (95% confidence interval, 88-95), which coincides with earlier reports. Revision rate for aseptic loosening was only 2%. The most common reason for revision was dislocation of the prosthesis with or without malposition of the socket (60%). Age was found to have significant effect on cup survivorship: each additional year in age decreased the risk of revision by 2.4% (95 % confidence interval, 0.1-4.7; $P = .044$). We found no differences in survival rates between aseptic and septic revisions. Furthermore, sex, diagnosis, and hospital volume did not affect the survival. **Keywords:** trabecular metal, revision arthroplasty, hip, survival, arthroplasty register.

Highly porous trabecular metal (TM; Zimmer, Inc, Warzaw, Ind; Fig. 1) components appear suitable tools in reconstruction of deficient acetabuli in acetabular revision arthroplasty [1-7]. There has been some concern regarding early postoperative transverse acetabular fractures related to revision arthroplasty with uncemented hemispherical cup [8], but otherwise, the published series using TM Monoblock cup or TM Revision Shell with or without augments in acetabular revision have been very promising [1-7]. As with other hip revision arthroplasty, the risk of dislocation may be over 10%, especially when using the TM Monoblock cup [3,6]. Rate of aseptic loosening has been 2% to 6% at 2 years [2,4,6].

The published series are however relatively small, mostly with less than 50 hips in each. We used the population-based Finnish Arthroplasty Register to analyze the outcome of TM Revision Shell in acetabular revision.

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Patients and Methods

Our study was based on information recorded in the Finnish Arthroplasty Register [9] relating to patients who underwent acetabular component revision using TM Revision Shell between 2002 and 2006. The coverage of the Finnish Arthroplasty Register was analyzed in 1994-1995 by comparing its data with those of the discharge registers of the participating hospitals; it was found to cover 90% of implantations and implant removals. Since 1995, the data of the register have been compared with those of the hospital discharge registers every few years. Currently, more than 95% of implantations are recorded. Revisions were linked to the primary operation using the unique personal identification number assigned to each resident of Finland.

The register contains data on 384 TM Monoblock cups and 927 TM Revision Shells, each of which have been recorded individually for every operation since the beginning of the Register. Among these implants, 827 (89%) TM Revision Shells and 88 (23%) TM Monoblock cups were used in acetabular revision. The TM Revision Shells were selected for further analysis.

Disease-Dependent Trends

In Finland, most of the 827 acetabular revisions with TM Revision Shells were due to aseptic loosening of the cup or both prosthesis components (n = 330, 40%). In 19 hips, the aseptic loosening of the cup was complicated by fracture of the acetabulum (2%). Deep prosthetic infection accounted for 39 (5%) of the revisions. Other indications included dislocation of the prosthesis with or

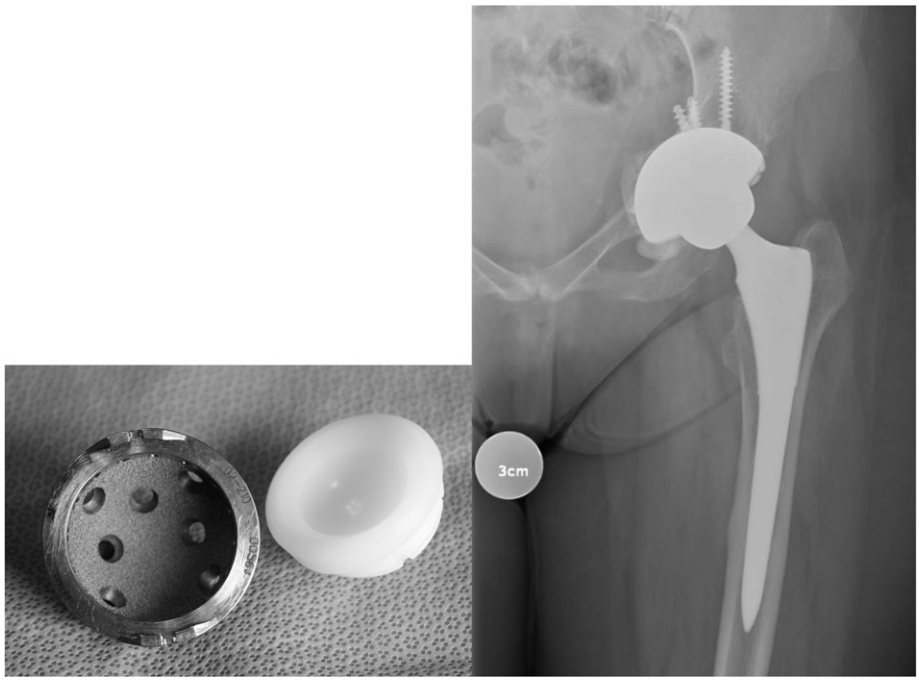

Fig. 1. Photographic and radiographic image of a TM Revision Shell (Zimmer, Inc).

without socket malposition (n = 88, 11%), socket exchange in association with aseptic loosening of the femoral component (n = 42, 5%), and other indications including liner exchange (n = 112, 14%). In 197 hips (23%), the indication was incompletely recorded. In 46 (5%) of the hips, the previous prosthesis had been removed in an earlier operation, and the reconstruction with TM Revision Shell was performed in a Girdlestone hip. We analyzed the overall survival of acetabular revisions with TM Revision Shells performed due to aseptic loosening of the cup or both prosthesis components and compared it to acetabular revisions due to deep prosthetic infection to assess the impact of underlying disease.

Hospital-Dependent Trends

In Finland, 187 (23%) of the 827 acetabular revisions with TM Revision Shells were performed in a limited company hospital during 2002-2006 (group A). Three university hospitals and 1 foundation-based hospital performed 70 to 140 operations each (group B). Fifteen other hospitals had performed 1 to 50 operations each (group C). We analyzed the overall survival of acetabular revisions with TM Revision Shells performed in highest volume hospital (group A) and compared it to the two other hospital groups (A vs B vs C) to assess the impact of hospital volume.

Statistics

The end point for survival was defined as revision with either one component or the whole implant removed or exchanged. Kaplan-Meier survival data were used to construct the survival probabilities of implants at 3 years. The Cox multiple-regression model was used to study differences between groups and to adjust for potential confounding factors. In all models, the confounding factors were age and sex. The factors studied with the Cox model were indication for operation and hospital type (high volume vs low volume hospitals). All models included adjustment for differences in age and sex.

The Cox regression analyses provided estimates of survival probabilities and revision risk ratios for different factors. Estimates from the Cox analyses were used to construct adjusted survival curves at mean values of the risk factors. The Wald test was applied to calculate *P* values for data obtained from the Cox multiple regression analysis. Differences between groups were considered statistically significant if the *P* values were less than .05 in a 2-tailed test.

We used SPSS 17.0 statistical software (SPSS Inc, Chicago, Ill) for the statistical analysis.

Results

Patient Characteristics

Of the 827 TM acetabular revisions, 522 (63%) were performed in women and 447 (54%) on the right hip. At the time of the operation, the mean age of the patients was 69.1 (range, 16-94) years. During the last 5 years, the mean annual use of TM Revision Shell was 3.3/100 000 inhabitants (Fig. 2).

Survival of TM Revision Shell

The 3-year survivorship for the whole TM Revision Shell cohort was 92% (95% confidence interval [CI],