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Acetabular Revision With Bone Impaction Grafting And A Cemented Polyethylene Cup; Comparison Of The Kaplan-Meier Analysis To The Competing Risk Analysis In 62 Revisions After 25 To 30 Years Follow-Up

Orthopaedics / Pelvis, Hip & Femur / Joint Replacement - Secondary

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Keywords: Acetabular Revision, Bone Impaction Grafting, Cemented Polyethylene Cup, Kaplan-Meier Analysis, Competing Risk Analysis, Long Term Follow-Up

Introduction

There is a great need of acetabular revision techniques with a proven long term survival, now more and more patients are revised at younger ages because there is a trend to implant primary total hip implants in younger patients. Acetabular bone impaction grafting is a biologically attractive technique in revision hip surgery, really reconstituting bone.

Objectives

We present the long term outcome of 62 consecutive acetabular revisions using bone impaction grafting and a cemented polyethylene acetabular component in 58 patients after a mean follow-up of 27 years (range 25 to 30).

Methods

All patients were prospectively followed. The group comprised 13 men and 45 women with a mean age at revision of 59.2 years (range 23 to 82). The indication for revision was either aseptic (58 hips) or septic loosening (4 hips). All used grafts were morsellised with a rongeur during the operation to provide cancellous chips with a diameter of 0.5 to 1.0 cm.

A standard post-operative follow-up protocol was used, with physical and radiographic examination at six weeks, three months, six months, one year and afterwards on an annual or biennially basis. Anteroposterior views of the pelvis were assessed by two authors based on consensus opinion.

For survivorship analysis we used Kaplan-Meier (KM) analysis and in addition we also performed a competing risk (CR) analysis. We added this analysis because we were interested in the probability of re-revision surgery (the event of interest) in the presence of the competing event of death, which clearly prevents the occurrence of re-revision. The KM analysis treats these competing endpoints as censored observations. However, if a patient has died, he or she has zero probability of experiencing the event of interest, and this must be considered in the model. All analysis have been performed using the mstate library in R.

Results

At review in March 2011, the series was updated with a minimum follow-up of 25 years since the revision surgery. At review, 48 patients (52 hips) had died or had been re-revised within 25 years after the revision. None of the deaths were related to the hip surgery. The mean HHS of the 10 patients with 10 acetabular reconstructions who were still survived was

76 (45 to 99).

Two of the nine hips for which the radiological data were available at a minimum of 25 years showed radiological loosening, but were not revised because of only mild symptoms. Two additional hips showed radiolucent lines in one and two zones.

The KM survivorship at 27 years for endpoint re-revision for any reason was 58.0% (95% confidence interval (CI) 38 to 73) and for re-revision for aseptic loosening 72.1% (95% CI 51 to 85), so the cumulative failure incidences (1-KM) were respectively 42.0% and 27.9%. In contrast, when we performed the CR analysis, the cumulative failure incidences for both endpoints were respectively 24.2% and 14.5%. This means that, because of the high number of competing events after this long term follow-up, the KM analysis overestimates the failure rate with 74% $((42.0-24.2)/24.2)$ for endpoint re-revision for any reason and even with 92% $((27.9-14.5)/14.5)$ for endpoint re-revision for aseptic loosening.

Conclusions

The current study shows that acetabular bone impaction grafting revisions provide acceptable clinical results at over 25 years. We also showed that especially after such a long term follow-up, the KM analysis overestimates the probability of revision surgery severely due to ignoring competing risks. Especially for a revision technique with a proven long term follow-up, patients should have fair information on their chance of having future revisions. CR analysis is very suitable for this purpose.