Uni- or bipolar proximal femoral endoprostheses following tumour reconstruction: Are acetabular resurfacings necessary?

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Abstract

Background: Proximal Femoral Replacements (PFRs) have a reported dislocation rate of between 6.5% and 22% when the acetabulum is resurfaced to form a total hip arthroplasty (THA). Dislocation rates are reduced by using large diameter uni- or bipolar heads, particularly in patients with a deficient soft-tissue envelope.

In patients with uni- or bipolar PFRs, acetabular erosion by the hemiarthroplasty head(1,2) and groin pain due to wear necessitating revision surgery have been reported(3–7). It has been reported that unipolar PFRs in children of all ages failed by ten years either because of pain or subluxation(9), and the optimum strategy for this age group eludes us.

In adults the necessity for acetabular revision surgery after monopolar proximal femoral reconstruction varies from 0 to 9.5%.(2,5,8,10–14) Donati et al. analysed 25 bipolar PFRs with minimal 10-year follow-up and found seven cases of cartilage loss to the acetabular rim and two with acetabular erosion, in one case greater than 2 cm.(4) Cannon et al. reviewed 447 hemiarthroplasty articulations for tumour resections.(7) All seven patients who underwent THA conversion surgery (1.6%) were revised within 2-years (median 13 months). In the 32 patients surviving 5-years or more median proximal migration was 3mm (range 0-24 mm) and median medial migration was 2mm (range 0-20mm).

Purposes: This study aimed to determine the clinical and functional outcomes of uni- and bipolar PFRs for limb-salvage surgery at our institution, if acetabular wear necessitates acetabular resurfacing revision surgery, and whether there is a difference in outcomes between uni- and bipolar articulations when used with PFRs.

Patients and Methods: We reviewed 100 consecutive PFRs used for tumour reconstruction from 2003 to 2013 without acetabular resurfacing. In 74 patients the procedure was undertaken for metastases, in 20 for a primary bone tumour, and in six for myeloma. There were 48 males and 52 females with a mean age of 61.4 years (range 19 to 85 years) and a mean follow-up of 1.9 years (0 to 11.1 years). All patients underwent reconstruction with either a unipolar (n=64) or bipolar (n=36) articulation. There were no dislocations and no conversions to THA. Articular wear was graded from 0-3, whereby 0 is normal and 3 represents protrusio acetabuli.(15) Migration of the femoral head and acetabular bone reactions were measured on well centred standardised anteroposterior pelvic radiographs: one immediately post-operatively and another at final follow-up. Four distances were measured on each radiograph using Synapse PACS software (Fujifilm, Tokyo, Japan), which had a measurement accuracy of 0.1mm. As rotation alters the measurements, the fixed distance between the acetabular line and the obturator line were used in the calculations.(7,16,17) This enabled the proximal and medial erosion, the thickness of superior cartilage and the degree of any lateral subluxation to be calculated using a modification of the technique described by Morris et al.(18)

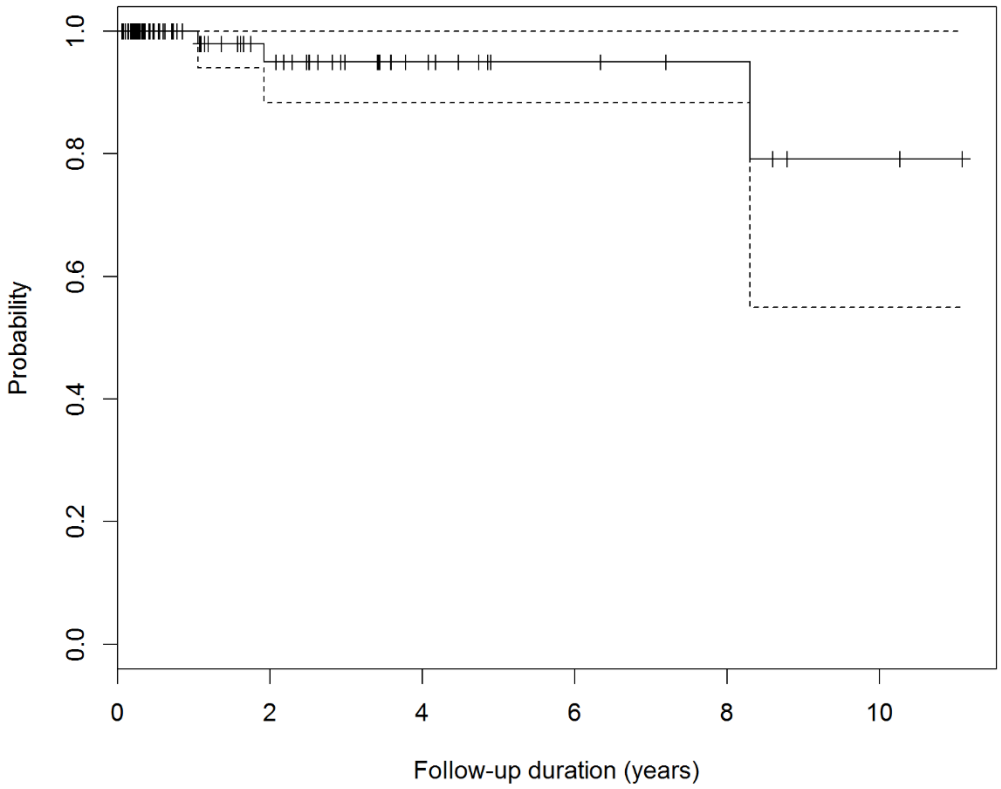
Results: Of the 49 patients with radiological follow-up greater than one year, six demonstrated grade-1 acetabular wear and two demonstrated grade-2 acetabular wear, the remainder demonstrated no radiographical evidence of wear. Mean medial migration was 0.4mm (3.8 to -1.4mm) and superior migration was 0.6mm (3.5 to -0.5mm). Revision surgery was required in three patients; one stem-fracture, one aseptic stem loosening and one local recurrence. The mean Toronto Extremity Salvage score was 65% (26% to 96%) at final follow-up. The estimated five-year implant survival with revision as the end-point was 95% (95% CI: 88.3 to 100%) (Figure 1). The overall patient survival was 63% at one-year and 26% at five-years.

Conclusions: After intermediate follow-up, uni- or bipolar articulations have not demonstrated any cause of implant failure necessitating acetabular revision and therefore should be considered for routine use for adult tumour limb-salvage when the acetabulum does not contain disease. In metastatic patients we can be confident that hemiarthroplasty heads are not a cause of conversion, but in younger primary sarcoma patients

this is less clear as reports with longer follow-up in oncology[9] and traumatic hemiarthroplasty[1] patients would suggest that acetabular wear does become more prevalent with time. This must be balanced by the elimination of risk of revision for instability after acetabular resurfacing at the index operation. We have not demonstrated a significant difference in radiological wear between uni- and bipolar articulations with PFRs and consequently are unable to comment on the relative merits of either articulation in this context.

Given the limited life expectancy of many patients, the absence of instability and revision for acetabular wear, hemiarthroplasty articulations are presently recommended for adult limb-reconstruction of the proximal femur in the short to medium-term.

Figure 1. Kaplan Meier survival analysis for all causes of revision of the proximal femoral endoprosthesis.



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