ABSTRACT

Purpose. To compare long-term outcomes of total hip replacement (THR) in patients with or without contamination of the femoral head.

Methods. After a mean period of 12 (range, 8–17) years, 104 female and 71 male THR patients aged 47 to 96 (mean, 77) years were reassessed via a self-administered questionnaire, and 25 other THR patients were reassessed by review of case notes. The questionnaires comprised the 12-item Oxford hip score and the European Quality Of Life (EuroQOL). 87 and 88 patients had positive and negative cultures in the donated femoral heads, respectively. The 2 groups were compared with respect to the Oxford hip score, the EuroQOL, and rates of complication and revision surgery.

Results. Long-term outcomes of THR patients with or without femoral head contamination were not significantly different. Respectively, the mean Oxford hip scores were 36 and 39 (p=0.4); 16 and 14 patients had the maximum score of 48; 2 and 3 patients scored <10 (mostly owing to aseptic loosening). The respective mean visual analogue scale score of the EuroQOL were 65 and 73 (p=0.07); only the dimension of self care was significantly different between groups (p=0.04). Respectively, 14 and 12 patients had complications (16% vs. 15%, $\chi^2=0.05$, p=0.8), whereas 11 and 5 patients had revision surgery (13% vs. 6%, $\chi^2=2.2$, p>0.1).

Conclusion. Microbiological screening of donated femoral heads plays no role in predicting long-term failure of THR in the donors.

Key words: arthroplasty, replacement, hip; femur head; microbiology

INTRODUCTION

The demand for femoral head allografts for restoration of bone stock in revision total hip replacement (THR) has increased.1,2 Bacterial contamination of the allografts may occur during procurement, despite aseptic techniques and stringent standards and control measures.3 The rates of contamination vary from 1
to 22%, owing to differences in quality control, microbiological screening, and the source and method used to culture micro-organisms. Contaminated femoral head allografts are usually discarded or irradiated to minimise the risk of cross-infection. In our previous study of 440 patients, 9% of femoral head allografts were contaminated. The rates of complication or revision surgery one year after THR were not significantly different in patients whose femoral heads were or were not contaminated. In donor patients, contamination of the femoral head was not associated with an increased infection rate. Most studies focus on infection in recipients of bone allografts rather than donors. We thus compared both disease-specific and generic long-term outcomes of THR patients whose femoral heads were or were not contaminated.

Materials and Methods

Between 1992 and 2001, 440 patients underwent primary THR and donated their femoral heads. A swab and a bone chip taken from the femoral head were sent for microbiological screening. No synovial fluid or soft tissue was taken. Contamination was assumed to be extra-corporeal and subsequent to extraction.

After a mean period of 12 (range, 8–17) years, 266 patients were alive and 174 had died. None of the deaths was related to the THR. 104 women and 71 men aged 47 to 96 (mean, 77) years were reassessed via a self-administered questionnaire; 25 other patients were reassessed by review of case notes, as they refused responding to the questionnaire (n=10), had Alzheimer’s disease (n=4) or were lost to follow-up (n=11). The remaining 66 patients were non-responders.

The self-administered questionnaires comprised the 12-item Oxford hip score (each item scores 0 to 4 [best outcome]) and the European Quality Of Life (EuroQOL), which consists of 5 dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) and visual analogue scale (VAS).

Of the 175 patients who were reassessed, femoral head contamination was positive in 87 patients and negative in 88 patients. The 2 groups were compared using the Mann-Whitney and Chi-squared tests. A p value of <0.05 was considered statistically significant.

Results

Respectively in patients with and without femoral head contamination, 14 and 12 of the patients had complications (recurrent dislocation, leaky wounds, thrombosis, and non-specific hip pain) [16% vs. 15%, p=0.8, \( \chi^2=0.05 \)], whereas 11 and 5 of the patients had revision surgery (13% vs. 6%, p>0.1, \( \chi^2=2.2 \), Table). The reasons for revision were mostly aseptic loosening, followed by recurrent dislocation, infection, and periprosthetic fracture. Two patients in the contaminated group underwent revision surgery for infection, compared to none in the non-contaminated group. In one patient, the same microorganism (coagulase-negative staphylococcus) was isolated at the time of revision surgery. In the other patient, no microorganism was isolated at revision surgery. In both cases, the revision surgery was performed at least 5 years after the primary THR. Case notes of the 25 patients indicated no complication or revision surgery.

**Table**

Demographics of the patients

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Femoral head contamination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (n=207)</td>
</tr>
<tr>
<td>No. of deceased patients</td>
<td>87</td>
</tr>
<tr>
<td>No. of non-responders</td>
<td>33</td>
</tr>
<tr>
<td>No. of living patients</td>
<td>87</td>
</tr>
<tr>
<td>Mean (range) patient age</td>
<td>76 (47–93)</td>
</tr>
<tr>
<td>No. of female: male</td>
<td>53:34</td>
</tr>
<tr>
<td>Mean (range) follow-up</td>
<td>139 (95–206)</td>
</tr>
<tr>
<td>Reason for revision surgery</td>
<td>Infection 2</td>
</tr>
<tr>
<td></td>
<td>Aseptic loosening 6</td>
</tr>
<tr>
<td></td>
<td>Recurrent dislocation 3</td>
</tr>
<tr>
<td></td>
<td>Periprosthetic fracture 0</td>
</tr>
</tbody>
</table>
35 of the 66 non-responders had an orthopaedic in-patient admission following their primary THR. Case notes of only 29 of these patients were reviewed; 2 patients had revision surgeries, one in each group, both for aseptic loosening.

**DISCUSSION**

In our previous study, 9% of femoral head allografts were contaminated based on both surface swabs and bone culture. This is comparable to the rates of 13% based on surface swabs, bone biopsies, joint swabs, and capsule segment culture studies, and 10% based on surface swabs alone. Nonetheless, grafts that had negative swab culture may still be contaminated and can cause infection. Of 106 femoral heads rejected for transplantation, 91 were swab culture negative but 10 of them grew microorganisms when the entire graft was cultured. Only 5 of the remaining 15 positive swabs grew microorganisms that were isolated from the entire culture. In 151 primary THR patients, femoral head allografts of 14 patients were contaminated and discarded; only one of whom developed a wound infection; no patient with a sterile femoral head at retrieval developed any wound infection. Three of 81 recipients (94 non-contaminated femoral head allografts were used) developed postoperative infections (two superficial and one deep) after 2 to 72 months. In another study, 48 of 426 femoral head allografts were contaminated, and 3 of them developed a wound infection (2 were deep and in the third the microorganism was the same in the contaminated allograft and the subsequent infection). Low contamination rates of 0% to 6% have also been reported. In a 10-year review of musculoskeletal-tissue banking, 113 of 2321 recipients (with 4030 allografts) developed postoperative infections.

Although microbiological screening of donated femoral heads plays no role in predicting long-term failure of THR in the donors, it should remain as a quality control measure.

**REFERENCES**