Metal-on-metal total hip arthroplasty
Zijlstra, Wierd Pieter

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No superiority of cemented metal-on-metal versus metal-on-polyethylene total hip arthroplasty at 5 years follow-up

Wierd P. Zijlstra
John Cheung
Maurits S. Sietsma
Jos J.A.M. van Raay
Robert Deutman

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ABSTRACT

A randomized controlled trial was performed to compare the cemented Stanmore metal-on-metal total hip arthroplasty (MM, 102 hips) to the cemented Stanmore metal-on-polyethylene arthroplasty (MP, 98 hips). The primary outcome was clinical performance. Radiological performance, serum cobalt analysis and prosthetic survival were secondary outcome measures. At a mean follow-up of 5.6 years 5 patients were lost to follow-up, 18 died and 4 were revised (3 MM, 1 MP). Harris hip scores improved from 48 to 90 in the metal-on-metal patients (p<0.001) and from 46 to 87 in the metal-on-polyethylene patients (p<0.001). Oxford hip scores changed from 40 to 19 in the metal-on-metal group (p<0.001) and from 40 to 18 in the metal-on-polyethylene group (p<0.001). For both Harris and Oxford hip scores, there was no significant difference between the two groups. Periprosthetic radiolucencies were present in 25% of the metal-on-metal hips and in 29% of the metal-on-polyethylene hips (p=0.711). Focal osteolysis was absent. Median serum cobalt concentration rose from 0.24 to 0.30 μg/l in the metal-on-polyethylene group (p=0.104) and from 0.18 to 0.88 µg/l in the metal-on-metal group (p<0.001); this difference was significant (p=0.001). We could not find a relation between cobalt concentration and periprosthetic radiolucency. Five year survival with revision for any reason was 97% (95%-CI 93-100%) in the metal-on-metal group and 99% (95%-CI 97-100%) in the metal-on-polyethylene group. All revisions were indicated for aseptic loosening (MM: 3 cup revisions; MP: 1 total revision). At 5-year follow-up, cemented 28mm metal-on-metal total hip arthroplasty shows no clinical superiority over 28mm metal-on-polyethylene arthroplasty.
INTRODUCTION

The results of total hip arthroplasty (THA) are good but polyethylene wear can lead to osteolysis and eventually failure of the implant. Metal-on-metal (MM) articulation is an alternative bearing with a reduced wear rate and it was widely used between 1960 and 1975. The high loosening rate of the McKee-Farrar and other first-generation MM hips and the early success of the Charnley prosthesis were reasons for abandoning the use of MM articulation. Metal-on-metal articulations were reintroduced in the early 1990s to address the emerging problems of polyethylene wear. Adjustments in metallurgy, sphericity and radial clearance have consistently shown improvement in wear performance in second-generation MM articulations. It is hypothesized that this reduction in wear would lead to less osteolysis and superior prosthetic survival. Indeed, published reports show that osteolysis is negligible in association with well-fixed components. 

In spite of favourable hip simulator study results, metal-on-metal arthroplasty has not shown clinical superiority over metal-on-polyethylene articulation yet. Furthermore, there have only been few reports regarding the outcome of cemented second-generation MM prostheses while randomized controlled trials (RCT) are lacking.

The objective of this study was to evaluate and compare cemented total hip prostheses with metal-on-polyethylene interface (MP) with prostheses with metal-on-metal interface (MM). The only difference was the metal inlay in the cup of the MM prosthesis. Primary outcome was clinical performance. Radiological performance, serum cobalt analysis and prosthetic survival were secondary outcome measures. We hypothesized equal clinical performance of the two bearings. The aim of the present report is to evaluate medium-term results.

MATERIALS AND METHODS

Patients

Patients with non-inflammatory degenerative hip joint disease including osteoarthritis, avascular necrosis and traumatic arthritis were included. Exclusion criteria were active infection, revision arthroplasty, marked bone loss precluding adequate fixation, unwillingness or inability to follow instruction, severe vascular insufficiency of the affected limb and severe instability or deformity of the soft tissues precluding stability of the prosthesis.

The randomization procedure was based on sequentially numbered opaque sealed envelopes, produced by an external institution not involved in the selection, care and
evaluation of the patients. The study design and procedures were approved by the local Medical Ethical Committee (registration number 97-19). Informed consent was obtained in all patients. The trial was performed in compliance with the Helsinki Declaration.

Operative technique and implants

Five orthopedic surgeons and two orthopedic residents performed the surgery via a posterolateral or direct lateral approach. Antibiotic prophylaxis with a first-generation cephalosporin was given for twenty-four hours intravenously. We used third-generation cementing techniques. Pre-packaged antibiotic-loaded cement was not used. All patients were treated postoperatively following a standardized protocol in terms of analgesia and mobilization. Oral anticoagulation by coumarin-derivate was given 6 weeks postoperatively.

The MP acetabular components were standard Stanmore cups (Biomet, Warsaw, USA) made from ultra-high molecular weight polyethylene (UHMWPE), packaged in an Argon environment and sterilized with gamma irradiation. This polyethylene was not highly cross-linked. The MM (M2A®) cup was manufactured by moulding a block of UHMWPE around a highly polished cobalt-chromium-molybdenum alloy bearing insert, meeting ASTM F1537 requirements. Sizes of the MP and MM acetabular components ranged from 40 to 57 mm. The 28-mm head used in all cases was made of cobalt-chromium-molybdenum alloy and had a radial clearance of 30 to 60 μm. This head was modular. The Stanmore femoral stem had a straight (straight stem) or slightly curved contour (standard stem) and a satin surface finish with a roughness of 0.8 μm Ra; it was made from forged cobalt-chromium-molybdenum alloy and was available in five sizes.

Clinical scores, radiographic evaluation, serum cobalt analysis

Patients were assessed with the Harris Hip Score (HHS)\textsuperscript{12,13} and the Oxford Hip Score.\textsuperscript{14} All patients returned for follow-up visits at 6 weeks, at 3, 6 and 12 months and then annually. HHS and Oxford Hip Scores were scored at 1, 2 and 5 years postoperatively. The examiners were not blinded. All complications were noted.

Supine anteroposterior (AP) pelvic hip radiographs (115% magnification) were taken. The radiographs after 6 weeks and after 5 years were evaluated. Radiographs of the stems were reviewed for presence of radiolucent lines and scored according to Gruen et al.\textsuperscript{15} Periacetabular radiolucencies were assessed according to De Lee and Charnley.\textsuperscript{16} As wear in the cemented MP cup was expected to become apparent only after several years, no protocolized scoring was done for wear. The scoring was undertaken by a radiologist and an independent orthopedic surgeon (M.S.). Date of the X-ray, patient
data and type of implant on the X-ray were hidden. None of the patients were cared for by this surgeon.

In a randomly assigned subgroup of patients, venous blood samples were taken preoperatively and 2 and 5 years postoperatively. Serum cobalt concentration was determined by grafite furnace atomic absorption spectrophotometry with Zeeman correction. The threshold for the laboratory was 0.18 μg/l.

**Statistical analysis**

In order to detect a least clinical relevant difference in Harris Hip Score of 5 points in a non-inferiority design with a standard deviation of 12, 144 hip arthroplasties were needed (alpha 0.05, power 0.80). To compensate for death and loss to follow-up we aimed to include 100 hip arthroplasties in each group. We used the Statistical Package for the Social Sciences (SPSS Inc, Chicago, USA). Non-parametric tests were used for comparisons of means within groups (Wilcoxon’s Signed Ranks Test) and between groups (Mann-Whitney Test). Chi-square (Fisher’s Exact) tests were employed for analysis of categorical variables. Prosthetic survival was calculated by Kaplan-Meier time series (Mantel-Cox log rank test). A two-sided p-value of <0.05 was assumed to be significant.

**RESULTS**

**Patient groups**

Metal-on-metal bearings were allocated to 102 hips; 98 received a metal-on-polyethylene bearing. Five patients underwent staged bilateral hip replacements (1 MM/MM, 1 MP/MP, 3 MM/MP). At baseline, no differences were found between the patients with the MP and MM bearing in terms of gender, operated side, preoperative HHS and Oxford Hip Score (Tables 1-3). Mean age at operation was higher in the MM group.

On average 5 years after surgery, a follow-up was done of all patients. Eighteen patients (19 hips) had died of non-related causes. Five patients were lost to follow-up. Four patients were not able to come to the hospital nor could be interviewed telephonically due to severe medical problems and one had moved and could not be traced. In none of these patients was revision pending or performed and mean HHS at the latest visit was 70. Four patients needed revision surgery. Therefore, a total of 168 patients (172 hips) remained for follow-up at an average of 67 + 6.5 months (range 51-85); 94% had at least 60 months follow-up.
**Table 1.** Preoperative demographics in the metal-on-polyethylene (MP) and metal-on-metal (MM) groups.

<table>
<thead>
<tr>
<th></th>
<th>MP</th>
<th>MM</th>
<th>Total</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of hips</td>
<td>98</td>
<td>102</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Male/female †</td>
<td>20/78</td>
<td>21/81</td>
<td>41/159</td>
<td>1.000</td>
</tr>
<tr>
<td>Side (right/left) †</td>
<td>57/41</td>
<td>56/46</td>
<td>113/87</td>
<td>0.671</td>
</tr>
<tr>
<td>Mean age (standard deviation) in years ‡</td>
<td>69 (8)</td>
<td>72 (7)</td>
<td>71 (8)</td>
<td>0.018</td>
</tr>
</tbody>
</table>

†P-values were calculated by Chi-Square (Fisher's Exact) tests.
‡P-values were calculated by Mann-Whitney tests.

**Table 2.** Number of hips included and followed-up in the metal-on-polyethylene (MP) and metal-on-metal (MM) groups.

<table>
<thead>
<tr>
<th></th>
<th>MP</th>
<th>MM</th>
<th>Number of hips (patients) remaining for analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inclusion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Randomized</td>
<td>98</td>
<td>102</td>
<td>200 (195)</td>
</tr>
<tr>
<td>- Operated</td>
<td>98</td>
<td>102</td>
<td>200 (195)</td>
</tr>
<tr>
<td>Follow-up (mean 66.7 + 6.5 months)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Died (not related to - surgical procedure)</td>
<td>11</td>
<td>8</td>
<td>181 (177)</td>
</tr>
<tr>
<td>- Lost to follow-up</td>
<td>1</td>
<td>4</td>
<td>176 (172)</td>
</tr>
<tr>
<td>- Revised</td>
<td>1</td>
<td>3</td>
<td>172 (168)</td>
</tr>
</tbody>
</table>

**Analysis of revisions**

All 4 revisions (3 MM, 1 MP) were undertaken because of aseptic cup loosening. The first patient presented with severe coxarthrosis. Within two years postoperatively, radiolucent lines emerged around the MM cup. Twenty-six months postoperatively acetabular revision was performed. The second patient had a 2 x 3 cm cyst in the cranial acetabulum treated by excavation and cement filling. Three months postoperatively a radio-lucent zone in this area suggested insufficient initial fixation of the acetabular component. At revision operation 33 months postoperatively, the cup was loose. The third patient presented with coxarthrosis and protrusion acetabuli. Recurrent posterior dislocations occurred two and three years postoperatively. Fifty-six months postoperatively, X-rays showed a cyst cranial to the cup in the prior protrusion region and subtle cup migration. The patient’s loose acetabular component was revised. In all MM cases, the femoral component was well-fixed. One MP patient was revised after 21 months because of pain associated with radiolucent reactions surrounding the stem. At opera-
tion all prosthetic material was removed. A cemented THA using bone impaction grafting was implanted. Six years later, a second revision was performed for aseptic stem loosening. A cementless stem was implanted; the cemented cup was well-fixed. At the last visit, the stem showed good osteointegration. In none of these subjects the index operation had been performed by a resident. Infection was ruled out in all cases.

**Complications**

One femoral shaft perforation occurred. Local complications were 6 hematomas, 5 superficial wound infections (none of these patients needed revision), and 1 posterior dislocation without further sequelae. Cardiovascular and urogenital problems occurred in 12 cases. Two patients suffered a periprosthetic femoral fracture afterward, treated with osteosynthesis without the need for revision.

**Clinical outcome**

No significant differences were noted between the two groups for either Harris Hip or Oxford scores after 5 years (Table 3). Twenty four patients were reviewed telephonically since they were unable to attend the clinic mostly because of medical conditions unrelated to the hip surgery. Improvement was also seen in the two patients with osteosynthesis for a periprosthetic fracture (HHS 96 and 97).

**Table 3.** Mean and standard deviation of the Harris Hip (HHS) and Oxford Hip Scores in the metal-on-polyethylene (MP) and metal-on-metal (MM) groups, preoperatively and at follow-up.

<table>
<thead>
<tr>
<th></th>
<th>MP</th>
<th>MM</th>
<th>P-value†</th>
<th>P-value‡</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HHS N=73*</td>
<td>Oxford N=85*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oxford N=75*</td>
<td>Oxford N=87*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preop</td>
<td>46 (13)</td>
<td>40 (8)</td>
<td>0.746</td>
<td>0.661</td>
</tr>
<tr>
<td>1 yr</td>
<td>85 (13)</td>
<td>18 (7)</td>
<td>0.446</td>
<td>0.461</td>
</tr>
<tr>
<td>2 yr</td>
<td>88 (9)</td>
<td>18 (7)</td>
<td>0.025</td>
<td>0.619</td>
</tr>
<tr>
<td>5 yr</td>
<td>87 (13)</td>
<td>18 (8)</td>
<td>0.791</td>
<td>0.515</td>
</tr>
<tr>
<td>P-value‡</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

* N is the number of hips at 5 year follow-up.
† P-values between groups were calculated by Mann-Whitney tests.
‡ P-values within groups were calculated by Wilcoxon’s Signed Rank tests (preoperatively versus 5 yr).

**Radiological outcome**

After 5 years both reviewers noted radiolucent lines, especially in Gruen zones 1, 2 and 7 and De Lee & Charnley’s zone 3 (Table 4; Figures 1 and 2). Statistical analysis revealed
no differences between the groups. None of the radiolucencies indicated implant loosening according to the Zicat criteria.\textsuperscript{17}

Table 4. Number of hips showing radiolucent lines on standard anteroposterior pelvic hip radiographs on average 5 years postoperatively.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Surgeon</th>
<th>Radiologist</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MP N=72</td>
<td>MM N=75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MP N=72</td>
<td>MM N=75</td>
<td></td>
</tr>
<tr>
<td>Stem (Gruen)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>4</td>
<td>1.000</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0.490</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>0</td>
<td>0.055</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>1</td>
<td>0.615</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1.000</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>0</td>
<td>0.490</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>5</td>
<td>0.394</td>
</tr>
<tr>
<td>Cup (De Lee &amp; Charnley)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1.000</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>3</td>
<td>0.715</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>8</td>
<td>0.800</td>
</tr>
<tr>
<td>Number of hips with a radiolucency</td>
<td>21 (29%)</td>
<td>19 (25%)</td>
<td>0.711</td>
</tr>
<tr>
<td></td>
<td>39 (54%)</td>
<td>41 (55%)</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*Chi-Square (Fisher’s Exact) tests were used to test for statistical differences between the metal-on-metal (MM) and metal-on-polyethylene (MP) groups.\textsuperscript{17}

Figure 1. Stanmore metal-on-polyethylene THA at a minimum 8-year follow-up.
Figure 2. Stanmore metal-on-metal THA at 7-year follow-up.

Serum cobalt analysis

Median cobalt concentration increased 1.3 times in the metal-on-polyethylene group and 4.9 times in the metal-on-metal group (Table 5). At 2 and 5 years cobalt concentration was higher in the MM group. Two MM patients had high cobalt values at 2 years: 7.9 and 15.6 μg/l. The first patient was lost to follow-up regarding her 5 year cobalt concentration but 5 year HHS was 90 and she had no periprosthetic radiolucent lines except for Gruen zone 7. In the latter patient cobalt concentration spontaneously decreased to 0.83 μg/l at 5 years; HHS was 96 and X-rays did not show progressive radiolucent lines. One patient showed cobalt levels of 7.0 μg/l at the 5 year follow-up. Her HHS was 88 and she showed no periprosthetic radiolucent lines. None of these patients needed revision surgery.

Survivorship

Survival at 5 years (revision for any reason) was 97% in the metal-on-metal group (95%-confidence interval (CI) 93-100%; 85 patients at risk) and 99% for the metal-on-polyethylene articulation (95%-CI 97-100%; 82 patients at risk). There were no significant differences between the two survival curves (p=0.359). The survival rates for aseptic loosening of the acetabular component are similar. Stem survival was 100% in the metal-on-metal group, and 99% (95%-CI 97-100%) in the metal-on-polyethylene group (any reason as well as aseptic loosening). Assuming that all patients lost to follow-up were failures, the worst-case 5 year survival was also calculated: 18 MM survival was 94% (95%-CI 89-99%; 85 patients at risk) and MP survival was 98% (95%-CI 95-100%; 82 patients at risk). This difference was not significant (p=0.121).
Table 5. Median and range of the serum cobalt concentrations (μg/L) in the metal-on-polyethylene (MP) and metal-on-metal (MM) groups, preoperatively and at follow-up.

<table>
<thead>
<tr>
<th></th>
<th>MP N=14*</th>
<th></th>
<th>MM N=17*</th>
<th></th>
<th>P-value†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
<td>Range</td>
<td>Median</td>
<td>Range</td>
<td></td>
</tr>
<tr>
<td>Preoperatively</td>
<td>0.24</td>
<td>0.18-0.65</td>
<td>0.18</td>
<td>0.18-1.77</td>
<td>0.185</td>
</tr>
<tr>
<td>2 yr</td>
<td>0.18</td>
<td>0.18-1.06</td>
<td>0.77</td>
<td>0.18-15.57</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>5 yr</td>
<td>0.30</td>
<td>0.29-1.65</td>
<td>0.88</td>
<td>0.29-7.02</td>
<td>0.001</td>
</tr>
<tr>
<td>P-value‡</td>
<td>0.104</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*N is the number of hips at 5 year follow-up; preoperatively and at 2 years N was 24 MM versus 19 MP.
†P-values between groups were calculated by Mann-Whitney tests.
‡P-values within groups were calculated by Wilcoxon’s Signed Rank tests (preoperatively versus 5 yr).

DISCUSSION

In a prospective RCT we found significant clinical improvements with both the metal-on-metal and the metal-on-polyethylene articulations and no difference between the two groups. Periprosthetic radiolucent lines were mainly seen in Gruen zones 1, 2 and 7 and in De Lee & Charnley’s zone 3. The number of radiolucencies did not differ statistically between the two articulations. Five year prosthetic survival was 97% (3 revisions) for the metal-on-metal articulation and 99% (1 revision) for the metal-on-polyethylene articulation, with no significant difference.

Studies comparing cemented second-generation metal-on-metal total hip arthroplasty to metal-on-polyethylene were scarce at the time of conception of our study. Given this anecdotal evidence, we aimed to compare these prostheses by means of an RCT. In our clinic, we have been using the Stanmore metal-on-polyethylene prosthesis since 1975. Survival has been shown to be 85% at 22 years. By only changing the metal inlay in the cemented cup we could ensure that the only varying parameter was the articulation and we could eliminate learning curves or prosthetic design failures. Certain limitations have to be considered. It was difficult to perform complete follow-up of older people with severe health problems who were well willing yet unable to visit the clinic, but most could be reviewed via the Oxford questionnaires. The mean age of the MM patients was 3 years higher than in the MP group, suggesting inadequate randomization and selection bias. Since the age difference was small and preoperative Harris and Oxford Hip Scores were equal, we feel the groups were comparable. Although the same criterion was used (presence of a radiolucent line from <1mm), the well established Gruen and De Lee & Charnley zones were used and the assessors were experienced,
the radiologist noted more radiolucencies than the orthopedic surgeon. The surgeon probably directly interpreted the radiolucencies based on his clinical and prosthetic revision surgery experience. In our view, this does not change the results since the radiologist also noted no difference between the two groups (Table 4).

With respect to clinical improvement and survival, our results are comparable to the work of Dorr et al.,\textsuperscript{9} implanting 70 Metasul metal-on-metal articulations with a cemented Weber cup. Survival was 98\% at 5.2 years. Calcar resorption was noted in two hips. Levai et al. calculated a 94\% survival in 122 cemented Metasul metal-on-metal hips at 3.7 years; eleven hips were radiographically loose.\textsuperscript{10} A similar (27\%) radiolucency rate as in our study was found by Nich et al.\textsuperscript{11}

As to why metal-on-metal bearings fail, several factors need to be considered: acetabular fixation, femoral head size, carbon-content and serum metal ion concentration. Satisfying results of cementless fixation have been shown by several RCTs comparing metal-on-metal to metal-on-polyethylene THAs.\textsuperscript{23-26} In general, clinical and radiological performance was equal, osteolysis was hardly seen, but none of the studies proved superiority of the metal-on-metal bearing over polyethylene, follow-up was relatively short (3.2 to 5.7 years) and the patients were relatively young. With respect to femoral head size and carbon content, hip simulator and retrieval studies have shown that metal-on-metal wear rates decrease with increasing head size (>40mm), low radial clearance (120-200 μm) and high carbon content.\textsuperscript{27} The radial clearance was satisfactorily low (30-60 μm), carbon content high (0.2-0.3\%), but the 28mm articulation may not have developed the optimal fluid film lubrication needed for low wear performance.

Measurement of serum cobalt and chromium concentrations has been advocated as a monitoring tool for high wear rate induced failure of metal-on-metal bearings. We measured a median serum cobalt concentration of 0.88 μg/l in the metal-on-metal bearings and 0.30 μg/l in the metal-on-polyethylene prostheses. Brodner et al. found a 0.7 μg/l concentration after 5 years\textsuperscript{28} and 0.75 μg/l after 10 years.\textsuperscript{29} We could not find a relation between cobalt concentration and periprosthetic radiolucency. Patients with high ion levels all showed high Harris Hip scores, few or no periprosthetic radiolucencies, and none were revised.

Concerns over the long-term biologic effects of metal-metal wear particles remain.\textsuperscript{8, 30, 31} Chromosomal and DNA damage are mentioned, as well as kidney disease, metal-induced toxicity and metal allergy or sensitivity. Metal sensitivity seems a type IV delayed-type hypersensitivity and we have reported this phenomenon in the past.\textsuperscript{32} The histologic features are referred to as aseptic lymphocytic vasculitis-associated lesions (ALVAL).\textsuperscript{33} In all, the enthusiasm for metal-on-metal bearings prompted by the milder periprosthetic tissue reaction and absence of osteolysis should perhaps be reconsidered, especially in
the absence of long-term randomized controlled trials. However, in none of our revised patients was ALVAL described by our pathologists and we could not relate the cause of revision to metal allergy or sensitivity. Our results do not indicate clinically harmful effects of the metal-on-metal articulation so far.

This randomized controlled trial compared cemented second-generation metal-on-metal total hip arthroplasty to metal-on-polyethylene hip arthroplasty to metal-on-polyethylene hip arthroplasty at 5 years follow-up. We found equal clinical improvement with both prostheses. Cobalt serum levels were higher in the metal-on-metal patients. We did not observe less periprosthetic radiolucencies with the metal-on-metal bearing, nor did we see improved prosthetic survivorship. Given the absence of clinical superiority of the cemented metal-on-metal bearing so far, we continue using the metal-on-polyethylene prosthesis in our clinic. We will report on the 10 year results in the future.

Acknowledgments

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Disclosure

The authors have no relevant financial relationships to disclose.
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