

**Journal club:** 26 January 2012

**Attendees:** Mr D. Meek, Mr D. Russell, Mr V. Soon, Mr J. Gillespie, Mr F. Welsh, Mr N. Holloway  
West of Scotland Journal Club

**Theme:** Surgery of the Hip

1. **Parker MI, Pryor G, Gurusamy K.**

Cemented versus uncemented hemiarthroplasty for intracapsular hip fractures. A randomised controlled trial in 400 patients.

*J Bone Joint Surg [Br]* 2010;92-B:116-22.

2. **Prieto-Alhambra D, Kassim Javaid M, Judge A, Murray D, Carr A, Cooper C, Arden NK.**

Association between bisphosphonate use and implant survival after primary total arthroplasty of the knee or hip.

*BMJ* 2011;343:d7222.

3. **Gruen TA, McNeice GM, Amstutz HC.**

Modes of Failure of Cemented Stem-type Femoral Components: A Radiographic Analysis of Loosening.

*Clin Orthop Relat Res* 1979;141:17-27.

4. **Grammatopolous, G, Pandit H, Kwpm YM, Gundle R, McLardy-Smith P, Beard DJ, Murray DW, Gill HS.**

Hip resurfacings revised for inflammatory pseudotumour have a poor outcome.

*J Bone Joint Surg [Br]* 2009;91-B:1019-24.

**Cemented versus uncemented hemiarthroplasty for intracapsular hip fractures. A randomised controlled trial in 400 patients.**

**Reviewer:** Mr V-Liem Soon

## Summary

### 1. Purpose

To determine whether there are any differences in outcome between treatment with a cemented Thompson hemiarthroplasty and an uncemented Austin-Moore prosthesis for patients with displaced intracapsular hip fractures.

### 2. Methods

All patients with intracapsular hip fractures admitted over a five year period were considered for the study. Exclusion criteria were if the fracture was undisplaced or minimally displaced, patients aged less than 60, patients aged between 60 and 75 and independently mobile, patients considered medically unfit for surgery, consent not obtained, pathological fractures, patients who had total hip replacement for concurrent arthritis, and if the lead trialist was not present at the

surgical procedure. Both groups had the same surgical approach, antibiotic and thromboembolic prophylaxis, and rehabilitation regimen. They were followed up at six weeks in person, and at three, six, nine and 12 months and thereafter every year for up to five years via telephone assessments. The patients' postoperative pain was measured with visual analogue scale (one to ten) and a pain score by Charnley (one to six), whilst mobility was measured by a scale of 0 to nine. Statistical tests used included Fisher's exact test, Mann-Whitney U test and Kaplan-Meier survival analysis. The results were analysed on an intention-to-treat basis.

### **3. Results**

After exclusion of 700 patients, the remaining 400 were randomised into two groups that were similar in terms of characteristics. Mean degree of residual pain was lower in the cemented group for all assessments, with statistically significant differences noted at eight weeks and at three, six, nine, 12 and 24 months. The differences between admission and all follow-up mobility scores were lower in the cemented group, meaning those patients had better degree of mobility, although only differences at six, nine and twelve months were statistically significant. Mean surgical time was seven minutes longer in the cemented group ( $p < 0.0001$ ). However, the total hospital stay was on average four days shorter for the cemented group ( $p = 0.004$ ). There were 14 operative femoral fractures in the uncemented group compared to none in the cemented group ( $p < 0.0001$ ), but otherwise there were no differences in surgical and medical complications. There was no difference in mortality rates for both groups at any point in follow-up.

### **4. Conclusions**

This study confirms the results from previously published randomised trials, that cemented prostheses cause less pain post-operatively and patients have better mobility, with no difference in mortality rates.

### **5. Critique**

#### **Strengths**

- The largest trial to date on this subject
- Standardisation of treatment protocol
- Intention-to-treat analysis
- Lack of patients lost to follow-up
- Blinded assessment of outcome

#### **Methodological Concerns**

- Bonferroni correction for large number of outcome measures means less results were statistically significant

**Association between bisphosphonate use and implant survival after primary total arthroplasty of the knee or hip.**

**Reviewer: Mr James Gillespie**

**Summary**

**1. Purpose**

To compare implant survival following THR and TKR in patients in those who have and have not received bisphosphonates

**2. Methods**

The authors searched the UKGP Research database using the codes (OXMIS and READ) for primary THR and TKR between 1986-2006. They reviewed medication prescriptions and clinical events. The sample size was 6.5million patients across 433 GP practices. Exclusion criteria were rheumatoid arthritis; hip fracture or age <40 years. Follow-up was for a maximum 15 years, with median of 3.5 years. Bisphosphonate users were defined as those treated for at least 6 months duration prior to revision surgery with 80% compliance ratio; or those who filled 6 or more prescriptions during the observation. Median duration of bisphosphonate treatment was 3 years. The measured outcome was time to revision surgery.

**3. Results**

1912 bisphosphonate users were identified. At 5 years users had 0.93% revision rate for THR and TKR whereas non-users had 1.96% revision rate. This conferred a time-to-revision ratio of 1.96 and a hazard ratio 0.54 (p=0.047). Analysis of time-to-revision ratio for TKR was 2.37 (p=0.068) and time-to-revision THR 1.71 (p=0.20). A separate analysis of 34336 patients with osteoarthritis demonstrated a hazard ratio of 0.40 (p=0.034) and time-to-revision ratio 2.69. If a 2% failure at 5 years is assumed, the NNT was 107 in osteoarthritis.

**4. Conclusions**

Bisphosphonate users had approximately 50% lower revision rate 5 years post op for the combined group of primary TKR and THR and approximately twofold greater implant survival time. This association was statistically significant. However, analysis of TKR and THR as separate subgroups did not demonstrate statistically significant findings. The protective effects were greater in those with disease code for osteoarthritis who had an approximate 2.7 fold increase median prosthesis survival time.

**5. Critique**

**Strengths**

Clinically relevant topic

Generalisability of GP Research database, which is; assumed valid to a wider population and is widely used in epidemiology

Uses revision rather than surrogates

Acknowledged design and statistical weaknesses

Addressed the side effects of treatment

### **Weaknesses**

Observational study with low median follow-up period.  
Lack of validation of each individual event  
Possible confounding  
Missing data on BMI, smoking, alcohol  
Lack of statistical significance  
The reasons for revision were not explored  
No analysis of cemented vs uncemented implants and operating surgeon  
Potential errors in coding and contralateral revision

### **Modes of Failure of Cemented Stem-type Femoral Components: A Radiographic Analysis of Loosening.**

**Reviewer: Mr F Welsh**

### **Summary**

#### **1. Purpose**

To identify real and potential modes of failure as an aid to classifying the loosening of femoral components

#### **2. Methods**

Retropective radiological review of 350 consecutive patients identified with 454 Total Hip Arthroplasties. The inclusion criteria also allowed patients with total hip arthroplasty revisions. Exclusion criteria removed patients with sepsis, radiolucent cement and under 6 months follow up leaving, 301 patients with 389 consecutive total hip arthroplasties. Patients included had either Charnley or Trapezoidal-28 femoral stems.

The radiographs were then examined by the presenting authors for evidence of loosening defined as a change in the mechanical integrity of the load carrying cemented femoral component: specifically looking for fractured cement and an interface gap such as a radiolucent zone at the stem-cement and cement-bone interfaces. The femoral stem was then divided into 7 zones to assist in the classification to the area of loosening. Xrays with signs of loosening were examined serially and the type of loosening was described by one of 4 modes of failure as previously described by the presenting authors.

No information recorded with regard to: approach, cement brands, cementing technique, operating surgeons or acetabular component.

#### **3. Results**

Seventy six of 389 (19.5%) Hip arthroplasties were noted to have radiological cement fracture or lucency with lateral (tensile) cement more frequently involved. There were 40 patients with stem/cement lucency and 43 patients with cement/bone lucency of whom 21 were revisions.

From the 76 hip loosening cohort, 56 hips showed signs of progressive failure (14.4%), however only 7 (2%) required removal due to pain/restricted function at time of assessment of which 2 had stem fractures. Using the zones described earlier in the paper, the modes of failure were classified into the following mechanisms: stem pistoning in acrylic (3.3% - Ia), cement-embedded stem pistoning with femur (5.1% - Ib), medial midstem pivot (2.5% - II), calcar pivot (0.7% - III) and bending (fatigue) cantilever (3.3% - IV).

#### **4. Conclusions**

Of the 40 with stem/cement lucency: 16 of these attributed to surgical technique failure and 24 due to medial migration. Similarly of the 43 with cement/bone lucency: 21 of which were revisions for previous femoral stem failure and were present from operation, the remaining 22 developed later lucency. This lucency in the revisions was postulated to be due to inadequate removal of fibrous membrane. Progressive loosening was observed in 56 (14.4%) and were subclassified into the 5 mechanisms (with type III being markedly less prevalent). The subclassification of zones around the femur in this paper was shown to assist classification of type of stem failure.

#### **5. Critique**

##### **Strengths**

- First attempt to classify failure into different areas of the stem
- Reasonable patient numbers
- Good explanation of theory behind methods of failure

##### **Methodological Concerns**

- Dated paper
- Short follow up by current standards (min 2yr)
- Lack of surgical information
- No standardisation
- No power calculation
- No statistical analysis of data
- Mechanisms of failure are derived by principle areas of failure around prosthesis. No biomechanical data
- Mix of revisions and primaries

**Hip resurfacings revised for inflammatory pseudotumour have a poor outcome.**

**Reviewer: Mr N Holloway**

##### **Summary**

###### **1. Purpose**

Primary - To determine the extent of the problem posed by pseudotumours by assessing the outcome of MMHR revised to conventional THR because of the formation of pseudotumours  
Secondary - To determine if the revision of MMHR was straightforward and achieved good results as has been suggested previously

###### **2. Methods**

Between 1999 and 2006, 1375 metal on metal hip resurfacing (MMHR) arthroplasties were reviewed. Eighteen surgeons conducted the procedures with four different implants. The researchers identified the cases revised and the reason for revision, grouping for pseudotumour, fracture, or other reason. Each revised MMHR was compared to two primary Exeter total hip arthroplasties (THR), the control group. The researchers looked at Oxford Hip Score (OHS), complications, operative time, blood loss (by transfusion requirement), and UCLA activity score. A variety of statistical methods were employed.

### **3. Results**

Of 1375 primary MMHR arthroplasties performed, 49 were revised, 16 for pseudotumour, 21 for fracture and 16 for other reasons (these groups include 4 other patients added to the study). The researchers found that MMHR revision for pseudotumour took significantly longer than the fracture or other groups, had a significantly higher major complication rate and resulted in significantly worse OHS.

Comparing revision MMHR to primary THR showed significantly longer operation time, significantly higher complication rates and significantly worse outcome scores. OHS following MMHR revision was in the range of pre-op THR.

### **4. Conclusions**

The researchers concluded that the outcome after revision of MMHR is dependent upon the indications for revision. They state that complications are similar to THR except infection rates but there are poor results if revised for pseudotumour. On the basis of the evidence presented they recommend that if a patient presents with symptomatic pseudotumour then one should revise early to limit complications

### **5. Critique**

#### **Strengths**

The study highlights problems associated with revising MMHR in presence of pseudotumour  
Appropriate statistical tests used

#### **Methodological Concerns**

Why were 4 patients included from elsewhere?

No pre-op OHS (are MMHR pts worse pre-op compared to THRs?)

When were scores obtained? – not in methodology

Timescales were not made clear

Some patients had incomplete scoring data

Compare revision surgery results with primary surgery results on the basis that MMHR was performed so that easy revision to a THR could be performed if necessary in the future, is this appropriate?

Large variety in surgical approach and surgery performed in pseudotumour group – did this influence results?

No specific evidence for final statement that you should revise early to limit complications.