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Consultant Orthopaedic Surgeon  
Northumbria Trust

# WHY NOT JUST DO A THOMPSON'S?

# Disclosures

- I have received payment for preparation of educational materials for Heraeus

# NICE guidelines 2011



**No!**



# NICE- what does it say?

<i>Recommendation</i>
<b>Use a proven femoral stem design rather than Austin Moore or Thompson stems for arthroplasties. Suitable designs include those with an Orthopaedic Data Evaluation Panel rating of 10A, 10B, 10C, 7A, 7B, 5A, 5B, 3A or 3B.</b>

# NICE- what does it say?

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## **Quality of evidence**

No randomised evidence comparing modern stems with older stems was found.

Patients with hip fracture, particularly older patients have been treated by methods which have evolved very little over the last 50 years. This has led to a perception that they may be receiving second-class treatment. An example is the difference in the design of hip replacement implants used in patients with fractures compared with those used in patients with degenerative change. Many of those used in the fracture patients now appear archaic and their equivalents in the elective orthopaedic patients were superseded many years ago.

Long-term follow-up studies to identify function and durability of a replacement component in a fracture patient are difficult to carry out as so many of the patients are frail and their life expectancy is limited. However such studies are easier in patients with degenerative change and there is a well recognised system of assessing the adequacy of the design of a femoral stem for these patients.

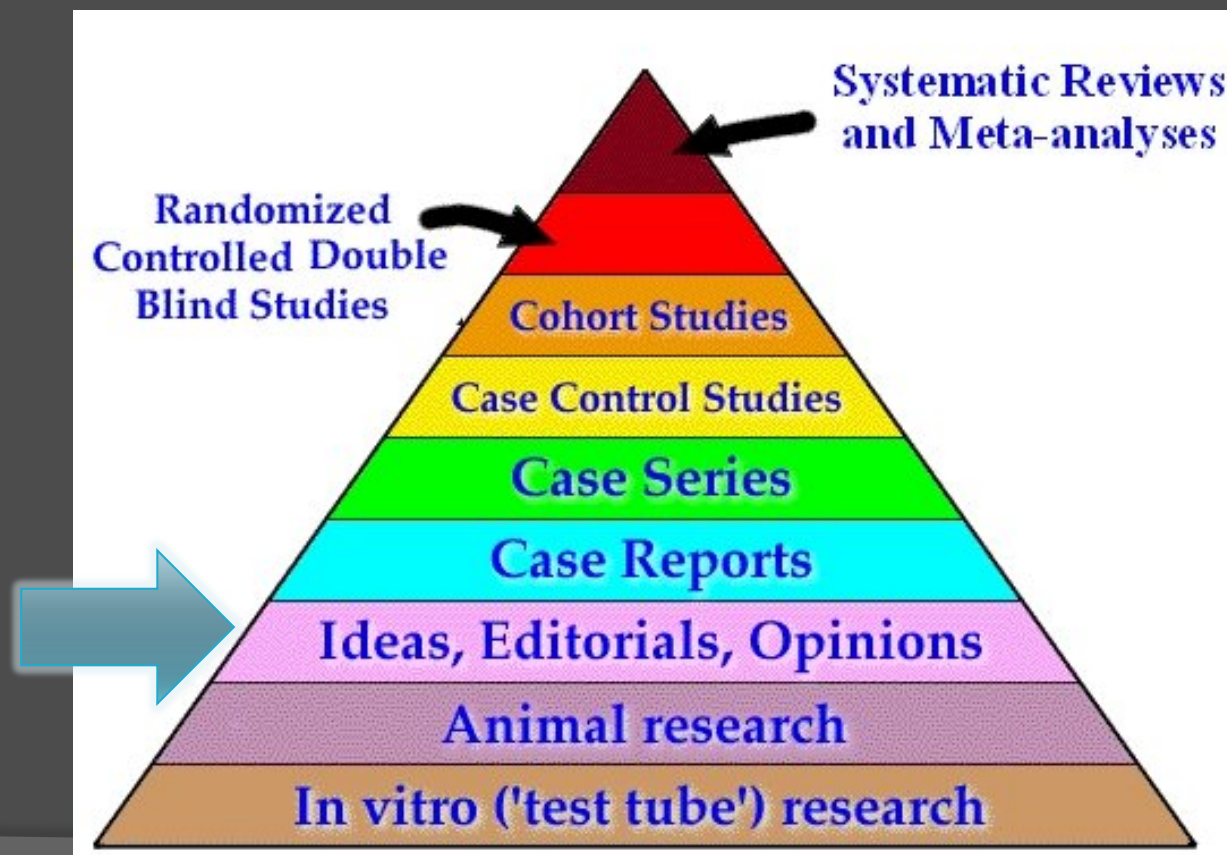
# McKee-Farrar

- Results part of justification for 'Born again MOM'?!



costs and a lower quality of life for patients. Data supplied by an expert advisor reported the cost of an Exeter Trauma stem (ETS) monoblock as an example of a proven femoral stem design as £249 at 2008 prices.

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# Examine the NICE 'evidence'

- 'Expert advisor'
- Guideline Development Group
  - Bob Handley- Oxford
  - Timothy Chesser- Bristol
- Expert Advisors
  - Martyn Parker- Peterborough



**Timothy Chesser**

GMC: 3483592

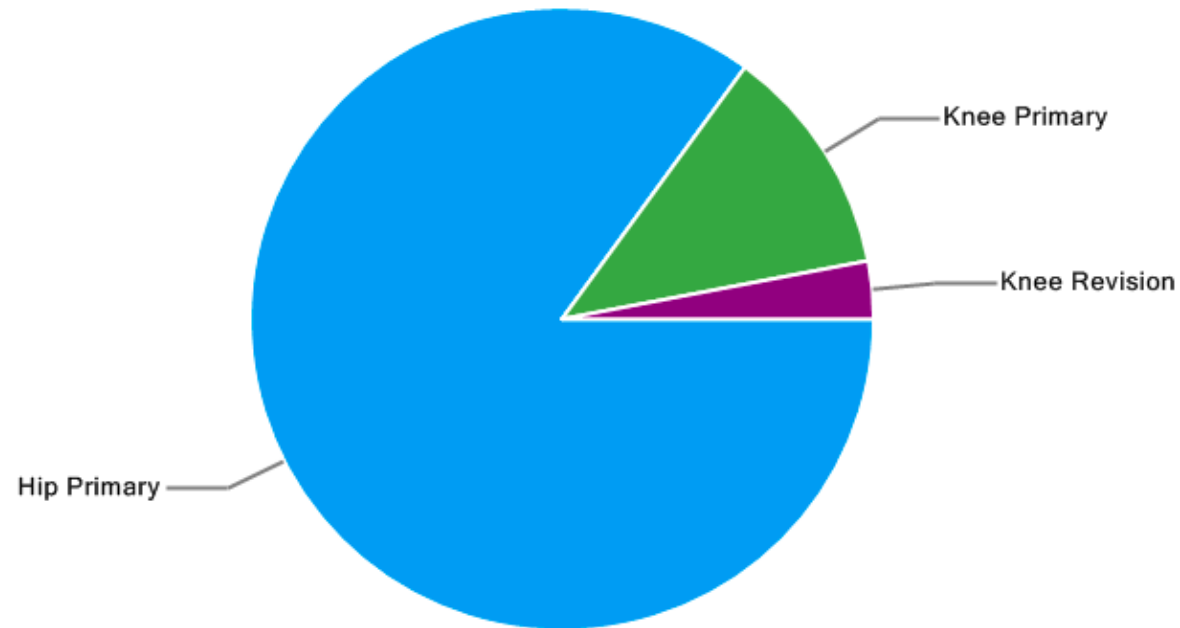
▶ Hospitals in which the Surgeon has activity recorded in NJR



▼ Practice Profile



Data For Period Jan 2012 – Dec 2012



Operation Type	Operation Subcategory	Procedures Recorded for this Surgeon	National Average
Hip Primary	-	50	51
Knee Primary	Total knee replacement	7	48
Knee Revision	-	Fewer Than 5	6
Total	-	57+	105

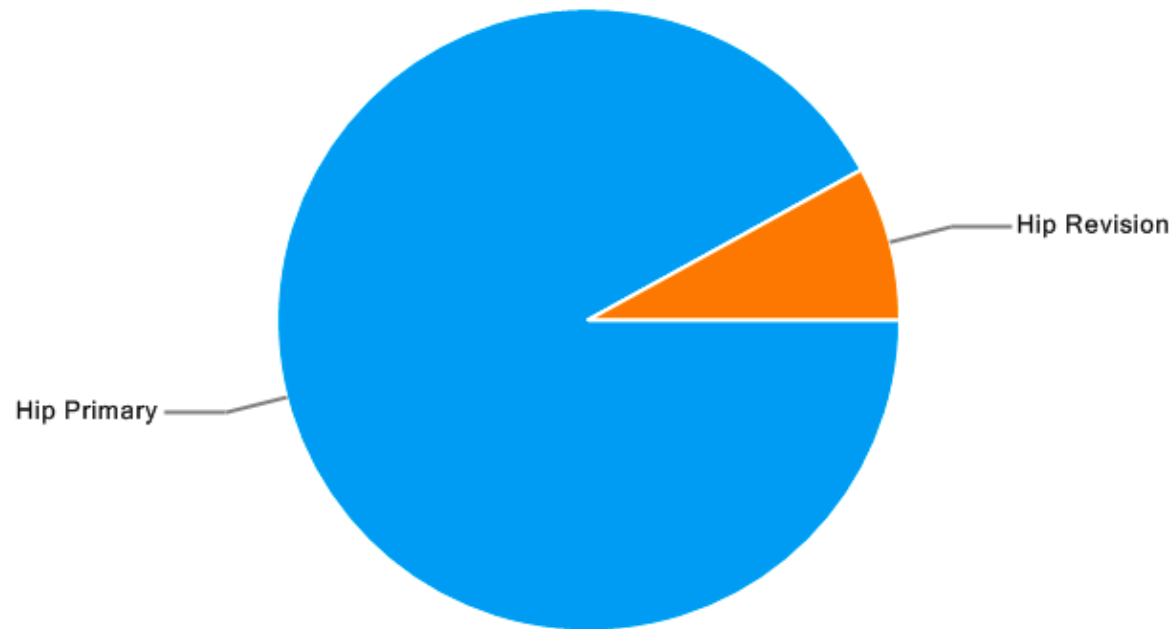


**Martyn Parker**  
GMC: 2529567

▶ Hospitals in which the Surgeon has activity recorded in NJR ⓘ

▼ Practice Profile ⓘ

Data For Period Jan 2012 – Dec 2012



Operation Type <span>ⓘ</span>	Operation Subcategory <span>ⓘ</span>	Procedures Recorded for this Surgeon <span>ⓘ</span>	National Average <span>ⓘ</span>
Hip Primary	-	12	51
Hip Revision	-	Fewer Than 5	12
Total	-	12+	63

# Evidence

- NJR England and Wales
  - Hemiarthroplasty not included

# Evidence

- NJR England and Wales
  - Hemiarthroplasty not included
- PRCT survivorship studies
  - None

# Evidence

## □ Swedish Registry Data -2012

*Injury*. 2012 Jun;43(6):946-9. doi: 10.1016/j.injury.2011.11.022. Epub 2011 Dec 29.

### **Monoblock hemiarthroplasties for femoral neck fractures--a part of orthopaedic history? Analysis of national registration of hemiarthroplasties 2005-2009.**

Rogmark C, Leonardsson O, Garellick G, Kärrholm J.

Department of Orthopaedic Surgery, Skane University Hospital, Malmö, Sweden. cecilia.rogmark@skane.se

#### **Abstract**

This study from the Swedish Hip Arthroplasty Register (SHAR) compares cemented (Thompson(®), Exeter Trauma Stem (ETS)(®)) and uncemented (Austin-Moore(®)) monoblock hemiarthroplasties (n=1116 and 616, respectively) with modular ones (n=18,659). Austin-Moore(®) prostheses lead to more re-operations (6.7%) compared to modular implants (3.5%) and Thompson(®)/ETS(®) (2.4%). A Cox regression analysis, adjusting for other risk factors, shows twice the risk of re-operation for Austin-Moore(®) implants (CI 1.5-2.8), in particular, due to periprosthetic fracture (5.4; CI 3.2-9.1) and dislocation (1.9; CI 1.3-3.0). The Thompson(®)/ETS(®) implants do not influence the overall risk of re-operation (0.7; CI 0.5-1.2) compared to modular implants and decrease the risk of re-operation due to infection (0.2; CI 0.04-0.7). An increased risk of re-operation is also seen in men, age groups 75-85 years and <75 years and after secondary fracture surgery. Both Swedish and Australian orthopaedic surgeons have decreased their use of Austin-Moore(®) implants after reports from their national arthroplasty registers identifying inferior outcome for this implant. Due to the increased risk of re-operations, it should not be used in modern orthopaedic care. Cemented Thompson(®) or ETS(®) implants could still be suitable for the oldest, low-activity patients. To finally decide if there is a place for them, patient-reported outcome must be analysed as well.

# Swedish Registry - 2012

- Thompson and ETS vs Austin-Moore
- Monoblock vs modular
- Results:
  - Austin-Moore 2x revision rate Thomp./ETS
  - Monoblock better than modular
- Conclusion
  - Stop Austin-Moore
  - 'Cemented Thompson's or ETS suitable for continued use in oldest low activity patients'

# Northumbria / S. Tees Data

Thompson survivorship

1

## **Cemented Thompson's Hemiarthroplasty in patients with intracapsular neck of femur fracture: survivorship analysis of 1670 procedures**

S. K. Khan<sup>1</sup>, MRCS, Research Fellow in Trauma and Orthopaedics

S. S. Jameson<sup>1</sup>, MRCS, Specialty Registrar in Trauma and Orthopaedics

A. Sims<sup>2</sup>, MRCS, Research Fellow in Trauma and Orthopaedics

J. A'Court<sup>1</sup>, MBBS, Foundation Trainee

M. R. Reed<sup>1</sup>, MD, FRCS (Trauma & Orth), Consultant Orthopaedic Surgeon

A. Rangan<sup>2</sup>, ChM (Orth), FRCS (Trauma & Orth), Professor of Orthopaedic Surgery

S. D. Muller<sup>1</sup>, MD, FRCS (Trauma & Orth), Consultant Orthopaedic Surgeon

<sup>1</sup> Northumbria Healthcare NHS Foundation Trust, Ashington NE63 9JJ, UK.

<sup>2</sup> South Tees Hospitals NHS Trust, Marton Road, Middlesbrough TS4 3BW

# Retrospective cohort study

- 1670 Thompson's
- 7 year period
  
- Mean age 82.7years
  
- Patient 5 year survival 30%

# Results

- 95% 5 year survival with revision as endpoint
- 36 revisions
  - 14 to THR
    - erosion, loosening, infection
  - 22 Excision arthroplasty
    - infection, dislocation

# Reasons for revision

- Infection
  - Independent of implant design
- Aseptic loosening
  - Poor technique
  - Implant?
- Dislocation
  - Infection 40%
  - Poor technique
  - Implant??

# Proven femoral stem design?

□ Thompson

vs

□ ETS

# Prospective, randomised, blinded trial

## **Cemented Thompson hemiarthroplasty versus cemented Exeter Trauma Stem (ETS) hemiarthroplasty for intracapsular hip fractures: a randomised trial of 200 patients.**

Parker MJ.

Orthopaedic Department, Peterborough and Stamford Hospital NHS Foundation Trust, Peterborough City Hospital, Peterborough PE3 9GZ, United Kingdom.  
Martyn.Parker@pbh-tr.nhs.uk

### **Abstract**

Numerous different designs of hemiarthroplasty are available but few have been compared within the context of a randomised controlled trial. Two-hundred patients presenting with a displaced intracapsular fracture of the hip were randomised to receive either a cemented Thompson hemiarthroplasty or a cemented smooth tapered stem hemiarthroplasty (Exeter Trauma Stem). All operations were undertaken or directly supervised by one surgeon using the same operative approach. Patients were followed up for 1 year from injury by a research nurse blinded to the treatment used. The smooth tapered stem was felt to present less operative difficulties compared to the Thompson prosthesis. There were no other statistically significant differences in outcomes between the two prostheses.

# ETS vs Thompson's

- 1 y follow up
- No difference in outcome
- ETS? Easier to use

# ETS – Stryker website 16/10/13

## Medical Professionals New Developments

[Home](#) >> [Medical Professionals](#) >> [New Developments](#) >> ETS

### New Developments

#### The Exeter Trauma Stem (ETS) - Rationale

- [Indication for Hemiarthroplasty](#)
- [Why a Cemented Hemiarthroplasty?](#)
- [Why a Unipolar Hemiarthroplasty?](#)
- [Why a Hemiarthroplasty with the Exeter Geometry and Surface Finish](#)
- [Summary](#)
- [Reference List](#)

# ETS

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### New Developments

#### The Exeter Trauma Stem (ETS) - Rationale

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### **Why a Hemiarthroplasty with the Exeter Geometry and Surface Finish**

There are two main reasons why the geometry and surface finish of the ETS helps the surgeon to achieve the optimal result following intracapsular fractures of the femoral neck: Survivorship; And ease of conversion to total hip replacement if required.

The geometry and surface finish of the ETS is based upon the Exeter Total Hip Replacement stem, being a polished collarless double tapered stem. The polished Exeter Total Hip Replacement has been demonstrated to have excellent long-term survivorship with no femoral lysis<sup>11</sup> and no revisions for aseptic loosening of the femoral stem<sup>12 13</sup> at up to 12 years follow-up. The ETS is designed to load the femur in exactly the same way as the primary hip replacement stem, to achieve the same excellent long-term results.



## ■ HIP

# Surface finish of the Exeter Trauma Stem

## A CAUSE FOR CONCERN?

T. G. Petheram,  
M. Bone,  
T. J. Joyce,  
I. Serrano-Pedraza,  
M. R. Reed,  
P. F. Partington

*From Wansbeck  
General Hospital,  
Northumberland,  
United Kingdom*

Recent guidance recommends the use of a well-proven cemented femoral stem for hemiarthroplasty in the management of fractures of the femoral neck, and the Exeter Trauma Stem (ETS) has been suggested as an example of such an implant. The design of this stem was based on the well-proven Exeter Total Hip Replacement stem (ETHRS). This study assessed the surface finish of the ETS in comparison with the ETHRS. Two ETSs and two ETHRSs were examined using a profilometer with a precision of 1 nm and compared with an explanted Exeter Matt stem. The mean roughness average (RA) of the ETSs was approximately ten times higher than that of the ETHRSs (0.235  $\mu\text{m}$  (0.095 to 0.452) *versus* 0.025  $\mu\text{m}$  (0.011 to 0.059);  $p < 0.001$ ). The historical Exeter Matt stem roughness measured a mean RA of 0.973  $\mu\text{m}$  (0.658 to 1.159). The change of the polished Exeter stem to a matt surface finish in 1976 resulted in a high stem failure rate. We do not yet know whether the surface differences between ETS and ETHRS will be clinically significant. We propose the inclusion of hemiarthroplasty stems in national joint registries.

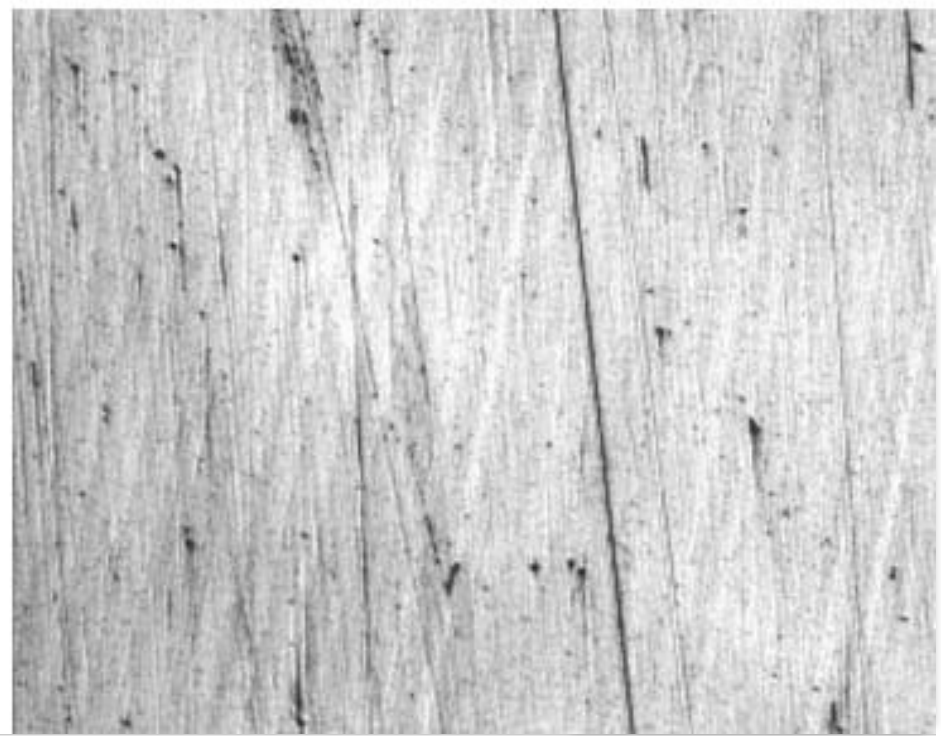
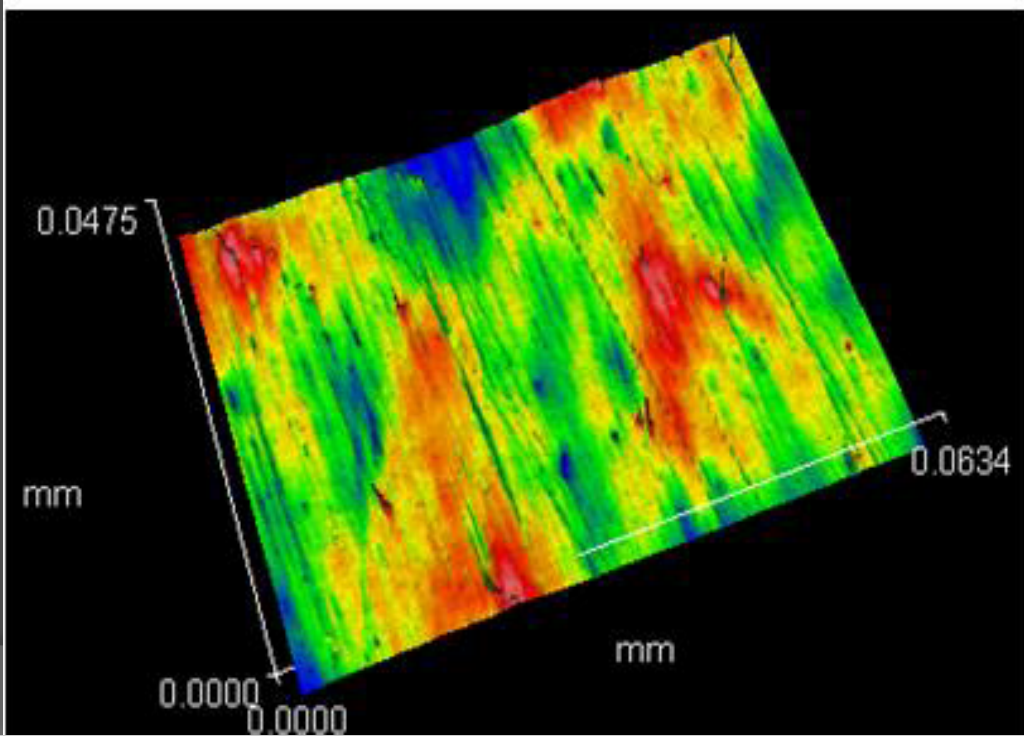
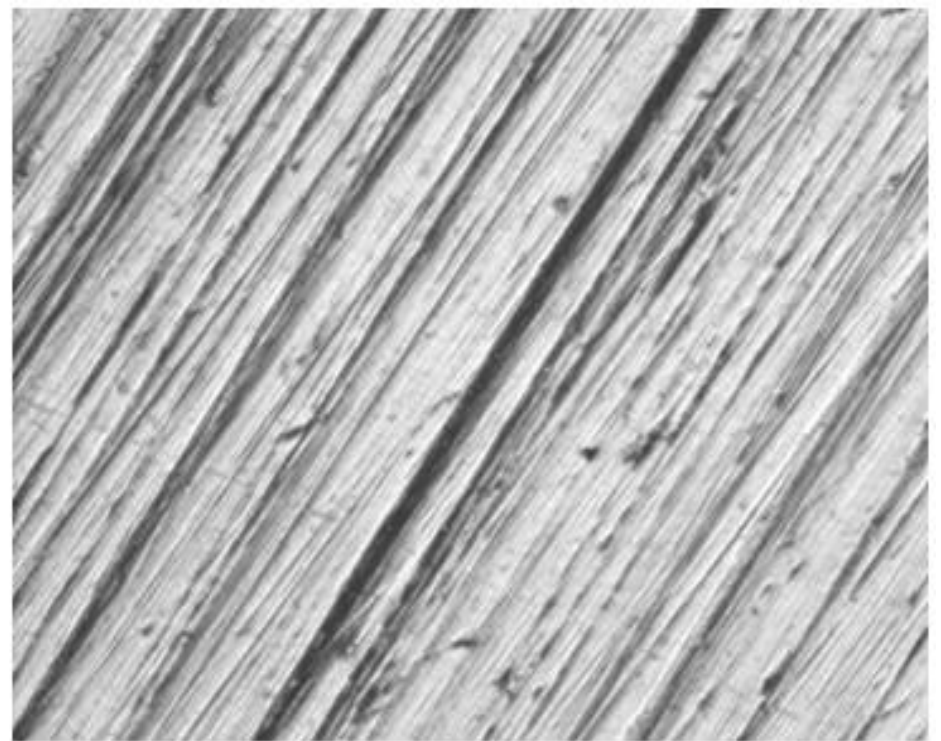
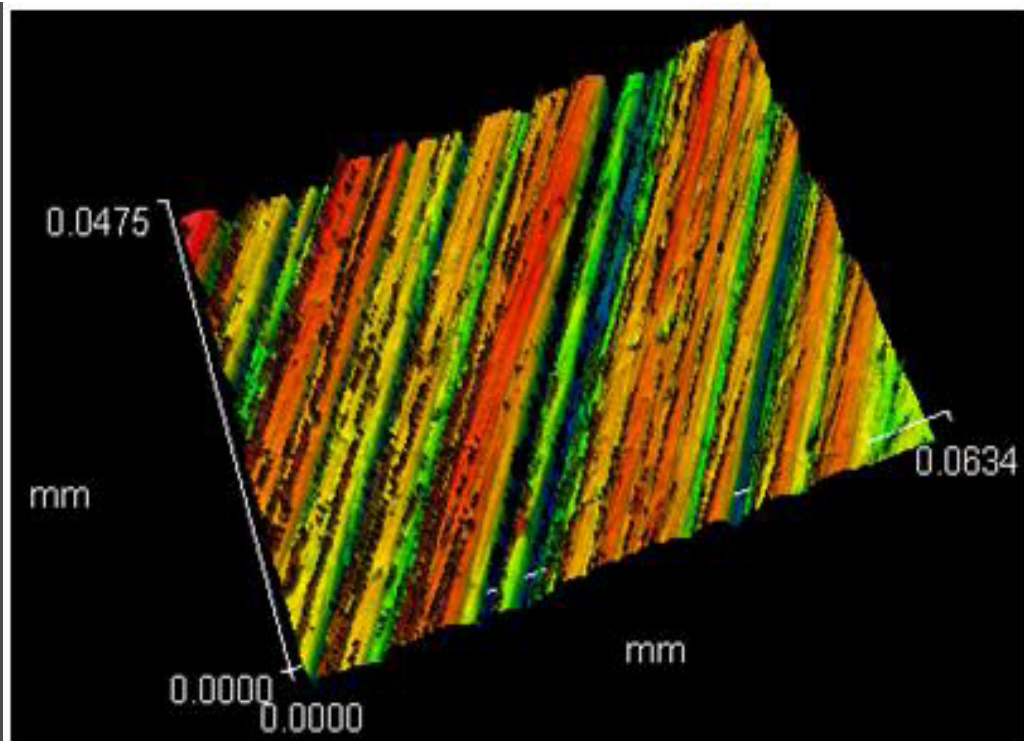
**Table I.** Mean surface roughness recorded for each of the five stems

<b>Stem*</b>	<b>Mean (SD) anterior side RA (<math>\mu\text{m}</math>)</b>	<b>Mean (SD) posterior side RA (<math>\mu\text{m}</math>)</b>
ETHRS 1	0.023 (0.008)	0.022 (0.010)
ETHRS 2	0.029 (0.011)	0.025 (0.009)
ETS 1	0.219 (0.045)	0.180 (0.049)
ETS 2	0.296 (0.079)	0.256 (0.065)
Exeter Matt	0.961 (0.066)	0.985 (0.111)

\* ETHRS, Exeter Total Hip Replacement stem; ETS, Exeter Trauma Stem

- Exeter total hip 1
- ETS 10x
- Exeter Matt 40x





# Does it matter?

- Taper slip philosophy (GOOD)
  - Hip loading results in Hoop stresses in cement – compressive
  - **Requires stem-cement debonding**
  - Shen G. Femoral stem fixation. JBJS 1998;80:754
  
- Increased surface roughness = increased stem-cement bonding = Shear forces in cement
  - Failure of Taper Slip (BAD)
  - Miles AW. The effect of surface finish... JBJS 1990;72-B:736
  
- Any movement in rougher stem-cement boundary = increased debris (BAD)
  - Crowninshield RD. Cemented component surface finish mechanics. CORR 1998;355:90

# Threshold for abrasive problems?

- 'probably somewhere between 0.1 and 0.3 $\mu\text{m}$ '
  - Howell JR et al 2004
- ETS measures 0.18 – 0.30 $\mu\text{m}$

J Arthroplasty. 2004 Jan;19(1):88-101.

## **In vivo surface wear mechanisms of femoral components of cemented total hip arthroplasties: the influence of wear mechanism on clinical outcome.**

Howell JR Jr, Blunt LA, Doyle C, Hooper RM, Lee AJ, Ling RS.

Orthopaedics and Trauma, Princess Elizabeth Orthopaedic Centr, Royal Devon and Exeter Hospital, United Kingdom.

### **Abstract**

The appearance and mechanism of femoral stem wear was studied in 172 retrieved femoral components, of which 74 stems had been stable in vivo. Macroscopic, microscopic, and nano-level scales of examination were used. Loss of stem surface in response to micromotion (wear) was found to affect 93% of stems. However, changes were frequently difficult to see with the naked eye, and in 19% of cases they would have been missed completely without the use of light microscopy. The surface finish of the prosthesis determined the mechanism of stem wear. Matte surfaces showed typical abrasive processes that also damage the cement, releasing particulate debris from the cement and metal surfaces. This may destabilize the stem within the cement. Polished stems showed a typical fretting appearance with retention of debris on the stem surface and without significant damage to the cement. These differences in wear mechanism between matte and polished stems have significant effects on stem function.

# How can we improve hemiarthroplasty outcomes? My 'Expert' opinion

- Reduce death
- Reduce infection
- Better training and supervision of surgery
- Add hemiarthroplasty to NJR
- Remove truly poor implants
- Keep costs down

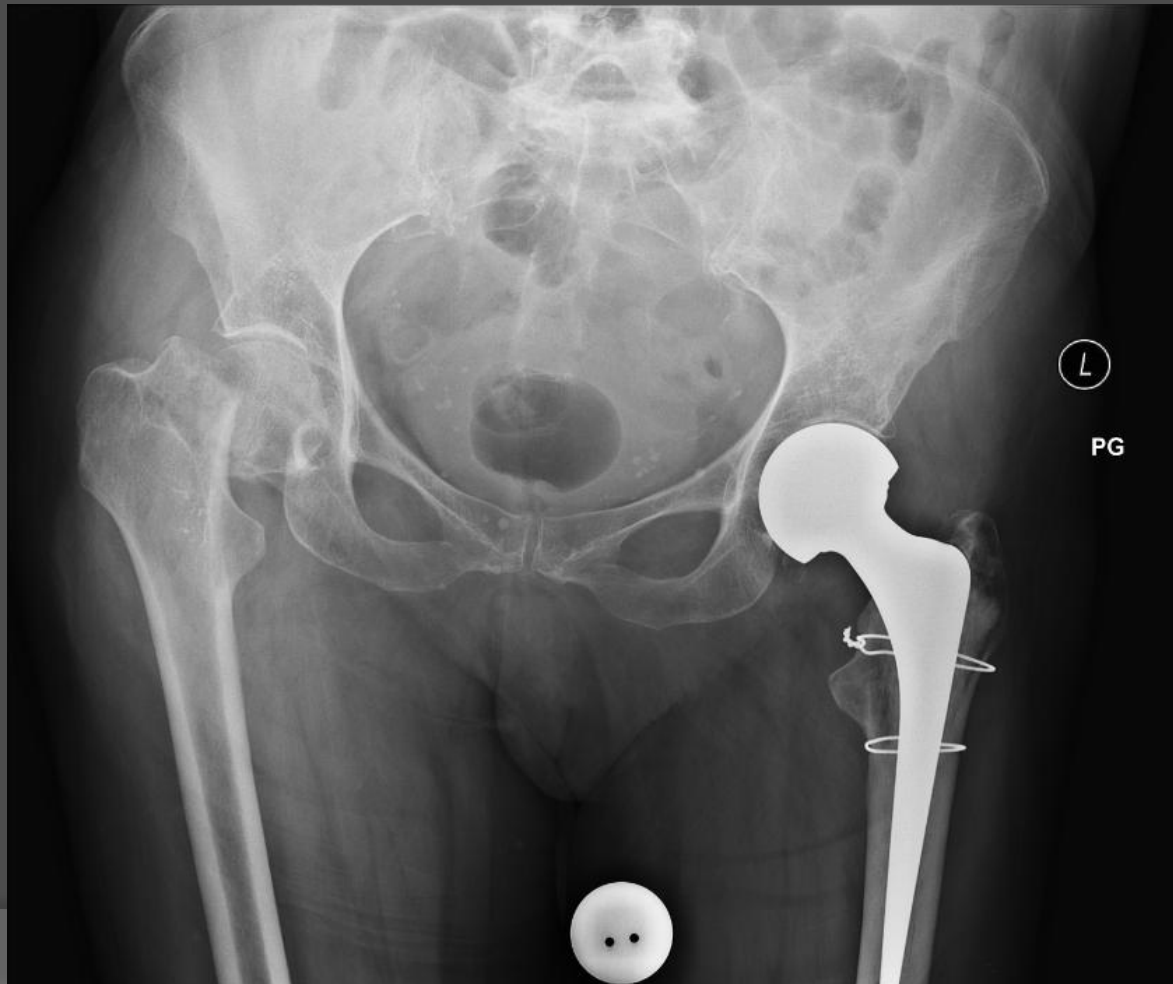
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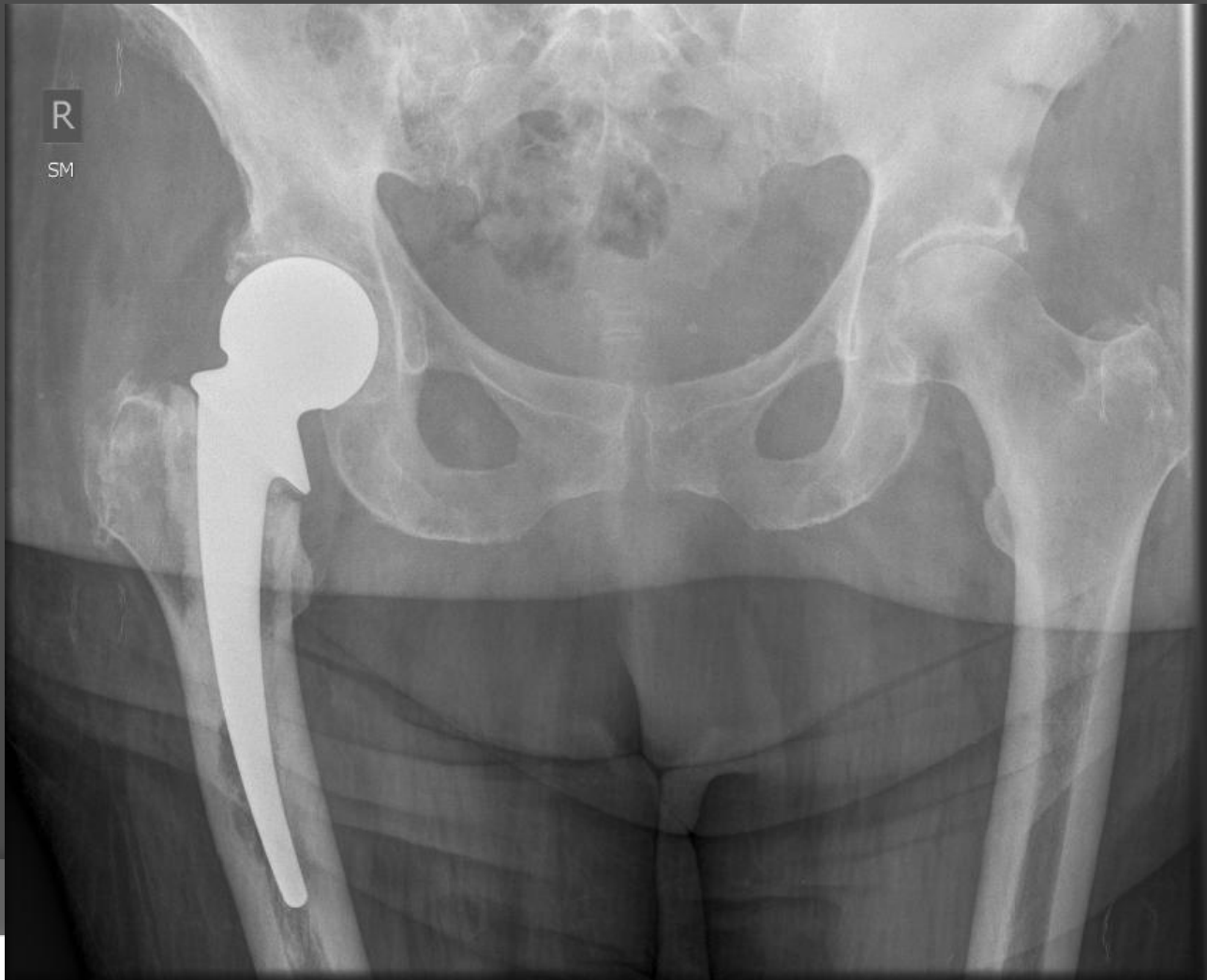
# Better training and supervision

- Pre-operative planning



# Better training and supervision

- Pre-operative planning



# Better training and supervision

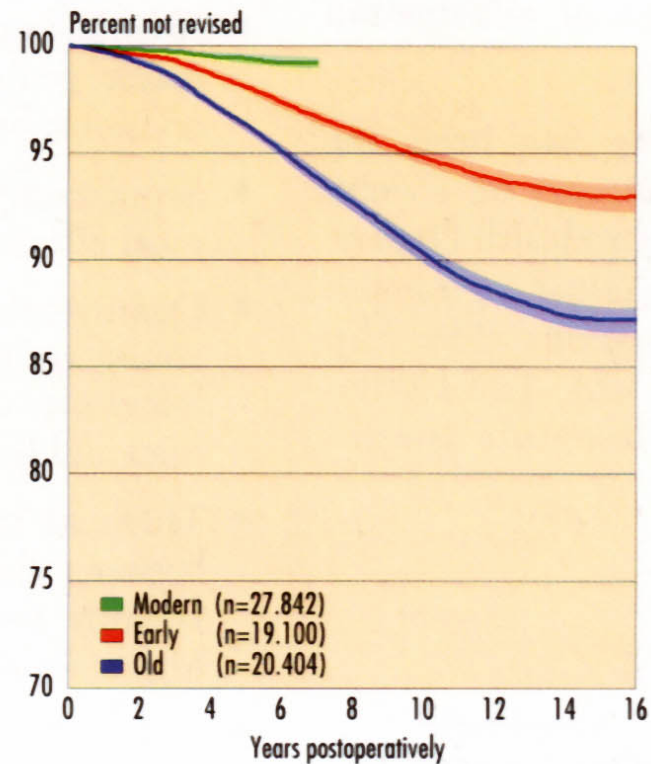
## □ Cementing

### Cementing techniques

1979-1994

	Old technique	Early technique	Modern technique
Distal femoral plug	No	Yes	Yes
Proximal seal in femur	No	No	Yes
Acetabular compression	No	No	Yes
Handmixing of cement	Yes	Yes	No
Vacuum mixing of cement	No	No	Yes
Brush	No	Yes	Yes
Pulsative lavage	No	No	Yes

### Observed survival with different cementing techniques



# Better training and supervision

- Soft tissue surgery





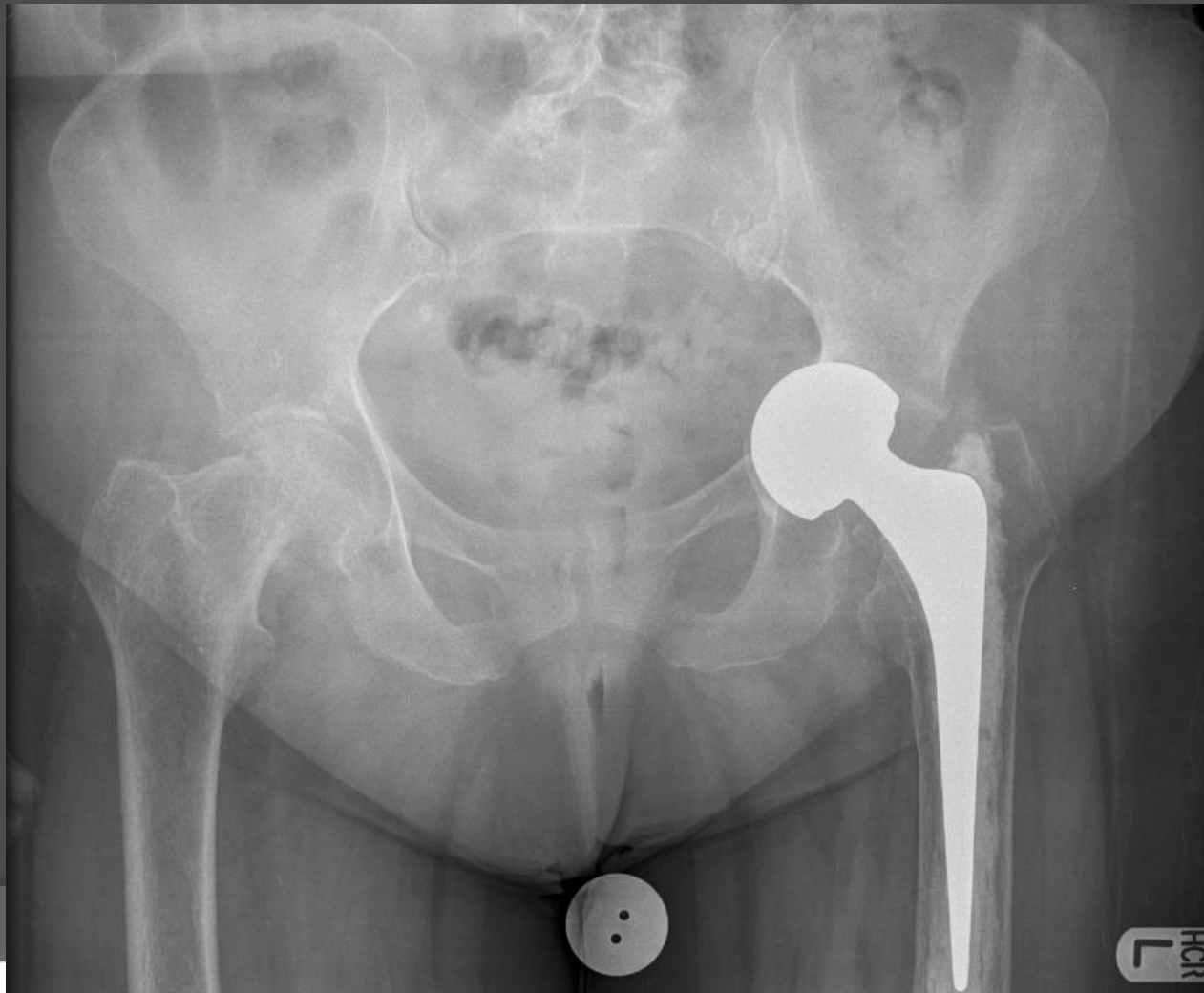
# Better training and supervision

- Sizing femoral head



# Better training and supervision

- Sizing femoral head



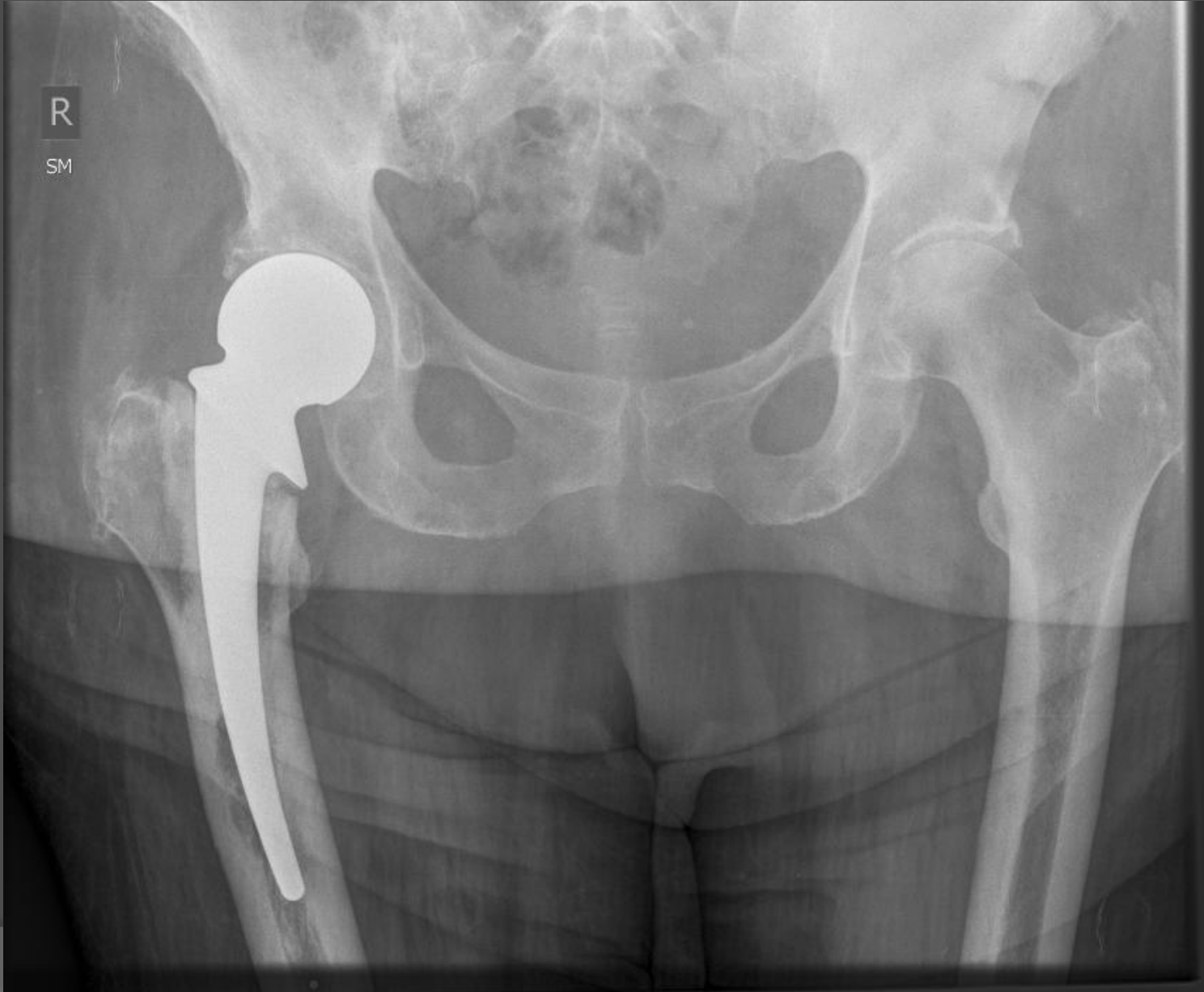
# C in C Revision



# C in C Revision



# Remove truly poor implants



# Titanium hemiarthroplasty prostheses

- Ti abandoned as bearing surface in THR
- Still in use in hemiarthroplasty!

S Patil, M Bone, J Kyle, T Joyce, P Partington

Northumbria Healthcare Trust and Newcastle  
University

TITANIUM HIP  
HEMIARTHROPLASTY  
PROSTHESES SHOULD BE  
WITHDRAWN

# Aims

- To compare the wear properties of Ti and CoCr prostheses
- To survey the hospitals in the north-east using Ti prostheses

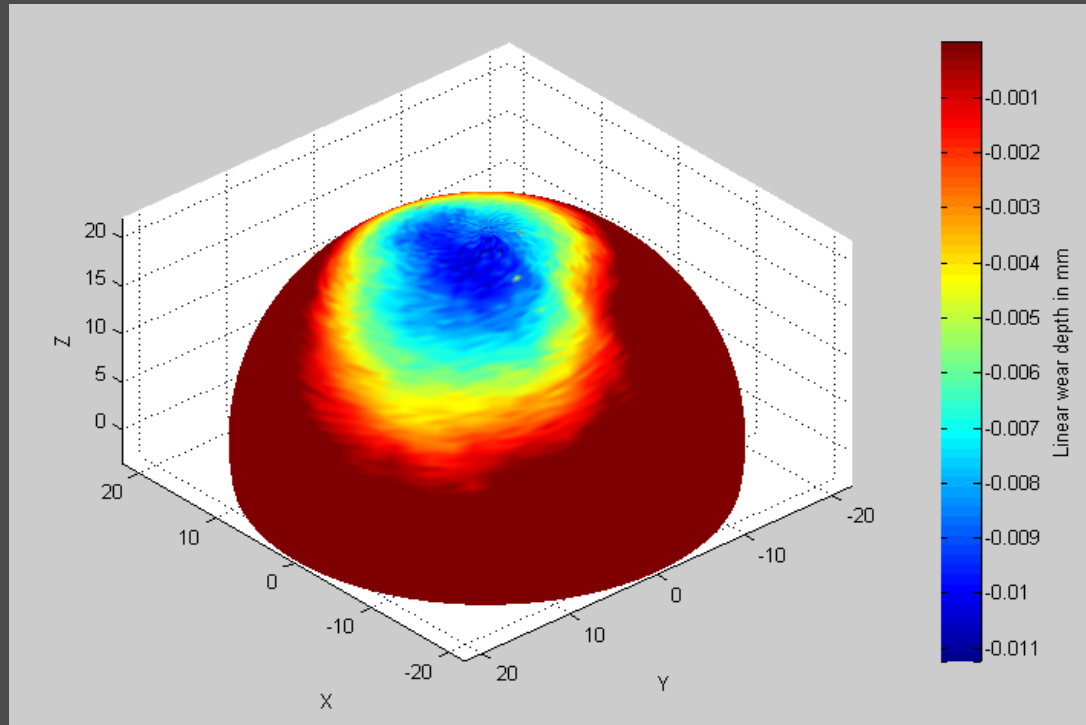


# Methods

- 3 Ti prostheses and 2 CoCr prostheses were retrieved at revision
- 1 unused Ti prosthesis used as control
- Volumetric wear measured using a coordinate measuring machine
- Contacted all hospitals in our region to ascertain the make of the prostheses

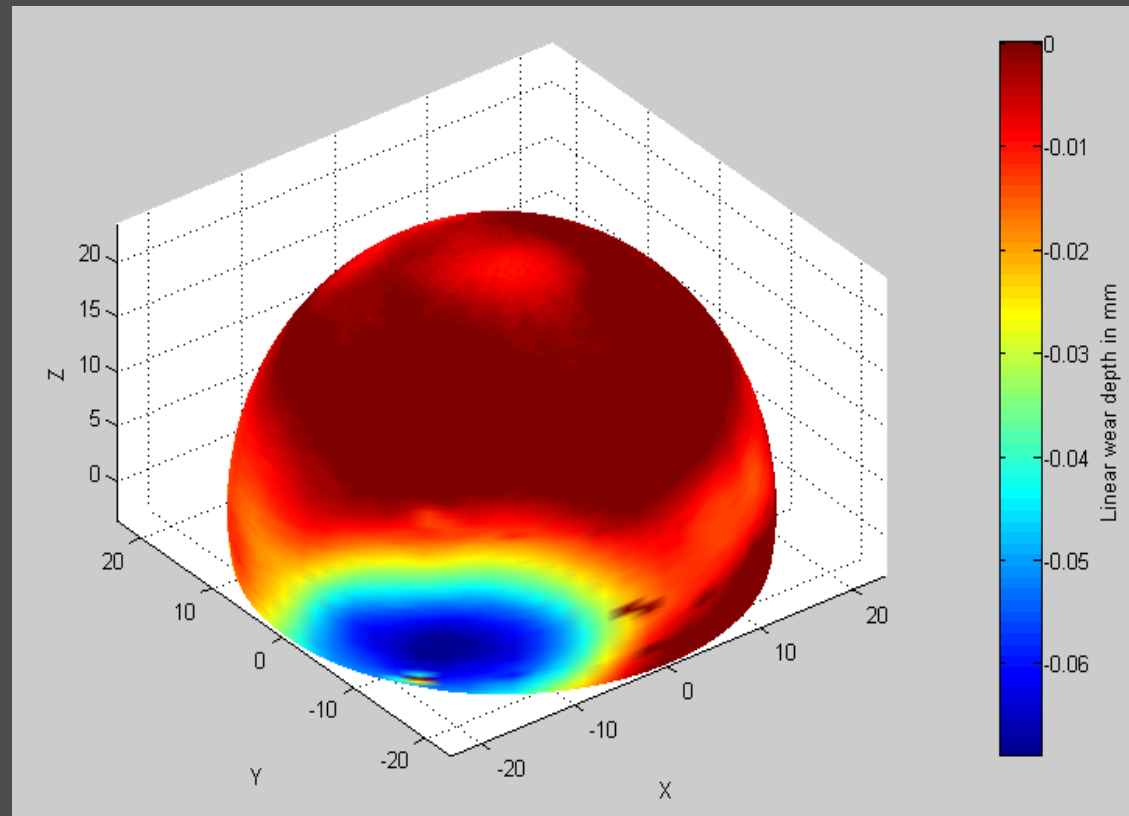


# Results



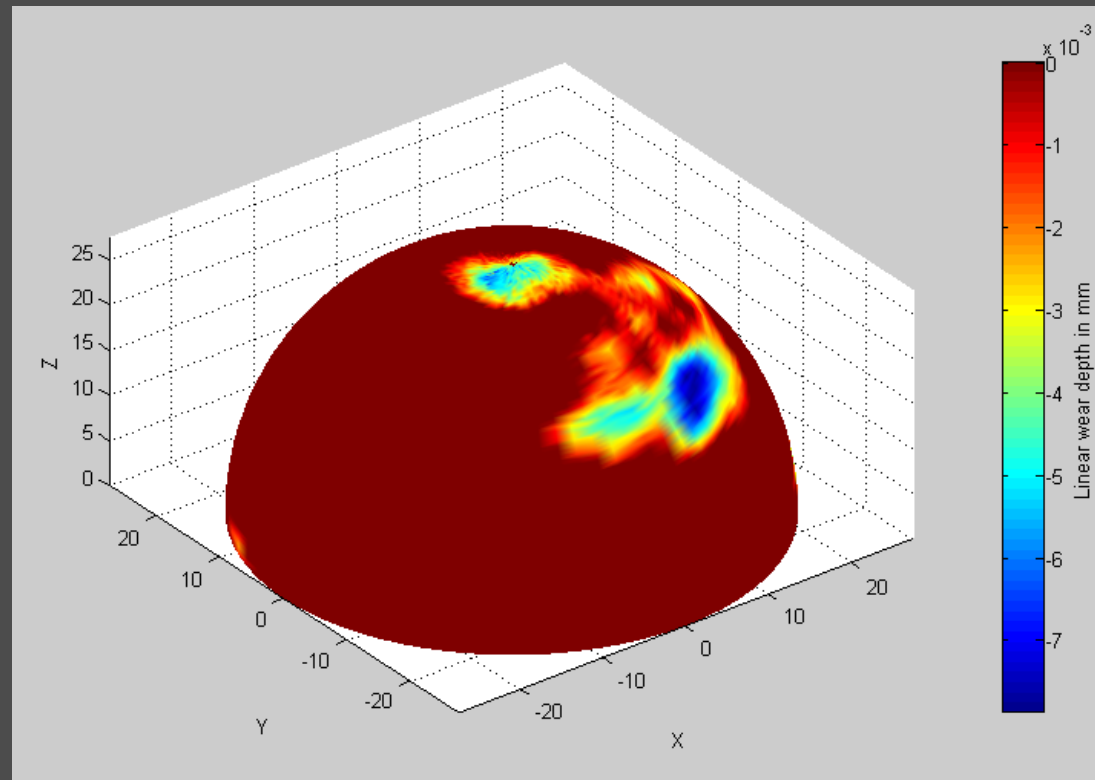
Wear in the CoCr prostheses was 1  
and 9mm<sup>3</sup>

# Results



Wear in Ti prostheses was 46, 33 and  
53mm<sup>3</sup>

# Results



'Wear' in the control Ti prosthesis was  
 $2\text{mm}^3$

# Results

- 5 of the 11 hospitals in our region were using Ti prostheses



# Results

- 5 of the 11 hospitals in our region were using Ti prostheses
- MHRA informed
  - Action?



R

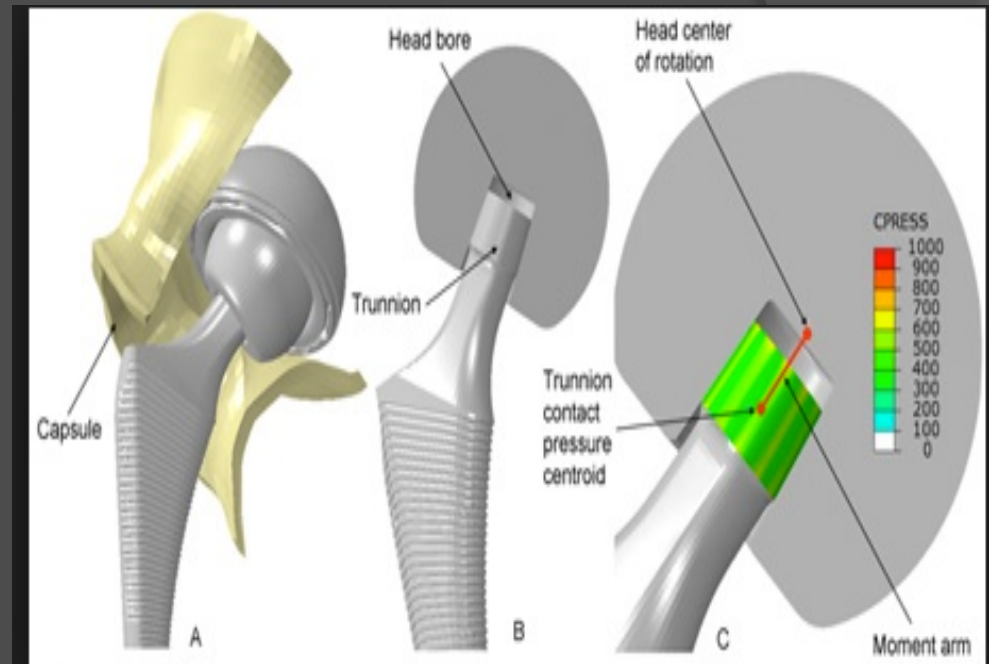
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# Large head Monopolar?

- ❑ Lessons from MOM THR?
- ❑ Trunnionosis?
- ❑ Cost?



# Summary

- NICE evidence for prosthesis change poor
- ETS not the same as proven Exeter
  - 2-3 x cost of Thompson's
- Death and infection big issues
- NJR needs to include hemis
  - Ti stems
  - Implant differences
- 'Elephant in the room'
  - Poor surgery
  - Supervision, training, templating etc