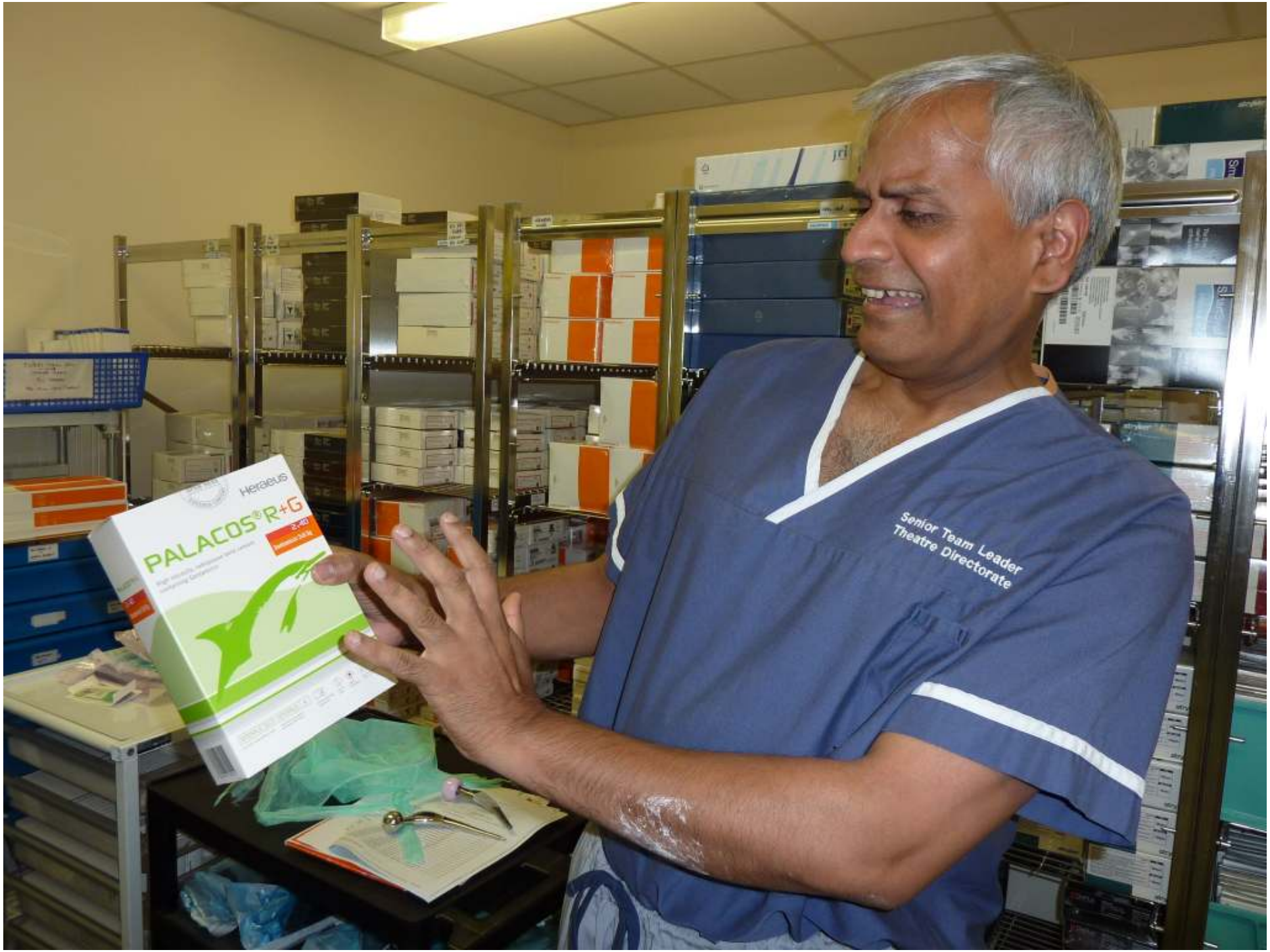
City Hospitals Sunderland NHS
NHS Foundation Trust

Cemented vs uncemented total hip replacement

Stephen M Green FRCS(Tr&Orth)
Consultant Orthopaedic Surgeon
Sunderland Royal Hospital

Divided opinion in the Orthopaedic community...


Heraeus
PALACOS® R+G
Senior Team Leader
Theatre Directorate

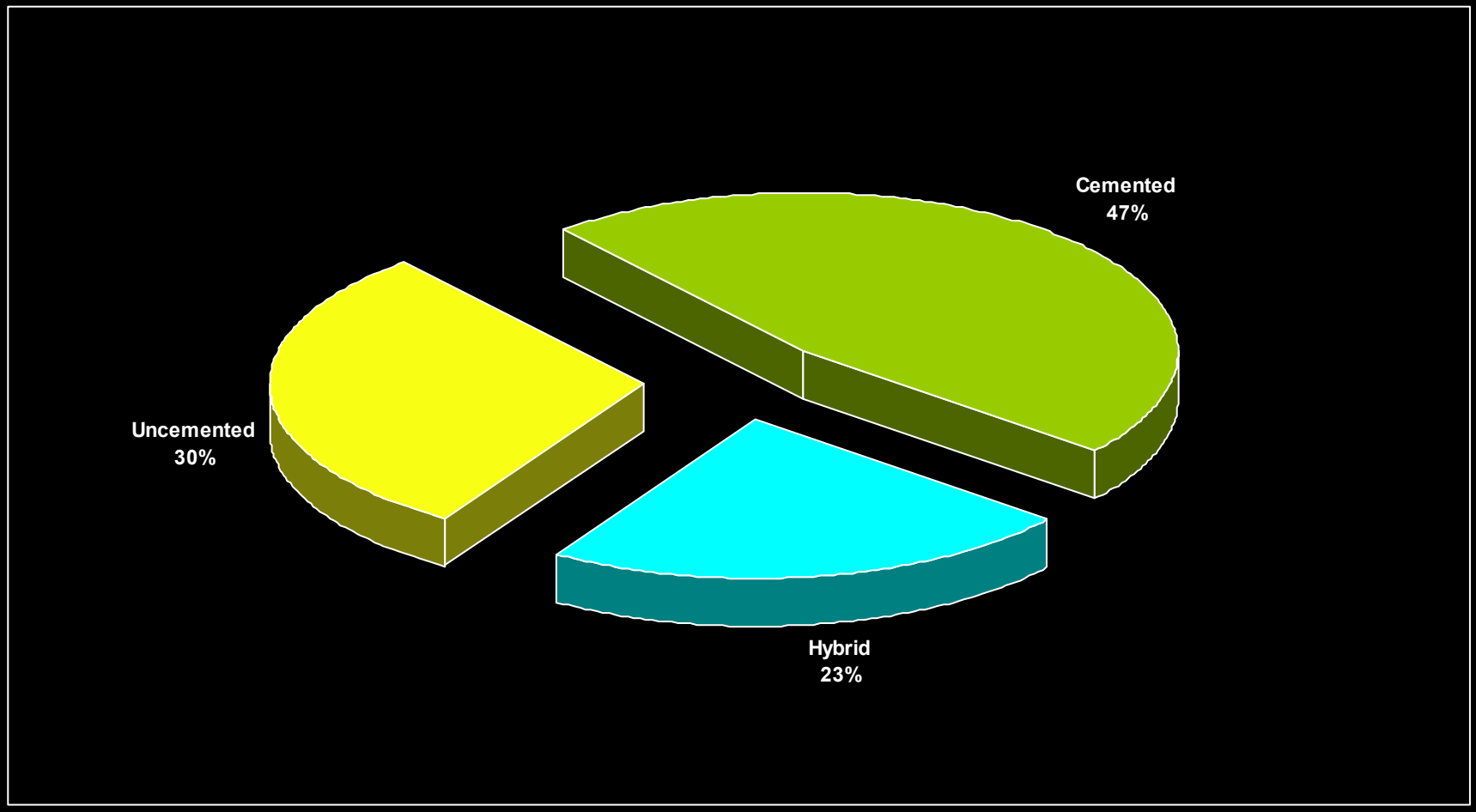

Senior Team Leader
Theatre Directorate


PALACOS R+G


L
MULLER'S
2

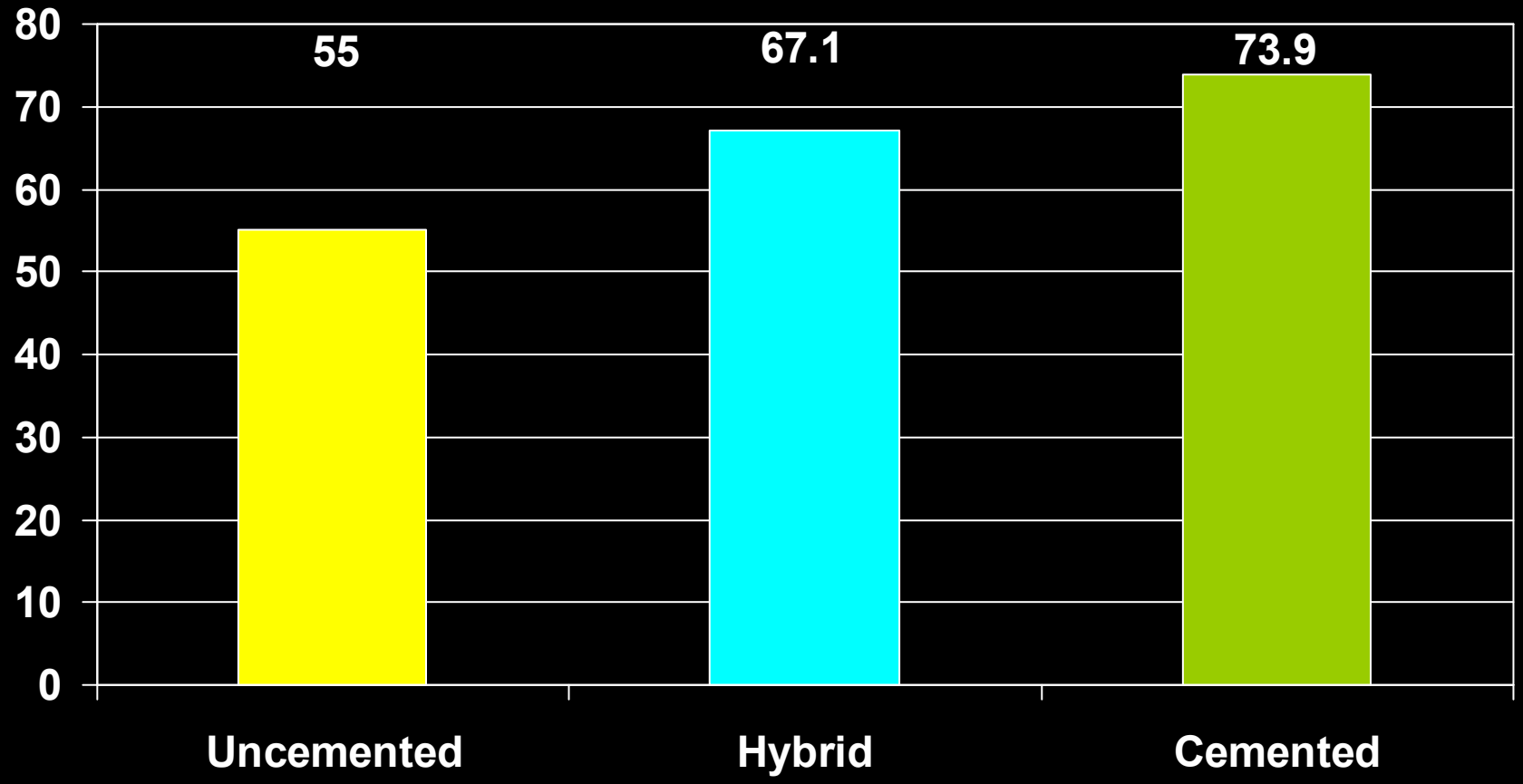

R
901

My practice



My practice

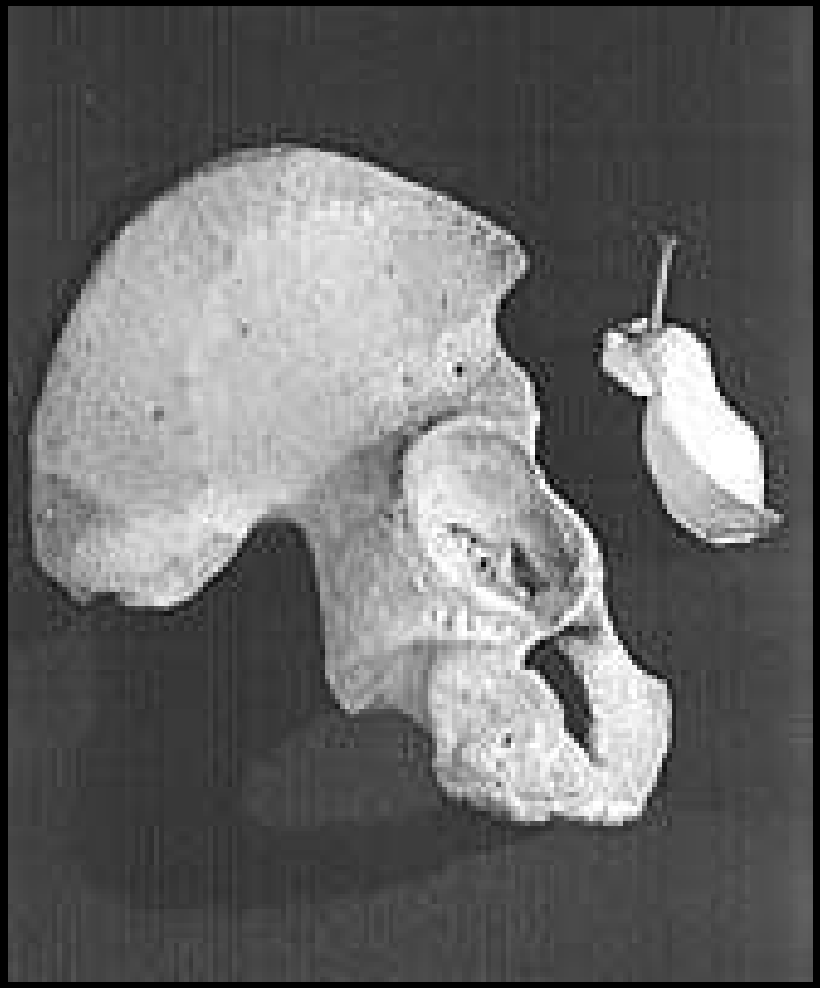
Average age



The basics...

Historical perspective

- Mid 19th C- interposition arthroplasty
- 1940s Smith-Petersen vitallium cup
- 1950s- Thompson & Austin-Moore hemiarthroplasty



Historical perspective

- Mid 19th C- interposition arthroplasty
- 1940s Smith-Petersen vitallium cup
- 1950s- Thompson & Austin-Moore hemiarthroplasty

Historical perspective

- Mid 19th C- interposition arthroplasty
- 1940s Smith-Petersen vitallium cup
- 1950s- Thompson & Austin-Moore hemiarthroplasty

Historical perspective

- Mid 19th C- interposition arthroplasty

- 1940s Smith-Petersen vitallium cup

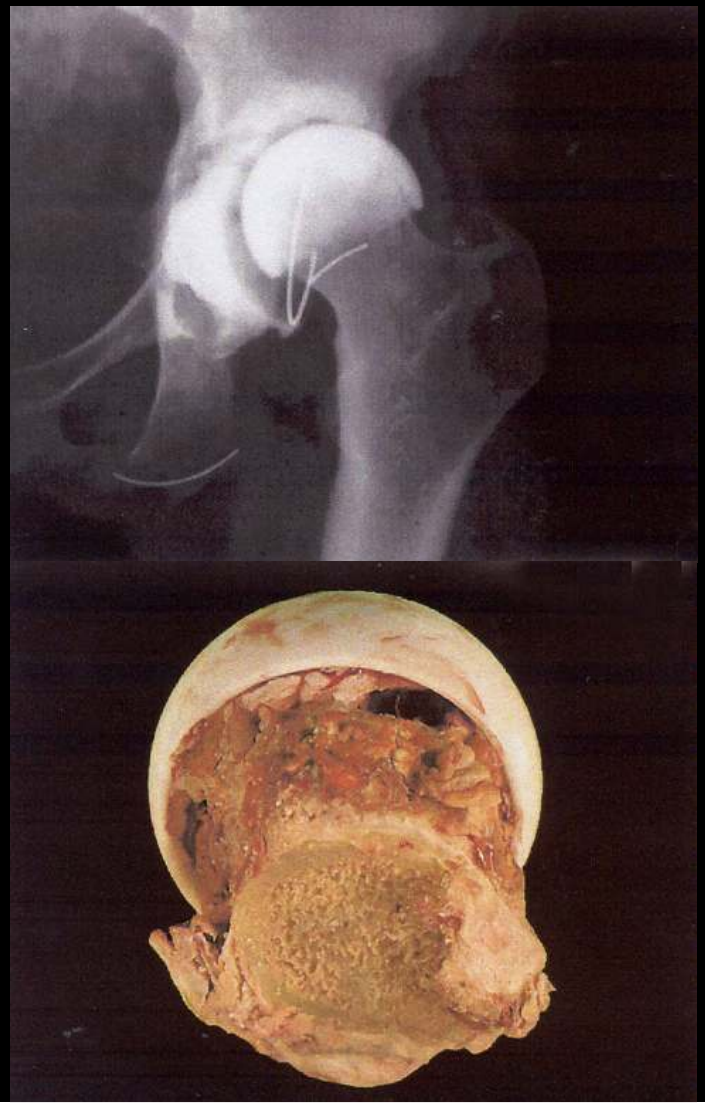
- 1950s- Thompson & Austin-Moore hemiarthroplasty

Historical perspective

- Mid 19th C- interposition arthroplasty
- 1940s Smith-Petersen vitallium cup
- 1950s- Thompson & Austin-Moore hemiarthroplasty

Early total hip arthroplasty

Early resurfacing

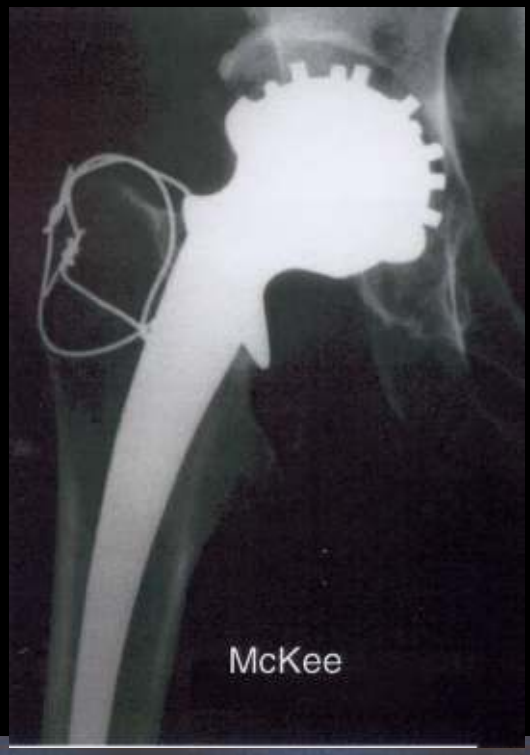


Metal on metal

- 1960s early metal on metal total hip replacements
- Ring
- McKee-Farrar

Metal on metal

- 1960s early metal on metal total hip replacements
- Ring
- McKee-Farrar



Metal on metal

- 1960s early metal on metal total hip replacements
- Ring
- McKee-Farrar

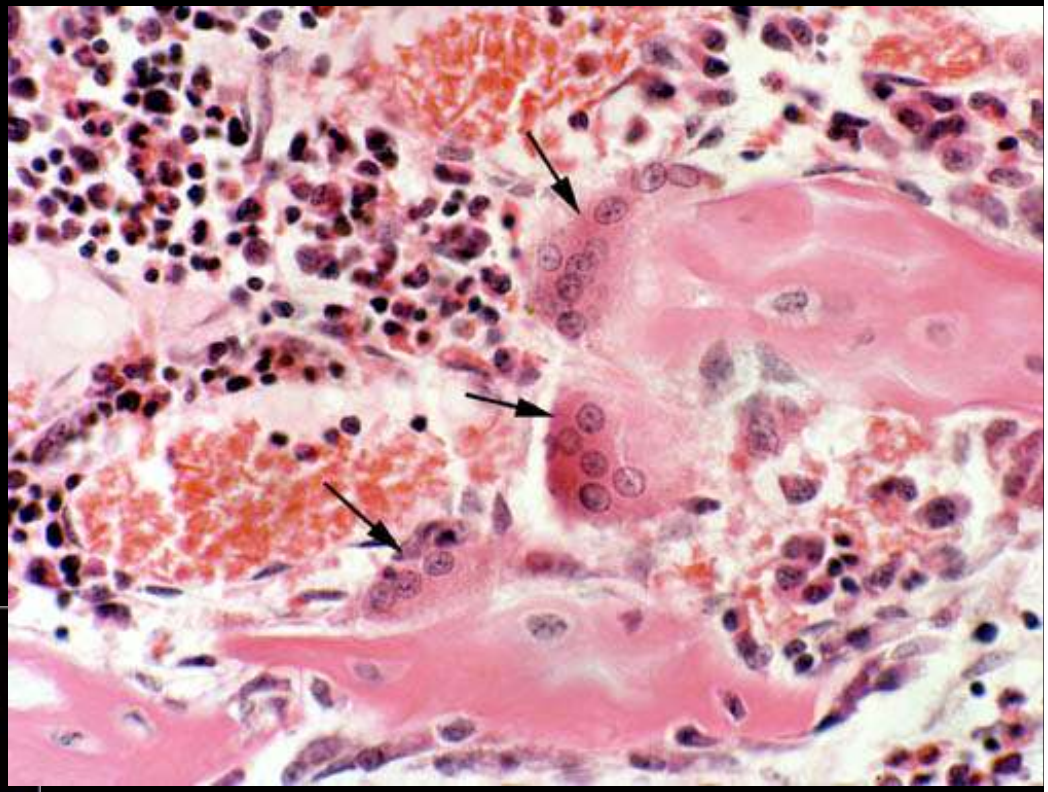
Low friction arthroplasty

Problems...

- Aseptic loosening & osteolysis

Problems...

- Aseptic loosening & osteolysis



Problems...

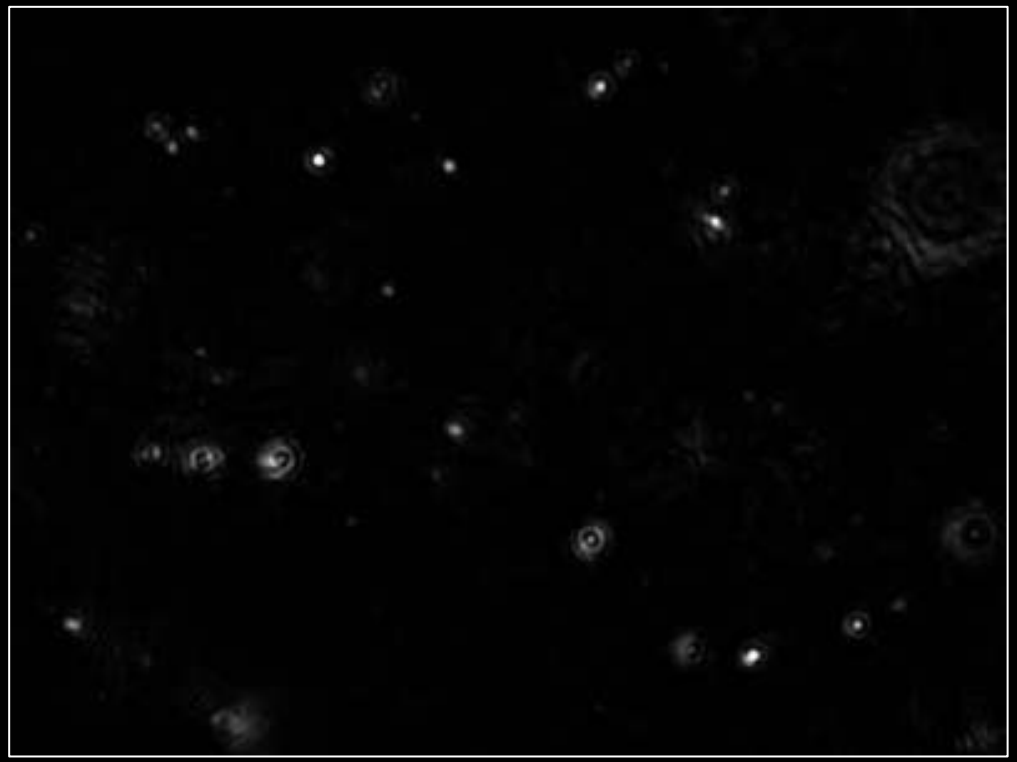
- Aseptic loosening & osteolysis
- ‘Cement disease’

Problems...

- Aseptic loosening & osteolysis
- ‘Cement disease’

Problems...

- Aseptic loosening & osteolysis
- ‘Cement disease’
- ‘Particle disease’



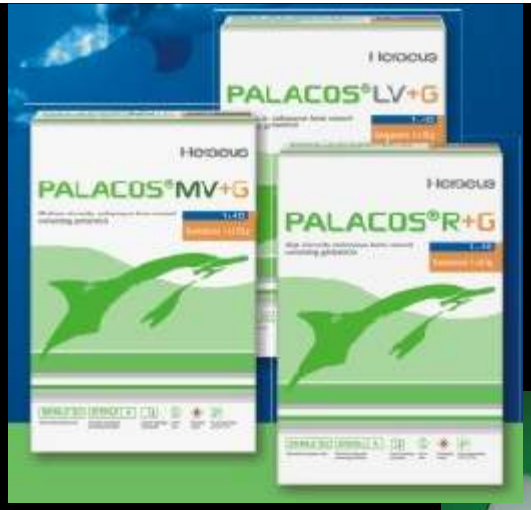
Cemented vs uncemented...

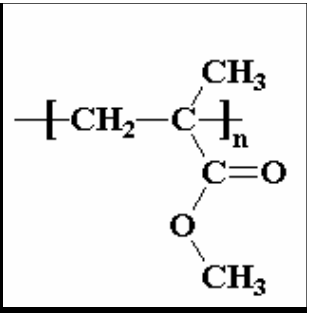
Cemented THR

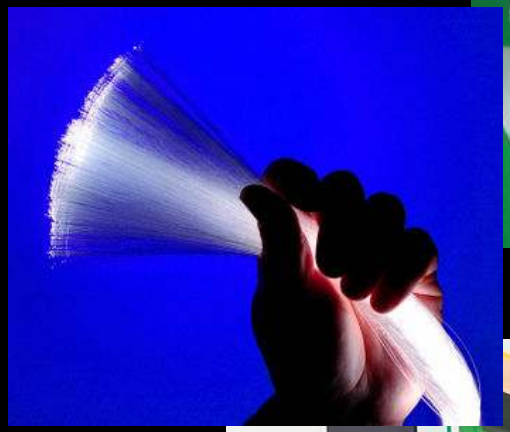
- Fixation with PMMA
- The ‘ultimate custom fit’
- Stainless steel or Co Cr
- Hoop stresses with polished tapers

Cemented THR

- Fixation with PMMA
- The ‘ultimate custom fit’
- Stainless steel or Co Cr
- Hoop stresses with polished tapers







Cemented THR

- Fixation with PMMA
- The ‘ultimate custom fit’
- Stainless steel or Co Cr
- Hoop stresses with polished tapers

Cemented THR

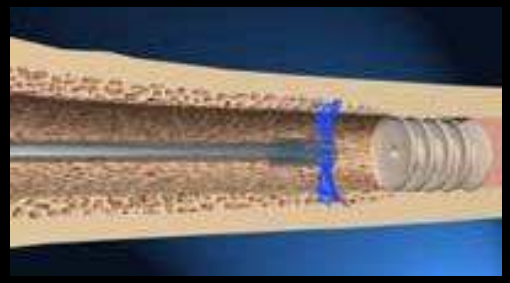
- Fixation with PMMA
- The ‘ultimate custom fit’
- Stainless steel or Co Cr
- Hoop stresses with polished tapers

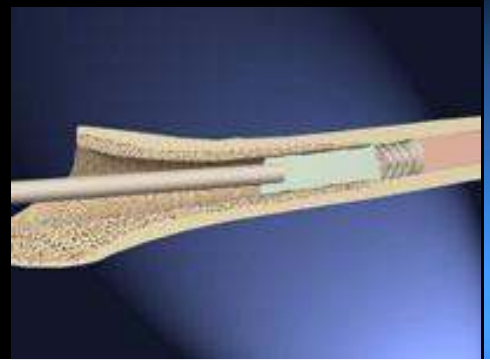
Cemented THR

- Improved cementing techniques
  - First generation
    - Hand mixed
    - Finger packing
- Improved results

Cemented THR

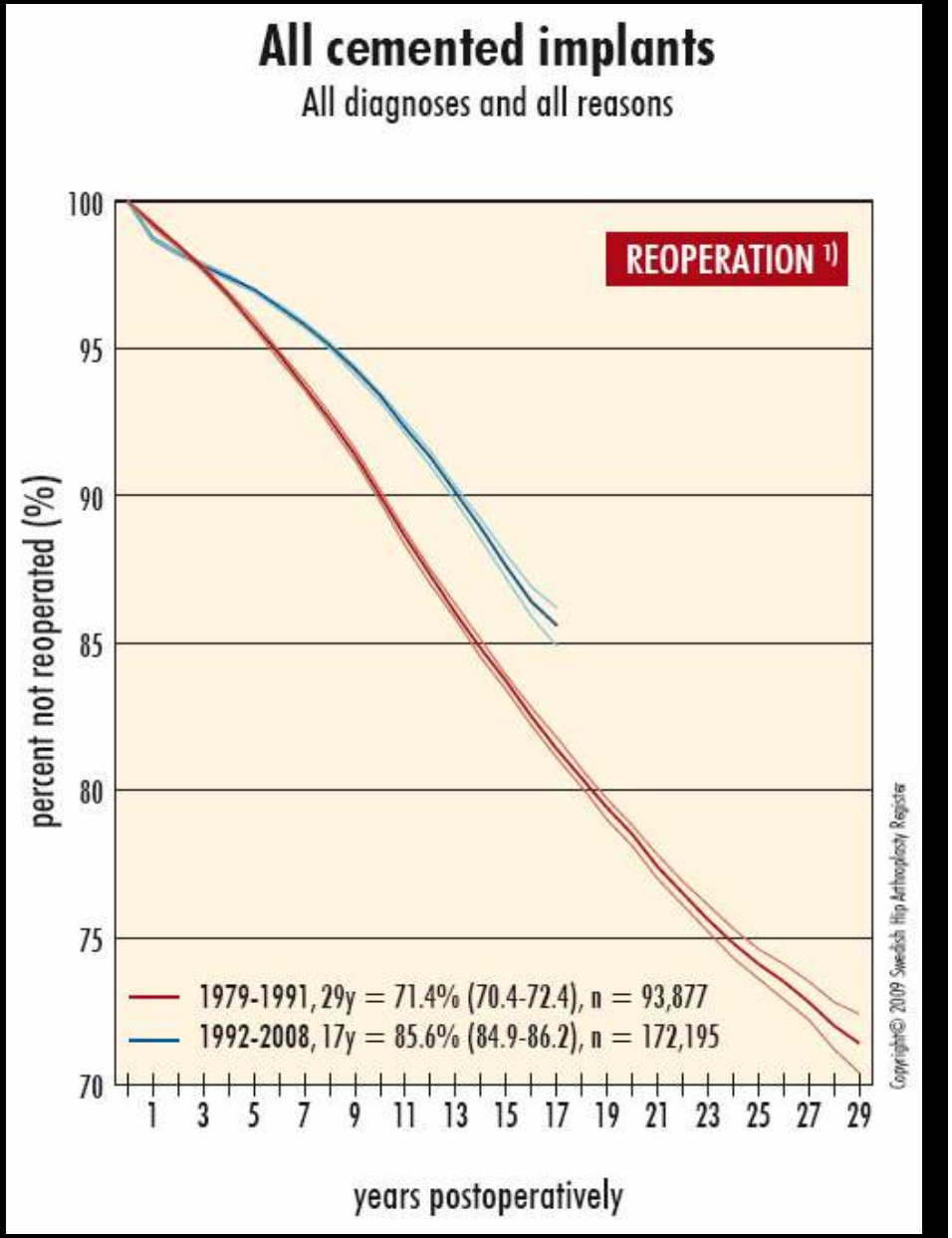
- Improved cementing techniques
  - Third generation
    - Vacuum mixed
    - Pulse lavage
    - Distal cement restrictor
    - Retrograde canal filling & venting
    - Cement pressurisation
- Improved results

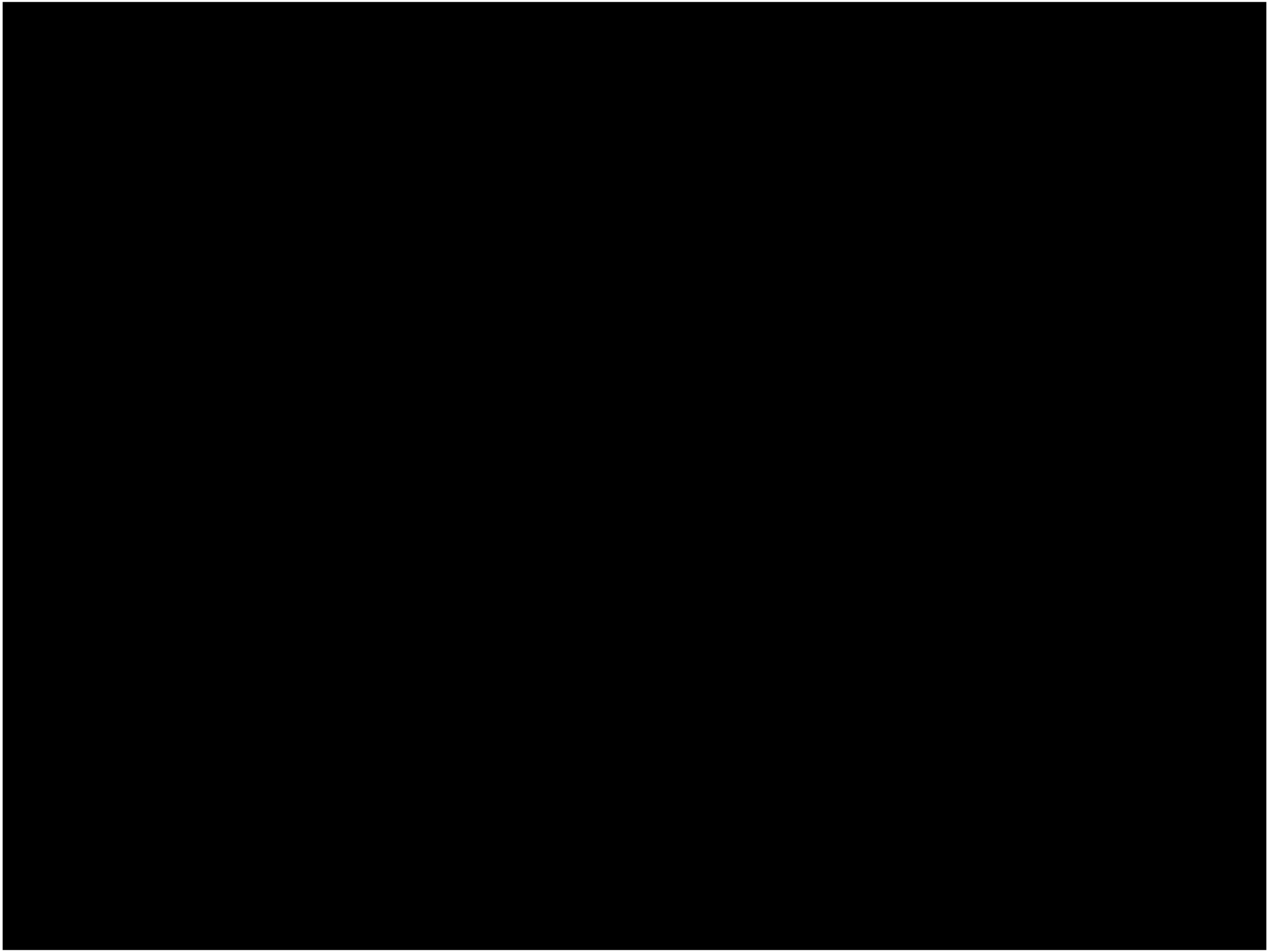




Cemented THR

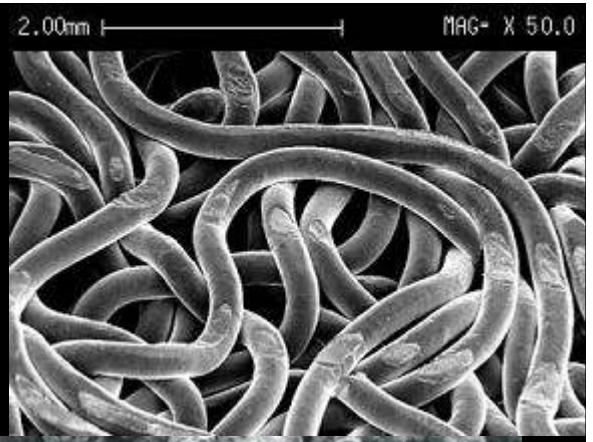
- Improved cementing techniques
- Improved results

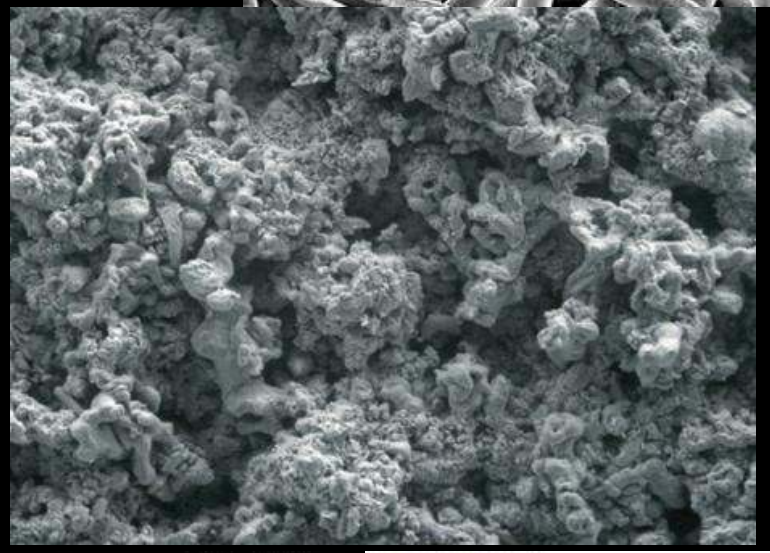


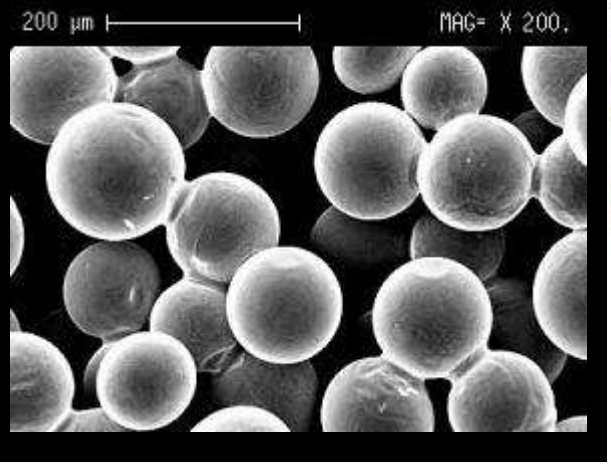


Uncemented THR

- Uncemented
  - Porous surface or hydroxyapatite
  - Titanium alloys
  - Proximal or extensive coating
  - Stress shielding



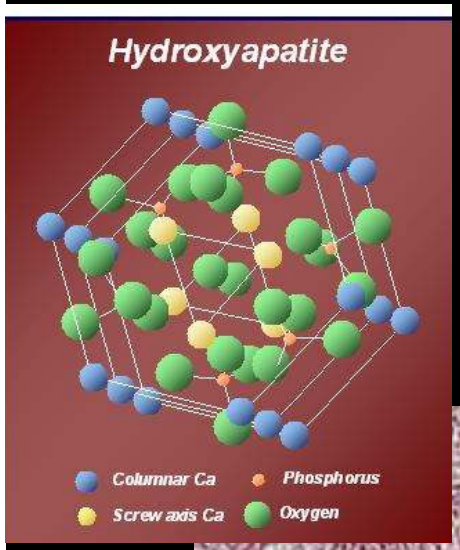


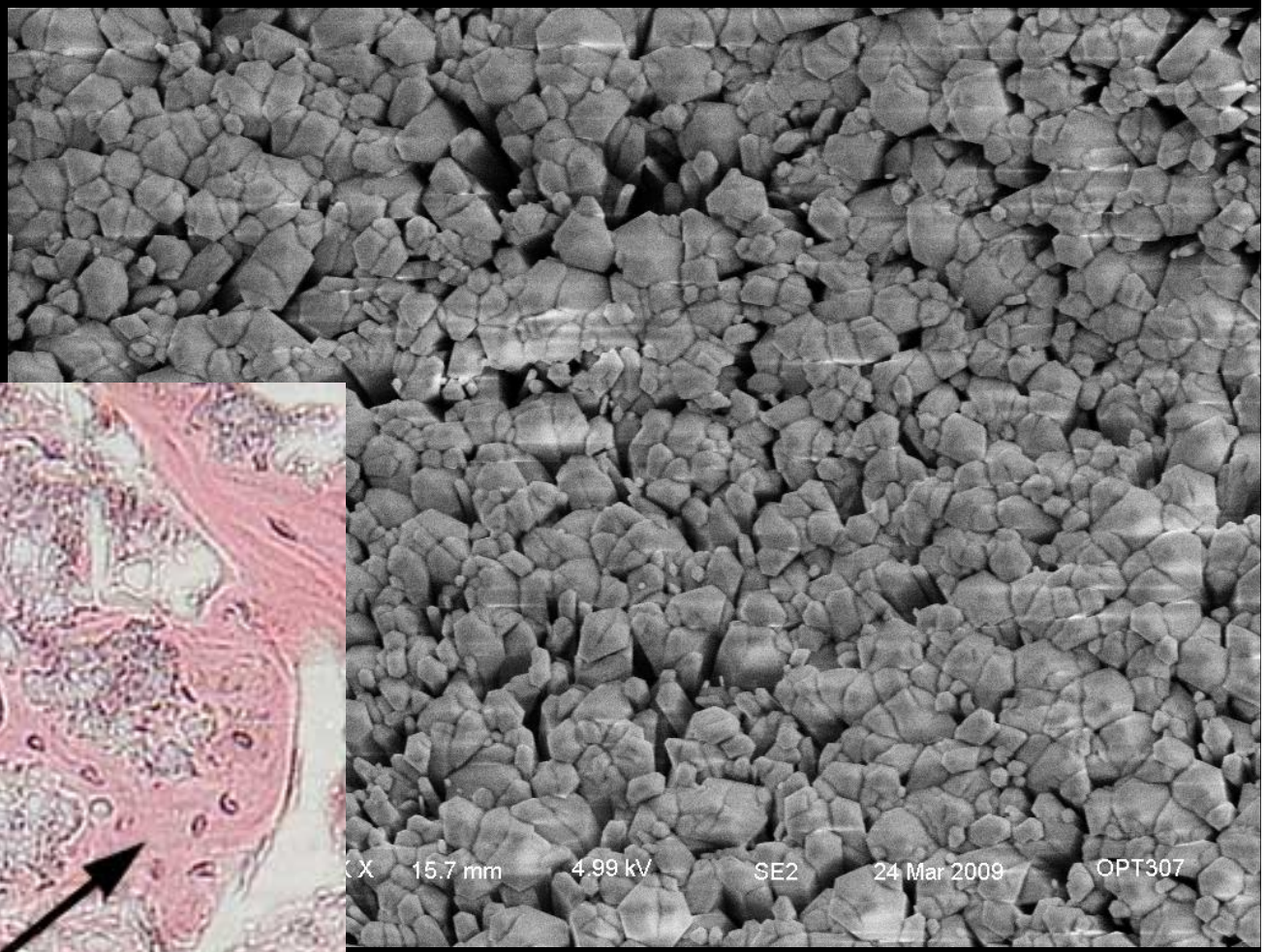


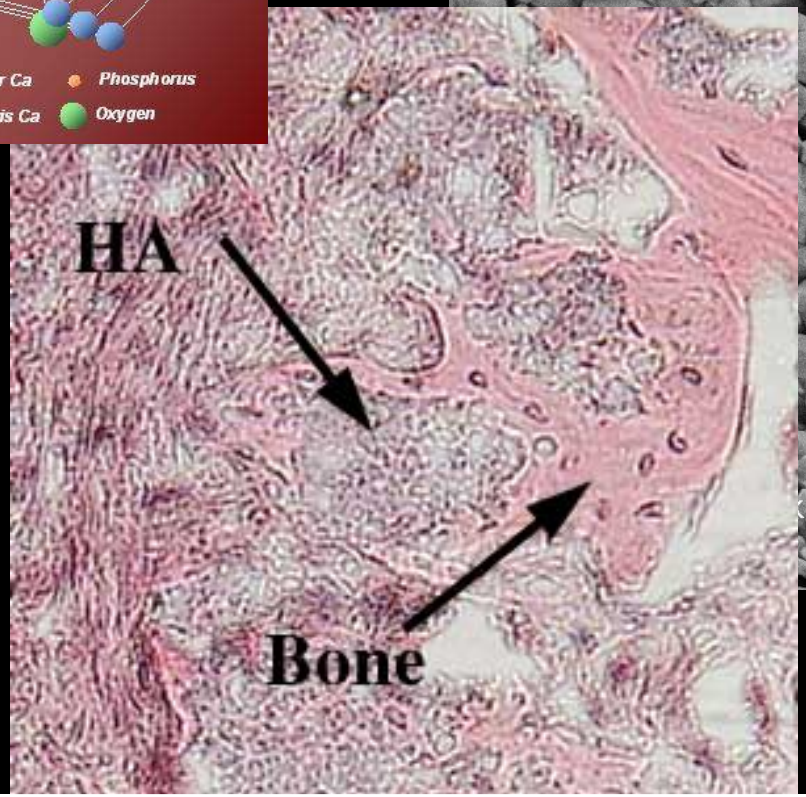
Uncemented THR

- Uncemented
  - Porous surface or hydroxyapatite
  - Titanium alloys
  - Proximal or extensive coating
  - Stress shielding

Calcium hydroxyapatite

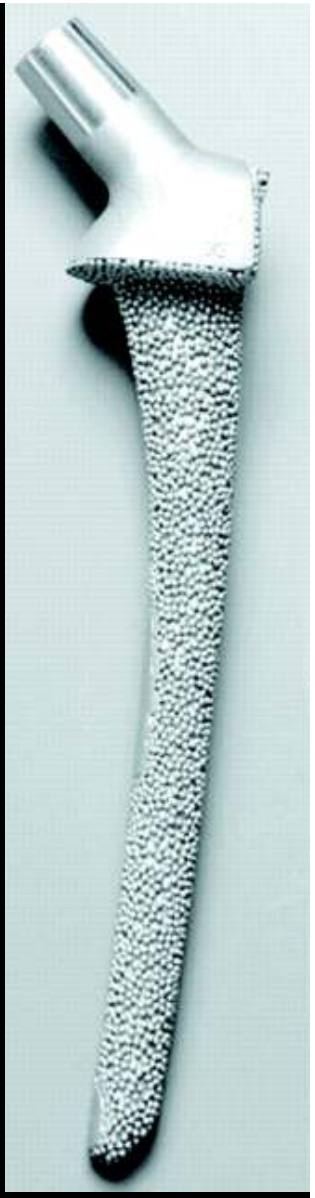






Uncemented THR

- Uncemented
  - Porous surface or hydroxyapatite
  - Titanium alloys
  - Proximal or extensive coating
  - Stress shielding

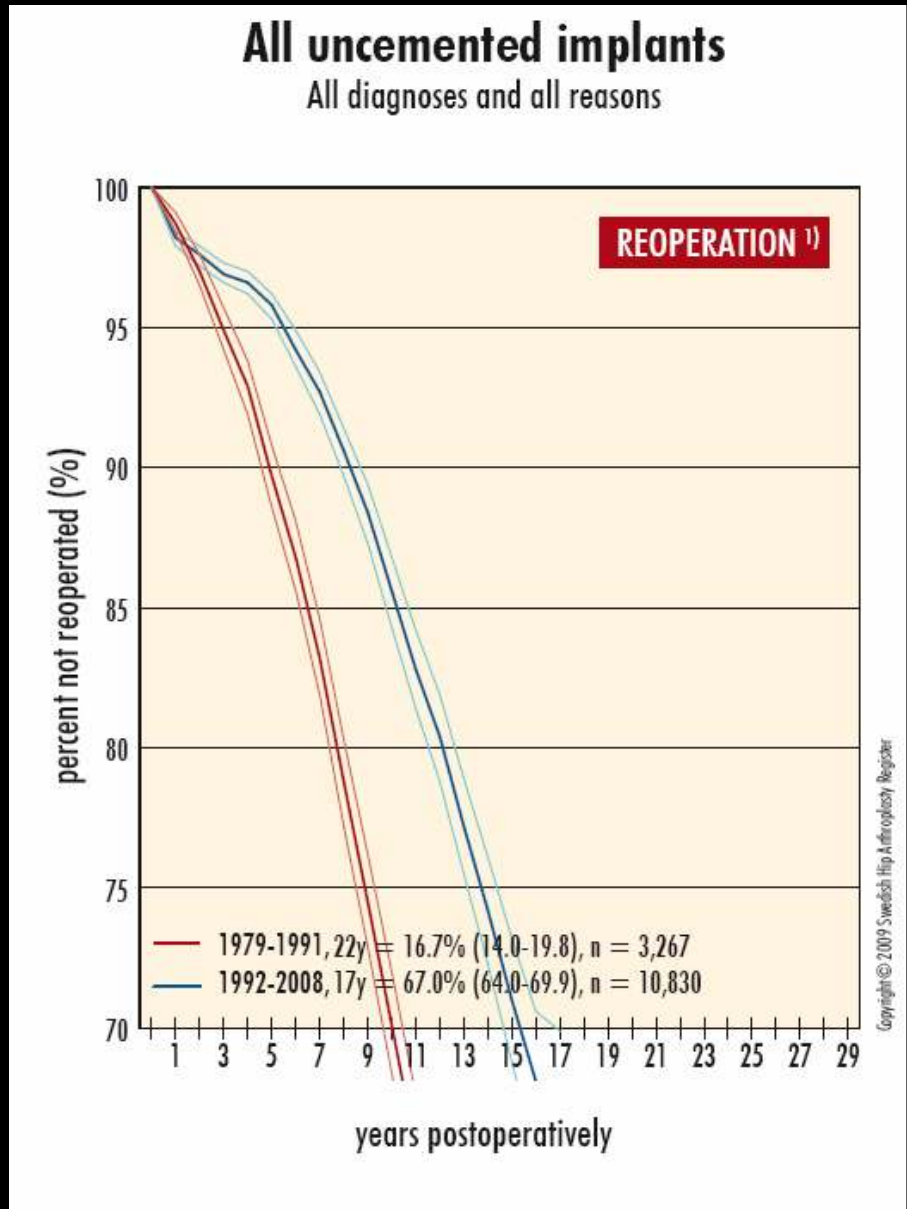


Uncemented THR

- Uncemented
  - Porous surface or hydroxyapatite
  - Titanium alloys
  - Proximal or extensive coating
  - Stress shielding

Uncemented THR

- Improved results



Arguments for & against

Arguments for & against

- Cemented
  - Immediate solid fixation
  - Lower early complication rate
  - Proven, durable results
  - Ease of revision

Arguments for & against

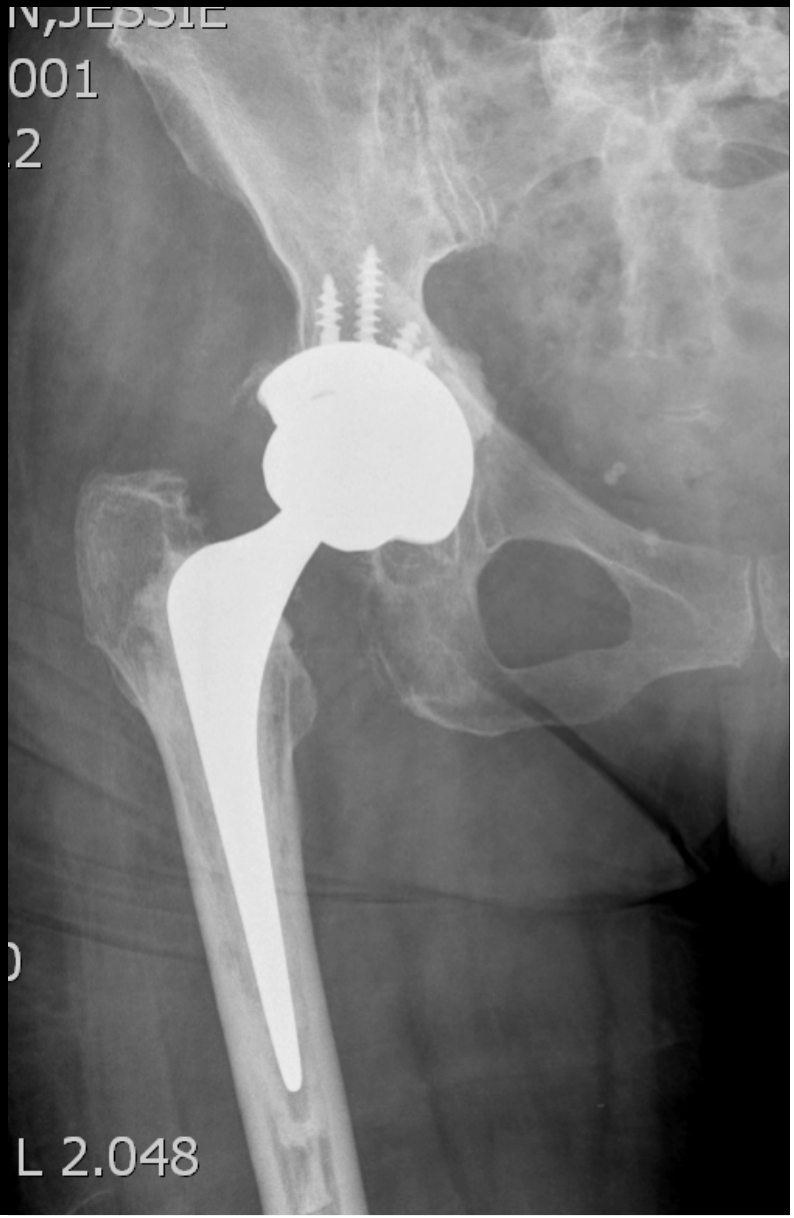
- Cemented
  - Immediate solid fixation
  - Lower early complication rate
  - Proven, durable results
  - Ease of revision

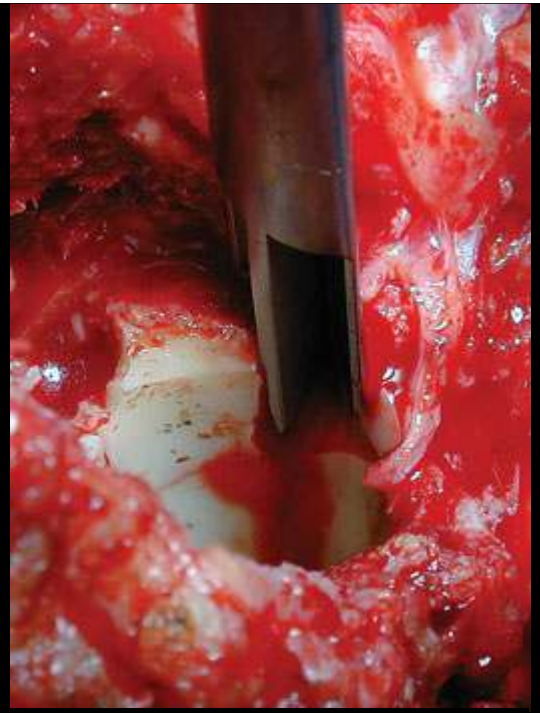
Arguments for & against

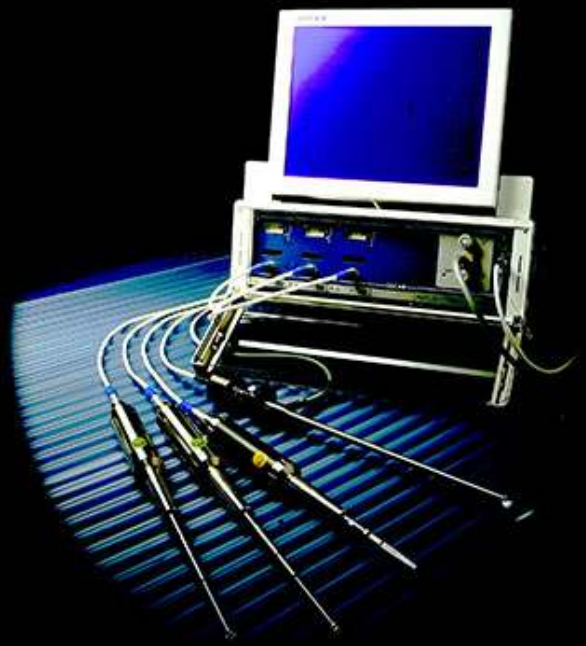
- Cemented
  - Immediate solid fixation
  - Lower early complication rate
  - Proven, durable results
  - Ease of revision

Arguments for & against

- Cemented
  - Immediate solid fixation
  - Lower early complication rate
  - Proven, durable results
  - Ease of revision







Arguments for & against

- Uncemented
  - Shorter operation time (infection, VTE)
  - Modularity
  - Bearings options
  - Biological fixation
- Revision
  - Can be difficult

Arguments for & against

- Uncemented
  - Shorter operation time (infection, VTE)
  - Modularity
  - Bearings options
  - Biological fixation
- Revision
  - Can be difficult

Arguments for & against

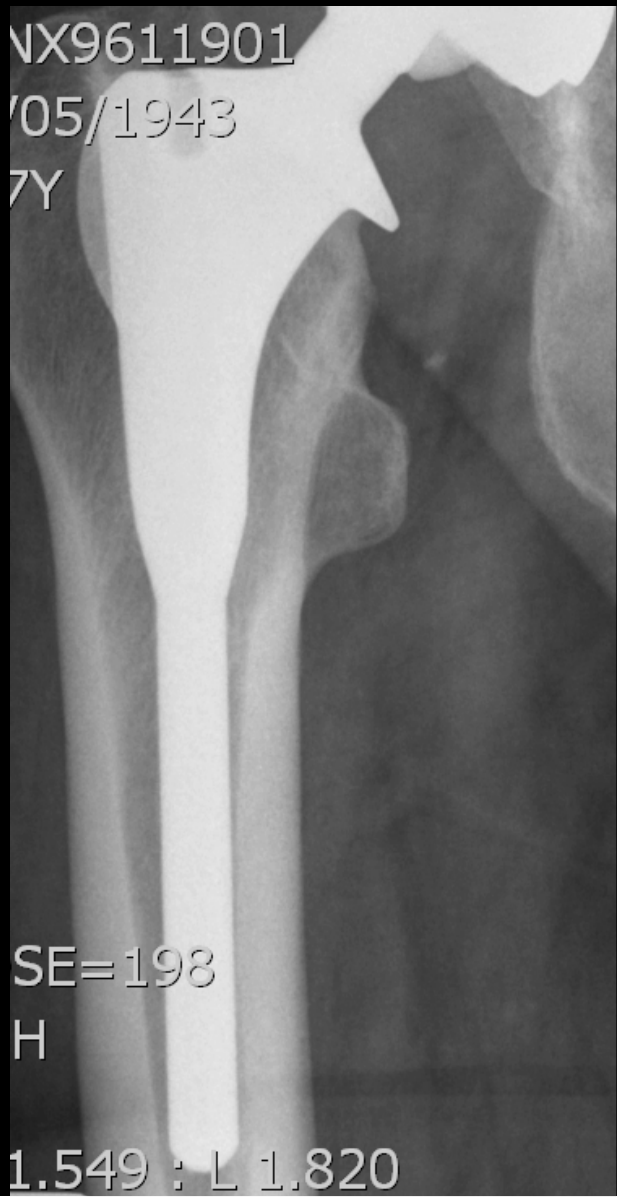
- Uncemented
  - Shorter operation time (infection, VTE)
  - Modularity
  - Bearings options
  - Biological fixation
- Revision
  - Can be difficult

Arguments for & against

- Uncemented
  - Shorter operation time (infection, VTE)
  - Modularity
  - Bearings options
  - Biological fixation
- Revision
  - Can be difficult

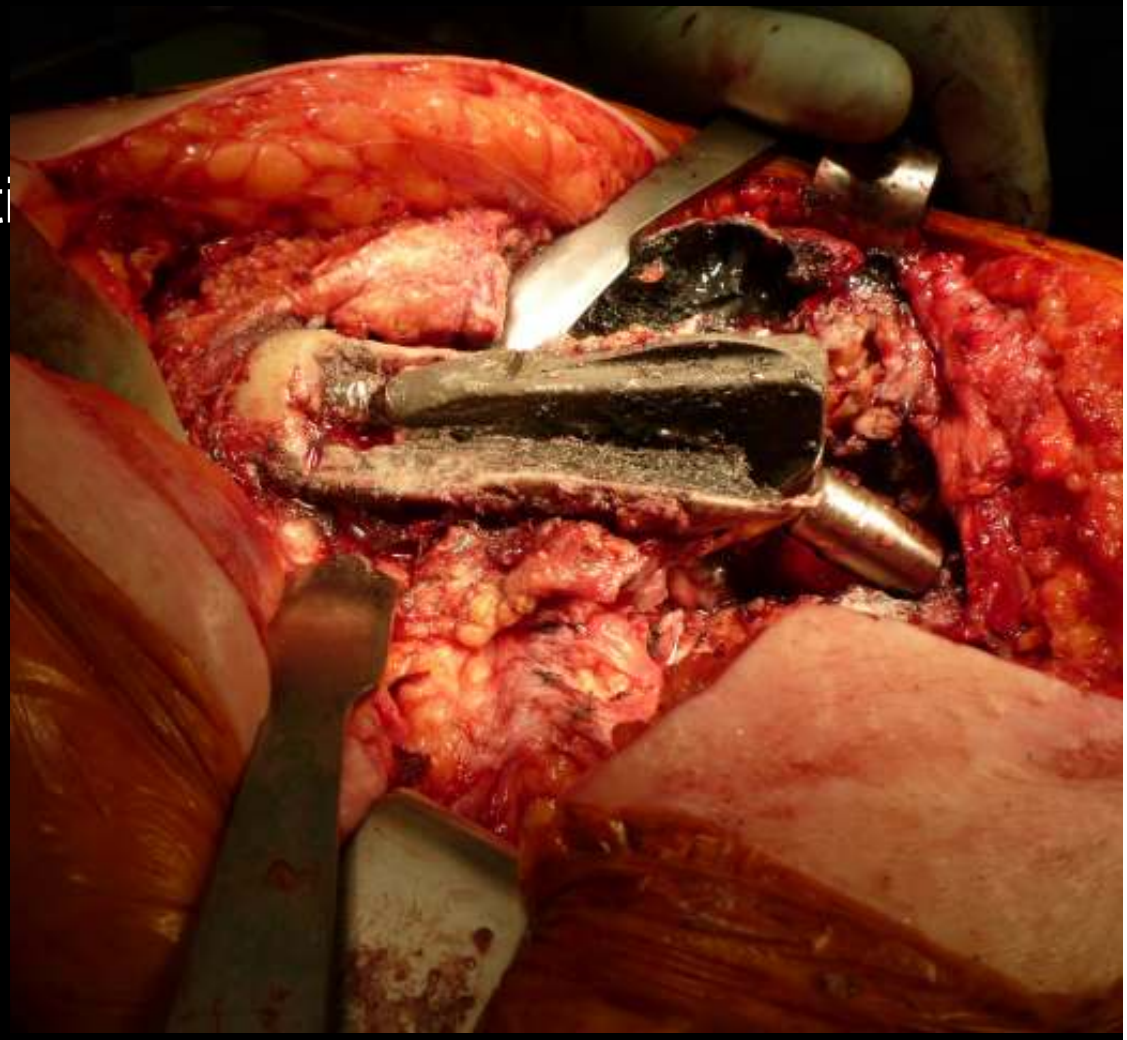
Arguments for & against

- Uncemented
  - Shorter operation time (infection, VTE)
  - Modularity
  - Bearings options
  - Biological fixation
- Revision
  - Can be difficult



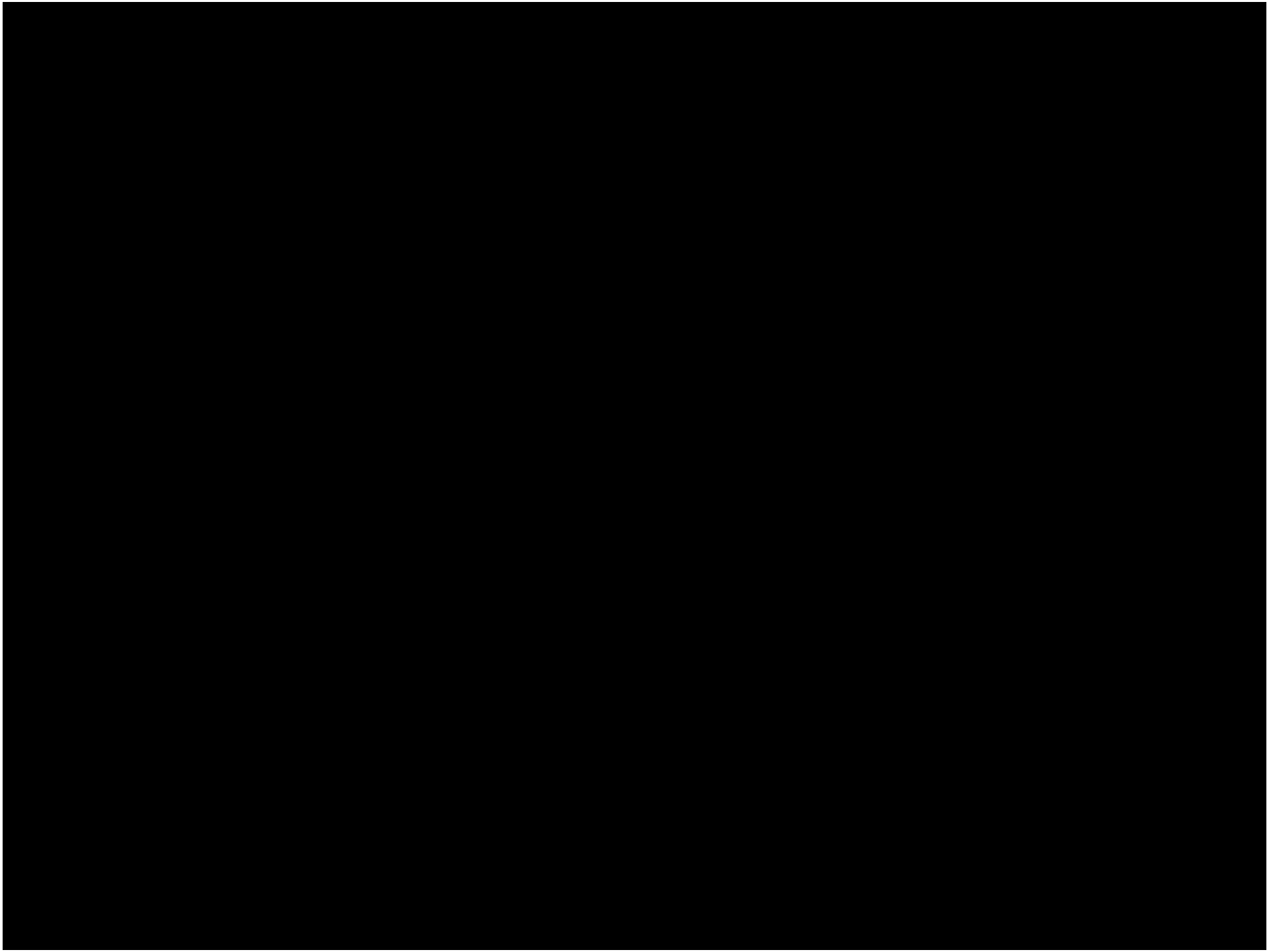
Arguments for & against

- Uncemented
  - Shorter operation ti
    (infection, VTE)
  - Modularity
  - Bearings options
  - Biological fixation
- Revision
  - Can be difficult



Arguments for & against

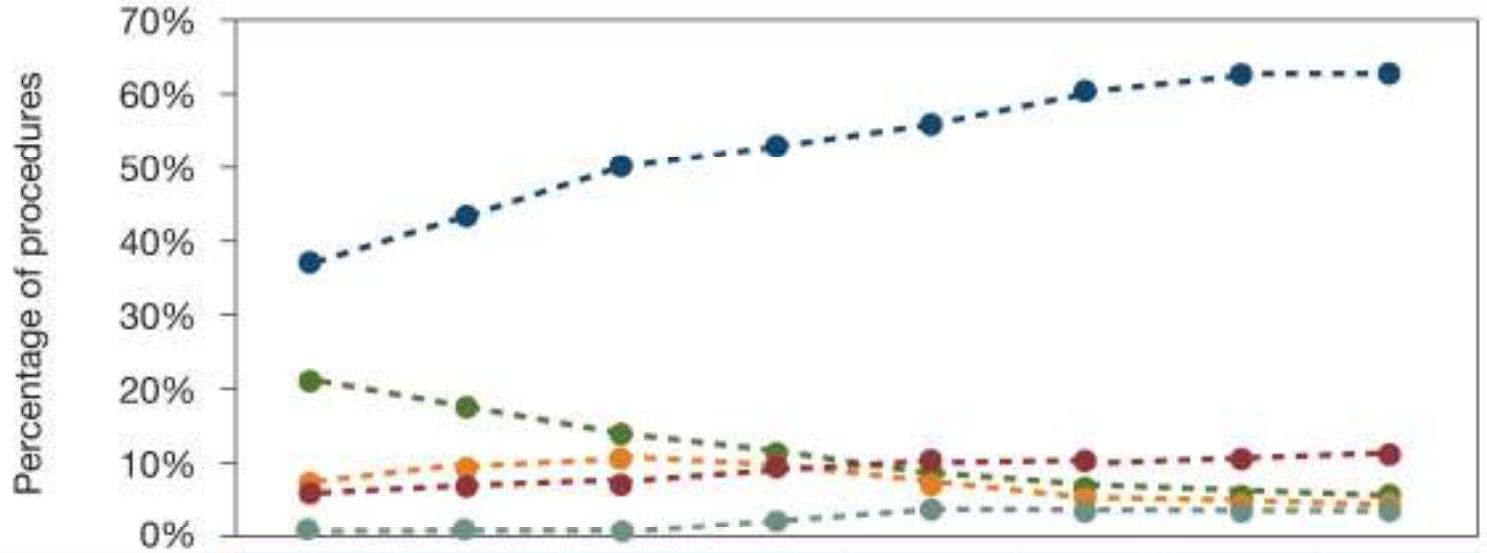
- Uncemented
  - Shorter operation time (infection, VTE)
  - Modularity
  - Bearings options
  - Biological fixation
- Revision
  - Can be difficult



What are we using

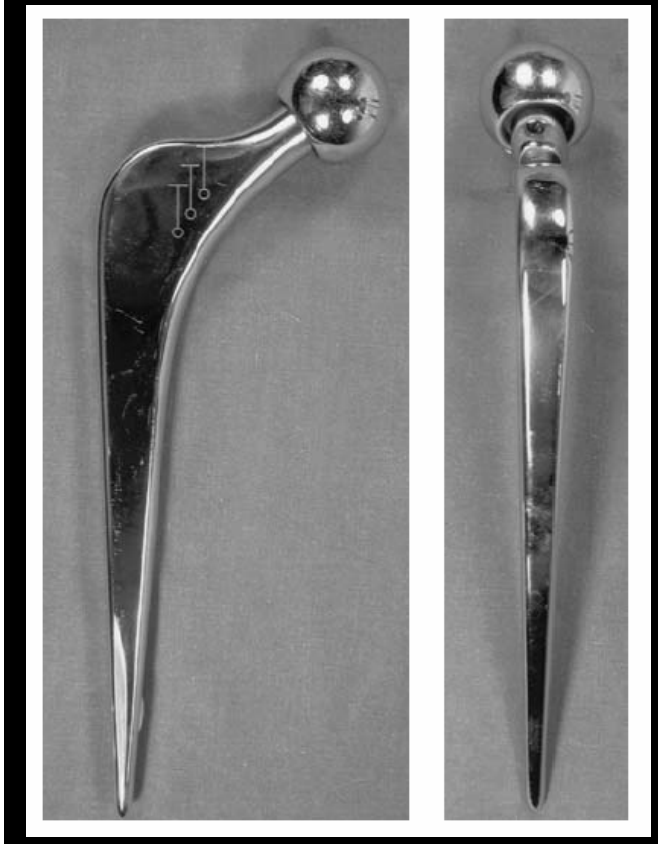
Figure 2.8

Top five cemented hip stem brands, usage trends 2003 to 2010.



Year	2003	2004	2005	2006	2007	2008	2009	2010
Number of components used	19,095	32,298	35,960	34,291	35,909	34,043	32,900	32,237

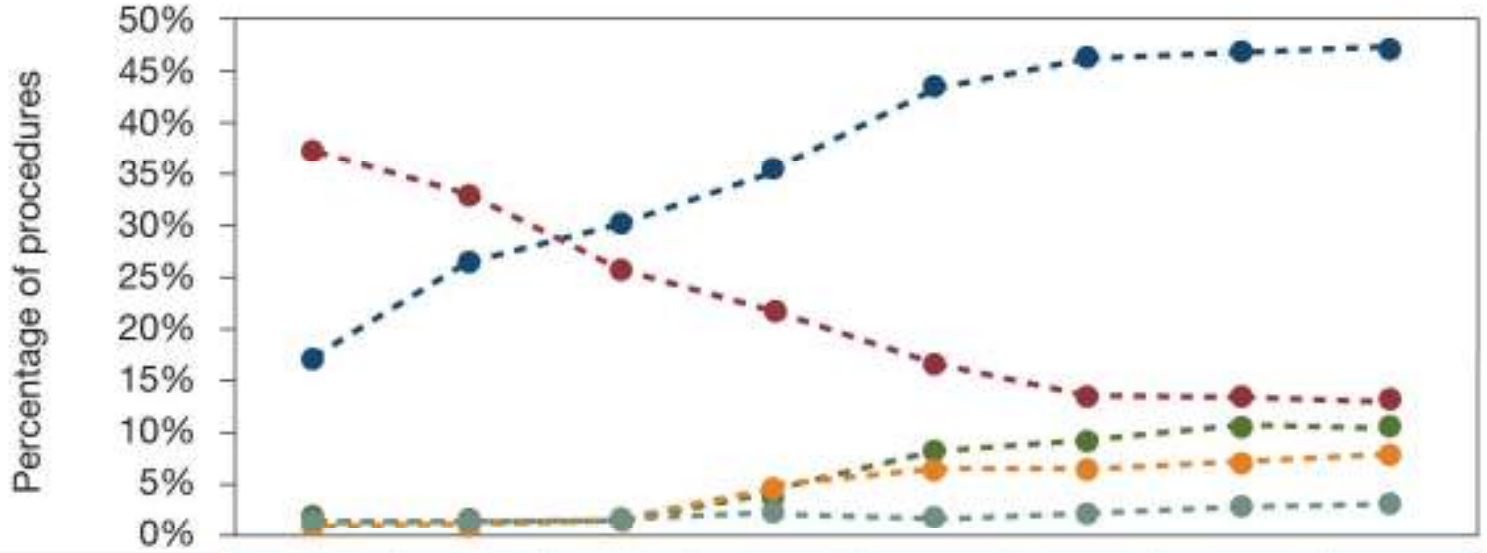
What are we using



What are we using

Figure 2.10

Top five cementless hip stem brands, usage trends 2003 to 2010.



Year	2003	2004	2005	2006	2007	2008	2009	2010
Number of components used	4,093	9,753	14,198	17,731	22,540	28,216	30,869	32,122

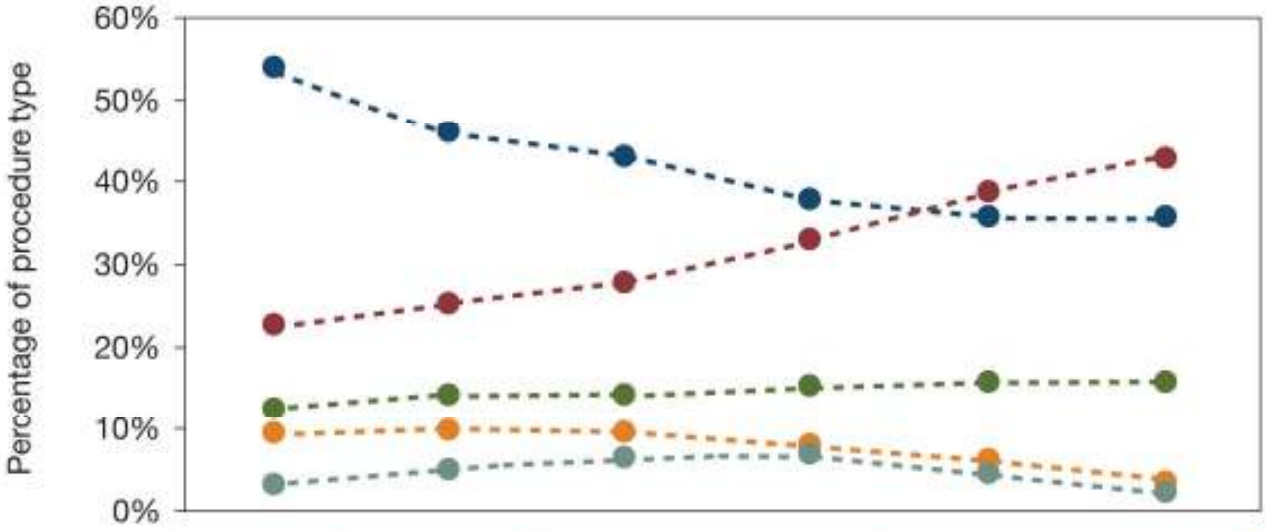
Corail Furlong HAC Accolade Taperloc Profemur

Uncemented

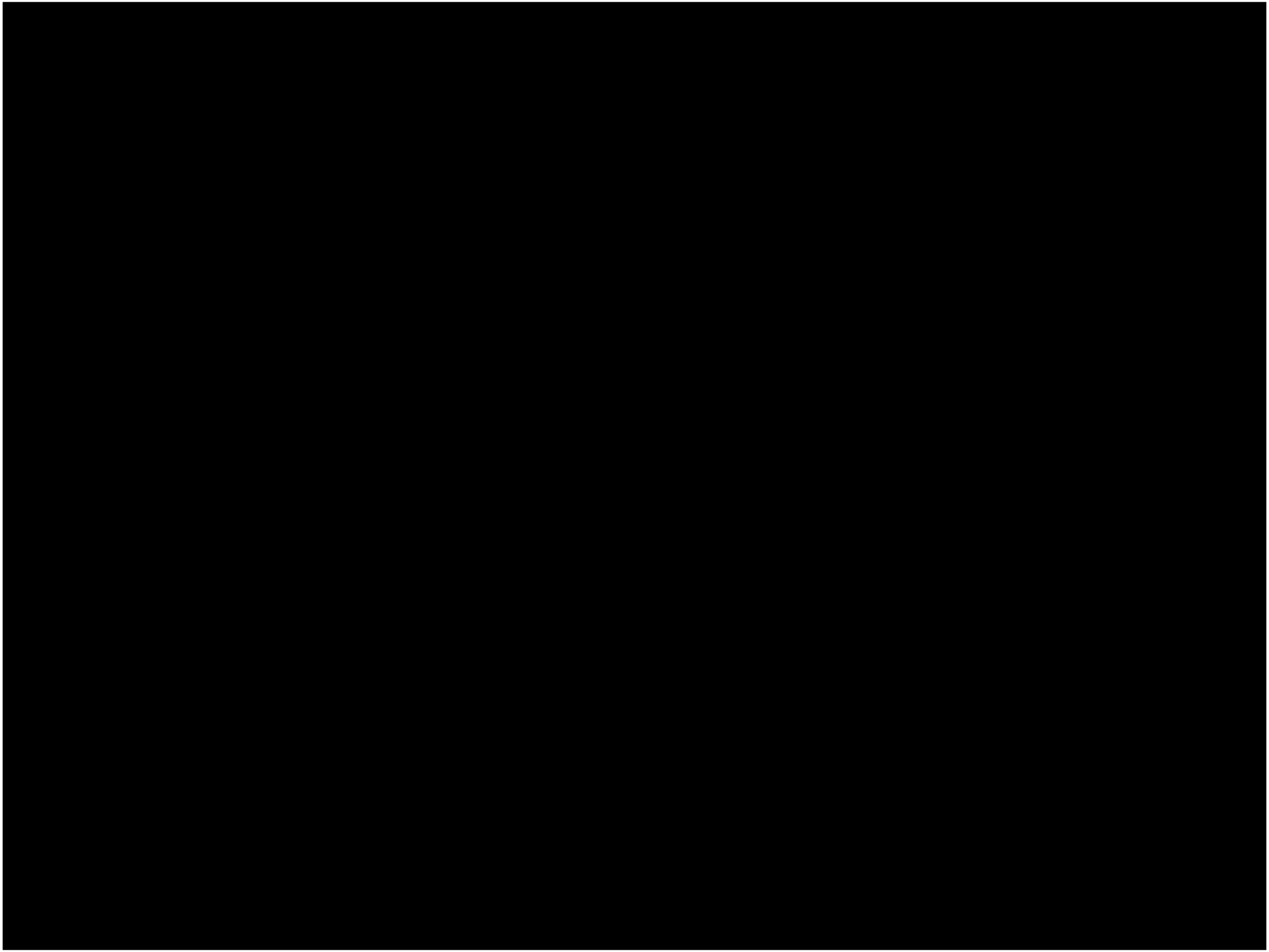
What are we using

Figure 2.3

Type of primary hip replacement procedures undertaken between 2005 and 2010.



Year	2005	2006	2007	2008	2009	2010
Cemented	54%	46%	43%	38%	36%	36%
Cementless	22%	25%	28%	33%	39%	43%
Hybrid	12%	14%	14%	15%	16%	16%
Resurfacing	9%	10%	9%	8%	6%	3%
Large head with resurfacing cup	3%	5%	6%	7%	4%	2%
Number of procedures	56,350	59,715	66,615	69,839	69,936	68,907



What’s the evidence?

Do cemented hips work?

- Berry et al

JBJS Am 2002;84A:171-177

- 2000 consecutive Charnleys, 25 year FU

- 77.5% no re-operation
- 86.5% no revision for aseptic loosening

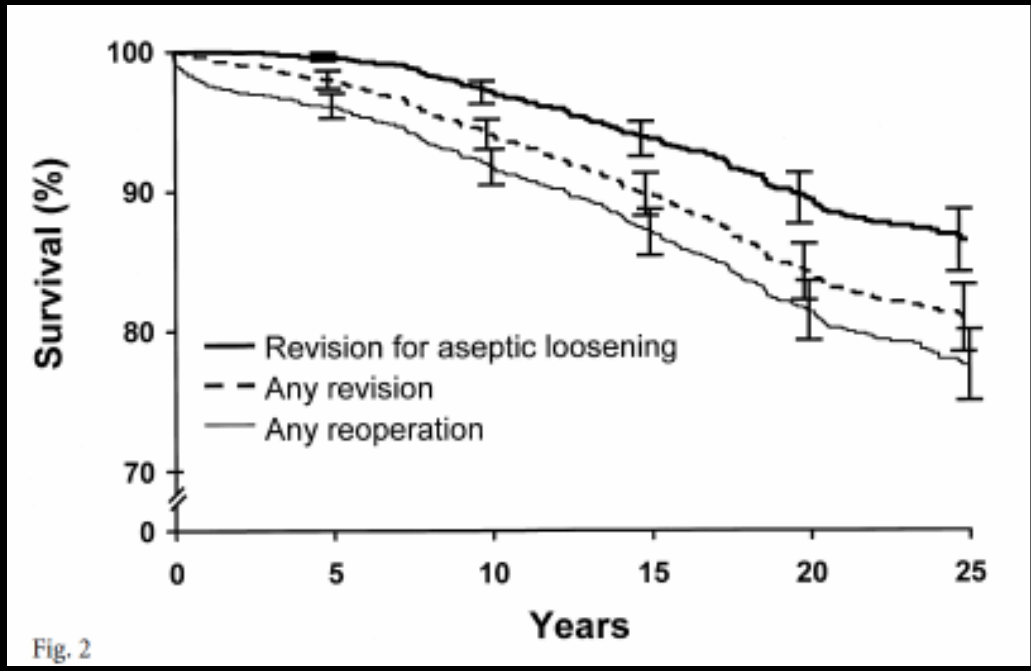


Fig. 2

Do cemented hips work?

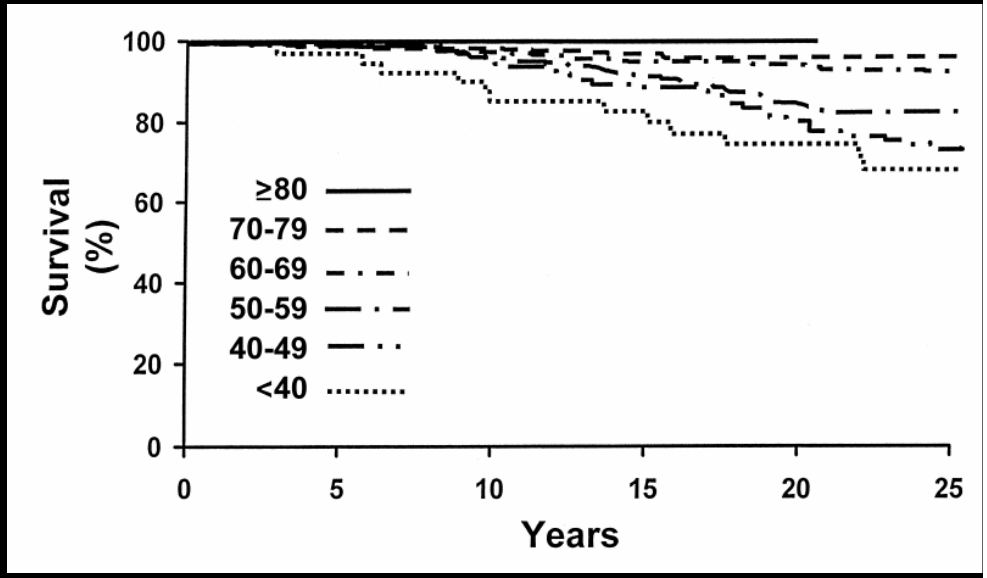
- Berry et al

JBJS Am 2002;84A:171-177

- 2000 consecutive Charnleys, 25 year FU

- 77.5% no re-operation
- 86.5% no revision for aseptic loosening

- Survivorship
  - 100% >80s
  - 68.7% <40s



Do cemented hips work?

- Callaghan et al JBJS-Am 2004;86A:690-95
  - 88% survivorship Charnleys at 30years
- Exeter group Ling 2005
  - 30 year stem survivorship aseptic loosening 91.5% (83% worst case)
  - Cup survivorship 95% at 10; 81% at 20 & 72% at 30 years

Do uncemented hips work?

Published results

THE JOURNAL OF BONE & JOINT SURGERY (BRITISH)

Cementless total hip replacement using second-generation components

A 12- TO 16-YEAR FOLLOW-UP

VOL. 92-B, No. 12, DECEMBER 2010

J. R. McLaughlin, K. R. Lee

From Kennedy Center for the Hip and Knee, Oshkosh, Wisconsin, United States

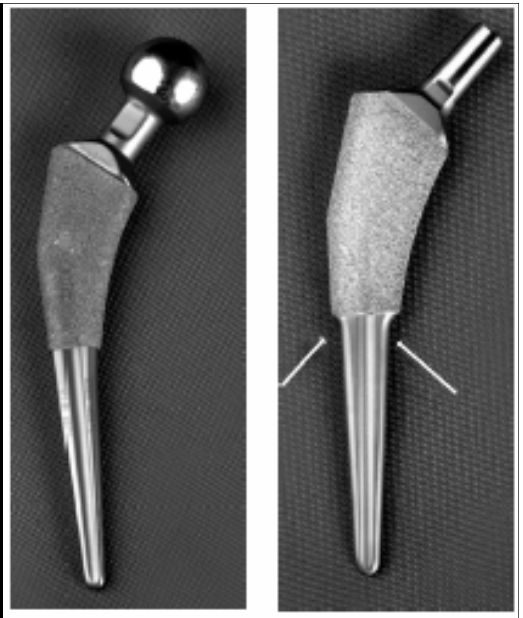


Fig. 1a

Fig. 1b

Photographs showing a) the first-generation non-modular Taperloc femoral component and b) the second-generation modular Taperloc component with a reduced profile distal to the porous coating (arrows).

Results

There were 123 THRs in 115 patients available for review. A revision for aseptic loosening had been required in three acetabular components (2%) at seven, seven and 11 years post-operatively. No femoral component had required revision for aseptic loosening, but one had needed a further operation following a peri-prosthetic fracture of the femur one year after the initial procedure.

Table I. Prevalence of aseptic loosening and revision of the femoral and acetabular components

	All hips (n = 172)	Hips in living patients (n = 123)
Femoral components (%)		
Revision loosening	0 (0)	0 (0)
Revision all reasons	1 (1)	1 (1)
Radiological loosening	0 (0)	0 (0)
Total	1 (1)	1 (1)
Acetabular components (%)		
Revision loosening	3 (2)	3 (2)
Revision all reasons	3 (2)	3 (2)
Radiological loosening	0 (0)	0 (0)
Total	3 (2)	3 (2)

Published results

THE JOURNAL OF BONE & JOINT SURGERY (BRITISH)

Results of a hydroxyapatite-coated (Furlong) total hip replacement

A 13- TO 15-YEAR FOLLOW-UP

A. A. Shetty,
R. Slack,
A. Tindall,
K. D. James,
C. Rand

From Medway Maritime Hospital, Kent, England

VOL. 87-B, No. 8, AUGUST 2005

We describe the survival of 134 consecutive JRI Furlong hydroxyapatite-coated uncemented total hip replacements. The mean follow-up was for 14.2 years (13 to 15).

The mean total Merle d'Aubigné and Postel score was 7.4 pre-operatively and 15.9 at follow-up. During the study period 22 patients died and six were lost to follow-up. None of the cups was revised. One stem was revised for a periprosthetic fracture following a fall but none was revised for loosening, giving a 99% survival at 13 years. Our findings suggest that the long-term results of these hydroxyapatite-coated prostheses are more than satisfactory.

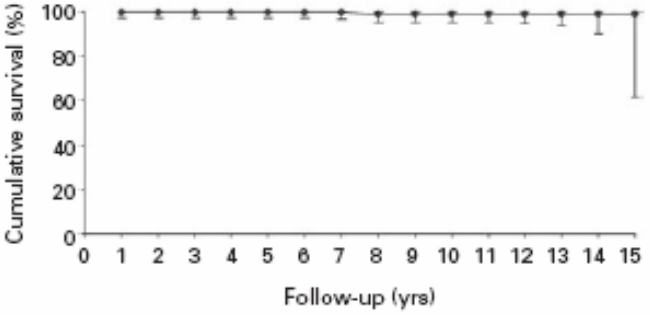


Fig. 4a

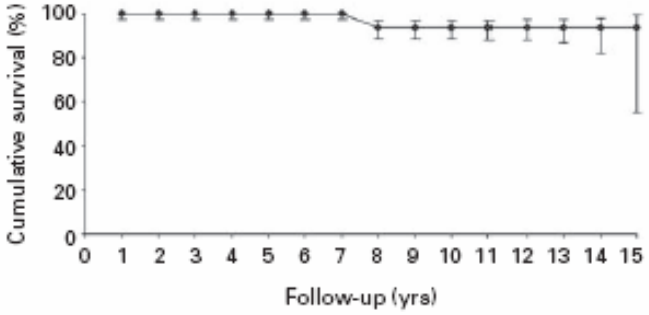


Fig. 4b

Survival curves showing the a) best and b) worst-case scenarios.

Published results

THE JOURNAL OF BONE & JOINT SURGERY (Br)

Long-term results of a hydroxyapatite-coated femoral component in total hip replacement

A 15- TO 21-YEAR FOLLOW-UP STUDY

S. S. Rajaratnam,
C. Jack,
A. Tavakkolizadeh,
M. D. George,
R. J. Fletcher,
M. Hankins,
J. A. N. Shepperd

From Conquest Hospital, St Leonards-on-Sea, England

VOL. 90-B, No. 1, JANUARY 2008

Between 1986 and 1991 we implanted 331 consecutive Furlong hydroxyapatite-coated femoral components of a total hip replacement in 291 patients. A cemented acetabular

mean follow-up of 17.5 years (15 to 21). Only two patients (0.68%) were lost to follow-up. With revision of the femoral component for any reason as the endpoint, the survival at a mean of 17 years was 97.4% (95% confidence interval 94.1 to 99.5), and with revision for aseptic loosening as the endpoint it was 100%. The survival at a maximum of 21 years with revision of the femoral component for any reason as the endpoint was 97.4% (95%

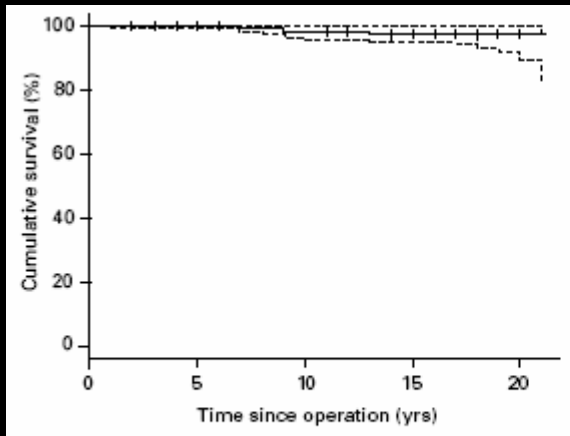


Fig. 3

Kaplan Meier survival curve (with 95% confidence intervals) with revision of the femoral component for any reason as the endpoint.

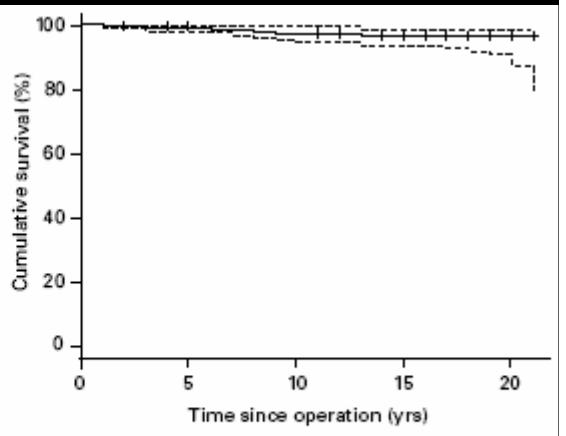


Fig. 4

Kaplan Meier survival curve (with 95% confidence intervals) showing the worst case scenario. The two cases lost to follow-up have been included as stem failures.

Published results

THE JOURNAL OF BONE & JOINT SURGERY (BRITISH)

Hydroxyapatite-ceramic-coated femoral components in young patients followed-up for 16 to 19 years

AN UPDATE OF A PREVIOUS REPORT

N. N. Shah,
A. J. Edge,
D. W. Clark

From Worthing and Southlands Hospitals NHS Trust, Shoreham-by-Sea, England

VOL. 91-B, No. 7, JULY 2009

In 2004 we described the ten-year prospective results of 38 total hip replacements using the Furlong hydroxyapatite-ceramic-coated femoral component in 35 patients < 50 years old. We have now reviewed the surviving 35 arthroplasties in 33 patients at a mean of 16 years (10.3 to 19.9). The mean age of the surviving patients at the time of operation was 41.3 years (26.0 to 49.0). Of these, eight have undergone revision of their acetabular component for aseptic loosening. None of the femoral components has had revision for aseptic loosening giving a survival rate of 100% at 16 years (95% confidence interval 89% to 100%).

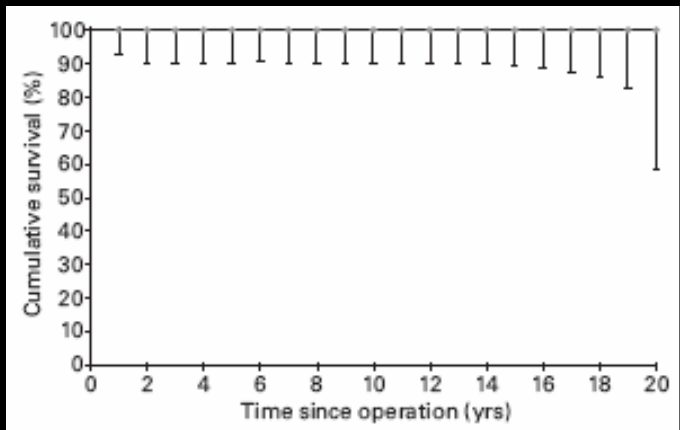


Fig. 2

The cumulative survival curve for the Furlong femoral component with the 95% confidence interval shown.

Registry data

ISSN 1745-1450 (Online)

National Joint Registry
www.njrcentre.org.uk

Surgical data to 31st December 2010

National Joint Registry for England and Wales

8th Annual Report 2011

Table 3.4 Summary of NJR data, April 2003 to December 2010.

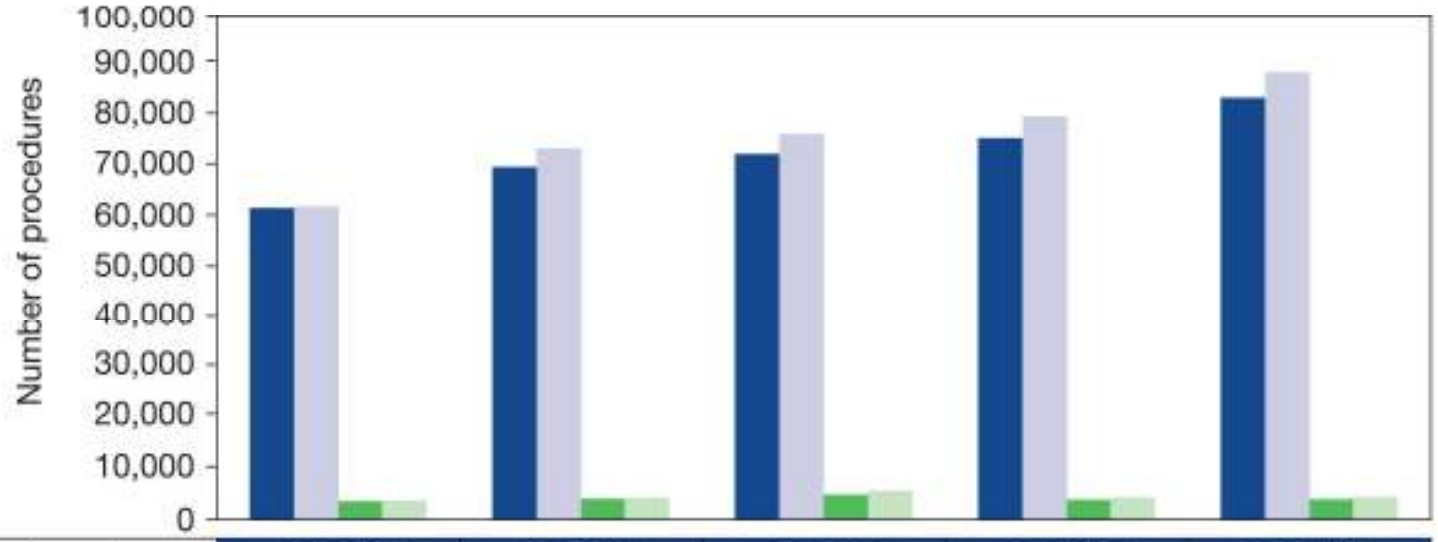
Year of operation	Primary hip	Revision hip	Primary knee	Revision knee	All
Number of all NJR records					
2003 (April-Dec)	26,432	2,826	24,662	1,157	55,077
2004	48,032	5,238	46,577	2,339	102,186
2005	57,490	6,342	60,704	3,265	127,801
2006	59,715	6,689	62,240	3,755	132,399
2007	66,616	7,436	73,297	4,287	151,636
2008	69,839	7,533	77,208	4,659	159,239
2009	69,936	7,848	78,021	4,963	160,768
2010	68,907	7,852	76,870	5,109	158,738
All years	466,967	51,764	499,579	29,534	1,047,844

Increasing numbers

Figure 1.4

Total hip and knee joint replacement procedures entered into the NJR, 2006/07 to 2010/11, recorded by the country in which the procedure took place.

Source: Procedures entered into the NJR 1st April 2006 to 31st March 2011.

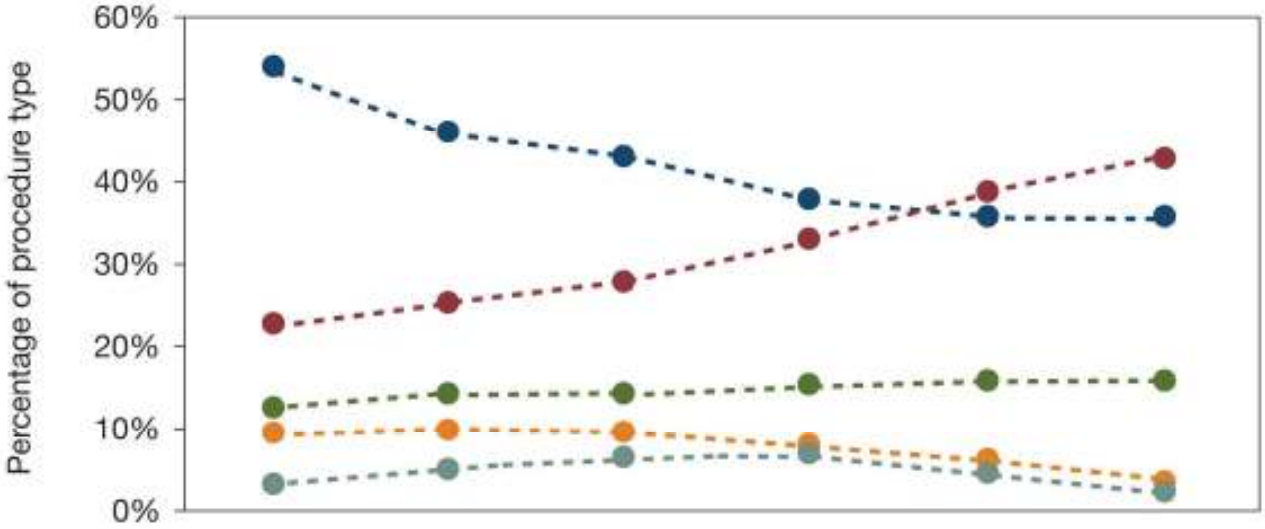


Procedures by year and country	2006/07	2007/08	2008/09	2009/10	2010/11
England hip	61,287	69,381	72,184	75,108	83,014
England knee	61,425	73,042	76,244	79,565	87,424
Wales hip	3,661	4,180	4,918	3,928	4,024
Wales knee	3,894	4,300	5,657	4,618	4,521

Trend towards uncemented THR

Figure 2.3

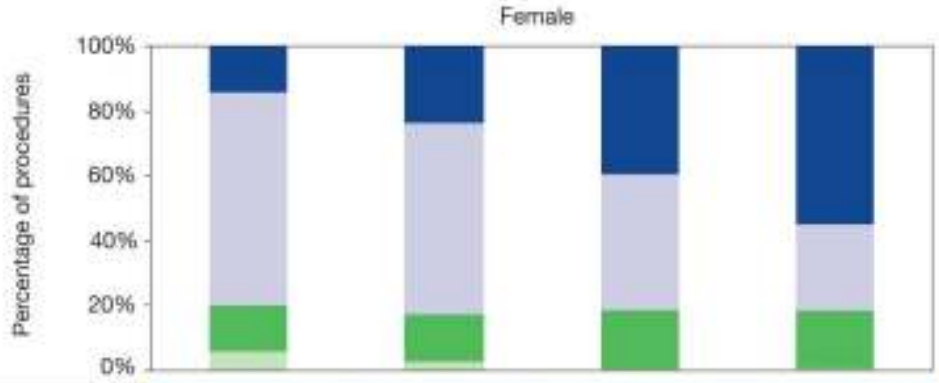
Type of primary hip replacement procedures undertaken between 2005 and 2010.



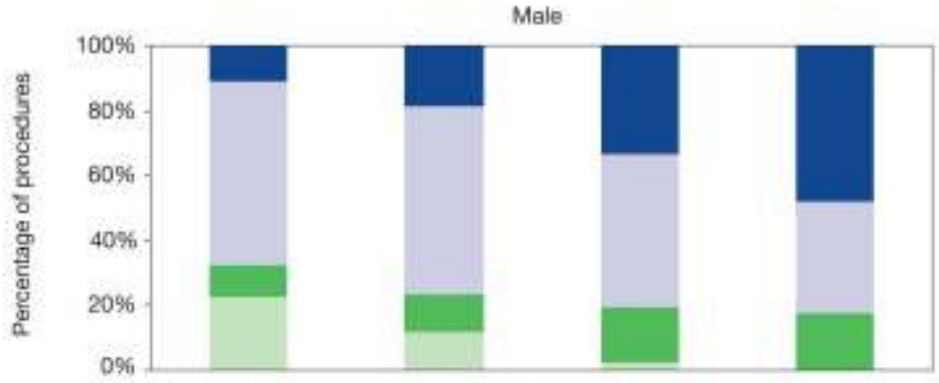
Year	2005	2006	2007	2008	2009	2010
Cemented	54%	46%	43%	38%	36%	36%
Cementless	22%	25%	28%	33%	39%	43%
Hybrid	12%	14%	14%	15%	16%	16%
Resurfacing	9%	10%	9%	8%	6%	3%
Large head with resurfacing cup	3%	5%	6%	7%	4%	2%
Number of procedures	56,350	59,715	66,615	69,839	69,936	68,907

Figure 2.4(a)

Age and gender for primary hip replacement patients in 2010.



Age group	<55	55 - 64	65 -74	75+
Cemented	15%	25%	40%	56%
Cementless	65%	58%	42%	27%
Hybrid	14%	15%	18%	18%
Resurfacing	6%	2%	<1%	<1%
Number of patients	3,856	8,081	13,593	13,200



Age group	<55	55 - 64	65 -74	75+
Cemented	11%	19%	34%	48%
Cementless	56%	58%	47%	35%
Hybrid	10%	12%	17%	17%
Resurfacing	22%	11%	2%	<1%
Number of patients	3,958	6,677	9,042	6,706

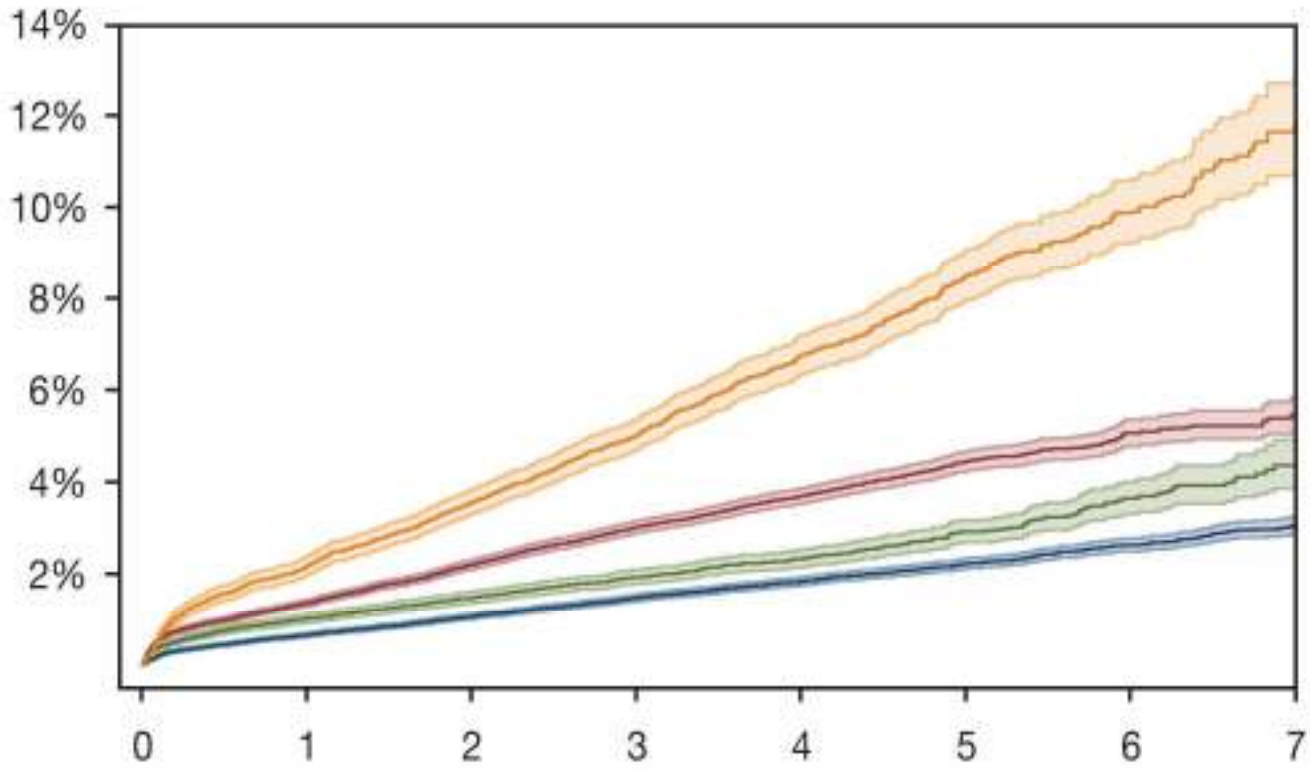


Figure 3.1

Risk of revision following primary hip replacement (cumulative hazard with 95% confidence intervals), by prosthesis type.

Table 3.9 Estimated revision rates following primary hip replacement, by prosthesis type (95% confidence intervals).

	Prosthesis type				All
	Cemented	Uncemented	Hybrid	Resurfacing	
30 days	0.18% (0.16%-0.21%)	0.50% (0.46%-0.55%)	0.36% (0.31%-0.42%)	0.45% (0.37%-0.55%)	0.34% (0.32%-0.36%)
90 days	0.34% (0.31%-0.38%)	0.78% (0.73%-0.84%)	0.56% (0.49%-0.63%)	1.13% (0.99%-1.28%)	0.58% (0.55%-0.61%)
Year 1	0.67% (0.62%-0.71%)	1.37% (1.30%-1.45%)	1.03% (0.93%-1.13%)	2.17% (1.98%-2.38%)	1.07% (1.03%-1.10%)
Year 2	1.07% (1.01%-1.13%)	2.20% (2.11%-2.31%)	1.48% (1.36%-1.61%)	3.55% (3.30%-3.83%)	1.69% (1.64%-1.74%)
Year 3	1.48% (1.41%-1.56%)	3.02% (2.89%-3.16%)	1.93% (1.79%-2.09%)	5.01% (4.69%-5.35%)	2.32% (2.25%-2.38%)
Year 4	1.84% (1.75%-1.93%)	3.70% (3.54%-3.86%)	2.34% (2.16%-2.53%)	6.74% (6.33%-7.18%)	2.89% (2.81%-2.97%)
Year 5	2.23% (2.12%-2.34%)	4.44% (4.24%-4.66%)	2.92% (2.69%-3.18%)	8.48% (7.95%-9.04%)	3.50% (3.40%-3.60%)
Year 6	2.64% (2.50%-2.78%)	5.07% (4.79%-5.35%)	3.64% (3.30%-4.01%)	9.88% (9.22%-10.59%)	4.07% (3.95%-4.20%)
Year 7	3.08% (2.89%-3.28%)	5.46% (5.09%-5.85%)	4.36% (3.86%-4.93%)	11.81% (10.80%-12.90%)	4.65% (4.48%-4.83%)
Base	132,511 (44.1%)	102,688 (34.2%)	43,933 (14.6%)	21,242 (7.1%)	300,374 (100%)

ISSN 1745-1450 (Online)

National Joint Registry
www.njrcentre.org.uk

Surgical data to December 2009

National Joint Registry for England and Wales

7th Annual Report 2010

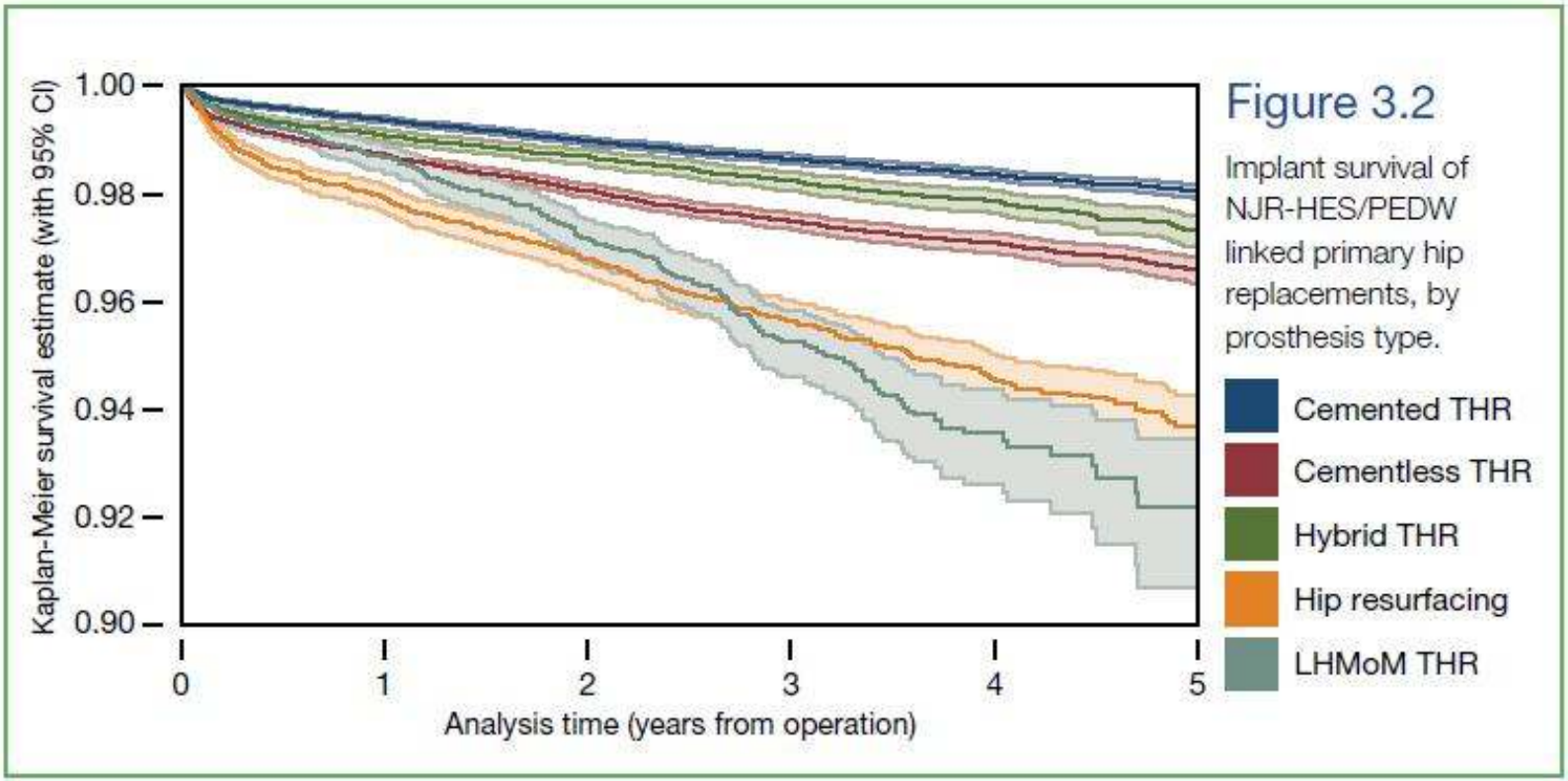


Figure 3.2

Implant survival of NJR-HES/PEDW linked primary hip replacements, by prosthesis type.

Table 3.1 Revision rates by prosthesis type at one, three and five years for primary hip replacement procedures, undertaken between 1st April 2003 and 31st December 2009, which were linked to a HES/PEDW episode.

Prosthesis type	Number of patients	Revision rates (95% CI)		
		One year	Three years	Five years
Cemented	99,359	0.6% (0.6% to 0.7%)	1.4% (1.3% to 1.5%)	2.0% (1.8% to 2.1%)
Cementless	62,937	1.3% (1.2% to 1.4%)	2.5% (2.4% to 2.7%)	3.4% (3.2% to 3.7%)
Hybrid	31,662	0.9% (0.8% to 1.0%)	1.8% (1.6% to 1.9%)	2.7% (2.4% to 3.0%)
Resurfacing	13,853	2.1% (1.9% to 2.3%)	4.3% (4.0% to 4.8%)	6.3% (5.7% to 7.0%)
LHMoM THR	8,882	1.3% (1.1% to 1.6%)	4.7% (4.2% to 5.4%)	7.8% (6.6% to 9.3%)
All	216,693	1.0% (0.9% to 1.0%)	2.1% (2.0% to 2.1%)	2.9% (2.8% to 3.0%)

© National Joint Registry 2010

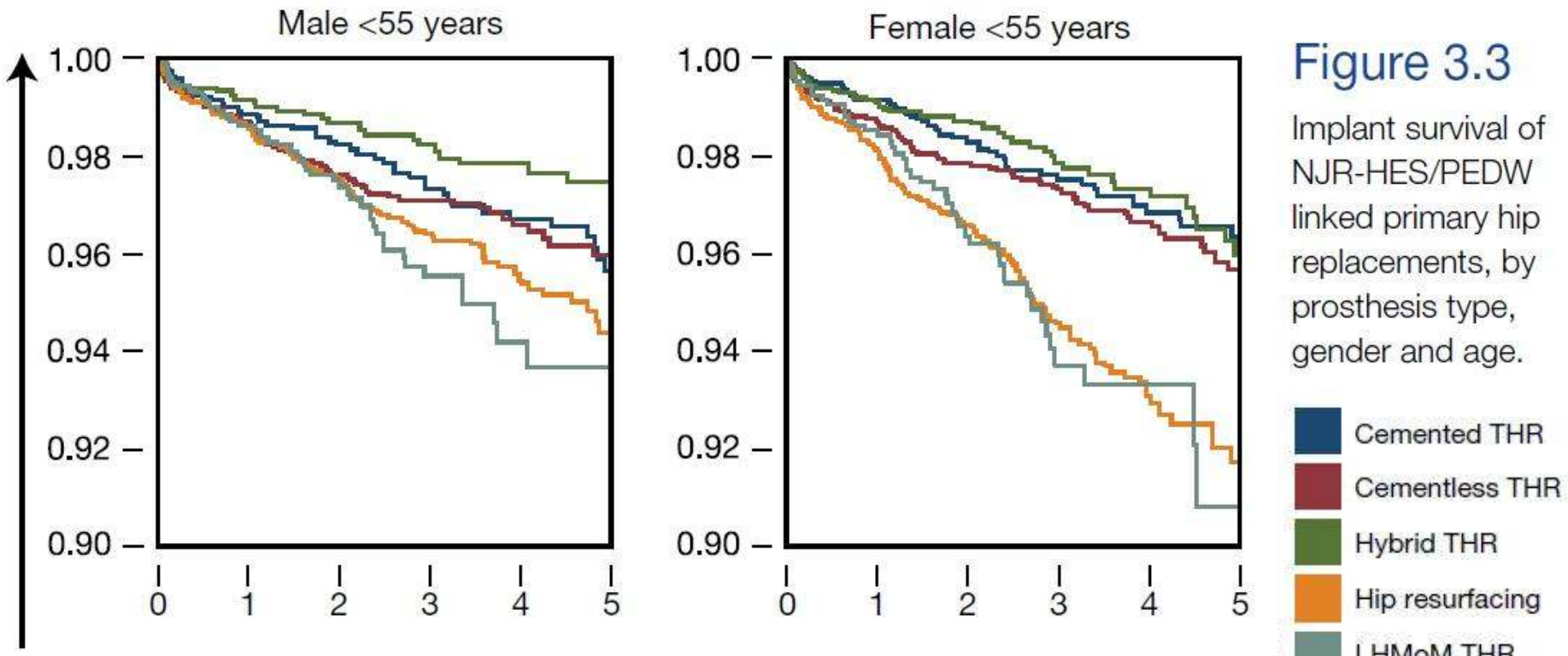
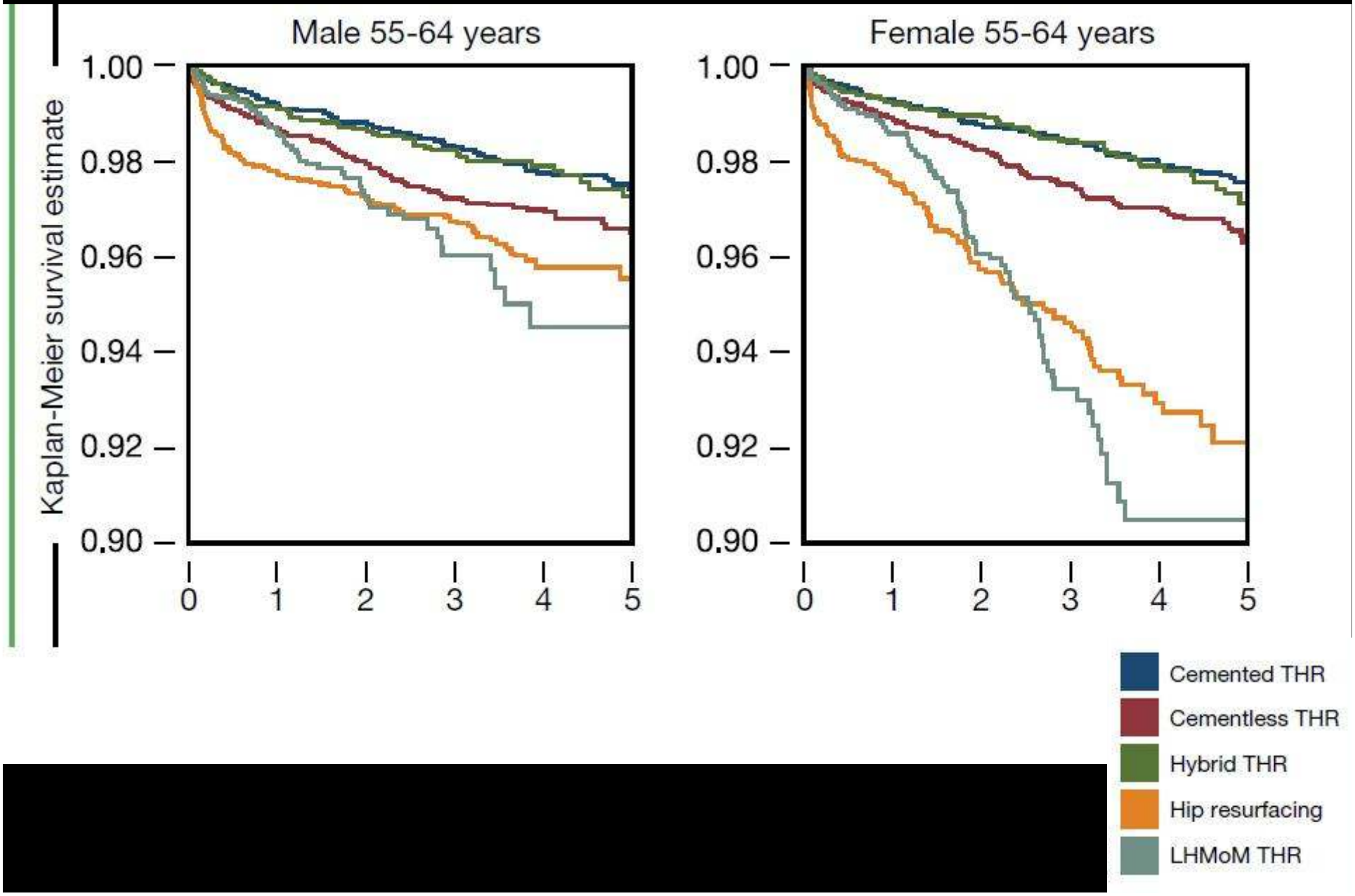
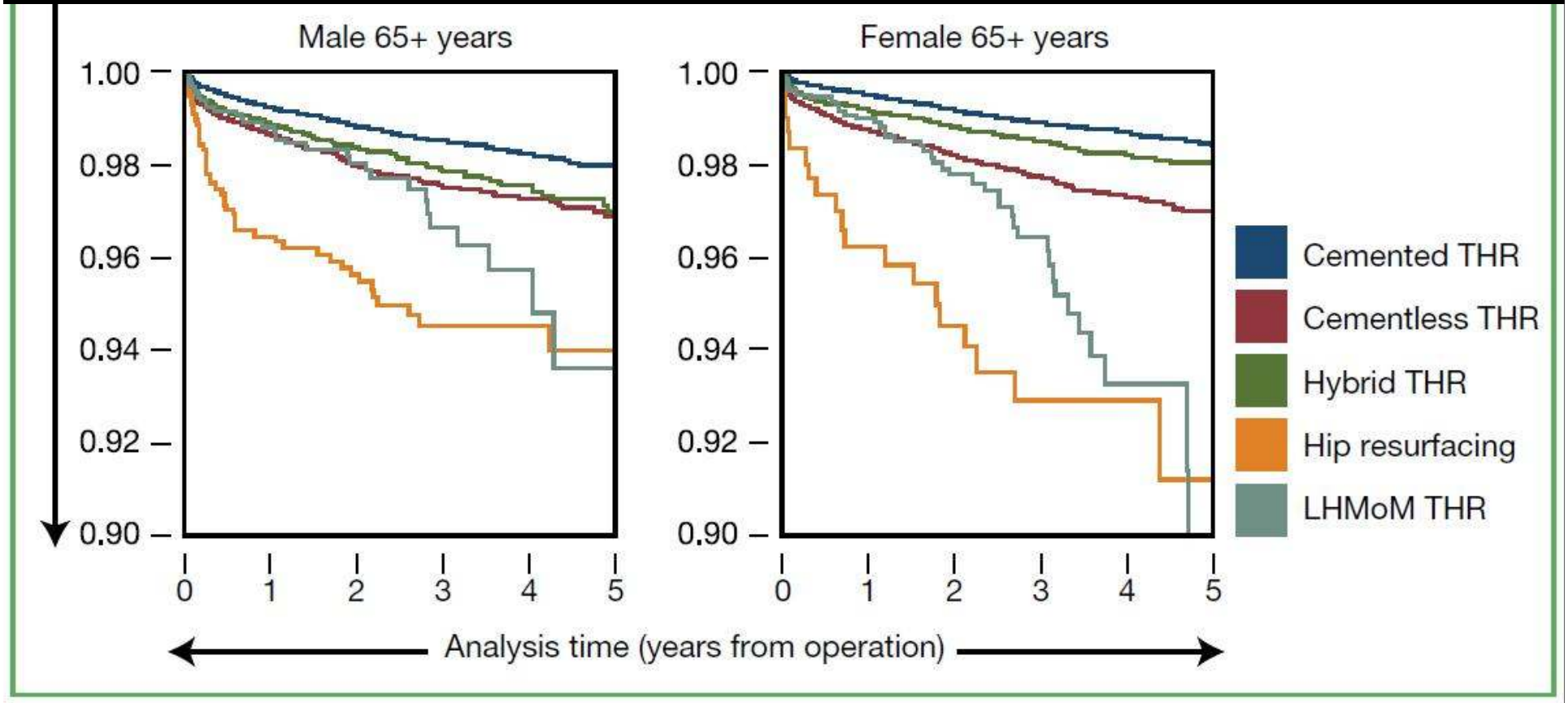


Figure 3.3

Implant survival of NJR-HES/PEDW linked primary hip replacements, by prosthesis type, gender and age.


Male 55-64 years
Female 55-64 years
Kaplan-Meier survival estimate
1.00
0.98
0.96
0.94
0.92
0.90
0
1
2
3
4
5
Cemented THR
Cementless THR
Hybrid THR
Hip resurfacing
LHMoM THR


Male 65+ years
Female 65+ years
1.00
0.98
0.96
0.94
0.92
0.90
0
1
2
3
4
5
Analysis time (years from operation)
Cemented THR
Cementless THR
Hybrid THR
Hip resurfacing
LHMoM THR

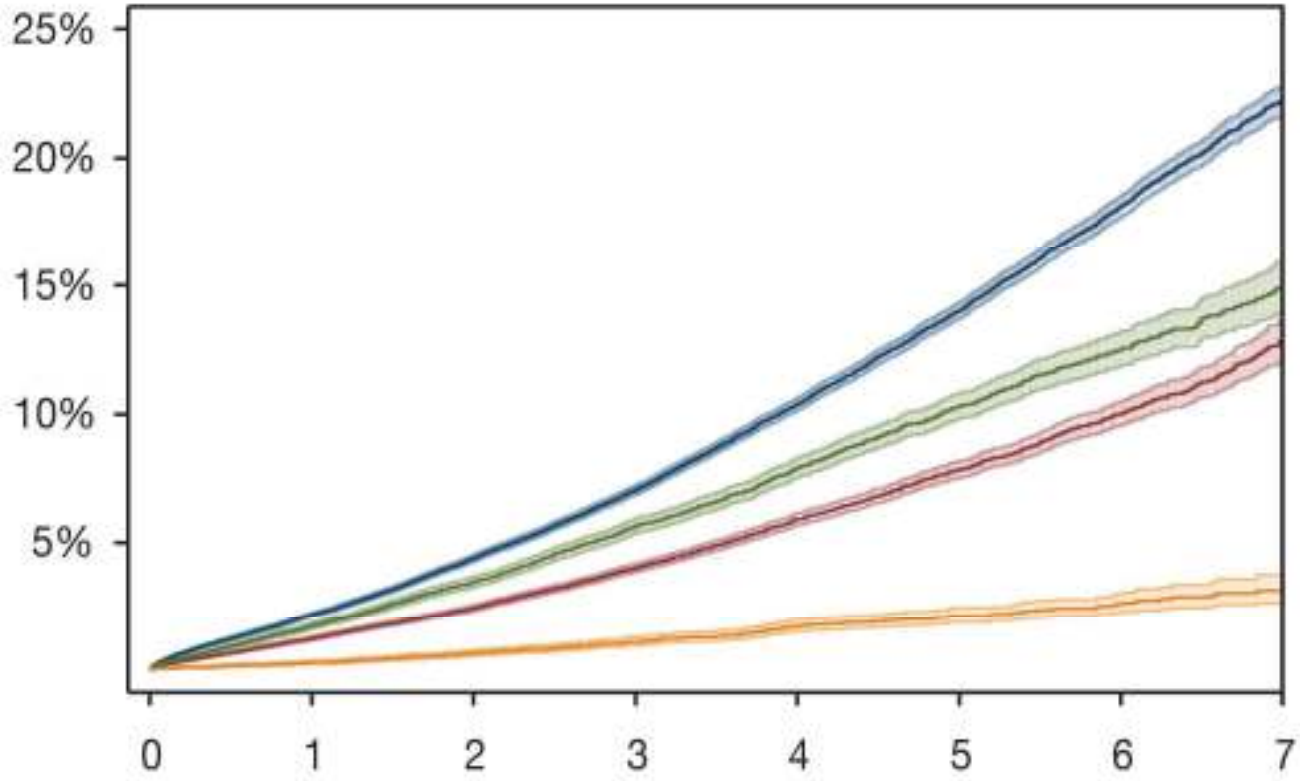


Figure 3.6

Risk of death following primary hip replacement (cumulative hazard with 95% confidence intervals), by prosthesis type.

- Cemented
- Uncemented
- Hybrid
- Resurfacing

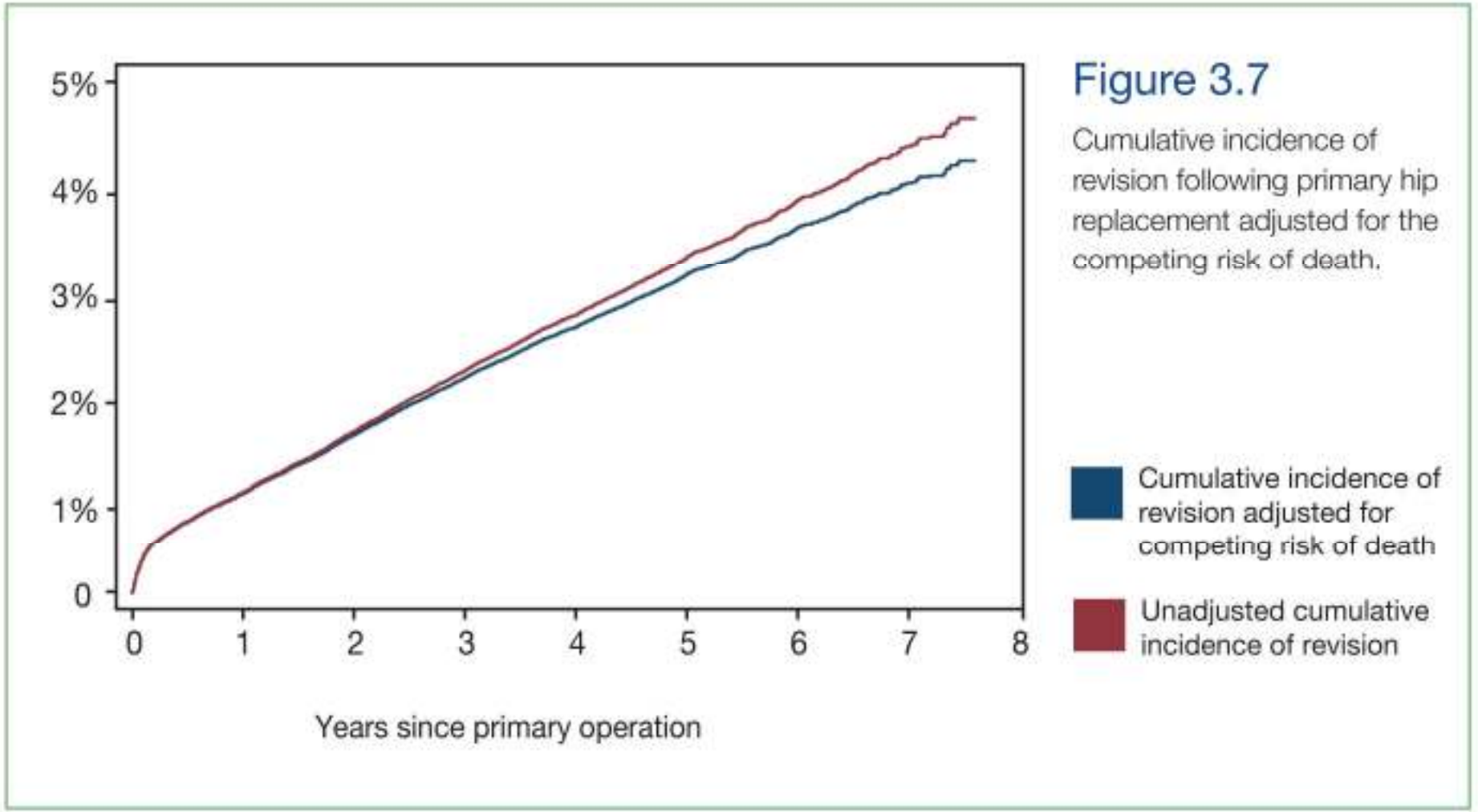


Figure 3.7

Cumulative incidence of revision following primary hip replacement adjusted for the competing risk of death.

Table 3.16 Estimated revision rates by hip prosthesis type (based on adjusted multivariable competing risks model for a patient aged under 60 with ASA<3 and osteoarthritis) (95% confidence intervals).

	Prosthesis type				
	Cemented	Uncemented	Hybrid	Resurfacing	Metal-on-metal stemmed prostheses
Male aged under 60					
Year 1	1.05% (0.91%-1.22%)	1.37% (1.23%-1.54%)	1.06% (0.87%-1.31%)	1.68% (1.50%-1.88%)	1.28% (1.10%-1.50%)
Year 3	2.12% (1.84%-2.44%)	2.67% (2.40%-2.96%)	1.89% (1.55%-2.29%)	3.74% (3.41%-4.10%)	3.73% (3.27%-4.26%)
Year 5	3.25% (2.83%-3.73%)	3.64% (3.28%-4.04%)	2.79% (2.30%-3.37%)	6.05% (5.55%-6.60%)	6.70% (5.88%-7.62%)
Base	3,076	7,171	1,943	8,765	3,223
Female aged under 60					
Year 1	0.83% (0.72%-0.96%)	1.23% (1.11%-1.37%)	0.83% (0.68%-1.01%)	2.91% (2.61%-3.25%)	1.72% (1.48%-2.01%)
Year 3	1.67% (1.45%-1.92%)	2.40% (2.17%-2.65%)	1.48% (1.22%-1.79%)	6.43% (5.88%-7.03%)	4.99% (4.40%-5.65%)
Year 5	2.57% (2.24%-2.95%)	3.27% (2.96%-3.62%)	2.19% (1.82%-2.64%)	10.33% (9.50%-11.22%)	8.92% (7.90%-10.06%)
Base	4,742	10,342	3,315	4,880	2,854

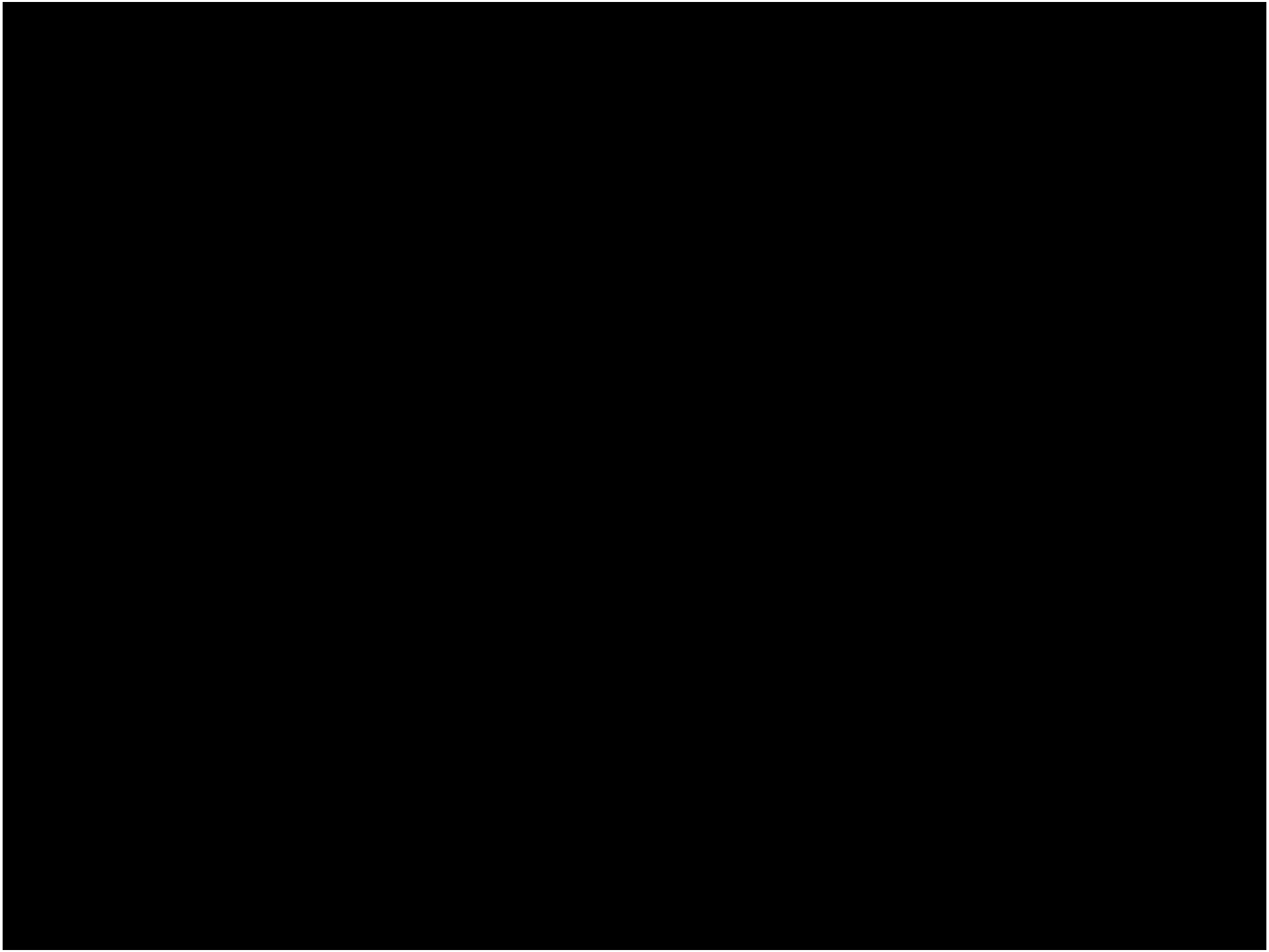
Table 2.4 Patient characteristics for primary hip replacement procedures in 2010, according to procedure type.

	Primary total prosthetic replacement using cement		Primary total prosthetic replacement not using cement		Primary total prosthetic replacement not classified elsewhere (e.g. hybrid)		Primary resurfacing arthroplasty of joint		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Total hip primaries	24,604	36%	30,827	45%	10,964	16%	2,512	4%	68,907	
Total hip primaries with patient data	23,418	95%	29,082	94%	10,320	94%	2,293	91%	65,113	94%
Average age	73.00		65.57		69.81		54.84		67.2	
SD	9.55		11.23		10.82		9.53		13.27	
Interquartile range	67.4 - 79.7		59.0 - 73.5		63.7 - 77.3		48.9 - 61.2		62.0 - 76.6	
Gender										
Female	15,395	66%	16,399	56%	6,512	63%	424	18%	38,730	59%
Male	8,023	34%	12,683	44%	3,808	37%	1,869	82%	26,383	41%
Patient physical status										
P1 – fit and healthy	2,635	11%	5,831	19%	1,462	13%	1,129	45%	11,057	16%
P2 – mild disease not incapacitating	17,274	70%	21,359	69%	7,621	70%	1,316	52%	47,570	69%
P3 – incapacitating systemic disease	4,522	18%	3,518	11%	1,805	16%	67	3%	9,912	14%
P4 – life threatening disease	167	<1%	115	<1%	74	<1%	0	0%	356	<1%
P5 – expected to die within 24 hours with or without an operation	6	<1%	4	<1%	2	<1%	0	0%	12	<1%
BMI										
Number with BMI data	15,426	63%	18,218	59%	6,610	60%	1,507	60%	41,761	61%
Average	28.21		28.82		28.42		28.32		28.51	
SD	5.1		5.3		5.2		4.4		5.2	
Indications for surgery										
Osteoarthritis	22,956	93%	28,822	93%	9,874	90%	2,377	95%	64,029	93%
Avascular necrosis	447	2%	810	3%	328	3%	50	2%	1,635	2%
Fractured neck of femur	549	2%	438	1%	377	3%	4	<1%	1,368	2%
Congenital dislocation	132	<1%	603	2%	219	2%	68	3%	1,022	1%
Inflammatory arthropathy	347	1%	399	1%	225	2%	20	<1%	991	1%
Failed hemiarthroplasty	91	<1%	60	<1%	49	<1%	1	<1%	201	<1%
Trauma – chronic	280	1%	297	<1%	186	2%	18	<1%	781	1%
Previous surgery, non-trauma related	24	<1%	113	<1%	47	<1%	9	<1%	193	<1%
Previous arthrodesis	13	<1%	12	<1%	5	<1%	0	0%	30	<1%
Previous infection	25	<1%	19	<1%	23	<1%	0	0%	67	<1%
Other	396	2%	443	1%	205	2%	75	3%	1,119	2%
Side										
Bilateral	85	<1%	283	<1%	61	<1%	12	<1%	421	<1%
Left, unilateral	10,900	44%	13,880	45%	4,915	45%	1,226	49%	30,921	45%
Right, unilateral	13,639	55%	16,664	54%	5,988	55%	1,274	51%	37,565	55%

Table 3.22 Revision rates (all causes) for main hip stem and cup combinations (95% confidence intervals).

Combination: stem, cup	Number of patients	Revision rate at 1 year	Revision rate at 3 years	Revision rate at 5 years
Cemented composite beam stems and cemented cups				
Charnley Cemented Stem, Charnley Cemented Cup	9,209	0.29% (0.20%-0.43%)	0.80% (0.63%-1.02%)	1.38% (1.12%-1.69%)
Charnley Cemented Stem, Charnley Ogee	7,958	0.33% (0.22%-0.48%)	1.12% (0.89%-1.40%)	1.71% (1.40%-2.10%)
Stanmore Modular, Stanmore-Arcom	2,718	0.26% (0.13%-0.55%)	0.83% (0.52%-1.34%)	1.10% (0.67%-1.80%)
Cemented taper slip stems and cemented cups				
C-Stem Cemented Stem, Elite Plus Ogee	3,036	0.48% (0.28%-0.80%)	0.92% (0.62%-1.36%)	1.22% (0.82%-1.80%)
CPT, ZCA	5,796	0.63% (0.45%-0.88%)	1.04% (0.79%-1.38%)	1.68% (1.27%-2.22%)
Exeter V40, Contemporary	37,995	0.38% (0.32%-0.45%)	0.86% (0.76%-0.98%)	1.26% (1.10%-1.44%)
Exeter V40, Elite Plus Cemented Cup	4,155	0.29% (0.16%-0.53%)	0.64% (0.41%-1.00%)	0.70% (0.45%-1.09%)
Exeter V40, Elite Plus Ogee	13,246	0.26% (0.18%-0.36%)	0.67% (0.53%-0.86%)	0.98% (0.78%-1.23%)
Exeter V40, Exeter Duration	11,267	0.54% (0.42%-0.70%)	1.04% (0.85%-1.27%)	1.64% (1.36%-1.98%)
Cemented taper slip stems and uncemented cups				
CPT, Trilogy	5,602	0.78% (0.58%-1.06%)	1.13% (0.58%-1.06%)	1.83% (1.37%-2.45%)
Exeter V40, Trident	18,358	0.52% (0.42%-0.64%)	1.01% (0.85%-1.20%)	1.69% (1.39%-2.07%)
Exeter V40, Trilogy	7,791	0.50% (0.36%-0.69%)	0.96% (0.75%-1.20%)	1.35% (1.04%-1.75%)
Uncemented stems and uncemented cups				
Accolade, Trident	10,021	0.96% (0.77%-1.18%)	1.83% (1.52%-2.21%)	2.35% (1.83%-3.02%)
Corail, Duraloc Cementless Cup	4,333	0.75% (0.53%-1.07%)	1.77% (1.36%-2.26%)	2.56% (2.04%-3.22%)
Corail, Pinnacle	40,879	0.75% (0.67%-0.85%)	1.73% (1.57%-1.91%)	2.29% (2.04%-2.57%)
Furlong HAC, CSF	13,330	0.89% (0.74%-1.07%)	1.58% (1.37%-1.83%)	2.03% (1.77%-2.33%)
Furlong HAC, CSF Plus	6,357	1.21% (0.95%-1.54%)	2.10% (1.61%-2.73%)	-
SL-Plus Cementless Stem, EPF-Plus	3,583	1.16% (0.85%-1.58%)	2.82% (2.26%-3.52%)	4.52% (3.54%-5.77%)
Taperloc Cementless Stem, Exceed	4,959	0.80% (0.57%-1.11%)	1.44% (1.04%-1.99%)	1.61% (1.13%-2.30%)
Uncemented stems and resurfacing cup				
Corail, ASR Resurfacing Cup	2,540	0.94% (0.63%-1.40%)	4.84% (3.99%-5.87%)	11.34% (9.06%-14.18%)
Other				
Other combination	97,307	0.67% (0.62%-0.72%)	1.51% (1.42%-1.60%)	2.16% (2.04%-2.29%)
Unknown combination	38,926	0.77% (0.69%-0.87%)	1.52% (1.38%-1.68%)	2.26% (2.06%-2.49%)
All	349,368	0.64% (0.61%-0.66%)	1.38% (1.33%-1.42%)	2.00% (1.93%-2.06%)

Note: for newer brands it is not always possible to estimate five-year revision rates.



Hip and Knee Arthroplasty

ANNUAL REPORT
2010

AOA
AUSTRALIAN ORTHOPAEDIC ASSOCIATION

National Joint Replacement Registry

Figure HT3: Primary Total Conventional Hip Replacement by Fixation

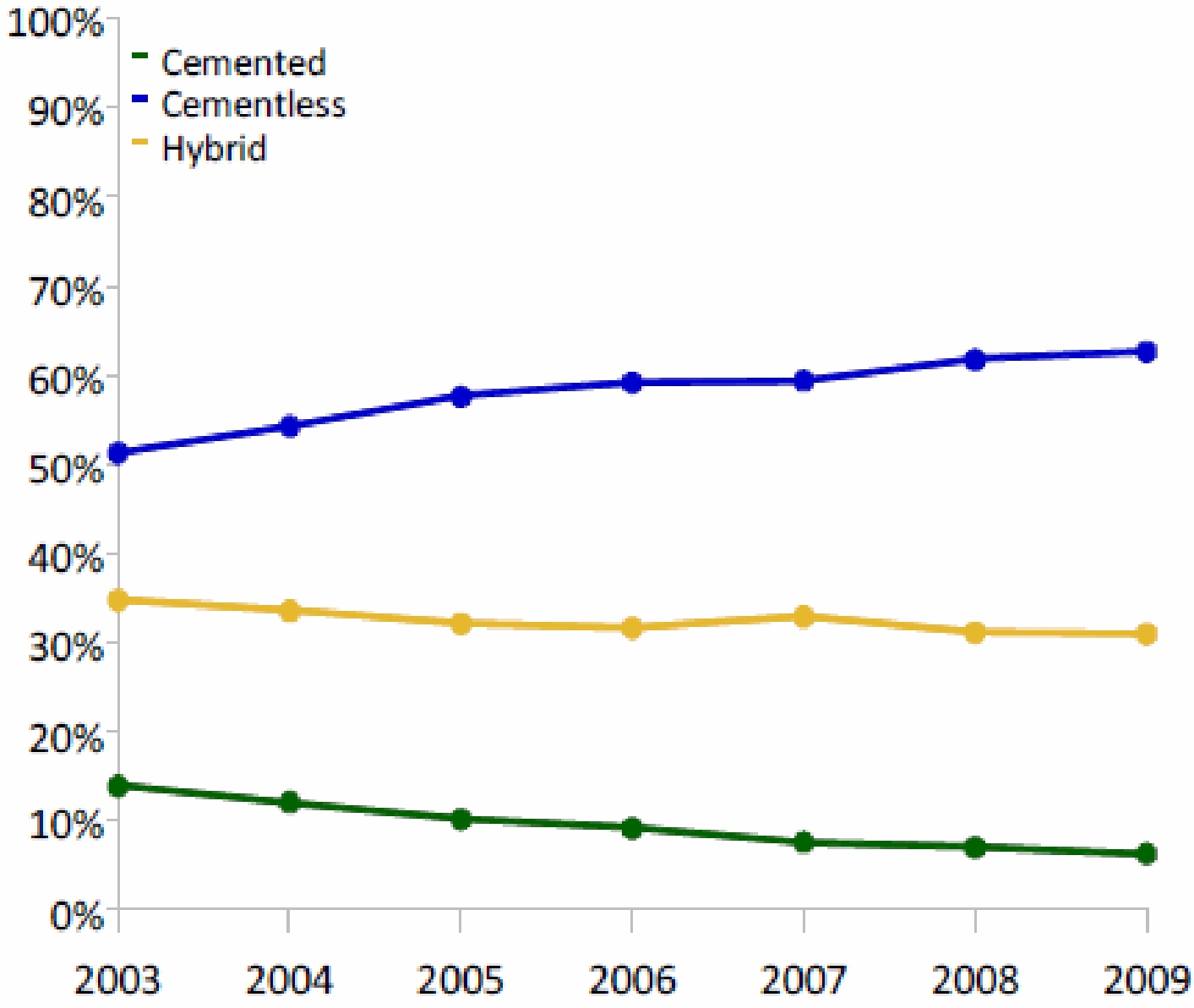
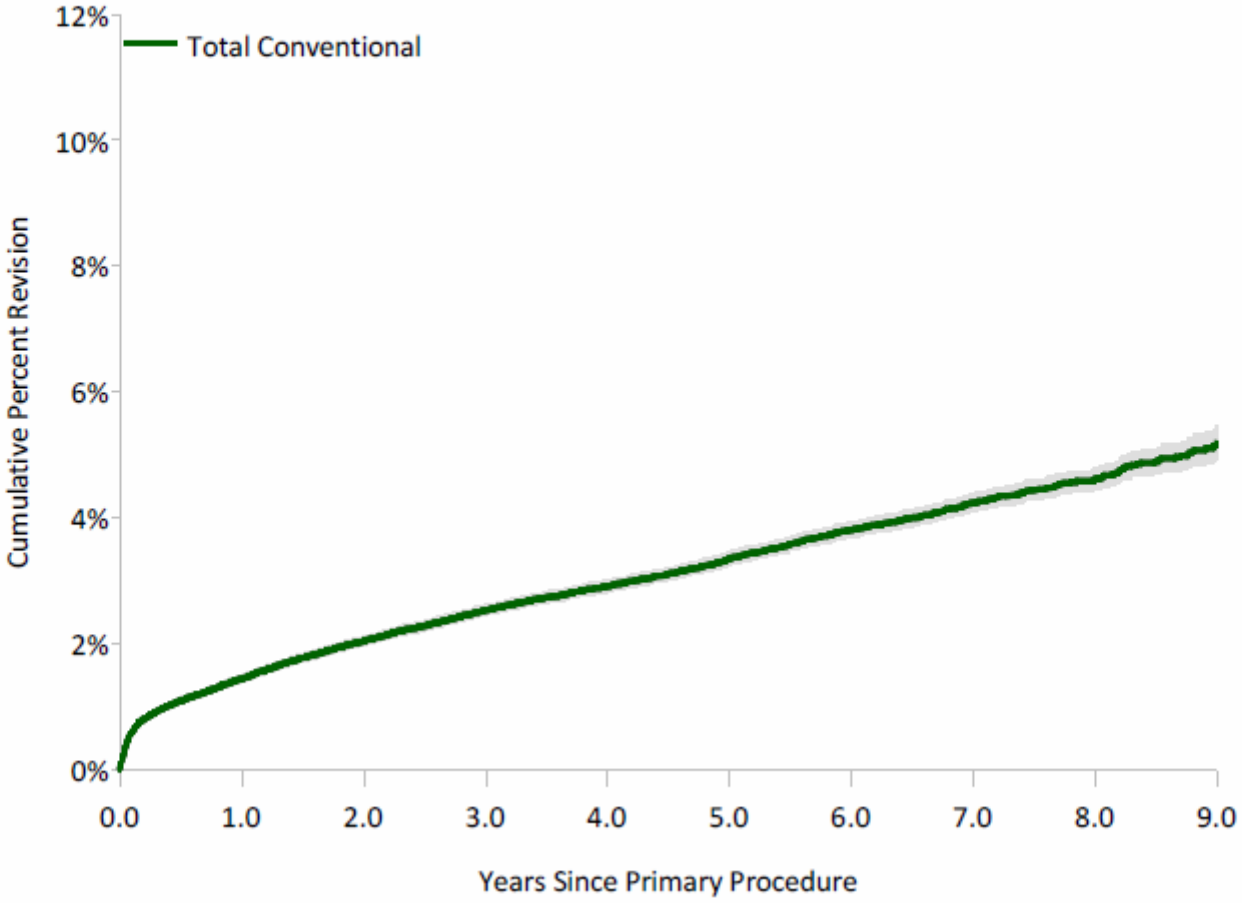


Table HT10: Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement (Primary Diagnosis OA)

CPR	1 Yr	3 Yrs	5 Yrs	7 Yrs	9 Yrs
Total Conventional	1.4 (1.4, 1.5)	2.5 (2.4, 2.6)	3.3 (3.2, 3.5)	4.2 (4.1, 4.4)	5.2 (4.9, 5.5)

Figure HT4: Cumulative Percent Revision of Primary Total Conventional Hip Replacement (Primary Diagnosis OA)

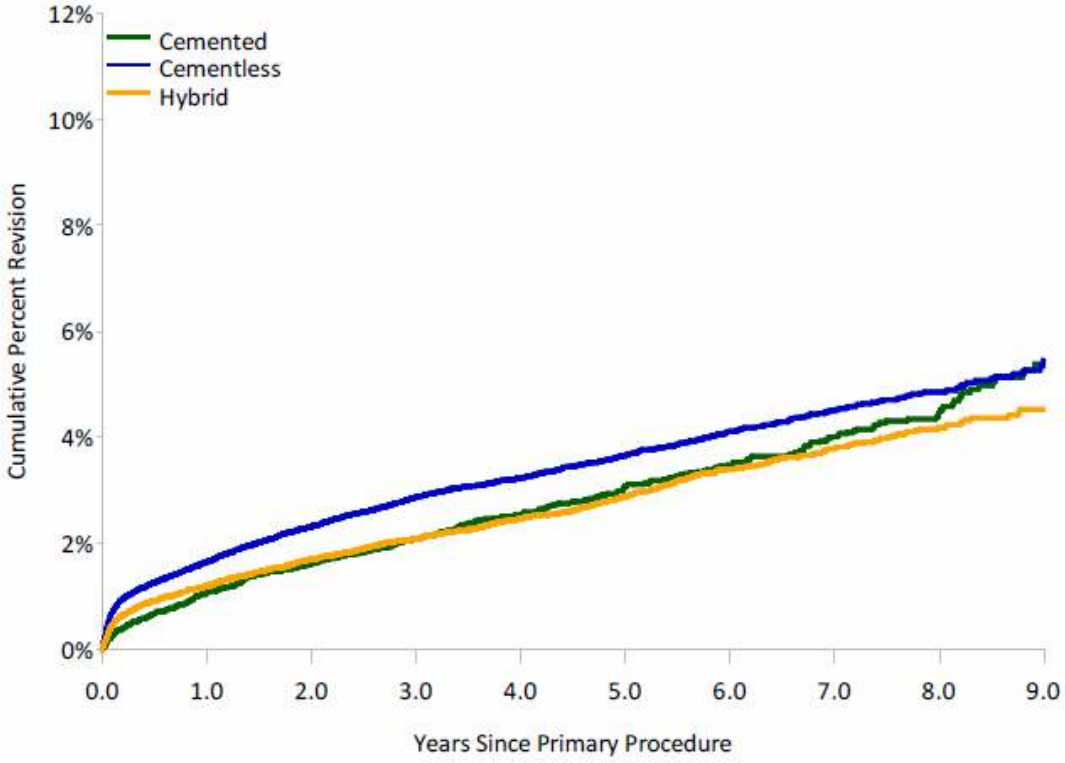


At nine years hybrid fixation has the lowest cumulative percent revision (hybrid 4.5%, cemented and cementless 5.4%) (Tables HT21 and HT22).

Cementless fixation has a higher risk of revision in the first month compared to cemented, however after three years it has a lower risk of revision (Figure HT11). Compared to hybrid fixation, it has a higher risk of revision up to four years. There is no difference in the risk of revision after this time (Figure HT11).

Cemented fixation has a lower risk of revision when compared to hybrid fixation in the first month however, after nine months it has a higher risk of revision (Figure HT11).

Figure HT11: Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Fixation (Primary Diagnosis OA)



HR - adjusted for age and gender

Cemented vs Hybrid

- 0 - 1Mth: HR=0.49 (0.34, 0.70),p<0.001
- 1Mth - 9Mth: HR=1.00 (0.80, 1.25),p=0.989
- 9Mth - 1.5Yr: HR=1.33 (1.04, 1.70),p=0.022
- 1.5Yr+: HR=1.18 (1.02, 1.36),p=0.025

Cementless vs Hybrid

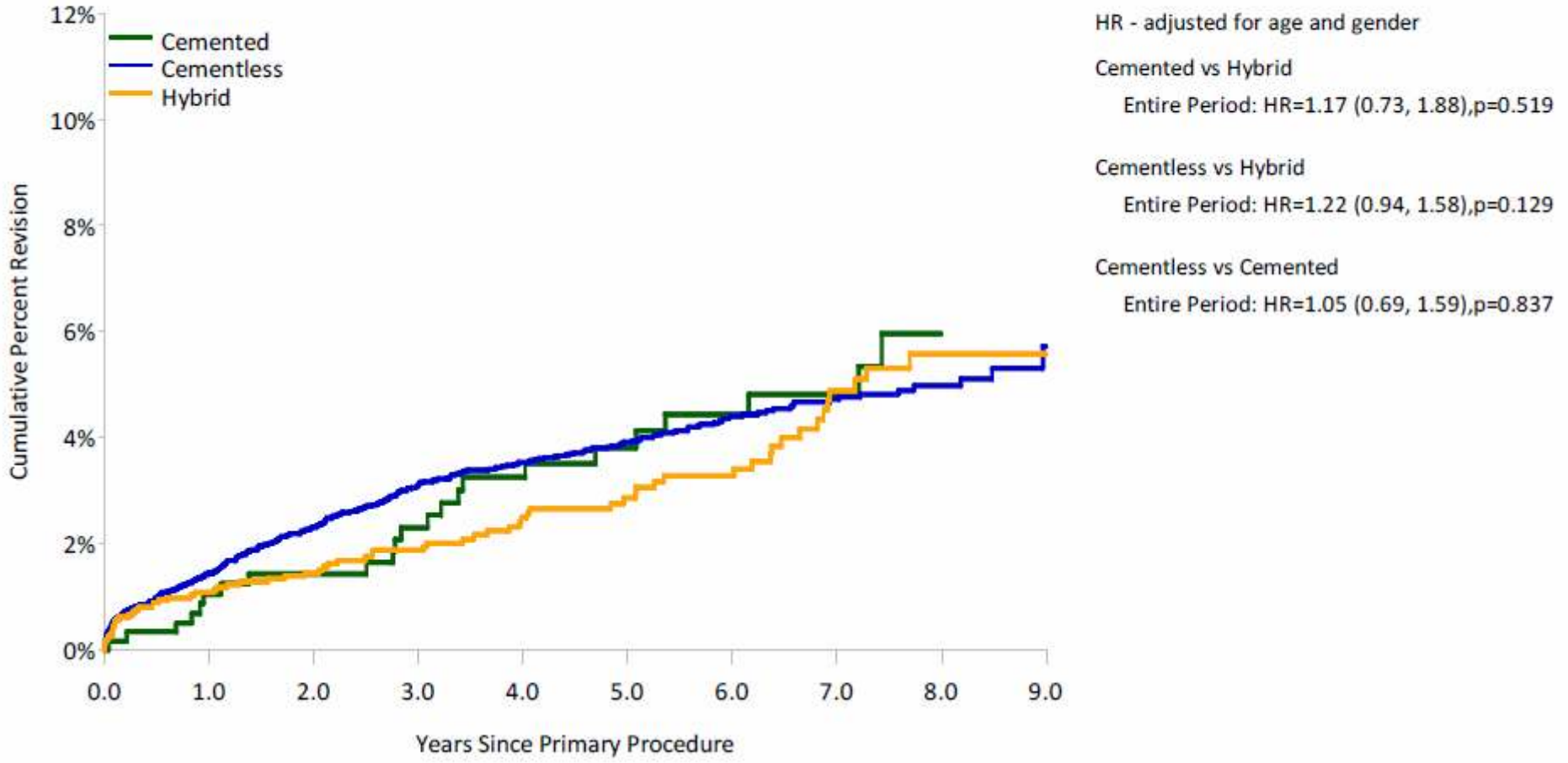
- 0 - 2Wk: HR=1.73 (1.37, 2.17),p<0.001
- 2Wk - 3Mth: HR=1.36 (1.18, 1.57),p<0.001
- 3Mth - 6Mth: HR=1.10 (0.87, 1.38),p=0.437
- 6Mth - 4Yr: HR=1.30 (1.18, 1.44),p<0.001
- 4Yr+: HR=1.01 (0.86, 1.18),p=0.916

Cementless vs Cemented

- 0 - 1Mth: HR=3.13 (2.20, 4.44),p<0.001
- 1Mth - 1.5Yr: HR=1.13 (0.99, 1.29),p=0.065
- 1.5Yr - 2Yr: HR=1.22 (0.95, 1.56),p=0.116
- 2Yr - 3Yr: HR=1.21 (0.99, 1.48),p=0.066
- 3Yr+: HR=0.86 (0.74, 0.99),p=0.039

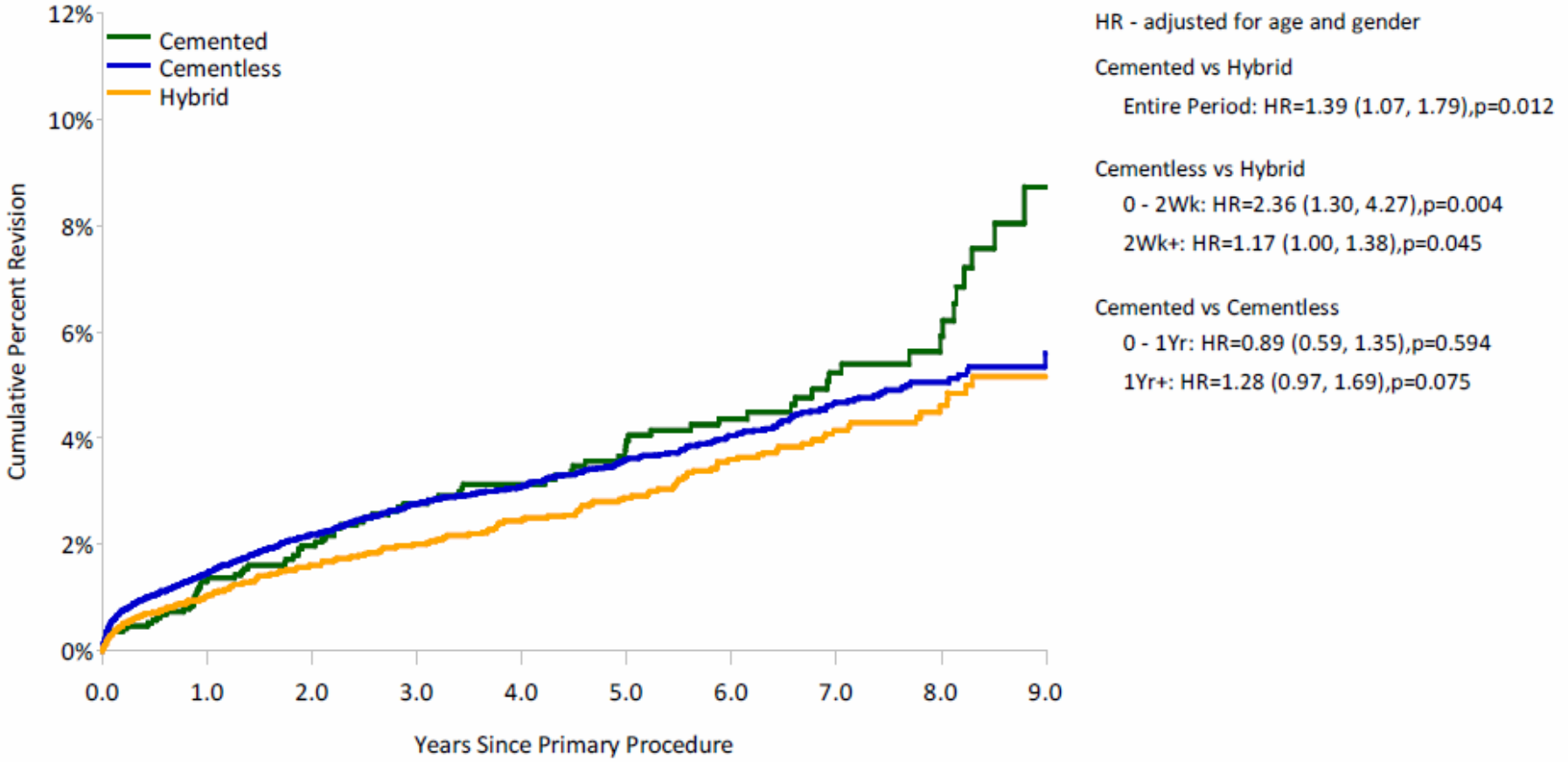
There are age related differences in the risk of revision for cemented and cementless fixation. The risk of revision for cemented fixation decreases with increasing age. The risk of revision for cementless fixation increases with increasing age. The risk for hybrid fixation does not vary with age (Tables HT23 and HT24 and Figures HT12-HT14).

Figure HT12: Cumulative Percent Revision of Primary Total Conventional Hip Replacement for Patients Aged <55 Years by Fixation (Primary Diagnosis OA)



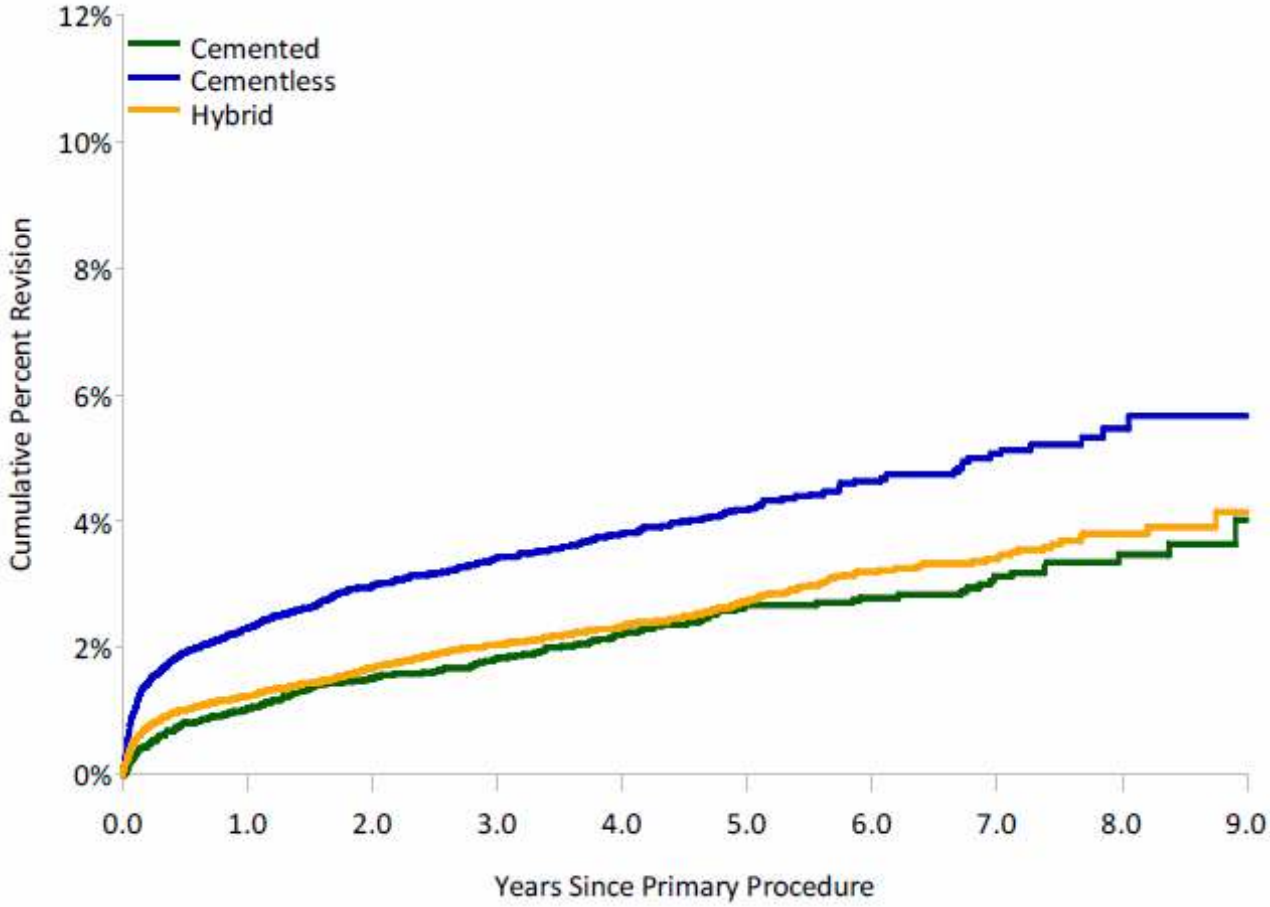
There are age related differences in the risk of revision for cemented and cementless fixation. The risk of revision for cemented fixation decreases with increasing age. The risk of revision for cementless fixation increases with increasing age. The risk for hybrid fixation does not vary with age (Tables HT23 and HT24 and Figures HT12-HT14).

Figure HT13: Cumulative Percent Revision of Primary Total Conventional Hip Replacement for Patients Aged 55-64 Years by Fixation (Primary Diagnosis OA)



There are age related differences in the risk of revision for cemented and cementless fixation. The risk of revision for cemented fixation decreases with increasing age. The risk of revision for cementless fixation increases with increasing age. The risk for hybrid fixation does not vary with age (Tables HT23 and HT24 and Figures HT12-HT14).

Figure HT15: Cumulative Percent Revision of Primary Total Conventional Hip Replacement for Patients Aged ≥75 Years by Fixation (Primary Diagnosis OA)



HR - adjusted for age and gender

Cementless vs Cemented

- 0 - 2Wk: HR=5.63 (2.27, 13.97),p<0.001
- 2Wk - 1Mth: HR=2.36 (1.70, 3.29),p<0.001
- 1Mth - 3Mth: HR=2.01 (1.47, 2.75),p<0.001
- 3Mth - 1.5Yr: HR=1.62 (1.27, 2.08),p<0.001
- 1.5Yr+: HR=1.28 (1.02, 1.61),p=0.031

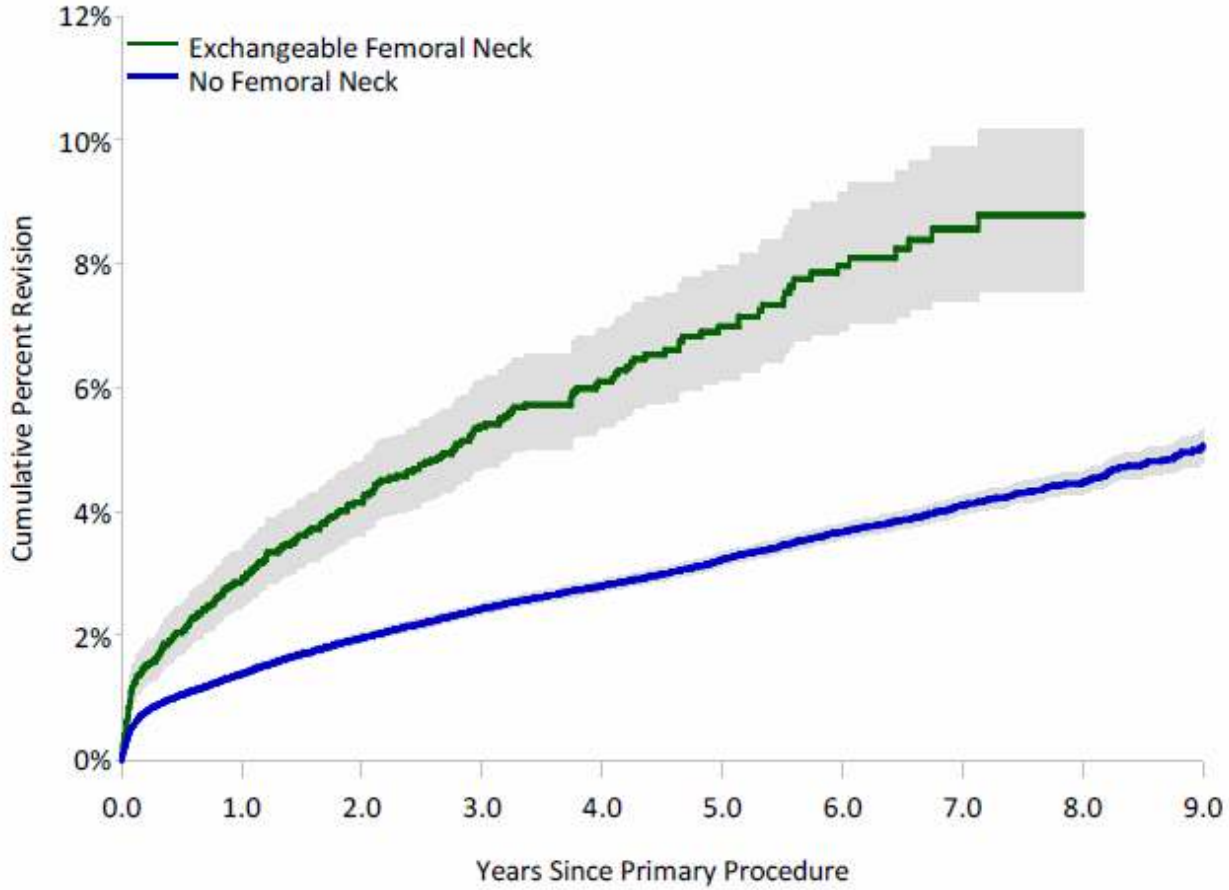
Hybrid vs Cemented

- 0 - 2Wk: HR=3.47 (1.38, 8.71),p=0.008
- 2Wk+: HR=1.03 (0.87, 1.23),p=0.721

Cementless vs Hybrid

- 0 - 3Mth: HR=1.90 (1.57, 2.31),p<0.001
- 3Mth - 2Yr: HR=1.65 (1.35, 2.03),p<0.001
- 2Yr+: HR=1.14 (0.91, 1.44),p=0.250

Figure HT16: Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Type of Femoral Neck (Primary Diagnosis OA)

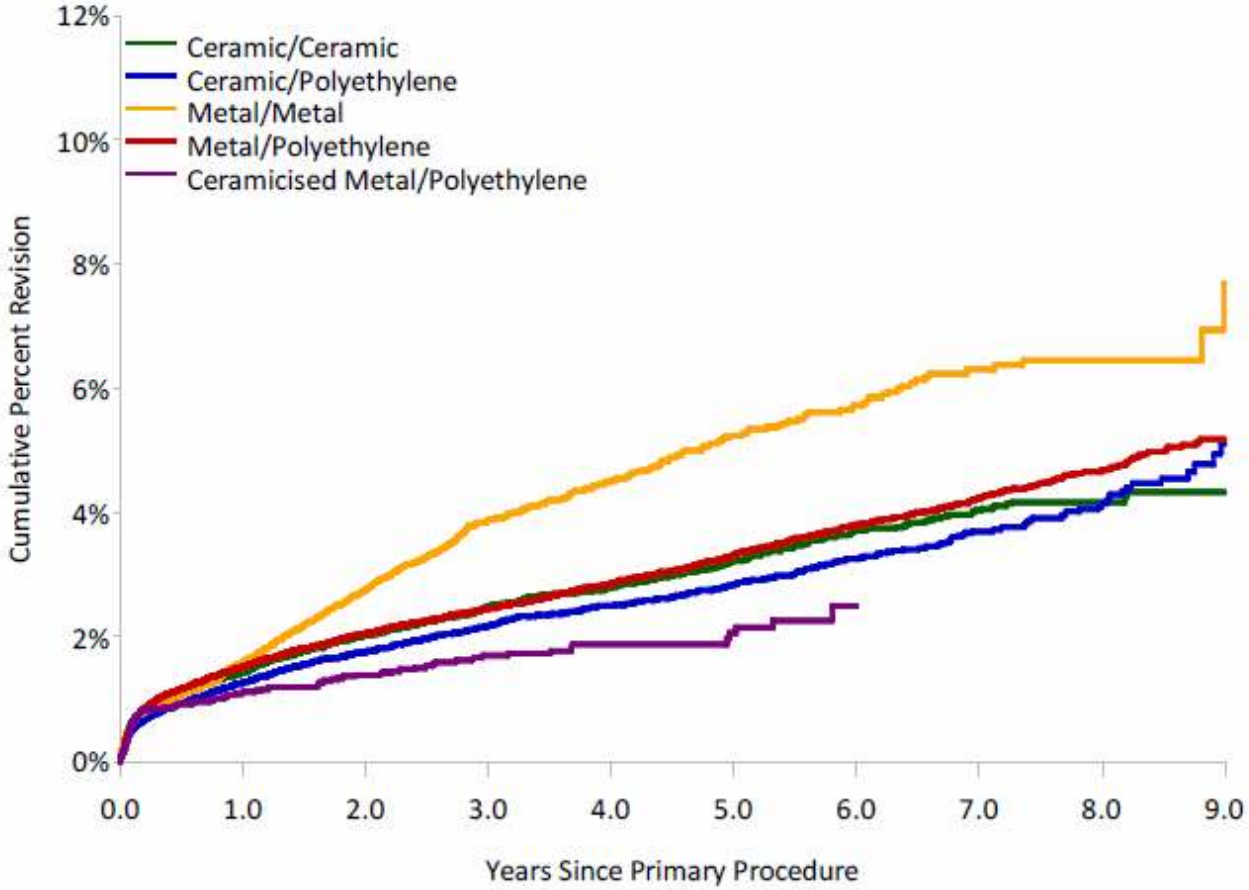


HR - adjusted for age and gender

Exchangeable Femoral Neck vs No Femoral Neck

Entire Period: HR=2.13 (1.88, 2.42),p<0.001

Figure HT18: Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Bearing Surface (Primary Diagnosis OA)



HR - adjusted for age and gender

Ceramic/Ceramic vs Metal/Metal

0 - 2Wk: HR=0.90 (0.68, 1.19),p=0.458

2Wk - 1Mth: HR=0.87 (0.66, 1.15),p=0.330

1Mth - 6Mth: HR=0.81 (0.67, 0.99),p=0.040

6Mth+: HR=0.57 (0.50, 0.64),p<0.001

Ceramic/Polyethylene vs Metal/Metal

Entire Period: HR=0.60 (0.54, 0.67),p<0.001

Metal/Polyethylene vs Metal/Metal

0 - 2Wk: HR=0.75 (0.59, 0.96),p=0.020

2Wk - 1Mth: HR=0.98 (0.78, 1.22),p=0.847

1Mth - 9Mth: HR=0.88 (0.76, 1.02),p=0.081

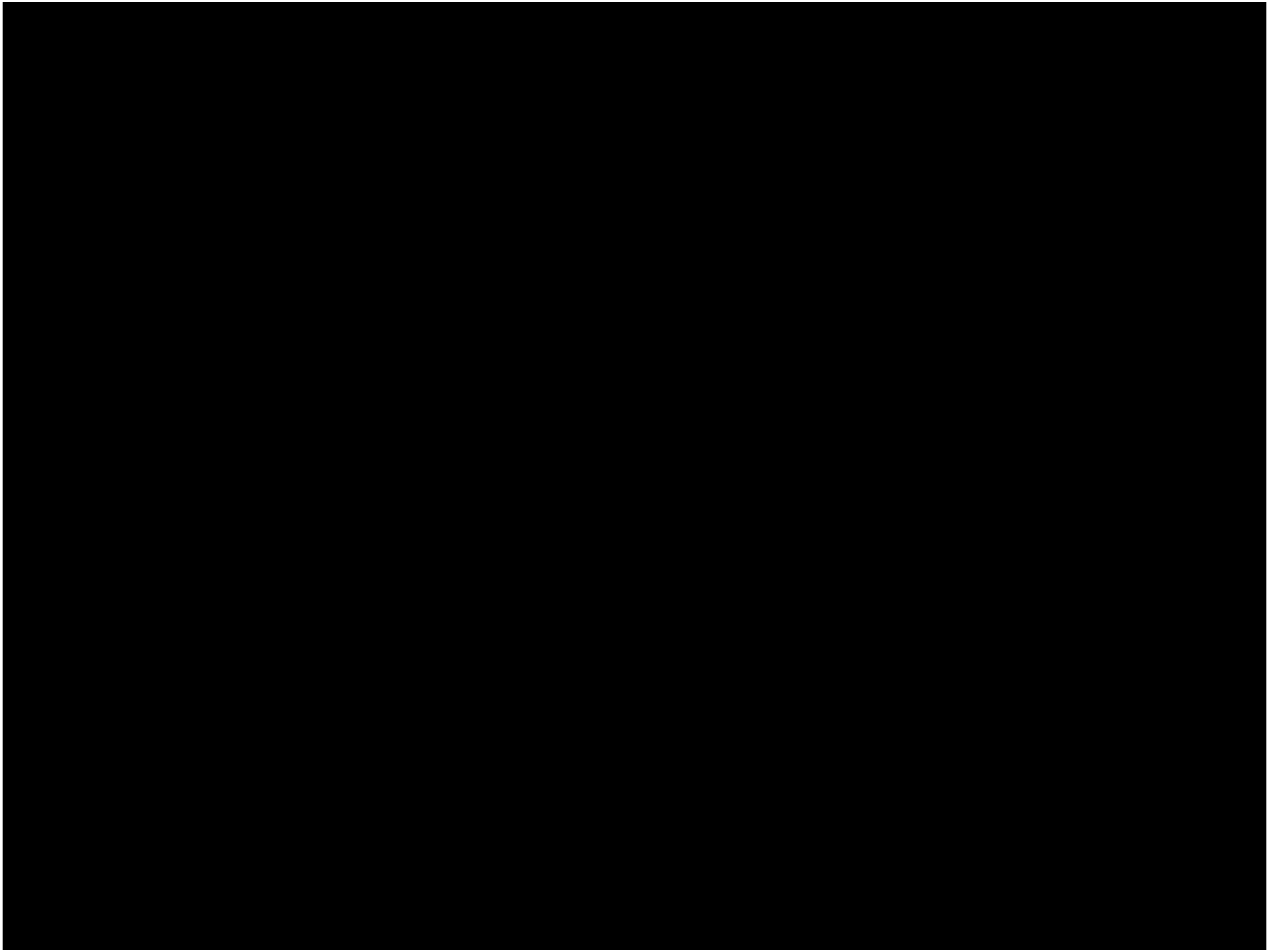
9Mth+: HR=0.59 (0.53, 0.66),p<0.001

Ceramicised Metal/Polyethylene vs Metal/Metal

0 - 2Wk: HR=0.52 (0.27, 1.00),p=0.050

2Wk - 3Mth: HR=0.91 (0.65, 1.28),p=0.589

3Mth+: HR=0.32 (0.24, 0.43),p<0.001



Swedish Hip Arthroplasty Register

Annual Report 2008
Shortened Version

TOTAL ARTHROPLASTY

299 368
PRIMARIES
1979-2008

36 307
REOPERATIONS
1979-2008
(closed reduction excl.)

29 401
REVISIONS
1979-2008

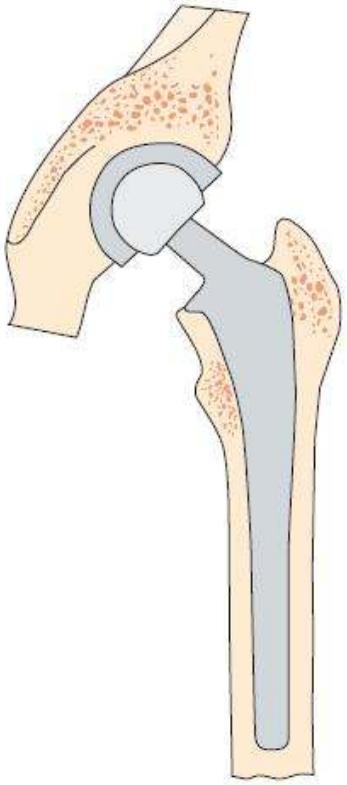
2 313
ENV./TECH PROFILES
1979-2008

74 111
PATIENT OUTCOME
2002-2008

HEMI ARTHROPLASTY

16 835
PRIMARIES
2005-2008

820
REOPERATIONS
2005-2008



Department of Ortopaedics
Sahlgrenska University Hospital
October 2009
www.shpr.se
www.jru.orthop.gu.se

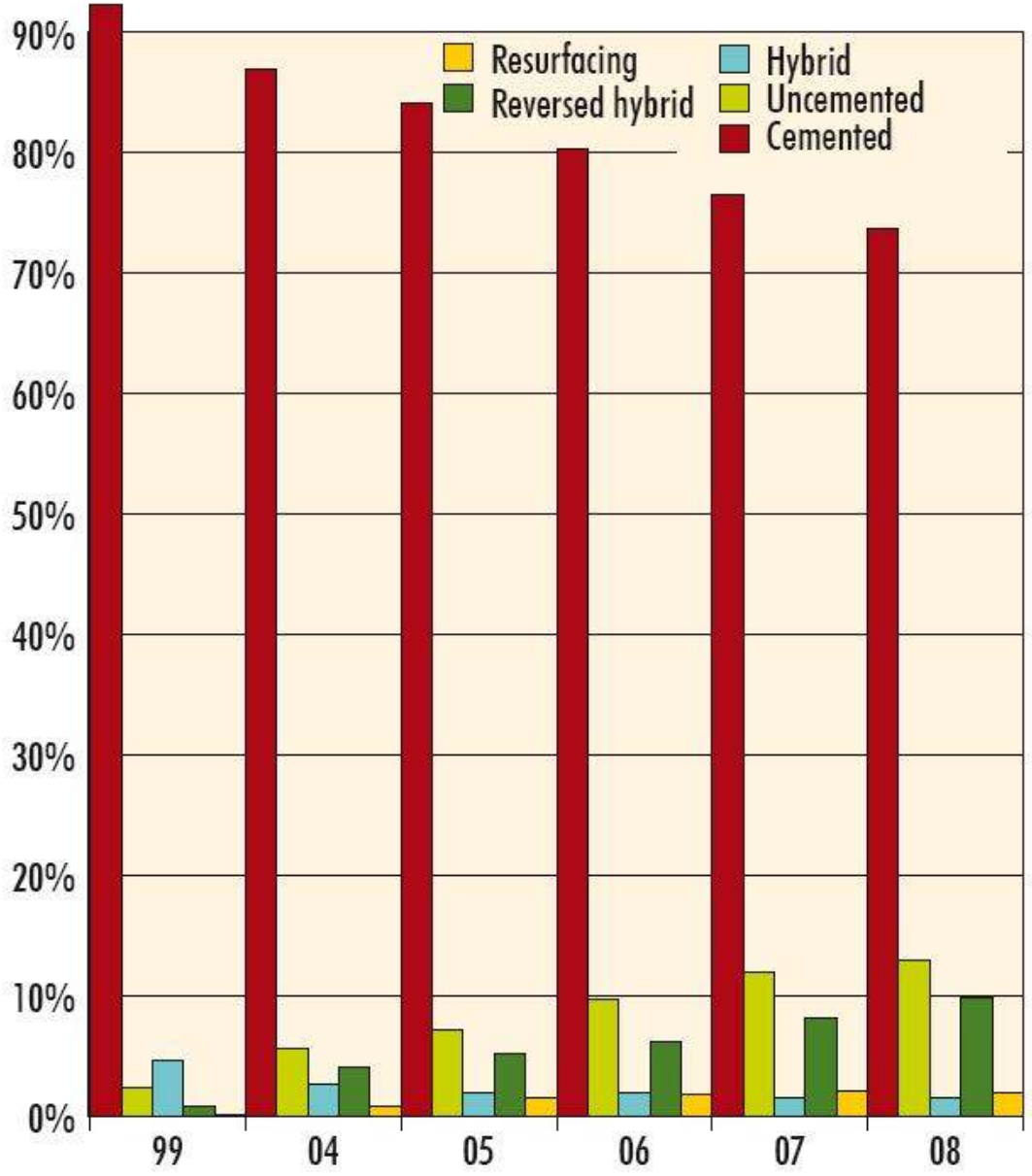
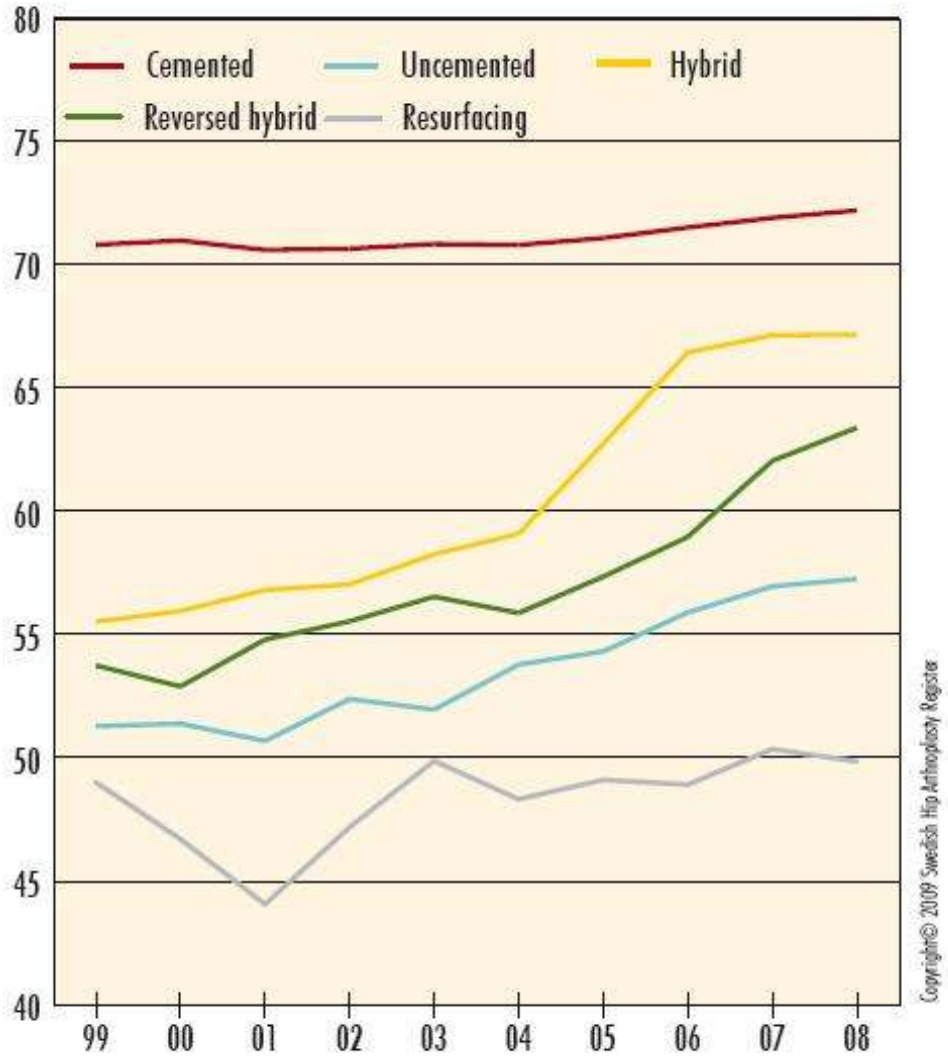


Figure 2. Type of fixation during the last 5 years and 1999 as comparison. The proportion all-cemented and hybrid prostheses are reduced in favour of totally uncemented, reversed hybrids and resurfacing prostheses.

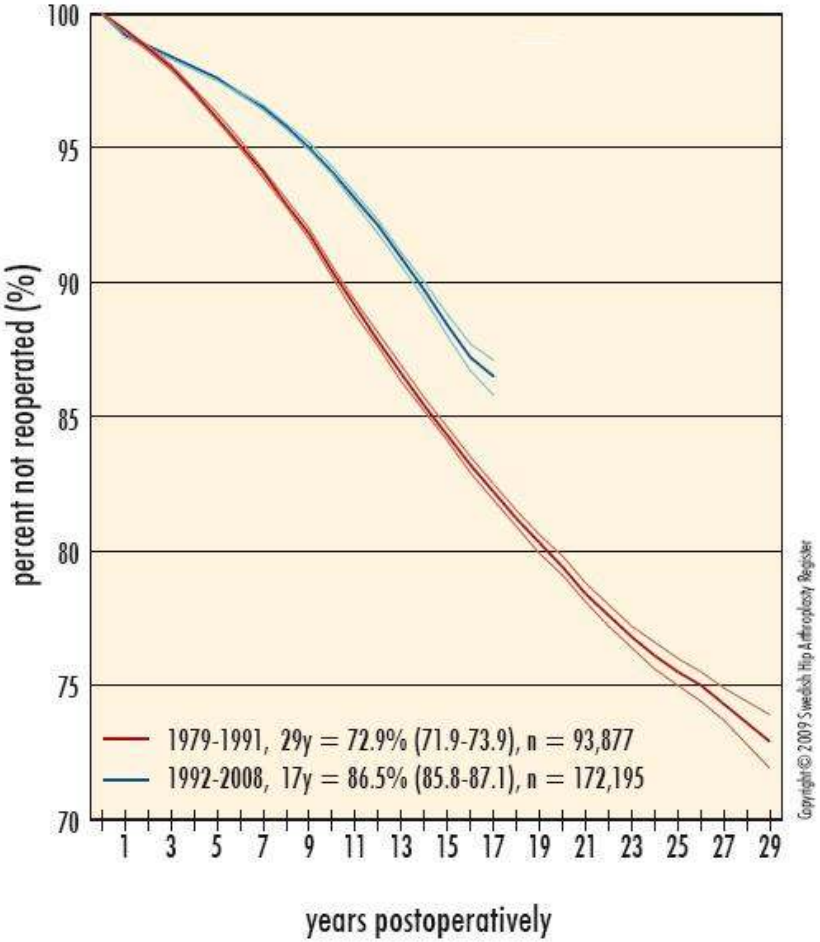
Mean age per type of fixation

the past 10 years, 129,026 primary THRs



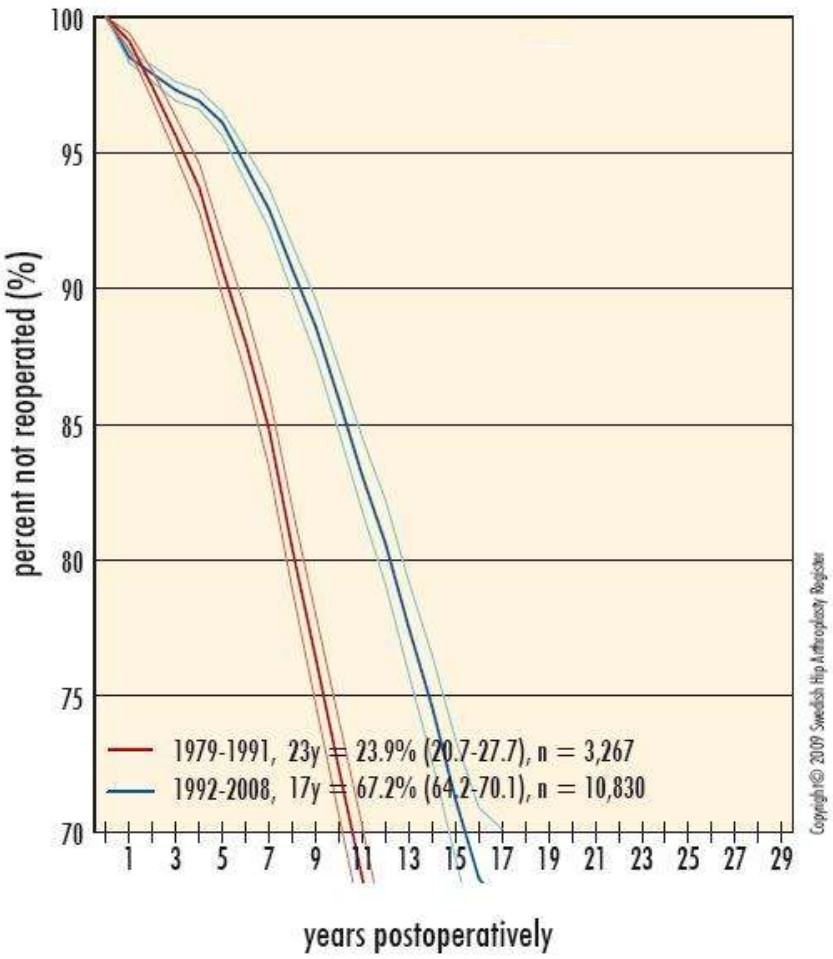
All cemented implants

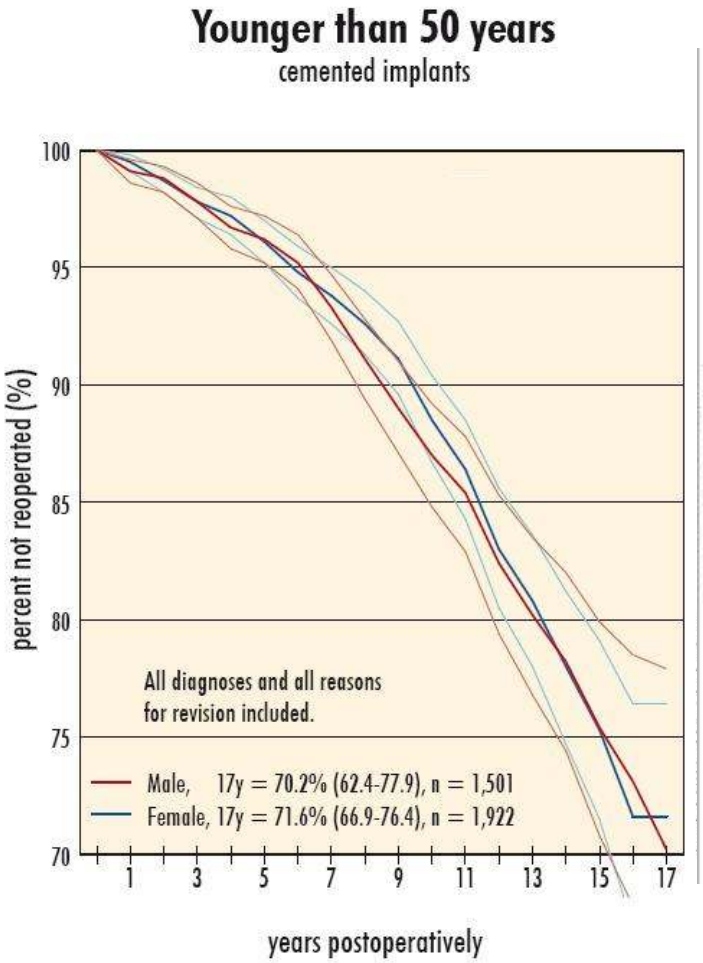
all diagnoses and all reasons for revision

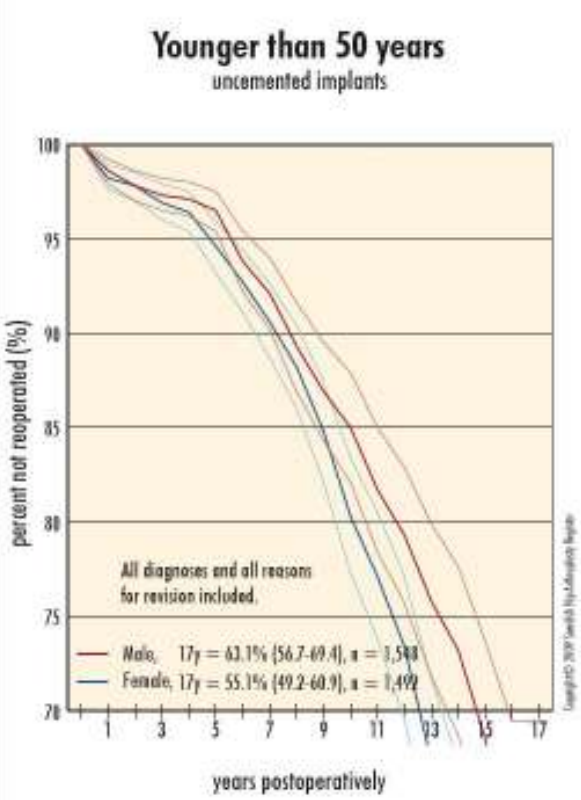


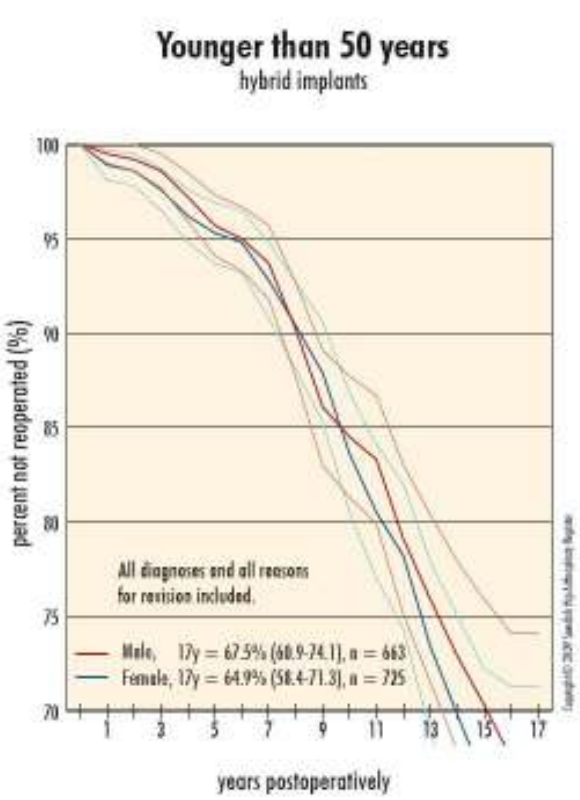
All uncemented implants

all diagnoses and all reasons for revision



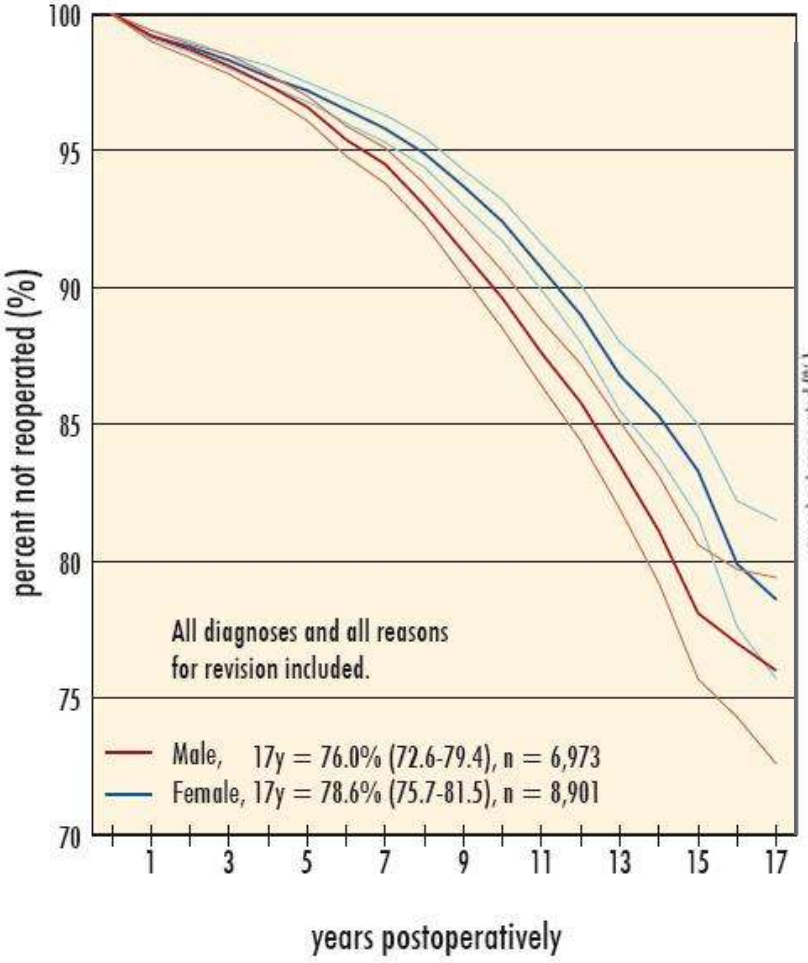

Younger than 50 years
cemented implants
100
95
90
85
80
75
70
percent not reoperated (%)
All diagnoses and all reasons
for revision included.
Male, 17y = 70.2% (62.4-77.9), n = 1,501
Female, 17y = 71.6% (66.9-76.4), n = 1,922
1
3
5
7
9
11
13
15
17
years postoperatively


Younger than 50 years
uncemented implants
100
95
90
85
80
75
70
percent not reoperated (%)
All diagnoses and all reasons
for revision included.
Male, 17y = 63.1% (56.7-69.4), n = 1,588
Female, 17y = 55.1% (49.2-60.9), n = 1,492
1
3
5
7
9
11
13
15
17
years postoperatively


Younger than 50 years
hybrid implants
100
95
90
85
80
75
70
percent not reoperated (%)
All diagnoses and all reasons
for revision included.
Male, 17y = 67.5% (60.9-74.1), n = 663
Female, 17y = 64.9% (58.4-71.3), n = 725
1
3
5
7
9
11
13
15
17
years postoperatively

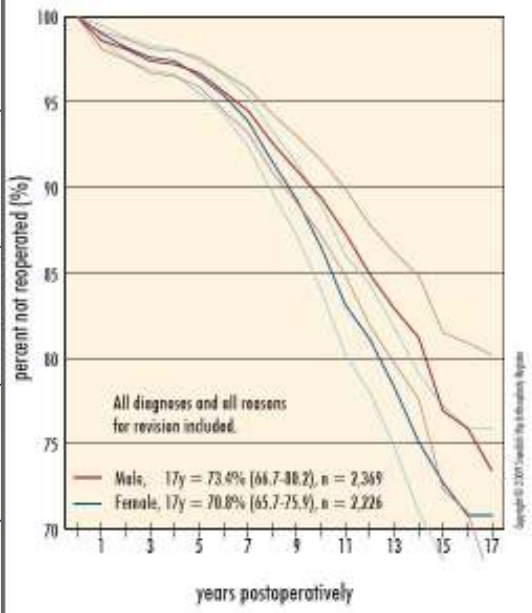
Between 50 and 59 years

cemented implants



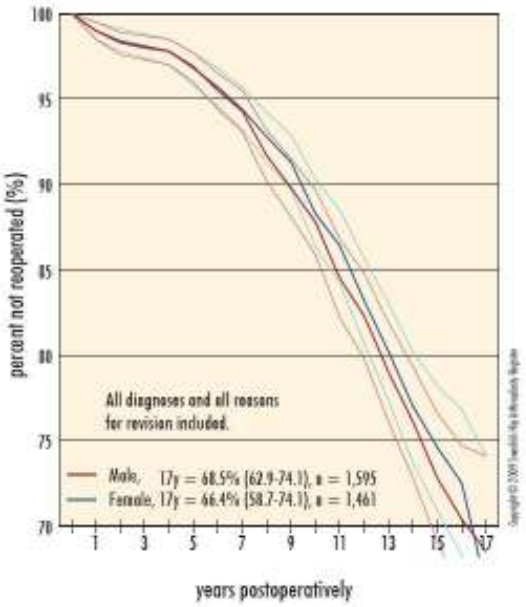
Between 50 and 59 years

uncemented implants



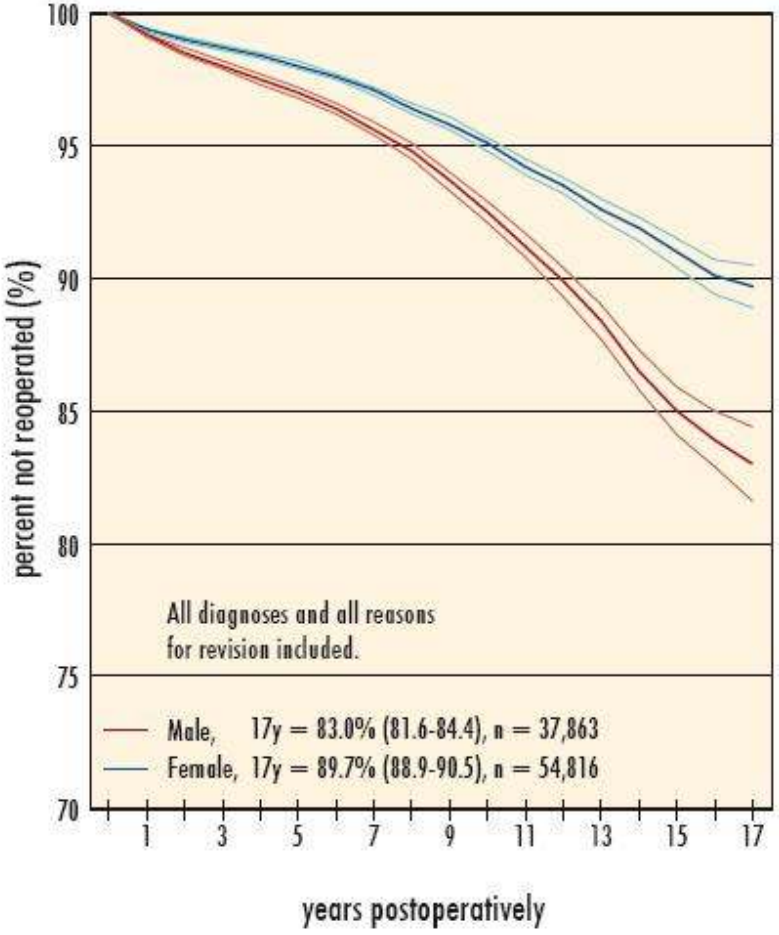
Between 50 and 59 years

hybrid implants



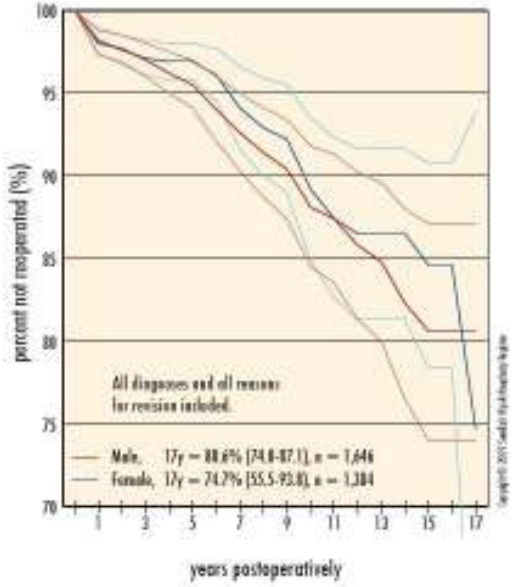
Between 60 and 75 years

cemented implants



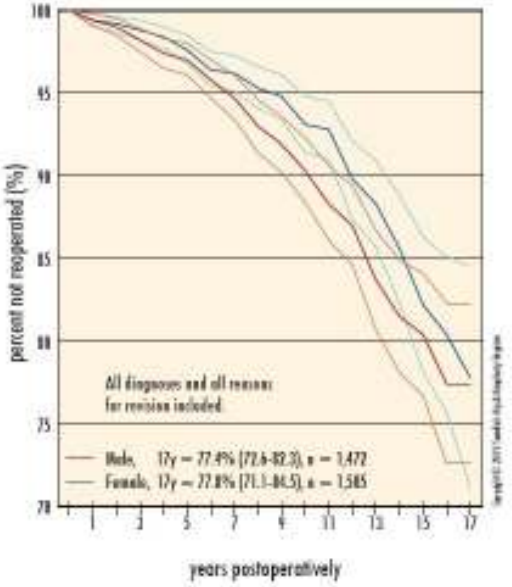
Between 60 and 75 years

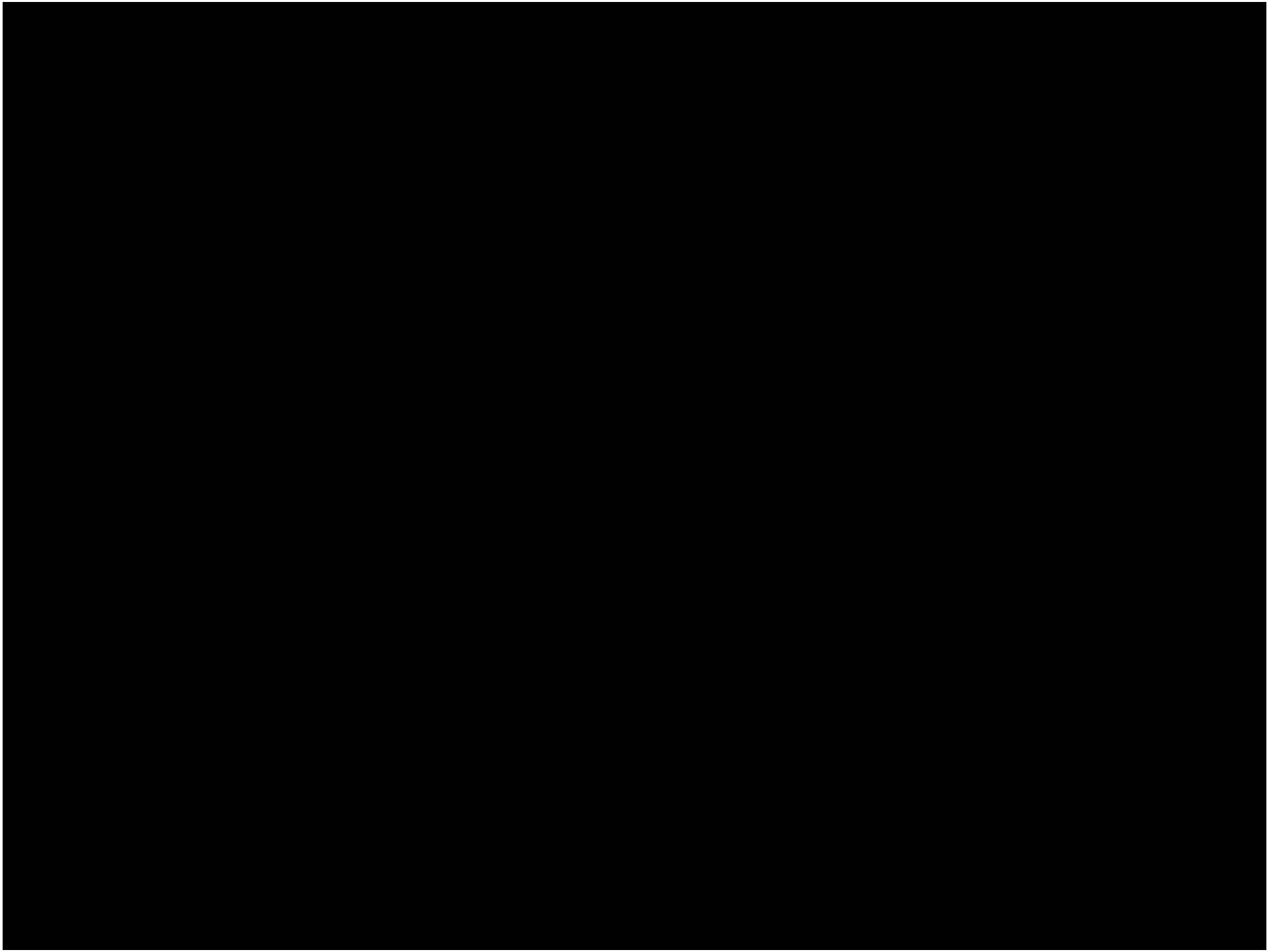
uncemented implants

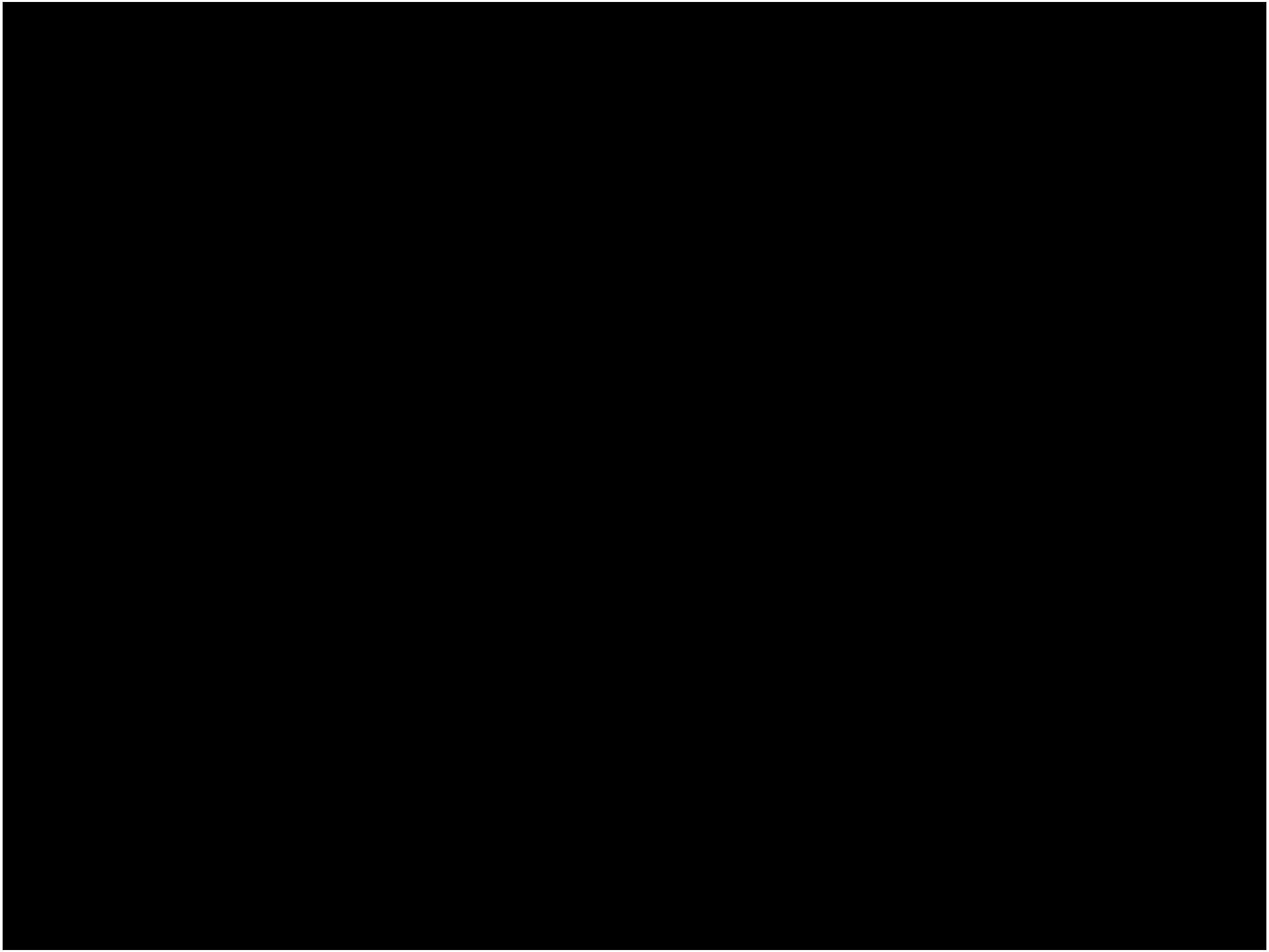


Between 60 and 75 years

hybrid implants







Cemented vs uncemented- decision making

- Cemented Exeter
- Bearing type
- Method of fixation

Cemented vs uncemented- decision making

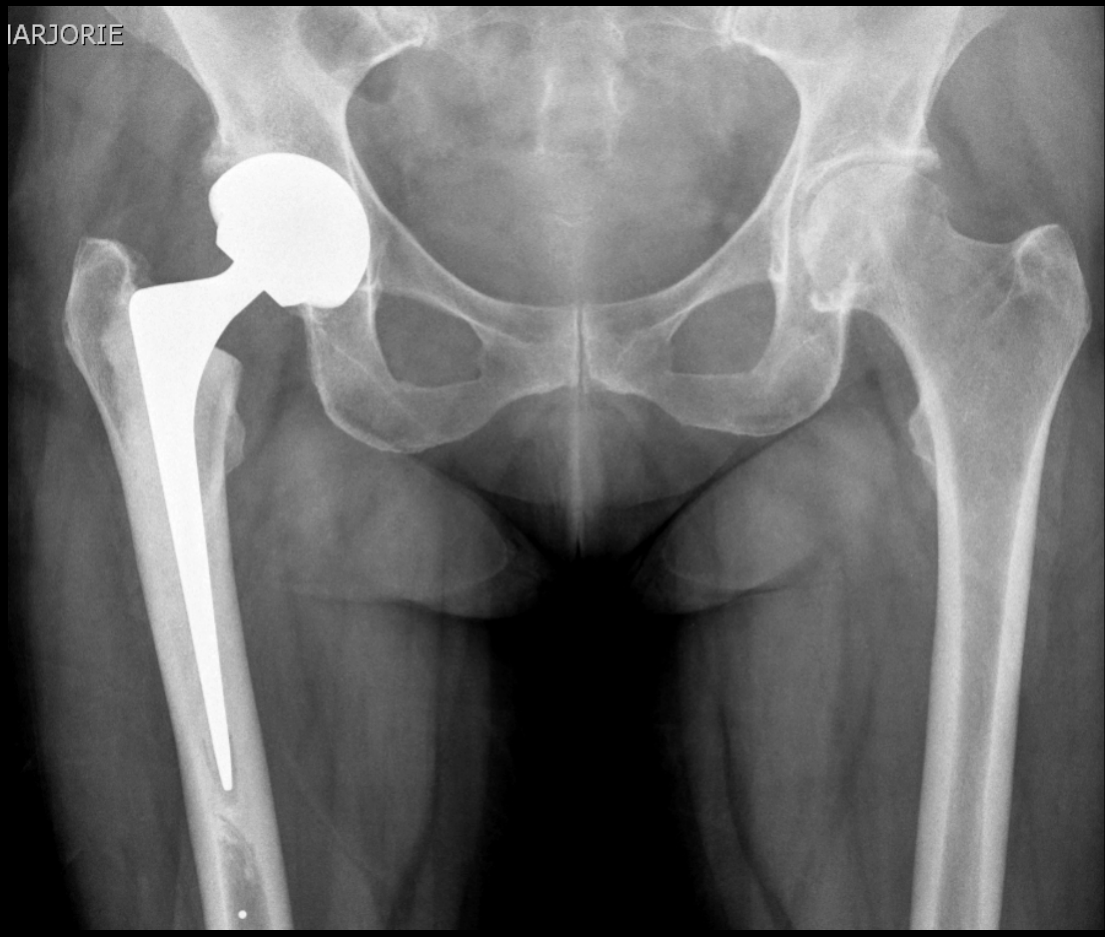
- Cemented Exeter

- Bearing type
  - Life expectancy (>15-20 years)
  - Functional level

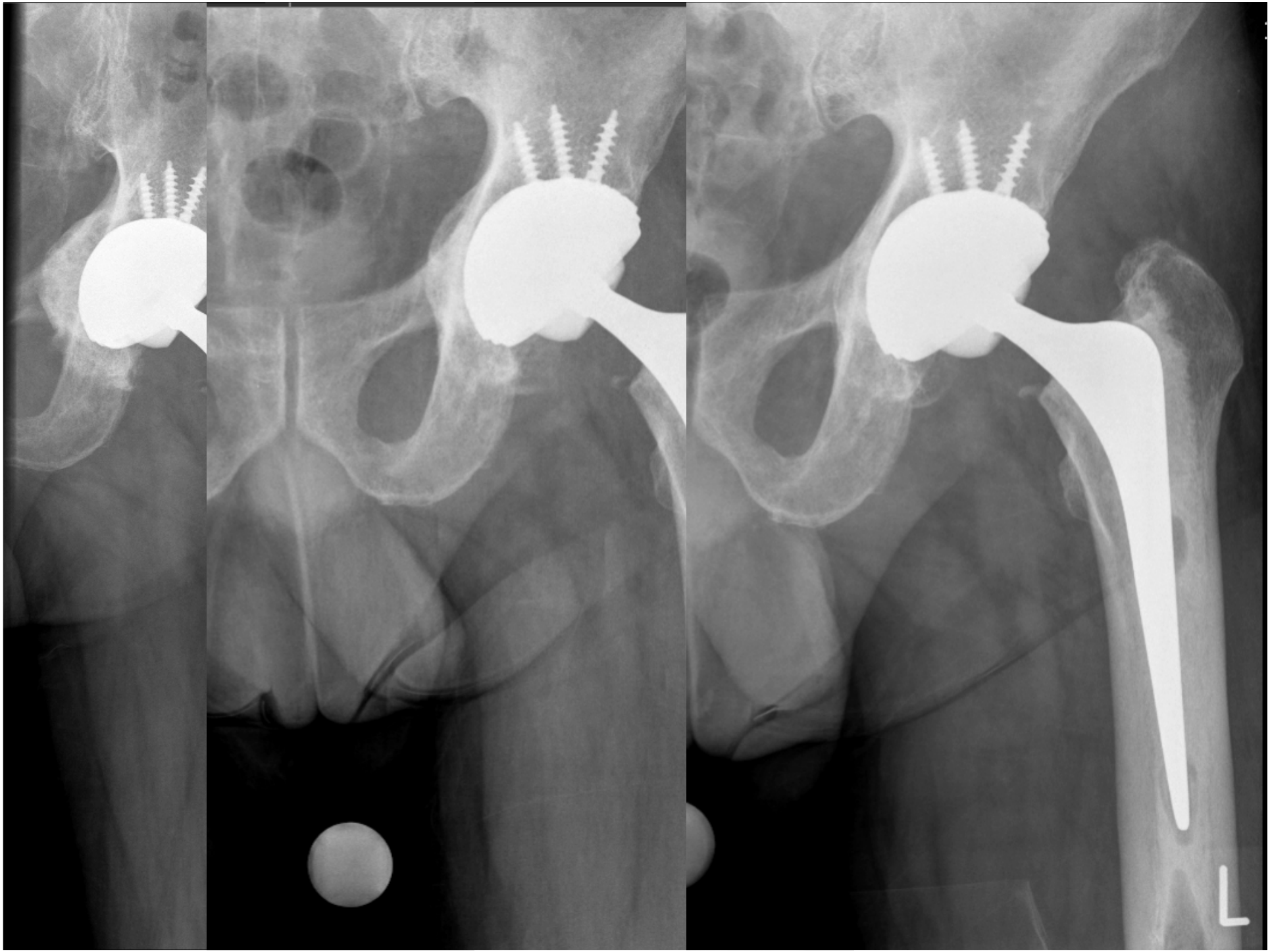
- Method of fixation

Cemented vs uncemented- decision making

- Cemented Exeter
- Bearing type
- Method of fixation
  - Cup
  - Stem
  - Life expectancy
  - Bony anatomy- acetabulum

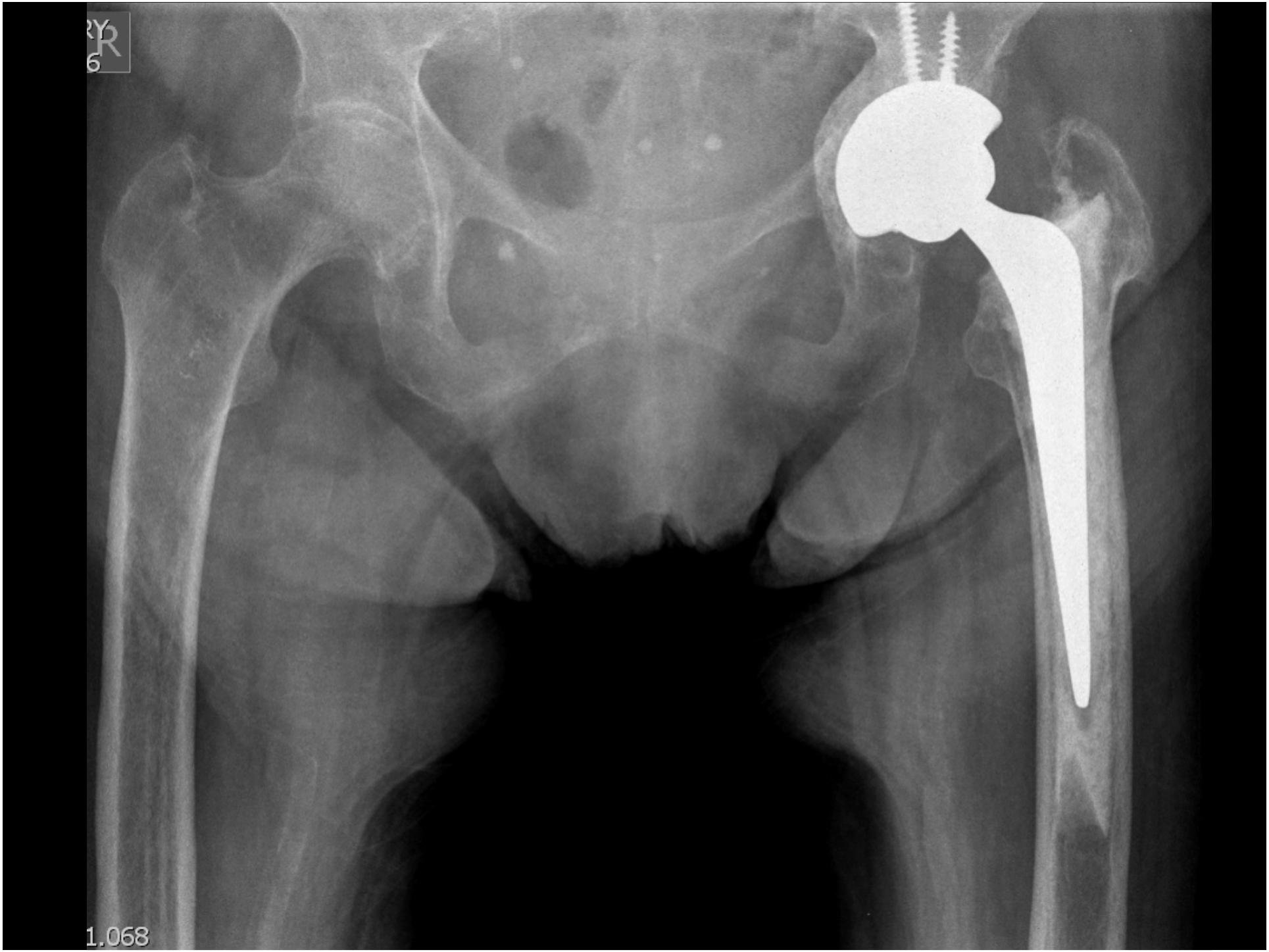



e PCC
R
1.320


L


923
43
Rac
PE
: L 2.043

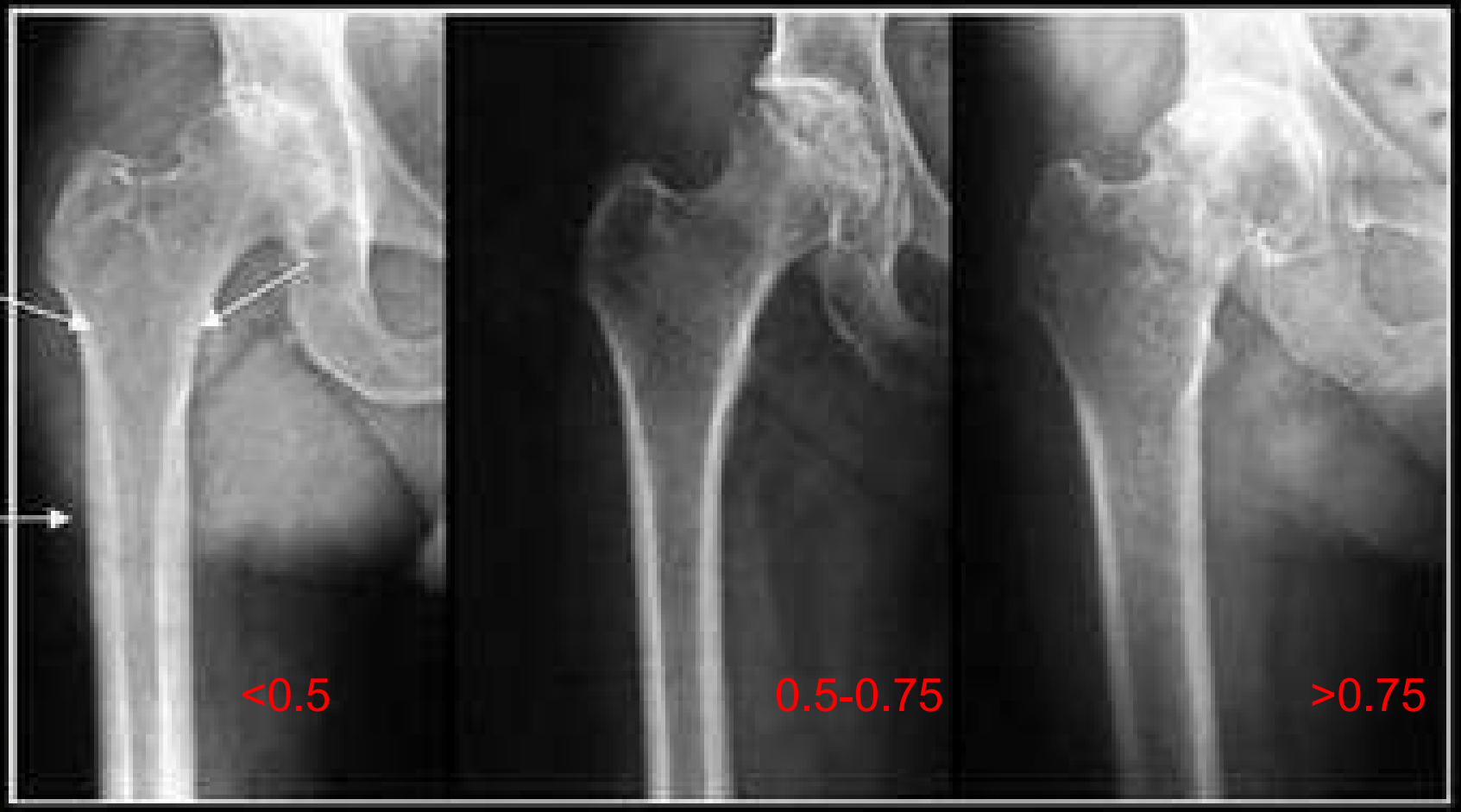

L


R
1.068

Cemented vs uncemented- decision making

- Cemented Exeter
- Bearing type
- Method of fixation
  - Cup
  - Stem
  - Life expectancy
  - Bony anatomy- femur

Dorr's Classification




H,DOROTHY
.692


DOROTHY
R
MULLER'S

Cemented vs uncemented- decision making

- Cemented Exeter
- Bearing type
- Method of fixation
- Young age
- Long life expectancy
- High fuctional demand
- Good femoral bone


R
901