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REGISTRE DES PROTHESES

SoFCOT Total Hip Arthroplasty Register
Annual report 2011

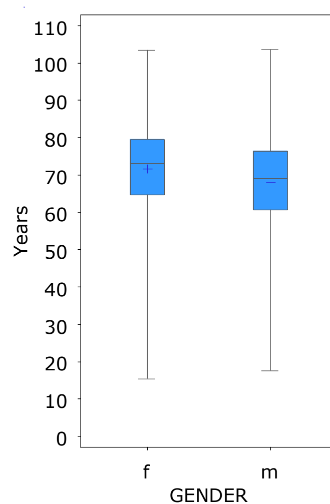
Part I: Primary Total Hip Arthroplasty

From January 1st 2006 until September 30th 2011, 7'331 Total Hip Arthroplasties (THA) were registered in the SOFCOT hip register. The average age of the patients was 70 years (SD, 12.4 years). A total of 4'134 patients (56%) were female with an average age of 71.6 years, and 3'196 were male with an average age of 67.9 years (Table 1, Figure1).

Table 1. Patient age at operation

GENDER	Min	Max	Average	Std Dev
Male	17.5	103.5	67.9	11.4
Female	15.4	103.5	71.6	11.1
Total	15.4	103.5	70.0	11.4

Figure1. Age distribution according to gender



Osteoarthritis is the main indication for THA (75%), followed by hip dysplasia and osteonecrosis of the femoral head. The order and the frequencies of the other diagnoses have not changed since the 2009 report (Table 2).

Table 2. Underlying diagnoses

DIAGNOSIS	Frequency	Percentage
Primary osteoarthritis	5495	74.96
Hip dysplasia	468	6.38
Femoral head necrosis	373	5.09
Acute hip fracture	342	4.67
Rapid destructive arthritis	261	3.56
Post-trauma	173	2.36
Rheumatoid arthritis	60	0.82
Post Perthes-Calve	37	0.50
Others	122	1.66

The posterolateral approach is used in more than half of the interventions (51.3%), while the use of an anterior approach is decreasing (Figures 2a and 2b)

Figure 2a. Distribution of surgical approach

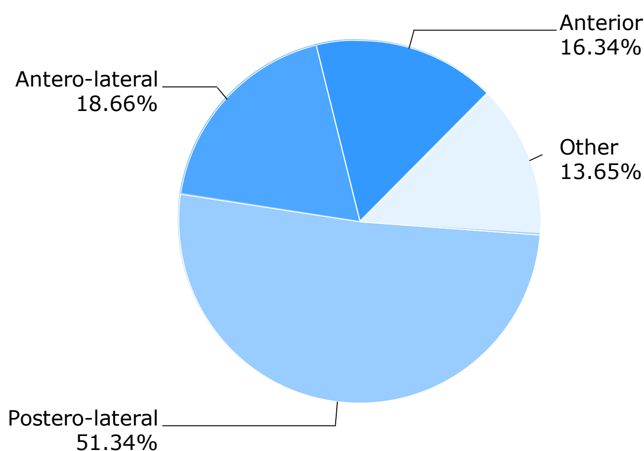


Figure2b. Distribution of surgical approach: change over 5 years

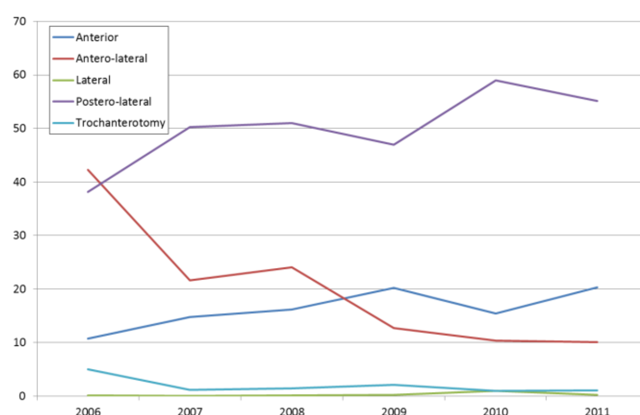


Table 3 shows that 90.5% of THAs are done conventionally, but a dual mobility cup was used in 6.9% of cases. All other types of THAs represent less than 1% of the total. More than 53% of THAs used uncemented fixation (Figure 3a). Since 2009 an increase of the uncemented fixation can be observed, which parallels a decline in cemented fixation (Figure 3b). When cement is used, it is in the majority of cases antibiotic-impregnated cement (from 87.3% in 2009 up to 90.6% in 2011) (Figure 4)

Table 3. Types of THA for primary implantation

TYPE of the PROSTHESIS	Frequency	Percent
Conventional THA	6632	90.47
THA with a dual mobility cup	506	6.90
Femoral prosthesis with a mobile cup	157	2.14
THA with a short femoral stem	9	0.12
Resurfacing	5	0.07
Others	22	0.30

Figure 3a. Fixation of components

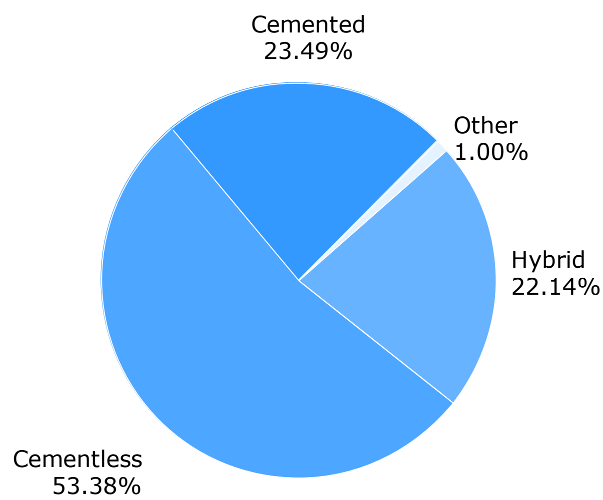


Figure3b. Fixation of components: change over the 5 years

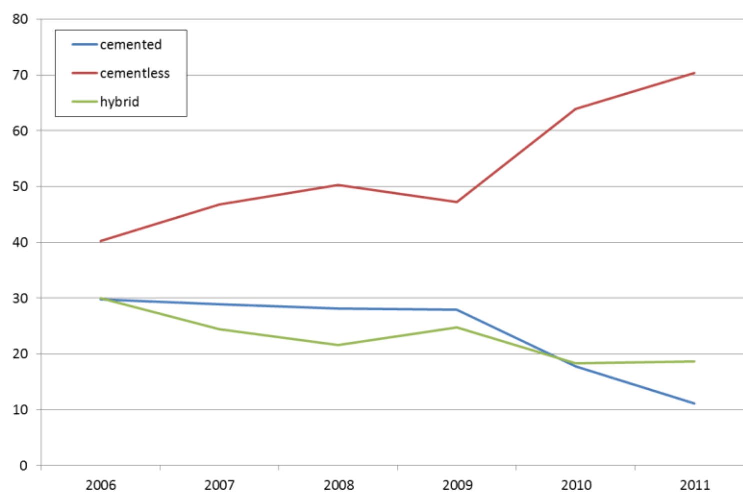
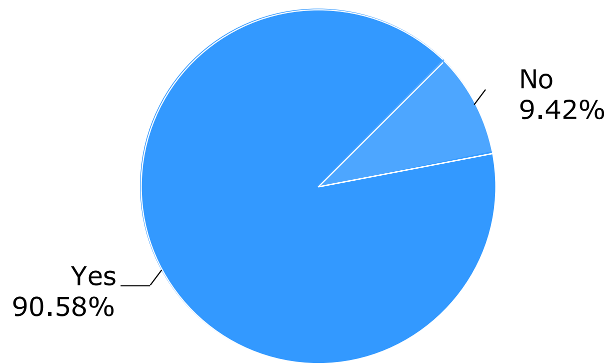


Figure 4. Use of antibiotic-impregnated cement

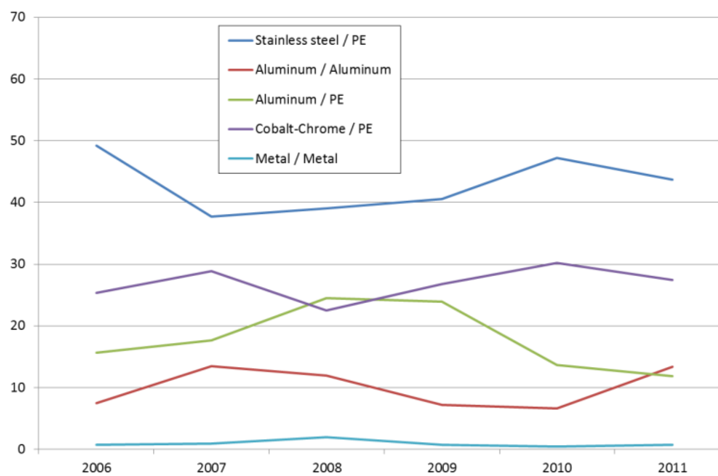


Four weight bearing materials represent 99% of THAs (Table 4). In contrast to 2009, alumina/alumina is now the most common combination, which increased from 27% to 30%, probably at the cost of the stainless steel/polyethylene combination, which is now in 2nd place (from 32% in 2009 to 29% in 2011).

Table 4. Weight bearing materials

MATERIAL	Frequency	Percent
Alumina / Alumina	2194	29.94
Stainless Steel/ PE	2148	29.31
Alumina / PE	1438	19.62
Cobalt-Chrome / PE	1045	14.26
Metal / Metal	420	5.73
Zirconia / PE	16	0.22
Zirconia / Alumina	15	0.20
Titanium / PE	6	0.08
Others	46	0.63

Figure5. Weight bearing materials: change over 5 years



The use of 28mm heads decreased slightly (from 47.7% in 2009 to 46.3% in 2011) but it is still the predominant femoral head size. On the other hand, the use of 36mm heads increased, from 6.4% in 2009 to 8.7% in 2011 (Table 5).

Table 5. Size of femoral head

SIZE	Frequency	Percent
28 mm	3392	46.29
22.2 mm	1641	22.39
32 mm	1590	21.70
36 mm	636	8.68
26 mm	24	0.33
>40 mm	45	0.61

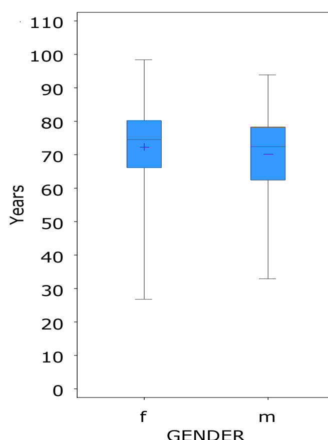
Part II : Re-intervention and THA Revision

From January 2006 to September 2011, 1'013 re-interventions of THAs were registered in SoFCOT. The average patient age was 71.5 years. A total of 625 patients (62%) were female with an average age of 72.3 years, and 388 patients were male with an average age of 70.2 years (Table 6, Figure 6)

Table 6. Age of the patients at the re-intervention/THA Revision

Gender	Min	Max	Average	SD
Male	32.9	93.9	70.2	11.6
Female	26.7	98.4	72.3	11.1
Total	26.7	98.4	71.5	11.4

Figure 6. Age distribution at the time of re-intervention/revision according to gender



Aseptic loosening remains the principal cause of re-interventions, however it declined from 56.7% in 2009 to 53.4% in 2011. Hip dislocation represents the second most common cause of re-interventions, similar to 2009. Re-interventions due to wear and osteolysis have increased by 2% since 2009, and the same is true for the periprosthetic fractures. Other causes of re-interventions worth mentioning are pain, acute infection, septic loosening and fracture of the implant, with frequencies of 3 to 5% (Table 7).

Table 7. Causes of re-interventions and THA revisions

DIAGNOSIS	Frequency	Percent
Aseptic loosening	541	53.41
Dislocation	135	13.33
Wear and/or osteolysis	85	8.39
Periprosthetic fracture	52	5.13
Pain	47	4.64
Acute deep infection	44	4.34
Septic loosening – chronic infection	39	3.85
Implant fracture	34	3.36
Resection of the femoral neck	5	0.49
Intraoperative fracture	1	0.10
Explantation of material	1	0.10
Other	29	2.86

In concordance with the causes of revision, the most common intervention remains the change of both the acetabular and femoral components, albeit with decreasing frequency since 2009. The proportion of isolated replacement of acetabular components increased by 4%, while that of isolated femoral replacements remains stable, from 12% in 2009 down to 11.25% (Table 8).

Table 8. Types of re-interventions / revisions

INTERVENTION/REVISION	Frequency	Percent
Complete exchange	504	49.75
Acetabular component only	283	27.94
Femoral component only	114	11.25
Head and Inlay	48	4.74
Reimplatation after previous resection	19	1.88
Removal of implants and spacer	13	1.28
Inlay only	6	0.59
Head only	6	0.59
Totalisation of previous femoral prosthesis	5	0.49
Head/neck resection	3	0.30
Prosthetic lavage	1	0.10
Other	11	1.09

Part II-A: Characteristics of the revised implants

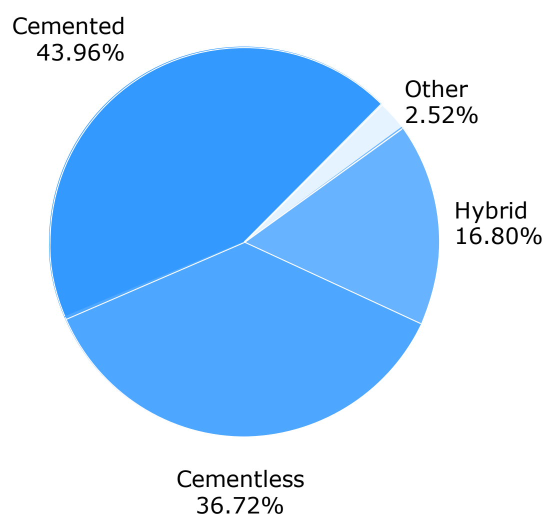
Unsurprisingly, the majority of the revised THAs are of the conventional type with a femoral stem and components with single mobility. The other arthroplasty types represent only 8% of the total THAs revised (Table 9).

Table 9. Characteristics of the revised implants

PROSTHESES REVISED	Frequency	Percent
Conventional THA	932	92.00
Femoral prosthesis	18	1.78
THA with a dual mobility cup	17	1.68
Spacer	11	1.09
Femoral head resurfacing	3	0.30
Full resurfacing	2	0.20
Other	30	2.96

The implants revised were mostly cemented, however this frequency decreased by 5% since 2009. These 5% possibly reflect the increase of the uncemented fixation seen in primary THAs (Figure 7).

Figure 7. Fixation of the revised implants



Most of the acetabular cups or inlays are still made of conventional polyethylene. Their proportion has remained stable since 2009, as have those of the bulk alumina or Co-Cr sandwich cups (Table 10). In contrast to the revised inlays, the distribution of the replaced heads has changed: compared to 2009, the proportion of the revised stainless steel heads decreased by 3%, down to a level of 32.5%. The alumina heads still represent 25% of the replaced heads, and the proportion of the revised CoCr heads increased by 2.5%, up to a level of 23.4%. The proportion of revised zirconia heads has also increased since 2009, to a current level of 15% (Table 10).

Table 10. Material of revised cups or inlays

MATERIAL	Frequency	Percent
Conventional PE	794	81.69
Bulk alumina	68	7.00
CoCr-sandwich	30	3.09
Highly cross-linked PE	19	1.95
Alumina-sandwich	13	1.34
CoCr-massive	3	0.31
Others	13	1.34
No acetabular implant	32	3.29

Missing information = 41

Table 11. Material of revised head

MATERIAL	Frequency	Percent
Stainless steel	315	32.47
Alumina	246	25.36
CoCr	227	23.40
Zirconia	144	14.85
Titanium	17	1.75
Other	21	2.16

Missing information = 43

Part II-B: Type of implant, fixation and cups used for revision

In a quarter of all acetabular revisions, the Implant is supported by a reinforcement ring. Another quarter of acetabular revisions are cemented, and the remaining half is uncemented (Figure 8). This indicates an increased use of reinforcement rings in cemented acetabular revisions, and an even more accentuated increase in uncemented revisions (Figure 9). In cases with cementation, an antibiotic-impregnated cement is used in 81.5% (Table 12).

Figure 8. Implant fixation of acetabular revisions

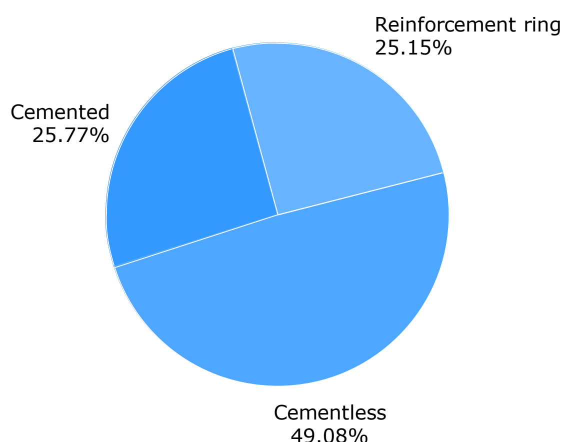


Figure 9. Use of cement in revisions

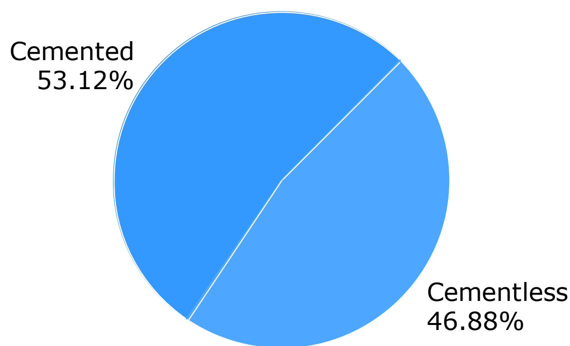


Table 12. Cemented revisions with and without antibiotics

ANTIBIOTICS	Frequency	Percent
Yes	497	81.48
No	113	18.52

Four weight bearing materials are mainly used in revisions, which are dominated by the classic combination of stainless steel/PE, although the frequency decreased by 2% since 2009 (Figure 10). Figure 11 shows a significant increase of the combination CoCr/PE at the cost of Alumina/PE since 2009.

Figure 10. Weight bearing materials used in revisions

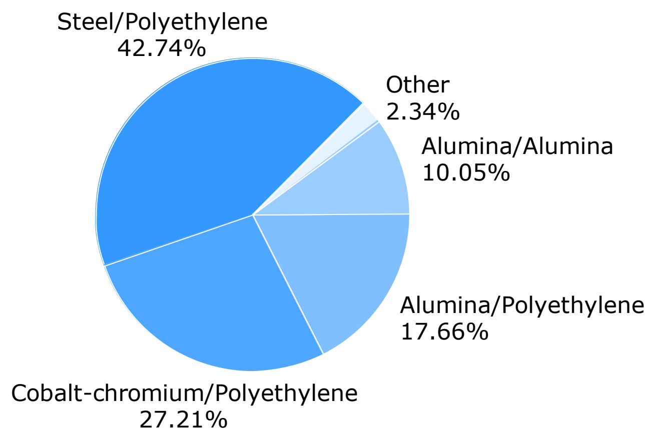
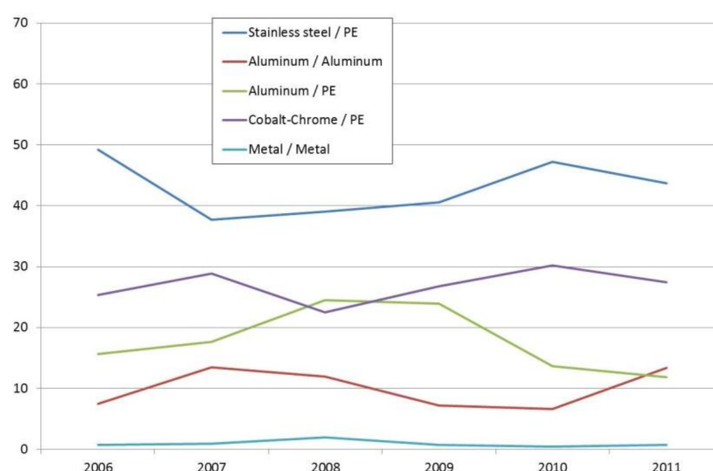


Figure11. Weight bearing materials used in revisions: change over 5 years



Part II-C: Analysis of the revision coefficients

The most important group of patients, those requiring a revision due to aseptic loosening, is composed of females in nearly 2/3 of the cases. In contrast, the revision group with deep infections or septic loosening mainly consists of male patients. Intra-operative or periprosthetic fractures usually occur in patients of high age.

The majority of the revised implants due to an aseptic loosening were cemented. The revised arthroplasties due to dislocation, wear and osteolysis, periprosthetic fractures and pain were cemented in 50% to 75% (Table 13).

Table 13. Patient characteristics and type of fixation in revised THAs

REVISION DIAGNOSIS	Age	% females	% cemented	% non-cemented	% hybrid
Aseptic loosening	71.8	66.9%	56.8	24.4	15.3
Dislocation	72.5	59.7	34.1	49.6	13.3
Wear and/or osteolysis	68.8	44.1	21.2	49.4	28.2
Periprosthetic fracture	79.3	65.3	23.1	67.3	9.6
Pain	62.1	78.3	17	59.6	23.4
Acute deep infection	72.2	45	38.9	36.1	25
Septic loosening-chronic infection	72.8	30.0	25.8	48.4	25.8
Implant fracture	70.3	54.6	42.4	45.5	12.1
Head/neck resection	67.5	60	n.a	n.a	n.a
Intra-operative fracture	85.0	100	n.a	n.a	n.a
others	69.1	66.7	n.a	n.a	n.a
TOTAL	71.5	62	44	36.7	16.8

Table 14. Co-variables influencing the 8 main causes for revision
(Odds ratios and 95% confident intervals)

Co-variables	Aseptic loosening	Dislocation	Wear and/or osteolysis	Peri-prosthetic fracture	Pain	Acute deep infection	Septic loosening-chronic infection	Implant fracture
Age	n.s.	n.s.	n.s.	1.1 (1.06-1.15)	0.95 (0.92-0.97)	n.s.	n.s.	n.s.
Female vs Male	n.s.	n.s.	0.55 (0.34-0.89)	n.s.	3.7 (1.7-7.9)	0.24 (0.11-0.54)	0.24 (0.11-0.54)	n.s.
Cemented vs uncemented fixation	4 (2.8-5.6)	0.47 (0.3-0.73)	0.47 (0.25-0.86)	0.21 (0.1-0.46)	0.19 (0.1-0.45)	n.s.	n.s.	n.s.
Hybrid *vs* uncemented	1.5 (1.1-2.3)	0.46 (0.26-0.82)	n.s.	0.35 (0.13-0.95)	n.s.	n.s.	n.s.	n.s.
Reverse Hybrid *vs* uncemented	5.1 (1.8-14.3)	n.s.	n.a.	n.a.	n.a	n.s.	n.s.	n.a.
Alu/PE *vs* stSteel/PE	n.s.	n.s.	n.s.	n.s.	n.s.	0.17 (0.04-0.77)	0.17 (0.04-0.77)	n.s.
Co-Ch/PE *vs* stSteelI/PE	n.s.	n.s.	1.9 (1.1-3.5)	n.s.	0.3 (0.1-0.87)	n.s.	n.s.	n.s.
Alu/Alu *vs* stSteel/PE	n.s.	0.36 (0.15-0.9)	n.s.	n.s.	n.s.	n.s.	n.s.	4 (1.5-10.3)
Convent THA. *vs* dual mobility THA	n.s.	n.a.	n.a.	n.s.	n.s.	0.09 (0.02-0.39)	0.09 (0.02-0.39)	n.a.

n.s. – non significant, n.a. – not applicable because of small sample sizes

Age is a significant risk factor, influencing the revisions due to the periprosthetic fracture and the revisions due to pain: for each additional year of age, the risk of a periprosthetic fracture increases by almost 10%, while the risk of a revision due to pain decreases by 5%.

Gender significantly influences the risk of revision due to wear and osteolysis, pain and infections. Women have only half the risk of revision due to wear and/or osteolysis compared to men. Females also show a four times reduced risk of revision due to septic loosening or infection. On the other hand, women are four times more likely than men to require a revision due to pain.

The risk of a revision due to aseptic loosening is four times higher in primary THAs with cemented fixation compared to uncemented fixation of the implant. The risk of revision due to a dislocation and wear/osteolysis is reduced by half, while the risk of revision due to a periprosthetic fracture or pain is reduced by a factor of 5.

Compared to uncemented fixation of both components, the standard hybrid fixation (cup uncemented, stem cemented) presents a 1.5 times higher a risk of revision due to an aseptic loosening, while the risk due to dislocation is half, and the risk of a revision due to periprosthetic fracture is reduced to about a third.

Compared to uncemented fixation of both components, the inverse hybrid fixation (cemented cup, uncemented stem) presents a 5 times higher revision risk due to aseptic loosening.

Compared to the stainless steel/PE combination, Co-Cr/PE has twice as high a risk of revision due to wear and osteolysis, although the risk of revision due to pain is reduced by 2/3.

Compared to the stainless steel/PE combination, alumina/alumina is associated with only a third of the risk of revision due to dislocation, although the risk due to implant fractures is quadrupled.

The data of the current register did not allow evaluating the risk of revision due to dislocation by conventional THAs compared to THAs with a dual mobility head.

NB. The multivariate analyses could only adjust for co-variates that were recorded in the SOFCOT registry. Other important co-factors may exist. The precision of some risk estimates needs to be interpreted with care, as the partially wide confidence intervals demonstrate.

Part III : Preliminary analysis of revisions of patients with documented primary THA

This is a new section, expected to develop bit by bit as the number of registered revisions grows for which information about the primary HTA is available in the SoFCOT registry. The social security number of the patient, gender and operated side allows establishing a link between the primary and revision interventions.

When this report went to press, only 81 revisions could be linked to primary THAs. Not surprisingly, the first and most frequent causes of an early revision are hip dislocation, periprosthetic fractures (possibly missed intra-operative fractures?!), infection and pain (Table 15).

Table 15. Characteristics of revisions of patients with documented primary THA

REVISION CAUSE	Demographics of re-operated patients					Fixation of the revised implants		
	N	%	Age	% females	Average interval	Cemented	Non-cemented	Hybrid
Dislocation	34	42.0	71.0	58.8	3.1	14	18	2
Periprosthetic fracture	18	22.2	78.3	68.8	2.2	1	15	2
Acute deep infection	9	11.1	71.5	42.9	2.6	3	4	2
Implant fracture	5	6.2	66.1	60	2.9	3	2	0
Pain	5	6.2	65.0	60	3.3	1	4	0
Aseptic loosening	4	4.9	72.3	50	3.9	2	2	0
Septic loosening-chronic infection	2	2.5	78.3	50	3.6			1
Intraoperative fracture	-	-	-	-				
Others	4	4.9	73.2	75				
TOTAL	81	100.0	72.2	57.5	2.8	24	48	8

Survival analyses only make sense in registries with a very high or complete documentation rate, ideally linked to other databases like death registers. Since this is not possible in many countries, including France, the revision percent per 100 observed component years (rp100ocy) was introduced by the Australian joint registry and has gained international acceptance as a measure for implant revision in registries with lower documentation rates. Its formula is:

The formula for the calculation of rp100ocy is:

(Number of cases of revision surgery for any reason / Number of observed components x observation time in years) x 100

Table 16. Revision per 100 observed component years (rp100ocy)

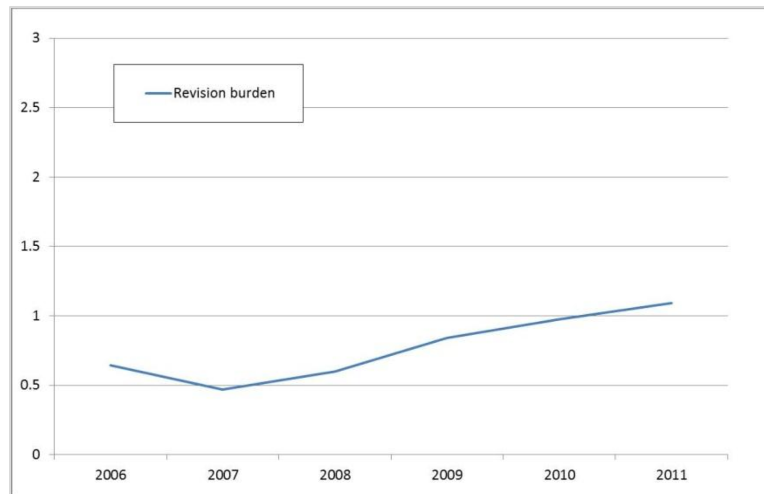
By year	Average (years)	N primary THAs	N revisions	Rp100ocy
- 2008	1.23	3328	20	0.49
- 2009	1.83	4369	37	0.46
- 2010	2.26	5781	57	0.44
- 2011	2.69	7331	81	0.41
By type of implant				
Conventional THA	2.86	6632	73	0.38
- cemented	3.15	1631	18	0.35
- uncemented	2.64	3445	42	0.46
- hybrid	3.11	1485	13	0.28
By bearing type				
- stainless steel / PE	2.82	2149	24	0.40
- alumina/ alumina	2.59	2195	18	0.32
- alumina / PE	2.52	1439	18	0.50
- cobalt-chrome / PE	2.68	1046	13	0.46
- metal / metal	3.26	422	6	0.44
By major implant manufacturer				
(1) Stryker	2.62	1734	17	0.37
Conventional THA	2.64	1666	14	0.32
- cemented	2.96	742	6	0.27
- uncemented	1.75	393	7	1.02
- hybrid	2.97	501	1	0.07
(2) Zimmer	2.70	1285	12	0.35
Conventional THA	2.81	1179	11	0.33
- cemented	3.03	256	0	0.00
- uncemented	2.55	485	6	0.49
- hybrid	2.97	426	5	0.40
(3) Depuy	2.57	1210	7	0.23
Conventional THA	2.82	1061	6	0.20
- cemented	1.70	81	0	0.00
- uncemented	2.90	901	4	0.15
- hybrid	4.07	54	2	0.91

The calculation of this Index allows for comparison of different implants even in the absence of survival curves.

Table 16 shows that the overall rp100ocy in the SoFCOT THA register is about 0,40. It also presents the various rp100ocy that can be calculated by creating different implant strata by type of implant, bearing type, and major implant manufacturer.

For the calculation of the annual revision burden according to the formula "N annual revisions/ (N annual primaries + N annual revisions)", it is still premature. With currently only 81 revisions recorded compared with 7331 primary THAs registered since January 1st 2006, the revision burden is only 1.1%.

Figure 11. Change of the revision burden since 2006.



The revision burden will inevitably increase in parallel with the growing number of recorded primary and revision interventions. It will be interesting to observe the future development of the revision burden (Figure 11). It will allow for comparisons of the performance of orthopaedic surgeons at the level of countries, institutions, and even between individual clinicians.

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The pilot group of the SoFCOT THA register would like to extend its sincere gratitude to all French orthopedic surgeons who are collaborating or have collaborated regularly to keep this register up dated

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http://www.sofcot.fr/10-registre-national/registre-national.asp

Heading : PROSTHESIS REGISTER
How to get your password>>>
You will receive a user name and a password transmitted by memdoc

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