

Supplementary article data

Increased risk of revision in patients with non-traumatic femoral head necrosis

11,589 cases compared to 416,217 cases with primary osteoarthritis in the NARA database, 1995–2011

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Table 4. Unadjusted and adjusted relative risk of revision due to loosening, separated into cemented and uncemented stems in 2 age groups. Adjustment made for sex, cup fixation, and age within each stratum (risk ratios for covariates are not shown)

Age group/diagnosis	n	RR	95% CI	p-value
All stems, unadjusted				
FHN ^a	11,589	1.35	1.21–1.51	< 0.001
Primary OA ^b	416,217	1		
Cemented stems, unadjusted				
< 70 years				
FHN ^a	3,327	1.42	1.22–1.65	< 0.001
Primary OA ^b	112,951	1		
≥ 70 years				
FHN ^a	4,604	1.25	0.98–1.59	0.07
Primary OA ^b	184,722	1		
Cemented stems, adjusted				
< 70 years				
FHN ^a	3,327	1.16	0.99–1.35	0.06
Primary OA ^b	112,951	1		
≥ 70 years				
FHN ^a	4,604	1.45	1.14–1.84	0.003
Primary OA ^b	184,722	1		
Uncemented stem, unadjusted				
< 70 years				
FHN ^a	3,275	1.08	0.85–1.38	0.5
Primary OA ^b	88,535	1		
≥ 70 years				
FHN ^a	383	1.98	0.88–4.44	0.1
Primary OA ^b	30,009	1		
Uncemented stem, adjusted				
< 70 years				
FHN ^a	3,275	1.02	0.79–1.31	0.9
Primary OA ^b	88,535	1		
≥ 70 years				
FHN ^a	383	1.99	0.89–4.48	0.1
Primary OA ^b	30,009	1		

^a FHN – Femoral head necrosis

^b Reference category

Table 5. Unadjusted and adjusted relative risk of revision due to dislocation

Variable	n	RR	95% CI	p-value
Diagnosis unadjusted				
FHN ^a	416,217	1.97	1.71–2.27	< 0.001
Primary OA ^b	11,589	1	1	
Diagnosis adjusted				
FHN ^a	416,217	2.03	1.76–2.34	< 0.001
Primary OA ^b	11,589	1		
Age, years				
< 50	14,184	0.69	0.58–0.82	< 0.001
50–59	56,772	0.79	0.72–0.88	< 0.001
60–69	137,132	0.87	0.81–0.94	< 0.001
70–79 ^b	159,850	1		
≥ 80	59,868	1.02	0.92–1.13	0.7
Sex				
Female ^b	254,091	1		
Male	173,715	1.01	0.95–1.07	0.8
Cup				
Cemented ^b	291,738	1		
Uncemented	136,068	2.05	1.89–2.23	< 0.001
Stem				
Cemented ^b	305,604	1		
Uncemented	122,202	0.88	0.80–0.96	0.004

^a FHN – Femoral head necrosis

^b Reference category

Table 6. Unadjusted and adjusted relative risk of revision due to infection, separated into 2 age groups (< 70 years of age or ≥ 70 years). Adjustment for sex and for cup and stem fixation (risk ratios for covariates are not shown)

Age group/diagnosis	n	RR	95% CI	p-value
All ages, unadjusted				
Femoral head necrosis	11,589	1.73	1.44–2.08	< 0.001
Primary OA ^a	416,217	1		
< 70 years, unadjusted				
Femoral head necrosis	6,602	1.79	1.41–2.28	< 0.001
Primary OA ^a	201,486	1		
≥ 70 years, unadjusted				
Femoral head necrosis	4,987	1.66	1.25–2.20	< 0.001
Primary OA ^a	214,731	1		
< 70 years, adjusted				
Femoral head necrosis	6,602	1.67	1.32–2.13	< 0.001
Primary OA ^a	201,486	1		
≥ 70 years, adjusted				
Femoral head necrosis	4,987	1.82	1.37–2.42	< 0.001
Primary OA ^a	214,731	1		
^a Reference category				

Table 7. Unadjusted and adjusted relative risk of revision due to periprosthetic fracture, separated into gender and type of stem fixation. Adjustment for age (< 70 years of age or ≥ 70 years) and cup fixation

Age group/diagnosis	n	RR	95% CI	p-value
All cases, unadjusted				
FHN ^a	11,589	2.29	1.81–2.89	< 0.001
Primary OA ^b	416,217	1		
Cemented stem, unadjusted				
Females				
FHN ^a	5,309	3.89	2.61–5.82	< 0.001
Primary OA ^b	185,309	1		
Males				
FHN ^a	2,622	1.87	1.10–3.20	0.02
Primary OA ^b	112,364	1		
Cemented stems, adjusted				
Females				
FHN ^a	5,309	3.91	2.61–5.84	< 0.001
Primary OA ^b	185,309	1		
Males				
FHN ^a	2,622	1.97	1.15–3.37	0.01
Primary OA ^b	112,364	1		
Uncemented stem, unadjusted				
Females				
FHN ^a	1,412	1.42	0.80–2.53	0.23
Primary OA ^b	62,061	1		
Males				
FHN ^a	2,246	2.20	1.42–3.40	< 0.001
Primary OA ^b	56,483	1		
Uncemented stem, adjusted				
Females				
FHN ^a	1,412	1.56	0.88–2.78	0.1
Primary OA ^b	62,061	1		
Males				
FHN ^a	2,246	2.44	1.57–3.79	< 0.001
Primary OA ^b	56,483	1		
^a FHN – Femoral head necrosis				
^b Reference category				

Table 8. Publications on patients operated with THA due to FHN. Publications from the Nordic registries have been excluded

Author	Year of publication	No. of THRs	Mean age of patients (range)	Mean follow-up, years (range)	Revision rate ^a
Saito et al.	1989	29		7	48% ^b
Piston et al.	1994	35	32 (21–40)	7 (5–10)	6%
Kim et al.	1995	78	48 (20–73)	7.2 (6–9)	21%
Fyda et al.	2002	53	55 (18–86)	14.5	17%
Hungerford et al.	2006	34	46	8.2 (0.1–20)	35%
Ha et al.	2008	46	49 (22–65)	11 (10–13)	7–42% ^c
Conroy et al.	2008	2,810			2.4%
Bose et al.	2010	96		5.4 (4.0–8.1)	4.6%
Kim et al.	2010	93	38 (24–45)	11 (10–13)	0%
Chiu et al.	2011	45	70 (60–83)	9 (5–12)	11%
Kim et al.	2011	148	47 (26–58)	17 (16–18)	2%/17% ^d
Solarina et al.	2012	68	50 (29–72)	13 (11–15)	<5%
^a Calculated by dividing all re-revisions (regardless of reason) by the number of hips included.					
^b Radiographic loosening.					
^c Cumulative revision rate: best- and worst-case scenario.					
^d Femoral component/acetabular component.					