

Supplementary data

Table 4. Stem migration during 25 years of follow-up. Per-protocol analysis (i.e., only stems with verified coating), using the 1-year postoperative RSA radiograph as a baseline (i.e., unknown initial migration). Values are count, mean (SD), median (range)

Migration FU year	Hydroxyapatite	Fluorapatite	Uncoated	p-value
Translation, mm:				
x-axis (medial-lateral)				
2 7	-0.07 (0.29) -0.16 (-0.49 to 0.45)	5 -0.09 (0.17) 0.00 (-0.37 to 0.05)	8 0.01 (0.22) -0.08 (-0.16 to 0.50)	0.5 ^a 1.0 ^b
5 2	-0.39 (0.40) -0.39 (-0.67 to -0.10)	5 -0.17 (0.35) -0.06 (-0.78 to 0.13)	6 0.01 (0.12) 0.02 (-0.13 to 0.15)	0.2 ^c
10 2	-0.25 (0.17) -0.25 (-0.37 to -0.13)	4 0.00 (0.11) -0.03 (-0.10 to 0.17)	7 0.09 (0.22) 0.07 (-0.19 to 0.49)	
15 3	-0.20 (0.09) -0.22 (-0.28 to -0.09)	3 0.02 (0.10) -0.01 (-0.06 to 0.13)	5 -0.01 (0.13) -0.02 (-0.17 to 0.13)	0.5 ^c
20 0	–	1 –	1 –	
25 0	–	1 –	1 –	
y-axis (cranial-caudal) ^d				
2 7	0.02 (0.17) 0.04 (-0.19 to 0.32)	5 0.14 (0.13) 0.20 (-0.02 to 0.27)	8 -0.03 (0.09) -0.03 (-0.16 to 0.12)	0.1 ^a 1.0 ^b
5 2	-0.06 (0.02) -0.06 (-0.07 to -0.04)	5 0.09 (0.23) 0.09 (-0.16 to 0.44)	6 0.00 (0.08) 0.00 (-0.12 to 0.12)	0.6 ^c
10 2	0.04 (0.03) 0.04 (0.02 to 0.06)	4 0.05 (0.09) 0.07 (-0.08 to 0.12)	7 -0.07 (0.25) -0.07 (-0.41 to 0.37)	
15 3	0.12 (0.30) 0.07 (-0.16 to 0.44)	3 0.00 (0.14) 0.04 (-0.15 to 0.13)	5 -0.18 (0.23) -0.18 (-0.52 to 0.12)	0.5 ^c
20 0	–	1 –	1 –	
25 0	–	1 –	1 –	
z-axis (anterior-posterior)				
2 7	0.20 (0.76) -0.09 (-0.61 to 1.56)	5 0.51 (0.45) 0.42 (0.06 to 1.21)	8 0.04 (0.15) 0.09 (-0.29 to 0.15)	0.08 ^a 0.5 ^c
5 2	-0.12 (0.19) -0.12 (-0.26 to 0.01)	5 0.71 (0.63) 0.66 (-0.04 to 1.63)	6 0.29 (0.36) 0.28 (-0.19 to 0.89)	0.05 ^c
10 2	0.10 (0.21) 0.10 (-0.05 to 0.25)	4 0.14 (0.26) 0.13 (-0.16 to 0.46)	7 0.07 (0.47) 0.18 (-0.74 to 0.59)	
15 3	0.34 (0.45) 0.19 (-0.01 to 0.85)	3 0.49 (0.17) 0.57 (0.29 to 0.60)	5 -0.17 (0.38) -0.06 (-0.81 to 0.16)	0.3 ^c
20 0	–	1 –	1 –	
25 0	–	1 –	1 –	
Rotation, degrees				
x-axis (transverse)				
2 3	0.13 (0.62) 0.00 (-0.42 to 0.80)	2 -0.04 (0.28) -0.04 (-0.24 to 0.16)	3 0.18 (0.36) 0.15 (-0.17 to 0.54)	0.5 ^a 0.9 ^b
5 1	–	2 -0.32 (0.28) -0.32 (-0.52 to -0.12)	2 0.20 (0.03) 0.20 (0.18 to 0.21)	–
10 1	–	2 0.12 (0.28) 0.12 (-0.07 to 0.32)	2 0.62 (0.89) 0.62 (-0.01 to 1.25)	
15 0	–	2 -0.57 (0.42) -0.57 (-0.86 to -0.27)	2 0.27 (0.43) 0.27 (-0.03 to 0.58)	–
20 0	–	0 –	0 –	
25 0	–	0 –	0 –	
y-axis (longitudinal) ^e				
2 3	-0.44 (0.82) -0.21 (-1.35 to 0.24)	2 -1.02 (0.30) -1.02 (-1.23 to -0.81)	3 -0.34 (0.53) -0.50 (-0.76 to 0.25)	0.5 ^a 0.2 ^b
5 1	–	2 -0.53 (0.30) -0.53 (-0.74 to -0.32)	2 -0.10 (0.53) -0.10 (-0.48 to 0.28)	–
10 1	–	2 -0.14 (0.12) -0.14 (-0.22 to -0.05)	2 -0.33 (0.28) -0.33 (-0.52 to -0.13)	
15 0	–	2 1.08 (2.18) 1.08 (-0.46 to 2.62)	2 -0.02 (0.62) -0.02 (-0.45 to 0.42)	–
20 0	–	0 –	0 –	
25 0	–	0 –	0 –	
z-axis (sagittal)				
2 3	-0.07 (0.46) 0.15 (-0.60 to 0.23)	2 0.18 (0.11) 0.18 (0.11 to 0.26)	3 0.09 (0.17) 0.18 (-0.11 to 0.19)	0.3 ^a 1.0 ^b
5 1	–	2 0.12 (0.06) 0.12 (0.07 to 0.16)	2 0.01 (0.19) 0.01 (-0.13 to 0.15)	–
10 1	–	2 0.09 (0.04) 0.09 (0.06 to 0.12)	2 -0.06 (0.09) -0.06 (-0.12 to 0.00)	
15 0	–	2 0.05 (0.34) 0.05 (-0.19 to 0.29)	2 0.03 (0.01) 0.03 (0.02 to 0.04)	–
20 0	–	0 –	0 –	
25 0	–	0 –	0 –	

^a Main effect, per protocol^b Group × time interaction, per protocol^c Prespecified time point, per protocol^d Negative values correspond to subsidence.^e Positive values correspond to internal rotation.

Table 5. Stem migration during 25 years of follow-up. Intention-to-treat analysis (i.e., all included stems as per randomization group), using the 1-year postoperative RSA radiograph as a baseline (i.e., unknown initial migration). Values are count, mean (SD), median (range)

Migration	Hydroxyapatite		Fluorapatite		Uncoated		p-value			
FU year										
Translation, mm:										
x-axis (medial-lateral)										
2	12	-0.01 (0.28)	-0.03 (-0.49 to 0.50)	12	-0.05 (0.13)	-0.01 (-0.37 to 0.15)	11	0.04 (0.17)	0.06 (-0.16 to 0.30)	0.8 ^a 1 ^b
5	6	-0.15 (0.29)	-0.11 (-0.67 to 0.13)	10	-0.08 (0.27)	-0.05 (-0.78 to 0.17)	10	0.07 (0.34)	0.09 (-0.63 to 0.70)	0.3 ^c
10	6	-0.01 (0.22)	0.01 (-0.37 to 0.20)	9	-0.09 (0.25)	-0.03 (-0.62 to 0.17)	10	0.15 (0.64)	0.11 (-1.08 to 1.48)	
15	6	-0.17 (0.09)	-0.17 (-0.28 to -0.05)	7	-0.09 (0.27)	-0.03 (-0.70 to 0.13)	8	-0.17 (0.49)	-0.05 (-1.34 to 0.13)	0.9 ^c
20	2	-0.11 (0.00)	0.00 (-0.11 to -0.11)	4	-0.32 (0.38)	-0.32 (-0.72 to 0.10)	1	-	-	
25	1	-	-	3	0.01 (0.10)	0.02 (-0.10 to 0.10)	1	-	-	
y-axis (cranial-caudal) ^d										
2	12	-0.03 (0.15)	-0.05 (-0.19 to 0.32)	12	0.06 (0.12)	0.04 (-0.15 to 0.27)	11	0.02 (0.11)	0.04 (-0.16 to 0.21)	0.5 ^a 0.9 ^b
5	6	-0.09 (0.08)	-0.06 (-0.23 to -0.02)	10	0.06 (0.23)	-0.02 (-0.17 to 0.44)	10	-0.06 (0.28)	-0.01 (-0.73 to 0.36)	0.4 ^c
10	6	-0.19 (0.19)	-0.23 (-0.41 to 0.06)	9	-0.06 (0.19)	-0.08 (-0.50 to 0.12)	10	-0.21 (0.40)	-0.08 (-0.98 to 0.37)	
15	6	-0.12 (0.37)	-0.11 (-0.59 to 0.44)	7	-0.03 (0.21)	-0.06 (-0.32 to 0.33)	8	-0.23 (0.48)	-0.15 (-1.28 to 0.24)	0.6 ^c
20	2	-0.50 (0.02)	0.00 (-0.52 to -0.49)	4	-0.32 (0.41)	-0.43 (-0.69 to 0.26)	1	-	-	
25	1	-	-	3	0.15 (0.13)	0.23 (0.00 to 0.23)	1	-	-	
z-axis (anterior-posterior)										
2	12	0.25 (0.61)	0.13 (-0.61 to 1.56)	12	0.19 (0.58)	0.18 (-1.17 to 1.21)	11	0.11 (0.22)	0.13 (-0.29 to 0.60)	0.3 ^a 0.9 ^b
5	6	0.24 (0.52)	0.12 (-0.26 to 1.18)	10	0.22 (0.79)	0.18 (-1.34 to 1.63)	10	0.02 (0.43)	0.03 (-0.67 to 0.89)	0.7 ^c
10	6	0.10 (0.23)	0.01 (-0.13 to 0.50)	9	0.03 (0.32)	0.08 (-0.55 to 0.46)	10	-0.07 (0.49)	-0.07 (-0.74 to 0.60)	
15	6	0.38 (0.46)	0.18 (-0.01 to 1.05)	7	0.15 (0.52)	0.29 (-0.78 to 0.60)	8	-0.23 (0.46)	-0.10 (-0.93 to 0.36)	0.8 ^c
20	2	-0.13 (0.31)	0.00 (-0.35 to 0.09)	4	0.17 (0.98)	-0.10 (-0.69 to 1.58)	1	-	-	
25	1	-	-	3	0.32 (0.38)	0.54 (-0.12 to 0.54)	1	-	--	
Rotation, degrees										
x-axis (transverse)										
2	5	-0.31 (0.86)	-0.36 (-1.57 to 0.80)	5	-0.57 (1.04)	-0.24 (-2.41 to 0.16)	5	-0.10 (0.46)	-0.17 (-0.59 to 0.54)	0.8 ^a 0.5 ^b
5	3	-0.63 (1.64)	0.07 (-2.49 to 0.55)	4	-0.08 (0.36)	-0.07 (-0.52 to 0.34)	5	-0.20 (0.68)	0.18 (-1.30 to 0.33)	0.7 ^c
10	3	0.45 (0.27)	0.35 (0.23 to 0.75)	5	-0.38 (0.96)	-0.07 (-2.08 to 0.32)	4	0.44 (0.69)	0.37 (-0.23 to 1.25)	
15	2	-0.81 (1.69)	-0.81 (-2.01 to 0.39)	4	-0.05 (0.70)	-0.07 (-0.86 to 0.81)	4	-0.08 (0.70)	0.08 (-1.07 to 0.58)	0.6 ^c
20	1	-	-	0	-	-	0	-	-	
25	1	-	-	1	-	-	0	-	-	
y-axis (longitudinal) ^e										
2	5	0.08 (0.93)	0.24 (-1.35 to 1.11)	5	-0.37 (0.77)	-0.37 (-1.23 to 0.82)	5	-0.18 (0.54)	-0.41 (-0.76 to 0.50)	0.4 ^a 0.6 ^b
5	3	0.59 (1.13)	0.57 (-0.53 to 1.74)	4	0.14 (0.85)	0.07 (-0.74 to 1.18)	5	0.26 (0.44)	0.32 (-0.48 to 0.68)	0.8 ^c
10	3	-0.02 (0.89)	-0.47 (-0.59 to 1.01)	5	0.03 (0.73)	-0.05 (-0.94 to 1.05)	4	0.67 (1.31)	0.39 (-0.52 to 2.42)	
15	2	1.17 (0.24)	1.17 (1.00 to 1.34)	4	0.52 (1.59)	0.19 (-0.92 to 2.62)	4	0.51 (0.86)	0.42 (-0.45 to 1.65)	0.8 ^c
20	1	-	-	0	-	-	0	-	-	
25	1	-	-	1	-	-	0	-	-	
z-axis (sagittal)										
2	5	-0.24 (0.58)	0.09 (-1.09 to 0.23)	5	-0.03 (0.38)	0.11 (-0.69 to 0.26)	5	0.00 (0.18)	-0.08 (-0.20 to 0.19)	0.7 ^a 0.5 ^b
5	3	-0.33 (0.88)	0.14 (-1.34 to 0.23)	4	-0.02 (0.19)	0.02 (-0.28 to 0.16)	5	-0.07 (0.25)	0.03 (-0.48 to 0.15)	0.7 ^c
10	3	0.16 (0.05)	0.16 (0.11 to 0.20)	5	-0.18 (0.33)	-0.01 (-0.56 to 0.12)	4	-0.03 (0.07)	-0.02 (-0.12 to 0.05)	
15	2	-0.57 (1.07)	-0.57 (-1.32 to 0.18)	4	0.08 (0.23)	0.10 (-0.19 to 0.29)	4	-0.24 (0.37)	-0.11 (-0.76 to 0.04)	0.4 ^c
20	1	-	-	0	-	-	0	-	-	
25	1	-	-	1	-	-	0	-	-	

^a Main effect, intention to treat^b Group × time interaction, intention to treat^c Prespecified time point, intention to treat^d Negative values correspond to subsidence.^e Positive values correspond to internal rotation.

Table 7. Harris Hip Score (min 0 – max 100 points) during 25 years of follow-up, per-protocol analysis (i.e., only stems with verified coating). Values are count, mean (SD), median (range)

FU year	Hydroxyapatite		Fluorapatite		Uncoated		p-value			
Preop.	5	33 (17)	35 (8–57)	3	34 (5)	34 (30–39)	9	32 (14)	37 (8–54)	0.6 ^a 0.3 ^b
2	2	81 (22)	81 (65–96)	2	90 (1)	90 (89–91)	4	94 (6)	95 (85–100)	
5	2	99 (1)	99 (99–100)	3	76 (8)	76 (69–84)	5	84 (13)	85 (66–100)	
10	4	85 (10)	86 (72–94)	5	75 (13)	73 (62–90)	7	81 (14)	86 (61–98)	
15	4	77 (25)	85 (41–99)	5	76 (13)	76 (61–90)	6	80 (6)	79 (74–90)	0.9 ^c
20	0	–	–	2	63 (8)	63 (57–69)	2	83 (1)	83 (82–83)	
25	0	–	–	1	–	–	1	–	–	

^a Main effect, per protocol
^b Group × time interaction, per protocol
^c Prespecified time point, per protocol

Table 8. Harris Hip Score (min 0 – max 100 points) during 25 years of follow-up, intention-to-treat analysis (i.e., all included stems as per randomization group). Values are count, mean (SD), median (range)

FU year	Hydroxyapatite		Fluorapatite		Uncoated		p-value			
Preop.	7	32 (15)	31 (8–57)	4	31 (8)	32 (21–39)	11	36 (15)	37 (8–61)	1 ^a 0.3 ^b
2	4	84 (15)	87 (65–96)	4	81 (12)	84 (64–91)	6	92 (10)	96 (74–100)	
5	4	97 (5)	99 (90–100)	9	84 (10)	84 (69–96)	8	83 (14)	83 (66–100)	
10	8	90 (9)	93 (72–100)	10	83(15)	88 (62–100)	11	79 (17)	86 (54–98)	
15	7	77 (24)	89 (41–99)	8	82 (13)	89 (61–95)	10	79 (9)	79 (60–91)	0.8 ^c
20	1	–	–	5	71 (11)	69 (57–87)	3	84 (3)	83 (82–87)	
25	1	–	–	4	86 (6)	87 (79–93)	2	78 (2)	78 (76–79)	

^a Main effect, intention to treat
^b Group × time interaction, intention to treat
^c Prespecified time point, intention to treat