

1 Supplementary Data

2 Table S1a. Mean (SD) of unmodelled hip stem migration results of the Microplasty stem

		Translation (mm)			Rotation (°)			MTPM (mm)
Follow-up		X	Y	Z	X	Y	Z	
6 weeks (n = 15)	Mean	0.28	-1.51	-0.47	-0.07	2.85	-0.34	3.57
	SD	0.41	1.43	0.54	0.62	2.23	0.97	2.35
1 year (n = 15)	Mean	0.32	-1.49	-0.30	-0.00	2.94	-0.27	3.45
	SD	0.43	1.42	0.40	0.83	1.89	1.01	2.23
2 years (n = 14)	Mean	0.24	-1.50	-0.15	0.04	2.54	-0.29	3.28
	SD	0.45	1.46	0.44	0.80	2.44	1.01	2.38

3 Translation in millimeter (mm) and rotation in degrees (°) along and about the X-, Y- and Z-axes;

4 MTPM = maximum total point motion

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6 Table S1b. Mean (SD) of unmodelled hip stem migration results of the Reduced Distal stem

		Translation (mm)			Rotation (°)			MTPM (mm)
Follow-up		X	Y	Z	X	Y	Z	
6 weeks (n = 19)	Mean	−0.24	−2.41	−0.22	−0.51	1.47	0.15	3.78
	SD	1.67	3.56	0.43	0.80	2.46	1.09	4.16
1 year (n = 20)	Mean	−0.20	−2.38	−0.29	−0.60	1.73	0.12	4.03
	SD	1.60	3.57	0.52	0.86	2.03	1.17	4.13
2 years (n = 19)	Mean	−0.26	−2.31	−0.26	−0.54	1.43	0.20	3.90
	SD	1.69	3.66	0.55	0.93	2.20	1.09	4.17

7 Translation in millimeter (mm) and rotation in degrees (°) along and about the X-, Y- and Z-axes;

8 MTPM = maximum total point motion

9 Table S2. Median (IQR) of HHS and PROM scores at each follow-up for the Microplasty and
10 Reduced Distal stems as implanted

PROM	Design (n = per follow-up)	Follow-up			
		Preoperative	6 week	1 year	2 years
HHS	Microplasty (n = 25; 25; 25; 24)	60.0 (56.0–69.0)	82.0 (69.5–88.5)	99.0 (93.0–100.0)	100.0 (97.0–100.0)
	Reduced Distal (n = 21; 20; 21; 21)	60.0 (54.5–75.5)	81.5 (75.3–88.5)	98.0 (91.5–100.0)	100.0 (97.00–100.0)
OHS	Microplasty (n = 25; 24; 25; 24)	25.0 (21.5–31.5)	39.5 (33.3–43.0)	46.0 (43.0–48.0)	48.0 (44.3–48.0)
	Reduced Distal (n = 20; 21; 20; 20)	26.5 (20.8–30.0)	38.0 (36.0–40.0)	43.5 (40.25–47.0)	46.5 (42.3–48.0)
EQ5D	Microplasty (n = 25; 25; 25; 24)	0.69 (0.30–0.78)	0.81 (0.78–0.90)	1.00 (0.84–1.00)	1.00 (0.88–1.00)
	Reduced Distal (n = 20; 20; 18; 20)	0.69 (0.48–0.78)	0.84 (0.78–0.97)	1.00 (0.81–1.00)	1.00 (0.85–1.00)
EQ5D- Health	Microplasty (n = 25; 24; 25; 24)	60.0 (50.0–70.50)	80.0 (70.0–90.0)	80.0 (71.3–90.0)	80.0 (75.0–90.0)
	Reduced Distal (n = 20; 21; 20; 20)	70.0 (51.3–77.3)	80.0 (70.0–90.0)	80.0 (75.3–91.8)	86.5 (71.3–90.0)
FJS	Microplasty (n = n/a; 25; 25; 23)	n.a.	48.0 (19.0–75.0)	75.0 (56.0–92.0)	92.0 (69.0–98.0)
	Reduced Distal (n = n/a; 21; 20; 19)	n.a.	35.0 (26.0–66.0)	61.5 (38.75–91.0)	88.0 (58.0–98.0)
HOOS- Pain	Microplasty (n = 25; 25; 25; 24)	45.0 (35.0–52.5)	82.5 (66.3–92.5)	97.5 (91.3–100.0)	100.0 (92.5–100.0)
	Reduced Distal (n = 21; 21; 21; 20)	42.50 (35.0–50.0)	85.0 (69.4–90.0)	95.0 (90.0–100.0)	95.0 (85.6–100.0)
HOOS- Symptoms	Microplasty (n = 25; 25; 25; 24)	40.0 (32.5–52.5)	75.0 (60.0–87.5)	90.0 (80.0–97.5)	95.0 (81.3–100.0)
	Reduced Distal (n = 21; 21; 21; 20)	40.0 (30.0–52.5)	70.0 (62.5–85.0)	90.0 (72.5–95.0)	87.5 (81.3–95.0)
HOOS- ADL	Microplasty (n = 25; 25; 25; 24)	44.1 (33.1–59.6)	85.3 (71.1–94.7)	92.7 (85.2–100.0)	98.5 (87.1–100.0)
	Reduced Distal (n = 21; 21; 21; 20)	42.7 (33.1–47.0)	81.3 (75.7–87.5)	92.7 (80.9–97.1)	92.7 (85.7–98.5)
HOOS- Sports	Microplasty (n = 25; 24; 23; 22)	18.8 (6.3–31.3)	64.6 (50.0–75.0)	81.3 (62.5–100.0)	89.6 (67.2–100.0)
	Reduced Distal (n = 21; 21; 21; 20)	18.8 (12.50–31.3)	59.34 (41.2–75.0)	71.9 (56.3–85.9)	87.5 (67.8–93.78)
HOOS- QoL	Microplasty (n = 25; 25; 25; 24)	25.0 (15.6–37.5)	62.5 (53.1–78.1)	93.8 (75.0–100.0)	93.8 (87.5–100.0)
	Reduced Distal (n = 21; 21; 21; 20)	25.0 (18.8–37.5)	62.5 (50.0–71.9)	81.3 (65.6–100.0)	90.6 (75.0–98.4)

11 IQR = interquartile range; HHS = Harris hip score; PROM = patient reported outcome measure; OHS =

12 Oxford hip score; EQ5D = Euroqol 5 dimensions; FJS = forgotten joint score; HOOS = hip osteoarthritis

13 outcome score; QOL = quality of live; n.a. = not applicable

Table S3. Modelled (LMM) mean migration results with 95% confidence interval (CI) and estimated mean difference (CI) of the patients with a good femoral canal fill (15 Microplasty and 18 Reduced Distal stems) (as implanted) at 6 weeks, 1 year, and 2 years follow-up, with respect to direct-postoperative follow-up

	Mean migration (CI)		
Follow-up	Microplasty	Reduced Distal	Mean difference (CI) (Microplasty– Reduced Distal)
T_x (mm)			
6 weeks	0.28 (0.14 to 0.43)	0.12 (–0.01 to 0.25)	0.16 (–0.05 to 0.37)
1 year	0.32 (0.17 to 0.46)	0.11 (–0.02 to 0.24)	0.21 (0.00 to 0.42)
2 years	0.24 (0.09 to 0.38)	0.09 (–0.04 to 0.23)	0.14 (–0.07 to 0.36)
T_y (mm)			
6 weeks	–1.51 (–2.11 to –0.90)	–1.46 (–2.01 to –0.90)	–0.05 (–0.94 to 0.83)
1 year	–1.49 (–2.09 to –0.88)	–1.43 (–1.98 to –0.88)	–0.05 (–0.94 to 0.83)
2 years	–1.47 (–2.01 to –0.85)	–1.39 (–1.95 to –0.83)	–0.07 (–0.97 to 0.82)
T_z (mm)			
6 weeks	–0.47 (–0.66 to –0.29)	–0.16 (–0.33 to 0.01)	–0.31 (–0.58 to –0.04)
1 year	–0.30 (–0.48 to –0.11)	–0.24 (–0.41 to –0.07)	–0.05 (–0.32 to 0.22)
2 years	–0.15 (–0.34 to 0.04)	–0.22 (–0.39 to –0.05)	0.07 (–0.20 to 0.35)
R_x (°)			
6 weeks	–0.07 (–0.34 to 0.21)	–0.28 (–0.53 to –0.03)	0.21 (0.19 to 0.61)
1 year	0.00 (–0.27 to 0.27)	–0.38 (–0.63 to –0.13)	0.38 (–0.01 to 0.77)
2 years	–0.05 (–0.22 to 0.33)	–0.34 (–0.59 to –0.08)	0.39 (–0.01 to 0.79)
R_y (°)			
6 weeks	2.85 (1.98 to 3.72)	1.78 (0.98 to 2.59)	1.07 (–0.21 to 2.34)
1 year	2.94 (2.07 to 3.81)	1.96 (1.17 to 2.76)	0.98 (–0.29 to 2.25)
2 years	2.57 (1.68 to 3.46)	1.86 (1.05 to 2.67)	0.71 (–0.58 to 2.00)
R_z (°)			
6 weeks	–0.34 (–0.64 to –0.04)	–0.14 (–0.42 to 0.14)	–0.20 (–0.64 to 0.24)
1 year	–0.27 (–0.57 to 0.04)	–0.19 (–0.47 to 0.09)	–0.08 (–0.52 to 0.36)
2 years	–0.31 (–0.61 to 0.00)	–0.17 (–0.46 to 0.11)	–0.13 (–0.58 to 0.32)

LMM = linear mixed model; T_x, T_y, T_z = translation in millimeter (mm) along the X-, Y- and Z-axes; R_x, R_y, R_z = rotation in degrees (°) about the X-, Y- and Z-axes

Table S4. Number, condition number and mean error of the femoral bone markers used in the RSA analysis. Note that information of the markers used in a marker-configuration model (MC-model) is included in the condition number information, but not in the mean error information

	Number of markers median (range)	Condition number mean (SD)	Mean error (mm) mean (SD)
Microplasty (n = 15)	6 (5–9)	90.9 (31.9)	0.16 (0.07) ^a
Reduced distal (n = 20)	6 (3–9)	73.6 (29.7)	0.15 (0.08) ^b

Microplasty = Microplasty stem; Reduced distal = Reduced distal stem; SD = standard deviation

^a based on 14 cases; ^b based on 16 cases

Qualitative measures for RSA migration analysis

- Days (median (range)) between surgery and postoperative RSA radiograph acquisition, of all implanted study stems:
 - 1 day (1 to 14)
- Days (median (inter quartal range)) deviating from the exact 24-months postoperative day, of all patients with 24-months postoperative RSA and who are included in the final analysis:
 - 29 days later (2 days early to 46 days later)