

Supplementary data

Table 3. MBRSA and AI-based CT-RSA translations (mm) and rotations (°). MBRSA migration results with day 1 or 2 weeks as postoperative reference. Stem results with coordinate system aligned according to the stem or the RSA cage. AI-based CT-RSA results with 2 weeks as postoperative reference. Stem results with coordinate system aligned according to the stem or patient position on the CT table. Values are mean (CI)

	2 weeks	3 months	1 year	2 years	5 years
Stem					
X-translation (medial – lateral)					
RSA stem (postop.)	0.04 (–0.02 to 0.10)	0.04 (–0.02 to 0.09)	0.04 (–0.02 to 0.10)	0.06 (0.01 to 0.12)	0.09 (0.03 to 0.14)
RSA cage (postop.)	0.19 (0.12 to 0.26)	0.22 (0.12 to 0.32)	0.23 (0.13 to 0.33)	0.24 (0.14 to 0.34)	0.26 (0.17 to 0.35)
RSA stem (2 weeks)		–0.01 (–0.05 to 0.03)	0.00 (–0.04 to 0.03)	0.01 (–0.03 to 0.06)	0.04 (0.01 to 0.08)
RSA cage (2 weeks)		0.03 (–0.02 to 0.08)	0.04 (–0.01 to 0.09)	0.05 (0.00 to 0.10)	0.07 (0.02 to 0.11)
CT stem					0.11 (0.06 to 0.17)
CT table					0.15 (0.10 to 0.21)
Y-translation (superior – inferior)					
RSA stem (postop.)	–0.26 (–0.39 to –0.13)	–0.49 (–0.72 to –0.25)	–0.47 (–0.71 to –0.24)	–0.44 (–0.67 to –0.20)	–0.46 (–0.70 to –0.22)
RSA cage (postop.)	–0.33 (–0.46 to –0.20)	–0.57 (–0.82 to –0.33)	–0.57 (–0.81 to –0.33)	–0.53 (–0.77 to –0.28)	–0.54 (–0.79 to –0.29)
RSA stem (2 weeks)		–0.21 (–0.34 to –0.08)	–0.20 (–0.32 to –0.07)	–0.16 (–0.29 to –0.02)	–0.18 (–0.31 to –0.05)
RSA cage (2 weeks)		–0.23 (–0.37 to –0.09)	–0.22 (–0.36 to –0.08)	–0.18 (–0.32 to –0.04)	–0.19 (–0.33 to –0.05)
CT stem					–0.36 (–0.53 to –0.19)
CT table					–0.34 (–0.51 to –0.18)
Z-translation (anterior – posterior)					
RSA stem (postop.)	0.04 (–0.03 to 0.12)	0.09 (0.02 to 0.16)	0.12 (0.02 to 0.21)	0.16 (0.06 to 0.27)	0.13 (0.06 to 0.20)
RSA cage (postop.)	0.05 (–0.03 to 0.13)	0.07 (–0.02 to 0.15)	0.08 (–0.01 to 0.18)	0.12 (0.02 to 0.21)	0.11 (0.02 to 0.20)
RSA stem (2 weeks)		0.04 (–0.05 to 0.12)	0.07 (–0.05 to 0.19)	0.13 (0.02 to 0.25)	0.09 (0.00 to 0.18)
RSA cage (2 weeks)		0.00 (–0.07 to 0.06)	0.01 (–0.08 to 0.10)	0.05 (–0.04 to 0.15)	0.04 (–0.03 to 0.12)
CT stem					0.05 (–0.01 to 0.12)
CT table					0.08 (0.01 to 0.14)
X-rotation (anterior – posterior)					
RSA stem (postop.)	0.14 (0.00 to 0.28)	0.20 (–0.03 to 0.43)	0.27 (0.04 to 0.49)	0.19 (–0.03 to 0.42)	–0.07 (–0.25 to 0.10)
RSA cage (postop.)	0.23 (0.09 to 0.37)	0.31 (0.09 to 0.54)	0.39 (0.18 to 0.60)	0.35 (0.17 to 0.54)	0.09 (–0.09 to 0.27)
RSA stem (2 weeks)		0.08 (–0.09 to 0.25)	0.14 (–0.05 to 0.34)	0.09 (–0.12 to 0.31)	–0.20 (–0.31 to –0.09)
RSA cage (2 weeks)		0.08 (–0.08 to 0.25)	0.16 (–0.02 to 0.33)	0.12 (–0.06 to 0.31)	–0.15 (–0.26 to –0.04)
CT stem					0.02 (–0.05 to 0.08)
CT table					–0.03 (–0.10 to 0.03)
Y-rotation (internal – external)					
RSA stem (postop.)	0.65 (0.43 to 0.86)	1.14 (0.69 to 1.59)	1.28 (0.78 to 1.78)	1.34 (0.85 to 1.82)	1.04 (0.64 to 1.44)
RSA cage (postop.)	0.58 (0.37 to 0.78)	1.05 (0.62 to 1.47)	1.18 (0.70 to 1.66)	1.24 (0.76 to 1.72)	0.92 (0.55 to 1.29)
RSA stem (2 weeks)		0.51 (0.15 to 0.88)	0.66 (0.27 to 1.05)	0.73 (0.32 to 1.14)	0.41 (0.11 to 0.71)
RSA cage (2 weeks)		0.49 (0.14 to 0.85)	0.64 (0.25 to 1.02)	0.71 (0.29 to 1.12)	0.36 (0.07 to 0.66)
CT stem					0.63 (0.32 to 0.94)
CT table					0.62 (0.30 to 0.93)
Z-rotation (valgus – varus)					
RSA stem (postop.)	–0.47 (–0.61 to –0.32)	–0.59 (–0.79 to –0.39)	–0.63 (–0.84 to –0.41)	–0.63 (–0.85 to –0.41)	–0.61 (–0.83 to –0.40)
RSA cage (postop.)	–0.54 (–0.68 to –0.40)	–0.75 (–0.98 to –0.51)	–0.79 (–1.04 to –0.54)	–0.83 (–1.07 to –0.59)	–0.82 (–1.06 to –0.59)
RSA stem (2 weeks)		–0.13 (–0.21 to –0.05)	–0.17 (–0.26 to –0.07)	–0.19 (–0.29 to –0.08)	–0.16 (–0.25 to –0.06)
RSA cage (2 weeks)		–0.21 (–0.33 to –0.08)	–0.25 (–0.39 to –0.11)	–0.29 (–0.42 to –0.17)	–0.27 (–0.40 to –0.15)
CT stem					–0.08 (–0.14 to –0.02)
CT table					–0.08 (–0.14 to –0.02)
Total translation					
RSA stem (postop.)	0.37 (0.25 to 0.49)	0.57 (0.35 to 0.79)	0.60 (0.39 to 0.82)	0.59 (0.38 to 0.81)	0.57 (0.35 to 0.79)
RSA cage (postop.)	0.46 (0.33 to 0.59)	0.68 (0.43 to 0.93)	0.69 (0.45 to 0.94)	0.68 (0.43 to 0.92)	0.69 (0.44 to 0.93)
RSA stem (2 weeks)		0.31 (0.18 to 0.44)	0.36 (0.24 to 0.49)	0.39 (0.27 to 0.52)	0.34 (0.21 to 0.46)
RSA cage (2 weeks)		0.32 (0.18 to 0.45)	0.36 (0.23 to 0.49)	0.37 (0.25 to 0.49)	0.33 (0.20 to 0.46)
CT stem					0.47 (0.33 to 0.62)
CT table					0.48 (0.33 to 0.62)

Table 3 continued

	2 weeks	3 months	1 year	2 years	5 years
Cup					
X-translation (medial – lateral)					
RSA cage (postop.)	0.00 (–0.08 to 0.08)	0.00 (–0.09 to 0.09)	–0.05 (–0.20 to 0.09)	0.02 (–0.09 to 0.13)	0.02 (–0.10 to 0.15)
RSA cage (2 weeks)		0.02 (–0.02 to 0.07)	0.01 (–0.09 to 0.11)	0.06 (–0.03 to 0.16)	0.01 (–0.08 to 0.10)
CT table					–0.05 (–0.08 to –0.01)
Y-translation (superior – inferior)					
RSA cage (postop.)	0.06 (0.02 to 0.10)	0.11 (0.06 to 0.16)	0.12 (0.07 to 0.18)	0.12 (0.06 to 0.18)	0.12 (0.06 to 0.17)
RSA cage (2 weeks)		0.05 (0.02 to 0.09)	0.06 (0.03 to 0.10)	0.06 (0.02 to 0.10)	0.06 (0.02 to 0.09)
CT table					0.02 (–0.01 to 0.05)
Z-translation (anterior – posterior)					
RSA cage (postop.)	0.06 (–0.01 to 0.13)	–0.01 (–0.10 to 0.09)	–0.05 (–0.15 to 0.06)	0.04 (–0.07 to 0.14)	0.11 (0.00 to 0.22)
RSA cage (2 weeks)		0.00 (–0.07 to 0.07)	–0.05 (–0.15 to 0.04)	0.02 (–0.09 to 0.13)	0.08 (–0.01 to 0.16)
CT table					0.07 (0.03 to 0.11)
X-rotation (anterior – posterior)					
RSA cage (postop.)	–0.13 (–0.46 to 0.19)	–0.13 (–0.44 to 0.18)	–0.03 (–0.40 to 0.34)	0.14 (–0.30 to 0.57)	0.19 (–0.13 to 0.51)
RSA cage (2 weeks)		–0.13 (–0.31 to 0.05)	0.01 (–0.30 to 0.32)	0.21 (–0.14 to 0.57)	0.28 (0.01 to 0.55)
CT table					–0.05 (–0.14 to 0.04)
Y-rotation (internal – external)					
RSA cage (postop.)	0.02 (–0.30 to 0.34)	0.02 (–0.35 to 0.39)	0.23 (–0.20 to 0.67)	0.25 (–0.13 to 0.64)	0.10 (–0.30 to 0.50)
RSA cage (2 weeks)		–0.03 (–0.26 to 0.21)	0.20 (–0.16 to 0.55)	0.21 (–0.10 to 0.53)	0.03 (–0.28 to 0.33)
CT table					–0.01 (–0.10 to 0.07)
Z-rotation (decreased – increased inclination)					
RSA cage (postop.)	0.03 (–0.14 to 0.19)	–0.02 (–0.17 to 0.13)	–0.12 (–0.36 to 0.12)	0.06 (–0.16 to 0.27)	0.06 (–0.21 to 0.32)
RSA cage (2 weeks)		–0.05 (–0.15 to 0.04)	–0.04 (–0.24 to 0.16)	0.08 (–0.09 to 0.26)	–0.01 (–0.23 to 0.21)
CT table					–0.20 (–0.28 to –0.12)
Total translation					
RSA cage (postop.)	0.20 (0.12 to 0.28)	0.29 (0.20 to 0.37)	0.34 (0.21 to 0.47)	0.34 (0.24 to 0.43)	0.36 (0.26 to 0.47)
RSA cage (2 weeks)		0.19 (0.15 to 0.23)	0.27 (0.17 to 0.36)	0.27 (0.17 to 0.37)	0.27 (0.21 to 0.34)
CT table					0.16 (0.13 to 0.18)