

Supplementary Material

10.1302/0301-620X.105B1.BJJ-2022-0465.R2

Table i. Inclusion and exclusion criteria.

Inclusion	Exclusion
<ul style="list-style-type: none"> • Non-inflammatory knee osteoarthritis • Unilateral osteoarthritis, or bilateral with contralateral knee functioning properly, not operated on in the last 6 months and not planned for TKA in the coming 2 years • Set to receive a primary cemented TKA • Age 40 to 75 years, inclusive, on the day of operation • Stable health (ASA grade ≤ 3), free of or treated for cardiac, pulmonary, haematological, or other conditions that would pose excessive operative risk • Correctable or $< 10^\circ$ rigid (non-correctable) varus or valgus deformity of the knee 	<ul style="list-style-type: none"> • BMI $> 35 \text{ kg/m}^2$ • Expected physical activity after surgery is 2 or less on the UCLA activity scale • Previous hip arthroplasty surgery in the last 6 months, or planned hip arthroplasty in the next 6 to 12 months • Major, non-arthroscopic surgery to the study knee, including HTO • Active, local infection or systemic infection • Prior high-energy trauma to the affected knee or prior history of anterior and/or posterior cruciate ligament rupture • Suspicion of anterior and/or posterior cruciate ligament rupture at clinical examination • Documented osteoporosis with patient in active medical treatment • Patient has physical, emotional, or neurological conditions that would compromise compliance with postoperative rehabilitation and follow-up • Bone quality compromised by disease or infection which cannot provide adequate support and/or fixation to the prosthesis • Severe instability of the knee joint secondary to the absence of collateral ligament integrity and function

	<ul style="list-style-type: none"> • Knee flexion < 90° • Fixed flexion deformity > 10° (passive extension lag) • > 30° extension deficit (active restraint to extension) • No proper functioning patella tendon on the affected side, measured as inability of active extension of the knee • Quadriceps weakness on the affected side; score on MRC scale < 4 • Rheumatoid arthritis, any autoimmune disorder, immunosuppressive disorder, or a terminal illness • Anterior and/or posterior cruciate ligament found missing or totally ruptured at direct intraoperative visualization
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ASA, American Society of Anesthesiologists; HTO, high tibial osteotomy; MRC, Medical Research Council; TKA, total knee arthroplasty; UCLA, University of California, Los Angeles.

Table ii. Median migration, translation in mm and rotation in °, of the femoral component at all follow-up points for the bicruciate-retaining and cruciate-retaining implants.

Variable	BCR					CR				
	6 wks	3 mths	6 mths	12 mths	24 mths	6 wks	3 mths	6 mths	12 mths	24 mths
Medial translation (Tx) (mm)										
Median (IQR)	-0.078 (-0.17 to 0.00)	-0.18 (-0.23 to -0.08)*	-0.16 (-0.28 to 0.13)	-0.12 (-0.31 to 0.20)	-0.15 (-0.30 to 0.23)	-0.018 (-0.11 to 0.05)	0.020 (-0.14 to 0.13)	-0.056 (-0.10 to 0.02)	-0.088 (-0.20 to 0.16)	0.0016 (-0.14 to 0.12)
Proximal translation (Ty) (mm)										
Median (IQR)	0.050 (-0.00 to 0.09)	0.066 (-0.05 to 0.12)	0.070 (0.02 to 0.15)	0.11 (0.00 to 0.19)	0.077 (-0.02 to 0.23)	0.031 (-0.05 to 0.10)	0.084 (0.01 to 0.13)	0.067 (-0.00 to 0.15)	0.11 (-0.02 to 0.17)	0.065 (-0.02 to 0.18)
Anterior translation (Tz) (mm)										
Median (IQR)	0.091 (-0.10 to 0.13)	0.12 (-0.06 to 0.41)	0.020 (-0.11 to 0.39)	0.18 (-0.13 to 0.48)	0.28 (-0.01 to 0.38)	0.089 (-0.07 to 0.27)	0.10 (-0.24 to 0.22)	0.12 (-0.14 to 0.39)	0.14 (-0.12 to 0.40)	0.11 (-0.16 to 0.48)
Total translation (TT) (mm)										

Median (IQR)	0.20 (0.15 to 0.33)	0.33 (0.23 to 0.47)	0.40 (0.23 to 0.64)	0.44 (0.29 to 0.81)	0.46 (0.32 to 0.82)	0.32 (0.16 to 0.39)	0.28 (0.23 to 0.40)	0.33 (0.18 to 0.49)	0.39 (0.25 to 0.95)	0.38 (0.20 to 0.71)
Flexion (Rx) (°)										
Median (IQR)	-0.050 (-0.11 to 0.17)	0.011 (-0.37 to 0.16)	0.0056 (-0.18 to 0.23)	-0.011 (-0.21 to 0.31)	-0.087 (-0.29 to 0.06)	0.034 (-0.15 to 0.21)	0.072 (-0.18 to 0.22)	0.031 (-0.28 to 0.23)	-0.015 (-0.11 to 0.36)	0.045 (-0.33 to 0.48)
Internal rotation (Ry) (°)										
Median (IQR)	0.052 (-0.06 to 0.25)	0.14 (0.04 to 0.32)*	0.13 (-0.19 to 0.28)	0.044 (-0.12 to 0.30)	0.12 (-0.06 to 0.37)	0.037 (-0.17 to 0.33)	-0.075 (-0.20 to 0.14)	0.015 (-0.14 to 0.28)	0.0055 (-0.20 to 0.32)	0.11 (-0.13 to 0.30)
Varus (Rz) (°)										
Median (IQR)	0.014 (-0.06 to 0.09)	-0.040 (-0.12 to -0.00)	-0.041 (-0.11 to 0.08)	-0.054 (-0.18 to 0.08)	-0.0093 (-0.12 to 0.24)	0.013 (-0.13 to 0.10)	-0.0060 (-0.12 to 0.11)	0.015 (-0.20 to 0.07)	0.016 (-0.14 to 0.08)	0.050 (-0.08 to 0.17)
TR (°)										
Median (IQR)	0.29 (0.14 to 0.51)	0.32 (0.19 to 0.55)	0.38 (0.28 to 0.58)	0.48 (0.39 to 0.88)	0.50 (0.40 to 0.93)	0.42 (0.26 to 0.52)	0.33 (0.26 to 0.40)	0.34 (0.29 to 0.61)	0.50 (0.22 to 0.89)	0.45 (0.22 to 0.92)
MTPM (mm)										
Median (IQR)	0.35 (0.26 to 0.57)	0.53 (0.33 to 0.82)	0.63 (0.42 to 0.93)	0.66 (0.55 to 1.29)	0.73 (0.56 to 1.28)	0.48 (0.41 to 0.67)	0.48 (0.37 to 0.63)	0.61 (0.38 to 0.76)	0.54 (0.44 to 1.44)	0.61 (0.37 to 1.05)

*A significant difference ($p < 0.05$) between the BCR and CR implants, tested using a Mann-Whitney U test.

BCR, bicruciate-retaining; CR, cruciate-retaining; IQR, interquartile range; MPTM, maximum total point motion; TR, total rotation.

Table iii. Median migration, translation in mm and rotation in °, of the tibial component at all follow-up points for the bicruciate-retaining and cruciate-retaining implants.

Variable	BCR					CR				
	6 wks	3 mths	6 mths	12 mths	24 mths	6 wks	3 mths	6 mths	12 mths	24 mths
Medial translation (Tx) (mm)										
Median	0.046	0.029	0.073	0.063	0.068	-0.028	-0.015	-0.021	-0.0015	0.0098
(IQR)	(-0.03 to 0.13)*	(-0.03 to 0.10)	(0.02 to 0.13)	(-0.07 to 0.14)	(0.01 to 0.18)	(-0.10 to 0.05)	(-0.12 to 0.07)	(-0.20 to 0.05)	(-0.08 to 0.06)	(-0.08 to 0.10)
Proximal translation (Ty) (mm)										
Median	0.025	0.029	0.044	0.11	0.090	0.032	0.061	0.099	0.12	0.15
(IQR)	(0.01 to 0.05)	(-0.02 to 0.09)	(-0.01 to 0.11)	(0.01 to 0.17)	(-0.03 to 0.13)	(0.01 to 0.11)	(0.01 to 0.12)	(0.03 to 0.15)	(0.05 to 0.19)	(0.06 to 0.22)
Anterior translation (Tz) (mm)										
Median	-0.032	0.017	-0.0047	0.024	-0.018	0.046	0.034	0.064	0.14	0.16
(IQR)	(-0.06 to 0.04)	(-0.09 to 0.16)	(-0.05 to 0.17)	(-0.18 to 0.19)	(-0.16 to 0.15)	(-0.09 to 0.19)	(-0.08 to 0.13)	(-0.13 to 0.29)	(-0.07 to 0.36)	(-0.09 to 0.36)
Total translation (TT) (mm)										
Median	0.13	0.19	0.21	0.31	0.29	0.23	0.24	0.27	0.28	0.31
(IQR)	(0.065 to 0.19)	(0.12 to 0.30)	(0.15 to 0.43)	(0.20 to 0.45)	(0.19 to 0.42)	(0.13 to 0.35)	(0.12 to 0.32)	(0.15 to 0.46)	(0.21 to 0.44)	(0.24 to 0.52)
Anterior tilt (Rx) (°)										
Median	-0.054	-0.16	-0.23	-0.45	-0.38	0.11	-0.018	0.033	0.094	0.044
(IQR)	(-0.29 to 0.14)	(-0.36 to 0.08)	(-0.46 to 0.08)	(-0.57 to 0.05)*	(-0.71 to -0.08)*	(-0.19 to 0.19)	(-0.13 to 0.20)	(-0.14 to 0.32)	(-0.13 to 0.29)	(-0.28 to 0.33)
Internal rotation (Ry) (°)										
Median	0.026	0.0062	0.048	0.069	0.081	0.0011	0.0075	-0.15	-0.23	-0.23
(IQR)	(-0.07 to 0.06)	(-0.17 to 0.06)		(-0.27 to 0.29)	(-0.17 to 0.41)*					

			(-0.16 to 0.12)			(-0.14 to 0.20)	(-0.16 to 0.11)	(-0.39 to 0.20)	(-0.40 to 0.13)	(-0.44 to 0.02)
Valgus (Rz) (°)										
Median (IQR)	-0.016 (-0.13 to 0.06)	-0.021 (-0.11 to 0.08)	-0.16 (-0.34 to 0.21)	-0.22 (-0.39 to 0.07)	-0.20 (-0.41 to -0.07)*	0.052 (-0.01 to 0.9)	0.037 (-0.08 to 0.18)	0.068 (-0.07 to 0.17)	0.011 (-0.09 to 0.09)	0.029 (-0.16 to 0.13)
TR (°)										
Median (IQR)	0.26 (0.15 to 0.38)	0.33 (0.23 to 0.51)	0.49 (0.38 to 0.76)	0.69 (0.54 to 1.01)	0.78 (0.51 to 1.00)	0.31 (0.21 to 0.49)	0.29 (0.21 to 0.59)	0.45 (0.32 to 0.62)	0.41 (0.29 to 0.68)	0.56 (0.30 to 0.70)
MTPM (mm)										
Median (IQR)	0.23 (0.14 to 0.33)	0.33 (0.20 to 0.54)	0.49 (0.34 to 0.72)	0.61 (0.41 to 0.98)	0.67 (0.41 to 0.92)	0.41 (0.26 to 0.60)	0.38 (0.24 to 0.65)	0.48 (0.33 to 0.85)	0.54 (0.36 to 0.75)	0.62 (0.43 to 0.81)

*Significant difference ($p < 0.05$) between the BCR and CR implants, tested using a Mann-Whitney U test.

BCR, bicruciate-retaining; CR, cruciate-retaining; IQR, interquartile range; MTPM, maximum total point motion; TR, total rotation.