Advanced Knee Surgery 2025

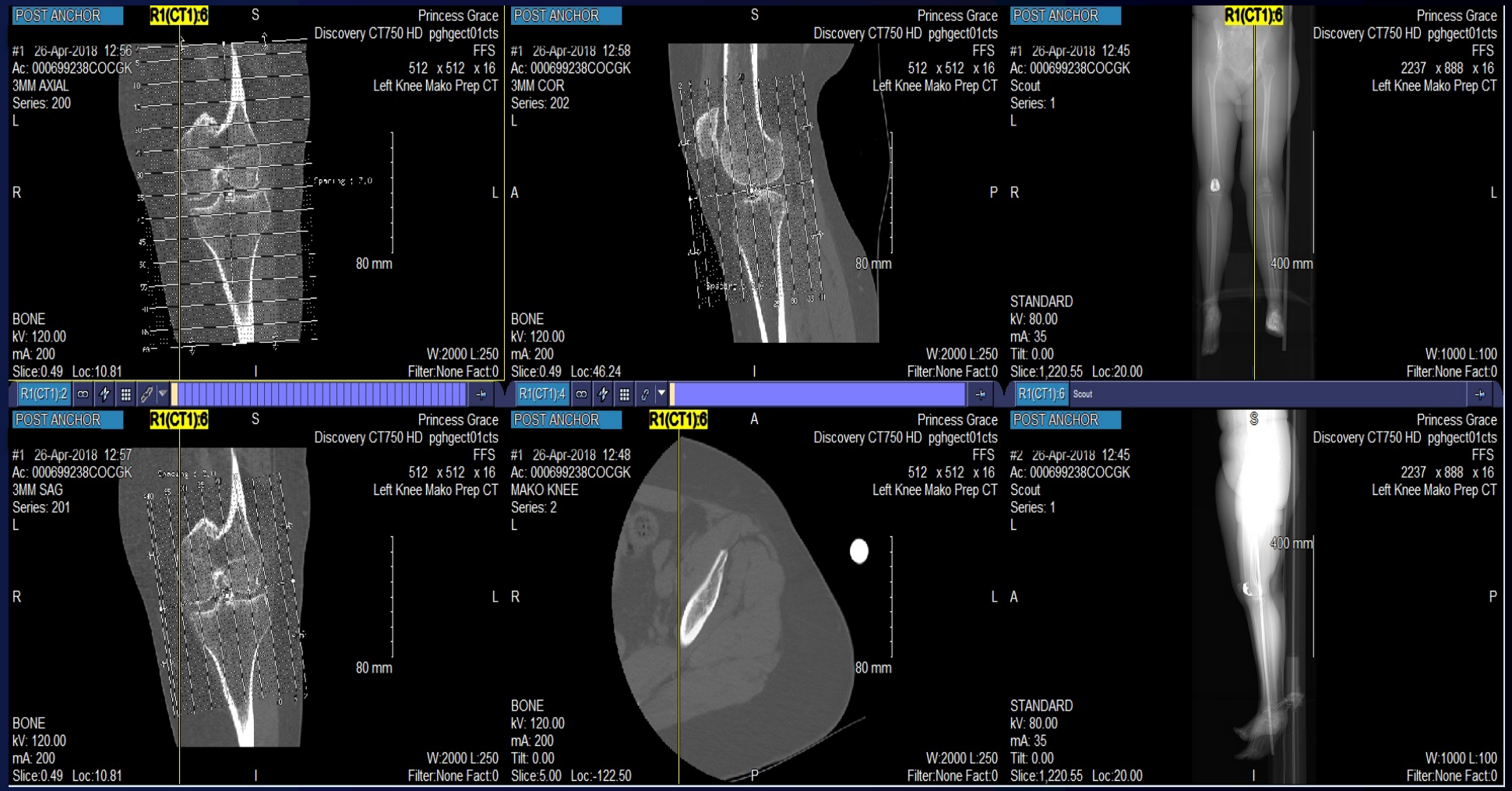
Robotics: Imaged based is mandatory

Sam Oussedik

Consultant Orthopaedic Surgeon & Dept Head, UCLH

Hon. Assoc. Prof. UCL

Pre-op CT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Discovery CT750 HD pghgect01cts
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FFS
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512 x 512 x 16
3MM AXIAL
Left Knee Mako Prep CT
Series: 200
L
R
L
80 mm
BONE
kV: 120.00
mA: 200
W:2000 L:250
Slice:0.49 Loc:10.81
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Filter:None Fact:0
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Discovery CT750 HD pghgect01cts
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3MM COR
Left Knee Mako Prep CT
Series: 202
L
A
P
80 mm
BONE
kV: 120.00
mA: 200
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2237 x 888 x 16
Scout
Left Knee Mako Prep CT
Series: 1
L
R
L
400 mm
STANDARD
kV: 80.00
mA: 35
Tilt: 0.00
W:1000 L:100
Slice:1,220.55 Loc:20.00
Filter:None Fact:0
R1(CT1):2
R1(CT1):4
R1(CT1):6
Scout
POST ANCHOR
R1(CT1):6
S
Princess Grace
Discovery CT750 HD pghgect01cts
#1 26-Apr-2018 12:57
FFS
Ac: 000699238COCGK
512 x 512 x 16
3MM SAG
Left Knee Mako Prep CT
Series: 201
L
R
L
80 mm
BONE
kV: 120.00
mA: 200
W:2000 L:250
Slice:0.49 Loc:10.81
I
Filter:None Fact:0
POST ANCHOR
R1(CT1):6
A
Princess Grace
Discovery CT750 HD pghgect01cts
#1 26-Apr-2018 12:48
FFS
Ac: 000699238COCGK
512 x 512 x 16
MAKO KNEE
Left Knee Mako Prep CT
Series: 2
L
R
L
80 mm
BONE
kV: 120.00
mA: 200
Tilt: 0.00
W:2000 L:250
Slice:5.00 Loc:-122.50
P
Filter:None Fact:0
POST ANCHOR
S
Princess Grace
Discovery CT750 HD pghgect01cts
#2 26-Apr-2018 12:45
FFS
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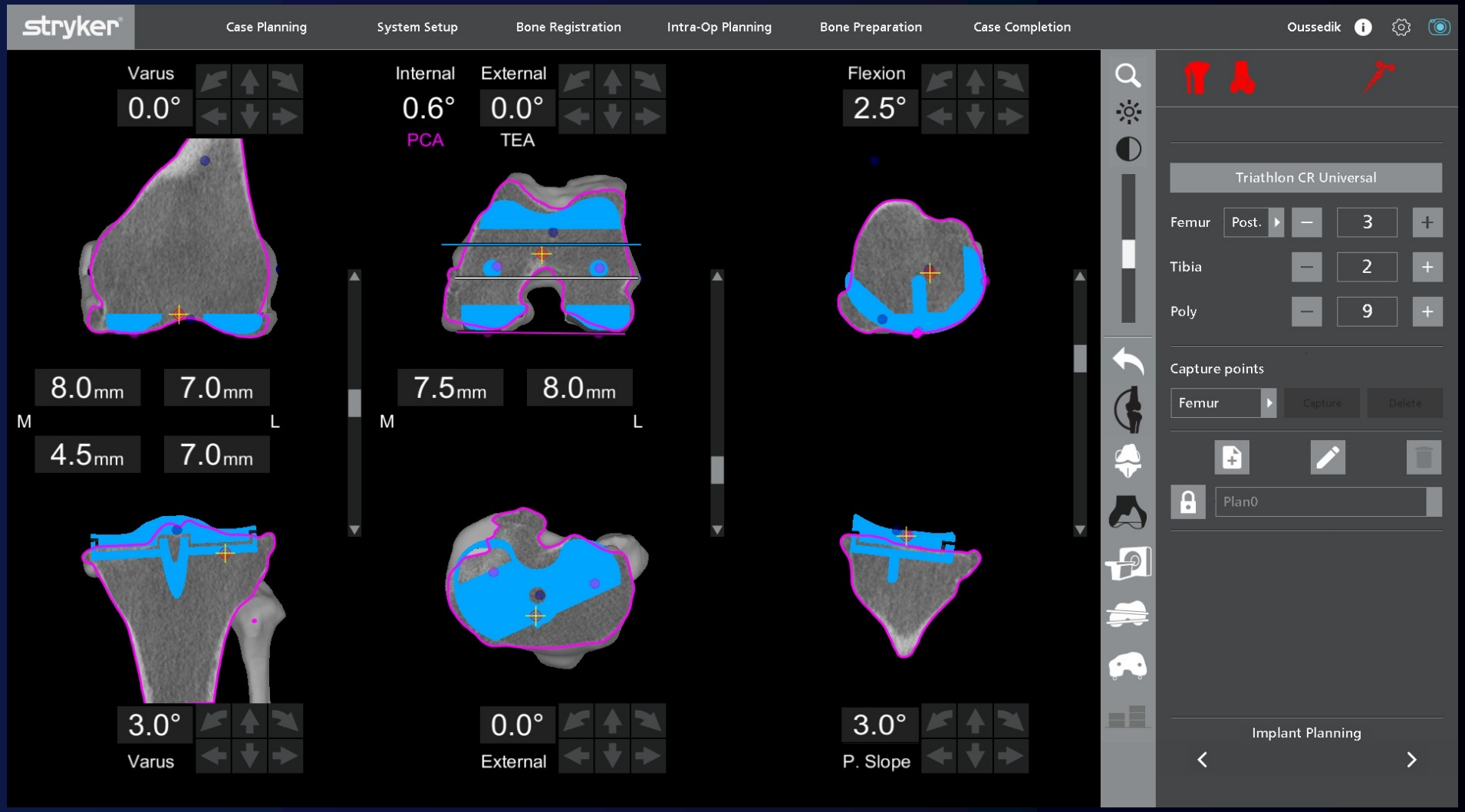
2237 x 888 x 16
Scout
Left Knee Mako Prep CT
Series: 1
L
A
P
400 mm
STANDARD
kV: 80.00
mA: 35
Tilt: 0.00
W:1000 L:100
Slice:1,220.55 Loc:20.00
I
Filter:None Fact:0

Pre-op plan


stryker
Case Planning
System Setup
Bone Registration
Intra-Op Planning
Bone Preparation
Case Completion
Oussedik
Varus
0.0°
Internal
External
0.6°
PCA
0.0°
TEA
Flexion
2.5°
8.0mm
7.0mm
M
L
4.5mm
7.0mm
7.5mm
8.0mm
M
L
3.0°
Varus
0.0°
External
3.0°
P. Slope
Triathlon CR Universal
Femur
Post.
3
Tibia
2
Poly
9
Capture points
Femur
Capture
Delete
Plan0
Implant Planning

Pre-op plan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Varus
0.0°
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Femur
Post.
3
Tibia
2
Poly
9
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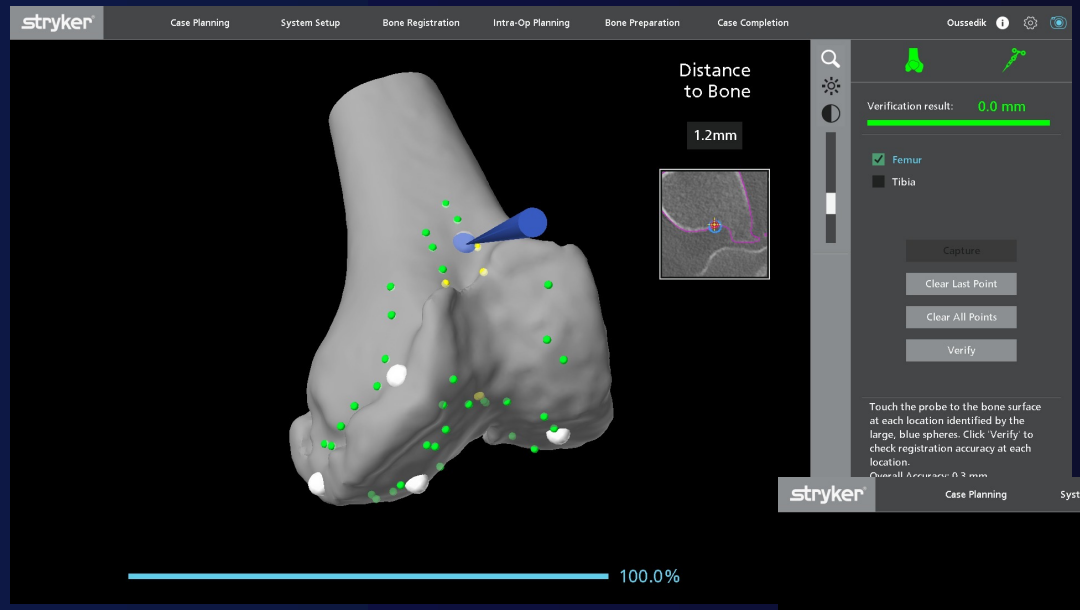
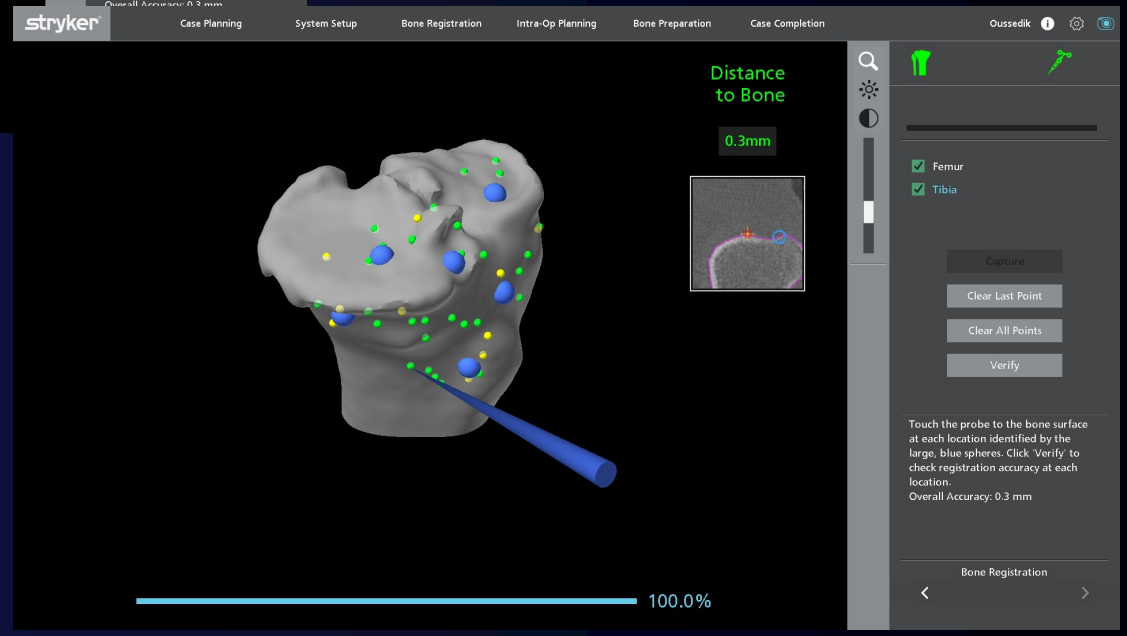
Femur
Capture
Delete
Plan0
Implant Planning

Registration

Registration





Balancing


stryker
Case Planning
System Setup
Bone Registration
Intra-Op Planning
Bone Preparation
Case Completion
Oussedik
Varus
0.0°
External
0.0°
Flexion
2.5°
M
L
1.0mm
3.5mm
-0.5mm
3.0mm
Initial Assessment Laxity
1.0°
Varus
0.0°
External
3.0°
P. Slope
Triathlon CR Universal
Femur
Post.
3
Tibia
2
Poly
9
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Femur
Capture
Delete
Plan0
Implant Planning

stryker

Mako Case Information

General

Osteophytes

Releases

Cuts & Implants

Timer

Plan & Anatomy

Component Planning

Sawblade	Narrow
Selected plan	Plan0

Sizes

Femoral	3
Baseplate	2
Insert	9 mm

Planned alignment	3.5° varus

Planned laxity (IA)	Medial	Lateral
Extension	1.0 mm	1.0 mm
Flexion	1.0 mm	1.0 mm

Femoral rotations

Coronal	0.5° varus
Transverse	2.0° external
Sagittal	3.0° flexion

Femoral resections	Medial	Lateral
Distal	7.5 mm	6.5 mm
Posterior	8.5 mm	7.0 mm

Tibial rotations

Coronal	3.0° varus
Transverse	0.0° external
Sagittal	6.5° p. slope

Tibial resections	Medial	Lateral
Proximal	3.5 mm	6.5 mm

Anatomical Information

As-scanned alignment

Coronal	10.0° valgus
Transverse	18.4° external
Sagittal	10.3° extension

Anatomic axes

AA to MA coronal	6.3° valgus
AA to MA sagittal	2.7° flexion
PCA to TEA	0.6° internal

Posterior slope

Medial	7.3° p.slope
Lateral	11.0° p.slope

Joint line

LDFA	91.6°
MPTA	83.4°

aHKA	8.2° varus
JLO	175.0°

Femur JLA	1.6° varus
Tibia JLA	6.6° varus

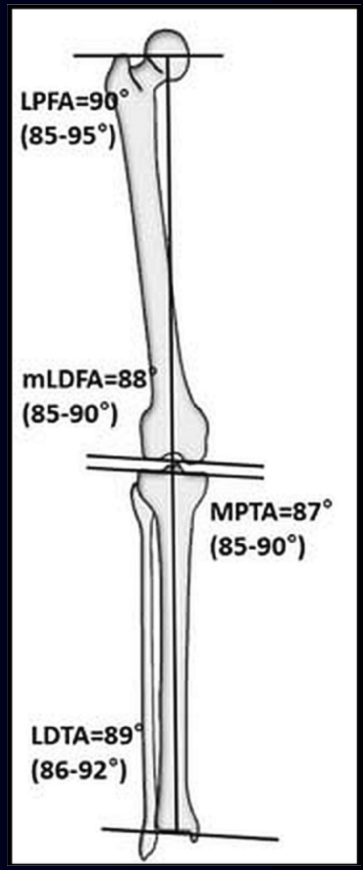
MEC to bone	23.0 mm
MEC to implant	24.0 mm

View values related to planned implant component and measurements related to anatomy

Close

Joint line

LDFA	91.6°
MPTA	83.4°
aHKA	8.2° varus
JLO	175.0°
Femur JLA	1.6° varus
Tibia JLA	6.6° varus



3.0°

Balancing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External
1.4°
PCA
External
2.0°
TEA
Flexion
3.0°
M
L
1.0mm
1.0mm
M
L
1.0mm
1.0mm
Initial Assessment Laxity
3.0°
Varus
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P. Slope
Triathlon CR Universal
Femur
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Tibia
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Balancing


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Triathlon CR Universal
Femur
Post.
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Tibia
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9
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Femur
Capture
Delete
Plan0
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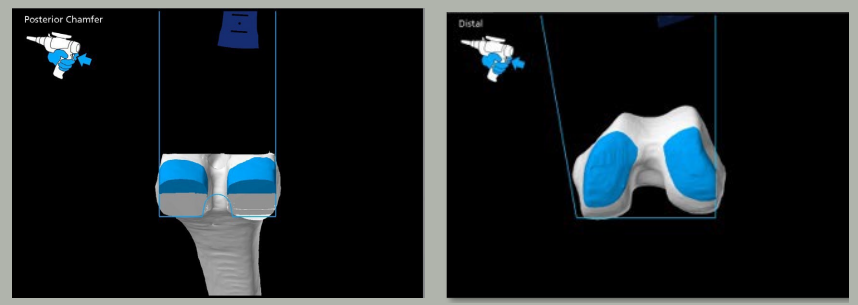
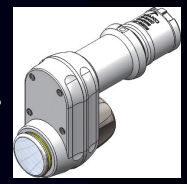
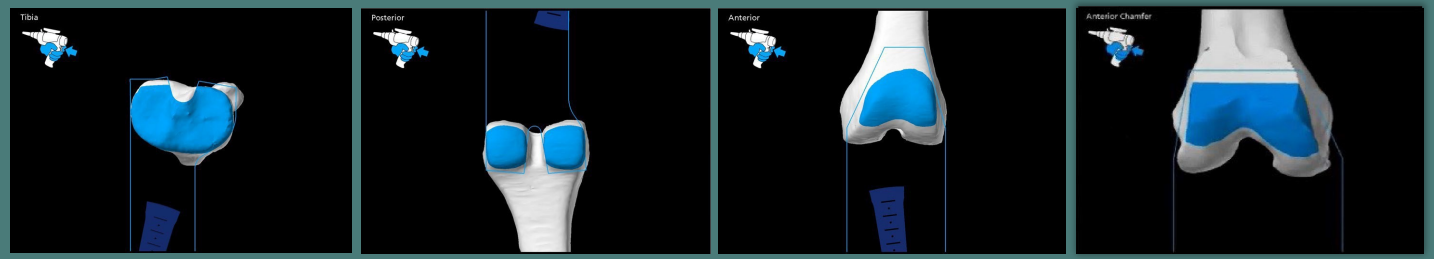
Bone resection

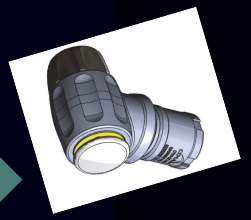
Haptic guided bone prep





Right angle saw attachment





Sagittal saw attachment

Technique

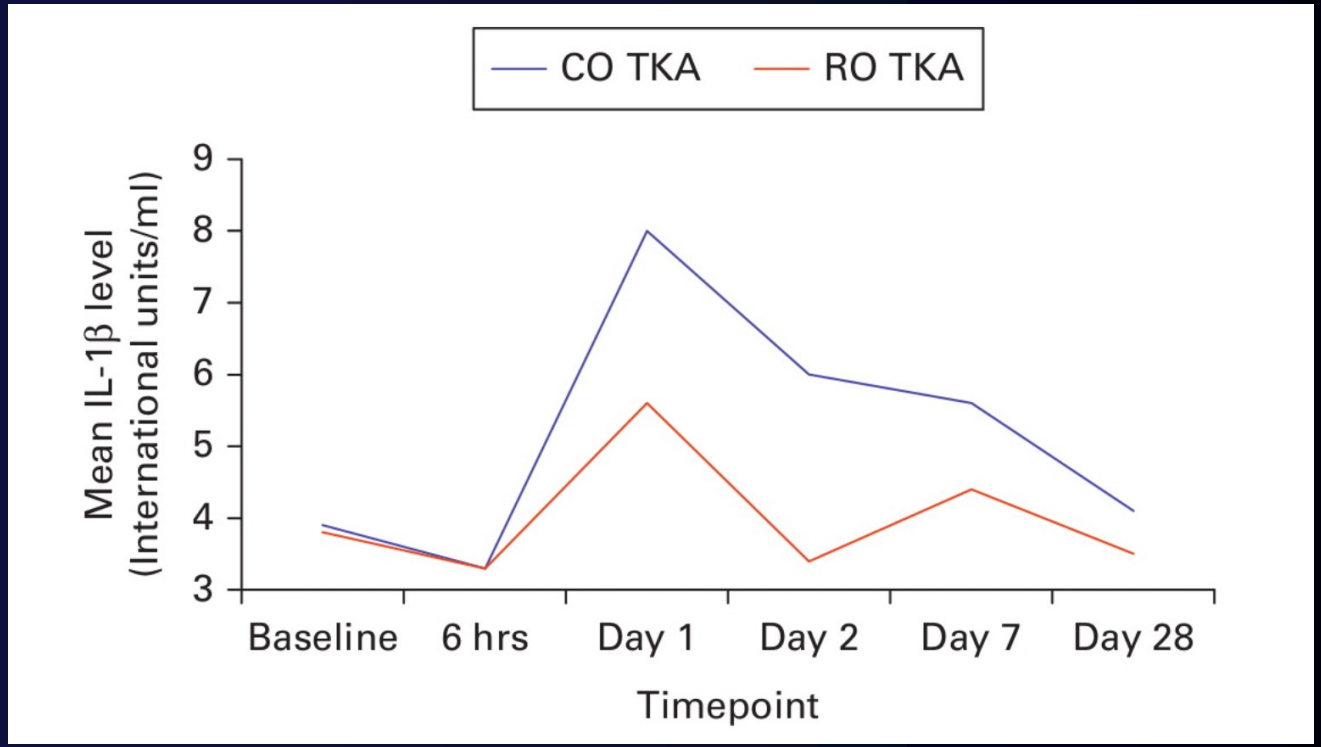
■ KNEE

A prospective randomized controlled trial comparing the systemic inflammatory response in conventional jig-based total knee arthroplasty versus robotic-arm assisted total knee arthroplasty

Babar Kayani, Jenni Tahmassebi, Atif Ayuob, Sujith Konan, Sam Oussedik, Fares S. Haddad

BJJ, Jan 2021

Technique



BJJ, Jan 2021

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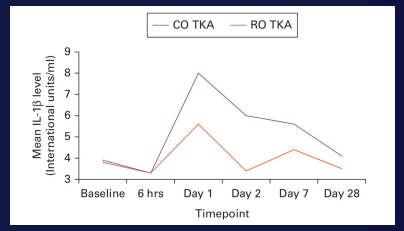
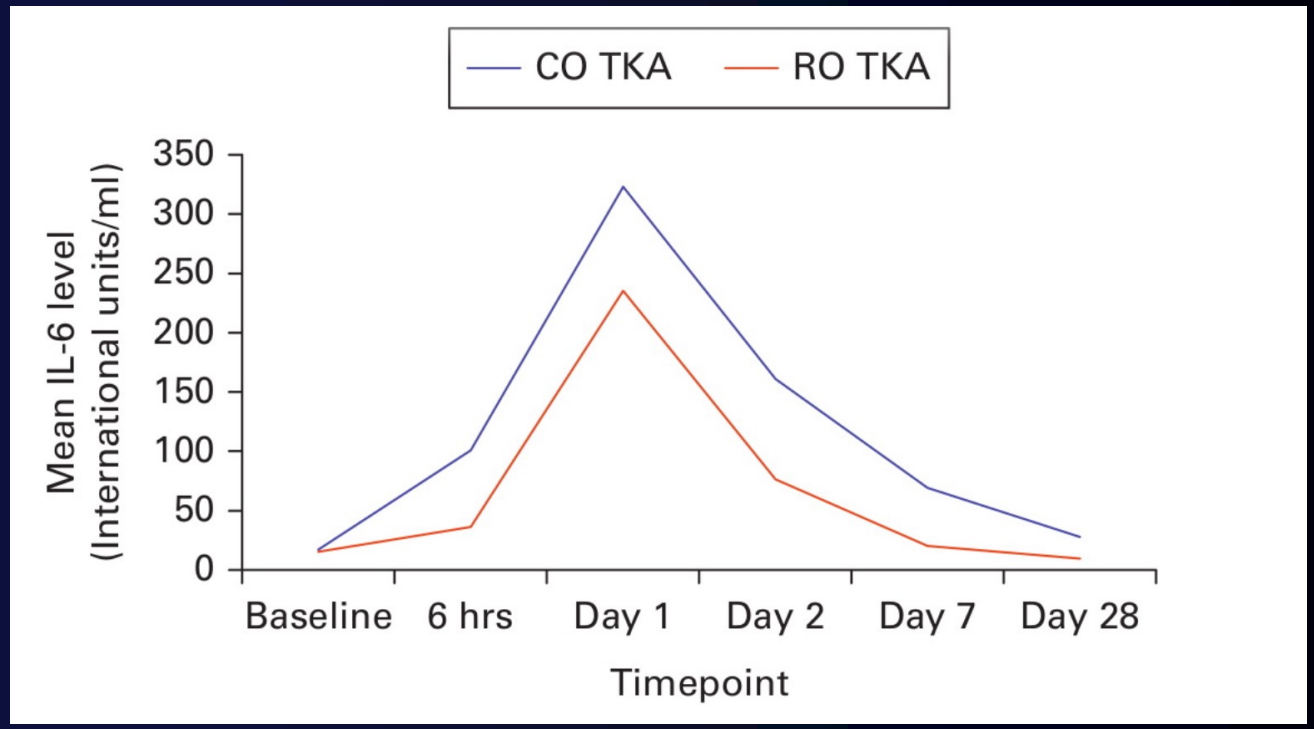
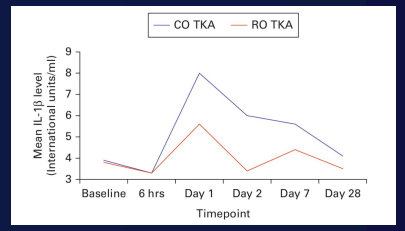
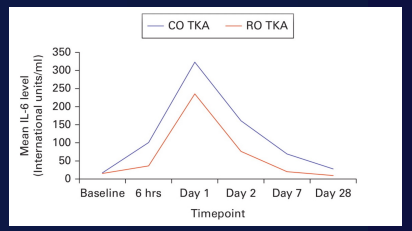


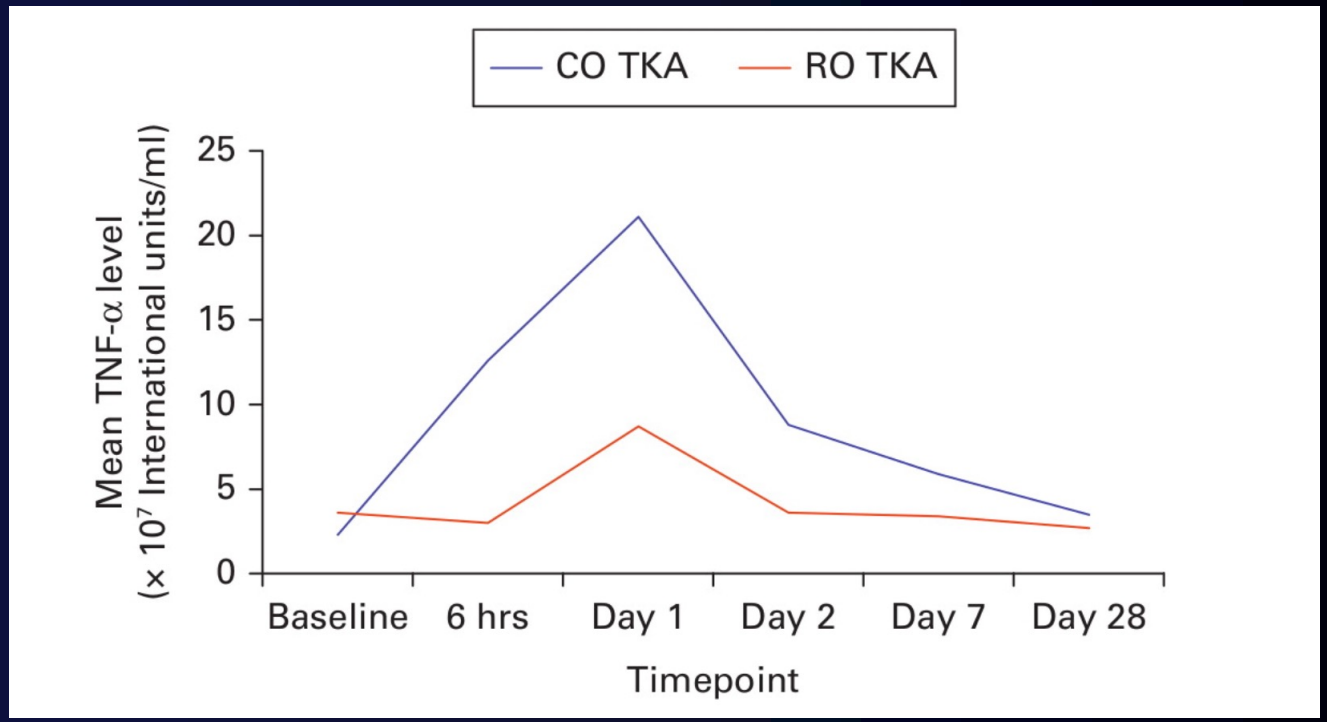


BJJ, Jan 2021

Technique







BJJ, Jan 2021

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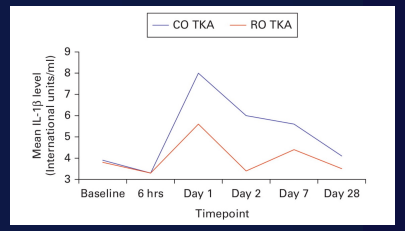

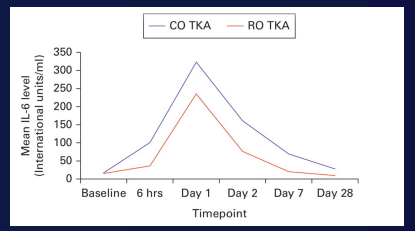

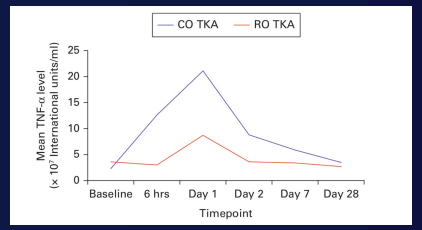

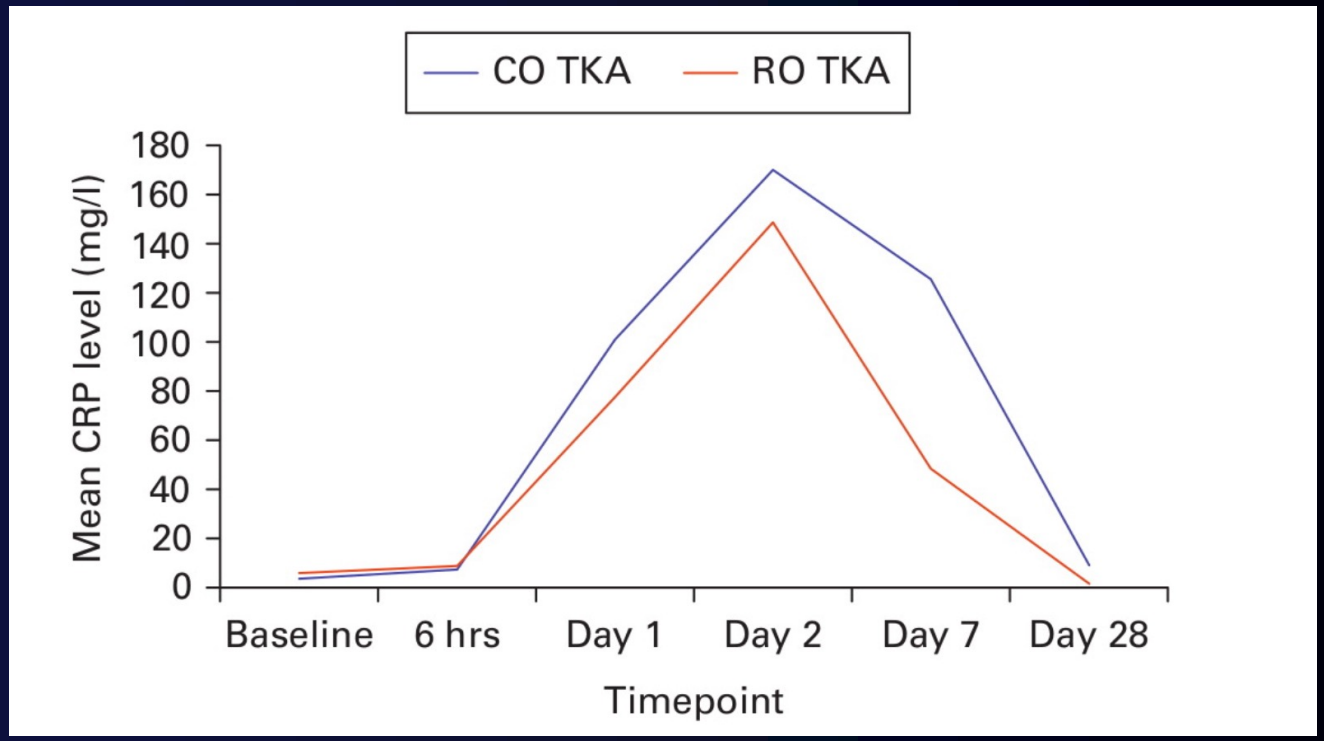

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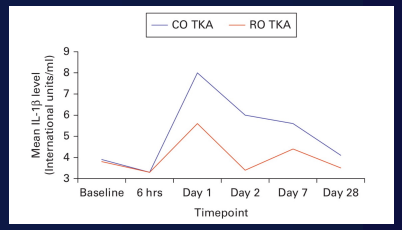

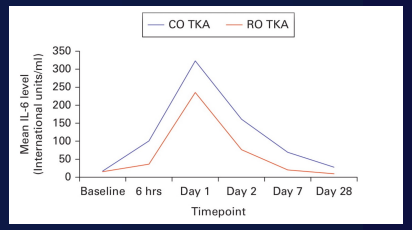

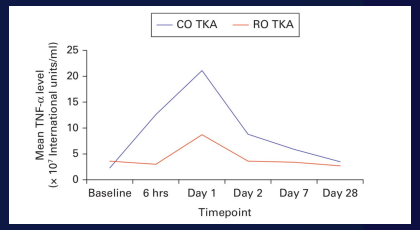

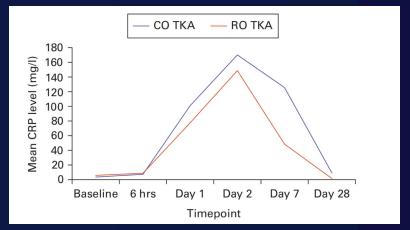

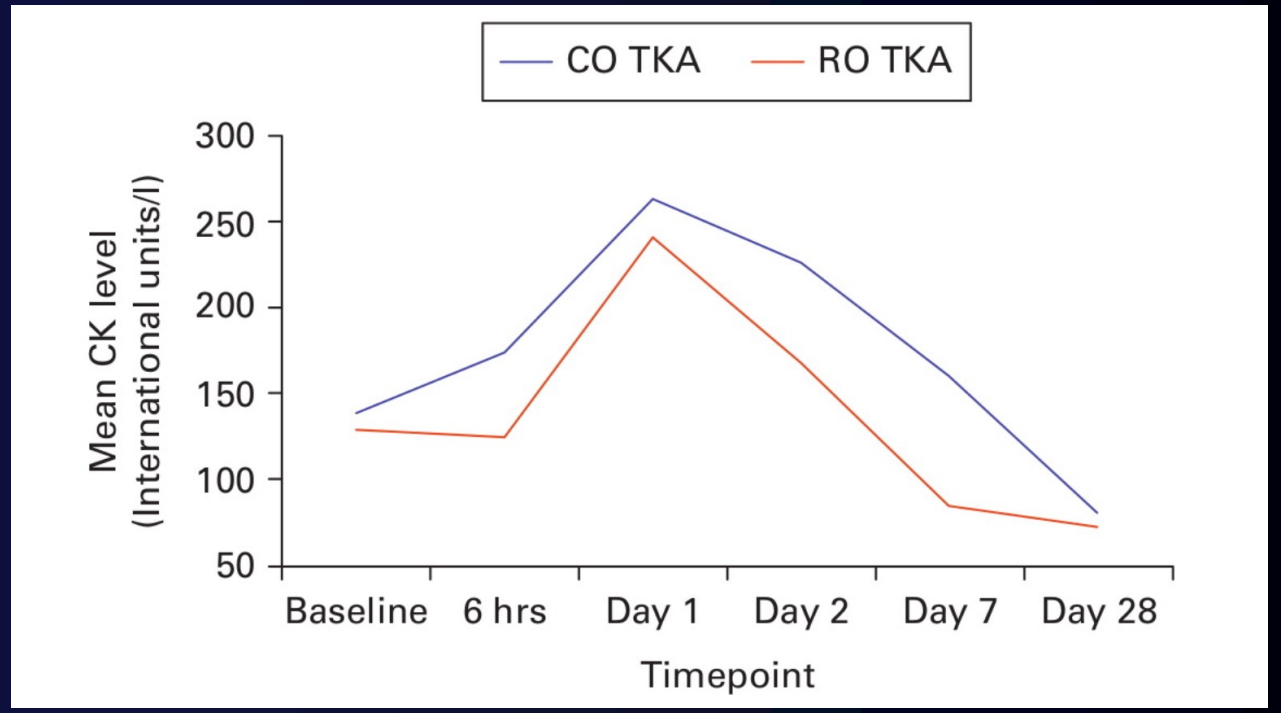

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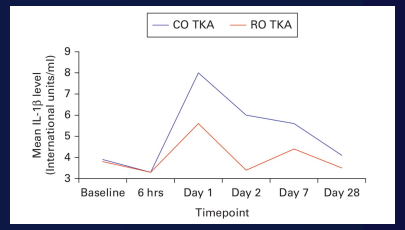
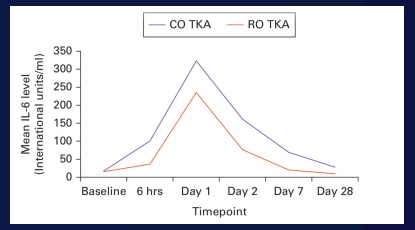
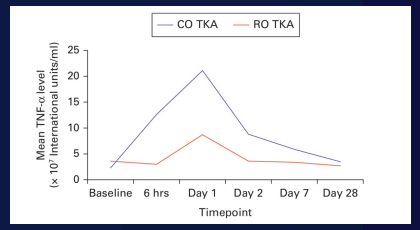
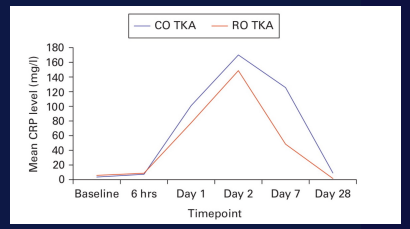
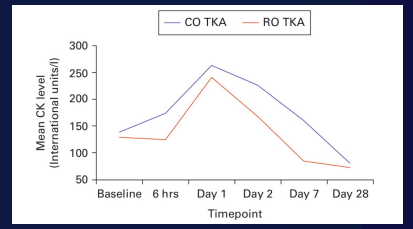
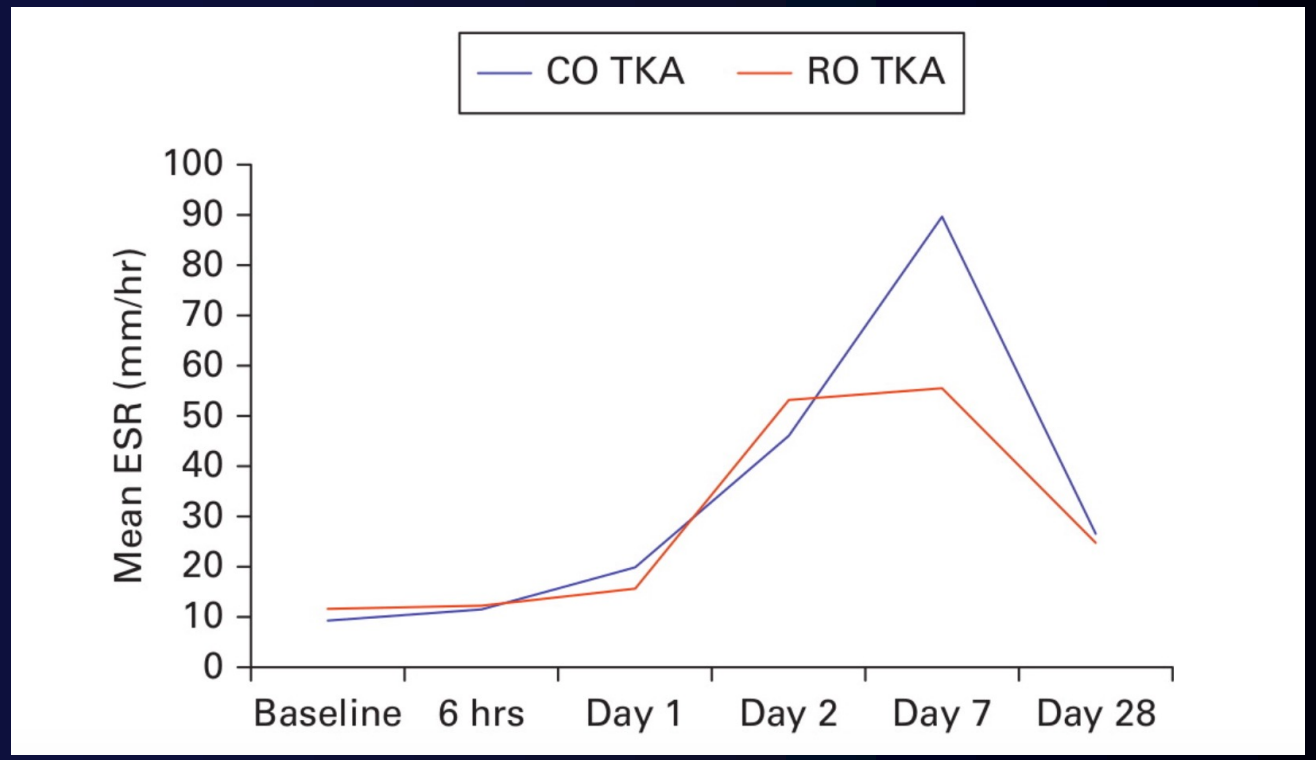






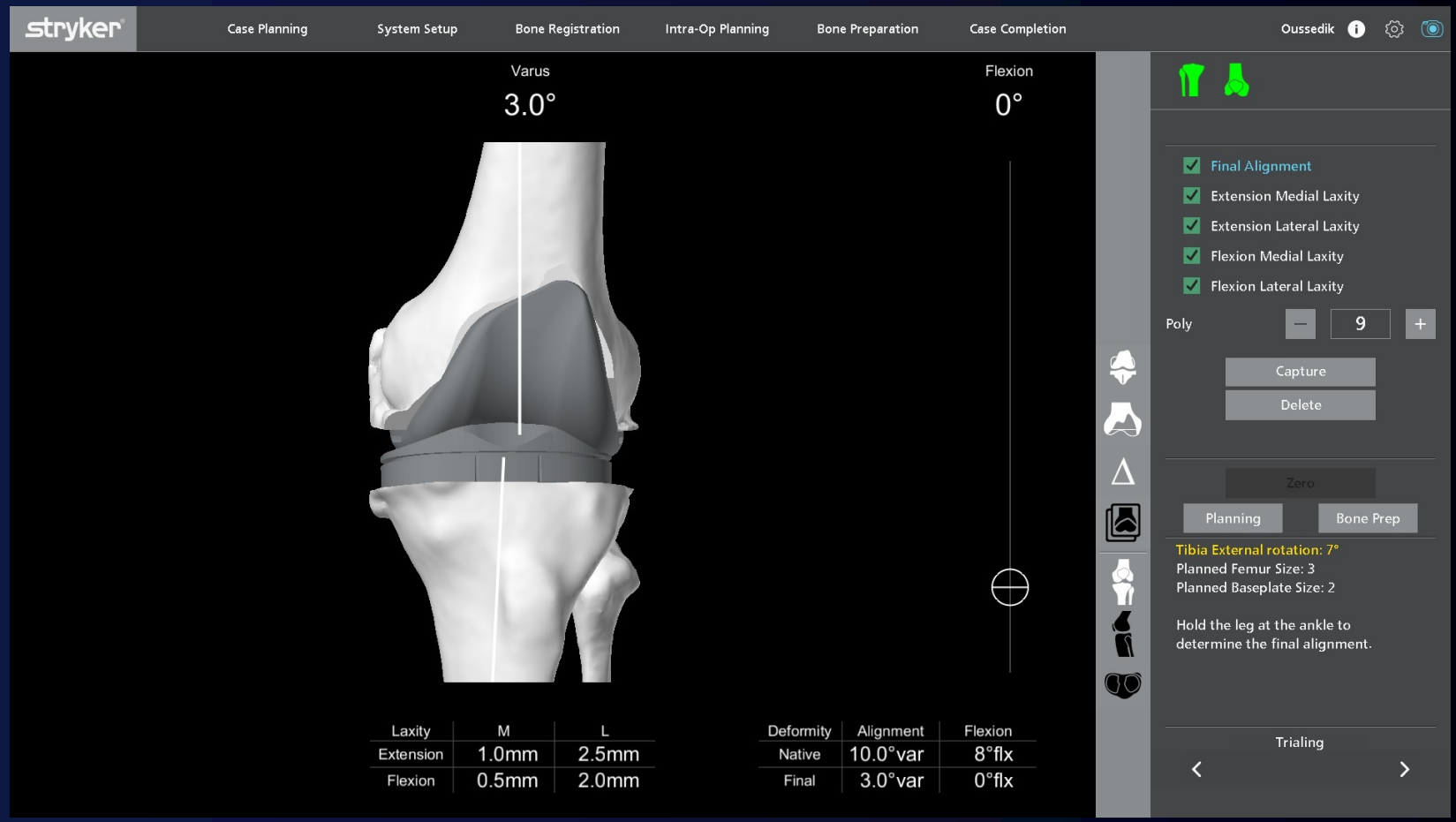




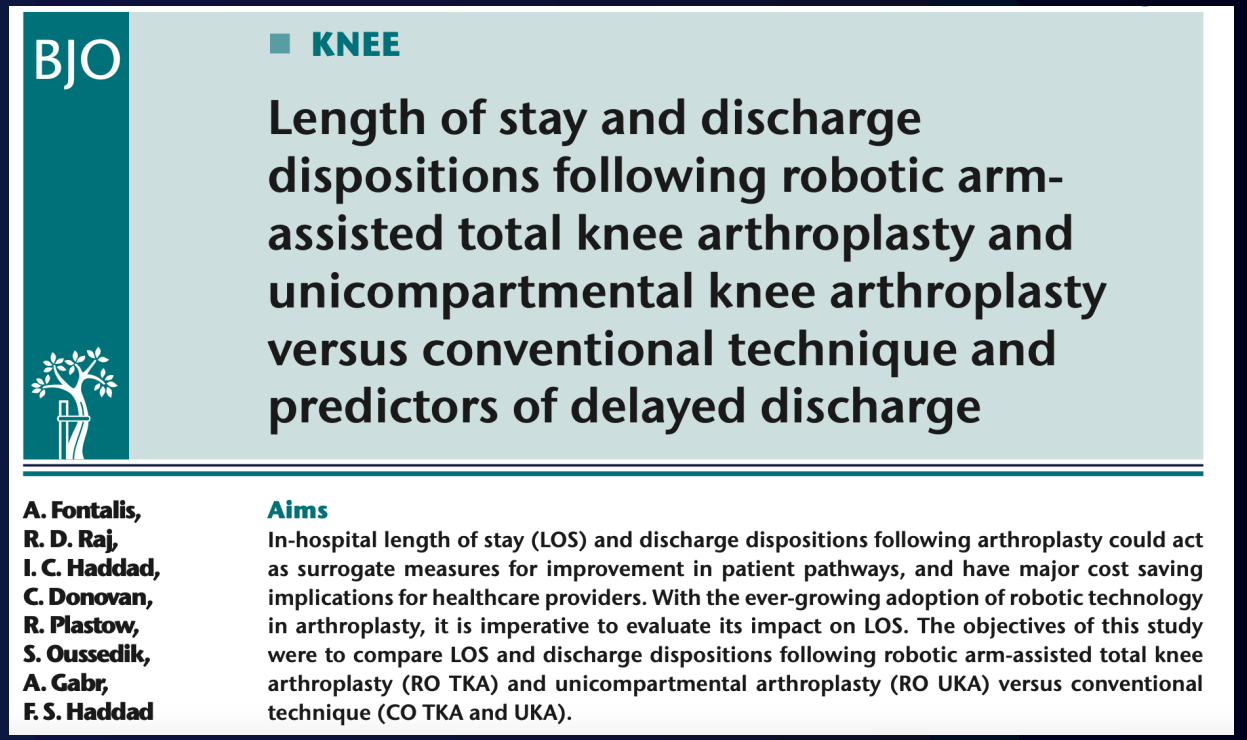


BJJ, Jan 2021

Trial


stryker
Case Planning
System Setup
Bone Registration
Intra-Op Planning
Bone Preparation
Case Completion
Oussedik
Varus
3.0°
Flexion
0°
Final Alignment
Extension Medial Laxity
Extension Lateral Laxity
Flexion Medial Laxity
Flexion Lateral Laxity
Poly
9
Capture
Delete
Zero
Planning
Bone Prep
Tibia External rotation: 7°
Planned Femur Size: 3
Planned Baseplate Size: 2
Hold the leg at the ankle to determine the final alignment.
Trialing
Laxity | M | L
Extension | 1.0mm | 2.5mm
Flexion | 0.5mm | 2.0mm
Deformity | Alignment | Flexion
Native | 10.0°var | 8°flx
Final | 3.0°var | 0°flx

Results



BJO

KNEE

Length of stay and discharge dispositions following robotic arm-assisted total knee arthroplasty and unicompartmental knee arthroplasty versus conventional technique and predictors of delayed discharge

A. Fontalis,
R. D. Raj,
I. C. Haddad,
C. Donovan,
R. Plastow,
S. Oussedik,
A. Gabr,
F. S. Haddad

Aims

In-hospital length of stay (LOS) and discharge dispositions following arthroplasty could act as surrogate measures for improvement in patient pathways, and have major cost saving implications for healthcare providers. With the ever-growing adoption of robotic technology in arthroplasty, it is imperative to evaluate its impact on LOS. The objectives of this study were to compare LOS and discharge dispositions following robotic arm-assisted total knee arthroplasty (RO TKA) and unicompartmental arthroplasty (RO UKA) versus conventional technique (CO TKA and UKA).

Results

STUDY PROTOCOL Open Access

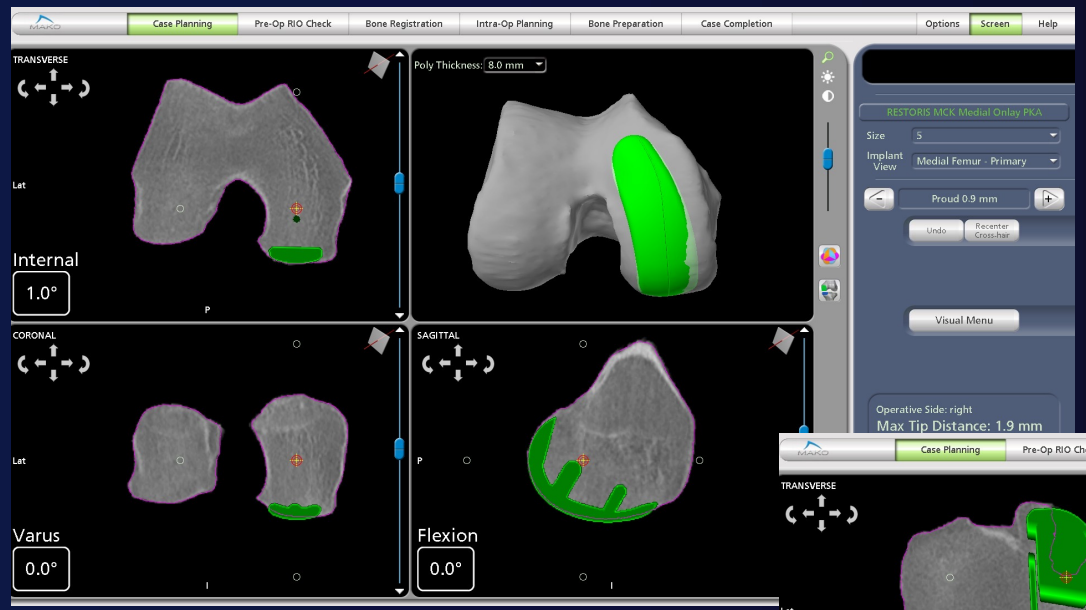
A prospective double-blinded randomised control trial comparing robotic arm-assisted functionally aligned total knee arthroplasty versus robotic arm-assisted mechanically aligned total knee arthroplasty

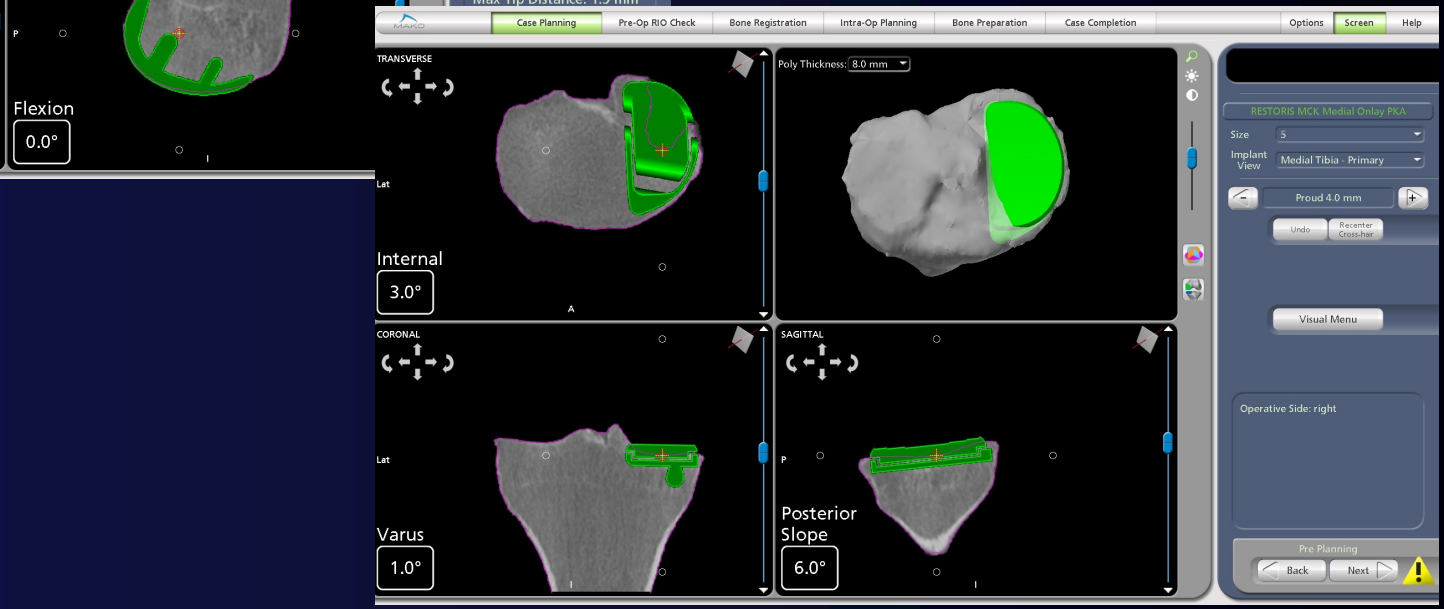
Babar Kayani*, Sujith Konan, Jenni Tahmassebi, Sam Oussedik, Peter D. Moriarty and Fares S. Haddad

Results

Partial Knee Replacement

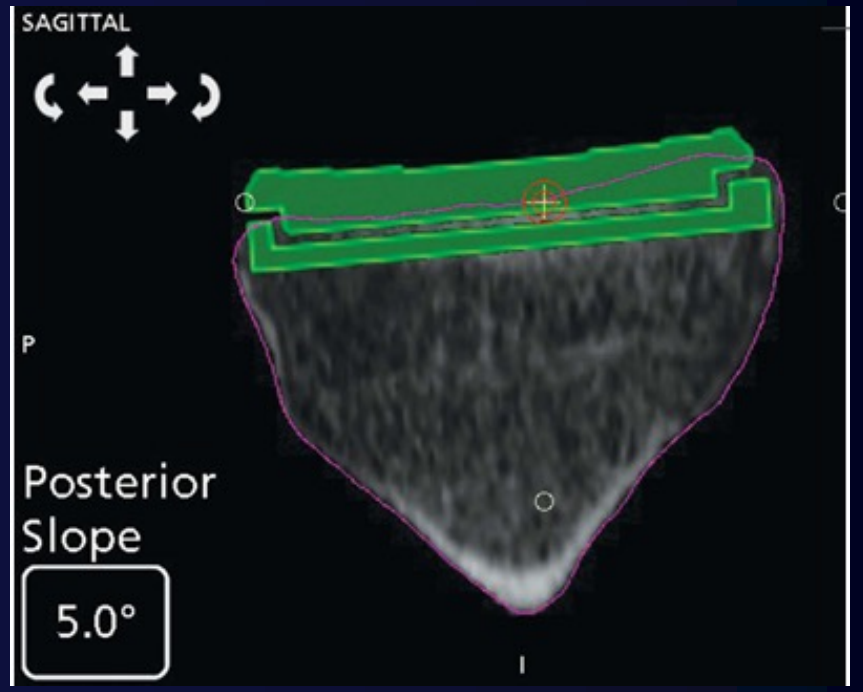
Sizing & Positioning





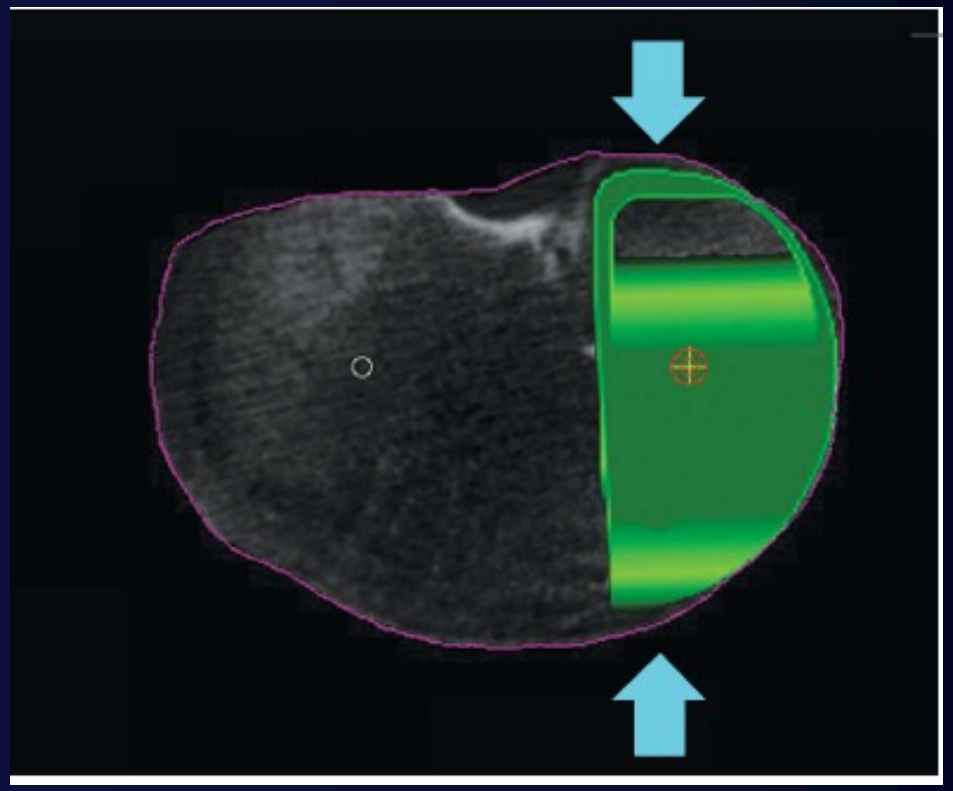
Sizing & Positioning

- Tibial slope
- AP sizing



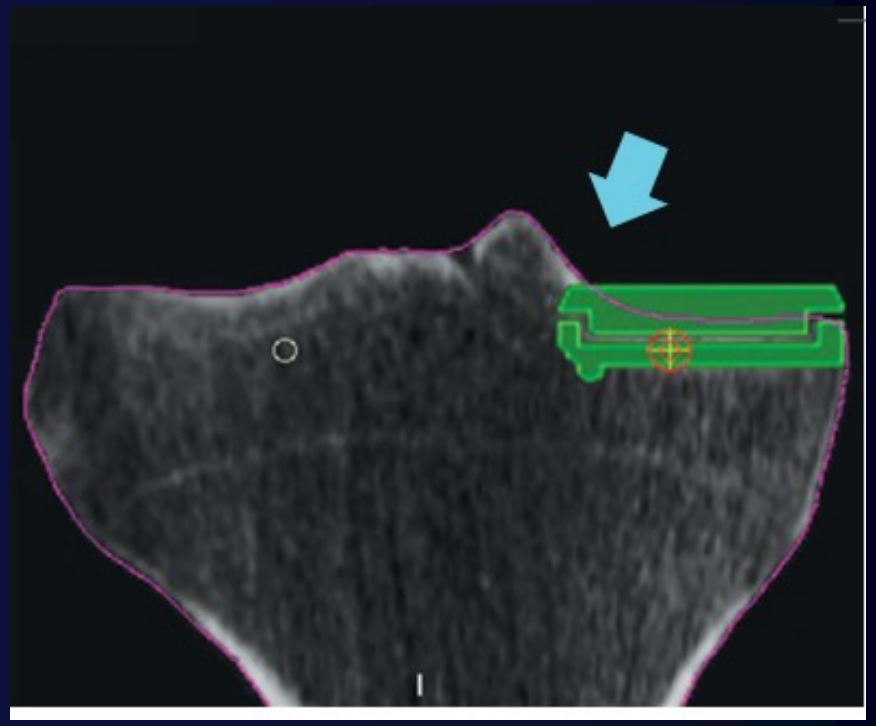
Sizing & Positioning

- Tibial slope
- AP sizing
- Coverage
- Rotation



Sizing & Positioning

- Tibial slope
- AP sizing
- Coverage
- Rotation



- M/L sizing
- Eminence resection
- Medial overhang

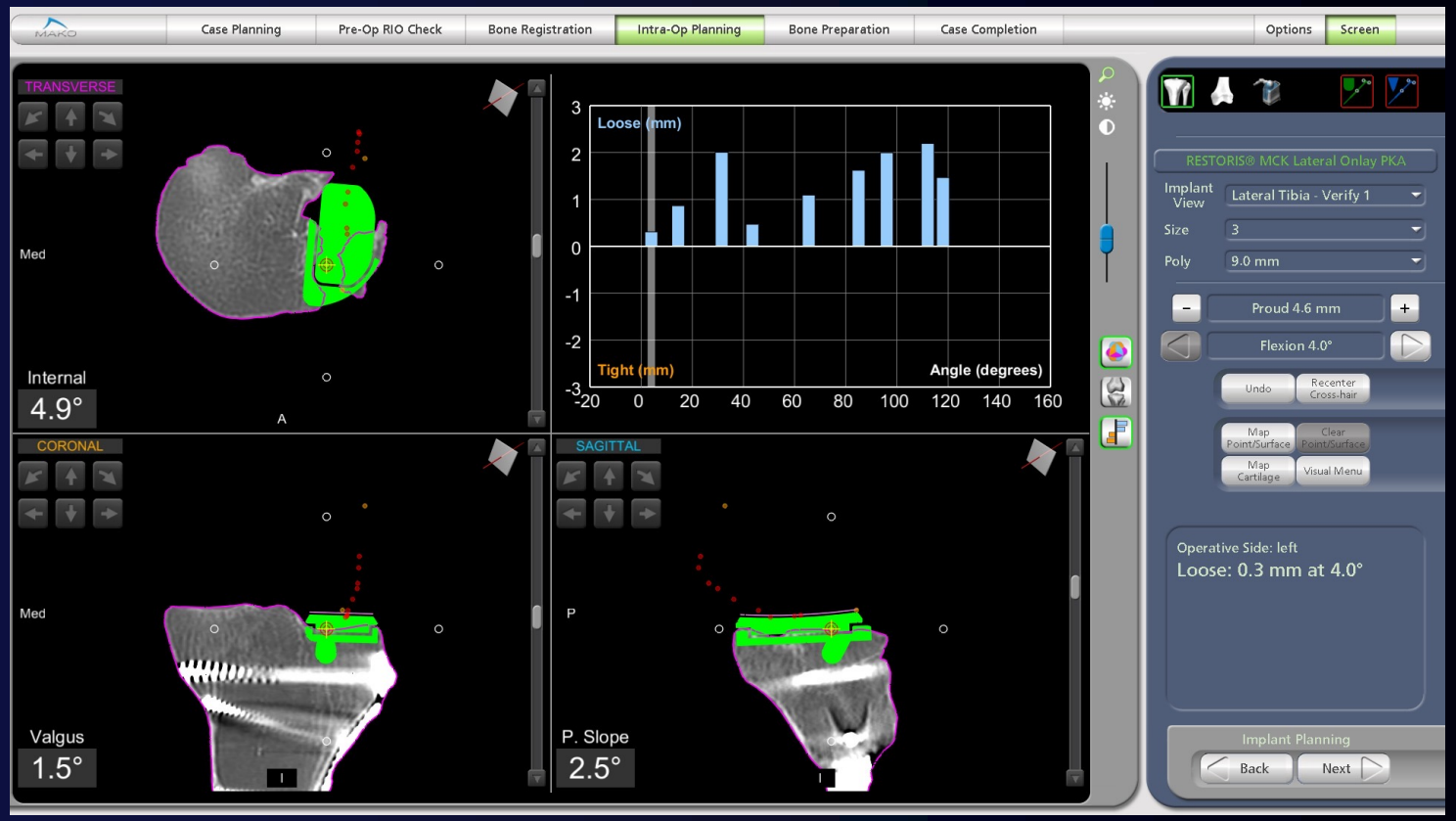
Sizing & Positioning

- Femoral curvature
- Posterior overhang

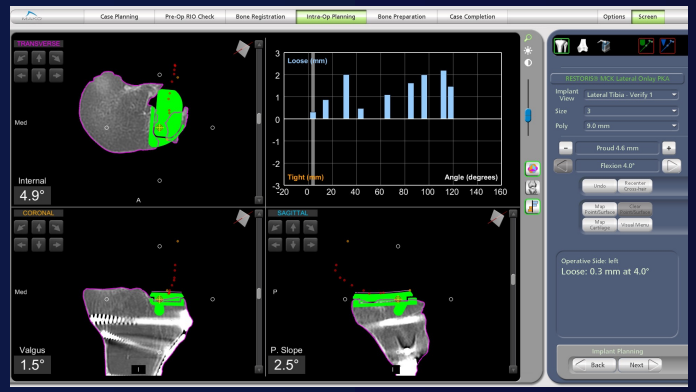
- Anterior proudness

Retained metal

Retained metal

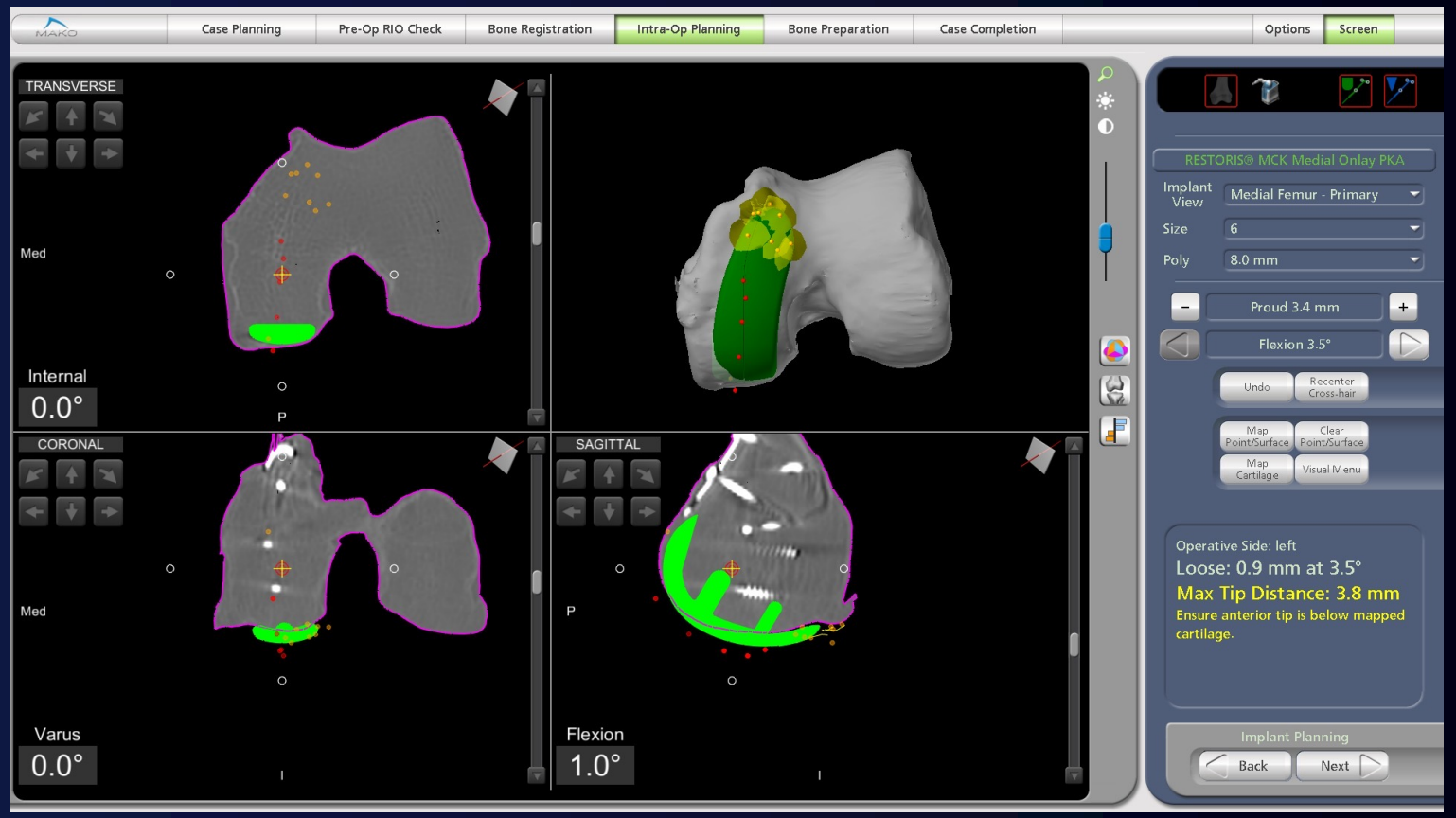


Retained metal



Retained metal

Retained metal



Retained metal

Results

Brand[1]	N	Age at primary Median (IQR)	Male (%)	Time since primary					
				1 year	3 years	5 years	10 years	15 years	20 years
All unicompartmental knee replacements	184,947	64 (57 to 71)	51	0.95 (0.91-1.00)	3.36 (3.27-3.45)	5.14 (5.03-5.25)	9.88 (9.70-10.06)	15.23 (14.93-15.53)	21.20 (20.27-22.17)
Unicondylar									
AMC/Uniglide[M.Fem:M.Tib]	2,762	64 (57 to 71)	52	2.43 (1.92-3.08)	6.20 (5.35-7.16)	7.92 (6.96-8.99)	12.77 (11.53-14.13)	17.99 (16.29-19.85)	
Journey Uni Oxinium[M.Fem] Journey Uni[M.Tib]	2,009	64 (57 to 71)	55	1.38 (0.94-2.02)	2.83 (2.14-3.73)	4.09 (3.20-5.23)	*7.70 (5.66-10.45)*		
MG Uni[M.Fem:M.Tib]	1,959	63 (57 to 70)	57	0.77 (0.46-1.27)	3.91 (3.13-4.87)	5.92 (4.95-7.07)	10.15 (8.86-11.62)	13.59 (12.06-15.29)	*16.05 (14.05-18.30)*
Oxford Cementless Partial Knee[L.Fem] Oxford Partial Knee[L.Tib]	1,191	68 (57 to 76)	36	1.24 (0.74-2.09)	3.20 (2.28-4.47)	5.31 (3.98-7.06)	*11.58 (8.29-16.05)*		
Oxford Cementless Partial Knee[M.Fem:M.Tib]	38,958	65 (58 to 72)	56	1.13 (1.03-1.24)	2.19 (2.03-2.35)	3.09 (2.89-3.30)	6.18 (5.71-6.68)	*11.54 (8.58-15.43)*	
Oxford Cementless Partial Knee[M.Fem] Oxford Partial Knee[M.Tib]	1,246	66 (59 to 73)	53	1.32 (0.81-2.15)	3.42 (2.51-4.65)	4.86 (3.73-6.32)	8.07 (6.46-10.08)	*12.18 (9.76-15.15)*	
Oxford Single Peg Cemented Partial Knee[M.Fem]Oxford Partial Knee[M.Tib]	41,953	64 (58 to 71)	52	1.16 (1.07-1.27)	4.31 (4.12-4.51)	6.40 (6.17-6.64)	11.39 (11.08-11.72)	16.55 (16.12-16.99)	22.69 (21.44-24.00)
Oxford Twin Peg Cemented Partial Knee[M.Fem]Oxford Partial Knee[M.Tib]	6,156	65 (57 to 72)	50	0.62 (0.45-0.86)	2.29 (1.92-2.72)	3.73 (3.23-4.30)	6.82 (5.98-7.79)	*11.81 (9.84-14.15)*	
Persona Partial Knee[M.Fem:M.Tib]	7,821	65 (58 to 72)	58	0.36 (0.24-0.54)	1.50 (1.16-1.93)	1.98 (1.55-2.53)			
*Physica ZUK[L.Fem:L.Tib]	1,349	63 (54 to 72)	41	0.83 (0.45-1.54)	1.43 (0.87-2.33)	2.71 (1.84-3.98)	*5.25 (3.63-7.56)*	*6.48 (4.36-9.59)*	
*Physica ZUK[M.Fem:M.Tib]	28,796	64 (57 to 71)	56	0.30 (0.24-0.37)	1.60 (1.44-1.77)	2.52 (2.30-2.75)	5.27 (4.84-5.72)	8.56 (7.52-9.73)	
Preservation[M.Fem:M.Tib]	1,418	63 (56 to 70)	56	2.41 (1.72-3.35)	8.28 (6.95-9.85)	11.57 (10.00-13.37)	17.67 (15.74-19.81)	22.91 (20.70-25.31)	*28.88 (25.52-32.58)*
Restoris[M.Fem:M.Tib]	2,919	65 (59 to 73)	60	0.39 (0.21-0.73)	1.70 (1.15-2.51)	*2.24 (1.42-3.52)*			
Sigma HP (Uni)[M.Fem] Sigma HP[M.Tib]	16,301	64 (57 to 71)	58	0.59 (0.48-0.73)	2.47 (2.22-2.74)	3.57 (3.26-3.91)	6.23 (5.71-6.79)	*8.31 (6.97-9.89)*	
Triathlon Uni[M.Fem] Triathlon[M.Tib]	2,055	63 (56 to 70)	57	1.00 (0.64-1.56)	3.68 (2.88-4.70)	5.79 (4.71-7.10)	8.66 (7.11-10.54)		

Results

Tib]	1,415	(56 to 70)	59	(1.72-3.35)	(6.95-9.85)	(10.00-13.37)	(15.74-19.81)	(20.70-25.31)	*(25.52-32.58)*
Restoris[M.Fem:M.Tib]	2,919	65 (59 to 73)	60	0.39 (0.21-0.73)	1.70 (1.15-2.51)	*2.24 (1.42-3.52)*			
Sigma HP (Uni)[M.Fem] Sigma HP[M.Tib]	16,301	64 (57 to 71)	58	0.59 (0.48-0.73)	2.47 (2.22-2.74)	3.57 (3.26-3.91)	6.23 (5.71-6.79)	*8.31 (6.97-9.89)*	
Triathlon Uni[M.Fem] Triathlon[M.Tib]	2,055	63 (56 to 70)	57	1.00 (0.64-1.56)	3.68 (2.88-4.70)	5.79 (4.71-7.10)	8.66 (7.11-10.54)		

Conclusion

- Image based robotics offers state of the art precision
- Safety of haptic boundaries offers confidence
- Anatomical knowledge can aid decision making in balancing
- Step-change in real world UKA survivorship
- Given the choice, what would you use?

Thank you

Elective Orthopaedic Centre @ Grafton Way Building, UCLH