



ISAKOS
CONGRESS
2025



MUNICH
GERMANY
June 8-11

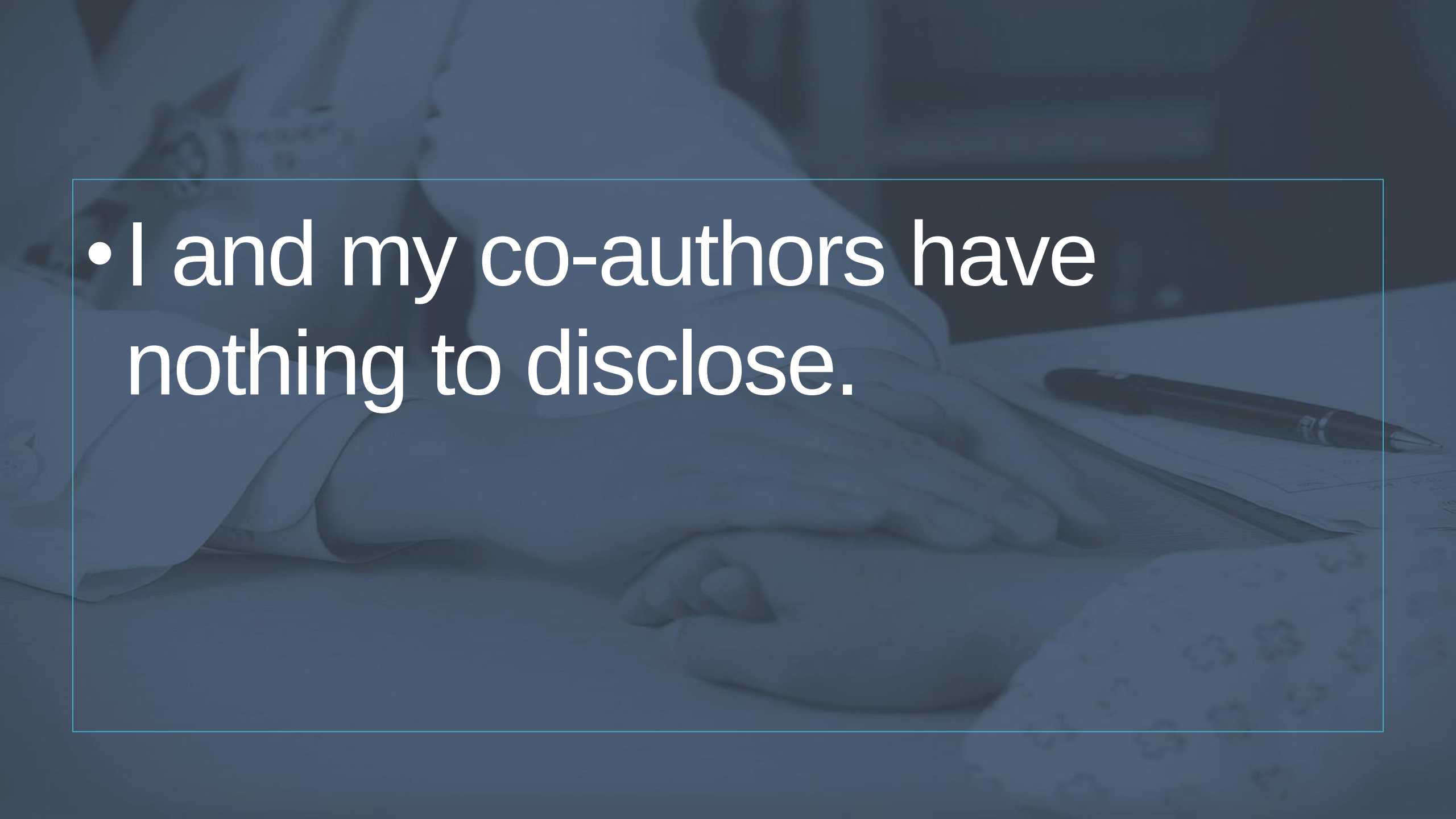
An MRI-Based Anatomy Study for Optimal Direction and Depth in Intraoperative Surgeon-Administered Adductor Canal Block Injection



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- The background of the slide is a dark blue, semi-transparent overlay on a photograph. The photograph shows a pair of hands clasped together, resting on a surface covered with papers and documents. A pen is visible on the right side of the frame. The overall tone is professional and academic.
- I and my co-authors have nothing to disclose.

Adductor canal block (ACB) in TKA

- Most useful analgesic modalities in contemporary perioperative management protocols
- Excellent pain relief and minimal difference in motor strength compared to baseline
- Easy performance with high success rates using portable ultrasound technology

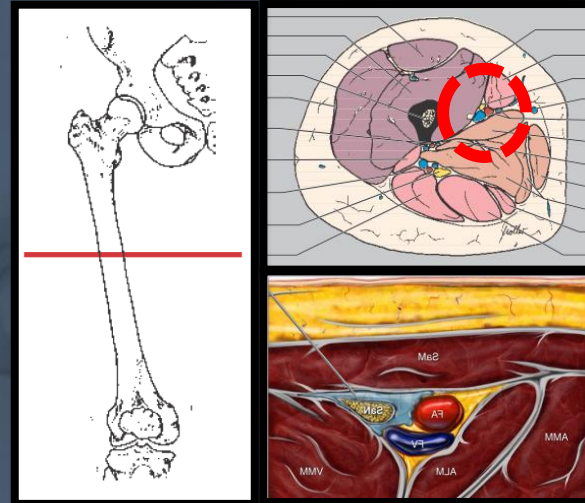
Li J-W, 2019

Grevstad U, 2014

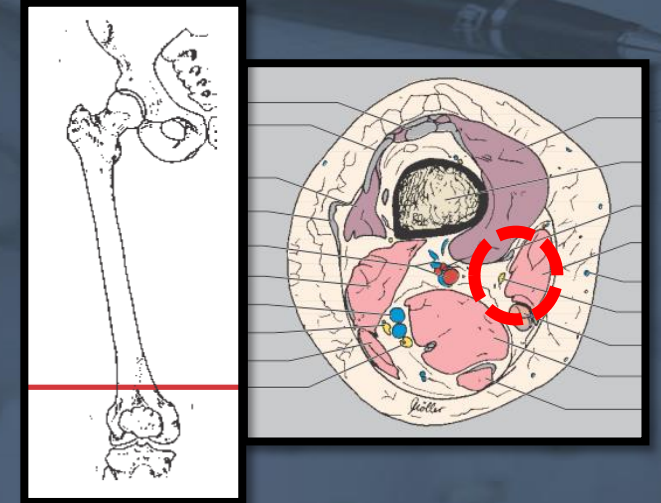
Koh, 2017

- Different Target point

<Conventional >

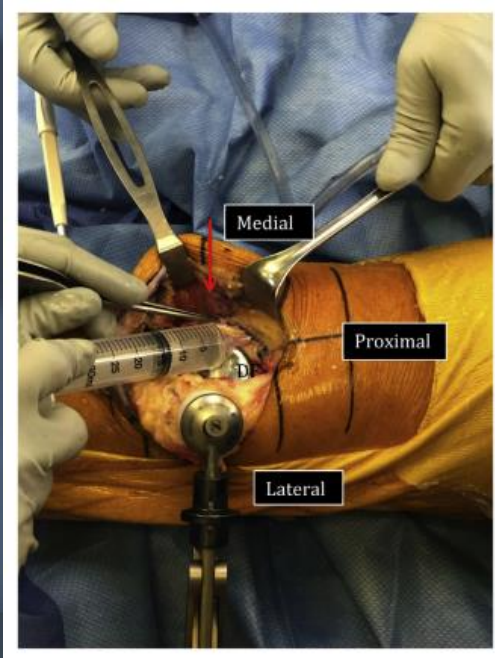


< Intraoperative >



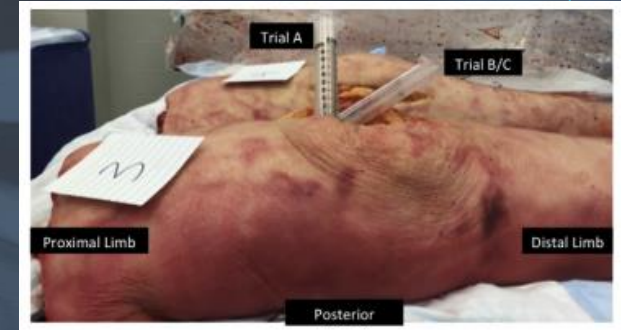
Intraoperative ACB by surgeon

- Not inferior to anesthesiologist administered ACB
- N= 30 vs. 29
- Method
 - 1.5 inch 18-gauge needle
 - Between VMO origin and medial femur
 - Direction: posteriorly, proximally, apprx. 15° medially
 - Deep to the VMO, at the level of adductor tubercle

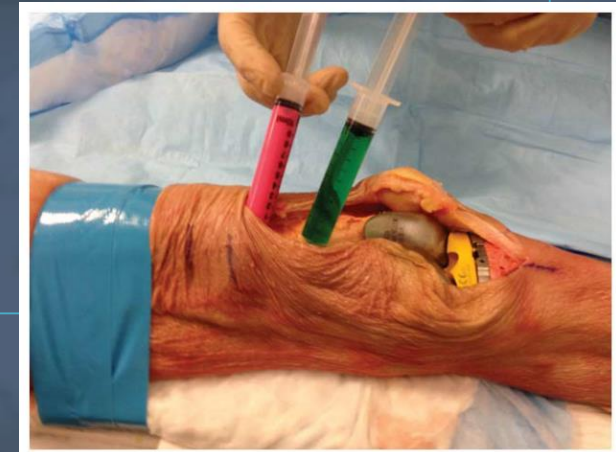


Greenky, JOA, 2020

- Accuracy : 86 vs. 14 vs. 57 (%)
- Femoral a. puncture rate : 0 vs. 43 vs. 0 (%)



- Accuracy : 72 vs. 54 (%)



Pepper, JOA, 2016
Kavolus, CORR, 2017

Purpose

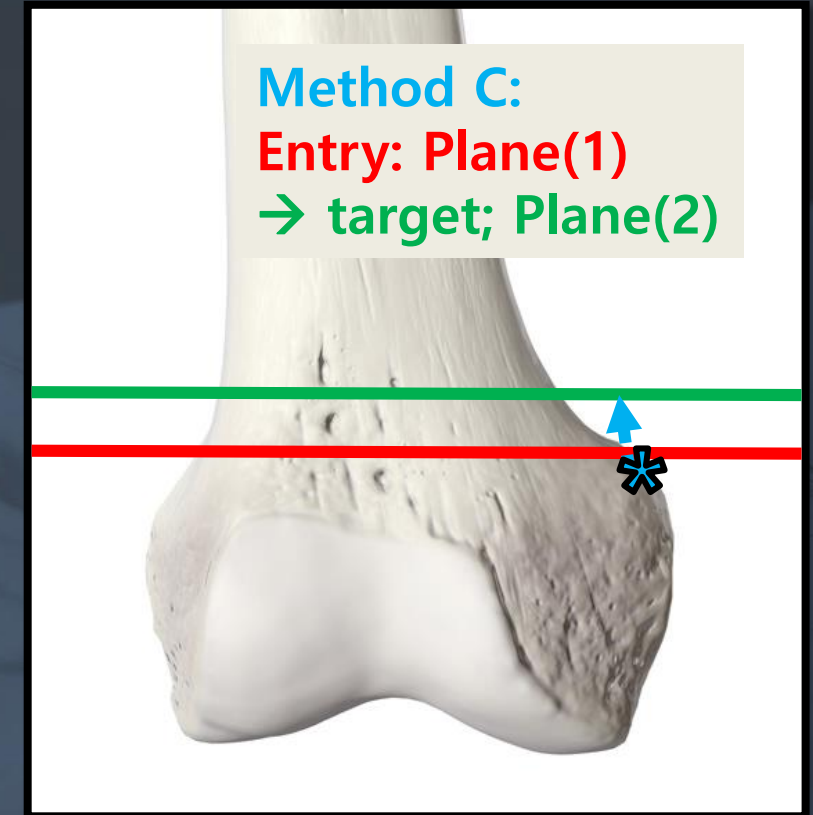
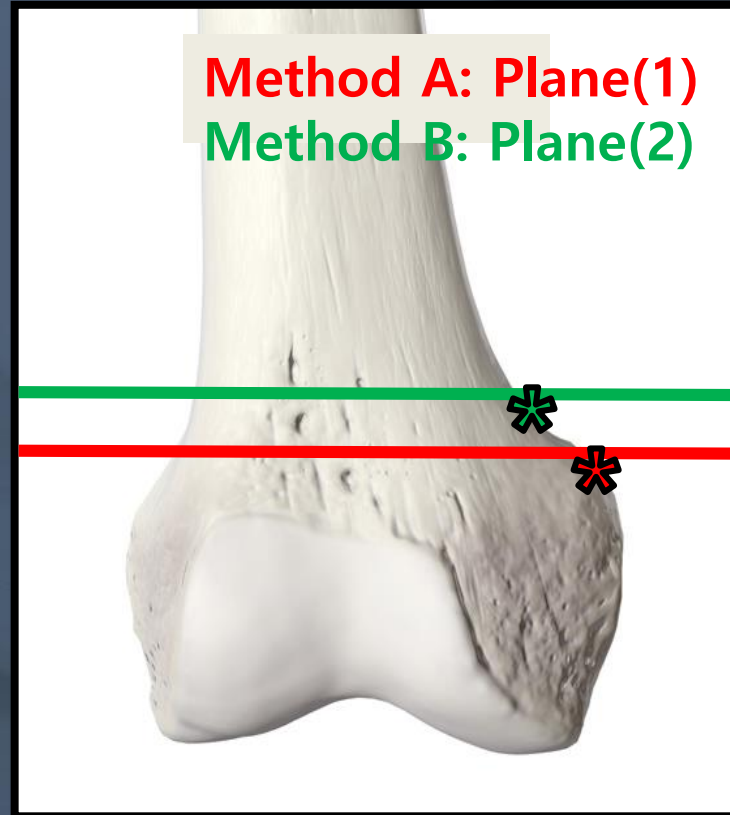
1. To investigate
Optimal Direction and Depth of the
Saphenous n.
for Intraoperative surgeon-
administered ACB
using MRI images with Korean
population
2. To verify
the most effective injection method

Methods: Study design & Subjects

- Retrospective
- 150 subjects
- Using convectional routine Knee MRI
- Regardless of knee osteoarthritis
- Exclusion Criteria>
 - Inflammatory/Septic arthritis, multiple ligament injury
 - adjacent bony deformity due to previous disease/trauma

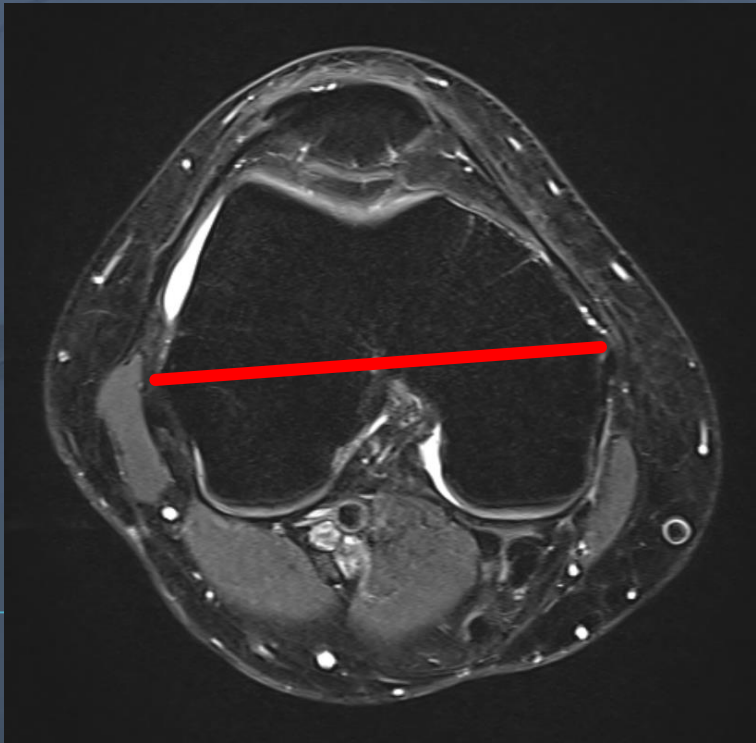
3 injection method

Meth od	Entry Point	Inj. Direction
A	Adductor Tubercle	Same transverse plane: Plane(1)
B	Most Concave depressio n	Same transverse plane: Plane(2)
C	Adductor Tubercle	Toward Level of Plane(2)

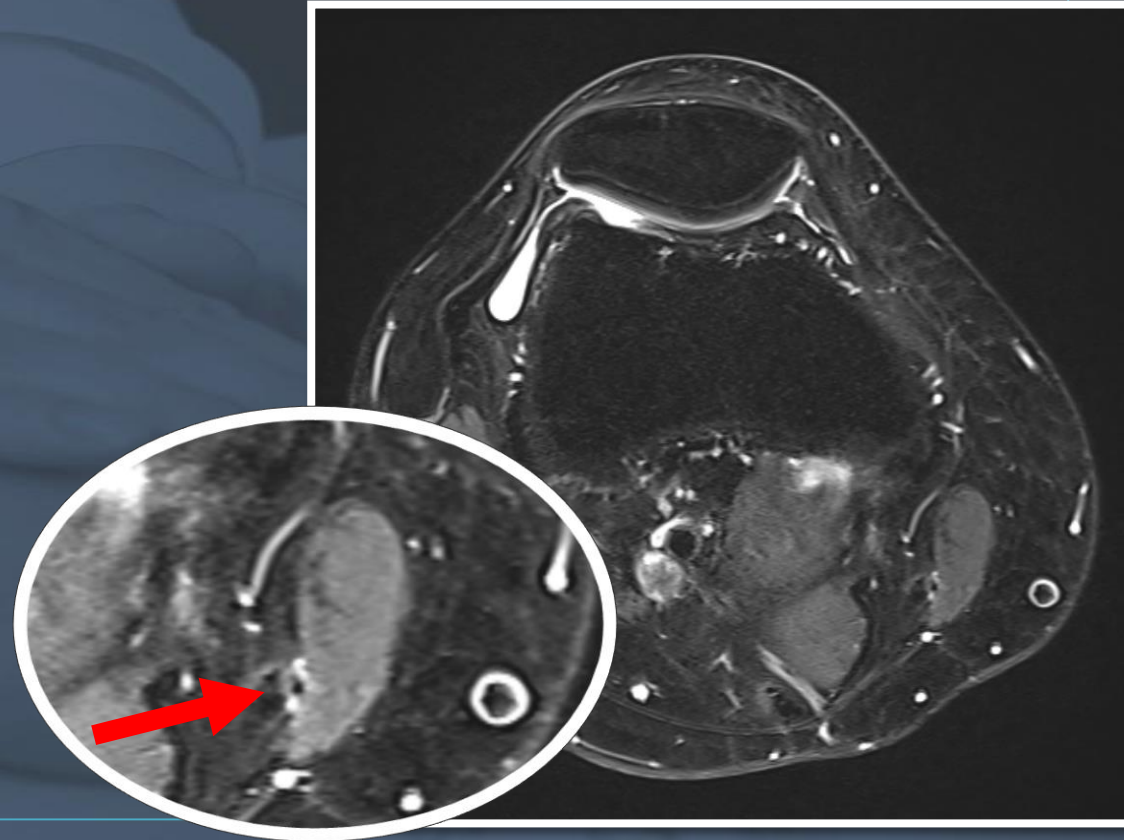


Measurement: MRI

- 1. TEA as a reference axis
 - Trans-epicondylar axis
 - Length

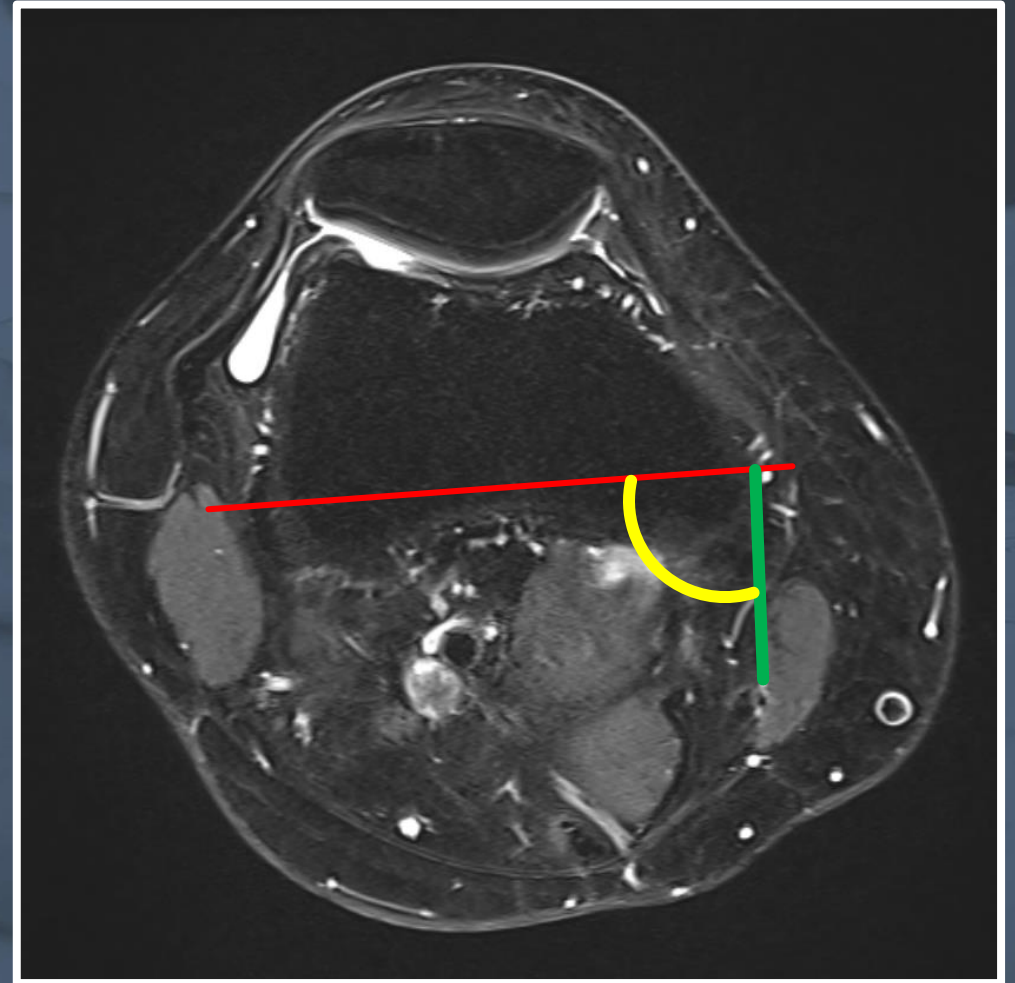


- 2. Saphenous nerve.



Measurement: MRI

- 1. Length of TEA
 - Trans-epicondylar axis
- 2. Saphenous nerve
 - Length
 - Most medial cortex of the femur
 - Angle
 - to the TEA (medial or lateral)



Patients demographics & Results

Mean age (years) 59.0 ± 10.5 (24 – 82)

Sex (F : M) 62 : 88 [41 : 59 %]

Mean TEA length 80.9 ± 6.2 mm (69.9 – 98.3)

Method	Angle (°)	Distance (mm)
A	Lateral 4.4 ± 9.6	31.8 ± 7.5
B	Medial 13.3 ± 11.9	31.0 ± 7.6
C	Lateral 8.8 ± 11.6	32.6 ± 8.0
	Semi-sagittal 22.5 ± 6.6	

ICC: Angle (.723) / Distance (.928)

Difference between Sex (M : F / 62 : 88)

Meth od	sex	Angle (°)	p-value	Distance (mm)	p-value
A	M	Lat. 6.6 ± 8.5	.013*	32.7 ± 7.4	.233
	F	Lat. 2.7 ± 10.1		31.2 ± 7.5	
	Diff.	3.9*		1.2	
B	M	Medial 13.8 ± 11.1	.704	32.2 ± 7.2	.114
	F	Medial 13.0 ± 12.5		30.2 ± 7.6	
	Diff.	0.8		1.8	
C	M	Lat. 10.3 ± 8.9	.148		
	F	Lat. 7.7 ± 13.1			
	Diff.	2.6			
	M	Sup. 22.0 ± 6.6	.377	33.6 ± 8.1	.219
	F	Sup. 22.9 ± 6.7		32.0 ± 7.8	
	Diff.	0.9		1.6	

Difference btw Large / Small TEA (79 / 71)

Method	TEA	Angle (°)	<i>p</i> -value	Distance (mm)	<i>p</i> -value
A	<81	Lat. 2.0 ± 9.5	.001*	30.6 ± 7.4	.030*
	≥81	Lat. 7.0 ± 9.1		33.2 ± 7.4	
	Diff.	5.0		3.4	
B	<81	Medial 14.5 ± 12.6	.206	29.9 ± 7.8	.050
	≥81	Medial 12.0 ± 11.4		32.3 ± 7.2	
	Diff.	2.5		2.4	
C	<81	Lat. 7.1 ± 14.2	.053		
	≥81	Lat. 10.7 ± 9.3			
	Diff.	3.6			
	<81	Sup. 23.6 ± 7.0	.306	30.7 ± 7.7	.126
	≥81	Sup. 22.2 ± 7.2		33.3 ± 9.0	
	Diff.	1.4		2.6	

Correlation between TEA and Parameters

	TEA	A-angle	A-distance	B-angle	B-distance
TEA	r=1 P-value= .	.203 .013**	.169 .039**	.075 .360	.369 <.001**
C-angle	.117 .153				
C-semi-sagittal	- .226 .005**				
C-distance	.207 0.11**				

Conclusion

- The intraoperative injection *method B* represents the most Reproducible and Reliable technique for the surgeon to block the saphenous nerve during TKA.

Entry	the most Concave depression point of medial femoral condyle
Direction	Medially 13° on the same transverse plane
Depth	when using 1.5 inch(3.75mm) 18-gauge needle, leaving 7mm of needle length



References

- Pepper AM, North TW, Sunderland AM, Davis JJ. Intraoperative Adductor Canal Block for Augmentation of Periarticular Injection in Total Knee Arthroplasty: A Cadaveric Study. *J Arthroplasty*. 2016 Sep;31(9):2072-6. doi: 10.1016/j.arth.2016.02.030. Epub 2016 Feb 26. PMID: 26996675.
- Greenky MR, McGrath ME, Levicoff EA, Good RP, Nguyen J, Makhdom AM, Lonner JH. Intraoperative Surgeon Administered Adductor Canal Blockade Is Not Inferior to Anesthesiologist Administered Adductor Canal Blockade: A Prospective Randomized Trial. *J Arthroplasty*. 2020 May;35(5):1228-1232. doi: 10.1016/j.arth.2020.02.011. Epub 2020 Feb 28. PMID: 32115328.
- Kavolus JJ, Sia D, Potter HG, Attarian DE, Lachiewicz PF. Saphenous Nerve Block From Within the Knee Is Feasible for TKA: MRI and Cadaveric Study. *Clin Orthop Relat Res*. 2018 Jan;476(1):30-36. doi: 10.1007/s11999.0000000000000006. PMID: 29529612; PMCID: PMC5919220.