TITLE

A prospective randomised study to compare the clinical and radiological outcomes in ***Functionally aligned (FA) VS Mechanically aligned (MA)*** total knee arthroplasty with robotic arm assistance

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- No financial disclosure
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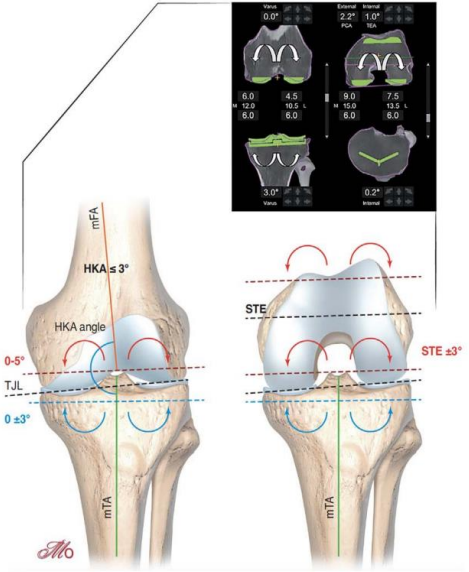
- No conflict of interest

INTRODUCTION:

- Following TKA 10 to 20% of patients are dissatisfied.[1]
- For decades, primary goal TKA - stable knee with a neutrally aligned lower limb. [2]
- Important for successful clinical outcomes and implant survivorship.[3]
- Aim of MA TKA - “biomechanically friendly prosthetic knee”.[4]
- Suboptimal results in TKA, a new alignment philosophy - ***Functional alignment (FA)*** .[5]
- FA is a hybrid computer-aided surgery (CAS) technique (navigated or robotic) [5].
- FA protects the soft-tissue envelope and achieves a balanced knee with the “most normal” kinematics possible. [6]

Functional alignment:



- Aims at recreating

-constitutional alignment

-joint line height and obliquity

-with adjustments to the implant positions

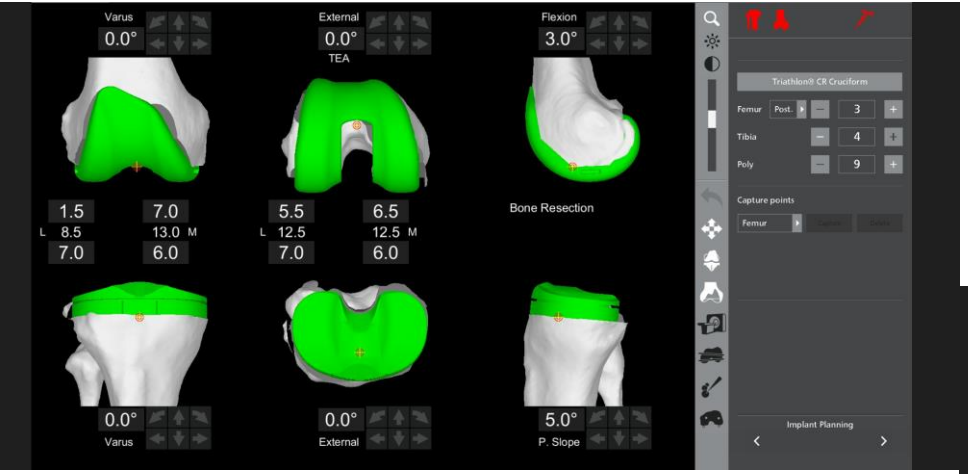
-based on a quantifiable soft tissue laxity assessment through an arc of flexion

-errors in the final implant position can be pre-empted prior to any bone cuts intraoperatively , avoiding the need for soft tissue releases.

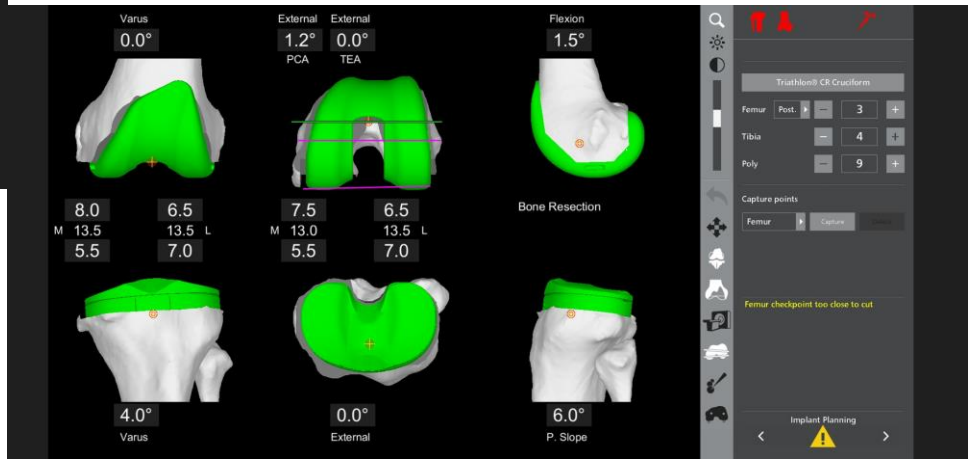
- *Shatrov J, Sappey-Marinier E, Lustig S. Functional Alignment Philosophy in Total Knee Arthroplasty - Rationale and technique for the varus morphotype using a CT based robotic platform and individualized planning. SICOT J. 2022*

Implant planning sample screenshot:

Mechanical alignment:



Functional alignment:



AIM :

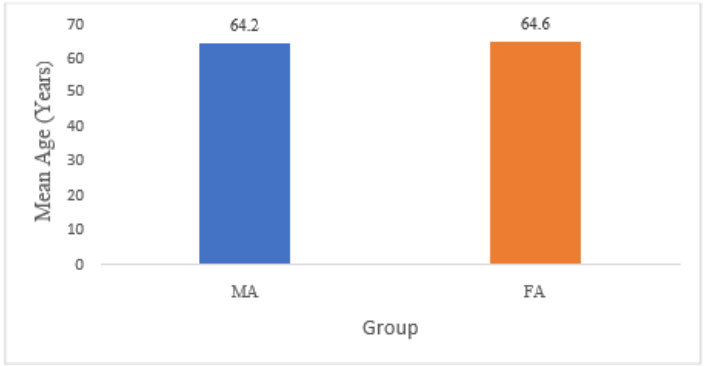
- To Compare Mechanical (MA) vs Functional Alignment (FA) in Robotic TKA .
- Comparing patient satisfaction, functional and radiological outcomes & also any complications.

MATERIALS AND METHODOLOGY:

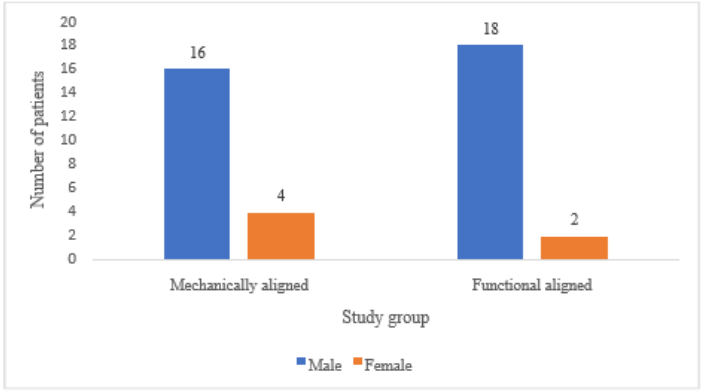
- Single center, prospective randomized study – under a single surgeon .
- A total of 40 patients, randomly selected.
- The study period - August 2020 to September 2022.
- Clinical outcomes measured with Patient reported outcome measure's (PROM's).
- Pre-operatively Knee society score (KSS) and Oxford knee score (OKS) score.
- Post-operatively KSS , OKS and Modified Forgotten Joint Score (MFJS) scores.
- At 6 weeks, 3 months, 12 months and 18 months.
- Planned posterior slope and tibial varus cut angle was compared to post op x-ray to determine the accuracy.

RESULTS:

Comparison of age between two groups



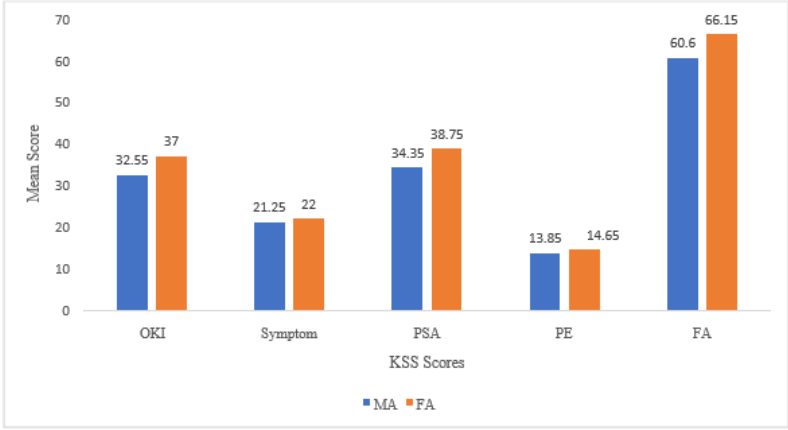
Comparison of gender distribution between two groups



Comparison of KSS score at 18 months between two groups

Variable	Group		p-value
	MA n=20	FA n=20	
	Mean ± SD		
OKI	32.55±1.43	37.00±1.45	<0.001
Symptom	21.25±0.63	22.00±0.00	<0.001
PSA	34.35±1.26	38.75±1.29	<0.001
PE	13.85±0.48	14.65±0.48	<0.001
FA	60.60±4.66	66.15±3.28	<0.001

Comparison of KSS score at 18 months between two groups



Comparison of OKS score at different time points between two groups

OKS Score	Group		p-value
	MA n=20	FA n=20	
	Mean ± SD		
6 weeks	18.85±1.04	20.65±1.34	<0.001
3months	38.30±1.30	39.55±1.60	<0.001
12 months	40.15±0.48	41.30±0.73	<0.001
18 Months	40.50±0.51	42.20±0.95	<0.001

Comparison of MFJS score at different time points between two groups

MFJS score	Group		p-value
	MA n=20	FA n=20	
	Mean ± SD		
6 weeks	69.45±1.50	71.55±1.70	<0.001
3months	74.55±1.05	77.80±1.10	<0.001
12 months	79.00±0.85	80.30±0.65	<0.001
18 Months	80.25±0.44	82.65±0.74	<0.001

Comparison of OKS score at different time points between two groups

Comparison of MFJS score at different time points between two groups

Comparison of agreement of posterior slope reading with intra-op posterior slope

Variable	Intraclass correlation coefficient	95%confidence interval	p-value
Posterior slope with final intra-op posterior slope	0.565	0.178,0.770	0.005

Comparison of post-op X-ray varus reading with Final intra-op Varus

Variable	Intraclass correlation coefficient	95%confidence interval	p-value
Post x-ray Varus with Final intra op Varus	0.829	0.676,0.909	<0.001

DISCUSSION:

- *Clinical outcomes:*
- KSS mean score - FA better than MA , for all 5 parameters
- At 6 weeks, 3 months , 12 months and 18 months.
- *p value < 0.001,* statistically significant

- OKS and MFJS mean score - FA better than MA
- At 6 weeks, 3 months , 12 months and 18 months.
- *p value < 0.001*, statistically significant

- *Radiologically* :

- Posterior slope cut vs Post-op x-ray slope
- Intraclass correlation coefficient - 0.565 , *p value = 0.05*
- Statistically significant Moderate agreeability

- Planned Tibia varus cut vs Post-op x-ray
- Intraclass correlation coefficient - 0.829, *p value <0.001*
- Statistically significant good agreeability

- Indicating good accuracy – Implant positioning in Robotic TKA

CONCLUSION:

- In our study we found - Robotic arm assisted FA TKA had:
- Better clinical outcomes consistently at all time points of 6 weeks, 3 / 12 / 18 months
- Radiologically the planned implant positioning was achieved in robotic TKA.
- The PROM's we used was able to demonstrate statistically significant difference in FA group.
- This is one of the first studies from India comparing clinical outcomes in robotic TKA.
- Long term follow up is required to assess the implant survivorship and patient satisfaction.

REFERENCES:

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