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Robot Assisted Total Knee Arthroplasty and Navigation Assisted Total Knee Arthroplasty : A Comparative Study with a Focus on Severe Varus Deformities.

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Disclosures

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Background

- Multiple studies have shown that Robot assisted (RTKA) & Navigation assisted (NTKA) Total Knee arthroplasty (TKA) improve implant positioning and accuracy compared to Conventional TKA.[1-5]
- When compared to NTKA, RTKA has shown to have increased accuracy in achieving surgical plan with no difference in overall surgical outliers.[6]
- While RTKA has shown improved early functional recovery [7,8] in the immediate post operative phase but there are no difference in outcomes at 1 year. [8,9]
- However, these studies have not looked at more severe deformities.

Aim

To compare clinical outcomes between NTKA and RTKA for

a) All patients

b) Patients with severe varus deformity (varus > 10°)

Materials and Methods

- All consecutive patients undergoing primary TKA between Jan and Dec 2023 at a Single center operated by a single surgeon

	Total	N- TKA	R-TKA
Entire cohort	**179**	**90**	**89**
Severe Varus Cohort (>10°)	122	62	60

93.8% follow-up

at 1 year

- Clinical outcomes were judged using New Knee Society Score and its subcomponents Objective Knee Score(OKS), Function Knee Score (FKS) and Symptoms score , Forgotten Joint Score (FJS), and Satisfaction with light activities
- Statistical Analysis was performed using Students T test, Mann Whitney U test, and Chi-Square Test.

Materials and Methods

TKA Strategy for ALL Patients

"Functional Balancing (limit of ± 3° coronal balance)"

At trialling stage, if the gaps were not balanced after bony adjustments within limits, we performed a Soft Tissue Release (STR)

STR For Varus Deformities

- Minor deformities – Pie crusting of MCL
- Severe deformities – Formal MCL release

Results

General Demographics

	Entire Cohort			Severe Varus Cohort		
	N-TKA Mean (SD)	R-TKA Mean (SD)	p	N-TKA Mean (SD)	R-TKA Mean (SD)	p
Age	67 (8.6)	66.9 (6.7)	0.87	66.5 (8.4)	67.1 (5.8)	0.65
BMI	30.4 (4.3)	30 (4.7)	0.57	30.6 (4.6)	30.1 (5.1)	0.59
Sex (M/F)	18/72	16/73	0.73	11/51	11/49	0.93
Deformity Type: Varus/Valgus	81/9	85/4	0.25	-	-	-
Deformity Angle - Varus	13.8 (5.6)	11.9 (4.9)	0.02	15.6 (5.1)	14 (4.2)	0.06
Deformity Angle - Valgus	12.9 (4.5)	8 (2.2)	0.07	-	-	-

Pre-operative PROMs

	Entire Cohort			Severe Varus Cohort		
	N-TKA Mean (SD)	R-TKA Mean (SD)	p	N-TKA Mean (SD)	R-TKA Mean (SD)	p
NKSS	76.6 (22.9)	73.9 (21.7)	0.45	75.9 (24.2)	75.1 (21.7)	0.98
OKS	38.4 (5)	39.9 (4.7)	0.61	38.6 (5.1)	38.9 (4.4)	0.98
Symptoms	6.6 (4.9)	6.1 (5.2)	0.33	5.7 (4.3)	6.7 (5.4)	0.46
FKS	29.7 (18)	26.8 (17.1)	0.31	29.7 (19)	27.3 (16.6)	0.62
FJS	19 (16.9)	18.3 (17.6)	0.55	17.8 (17.4)	20.2 (18.3)	0.54

Results

Intra-operative Details

	Entire Cohort			Severe Varus Cohort		
	N-TKA	**R-TKA**	**P**	**N-TKA**	**R-TKA**	**P**
Tourniquet Time	76.1 (11.9)	79.4 (11)	**0.05**	77.3 (10)	80.3 (11.2)	0.12
Drain	210.1 (90.5)	218.4 (116.7)	0.6	205.9 (86.1)	210.1 (113.2)	0.82
Lateral Retinacular Release Rate	7	9	0.58	2	5	0.23
STR Rate (Varus)	36 (44.4%)	22 (25.8%)	**0.03**	34 (54.8%)	20 (33.3%)	**0.02**
STR Rate (Valgus)	2 (22.2%)	1 (25%)	0.91	-	-	-

Results

At 3-months

	Entire Cohort			Severe Varus Cohort		
	N-TKA Mean (SD)	**R-TKA** Mean (SD)	p	**N-TKA** Mean (SD)	**R-TKA** Mean (SD)	p
NKSS	143 (22.8)	147.7 (19.8)	0.13	144.1 (22.7)	150 (19.6)	0.13
OKS	75.9 (2.6)	76.8 (1.7)	**0.03**	76 (2.1)	76.9 (1.6)	**0.02**
Symptoms	18.3 (5.5)	18.1 (5.1)	0.61	18.4 (5.3)	18.4 (4.8)	0.94
FKS	42.6 (18.3)	46.8 (17)	0.13	43.6 (18.6)	48.6 (17.2)	0.18
Improvement (Change) in scores						
NKSS	63.6 (30.2)	73.8 (27.6)	**0.04**	64.6 (31.9)	73.7 (28)	0.15
OKS	37.2 (5.4)	38 (4.9)	0.28	36.9 (5.2)	37.9 (4.3)	0.23
Symptoms	11.5 (7.7)	11.5 (6.9)	0.95	12.3 (7.4)	11.6 (7.1)	0.70
FKS	10.7 (23.8)	20.3 (22.1)	**0.03**	11.2 (25.6)	20.3 (22.7)	0.10

Results

1-year PROMs

	Entire Cohort			Severe Varus Cohort		
	N-TKA Mean (SD)	R-TKA Mean (SD)	p	N-TKA Mean (SD)	R-TKA Mean (SD)	p
NKSS	154.9 (21.1)	157.4 (20)	0.45	155.9 (22.2)	157.3 (17.8)	0.78
OKS	77.3 (1.5)	77.4 (1.6)	0.51	77.2 (1.5)	77.3 (1.7)	0.69
Symptoms	20.4 (4.9)	20.8 (5)	0.36	20.7 (4.7)	21.0 (4.9)	0.64
FKS	50.7 (18)	52.5 (17.2)	0.45	51.5 (19.3)	52.3 (15.6)	0.82
FJS	65.2 (26.5)	67.6 (26.6)	0.51	66.5 (27.5)	67.8 (24.4)	0.91
Improvement (Change) in Scores						
NKSS	79.2 (26.7)	83.2 (27.7)	0.42	80.7 (26.4)	81.9 (28.6)	0.86
OKS	38.8 (5)	38.4 (4.7)	0.79	38.6 (5.2)	38.4 (4.3)	0.86
Symptoms	14.1 (7.1)	14.6 (6.9)	0.80	15.2 (6.7)	14.1 (7.1)	0.29
FKS	21.6 (21.8)	25.7 (22.1)	0.28	22.3 (21.7)	25.1 (22.9)	0.51
FJS	46.7 (32.1)	48.9 (30.8)	0.67	48.8 (33.2)	47.2 (31.5)	0.68

Results

Satisfaction at 1 yr

5-point Likert scale – % Patients responding as satisfied or very satisfied

	Entire Cohort			Severe Varus Cohort		
	N-TKA	R-TKA	P	N-TKA	R-TKA	P
Satisfied Y (%)	71 (85%)	80 (94%)	0.04	50 (84.7%)	54 (94.7%)	0.08

Conclusion

- ✓ Reduced Soft Tissue releases with RTKA in severe varus deformities having the same coronal alignment pre and post operatively.
- ✓ RTKA patients seem to have improved functional recovery at 3 months and higher satisfaction at 1 year but further studies in a larger different population are required to confirm our results.
- ✓ Excellent satisfaction rates (94.7%) at 1 year with RTKA in patients with severe varus deformities

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