The Effect of Postoperative Coronal Alignment on Clinical Outcomes after Total Knee Arthroplasty in Patients with Preoperative Valgus Deformities

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INTRODUCTION: The optimal postoperative coronal alignment after total knee arthroplasty (TKA) for valgus deformity is unknown. The aim of this study was to assess the effect of postoperative coronal alignment on clinical outcomes after TKA in patients with preoperative valgus deformities of the knee.

METHODS: A retrospective review of patients with preoperative valgus deformity undergoing primary TKA between 2010 and 2020 with at least one year of follow up was performed. Mechanical alignment of the knee was measured preoperatively and postoperatively on 36" standing radiographs. Valgus alignment was defined as greater than two degrees of valgus from the mechanical axis, neutral alignment as within two degrees of the mechanical axis, and varus alignment as greater than two degrees of varus from the mechanical axis. Patient demographics, complications, and patient-reported outcome measures (PROMs) were collected.

RESULTS: After applying inclusion and exclusion criteria, 106 patients with preoperative and postoperative PROMs were identified. The mean preoperative valgus deformity was 9.4 ± 4.19°. Postoperatively, 67% (71/106) were over-corrected to varus, 28% (30/106) remained in valgus, and 5% (5/106) were corrected to neutral. The overall revision rate was 6.7% (7/106). Univariate analyses demonstrated that valgus postoperative alignment was associated with significantly lower VR-12 physical scores than those in varus (6.6 vs. 9.8 points, p = 0.035).

DISCUSSION AND CONCLUSION: In patients with preoperative valgus deformities, coronal plane over-correction to varus resulted in improved patient-reported outcomes when compared to those under-corrected with residual valgus.

Table 1: Patient Demographics

	N	%
Post-Operative Alignment		
Valgus	30	28.3%
Neutral	5	4.7%
Varus	71	67.0%
Sex		
Female	74	69.8%
Male	32	30.2%
Primary Diagnosis		
Osteoarthritis	94	88.7%
Osteonecrosis	4	3.8%
Post-infectious arthritis	3	2.8%
Post-traumatic arthritis	1	0.9%
Rheumatoid arthritis	4	3.8%
ASA Classification		
1	5	4.7%
2	48	45.3%
3	53	50.0%
Implant Type		
CCK or Hinge	7	6.7%
CR	10	9.5%
PS	88	83.8%
Revision		
No	97	93.3%
Yes	7	6.7%

Table 2: Pairwise Analysis of Post-Operative Alignment Groups

Pairwise	Tukey adj. p-value
Neutral vs Valgus	0.622
Varus vs. Valgus	0.035
Varus vs. Neutral	0.987

Table 3: Univariate Differences in Scores vs. Alignment Categories

Variable	Level	N	Mean	SD	Lower 95%	Upper 95%	p-value
ΔUCLA	Valgus	97	0.4	1.7	0.1	0.7	0.777
	Neutral	15	0.7	1.0	0.1	1.2	
	Varus	213	0.6	1.9	0.3	0.8	
ΔVR-12 Physical	Valgus	93	6.6	10.7	4.4	8.7	0.045
	Neutral	13	9.4	12.0	2.9	15.9	
	Varus	179	9.8	9.9	8.4	11.3	
ΔVR-12 Mental	Valgus	93	2.5	9.6	0.6	4.5	0.150
	Neutral	13	0.3	7.3	-3.7	4.3	
	Varus	179	0.3	9.0	-1.1	1.6	