Nail Plate Combination versus Single Device Constructs for Distal Femur Fractures is Associated with Improved Clinical and Radiographic Outcomes

Melissa Rose Holloway¹, Urvi Patel², Carla Guedikian, Noah Joseph³, John P Ketz

¹University of Rochester Medical Center, ²URMC, ³Florida Orthopaedic Institute

INTRODUCTION: The purpose of this study is to investigate clinical, radiographic, and patient-reported outcomes following operative intervention for distal femur fractures between patients who underwent fixation with a locked lateral plate (LLP), retrograde intramedullary nail (rIMN), and nail-plate combination (NPC). We also compared need for postoperative blood transfusions, length of hospital stay, ambulatory status, and rate of revision surgery. We hypothesize similar clinical and radiographic outcomes between patients who undergo NPC as compared to single device constructs.

METHODS: We retrospectively reviewed patients who presented with distal femur fractures at our level- 1 trauma center. Patients under the age of 18 were excluded. Demographic characteristics, OTA fracture classification, postoperative complications, and clinical outcomes were reviewed. Statistical significance was determined at p<0.05.

RESULTS: 169 patients met our inclusion criteria. A total of 94 patients underwent LLP, 45 underwent rIMN, and 30 underwent NPC. Mean ages were 79.8 \pm 10.3, 70.4 \pm 8.3, and 77.1 \pm 11.1 years, respectively (p<0.01). Six patients in the LLP group, 8 patients in the rIMN group, and 19 patients in the NPC group were weight-bearing as tolerated at time of discharge (p<0.01). Six patients in the LLP and rIMN group went on to non-union, as compared to 0 in the NPC cohort (p=0.04). 28 patients in the LLP group and 18 patients in the rIMN group, compared to 4 patients in the NPC group, experienced impaired gait from baseline at 6 months post-op (p=0.01). Mean knee range of motion at 6 months was 96 \pm 16 degrees in the LLP group, 88 \pm 23 degrees in the rIMN group, and 101 \pm 7 degrees in the NPC group (p=0.05). There were no differences in rates of re-operation or deep infection.

DISCUSSION AND CONCLUSION: Ultimately, our study shows that fixation with NPC for distal femur fractures presents with lower rates of non-union and more favorable clinical outcomes as compared to fixation with single device constructs.

Treatment		LLP (n=94)	IMN (n=45)	NPC (n=30)	p value
Sex	Male	6	11	1	0.0033
	Female	88	34	29	
Age (years)		79.8 (10.3)	70.4 (8.3)	77.1 (11.8)	0.0001
BMI		28.4 (7.4)	32.1 (10.0)	31.2 (11.9)	0.0554
Clinical Comorbidities	Hypertension	82	36	22	0.1668
	Diabetes	38	17	13	0.8670
	Osteoporosis	56	29	25	0.0530
	Hypothyroidism	28	6	4	0.0427
OTA Fracture Classification	А	60	40	12	0.0001
	в	8	0	4	
	С	26	5	14	
Time to Surgery					
(days)		1.4 (1.3)	1.7 (0.8)	1.7 (1.0)	0.3296
Length of Stay					
(days)		8.2 (5.6)	18.4 (10.3)	9.0 (4.6)	0.0001
Intra-Operative					
Blood Loss (mL)		307.2 (267.3)	335.3 (259.0)	416.7 (274.8)	0.1668
pRBCs Transfused					
During Stay (units)		1.1 (1.1)	1.6 (2.0)	1.6 (1.7)	0.0976

Teastmant		LL D (n=04)	D/DJ (n=45)	NIBC (n=20)	n value
Weight-Rearing	NWB	88	37	11	p value
Status at Discharge	WBAT/TDWB	6	8	19	0.0001
Discharge Disposition	Home	12	11	9	0.0685
	SNF	78	34	21	
Hardware Complications	Non-Union	6	6	0	0.0417
	Hardware Failure	8	0	2	0.1659
	Re-Operation	14	6	2	0.5948
	Deep Infection	4	0	2	0.3183
	Soft Tissue Irritation	16	5	4	0.8680
Functional Complications at 6- Month Follow-Up	Knee Stiffness	20	8	9	0.5239
	Quadriceps Weakness	28	7	4	0.0995
	Severe Gait Impairment	28	18	4	0.0139
Knee Range of	1				
Motion at 6-Month					
Follow-Up		06.2 (15.8)	88.0 (22.0)	100.8 (6.7)	0.0403
(degrees)		90.3 (13.8)	88.9 (22.9)	100.8 (0.7)	0.0495