

Results of Retrograde Intramedullary Nailing Versus Locked Plating for Extreme Distal Periprosthetic Supracondylar Femur Fractures

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Purpose: This study was undertaken to compare clinical and radiographic outcomes following locked plating (LP) versus retrograde intramedullary nailing (rIMN) in extreme distal periprosthetic femur fractures, defined as fractures at or distal to the anterior flange (Su 2 or 3).

Methods: A retrospective review of all patients treated for a Su 2 or 3 periprosthetic distal femur fracture at a single Level I trauma center and minimum 3-month follow-up were reviewed. The primary outcome was reoperation for fixation failure or nonunion. Secondary outcomes included infection, delayed union, overall reoperation rate, postoperative lateral and anterior distal femoral angles (LDFA and ADFA), and change in distal femoral alignment. Outcomes were compared between patients treated with rIMN versus LP.

Results: 33 patients met inclusion criteria, including 7 patients treated with rIMN and 26 patients treated with LP. Average follow-up was 55 weeks (interquartile range [IQR] 18-69 weeks). Demographic data and fracture characteristics are shown in Table 1. The LP group had more points of fixation in the distal segment (nails: 2.9 ± 0.4 ; plates: 5.5 ± 0.5 , $P < 0.0001$) and fewer patients who were allowed to weight-bear as tolerated immediately (rIMN: 71%; LP: 12%, $P = 0.001$). There were no reoperations or delayed unions in the rIMN group. In the LP group, 6 of 26 patients (23%) underwent reoperation: 2 for nonunion, 1 for early fixation failure, 2 for infection, and 1 for symptomatic implants. 2 (8%) of the 26 plated fractures had a delayed union that did not require further surgery. None of these complications were statistically significant when compared to the nail group (Table 1). There were no differences in distal femoral alignment or alignment change between groups.

Conclusion: Retrograde intramedullary nailing of extreme distal periprosthetic femur fractures appears safe and effective. Surgeons treating these fractures should consider this treatment strategy, even in the most distal fractures.

Table 1: Patient Demographics, Fracture Characteristics and Complications

	rIMN (n = 7)	% or SDEV	plate (n = 26)	% or SDEV	All (n = 33)	% or SDEV	P
Age (years)	78.2	10.4	75.6	13.1	76.1	12.5	0.633
BMI	31.0	6.5	30.4	8.9	30.5	8.3	0.872
Follow Up (weeks)	26.3	24.0	63.1	72.8	55.3	67.0	0.031
Gender							
Male	1	14%	7	27%	8	24%	Ref
Female	6	86%	19	73%	25	76%	0.652
Smoking							
No	7	100%	24	92%	31	97%	Ref
Yes	0	0%	1	4%	1	3%	>0.999
Laterality							
Left	6	86%	17	65%	23	70%	Ref
Right	1	14%	9	35%	10	30%	0.397
Mechanism							
GLF	4	57%	25	96%	29	88%	Ref
Medium energy (ie bike)	2	29%	0	0%	2	6%	0.032
High energy (ie MVC)	1	14%	1	4%	2	6%	0.301
Open							
No	6	86%	24	92%	30	91%	Ref
Yes	1	14%	2	8%	3	9%	0.524
Su Class							
2	0	0%	6	23%	6	18%	Ref
3	7	100%	20	77%	27	82%	0.301
Comminution							
No	1	14%	9	35%	10	30%	Ref
Yes	6	86%	17	65%	23	70%	0.397
Distal Fixation Points	2.9	0.4	5.5	0.5	5.0	1.2	<0.0001
Weight-Bearing RX							
NWB	0	0%	17	65%	17	52%	Ref
Protected WB	2	29%	6	23%	8	24%	0.093
WBAT	5	71%	3	12%	8	24%	0.001
Post-op Alignment							
LDFA	83.2	2.9	83.9	3.7	83.8	3.6	0.771
ADFA	84.9	8.4	91.3	7.0	90.1	7.6	0.06
Final Alignment							
ΔLDFA	1.9	1.3	2.4	1.7	2.3	1.6	0.798
ΔADFA	4.6	2.4	2.9	2.4	3.3	2.5	0.067
Complications							
Nonunion	0	0	2	8%	2	6%	>0.999
Delayed Union	0	0	2	8%	2	6%	0.559
Fixation Failure	0	0	1	4%	1	3%	>0.999
Infection	0	0	2	8%	2	6%	>0.999
Any Reoperation	0	0	6	23%	6	18%	0.301

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.