Dual Implants for Geriatric Distal Femur Fractures Results in Greater Healthy Days at Home

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INTRODUCTION:

Healthy Days At Home (HDAH) is a recently adopted quality metric that captures both functional recovery and return to independent living that geriatric trauma patients value. Aside from mortality, HDAH is regarded by patients as one of the most important outcomes through patient engagement studies. The purpose of this study was to investigate the impact of dual implants (DI) vs. single implant (SI) on $HDAH^{90}$ in geriatric distal femur fractures.

METHODS:

Geriatric (age ³ 60 years) distal femur fractures from 3 level-1 trauma centers between January 2019-January 2024 were retrospectively reviewed. Demographics, comorbidities (CCI), pre-injury function, fracture classification/characteristics, weight bearing recommendations, facility days, weight bearing status, and 90-day readmission were recorded. $HDAH^{90}$ was calculated from hospital discharge to 90 days follow-up and accounted for days spent in mortality, care facilities, readmissions, and secondary surgeries. Chi-square and ANOVA were used for bivariate analysis. ANCOVA or binary logistic regression was used to compare $HDAH^{90}$, 90-day readmission and mortality rates, return to baseline at 90 and 180 days, length of hospitalization, and time to weightbearing in DI and SI cohorts while controlling for gender, open fracture, AO/OTA type, pre-operative functional status, and post-operative weight bearing status.

RESULTS:

229 SI and 70 DI patients were included. DI patients were more likely to be female (83% vs 71%, p=0.044) and had more periprosthetic fractures (55.7% vs. 35.4%, p=0.002). There was no other demographic, fracture characteristic, or preoperative functional differences between groups. Following regression analysis, DI patients had greater $HDAH^{90}$ (65 vs 53, p=0.033) than SI patients. There were no differences in 90-day readmission (DI odds 1.23, p=0.54), 90-day mortality (DI odds 1.14 p=0.85), return to baseline at 90-days (DI odds 1.28, p=0.49) or 180 days (DI 0.821, p=0.787), length of hospitalization (DI 10.42 days vs SI 12.56 days, p=0.185), and time to weightbearing (DI 40 days vs SI 47 days, p=0.350).

DISCUSSION AND CONCLUSION:

Distal femur fracture treatment with DIs increases the number of HDAH within 90 days after hospitalization as compared to single implants. Given that a 5-day difference in HDAH is clinically significant, using DIs may represent an improvement in care for distal femur patients.

Table 2. Estimated Outcomes after Controlling For Post-operative Weight Bearing, Pre-operative Function, Open Fracture, AO/OTA Fracture Type, and Gender with ANCOVA

Estimated Outcome	Single Implant	Dual Implant	p-value
90-day healthy day at home (SD)	52.47 (3.16)	64.67 (4.72)	0.033
Length of hospitalization (days, SD)	12.56 (.89)	10.42 (1.34)	0.185
Days to weight bearing (SD)	47.11 (4.2)	39.96 (6.4)	0.350

Table 3. Estimated Outcomes after Controlling For Post-operative Weight Bearing, Pre-operative Function, Open Fracture, AO/OTA Fracture Type, and Gender with logistic regression

Estimated Outcome	Dual implant (odds ratio, 95% CI)	p-value
90-day readmission rate*	1.228 (0.639, 2.361)	0.538
90-day mortality rate*	1.143 (0.278, 4.694)	0.853
Return to functional baseline at 90 days*	1.282 (0.632, 2.601)	0.491
Return to functional baseline at 180 days*	0.821 (0.196, 3.430)	0.787

*Using single implant as reference

Table 1. Demographics and Fracture Patterns of Single and Dual Implant Patients

		All (n=299)	Single Implant (n=229)	Dual Implant (n=70)	p-value
Demographics	Age (sd)	73.41 (9.42)	72.84 (9.44)	75.31 (9.17)	0.055
	Female (%)	220 (73.6%)	162 (70.7%)	58 (82.9%)	0.044
	Follow-up (months) (sd)	11.21 (10.4)	11.59 (10.90)	9.56 (8.54)	0.250
	BMI (sd)	29.88 (8.06)	29.75 (8.01)	30.28 (8.23)	0.629
	CCI (sd)	4.00 (2.49)	3.87 (2.39)	4.40 (2.78)	0.122
	Race (%)				0.541
	Caucasian	225 (75.3%)	171 (74.7%)	54 (77.1%)	
	African American	27 (9%)	19 (8.3%)	8 (11.4%)	
	Hispanic	16 (5.4%)	13 (5.7%)	3 (4.3%)	
	Asian	2 (0.7%)	1 (0.4%)	1 (1.4%)	
	Other/Unknown	29 (9.6%)	25 (10.9%)	4 (5.7%)	
	Smoking (%)				0.716
	Yes	28 (9.4%)	23 (10%)	5 (7%)	
	Former	46 (15.4%)	34 (15%)	12 (17%)	
	Never	225 (75.3%)	172 (75%)	53 (76%)	
	Alcohol (%)				0.635
	Yes	81 (27.1%)	64 (27.9%)	17 (24.3%)	
	Former	18 (6%)	15 (6.6%)	3 (4.3%)	
	Never	198 (66.2%)	149 (65.1%)	49 (70%)	
	Unknown	2 (0.7%)	1 (0.4%)	1 (1.4%)	
	Preoperative Functional status (%)				0.721
	Independent	200 (66.9%)	157 (68.9%)	43 (61.4%)	
	Partial dependent	37 (12.4%)	27 (11.8%)	10 (14.3%)	
	Walker	47 (15.7%)	33 (14.5%)	14 (20%)	
	Wheelchair	14 (4.7%)	11 (4.8%)	3 (4.3%)	
	Unknown	1 (0.3%)	1 (0.4%)		
Injury pattern	Mechanism of injury (%)				0.906
	Ground level fall	235 (78.6%)	178 (77.7%)	57 (81.4%)	
	Motor Vehicle/Cycle crash	47 (15.7%)	37 (16.2%)	10 (14.3%)	
	Other	7 (2.3%)	5 (2.2%)	2 (2.9%)	
	Gunshot	2 (0.7%)	2 (0.9%)	0	
	Fall from height	7 (2.3%)	6 (2.6%)	1 (1.4%)	
	Ped vs Auto	1 (0.3%)	1 (0.4%)	0	
	Open Fracture (%)	37 (12.4%)	26 (11.5%)	11 (15.7%)	0.332
	Periprosthetic Fracture (%)	120 (40.1%)	81 (35.4%)	39 (55.7%)	0.002
	OTA Classification (%)				0.289
	33-A	140 (46.8%)	111 (48.5%)	29 (55.8%)	
	33-B	25 (8.4%)	21 (9.2%)	4 (7.7%)	
	33-C	78 (26.1%)	59 (25.8%)	19 (36.5%)	
Recovery	Immediate Post-operative Weightbearing (%)	192 (64.2%)	147 (64.2%)	45 (64.3%)	0.989
	Days to weightbearing (SD)	41.10 (48.63)	42.62 (48.42)	36.12 (49.38)	0.339