Dual and Single Plating Yield Similar Clinical Outcomes for Midshaft Clavicle Fractures

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INTRODUCTION:

Displaced, midshaft clavicle fractures are commonly treated with open reduction and internal fixation (ORIF). While dual plating techniques have been shown to improve biomechanical stability and reduce hardware complications compared to single plating, patient-reported outcome measures (PROMs) between these techniques remain underexplored. The purpose of this study was to evaluate PROMs between single and dual plating techniques for midshaft clavicle fractures. Secondary aims included comparing complication and hardware removal rates. We hypothesize that the dual plating technique will be superior to single plating for PROMs and complication rates.

METHODS:

A retrospective review was conducted of patients who underwent ORIF for midshaft clavicle fractures between January 2010 and December 2023. Patients were stratified into three groups: dual plating, single anterior plating, and single superior plating. PROMs collected included QuickDASH, ASES-Pain, ASES-ADL, ASES-Total, and VAS-Pain. Complication data included hardware removal, broken hardware, paresthesia, post-surgical pain, and limited mobility.

RESULTS:

Of the initial patients yielded, 109 met inclusion criteria: 22 dual plate, 13 single anterior plate, and 74 single superior plate patients. Mean follow-up was significantly shorter in the dual plate group (2.89 ± 2.48 years) compared to both single anterior (7.87 ± 4.60, $p = 0.0003$) and single superior plate groups (7.46 ± 4.02, $p < 0.0001$). No differences were found between groups in age, sex, BMI, tobacco use, diabetes status, or fracture morphology. PROMs did not significantly differ between groups. Hardware removal was significantly more frequent in the single anterior plate group (38.4%) compared to the single superior plate group (2.7%, $p < 0.001$). No other complication rates differed between groups.

DISCUSSION AND CONCLUSION:

Long-term outcomes do not differ between dual and single plating techniques for displaced, midshaft clavicle fractures. Surgeons can feel comfortable choosing a technique based on their preference.

Table 1. Demographics and Fracture Classification

Cohort Variable	Dual Plate (n=22)	Single Anterior Plate (n=13)	Single Superior Plate (n=74)	p-value
Age[a]	46.3 ± 12.2	37.1 ± 14.8	41.8 ± 14.6	0.1641
Follow-up (years)[a]	2.9 ± 2.5	7.9 ± 4.6*	7.5 ± 4.0†	<0.001
Male[b]	17 (77.3)	8 (61.5)	46 (62.2)	0.4087
BMI[a]	30.8 ± 7.2	28.6 ± 6.3	28.7 ± 6.0	0.3804
Tobacco Use[b]	8 (38.1)	8 (61.5)	32 (43.2)	0.3820
Diabetes Status[b]	2 (9.1)	1 (8.3)	3 (4.2)	0.6231
Complications[b]	5 (22.7)	5 (38.5)	13 (17.6)	0.2295
Fracture Morphology[b]				0.0637
Z-type	5 (16.1)	1 (3.2)	25 (80.7)	
Transverse	4 (19.0)	6 (28.6)	11 (52.4)	
Oblique	13 (22.8)	6 (10.5)	38 (66.7)	

[a]Data presented as mean ± SD; [b]Data presented as n(%); *BMI*, Body Mass Index; *, significant difference between *Dual Plate* and *Single Anterior Plate*; †, significant difference between *Dual Plate* and *Single Superior Plate*

Table 2. Patient Reported Outcome Measures

Survey	Dual Plate (n=22)	Single Anterior Plate (n=13)	Single Superior Plate (n=74)	p-value
QuickDASH	22.5 ± 25.6	21.3 ± 29.0	16.3 ± 21.0	0.4667
ASES Pain	35.2 ± 16.6	35.0 ± 17.3	40.3 ± 13.8	0.2461
ASES ADL	40.3 ± 10.9	39.1 ± 14.9	42.4 ± 10.0	0.4928
ASES Total	75.3 ± 26.9	74.1 ± 30.8	82.7 ± 22.2	0.3043
VAS Pain	2.9 ± 3.3	3.1 ± 3.5	2.3 ± 2.7	0.5142

Data presented as mean ± SD; *QuickDASH*, Quick Disabilities of Arm, Shoulder, and Hand score; *ASES*, American Shoulder and Elbow Score; *VAS*, Visual Analogue Pain; *ADL*, Activities of Daily Living

Table 3. Complications

	Dual Plate (n= 22)	Single Anterior Plate (n= 13)	Single Superior Plate (n= 74)
Number of Patients with Complication(s)	5 (22.7)	5 (38.4)	13 (17.6)
Complication			
Hardware Removal	3 (13.6)	5 (38.4)	2 (2.7)*
Broken Hardware	0 (0)	2 (15.4)	1 (1.5)
Tingling/Paresthesia	1 (4.5)	1 (7.7)	7 (9.5)
Lack of Mobility	2 (9.1)	0 (0)	3 (4.1)
Post-Surgical Pain	2 (9.1)	0 (0)	0 (0)
Nonunion/Malunion	0 (0)	0 (0)	0 (0)
Other	2 (9.1)	2 (15.4)	4 (5.4)

Data represented as number (%).*, p<0.001 between *Single Anterior Plate* and *Single Superior Plate*