A Comparison of Thumb Metacarpophalangeal Fusion Techniques

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INTRODUCTION: Thumb metacarpophalangeal fusion is indicated for a variety of pathology including instability, arthritis, trauma, and deformity. Fusion rates have been high, ranging from 85-100%(1). Complication rates from thumb metacarpophalangeal fusion have been relatively low ranging from 0-30%(1-3). Many fixation techniques have been described including screw fixation, k-wires, tension-band wire, and plate fixation. There is little published comparing thumb metacarpophalangeal fusion methods. A study by Lutsky et al. compared tension band versus plate and screw fixation in 53 patients, and observed there was increased nonunion in plates with locking screws (1). There is no consensus on optimal fusion technique. Our goal was to compare union rates and complications between thumb metacarpophalangeal fusion techniques at our institution.

METHODS:

We performed retrospective chart review of patients who underwent primary thumb metacarpophalangeal fusion at our institution from 2000-2022 by three fellowship trained hand surgeons. Patients who underwent revision fusion, fusion for infection, or amputation, were excluded. Fusions of metacarpophalangeal joints of other fingers were excluded.

Data collection consisted of demographic data, complications, time to fusion, and flexion angle. Delayed union was defined as healing that took over 6 months but healed. Nonunion was defined as failure to heal over 12 months postoperatively, hardware failure, or revision surgery for failure to heal (1). Flexion angle was measured using software on the postoperative radiographs. Five different fusion constructs were evaluated during our study period, staples, k-wires, cerclage, k-wires with cerclage, and intramedullary screw.

RESULTS:

There were 92 patients included in the study (57 women, 35 men). The mean age was 54.8 years (range 33-84). Forty-seven patients underwent fusion with staples, 16 with k-wires, 14 with cerclage, 9 with k-wires and cerclage, and 6 with an intramedullary screw.

The average time to union was 71 ± 6.1 days. The average time to union for the staples group was 65 days, k-wire 78 days, cerclage 76 days, k-wires with cerclage 78 days, and intramedullary screw 77 days. There was no statistically significant difference in time to union between the different groups. The average flexion angle overall was 12.4 degrees. The average flexion angle for the staples group was 11.2 degrees, k-wire 9.4 degrees, cerclage 9.5 degrees, k-wires with cerclage 21.8 degrees, and intramedullary screw 21.1 degrees. The complication rate was 9.7% ± 6. There were 9 complications; 1 patient had intractable pain, 1 patient had stiffness, and 7 patients had nonunions. There were 3 nonunions in the staples group (6%), 1 in the cerclage group (7%), and 3 in the intramedullary screw group (50%). There was a significant difference (p=0.001) in complications between the screw group and the staples groups.

DISCUSSION AND CONCLUSION:

The overall fusion rate was 92 ± 5.5% with no significant difference in time to union across the different groups (71 ± 6.1 days). The average sagittal alignment was 12.4 degrees. The complication rate of 9.7 ± 6% was less than some reports in the literature (1,3) but not insignificant. There was a higher rate of nonunion (P=0.001) in the intramedullary screw group with 3 out of 6 patients (50%) going on to nonunion. There were only 6 patients in this group, but we would use caution when using this fixation option given the wide array of other techniques with acceptable outcomes.

Fusion technique (n)	Average days to union	P value
Staples (47)	65	
K-wire (16)	78	p = 0.788
Cerclage (14)	76	
K-wires cerclage (9)	78	
Screw (6)	77	p = 0.754

Fusion technique (n)	Nonunions (%)	Complications	P value
Staples (47)	3 (6.3)	2	
K-wire (16)	0	0	
Cerclage (14)	1 (7.1)	0	0.919
K-wires cerclage (9)	0	0	
Screw (6)	3 (50)	0	0.001