

Intercuneiform Stabilization during a modified Lapidus Procedure for Hallux Valgus Results in Decreased Intercuneiform Gapping and Recurrence Rates

Amanda Zeng¹, Jaeyoung Kim, Joseph Nguyen, Scott Ellis, Matthew Conti

¹Foot & Ankle

INTRODUCTION:

The modified Lapidus procedure involving arthrodesis across the 1st tarsometatarsal (TMT) joint is a widely accepted treatment for Hallux Valgus (HV) deformity. While it has generally demonstrated significant radiographic correction and improved patient-reported outcomes, some patients remain dissatisfied after bunion surgery. Kim et al. previously reported a recurrence rate of 17.3%, linking increased medial-middle intercuneiform (C1-C2) joint widening and higher incidence of HV recurrence following modified Lapidus procedure with a 1st TMT-C1 screw fixation (CS). This study aims to identify whether the addition of an intercuneiform screw for fusion across the 1st TMT and middle cuneiform (IS) reduces HV recurrence and minimizes C1-C2 joint gapping following a modified Lapidus procedure.

METHODS:

This retrospective comparative cohort study analyzed HV patients who underwent a modified Lapidus procedure, using data from a prospectively collected foot and ankle registry. A total of 171 patients were identified, of which 18 (11%) were male and 153 (89%) were female. Patients were categorized by screw fixation: 87 (51%) in the cross-screw (CS) group and 84 (49%) in the intercuneiform screw (IS) group. The primary outcome was HV recurrence, defined as a postoperative hallux valgus angle (HVA) exceeding 20°. Preoperative and postoperative radiographic measurements including HVA, intermetatarsal angle (IMA), C1-C2 distance, C1-C2 angle, C1-ground angle, sesamoid position, and 1st TMT pronation of the first ray were analyzed using coronal multiplanar reconstructed weight-bearing CT (WBCT) images to assess C1-C2 joint stability.

RESULTS:

Mean ages were 52.8 years for the CS group and 54.0 years for the IS group. Recurrence occurred in six of 87 (7%) CS patients, but none in the IS group ($p = 0.029$). Preoperative HVA was similar between groups but was lower postoperatively in the IS group ($p = 0.036$). IMA was higher preoperatively for the IS group ($p = 0.011$), though it did not differ postoperatively (Table 1). C1-C2 joint distance in the IS group was significantly higher preoperatively ($p = 0.020$) and lower postoperatively ($p < 0.0001$). Change in intercuneiform gapping was significantly reduced in the IS group ($p < 0.0001$). Postoperative TMT pronation and sesamoid station were both reduced in the IS group ($p = 0.009$; $p = 0.009$).

DISCUSSION AND CONCLUSION:

Our findings suggest that 1 TMT-C2 intercuneiform screw fixation reduces recurrence and enhances C1-C2 joint stability in the modified Lapidus procedure, as evidenced by lower postoperative and relative percent change in C1-C2 distance, less angular correction, a more favorable sesamoid position, and a significantly lower recurrence rate. These results build upon previous literature, reinforcing the benefit of routine intercuneiform joint stabilization in minimizing recurrence risk. However, further research on failure rates and patient-reported outcomes (PROMIS) is needed to evaluate long-term clinical efficacy.

Table 1. Comparison of Demographic and Radiographic Parameters Between Groups

	NS (n = 87)		ICS (n = 84)		P-value
	Mean	SD	Mean	SD	
Demographic					
Age (y)	52.8	11.9	54	13.7	0.534
BMI (kg/m ²)	69.9	17.4	67.2	13	0.259
Female	70	-	53	-	
Male	17	-	31	-	
Radiographic					
<i>Preoperative</i>					
HVA (°)	31.5	8.7	31.8	8.4	0.811
IMA (°)	14.5	3.2	15.8	3.4	0.011
C1-C2 Distance (mm)	6.97	0.24	1.05	0.19	0.020
1 st TMT Pronation (°)	36.7	6.8	36.8	7.5	0.889
Sesamoid Station (grade)					0.028
0	1	-	2	-	
1	30	-	33	-	
2	34	-	34	-	
3	22	-	15	-	
<i>Postoperative</i>					
HVA (°)	8.1	8.5	5.8	5.8	0.036
IMA (°)	4.0	2.7	4.1	2.7	0.728
C1-C2 Distance (mm)	1.25	0.38	1.05	0.25	<0.0001
1 st TMT Pronation (°)	31.4	6.0	28.3	7.5	0.009
Sesamoid Station (grade)					0.009
0	44	-	82	-	
1	36	-	18	-	
2	7	-	3	-	
3	0	-	1	-	
<i>Changes (Pre to Post)</i>					
C1-C2 Distance (mm)	0.28	0.25	0.00	0.15	<0.0001

Abbreviations: BMI, body mass index; IMA, intermetatarsal angle; HVA, hallux valgus angle; C1, medial cuneiform; C2, middle cuneiform; 1st TMT, first metatarsal; SD, standard deviation

Figure 1: Table comparing demographic and radiographic parameters between groups

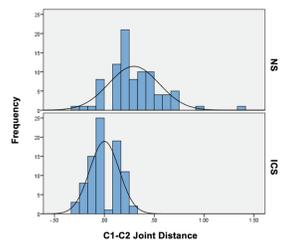


Figure 2: Distribution of the relative percentage change (preoperative to postoperative) in C1-C2 joint distance between the NS and ICS groups

The ICS curve peaks around a percent change of zero, with narrower distribution. The NS curve is centered around a percent change of 0.30-0.40 with a wider curvature. This suggests that the additional intercuneiform screw (ICS) maintains preoperative C1-C2 joint distance and enhances intercuneiform stability in comparison to the 1st TMT - C1 cross screw (NS).

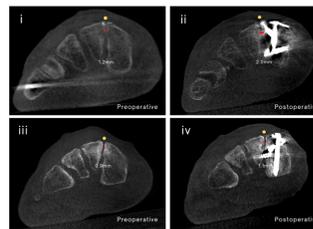


Figure 3: Weightbearing computed tomography (WBCT) images showing preoperative and postoperative widening of the intercuneiform (C1-C2) joint in NS and ICS groups.

NS: (i) Preoperative - 1.2mm
(ii) Postoperative - 2.0mm

ICS: (iii) Preoperative - 0.9mm
(iv) Postoperative - 1.1mm

Note the widening of the C1-C2 joint (yellow asterisk).