

Correcting the Hallux Valgus Deformity: A Comparison Between Modified Lapidus Procedure and Scarf Osteotomy

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Category: Bunion; Midfoot/Forefoot

Keywords: Hallux Valgus; Lapidus; Scarf Osteotomy

Introduction/Purpose: Lapidus procedure and Scarf osteotomy are indicated for treatment of mild to moderate hallux valgus. Advantages of modified Lapidus procedure include ability to address severe deformity, first tarsometatarsal arthritis, and first ray hypermobility. Advantages of Scarf osteotomy include greater correction of the distal metatarsal articular angle (DMAA) and greater fixation stability than other techniques. Both procedures have shown good radiographic and clinical outcomes; however, no prior studies have compared these outcomes between the procedures. The aim of this study was to compare clinical and radiographic outcomes between patients with hallux valgus treated with the modified Lapidus procedure or Scarf osteotomy.

Methods: This retrospective cohort study included patients treated by one of seven fellowship-trained foot and ankle surgeons were identified. Inclusion criteria were age greater than 18 years, primary modified Lapidus procedure or Scarf osteotomy for hallux valgus, minimum 1-year postoperative PROMIS scores, and minimum 3-month postoperative radiographs. Revision cases were excluded. Clinical outcomes were assessed using six PROMIS domains: Pain Interference, Pain Intensity, Physical Function, Global Mental Health, Global Physical Health, and Depression. Pre- and postoperative radiographic parameters were measured on AP (HVA, IMA, DMAA, tibial sesamoid position), and lateral (talo-1st-metatarsal angle (Meary's), Horton index, Seiberg index, sagittal IMA) x-rays. Statistical analysis utilized targeted maximum likelihood estimation controls for confounding of bunion severity by including covariates for baseline HVA and IMA. Statistics were also analyzed in a restricted cohort of mild to moderate severity bunions (HVA<40 and IMA<16; n=57 each). Complications including repeat surgeries, recurrence of deformity, and malunion/nonunion were recorded.

Results: 136 patients (73 Lapidus, 63 Scarf) with average 17.8 month follow-up constituted our study. Both groups demonstrated significant improvement in Global Physical Health, Global Mental Health, and Physical Function, with patients in the Lapidus group showing a significantly greater improvement of 3.6 points (p=0.01) compared to Scarf. After controlling for bunion severity, the probability of having normal postoperative IMA (<10) was 17% lower (p<0.001) with Scarf compared to Lapidus. This finding was consistent in the restricted cohort of mild to moderate severity bunions. Lapidus group demonstrated significantly greater correction in Meary's angle, Seiberg index, and sagittal IMA. Complications in the Lapidus group included one nonunion, three symptomatic implants, two hallux varus. The Scarf group had one reoperative cheilectomy and one second metatarsal stress fracture.

Conclusion: This is the first study to compare both radiographic and patient-reported outcomes between Lapidus procedure and Scarf osteotomy for correction of hallux valgus deformity. While both procedures yielded improvements in outcomes, results suggest that the probability of having a normal postoperative IMA is greater with Lapidus procedure, even when adjusted for severity of deformity. In addition, greater correction reflected in sagittal measurements may further support the role of rotational correction in the Lapidus procedure.

		Lapidus (n=73)	Scarf (n=63)	p-value
		Mean (SD)	Mean (SD)	
HVA	Preop	32.5 (8.9)	30.2 (8.5)	0.65
	Postop	10.1 (6.4)	9.5 (5.8)	0.55
	Change	-21.4	-20.7	0.34
IMA	Preop	15.8 (3.4)	15.1 (3.3)	0.61
	Postop	5.7 (2.7)	7.4 (3.2)	*<0.001
	Change	-10.1	-7.7	*<0.001
DMAA	Preop	27.8 (7.6)	26.8 (9.2)	0.18
	Postop	9.1 (5.9)	8.3 (6.2)	0.41
	Change	-18.8	-18.5	0.89
Tibial Sesamoid Position	Preop	5.9 (1.3)	5.8 (1.1)	0.55
	Postop	2.3 (1.0)	2.4 (1.3)	0.37
	Change	-3.7	-3.4	0.24
Meary's angle	Preop	-5.4 (6.8)	-9.0 (7.3)	*<0.001
	Postop	-2.2 (6.5)	-7.4 (6.7)	*<0.001
	Change	3.3	1.5	*0.028
Horton index	Preop	2.8 (2.2)	2.5 (1.9)	0.51
	Postop	2.0 (2.0)	2.6 (2.2)	0.25
	Change	-0.7	-0.1	0.06
Seiberg index	Preop	0.3 (1.3)	0.5 (1.3)	0.45
	Postop	-0.4 (1.5)	0.4 (1.3)	*<0.001
	Change	-0.7	-0.1	*0.007
Sagittal IMA	Preop	0.7 (2.6)	1.0 (2.5)	0.49
	Postop	-1.0 (2.7)	1.2 (2.3)	*<0.001
	Change	-1.6	0.2	*<0.001

Table: Comparison table of radiographic parameters between modified Lapidus procedure and Scarf osteotomy. *p<0.05. HVA, hallux valgus angle; IMA, intermetatarsal angle; DMAA, distal metatarsal articular angle; Meary's, talo-1st-metatarsal angle.