

Percutaneous Correction of Hallux Valgus Deformity in Patients with Spasticity Disorder

Brittany E. Mayer, DPM,¹ Hummira H. Abawi, DPM, AACFAS,² and Noman A. Siddiqui, DPM, AACFAS, MHA³

¹Co-Chief Resident, VA Maryland Healthcare System and Rubin Institute for Advanced Orthopedics at Sinai Hospital of Baltimore;

²Instructor, University of Maryland, Department of Orthopaedic Surgery; ³Director of Podiatric Surgery Service, Rubin Institute for Advanced Orthopedics at Sinai Hospital of Baltimore

Introduction / Purpose

- Hallux valgus deformity is common in individuals with cerebral palsy and other spasticity disorders due to the imbalance of the intrinsic musculature and abnormal extrinsic muscular function in the lower extremity.¹
- Previous literature on the treatment of hallux valgus deformity in these patients historically promotes arthrodesis of the first metatarsophalangeal joint.²
- Percutaneous bunionectomy was first described by Bosch and colleagues in 1990.³⁻⁴
- This case series explores the use of a modified Bosch percutaneous bunionectomy as a joint sparing procedure to correct hallux valgus deformity among patients with spasticity disorder.⁴

Patient Selection

- Three young adult patients all with underlying spasticity deformities (Table 1):
 - One patient with bilateral hallux valgus deformities
 - Two patients with unilateral hallux valgus deformity
- All four hallux valgus deformities underwent correction utilizing the percutaneous bunion technique.
- Two surgeons (HHA, NAS) performed the percutaneous bunion correction within three hospital systems:
 - University of Maryland Medical Center
 - DVA Maryland
 - Rubin Institute for Advanced Orthopedics at Sinai Hospital of Baltimore
- Both attending surgeons followed the operative technique for the percutaneous bunion deformity correction as described by Siddiqui.⁵
- Prior to operative intervention, all patients and/or caregivers reported painful bunion deformity causing discomfort during ambulation or difficulty with shoe gear.

Table 1. Patient demographics.

Patient	Gender	Type of Spasticity Disorder	Age at Time of Procedure	Laterality of Hallux Valgus Deformity
A	Male	Cerebral Palsy	20	Right
A	Male	Cerebral Palsy	21	Left
B	Male	CVA Injury	28	Left
C	Female	Cerebral Palsy	18	Right

CVA, cerebrovascular accident.

Operative Technique

- Step 1. 2-mm K-wire inserted from the distal medial aspect of the great toe to the medial aspect of the head of the first metatarsal in an extraperiosteal fashion (Figure 1).**
- Step 2. Incision made along the medial aspect of the 1st metatarsal and a 1.8-mm K-wire was inserted from medial to lateral direction (Figure 2A, 2B).
- Step 3. Osteotome and/or micro-sagittal saw used to complete the osteotomy (Figure 3).
- Step 4A. Hallux manipulated into position with simultaneous translation of the capital fragment and correction of the frontal plane deformity (Figure 4A).
- Step 4B. 2-mm K-wire advanced down the medullary shaft of the 1st metatarsal (Figure 4B).



Figure 1

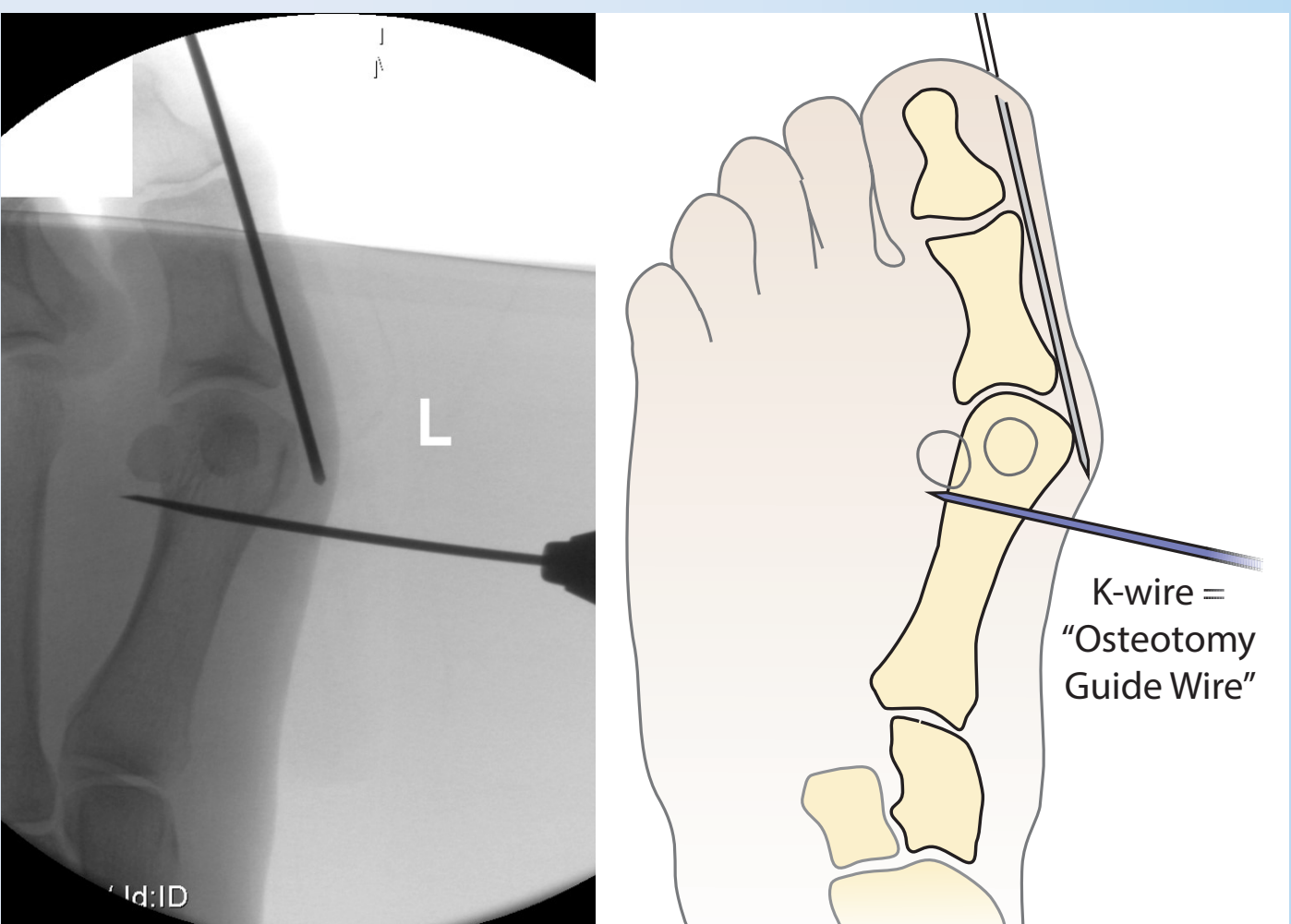


Figure 2A

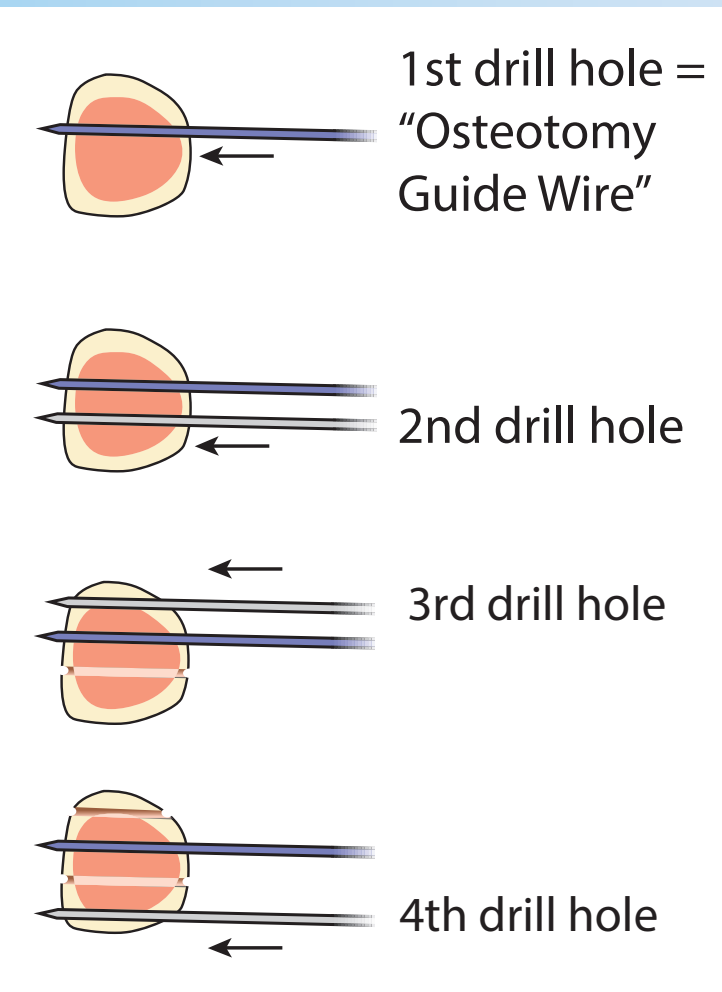


Figure 2B

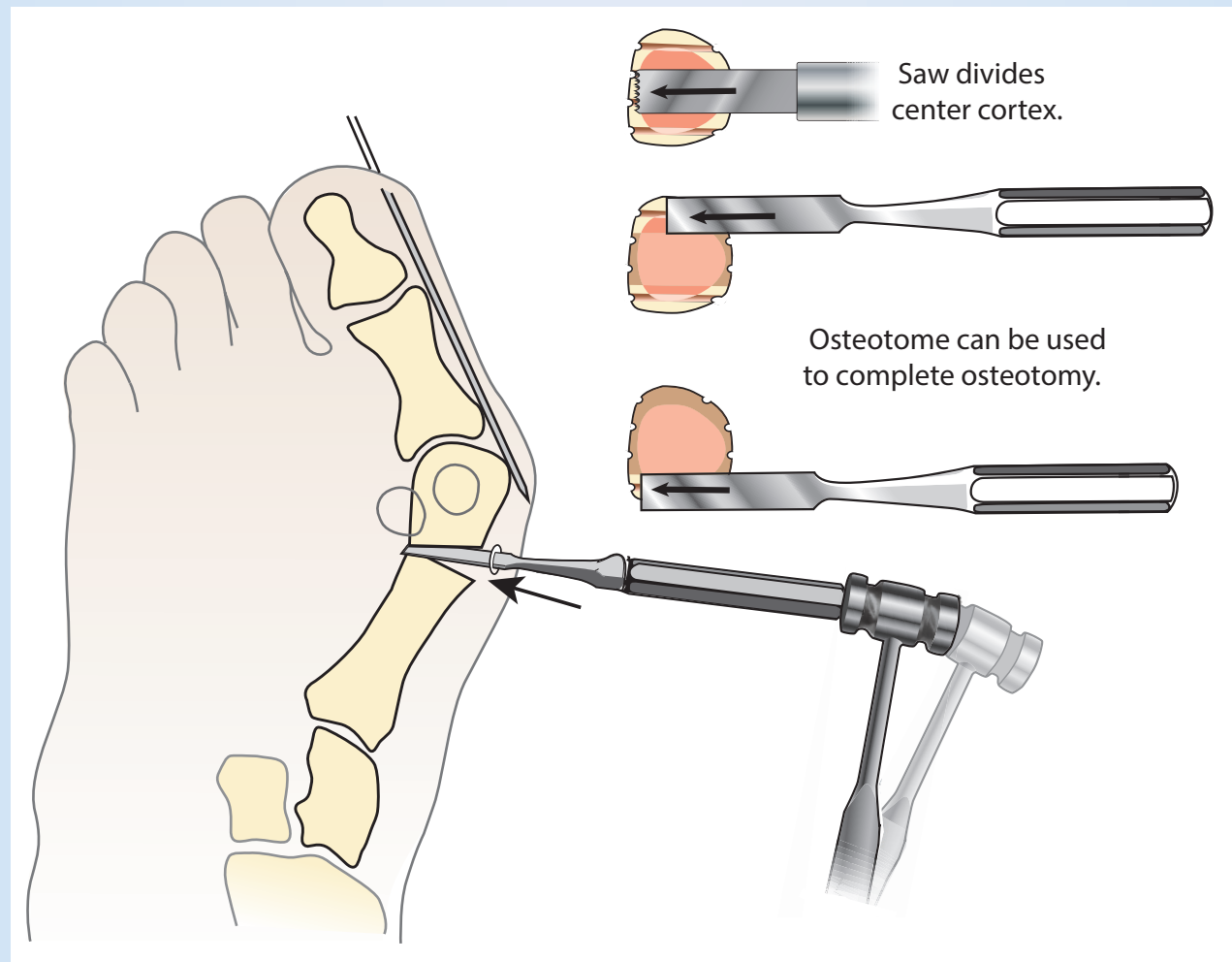


Figure 3



Figure 4A

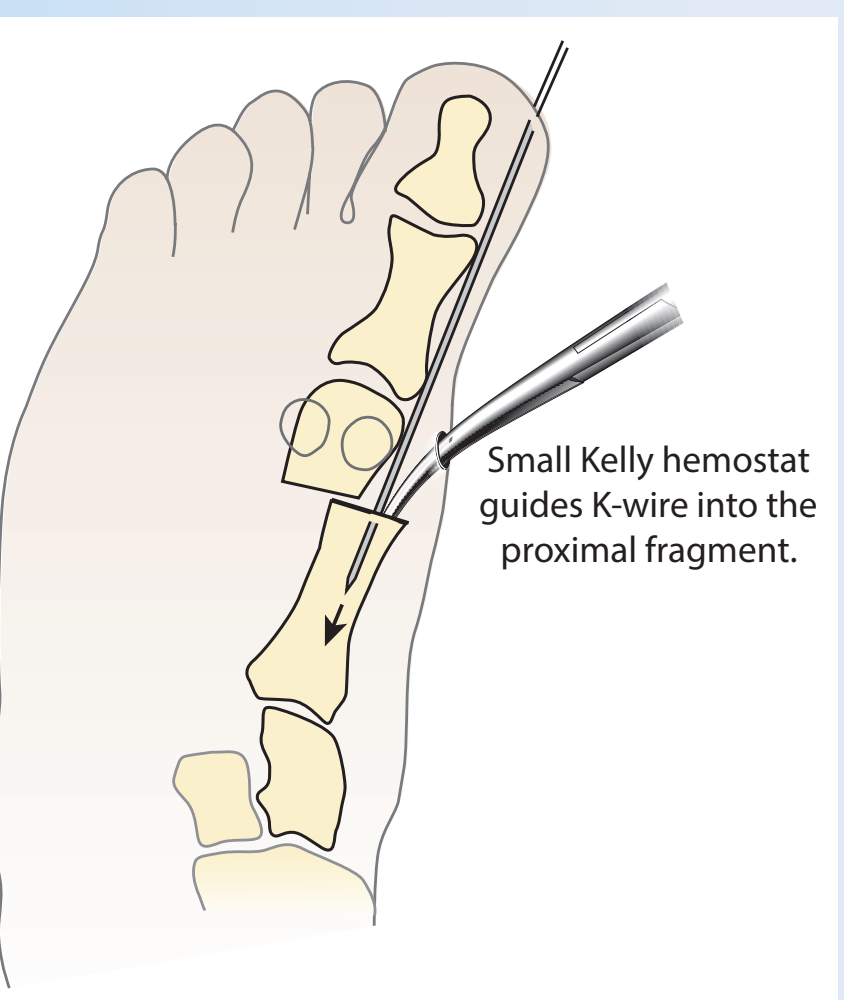


Figure 4B

**Note: Typically a lateral release/or adjunctive soft-tissue procedure is not necessary in the percutaneous bunion procedure; however, the lateral release was indicated in three of our four procedures due to the severity of deformity. The lateral release was performed at the start of the procedure.

Patient Data

- Preoperative evaluation of the hallux valgus deformities included three views of weight bearing foot radiographs (Figure 5).
- Standard first ray angles were appropriately calculated for operative planning prior to surgical intervention (Table 2).
- All patients were placed in a non-weight bearing short leg cast following operative intervention (Figure 6).
- Postoperative follow-up visits with the attending surgeons were performed at two to three week intervals until percutaneous K-wire fixation was removed (Table 3).
- Radiographic evaluation of overall hallux valgus deformity correction was obtained from AP radiographs taken at patient's postoperative follow-up visit (Figure 7).
- All patients maintained adequate correction of bunion deformity with no evidence of recurrence.



Figure 5. Preoperative weight bearing AP radiograph with measurement of hallux abductus angle (Patient C).



Figure 6. Postoperative AP radiograph with evidence of percutaneous pin fixation and short leg cast application (Patient C).



Figure 7. Final postoperative AP and lateral view radiographs with evidence that deformity correction was maintained (Patient C).

Table 2. Preoperative hallux valgus angles.

Patient	Intermetatarsal Angle Pre-Op (°)	Hallux Abductus Angle Pre-Op (°)	Proximal Articular Set Angle Pre-Op (°)	Tibial Sesamoid Position Pre-Op
A	11	25	21	7
A	13	27	23	6
B	10	29	11	3
C	11	34	30	6

Table 3. Lateral release and postoperative care.

Patient	Lateral Release Performed	K-Wire Removed (# Weeks Post-Op)	Post-Op Dressing
A	Yes	6	Short Leg Cast
A	Yes	3	Short Leg Cast
B	Yes	6	Short Leg Cast
C	No	7	Short Leg Cast

Results

- Preoperative and postoperative radiographic values were calculated and the average correction was calculated (Tables 4 and 5).
- All patients tolerated the operation and postoperative course well with no complications.
- No recurrence of the hallux valgus deformity has been observed in the average follow-up period of 16 months.

Table 4. Results of hallux valgus deformity correction.

Patient	Intermetatarsal Angle Post-Op (°)	Hallux Abductus Angle Post-Op (°)	Proximal Articular Set Angle Post-Op (°)	Tibial Sesamoid Position Post-Op
A	6	5	5	4
A	7	6	11	3
B	7	10	6	1
C	7	5	5	3

Table 5. Average correction observed at final follow-up.

	Intermetatarsal Angle (°)	Hallux Abductus Angle (°)	Proximal Articular Set Angle (°)	Tibial Sesamoid Position
Average Correction	4.5	21.75	14.5	2.75

Conclusion

- Based on the successful results of this small case series, the two lead surgeons suggest that the percutaneous bunion procedure be considered as a treatment option for correction of hallux valgus deformity in patients with an underlying spasticity disorder.
- Additional research should be conducted that includes a larger patient population and long-term follow-up (i.e., 5-10 years).
- This series provides a joint sparing treatment option for patients with spasticity disorders and should be considered as an option for skilled and able surgeons, when appropriate.

References

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