Plantar Approach for Midfoot Wedge Resection to Reconstruct the Rocker Bottom Foot

Travis Langan[1] DPM, AACFAS; Justin Persky[2] DPM; Patrick Burns[3] DPM, FACFAS

[1]Fellow, Orthopedic Foot and Ankle Center, Westerville, OH

[2]Podiatric Surgical Resident, University of Pittsburgh Medical Center, Pittsburgh, PA

[3]Director University of Pittsburgh Medical Center Podiatry Residency, Pittsburgh, PA

Abstract

Chronic deformity of the foot can lead to ulceration, infection, and amputation. Midfoot wedge osteotomy for deformity correction can be performed from a medial or plantar approach but there is limited data on outcomes regarding these relatively uncommon procedures. A retrospective review of 30 patients who had a midfoot wedge performed from the plantar surface to address rocker bottom deformity due to Charcot neuroarthropathy (CN) or severe flatfoot were included. Pre and post-op lateral talo-1st met angle, minor and major complications, wound healing, and functional limb status were all evaluated.

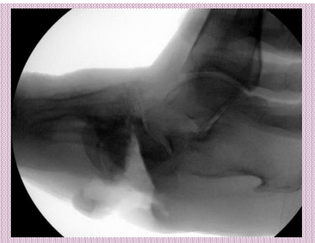
Statement of Purpose

To review the outcomes of patients with a rocker bottom foot deformity who underwent a midfoot wedge resection performed through a plantar approach for deformity correction, wound healing, and limb salvage.

Methods

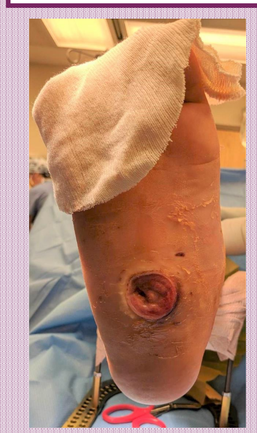
30 patients who underwent midfoot wedge resection performed through a plantar approach for correction of a rocker bottom foot deformity were identified from 03/2008 to 11/2017. The following data was extracted: the presence of a rocker bottom deformity, the presence of an ulcer and/or infection at initial presentation, the presence of diabetes, presence of charcot neuroarthropathy, age, sex, BMI, and laterality. Outcome measures included the presence of a wound at final follow-up, change in talo-first metatarsal angle based on lateral radiograph, post-operative complications (minor and major), and rate of functional limbs at final follow-up.

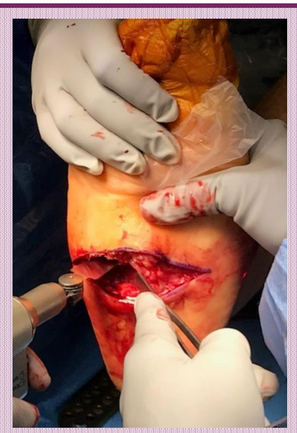
Patients were treated in either a single or multiple stage fashion. Patients without a wound or infection and whose deformity could be reduced acutely were treated in single stage fashion. The single stage procedure consisted of a midfoot osteotomy with a plantar based wedge for deformity correction. Internal fixation was utilized for fusion across the osteotomy site. Additional fusions were performed when needed and consisted of triple arthrodesis or pan-talar arthrodesis. Other additional procedures included forefoot realignment procedures and posterior muscle group lengthening. Those patients with a wound and/or infection, or whose deformity could not be reduced acutely were generally treated with a staged procedure. The first stage consisted of a plantar based wedge resection with deformity correction and application of external fixation. If there was a plantar wound, the wound was excised and plantar based wedge osteotomy was made through the wound. If there was infection, it was treated appropriately. In some cases, after excision of the wound and deformity correction, primary closure was obtained. In cases where the wound could not be completely closed, local wound care was performed. Following treatment of the wound and infection, the external fixator was removed and internal fixation was placed. Arthrodesis and additional procedures were then performed.

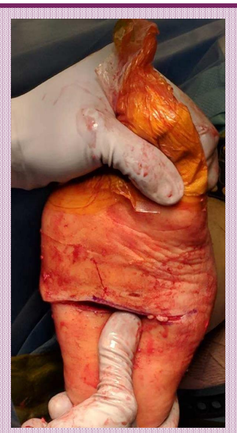


Results

Mean follow up was 28.7 (range 7-97) months. Mean pre-operative talo-first metatarsal angle measured on lateral radiograph was -25° and improved to -5° post-operatively. Osteomyelitis was present in 10 of the 15 infections. Of the 20 patients with preoperative wounds, 16 underwent a staged procedure with external fixation and wound/infection treatment followed by internal fixation. At last follow up, 17 of 20 (85%) pre-operative wounds had healed. Of the 18 that required external fixation, 13 (72%) had a diagnosis of pre-operative infection, 8 of which were positive for osteomyelitis. At the time of last follow-up, there was an 87% limb salvage rate (26/30). BMI was the only characteristic with a statistically significant relationship to functional limb status. The average BMI for those patients who had a non-functional limb was 49.6, while functional limb BMI average was 32.4 (p=0.02 Wilcoxon rank sum test). A total of 2 patients died due to septicemia; 1 patient underwent major amputation and expired while undergoing treatments, and 1 patient had chronic deep infection that lead to septicemia and expired after refusing amputation. Of the 4 non-functional limbs, 2 had a history of deep infection pre-operatively. Post-operative complications occurred in 18 of 30 patients (60%), with 15 major and 3 minor. There were no variables with a significant relationship related to post-operative complication. There was no statistical significance in outcomes between patients with or without diabetes.







Outcome Measure	Result
Functional Limb	26/30 (87%)
Major Complication	15/30 (50%)
Minor Complication	3/30 (10%)
Healed Pre-operative Wound	17/20 (85%)
Talo-First Metatarsal Angle	-25º Pre-operative -5º post-operative

Discussion

The plantar based midfoot wedge osteotomy performed from a plantar approach described in this study addresses the rocker bottom deformity at its apex. Although the complication rate was relatively high, the current technique demonstrated an 87% limb salvage rate. This is comparable to other studies looking at limb salvage rate in severe lower extremity deformities (1,2). Maintaining a functional limb can have profound effects on a patient's quality of life. Morbach and colleagues showed that major predictors of death of diabetic patients include age, male sex, chronic renal insufficiency, dialysis, and PAD (3). Generally, patients with CN have multiple comorbidities and are at an increased risk of early death . Major amputation only propagates this statistic. Similar to other reports, Gurney et al. showed a 57% mortality rate at 3 years for diabetic patients undergoing major amputation (4).

Conclusion

The current study has shown that a midfoot wedge osteotomy performed from the plantar surface can be performed in patients with severe rocker bottom foot deformity with success. This technique allows for the restoration of a plantigrade foot by effectively recreating an arch, allowing for a functional limb for the patient.

References

1. Wukich, D. K., Hobizal, K. B., & Brooks, M. M. Severity of diabetic foot infection and rate of limb salvage. *Foot & Ankle International*, *34*(3), 351-358, 2013.
2. Papa, J, Myerson, M., & Girard, P. Salvage, with arthrodesis, in intractable diabetic neuropathic arthropathy of the foot and ankle. *Journal of Bone and Joint Surgery*, *75*(7), 1056-1066, 1993.
3. Morbach, S., Furchert, H., Gröblinghoff, U., Hoffmeier, H., Kersten, K., Klauke, G. T., & Rümenapf, G. (2012). Long-term prognosis of diabetic foot patients and their limbs. *Diabetes care*, *35*(10), 2021-2027.
4. Gurney, J. K., Stanley, J., York, S., Rosenbaum, D., & Sarfati, D. (2017). Risk of lower limb amputation in a national prevalent cohort of patients with diabetes. *Diabetologia*, 1-10

Financial Disclosures: None