Utilizing the Pantalar Arthrodesis to Reconstruct a Stage 4 Progressive Collapsing Foot Deformity

Kayla Curlis, DPM; Alejandro Jorge, MS4; Quinn Schroeder, DPM; Maggi Smith, DPM, FACFAS; Khase Wilkinson, DPM, FACFAS

St. Vincent Medical Center- Toledo, OH

Statement of Purpose:

This case report presents a stage 4 flat foot deformity involving both the hindfoot and ankle with a subsequent collapse of the midfoot arch. To provide stability and re-create anatomic structure, a pantalar and medial column arthrodesis was performed. Due to significant bone loss in the midfoot region, a navicular allograft was also incorporated.

Literature Review:

Patients with severe hindfoot and ankle valgus deformities, combined with pain and limited range of motion, often have few effective treatment options. In these challenging cases, arthrodesis remains the most widely used surgical solution for limb salvage. Recent studies on Progressive Collapsing Foot Deformity (PCFD) have incorporated treatment algorithms to include clinical examination findings with subsequent intervention plans [1]. Stage 4 deformities are clinically characterized as severe ankle valgus with deltoid ligament attenuation. At such an advanced stage, the primary surgical goal is stabilizing the ankle and improving functionality to provide an ambulatory, plantigrade foundation [4].

To correct the mechanical axis, osteotomies such as a lateral column lengthening, medial calcaneal slide, or a medial opening dorsal wedge (Cotton) are commonly considered [1][2][3]. These procedures, however, do not account for areas with large osseous voids. An alternative approach to patients with such significant bone loss can be a tibiotalocalcaneal (TTC) arthrodesis with the use of structural allografts. Allografts, either cortical or corticocancellous, can provide the mechanical stability and rigid support needed without the potential donor site morbidity associated with an autograft harvest [4]. A study performed by Cifaldi et al. discovered a 67.4% union rate and a 92.5% limb salvage rate for TTC arthrodesis with a femoral head structural allograft. An intramedullary rod was the most common fixation method, while the most prevalent complications were nonunion and graft-related failures [4].

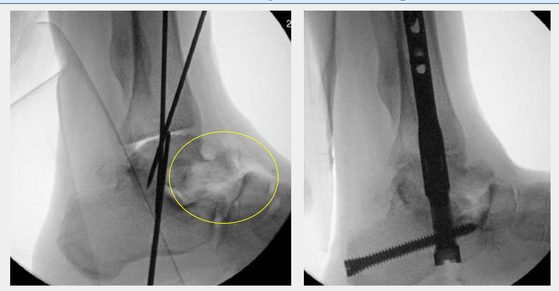
Gross and Jackson highlight the critical role that medial column stabilization has in reducing adjacent joint non-union rates in PCFD correction. Medial column procedures such as a naviculocuneiform (NC) arthrodesis, the Cotton osteotomy, and a first tarsometatarsal arthrodesis (Lapidus) procedure aim to not only restore structural integrity but also optimize load distribution. NC arthrodesis has demonstrated high fusion rates, especially when combined with rigid internal fixation [5]. Additionally, the Cotton osteotomy as well as the Lapidus effectively plantarflexes the medial cuneiform, which in turn, improves medial arch height. Medial column support in PCFD correction is important in mitigating the risk of adjacent joint overload and subsequent nonunion [5].

Case report:

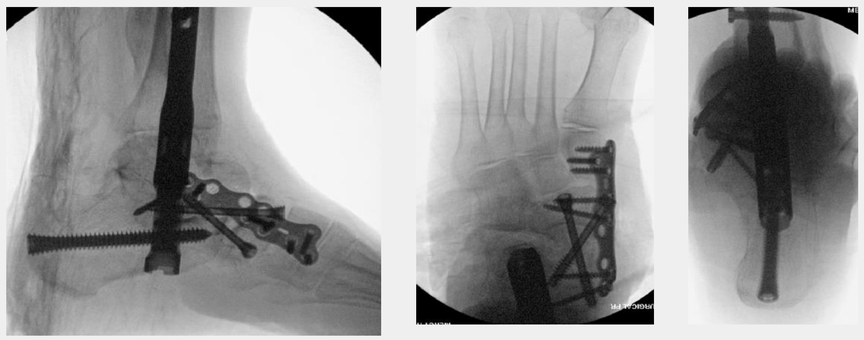
The patient is a 75-year-old female with a history of hindfoot and ankle valgus. The patient presented with significant pain and difficulty with ambulation as well as a chronic non-healing wound to the medial aspect of her midfoot. The patient exhausted all conservative measures and remained compliant wearing a custom brace. As the arthritic processes continued to develop within her ankle joint, her pain became intolerable, limiting her ability to perform daily life activities. She also developed a stress fracture due to the excess valgus force to the ankle. The patient elected to undergo pantalar arthrodesis with fibular takedown and arthrodesis of multiple joints.

Pre-Operative Images

Intra-Operative Images



Post-Operative Images



Results:

Following the procedure the patient had a neutral, anatomically aligned left foot with recreation of the medial arch. Pictured below are clinical images that were obtained 6 months post-operatively. The patient throughout her follow up appointments progressed with minimal pain and stiffness. She had an overall successful post-operative course.

Discussion:

Due to the severity of the arthritic changes, affecting both the talar head and navicular, allograft augmentation was necessary to restore structural integrity. The osseous void became evident following joint preparation of the subtalar joint for the pantalar arthrodesis. This created the need for additional stabilization. To enhance fixation and promote appropriate fusion, a medial column arthrodesis with a bridge plate construct was performed as an additive procedure following graft placement.

This case report reflects the current research, advocating for the use of arthrodesis and structural allografts in managing severe ankle deformities with substantial bone loss [1][3]. While early outcomes appear favorable, ongoing follow-up is crucial to evaluate graft incorporation, long-term durability, and functional improvement.

Level of Evidence: V

References:

1) Classification and Nomenclature: Progressive Collpasing Foot Deformity. Myerson et al.
2) Lee TY, Wu CC, Yang KC, Yeh KT, Chen IH, Wang CC. Midterm outcomes of midfoot and hindfoot arthrodesis with strut allograft for Müller-Weiss disease.
3) Omar Ali Batouk et al, Progressive collapsing foot deformity: clinical presentation, diagnosis, and management options
4) Cifaldi A, Thompson M, Abicht B. Tibiotalocalcaneal Arthrodesis with Structural Allograft for Management of Large Osseous Defects of the Hindfoot and Ankle: A Systematic Review and Meta-Analysis. J Foot Ankle Surg. 2022
5) Gross CE, Jackson JB 3rd. The Importance of the Medial Column in Progressive Collapsing Foot Deformity: Osteotomies and Stabilization. Foot Ankle Clin. 2021