# Naviculocuneiform Sag in the Acquired Flatfoot

## What to Do

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**KEYWORDS**

• Flatfoot • Pes planus • Naviculocuneiform sag • Medial column instability

**KEY POINTS**

- No single procedure is enough to address the complexity of the adult acquired flatfoot deformity.
- Careful physical evaluation and weight-bearing radiographs are required to form a comprehensive surgical plan.
- Sag at the naviculocuneiform (NC) joint represents an important aspect of the flatfoot deformity.
- Failure to address medial column instability could lead to continued deformity and poor patient outcomes.
- Whether in combination with other procedures or in isolation, NC fusion and Cotton osteotomy are important pieces of the armamentarium to address all aspects of the flatfoot deformity.

### INTRODUCTION

Medial column collapse in the adult acquired flatfoot is a complex problem with several solutions. The typical flatfoot patient complains of medial or subfibular hindfoot pain with progressive planovalgus deformity. The posterior tibial tendon (PTT), along with the spring ligament complex, provides the structural integrity of the medial ankle. Failure of these structures can lead to collapse of the medial column through the first tarsometatarsal (TMT) joint, naviculocuneiform (NC) joint, or talonavicular (TN) joint.[1]

Physical examination helps to clarify the severity of PTT dysfunction (PTTD). In stage I PTTD, the patient can perform a single limb heel rise with some discomfort, but minimal or no deformity. In stage II, the PTT becomes more diseased and the patient cannot perform a single limb heel rise. The hindfoot valgus is correctable, but residual forefoot varus can sometimes be appreciated (**Fig. 1**). Stage III disease is characterized by a rigid flatfoot that is not passively correctable to neutral. The patient cannot perform a single limb heel rise.

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**Fig. 1.** (*A*) Asymmetric heel valgus on the left side, typical of a patient with PTTD. (*B*) Residual forefoot varus after correction of hindfoot valgus seen in type IIB flatfoot. Forefoot varus after correction of hindfoot valgus is an excellent indication for a Cotton osteotomy.

Radiographic evaluation of the flatfoot helps to quantify the severity of the problem and to guide treatment. Standing plain films can demonstrate relative shortening of the lateral column compared with the medial column. The TN joint can be 3 to 5 mm shorter than the calcaneocuboid (CC) joint on an anteroposterior (AP) radiograph, as compared with the typical parallel relationship in a normal radiograph. Forefoot abduction is assessed on standing plain films by the coverage of the TN joint. Some surgeons would consider adding a lateral column (ie, lateral column lengthening or distraction CC fusion) procedure with TN uncoverage greater than 50%. Meary's angle is measured on the lateral radiograph and is formed by the intersection of a line drawn down the longitudinal axis of the talus and the first metatarsal. A measurement of less than 30° is considered severe whereas a measurement of 15 to 30° is moderate pes planus.[2] The calcaneal pitch measures the angle between plantar aspect of the calcaneus and the ground. Normal is considered 10 to 30° and less than 10° is considered planus.

The weight-bearing lateral radiograph is the most important study for evaluation of the competence of the medial column. Careful examination of the TN, NC, and TMT joints is required for full evaluation of pes planus deformity. Plantar gapping at the first TMT joint may be indicative of a hypermobile first ray.[1,3] Sag at the NC joint, degenerative changes at the NC joint, or both can be appreciated as well. These findings may be used to guide surgical treatment.

In patients with an apex of deformity at the NC joint, the reverse Coleman block test can also be used to identify if arthrodesis or Cotton osteotomy is indicated.[4] The patient with heel valgus and sag at the NC joint on a standing lateral radiograph is asked to place the first metatarsal on a radiolucent block until the heel valgus is corrected to neutral. Repeat plain films are then obtained. If the NC sag persists, even with correction of hindfoot valgus, then strong consideration should be given to addressing the medial column during surgery.