# Extra-Osseous Stabilization Devices: A New Classification System

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Michael E. Graham, DPM, FACFAS, Nikhil T. Jawrani, MS

## Purpose

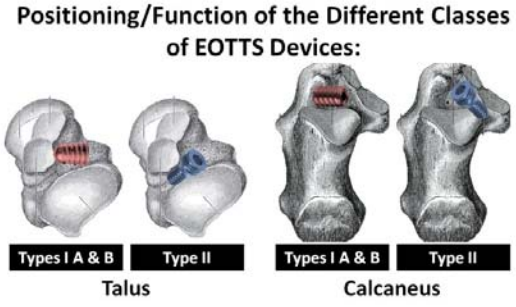
The purpose of this study was to classify the various extra-osseous talotarsal stabilization (EOTTS) devices into categories by design features and biomechanical function. These differences may have an impact on the success rates of each type. This classification system will help surgeons appreciate these differences and the associated benefits, which in turn will aid them when making patient care decisions.

## Background

Many treatment options have been used to correct the partial dislocation of the talus on the tarsal mechanism (RTTD), a dynamic deformity that has been shown to be the primary etiology for many pathologies of the foot and ankle. EOTTS has been a controversial surgical option. It offers improved stabilization over external measures and is less invasive than traditional hindfoot reconstructive surgery. Over the years, many subtalar devices have been introduced, which differ in design, materials, orientation and biomechanical function. Previous classification systems have been published, however, due to the introduction of a new implant design and function, it was thought it would be beneficial to present an updated classification system.

## Methods

- Four critical design/function aspects were determined on which to base classification:
  - Device geometry/shape.
  - Anatomic orientation within the sinus tarsi.
  - Anchoring location within the tarsal sinus.
  - Mechanism of talar stabilization and biomechanical function.
- Two major categories were established – Type I and Type II devices. Type I devices were further sub-classified into Type IA and Type IB.




## Results/Classification System Parameters

- Type I Devices:
  - Cylindrical (IA) or Conical (IB) in shape.
  - Inserted in a lateral-to-medial/oblique orientation.
  - Leading anterior edge inserted up to the longitudinal talar bisection.
  - Laterally anchored by soft tissues in the sinus portion of the tarsal sinus.
  - Function by an impingement mechanism (block excessive motion).
- Type II Devices:
  - Lateral conical and medial cylindrical geometry.
  - Inserted anterior-distal-lateral to posterior-proximal medial.
  - Leading anterior edge inserted medially beyond the longitudinal talar bisection.
  - Medially anchored by soft tissues within the canalis portion of the tarsal sinus.
  - Function by allowing normal helicoidal motion of the talus on the tarsal mechanism.

## Clinical Significance & Conclusions

- The partial/recurrent dislocation of the talus on the tarsal mechanism is a triplane deformity. Displacement on any one of the four articular facets of the TTM leads to displacement at the other facets.
- The ideal method to stabilize the TTM is exactly at the axis of triplanar talotarsal motion. In the TTM, this is referred to as the “cruciate pivot point” and is generally located at the entrance of the canalis tarsi along the longitudinal talar bisection line.
- It has been acknowledged that a device that better matches the anatomical shape of the tarsal sinus and follows its natural orientation would allow for better biomechanical functioning.
- Only Type II devices meet the ideal parameters, which has an impact on their improved success rates.
- This improved design and function may also contribute to the success of Type II devices in decreasing the effects of or even eliminating secondary pathologies.