Intraoperative Positioning of the Hindfoot with the “Hindfoot Alignment Guide”

Foot & Ankle Category: Hindfoot

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Introduction
Intraoperative positioning of the hindfoot is generally made by visual means. This resulted in the wrong varus/valgus position by 10 degrees and a relatively large standard deviation of 8 degrees. Such a lack of precision would not be acceptable in surgery around the hip or knee. Furthermore, the hindfoot alignment also influences the short- and long term clinical outcome of foot and ankle surgery. Therefore new means are needed to improve the precision of intraoperative hindfoot positioning. So far navigation and intraoperative pedobarography have been advocated. However, these methods are expensive and normative data is lacking. We were therefore seeking a hindfoot alignment-guide as simple and easy to use as an alignment rod in total knee surgery.

Methods
A completely novel hindfoot alignment guide (HA-Guide) has been developed. This HA-guide projects the mechanical axis from the tibia (or whole leg) down to the heel similar to an alignment rod used in total knee surgery. The HA-guide enables to position the hindfoot in the desired varus/valgus position in the frontal plane (neutral for joint preserving surgery and total ankle replacement [TAR], 10 degrees valgus for ankle arthrodesis) and also the foot in plantigrade position in the lateral plane. The HA-guide has been tested in saw bones and the author’s university anatomy lab during eighth months and modifications were made. The HA-guide has then been used intraoperatively from May-November 2011 in 11 complex cases with simultaneous correction of the supramalleolar, tibio-talar and inframalleolar alignment: TAR with supra- and inframalleolar osteotomy/arthrodesis (2), TAR with inframalleolar osteotomy (3), supra- and inframalleolar osteotomy (3), pantalar arthrodesis in Charcot foot (1), subtalar arthrodesis with calcaneal and midfoot osteotomy (1), ankle arthrodesis in severe equinus foot (1). Pre- and postoperatively weight bearing hindfoot alignment radiographs according to Saltzman were taken and the position measured. The use of the HA-guide during the operation involved two additional radiographs with the fluoroscan which lasted about 1-2 minutes.

Results
In 10/11 cases the desired position could be achieved. In 3 cases, the planned calcaneal osteotomy could be avoided because the use of the HA-guide revealed an already sufficient correction. On the other hand side, in 3 cases the HA-guide revealed the need for unplanned additional calcaneal osteotomies. In one case the postoperative Saltzman view revealed too much valgus in a TAR despite the use of the HA-guide. This was probably due to a malrotation of the guide in relation to the radiographic direction of the fluoroscan.
Conclusion
This study describes the development and clinical use of the first hindfoot alignment guide of the world. This HA-guide helps to improve the alignment of the hindfoot intraoperatively to the desired position with a greater precision than just visual means. The HA-guide is especially useful for combined supra-, tibio-talar and inframalleolar alignment corrections were besides preoperative planning the decision for the need and amount of a simultaneous osteotomy needs to be evaluated intraoperatively.