Subtalar Joint Neutral and Orthotic Fitting

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Subtalar joint neutral position (STJN) provides a starting point for obtaining several lower extremity measures and is generally an important piece of information used for orthotic fabrication (Elveru et al., 1988; Pierrynowski et al., 1996, 1997). There are two often-used methods of determining neutral subtalar position. Perhaps the most common and clinically relevant method is to determine STJN by palpation in the prone position, because of its relative ease when compared with more complicated calculations involving total calcaneal motion (Root et al., 1977). Some believe that open kinetic chain STJN might not be the best measure of subtalar joint position relative to biomechanics of gait and, thus, that the importance of STJN in orthotic fabrication is limited (Pierrynowski & Smith, 1996; Sobel & Levitz, 1997). Either way, determining the neutral position by palpation remains a key element in biomechanical assessment for most clinicians.

The purposes of this article are to (a) examine the methods of determining neutral subtalar position, (b) explain how the neutral position is theoretically necessary for therapeutic benefit from orthotic intervention, and (c) discuss how orthotic intervention might be beneficial without the absolute necessity of maintaining subtalar neutral position.

Methods of Determining Subtalar Neutral Position

How do we find the neutral position by palpation? The method has been explained in several ways; we have based our description on the work of Elveru et al. (1988). We begin by placing the patient prone on a plinth or table, with the involved leg straight and the foot extending over the edge of the table. The opposite leg is placed in a “figure-4” position to help align the hips and keep the calcaneus parallel to the floor in order to allow more accurate...
measures (Figure 1). Once the patient is in position, we need to determine the lines of bisection to be used for our goniometric measurements. While positioned behind the patient, the therapist draws the first line of bisection along the vertical line separating the calcaneus into equal halves (Figure 2a). The second line will divide the distal third of the lower leg. The athletic trainer or therapist should palpate the medial and lateral aspects of the leg and draw a straight line along the distal portion, excluding and ignoring the Achilles tendon (Figure 2b).

The athletic trainer or therapist uses the hand nearest the medial border of the foot and palpates for the head of the talus. The thumb of the hand on the medial aspect is placed over the medial head of the talus, which is found by palpating the talonavicular joint just anterior to the medial malleolus. The index finger is placed over the lateral aspect of the talar head, which can be palpated just anterior to the sinus tarsi. The other hand is placed with the thumb along the plantar surface of the lateral metatarsal heads, with the fingers along the dorsal surface (Figure 3).

The hand on the lateral aspect is then used to maximally invert and evert the foot to determine the full excursion of the talus. Subtalar neutral is the position at which the athletic trainer or therapist is able to equally palpate both medial and lateral aspects of the talus and the talus is congruent with the navicular. Once STJN is achieved, the rear-foot relationship can be determined. With the foot in neutral, the line of bisection of the calcaneus is compared with the one on the lower third of the leg. If the measured angle is 0°, the rear foot is considered to be neutral. If the relationship is other than neutral,