Resolving Medial Arch Suspicions: The Navicular Drop Test

By Mark Charrette, DC

Healthy feet have three distinct arches: medial longitudinal, lateral longitudinal and anterior transverse. This architectural design provides substantial strength while still permitting sufficient flexibility to accommodate changes in terrain, and to provide propulsion.

Of the three arches, the medial arch is the most prominent and, arguably, is subject to the most strain during the gait cycle. The navicular bone forms the "keystone" of this large and long arch, which is supported primarily by the plantar fascia and spring ligament, not muscles. In fact, the early electromyographer, Dr. John Basmajian, concluded in 1963 that the muscles of the foot and lower leg do not support the medial arch except at toe-off during walking or when standing on tip-toe.

Evaluating the Medial Arch

Several measurement and footprint systems have been developed to compare the medial arches and identify problems. In the absence of these tools, which are generally located in institutional gait laboratories, the most functional method to examine and categorize a patient’s medial arch is the navicular drop test, which was first described by Brody. This procedure evaluates the connective tissues that support the medial arch by performing a comparison between its non-weight-bearing and weight-bearing alignment.

The navicular drop test provides an objective measurement of the extent of plastic deformation in the support tissues. It is an easy-to-perform clinical test that requires no special equipment, and it has been used successfully to evaluate the risk of athletes with ACL ruptures.

Performing the Test

The only pieces of equipment needed to perform the navicular drop test are a marking pen and a piece of card stock (a 3" by 5" card works well). The procedure requires a chair and is much more accurate when performed on a non-compressible floor surface (wood or concrete, or a thin carpet with low nap and no foam pad).
With the patient sitting comfortably (feet on the floor, but non-weight-bearing), palpate the medial aspect of each foot and find the navicular prominence. This will be the most prominent bony landmark found inferior and somewhat anterior to the patient’s medial malleolus.

Using the pen, make a mark on the patient’s skin at the point of the navicular prominence. Stand the card on the floor next to the medial arch of the foot and mark the card at the level of the navicular prominence mark.

Next, ask the patient to stand up, relaxing the feet and allowing them to bear the weight of the body. With the arch weight-bearing, the navicular prominence will be somewhat lower. Make a second mark on the same side of the card at the new level of the navicular prominence. Perform the same procedure with the other foot (use the other side of the card and be sure to indicate which foot you are recording).

Finally, subtract to find the difference between the two marks for each foot. If there is a difference of 10 mm or more in the arch between sitting and standing, or if there is an obvious asymmetry from left to right, your patient has objective evidence of a significant biomechanical problem in foot function – hyperpronation / collapse of the medial arch.

A variance of 7 mm (high risk) or more between sitting and standing requires intervention, and even 4-6 mm (moderate risk) of drop can be a problem for athletes or others who are on their feet for long periods. This condition is best treated with individually designed stabilizing orthotics made to be worn during all weight-bearing activities. The test procedure quickly verifies clinical suspicions, and provides a quantified rationale for the need for orthotic support.

References

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