

THE REVISED NAVICULAR DROP TEST: INTER- AND INTRA-EXAMINER RELIABILITY OF AN IMPROVED TEST FOR MEDIAL ARCH COLLAPSE

JOHN K HYLAND DC¹, GARY BRAZZELL BA²
Private Practice¹ – Colorado, USA; Foot Levelers, Inc.² – Virginia, USA

Introduction: Excessive pronation of the foot affects gait and is a risk factor for lower extremity injuries.^{1,2} Hyperpronation can also interfere with pelvic and spinal function, and the success of chiropractic treatment.³ A rapid and reliable method to quantify the amount of medial arch collapse is needed to evaluate patients and to screen for the presence of hyperpronation.

Only one static test has been shown to predict maximum-foot pronation during gait, the Navicular Drop Test.⁴ One study, however, found poor reliability of this test (in two inexperienced examiners).⁵ And clinicians have complained of the time needed to perform the test. We feel that this is primarily because the test as originally described by Brody requires the examiner to place the subtalar joint in a neutral position while standing.⁶ This artificial foot position has been found to be difficult to establish and maintain, and its inter- and intra-examiner reliability is poor to moderate.^{7,8} When a test begins with a position that is difficult and unreliable, this may be an unnecessary and time-consuming source of error.

We have revised the test to remove this extraneous step. Our revision begins with the patient in relaxed stance, after walking in place. This removes the subjectivity of the examiner trying to place the foot in an artificial position to begin the test. We measure the height of the navicular prominence with the patient in a weightbearing, activity-related ankle and foot position. We then compare the height of the navicular with the patient seated, when the medial arch and navicular bone are non-weightbearing. The difference is the amount of "navicular drop". This is a report of an initial trial of the revised version of the Navicular Drop Test.

Methods: The revised navicular drop test was performed by licensed chiropractors, on other chiropractors, all of whom were inexperienced in performing the Navicular Drop Test. No exclusions or selections were made from this convenience sample. All examiners followed only brief verbal and written instructions, no training or exam practice was provided. Thirty-eight doctors and 38 subjects participated in the inter-examiner test. Two different doctors measured each subject on two separate days. Thirty doctors and 30 subjects participated in the intra-examiner test. The same doctor tested the feet of one subject on two separate days.

Results: The mean inter-examiner discrepancy was 3.5 mm (SD 2.6). The mean intra-examiner discrepancy was 4.1 (SD 3.5). A 95% confidence level was used for all calculations. These ranges are similar to previous reliability studies of the standard Navicular Drop Test.^{5,9}

Conclusions: The results of this initial study suggest that the Revised Navicular Drop Test is as reliable as the original version, which requires the examiner to place the patient's foot in subtalar neutral. We have determined that this is an unnecessary step. A larger trial with more subjects is needed to better define the reliability of the revised test. Doctors of chiropractic should consider using the revised version of this test as one factor when screening their patients for the existence of excessive pronation and/or medial arch collapse. While high navicular drop scores may indicate pedal instability with a 95% reliability, the test is not capable of ruling out excessive pronation with 95% certainty.

References:

- ¹ Beckett ME, et al. *Incidence of hyperpronation in the ACL injured knee: a clinical perspective.* J Athl Train 1992; 27:58-62.
- ² Busseuil C, Freychat P. et al. *Rearfoot-forefoot orientation and traumatic risk for runners.* Foot Ankle Int 1998; 19:32-7.
- ³ Rothbart BA, Estabrook L. *Excessive pronation: a major biomechanical determinant in the development of chondromalacia and pelvic lists.* J Manip Physiol Therap 1988; 11:373-9.
- ⁴ McPoil TG, Cornwall MW. *The relationship between static lower extremity measurements and rearfoot motion during walking.* J Orthop Sports Phys Ther 1996; 24:309-14.
- ⁵ Picciano AM, Rowlands MS, Worrell T. *Reliability of open and closed kinetic chain subtalar joint neutral positions and navicular drop test.* J Orthop Sports Phys Ther 1993; 18:553-8.
- ⁶ Brody DM. *Techniques in the evaluation and treatment of the injured runner.* Orthop Clin North Am 1982; 13:541-58.
- ⁷ Elveru RA, Rothstein JM, Lamb RI. *Goniometric reliability in a clinical setting: subtalar and ankle joint measurements.* Phys Ther 1988; 68:672-7.
- ⁸ Smith-Oricchio K, Harris BA. *Interrater reliability of subtalar neutral, calcaneal inversion and eversion.* J Orthop Sports Phys Ther 1990; 12:10-5.
- ⁹ Mueller MJ, Host JV, Norton BJ. *Navicular drop as a composite measure of excessive pronation.* J Am Podiatr Med Assoc 1993; 83:198-202.