

Simulated Method to Perform the Coleman Block Test in Educating Orthopaedic Residents Outside of the Clinic

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ABSTRACT

The Coleman block test is an important examination performed on patients with a cavovarus foot deformity. Unfortunately, resident physicians in orthopaedic programs have limited exposure to patients with this deformity. Few residents witness the Coleman block test, and it is difficult to understand without observing. We devised a method to simulate a cavovarus foot to instruct orthopaedic residents on performing the test. A 2-cm wedge was placed beneath the medial metatarsals to simulate the plantar-flexed first ray seen in a cavus foot. The position of the lift tilted the heel into varus owing to the tripod effect. The Coleman block test was then performed. Comparison of the heel positions before and after use of the test provided clear demonstration of the Coleman block test. Furthermore, residents can practice performing the test without a patient. The Coleman block test can then be demonstrated for teaching purposes.

Keywords: Foot Deformities, Medical Education, Physical Examination.

INTRODUCTION

Cavovarus feet are characterized by a high arch and varus position of the heel. Symptoms include recurrent sprains, lateral-sided foot pain, and metatarsalgia. Cavovarus feet may develop without a known cause or because of a neurological disorder such as the Charcot-Marie-Tooth disease. Cavus develops owing to relative plantar flexion of the first ray, which causes the heel to tip into varus with weight bearing because of the tripod effect. This varus heel deformity eventually can become more pronounced as stabilizing structures stretch and the peroneal tendons develop more pathological features. The heel varus can become fixed. The Coleman block test helps determine the flexibility of this heel deformity.¹

The Coleman block test was described by Sherman Coleman, MD, and William Chestnut, MD in 1977.² The test is used on patients with a cavovarus foot deformity to determine whether the hindfoot varus deformity is fixed or flexible, and the result helps guide the type of orthotic device and operative treatment needed. If the hindfoot varus deformity is flexible, a dorsiflexion osteotomy of the first ray can be performed. If it is fixed, a lateral closing wedge osteotomy of the calcaneus is also required.³ We devised a method to perform the Coleman block test for educational use in orthopaedic residency programs.

METHODS

During the Coleman block test, the foot is placed on a block high enough to avoid touching the ground when placing the plantar-flexed first metatarsal over the block's edge. The medial metatarsals are placed off the edge while the rest of the foot remains on the block. This way, the plantar-flexed first metatarsal cannot tilt the foot into varus. If the heel deformity corrects while weight bearing during this maneuver, the deformity is flexible. If the heel deformity does not correct, there is a fixed hindfoot deformity.

In the current study, a 2-cm wedge was created out of any firm material (we used rubber wrapped with coband). The wedge was 2-cm high, 9-cm long, and 5-cm wide. The wedge was placed beneath the first metatarsal of a volunteer (senior author, RAM) with a normal and flexible foot. The wedge was held using coband or tape wrapped about the foot (Figure 1).

RESULTS

When the participant stood, the wedge tended to tilt the heel into a more varus position as seen when viewed from behind (Figure 2). Figure 3 shows this wedge in position from a medial-side view. A large

amount of varus was not seen because of the ability of the metatarsal-cuneiform joint to dorsiflex in our participant's healthy foot. Also, our participant did not have a chronic heel deformity, and secondary structures such as the subtalar ligaments only allowed limited motion. Compared to the position in Figure 2, the position of the heel obtained during the Coleman block test (Figure 4) provided a successful demonstration. Notably, the heel returned to a position of slight valgus during the test, signifying a flexible deformity.



Figure 1. The wedge placed beneath the first metatarsal, simulating a cavus foot.



Figure 2. The position of the heel in slight varus while weight bearing with the lift in place.



Figure 3. Medial view of the wedge in position.



Figure 4. Restoration of normal heel valgus during the Coleman block test, consistent with a flexible deformity.

DISCUSSION

Performing and interpreting results of the Coleman block test can be difficult concepts to understand. Orthopaedic residents may not be exposed to many patients with cavovarus foot deformities; subsequently, residents may not see the test performed often during their training.

The commonly used Orthobullets website currently poses five questions pertaining to the Coleman block test.⁴ Those questions have 3946 responses, of which only 2853 (72%) have been correct. The percentage of correct responses for each individual question ranges from 56% to 78%. Furthermore, questions about the Coleman block test are occasionally seen on the Orthopaedic In-Training Examination (OITE). In 2016, the OITE had two questions about the Coleman block test.

The Coleman block test is a necessary examination to learn during orthopaedic residency, yet it is performed infrequently and can be difficult to understand. The simulation method described in this paper allows orthopaedic residents to witness the Coleman block test without a patient, learn how to perform the test, and interpret subsequent results.

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