Sensitivity and Specificity of Modified Bragard Test in Patients With Lumbosacral Radiculopathy Using Electrodiagnosis as a Reference Standard

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Abstract

Objective: The purpose of this study was to assess the diagnostic accuracy of a modified Bragard test compared with the straight leg raise (SLR) test in patients presenting with electrodiagnostic evidence of L5 and S1 nerve root compression.

Methods: This was a cross-sectional study conducted on 506 consecutive patients with signs and symptoms consistent with lumbosacral radiculopathy confirmed by electrodiagnostic study. Patients were evaluated from September 2013 to September 2015 in the physical medicine and rehabilitation outpatient clinic of Shahid Faghihi Teaching Hospital, Shiraz, Iran. The SLR test was investigated concomitantly to determine the sensitivity and specificity.

Results: Electrodiagnostic study findings indicated lumbosacral radiculopathy in 312 patients. Of these participants, 198 were positive on SLR testing, and of 114 SLR-negative patients, 79 were positive on Modified Bragard testing. Sensitivity of the Modified Bragard test was 69.3%, and specificity was 67.42%. Positive and negative predictive values were 73.15% and 63.16%, respectively. Positive likelihood ratio was 2.13, and negative likelihood ratio was 0.46. Diagnostic odds ratio was 4.63. In patients with symptom duration of less than 3 weeks, SLR sensitivity and specificity decreased as the Modified Bragard test diagnostic accuracy increased.

Conclusions: The Modified Bragard test is easy to perform and has an acceptable test performance, which can help to increase the discriminative power of clinical examination in patients with L5 or S1 nerve root compression who exhibit a negative SLR test result, especially in the acute phase of disease. (J Chiropr Med 2017;xx:1-8)

Key Indexing Terms: *Intervertebral Disc Displacement; Physical Examination; Radiculopathy; Sensitivity and Specificity; Low Back Pain; Sciatica*

Introduction

Low back pain is one of the most common health problems and results in personal, community, and financial burden globally. A recent global review of the prevalence of low back pain in the adult general population reported a point prevalence of 12% to 33% and a 1-year prevalence of 22% to 65%.[1] Of all 291 conditions studied in the Global Burden of Disease 2010 Study, low back pain ranked highest in terms of disability (years lived with disability), and sixth in terms of overall burden (disability-adjusted life years).[2] In Iran, low back pain is the third leading cause of disease burden as measured by disability-adjusted life years in the Iranian population aged 15 to 69 years, regardless of the causes of intentional and unintentional injuries.[3]

There are different medical conditions that cause low back and lower extremity pain, and patients may have more than 1 disorder. The question of whether a lumbosacral radiculopathy—or sciatica—is present is one of the most common cause of referrals to the electrodiagnostic laboratory.[4] Although precise epidemiologic data are difficult to establish, the prevalence of lumbosacral radiculopathy is approximately 3% to 5%, distributed equally in men and women.[5] Most radiculopathies are caused by root compression, most commonly from the intervertebral disk disease or other degenerative changes of the spinal column, such as ligamentous hypertrophy or the bony changes that accompany osteoarthritis. Other compressive lesions can less commonly cause radiculopathy,

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such as tumors and cysts.[4] Lumbosacral radiculopathy is characterized by pain, paresthesia, weakness, reflex change, and sensory loss. Pain and paresthesia are uniquely distributed within the areas innervated by the affected nerve root.[6]

Patients with sciatica are commonly treated in primary care, but a small proportion is referred to secondary care and may eventually have surgery.[7] Primary care clinicians use patient history and physical examination to evaluate the likelihood of radiculopathy and select the patients for further imaging and possible surgery. Clinical provocative tests, which place the lower extremity in a position to aggravate or relieve radicular compression symptoms, are commonly used in clinical practice in patients with a suspected lumbosacral radiculopathy. The straight leg raise test (SLR) and the crossed straight leg raising test (CSLR) are physical maneuvers that provoke the lumbosacral nerve roots. These tests are often used in making decisions about diagnostic imaging or hospital referral.[8] Another complementary physical maneuver is the Bragard test. It is used when the SLR test is positive at a given point: the leg is lowered below the angle of radicular pain and dorsiflexion of the foot is induced. If there is an increase in radicular pain, the test is considered positive.

Because the current evidence indicates poor diagnostic performance of most physical tests used to identify lumbar radiculopathy,[9] it is worthwhile to present a variation of a test that appears to have better diagnostic accuracy. The purpose of this study was to compare the diagnostic accuracy of the Modified Bragard test and the SLR test in a selected group of patients who had a clinical presentation of lumbosacral radiculopathy and correlated electrodiagnostic evidence of L5 or S1 nerve root compression.

Methods

This cross-sectional study included 506 consecutive patients referred for electrodiagnosis of the lower extremities as a result of unilateral radicular low back pain who were evaluated from September 2013 to September 2015 in the physical medicine and rehabilitation outpatient clinic of Shahid Faghihi Teaching Hospital, Shiraz, Iran. The study was performed in accordance with the Declaration of Helsinki. Its protocol was reviewed by medical ethics committee of Shiraz University of Medical Sciences. The rationale of the study was explained to all participants and they all signed a consent form before enrollment. This article was written according to the Standards for Reporting of Diagnostic Accuracy statement (except for items 13, 18, 22, and 24).[10]

Inclusion and Exclusion Criteria

Inclusion criteria were: age range of 20 to 80 years with a history and physical examination suggesting unilateral L5 or S1 radiculopathy (which includes symptoms of low back pain with pain or paresthesia radiating into the right or left lower extremity below the level of the knee, in the nerve root territory, dermatomal sensory loss for at least 2 weeks; or any sign of muscle atrophy or weakness as well as decreased Achilles stretch reflexes). Exclusion criteria were: current pregnancy or a history of major trauma to the vertebral column or spinal or lower limb surgery, history of spinal congenital abnormalities and diagnosis of infection or malignancies, and underlying rheumatologic disease or diabetes.

Clinical Examination

All participants were referred by physicians other than those who performed the study. One physical medicine and rehabilitation specialist blinded to all outcome data visited all eligible participants and performed the physical examinations. Standardized clinical examination consisted of L5, S1 dermatomal sensory testing through softly striking the skin bilaterally and simultaneously. The patient, with eyes closed, was asked if the feeling clearly differed between the left and right sides, L5, S1 myotomal muscle strength (by testing muscle strength during big toe extension and ankle plantar flexion in supine position against resistance compared with nonsymptomatic side), and determination of Achilles stretch reflexes (noticing reflex diminution or abolishment) and muscle wasting (by measuring calf circumference and providing 1 cm difference with nonsymptomatic side for a positive test result). There were intervals of 5 minutes' rest between diagnostic tests to allow the patients recover from any pain or discomfort induced during examination. The order of test performance (SLR or Modified Bragard test) was also randomly alternated to prevent testing bias.

Assessment Procedures

The SLR test was performed by having the patient lie down on a flat examination table in a supine position. Both hips and knees of the involved leg were maintained in a neutral position neither abducted nor adducted. The patient's head was not supported by a pillow. The examiner grasped the patient's heel in the cup of his hand. The examiner's other hand maintained the patient's knee in an extended position. The examiner slowly raised the tested leg up to 90° by flexing the hip while maintaining the knee in extension and keeping the limb neutral, neither externally nor internally rotated. The maneuver was positive if the patient complained of reproduction of symptoms distal to the knee joint, between 30° and 70° of hip flexion.[5] An angular goniometer with a degree of error equal to ±1° was applied at the level of the greater trochanter to measure the value of hip flexion.