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Clinical update

Combination testing in orthopedic and neurologic physical examination: a proposed model

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Abstract

Objective: This article suggests a 4-part model for teaching and using orthopedic and neurologic physical testing.

Discussion: Four methods of combining and sequencing orthopedic and neurologic physical tests are described. The descriptions are followed by examples including test names, test performance, and the relationships between the tests in each group. The principles of the methods originated in the lead author's private practice and were refined while teaching chiropractic students and graduate doctors.

Conclusion: This model offers one possible method of combining and sequencing the orthopedic and neurologic examination in an effort to provide a more complete picture portraying the mechanisms, results, pathologies, differential diagnosis, and clinical thought processes associated with common orthopedic and neurologic physical tests.

Introduction

Combining orthopedic and neurologic tests is not a new phenomenon. Several authors have described individual combinations.[1-4] This paper goes beyond limited combinations, describing a system that can be used to form multiple useful combinations. The purpose, as with other descriptions, is to increase the productivity of the physical examination process. Productivity can be increased in multiple ways. Combining tests reduces the number of patient position changes during the examination process. This decreases wear and tear on the patient. The time required for the examination also decreases, and the flow of the examination improves.

Testing combinations and sequences also allow the doctor to gauge the severity of the patient's condition.

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Two physical maneuvers that detect the same pathology are more likely to identify the pathology if performed together than if the tests are performed individually. If the results of 2 tests are positive in combination, but negative individually, the findings can be considered less severe.

The tests described below were selected because they provided good examples of the combination and sequencing methods discussed. They were not selected based on their sensitivity or specificity. Information on sensitivity and specificity is provided where available; but unfortunately, this information is not available for most orthopedic and neurologic tests. Despite the lack of this information, these tests and many others are embedded in health care education and clinical practice. Increasing the utility of the tests until better clinical procedures are available is prudent. The purpose of this article is to offer personal opinions of how orthopedic and neurologic tests may be combined.

Discussion

Four methods of test combining

The first method is testing by indirect method. A common example is recording a patient's respiration rate while pretending to record his pulse. This is done to prevent the patient from consciously or subconsciously altering respiration rate. The patient is unaware of the true purpose of the procedure and is deliberately distracted during testing.[5]

The second method of combining applies to tests that have the same mechanism of performance yet test for different pathologies. An example is the combination of the Soto-Hall, Lhermette, Brudzinski, and Lindner tests. The primary mechanism of performance for these tests is flexion of the cervical spine (Table 1). Knowledge of the multiple responses possible with cervical flexion and the positive and negative findings for each test determines how results are interpreted and which test result is listed as positive. The movement of a joint or series of joints affects multiple tissues. Bones, cartilage, muscles, tendons, ligaments, fascia, blood vessels, nerves, skin, and other tissues are involved in or influenced by a movement. It is almost impossible to consider an individual physical maneuver as testing a single tissue or pathology. True differential diagnosis occurs when the examiner understands the maneuver's effect on every tissue influenced and the possible patient response generated by each if pathological or dysfunctional.

The third method of combination testing involves tests that identify the same pathology but have different mechanisms of performance. An example is the combination of the Lindner, straight leg raising, and Bragard tests (Table 2). The mechanisms of performance for these tests differ, but they all test for lower extremity radicular pathology. Combining these tests requires performing all 3 mechanisms (cervical flexion, straight leg raising, and foot dorsiflexion) simultaneously in an attempt to reproduce radicular symptoms. This is the method of combined testing that allows the severity of the patient's condition to be gauged. If all 3 tests are required to reproduce symptoms, the patient's condition is not as severe as it would be if symptoms were reproduced by 2 tests in combination or if the tests produced symptoms individually.

The fourth method is sequential testing or using testing groups. It is almost impossible for some orthopedic and neurologic tests to stand alone in the diagnostic process. Few tests are absolute indicators of the pathology they are intended to detect, and many of the tests raise more questions than they answer.

Grouping related tests in sequence provides clinical information needed to clarify test findings. Tests with higher specificity and sensitivity require smaller sequences. Tests with lower specificity and sensitivity require larger sequences.

Testing by the indirect method

Range of motion (ROM) can be tested by the indirect method. Range of motion testing has long been a standard assessment of the musculoskeletal system. This is despite the subjectivity of the methods and

Table 1 Cervical flexion tests

Test	Major Mechanism	Positive Indicators	Pathology
Soto-Hall	Cervical Flexion	Cervical and/or Thoracic Pain	Spinal Sprain, Strain, Subluxation, or Fracture
Lhermitte	Cervical Flexion	Shock or Electric Sensation in the Extremity(s)	Spinal Cord Pathology
Brudzinski	Cervical Flexion	Spine Pain and/or Knee and Hip Flexion	Meningeal Irritation
Lindner	Cervical Flexion	Lower Extremity Radicular Pain	Radiculopathy