

## **Test Combinations in Patient Examination: Test Sequencing**

By K. Jeffrey Miller, DC, DABCO

Most orthopedic and neurological tests are taught as individual entities. They are then grouped into regions and/or categories of pathology. Seldom are they taught in patterns or sequences that consider efficiency in performance or clinical use. There are a few exceptions to this: Bragard's test is almost always taught as an immediate follow-up to the straight-leg-raising (SLR) test, and Fajersztajn's test is almost always taught as an immediate follow-up to the crossed straight-leg-raising test (CSLR). These short sequences are effective, but they can be enhanced.

SLR and Bragard's tests are intended to detect radicular pathologies causing lower extremity pain. SLR is employed first to reproduce the pain of the chief complaint. Bragard's follows immediately after to confirm the SLR result. The SLR/Bragard's combination is usually considered diagnostic. However, there are a few instances in which they can miss the pathology they are intended to detect.

Most tests for radicular pathology typically use some combination of hip flexion and knee extension. Lasegue's test and SLR, for example, both use these maneuvers. The only difference in the tests is the order in which the maneuvers are performed. Lasegue's uses hip flexion first, followed by knee extension. SLR uses knee extension first, followed by hip flexion. This minor difference is the reason the names of the two tests are often used interchangeably.

Since Lasegue's and SLR both require hip flexion and knee extension to reproduce symptoms, it is logical that removing one of the movements would reduce symptoms. This would serve as a confirmatory test, just as Bragard's does. When using Lasegue's test, if symptoms produced by hip flexion and knee extension are reduced by flexing the knee back to its original position, the procedure is termed Lasegue's differential test.

Considering the above, SLR-Lasegue's, Bragard's and Lasegue's differential can be sequenced to improve clinical efficiency. This can be taken a step further by studying the mechanism of Bragard's test.

Bragard's test for radicular pathology and Homan's test for deep-vein thrombosis (DVT) both involve dorsiflexion of the foot. A second commonality is that the conditions these tests are intended to detect both cause pain in the lower leg and calf. This mandates differential diagnosis.

When the foot is dorsiflexed following SLR, reproducing lower leg and calf pain, the pain may be radicular or due to a DVT. Differential diagnosis can be accomplished by flexing the knee, as in the Lasegue's differential test, while maintaining the dorsiflexed position of the foot.

With flexion of the knee, tension in the nerve root is reduced. The dorsiflexed position of the foot does not elicit enough tension in the nerve tissue and symptoms should decrease. Flexing the knee would not affect a DVT and symptoms would persist.

Note that some authors recommend a quick, sudden dorsiflexion of the foot during Bragard's test. This is not recommended in practical assessment. The action may dislodge a DVT, making it subject to transport through the vascular system.

The sequence has now expanded to a series of four tests. The supine patient can be examined by raising the extended symptomatic leg to the point at which symptoms are reproduced. The leg is then lowered to just below the point symptoms were produced and the foot dorsiflexed. Reproduction of symptoms reinforces the initial SLR finding and is then followed by flexion of the knee while maintaining foot dorsiflexion.

Relief of symptoms with knee flexion further reinforces the SLR/Bragard's findings. Continued symptoms with knee flexion and continued dorsiflexion suggest the possibility of DVT. Moses' test (squeezing the calf muscles to reproduce the pain of DVT) is used as a confirmatory procedure when DVT is suspected. Squeeze cautiously to avoid dislodging the DVT.

Symptoms during SLR are typically produced between 35 and 70 degrees. Considering this, flexion of the knee for Lasegue's differential test should occur while maintaining the angle of hip flexion present when Bragard's test is performed. This allows the possibility of symptom relief and test interpretation without movement of the hip joint. Avoiding movement of the hip at this point is important, as it allows the sequence to expand further.

The "sign of the buttocks" test differentiates between radicular and hip joint pathologies. The test is performed by maintaining the position of the hip joint following a positive SLR. Flexing the knee (Lasegue's differential) and attempting to increase hip flexion provide the differential. If the hip flexes

further, the condition is radicular/sciatic in nature. If the hip does not flex further, hip joint pathology is indicated. Hip joint pathology can be further evaluated by attempting to move the patient's leg into the figure-four position of Patrick's test.

The sequence has now expanded to a series of five tests. The supine patient can be examined by raising the extended symptomatic leg to the point at which symptoms are reproduced. The leg is then lowered just below the point symptoms were produced and the foot dorsiflexed. Reproduction of symptoms reinforces the initial SLR finding. This is followed by flexion of the knee while maintaining foot dorsiflexion. This position is held long enough to interpret results for Homan's test; the hip is then flexed further to complete the sequence with the sign of the buttocks maneuver.

The described sequence provides diagnostic information for identifying radicular problems, DVT and hip joint pathologies. The time spent performing the sequence is only seconds longer than the original SLR and Bragard's sequence. The result is improved efficiency and diagnostic information.

It is recommended that the reader study the tests listed here individually before using them in combination. After study of these and other tests, testing combinations will become more evident and their employment will enhance any examination.

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## **Test Combinations in Patient Examination, Part 2: Tests for the Same Pathology**

By K. Jeffrey Miller, DC, DABCO

Most orthopedic and neurological tests are taught as individual entities. They are then grouped into regions and/or categories of pathology. Seldom are they taught in patterns or combinations that consider efficiency in performance or clinical use. There are exceptions to this: Brudzinski's test for meningeal irritation is almost always taught in combination with Kernig's test for meningeal irritation. This occurs with enough consistency that many authors consider the procedures to be a single test.

There are multiple tests with different mechanisms of performance for a specific pathology. This gives the examiner more than one testing option and the opportunity to use other tests in combination. While Brudzinski's and Kernig's tests are for the same pathology, they have different mechanisms of performance. Brudzinski's involves flexion of the head and cervical spine, while Kernig's involves the same mechanism as Lasegue's test: hip flexion followed by knee extension.

Combining these tests or other tests offers advantages over using the tests individually. Using them in combination allows the tests to be performed simultaneously, saving time during the examination process. The combination also offers increased stress on the tissue being tested. The intent is to increase the likelihood of detecting the pathology in question. If the tests are negative in combination, there is little reason to perform the tests individually, as they are not likely to be positive. The doctor can move on, saving time. On the other hand, if a combination of tests produces a positive result, the doctor is obligated to perform the tests individually.

Combinations of this nature provide the possibility of grading the severity of pathology. As stated, if the tests are not positive in combination, the odds of them being positive individually are low. If the tests are positive in combination but not individually, then the pathology is not as severe as if the tests were positive in combination *and* individually. Obviously, the prognosis for patients with tests positive in combination

and negative individually is more favorable than for a patient with tests positive in combination and individually.

This information leads to the possibility of using test combinations to also gauge progress. For example, let's say a patient's symptoms are reproduced both in combination and individually during the initial examination. However, during the progress exam these symptoms are *only* reproduced in combination. This would be evidence of patient improvement.

Dozens of other combinations of this nature are possible. The straight leg raise (SLR), Bragard's and Lindner's tests are a good example. The mechanism for SLR is self-explanatory. Bragard's involves dorsiflexion of the foot following SLR, and Lindner's requires flexion of the cervical spine by the patient. Each test has a different mechanism, yet they test for the same pathology.

All three tests can be performed simultaneously. If they are negative in combination, they are all negative individually. The doctor can then proceed with the next test or combination of tests. If the tests are positive in combination, the doctor should perform all three tests individually.

The combination of SLR, Bragard's and Lindner's can be intensified by adding Bonnet's test. Bonnet's consists of adducting the leg and internally rotating the foot during the SLR maneuver. This series was described by Breig-Troup. The additional test adds traction to the sciatic nerve and piriformis muscle. The tension placed on the tissues by four tests is greater than that of three tests and much greater than any of the tests individually. The chances of the patient having radicular pathology if all four tests are negative in combination are minimal.

Hoffman's pathological reflex and Lhermitte's test can both identify upper motor neuron lesions.

Hoffman's, which is the upper extremity equivalent of Babinski's reflex, involves nipping the middle finger and watching for flexion of the fingers. When positive, Lhermitte's elicits electric-like sensations in the patient's extremities with cervical spine flexion. The combination of the two tests is referred to as a dynamic Hoffman's maneuver. Again, the combination increases the chances of identifying the pathology in question. When both tests are negative in combination, both tests are negative individually.

The described combinations provide diagnostic information more efficiently than typically gleaned from use of the tests individually. It must be reiterated, however, that the examiner must at all times be prepared to perform and interpret the tests individually when necessary, and know each test individually in order to understand the combinations and reverse the process for the most accurate diagnosis.

It is recommended that the reader study the tests listed here individually before using them in combination. After study of these and other tests, testing combinations will become more evident and their employment will enhance any examination.

*Part 1 of this article focused on the value of test sequencing. It appeared in the July 1, 2009 issue.*

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## **Test Combinations in Patient Examination, Part 3: Testing by Indirect Method**

By K. Jeffrey Miller, DC, DABCO

As discussed previously, most orthopedic and neurological tests are taught as individual entities and are then grouped into regions and/or categories of pathology, rather than being taught in patterns or sequences that consider efficiency in performance or clinical use. In the first two articles in this series, we discussed test sequencing and testing for the same pathology, respectively. The third method of combining tests is testing by indirect method. This method involves obtaining clinical information without actually having to perform a test.

### **The Subtle Art of Indirect Observation**

Many orthopedic and neurological tests are purely observations. The doctor simply watches the patient to obtain information. Another method is to perform a test that simultaneously allows for observations of other characteristics. The key is for the doctor to avoid making it obvious that they are watching the patient. The patient is distracted by the test being performed and the doctor obtains two pieces of clinical information while only performing one test.

A common example of the second concept occurs when recording pulse and respiration rates. A patient cannot (except in very rare situations) control their pulse rate; they can, however, control their respiration rate. Taking the pulse rate is easy, while taking the respiration rate can be more difficult if the patient is aware the doctor is watching them breathe. The patient may become self-conscious and alter their normal pattern and rate of breathing.

With this in mind, students are taught to take the pulse and once finished, continue to hold the wrist as though still taking the pulse, but instead begin counting the patient's breaths. The patient is unaware of the doctor's actions and the recorded breathing pattern and rate are more accurate. This is indirect observation of the patient.

This concept is very important in testing range of motion (ROM). Range of motion is very subjective. This is of particular concern in cases that may eventually involve litigation and financial reward. It does not take a great deal of intelligence for a patient with questionable ethics to realize that the less they move, the better their reward may be. This is one of the reasons ROM testing is now a secondary method of determining spine-related disability.

Orthopedic and neurological testing allow for observation of spinal and extremity ROM through indirect method. Most tests require the patient to move joints through specific ranges of motion. The examiner should look for the result of a particular test, but also note the patient's ROM during the test. The patient will be distracted by the performance of the test and the doctor's questions. It is interesting that in some cases, you can see the differences between ROM results from the indirect method versus standard ROM methods.

### **Combining Tests to Gather Additional Information**

The maximal cervical compression test for radicular pathology requires rotation and extension of the cervical spine. L'Hermitte's test for spinal cord pathology requires flexion of the cervical spine. The shoulder depressor test of brachial plexus pathology requires lateral bending of the cervical spine. Three tests cover all four planes of cervical spine range of motion.

Here's another example: The slump test for neuromeningeal pathology requires flexion of the lumbar spine. The sphinx test for spinal extension requires extension of the lumbar spine. Kemp's test for disc and radicular pathology requires rotation and lateral bending of the lumbar spine. Again, three tests cover all four planes of lumbar range of motion.

A doctor will observe multiple ranges of motion during the course of an exam. This may be all the ROM testing necessary. Doctors can also perform ROM testing individually using instruments if clinical findings indicate instrumentation will be necessary. When more traditional methods are performed, the order of performance should be active movements followed by passive movements and finally resisted movements.

This method of test combining overlaps with the method of testing using tests with the same mechanism of performance that identify different pathologies, as discussed in parts 1 and 2 of this series. Only one mechanism is performed, yet the doctor is obtaining multiple pieces of clinical information. The patient is unaware of the doctor's purpose in both methods.



Remember, as I've stated before, always study tests individually before using them in combination. With knowledge of the tests enhanced, testing combinations will become more evident and examination procedures more practical. The whole point is to maximize clinical efficiency and your ability to gather information in the most reasonable period of time.

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Part 1 of this article focused on the value of test sequencing and appeared in the July 1, 2009 issue. Part 2 dealt with tests for the same pathology and ran in the July 29 issue.

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