A FUNCTIONAL PRE-MANIPULATIVE SPINAL ORTHOPEDIC ASSESSMENT MANEUVER

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ABSTRACT

Objective: To introduce and describe a standardized protocol for a functional, pre-manipulative assessment procedure for spinal pain.

Design: Two brief case reports and the clinical utility of this maneuver is compared with another commonly used orthopedic test in a retrospective study involving 50 subjects.

Setting: Northwestern Health Sciences University's Bloomington Natural Care Center.

Results: The use of the proposed pre-manipulative orthopedic assessment maneuver may have clinical utility for patients presenting with back and/or leg pain. There were differences in the subjective responses of some subjects between the use of the torsion test and the straight leg raise and some results that suggest a correlation between the two tests.

Conclusion: The test described may be useful as an additional assessment procedure since it closely reflects those spinal stressors that are commonly present when manual therapy is being employed. Additionally, the torsion test may have practical utility since it can be modified to reflect different techniques employed by different health care providers. (*J Chiropr Med* 2005;4:61–68)

Key Indexing Terms: Spine; Back Pain; Manipulation, Chiropractic; Pre-manipulative Test

INTRODUCTION

Doctors of chiropractic routinely perform orthopedic tests as part of new patient assessment. These tests

are performed so that the doctor can ascertain the underlying cause(s) of a patient's complaint and be more likely to establish a treatment plan that will increase the likelihood for a positive clinical outcome. Some patients may be seen for preventive services and orthopedic and functional testing may still be utilized. In this situation such tests may be used to assess a patient's candidacy for wellness care, rather than to provide care for the presence of specific symptoms. The manual adjustment is an important part of the treatment provided by the majority of doctors of chiropractic and the literature strongly supports this treatment intervention for addressing back pain and related complaints.¹ There is additional evidence suggesting a relationship between this form of manual intervention and some somatovisceral presentations.² However, most orthopedic tests that are used for spine related presentations^{3–5} do not adequately assess functional, coupled end-range limitations that reflect the specific forces commonly associated with those that are delivered when a manual adjustment is performed.^{6–16}

Orthopedic and functional examination procedures are used widely yet there is little research that adequately investigates the reliability, sensitivity, and specificity of the majority of them. Doctors who use manual therapies as one of their primary interventions may additionally use a variety of specific technique protocols. Because there is such a variety of treatment techniques employed by different manual practitioners, the Torsion Test (TT) described here is proposed to serve as a method for assessing a patient's end-range tolerance to the specific technique being employed. In this way, an assessment procedure is available that will be relatively specific to the preferred treatment intervention.

The TT has not been subjected to formal research testing, but the procedure involves intersegmental position, stiffness, tissue compliance, range of motion, and local pain sensitivity. Each of these has been tested to some degree, although the validity and reliability for each of them is variable.^{17–22} The identification of common findings or themes among

a group of testing procedures has been shown to have promise^{23–26} and so the TT may have value in that several end-range elements are addressed simultaneously when this testing procedure is used. This may assist the clinician in identifying the potential for a pathological lesion or more specifically identifying the actual location of the lesion needing to be addressed through a manual technique. TT results may predict the need to modify the treatment strategy, since it will be performed to mimic the technique that the doctor is most likely to select, or at least to modify the way the patient is positioned so that the potential for a positive clinical outcome can be increased and the likelihood for potential detrimental residuals reduced.

Therefore, the TT is a functional orthopedic assessment protocol established to mimic end-range functional, coupled vertebral motion tolerances typically associated with manual adjustive interventions. The TT can be performed as a screening tool in any spinal region where the manual adjustment will be performed, in concert with the specific technique utilized at the time.

The TT is recommended for patients who are considered candidates for manual, spinal adjustment during the initial assessment or at least, minimally, prior to the initiation of the manual adjustment. This may assist the clinician in: 1) ruling out end-range spinal mechanical loading intolerances that would make the manual adjustment a contraindication and, if positive, help to establish whether the contraindication may be absolute or relative; 2) understanding the likely underlying cause for presenting chief complaints; 3) addressing one's candidacy for wellness/preventive care, if there are no specific presenting symptoms; 4) ruling out diagnostic impressions.

The side-posture manual adjustment has been controversial in terms of its application for patients with intervertebral disc derangement. Some suggest that rotational maneuvers may be a potential contraindication for such²⁷ and others report that it is safe and appropriate if performed properly.^{28–30} One of the reasons for controversy on this issue may be due to each patient's unique ability to safely tolerate end-range manual force in any of three primary planes of motion or in any combination of these planes of motion.³¹ The TT is one method for proactively assessing this tolerance threshold and may prove to be beneficial for reducing complications for

patients who cannot safely tolerate end-range mechanical loading from those who can. Rotation is a normal, functional plane of motion in the spine. Since one objective is to provide treatment that will improve the functional, biomechanical pain-free range of motion of spinal vertebral segments, a screening tool for these spinal stressors seems prudent.

Some patients are considered candidates for manipulation under anesthesia^{32–36} and the TT may be beneficial in identifying appropriate candidates. Additionally, once candidates are selected, it may be appropriate to proactively assess end-range spinal loading tolerances prior to the patient being placed under anesthesia because during the manipulation procedure, the patient is placed under conscious sedation and is under the influence of a pharmaceutical agent that creates muscle relaxation, preventing the availability of reflex protective guarding. Additionally, in this sedated state it is impossible to obtain real-time information regarding the presence of central versus peripheral pain, if it is of clinical interest at the time. This is of special clinical utility since there is evidence to suggest that patients with intervertebral disc derangement do not respond as well to MUA when compared to patients who do not have it.³⁷

Description of Test

The TT is a functional orthopedic test that has application to various spinal regions and should be applied based on normal spinal biomechanical functional range(s) at the segmental and regional level.⁷ Since the cause of spinal pain is multi-factorial, a positive test may include more than one element and must be interpreted as such. For example, the presence of worsening peripheral pain to the distal lower extremity during the performance of the TT may indicate aberrant progressive migration of an intervertebral disc with consequential increased nerve root compression. Peripheral pain resolving and becoming centralized during the performance of the TT may suggest that a disc derangement is reducing in its degree of aberrant migration and that associated nerve root compression is proportionately less, based in information provided by McKenzie and the centralization phenomenon.^{38–46}

Pathognomonic orthopedic tests for specific conditions are rare. Using a number of evaluative tools, however, and being perceptive to common findings

among them, will lead the clinician to identify the most common underlying elements responsible for a presenting complaint or to determine how a patient could best benefit from preventive spinal manual adjustments. There is no specific battery of tests that research demonstrates should always be included when a patient presents with a specific symptom pattern. However, it appears logical and in the best interest of the patient that some of the evaluative methods reflect those spinal stressors typical of activities of daily living and those spinal stressors that may be used when the case management plan is introduced. If high velocity, low amplitude side-posture manual techniques will not be employed for a particular patient, the TT may still be beneficial for improving the clinical diagnostic impression and subsequently, in the establishment of a case management plan that will yield positive outcomes in the clinical setting and positive changes related to the performance of activities of daily living.

Torsion Test Protocol

First, the patient is placed in a side-posture position (Fig 1). The knee on the superior side is elevated (ie, hip flexion) until the spinous process at the level of involvement begins to separate from the adjacent spinous process. For example, if L5 is to be adjusted, the knee should be flexed toward the patient's trunk until the L4 and L5 spinous processes begin to separate. This will increase the likelihood that TT functional vertebral coupled testing will more specifically affect the region of interest. Specific manual contacts are made by the doctor as if a manual adjustment were going to be employed, with a slow but steady increase in lateral bending and rotational

stress to the area of involvement, in concert with coupled vertebral movement patterns in the region of the spine being addressed. The objective is to reach the end-range of patient tolerance or the end of the elastic barrier, whichever comes first. Obviously, joint cavitation is not an objective for this specific testing maneuver, but rather to reach an end-range position just prior to cavitation, as tolerated. The protocol for other spinal regions will reflect those specific end-range positional stressors utilized by the clinician performing the specific adjustment.

A positive sign is reported pain, paraspinal muscle guarding, and/or functional compensations that prevent achieving end-range. A positive sign can suggest more than one diagnostic entity. A list of the hypothesized identifiable clinical syndromes associated with a positive TT is presented in Figure 2. It is recommended that diagnostic impressions arrived at with the use of this testing protocol be supported with other testing procedures.

It is recommended that the TT be utilized so that it is clinically applicable during the assessment process and in helping to establish a case management plan. Additionally, it may also be relevant with regard to patient at-home recommendations so that clinical progress can be positively promoted and so that patient self-sufficiency can become an early part of the case management plan as well. For example, if a patient has peripheral pain that worsens with the right side down and trunk lateral flexion and rotation introduced, the clinician may want to suggest a sleeping posture that will reduce negative consequences associated with this postural sensitivity.

This procedure may have some relative and absolute contraindications, for which to date there have been no research-based recommendations. However, a patient with a history of recent lumbar spinal fusion, for example, may not be one with whom you would want to introduce forceful spinal rotation.⁴⁷⁻⁵⁰

Figure 1. Positioning of patient for assessment.

1. Intervertebral disc derangement
2. Intervertebral foramen and/or spinal canal central stenosis
3. Spinal nerve root or spinal nerve irritation or inflammation
4. Space occupying lesion
5. Spinal vertebral mechanical dysfunction
6. Sciatic neuritis
7. Dural root sleeve adhesions
8. Vertebral instability
9. Pathologically restricted vertebral motion, such as DISH (diffuse idiopathic skeletal hyperostosis), ankylosing spondylitis, etc
10. Vertebral facet imbrication

Figure 2. Possible indications of positive TT maneuver.

This, of course, is a clinical decision that should be based on the culmination of evidence obtained from the entire consultation and assessment service visit, including outside records and imaging data. The TT may be used as a re-evaluation tool so that changes in clinical patterns can be documented and progress can be monitored, as indicated.

CASE REPORT

Case 1

A 32-year-old male had a chief complaint of low back pain at the lumbosacral junction that began insidiously two weeks prior to examination. Right lower extremity pain along the L5-S1 dermatome began a few days after the onset of low back pain, and had slowly progressed distally. He related that sciatic numbness and tingling went all the way down to his right foot. Coughing or sneezing aggravated the symptoms. He denied any trauma that may have triggered the onset of the symptoms, but did report that he sits for extended periods of time while conducting business meetings with clients. He related that the lower extremity symptoms had become more pronounced than the lumbosacral pain over time.

A straight leg raise (SLR) was positive on the right side at 45°, with Braggard's Test positive at 40°. Range of motion testing was conducted in concert with a McKenzie mechanical loading strategy and forward flexion, which was limited to 45°, resulted in a reduction in lumbosacral symptom intensity but in a significant increase in lower extremity symptom intensity to the distal right extremity (Fig 3). Extension was limited by pain in the lumbar spine to 5°, and the patient was asked to isometrically hold this position in 5° of extension. In this static position (mechanical spinal loading in extension), he reported the presence of a significant increase in lumbosacral pain. At the same time, and while still holding this static posture, he experienced a dramatic reduction of sciatic symptoms, with the distal pain centralizing to the right gluteal region (Fig 4). The right Achilles reflex was 1+, other reflex responses were 2+ and symmetrical. Pathological reflexes signs were not present. Heel and toe walk was performed with adequate motor strength, but the heel walk produced more lumbosacral pain. The Slump test was positive for an increase in right distal extremity pain, subsequent to the patient actively performing bilateral knee extension, dorsiflexion

Figure 3. Forward flexion produced a reduction in lumbosacral symptom intensity but an increase in symptom intensity to the distal right extremity.

and forward flexion of the trunk. Plain film anteroposterior and lateral weight bearing radiographs were negative for bony pathology but there was evidence of suboptimal vertebral relationships.

A likely primary diagnostic element present in this clinical presentation was right, posterolateral L5 intervertebral disc derangement with associated nerve root compression and neuroradiculitis. Since the onset was insidious, it may be likely that vertebral disrelationships were present and initially responsible for slow, progressive migration of the disc, but complete discussion of this potential etiology is beyond the intent of this manuscript.

The TT was then used on this patient. The patient was placed in a recumbent, right side down position and all of the tailored positional elements were introduced as if the manual adjustment were going to be performed. At end-range of motion, the patient related that he was experiencing an increase in peripheral symptoms all the way down his leg. Performing this maneuver with the patient in a recumbent left side down position resulted in a significant decrease in leg pain but with a marked increase in lumbosacral and gluteal pain.

Performing the TT with the patient in a right side down position caused pain peripheralization, indi-

Figure 4. While isometrically holding this position the patient experienced an increase in lumbosacral pain but a dramatic reduction of sciatic symptoms, with the distal pain centralizing to the right gluteal region.

cating that nerve root compression, and hence, distal neurological symptoms were being accentuated. It was determined that the patient should not be adjusted in this position, due to aggravation of symptoms. The patient was a strong candidate for the adjustment in the left side down position since there was pain centralization at end-range of motion in this posture, since symptom patterns are improving real-time with the patient providing subjective changes in symptomatic characteristics while these tests are being administered.

Case 2

A 49 year old female returned to the office for intermittent supportive care, secondary to lumbar degenerative changes. She was last seen approximately 10 weeks previously. She related that she was placed under general sedation 6 weeks ago for a hysterectomy. There were no reported complica-

tions. She experienced post-surgical soreness and did not drive for 5–6 weeks after the surgery was performed. She expressed concern that she may not be able to tolerate the side-posture adjustment at that time, since the healing process from the surgical intervention was not yet complete. She experienced the pain patterns that were typical for her, namely, intermittent lumbo-sacral pain without any radiating qualities. She denied the presence of associated symptoms or any new trauma to the involved region.

Traditional orthopedic tests were negative, except for Milgram's, which was positive for symptoms exacerbation at the lumbo-sacral junction. Neurological reflexes were 2+ bilaterally. No sensory asymmetries were present. Motor testing was normal. Pain was elicited with posterior to anterior pressure over the lower lumbar spine, but did not radiate. Heel walk produced some increased lumbo-sacral discomfort and toe walk could be performed normally. When trunk range of motion was performed, extension was the most limited and the most pain-producing. Plain film radiographs, taken previously, revealed lumbar hyperlordosis, an increased sacral base angle and degenerative disc disease at L4 and L5. On the radiographs, L4 was left laterally flexed and there was concomitant lumbar spinal tilt to the left. There was evidence to suggest an apparent short leg on the right side, which became balanced with the left side when both knees were flexed to 90 degrees. It was determined that the patient was suffering from recurrent lumbo-sacral pain secondary to lumbo-sacral facet imbrication and complicated by degenerative disc disease. Presentation was complicated by vaginal hysterectomy performed 6 weeks previous.

The TT was performed. The patient was placed in the right side down position and lower trunk lateral flexion and rotational elements were introduced in a slow and progressive fashion. The patient was instructed to indicate whether the pain was increasing (either from the lumbar spine and/or the pelvic region in general, where the surgical procedure was performed). She was also instructed to rank the pain using a verbal pain scale from 0–10. The patient reported low back pain at a 4/10 but that did not increase in intensity as torsion force was slowly increased. She experienced the same symptom pattern when she was placed on her left side. Since the patient was able to safely tolerate forces at end-range of motion, an adjustment force was intro-

duced and tolerated well bilaterally. Subjectively, there was significantly reduced pain immediately post-treatment and the patient was instructed to schedule for follow-up care in one month or as needed. At home self-care measures were also reviewed.

COMPARISON OF TT TO SLR

The SLR orthopedic assessment test has been used for many years and is considered by many health care providers to be a routine, standard test for patients presenting with back and/or leg pain suspected of having dural compromise. In order to assess the potential utility of the TT, the subjective clinical results obtained from using the TT were compared to those results obtained while using the SLR when both tests were used simultaneously in a group of similar patients.

Fifty patient files involving subjects presenting with back pain complaints, and in some cases leg pain or sciatica, were confidentially assessed at Northwestern Health Sciences University's Bloomington Natural Care Center.

A summary of the primary comparisons between subjective symptom patterns obtained while utilizing the SLR and TT tests are summarized in Figures 5–12. The majority of patients reported similar results with the use of both the SLR and TT. In Figure 5, 10 out of 26 patients had similar results when both the TT and SLR were performed. In 4 out of 24 subjects, back pain was replicated using the TT but was absent when using the SLR. The SLR revealed leg pain in 2 subjects that reported no pain with the

Figure 5. Comparison between subjective pain findings utilizing the SLR when the TT was positive for back pain and non-revealing for leg pain ($N = 26$). +B = centralized low back pain; -B = absence of centralized low back pain; +L = peripheral pain; -L = absence of peripheral pain; +UL = unilateral peripheral pain; +BL = bilateral peripheral pain.

Figure 6. Comparison between subjective pain findings utilizing the SLR when the TT was non-revealing for back and leg pain ($N = 24$). +B = centralized low back pain; -B = absence of centralized low back pain; +L = peripheral pain; -L = absence of peripheral pain.

Figure 7. Comparison between a chief complaint (CC) of low back pain and absence of peripheral symptoms with the subjective findings utilizing the TT ($N = 34$). +B = centralized low back pain; -B = absence of centralized low back pain; +L = peripheral pain; -L = absence of peripheral pain.

TT, suggesting that neurological traction in the extremity may be easier to detect with the SLR.

Figure 8 demonstrates that more patients with leg pain as an initial presentation experienced absence of leg pain and centralized back pain with the use of the TT. Figure 10 demonstrates that the SLR is consistent in replicating leg pain when it is part of the presenting complaint, but that it is not consistent with the replication of back pain in the same subjects. When patients presented without leg pain, the SLR was able to replicate back pain in only 20 out of 34 subjects (Fig 9).

The findings from the SLR and the TT together in a group of similar patients suggest that they may be addressing differences in patients that present with back and/or leg pain. More research on functional assessment reliability is encouraged, to increase the accuracy of diagnostic impressions and so that sub-

Figure 8. Comparison between a chief complaint (CC) of back and leg pain with the subjective findings utilizing the TT (N = 16). +B = centralized low back pain; -B = absence of centralized low back pain; +L = peripheral pain; -L = absence of peripheral pain.

Figure 9. Comparison between a chief complaint (CC) of back pain and absence of leg pain and findings utilizing the SLR (N = 34). +B = centralized low back pain; -B = absence of centralized low back pain; +L = peripheral pain; -L = absence of peripheral pain; +UL = unilateral peripheral pain; +BL = bilateral peripheral pain.

Figure 10. Comparison between a chief complaint (CC) of back and leg pain and subjective pain findings utilizing the SLR (N = 34). +B = centralized low back pain; -B = absence of centralized low back pain; +L = peripheral pain; -L = absence of peripheral pain; +UL = unilateral peripheral pain; +BL = bilateral peripheral pain.

Figure 11. Patients reporting a chief complaint of centralized low back pain and absence of peripheral pain and the outcome after a course of treatment (N = 34).

Figure 12. Patients reporting a chief complaint of centralized low back and peripheral pain and the outcome after a course of treatment (N = 13).

sequent case management plans and clinical outcomes can be improved.

CONCLUSIONS

Changes in manual pressure applied to the spine can alter coupled vertebral spinal motion patterns and so it can be challenging to predict patient response to a spinal adjustment.⁴⁷ There is evidence that the use of functional maneuvers may serve the clinician in the decision-making process regarding the specificity of the case management plan.⁵¹ The TT will hopefully add an additional component to the assessment procedure and provide predictive value regarding the prognosis for some of the clinical presentations that are usually unique and many times multi-dimensional in the clinical setting. Further research regarding the use of this assessment screen is encouraged, especially relevant to reliability, specificity, validity and predictive value.⁵² Along

with the author, many doctors may have instinctively used elements of this screening assessment in the past. This testing procedure is now formally introduced with a more standardized protocol and with a broad range of application.

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