PAIN POINTS

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Function over Structure

The Janda approach to chronic musculoskeletal pain emphasizes muscle function.

THE LATE VLADIMIR JANDA, A Czechoslovakian neurologist and physiatrist, knew about chronic musculoskeletal pain long before he devoted his medical career to the study of muscle imbalance.

Dr. Janda contracted polio during his teen years and spent three years of his young life in rehabilitation. Those years would lay the groundwork for his extensive clinical research on the pathogenesis and treatment of chronic musculoskeletal pain. He is known around the world for his concepts of muscle imbalance and continued to be active in clinical practice, research and lecturing until his death in November 2002.

Dr. Janda published his first book on muscle testing at the age of 20. Noting the work of Hans Kraus, as well as that of Henry and Florence Kendall, Dr. Janda became intrigued by the functional role of muscles. He first observed that patients with polio and those with low back pain often had a dysfunctional gluteus maximus.

Those observations led him to test his patients with surface electromyography, in which he noted patterns of muscle contraction with particular limb movements. He, therefore, concluded that the recruitment patterns and speed of muscle contraction should be emphasized, rather than muscular strength. He also theorized that muscle imbalance was predictable and involved the entire motor system.[1]

Dr. Janda believed in two schools of thought in musculoskeletal medicine: structural and functional. The structural approach relates pain and/or dysfunction with the pathology of specific static structures. This is the typical orthopedic approach that stresses diagnosis based on localized evaluation and special tests, such as X-rays, MRIs and CT scans.

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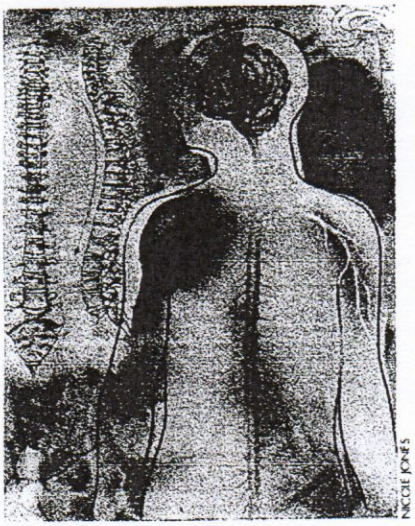

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The functional approach, on the other hand, recognizes the function of all processes and systems within the body, rather than focusing on a single site of pathology. While the structural approach is necessary and valuable for acute injury or exacerbation, the functional approach is often preferable when addressing chronic musculoskeletal pain. This is the basis of the Janda approach to evaluating and managing chronic musculoskeletal pain.

With chronic pain, special diagnostic tests of localized areas (for example, low back radiographs) are often normal, although the patient complains of pain. Often, however, the site of pain isn't the cause of the pain. Recent evidence supports that chronic pain is centrally mediated,[2] but remains evident in the musculoskeletal system. Mannion et al. came to similar conclusions, noting improvements in patients with chronic low back pain regardless of the type of exercise they performed.[3] This research supports the basis of Dr. Janda's approach: the interdependence of the musculoskeletal and central nervous system.

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DID YOU KNOW
Steroids were introduced in the 1950s for arthritis pain.

Dr. Janda purported that these two anatomical systems cannot be separated functionally. Therefore, the term "sensorimotor" system defines the functional system of human movement. In addition, changes in one part of the system will be reflected by compensations or adaptations elsewhere in the system as the body attempts to achieve homeostasis.[4]

The muscular system often reflects the status of the sensorimotor system, as it receives information from the musculoskeletal and central nervous systems. Changes in muscle tone are the first responses to nociception by the sensorimotor system. Various studies support this, demonstrating the effect of joint pathology on muscle tone.

For example, knee effusion causes reflex inhibition of the vastus medialis.[5] The multifidus has been shown to atrophy in patients with chronic low back pain,[6] and muscles demonstrate increased latency after ankle sprains[7] and ACL tears.[8] Moreover, Bullock-Saxton demonstrated the global effect of joint pathology on the sensorimotor system.[9] In fact, she noted a delay in firing patterns of the hip muscles and decreased vibratory sensation in patients with ankle sprains.

Because the CNS is involved in muscle imbalance and pain, the Janda approach emphasizes the importance of the afferent proprioceptive system. A reflex loop from the joint capsular mechanoreceptors and the muscles surrounding the joint is responsible for reflexive joint stabilization.[10-11] In chronic instability, deafferentation (loss of proper afferent information from a joint) is often responsible for poor joint stabilization.[12]

Dr. Janda identified two groups of muscles based on their phylogenetic development: tonic and phasic.[13] The tonic system consists of the "flexors" and is phylogenetically older and dominant. These muscles are involved in ▷

repetitive or rhythmic activity[14] and are activated in flexor synergies. The phasic system consists of the "extensors" and emerges shortly after birth. These muscles work eccentrically against the force of gravity and emerge in extensor synergies.[14]

Tonic system muscles are prone to tightness or shortness, Dr. Janda noted, and the phasic system muscles are prone to weakness or inhibition. Based on his clinical observations of orthopedic and neurological patients, Dr. Janda found that this response is based on the neurological response of nociception in the muscular system. For example, following structural lesions in the CNS (such as cerebral palsy or stroke), the tonic flexor muscles tend to be spastic, and the phasic extensor muscles tend to be flaccid. Therefore, patterns of muscle imbalance may be due to CNS influence, rather than structural changes within the muscle itself.

This classification is not rigid, however; some muscles may exhibit tonic and phasic characteristics. And structural changes within the muscle also contribute to muscle imbalance. However, with chronic pain that's centralized in the CNS, patterns of muscle imbalance are often a result of neurological influence rather than structural changes.

Over time, these imbalances will spread throughout the muscular system in a predictable manner. Janda has classified these patterns as "Upper Crossed Syndrome" (UCS), "Lower Crossed Syndrome" (LCS) and "Layer Syndrome" (LS).[15,16]

Crossed syndromes are characterized by alternating sides of inhibition and facilitation in the upper quarter and lower quarter. Layer syndrome, essentially a combination of UCS and LCS, is characterized by alternating patterns of tightness and weakness, indicating long-standing muscle imbalance pathology.

USC is characterized by facilitation of the upper trapezius, levator, sternocleidomastoid and pectoralis muscles, as well as inhibition of the deep cervical flexors, lower trapezius and serratus anterior. LCS is characterized by facilitation of the thoraco-lumbar extensors, rectus femoris and iliopsoas, as well as inhibition of the abdominals (particularly transversus abdominus) and the gluteal muscles.

By using Dr. Janda's classification, you can begin to predict patterns of tightness and weakness in the sensorimotor system's attempt to reach homeostasis. These changes in muscular tone create a muscle imbalance, which leads to movement dysfunction. Muscles prone to tightness generally have a "lowered irritability threshold" and are readily activated with any movement, thus creating abnormal movement patterns.

These imbalances and movement dysfunctions may have a direct effect on joint surfaces, thus potentially leading to joint degeneration. In some cases, joint degeneration may be a direct source of pain. But the actual cause of pain is often secondary to muscle imbalance. Therefore, it's important to find and treat the cause of the pain, rather than focus on the source of the pain.

Evaluating muscular imbalance begins with static postural assessment, observing muscles for characteristic signs of hypertrophy or hypotrophy. This is followed by observing single-leg stance and gait. Static posture, gait and balance often give the best indication of the status of the sensorimotor system. Computerized force plate posturography is often valuable in quantifying sensory and motor deficits.

Next, assess characteristic movement >

patterns, and test specific muscles for tightness or shortness. Surface electromyography is useful for quantifying muscle activation patterns. All of this information gives clinicians a system to determine or rule out the existence of muscle imbalance syndromes. Moreover, identifying specific patterns and syndromes of imbalance helps clinicians choose appropriate interventions to address the cause of the dysfunction.

The Janda approach to treating musculoskeletal pain follows several steps. It begins with normalizing afferent information entering the sensorimotor system. This includes providing an optimal environment for healing (by reducing effusion and protecting healing tissues), restoring proper postural alignment (through postural and ergonomic education) and correcting the biomechanics of a peripheral joint (through manual therapy techniques).

Once peripheral structures are normalized, muscle balance is restored by normalizing muscle tone around joints. Sherrington's law of reciprocal inhibition states that a hypertonic antagonist muscle may be reflexively inhibiting its agonist.[16] Therefore, if antagonist muscles are tight and/or short, restore normal muscle tone and/or length first, before trying to strengthen a weakened or inhibited muscle. Make sure techniques to decrease tone are specific to the cause of the hypertonicity. These include post-isometric relaxation[17] and post-facilitation stretch.[15]

Muscles that have been reflexively inhibited by tight antagonists often recover spontaneously after tightness is addressed. With the Janda approach, the coordinated firing patterns of muscle are more important than the absolute strength of muscles. The strongest muscle is not functional if it cannot contract quickly and in coordination with other muscles. Therefore, the Janda approach doesn't emphasize isolated muscle strengthening. Instead, muscles are facilitated to contract at the proper time during coordinated movement patterns to provide reflexive joint stabilization.

The Janda approach emphasizes the importance of the afferent proprioceptive system.

Once muscle balance has been addressed, Dr. Janda stressed increasing proprioceptive input into the CNS with a specific exercise program, "Sensorimotor Training" (SMT).[18] This program increases afferent information entering the subcortical pathways—including spinocerebellar, spinothalamic and vestibulocerebellar pathways—to facilitate automatic coordinated movements. SMT involves progressive stimulation through specific exercises with increasing levels of challenge to the sensorimotor system. It has been proven to improve proprioception, strength and postural stability in ankle instability,[12] knee instability[8] and after ACL reconstruction.[19]

Finally, endurance is increased in coordinated movement patterns. Because fatigue is a predisposing factor to compensated movement patterns, endurance is more important than absolute strength. Exercises are performed at low intensities and high volumes to simulate activities of daily living.

The Janda approach is valuable in today's managed care environment. Once you identify these patterns and syndromes, you can implement specific treatment without expensive equipment. By detecting these causes of chronic pain early, you can treat patients with fewer visits and less expensive equipment compared to traditional interventions that emphasize modalities and passive treatments.

The key to the Janda approach is the home exercise program. Inexpensive exercise equipment, such as wobble boards, elastic bands and foam pads are used with a specific progression of exercises as the patient improves in function.

The approach emphasizes the importance of the CNS in the sensorimotor system and its role in the pathogenesis in musculoskeletal pain. In particular, it emphasizes the neurological pre-disposition of muscles to exhibit predictable changes in tone, and the importance of proprioception and afferent information in regulating muscle tone and movement.

Therefore, to assess and treat chronic musculoskeletal pain, focus on the sensorimotor system, rather than the musculoskeletal system itself. Using a functional—rather than a structural approach—the Janda approach can help you quickly identify and address the cause of musculoskeletal pain. Once you do that, relief is on the way. ■

For a list of references, go to www.ADVANCEforDR.com and click on the references tool bar.