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Pain, Activity Limitation, and Dysfunction: How Rehabilitation Can Help

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The functional restoration model is concerned with activity limitation and pain. The goal of modern care of musculoskeletal problems is two-fold: reactivate patients and provide pain relief; restore function and teach them self-treatment skills so that recurrences can be reduced. Patient evaluation involves a combination of history and examination to determine which specific activities are limited, the mechanical nature of the pain, and the patient's functional status. Such an evaluation is goal-oriented and gives the doctor a view to specific functional end points of care.

History and Examination

Functional evaluation begins with history. Finding out what activities are limited is the key to appropriate goal setting. It is necessary to find out which specific movements or positions are provocative of pain. The patient's tolerance for different sitting or standing postures, or walking activities must be determined. Any sensitivity to weightbearing such as a gravity intolerance should also be sought. The history is followed by an examination which checks the patient's movement, postural, or weightbearing sensitivities. Range of motion (ROM) testing is an excellent starting point for determining provocative and relieving mechanical behaviors. Specific positions (i.e., Gaenslens), skills (i.e., kneeling), or movement stereotypes (i.e., supine trunk flexion) may be evaluated for more detailed information. Evaluating the body's response to different loading strategies is necessary for clarification. For instance, motion palpation evaluates mechanical responses at end-range. McKenzie evaluation evaluates mechanical and symptomatic effects of repetitive and/or sustained end-range loading. Cyriax identifies muscular lesions by pain with resisted motion and nonmuscular lesions by pain with passive motions. Pain-generating soft tissues can also be identified by palpation for tender or trigger points.

Cyriax was a pioneer in using a systematic approach to determine the tissue which was provocative of pain. He incorporated passive and active ROM and resisted muscle testing to determine if muscle or joint sensitivity was primary. He divided patients into those with contractile (muscular) vs. inert (joint, ligament, bursa) conditions. For joint problems he further subdivided them into capsular vs. noncapsular patterns. This approach was easiest to apply in the extremities. McKenzie expanded this model by adding the use of repetitive active movements to end-range for the spine. He was thus able to classify patients into derangement, dysfunction or postural syndromes.¹ Of particular value was McKenzie's ability to identify the specific direction of self-generated movement which could safely centralize radicular symptoms. Vollowitz has added to this model a thorough history and examination for positional, movement, and weightbearing sensitivities.² The goal is to identify movements and positions which are painless or painful so that an exercise prescription of safe, painless exercises can be established.

McKenzie's derangement patients have pain which is worsened by repeated movements. This is believed to be related to an internal disc displacement. Dysfunctions have pain which is provoked only at end-range, but no symptom aggravation occurs as a result of the test movements. Such dysfunctions are thought to be the result of "adaptive shortening." Postural patients are not irritated by most test movements. Their pain is believed to be from prolonged static overstrain, and thus is not provoked by single or repeated test movements. However, postural pain can be provoked by sustained loading at end-range.

The derangement syndrome is the only syndrome that has pain during mid range motion (i.e., pain while moving from sitting to standing). This pain can change rapidly as a result of different movements or positions. Typically, forces applied in one direction make the patient worse, while forces applied in the opposite direction may benefit the patient. Often this occurs with radicular symptoms and is accompanied by a trunk list. Once the list is reduced, the classic McKenzie patient has pain which peripheralizes with flexion and centralizes with extension. Extension is thus the prescribed direction of therapeutic motion.

According to McKenzie patients whose pain is aggravated by a trial of repeated end-range extension movements, and are either status quo or better with flexion movements, have a derangement involving an anterior disc problem.³ They will typically respond well to flexion movements (i.e., self stretching or postisometric relaxation) or procedures which can gap the posterior facet joints (i.e., chiropractic adjustments).

Dysfunction patients have pain which appears at end-range loading of a shortened structure. This is thought to be from adaptive shortening either in a muscle or joint capsule. Unlike derangement patients once the end point is released there is immediate relief. Clinically, the patient has decreased range of motion and pain at end-range. The McKenzie system prescription for dysfunction is to stretch the tissues in the painful direction for a few weeks.

The third McKenzie classification is the postural syndrome. This patient has generalized pain, but no movement can be found which provokes pain. A history of pain after prolonged sitting or standing is common. Such pain is believed to be the result of prolonged static overstrain and thus the prescription is improved posture, ergonomic support, and frequent "micro-breaks" with stretching.

The McKenzie system's allure is best exemplified by the derangement syndrome where therapeutic movements can be adjudicated on the basis of their ability to centralize radicular symptoms or reduce pain. Here a specific direction of movement can be ascertained which aggravates the patients symptoms and another direction which relieves those symptoms. Neither the dysfunction or postural syndromes result in such clear test results. Repeated end-range testing in dysfunction patients does not reveal a pain relieving direction of therapeutic movement. In fact, the prescription is to stretch into the same direction which caused pain. Postural patients also do not have a clear pattern of test movements which either provoke or relieve symptoms.

Another model for looking at dysfunction and posture is the functional pathology of the motor system model (see "DC" June 16, 1995). Dysfunction patients typically do have "adaptive shortening" as McKenzie suggests, but according to Janda, such shortening is usually not the cause of their pain, instead it is an adaptation to injury, poor posture, or repetitive strain.⁴ Overstress of a joint will predictably lead to shortening and/or overactivity of postural muscles and weakness and/or inhibition of phasic muscles. The key to treating this muscle imbalance is facilitation of the inhibited "weak link" by a specific spinal adjustment.⁵ Sometimes, the muscle imbalance has been present long enough to change stereotypical movement patterns such as gait or prehension on a reflex, subcortical basis. This faulty programming in the central nervous system -cerebellum will not usually be corrected by treatment operating at the segmental spinal level such as spinal adjustments. Specific exercises, such as proprioceptive training, designed to include the "weak link" in functional activities on a reflex basis are necessary.

A synthesis of Cyriax, McKenzie, Vallowitz, and Janda is possible. The following chart demonstrates the use of these complementary exercise interventions.

Acute pain

- Determine direction of end-range movement which centralizes or reduces pain (McKenzie derangement syndrome) >> Perform end-range repeated exercises throughout the day and avoid provocative positions

Subacute or Chronic pain

- Determine range of movement which is both painless & biomechanically appropriate for the task at hand ("functional range") (Vallowitz, Morgan) >> Perform exercises within the "functional range" which can retrain kinesthetic awareness and recondition weak muscles. The key is to avoid provocative movements and stay within the "functional range" while training the muscles and motor control to exhaustion.
- Determine muscle imbalances (related tight and weak muscles) (Janda) >> Intervention begins with treatment of joint dysfunction which can facilitate "weak link" >> If necessary, perform post-isometric relaxation on tight or overactive muscles >> If muscle imbalance still programmed in the cerebellum utilize exercises designed to selectively activate the "weak link" in functional activities (i.e., proprioceptive retraining)

Exercise (McKenzie, stabilization, proprioceptive), education (sitting/standing/lifting posture), and manipulation (joint, soft tissue) are all important in rehabilitation. Purely provocative approaches such as McKenzie are most important in the acute phase when pain is excessive. However, as soon as possible functional pathology of the motor system and the quality of movement should be evaluated so that we can attempt to treat the cause of the pain. In the end our goal is twofold. First, that postural, movement, and weightbearing sensitivities are reduced so that our patient has little or no activity limitation in the job or lifestyle; and, second that function is restored and that they have learned self-treatment skills so that recurrences can be minimized.

References

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