SWEETMAN TECHNIQUE

A Dynamic Three-Dimensional Evaluation of Fascial/Connective Tissue Restrictions

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This paper introduces a three-dimensional dynamic standing evaluation technique that is an important element when considering the total body musculoskeletal asymmetries and dysfunctions. The technique demonstrates the influence of connective tissue, muscular, and skeletal imbalances, by eliminating visual (exteroceptive input) and decreasing muscle joint (proprioceptive) input. The restrictive nature of the connective tissue then takes precedence, causing the body to move into the restrictions along the lines of pull. This technique identifies specific directional connective tissue/fascial restrictions, thus enabling the practioner to adapt a treatment program that is specific and in accordance with an individual's needs.

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This evaluative technique was presented by Sweetman and Lossing at the Twenty-First International Congress for Physiotherapy in a paper entitled "Dynamic Three-Dimensional Evaluation and Biomechanical Treatment for Neck and Back Pain Using Positional Distraction."[1] It has been used as a teaching tool in evaluating the total body in *An Integrated Approach to Spinal Management, Art of Touch, Total Body Concept (TBCTM)* seminars since 1988. It is a necessary evaluative consideration in the chronic dysfunctional patient because of muscular and connective tissue imbalances and adaptive postural malalignments that have occurred over time.

Usage

The author has used this dynamic three-dimensional evaluative technique in addition to the traditional musculoskeletal evaluative measures since 1988 and suggests that it as an important factor to be considered when planning an effective comprehensive treatment program. It is used on the long-term chronic patient with multiple pain syndromes. It is not used on patients who have been acutely and directly traumatized, as the restrictive components have not yet become a factor in the newly formed asymmetry and dysfunction. It is used rarely as a reevaluative measure during a treatment program, so the patient does not become knowledgeable in motion awareness in the testing situation. However, if the patient has a history of many years as a chronic pain patient, and the treatment program is long term, it is helpful in reevaluation to periodically monitor the different multidirectional pulls that often change because of the elimination of gross restrictions. It is used upon discharge to ascertain whether there are asymmetries still apparent. If the treatment program is effective, the normal reevaluative measures will demonstrate perfect symmetrical balance with no abnormal motion in any direction.

Procedure

The instructions given to the patient have an important effect. It is imperative that the subject is entirely at ease with no fear of falling. A state of relaxation and trust is essential.

Have the patient step onto the block of foam. (The foam decreases proprioceptive input.) Assure the patient you will not let him fall. Place your hands on each shoulder of the patient. If restrictions are blatant in one direction or another, position yourself accordingly. There must be enough contact to give support, giving the patient the feeling of stability.

Have the patient place his or her feet together. (This decreases the base of support.) Reassure the patient you will not allow him or her to fall.

Next, have the patient close his or her eyes. (This eliminates visual balance mechanisms-exteroceptive input.) Explain to the patient that it may *feel* as if he is moving a great distance in space, but that the movement really is very small. At the same time, make certain that the patient is not co-contracting leg, torso, or cervical musculature to keep from falling. At this time, begin giving a gentle passive resistance that allows the patient to move slowly through the lines of abnormal tissue pulls while you are giving a gentle support and, if necessary, preventing a fall. You must be relaxed enough to be able to flow with the dynamic pull of tissues that create motion, and to move with the patient into the range of the restrictions.

Normally, if the patient is totally relaxed, restrictions begin to pull within 5 to 10 seconds after the visual (exteroceptive) input and joint and muscle receptors (proprioceptive) input is decreased. The practitioner feels for muscle tone, muscle contractions (to be certain the patient is not guarding), and bodily motion. Feel exactly how the body is being pulled and move with it into changes of posture. This usually takes place in a "slow-motion" effect. Consider all the gross motions of the body in a three-dimensional space. Motions to be considered are: anterior-posterior, lateral, torsional, multitorsional, diagonal, multidiagonal.

For instance, restrictions may cause a patient to side-bend to the left as the right shoulder moves forward and downward towards the left hip as the left hip moves more medially and posteriorly and the right hip moves laterally and anteriorly. This would be documented as: Dynamic Three Dimensional Evaluation demonstrated gross directional fascial/connective tissue restrictions: right lateral shift, left torso restrictions; diagonal and torsional torso restrictions-right shoulder to left hip; lower quarter torsional pull-left hip posterior, right hip anterior.

An evaluation graph and/or pictures help substantiate directional pulls into different ranges (see Figs. 1-4).

For the extremely involved

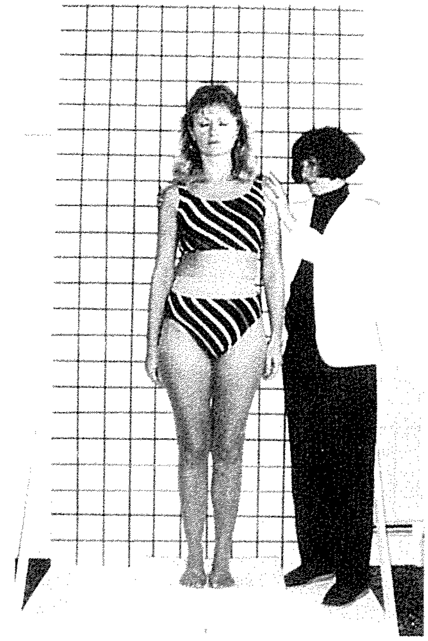

Figure 1. Applying gentle passive resistance, allowing the patient to move slowly through lines of abnormal tissue pulls. Note that the patient stands on a block of foam. (Polyurethane foam, 15" x 26", 10-cm thick, density = 0.003 g/mL, compressibility of 0.04 psi/in^2.

Figure 3. Moving patient through flexion and rotation.

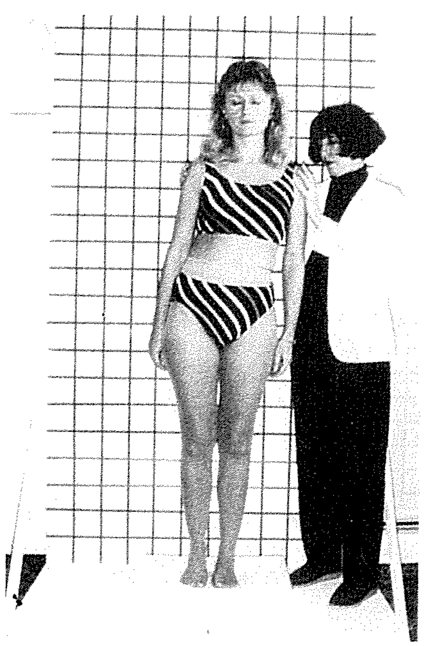

Figure 2. Moving patient slowly through lateral flexion which incoporates rotation as a conjunct movement.

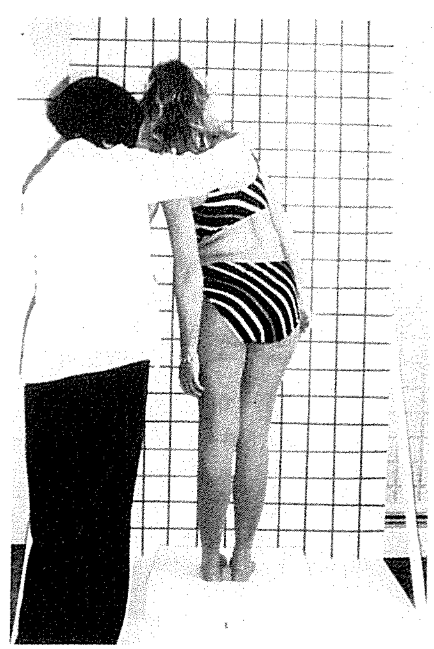

Figure 4. Moving the patient slowly through extension and rotation.

chronic patient with multiple restrictions, a reevaluation at a later date will enable you to attend to the next primary source of restrictions.

When the practitioner believes all restrictions have been eliminated, the musculoskeletal system is balanced, and the patient is ready for discharge, the patient should be reevaluated using this method. The patient should be able to stand in perfect balance with no apparent motion as you gently support him or her at the shoulders.

Discussion

The body acts as a total three-dimensional unit, not as individual pieces that are merely adjacent to each other. Each motion, position, and symmetry has a direct effect on every other motion, position, and symmetry throughout the body.

It is well established that the cerebellum plays an important role in the maintenance of equilibrium. It acts as a major switchboard for the receiving, monitoring, coordinating, and sending of impulses throughout the body. It receives proprioceptive input from the muscle and joint receptors, and exteroceptive input from the visual receptors, head, trunk, and lower extremities. Proprioceptive (interoceptive) stimuli originate in muscles, tendons, connective tissue, fascia, and joints and send information to the cerebellum as to their state of position, length, and tension. Visual stimulation, classified as exteroceptive stimuli, sends information to the cerebellum for balancing.[2]

Musculoskeletal balance for postural tone, equilibrium, and movement depends on proprioceptive (or interoceptive) input of the muscle and joint receptors and exteroceptive input of visual stimuli.[3,4] We must also take into consideration the skeletal alignment, muscle length, strength, tone, and reflexes. Skeletal set, or postural habits, also influence the control of posture, all skeletal motor movement, coordination, and stabilization.[5] Both postural set and individual inherent stiffness properties of muscles may be produced from exteroceptive as well as muscle proprioceptive inputs.[6]

Fascia, a component of connective tissue, has a biomechanical effect on muscle, and has a role in the development of muscle tension and maintenance of muscle force.[7] It is a three-dimensional structure with interlacing, scissor-like fibers that facilitate adaptive changes. Scarring in the muscle collagen network determines severity of connective tissue structural changes. This can also effect muscle strength.[8,9] In healing, fibroblastic activity contributes to the reorganization and regeneration of connective tissue properties. Functional adaptation and restriction of tissues are related to the organization of extracellular matrix components and structure of connective tissue.[8–11] Each adaptation causes further compensations throughout the musculoskeletal system.

Physics teaches us that the center of gravity of a body is a point about which the mass of that body is distributed equally. Erect and balanced posture infers that a body is in stable equilibrium when a vertical line is drawn through the tip of the ear, shoulder, T12, S2, and lateral malleolus. The vertical line does not fully evaluate torsional aspects, nor does it take into account deviation from normal spinal curvature. Muscles and connective tissue of the torso provide a flexible support for the vertebral column in relation to the pelvic girdle and shoulders, SI, head, neck, and extremities. All must be in proper alignment and torsionally balanced and/or be within a physiological pain-free range for optimal motion. Unfortunately, musculoskeletal guarding, spasms, and pain in relation to the musculoskeletal misalignments often become chronic when trying to maintain posture and function.

A widely accepted neuromuscular adaptation phenomenon is when an antagonist muscle or muscle groups within the body are weak, the weakness is usually counterbalanced by an increased tone in the opposite, or agonist muscle or muscle groups. As the body is subjected to these imbalances, adjustments are made through deviations and compensations throughout the body in a three-dimensional manner to maintain a vertical balance in the musculoskeletal system. A very slight leg length discrepancy of as little as 1 cm may be biomechanically important, as it results in a significant shift of the mean center of pressure position and an increase in postural sway.[12]

To help maintain balance, an individual may restore equilibrium by moving the body mass backward or forward, changing the center of gravity. These compensatory torques take place about the ankle, and can be influenced by support-surface conditions.[13]

We know that proprioception is best when input from skin, muscles, and joints are all contributors. Joint receptors are necessary for normal proprioceptive activity.[14] Inaccurate or conflicting visual and/or proprioceptive information is an important assessment of balance function even in symptomless subjects.[15]

It is well known that visual information (exteroceptive input) also plays an important role in posture. Many investigators have shown that postural activity and muscle responses are influenced significantly by visual input, change of body position, motion, and balance.[16–19]

Interrelationships of the body are at a disadvantage if blood gets entrapped: muscle spasms are prolonged, muscle guarding takes place, fascial tissues undergo inflammatory shrinkage. Changes in the cell environment impede proper metabolism, scars develop causing improper alignment of fascial fibers, fibroblastic activity disrupts the even flow of collagenous fibers which then adhere improperly with movement. Misaligned vertebrae, muscle shortening, asymmmetrical shoulder or pelvic girdles, or loss of fascial/connective tissue mobility may create gross improper structural pulls on the entire musculoskeletal system, causing very definite restrictive properties that are difficult to diagnose. Therefore, by combining the elimination of visual exteroceptive input and decreasing joint and muscle proprioceptive input, it is possible to evaluate where connective tissue restrictions have occurred, and where musculoskeletal imbalances are. This is achieved by closing the eyes to eliminate visual stimulation, by eliminating the base of support by placing the feet together, and further reducing the joint and muscle proprioceptive input by standing on a piece of foam. Motion, direction of motion, muscle movement, and tone add to an evaluation of musculoskeletal/connective tissue imbalances throughout the entire body. The pulling nature of these imbalances or restrictions that have occurred subsequently enables the practitioner to make a viable treatment program that addresses connective tissue restrictions and musculoskeletal imbalances.

If these restrictive tissues are not taken into consideration and diagnosed, treatment programs will not reflect these very important dysfunctional properties, particularly in the chronic pain patient.

Case Study

Thirty-year-old male chief complaint: chronic lower back pain, left shoulder and medial scapular pain. Intermittent flare-ups. MVA 7 years of age. Sitting, stair climbing, active activities, i.e., hiking, bicycling, volley ball, increased pain significantly.

Soft tissue evaluation: head tilted to left, rotated to right. Upper extremities internal rotation, lower extremities external rotation. Asymmetrical shoulder girdle left higher than right. Uneven medial borders of scapula (3″ from spinous process on left and 3 3/4″ from spinous process on right). Increased left waist curvature, umbilicus "pulled" to right, flattened thoracic kyphosis, asymmetrical pelvic girdle indicating right anteriorly rotated ilia. He also demonstrated a decreased cervical lordosis, 3 1/2″ forward head (2 1/4″ normal; however, flattened thoracic curve noted).

Range of Motion

Cervical:

- Left rotation: 45°
- Right rotation: 55°
- All other motions WNL

Shoulder:

- WNL (asymmetry noted, tightness on left)

Trunk Mechanics with Pelvic Girdle Stabilized:

- Flexion: full, but noted a flattened thoracic T5-T12
- Extension: full, but noted that all motion was from upper thoracic
- Rotation: Right-decreased significantly (negligible motion) due to tightness; Left-full
- Side-bending: Right decreased significantly, flattened lower spinal curve, motion from upper thoracic; Left-WNL

Tissue mobility:

Restricted anterior and dorsal thoracic regions. Lateral and caudal restrictions anteriorly and lateral, caudal, and right diagonals to right shoulder (due to tightness on left).

His Dynamic Three Dimensional Evaluation: left lateral motion, torsional twisting motion with right shoulder moving forward and down toward left hip while the left shoulder moved posteriorly, caudally, and diagonally towards the right hip. Documented as: Dynamic Three-Dimensional evaluation demonstrated gross fascial/connective tissue restrictions: left torso tightness, diagonal torsional components—right shoulder anteriorly and diagonally to right hip. Significant torsional and diagonal components that were opposite from each other on the anterior and posterior planes.

Treatment plan: utilize Total Body Concept to balance musculoskeletal system. Decrease gross soft tissue restrictions, balance pelvic and shoulder girdles, increase ROM, improve flexibility and quality of motion, improve specific muscle skill and then strengthen as tolerated without increasing spasms or dysfunctions.

Modalities and treatment techniques of choice include: moist heat, Neck Trac, Back Trac, manual traction, soft tissue mobilization and massage, trigger point releases, cranial-sacral therapy, myofascial release, joint mobilization, therapeutic exercises to include specific and general stretching, muscle skill, specific and general strengthening, kinetic activities, postural training.

This patient was seen intensively for a total of 3 days in October, 6 days in November, 3 days in December, and 1 day in March for follow-up. (Intensive therapy sessions: 2 1/2 hours to 6 hours per day. This was necessary because of patient's scheduling problems at work and distance to Body Ease Physical Therapy Centre. It is not necessary to schedule in this manner.)

At time of discharge, this patient was able to continue a strong home program with stretching and strengthening while increasing all physical activities without increase of pain or dysfunction. The musculoskeletal system appeared to be balanced. Pelvic girdle and shoulder girdles level, cervical, shoulder ROM full, good quality; trunk mechanics full-good quality. Dynamic three-dimensional connective tissue evaluation demonstrated no side, torsional, or diagonal gross movements perceived while testing. Patient was able to stand in perfect balance on testing foam, feet together, eyes closed while being lightly stabilized.

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