Ligament Interlink

Ligament interlink technique in applied kinesiology is based on the interaction of joints during gait. In quadruped walking, there is toe extension of the contralateral forelegs and hindlegs during the stance phase, and flexion during the swing phase. This correlation of motion is present throughout the extremity joints, including the elbows and knees, shoulders and hips. The same correlative motion is present in the biped, but it is less easily recognized in the distal articulations of the hand. When walking quickly in a relaxed manner, it can be observed that the wrist flexes and extends in unison with the contralateral ankle. The fingers also tend to flex and extend in unison with the toes of the contralateral extremity. The correlation between shoulder and hip and elbow and knee is obvious.

Goodheart[27] first observed the possibility of additional factors in the correlation of contralateral upper and lower limbs in a patient with severe inflammatory swelling of the knees, caused by rheumatic fever. The patient could obtain relief in his knee by flexing his elbow. Upon extending or stiffening his elbow, the knee pain became worse.

Sometimes an enigmatic joint pain can be explained by the ligament interlink technique. In this situation there is joint pain, yet no positive therapy localization, challenge, or other evidence of disturbed joint function or pathology. A positive ligament interlink test is when there is no positive therapy localization of the joint; however, when the contralateral correlating gait joint is simultaneously therapy localized, it becomes positive. An example is pain in an elbow joint which tests negative during all testing procedures, but becomes positive when there is simultaneous therapy localization to the elbow and the contralateral knee. In a positive ligament interlink case, both the elbow and knee will have negative therapy localization when done separately. If therapy localization is positive to either joint, determine the cause and correct it before further evaluating for ligament interlink.

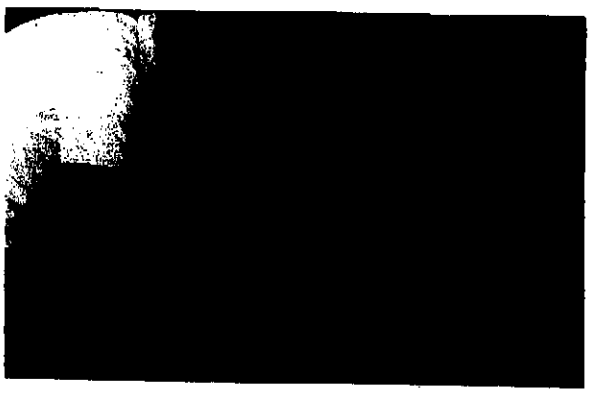
In an effort to find some factor that would interrupt the positive two-handed therapy localization, Goodheart applied manipulation and other therapeutic efforts to the articulation(s). In general, these efforts were ineffective in eliminating the pain at the articulation. It was found that moving the hyoid interrupted the positive two-handed therapy localization. Goodheart hypothesized that moving the hyoid stimulates the proprioceptors of the hyoid muscles in some way to influence the neurologic crossover mechanism connecting the two articulations[27]. A system was developed to treat the painful condition, using hyoid movement in conjunction with manual stimulation of one of the articulations.

Procedure

First the painful articulation is evaluated with therapy localization. If positive, the usual AK procedures of manipulation, muscle balancing, and others are performed to eliminate the positive finding. When therapy localization is negative, the joint is therapy localized simultaneously with the appropriate contralateral articulation. Weakening of a previously strong indicator muscle is positive indication of ligament interlink involvement.

The positive two-handed therapy localization is generally specific to associated ligaments. For example, elbow flexion correlates with contralateral knee flexion. Evaluate the action of the ligaments at the painful elbow, and therapy localize comparable ligaments in the knee. Considering the arm held in the anatomical position, the lateral aspect of the elbow correlates with the medial side of the knee because in this position the forearm moves anteriorly with elbow flexion, and the leg moves posteriorly with knee flexion. The correlation of the wrist-ankle, hand-foot is that the thumb equates with the great toe and the little finger with the 5th toe.

6—22. Therapy localization to wrist while in position to move only slightly for second phase of test.



6—23. Second phase, two-handed therapy localization to wrist and ankle. Subject's arms are not touching the knee, which could add another variable.

6—24. Digital massage of ankle ligaments for wrist pain, while patient holds hyoid toward side of therapy on the ankle. Wrist contact by doctor is only for monitoring pain reduction.

Therapy for positive ligament interlink is digital stimulation of one of the points of positive therapy localization while the hyoid is held toward the side being stimulated. The joint to stimulate is the one which is less tender. It is generally the joint contralateral to the joint with the patient's pain. In some cases the contralateral joint may be more painful. In any case, choose the less painful one.

Digital manipulation is applied with eight to ten pounds of pressure intermittently for thirty to forty seconds. Throughout the digital manipulation of the ligament, the patient holds the hyoid toward the side of manipulation. While administering the manipulation, the physician monitors the contralateral articulation for pain reduction.

The contralateral joint correlation described is nearly always the pattern observed. Occasionally the pattern can be ipsilateral. The same two-handed therapy localization and treatment procedures are applicable. The reason for the unusual ipsilateral pattern is unknown. It does not appear to correlate with neurologic disorganization (switching). It may be a failure of all the nerve fibers to decussate.

Occasionally one finds positive therapy localization to an articulation which cannot be effectively treated with the usual applied kinesiology techniques. In this case, evaluate the contralateral associated gait joint. If it also therapy localizes, use two-handed therapy localization. If the joints are associated, the two-handed therapy localization will be negative. In other words, both joints have positive therapy localization individually, but negative therapy localization together. The therapeutic effort is applied in exactly the same way as the usual correction for ligament interlink, described above.

There is an additional association of joints which is usually not regarded as being gait-associated. The sacroiliac articulations equate with the sternocostal articulations. Treatment to this association is sometimes effective in treating Tietze's syndrome. The xiphoid process and coccyx relate together and may be associated with general diaphragmatic involvement or specific problems, such as hiccups.

The spinal column-ligament interlink relationship follows the Lovett reactor association of vertebrae (page 70). First the painful vertebra is therapy localized. While maintaining this therapy localization, the Lovett reactor is therapy localized on the opposite side to determine if positive therapy localization develops. Therapy is applied to the less tender vertebra while holding the hyoid as usual toward the side being manipulated with digital pressure.

The temporomandibular joint has been clinically associated with any joint of the body. Its association is evaluated the same as any other two joints on a ligament interlink basis.

The ligament interlink approach is not applicable to all joint conditions. It does not substitute for proper therapy, which may include the correction of a subluxation, reduction of strain in the joint by correcting imbalance of the supporting musculature, and other procedures described throughout applied kinesiology.

When bilaterally therapy localizing the articulations, as many variables as possible must be ruled out. Place the patient in position to therapy localize both articulations with minimal movement. When the patient is therapy localizing the wrist and has to move a great distance to therapy localize the ankle, other variables — such as spinal movement — could influence the indicator muscle test.

Muscle Stretch Reaction

Initial treatment in applied kinesiology is usually directed toward muscles that test weak in the clear. It is possible that a muscle strong in the clear has some type of dysfunction which may be found by numerous applied-kinesiology techniques. One such technique is the muscle stretch reaction.

Normally, when a muscle that tests strong in the clear is stretched and then re-tested, it tests equally strong or stronger because of facilitation by the myotatic reflex. A positive muscle stretch reaction

Reactive Muscles

A reactive muscle is one which tests weak only after another muscle has previously been contracted. The muscle which tests weak is known as the "reactive muscle," and the initial muscle contracted is the primary one. The two muscles are referred to as a reactive pair, or a portion of a reactive group.[44] The weakening of the reactive muscle is apparently due to improper signaling from the neuromuscular spindle cell, or possibly Golgi tendon organ, of the primary muscle.

In Goodheart's original discussion of reactive muscles,[14] he hypothesized that the neuromuscular spindle cell of the primary muscle is "set too high"; thus, when there is activation of the primary muscle, the Ia afferent impulses cause an overabundant inhibition of an antagonist muscle through the inhibitory interneuron.

Triano and Davis[44] studied the reactive muscle phenomenon with electromyography. The study was of reactivity in the deltoid secondary to contraction of the rhomboid muscle. The study established the reactivity of deltoid weakening after rhomboid contraction. The deltoid no longer weakened after the rhomboid was treated to set down the neuromuscular spindle cell (spindle cell together treatment). To determine if the apparent spindle cell manipulation related with Hagbarth's studies[20,21] on muscle reflex activity from cutaneous touch and pressure, they applied generalized pressure into the muscle belly; it did not have the same effect.

Reactive muscles are discovered by analyzing the patient's problem. Often the primary muscle is an antagonist of the reactive one, such as the hamstrings being reactive to the quadriceps muscles. As the reactive pair becomes more remote from each other, the evaluation becomes more difficult. The muscle pair may be associated as in gait or the sequential aspects of sports, or it may be remote, with association difficult to understand.

The reactive muscle problem can be present in any type of structural condition. It is often associated with athletic injuries and should always be suspected when there is no apparent reason for joint strain. An example is an athlete who is having knee or ankle problems, which may include recurrent injuries for no apparent reason. Upon examination, the muscles supporting the knee or ankle test strong, and orthopedic tests, x-rays, and other testing procedures reveal no problem. There will often be a history of running with or without cutting, and the knee or ankle seems to "give out." Under these circumstances, analyze the muscles that function during the activity, and then have the patient contract a muscle; immediately afterward test the muscle(s) which acts sequentially. A positive test is when both muscles test strong in the clear, but one tests weak after the primary muscle contracts.

A pattern of reactive muscles is known as "muscle interlink." This is reactivity between upper and lower contralateral extremity muscles which have a comparable function in gait. For example, the right knee and left elbow flex together during gait; thus there is facilitation of the hamstrings and contralateral biceps muscle. To evaluate for muscle interlink, first determine that the muscles are strong in the clear. Muscle interlink is present when one of the muscles or muscle groups tests weak immediately after the contralateral muscle was contracted by muscle testing. (For further information about the organization of muscles and joints in gait function, see "Ligament Interlink," page 168.)

Treatment is nearly always applied to a dysfunctioning neuromuscular spindle cell in the primary muscle. Locate the spindle cell by therapy localization and palpation, as previously described under "Neuromuscular Spindle Cell Treatment." Manipulate the two ends of the spindle cell toward each other to "set down" the spindle cell. Immediately after treatment, the reactive muscle should test normal after contraction of the primary muscle.

Occasionally, Golgi tendon organ dysfunction appears to be responsible for a reactive muscle pair. If muscle reactivity is found and no neuromuscular spindle cell dysfunction can be located, evaluate the musculotendinous junction for possible dysfunctioning Golgi tendon organs. Treat as indicated under "Golgi Tendon Organ Treatment" and re-test for reactivity. Clinically this is occasionally effective, although the neuromuscular function is not understood.

Reactive Muscle Chart

The left column of Table 2—65 represents the muscle suspected of being reactive; the right column is the muscle which requires muscle spindle cell or Golgi tendon organ sedation. Note that all muscles listed on the right are also listed on the left, and vice versa. The reactive muscle may be in either sequence.

No chart is all-inclusive; additional examination for muscle interlink, as described, may be necessary. Other combinations not as frequently observed may also be found by analysis of the patient's problem. If a particular joint is involved, the prime mover, synergists, antagonists, and fixator muscles should be evaluated. Contralateral muscles should also be evaluated; they may be involved on the basis of cross-reciprocal innervation. Generally the patient can give clues about activities which appear to make the

condition worse. This is especially true in sports. All preparatory motions to the difficult activity should be evaluated for possible contribution on a reactive muscle basis.

The chart is organized by body sections, beginning at the cervical spine and proceeding to the shoulder, elbow, trunk, pelvis, hip, knee, and ankle. Note the overlapping of muscles which influence two articulations.

Table 2—65.

Suspected Reactive Muscle	Sedation Required
Neck flexor	Contralateral psoas
Splenius capitis	Contralateral piriformis
Upper trapezius	Latissimus dorsi Biceps Contralateral upper trapezius
Deltoid	Rhomboid Pectoralis minor
Supraspinatus	Rhomboid Pectoralis minor
Rhomboid	Deltoid Serratus anticus Supraspinatus
Latissimus dorsi	Contralateral hamstring Upper trapezius
Pectoralis minor	Serratus anticus Supraspinatus Deltoid
Pectoralis major (clavicular division)	Gluteus maximus
Serratus anticus	Rhomboid Pectoralis minor
Biceps	Triceps Upper trapezius
Triceps	Biceps Supinator
Sacrospinalis	Transverse abdominals Gluteus maximus Hamstrings
Diaphragm	Psoas
Rectus abdominis	Quadriceps Contralateral gluteus medius
Upper rectus abdominis	Lower rectus abdominis
Lower rectus abdominis	Upper rectus abdominis
Transverse abdominals	Sacrospinalis
Psoas	Adductors Contralateral anterior neck flexor Diaphragm
Gluteus medius	Contralateral rectus abdominis
Piriformis	Contralateral splenius capitis
Gluteus maximus	Sacrospinalis Pectoralis major (clavicular division)
Hamstrings	Sacrospinalis Contralateral latissimus dorsi Quadriceps Popliteus
Tensor fascia lata	Adductors Peroneus tertius
Adductors	Tensor fascia lata Psoas
Quadriceps	Gastrocnemius Hamstrings Rectus abdominis Sartorius
Sartorius	Tibialis anterior Quadriceps
Popliteus	Gastrocnemius Hamstrings Upper trapezius
Gastrocnemius	Popliteus Quadriceps
Tibialis anterior	Sartorius
Peroneus tertius	Tensor fascia lata

Cutaneous Receptors

Cutaneous exteroceptors are classified as mechanoreceptors, thermoreceptors, and nociceptors. Mechanoreceptors are classified[5] as position, velocity, or transient detectors. Position detectors signal displacements of the skin and are sometimes referred to as touch or pressure receptors. They also have the ability to signal velocity. The nerve terminates at Merkel's cells. Stretch, or a movement of the skin adjacent to the corpuscles, has no effect. This localized sensibility gives discrete localization to the stimulus. The type II ending is the Ruffini ending, which is found in skin both with and without hair. Adequate stimulus is displacement of the skin directly over the receptor, and stretching of adjacent skin.

Velocity detectors are found in skin both with