Dynamic Chiropractic

ORTHOTICS & ORTHOPEADICS

A Stabilizing Muscle Group That Requires Your Support

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The hip and pelvic muscles are a significant concern to chiropractors. Long have we appreciated what researchers began acknowledging back in the mid-'90s – that a smooth and symmetrical gait is closely tied to proper vertebral function.[1] During walking there is a fine interplay between the movements of the feet, the hips, the pelvis and the spine. Whenever chiropractic care includes evaluation of spinal and pelvic posture, and especially when orthotics are being considered, the iliopsoas muscle group (IMG) must be addressed. While the importance of the iliopsoas to posture is evidenced by its origins and its insertion, we have only recently begun to understand some of the finer interactions of these muscles[2] and their effect on other areas of the body.[3]

A Muscle Merger

The IMG is the primary flexor of the hip joint and also provides significant stabilization for the pelvis.[4] It is the only muscle that has the anatomical prerequisites to simultaneously and directly contribute to stability and movement of the trunk, pelvis and leg. It is composed of two distinct muscles that originate from two separate areas and have separate innervations.

The psoas muscle originates from the vertebral bodies, intervertebral discs, and transverse processes from T12 through L5. The iliacus arises from the inner surface of the iliac wing, the ventral sacroiliac and iliolumbar ligaments, and the upper surface of the lateral aspect of the sacrum. These two muscles come together to form a common tendon that travels in front of the hip capsule and inserts into the lesser trochanter of the femur.

Clearing Up Confusion

The dominant function of the IMG appears to be as a stabilizer during erect posture. This effect occurs through the lumbar spine and trunk to the pelvis and hips, and into the lower extremities. The complex and interrelated functions performed by the iliacus and psoas muscles have caused a lot of confusion and spawned some misunderstandings. The inaccessibility to electromyography has contributed to the difficulty in studying the *in vivo* function of this muscle group.

Because it is the largest muscle at the lower levels of the lumbar spine – extending from the thoracolumbar junction past the sacrum, through the pelvis, in front of the hip joints, and finally attaching into the upper leg – the iliopsoas plays a large role in postural alignment, spinal / pelvic function and gait.

Lumbar spine. Recent studies have demonstrated that the paired psoas muscles contribute two major biomechanical components to spinal stability. They are strong lateral flexors of the lumbar spine, thereby acting as guy wires to stabilize the spine during lateral bending and lifting.[5] In addition, when bilaterally activated, they also develop a considerable amount of compression on the lumbar spine, thereby increasing stiffness and decreasing intersegmental flexibility.[6] These

studies and others have determined that the psoas muscles do not significantly contribute to or decrease the lumbar lordosis.

Pelvis. The iliacus, which attaches to the inner aspect of the ilium and sacrum, is a significant stabilizer of the pelvis, especially during contralateral leg extension.[7] This is especially necessary in order to maintain pelvic alignment during the stance phase of gait. The psoas muscle (which does not originate or insert into the pelvis) does not appear to play any significant role in pelvic alignment.

Hip joint. As stated above, the iliacus and psoas muscles function together to flex the hip joint. This is true when standing erect, when walking and also when lying down. Secondary hip flexors include the tensor fasciae latae and rectus femoris muscles. Shortening or contracture of the iliopsoas will limit hip extension, interfering with gait and causing a compensatory lumbar hyperlordosis.

In the supine position, leg lifts will produce a high activation of the IMG, while doing trunk curls by lifting only the shoulders keeps the iliopsoas relaxed, whether the legs are kept straight or flexed. Full sit-ups with the feet anchored elicit high iliopsoas muscle activation, more so with the legs flexed.[7]

Leg and foot. During gait, the iliopsoas helps to control excessive internal and external rotation of the femur. In stance phase, with the foot fixed to the ground, these muscles are significant stabilizers of the lower extremity. Prolonged pronation will cause excessive internal rotation of the entire leg, resulting in increased strain at the iliopsoas insertion on the femur. This may lead to various compensations, maladaptive movement patterns and injuries in athletes. Dancers, in particular, seem to be particularly susceptible, due to their attempt to achieve "turnout" (external rotation of the leg from the hip).[8]

Support

Flexible stabilizing orthotics that support the feet and provide biomechanical control during gait can reduce many of the forces described above. Excessive stress on the iliopsoas muscles from the lower extremities can decrease their ability to stabilize the spine and pelvis. While the feet seem to be far away from these muscles, they are intimately connected during standing, bending and gait through the closed kinetic chain.

If the foot / ankle complex is not functioning correctly during the stance phase of gait, abnormal strain will be transmitted to the pelvis and spine, and in particular to the iliopsoas muscles, with every step. This is just one of the ways in which providing proper orthotic support can help to alleviate chronic spinal and pelvic conditions.

References

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