Dynamic Chiropractic

MUSCULOSKELETAL PAIN

Hamstring Injuries Resulting from Sacroiliac Dysfunction

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The hamstring muscle complex is the most commonly strained muscle complex of the thigh, and possibly one of the most common sports injuries.

To assess and treat hamstring injuries, a differentiation must be made as to whether the cause is direct and acutely traumatic, or whether the injury is a common resultant from a gradual onset. This can be confusing, because a gradual onset hamstring strain, which is subclinical, may become clinically manifest with increased activity and may be regarded as traumatic. In these cases, it really is still a chronic and gradual onset, ultimately intensified by intensive activity and rendered clinically symptomatic. It is necessary to classify hamstring strains as direct traumatic and abrupt strains, gradual onset strains, or those related to hereditarily tight muscles.

I would like to address gradual onset hamstring strains in relation to pelvic dysfunction. In several previous articles for *Dynamic Chiropractic,* I have explained and reviewed the concepts of nutation and counternutation, as presented in *Physiology of The Joints, Vol. III* by Kapandji. According to educators, review is the mother of learning, so I will briefly review these concepts again. Nutation is the process of the sacral base moving in the anterior and inferior direction, as the ilium or ilia move in the opposite posterior-inferior direction, with the PSIS as the point of reference. Counternutation is the process of the sacral base moving in the posterior-superior direction, as the ilium or ilia move in the anterior-superior direction.

During the dynamics of the integrated motion, the ilia can become fixated in the anterior-superior direction (AS fixation), or they can become fixated in the posterior-inferior direction (PI fixation).

From this point on, I want to address the AS ilium fixation in relation to hamstring strains. Let me begin with the general attachments of the hamstrings. I do not wish to grovel in anatomical details here, but mainly in concepts. The origin for the main part of the hamstrings is the ischial tuberosity. The biceps femoris also has attachments to the sacrotuberous ligament and femur. I am concerned here with the ischial attachments. The insertions are in the tibia and fibula just below the knee. The actions of the hamstrings generally are to flex the knee and, secondarily, to rotate the knee.

When a person walks, runs or performs a straight-leg raise test, the leg is extended to some degree. Visualize this action in relation to the ischium hamstring attachments. With flexion of the hip and forward motion of the thigh, combined with knee extension, the hamstrings pull at their attachments at the ischium and leg. To facilitate this pull and hamstring stretch, consider the following mechanisms in place. Flexion of the hip occurs with walking, running and SLR. Some doctors actually believe this is the only joint motion to occur during these activities (except the knee, of course). The other important consideration is the sacroiliac joint. During hip flexion, the ilium on that same side is supposed to move with the hip joint.

The ilium is supposed to assume posterior-inferior motion (PI motion), with the PSIS as the point of reference. The beauty of this is that as the ilium rocks backwards (rotates in the PI direction), the

ischial tuberosity moves anteriorly, thus reducing hamstring strain.
At this point, visualize an AS ilium fixation. With an AS fixation, the ischium will not move anteriorly during hip flexion; this will create increased stress upon the hamstrings. They no longer have the cooperation of the SI joint during hip flexion and begin to develop strain.

This strain develops throughout the hamstring muscles, which have ischial attachments, and also develops in the tendons and tendonous attachments. Signs of HS or tendon stress may develop because of this chain of events. Additionally, ischial bursitis may be a consequence due to the irritation at the ischial tuberosity. Other areas are also placed in a position of increased strain because hamstring muscles, like all muscles, will tighten or resist stretching if irritated or inflamed from overuse. Contraction can cause shortening; shortening will cause increased hip and knee-joint compression during motion. The hip joint will be more compressed during hip flexion, which may cause eccentric motion during hip flexion in order to complete the joint's range of motion. The knee will suffer increased compression and eccentric motion during extension.

I have carefully explained how AS and PI ilium fixations occur in previous articles for *Dynamic Chiropractic.* In this article, I have referred to the AS ilium fixation as the ilium dysfunction causing certain hamstring disorders. I have delineated the causes of AS ilium fixations over a period of time as:

1. lumbar disorders
2. thoracic disorders
3. cervical disorders
4. occipital disorders
5. others (trauma, extremity disorders)

Therefore, we may see occipital or upper cervical dysfunctions affecting hip, hamstring and knee function. I would also like you to consider that hamstrings associated with AS ilium fixations may resist stretch during hip flexion, such as straight-leg raise testing, in coordination with quadratus lumborum contraction, in order to prevent sacral nutation. Nutation is the anterior-inferior motion of the sacral base, creating posterior disc and facet loading at the lumbosacral joint. In this case, there is a good cause for tight hamstrings.

I hope I've given you some new ideas for consideration and have expanded your appreciation for the simplicity, yet intricacy, of body coordinations. I call these potential problems, secondary to AS ilium fixations, "associated disorders."

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