Many causes of hindlimb lameness originate from the upper hindlimb. Awareness of hip dysplasia is high, but many other conditions produce hindlimb dysfunction and pain that go undiagnosed. Many of these conditions have minimal radiographic changes, and thus we must rely heavily on other means of diagnosis.

Patients afflicted with hip dysplasia have different clinical deficits, symptoms, and diagnoses due to the stage of the disease, which commonly correlates with age. In the adolescent dog (5–16 months of age), hip dysplasia is primarily a condition of excessive laxity resulting in coxofemoral subluxation that is exacerbated during weight-bearing. Pain originates from articular trauma, inflammation, and also myalgia of regional muscles that combat subluxation. The gait alterations of adolescent dogs reflect compensatory adaptations to limit painful joint subluxation. To limit coxofemoral subluxation, they recruit muscle support (pectineus) and limit joint extension. The patient self-limits hip extension and thus avoids painful subluxation, and this produces a “bunny-hopping” gait. The recruitment and overuse of these muscles produce strain injury and pain. It is common that pectineal muscle soreness and spasm are evident. Anesthetized hip evaluation eliminates the influence of muscle pain and the protective influence of the supporting pelvic musculature in the awake dog. Therefore, this provides a conformational analysis of the skeletal components of the hip joint, including positional subluxation and reduction.

Many other conditions beyond the hip joint that affect pelvic and hip motion are overlooked. Regional pelvic muscle injuries, strains, or exertional soreness is commonly associated with hindlimb lameness as a primary or secondary ailment. In our practice, pectineus myalgia is a common ailment for acute lameness occurring several weeks into recovery from stifle surgery. It is also commonly associated with hip dysplasia, likely due to chronic overuse in combating hip subluxation. We also find pectineal myalgia in agility dogs and believe it to be an athletic muscle strain (typically unilateral). The pectineus muscle is a fusiform-shaped muscle, easily palpable, and provides adduction support for the pelvic limb.

The iliopsoas muscle is a common area of injury. As a major flexor of the hip, injury can have significant impact. On physical examination, these patients have pain with hip extension that is similar to hip dysplasia. It is important to attempt to separate this discomfort from joint discomfort. For the most part, there are no radiographic changes with iliopsoas injuries (occasional enthesiophytes at the lesser trochanter). Pain in patients with iliopsoas strains are intensified with internal rotation of the leg or with direct palpation of the iliopsoas complex that inserts on the lesser trochanter. Pain can also be elicited with digital pressure over the muscle body and origin that is on the ventral aspect of the ilium and lumbar vertebrae. The iliopsoas muscle represents the fusion of the psoas major and the iliacus muscles. The psoas major muscle arises from the transverse processes of the lumbar vertebrae of the lower spinal column at L2 and L3 and the bodies of L4-7, and the iliacus arises from the ventral or lower surface of the ilium. The two muscles combine and have a common insertion on the lesser trochanter of the femur. The action of this muscle is to hip flexion. Iliopsoas strains occur as the result of excessive force acting on this muscle, and they are commonly associated with highly athletic activities, such as agility. These injuries often occur at or near the muscle-tendon junction, which is the weakest part of the myotendinous unit. Eccentric contraction, in which the muscle is activated during stretch, is known to be an important factor in the development of these acute strain injuries. Traumatic incidents that result in active eccentric muscle contraction, such as slipping into a splay-legged position, jumping out of a vehicle, aggressive agility training, or rough-housing with other dogs, are often suspected in precipitating acute lameness. It is not uncommon to find dogs with iliopsoas strains that have other concurrent orthopedic problems or that have recently undergone surgical treatment for another orthopedic condition, such as cranial cruciate ligament rupture.

Dogs with iliopsoas strains commonly present with a history ranging from a subtle intermittent offloading of the hindlimb to significant unilateral hindlimb lameness that is exacerbated with activity. These dogs commonly demonstrate performance issues, such as knocking bars with the hindlimbs and slowing in the weave poles. On direct palpation, discomfort and spasm of the myotendinous unit may be noted. Pain and spasm will also be noted when stretching the myotendinous unit by either placing the hip in extension with abduction, or by simultaneous extension of the hip with internal rotation of that pelvic hindlimb.
In chronic iliopsoas strains, it is important to re-initiate the inflammatory process to assist in the remodeling of the
affected muscle and/or tendon can increase confidence in the diagnosis. Ultrasonography is a relatively inexpensive,
noninvasive imaging modality for canine musculoskeletal evaluation, with the additional advantage that general
anesthesia is not required. This imaging modality is particularly dependent on the expertise of the operator, which
may limit its practical application in some settings. Advanced diagnostics, such as CT scan and MRI (magnetic
resonance imaging), may be used to identify iliopsoas strains and are both widely used in diagnosing acute, stretch-
induced muscle injury in human patients. Although CT is valuable for imaging soft-tissue lesions, the use of MRI
has greatly increased the ability to detect submacroscopic lesions.

Acute iliopsoas strains should be treated conservatively. Skeletal muscle relaxants may be administered in severe
cases to reduce pain and muscle spasms. Medical management may also include nonsteroidal anti-inflammatory
drugs (NSAIDs), massage, and controlled activity. Rehabilitation can be very effective in treating iliopsoas strains.
Treatments may include laser therapy to increase circulation, remove waste products, and promote healing. Pain-free
passive range of motion (PROM) and high-repetition exercise also are recommended. Acute strain injuries should
not be stretched, as microtears may occur. Core strengthening is essential in the return of the athletic dog to
competition and a pain-free lifestyle. Activities such as theraball work need to be performed to work on the dog’s
core control—the lower back and abdominals. Since the origin of the iliopsoas is the lumbar spine, the lumbar spine
and lumbosacral area may need to be treated in acute cases. PROM, interferential e-stimulation, stabilization
exercises, and gradual increases in weight-bearing of the involved limb are recommended. Active ROM and
strengthening exercises are added next. Strengthening exercises might include stepping over cavaletti poles, para
standing (lifting both front and hind limbs on one side of the dog’s body while he balances on the remaining limbs),
paws on the counter, and use of the wobble board. Hill walking should be added to increase the strength of the
dorsal musculature. A steep hill, approximately 20 to 40 degrees in incline and the dog should be slowly walked up
the hill. It is important that the dog walks and not bunny hops or trots up the hill. Slow walking will promote an
equal balance of each hindlimb and focus on the caudal musculature, the hamstrings and the gluteals. The dog
should be walked up approximately 100 feet and then slowly walked down. The downward motion will work the
iliopsoas in an eccentric fashion. This can be repeated three to five times, and repeated a few times during the week.
Acupuncture may be helpful to assist with pain control and to promote healing, including the lumbar and
lumbosacral region. Joint mobilization and other manual therapy may also be needed to assist with the lumbar range
of motion and motion of the coxofemoral joint.

In chronic iliopsoas strains, it is important to re-initiate the inflammatory process to assist in the remodeling of the
tendon fibers. Rehabilitation therapy is recommended with chronic iliopsoas strains. Modalities might include heat,
ultrasound, and laser, followed by massage therapy. Chronic iliopsoas strains may come from a problem with
mechanics, therefore, working on correcting the mechanics of movement, will help to take the strain off the
iliopsoas and contribute to its healing. The exercise progression is similar to that for acute iliopsoas strains, but
initiating stretching (hip extensors with abduction) after modalities and massage is advised as are longer walks. In
chronic muscle strain injuries it usually takes longer to recover and progress through the stages of healing and
exercise because of the chronic nature of the changes in the myotendinous unit. The underwater treadmill, hiking
and hill work are all appropriate. With regard to aquatic therapy, swimming may aggravate the iliopsoas injury as it
forces the body to maintain the hip in a shortened or flexed position. When returning to agility training, weave poles
and tight turns at full jump heights should be avoided during the early stages of retraining. Appropriate warm-ups,
stretching, and retraining are extremely important in preventing injury and in returning your dog to a competitive
performance level.

Surgical treatment is warranted for those that do not respond to conservative medical management and rehabilitation
therapy. In these cases, where there are irreversible changes to the myotendinous unit, such as fibrosis (forming
excess fibrous tissue while healing) of the muscle-tendon junction, surgical treatment by tenotomy/tenectomy
(releasing the tendon) or reattachment may be indicated. Good to excellent results have been reported with dogs
returning to function, although performance dogs may work at a lower level than previously.

Lumbosacral joint pain is often overlooked and can produce severe lameness with difficulty in rising, jumping, and
extending, very similar to hip dysplasia. Lumbosacral disease is reported predominately in middle-aged medium to
large breeds, especially highly active dogs, but keep your eyes open for outliers. Classic symptoms include lower
back pain, hindlimb weakness, and urinary incontinence. In my experience, urinary incontinence occurs in very
advanced cases; again, early treatment is ideal. Lumbosacral stenosis is often dynamic, producing compression during high activity in which the lumbosacral joint is extended. Therefore, clinical signs are often intermittent and in some patients manifest mostly during highly athletic activities that are difficult to emulate during the clinical examination. Due to the insidious onset, this condition causes more clinical impact than many owners realize until substantial improvement is noted following treatment. Following decompression, owners are often surprised by the degree of improvement, stating that the patient seems much younger, wants to play again, has greater endurance, and has regained hindlimb musculature and shown postural improvements. This implies that lumbosacral disease has considerable insidious clinical impact, but detection can be challenging. In addition, not only is the lumbosacral joint impacted but also regional support muscles that can also be painful without significant lumbosacral pathology. Redundant diagnostic techniques to confirm lumbosacral pain and help you better appreciate the associated myalgia will aid in confirmation of this condition. Evaluate the patient for postural changes associated with lumbar pain, kyphosis, and functional ability to jump or extend the lumbar region. An orthopedic examination includes forced lumbar extension, specific palpation of epaxial muscles and vertebrae, tail extension, and iliopsoas palpation. Following manipulation, reassessment of the patient’s gait and posture is helpful.

It can be valuable to divide lumbosacral conditions into four different clinical presentations: (1) degenerative lumbosacral stenosis with radiographically apparent bone changes (for example, vertebral spondylosis), in which compression is caused by combinations of disc protrusion, hypertrophied soft tissue, and vertebral osteophytosis; (2) primarily disc protrusion with minimal radiographic abnormalities, but with CT or MRI demonstrating a very large disc impingement; (3) dynamic lumbosacral impingement, in which significant cauda equine compression occurs during extension (static three-dimensional studies may underrepresent the degree of impingement, and your clinical findings become very significant in diagnosing these patients; these are sometimes challenging cases and may have predisposing factors such as developmental anomalies); and (4) primary lumbar muscle pain. Although the fourth type is in part a diagnosis of exclusion, I included it as a reminder that severe lumbar myalgia and spasm can occur as a secondary condition (compensation from weight shifting in bilateral hindlimb lameness) or as a primary condition. Radiography is of value in detecting cases with degenerative changes and to screen for other disease entities, but complete evaluation typically requires CT or MRI.

Surgical decompression provided by dorsal laminectomy is highly successful in alleviating nerve root compression when performed in a timely manner (a recent study showed that 79% of dogs became normal after surgery and 93% improved). Yet be forewarned that allowing this disease to progress untreated can have irreversible consequences. Earlier detection and decompression provide substantial improvement in comfort and function. Treatment of these conditions can provide substantial clinical improvement. The ability to evaluate the hip, lower lumbar musculature, lumbosacral junction, and regional muscles will significantly improve your patient care.

**Key Diagnostics: Tips for Improving Hip Evaluation**

Hip pain can be masked, and often a faster gait is required to elicit the deficiencies that can be seen during a gait evaluation. To improve evaluation, incorporate functional tests, including voluntary hip extension, jumping up onto objects, climbing stairs, and increasing the speed of the gait. This procedure provides a double advantage by furnishing the opportunity for both orthopedic and neurologic assessment. The classic “hip extension” test, in which a forced upper leg extension is performed, can be used as a good screening test as long as we remember that this can produce pain originating from the hip, lower back, and regional pelvic muscles. Therefore, when this test is positive for pain, a more specific evaluation is necessary to localize the source of pain. To isolate the hip, I like to ensure that the lumbosacral junction is flexed and protected, thereby eliminating lumbosacral stress. The pectineal muscles are easily isolated and palpated for pain and spasm. Pectineal myalgia is common in patients with active hip subluxation. The iliopsoas muscles are more challenging to evaluate, but detection of pain and spasm in this region is significant and common. I like to use multiple diagnostic tests to confirm iliopsoas pain, since it is challenging to palpate and closely associated with the pectineus muscle group. The hip joint can be specifically evaluated by abduction, rotation, and flexion. Rotation can be particularly helpful in confirming joint pain or crepitance due to degenerative joint disease. Quadriceps muscle pain is fairly common in dogs with severe lameness, although I typically see this as a secondary muscle soreness.

**References**


