Cranial Cruciate Ligament Disease in Dogs

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Introduction

Cranial cruciate ligament (CCL) tears are the most common cause of pelvic limb lameness in dogs. While it may occur in patients of any breed, size, or signalment, CCL tearing is most common in middle aged, large breed dogs. Presenting complaints vary from an acute, minimally weight-bearing limp in a patient with a complete ligament tear to an intermittent, weight-bearing limp in patients with a partial ligament tear.

Multiple treatment options may be offered to patients suffering from CCL tears, but surgical intervention generally preferred in most cases. There are many methods of surgically “correcting” the symptoms associated with the tear (the ligament itself is never “repaired”), and many factors must be taken into account when selecting a course of action. Factors such as patient age, size, activity level, concurrent systemic health conditions (Cushing’s disease, etc), and surgeon preference will all play a role in deciding which surgery or medical treatment option best suits the patient’s needs.

Pathophysiology

The knee joint is comprised of multiple ligaments including the CCL. The role of these ligaments is to provide stability during normal gait and weight-bearing stance. The cause of CCL tears is not fully understood but it is typically a degenerative rather than purely traumatic disease. Due to the abnormal motion between the femur and tibia in patients with complete CCL tears, the medial meniscus is often damaged, causing additional patient discomfort. Due to the degenerative nature of the disease, tearing of the other CCL occurs in 30% – 40% of patients.

Clinical Symptoms

Many patients suffering from CCLD will present with pelvic limb lameness to varying degrees. Acute tears typically present with a sudden, non-weight-bearing lameness that will improve over several weeks, but the limp will never fully resolve. Chronic or partial tears patients will have a history of waxing and waning lameness for weeks, months, or even years.

Physical examination will reveal excessive effusion, or fluid, in the knee joint along with marked abnormality in joint movement when manipulated during a physical exam. The cranial drawer test remains the most common test for diagnosis of CCL tears. Cranial drawer is an abnormal movement of the tibia in relation to the femur that should not be possible with an undamaged CCL. Alternatively, the tibial compression test may be used. The tibial compression test simulates normal weight-bearing. When

the cranial cruciate ligament is intact, there is no forward (cranial) motion of the tibia in relation to the femur. However, a torn cranial cruciate ligament will allow the tibia to thrust forward in relation to the femur.

Diagnostics

Radiography (X-ray) is frequently the only imaging modality used in CCL tear patient work-up. Radiographic changes such as joint effusion and arthritis are usually present in CCL tear patients. When a partial tear is present, the diagnosis can be more challenging but the classic radiographic sign of increased joint effusion is typically seen.

Treatment

Surgical intervention is usually recommended in the treatment of CCL tears. Many surgical approaches to this problem have been described with favorable documented outcomes. These surgical procedures generally fall into two categories: extracapsular stabilization methods which replace the ligament; and osteotomy-based procedures which alter the biomechanics of the knee such that the ligament is no longer needed. An example of an extracapsular procedure is the modified retinacular imbrication technique (MRIT) where a suture-like material, anchored to the femur and tibia, is used to mimic the cranial cruciate ligament's function. The extracapsular techniques are all fundamentally similar but there are many variations. Examples of osteotomy procedures include Tibial Plateau Leveling Osteotomy (TPLO), Tibial Tuberosity Advancement (TTA), and Cranial Closing Wedge Ostectomy (CCWO). These procedures alter the forces of weight-bearing in the knee so that it is stable in the absence of the CCL.

Alternative methods to surgery have been proposed for patients that are unable or unwilling to undergo a surgical procedure. These medical therapies may be utilized alone, together, or in conjunction with surgery to improve leg function and quality of life. Medical therapies include platelet rich plasma (PRP) injection, shockwave therapy, mesenchymal stem cell harvest and injection, professionally guided rehabilitation, and the use of functional bracing.

In summary, CCL tears are common in dogs but with appropriate treatment and after-care, the vast majority of dogs are able to return to a pain-free level of function and lead a normal life.