VetPlus Clinical Focus

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Nacho Calvo graduated as a Veterinary Surgeon from Universidad de Córdoba in 2000. After a training period at the Universidad Complutense de Madrid, he completed a general internship and residency in traumatology and orthopaedics at the University of Glasgow. Nacho has worked as a Senior Lecturer and Head of the Traumatology and Orthopaedics Service at the Royal Veterinary College (RVC) in London, and was Lecturer of Traumatology and Orthopaedics at the Universities of Dublin and Glasgow. He was a senior surgeon at Fitzpatrick Referrals.

Since January 2019 he has been working at the VETSIA Veterinary Hospital in Madrid as Head of the Traumatology and Orthopaedics Service. Nacho obtained the certificate of surgery from the Royal College of Veterinary Surgeons (CertSAS) in 2009, diploma from the European College of Veterinary Surgeons (Dipl ECVS) in 2012 and the doctorate (PhD) from the Universidad Complutense de Madrid in 2016, for studies on the advancement of the tibial tuberosity. Nacho was the editor-in-chief of the trauma section of BMC Veterinary Research (impact 1.7) from 2016-2019 and he is currently the director of content for the journal, Centro Veterinario, edited by AMVAC, is a member of the AOVET European Directive, member of the AOVET International Commission on Education and Head of AOVET courses in Spain. Nacho has more than 30 publications in impact magazines and international conferences. His areas of clinical interest and research are cranial cruciate ligament surgery, arthroscopy, prosthetic joints and feline trauma.

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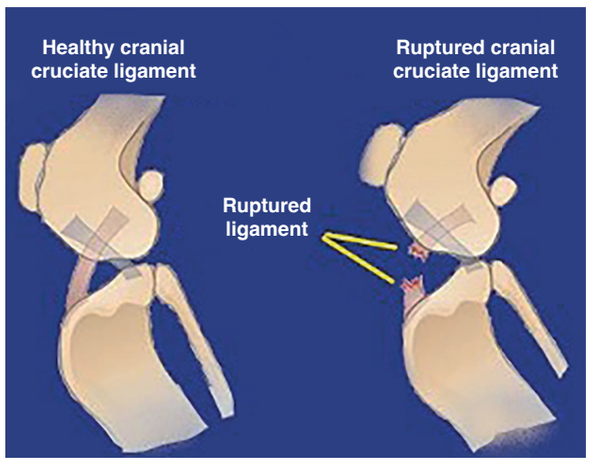
Carlos graduated in Veterinary Medicine at the Universidad de Córdoba and is a member of the Royal College of Veterinary Surgeons, AOVET, GEVO and BSAVA. He has worked in England for over five years as a small animal surgeon at diverse first opinion and referral centers. Carlos is currently in the process of obtaining the certificate in Advanced Veterinary Practice (CertAVP) and is the surgical intern at VETSIA.

Diagnosis and treatment of cranial cruciate ligament disease: two clinical cases

Rupture of the cranial cruciate ligament is the most common orthopaedic pathology and the most frequent cause of degenerative knee osteoarthritis in dogs (Innes *et al*., 2000 (1); Aragon & Budsberg, 2005 (2)). Remembering that there are two cruciate ligaments: the cranial and the caudal. The cranial is made up of two bands: craniomedial and caudolateral. The craniomedial band is tensioned in flexion and extension, while the caudolateral is only tensioned in extension. This is relevant during the clinical examination in cases with partial rupture of the ligament because we will always have to perform a drawer test in flexion and extension, in order to diagnose partial breaks of the cranial cruciate ligament.



The cruciate ligaments of the knee are in charge of regulating the joint kinematics, preventing hyperextension, limiting rotation and maintaining the relation of the femur versus the tibia, during weight bearing in joint extension and flexion.

The cause of rupture of the cranial cruciate ligament is multifactorial, although in general we can define it as a degenerative process (unlike in people where it usually has a traumatic origin). The incidence is influenced by genetics, conformational or structural factors (genu varum, internal rotation of the femur, medial dislocation of the kneecap, proximal deformities of the tibia, excessive angle of the tibial plateau and stenosis of the intercondylar notch), early castration, sedentary lifestyle and being overweight, muscle condition and various inflammatory components. This leads to a disparity between the mechanical forces to which the ligament is exposed and its ability to withstand this stress, with the consequent rupture and development of degenerative joint disease (Griffon, 2010) (3).

Cruciate ligament disease occurs more frequently in older dogs, with the majority having a basic degenerative aetiology as mentioned above. The incidence of cranial cruciate rupture has increased two-fold in the past 30 years (Witsberger *et al*., 2008) (4).

Dogs with cranial cruciate ligament (CCL) disease usually present with varying degrees of hindlimb lameness. In cases with acute, complete rupture of the cranial cruciate ligament, lameness will probably be high-grade or even non-weight bearing. In cases of partial rupture, the lameness is usually mild to moderate, tending to worsen

after exercise and rest. In both cases, medical treatment and rest have limited effectiveness because around 90% of partial ruptures progress to a complete rupture in one year.

During the examination there is usually an evident joint effusion / synovial effusion, pain or discomfort in forced extension and depending on the chronicity, there can be muscular atrophy and fibrosis in the medial area of the joint (medial buttress). A definitive diagnosis is made with the drawer test and/or tibial compression test.

It is important to perform the drawer test with the limb flexed, neutral and extended, under sedation, if possible, because it is very easy to obtain false negatives in conscious animals.

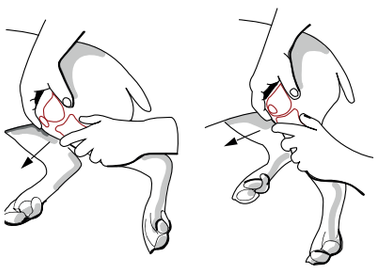


Fig.1

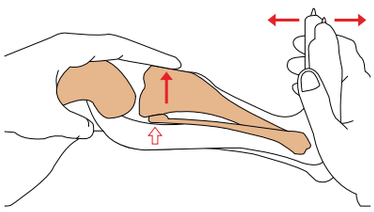


Fig. 2

A good radiological study is essential to confirm the diagnosis, to evaluate the joint condition and plan the stabilisation technique. This should include orthogonal plates of both knees, and both ventrodorsal (with the hips in extension) and lateral views of the pelvis. A ruptured cranial cruciate ligament shows characteristic radiological signs, seen in figures 3a and 3b: cranial subluxation of the tibia (medial lateral radiograph), presence of intraarticular opacity with displacement of the fat pad cranially (white arrow) and the fascia of the gastrocnemius muscle caudally (yellow arrow), presence of enthesophytes at the cranial cruciate insertion of the cranial cruciate ligament in the tibial plateau area (red arrow), and periarticular osteophytes (blue arrow).

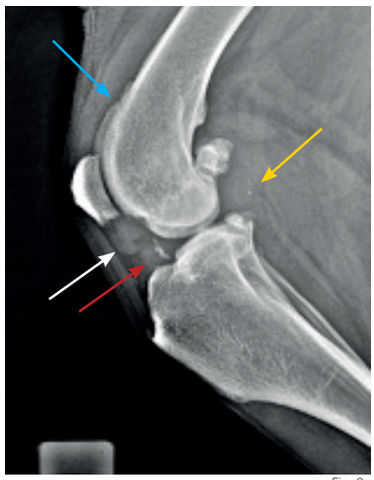


Fig. 3a

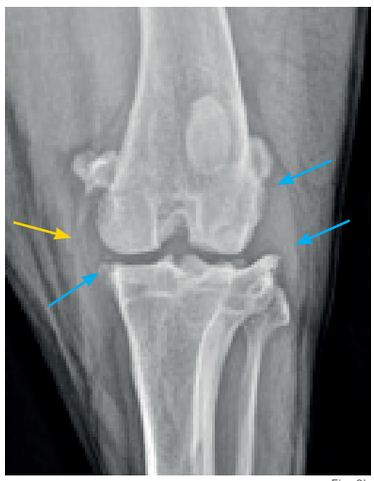


Fig. 3b

If, after radiological exam, there is any doubt, to get a final diagnosis an MRI scan may be done. However, 100% confirmation will be achieved through surgical exploration with arthroscopy/ arthrotomy.

Dogs affected bilaterally could be mistaken as neurological patients, due to confusion of their bilateral lameness with an ambulatory paresis. The patient with bilateral cruciate ligament tears will not have any proprioceptive deficit. Due to the degenerative nature of the disease/rupture of CCL, contralateral disease happens in 50% of patients in an average of 18 months from the first diagnosis.

The management usually recommended, based on a better prognosis, is surgical. There are different possible techniques, which are divided into three groups: intra-articular, extracapsular and extraarticular (osteotomies).

Post-surgical results are usually good, and recent studies suggest a better outcome with long-term osteotomies (TPLO / CTWO), compared to TTA and Fabello-tibial suture (Gordon-Evans *et al*., 2013 (5); Krotscheck *et al*., 2016 (6)).

Regardless of the technique used, the progression of knee arthrosis is inevitable, so we recommend the use of chondroprotectors and omega-3 essential fatty acids in the long term.

Clinical case 1

Kendra is an 8 year old Yorkshire terrier weighing 7 kg. She presented with a 4/5 lameness in her right hind limb, pain in forced flexion and stifle hyperextension, presence of medial buttress, joint effusion and both positive tibial compression and cranial drawer tests. Mediolateral and caudocranial radiographs were taken under sedation.

Most relevant anomalies were appreciated in mediolateral radiographs:

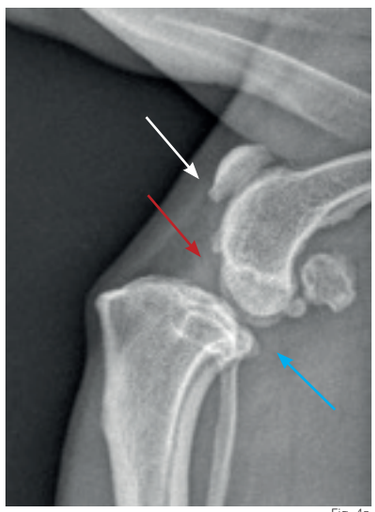


Fig. 4a

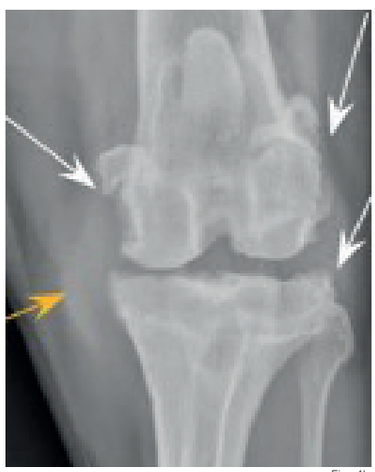


Fig. 4b

Here, we can appreciate synovial effusion (whitish-greyish area inside the joint, red arrow), with cranial compression of the fat pad (black area inside the joint) due to increased intraarticular fluid (whitish-greyish density inside the joint, tip of the red arrow) and the gastrocnemius muscle fascia which can be observed as a black line. This usually goes from the

fabellae, on a proximodistal direction, close to the caudal aspect of the fibula head. In this image we can appreciate the fascial line bulging caudally (blue arrow).

We can also appreciate the presence of periarticular osteophytes on the distal patellar pole, patellar groove and lateral aspects of the femoral condyle (white arrows). Medial buttress is also apparent (yellow arrow) (fig. 4a and fig. 4b).

All of these are consistent signs of degenerative articular disease.

Surgery was recommended. We proceeded to perform a routine mini-arthrotomy to examine the medial meniscus, a structure which can be damaged in unstable joints with CCL deficiency, and limit post-surgical recovery. The meniscus was intact and complete CCL rupture was confirmed. In this patient we performed a CTWO (Closed Tibial Wedge Osteotomy). The tibial plateau angle was measured, with the purpose of reducing this angle to 6 degrees, and neutralising the cranial translation forces during weight-bearing, suppressing the functional need of the CCL.

The wedge was reduced using a cranial cerclage wire and reduction was maintained using a 2.4 mm TPLO locking plate, on the medial aspect of the tibia (fig. 5a and Fig. 5b)

Fig. 5a

Fig. 5b

After 6-8 weeks of controlled activity Kendra progressively regained normal physical activity, and no lameness was detected 4 weeks post-surgery.

Clinical case 2

Tango is a 2 year old, male neutered, slightly overweight German Short-Haired Pointer. He presented at the hospital with a history of chronic lameness of his left hindlimb of 8 week duration. In his usual clinic he had been treated with different anti-inflammatory drugs and analgesics, showing only a partial response to medical treatment and rest.

On physical examination he showed a 3/5 lameness, mild muscle atrophy of the limb and when seated, the limb was abducted laterally, avoiding complete joint flexion. Palpable thickness in the medial knee area was appreciated, as well as pain in flexion, a slight reduction in range of mobility and a “click” sound during knee flexion. Cranial drawer test and tibial compression test were not clear, due to periarticular fibrosis.

We decided to take bilateral, mediolateral and caudocranial radiographs of the knee, under sedation, as well as hip radiographs to exclude a possible concomitant pathology in the hip joint.

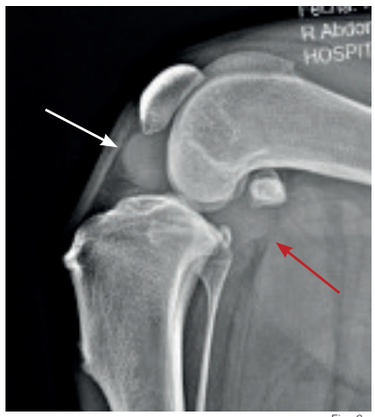


Fig. 6a

Fig. 6b

Here, we can appreciate the synovial effusion (increased opacity of the soft tissues in the joint, white arrow), cranial fat pad compression and the gastrocnemius fascia displaced caudally (red arrow).

Also increased soft tissue opacity in the medial joint area, fibrosis/ “medial buttress” was present (yellow arrow) (fig.6a and fig.6b).

In this case, based on bone morphology, we decided the best option to stabilize Tango’s stifle was a TPLO (tibial-plateau-leveling osteotomy). After taking specific measurements and with a suitable saw size for the osteotomy, we proceeded with surgery. Initially performing a mini-arthrotomy, we confirmed a bucket-handle tear in the caudal horn of the medial meniscus, which was removed, taking care not to damage adjacent structures. We then proceeded with a medial approach to the proximal tibia and achieved the osteotomy using a 30mm oscillating saw. The fragment was rotated, according to the existing tables, to obtain a resulting tibial plateau angle of 6 degrees post-surgery. The osteotomy was stabilized with a 3.5 mm TPLO large locking plate (fig.7a and fig.7b).

Fig. 7a

Fig. 7b

The recovery was a complete success. Tango started a strict diet to reduce his body fat index and a period of strict rest for 6-8 weeks post-surgery. After the sutures were removed he began visiting our rehabilitation and physiotherapy team to improve musculature, articular range of motion and ambulatory function of the limb. Six weeks post-surgery revision radiographs were taken to confirm ossification of the osteotomy, which had been achieved and he was discharged from the hospital. Tango receives Synoquin Large Breed daily.

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