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Cranial cruciate ligament disease is the most common cause of hind limb lameness in the dog. The disease is characterized by a chronic degeneration of the cranial cruciate ligament leading to instability of the stifle joint. As this is a chronic disease most of the dogs present with progressive signs of osteoarthritis. The instability can be appreciated by the cranial drawer sign in which the tibial plateau can be displaced in a cranial direction manually. The same cranial drawer occurs during physiologic loading of the stifle joint during locomotion. This instability can lead to overloading of the medial meniscus and eventually rupture of the meniscus which will exacerbate the clinical signs of lameness. Cranial cruciate ligament disease usually affects both stifle joints. Treatment of cranial cruciate ligament disease initially aimed at removing remnants of the cranial cruciate ligament, treating meniscal injury by partial menisectomy and restoring stifle joint stability by using intra- or extra-articular autogenous or artificial ligaments. Although these techniques were quite successful the recovery after these arthrotomies took a considerable amount of time and slow improvement of lameness. Meniscal injuries during or after the recovery period were a common complicating factor attributed to insufficient stability of the stifle joint.

Tibial Plateau Levelling Osteotomy (TPLO)
The first change in managing the cranial tibial instability was the introduction of the tibial plateau levelling osteotomy (TPLO). Rational behind this procedure was to eliminate cranial tibial thrust by levelling the tibial plateau slope, characterised by the tibial plateau angle, to perpendicular to the long axis of the tibia\(^1\). The procedure started as a cranial closing wedge osteotomy of the proximal diaphysis of the tibia. The procedure evolved in a radial osteotomy of the tibial plateau in combination with cranial rotation and levelling of the tibial plateau. The tibial plateau is stabilized with a designated plate. The TPLO procedure results in a dynamic stabilisation of the stifle joint which is in part attributed to the caudal cruciate ligament. The cranial drawer sign is not eliminated by this procedure. Secondary meniscal injury remained a common complicating factor and intraoperative meniscal release was introduced to overcome this problem.

Tibial tuberosity advancement (TTA)
Tibial tuberosity advancement (TTA) aims at eliminating cranial tibial thrust by altering the angle of attack of the patellar ligament to perpendicular to the tibial plateau\(^2\). The technique relies on a cranial advancement of the tibial tuberosity after an osteotomy of the tibial crest. The crest is stabilized with a cage and forked tension plate. The TTA procedure results in a stable stifle joint and eliminates the drawer sign. The advancement of the tibial tuberosity not only alters the angle of the patellar ligament but also tensions the medial and lateral fascia of the stifle joint. The TTA is less invasive than the TPLO procedure.

Triple tibial osteotomy (TTO)
The triple tibial osteotomy (TTO) aims at combining the theoretical basis of the TPLO and TTA. The TTO relies on a tibial cranial closing wedge osteotomy in combination with an incomplete osteotomy of the tibial crest. By closing the tibial cranial wedge the tibial plateau is levelled and the tibial tuberosity is advanced. The tibial wedge osteotomy is stabilised using a plate without the need of osteosynthesis of the tibial crest\(^3\). This procedure is more invasive than the TTA. These three procedures can be combined with arthroscopy of the stifle joint eliminating the need for an arthrotomy and decreasing subsequent post-surgical pain. Although these newer procedures can result in a faster recovery time the final outcome has not been proven to be better than the classic cranial cruciate surgery techniques.

References
2. LaFaver S, Miller NA, Stubbs WP, Taylor RA, Boudrieau RJ. Tibial tuberosity advancement for stabilization of the canine cranial