SHOULD I DO A TOTAL KNEE REPLACEMENT OR A TIBIAL OSTEOTOMY?
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Since the 1950s the canine stifle joint has been the subject of a considerable number of publications in the veterinary literature with many problems being discussed such as medial patellar luxation, the osteochondroses and fractures but the topic of the overwhelming majority is cranial cruciate ligament disease. Despite many improvements in the management of stifle joint problems the end result is very often osteoarthritis. Canine patients with osteoarthritis of the stifle joint show a wide variation in clinical signs but many develop disease that can limit their ability to lead a life of reasonable quality despite medications, physical therapy, acupuncture and other conservative means. Surgical techniques for management of osteoarthritis of the stifle have been traditionally limited to arthrodesis and amputation but in recent years the development of implants and instrumentation for replacing the canine stifle joint has given veterinarians another option for helping patients with this debilitating problem.

The current design of the canine Total Knee Replacement (TKR) is based on the lessons learned from the history of human total knee arthroplasty as it evolved from Gluck’s first attempt in 1860 to the advanced materials and non hinged designs of today.

In 2009 Liska and Doyle published the surgical technique and results of the use of a modular TKR (Canine Total Knee System, Biomedtrix LLC, Boonton, NJ) in six clinical patients followed in considerable detail for 12 months after implantation to relieve the symptoms of end stage osteoarthritis.

The implants are a Cobalt-Chrome (Co-Cr) Femoral component that replaces the femoral condyles and trochlear groove and articulates with a tibial surface manufactured from one block of Ultra High Molecular Weight Polyethylene (UHMWPE).

The surface of the femoral component in contact with the bone is covered with three layers of Co-Cr beads and bone ingrowth is expected to occur to achieve final fixation of the implant. The UHMWPE tibial component is secured with polymethylmethacrylate (PMMA) bone cement or by bone ingrowth into the beaded surface of a Co-Cr plate beneath the UHMWPE.

These initial results were extremely encouraging and over the last five years the procedure has been adopted in a number of centres throughout the world. It has become apparent that TKR is indeed a valuable addition to the treatment options available for managing severe osteoarthritis in the dog. This paper proposes an expansion of the use of TKR in end stage joint disease to a procedure to consider when surgically managing CCL disease.

Historically, cranial cruciate ligament problems were considered to be the result of trauma causing total or partial tears, the instability causing damage to the joint surfaces and subsequently osteoarthritis. However, it is now clear that trauma plays a relatively minor role in the pathogenesis of the disease in the dog. There are only a small number of dogs that rupture the CCL in one incident as is seen in most instances in human patients. Much more commonly CCL disease in the dog is the result of an interplay of many factors: genetics, hind limb conformation, increased Tibial Plateau Angle (TPA) and a complex inflammatory process. Although it is not clear if inflammation precedes damage to the ligament it has been documented that inflammation does result from even very slight tears in the CCL. It has been suggested that a combination of repetitive biomechanical strain in a limb with poor conformation results in slight tearing of the of
the CCL and the inflammation thus initiated is the cause of the poor results that often follow surgery to stabilize these joints.

In clinical practice one is often presented with large breed dogs such as Mastiffs, Great Danes, Newfoundlands, and in particular Labrador Retrievers, Boxers, Bull Terriers and Pit Bulls that have a history of intermittent hind limb lameness over a number of weeks or months caused by a problem in a stifle joint. Examination will often show mild muscle atrophy, mild to moderate periarticular thickening, slight restriction in full flexion or extension, only a slight anterior drawer sign and a positive tibial compression test. Radiographs often show only mild changes associated with osteoarthritis and arthroscopy may reveal simply synovial inflammation, mild osteophytosis, slight tearing of the CCL and perhaps some degree of meniscal damage.

A Tibial Plateau Leveling Osteotomy (TPLO) or Tibial Tuberosity Advancement (TTA) is often proposed as the treatment of choice for such large patients and especially if working or athletic activities are planned in the future to restore stability and have the remaining intact portion of the CCL aid in attaining full function in the limb.

Many of such patients do not do as well as anticipated, osteoarthritis continues to develop and long term treatment of the joint disease has to be instituted. If conservative measures are insufficient then a TKR may be needed.

It is proposed in this presentation that a TKR performed instead of a routine joint stabilizing procedure may result in a more satisfactory long term result. The Biomedtrix TKR is a cruciate sacrificing procedure thus removing an apparent initiator of the inflammatory process and since the menisci are also removed another cause of postoperative complications is eradicated. Owners are often reluctant or financially unable to have a second procedure performed after the first has not been as successful as anticipated. Thus although it may appear to be a rather dramatic and invasive procedure to suggest when not faced with end stage joint disease a TKR performed as the initial operative treatment could be a very satisfactory method of managing this situation.

It is somewhat akin to the situation with regard to Total Hip Replacement in dogs and cats. Initially THR was proposed as an alternative to Femoral Head and Neck Excision in patients with disabling coxofemoral osteoarthritis but as the implants and instrumentation have become more sophisticated it has become routine to propose joint replacement as an initial surgical intervention with extremely successful long term results.

TKR in the dog is showing very great promise in the treatment of end stage joint disease and the results in patients in which TKR has been used as the primary surgical procedure for CCL disease over the last four years indicate that this is indeed a viable option to consider when formulating a treatment plan.