Current Innovations in Total Joint Replacement in Small Animals

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Introduction
Total joint replacement in small animals has become commonplace within veterinary orthopedics with increasing demand each year. Currently, there are available prostheses for canine and feline total hip replacement, canine total elbow replacement, as well as canine total knee replacement. The purpose of this seminar is not to teach how total joint replacement is performed, but rather review current joint replacement techniques/prostheses and where the field of veterinary total joint replacement is headed.

Total Hip Replacement (THR)
Total hip replacement first became commercially available in the dog in 1974. Design modifications to the implants were made throughout the 1970’s in order to decrease the tendency for luxation, provide more consistent placement of the acetabular component, and reduce the possibility of damage to the femoral component during preparation of the femur. In 1993, BioMedtrix first released its conventional cemented system (CFX), followed by its biologic/press-fit system (BFX) in 2003. While these systems have been used with tremendous success, THR remains challenging in large and giant breed dogs, particularly those dogs with what is referred to as a “stove-pipe” femur. Craniodorsal luxation and femoral fissures and fractures remain the most common complications following THR, which has resulted in the recent development of several novel THR concepts. These include the Zurich and Helica THR systems, as well the Centerline THR system from BioMedtrix, which is still undergoing research and development including a new clinical trial here at Michigan State University with Dr. Loic M. Dejardin. Each of these systems will be discussed in regards to patient selection for each system and the relative pros-/cons- for each.

Total Elbow Replacement (TER)
Treatment options for end-stage elbow osteoarthritis can be challenging. When medications, weight management, and physical therapy fail to provide satisfactory results, some types of surgical treatment can be attempted. Elbow arthrodesis is the first option. Although arthrodesis gets rid of the pain, the functional results are far from being optimal. The dog typically has an abnormal gait with a marked circumduction of the operated limb. The risk of complication is also a concern. Another option in case of severe pain is amputation. However elbow dysplasia is most often a bilateral disease,
which limit the use of amputation as an option in most cases. These limitations have fueled a growing interest in total elbow replacement in dogs over the last two decades. Several systems are currently available, with the two most common being the Iowa State system, which is a hybrid fixation stemmed design, and the TATE systems, which is a cementless resurfacing design. We will discuss the current state of total elbow replacement, patient selection and success for both of these systems here at Michigan State University.

**Total Knee Replacement (TKR)**
Approximately 100 canine total knee replacements have been performed worldwide to date. This is in comparison to human orthopedics were over 500,000 are performed each year in the US alone. Early results of canine TKR are encouraging with improved range of motion and improved limb use, however, long-term data is lacking. Challenges that remain with TKR gaining popularity included limited revision options if there are complications (i.e., stifle arthrodesis, amputation) and the relative “competition” with high-tibial osteotomies including TPLO and TTA. While TPLO and TTA have become the mainstream for canine cruciate ligament disease, are they appropriate in all situations? Does a TPLO truly benefit a chronic, end-stage cruciate deficient stifle with significant osteoarthritis or should we be considering TKR in these patients? We will discuss patient selection, surgical technique/prostheses and early clinical results.