Total Elbow Replacement in Dogs  (Nov 2005)

The first canine total elbow replacement (TER) system has recently been marketed by BioMedtrix, an American company who specialise in canine joint replacement. The new TER system was developed at Iowa State University by Dr. Mike Conzemius and his team and has evolved from several earlier designs over the past 5 years. Previous attempts at producing an elbow prosthesis by others has been largely unsuccessful. Whilst a more demanding technique than THR, Iowa State have been getting fairly consistent results with the system and a number of specialist practices have been offering the procedure in the US. The technique has recently been introduced into the UK, and the first dog to receive a total elbow replacement was at Liverpool University earlier this year. Cases treated remain in the low single figures in the UK.

There is clearly going to be a learning curve for this new technique and it is likely that the implants and instrumentation will evolve as experience is gained. However there are some fundamental differences from total hip replacement, which means it is unlikely to ever be as successful as it is in this joint. These result from fundamental differences between the two joints;
1. The elbow joint is a composite joint and therefore more complex than the hip;
2. The forelimbs bear 60% of total body weight bearing forces;
3. Joint damage and OA is generally less well tolerated in the elbow than the hip.

Differences from THR
1. Cases currently recommended for replacement are the severe end-stage joints with no other medical or surgical options. Consequently these dogs will have had long standing lameness, have a very restricted joint range of movement and the limb is therefore likely to have significant muscle atrophy;
2. Many will have had previous surgery (which increases infection risk);
3. There are no “simple” salvage procedures available equivalent to femoral head and neck excision arthroplasty in the hip. Arthrodesis is the only option (other than amputation), which is a difficult procedure and will result in a more significant gait deformity than FHNE;
4. It can take up to a year for an elbow to reach its full potential following replacement surgery, and more active rehabilitation with physiotherapy & hydrotherapy is necessary than with hip replacement;
5. Some degree of lameness and a significantly restricted range of motion will remain even in the best cases.

Success rates
Success rates are currently quoted as 85%. However “success” is not equivalent to THR success (see above), although this may be the result of the severity soft tissue pathology consequent of the cases selected being severe end-stage joints.
Procedure
Surgery involves the following steps;
1. Lateral luxation of the joint to gain access to the joint surfaces (difficult in severely osteoarthritic cases)
2. Implantation of a colbalt-chrome humeral component (using a hybrid fixation of cement and osseous integration).
3. Implantation of a combined polyethylene radio-ulna component (using a cemented fixation)
4. Repair of the lateral collateral ligament
5. Radio-ulnar synostosis (by distal ulna ostectomy and use of a bone graft)

Case Selection
1. End-stage intractable elbow disease
2. Non-responsive to good conservative management.
3. Not obese
4. No history of joint sepsis and negative joint taps.
5. No other significant current disease (especially infective processes eg. skin and dental disease)
6. Owners that are aware that the procedure has only been recently launched commercially and have a realistic expectation of the clinical results and are fully aware of potential complications.

Complications
Complications can occur intra-operatively (condyle fracture), immediately post-operatively (luxation) and in the medium to long term (luxation, infection, olecranon fracture, aseptic loosening).
Complications specific to TER;
1. Condyle fracture during surgery - arthrodesis is necessary
2. Olecranon fracture (post op) – may be resolvable but also require arthrodesis

Those complications common to any total joint arthroplasty;
1. Infection – arthrodesis will be required after removal of all implants & cement
2. Luxation – may be resolvable
3. Aseptic loosening – may be resolvable

Elbow arthrodesis
This requires removal of all implants, placement of a large caudally applied lengthening plate and extensive bone grafting of the large bony deficit. Arthrodesis will take several months before it is complete.

Dogs with a successful elbow arthrodesis have a pain-free gait but a significant mechanical lameness. It is necessary for them to circumduct the limb in a characteristic way during limb protraction. Arthrodesis tends to put increased stress on neighbouring joints, therefore any co-existing carpal & shoulder osteoarthitis may become more clinically significant.

Costs
BioMedtrix have made an introductory offer to surgeons undertaking the TER course, loaning the equipment and discounting the implants for a trial period. We intend therefore charging a fixed cost of £2000 inc. VAT for the procedure, that reflects the costs of materials and overheads only. This will last for the trial period whilst some experience is gained in the technique. The full cost is likely to be in the region of £3500-4000.

Further information
www.biomedtrix.com/pro_elbow.html
www.vetmed.iastate.edu/departments/vcs/orthopaedic/home.htm

We would be very pleased to discuss any potentially suitable cases. An initial consultation would be necessary at The Grove to enable further assessment of the case and allow counselling of the owners on the procedure.

Simon & Gordon (Nov.2005)