Supplementary Appendix A

Definition of complications used in this report as defined by J.L Cook et al (2010)

“Catastrophic complication: complication or associated morbidity that causes permanent unacceptable function, is directly related to death, or is cause for euthanasia.

Major complication: complication or associated morbidity that requires further treatment based on current standards of care:

1. Requires surgical treatment to resolve based on current standards of care
2. Requires medical treatment to resolve based on current standards of care

Minor complication: not requiring additional surgical or medical treatment to resolve (e.g. Bruising, seroma, minor incision problems, etc.).

Definition of outcomes used in this report as defined by J.L Cook et al (2010)

Full function: restoration to, or maintenance of, full intended level and duration of activities and performance from pre-injury or pre-disease status (without medication).

Acceptable function: restoration to, or maintenance of, intended activities and performance from pre-injury or pre-disease status that is limited in level or duration and/or requires medication to achieve.

Unacceptable function: all other outcomes.”

Case Histories, further details:

Three cases in this series (cases 1, 2 and 5) had an elbow arthrodesis following explantation of a total elbow replacement (TER). Of the remaining three cases the indication for elbow arthrodesis was severe osteoarthritis for case 3, a persistent septic arthropathy for case 4 and a fracture non-union in case 6.

Case 1 had chronic luxation of the Sirius (i) TER implant (~ Fig. 1) which was associated with a 4/5 lameness, a reduced range of motion and pain. The TER was explanted seven months after implantation and arthrodesis of the left elbow joint using a medial plate was performed.

Four years post TER (Iowa State Elbow Replacement (ii)) case 2 was unable to fully weight bear through the operated limb with sufficing of the toes during the swing phase of the gait cycle. Radiographs (~ Fig. 2) indicated that the polyethylene part of the radioulnar component of the prosthesis was severely worn. The TER was explanted and arthrodesis of the elbow joint was performed using a medially-positioned bone plate.

Case 3 had a left elbow arthrodesis with a medial plate to manage chronic pain and a 3/5 left thoracic limb lameness secondary to osteoarthritis. The patient suffered from multiple joint disorders including right cranial cruciate ligament rupture, left medial patella luxation and bilateral carpal hyperextension injury.

Case 4 underwent elbow arthrodesis, with a medially positioned plate, to manage a 5/5 right thoracic limb lameness caused by severe osteoarthritis and a septic arthropathy which had failed to respond to medical management. At the time of surgery the patient was suffering from moderate contracture of the flexor tendons on the ipsilateral limb, attributed to chronic disuse.

Case 5 had a TER (Iowa State Elbow Replacement (iii)) to manage a malunion of a left lateral humeral condylar fracture associated with a 5/5 lameness. Intra-operative subluxation of the implants occurred and resolution was not possible, therefore explantation was performed with conversion to an elbow arthrodesis using a caudal plate. Three months postoperatively the elbow arthrodesis failed with breakage of the caudal plate. All implants were removed and fixation of the elbow for arthrodesis achieved with a medial plate.

Case 6 sustained a lateral humeral condylar fracture secondary to a humeral intracondylar fissure. Open reduction and fixation was performed and two further revision surgeries but the fracture failed to heal. A non-union of the supracondylar fracture, with loosening of the transcondylar screw and persistence of an intracondylar fissure was documented by computed tomography seven months after the initial fracture was sustained. Clinically, the patient had a 5/5 lameness of the right thoracic limb, moderate muscle atrophy of the affected thoracic limb and a contralateral humeral intracondylar fissure. The previously placed implants were removed immediately prior to an elbow arthrodesis with a medially-positioned plate.

Anaesthetic protocols

Anaesthetic protocols varied between cases. Most commonly an opioid combined with an alpha -2 adrenergic agonist were used for pre-medication, propofol (PropoFl; Zoetis; Surrey United Kingdom) for induction and either isoflurane or sevoflurane for maintenance of anaesthesia. A brachial plexus block using bupivacaine at 1 mg/kg (Marcain; AstraZeneca; Cambridge, United Kingdom) was used in all cases where electronic records were available (cases 1, 3 and 4). Intra-operative breakthrough pain was variably managed with either an opioid or N-methyl-D-aspartate (NMDA) receptor antagonist or a combination of both. Post-operative analgesia regimes were tailored to each individual case. Opioid analgesia combined with a non-steroidal anti-inflammatory drug (NSAID) and/or paracetamol was continued for a minimum of 24 hours post-operatively in all cases.

Case 1, 3, 4 and 6 were discharged with a NSAID and paracetamol/codeine (Pardale-V; Dechra Limited; Northwich, UK), case 2 was discharged with paracetamol/codeine and tramadol and case 5 was discharged with a NSAID only.
Informed consent for the off-license use of tramadol and paracetamol/codeine was obtained. Although paracetamol/codeine is a licensed product, the dose used, length of administration and concurrent use with non-steroidal anti-inflammatory drugs were all off-license.

All cases received perioperative intravenous antibiotics in the form of either cefuroxime (15 mg/kg every 90 minutes) or amoxicillin/clavulanic acid (20 mg/kg combined, every 90 minutes). Cases 1, 2 and 5 received a post-operative course of oral amoxicillin/clavulanate (12.5–16 mg/kg twice daily for five to seven days). Cases 4 and 6 continued a course of cephalexin (20 mg/kg twice daily PO) for five and seven days respectively, and case 3 did not receive any postoperative antimicrobials.