Fracture of the anconeal process in two cats

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Summary

Two adult domestic shorthair cats were presented with acute forelimb lameness. In one case, there was a history of trauma. A fracture of the anconeal process was diagnosed on the flexed mediolateral radiographs of the elbow in both cats. The fracture was accompanied by a bony avulsion of the tricipital tendon in one animal. Both cats underwent surgical removal of the fractured anconeal process. The long-term clinical outcome, based on owner telephone follow-up four and nine years post-operatively, was considered to be satisfactory. Follow-up radiographic evaluation was available for one cat six month after treatment, radiographs showed evidence of osteoarthritis.

Keywords

Cat, fracture, anconeal process, elbow

Introduction

Radial and ulnar fractures represent 17.3% of all reported fractures in cats and dogs (1). However, fractures limited exclusively to one of the two bones are rarely observed and tend to be confined to the proximal third. In the ulna, these include intra- and extra-articular fractures of the olecranon, proximal diaphyseal fractures and Monteggia fractures (2). An isolated fracture of the anconeal process (AP) has previously been mentioned in one cat (3), yet more detailed information and discussion regarding etiology, diagnosis and treatment options were not given. In dogs, three cases have been reported, of which two were Boxers (4, 5) and one was a German shepherd (6). In two of these cases (4, 6), the fractured AP was thought to
be a sequel to an ununited anconeal process (UAP), where the secondary ossification centre of the AP fails to fuse with the ulna. The UAP is well known in German shepherds with an incidence of up to 30% (7). More recently a remarkable decrease to 1.1% was reported in a population investigated in France (8), but these results have some limitation because the examined dogs were prescreened. This disease has not been reported in Boxer dogs or in cats.

The aim of this report is to describe and discuss the clinical presentation, diagnosis and treatment of AP fractures in the cat. Outcome is based on owner telephone follow-up.

Case history

Case 1

A five-year-old, spayed female, domestic shorthair cat was presented with an acute onset of right forelimb lameness of two days duration. The owner was unaware of any antecedent trauma.

A weight-bearing right forelimb lameness, grade 2 out of 5, was noted on clinical examination. Pain was elicited on full extension of the right elbow but flexion was only minimally painful. There was no discernable soft tissue swelling. The remainder of the clinical examination and routine blood work were unremarkable. A flexed mediolateral radiograph of the right elbow revealed a triangular-shaped mineral opacity craniodorsal to the anconeus (Fig. 1), which was aligned with the anconeus but separated from it by a radiolucent line. A second ovoid mineral opacity was evident cranial to the humerus, which was interpreted as an osteochondroma or sesamoid bone. According to Wood et al. (9) a sesamoid bone within the tendon of origin of the supinator muscle is most likely, the presence of a similar smooth-shaped fragment of bone on the radiographs of the contra-lateral elbow is supportive. A craniocaudal radiograph of the right elbow revealed no abnormalities.

General anaesthesia was induced with intravenously (IV) administered ketamine\(^a\) (10 mg/kg IV) and midazolam\(^b\) (0.1 mg/kg IV) and maintained with isoflurane\(^c\). Perioperative analgesia was provided by a local infiltration of the brachial plexus using

\(^a\) Narketan®, Vetoquinol AG, Ittingen/Bern, Switzerland
\(^b\) Dormicum®, Roche Pharma AG, Reinach, Switzerland
\(^c\) IsoFlo®, Abbot AG, Baar, Switzerland
bupivacaine\textsuperscript{d} 0.5\% (2 mg/kg). Cefazolin\textsuperscript{e} (22 mg/kg IV) was administered as a peri-
operative antibiotic.

A standard caudolateral approach to the elbow was performed, as described by
Piermattei and Johnson (10). Small osteophytes were present at the incision site of
the joint capsule. Inspection of the AP revealed a two-millimetre bony fragment at the
tip. The fragment was excised and the joint was copiously lavaged and closed in a
standard manner. The removed fragment was submitted for histopathological
examination, which confirmed the diagnosis of an acute fracture of the AP. Fibrinous
exsudation with beginning proliferation of fibroblasts and osteoblasts with osteoid-
formation were evident.

The cat was discharged the next day and exercise restriction was advised for four
weeks. Post-operative analgesia consisted of buprenorphine\textsuperscript{f} (0.015 mg/kg IV/PO
q6h) for two days and a single administration of meloxicam\textsuperscript{g} at 0.2 mg /kg IV. After
discharge the administration of buprenorphin was continued orally every 6 hours for
another day by the owner, a student of veterinary medicine.

At follow-up examinations, one and six months after surgery, neither lameness nor
reduced range of motion of the joint was evident. Radiographs taken four weeks
post-operatively showed minimal osteoarthritic changes at the tip of the AP. Six
months after surgery, moderate degenerative joint disease was evident. At telephone
follow-up four years post-operatively, the owner reported normal weight bearing and
jumping.

Case 2

A three-year-old, spayed female, domestic shorthair cat was presented for acute
lameness following a fall from a height. The medical record from this case was
incomplete and initial physical examination findings and bloodwork were not found.

Radiographic examination of the chest revealed a mild pneumothorax and cloudy
shadowing of the peripheral parts of all lung lobes, consistent with pulmonary
contusions. Abdominal radiographs were unremarkable. The flexed mediolateral

\textsuperscript{d} Carbostesin®, AstraZeneca, Zug, Switzerland
\textsuperscript{e} Kefzol®, Teva Pharma AG, Aesch, Switzerland
\textsuperscript{f} Temgesic®, Essex Pharma GmbH, Luzern, Switzerland
\textsuperscript{g} Metacam®, Boehringer-Ingelheim GmbH, Basel, Switzerland
radiograph of the left elbow revealed a fracture of the AP close to the base of the process, as well as a suspected bony avulsion of the tricipital tendon at its insertion on the olecranon (Fig. 2a). The fractured AP was not visible on the craniocaudal view (Fig. 2b).

Surgical excision of the fractured AP was performed through a standard caudal approach after induction of general anesthesia, as described in the first case. The tricipital tendon was sutured and anchored to the olecranon tuberosity through a bone tunnel (Fig. 3). The exact suture technique used for tendon repair was not found in the medical records. Post-operative radiographs confirmed complete removal of the anconeal fragment and sufficient apposition of the avulsed bony fragment with the olecranon. Stabilization after surgery was provided by a spica splint for two weeks. Information on post-operative analgesia was not available due to incomplete data. Healing and clinical performance were noted as satisfactory at bandage changes. Two weeks post-operatively, left hindlimb lameness, due to a caudodorsal coxofemoral luxation of unknown cause, was diagnosed. As acetabular damage of the cranio- and caudodorsal rim with loose bony fragments was present, a femoral head and neck excision was performed, which healed without complication.

Further clinical and radiographic follow-up examinations were not performed because the owner moved to a foreign country. Owner-based telephone follow-up revealed normal weight bearing without lameness or impaired ability to jump nine years postoperatively.

Discussion

The fracture of the AP has been previously mentioned in one cat (3), but a more detailed description is not available. In dogs, major or minor trauma is reported as causes of anconeal fractures (4-6). One of the dogs previously reported was hit by a car (5); the other two dogs were suspected to have sustained minor trauma (4, 6). In these dogs, an underlying condition consistent with an UAP could not be excluded although signs of chronic degenerative joint disease were not evident on radiographs. In contrary to the German Shepherd a secondary centre of ossification of the AP is not reported in the Boxer dog and information on the nature of maturation of the AP is not available for the cat. In one of the two cats presented herein, the AP fracture was caused by a fall that additionally resulted in an avulsion of the tricipital tendon. The extreme loading of the cubital joint during landing
and the flexion accompanied by rotation within the joint are suspected to have caused the fracture of the AP. A trauma is considered very likely in the other case, in which histopathology confirmed an acute fracture of the AP. The fracture of the AP is also known to occur in the swine. Histopathologic examination carried out on the elbow joints of 5 pigs revealed similar findings as in the presented cat with additional efforts to stabilize the joint by formation of hyaline- and fibrocartilage as well as a buttress callus (11). Underlying causes discussed for the porcine AP fracture are acute traumatic incidents, repetitive traumata and in addition osteochondrosis of the elbow joint. Considering the available data we reckon that a trauma is necessary to fracture the AP in cats, however further investigation on the maturation of the feline AP would be interesting.

The diagnosis of AP fracture can be made following physical and radiographic examination. The injured elbow may be painful on palpation and soft tissue swelling may be present. In the first case described herein, extension of the elbow was extremely painful although flexion did not elicit pain. Crepitus, joint effusion and soft tissue swelling were not evident. These findings were consistent with those previously described in dogs. Additional findings in dogs were pain on rotation of the antebrachium, crepitation, joint filling and soft tissue swelling (4, 5). Assuming trauma to be the most common cause of AP fractures, careful physical examination for other trauma-related injuries is prudent. Given that superimposition of the humeral condyles may obscure a direct view of the AP in standard mediolateral radiographs a radiographic diagnosis in cats is best made on the flexed mediolateral view as reported in dogs (12). If injury is confined to the AP, the fracture is not visible on craniocaudal views, as was the case in these two cats.

Treatment options in dogs with an UAP include fragment excision, lag-screw fixation, proximal ulnar osteotomy and a combination of the latter (13). Conservative management as well as excision of an UAP, resulting in progressive lameness and degenerative joint disease (14), are not recommended. Nevertheless there is little evidence available that other surgical methods, like repairing AP fractures or stabilizing ununited anconeal processes, have a better clinical outcome in all cases and that at the least radiographic osteoarthritic changes have to be expected. Removal of the fractured fragment was performed in both Boxers with AP fractures (4, 5). Lag screw fixation, feasible for larger fragments, was performed in the German shepherd (6). Considering the small size of the fracture fragments seen in both presented cases fixation was not attempted and excision was performed. Conservative treatment was not considered because, as proven for the
dog, the fragment would continuously act as joint mouse, causing persistent joint inflammation, which leads to osteoarthritis, pain and a poor functional outcome.

Radiographic changes consistent with degenerative changes and osteoarthritis are likely to develop despite surgical therapy, as was seen in the first case with a six-month radiographic follow-up and is likely for the second cat. The assessment of clinical outcome in the presented cases is limited to owner evaluation, which both reported normal weight bearing, jumping and limb function. Despite the method of follow-up evaluation the outcome for surgical excision of a fractured AP can be considered satisfactory in the cat.

References


