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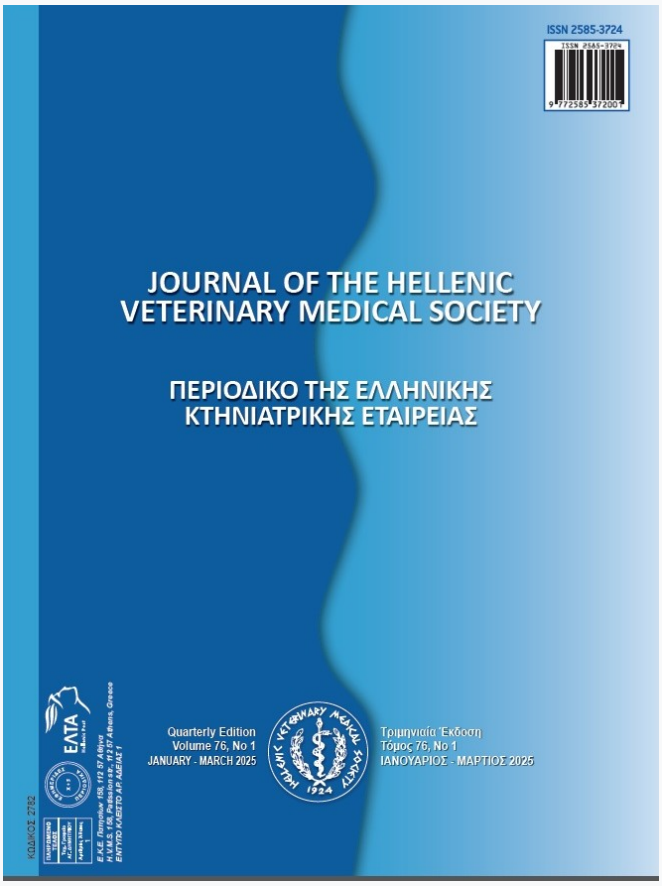

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Case report
Κλινικό περιστατικό

Lateral luxation of the elbow and its treatment in a kitten

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ABSTRACT: Elbow luxations are an uncommon orthopedic issue in kittens. The main objective of treating such luxations is to minimize restrictions on the range of motion in the cubiti joint. While various techniques are employed for this purpose, diverse treatment options are still necessary. This report focuses on the lateral luxation of the elbow and its treatment in a three-month-old cat, emphasizing the importance of an operative technique that does not hinder normal elbow joint movements and serves as an alternative to standard methods. During the operation, the radius bone was secured to the ulna bone using an orthopedic pin, and the elbow luxation was stabilized with a cerclage wire. The patient began using its foot on the third day of the postoperative period and underwent a four-month follow-up. Subsequent interviews with the patient's owner revealed the patient's favorable condition, with the ability to use its foot comfortably.

***Keywords*:** Cat; Dislocation; Elbow

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INTRODUCTION

The elbow joint, a composite joint comprising the humerus, radius, and ulna bones, is characterized by its high stability, attributed in large part to robust collateral ligaments and the anconeus process, which secures the joint by entering the olecranon fossa (Schaeffer et al., 1999; Guzel et al., 2006; Bongartz et al., 2008; Abrescia et al., 2019). Among joints in cats and dogs, the elbow joint ranks second only to the hip joint in terms of luxation frequency (Schaeffer et al., 1999; Guzel et al., 2006; Bongartz et al., 2008). Elbow dislocations can be congenital or result from traumatic incidents, commonly associated with factors such as traffic accidents, high-energy blunt traumas, falls, and inter-animal conflicts (Schaeffer et al., 1999; Guzel et al., 2006; Bongartz et al., 2008; Abrescia et al., 2019; Saglam et al., 2020). While numerous case series on elbow luxations in dogs have been documented, it is acknowledged that such cases in cats are infrequently reported (Bongartz et al., 2008; Abrescia et al., 2019; Saglam et al., 2020).

Cats and dogs affected by elbow dysplasia exhibit a characteristic posture, holding their elbows in a flexed position and unable to reach the ground. Clinical examination typically reveals signs of pain, swelling, and restricted movement in the elbow (Schaeffer et al., 1999; Guzel et al., 2006; Bongartz et al., 2008; Abrescia et al., 2019; Saglam et al., 2020). Diagnosing elbow luxations relies significantly on a thorough physical examination and bilateral radiography. Radiographic assessments, specifically noting abnormal positioning of the radius and ulna bones and the absence of the olecranon in its usual location, serve as crucial indicators supporting the diagnosis.

In the acute phase, the prognosis for elbow dysplasia treatment is generally positive. Closed reduction under general anesthesia is often effective during this period (Guzel et al., 2006; Bongartz et al., 2008; Saglam et al., 2020). This procedure involves placing the elbow joint in a flexed position at an angle of 100-110° and medially rotating it. Once the processus anconeus is correctly positioned in the fossa olecrani, the leg is extended, restoring the joint to its normal alignment. Following the placement of the processus anconeus, a Robert-Jones bandage can be applied for 7-10 days. It is crucial to restrict the patient's movements for a minimum of four weeks post-procedure (Guzel et al., 2006; Mitchell, 2011; Saglam et al., 2020).

In cases of chronic elbow dysplasias accompanied by fractures, hematomas, and fibrosis within the joint capsule, open reduction is the preferred approach. This procedure not only addresses these complications but also enhances the success rate in treating elbow luxations during the acute phase (Guzel et al., 2006; Saglam et al., 2020). The open reduction process involves making an incision lateral to the elbow joint. Employing appropriate surgical techniques, the organized hematoma, connective tissue, and capsule fragments in the joint are excised. Subsequently, the head of the radius and the processus anconeus are repositioned to their normal alignment. In instances where conventional reduction proves challenging, olecranon osteotomy, approached from the back of the elbow, can be performed to reduce tension in the triceps muscle. Damaged collateral ligaments, repairable after reduction, are addressed through suturing. If repair of the collateral ligaments, particularly the ligamentum collaterale mediale, is not feasible, joint stabilization can be achieved by placing a screw on the humeral condyles and ulna, with a non-absorbable suture or cerclage wire passed over these screws (Guzel et al., 2006; Arican, 2020; Saglam et al., 2020). Traumatic elbow luxations may also benefit from transarticular external fixators and flexible external fixators (Arican, 2020).

This report is particularly significant as it emphasizes the importance of preserving normal elbow joint movements and providing an alternative to conventional surgical techniques.

CASE HISTORY

As the cat in this case report was a stray animal, informed consent was obtained from the individual who found and adopted the cat. The report discusses the case of a three-month-old male cat brought to Firat University Animal Hospital Surgery Department due to complaints of an inability to use its right forefoot and swelling in the elbow region. Given the stray nature of the cat, the available medical history was limited.

The inspection revealed that the cat was unable to use its right foreleg, and there was significant swelling in the elbow region. Palpation of the elbow joint revealed the cat's heightened reaction and evident pain. Further examination indicated that the bones constituting the elbow joint were not in their normal position. Subsequent to the physical examination, radiographs of the cubiti joint, taken from different angles and bilaterally, confirmed a lateral luxation in the cat's elbow joint (Fig. 1A, B, C, D). Additionally, the radiograph revealed the joining and separation of the radius and ulna bones at the articular surface known as the circumferentia articularis.

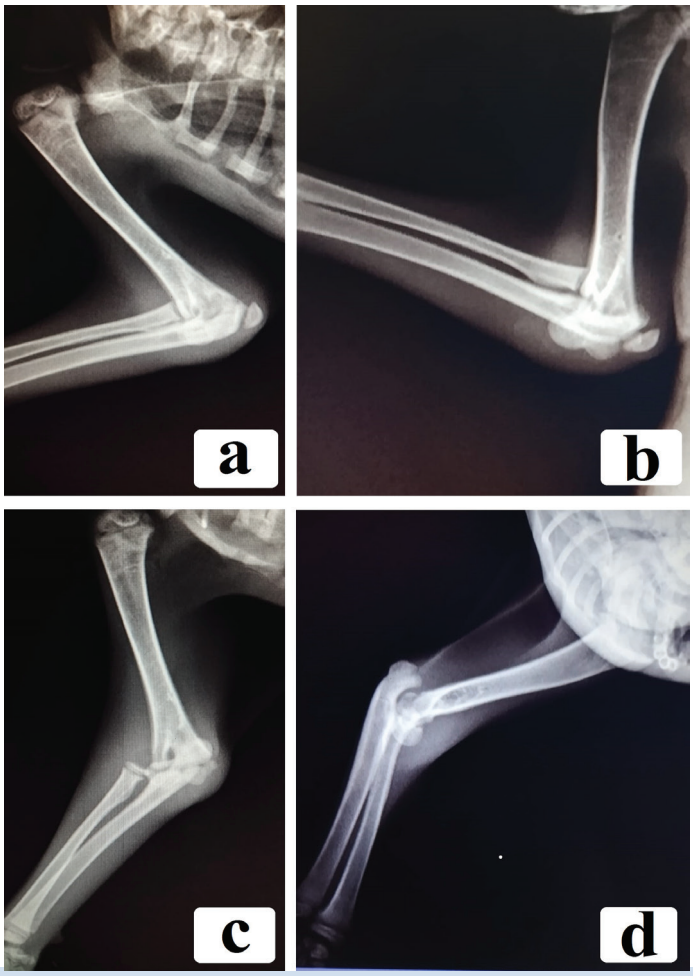

Fig 1. Preoperative mediolateral radiography: angle of articulatio cubiti joint 60° (a), angle of articulatio cubiti joint 90° (b), angle of articulatio cubiti joint 120° (c), angle of articulatio cubiti joint 120° (d); in the mediolateral position (a,b,c), in the lateromedial position (d)

In light of the unsuccessful closed reduction for the cat experiencing elbow joint luxation, the decision was made to proceed with open reduction under general anesthesia. Pre-anesthesia was initiated by administering xylazine hydrochloride (*Rompun 2%, Bayer, 23.32 mg/ml*) intramuscularly at a dose of 2 mg/kg. After a 20-minute interval, general anesthesia was induced through intramuscular administration of ketamine hydrochloride (*Ketasol 10%, Richter® Pharma Ag, 100mg/kg*) at a dose of 15 mg/kg. A 4 cm incision was made by approaching from the lateral aspect of the right front leg of the cat, following the completion of preoperative preparations. Employing appropriate surgical procedures, access to the elbow joint was established. Initially, the radius and ulna bones were stabilized by inserting an orthopedic nail (*Steinman, Ø 1.8 mm*) in the craniocaudal direction perpendicular to the bone, positioned at the upper third of the radius (Fig. 2A, B). Subsequently, an orthopedic nail (*Steinman, Ø 1.8 mm*) was placed on the olecranon in the lateromedial direction, and its tip was bent. Following the drilling of a hole in the lateromedial direction on the humerus proximal to the foramen subtrochlea using an orthopedic nail (*Steinman, Ø 1.8 mm*), a 0.3 mm diameter cerclage wire was passed through and secured by wrapping it around the orthopedic nail on the olecranon (Fig. 2A, B). Following the confirmation that there were no restrictions on joint movements during the last assessments, the soft tissues were closed through suturing according to routine surgical procedures. The cat, under cage rest for 15 days, received intramuscular administration of amoxicillin-clavulanic acid at a dose of 8.75 mg/kg for 7 days postoperatively. Additionally, pain management was ensured by administering meloxicam 45 minutes before the operation and three times postoperatively. In the follow-up examinations on the 7th, 14th, and 270th days postoperatively, it was observed that the cat used its foot comfortably, with no discernible restrictions in joint movement (Fig. 2C). Photographs, radiographs, and videos provided by the owner on the 105th and 270th postoperative days indicated that the cat used its feet normally and exhibited no issues (Fig. 3A, B; Fig. 4A, B, C). The owner expressed the decision not to remove the implant due to the cat's excellent overall condition and its ability to use its foot normally without experiencing any pain.

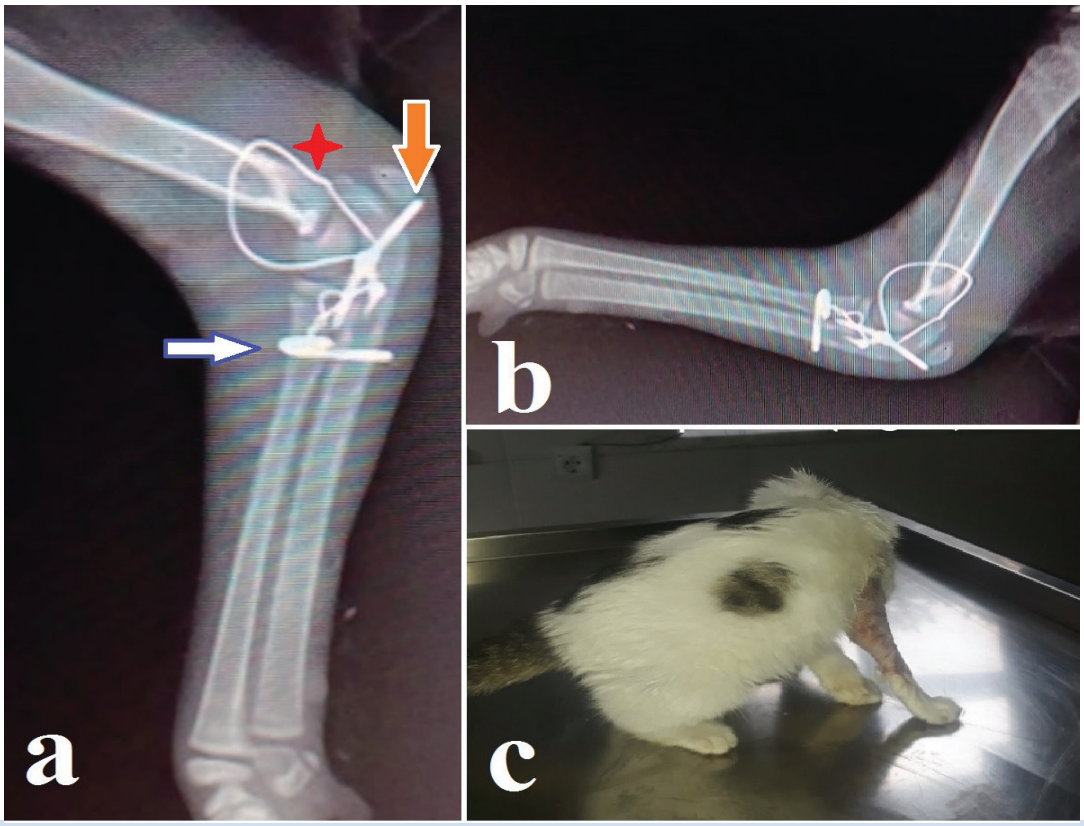

Fig 2. Postoperative mediolateral radiography (a,b), orthopedic nail placed between radius and ulna (white arrow), orthopedic nail placed in the olecranon (orange arrow), cerclage wire passed through the humerus and fixed to the olecranon (red star), the patient's condition on the 7th postoperative day (c).

Fig 3. The patient's condition on the 105th postoperative day (a,b)

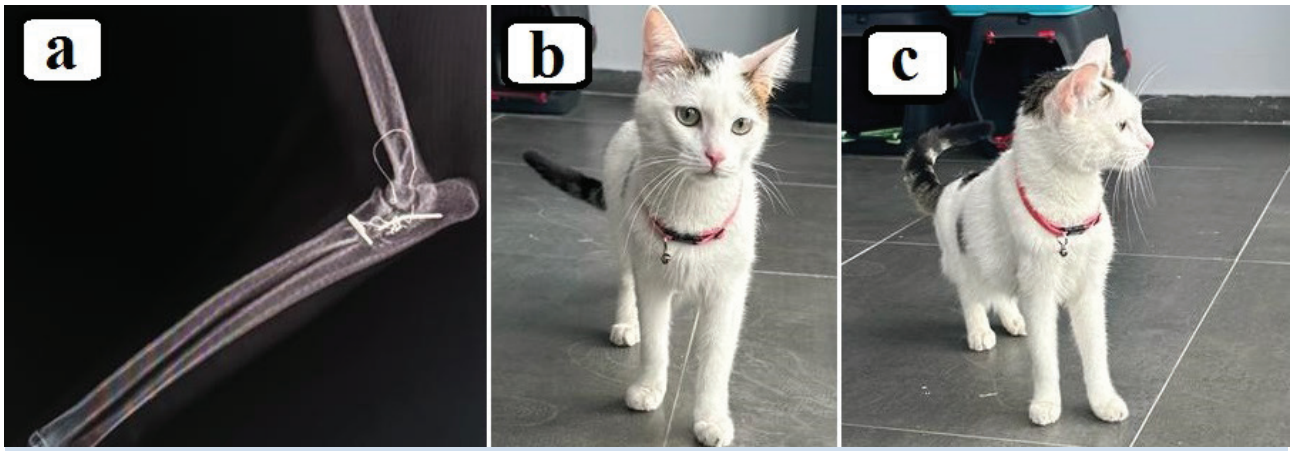

Fig.4. Radiography (a) and general appearance (b) of the patient on the 270th day

DISCUSSION

Elbow luxation stands as the most prevalent luxation in cats and dogs following hip dislocation. Although certain studies (Guzel et al., 2006; Mitchell, 2011; Saglam et al., 2020) provide information about age and gender in feline cases, there is no conclusive scientific data establishing these parameters as predisposing factors for elbow luxations. Some studies (Guzel et al., 2006; Saglam et al., 2020) suggest a higher incidence in male cats, while others (Mitchell, 2011) indicate a greater prevalence in female cats. The reported average age in these studies falls within the range of 20 to 36 months, but elbow luxations have also been identified in cats as young as 3 months old (Guzel et al., 2006; Mitchell, 2011; Saglam et al., 2020). In the case presented in this report, it was observed that the stray cat with elbow luxation was a 3-month-old male.

Elbow luxations predominantly result from traumatic incidents, including traffic accidents, high-energy blunt traumas, falls from height, and animal altercations (Guzel et al., 2006; Saglam et al., 2020). In a study by Saglam et al. (2020), four out of six cats with elbow luxation were attributed to traffic accidents, while two were the result of falls from a height. Guzel et al. (2006) reported in their study that 18 out of 22 animals (17 dogs, 5 cats) with elbow luxation were involved in traffic accidents, and three cases were linked to falls from a significant height. The cause of elbow luxation remained unclear in one animal in their study. Similarly, Mitchell (2011) found that 10 out of 25 animals (14 dogs, 11 cats) with elbow luxation had incidents related to traffic accidents. The specific cause of elbow luxation in the stray cat presented in this report is not known. Considering that elbow luxations in kittens are often congenital, it is hypothesized that this particular case may be congenital in nature.

Clinical examinations of elbow luxations commonly reveal symptoms such as the inability to bear weight on the affected foot or limping, restricted joint movements, abnormal posture, pain in the elbow region, and maintaining the joint in a slightly flexed position (Guzel et al., 2006; Bongartz et al., 2008; Farrell et al., 2009; Abrescia et al., 2019; Saglam et al., 2020). In the case presented in this report, a three-month-old cat with elbow luxation exhibited the inability to place its right forefoot on the ground, severe swelling in the elbow joint, and pain upon palpation examination.

Determining the appropriate treatment protocol for elbow luxations involves considering factors such as whether the case is acute or chronic and whether there are accompanying conditions like osteoarthritis or fractures. Treatment options include closed and open reduction techniques to restore the elbow joint to its normal position. Closed reduction is typically applied in acute cases, while open reduction is employed for chronic cases involving osteoarthritis or fractures. During open reduction, joint stabilization can be achieved by inserting a screw into the humeral condyles and ulna and passing a cerclage wire between these two screws. Additional methods for achieving elbow stability include the use of transarticular external fixators and flexible external fixators (Guzel et al., 2006; Arican, 2020; Saglam et al., 2020). Saglam et al. (2020) outlined their approach to treating cats with elbow luxation, reporting the use of the open reduction technique in four out of six cats and the closed reduction technique in the remaining two. In the cases where open reduction was applied, they inserted a screw into the humerus and ulna, passing a cerclage wire through eight-shaped screws. Farrell et al. (2009) described a treatment method involving the creation of mediolateral tunnels on the radius, ulna, and humerus bones. They then fixed the humerus bone to both the radius and ulna using suture material in cats with elbow luxation. Abrescia et al. (2019) reported their treatment of two cats with traumatic elbow luxation using closed reduction and a transarticular

external fixator. In the case described in this report, an alternative technique to routine surgical methods was employed for the cat with elbow luxation. Initially, the radius and ulna bones were fixed with an orthopedic nail. Subsequently, a lateromedial tunnel was created from the proximal region to the foramen subtrochlea in the humerus. The joint was then stabilized by threading a cerclage wire between the orthopedic nail on the olecranon and the created tunnel.

In conclusion, this report describes the utilization of a technique for treating elbow luxations that aims to prevent postoperative joint movement restrictions and offers an alternative to conventional surgical techniques. The development and implementation of such techniques hold significance not only in streamlining the postoperative recovery period but also in achieving maximum efficiency.

CONFLICT OF INTEREST

The authors declared that there is no conflict of interest.

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