REPAIR OF LUXATED ELBOW IN A DOG – A CASE REPORT

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[Received: 24.7.2015; Accepted: 05.12.2015]

Traumatic luxations of the elbow joint are uncommon in canines, however common in humans (Lill *et al*., 2001) and also have been reported in non-human primates (Wellehan *et al*., 2004), cats (Schaeffer *et al*., 1999) and raptors (Ackerman and Redig, 1997). The reports on the type of reduction and stabilization technique employed in elbow luxations hardly provide predictable long term outcomes favoring a particular technique. Early closed reduction of the luxated elbow has a good prognosis (O'Brien *et al*., 1992) especially if the periarticular ligaments have only been stretched and not ruptured (Bongartz *et al*., 2008). Persistent instability following closed reduction is common and may yield poor long term outcome (Schaeffer *et al*., 1999). An early surgical repair is imperative as it may otherwise result in fibrosis, soft tissue contraction, and degenerative changes. The different surgical techniques employed in luxated elbows include primary suturing, transarticular pinning (O'Brien *et al*., 1992), external skeletal fixation (Billings *et al*., 1992), bone tunnels and sutures (Mitchell, 2011) and screws with washers and figure of eight wiring (McCartney *et al*., 2010). However, literatures on open reduction and augmentation by using orthopaedic wires and screws are little and the outcomes are contradictory. The present case describes successful surgical management of luxated elbow in a Spitz by open surgical reduction and stabilization using orthopaedic wires (figure of eight wiring) and screws.

Case history and Treatment

A 1-year-old, intact male, Spitz weighing 6 kg was presented to the Referral Polyclinic with non-weight bearing lameness of right forelimb. The animal had a dog bite attack before two days. On physical examination, the elbow was moderately swollen, painful and was held in a flexed and abducted position. The physiological parameters were within the normal range. The elbow joint had decreased range of motion and the animal evinced pain on palpation. The olecranon was palpated medial to the medial humeral condyle. Proprioceptive responses and withdrawal reflexes were normal. The grade of lameness, evaluated by the scoring system suggested by Gordon-Evans, was assessed to be 5 during rest and progression. On lateral projection radiograph of the right antebrachium, humeral head was found luxated cranially and the radius and ulna caudally and the humeral condyle was entirely free of the articular surface of the radius and ulna (Fig. 1). A bone density was noticed caudal to the distal humerus and cranial to the ulnar notch that was considered consistent with the avulsed fragment of lateral collateral ligament. Based on the clinical history, physical examination, and radiographic findings, traumatic lateral luxation of elbow was diagnosed. Conservative treatment failed to stabilize the joint and hence an open surgical reduction was resorted for repair.

The patient was stabilized pre-operatively by administration of 5% dextrose normal saline. The animal was premedicated with atropine sulphate at the rate of 0.045 mg/kg body weight intramuscularly followed by intravenous diazepam at the rate of 0.5 mg/kg body weight. Preoperative antibiotic, ceftriaxone sodium at the rate of 25 mg/kg bodyweight

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and analgesic pentazocine at the rate of 1 mg/kg was administered intravenously. The animal was positioned in left lateral recumbency. The hair from the level of scapular spine up to carpus was shaved, scrubbed with chlorhexidine gluconate solution, painted with povidone iodine and was prepared for an aseptic surgery. General anaesthesia was induced with 5% thiopentone sodium at the rate of 12 mg/kg body weight intravenously and was maintained along with intravenous infusion of normal saline 'to effect'.

Fig 1: Lateral radiograph of elbow showing cranially luxated humeral condyle and caudally luxated radius and ulna. A 1 mm bone density caudal to distal humerus indicating avulsion of collateral ligament

A 3 cm long skin incision was made along the lateral elbow on the caudal aspect of the right antebrachium. Blunt dissection was used to expose the luxated lateral humeral condyle and the articular facets of radius and ulna. The lateral collateral ligament was found avulsed from the humeral condyle. The avulsed bony fragment was too small and the ligament was found to be nonviable for reconstruction. Hence it was decided to anchor the joint using orthopaedic wire and screws. The joint cavity and the articular surfaces were irrigated with normal saline, cleared of any debris and the articular surfaces were reduced to its anatomical position. Holes were drilled at the proximal radius and distal humerus in preparation for tapping. The joint was stabilized using two screws, each applied on to the proximal and distal holes. A 21 gauge orthopaedic wire was passed around the two screws in a figure-of-eight fashion to anchor the joint and was tightened enough after assessing adequate range of motion. The subcutaneous tissue was apposed using polyglactin 910 No. 1/0 by simple interrupted sutures and the skin was apposed using polyamide o. 1-0 by horizontal mattress sutures. The operated limb was immobilized in extension by a Spica splint. The postoperative lateral and antero-posterior radiographs revealed accurate anatomic reduction of articular surfaces.

Postoperatively, cephalexin at the rate of 10 mg/Nkg body weight for 7 days and meloxicam at the rate of 0.2 mg/kg body weight for 3 days was administered orally. Post exposure therapy against rabies was administered on the 0^{th}, 3^{rd}, 7^{th}, 14^{th} and 28^{th} day. The dog started to bear weight in the repaired limb from the second postoperative day. The stability of the elbow joint, tested using the Campbell method, was found excellent. Skin sutures were removed on the 12^{th} postoperative day. By day 17, complete weight bearing was noticed even though there was a fractional reduction in joint mobility compared to the unaffected limb. The lacerated wounds healed completely. Radiographs showed good alignment of the reduced elbow joint with intact screws and figure of eight wires (Fig. 2). Passive range of motion exercises and confinement was advised. Postoperative complications were

not observed since then and the animal had an uneventful recovery.

Fig 2: Postoperative lateral (A) and anterior-posterior (B) radiograph taken after 2 weeks of surgery showing anatomically reduced elbow joint with intact screws and figure of eight wires

Discussion

Luxations of the elbow may be congenital or traumatic as also reported by Bongartz *et al*. (2008) and Fafard (2006). Traumatic luxations of the elbow are uncommon compared to fractures of distal humerus or proximal radius and ulna as mentioned by O'Brien *et al*. (1992) also. This could be due to the strong surrounding muscular, ligamentous and bony structures that predisposes to fractures than luxations due to the nature of the forces that the elbow is most commonly subjected to during trauma as also narrated by Dassler and Vasseur (2002). At times, the luxation may be accompanied by concurrent injuries like dislocations, fracture of tibia, maxilla, pelvis or fractures of ulna referred as the Monteggia fracture as reported by Mitchell (2011) and Vallone and Schulz (2011) also. In the present case, a violent dog bite attack resulted in disruption of elbow joint that resulted in the dislocation of both radius and ulna. Direct forces can cause dislocation if the elbow is flexed at an angle of 45º or less as mentioned by Dassler and Vasseur (2002) also. In addition, the luxation might have occurred when the body of the animal pivoted around the flexed elbow resulting in indirect rotational forces during the traumatic event as narrated by Bongartz *et al*., (2008) also. Although the animal had severe lacerations, contusions and bruises, it was devoid of any concurrent fractures. The luxation was lateral as previously reported by Billings *et al*. (1992) and Mitchell (2011) to be predominant type, as the prominent medial humeral epicondylar ridge protects the elbow from medial luxation as also mentioned by Dassler and Vasseur (2002). Surgical repair was attempted with the set goal of reconstructing the collateral ligament as closed reduction was unstable. Replacement of collateral support was done since the collateral ligament was nonviable for repair. Also, the dog may not tolerate a splint or cast that is inevitable following closed reduction. However, an immobilization period of 14 days as suggested by Schaeffer *et al.* (1999) could be provided after repair. The excellent clinical outcome and in particular the absence of osteoarthritis in this case could be due to the surgical technique adopted, stability of the joint after stabilization, the short period of immobilization and the body weight of the animal. A consistent finding by McCartney *et al*. (2010) in dogs with excellent outcome undergone open reduction was the body weight of the animal. Similar encouraging results were observed in the present case also that envisaged the significance of this surgical technique in small breeds of dogs.

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