

Araştırma Makalesi

TRAUMATIC LUXATIONS OF THE ELBOW IN CATS AND DOGS

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Kedi ve Köpeklerde Travmatik Dirsek Çıkıkları

Özet: Küçük hayvan pratiğinde travmatik dirsek eklemi çıkıkları, yaygın olarak gözlenir. Çıkıkların büyük çoğunluğu lateral doğrultuda şekillenir.

Çalışma materyalini 1998-2004 yılları arasında İstanbul Üniversitesi Veteriner Fakültesi Cerrahi Anabilim Dalı Kliniği'ne ön ayağına basamıyor şikayetiyle getirilen 5 kedi, 17 köpek oluşturdu. Olgulara çıkığın durumuna göre açık ya da kapalı ret uygulandı. Kapalı ret uygulamasında klinik sonuçlar, yürüyüş sırasında oluşan topallığın derecesine göre; 4 olguda mükemmel, 2 olguda iyi, 2 olguda orta ve 1 olguda zayıf olarak belirlendi. Açık ret uygulamasında aynı kriterler doğrultusunda yapılan değerlendirmede klinik sonuçlar; 1 olguda mükemmel, 4 olguda iyi, 1 olguda orta ve 6 olguda zayıf olarak gözlendi.

Çalışma sonunda, kapalı ve açık ret uygulanan olgulara ait radyolojik ve klinik sonuçlar değerlendirildi. Buna göre, kapalı reddi takiben elde edilen sonuçlar daha memnuniyet verici bulundu.

Anahtar Kelimeler: Dirsek, eklem, travmatik çıkık, sağaltım, kedi, köpek.

Summary: Elbow luxation is seen frequently in small animal practice. A large proportion of these luxations occur laterally.

The material of this study included in 5 cats and 17 dogs brought to Istanbul University, Faculty of Veterinary Medicine, Department of Surgery from 1998 to 2004, complain of inability of functional using of the forelimb. Open or closed reduction was carried out, depend on the condition of the luxation. According to the degree of lameness during walking, clinical results for closed reduction were classified as: excellent in 4 cases, good in 2 cases, fair in 2 cases and poor in 1 case. Clinical results for open reduction, also determined depending on the same criteria were classified as: excellent in 1 case, good in 4 cases, fair in 1 case and poor in 6 cases.

Radiological and clinical results of both the closed and open reduction cases were assessed at the end of the study. The results achieved after closed reduction were found to be more satisfactory.

Key words: Elbow, joint, traumatic luxation, treatment, cat, dog.

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In small animal practice, traumatic elbow luxations is occurred secondarily after traumatic hip luxations. The elbow is a ginglymus (hinge) joint allows flexion, extension and a limited ability of rotation. The elbow joint is a compound joint formed by humerus, radius and ulna. It is reasonably strong due to its anatomical structure. When the forelimb is extended, the anconeal process of the ulna fits into the fossa olecrani of the humerus and locks the joint. Strong collateral ligaments and the anconeal process limit the movement of the joint to the lateral and the medial. The annular ligament and interosseal ligaments provide the connection between radius and ulna. Muscles around the elbow create active stability (2, 3, 8, 9).

Elbow luxations occur congenitally and traumatically (2, 9).

Congenital elbow luxations form 17-20% of lameness cases unrelated to trauma and which originate from this joint. They are generally seen in small breed dogs (Terrier, Lhasa apso, Bulldog etc). This condition shows at birth or 3-4 months later. The possible reason for congenital luxations is thought to be aplasia of the medial collateral ligament, which causes hypoplasia of the coronoid and anconeal processes and shallowness of the trochlear incisura (7, 9, 10).

Traumatic luxations are usually seen in cats and dogs older than one year of age. They are mostly caused by traffic accidents, falling from a height or getting the leg caught in something (2, 8, 10).

Since the joint has a strong structure, luxation is usually caused by indirect rotational forces. Direct forces can only cause luxation when the joint is bent at an angle of 45° or less (1, 8 - 10). The fact that the medial humeral epicondyle is longer and larger, causes more than 90% of luxations to occur laterally. Luxation may also occur medially or caudally. These, however, are rare (8, 12).

Medial luxations are mostly observed together with condylar fractures of the humerus. Blunt forces acting on the caudal ulna cause luxations to the cranial. These luxations are seen together with fractures of the olecranon (Monteggia fracture) (1, 8, 12). An ulnar diaphyseal fracture is usually accompanied by cranial or proximal luxation of the radial head. For the preservation of the connection between the radius and ulna, the fracture must be on the same level as the trochlear incisura. In such a case, the annular ligament may remain intact (8).

Clinical examination reveals inability to use the forelimb, the joint being held in slight flexion and abduction as well as rotation in the antebrachium. Pain is present in the region. Joint movement is limited (2, 7 - 9). A step is seen in lateral luxations, due to dislocation of the radial head. Compared to the condyles, the olecranon is positioned laterally. In Monteggia fractures, swelling and crepitation is noticeable in the distal of the elbow. Chronic luxations are less painful. On the other hand, there is more crepitation due to osteoarthritis (1).

Diagnosis of elbow luxations is made with physical examination and two-way radiographs. Radiographic examination may reveal avulsions in the connections of the collateral ligaments, position changes for the radius and ulna and the presence or absence of the olecranon within the fossa olecrani (7 - 9).

Prognosis is positive in acute cases, while guarded or negative as time elapses (1, 12).

Elbow luxations are treated using closed or open reduction methods (2, 4, 6 - 8). Closed reduction must be carried out as early as possible and fixed stability of the elbow must be achieved (5, 8, 9, 11). This procedure is carried out under general anaesthesia. The joint is flexed. The radius and ulna are rotated medially. The joint is extended until the anconeal process assumes its normal position between the humeral epicondyles. Joint movements are seen to relax when the radial head and anconeal process are in their normal position. Following reduction of the luxation, an application similar to the Robert-Jones bandage is carried out for a period of 7-10 days. Joint movements are restricted for 4 weeks (1, 2, 8, 9). Complications such as osteoarthritis, decrease in joint movements and ankylosis may be encountered after closed reduction (8, 9).

Open reduction is preferred in cases of chronic luxation, fracture, haematoma, relaxation and fibrosis formation in the capsule (1, 8, 9). However, since these conditions will damage the joint surfaces, they will also cause osteoarthritis. More successful results are achieved with open reduction in acute luxation cases (8, 9). The lateral parts of the elbow and the radial head restrict approach to the joint. This approach can only be used in 6-7 days old cases. Organised haematoma, ligament and capsule fragments are removed from the joint. The radial head and anconeal process are placed back into their position. To avoid damaging the joint surface during this procedure, scissors with a closed tip or periosteum elevators must be used. In cases where reduction has not been achieved, a caudal approach may be attempted with the osteotomy of the olecranon process. This approach enables removal of granulation tissue in chronic cases, reduces tautness and makes reduction easier. Damaged ligaments are sutured following reduction. In cases where the medial collateral ligament has been damaged, a screw is placed in the medial condyle of the humerus and another in the ulna. The joint is stabilised by passing a non-absorbable suture or cerclage wire between the two screws. The surgical site is closed routinely. The forelimb is put into a Robert-Jones bandage for 5-7 days and joint movements are restricted. Passive flexion-extension movements are applied after removal of the bandage (1, 2, 6, 7, 9, 11).

Lack of sufficient joint stability following open or closed reduction causes osteoarthritis and restricted joint movement. Longer than 14 days of the forelimb remaining in the bandage also leads to the same negative results (5, 8, 11).

The purpose of this study is to assess radiological and clinical results achieved after closed or open reduction in traumatic elbow luxations of cats and dogs and pass this information on to practise.

Material and Method

The material of this study included in 5 cats and 17 dogs brought to Istanbul University, Faculty of Veterinary Medicine, Department of Surgery from 1998 to 2004, with a complaint of not bearing weight on a foreleg. While 18 of the cases were due to traffic accidents and 3 falling from a height, the history was unknown in 1 case.

Following clinical examination, antero-posterior (AP) and medio-lateral (ML) radiographs were taken of the cases which were subsequently diagnosed with elbow luxation. Closed reduction was carried out in 9 of these cases and open reduction in 12 cases. The delayed 1 case was left untreated.

Closed reduction was carried out in 9 cases which were brought to the clinic within the first week period. The cases were put under general anaesthesia for this procedure. For premedication, Xylazine (Rompun - Bayer) was administered at a dose of 2mg/kg IM. General anaesthesia was achieved using ketamine hydrochlorure at a dose of 10mg/kg IM in cats and 15mg/kg IM in dogs.

The cases were put into lateral recumbency on the operating table with the luxated forelimb uppermost. The elbow was flexed. The radius and ulna were rotated medially. The joint was extended until the anconeal process assumed its normal position between the humeral condyles. When the correct positions of the radial head and anconeal process were resumed, the joint movements were seen to relax. Joint movements were restricted for 1 week by applying a Robert-Jones bandage after reduction of the luxation. Movements of the patient were also advised to be limited for a further 4 weeks.

Open reduction was carried out in chronic luxations. Premedication for the 12 cases which underwent open reduction was achieved using Xylazine (Rompun - Bayer) at a dose of 2mg/kg IM. Anaesthesia induction was established with ketamine hydrochlorure (Ketalar - Parke Davis) administered at a dose of 5mg/kg IV. Following intubation, inhalation anaesthesia was given to the cases. This was carried out with Isoflurane at an initial dose of 4%, followed by a maintenance of 2%.

The surgical site was shaved and each case was placed in lateral recumbency on the operation table with the luxated leg uppermost. Following routine disinfection, the operation commenced. The joint was approached from the lateral. Organized haematomae, ligament and capsula particles were removed from the joint. The radial

head and anconeal process were returned to their normal position. To avoid damaging the joint surfaces, scissors with a closed tip were used. Following reduction, the damaged ligaments were sutured using non-absorbable suture material (Propilen - monofilament polipropilen - Dogsan). In 12 cases with a damaged medial collateral ligament, a cortical screw was applied to both the medial humeral condyle and the ulna. Joint stabilisation was established with the aid of cerclage wire passed between the two screws. The joint capsule was closed using the same suture material. The operation was completed with the routine suturing of soft tissues and the skin. The forelimb was put into a Robert-Jones bandage and joint movements restricted for a week. Following removal of the bandage, it was advised that cases were given passive flexion and extension movements.

In the delayed case no.16 (6-month delay), following radiographic examination, it was seen that there was severe osteoarthritis in the elbow and destruction in the joint structure. Arthrodesis was suggested to the patient owner. However, upon the patient owner's refusal, no treatment was given to this case.

The cases were assessed radiographically at a later period (1 month – 2 years). The extent to which osteoarthritis had developed was determined.

Results

In this study, 5 cats and 17 dogs brought to the Istanbul University, Faculty of Veterinary Medicine, Department of Surgery from 1998 to 2004, complain of inability of functional using of forelimb were evaluated. Of the cases, 18 were caused by traffic accidents, 3 cases by falling from a height and the cause of the remaining one case was unknown. Age distribution of the cats ranged between 3 months to 3 years. Of these, 2 were female and 3 were male. The age distribution of the dogs was between 6 months and 6 years and there were 7 females and 10 males.

In the clinical examination of the cases, the patients were seen to be unable to bear weight on their affected forelimb. Joint movements were limited and pain was present in the region. The elbow was seen to be held in slight flexion and that there was rotation in the antebrachium. In the radiographic examination following physical examination, it was observed that all luxations were to the lateral.

While joint stability could not be achieved in 1 of the closed reduction cases, in all the others joint movements returned to normal. Results of the cases are shown in Table 1.

Table 1. Data belonging to closed reduction cases**Tablo1.** Kapalı Ret Yapılan Olgulara Ait Bilgiler

Case No	Age (year)	Breed	Sex	Etiology	Stability after reduction	Severity of osteoarthritis	Clinical results
1	3	White Terrier	Male	Falling from a height	Stable	+	Excellent
2	6(mo)	German Shepherd Dog	Female	Traffic accident	Stable	++	Fair
5	1.5	Mixed Breed Cat	Male	Falling from a height	Stable	++	Fair
6	3	Mixed Breed Dog	Female	Traffic accident	Stable	+	Excellent
7	5	White Terrier	Female	Traffic accident	Stable	+	Excellent
10	2	Mixed Breed Dog	Male	Traffic accident	Instable	+++	Poor
15	3(mo)	Mixed Breed Cat	Female	Falling from a height	Stable	+	Good
17	2	Kangal	Male	Traffic accident	Stable	+	Excellent
21	4	Mixed Breed Dog	Female	Traffic accident	Stable	+	Good

Mo: Month**Severity of osteoarthritis:** + (slight), ++ (moderate), +++ (severe)**Clinical results**

Excellent: Problem-free gait

Good: Slight lameness when running

Fair: Slight lameness when walking

Poor: Lameness when walking

In the radiographic investigations approximately 1 month after closed reduction, the degree of osteoarthritis development was assessed. According to this; there was severe osteoarthritis in 1 case, moderate in 2 cases and slight in 6 cases.

Depending on the degree of lameness during walking, clinical results were determined as; excellent in 4 cases (Figure 1, table 1), good in 2, fair in 2 and poor in 1 case. A partial loss was observed in the joint movements of the 3 cases classified as fair and poor. There was no restriction on the joint movements of the other cases.



a



b



Figure 1. A 2 years-old male Kangal dog (no.17) with traumatic lateral elbow luxation; a) Laterolateral (LL) radiography, (b) Anterio-posterior (AP) radiography of the elbow luxation. (c) LL and (d) AP radiography of the same joint after closed reduction.

Şekil 1. Travmatik lateral dirsek ekleminin çıkıklı 2 yaşlı erkek Kangal köpeğinin (no. 17); (a) LL radyografisi (b) AP radyografisi (c) Aynı eklemin kapalı ret sonrası LL ve (d) AP radyografik görünümü.

Joint stability could not be established post-operatively in 1 of the open reduction cases. However, joint movements returned to normal in the other cases. The cases were radiographically assessed approximately 1 month after surgery. Findings related to these cases are shown in Table 2.

Table 2. Data belonging to open reduction cases**Tablo 2.** Açık ret yapılan olgulara ait bilgiler

Case No	Age (year)	Breed	Sex	Etiology	Stability after reduction	Severity of osteoarthritis	Clinical results
3	11(mo)	Mixed Breed Dog	Male	Traffic accident	Stable	+++	Poor
4	6	Mixed Breed Dog	Male	Traffic accident	Stable	+++	Poor
8	2	Mixed Breed Dog	Female	Traffic accident	Stable	+	Good
9	4	Kangal	Male	Traffic accident	Stable	+	Excellent
11	10(mo)	Pointer	Female	Traffic accident	Stable	+	Good
12	3	Mixed Breed Dog	Male	Traffic accident	Stable	++	Fair
13	5	Mixed Breed Dog	Male	Traffic accident	Instable	+++	Poor
14	1	Mixed Breed Dog	Male	Traffic accident	Stable	+++	Poor
16	3	Mixed Breed Cat	Male	Unknown	Untreated		
18	2	Mixed Breed Cat	Male	Traffic accident	Stable	+	Good
19	6	Mixed Breed Dog	Female	Traffic accident	Stable	+++	Poor
20	7(mo)	German Shepherd Dog	Male	Traffic accident	Stable	+++	Poor
22	6(mo)	Mixed Breed Cat	Female	Traffic accident	Stable	+	Good

Mo: Month**Severity of osteoarthritis:** + (slight), ++ (moderate), +++ (severe)**Clinical results**

Excellent: Problem-free gait

Good: Slight lameness when running

Fair: Slight lameness when walking

Poor: Lameness when walking

Slight to severe osteoarthritis was observed in all the open reduction cases in which the medial collateral ligament had been damaged. The osteoarthritis was classified as severe in 6 cases, moderate in 1 case and slight in 5 cases.

Depending on the degree of lameness during walking, clinical results were observed as excellent in 1 case (Figure 2), good in 4 cases, fair in 1 case and poor in 6 cases. A partial loss in the joint movements of the cases classified as poor was observed.



a



b

Figure 2. A 4 years-old male mixed breed dog (no.9) with traumatic lateral elbow luxation; (a) AP radiography. (b) AP radiography of the same joint after open reduction.

Şekil 2. Travmatik lateral dirsek eklemi çıkıklı 4 yaşlı erkek melez köpeğin (no. 17); (a) AP radyografisi (b) Aynı eklemin açık ret sonrası AP radyografik görünümü.

Discussion

Traumatic elbow luxations are encountered frequently in small animal practice. They are usually caused by traffic accidents, falling from a height or getting the leg caught in something (2, 8, 10). In this study, the elbow luxations were all caused by traffic accidents and falling from a height.

It has been reported that, traumatic elbow luxations occur more often in dogs and cats older than 1 year of age (2, 8, 10). In the study, 7 of the cases of elbow luxation were 1-year-old and younger. It was also interesting that there were no fractures in these cases.

In the clinical examination, it was seen that the affected forelimb was not used, that the joint was held in slight extension and abduction and that the region was painful. These clinical findings were consistent with other literatures (2, 7, 8, 12). Radiographic investigation revealed that all luxations were in the lateral direction. While elbow luxations have been reported to very rarely occur in the medial or caudal direction (8, 12), no luxations in these directions were seen in our cases.

Osteoarthritis ranging from slight to severe was seen in all of the closed reduction cases. This condition is thought to have developed due to joint movement being restricted for a long period, as stated in literatures (5, 8). The severe osteoarthritis occurring in one of the cases is thought to be caused by insufficient repositioning. In this case, despite open reduction being advised to the patient owner, this suggestion was refused.

The partial loss of joint movement observed in the clinical examination of 3 closed reduction cases, was considered to be a complication of this procedure, as has been reported in other literatures (8, 9).

Stabilisation of joints in open reduction cases was achieved in all but 1 case. It was concluded that, insufficient joint stabilisation in this case was due to the operation being done in a relatively late period (20 days later).

It is thought that, osteoarthritis observed in open reduction procedures develops due to the damage occurring in the joint surfaces during surgery and the long term immobility of the joint. This is also supported by literatures (5, 8).

The fact that more successful results can be reached with open reduction in acute luxation cases, is also consistent with literatures (8, 9).

In 1 case, in which 6 months had passed after occurrence of the luxation, it was seen that the joint was severely degenerated, no joint movement was present and that the patient was unable to use the forelimb. This case was included in the study to demonstrate the joint changes which may occur in chronic elbow luxation cases.

Long periods of joint immobility causes lameness, a decrease in joint movements and osteoarthritis (5, 8, 9, 11). After open reduction, bandage application for 2 weeks, followed by 14 days of cage rest and passive movements may provide better clinical result.

In conclusion, in acute elbow luxations, closed reduction carried out under general anaesthesia provides successful recovery without damaging joint surfaces and ligaments. In order to prevent osteoarthritis, it is extremely important that damaged ligaments, joint capsules and muscles are repaired and joint stability is achieved.

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