

## TREATMENT TRIALS FOR VARIOUS FRACTURES AND DISLOCATIONS: A CLINICAL INVESTIGATION OF 118 DOGS

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**Abstract.** Fractures of the limbs have an important place in cases of fractures in dogs. The aim of this study was to describe treatment trials for various fractures and dislocations in 118 dogs. 118 dogs (different breed, age and sex) made up the study material. 103 fractures and 21 dislocations were observed and these cases were treated systematically. Various fractures were observed of the humerus, radius and ulna, pastern, pelvis, femur, tibia and fibula, metatarsus, ribs and mandible in 118 dogs. 72 (69.90%) of the fractures were diaphyseal, 20 (19.42%) epiphyseal and 11 (10.68%) supracondylar. 80 (77.67%) of the fractures were single fractures and 23 (22.33%) were multiple fractures. On postoperative examinations, the treated cases healed completely, so fractures and dislocations are still considered a major problem in dogs. It is believed that satisfactory results can be achieved with the right treatment methods and postoperative care.

**Keywords:** Fracture, dislocation, treatment, dog.

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**Received:** 03 February 2021;

**Accepted:** 05 April 2021;

**Published:** 29 April 2021.

### 1. Introduction

Aging, extreme fatigue, imbalances or deficiencies in minerals and vitamins, bone tumors, inflammatory bone diseases, rickets, osteomalacia and osteoporosis can lead to fracture. Gunshot wounds, falls, bites and crushes are constructive causes of fractures (Denny, 1980). On the other hand, a sudden and excessive application of the bones, forced rotations of long bones around their axis, excessive active or passive muscle contractions are constructive factors of fractures (Bierens *et al.*, 2017; Denny, 1980).

Classic cage rest, bandage applications, closed reduction and external fixation, open reduction and external fixation, splint applications, percutaneous intramedullary fixation, percutaneous external fixation, interfragmentary compression, axial compression and intramedullary nailing methods are frequently used treatment methods in fractures (Bierens *et al.*, 2017; Rao *et al.*, 2017).

Besides the relaxation of ligaments that protect the joint, all kinds of traumatic causes effective in fractures play a role in the formation of dislocations. The condition of the case and the location of the dislocation are important in determining dislocation treatment options. While repositioning and stabilization is recommended in new cases, surgery is recommended in old cases and in cases where repositioning is not possible (Bierens *et al.*, 2017; Denny, 1980).

The aim of this study is to identify and discuss the results obtained from fractures and dislocations, and methods of treatment in 118 dogs.

## 2. Material and Methods

The study material consisted of 118 dogs of different breed and sex, which were bone fractures and dislocations. In dogs diagnosed with a fracture, conventional cage rest, bandage applications or surgical intervention methods have been applied depending on the disease state (Denny, 1980; Piermattei & Greeley, 1979). Clinical and radiological checks of the dogs were carried out at fortnightly intervals after the operation. The bandage applications were renewed every two weeks. The bandages were removed after an average of one month.

In case of dislocation, repositioning and stabilization were performed. Cases which could not be treated with these applications were implemented (Denny, 1980; Piermattei & Greeley 1979). All cases were followed for 6 months and the results of treatment were evaluated.

## 3. Results

A total of 118 dogs were used in this study. Distributions of fracture and dislocation cases according to dog breeds are given in Table 1.

**Table 1.** Distributions of fracture and dislocation cases according to dog breeds

	n	Fracture	Dislocation
Kangal and its mix breed	61	54	11
Anatolian shepherd dog and its mix breed	28	23	7
Terrier	17	15	2
Pointer	5	5	-
Boxer	4	3	1
Coli	2	2	-
Doberman	1	1	-
Total	118	103	21

The distributions of fractured and dislocated cases according to breed and age is presented in Table 2 and Table 3.

**Table 2.** Distributions of fractures according to breed and age

	Age					Total
	1	2	3	4	5 and above	
Kangal and its mix breed	38	8	2	2	4	54
Anatolian shepherd dog and its mix breed	12	7	2	-	2	23
Terrier	7	3	2	1	2	15
Pointer	4	1	-	-	-	5
Boxer	2	-	-	-	1	3
Coli	1	1	-	-	-	2
Doberman	1	-	-	-	-	1
Total	65	20	6	3	9	103

**Table 3.** Distributions of dislocations according to breed and age

	Age					Total
	1	2	3	4	5 and above	
Kangal and its mix breed	6	5	-	-	-	11
Anatolian shepherd dog and its mix breed	4	2	-	-	1	7
Terrier	-	-	-	1	1	2
Boxer	1	-	-	-	-	1
Total	11	7	-	1	2	21

Distributions of fractures according to breed and location are presented in Table 4.

**Table 4.** Distributions of fractures according to breed and location

	H	RU	Mc	P	F	TF	Mt	R	M	Total
Kangal and its mix breed	6	6	-	7	23	10	-	2	-	54
Anatolian shepherd dog and its mix breed	1	4	1	6	8	1	1	-	1	23
Terrier	2	3	-	3	4	2	-	1	-	15
Pointer	-	-	1	-	1	3	-	-	-	5
Boxer	-	-	-	-	3	-	-	-	-	3
Coli	-	1	-	-	1	-	-	-	-	2
Doberman	-	-	-	-	1	-	-	-	-	1
Total	9	14	2	16	41	16	1	3	1	103

**H:**Humerus.**RU:** Radius and Ulna.**Mc:** Metacarpus.**P:** Pelvis.**F:** Femur.**TF:** Tibia andFibula.**Mt:** Metatarsus.**R:** Rib.**M:**Mandible.

72 (69.90%) of the fractures were diaphyseal, 20 (19.42%) were epiphyseal and 11 (10.68%) were supracondylar. 80 (77.67%) of the fractures were single fractures and 23 (22.33%) were multiple fractures.

Distributions of dislocations according to breed and location of formation is presented in Table 5.

**Table 5.** Distributions of dislocations according to breed and location

	Elbow joint dislocation	Sacroiliac dislocation	Coxofemoral dislocation	Patellar dislocation	Total
Kangal and its mix breed	1	1	8	1	11
Anatolian shepherd dog and its mix breed	1	2	4	-	7
Terrier	-	1	1	-	2
Boxer	-	-	1	-	1
Total	2	4	14	1	21

#### 4. Discussion

Formation of fractures, location and shape of the fracture plays a role in the selection of treatment methods. Complete reduction and fixation are essential for the success of treatment. Femur fractures have an important place in fracture cases in dogs. In this study, the incidence of femur fractures was found to be 39.80%. In the present study, in young animals, the high rate of femoral fracture cases was similar to those reported by some researchers (Denny, 1980).

It is reported that movements can be limited and fracture healing can be achieved with closed reduction and splint application in the non-displacement fractures in the extremities (Denny, 1980; Piermattei & Greeley, 1979). In this study, in non-displaced limb fractures after provided normal anatomic location of bone with closed reduction PVC-supported bandage applications were performed. Bandages were applied two times at 15-day intervals and it was determined that bandage support was not required at the end of this period.

In operative treatment of fractures of long bones, intramedullary pin (Abd El Raouf *et al.*, 2017; Durmuş *et al.*, 2003), cross pin applications (Sağlam *et al.*, 1999), external fixator (Durmuş *et al.*, 2003; Helber & Ulrich, 2000; Marcellin-Little, 1999), various plates and screw applications (Augat & von Rügen, 2018; Durmuş & Ünsaldı, 2001; Ramírez & Macías, 2016) are most applied fixation tools. In partial diaphyseal fractures, plate and external fixator applications are recommended (Denny, 1980; Manchi *et al.*, 2017; Rao *et al.*, 2017). In this study, in single fractures of long bones, intramedullary pin applications were performed with retrograde method. In partial fractures, the length of the bone was maintained by applying a plate, and this way stabilization was provided. It was understood that the fracture healing was completed in the postoperative controls and the treatment method applied was sufficiently safe to ensure stabilization. Free fracture fragments were fixed by cerclage wires in multiple fracture cases. Autogenous cancellous bone grafts obtained from the proximal metaphysis of the humerus or tibia were used in multiple fracture cases. After the operation, PVC-supported bandage was applied on effected extremities of all cases.

In mandible fractures, treatment methods differ depending on where fracture is formed. Screwing, cerclage, nailing, tension wire application methods in symphysis mandible fractures; in corpus mandible fractures, plate, transversal nailing, cerclage, wire stitching and immobilization are preferred (Guzu & Hennes, 2017). In this study, the symphysis mandible fracture in a German shepherd dog was fixed with cerclage wiring. Feeding with liquid and soft foods was recommended until full recovery after the operation. It was observed that the patient recovered completely during the subsequent controls.

In cases of rib fractures observed in two dogs, it was expected to heal spontaneously without any intervention.

In a dog with an acute elbow joint dislocation, positive results were obtained demonstrating the applicability of the method with closed reduction and stabilization.

It is reported that if there is not much gap between sacrum and ilium in sacroiliac dislocations, small pelvic fractures accompanying dislocation may heal by limiting the animal's movements for a while (Ergin *et al.*, 2016). In the 4 sacroiliac dislocation cases observed in this study, the separation between the sacrum and ala ossis ilium was not major and it was observed that they healed with the application of cage rest.

There are different treatment methods for hip joint dislocations depending on the case. Triple pelvic osteotomy (Haburjak *et al.*, 2001), Toggle pin (Acar *et al.*, 1996), excision arthroplasty (İki & Sağlam, 2004; Ünsaldı *et al.*, 1999), interposition arthroplasty (Ünsaldı *et al.*, 1999), transtrohanteric nailing technique (Yücel *et al.*, 1999) are some of them. Excision arthroplasty was performed in accordance with the methods reported by the researchers (Bierens *et al.*, 2017; İki & Sağlam, 2004; Ünsaldı *et al.*, 1999) in cases with coxofemoral dislocation and fracture of the collum and/or femoral head. The operated legs of the animals were bandaged in the flexed position for 20 days after the operation. In the postoperative 6 months follow-up period, the cases

recovered completely and functional recovery was between 1-3 months. It was determined that breed, age and weight did not have a significant effect on recovery. Based on the findings obtained, it was concluded that the method of excision arthroplasty can be safely used in coxofemoral dislocation and femoral head and/or collum femoris fractures is observed in dogs.

In this study, the first degree of patella dislocation was detected in a Kangal dog, and its treatment was performed according to the authors (Di Dona *et al.*, 2018) report. It was determined that the dog recovered during the follow-up period.

## 5. Conclusion

As a result, cases of fractures and dislocations are still considered a major problem in dogs. It is believed that satisfactory results can be obtained with the right treatment methods and postoperative care

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