

## Retrospective Analysis of Extremity Fractures in Cats: 288 Cases (2018-2023)

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**Abstract:** This retrospective study analyzed the prevalence, etiology, and treatment methods of limb fractures in 288 cats that were admitted to the Siirt University Animal Health Application and Research Hospital between 2018 and 2023 with trauma-related fractures. The findings revealed that the most common fractures occurred in the femur (47.91%), tibia-fibula (22.56%), and humerus (11.45%). It was determined that 56.25% of the fractures were caused by unknown traumas, 23.95% by fall from heights, and 19.79% by traffic accidents. In terms of treatment approaches, surgical intervention was preferred in complex cases, while cage rest and medical treatment [(0.3 mg/kg for 3 days meloksikam (Meloxicam, Bavet, Tuzla, İstanbul, Türkiye)] were chosen for simpler fractures. Surgical treatment was applied in 54.3% of femur fractures and 67.6% of tibia-fibula fractures. These findings highlight that the fracture type and severity of trauma are key factors in determining the appropriate treatment strategy for feline limb fractures. The research findings will contribute to future studies on the most frequently broken bones in cats, the rates of surgical or conservative treatment of these fractures, and various factors that may affect treatment choices. Conducting more comprehensive studies on the subject will make significant contributions to the literature and to veterinary clinicians.

## Kedilerde Ekstremitte Kırıklarının Retrospektif Analizi: 288 Olgu (2018-2023)

### Anahtar Kelimeler

Kedi,  
Kırık,  
Medikal tedavi,  
Retrospektif,  
Cerrahi tedavi

**Öz:** Bu retrospektif çalışmada, 2018-2023 yılları arasında Siirt Üniversitesi Hayvan Sağlığı Uygulama ve Araştırma Hastanesi'ne getirilen ve travmaya bağlı ekstremitte kırığı tespit edilen 288 kedide kırıkların prevalansı, etiyolojisi ve tedavi yöntemleri analiz edildi. Bulgular, en sık görülen kırıkların femur (%47,91), tibia-fibula (%22,56) ve humerus (%11,45) kemiklerinde meydana geldiğini gösterdi. Olguların %56,25'inin sebebi bilinmeyen travmalar, %23,95'inin yüksekten düşme ve %19,79'unun da trafik kazası nedeniyle meydana geldiği belirlendi. Tedavi yaklaşımlarında, kompleks vakalarda operatif müdahale ön plana çıkarken, daha basit kırıklarda ise kafes istirahati ve medikal tedavi tercih edildi. Femur kırıklarının %54,3 ve tibia-fibula kırıklarının ise %67,6'sında operatif tedavi yöntemi uygulandı. Çalışmadan elde edilen veriler kedilerde ekstremitte kırıklarının tedavisinde doğru tedavi stratejisinin belirlenmesinde kırık türü ve travma şiddetinin önemli faktörler olduğunu gösterdi. Araştırma bulguları, kedilerde en sık kırılan kemikler, bu kırıkların cerrahi veya konservatif yöntemlerle sağaltım oranları ve tedavi seçimlerini etkileyebilecek çeşitli faktörler üzerine ileride yapılacak olan çalışmalara katkı sağlayacak nitelikte olup, konuyla ilgili daha kapsamlı çalışmaların yapılması literatür bilgiye ve klinisyen veteriner hekimlere önemli katkılar sunacaktır.

## 1. INTRODUCTION

A fracture is defined as the complete or partial disruption of bone integrity. The clinical signs of fractures include lameness, swelling, abnormal mobility, and crepitus, and these signs vary depending on the affected bone, the fracture's location, and type (transverse, oblique, comminuted, spiral, etc.) [1, 2]. In cats, limb fractures are more common than other types of fractures [3]. Studies report that femur fractures are the most frequently observed, with hind limb fractures occurring more often than forelimb fractures [2, 4-7].

The etiology of fractures in cats and dogs includes fall from heights, traffic accidents, human-induced injuries, animal bites, and unknown traumas [1, 7-10]. The incidence of fractures in cats varies depending on factors such as age, gender and activity level. Younger, more active cats are at higher risk of fractures due to fall from heights, traffic accidents, fights, or pathological conditions that weaken the bones [2].

Understanding fracture biomechanics and classification is critical for effective treatment, as these factors guide surgical techniques and postoperative care strategies [2, 11]. According to Farghali et al. [2], fracture classification should consider the cause of the fracture, whether it is open or closed, the severity of bone damage, the number of fragments, the direction of the fracture line, the location, bone stabilization, the severity of soft tissue damage, and the time of occurrence.

Bone fractures in cats can be treated using various operative and conservative treatment methods (cage rest+medical treatment). Treatment options include external and internal fixation, supportive bandaging, cage rest, and limb amputation. The choice of appropriate treatment depends on the type of fracture, availability of necessary orthopedic implants, and the owner's consent [6, 12, 13].

This retrospective study aims to provide descriptive data on the prevalence, etiology, and types of fractures in cats presented to Siirt University Animal Health Application and Research Hospital between 2018 and 2023, with an emphasis on the demographic characteristics of the affected cats, including age, gender and breed.

## 2. MATERIAL AND METHOD

In this retrospective study, data from 288 cats of various breeds, ages, and genders, admitted to Siirt University Animal Health Application and Research Hospital between 2018 and 2023 with limb fractures confirmed by clinical and radiological examinations, were analyzed.

The cats were classified by age into three groups: 0-1 year (excluding one-year-olds), 1-2 years (including one- and two-year-olds), and >2 years (excluding two-year-olds). They were also categorized by breed as mixed

breed, British Shorthair, Scottish Fold, Van cat, Ankara cat, Siamese, and Persian cat.

Affected bone was assessed based on the anatomical position of the fracture line. In addition, the etiology of the fractures was classified into categories such as unknown trauma, traffic accidents, and fall from heights. The treatment options applied were evaluated as surgical interventions and conservative treatments.

**Ethical Approval:** This study is not subject to the permission of HADYEK in accordance with the "Regulation on Working Procedures and Principles of Animal Experiments Ethics Committees" 8 (k). The data, information and documents presented in this article were obtained within the framework of academic and ethical rules.

## 3. RESULTS

This study evaluated 288 cases of limb fractures diagnosed among 1,524 cats admitted to Siirt University Animal Health Application and Research Hospital between 2018 and 2023, representing 18.89% of the total cases. The annual distribution of cases was recorded as 10.7% (n=31) in 2018, 19.7% (n=57) in 2019, 27% (n=78) in 2020, 18% (n=52) in 2021, 12.8% (n=37) in 2022, and 11.4% (n=33) in 2023. The highest incidence of fractures was observed in 2020, followed by a decline in cases after 2021.

Of the 288 cats evaluated, 50.69% (n=146) were male and 49.30% (n=142) were female. In terms of age distribution, 46.87% (n=135) were in the 0-1 year group, 43.05% (n=124) in the 1-2 year group, and 10.06% (n=29) were 2 years or older. Breed distribution showed that 79.51% (n=229) of the cats were mixed breed, 6.59% (n=19) were British Shorthair, 5.55% (n=16) were Scottish Fold, 3.81% (n=11) were Van cats, 2.08% (n=6) were Ankara cats, 1.38% (n=4) were Siamese cats, and 1.04% (n=3) were Persian cats (Table 1).

In terms of etiology, 56.25% (n=162) of the fractures were caused by unknown trauma, 23.95% (n=69) were due to fall from heights, and 19.79% (n=57) resulted from traffic accidents. The anatomical distribution of fracture etiology is shown in Table 2.

The treatment methods applied to the cases are presented in Table 3. The findings indicate that both cage rest combined with conservative treatment and surgical intervention combined with medical treatment [(0.3 mg/kg for 3 days meloxicam (Meloxicam, Bavet, Tuzla, İstanbul, Türkiye)] were utilized. All cases received medical treatment, and femur and tibia-fibula fractures were the most common fracture types requiring surgical intervention.

**Table 1.** Distribution of signalment information for the cases included in the study, along with the etiology and anatomical localization of the fractures identified.

Signalement	n	%
Male	146	50.69
Female	142	49.30
0-1 Age	135	46.87
1-2 Age	124	43.05
>2 Age	29	10.06
Mixed Breed	229	79.51
British Shorthair	19	6.59
Scottish Fold	16	5.55
Van Cat	11	3.81
Ankara Cat	6	2.08
Siamese cats	4	1.38
Persian Cat	3	1.04
<b>Etiology of Fractures</b>		
Fall From Heights	69	23.95
Unknown Traumas	162	56.25
Traffic Accidents	57	19.79
<b>Affected Bones</b>		
Femur	138	47.91
Tibia- Fibula	65	22.56
Humerus	33	11.45
Radius-Ulna	20	6.94
Metacarpus	19	6.59
Metatarsus	13	4.51
<b>Total</b>	<b>288</b>	<b>100</b>

**Table 2.** Distribution of fractures according to their etiological data in the cases.

Fractures	Unknown Traumas	Fall From Heights	Traffic Accidents	Total
Femur	73 (52.89%)	33 (23.91%)	32 (23.18%)	138 (47.91%)
Tibia- Fibula	36 (55.38%)	15 (23.07%)	14 (20.53%)	65 (22.56%)
Humerus	15 (45.45%)	11 (33.33%)	7 (21.21%)	33 (11.45%)
Radius-Ulna	17 (85%)	3 (15%)	0	20 (6.94%)
Metacarpus	12 (63.15%)	4 (21.05%)	3 (15.78%)	19 (6.59%)
Metatarsus	9 (69.23%)	3 (23.07%)	1 (7.69%)	13 (4.51%)
<b>Total</b>	<b>162 (56.25%)</b>	<b>69 (23.95%)</b>	<b>57 (19.79%)</b>	<b>288 (100%)</b>

**Table 3.** Distribution of treatment methods applied for the diagnosed fractures.

Fractures	Cage Rest + Medical Treatment	Surgical Treatment + Medical Treatment	Total
Femur	63 (45.6%)	75 (54.3%)	138 (100%)
Tibia- Fibula	21 (32.3%)	44 (67.6%)	65 (100%)
Humerus	13 (39.3%)	20 (60.6%)	33 (100%)
Radius-Ulna	7 (35%)	13 (65%)	20 (100%)
Metacarpus	8 (42.1%)	11 (57.8%)	19 (100%)
Metatarsus	6 (46.1%)	7 (53.8%)	13 (100%)
<b>Total</b>	<b>118 (40.9%)</b>	<b>170 (59%)</b>	<b>288 (100%)</b>

#### 4. DISCUSSION AND CONCLUSION

This study provides a retrospective evaluation of feline limb fractures diagnosed over the past five years at Siirt University Animal Health Application and Research Hospital. It differs from previous studies by focusing solely on cats and comprehensively evaluating fractures in all limb regions.

Previous research has shown that hind limb fractures, particularly femoral fractures, are the most common in cats [2, 4, 7, 8]. The finding in our study that femur fractures were the most prevalent is consistent with these prior findings. In our study, fractures were most frequently observed in the femur, followed by the tibia-fibula, humerus, radius-ulna, metacarpal, and metatarsal bones. These results align with other studies in the literature. For instance, Farghali et al. [2] found that femur fractures were the most common, followed by tibia-fibula, humerus, radius-ulna, and other bones. Similarly, Ali [8] also reported femur as the most frequently fractured bone, but found radius-ulna fractures to be more prevalent than tibia-fibula fractures.

Thus, the affected bones in our study shows similarities with Farghali et al. [2] and partial agreement with Ali [8].

The etiology of feline limb fractures shows significant variability. Studies by Scott and McLaughlin [14] and Piermattei et al. [15] have identified traffic accidents and fall from heights as the leading causes of fractures in cats. However, our study revealed a different distribution of trauma etiology. In our findings, the most common cause of fractures was unknown trauma (56.25%), followed by fall from heights (23.95%) and traffic accidents (19.79%). The high incidence of unknown trauma is likely due to the fact that many of the patients were stray cats, and the history provided by municipal workers or animal welfare volunteers may have been incomplete. Additionally, environmental factors, living conditions, and regional traffic patterns may have influenced this distribution. Stray cats, living without control and exposed to the external environment, are more susceptible to trauma, and the exact cause of their injuries may often remain undetermined.

When examining age and gender distribution, our study produced results both similar to and different from previous research. In a study conducted by Farghali et al. [2] of 149 cats, 60.83% were female and 39.17% were male, contrasting with our results, where no significant difference was observed between the genders. Farghali et al. [2] also found that the majority of fracture cases occurred in younger cats, a finding consistent with our study. Hill [16] reported that 75% of fractures occurred in cats aged 2 years or younger, and Phillips [17] found that 80% of fractures were in cats under 3 years of age. Our study showed a slight male predominance, in line with previous research, with 46.87% of fractures occurring in cats aged 0-1 years and 43.05% in the 1-2 year age group. These findings suggest that the small differences in gender distribution are negligible, while young cats remain at higher risk of fractures.

Various surgical and conservatif treatment (cage rest+medical treatment) options are available for managing feline limb fractures [7, 12, 18]. Studies indicate that surgical methods are typically preferred in more complex cases, while cage rest and medical treatment are often suitable for simpler fractures with high healing potential [12, 18]. In our study, cage rest combined with medical treatment was employed in 45.6% of femur fractures, 32.3% of tibia-fibula fractures, 39.3% of humerus fractures, 35% of radius-ulna fractures, 42.1% of metacarpal fractures, and 46.1% of metatarsal fractures. Surgical intervention combined with medical treatment was applied in 54.3% of femur fractures, 67.6% of tibia-fibula fractures, 60.6% of humerus fractures, 65% of radius-ulna fractures, 57.8% of metacarpal fractures, and 53.8% of metatarsal fractures. Despite the higher number of femur fractures, the relatively lower rate of surgical intervention may be due to factors such as the patient's overall condition or the pet owner refusing the operation. Ultimately, fracture type, location, and owner preferences play crucial roles in determining the treatment strategy [12, 19].

The results of this study revealed that the most common fractures in cats occur in the femur, with the majority of these fractures being attributed to unknown traumas. Additionally, the data showed a higher incidence of fractures in younger and inexperienced cats, with femur and tibia-fibula fractures often requiring surgical intervention. The frequent occurrence of unknown traumas in stray cats highlights this as a significant etiological factor in clinical practice, emphasizing the need for more detailed evaluations of such cases. This study has the potential to serve as a significant reference for future research regarding the types of bones that are most frequently fractured in cats, the proportion of these fractures that are treated surgically versus conservatively, and the factors that may influence treatment options. Future investigations should address these topics more comprehensively in order to deepen the knowledge base in this field and provide guidance for clinical practice.

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