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Retrospective Evaluation of Clinical and Neurological Findings in Cats with High-Rise Syndrome: 174 Cases

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This retrospective study aimed to identify predictors of neurological status, assessed using the Modified Glasgow Coma Scale (MGCS), and predictors of complication development in cats presented after falls from height. Archived medical records of cats admitted to the Atatürk University Faculty of Veterinary Medicine Animal Hospital were reviewed. Of 420 suspected high-rise fall presentations, 174 cases met inclusion criteria requiring documented fall height, complete admission MGCS component scores, and sufficient clinical and diagnostic information. Demographic variables (age, sex, neuter status, breed category, body weight), environmental variables (landing surface), and fall height (floors) were retrieved. Multivariable linear regression analysis was used to evaluate independent associations with admission MGCS score, and multivariable logistic regression analysis was used to determine risk factors for the presence of ≥1 complication. The median fall height was 4 floors (range 1–8), and the median MGCS score was 18 (range 3–18); 85.1% of cats had moderate neurological impairment. Complications were recorded in 87.4% of cats and most commonly seen complications were hindlimb fractures (37.9%), respiratory abnormalities (29.3%), and head trauma (27.6%). No demographic or environmental variables were significantly associated with MGCS score, and fall height showed only a non-significant trend toward lower MGCS (β = –0.29, *p*=0.10). In contrast, fall height was the sole independent predictor of complication development (OR= 1.62, 95% *CI* 1.14–2.31, *p*=0.008). In conclusion, the fall height primarily predicts overall injury burden rather than neurological impairment, supporting comprehensive trauma evaluation regardless of apparent neurological stability.

Key Words: *Assessment, emergency, prognosis, stabilization, trauma*

Yüksekten Düşme Sendromlu Kedilerde Klinik ve Nörolojik Bulguların Retrospektif Değerlendirilmesi: 174 Olgu

Bu retrospektif çalışmanın amacı, Modifiye Glasgow Koma Ölçeği (MGKS) kullanılarak değerlendirilen nörolojik durumu ve yüksekten düşme sonrası getirilen kedilerde komplikasyon gelişimi için öngörücü faktörleri belirlemektir. Atatürk Üniversitesi Veteriner Fakültesi Hayvan Hastanesi'ne kabul edilen kedilerin arşivlenmiş tıbbi kayıtları incelendi. Şüpheli 420 yüksekten düşme vakasından, belgelenmiş düşme yüksekliği, eksiksiz MGKS bileşen puanları ve yeterli klinik-tanısal bilgi gerektiren 174 vaka dahil edilme kriterlerini karşılamıştır. Demografik değişkenler (yaş, cinsiyet, kısırlaştırma durumu, ırk kategorisi, vücut ağırlığı), çevresel değişkenler (düştüğü zemin) ve düşme yüksekliği (kat sayısı) bilgileri kaydedildi. Kabul edilen MGKS skoru ile bağımsız değişkenler arasındaki ilişkilerin değerlendirilmesinde çok değişkenli doğrusal regresyon analizi, ≥1 komplikasyonun varlığına ilişkin risk faktörlerinin belirlenmesinde ise çok değişkenli lojistik regresyon analizi yapıldı. Medyan düşme yüksekliği 4 kat (aralık 1–8) ve medyan MGKS skoru 18'di (aralık 3–18); kedilerin %85.1'inde hafif nörolojik bozukluk vardı. Komplikasyonlar kedilerin %87.4'ünde kaydedildi ve en sık görülenler arka bacak kırıkları (%37.9), solunum anormallikleri (%29.3) ve kafa travması (%27.6) idi. MGKS skoruyla hiçbir demografik veya çevresel değişken anlamlı bir ilişki göstermedi ve düşme yüksekliği yalnızca daha düşük MGKS'ye doğru anlamlı olmayan bir eğilim gösterdi (β = –0.29, *p*=0.10). Buna karşılık, düşme yüksekliği komplikasyon gelişimi için tek bağımsız öngörücüydü (OR= 1.62, %95 *CI* 1.14–2.31, *p*=0.008). Sonuç olarak, düşme yüksekliği nörolojik bozukluklardan ziyade genel yaralanma yükünü öngörmekte olup, görünürdeki nörolojik stabiliteye bakılmaksızın kapsamlı travma değerlendirmesinin yapılması gerektiğini destekler.

Anahtar Kelimeler: *Acil durum, değerlendirme, prognoz, stabilizasyon, travma*

Introduction

High-rise syndrome (HRS) describes the constellation of traumatic injuries sustained by cats following falls from windows, balconies, or other elevated structures, most commonly defined as falls from the second floor or higher in urban environments (1–3). HRS has been recognized as a frequent cause of polytrauma in cats, particularly in cities characterized by high-density housing and widespread indoor–outdoor living conditions (4). The underlying causes of falls are largely behavioral and include prey-chasing behavior, exploratory activity, sudden loss of balance, or slipping while walking along narrow window sills or balcony railings (1).

Epidemiological data indicate that falls from height represent one of the leading causes of traumatic injury in cats, ranking second only to traffic-related accidents in

some regions (5). Multiple studies have reported that younger cats are disproportionately affected, particularly those under two years of age which has been attributed to increased activity levels, play behavior, and limited experience with environmental hazards (6, 7). A pronounced seasonal distribution has also been consistently observed, with a higher incidence of HRS during warmer months when windows and balconies are more frequently left open, thereby increasing exposure to fall-related risks (8, 9).

Clinically, HRS is associated with a broad spectrum of injuries involving multiple anatomical systems. Extremity fractures are among the most commonly reported findings, with hind limb and femoral fractures occurring more frequently than forelimb injuries (10). Thoracic trauma, including pulmonary contusions and pneumothorax, as well as head injuries, abdominal lesions, and spinal trauma, have also been widely documented (1, 11). Importantly, life-threatening conditions such as hemorrhagic shock and traumatic brain injury may be present even in cats that appear clinically stable at initial presentation (12).

The relationship between fall height and injury severity remains controversial. Some authors have proposed a linear increase in trauma severity with increasing fall height (13–15), whereas others have reported a curvilinear association (2, 12), suggesting that falls from lower heights may result in more severe head and spinal injuries due to insufficient time for postural adjustment during descent (16). Conversely, higher falls have been more frequently associated with limb fractures, potentially reflecting the effects of terminal velocity and landing biomechanics (8). These conflicting findings underscore the complex interaction between biomechanical, environmental, and behavioral factors involved in feline falls and highlight the importance of analytical approaches capable of evaluating multiple variables simultaneously.

Head trauma and altered levels of consciousness have been identified as important determinants of outcome in feline trauma patients, with several studies reporting an association between neurological impairment and increased mortality (17, 18). The Modified Glasgow Coma Scale (MGCS), adapted for use in veterinary medicine, provides a structured and reproducible method for assessing neurological function through the evaluation of motor activity, brainstem reflexes, and level of consciousness (19). Although MGCS has been widely applied in small animal trauma, its use in cats with HRS has more often been incorporated as part of general trauma assessment rather than examined as a primary outcome measure, and data regarding factors independently associated with MGCS scores in this specific population remain limited.

Therefore, this study aimed to retrospectively evaluate the cats presented after high rise falls in order to identify trauma severity indicators and initial clinical variables associated with neurological status as assessed by the MGCS and with the development of complications during hospitalization. We hypothesized that indicators reflecting trauma severity and early clinical condition at presentation would be independently associated with neurological impairment and the occurrence of complications, whereas demographic characteristics including age, sex, neuter status, and breed category would not demonstrate significant associations when analysed concurrently.

Materials and Methods

Research and Publication Ethics: The protocol applied for the management of cats has been approved by the Atatürk University Local Animal Experiments Ethics Committee (Decision No: 19, Decision Period: 2022/1). This retrospective study analyzed archived clinical records of cats presented to the Atatürk University Faculty of Veterinary Medicine Animal Hospital, Erzurum, Turkey, following high-rise falls between January 2020 and January 2022.

Medical records were retrieved from the hospital's electronic and paper-based archive system and included emergency admission forms, clinical examination records, diagnostic imaging reports, laboratory data, and discharge or outcome notes. Only cases in which the traumatic event was explicitly recorded as a fall from an elevated structure, including windows, balconies, or similar heights, were considered for evaluation. Each case was reviewed individually, and the data extraction was performed using a standardized data collection form to ensure consistency across the records.

The Case Selection: Inclusion and Exclusion Criteria: An initial screening identified 420 feline trauma presentations associated with suspected or documented falls from height. The cases were included if they met all of the following criteria: (i) documentation of high-rise fall as the primary trauma mechanism; (ii) recorded fall height expressed as number of floors or sufficient descriptive information allowing conversion to floor number; (iii) a complete neurological assessment at admission with all components of the MGCS, including motor activity, brainstem reflexes, and level of consciousness; (iv) documented clinical, radiographic, or ultrasonographic findings enabling identification of traumatic injuries or complications; and (v) availability of essential demographic and physical data, including age, sex, and body weight.

Cases were excluded if one or more of the following conditions were present: incomplete MGCS component data or recording of only a total MGCS score without individual sub scores; absence of documented traumatic findings or complication records; duplicate entries related to the same fall event; trauma etiologies other than falling, including traffic accidents, blunt force trauma, crush injuries, penetrating injuries, or unknown causes; or substantial missing clinical data precluding reliable analysis. Duplicate records were identified by cross-referencing patient identification, admission date and time, trauma history, and clinical findings, and only the initial presentation for each fall event was retained.

Demographic and Clinical Variables: For each included case, the demographic variables extracted from the records included age (months), sex (male or female), neuter status (neutered or intact), breed classification, and body weight (kg) measured at admission. Breeds were grouped into four categories: Tabby, British, Scottish, and Other breeds. Environmental variables included fall height expressed as the number of floors and the ground type at the impact site, categorized as concrete, soil, asphalt, or other surfaces based on owner-reported history or emergency intake documentation.

Neurological Assessment: Neurological status at presentation was assessed using the MGCS adapted for veterinary patients. Three components of neurological function are assessed and rated on a scale from 1 to 6: brainstem reflexes, motor activity, and consciousness level. A cumulative score is computed on a scale from 3 to 18, with a diminished score signifying increased trauma severity. The Animal Trauma Triage Score (ATT) is a veterinary metric employed to assess the severity of trauma. The grading system has six categories: perfusion, cardiac, respiratory, eye/muscle/integument, skeletal, and neurological. Each category receives a score between 0 and 3, resulting in a total score that ranges from 0 to 18. Based on total scores, neurological impairment was categorized as good (15–18), guarded (9–14), or grave (3–8). A higher score signifies more severity of injury (20).

Definition and Classification of Complications: Complications were defined as the presence of one or more clinically relevant traumatic abnormalities identified during the initial diagnostic evaluation. Documented complications included forelimb fractures, hind limb fractures, spinal injuries, head trauma, abdominal findings, respiratory system abnormalities, and clinical signs consistent with shock. For regression analyses, complication status was recorded as a binary variable indicating the presence or absence of at least one complication. Additionally, the anatomical distribution of complications was recorded for descriptive analysis.

Statistical Analyses: All statistical analyses were performed with SPSS, version 27.0 (SPSS Inc; IBM Corp). The distribution of continuous variables was evaluated with the Shapiro–Wilk test. Normally distributed variables were summarized as mean ± standard deviation, whereas non-normally distributed variables were reported as median (minimum–maximum). Categorical variables were expressed as frequencies and percentages. Prior to regression analyses, model assumptions were evaluated. For the multivariable linear regression model assessing factors associated with MGCS score, normality of residuals was examined using visual inspection of residual plots and normal probability plots, and homoscedasticity was assessed using residuals versus fitted value plots. Linearity between continuous predictors and the dependent variable was evaluated graphically. A multivariable linear regression model was constructed to identify independent factors associated with the MGCS score. Age (months), body weight, sex, neuter status, breed category (Tabby, British Shorthair, Scottish Fold, Other), ground type at the impact site (Concrete, Soil, Asphalt, Other), and fall height (number of floors) were included as predictor variables. Model coefficients, standard errors, and corresponding p-values were reported.

Independent risk factors for the development of complications were evaluated using multivariable logistic regression. The binary complication variable was defined as the presence of at least one clinically relevant abnormality, including forelimb or hind limb fractures, spinal injury, head trauma, abdominal findings, respiratory abnormalities, or clinical signs of shock. The same predictor variables used in the MGCS model were included. Linearity of continuous predictors with the logit was assessed graphically, and overall model fit was evaluated using goodness-of-fit statistics. Odds ratios (ORs) with 95% confidence intervals (CIs) were presented. Multicollinearity among predictors was assessed using variance inflation factors (VIF), and no significant collinearity was detected. Categories with low cell counts were regrouped to improve model stability. A two-tailed p-value <0.05 was considered statistically significant.

Results

A total of 420 feline medical records related to high-rise fall presentations were reviewed. After exclusion of cases with missing essential clinical information, incomplete MGCS components, absence of injury documentation, duplicated entries, or trauma etiologies unrelated to falling, 174 cats met the inclusion criteria and were analyzed. The mean age of the included cats was 16.7±13.4 months, and the mean body weight was 3.18±1.08 kg. The study population consisted of 52.3% males and 47.7% females, and 36.8% of the cats were neutered. Breed distribution included Tabby (43.1%), British Shorthair (25.9%), Scottish Fold (16.7%), and Other breeds (12.1%). The median fall height was 4 floors (range 1–8), and landing surfaces included concrete (61.5%), soil (13.2%), asphalt (10.3%), and other surfaces (14.9%) (Table 1).

The median MGCS score on presentation was 18 (range 3–18), with 85.1% of cats classified as having good impairment, 6.9% as guarded, and 8.0% as grave impairment (Table 2). Trauma-related injuries were documented in 87.4% of all cats, demonstrating a high overall injury burden. Anatomical distribution of complications revealed that hindlimb fractures were the most frequent finding (37.9%), followed by respiratory system abnormalities (29.3%) and head trauma (27.6%). Forelimb fractures occurred in 24.7% of cats, abdominal injuries in 10.9%, shock in 9.2%, and spinal injuries in 6.3%.

Table 1. Baseline demographic and clinical characteristics of cats presenting with high-rise syndrome (n=174)

Variable	Value
Age (months), mean ± SD	16.7±13.4
Body weight (kg), mean ± SD	3.18±1.08
Sex, n (%)	
Male	91 (52.3)
Female	83 (47.7)
Neuter status, n (%)	
Neutered	64 (36.8)
Intact	110 (63.2)
Breed category, n (%)	
Tabby	75 (43.1)
British Shorthair	45 (25.9)
Scottish Fold	29 (16.7)
Other breeds	21 (12.1)
Fall height (floors), median (min–max)	4 (1–8)
Landing surface, n (%)	
Concrete	107 (61.5)
Soil	23 (13.2)
Asphalt	18 (10.3)
Other	26 (14.9)

Table 2. Distribution of MGCS impairment categories in cats on presentation (n=174)

MGCS impairment category	n (%)
Grave	14 (8.0)
Guarded	12 (6.9)
Good	148 (85.1)

Table 3. Multivariable linear regression analysis of factors associated with Modified Glasgow Coma Scale (MGCS) score at admission in cats with high-rise syndrome (n=174)

Predictor	β coefficient	Standard error	*p*-value
Age (months)	–0.06	0.07	0.34
Body weight (kg)	0.04	0.16	0.81
Sex (male vs female)	–0.21	0.32	0.51
Neuter status (neutered vs intact)	–0.18	0.37	0.63
Breed category			
British Shorthair vs Tabby	–0.41	0.44	0.35
Scottish Fold vs Tabby	–0.56	0.48	0.26
Other vs Tabby	–0.38	0.53	0.47
Landing surface			
Soil vs concrete	0.27	0.49	0.58
Asphalt vs concrete	–0.19	0.55	0.73
Other vs concrete	0.14	0.46	0.76
Fall height (floors)	–0.29	0.18	0.10

Table 4. Multivariable logistic regression analysis of factors associated with the presence of ≥1 complication in cats with high-rise syndrome (n=174)

Predictor	Odds ratio (OR)	95% CI	*p*-value
Age (months)	1.01	0.99–1.03	0.29
Body weight (kg)	1.04	0.78–1.38	0.79
Sex (male vs female)	1.18	0.61–2.29	0.61
Neuter status (neutered vs intact)	0.91	0.45–1.86	0.79
Breed category			
British Shorthair vs Tabby	1.14	0.51–2.54	0.75
Scottish Fold vs Tabby	1.21	0.49–2.97	0.67
Other vs Tabby	0.88	0.31–2.52	0.81
Landing surface			
Soil vs concrete	0.97	0.39–2.41	0.95
Asphalt vs concrete	1.08	0.41–2.83	0.88
Other vs concrete	0.92	0.37–2.31	0.86
Fall height (floors)	1.62	1.14–2.31	0.008

In the multivariable linear regression analysis, none of the evaluated demographic or physical variables showed a statistically significant independent association with MGCS score. Specifically, age (p=0.34), body weight (p=0.81), sex (p=0.51), neuter status (p=0.63), breed category (all p>0.25), and landing surface (all p>0.30) were not significantly associated with MGCS after adjustment for all other variables included in the model. Fall height demonstrated a negative regression coefficient (β=−0.29), indicating a trend toward lower MGCS scores with increasing fall height, although this association did not reach statistical significance (p=0.10) (Table 3). Fall height emerged as the sole independent predictor of complication development (OR=1.62; 95% *CI*:1.14–2.31; p=0.008), indicating that each additional floor of fall height increased the likelihood of sustaining at least one complication by approximately 62%. Other variables, including age, body weight, sex, neuter status, breed group, and ground type, were not significantly associated with complication risk (all p>0.20) (Table 4).

Discussion

The present study demonstrates that fall height is the sole independent predictor of complication development in cats with HRS, whereas neurological status at admission, as assessed by MGCS, is not significantly associated with fall height or with any evaluated demographic or environmental variables. The hypothesis that fall height would be associated with an increased risk of complications was supported, while the expectation of a parallel increase in neurological impairment with greater fall height was not confirmed. This separation between predictors of overall injury burden and predictors of neurological status highlights the complex and multifactorial nature of trauma in cats affected by HRS.

The high prevalence of complications in this cohort underscores that HRS is typically characterised by polytrauma with clinically relevant lesions affecting

multiple organ systems. In keeping with established descriptions of feline HRS, the most frequent complication category comprised extremity injuries, with hindlimb fractures predominating, followed by respiratory system abnormalities and head trauma. This distribution is consistent with the prevailing pattern reported in retrospective series, in which orthopaedic trauma represents the dominant lesion category and femoral or pelvic fractures occur with high frequency (10, 12). Thoracic trauma has similarly been emphasized as a major contributor to morbidity in HRS, and the comparatively high proportion of respiratory abnormalities in the present study aligns with repeated observations that pulmonary contusions and pneumothorax remain central components of the syndrome (1, 21). Conversely, the relatively low frequency of spinal injuries parallels earlier reports indicating that, although spinal trauma can be severe when present, it is documented less commonly than appendicular or thoracic injuries in cats sustaining high-rise falls (2,10). Taken together, these findings indicate that an apparently stable neurological presentation does not exclude the presence of clinically relevant thoracic or orthopedic injuries, which may be identified through clinical, neurological, and radiographic examination in cats presenting after high-rise falls.

Fall height emerged as the sole independent predictor of complication development, with the odds of sustaining at least one clinically relevant lesion increasing with each additional floor. This pattern supports the biomechanical rationale that greater vertical distance increases impact energy transfer and, in turn, the likelihood of clinically apparent traumatic lesions, even if the precise relationship between height and severity is not necessarily linear across all injury types (1, 22). Prior retrospective studies have similarly linked increasing fall height to higher frequencies of severe orthopedic and thoracic injuries, although reported associations have varied across cohorts and analytic approaches (2, 10, 14). The present findings extend this literature by demonstrating that the effect of fall height persists after adjustment for demographic variables and environmental factors, suggesting that height operates as a robust determinant of overall injury burden within the constraints of retrospective clinical data. The absence of independent effects for age, sex, neuter status, breed grouping, body weight, or landing surface in the multivariable model further suggests that these factors, at least as recorded in routine clinical documentation, are less influential than fall height in predicting whether a cat will sustain a clinically relevant complication once a fall has occurred.

In contrast, fall height was not significantly associated with neurological status at admission as measured by MGCS, which is not unexpected, as neurological impairment does not develop uniformly in all trauma patients. In cases of high-rise syndrome, the presence and severity of neurological signs are influenced not only by the trauma mechanism itself but also by the distribution of impact forces and the specific anatomical systems affected at landing. Accordingly, vertical distance alone may be insufficient to predict neurological phenotype at presentation, a finding that is consistent with previous reports describing inconsistent, non-linear, or paradoxical relationships between fall height and neurological injury severity (2, 16). Several methodological and biological factors may further explain the absence of a statistically significant association. First, MGCS scores in the present cohort demonstrated a marked ceiling effect, with the majority of cats presenting with good neurological impairment or near-normal scores, thereby limiting score variability and reducing the ability to detect height-related differences. Second, the relatively low dispersion of MGCS values may have constrained statistical power, particularly in a retrospective clinical population enriched for survivors reaching hospital admission. Third, as neurological status was assessed retrospectively from medical records, subtle or transient neurological deficits may have been under-recognised or inconsistently documented, introducing additional measurement variability. Beyond these methodological considerations, a plausible biological interpretation is that neurological impairment in high-rise syndrome is shaped by a complex interplay of impact biomechanics and situational dynamics not captured by floor number alone, including body orientation during descent, the capacity for postural adjustment before landing, and the localisation of impact forces to the head and cervical region versus the thorax and appendicular skeleton (1, 23). Under this framework, greater heights may increase the probability of musculoskeletal and thoracic injury through increased impact energy, whereas neurological injury may depend more strongly on impact configuration and site-specific energy transmission, producing variability that weakens a simple height–MGCS relationship within clinical samples. Clinically, these results reinforce that preserved mentation and near-normal MGCS at admission should not be interpreted as reassurance against clinically important trauma elsewhere, particularly given the high overall complication prevalence and the prominent contribution of thoracic and orthopaedic injuries to morbidity in feline HRS (1, 21).

Several limitations of this study should be acknowledged. The retrospective design limited control over data completeness and standardization of clinical assessments, and variability in record quality may have influenced injury classification. Fall height was recorded as the number of floors rather than as an exact vertical distance, which may have introduced variability related to differences in building structure. Additionally, expressing the fall height as a multiple of the coefficient may not fully reflect the variation in the actual fall distance. Complication status was defined broadly to capture overall injury burden, increasing sensitivity for detecting clinically relevant trauma but potentially reducing specificity with respect to injury severity. Neurological status was assessed only at admission using MGCS, and longitudinal neurological outcomes could not be evaluated due to the absence of standardized follow-up data. As a single-center study conducted at a tertiary veterinary hospital, the findings

may not be fully generalizable to other clinical settings. The retrospective design and fixed sample size limited statistical power, and non-significant associations should therefore be interpreted with caution. Finally, mortality and survival analyses were not included in the present study. The primary aim was to identify predictors of neurological status at admission and the development of complications rather than outcome-based endpoints. In addition, the retrospective design resulted in incomplete and non-standardized outcome data, as a proportion of cats were discharged early, referred to other clinics, or lost to follow-up, precluding reliable survival analysis. Furthermore, the study population was inherently enriched for cats that survived long enough to reach hospital admission, introducing potential survivorship bias.

In conclusion, fall height is an independent predictor of complication development in cats with HRS, whereas neurological status at admission, as assessed by MGCS, is not significantly influenced by fall height or by demographic and environmental factors. These findings indicate that vertical distance primarily affects overall injury burden rather than the degree of neurological impairment. Clinically, cats presenting with preserved MGCS scores may still harbor substantial traumatic injuries, emphasizing the need for comprehensive diagnostic evaluation regardless of apparent neurological stability. The results refine current understanding of prognostic factors in HRS and support a system-based approach to the assessment and management of feline trauma patients.

References

1. Lefman S, Prittie JE. High-rise syndrome in cats and dogs. J Emerg Crit Care 2022; 32: 571-581.
2. Vnuk D, Pirkić B, Matičić D, et al. Feline high-rise syndrome: 119 cases (1998-2001). J Feline Med Surg 2004; 6: 305-312.
3. Durmuş AS, Polat E. Kedilerde yüksekten düşme sendromu. Fırat Üniversitesi Sağlık Bilimleri Veteriner Dergisi 2023; 37: 155-159.
4. Candela Andrade M, Slunsky P, Nerlich A, et al. High-rise syndrome in cats (part 1): Epidemiology and risk factors. J Feline Med Surg 2025; 27: 1098612X251334091.
5. Hernon T, Gurney M, Gibson S. A retrospective study of feline trauma patients admitted to a referral centre. J Small Anim Pract 2018; 59: 243-247.
6. Henning J, Nielsen T, Fernandez E, et al. Cats just want to have fun: Associations between play and welfare in domestic cats. Anim Welf 2023; 32: e9.
7. Yamada R, Kuze-Arata S, Kiyokawa Y, et al. Prevalence of 17 feline behavioral problems and relevant factors of each behavior in Japan. J Vet Med Sci 2020; 82: 272-278.
8. Gordon L, Thacher C, Kapatkin A. High-rise syndrome in dogs: 81 cases (1985-1991). J Am Vet Med Assoc 1993; 202: 118-122.
9. Inal KS, Önyay T, Ersoy BDÖ, et al. Survival rate of high-rise syndrome cases using animal trauma triage score in cats. Veterinary and comparative orthopaedics and traumatology 2025; 38: 11-17.
10. Çatalkaya E, Altan S, Ersöz Kanay B, et al. Clinical and etiologically evaluation of cats with high-rise syndrome: Assessment of 72 cases (A retrospective study). Veterinary Journal of Mehmet Akif Ersoy University 2022; 7: 20-25.
11. Ergin H, Parlak K. Radiographic Evaluation of Thoracic Injuries in Traumatized Cats. Curr Vet Sci 2024: 15-19.
12. Candela Andrade M, Slunsky P, Nerlich A, et al. High-rise syndrome in cats (part 2): Injury patterns and survival rate. J Feline Med Surg 2025; 27: 1098612X251334096.
13. Karabağlı M, Mutlu Z, Aydın Kaya D, et al. A Retrospective analysis of high rise syndrome in cats in İstanbul: 160 Cases (2016-2017). Pak Vet J 2024; 44: 727-732.
14. Papazoglou L, Galatos A, Patsikas M, et al. High-rise syndrome in cats: 207 cases (1988-1998). Australian Veterinary Practitioner 2001; 31: 98-102.
15. Dupre G, Allenou A, Bouvy B. High-rise syndrome: Retrospective study on 413 cats. Vet Surg 1995; 24: 294.
16. Zaghloul A, Samy A. High rise syndrome: A correlation between height and affections in 45 cats from urban areas. Alex J Vet Sci 2018; 59: 43-48.
17. Girol-Piner AM, Moreno-Torres M, Herrería-Bustillo VJ. Prospective evaluation of the animal trauma triage score and modified glasgow coma scale in 25 cats with high-rise syndrome. J Feline Med Surg 2022; 24: e13-e18.
18. Cameron S, Weltman JG, Fletcher DJ. The prognostic value of admission point-of-care testing and modified glasgow coma scale score in dogs and cats with traumatic brain injuries (2007-2010): 212 cases. J Vet Emerg Crit Care 2022; 32: 75-82.
19. Platt S. Altered states of consciousness in small animals. Vet Clin North Am Small Anim Pract 2014; 44: 1039-1058.
20. Tinsley AT, Oyama MA, Reineke EL. Animal trauma triage score, modified glasgow coma scale, age, and weight were associated with outcome in feline bite wounds (1,065 cases): A vetcot registry study. J Am Vet Med Assoc 2023; 261: 881-887.
21. Uzun S, Ionascu I, Dumitrescu F, et al. Thoracic trauma updates ın feline high-rise syndrome. What changed in 30 years? 50 cases in one year. Scientific Works Series C: Veterinary Medicine 2023; 69: 113-120.
22. Warner KG, Demling RH. The pathophysiology of free-fall injury. Ann Emerg Med 1986; 15: 1088–1093.
23. Diamond JM. Why cats have nine lives. Nature 1988; 332: 586-587.