

Prevalence of pelvic fractures in cat and dogs: A retrospective study in 183 cases (2016-2020)

Research Article

ABSTRACT

This study aims to classify radiographically diagnosed pelvic fractures in cats (n = 103) and dogs (n = 80). The pelvic bone resembles a box structurally, and as a result of the trauma of this bone, multiple fractures usually occur. Radiographs of cats and dogs exposed to various traumas were evaluated and classified as ilium, ischium, pubis, acetabulum, sacroiliac luxations and symphysis pubis fractures. The mean age of the cases included in the study was 16.9 months in cats and 19.2 months in dogs. Pelvic fractures were more common in females than males (♀=57.9%, ♂= 42.1%). In this context, it was constituted 18.7% ilium fractures, 12.6% pubis fractures, 18.9% ischial fractures, 11.3% acetabulum fractures, 29.2% sacroiliac luxation and 9% symphysis pelvis fractures of pelvic fractures. As a result, it was revealed that multiple fractures could be seen in traumas taken to the pelvic area and their rates.

Keywords: Cat, Dog, Pelvic fractures, Prevalence, Trauma

INTRODUCTION

Pelvis consists of the ilium, ischia, pubis, sacrum and first coccygeal vertebra. The junction of each pelvic bone is called the symphysis pelvis. Pelvic fractures are usually caused by falling from a height, traffic accidents, kicking, gunshot and bite injuries, and tumoral causes (Altunatmaz et al., 2004; Mesquita et al. 2009, Witte and Scott 2012; Bourbos et al. 2020). Pelvic fractures are common injuries in cats and dogs and constitute 20-30% of all fractures caused by trauma (Altunatmaz et al., 2004; Draffan et al. 2009; Mesquita et al. 2009; Stieger-Vanegas et al. 2015; Sadan et al. 2016). Pelvic fractures are generally classified as sacroiliac luxations, iliac wing, iliac body, acetabular, ischial and pelvic floor fractures. In pelvic fractures, the ilium is most affected (18-46%) (Altunatmaz et al., 2004; Harasen 2007; Stieger-Vanegas et al., 2015). In untreated cases, the degenerative joint disease develops because joint compliance will be impaired (Mesquita et al. 2009). On the other hand, dogs have difficulty in carrying body weight due to coxofemoral luxations and sacroiliac separations, which is considered a common cause of morbidity (Draffan et al. 2009). Concomitant injuries to other body systems, including life-threatening injuries, are also common and should be detected and treated in a timely manner. Soft tissue and organ damage are common in multiple pelvic fractures. Lower urinary and gastrointestinal system organs and peripheral nerves are mostly affected due to pelvic fractures (Ünsaldı 1995; Sadan et al. 2016).

How to cite this article

Yurtal, Z., Deveci, MZY., Alakuş, İ., Kırız, Ö., Alakuş, H., İşler, CT., Altuğ ME. (2022). Prevalence of pelvic fractures in cat and dogs: A retrospective study in 183 cases (2016-2020). *Journal of Advances in VetBio Science and Techniques*, 7(1), 109-114. <https://doi.org/10.31797/vetbio.981133>

Ziya Yurtal^{1a}
Mehmet Zeki Yılmaz
Deveci^{1b}
İbrahim Alakuş^{1c}
Ömer Kırız^{1d}
Halil Alakuş^{1e}
Cafer Tayer İşler^{1f}
Muhammed Enes Altuğ^{1g}

¹Department of Surgery,
Faculty of Veterinary
Medicine, Hatay Mustafa
Kemal University, 31040,
Hatay, Turkey

ORCID-

^a[0000-0001-6080-1860](https://orcid.org/0000-0001-6080-1860)

^b[0000-0002-9532-247X](https://orcid.org/0000-0002-9532-247X)

^c[0000-0002-2031-7035](https://orcid.org/0000-0002-2031-7035)

^d[0000-0002-0222-1363](https://orcid.org/0000-0002-0222-1363)

^e[0000-0001-9265-2310](https://orcid.org/0000-0001-9265-2310)

^f[0000-0002-1910-8316](https://orcid.org/0000-0002-1910-8316)

^g[0000-0003-3896-9944](https://orcid.org/0000-0003-3896-9944)

Correspondence

Ziya Yurtal
ziyayurtal@gmail.com

Article info

Submission: 10-08-2021

Accepted: 02-04-2022

Publication: 30-04-2022

e-ISSN: 2548-1150

doi prefix: 10.31797/vetbio

• <http://dergipark.org.tr/vetbio>

This work is licensed under a
Creative Commons Attribution
4.0 International License



Radiographic examination of the pelvic is a standard diagnostic test to evaluate cases with suspected trauma. Shots are typically done in laterolateral, ventrodorsal, and oblique positions (Altunatmaz et al., 2004; Mesquita et al., 2009; Sadan et al. 2016). The pelvic is similar to a box in terms of its structure, so it is very likely that more than one bone will be affected during trauma; that is, only one bone may be affected or more than one pelvic bone may be affected (Denny 1978; Altunatmaz et al., 2004; Mesquita et al. 2009). However, the displacement of the fracture parts is generally not formed without 2

or 3 fractures due to the pelvic structure (Bourbos et al. 2020). The most important complications in pelvic fractures are damage to the pelvic structures and nerves, especially the sciatic nerve (Ünsaldı 1995; Meeson and Geddes 2017). When the damage takes shape, it should be treated conservatively or surgically (Houlton and Dyce 1994; Ünsaldı 1995; Mesquita et al. 2009).

This study aims to retrospectively of pelvic fractures in cats and dogs admitted to our clinic with pelvic trauma.

MATERIAL and METHOD

The material of the study consisted of a total of 183 cases, including 103 cats and 80 dogs of different ages, breeds and sex, brought to the Hatay Mustafa Kemal University Veterinary Health, Practice and Research Hospital between 2016-2020. In a total of 183 cases included in the study, 475 fractures were evaluated. In the first stage, radiographs of the cases were taken in ventrodorsal and laterolateral positions. After

radiographic examining, pelvic fractures; ilium, ischia, pubis, acetabulum, sacroiliac separations and as symphysis pelvic fractures were categorized. All fractures except symphysis pelvic fractures were classified as right and left sides. Also, unilateral and bilateral incidence rates for bilateral pelvic bones were also presented. Fractures were named as traffic accidents, falling from a height, dog attack and the cause of unknown trauma.

RESULTS

A total of 183 cases, including 103 cats and 80 dogs, were included in the study. Seventy-seven of the animals affected by the trauma were male, and 106 of them were female. 39 (37.8%) of the cats were male, 64 (62.2%) of them were

female, while 38 (47.5%) of the dogs were male, and 42 (52.5%) of them were recorded as female. The average age of cats was 16.9 months, and dogs were 19.2 months. Of the pelvic fractures were evaluated as 135 (73.7%) from traffic accidents, 34 (18.5%) from falling from a height, 1 (0.5%) from a dog attack, and 13 (7.1%) of unknown.

Table 1. Information on 183 cases that are taken into evaluation

Species	Cases	The average age	Sex* M/F	Etiology* TA/FH/DA/U	İlium fracture left/right	İschii fracture left/right	Pubic fracture left/right	Acetabular fracture left/right	Sakroiliac separation left/right	Symphysis pelvis fracture	Fractures
Cat	103	16.9	39/64	60/31/1/11	17/26	21/26	16/18	9/15	51/42	28	269
Dog	80	19.2	38/42	75/3/0/2	18/28	18/25	12/14	14/16	23/23	15	206
Total	183	18.05	77/106	135/34/1/13	35/52	39/51	28/32	23/31	74/65	43	475

*: M: Male, F: Female

** : TA: Traffic accident, FH: Falling from high, DA: Dog attack, U: Unknown

60 of the pelvic fractures in cats were caused by a traffic accident, 31 from falling from a height, 1 from a dog bite, and 11 from an unknown reason. In dogs, 75 of the cases were caused by a traffic accident, 3 as a result of a fall from a height, and 2 as a result of an unknown trauma. In 183 cases included in the study, 475 fractures were detected, 269 in cats and 206 in dogs. These; 35 left ilium fractures, 54 right ilium fractures; 39 left ischial fractures, 51 right ischial fractures; 28 left pubis fractures, 32 right pubis fractures; 23 fractures of the left acetabulum, 31 fractures of the right acetabulum; 74 were left sacroiliac separations, 65 were right sacroiliac separations, and 43 were symphysis pelvis fractures (Table 1). Of cats; left ilium fracture in 17, right ilium fracture in 26 (Figure 1a); 21 left ischial fracture, 26 right ischial fracture; 16 left pubis fracture, 18 right pubis fracture; 9 had left acetabulum fracture, 15 had right acetabulum fracture (Figure 1a);

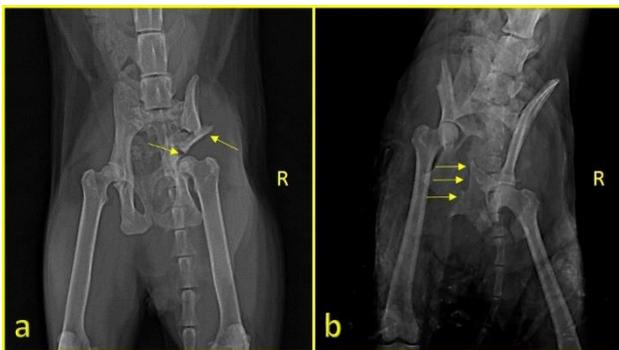


Figure 1a. Radiography of a cat with a fracture of the right ilium and right acetabulum in the pelvic **b)** Radiography of a cat with a symphysis pelvis separation in the pelvic

51 left sacroiliac separations, 42 had right sacroiliac separations, and 28 had symphysis pelvis fracture (Figure 1b); If the dogs; left ilium fracture in 18, right ilium fracture in 28; 18 left ischial fracture, 25 right ischial fracture; 12 had left pubis fracture, 14 had a right pubis fracture; 14 had left acetabulum fracture, 16 had right acetabulum fracture; 23 had left sacroiliac separations, 23 had right sacroiliac separations, and 15 had symphysis pelvis fractures.

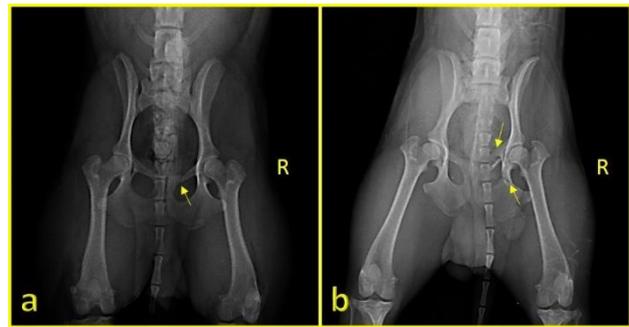


Figure 2a. Radiography of a cat with a single pelvic fracture (left ischial bone) **b)** Radiography of a cat with multiple pelvic fractures (right ischial bone and bilateral sacroiliac separation)

More than one pelvic bone was fractured in 136 of the 183 cases in cats and dogs. Of the 103 cases in total, 25 (24.2%) of the cats had a single pelvic bone (Figure 2a), and 78 (75.8%) had more than one pelvic bone (Figure 2b). In dogs, 22 of 80 cases (27.5%) had a single pelvic bone (Figure 3a), and 58 (72.5%) had multiple pelvic fractures (Figure 3b).



Figure 3a. Radiography of a dog with a single pelvic fracture (right os pubis) **b)** Radiography of a dog with multiple pelvic fractures (right ischial bone and right os pubis)

Bilateral fracture of the ilium in 1 (0.9%) of the cats, bilateral ischial fracture in 6 (5.8%) (Figure 4a),



Figure 4a. Radiography of a cat with bilateral ischial fracture of the pelvic **b)** Radiography of a cat with bilateral sacroiliac separation in the pelvic

bilateral pubic fracture in 8 (7.7%), bilateral acetabular fracture in 1 (0.9%) and bilateral sacroiliac separations in 29 (28.1%) (Figure 4b); In dogs, bilateral ilium fracture in 7 (8.7%),

bilateral ischial fracture in 5 (6.2%), bilateral pubic fracture in 5 (6.2%), bilateral acetabular fracture in 3 (3.7%) and 12 bilateral sacroiliac separations (15%) were detected (Table 2).

Table 2. Unilateral and bilateral fractures in cats and dogs

Species	Ilium fracture U/B***	Ischii fracture U/B	Pubic fracture U/B	Acetabular fracture U/B	Sakroiliac separation U/B
Cat	42/1	35/6	18/8	22/1	35/29
Dog	31/7	33/5	16/5	24/3	22/12

***: U; Unilateral, B; Bilateral

DISCUSSION

Pelvic fractures, which are common in small animals, constitute 16% of all fractures in dogs and 25% in cats (Bourbos et al., 2020; Cinti et al., 2020). Mesquita et al., (2009) reported that traffic accidents were the most common cause of pelvic fractures. Meeson and Geddes (2017) unveiled that motor vehicle accidents are the most common cause of trauma, and they argued that the geographical region inhabited has also an effect on this condition. The same researchers stated that this rate might be high in settlements close to the metropolis, especially in stray dogs. In parallel with these determinations, the reason for 73.7% of the cases evaluated in our current study is traffic accidents. Most of the fractures in cats and dogs are caused by traffic accidents. Falling from a height is the second reason for fractures in cats.

Sadan et al., (2016) stated that most pelvic fractures are seen in healthy animals under the age of three. Moreover, Bourbos et al., (2020) also revealed that pelvic fractures are mostly seen in young animals and associated with the walking habits of the animals. On the other hand, Bennet (1975) and Ünsaldı (1995) reported that the animals with pelvic fractures were between the ages of 1-3. In our study, the average age of pelvic fractures was observed as 16.9 months in cats and 19.2 months in dogs, consistent with the studies mentioned above.

Johnson and Hulse (2005) emphasized that there is no race, age or gender predisposition in pelvic fractures which occur in small animals.

Bennet (1975) stated that pelvic fractures are detected more in male cats compared to female cats. On the contrary, Ünsaldı (1995) suggested that pelvic fractures are more common in females. In our study, a diagnosis of pelvic fracture was made in many races rather than specific races. In other words, no racial predisposition has been determined. It has been found that the ages of affected animals are close to each other in cats and dogs. In terms of gender, it was noted that fractures were more common in females than males in both dogs and cats (Table 1).

Ünsaldı (1995) reported that 80% of cases with pelvic fractures had multiple fractures. Similarly, the incidence of such fractures is 75.8% in cats and 72.5% in dogs, consistent with Unsaldı's results (1995).

Bookbinder and Flanders (1992) stated that the most common pelvic fracture in cats is pelvic floor fractures, and these fractures accounted for 90% of cases. Sadan et al., (2016) unveiled in their study that 54.5% of cats and 59.6% of dogs had unilateral pubic fractures. In our study, unilateral pubic fractures were detected in 17.4% of cats and 20% of dogs.

DeCamp (2005) stated that the most common fracture is the ilium fracture. Furthermore, Bouabdallah et al., (2020) reported in their study that the rate of ilium fractures among pelvic fractures was 35.7%. In the present study, we found that the rate of ilium fractures among

pelvic fractures was 20.8%. Bouabdallah et al., (2020) reported that the rate of sacroiliac separation among pelvic fractures was 59.5%.

Johnson and Hulse (2005) suggested that sacroiliac separations should be surgically treated. In contrast, there are also studies suggesting conservative treatment for sacroiliac separations (Mesquita et al., 2009). On the other hand, DeCamp (2016) emphasized that there could be neurological deficits in sacroiliac separations. In the current study, sacroiliac separation was mostly diagnosed in cats (34.5%). In dogs, this rate remained at 22.3%. It has been reported that sacroiliac separations are mostly unilateral (Aksoy et al., 2005). In the present study, 29 of sacroiliac separations were bilateral (28.1%) in cats, 35 unilateral (33.9%), 12 bilateral (15%) in dogs, 22 unilateral (27.5%). These results are compatible with the literature mentioned above.

The incidence of acetabular fractures varies between 14% and 43% (Hardie et al., 1999; Boswell et al., 2001; Mesquita et al. 2009). Bouabdallah et al. (2020) reported the incidence of acetabulum and pubis fractures to be 21.4% in their study. In our study, these rates are 11.3% and 12.6%, respectively. The rate of formation of ischial fractures is 18.9% (Bouabdallah et al., 2020). Sadan et al., (2016) revealed that the incidence of unilateral ischial fractures is 67.9% in dogs and 64.3% in cats. In our study, unilateral ischial fractures between the pelvic bones were observed as 13.1% in cats and 16.0% in dogs.

Bourbos et al., (2020) unveiled that symphysis pelvic fractures are rarely occurred. Sadan et al., (2016) emphasized in their study that symphysis pelvic separations are more common in cats than in dogs (15.3% in cats; 5.4% in dogs). Among the cases included in our study, symphysis pelvic fracture occurred in 27.1% in cats and 18.7% in dogs. The incidence of pelvic fractures is only 9%.

Most veterinary orthopedic surgeons recommend that most pelvic fractures in cats and

dogs need surgery. However, surgical interventions may be disrupted due to financial constraints, chronic fractures, or veterinarians not having enough experience in orthopedics (Bouabdallah et al., 2020). In addition to these, radiographic evaluations in pelvic fractures are of great importance in planning the treatments to be applied.

CONCLUSION

In cats and dogs, multiple fractures are encountered in the pelvic bone, especially as a result of motor vehicle accidents and falls from height. In addition to protecting the digestive and excretory system organs with its box-like structure, it should be kept in mind that this bone may be damaged due to its neighbourhood with the sciatic and femoral nerve, especially in sacroiliac joint separations. As a result, of pelvic fractures were observed to cause 18.7% ilium fractures, 18.9% ischial fractures, 12.6% pubis fractures, 11.3% acetabulum fractures, 29.2% sacroiliac separations, and 9% symphysis pelvic fractures.

ACKNOWLEDGMENT

Ethical approval: The study was conducted with the approval of the Hatay Mustafa Kemal University Experimental Animals Local Ethics Committee No. 2021 / 02-07.

Conflict of interest: There is no conflict of interest between the authors.

REFERENCES

- Aksoy Ö, Acar SE, Düzgün O, Mutlu Z. (2005).** Kedi ve köpeklerde sakro-iliak ayrılmaların değerlendirilmesi: 56 olgu (2000-2003). *Kafkas Üniversitesi Veteriner Fakültesi Dergisi*, 11(2), 119-125.
- Altunalmaz K, Aksoy Ö, Özsoy S. (2004).** Kedi Ve Köpeklerde Ossa Coxae Kırıkları Ve Bunlarla Eş Zamanlı Şekillenen Ortopedik Lezyonların Radyografik Olarak Değerlendirilmesi (1992-2002): 621 Olgu. *İstanbul Üniversitesi Veteriner Fakültesi Dergisi*, 30(1), 1-9.
- Bennet CW. (1975).** Orthopaedic disease affecting the pelvis region of the cat. *Journal of Small Animal Practice*, 16(1-12), 723-738.

- Bookbinder PF, Flanders JA. (1992).** Characteristics of pelvic fracture in the cat. *Veterinary and Comparative Orthopaedics and Traumatology*, 5,122-127.
- Boswell KA, Boone Jr EG, Boudrieau RJ. (2001).** Reduction and temporary stabilization of acetabular fractures using ASIF mandibular reduction forceps: technique and results using plate fixation in 25 dogs. *Veterinary Surgery*, 30(1),1-10.
- Bouabdallah R, Meghiref FZ, Azzag N, Benmohand C, Zenad W, Rebouh M. (2020).** Conservative management of pelvic fractures in dogs and cats in Algiers: Incidence and long-term clinical outcomes. *Veterinary World*, 13(11), 2416-2421.
- Bourbos A, Cinti F, Sergiampietri F, Pisani G. (2020).** The use of an intraoperative skeletal traction device for delayed reduction in pelvic fractures in two dogs. *Veterinary and Comparative Orthopaedics and Traumatology*, 3(01), e40-e45.
- Cinti F, Cavaliere L, Degna MT, Rossi F, Pisani G. (2020).** Triple Pelvic Osteotomy Fixed with Lag Screw for the Treatment of Pelvic Canal Stenosis in Five Cats. *Veterinary and Comparative Orthopaedics and Traumatology*, 33(05), 363-369.
- DeCamp CE. (2005).** Fractures of the pelvis. In: Johnson AL, Houlton JEF, Vannini R (Eds.), *AO Principles of Fracture Management in Dog and Cat*, 1st Ed, Davos Platz: AO Publishing, Clavadelerstrasse, Switzerland,; pp. 161–199.
- DeCamp CE. (2016).** Fractures of the Pelvis. In: DeCamp CE, Johnston SA, Dejardin Lm, Schaefer SL (Eds). *Brinker Piermattei, and Flo's Handbook of Small Animal Orthopedics and Fracture Repair*, 5th Ed, Elsevier, St Louis, France, 2016: pp. 437-467.
- Denny HR. (1978).** Pelvic fractures in the dog: a review of 123 cases. *Journal of Small Animal Practice.*, 19(1-12), 151-166.
- Draffan D, Clements D, Farrell M, Heller J, Bennett D, Carmichael S. (2009).** The role of computed tomography in the classification and management of pelvic fractures. *Veterinary and Comparative Orthopaedics and Traumatology*, 22 (03), 190-197.
- Harasen G. (2007).** Pelvic fractures. *Canadian Veterinary Journal*, 48(4), 427.
- Hardie RJ, Bertram JEA, Todhunter RJ, Trotter EJ. (1999).** Biomechanical comparison of two plating techniques for fixation of acetabular osteotomies in dogs. *Veterinary Surgery*, 28(3), 148-153.
- Houlton J, Dyce J. (1994).** Tratamiento de las fracturas pélvicas en perros y gatos. *Waltham Focus.*, 4(2), 17-25.
- Johnson AL, Hulse DA. (2005).** Tratamento de fraturas específicas. In: Fossum TW (Eds.), *Cirurgia de Pequenos Animais*, 2nd Ed, Elsevier, São Paulo, Brazil, pp. 900-1016.
- Meeson RL, Geddes AT. (2017).** Management and long-term outcome of pelvic fractures: a retrospective study of 43 cats. *Journal of Feline Medicine and Surgery*, 19(1), 36-41.
- Mesquita LR, Muzzi LAL, Silva WG, Muzzi RAL, Giannico AT. (2009).** Pelvic Fractures in Small Animals: Retrospective Study of the Cases Assisted in the Veterinary Hospital of the Federal University of Lavras From January 2001 to July 2008. *World Small Animal Veterinary Association World Congress Proceedings*.
- Sadan MA, Amort K, Kramer M. (2016).** Pelvic floor fractures in 55 dogs and 39 cats: CT and X-ray findings. *International Journal of Veterinary Science & Research*, 2(1), 1-7.
- Stieger-Vanegas SM, Senthirajah SK, Nemanic S, Baltzer W, Warnock J, Bobe G. (2015).** Evaluation of the diagnostic accuracy of four-view radiography and conventional computed tomography analysing sacral and pelvic fractures in dogs. *Veterinary and Comparative Orthopaedics and Traumatology*, 28(03), 155-163.
- Ünsaldı E. (1995).** Kedilerde Pelvis Kırıklarının Osteosentez İle Sağaltımı. *Ankara Üniversitesi Veteriner Fakültesi Dergisi*, 42(2), 129-138.
- Witte P, Scott H. (2012).** Conditions of the feline pelvic region. *In Practice*, 34(9), 498-511.