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Research Article

Characteristics and Prevalence of Surgical Diseases in Avian Species within Aydın Province: A Study of Domestic and Wildlife Birds

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ABSTRACT

This study aims to present descriptive information on surgical cases observed in avian species. The study included a total of 125 domestic and wild avian species of various ages, genders, species, and breeds, which were presented to the clinics of the Department of Surgery, Faculty of Veterinary Medicine, Aydın Adnan Menderes University. Species, breed, age, and gender information were recorded for each animal, and comprehensive clinical examinations, including inspection, palpation, percussion, auscultation, and radiography, were performed to assess their overall condition. Definitive, suspected, or symptomatic diagnoses were established, and diseases were categorized and presented under specific headings such as fracture, dislocation, infection, soft tissue injury, mass, wound, paralysis, and other diseases. The medical and/or surgical treatments were administered based on the specific disease classification. The study material consisted of a total of 125 avian cases, categorized and evaluated as follows: 53 (42.4%) fractures, 2 (1.6%) luxations, 13 (10.4%) infections, 11 (8.8%) soft tissue injuries, 12 (9.6%) masses (cysts/tumors), 22 (17.6%) wounds, 6 (4.8%) paralysis cases, and 6 (4.8%) other diseases. This study provides insights into the prevalence and clinical conditions of surgical diseases in avian species. It also offers valuable information regarding the diagnosis and treatment of these conditions.

***Keywords**: Avian, surgery, avian surgical diseases, soft tissues, psittaciformes.*

Türkiye'nin Aydın İlindeki Kanatlı Cerrahi Hastalıkların Özellikleri ve Prevelansı: Evcil ve Yabani Kuşlar Üzerinde Bir Çalışma

ÖZET

Bu çalışmanın amacı, kuş türlerinde gözlenebilen cerrahi vakalara dair tanımlayıcı bilgiler sunmaktır. Çalışma, çeşitli yaş, cinsiyet, tür ve ırklara sahip toplam 125 evcil ve vahşi kuş türünü içermekte olup, bu kuşlar, Aydın Adnan Menderes Üniversitesi Veteriner Fakültesi Cerrahi Anabilim Dalı'nın kliniklerine getirilmişlerdir. Her bir hayvan için tür, ırk, yaş ve cinsiyet bilgileri kaydedilmiş ve genel durumlarını değerlendirmek için inspeksiyon, palpasyon, perküsyon, oskültasyon ve radyografi de dahil olmak üzere kapsamlı klinik muayeneler gerçekleştirilmiştir. Kesin, şüpheli veya semptomatik tanılar konulmuş ve hastalıklar kırık, çıkık, enfeksiyon, yumuşak doku yaralanması, kitle (kist/tümör), yara, felç ve diğer hastalıklar gibi belirli başlıklar altında kategorize edilip sunulmuştur. Tıbbi ve/veya cerrahi tedaviler, belirli hastalık sınıflandırmasına göre uygulanmıştır. Çalışma materyali, toplamda 125 kuş vakasını içermekte olup, bu vakalar şu şekilde kategorize edilip değerlendirilmiştir: 53 (%42,4) kırık, 2 (%1,6) çıkık, 13 (%10,4) enfeksiyon, 11 (%8,8) yumuşak doku yaralanması, 12 (%9,6) kitle (kist/tümör), 22 (%17,6) yara, 6 (%4,8) felç vakası ve 6 (%4,8) diğer hastalıklar. Bu çalışma, kuş türlerinde cerrahi hastalıkların yaygınlığı ve klinik durumlarına dair fikir vermektedir. Ayrıca bu koşulların tanı ve tedavisi hakkında değerli bilgiler sunmaktadır.

***Anahtar kelimeler**: Kanatlı, cerrahi, kanatlı cerrahi hastalıkları, yumuşak doku, psittaciformes.*

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Introduction

In addition to dogs and cats known as human's best friends, smaller animals like reptiles and wild birds are becoming increasingly popular as exotic pets as people move from rural to urban areas. The class Aves comprises approximately 9.700 avian species classified into 27 orders and 166 families, with over 22.000 subspecies identified (Shivaprasad, 2002). Among these avian species, certain types, particularly those that easily adapt to domestic life, exhibit vibrant colors, possess gentle temperaments, and have long lifespans as seen in parrots, gained more attention and are commonly kept as pets (Rosskopf and Woerpel, 1996). However, it is also recognized that wild avian species play a significant role in maintaining natural balance and healthy ecosystems (Kibar and Bumin, 2006; Aslan et al., 2009).

The class of Aves, with its numerous subspecies, is known to have various unique diseases (Tully et al., 2000; Shivaprasad, 2002), including surgical conditions, which can be categorized as orthopedic problems, soft tissue disorders, eye diseases, and other, similar to different animal species. However, the aves class, unlike domestic mammals, has distinct anatomical and physiological characteristics that necessitate careful consideration when approaching clinical and surgical interventions, requiring specialized equipment. It should be noted that the treatment process for avian species can be challenging. Clinical studies on avian species may provide valuable insights into diseases and treatments specific to the Aves class. Thus, this study aims to share the distribution of diseases observed in avian species within Aydın province of Türkiye, along with their diagnosis, treatment approaches, and results.

Materials and Methods

The study was conducted at the Small Animal Clinic of the Department of Surgery, Faculty of Veterinary Medicine, Aydın Adnan Menderes University between 27th February 2019 and 27th February 2020. A total of 125 domestic and wild avian species were evaluated.

The study involving animal ex- periments and protocols received approval from the In- stitutional Animal Care and Ethical Committee of Aydın Adnan Menderes University) and the Republic of Türkiye Ministry of Agriculture and Forestry (27/02/2019- E7003).

For each animal, the history of the case, species, breed, age, gender, and examination findings (inspection, palpation, percussion, auscultation, radiography, etc.) were recorded. In radiological examinations, stationary X-ray devices with a fixed power of 100 mAs (Imago®, Italy) and mobile X-ray devices with a power of 70 mAs (F100®, China) were used. The cases were classified and analyzed under headings such as fracture, dislocation, infection, soft tissue injury, mass, wound, paralysis, and other diseases. Appropriate treatment methods were determined for each case. For medical treatment purposes, suitable agents (antibiotics, analgesics, steroids, NSAIDs, scar-promoting ointments, antifibrinolytics, preparations containing lactulose, crystalloid fluids, and vitamins) were selected and administered. Bandages (such as figure-of-eight bandage, ehmer sling, splint bandage, supported bandage, etc.) were utilized for conservative treatment. PVC, wooden sticks, vetfleks (OctaMed®, İstanbul, Türkiye), cotton, sterile gauze, and adhesive tape were employed as bandages and support materials. The wound areas were cleaned with appropriate antiseptics [(etakridine lactate (Rivanol®, İstanbul Pharmaceuticals, İstanbul, Türkiye)], hypochlorous acid [(Crystalin®, NHP, İzmir, Türkiye)], and dry or wet dressings were applied according to the characteristics of the wound. Operative treatment methods varied depending on the disease and avian species. Internal fixation methods (Steinmann pins, Kirschner pins, and occasionally cerclage wire) were used for fracture cases. In cases requiring suturing, polyglactin (Vicryl®, Ethicon, Woluwe-Saint-Lambert, Belgium), silk, and monofilament polydioxanone (Monosorb®, Sutures, Wales, United Kingdom) sutures were used to perform simple continuous, simple interrupted, and/or horizontal mattress sutures. Necrotic extremities were amputated. Excision procedures were performed for mass formations using routine surgical techniques and approaches. A small animal soft tissue set and routine orthopedic set were utilized during surgeries. Before the operations, the feathers in the surgical area were removed, and a disinfectant (10% povidone-iodine, Kimpa®, İstanbul, Türkiye) was performed. In open fractures, an initial wound dressing with suitable antiseptics [(etakridine lactate (Rivanol®, İstanbul Pharmaceuticals, İstanbul, Türkiye)] and hypochlorous acid (Crystalin®, NHP, İzmir, Türkiye) were applied to control infection. Subsequently, suitable internal fixation methods were employed. Operations were performed under Isoflurane gas anesthesia (Isoflurane, USP®, Adeka, İstanbul, Türkiye).

Analyses

Descriptive analyses were systematically conducted to present the frequencies and percentages of results in separate tables. Microsoft Excel 2016® (Redmond, Washington, USA) software was utilized for the compilation and organization of this descriptive data.

Results

The distribution of the 125 avian cases that constituted the study material is as follows: 42 Budgerigar (*Melopsittacus undulatus*), 16 Parrots (*Psittaciformes*), 11 Hawk (*Buteo buteo*), 11 Chicken (n=5)/Rooster (n=6) (*Gallus gallus domesticus*), 8 Stork (*Ciconia ciconia*), 5 Sparrowhawk (*Accipiter nisus*), 5 Owls (*Strigiformes*), 5 Pigeon (*Columba livia domestica*), 4 Ducks (*Anatinae*), 4 Collared Dove (*Streptopelia decaocto*), 3 Canary (*Serinus canaria*), 2 Herons (*Ardeidae*), 2 Crows (*Corvus*), 2 Eurasian Kestrel (*Falco tinnunculus*), 2 Seagull (*Laridae*), 1 Bee-eater (*Merops orientalis*), 1 Chaffinch (*Fringilla*), and 1 Bald Eagle (*Haliaeetus leucocephalus*). The encountered cases were recorded and presented as follows: fractures (n=53; 42.4%), dislocations/luxations (n=2; 1.6%), infections (n=13; 10.4%), soft tissue injuries (n=11; 8.8%), masses (cysts/tumors) (n=12; 9.6%), wounds (n=22; 17.6%), paralysis (n=6; 4.8%), and other diseases (n=6; 4.8%).

Fracture Cases

The study included 53 fracture cases. Table 1 provides an overview of the distribution of fractures across the bones. One case involved a fracture in both the humerus and antebrachium bones. Therefore the study presents 54 fractured bones (Table 3) in 53 fracture cases (n=53). Deformation and loss of function were observed in all cases. The cause of the fracture was unknown in 35 cases, while various traumas and injuries were identified as causes in the remaining cases. Additional clinical and radiological findings are summarized in Tables 2 and 3, respectively.

Table 1. Distribution of fracture cases in bones [n, (%)]

Fractured bones, 53 (42.4%)[a]						
Humerus	**Antebrachium**	**Metacarpus**	**Antebrachium and Humerus**	**Femur**	**Tibiotarsus**	**Tarsometatarsus**
8 (15.2%)[b]	14 (26.5%)[b]	3 (5.6%)[b]	1 (1.8%)[b]	2 (3.8%)[b]	24 (45.3%)[b]	1 (1.8%)[b]

[a]: Represents the percentage share among all diseases recorded in the study, [b]: Represents the percentage share among the cases diagnosed as a fracture.

Among the cases with open fractures [n=16, (12.8%)], 13 were treated with bandage with a window throw the layers of wet cotton, and 3 underwent intramedullary pin fixation (Steinmann or Kirschner). Preoperative and postoperative bandage with a window throw the layers of wet cotton were changed every other day. Out of these cases, 10 resulted in mortality due to deteriorating health status. Three cases showed no improvement and experienced impaired limb function, while two cases necessitated intraoperative amputation, and one required postoperative amputation. In the closed fractures [n=37, (29.6%)], 29 were applied with bandages, 5 underwent open reduction internal fixation, and no treatment was administered to the remaining 3 cases due to the refusal of the recommended treatment methods by the owners. Among the cases treated solely with bandages, 7 were recovered after 3 weeks, 1 had no improvement, and 1 developed necrosis (amputated). Four cases deteriorated and did not survive. Information about the treatment

Table 2. Local clinical findings in fracture cases [n, (%)]

	Bone							
Clinical findings	**Humerus**	**Antebrachium**	**Metacarpus**	**Antebrachium and Humerus**	**Femur**	**Tibiotarsus**	**Tarsometatarsus**	**Total**
Skin wound	7	5	2	1	-	1	-	16
Hematoma	8	7	2	1	2	5	-	25
Ecchymosis	3	1	-	1	1	1	-	7
Crepitation	8	10	3	1	2	22	1	47
Pain	6	9	2	1	2	22	1	43

Table 3. Radiographical findings in fracture cases (n)

		Humerus		Antebrachium		Metacarpus		Femur		Tibiotarsus		Tarsometatarsus		Total
		O	C	O	C	O	C	O	C	O	C	O	C	
Region	Epiphyseal	1	-	-	1	-	-	-	-	1	1	-	-	4
	Diaphyseal	5	1	6	8	2	1	-	2	-	21	-	1	47
	Supracondylar	2	-	-	-	-	-	-	-	-	1	-	-	3
	Total	8	1	6	9	2	1	0	2	1	23	0	1	54
Fracture Line	Oblique	4	-	4	5	1	-	-	1	-	9	-	-	24
	Transversal	4	1	1	3	1	-	-	1	1	12	-	1	25
	Longitudinal	-	-	-	-	-	-	-	-	-	1	-	-	1
	Multiple	-	-	1	1	-	1	-	-	-	1	-	-	4
	Total	8	1	6	9	2	1	0	2	1	23	0	1	54

O: open fracture, C: close fracture

outcome could not be obtained for 9 cases due to the inability to reach the owners. Among the cases that received post-bandage physiotherapy (7 cases), 6 showed complete healing within 5 weeks, and 1 had an unknown outcome. Among the 5 surgically treated cases, 1 recovered and was released, 2 died during the operation, and 1 died 3 days post-operation due to worsened health. The remaining case had impaired limb function. Table 4 provides a thorough summary of all of this information.

Luxation cases

Table 5 presents the distribution of luxation cases based on the affected extremity and joint. One case received bandage treatment and analgesic medication (Meloxicam®, Bavet, İstanbul, Türkiye), while another (coracoid joint) underwent surgery. The outcome of the bandage-treated case could not be determined due to the inability to schedule a follow-up appointment. The coracoid luxation case experienced a deterioration in general condition and died.

amoxicillin+clavulanic acid (Augmentin®, GlaxoSmith-Kline, İstanbul, Türkiye) was administered. *Klebsiella* spp. was isolated in the other case (periorbital infection), and treatment with cefoperazone (Sulperazon®, Pfizer, İstanbul, Türkiye) was administered. Both cases showed recovery after treatment. In 5 of the infection cases [mandible (n=1), sinus-sinusitis (n=1), phalanx (n=3)], aspiration was performed to evacuate the contents, and medical treatment was provided (Figure 1). Among these 5 cases, 3 (1 mandible, 1 phalanx, 1 sinus) presented improvement, 1 case (phalanx) died to follow-up for unknown reasons, and another case (phalanx) could not be reached for post-treatment information due to the unavailability of the owner for a follow-up visit. In the remaining 6 cases [periorbital region (n=1), bumblefoot (n=3), eye (n=2)], no procedure (aspiration) was performed, and only medical treatment was recommended. Among these cases, 2 (1 bumblefoot, 1 eye) fully recovered. In comparison, 4 cases (2 bumblefoot, 1 eye, 1 periorbital region) could not provide post-treatment information as the owners did not attend follow-up visits and could not be reached.

Table 4. The treatment and results of the closed fracture cases (n)

	Result					
Treatment option	**Healed**	**Non-healed[a]**	**Amputated**	**Died**	**Unknown**	**Total**
Bandage	7(in three weeks)	1	1	4	9	22
Bandage and physiotherapy	6 (in five weeks)	-	-	1	-	7
Operated on	1	1	-	3	-	5
Refuse treatment	-	-	-	-	-	3
Total	14	2	1	8	9	

[a]: inability to use.

Table 5. Luxation cases by affected region and treatment results [n, (%)]

	Luxation, (1.6%[a])	
	Coracoid joint, n (%)	**Intertarsal joint, n (%)**
	1 (50%)[b]	1 (50%)[b]
Outcomes	The case expired one week post-surgery due to poor general condition	unknown; the owner could not be reached

[a:] Represents the percentage share in all diseases, [b:] Represents the percentage share among the cases diagnosed as luxation.

Table 6. Infections by anatomical location

Infection	**Eye**	**Periorbital**	**Footpad**	**Phalanx**	**Sinus**	**Mandible**	**Oral cavity**
(10.4%)[a]	2 (15%)[b]	2 (15%)[b]	3 (23%)[b]	3 (23%)[b]	1 (7%)[b]	1 (7%)[b]	1 (7%)[b]

[a:] Represents the percentage share among all diseases involved in the study, [b:] Represents the percentage share among cases diagnosed with an infection.

Infection cases

In the 13 cases diagnosed with an infection, the anatomical regions affected and treatment outcomes are summarized in Table 6. Deformation, pain, swelling, and additional symptoms were observed in all cases. Pathogen isolation and antibiogram analyses were conducted in only two cases. *Staphylococcus aureus* was identified in one case (oral cavity infection), and treatment with

Soft Tissue Injury Cases

Soft tissue injuries were diagnosed in the extremities in 11 cases (Table 7). Three cases were advised to rest only, and all cases recovered after 10 days. The outcome of the one case advised bandage and rest could not be obtained due to loss of follow-up. In 7 cases, medical

Figure 1. Sinusitis in the infraorbital sinus of a budgerigar and its treatment process. a) Clinical appearance, b) Clinical appearance of infraorbital sinuses (white arrows), c) Puncture procedure, d) The fluid aspirated, e) Patient's healthy appearance after treatment (right infraorbital sinus), f) Patient's healthy appearance after treatment (left infraorbital sinus).

treatment (local; analgesics, muscle relaxants) and rest were recommended. Two cases of these 7 cases fully recovered after 10 days, one case resulted in death, three cases did not show satisfactory healing and were advised warm antiseptic compress and massage, while information regarding one case could not be obtained. Among the 3 cases recommended warm antiseptic compress and massage, 1 case fully recovered after 2 weeks, 1 case died, and the remaining case was lost to follow-up.

anatomical regions and presented in Table 9. Deep tissue involvement was observed in 13 cases, while superficial tissue was affected in 9 cases. Limb loss was observed in four cases, and a noticeable infection on the wound was detected in one case. Wound management involved mechanical cleansing, debridement with antiseptics [etakridine lactate (Rivanol®, Istanbul Pharmaceuticals, İstanbul, Türkiye)], antibiotic prescriptions, and suturing in some cases. Wet dressings with antiseptics [etakridine

Table 7. Distribution of detected soft tissue injury by anatomical regions

Soft tissue lesions	Front limb	Hind limb
(8.8%)[a]	2 (18%)[b]	9 (82%)[b]

[a:] Represents the percentage share among all diseases involved in the study, [b:] Represents the percentage share among cases diagnosed with soft tissue lesions.

Table 8. Mass distribution by anatomical regions

Mass (Tumor/cyst)	Cranium	Thorax	Abdomen	Tail	Front limb	Hind limb	Phalanx	Both extremities
(9.6%)[a]	2 (16.6%)[b]	1 (8.3%)[b]	2 (16.6%)[b]	1 (8.3%)[b]	3 (25%)[b]	1 (8.3%)[b]	1 (8.3%)[b]	1 (8.3%)

[a:] Represents the percentage share among all diseases involved in the study, [b:] Represents the percentage share among cases diagnosed with mass.

Table 9. Wound distribution by anatomical regions

Wound	Cranium	Craw/ Grizzard	Thorax	Foot sole	Phalanx	Hind limb	Front limb	Cervical and thoracal
(17.6%)[a]	2 (9%)[b]	1 (4.5%)[b]	1 (4.5%)[b]	1 (4.5%)[b]	3 (13.6%)[b]	4 (18.1%)[b]	9 (40.9%)[b]	1 (4.5%)

[a:] Represents the percentage share among all diseases involved in the study, [b:] Represents the percentage share among cases diagnosed with wounds.

Mass Cases

Mass diagnoses were recorded in 12 cases involving different anatomical regions and presented in Table 8. Each of the 6 cases received suitable combinations of local and systemic antibiotics, antiseptics, and corticosteroids as part of the medical treatment. Among these 6 cases, 4 resulted in death, and the outcome for 2 cases is unknown. Surgical intervention was recommended for 5 cases, with two cases undergoing immediate surgery and fully recovering, two cases undergoing surgery after medical treatment resulting in one case recovering and the other resulting in death, and the owner of one case refusing treatment. The remaining case did not receive treatment due to poor prognosis.

Wound Cases

A total of 22 cases were diagnosed with wounds in various

lactate (Rivanol®, Istanbul Pharmaceuticals, İstanbul, Türkiye)] were applied in nine cases, including a case with a maggot-infested wound. Dry dressings with antibiotic [enrofloksasin (Baytril®, Bayer, İstanbul, Türkiye)] and were used after 3 days. Healing outcomes varied, with some cases achieving complete healing (9 cases) while others experienced complications (2 cases) or death (9 cases) the remaining (2 cases) was lost to follow-up.

Paralysis Cases

Out of 125 cases, 6 were diagnosed with paralysis and the affected regions are shown in Table 10. Treatment recommendations varied: 3 cases received physical therapy and multivitamin supplementation, and 1 received bandaging, physical therapy, and multivitamin supplementation. Two cases were advised physical therapy and a multivitamin supplementation but could not receive

Table 10. Paralysis distribution by limbs

Paralysis	Hind limb	Front limb	All limbs
(4.8%)[a]	4 (66.6%)[b]	1 (16.6%)[b]	1 (16.6%)[b]

[a:] Represents the percentage share among all diseases involved in the study, [b:] Represents the percentage share among cases diagnosed with paralysis.

Table 11. Distribution of other diagnosed diseases by affected anatomical regions

Other diseases (4.8%)[a]	Eye	Air sac	Cloaca	Cranium	Beak
Atrophy	1 (16.6%)[b]	-	-	-	-
Rupture	-	2 (33.3%)[b]	-	-	-
Prolapse	-	-	1 (16.6%)[b]	-	-
Trauma	-	-	-	1 (16.6%)[b]	-
Deformity	-	-	-	-	1 (16.6%)[b]

[a:] Represents the percentage share among all diseases involved in the study, [b:] Represents the percentage share among cases diagnosed with other diseases.

physical therapy due to the owner's inability to check in due to distance. Among those, who received physical therapy and multivitamin supplementation, one case underwent a 15-day treatment and fully recovered. Another case received 10 days of treatment but experienced progressive necrosis, resulting in amputation. A custom 3D-printed prosthesis was offered but declined by the patient owner. The other treated case died on the fifth day. In one case, which involved physical therapy, multivitamin supplementation, and supported bandaging, the case received treatment for three days before being discharged. This case died during the follow-up period on the fifth day. The outcomes could not be obtained for two cases due to unreachable owners.

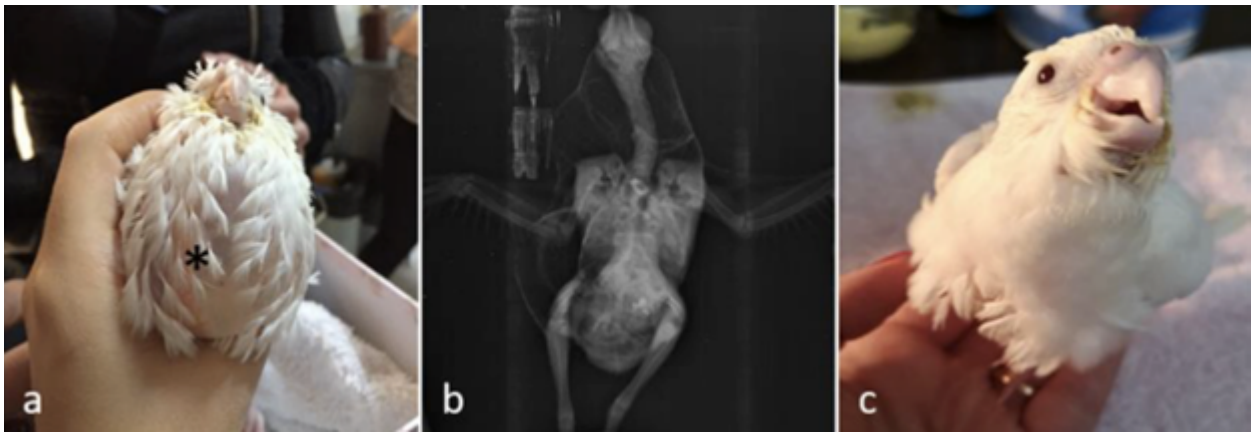

Figure 2. Air sac rupture in a cockatiel. a) Clinical appearance (*: Translucent appearance on skin due to swelling and tension), b) Ventrodorsal X-ray image, c) Healthy appearance of the patient after treatment.

Other Disease Cases

The 6 cases, consisting of 1 case of eye atrophy, 2 cases of air sac rupture (Figure 2), 1 case of cloacal prolapse, 1 case of head trauma, and 1 case of beak deformity, were not classified under the aforementioned categories. The affected regions and percentages are presented in Table 11. The case of eye atrophy showed no visual function in the affected eye, and no other clinical findings were observed. Suggestions, such as using artificial tears and administering antibiotic eye drops if needed, were provided. For cases of air sac rupture, the accumulated air under the skin was evacuated externally using a sterile angiocath for three consecutive days. Both cases exhibited complete recovery by the end of the third day. Surgery was recommended for the case of cloacal prolapse, and a reduction procedure was performed, followed by suturing the cloaca. The case fully recovered and exhibited normal defecation 10 days after the surgery. The case with head trauma received shock therapy and was under clinic supervision but died on the first day. In the case of beak deformity, the excessively elongated areas of the beak were trimmed and rasped, resulting in improved food consumption.

Discussion

It is a well-known fact that the preference for avians as pets, similar to cats and dogs, has been increasing (Rosskopf and Woerpel, 1996). Some birds, especially those that can easily adapt to domestic life, attract more attention as pets due to their colors, behaviors, and long lifespans, similar to parrots. However, it is also known that wild birds play a significant role in maintaining natural balance and ensuring their healthy continuity (Kibar and

Bumin, 2006; Aslan et al., 2009). In the study conducted at Aydın Adnan Menderes University Faculty of Veterinary Medicine (Sarıerler and Kılıç, 2003), a total of 48 avians were recorded between 1999 and 2003. In a study conducted by Aslan et al. (2009) in the Van province of Türkiye and its surroundings, wild avians with wounds or fractures were identified over 2 years, and a total of 26 wild avians were recorded. Another study conducted in Aydın (Akın et al., 2015) recorded a total of 120 avians over 13 years. These studies observed that the number of domestic avians was higher than wild avians. This may be attributed to the continuous cohabitation of domestic avians with humans. The higher number of domestic avians brought to the clinic than wild avians reflects a similar trend.

Many avian species, especially some species belonging to the *Psittaciformes* order are known to be monomorphic; therefore, determining the gender of these birds is quite challenging (Helmer et al., 2005; Cerit and Avanus, 2007). In a study reported over a span of twelve years, which included a total of 7.553 cases (Molina-Lopez et al., 2013), it was noted that 59.4% of the cases (3.695 cases) had unknown gender, 21.9% were female (1.363 cases), and 18.7% were male (1.163 cases). In the current study, 34 cases were identified as male, 18 as female, and the gender of 74 birds could not be determined. The gender of the cases with known genders was recorded based on information provided by the owners.

The surgical diseases can affect birds as they can other animals. These diseases can be classified as orthopedic and other conditions (soft tissue disorders, eye diseases, etc.). It is believed that avians are more sensitive compared to other animals, which makes the treatment process quite challenging. The increase in the number of wild and domestic avians brought to our clinic in the Aydın province of Türkiye and its surroundings can be considered one of the reasons examined in this study. During the literature review conducted for the presented study, it was observed that there is a greater amount of information available regarding fracture cases (Kibar and Bumin, 2006; Aslan et al., 2009; Korkmaz et al., 2014; Akın et al., 2015), while relatively less literature is available for other cases. This observation, consistent with the findings of the presented study, emphasizes the predominance of fracture cases in avian species. Therefore, there is a need for further research on other surgical diseases in avian species in addition to fractures in avian species.

Avian species can vary in their herbivorous, carnivorous, and aquatic nature depending on the geographical region, and they possess various anatomical and physiological characteristics. Therefore, it is believed that determining which avian species are more prevalent in specific regions and specializing in the unique requirements of each species are crucial aspects.

Wild avians, particularly migratory species, prefer wetland areas for hunting and feeding purposes. The presence of seas and lakes in the Aydın province and its surroundings forms crucial habitats for these animals. Climate changes and the resulting variations in temperature and humidity also play significant roles in the lives of wild avians. These differences can substantially impact avian populations. Since the normal body temperature of avians generally ranges between 40-44°C, sudden drops in body temperature can be fatal (Tully et al., 2000).

When analyzed regarding fracture locations, tibiotarsal fractures were most commonly observed in domestic avians, while antebrachial fractures were more prevalent in wild avians. This could be related to domestic avians using their forelimbs less frequently and relying more on their hind limbs (spending more time in cages, while wild animals spend longer periods in flight, etc.). On the other hand, the increased flight behavior of wild avians and their higher exposure to firearms may contribute to a higher occurrence of fractures in their forelimbs.

The case's overall condition was examined, and it was found that domestic avians had better conditions in closed fractures. In open fractures, however, the exposure of the fractured bones to the external environment and the increased risk of infection can reduce the probability of healing. The prognosis of orthopedic surgeries in wild birds can vary depending on factors such as the time of presentation to the clinic, the type of fracture (open or closed), and the general condition of the bird (Punch, 2001; Buttle, 2004; Kibar and Bumin, 2006). In the presented study, the majority of the wild cases exhibited a consistently poor general condition, which was thought to have a negative impact on the prognosis.

Conclusion

As a result, it was determined that there is a diversity of surgical diseases in avians and different species have specific treatment requirements. It has been concluded that classical treatment methods in the literature may not yield the desired results in some cases and species-specific studies can provide significant contributions. In treating surgical cases in avians, the characteristics of the species and their diseases should be considered. Further scientific research is needed to treat of surgical diseases in these animals. In future studies, it should be noted that species-specific approaches may be necessary, and the reporting of these characteristics should be emphasized. This can help find more effective solutions to health issues in avians.

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Conflict of interest

None of the authors has any financial or personal relationships that could inappropriately influence or bias the

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References

Akın, İ., Yaygıngül, R., Derincegöz, O.Ö., Tatlı, Z.B., Şen, Z.B., Bellek, C.G., Bulut, O., Sarıerler, M., Belge, A., & Kılıç, N. (2015). Adnan Menderes *Üniversitesi* Veteriner Fakültesi Cerrahi Kliniğine getirilen kanatlı hayvanların değerlendirilmesi: 120 olgu (2000-2013). *Animal Health Production and Hygiene,* 4(1), 355-358.

Aslan, L., Özdemir, A., Karasu, A., Özkan, C., Gençcelep, M., Durmuş, A., & Akgül, Y. (2009). Van Gölü Havzasında 2006-2008 yılları arasında yabani kuşlarda yaralanma ve kırık olgularının tedavileri. *Yüzüncü Yıl Üniversitesi Veteriner Fakültesi Dergisi,* 20(2), 7-12.

Buttle, E.P. (2004). Concomitant leg injuries in raptors with wing damage. *Journal of the South African Veterinary Association,* 75(4), 154. https://doi.org/10.4102/jsava.v75i4.473

Cerit, H., & Avanus, K. (2007). Sex identification in avian species using DNA typing methods. *World's Poultry Science Journal*, 63(1), 91-99. https://doi.org/10.1017/S0043933907001316

Helmer, P., & Whiteside, D.P. (2005). Clinical Anatomy and Physiology of Exotic Species. In B. O'Malley, (Eds.), *Avian anatomy and physiology* (pp. 97-161). W.B. Saunders.

Kibar, M., & Bumin, A. (2006). Yırtıcı kuşlarda ateşli silah yaralanması sonucu oluşan kırıkların değerlendirilmesi: 85 olgu (1998-2005). *Kafkas Üniversitesi Veteriner Fakültesi Dergisi*, 12(1), 11-16.

Korkmaz, M., Yaprakçı, M.V., Pamuk, K., Demirkan, İ. & Sarıtaş, Z.K. (2014). Pelikanlarda (*Pelecanus onocrotalus*) ateşli silah yaralanması sonucu oluşan kırıkların değerlendirilmesi. *Van Veterinary Journal*, 25(2), 37-40.

Molina-Lopez, R.A., Casal, J., & Darwich, L. (2013). Final disposition and quality auditing of the rehabilitation process in wild raptors admitted to a wildlife rehabilitation centre in Catalonia, Spain, during a twelve year period (1995–2007). *PLoS One*, 8(4), e60242. https://doi.org/10.1371/journal.pone.0060242

Punch, P. (2001). A retrospective study of the success of medical and surgical treatment of wild Australian raptors. *Australian Veterinary Journal,* 79(11), 747-752. https://doi.org/10.1111/j.1751-0813.2002.tb11035.x

Rosskopf, W.J., & Woerpel, R.W. (Eds.). (1996). *Diseases of Cage and Aviary Birds.* Williams & Wilkins.

Sarıerler, M., & Kılıç, N. (2003). Adnan Menderes *Üniversitesi* Veteriner Fakültesi Cerrahi Kliniğine getirilen hastalara toplu bir bakış (1999-2003). *Uludağ Üniversitesi Veteriner Fakültesi Dergisi*, 22(1-2-3), 75-79.

Shivaprasad, H.L. (2002, April). *Pathology of birds-an overview.* In *CL Davis Foundation Conference on Gross Morbid Anatomy of Animals, AFIP, Washington DC, USA.* (pp. 1-57).

Tully, T.N., Lawton, M.P.C., & Dorrestein, G.M. (Eds.). (2000). *Handbook of Avian Medicine.* Butterworth-Heinemann. https://doi.org/10.1016/b978-0-7506-3598-1.x5001-2