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Exophthalmus in a Calf Naturally Infected with *Theileria annulata*

Theileria annulata ile Doğal Enfekte Bir Buzağıda Ekzoftalmus

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ABSTRACT

Tropical theileriosis is a hemoprotozoan disease caused by *Theileria annulata* (*T. annulata*) transmitted to cattle by ticks of the genus Hyalomma. Purpose of this case report is to describe the exophthalmus findings observed in a calf that had a *T. annulata* infection. A 2 month old male calf was brought to Bingöl Veterinary Teaching Hospital Ruminant Clinic and had an anamnesis of 5 days of loss of appetite, weakness, vision loss that occurred 1 day ago, and two days before admission to the hospital, the right eyes protruded from the exophthalmus and had difficulty breathing. Clinical examination, the patient's signs showed exophthalmus in the right eye and edema in the left, a respiratory rate of 96 breaths/min, a heart rate of 128 beats/min, a body temperature of 41.6°C, lacrimation, icterus, and petechiae on the conjunctiva, oral mucosa, and skin. In addition, pyoplasmic agents were detected in erythrocytes of *T. annulata* by light microscopic examination of smear frotin prepared from peripheral blood. It was concluded that exophthalmus and edema findings should be taken into consideration in the differential diagnosis and treatment of *T. annulata* infection.

Keywords: Calf, Exophthalmus, *Theileria annulata*

ÖZ

Tropikal theileriosis, Hyalomma cinsi keneler tarafından sığırlara nakledilen *Theileria annulata*'nın (*T. annulata*) neden olduğu hemoprotozoan bir hastalıktır. Vaka raporunda *T. annulata* ile enfekte bir buzağı görülen ekzoftalmus bulgusunun sunulması amaçlanmıştır. Bingöl Veteriner Eğitim Hastanesi Ruminant Kliniği'ne getirilen 2 aylık, erkek buzağının 5 gündür devam eden iştahsızlık, halsizlik, 1 gün önce oluşan görme kaybı ve hastaneye başvurmadan iki gün önce sağ gözde ekzoftalmus şekillendiği, solunum güçlüğü yaşadığı bilgisi şeklinde anamnez alındı. Klinik muayenede solunum frekansı 96 solunum/dk, kalp frekansının 128 vurum/dk, vücut sıcaklığının 41.6 °C, sağ gözde ekzoftalmus, sol gözde ödem, göz yaşı akıntısı, ikterus, konjuktiva, ağız mukozası ve deri üzerinde peteşiler tespit edildi. Ayrıca periferal kandan hazırlanan yayma frotinin ışık mikroskobunda incelenmesiyle *T. annulata*'ya ait eritrositler içerisinde piroplazm formdaki etkenler tespit edildi. *T. annulata* enfeksiyonunun ayırıcı tanı ve tedavisinde ekzoftalmus ve ödem bulgularının dikkate alınması gerektiği sonucuna varıldı.

Anahtar Kelimeler: Buzağı, Ekzoftalmus, *Theileria annulata*

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INTRODUCTION

Tropical theileriosis is a hemoprotozoan disease caused by *Theileria annulata* (*T. annulata*) transmitted to cattle by ticks of the genus Hyalomma with high mortality and morbidity.[1,2,3] An estimated 250 million cattle in tropical and subtropical regions such as Turkiye, Southern Europe, North Africa, China, India, Central and East Asia are at risk and the disease causes high economic losses.[3,4]

T. annulata may be transmitted intrauterinally, mechanically, and spontaneously (biologically).[5] The life cycle of the agent consists of two stages one in the tick and one in the host.[1] According to one account, it multiplies by infecting lymph nodes, lymphoid cells, macrophages, and erythrocytes after being transmitted from the tick to the host.[2] The quantity of sporozoites secreted by the salivary gland, the host's immune system, and immunization all have a major impact on the disease's severity.[6,7] When cattle contract *T. annulata*, common clinical signs include fever, mild eye and nasal discharge, appetite loss, increased salivation, enlargement of superficial lymph nodes, dyspnea, and, in later stages, anemia, icterus, and petechial hemorrhages on the surface of the conjunctiva or the skin.[1,8,9] The disease can be diagnosed by microscopic examination of pyroplasma and macroschizonts in Giemsa stained blood or lymph node smears, indirect immunofluorescent antibody testing (IFAT) and polymerase chain reaction (PCR) methods.[4]

Even though the literature research stated that exophthalmus can be observed from ocular lesions in animals infected with *T. annulata*[10], it was discovered that there is little information available on this topic and that it was only observed in one case, which was reported by Kumar et al.[11] Furthermore, this is the first instance of *T. annulata* infection in a calf that has occurred naturally in Turkiye. Consequently, the purpose of this case report is to describe the exophthalmus findings observed in a calf that had a *T. annulata* infection.

CASE PRESENTATION

A 2 month old male calf was brought to the Bingöl Veterinary Teaching Hospital Ruminant Clinic and had an anamnesis of 5 days of loss of appetite, weakness, vision loss that occurred 1 day ago, and two days before admission to the hospital, the eyes protruded from the orbital pit and had difficulty breathing. Following the physical examination, 5 mL of blood was collected into a gel serum tube devoid of anticoagulant for biochemical analysis, and 2 mL of blood was drawn from the jugular vein into a lithium heparin syringe for blood gas analysis. Using microhematocrit tubes, blood samples were extracted from the outer edge of the ear, and the hematocrit (HCT) value was ascertained following a 5 minute centrifugation at 5000 rpm. A drop of blood from the peripheral end of the ear was used to create a thin blood smear. The smears were allowed to air dry, fixed for five minutes with methyl alcohol, and then stained for thirty minutes using a 10% Giemsa solution. Upon staining, the smears were dried, rinsed with tap water, and then magnified 100 times using immersion oil to view the intraerythrocytic form of *T. annulata*. This protozoan was identified by scanning at least fifty different locations. Using a blood gas analyzer (Wondfo BGA 101, China), the concentrations of pH, bicarbonate (HCO_3^-), sodium (Na^+), potassium (K^+), chloride (Cl^-), calcium (Ca^+), glucose, and lactate were measured.

Clinical examination, the patient's signs showed exophthalmus in the right eye and edema in the left, a respiratory rate of 96 breaths/min, a heart rate 128 beats/min, a body temperature of 41.6 °C, tear discharge, icterus, and petechiae on the conjunctiva, oral mucosa, and skin (Figure 1-2). Furthermore, pyroplasmic agents were found in *T. annulata* erythrocytes during light microscopic analysis of the smear (Figure 3).

Figure 1. Calf infected with *Theileria annulata*
A: Exophthalmus in the right eye, **B:** Edema in the left eye

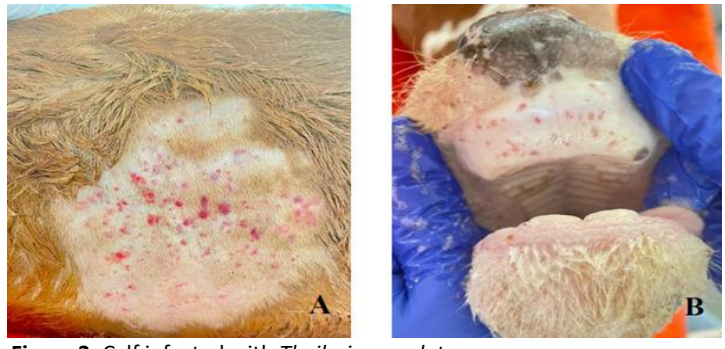

Figure 2. Calf infected with *Theileria annulata*
A: Petechial hemorrhages at different points of the skin
B: Petechial hemorrhages in the oral mucosa

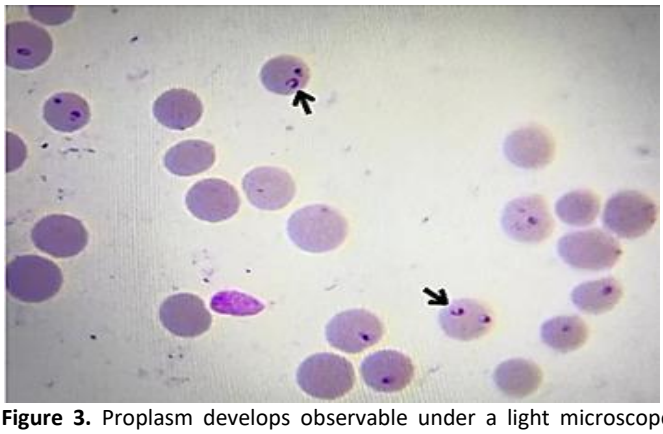

Figure 3. Proplasm develops observable under a light microscope in *Theileria annulata* erythrocytes. **Black arrow:** Piroplasm form of *Theileria annulata*

In comparison to reference values, drops in pH, HCO_3^-, Na^+, Ca^+ and glucose concentrations as well as increases in K^+ and lactate concentrations were found in blood gas analysis. Table 1 shows the findings of the blood gas analysis.[12-15] After diagnosis, the owner assessed the cost of treatment and the chances of success and decided to euthanize the patient.

Table 1. Blood gas analysis result of calf infected with *Theileria annulata*

Parameters	Result	Reference Ranges
pH (mm/Hg)	7.13 **(L)**	7.35-7.50[12]
HCO_3^- (mmol/L)	8.2 **(L)**	20-30[12]
Na^+ (mmol/L)	133 **(L)**	136–144[13]
K^+ (mmol/L)	7 **(H)**	3.6–4.9[13]
Cl^- (mmol/L)	103	99–107[13]
Ca^+ (mmol/L)	1.06 **(L)**	2.0–2.8[13]
Glucose (mmol/L	1.1 **(L)**	2.2-5.6[13]
L-Lactate (mmol/L)	8.52 **(H)**	2.0[14]
HCT (%)	17 **(L)**	24-46[15]

HCO_3^-: Bicarbonate, Na+: Sodium, K^+: Potassium, Cl^-: Chlorine, Ca^+: Calcium, L; Low, H; High

DISCUSSION

T. annulata is an important hemoprotozoan disease affecting cattle with various clinical signs.[16] Common clinical manifestations include icterus, anemia, enlarged superficial lymph nodes, loss of appetite, and elevated body temperature.[8,9] This case report, however, reports the unusual discovery of exophthalmus in *T. annulata* infected cattle a condition that has never before been reported in Turkiye.

In blood gas analysis, pH, HCO_3^-, HCT were detected below the reference value reported for cattle and anemia and metabolic acidosis were detected. It is known that metabolic acidosis can be seen in 2 types, secretory and titrational. It is stated that hypoxia will occur due to the decrease in tissue perfusion due to anemia formed in *T. annulata* and that the production of lactic acid and other metabolites acids, which are products of anaerobic metabolism, will increase as a result of severe liver and kidney dysfunction, thus the acidosis caused by the presence of non CO2 acids leading to a decrease in HCO_3^- is of the titrational type.[17] Although the metabolic acidosis detected in this case report is consistent with some studies[2,17,18] evaluating blood gas parameters in *T. annulata*, a case in which metabolic acidosis and anemia were not observed was reported by Ünal and Uztimür.[19] The reason for the variable findings between cases is considered to be the severity of the infection and the differences in the general condition and immune systems of the infected animals.

Although there are limited studies evaluating lactate concentration in cattle infected with *T. annulata*, hyperlactatemia was reported by Uztimür and Keçeci[2] as 9.95 mmol/L and Ünal and Uztimür[19] as 5.61 mmol/L, which is consistent with the results in this case. It has been stated that hyperlactatemia in cattle infected with *T. annulata* may occur as a result of tissue anoxia due to anemia triggering the lactic acid mechanism.[17]

As reported in many studies on *T. annulata*[8,9,19], the clinical examination in this instance revealed the usual signs of respiratory frequency, body temperature rising by 41.6 °C, icterus, conjunctiva, oral mucosa, and skin petechiae. There are many different clinical manifestations of *T. annulata*, and uncommon clinical signs have also been documented. Cattle infected with *T. annulata* may exhibit uncommon clinical signs such as ulcerative hemorrhagic lesions[16], skin nodules[20], ocular edema[16], and epistaxis.[19] This case report describes the clinical observation of exophthalmus, a rare occurrence in previous reports. The exophthalmus associated with the disease was first described by Kumar et al.[11] and may have resulted from increased production of tumor necrosis factor-α and lymphocyte infiltration. Similarly, Sivajothi et al.[21] reported that it was caused by inflammatory cell infiltration and glycosaminoglycan accumulation in the cells, which led to the expansion of the extraocular muscles. Lastly, Sudan et al.[22] reported a case of proptosis, wherein *T. annulata* may have entered the cerebral circulation through the uteroplacental route and that increased vascular permeability negatively impacted vascular nutrition to the orbits. It is possible that these mechanisms may contribute to the observed case, even if the pathophysiology of exophthalmus in *T. annulata* is uncertain.

In this case report, rare findings of exophthalmus and edema in *T. annulata* were demonstrated. It was concluded that exophthalmus and edema findings should be taken into consideration in the differential diagnosis and treatment of *T. annulata* infection and that these findings should be better understood with further research.

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A Bilateral Congenital Scrotal Hernia in an Akkaraman Breed Lamb: A Diagnostic Approach and Surgical Management

Akkaraman Irkı Bir Kuzuda Bilateral Konjenital Skotal Herni: Tanısal Değerlendirme ve Cerrahi Yönetim

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ABSTRACT

This case report aimed to evaluate the clinical course of an Akkaraman lamb with a bilateral congenital scrotal hernia, especially in terms of diagnostic approach and surgical treatment process. Clinical, radiological, and ultrasonographic examinations made diagnosis and hematological parameters were additionally examined. In this particular case, trans-scrotal ultrasonography demonstrated a reduction in blood flow to the herniated intestinal segments. Hematological analyses revealed hyperlactatemia, leukopenia, and decreased MCHC levels. During the operation, it was determined that the herniated organ was the small intestine; it was observed that both testicles were atrophic, and the left inguinal ring expanded in the craniolateral direction, forming an opening of approximately 15 cm. Bilateral orchiectomy, herniorrhaphy, and scrotal ablation procedures were performed operatively. The lamb was discharged in good health on the 10th postoperative day. As a result of the literature review, it was seen that this was the first case of bilateral congenital scrotal hernia reported in a lamb and the Akkaraman sheep breed. Furthermore, hematological tests are believed to possess diagnostic and prognostic value in such cases.

Keywords: Akkaraman, Herniorrhaphy, Lamb, Orchiectomy, Scrotal hernia

ÖZ

Bu olgu sunumunda, bilateral konjenital skrotal herni'ye sahip bir Akkaraman kuzusunun klinik seyrini, özellikle tanısal yaklaşım ve cerrahi tedavi süreci açısından, değerlendirmek amaçlamıştır. Tanı; klinik, radyolojik ve ultrasonografik muayeneler yoluyla konulmuş ve ek olarak hematolojik parametreler incelenmiştir. Bu vakaya özgü olarak transskrotal ultrasonografide, fıtıklaşmış bağırsak segmentlerinin kan akımında azalma saptanmıştır. Hematolojik analizlerde ise hiperlaktatemi, lökopeni ve MCHC düzeyinde düşüş tespit edilmiştir. Operasyon sırasında fıtıklaşan organın ince bağırsaklar olduğu belirlenmiş; her iki testisin atrofik geliştiği ve sol inguinal kanal girişinin kraniolateral yönde genişleyerek yaklaşık 15 cm'lik bir açıklık oluşturduğu gözlenmiştir. Operatif olarak bilateral orşiektomi, herniorafi ve skrotal ablasyon işlemleri uygulanmıştır. Kuzu, postoperatif 10. günde sağlıklı bir şekilde taburcu edilmiştir. Yapılan literatür taramaları neticesinde, bu olgunun bir kuzuda ve Akkaraman koyun ırkında bildirilen ilk bilateral konjenital skrotal herni vakası olduğu görülmüştür. Ayrıca, hematolojik testlerin bu tür vakalarda tanısal ve prognostik önem taşıdığı düşünülmektedir.

Anahtar Kelimeler: Akkaraman, Herniorafi, Kuzu, Orşiektomi, Skrotal herni

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INTRODUCTION

A scrotal hernia is when abdominal organs, typically the small intestines and omentum, herniate into the scrotum through the enlarged inguinal ring.[1] In the field of veterinary literature, there have been reports of scrotal hernia in rams and lambs of various breeds, including Oudah, Balami, German Merino, Dumba, and several local breeds.[2-6] A diagnosis can typically be made relatively easily through a clinical examination. Furthermore, radiography and ultrasonography are valuable diagnostic tools employed in differential diagnosis.[3,7] Treatment is surgical, and herniorrhaphy is the most common procedure used for this purpose. This procedure can be combined with orchiectomy, depending on the case and wishes of the patient owner.[1]

This report presents the first case of a bilateral congenital scrotal hernia in a lamb. Additionally, it is the first case of this condition ever described in an Akkaraman breed.

CASE PRESENTATION

A 12-day-old Akkaraman lamb was presented to the Selcuk University Faculty of Veterinary Medicine Surgery Clinic with a complaint of congenitally abnormal size of the scrotum. At first glance, the lamb's general condition appeared normal, but its scrotum, which sagged to the level of the tarsal joints (Figure 1), and considerably expanded in volume, was striking. No pathological findings were identified during the general examination other than mild pain (teeth grinding). He had a sucking reflex, and his reaction to the environment was normal. During the examination, both hernia passages were palpable, and it was surmised that the herniated structures might be intestines due to their consistency. Additionally, it was felt that the left hernia passage was more expansive than the right one.

Figure 1. Appearance of enlarged scrotum extending to the level of the tarsal joint.

The radiographs revealed the presence of intestinal segments containing gas (Figure 2).

Figure 2. Radiographic view of gas-filled bowel segments herniated into the scrotum.

In the trans-scrotal ultrasonographic examination, the hernia holes, herniated bowel segments (Figure 3), and atrophic testicles (Figure 4) were identified. It was also observed that the blood flow in the herniated intestinal segments was relatively reduced. It is known that there is a risk of ischemia or hypoperfusion in cases of scrotal hernia.[8]

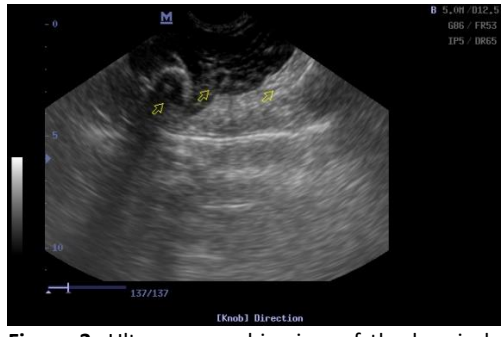

Figure 3. Ultrasonographic view of the hernia hole, herniated bowel segments and scrotum skin, respectively (yellow arrows from left to right).

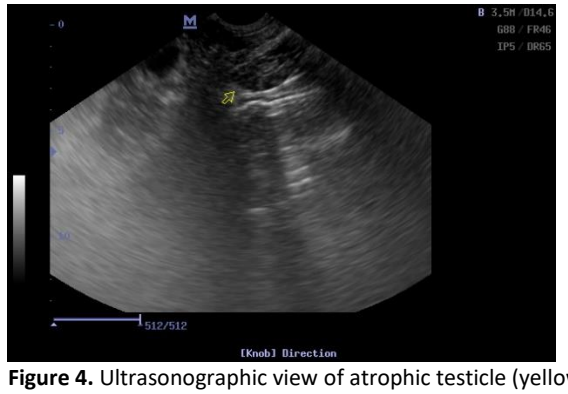

Figure 4. Ultrasonographic view of atrophic testicle (yellow arrow).

In the presented case, to determine these complications and the hematological changes that may occur due to them a venous blood sample (5-6 mL) was obtained via jugular vein puncture under aseptic conditions. Complete Blood Count (CBC), venous blood gas and electrolyte levels were

measured within the scope of laboratory analysis. As a result of CBC, it was determined that total WBC (2.59 m/mm^3), and MCHC (28.1 g/dL) levels were lower, and PLT (947 m/mm^3) levels were higher than the reference values. Blood gas and electrolyte analysis revealed a low pH (7.276), high paCO2 (49.7 mmHg), low paO2 (26.8 mmHg), and hyperlactatemia (3.3 mmol/L), indicating mild respiratory acidosis.

After a clinical examination, the patient was administered sedation via an intravenous injection of Diazepam (Diazem, 10 mg/2 mL, DEVA Holding Inc., Istanbul, Türkiye) at a dose of 0.2 mg/kg. The induction was performed with the administration of Ketamine (Ketasol 10%, 100 mg/mL, Interhas, Ankara, Türkiye) via intravenous injection at a dose of 2 mg/kg, and the patient was intubated using a size 4 polyvinyl chloride endotracheal tube and connected to the anesthesia device. The surgical procedure was performed under inhalation anesthesia using Isoflurane (100 mL Liquid, Forane®, Aesica Queenborough Ltd., UK). The initial concentration was set at 3%, subsequently reduced to 1.5%. In addition, 10 mL of lidocaine (Adokain, 50 mL, Sanovel, Istanbul, Türkiye) was administered via local infiltration anesthesia at the base of the scrotum.

The surgical site was prepared in accordance with the standard operating procedures. Following the incision of the skin and tunica dartos, the tunica vaginalis was accessed through blunt dissection. By incising the tunica vaginalis, the herniated intestines and atrophic testicles were exposed (Figure 5).

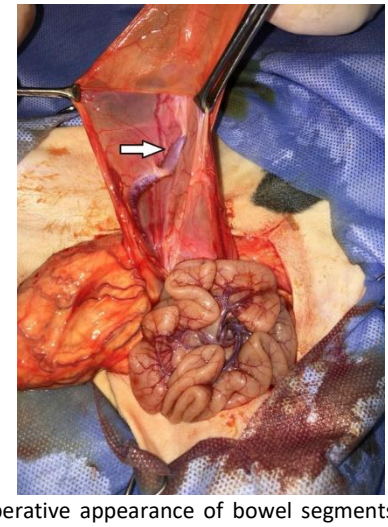

Figure 5. Intraoperative appearance of bowel segments and atrophic testicle (white arrow).

During the examination, the intestines were observed to have a normal structure. In contrast to the right side, the left hernial orifice expanded, forming an opening measuring approximately 15 cm in the craniolateral direction. Once all the requisite checks had been completed, the herniated intestines were returned to the abdominal cavity, and the atrophic testicles were excised following ligation of the spermatic cords (orchiectomy). Following the excision of the tunica vaginalis from the distal end, the inguinal rings were closed with an interrupted pattern suture (herniorrhaphy) using polyglycolic acid no 0 (Alcasorb, Katsan, Izmir, Türkiye). The excess scrotum was excised (scrotal ablation), and the subcutaneous tissues were sutured in a continuous pattern using polyglycolic acid no 2-0 (Alcasorb, Katsan, Izmir, Türkiye). The skin was then closed with simple interrupted sutures using silk no 0 (Alcasilk, Katsan, İzmir, Türkiye). To prevent potential infection, a 0.75 mL intramuscular benzylpenicillin+dihydrostreptomycin (Reptopen, 50 mL, Ceva, Istanbul, Türkiye) injection was administered once daily for five days. The patient did not develop any complications and was discharged on the 10th postoperative day.

DISCUSSION

A review of the available literature revealed that three distinctive features of this case were identified, differentiating it from previous reports in the field.[2-7, 9-11] Firstly, this is the first case of scrotal hernia observed in the Akkaraman sheep breed. Secondly, the herniation was bilateral. In available case reports it has been reported that scrotal hernia cases occur unilaterally.[2-6, 7-11] The third feature is that it has been demonstrated that scrotal hernia is a congenital condition. In the literature searches, three case reports that were considered congenital were encountered.[6,9,10] Dennis and Leipold[9] reported that two of the 21 lambs with a congenital hernia that they detected during necropsy exhibited scrotal hernia. Details of this study could not be obtained. Parizi[6] reported a case of scrotal hernia in a 5-day-old local breed lamb that was noticed on the 2nd day after birth but did not express an opinion about its etiology. Smith et al.[10] reported the detection of congenital scrotal hernia in three hoggets during research conducted at the slaughterhouse. Nevertheless, given their age, we consider the probability of these cases being congenital hernias to be low.

In the presented case, a notable observation made during the ultrasonographic examination was a reduced perfusion of the herniated bowel segments. At this point,

hematological tests were used. In literature research related to the subject, it has been observed that an increase in lactate levels may be related to hypoperfusion and ischemic hypoxia.[12,13] Furthermore, the number of leukocytes may change in response to microvascular damage in cases of ischemia and reperfusion.[14] Finally, the decrease in MCHC level may be related to the hypooxygenation of organs.[15] In this context, it is suggested that the test results of the presented case (hyperlactatemia, leukopenia, and the decrease in MCHC level) are related to hypoperfusion, reperfusion, and hypooxygenation of peripheral tissues. It is thought that these conditions may be caused by scrotal hernia.

This report evaluated the clinical course of a bilateral congenital scrotal hernia case encountered for the first time in an Akkaraman lamb. The patient was successfully treated with surgical intervention, resulting in a favorable recovery. CBC, blood gas, and electrolyte analyses were essential in the clinical and ultrasonographic examinations. It was concluded that these analyses were necessary to assess the presence or severity of hypoperfusion, as in the case presented.

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Ovarian Cyst in a Dog

Bir Köpekte Ovaryan Kist

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ABSTRACT

Ovarian abnormalities are commonly congenital pathologies in the reproductive organs. This report presented a case of ovarian cyst and agenesis observed in a dog. The case was observed a 4-year-old mixed-breed female dog. This animal had previously given birth and required sterilization. The diagnosis was made during the ovariohysterectomy. The uterus and ovaries were examined after surgery. The uterine horns and the left ovary were normal. However, instead of the ovarian tissue, a cyst was found in the location of the right ovary. This cyst was surrounded by a thin membrane and it was filled with fluid. This structure was considered as congenital. As a result, unilateral ovarian agenesis and cyst had no effect on reproduction.

Keywords: Agenesis, Congenital, Cyst, Female Dog, Ovary.

ÖZ

Ovaryum anomalileri, reprodüktif organlarda yaygın olarak görülen konjenital patolojilerdir. Bu raporda, bir köpekte gözlenen ovaryum kisti ve agenezisi sunuldu. Vaka, 4 yaşında melez bir dişi köpekte görüldü. Bu hayvan, daha önce doğum yapmış ve kısırlaştırılma isteğiyle getirilmiştir. Tanı, ovaryohisterektomi sırasında konuldu. Uterus ve ovaryumlar operasyon sonrası incelendi. Kornu uteriler ile sol ovaryumun normal olduğu görüldü. Ancak, sağ ovaryumun olması gereken yerde bir kist bulundu. Bu kist, ince bir zarla çevriliydi ve içi sıvı doluydu. Bu yapının konjenital olduğu düşünüldü. Sonuç olarak, tek taraflı ovaryum agenezisi ve kistinin üreme üzerinde herhangi bir olumsuz etkisinin olmadığı görüldü.

Anahtar Kelimeler: Agenesis, Konjenital, Kist, Dişi Köpek, Ovaryum.

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INTRODUCTION

Ovarian disorders have been observed in animals. These include anomalies such as agenesis, hypoplasia, cysts, and atypical development. These disorders, which affect the reproductive system, may have a congenital origin. Ovarian agenesis is a rare pathology in cats and dogs. It can develop unilaterally or bilaterally. The absence of an ovary may be accompanied by aplasia or hypoplasia of the fallopian tube and uterine horn. In unilateral cases, the diagnosis may not be made because the contralateral ovary can still function normally. In bilateral cases, the fact that the animal has not reached puberty may be an important clue. This prevents the onset of estrus in the animal and results in sterility. The definitive diagnosis is usually made during laparotomy.[1-5]

Another important condition that can be seen in dogs is ovarian cysts. The most common pathology involves the presence of a cystic mass in the ovary. The cyst may be either follicular or luteal in structure. Luteal cysts typically do not cause obvious symptoms, while follicular cysts often produce estrogen. As a result, estrogen levels increase and nymphomaniac behaviors occur in the animal. These cysts can be unilateral, bilateral, or multiple. Hormonal treatment can be used for cysts. However, the most effective treatment is ovariohysterectomy.[4,6]

In the present case, a fluid-filled cystic ovary was found in a female dog that had previously given birth, during an ovariohysterectomy.

CASE PRESENTATION

In this report, a case of ovarian agenesis and cyst in a dog case was presented. The animal was a 4-year-old mongrel bitch. According to the anamnesis, this dog had previously given birth. Subsequently, it was brought to a private veterinary clinic by its owner for neutering. During the pre-operative examination, the animal's vital parameters were found to be normal, and it was decided to perform an ovariohysterectomy. General anesthesia was induced with intramuscular xylazine (1 mg/kg) and ketamine (10 mg/kg). The incision area was shaved and treated with antiseptics. After that, the abdominal cavity was accessed through the median line. The uterus and ovaries were ligated and removed.

The diagnosis was made after the sterilization surgery. During the post-operative examination, it was observed that the cervix, corpus and uterine horns were of normal structure. However, upon examining the ovaries, it was found that left ovary was normal (Figure 1a), while a cystic structure was present in the bursa ovarica on the other side (Figure 1b). The cyst measured 10 mm size. It was surrounded by a thin membrane and filled with fluid. The fluid was observed to be serous and clear (Figure 1c).

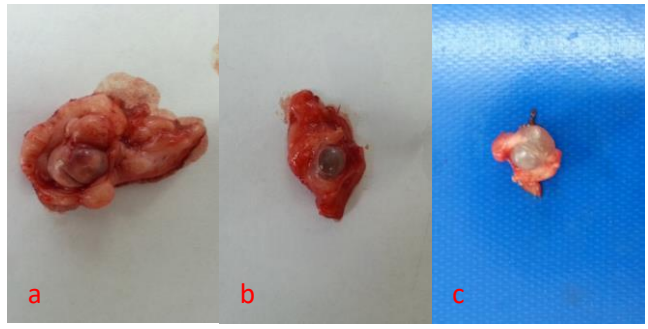

Figure 1. a) Normal ovary located on the left side.
b) Cystic structure on the right side.
c) Appearance of the cyst after clearance of surrounding structures.

DISCUSSION

Ovarian agenesis is a rare condition in dogs and can cause infertility or sterility if it develops bilaterally. In the presented case, a cystic structure was associated with unilateral ovarian agenesis. Despite this, animal's fertility was not affected because the agenesis was unilateral.[2,7-11]

Ovarian cysts are divided into different types: follicular cysts, cysts of subsurface epithelial structures, cystic rete ovarii, lutein cysts and cystic corpora lutea.[2,12] Follicular cysts that produce estrogen lead to hyperestrogenism in animals, causing nymphomaniac behavior. However, animals do not mate even though under the influence of estrogen.[6] Luteal cysts are rarer and secrete progesterone.[2] In the present case, the animal mated and gave birth to pups. Therefore, it is likely that the cyst was inactive and the structure was considered as congenital.

As a result, we concluded that unilateral ovarian agenesis did not cause infertility in this case. Furthermore, the cystic structure was inactive and the animal displayed normal sexual activity. Since this case had both an agenesis and a cystic structure, it was thought that its presentation could be useful.

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Esophageal Perforation and Pericarditis Case Caused by Chicken Scapula Bone in a Puppy

Yavru Bir Köpekte Tavuk Scapula Kemiğinin Neden Olduğu Özefagus Perforasyonu ve Perikarditis Olgusu

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ABSTRACT

Because of their eating habits, dogs often experience foreign bodies in their esophagus. A common diagnostic imaging technique for identifying and excising foreign objects from the stomach, esophagus, and anterior duodenum is endoscopy. Bones and other hard, stinging foreign objects can clog and puncture the esophagus. Serious side effects including pericarditis and pleuritis can arise from a delayed detection of an esophageal perforation. In this case, there was anamnesis of dysphagia shortly after eating chicken meat with bones and subsequent regurgitation of the food. A case of pericarditis with perforation in the esophagus, inflammation in the pleura and thoracic cavity and pericarditis with perforation in the esophagus, perforation in the esophagus and inflammation in the pleura and thoracic cavity in a 45-day-old, 5 kg live weight, male, kangal cross-breed puppy who was admitted to our clinic with clinical symptoms such as cough, lethargy, decreased movement, moaning, anorexia, difficulty in eating and drinking and constant desire to lie down was evaluated.

Keywords: Chicken bone, Dog, Esophageal perforation, Foreign body, Pericarditis

ÖZ

Yemek yeme alışkanlıkları nedeniyle köpeklerde yemek borusunda yabancı cisimlere sıklıkla rastlanılmaktadır. Endoskopi, özefagus, mide ve duedonumun ön kısmındaki yabancı cisimlerin teşhisinde ve uzaklaştırılmasında yaygın olarak kullanılan bir diagnostik görüntüleme yöntemidir. Kemik gibi sert ve batıcı özellikteki yabancı cisimler özefagusta tıkanıklığa ve perforasyona neden olabilmektedir. Özefagus perforasyonunun gecikmiş tanısı pleuritis, perikarditis gibi ciddi komplikasyonlarla sonuçlanabilmektedir. Bu olguda, kemikli tavuk eti yedikten kısa bir süre sonra yutma güçlüğü ve müteakiben verilen gıdayı tekrar geri çıkarmaya çalıştığı anamnez bilgisi mevcuttu. Öksürük, durgunluk, hareketlerde azalma, inleme, iştahsızlık, yemede içmede zorluk ve sürekli yatma isteği gibi klinik belirtilerle kliniğimize başvuran 45 günlük, 5 kg canlı ağırlığında, erkek, kangal melezi yavru bir köpekte özefagusta perforasyon, pleurada ve göğüs boşluğunda yangı ile birlikte perikarditis şekillenmiş bir olgu değerlendirilmiştir.

Anahtar Kelimeler: Köpek, Özefagus perforasyonu, Perikarditis, Tavuk kemiği, Yabancı cisim

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INTRODUCTION

Due to their eating habits, foreign bodies in the esophagus are more common in dogs than in cats.[1] The most common foreign bodies reported in the literature are bone, cartilage, and plastic objects.[1,2] Other foreign bodies frequently swallowed by dogs and cats include many penetrating and non-penetrating objects such as toys, shoe strings, pine cones, fishing rods, needles, thread, balls, pieces of wood, coins, and plastic buckles.[3,4] Hypersalivation, retching, vomiting, regurgitation, anorexia, repeated swallowing attempts, pain, and respiratory distress are common clinical findings after foreign body ingestion. The severity of clinical signs may vary depending on various factors such as the location of the swallowed foreign body (esophagus, stomach or duodenum), its size and the size of the animal, its species (whether it is traumatic for the gastrointestinal mucosa) and the duration of the obstruction.[1,5] In one study, it was reported that 11.7% of foreign bodies in dogs were localized in the esophagus, 83.8% in the stomach and 2.4% in both.[1] Of the foreign bodies in the esophagus, 1.2% were reported to be in the cervical esophagus, 10.5% in the thoracic esophagus and 2.4% in both the thoracic esophagus and stomach. In contrast, another case series reported that 41% of foreign bodies in the esophagus had a cervical localization.[6] Esophageal obstructions can cause necrosis, ulceration and perforation in the esophageal mucosa, which can lead to pneumothorax, pneumomediastinum or pyothorax as a result of prolonged retention of foreign bodies.[1,7]In this case, a case of esophageal rupture and subsequent pericarditis resulting from the ingestion of a foreign body (Os scapula) in a puppy is presented. This case report is expected to contribute to veterinarians' diagnosis of cases complicated by pericarditis that may occur due to foreign body ingestion.

CASE PRESENTATION

A 45-day-old male Kangal crossbred puppy, weighing 5 kg, was presented to the Internal Medicine Clinic of the Faculty of Veterinary Medicine at Erciyes University, exhibiting symptoms of dysphagia, vocalization, and emesis following the ingestion of chicken meat with bones. During the anamnesis, information was gathered from the animal's owner, revealing that the owner procured boned chicken meat, referred to as 'chicken bone for soup,' from a market specializing in offal goods, which he subsequently cooked and fed to his dogs. It was also discovered that one of the puppies experienced trouble swallowing quickly after ingesting the food and subsequently attempted to regurgitate it. Subsequently, he exhibited symptoms like coughing, lethargy, reduced mobility, groaning, anorexia, difficulties in eating and drinking, and a persistent inclination to recline. About 36 hours' post-consumption, the owner sought diagnosis and treatment at our clinic due to the dog's deteriorating condition and lack of improvement.

The patient's general clinical examination revealed a body temperature of 38.8°C, a respiratory rate of 28 breaths per minute, and a pulse rate of 160 beats per minute. Symptoms observed included regurgitation, weakness, groaning, loss of appetite, reluctance to move, excessive salivation, odynophagia, halitosis, and gagging. The oral mucosa appeared normal, with hypersalivation attributed to swallowing difficulties. The conjunctival mucosa was also normal. Dehydration was assessed as moderate (6-8%), and the prescapular lymph nodes were slightly enlarged. A latero-lateral (L/L) radiograph encompassing the neck, thorax, and abdomen was obtained, in addition to the anamnesis and physical examination findings (Figure 1).

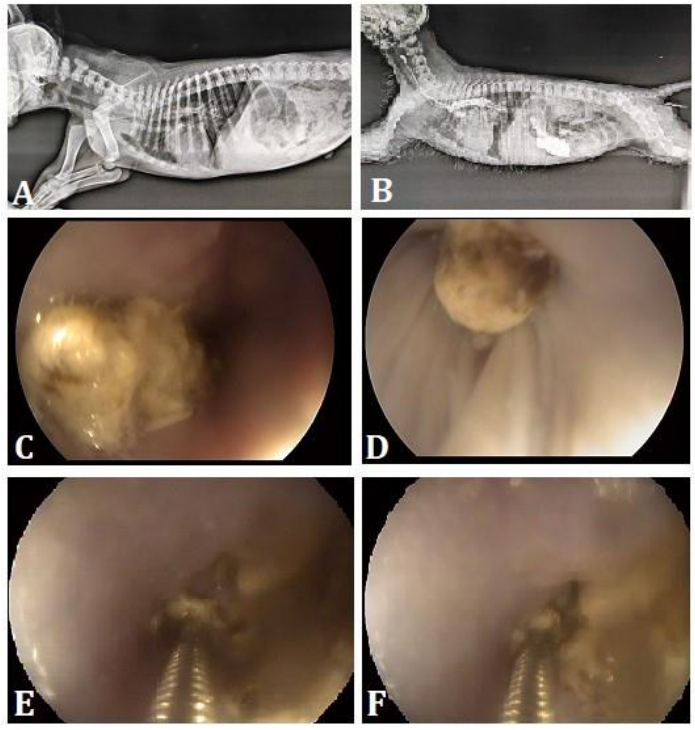

Figure 1. (A) Latero-lateral direct and **(B)** indirect Neck and Thorax radiographs of the dog. **(C)** Endoscopy showing food debris and **(D)** foreign body (chicken meat with bones) in the esophageal lumen, attempt to remove the foreign body with the help of alligator forceps **(E, F).**

The radiograph evaluation revealed a radio-opaque foreign body located in the thoracic esophagus, positioned dorso-caudal to the heart and at the level of the main bronchi, along with fluid accumulation in the lungs. The widest portion of the foreign body was believed to be pressed against the esophageal wall, leading to perforation from penetration and subsequent aspiration of saliva due to hypersalivation. The puppy underwent general anesthesia using a combination of medetomidine (100 µg/kg, IM, Domitor®, Pfizer®, Finland) and ketamine (10 mg/kg, IM, Ketasol 10%, Richter Pharma Ag, Wels, Austria) for endoscopy and foreign body removal. Endoscopic examinations were conducted by an experienced operator and observer. The observer aided the operator in the attempts to grasp and remove the foreign body using forceps. Esophagoscopy commenced following the administration of anesthesia to the patient. The endoscope (EickView HD Video Endoscope 150, Eickemeyer, Germany) was inserted from the oral cavity into the esophagus using a padan. Endoscopy was utilized to assess the esophageal lumen and mucosa. Food residues and fibrous plant materials, including grass, were observed in the cervical esophagus, specifically in its proximal third. The cervical esophageal mucosa was assessed and found to be normal. The thoracic esophagus, comprising the middle two-thirds of the esophagus, was subsequently accessed. The chicken bone was observed lodged and embedded within the esophageal lumen. The chicken bone was subsequently removed using alligator forceps. The removal of the chicken bone was impeded due to its considerable size, compression within the esophagus, and penetration into the esophageal mucosa. The case was referred to the Department of Surgery for surgical intervention. Indirect radiography (BLD-150AJ, AJEX Meditech. Ltd., Korea and Fujifilm Computed Radiography, CR-IR 392, Chine) was conducted using diatrizoate (10 ml, Oral, Urografin® 76% Solution for injection and infusion, Schering AG, Berlin, Germany) to enhance the overall condition and verify the complication of esophageal perforation prior to the surgical procedure. Indirect radiography revealed the aspiration of contrast material from the esophagus into the chest cavity. The surgical intervention was postponed due to pleural effusion in the chest cavity, a prominent and hyperechoic cardiac silhouette, and a deterioration in the general condition. To enhance the patient's overall condition, treatment with penicillin and streptomycin (Reptopen®, Ceva, Türkiye), meloxicam (Maxicam, Ceva, Türkiye), isotonic 0.9% NaCl® (Polifleks, Polifarma, Istanbul), Lactated Ringer (Polifleks, Polifarma, İstanbul, Türkiye), 5% Dextrose (Polifleks, Polifarma, İstanbul, Türkiye), and a vitamin-mineral-amino acid solution (Duphalyte®, Zoetis, Spain) was initiated, and the dog was transferred to the intensive care unit. An emergency operation was deemed necessary approximately 16 hours after the initiation of treatment due to respiratory and cardiac failure. Despite all emergency interventions conducted prior to the operation, the dog succumbed. A thoracostomy was performed for diagnostic and macroscopic examination following the dog's death. Following the thoracostomy, a chicken bone (Os scapula) measuring 3.7 cm in length, 2.5 cm at its widest point, and 0.85 cm at its highest point was identified in the thoracic esophagus at the level of the heart, resulting in partial obstruction. Furthermore, it was established that the esophageal mucosa exhibited perforation, accompanied by the presence of a cloudy fluid within the chest cavity. Pleural effusion, pleuritis, and diffuse pericarditis of the heart were also documented. This case report presents a fluid aspiration and pericarditis resulting from esophageal rupture caused by the ingestion of a foreign body (Os scapula) (Figure 2).

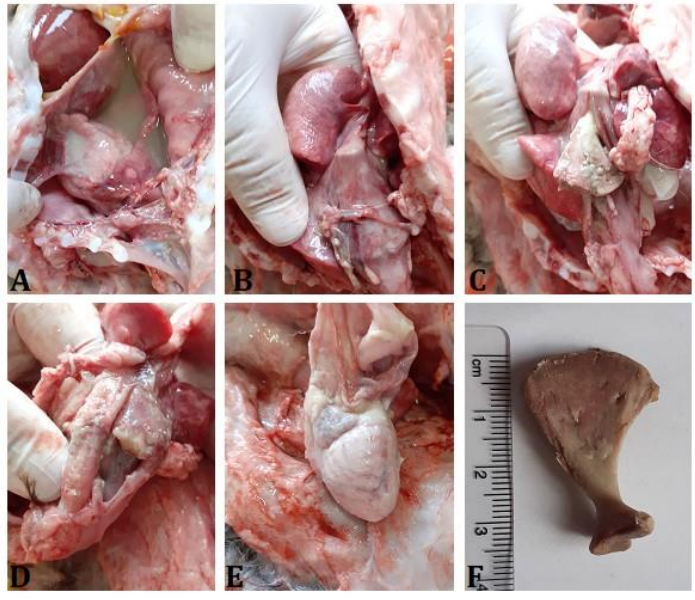

Figure 2. (A) Macroscopic image of fluid accumulation in the chest cavity, **(B)** chicken bone stuck in the esophagus, **(C)** removal of the chicken bone by incision and **(D)** perforation in the esophageal mucosa due to a foreign body (chicken meat with bones), **(E)** Exudate accumulation in the pericardium, **(F)** chicken bone (Os. Scapula, 3.7 cm long, 2.5 cm at its widest point and 0.85 cm at its highest point).

DISCUSSION

Foreign body ingestion is a common condition in pets, both for play purposes and due to improper feeding, and dogs are more likely to apply to clinics with complaints of foreign bodies in the esophagus and stomach than cats.[5] Foreign body ingestion is a condition that affects young dogs more due to their habits of playing with toys and

eating them haphazardly.[8] Foreign bodies detected in the esophagus are most commonly seen in puppies and small breed dogs due to the size of this organ, and obstruction is often detected in areas where the organ is anatomically narrowed (thoracic inlet, heart base and hiatal esophageal region).[7] Digestible esophageal foreign bodies can be pushed into the stomach instead of being removed orally, and possible damage can be minimized. Digestible food materials, such as bone and cartilage, can be processed in the stomach, whereas the expulsion of other foreign bodies is contingent upon their characteristics and dimensions. Due to the complexities associated with direct surgical intervention on the esophagus, it is advisable to utilize direct grasping forceps to retrieve foreign bodies or to push them into the stomach for removal via gastrotomy. This approach aims to minimize the risk of complications and enhance the prognosis.[7,9] Nonetheless, the insertion of foreign bodies into the stomach may not be feasible in all instances. A study indicated that 10.5% of foreign bodies in the esophagus were found in the thoracic esophagus, while 1.2% were located in the cervical esophagus.[1] The present case report identifies the localization of a foreign body, specifically a chicken scapula bone, within the thoracic esophagus. In dogs, the most frequently reported foreign bodies in the esophagus include socks (12.8%), plastic pieces (12.8%), rags (11.6%), bones (8.1%), pine cones (7%), wooden toothpicks (5.8%), needles (2.2%), and fishing rods (2.2%).[1] The success rate for endoscopic removal of gastric foreign bodies ranges from 78% to 94%, whereas for esophageal foreign bodies, it ranges from 68% to 88%.[10] The attempt to endoscopically remove the esophageal foreign body in the present case was unsuccessful. The substantial size of the foreign body (chicken scapula bone) precluded attempts to either extract it or push it into the stomach. The failure of the attempt can be attributed to the narrow esophageal lumen characteristic of a 45-day-old dog. In cases where endoscopic removal or gastric pushing is unsuccessful, surgical intervention is necessary for the extraction of foreign bodies.[9,10] The challenges and risks associated with surgical manipulation, particularly in the thoracic region of the esophagus, diminish the likelihood of intervention in these instances. The prognosis of patients who ingest foreign bodies is significantly worsened by complications that arise as a result of the foreign body.[1,7] One study indicated that complications occurred in 43.4% of cases following foreign body ingestion.[1] Minor complications, including esophageal or gastric mucosal inflammation, occurred in 92.5% of cases, whereas major complications such as bleeding, perforation, and pneumothorax were observed in 7.5% of cases.[1] Maggi et al.[1] documented erosion and ulceration of the esophageal mucosa in 2 out of 3 cases of significant complications following foreign body ingestion, as well as esophageal perforation resulting in pneumothorax and mortality in 1 case. In this case report, significant complications including esophageal perforation, pleuritis, and pericarditis were identified as a result of a chicken bone, leading to the puppy's death shortly thereafter. A comparable instance of esophageal perforation and pericarditis resulting from a chicken sternum bone (right trabecula lateralis and trabecula intermedia) was documented in an 8-month-old, female, 3-kg dog.[11] A case of pericarditis resulting from esophageal rupture due to the ingestion of a chicken bone was reported in a 59-year-old individual.[12] A human case report describes an instance of esophageal perforation that developed 48 hours after onset, resulting in multifactorial shock (septic and cardiogenic) attributed to pericarditis and pericardial and pleural effusion.[13] Prior research indicates that small dogs with extended esophageal obstruction and foreign bodies, including bones and fishing lines, experience poor prognosis and significant complications.[14,15] The esophageal perforation in this case likely resulted from the sharp edge of the bone penetrating or tearing the mucosa during its movement toward the stomach, coinciding with the peristaltic actions of the esophagus. Significant complications associated with penetrating esophageal foreign bodies, specifically bone, have been documented in small dogs, particularly those localized in the thoracic esophagus.[1] In the present case report, efforts to extract the bone using forceps and to advance it into the stomach during endoscopic removal may have worsened the esophageal perforation. Literature indicates that complications may arise from irregular surfaces of foreign bodies, compression, or entrapment in the esophagus.[1,7,14,15] The presence of chicken scapula bone in the thoracic esophagus of dogs is an uncommon phenomenon when assessed from all these perspectives. The occurrence of esophageal perforation due to chicken scapula bone, accompanied by significant comorbidities such as pericarditis, enhances the case's importance. Major complex esophageal foreign masses are hardly encountered in small animal clinics.

In conclusion, current information suggests that a potential solution involves the extraction of massive, rigid, inflexible foreign substances, such as bones, by fragmenting them into smaller pieces within the esophagus lumen. Consequently, augmenting the assortment of endoscopic forceps in Veterinary Hospitals will facilitate intervention in challenging circumstances.

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ATATÜRK ÜNİVERSİTESİ YAYINLARI
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Case Report *Olgu Sunumu* DOI: 10.5281/zenodo.14638149

A Case of Acanthomatous Ameloblastoma in a Anatolian Shepherd (Kangal) Dog

Bir Anadolu Çoban Köpeğinde (Kangal) Akantomatöz Ameloblastoma Olgusu

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ABSTRACT

Canine acanthomatous ameloblastoma (CAA) is a benign but locally invasive tumor originating from odontogenic epithelium and is one of the most common oral neoplasms in dogs. This report presents a case of CAA in a 6-year-old male Anatolian shepherd (Kangal) dog, which exhibited progressive growth in the rostral region of the maxilla, accompanied by symptoms such as bleeding gums and loss of appetite. Following physical examination, radiographic evaluations, and histopathological analyses, a diagnosis of CAA was made, and lesions were excised radically. Postoperatively, the dog was treated with amoxicillin-clavulanic acid, 8.75-25 mg/kg subcutan, 0.12% oral antiseptic spray, 0.04 mg/kg subcutan meloxicam and 1.0 mg/kg per os famotidine. No signs of malignancy were found in the samples taken from around the oral masses. A follow-up examination on the 70th day after surgery showed no metastasis or recurrence. In conclusion, this case report emphasizes that CAA can also be seen in Anatolian shepherd (Kangal) dogs. Additionally, radical surgery is an effective treatment option and excision of soft tissues as well as bone tissue may reduce the risk of midterm recurrence.

Keywords: Maxilla, Odontogenic tumors, Oral, Surgical excision.

ÖZ

Köpeklerde akantomatöz ameloblastoma (CAA), odontojenik epitelden kaynaklanan, iyi huylu ancak lokal olarak invaziv bir tümördür ve köpeklerde en yaygın oral neoplazilerden biridir. Bu rapor, 6 yaşında erkek bir Anadolu çoban köpeğinde (Kangal) görülen CAA vakasını sunmaktadır. Maksillanın rostral bölgesinde ilerleyici büyüme gösteren bu tümör, diş etlerinde kanama ve iştahsızlık gibi semptomlarla birlikte ortaya çıkmıştır. Fiziksel muayene, radyografik değerlendirmeler ve histopatolojik analizler sonrasında CAA tanısı konulmuş ve lezyonlar radikal olarak çıkarılmıştır. Ameliyat sonrası dönemde köpeğe amoksisilin-klavulanik asit (8.75-25 mg/kg subkutan), %0.12'lik oral antiseptik sprey, meloksikam (0.04 mg/kg subkutan) ve famotidin (1.0 mg/kg oral) uygulanmıştır. Oral kitlelerin çevresinden alınan örneklerde malignite bulgusuna rastlanmamıştır. Ameliyattan sonraki 70. gün yapılan takip muayenesinde metastaz veya nüks izlenmemiştir. Sonuç olarak, bu olgu sunumu, CAA'nın Anadolu çoban köpeklerinde (Kangal) görülebileceğini vurgulamaktadır. Ayrıca, radikal cerrahinin etkili bir tedavi seçeneği olduğu ve yumuşak dokuların yanı sıra kemik dokusunun da çıkarılmasının, orta vadede nüks riskini azaltabileceği belirtilmektedir.

Anahtar Kelimeler: Maksilla, Odontojenik tümörler, Oral, Cerrahi eksizyon.

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INTRODUCTION

Canine acanthomatous ameloblastoma (CAA) is one of the most prevalent odontogenic neoplasms in dogs. It is a benign but locally invasive tumor originating from the odontogenic epithelium. CAA accounts for approximately 6% of all known oral tumors and 45% of all odontogenic tumors in dogs.[1] Tumors arising from odontogenic epithelial cells are classified as "ameloblastomas." The term "acanthomatous" refers to the spine-like morphology of the epithelial cells within these tumors.[2] CAA predominantly occurs in the gingival region and has the potential to invade surrounding tissues, especially the jawbone. Although it typically presents as a painless, slow-growing mass, its invasive nature necessitates surgical intervention.[3]

Histopathological analysis remains the definitive method for diagnosing CAA, with the formation of cord-like structures by ameloblastic epithelial cells serving as a hallmark feature. Ameloblastomas arise from the epithelial remnants of the gingiva, also known as Serres remnants, which manifest as irregular, exophytic gingival masses on either side of the dental arch. These tumors grow slowly and frequently display a cystic structure that destroys the alveolar bone. Ameloblastomas in humans rarely metastasize. Similarly, no cases of distant metastasis or regional lymph node involvement have been reported in dogs.[4]

CAA primarily affects dogs six years or older and is more frequently observed in brachycephalic breeds such as Boxers, Pekingese, Pugs, and Shih Tzus.[5] However, there have been no reports to date describe CAA in Anatolian Shepherd (Kangal) dogs. Diagnostic imaging, including X-ray, computed tomography (CT), or magnetic resonance imaging (MRI), is recommended before treatment to precisely assess the tumor's extent. MRI is particularly effective in delineating tumor margins compared to CT images.[5] Radical surgical resections, such as maxillectomy or mandibulectomy, is the treatment of choice for CAA. While intralesional antineoplastic drugs and radiation therapy have also demonstrated success, broad surgical excision remains the most effective treatment, especially in cases requiring long-term remission.[2]

CASE PRESENTATION

A 6-year-old, 49-kg male Anatolian Shepherd (Kangal) dog presented to the Atatürk University Faculty of Veterinary Medicine Animal Hospital with a progressive oral mass, accompanied by halitosis, gingival bleeding, and loss of appetite. Based on the owner's account, the mass had been present for approximately six months, exhibiting progressive enlargement and leading to difficulties in oral intake. Additionally, gingival bleeding was reported to occur following meals.

Physical examination revealed three firm, pink, exophytic masses with focal ulcerative regions in the rostral maxilla on both the right and left sides. The masses were palpably firm and adhered to underlying structures (Figures 1A-B). Notably, the owner reported a history of transmissible venereal tumor (TVT) in the same dog three years prior, which had been successfully treated with vincristine, leaving no residual lesions.

Radiological evaluation was performed to determine the invasion of the mass.

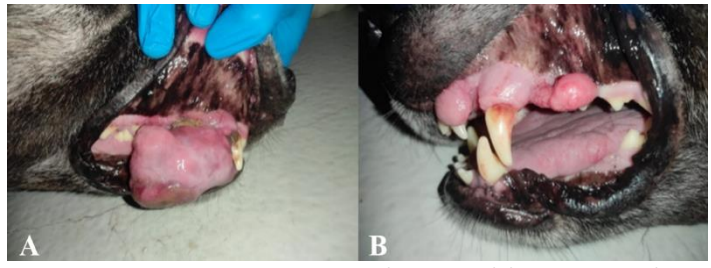

Figure 1. A. Preoperative view: Gingival mass caudal to canine tooth 104 in the oral cavity.
B. Preoperative view: Gingival mass in the oral cavity around tooth 203-205.

Radiography

After sedation with medetomidine 100 µg/kg intramuscular (Domitor, Zoetis, USA) and propofol 2 mg/kg intravenoz (Propofol %2 Fresenius Kabi, Germany) orthogonal radiographs of the maxilla were taken. Radiographic findings revealed masses extending from the distal aspect of tooth 104 to the buccal surface of tooth 108, with radiopaque and radiolucent areas around teeth 203 and 205. Canine tooth 104 was buccally displaced due to the tumor mass (Figures 2A-B).

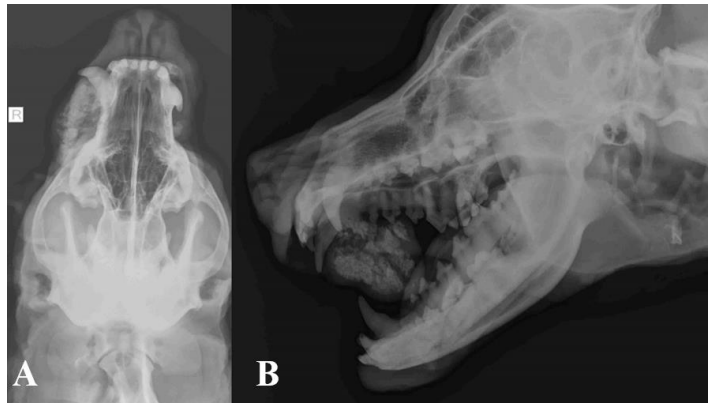

Figure 2. A. Preoperative radiographic view in ventro-dorsal direction.
B. Preoperative radiographic view in the latero-lateral direction.

Surgery

The dog was fasted for 12 hours prior to induction of anesthesia. The patient was sedated with medetomidine 100 µg/kg intramuscular (Domitor, Zoetis, USA) and induced with propofol. Infraorbital nerve block was performed with 2.5 mg/kg bupivacaine (Buvicaine, Polifarma, Turkey).[6] Oxygenation was provided using an endotracheal tube during total intravenous anesthesia (TIVA) of propofol-ketamine combinations. Ketamine 4 mg/kg (Ketasol, Interhas, Richter Pharma AG) and propofol 4 mg/kg (Propofol 2% Fresenius Kabi, Germany) were combined in a 1:2 ratio, to create a solution known as ketofol. This was administered intravenously as a bolus via the cephalic vein at a rate of 0.2 ml/kg/min. The administration continued until jaw relaxation was observed. To maintain anesthesia, additional top-ups of the same volume were given when heart rate, mean arterial pressure, and respiratory rate increased by more than 20% from baseline, with each top-up administered over 120 seconds.[7] Using the help of an oral gag and a cautery device, the masses were excised with 1 cm of healthy tissue margins. The maxillary rim was reduced using rongeurs to remove the affected bone tissue. The patient's vital parameters were monitored with a veterinary monitor (ePM 12M Vet, MINDRAY, China) during the entire procedure. Hemostasis was achieved using a monopolar electrosurgical device (EK-160, Üzümcü, Ankara, Turkey) with a power setting of 30-50 watts for cutting and 25-40 watts for coagulation. Three excised masses measured 8×5×3 cm, 4×2×2 cm, and 2×1×1 cm, respectively (Figure 3A-C). The gingiva and underlying tissues were sutured with simple interrupted sutures (Figure 4A-B).

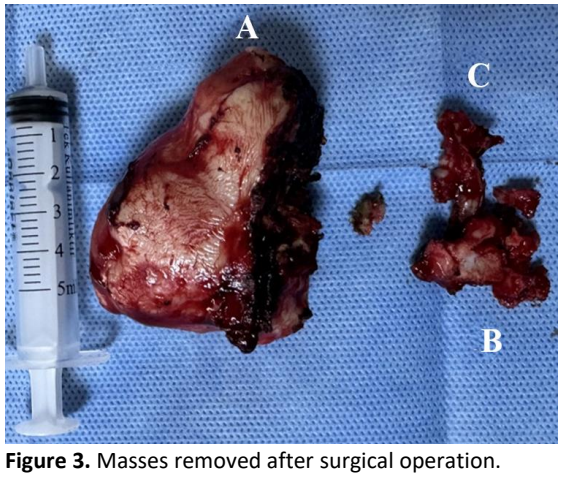

Figure 3. Masses removed after surgical operation.

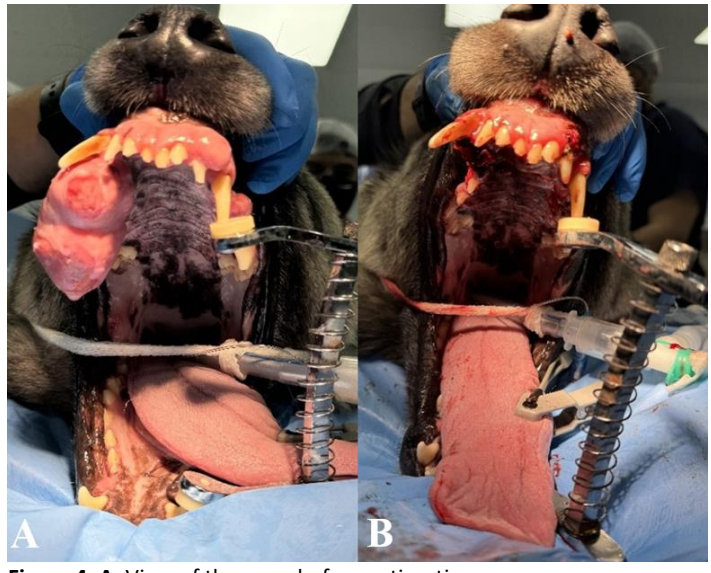

Figure 4. A. View of the mass before extirpation.
B. Jaw appearance after surgical excision of the mass.

Histopathology

The sections were placed in an oven at 57°C for one hour to thaw the paraffin. Deparaffinization was then performed in xylene I and II solutions. The sections were treated in decreasing concentrations of alcohol (100%, 100%, 96%, 90%, 70%, 50%; 3 minutes in each) and then placed in distilled water for 5 minutes for rehydration. After application of hematoxylin stain, sections were rinsed with tap water and stained in eosin solution for 15 seconds. They were then passed through increasing concentrations of alcohol before being transferred to xylene. Sections were coverslipped with Entellan and examined under a light microscope (Leica DM750, Flexicam i5). Histopathological analysis revealed characteristic features of CAA, including acanthosis, formation of ameloblastomatous islands, and uneven epithelial layering. Palisade cells in the stratum basale showed larger nucleoli, nuclear polymorphism, and an increased nuclear-to-cytoplasmic ratio. Additional findings included osseous island formation and increased vascularization (Figures 5A-D).

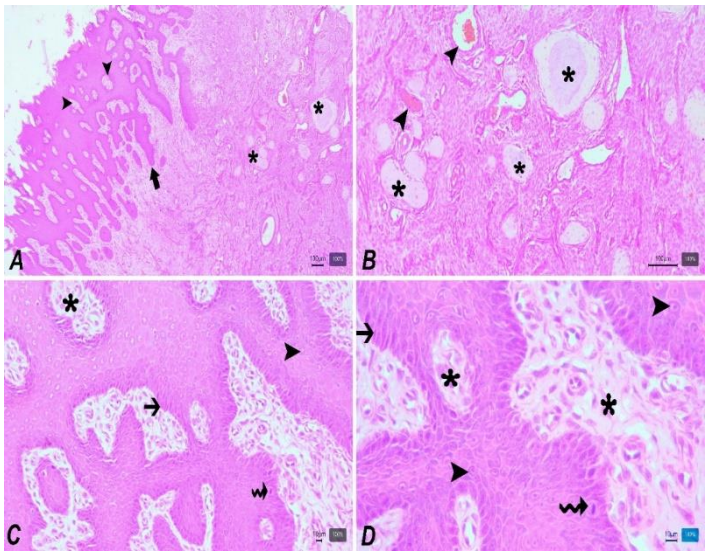

Figure 5. Canine acanthomatous ameloblastoma. **A:** Ameloblastomatous islets (arrowhead), acanthosis (thick arrow), and osseous islets in the dermis (asterisk), Magnification: 4X. **B:** Closer view of osseous islets (asterisk) and vascularisation (arrowhead), Magnification: 10X. **C:** Ameloblastomatous islets (asterisk), prickle cells (thin arrow), and mitotic figure (zigzag arrow), Magnification: 20X. **D:** Ameloblastomatous islets (asterisk), increased nuclear-to-cytoplasmic ratio (arrowhead), prickle cells (thin arrow) and mitotic figure (zigzag arrow), Magnification: 40 X. H&E.

Postoperative management

Postoperative treatment consisted of 0.12% oral chlorhexidine spray (Geraks, Kim-Pa, Istanbul, Turkey) for 15 days, 0.04 mg/kg subcutaneous meloxicam (Bavet Meloxicam, Istanbul, Turkey) for 5 days, prophylactic amoxicillin-clavulanic acid 8.75-25 mg/kg subcutaneously (Synulox, Zoetis, Istanbul, Turkey) for 7 days and famotidine 1.0 mg/kg per os (Sandoz, Istanbul, Turkey) for 5 days. An Elizabethan collar (35 cm, Pawise, İzmir, Turkey) was encircled the neck to prevent self-trauma. At 15-day intervals, the patient owner was contacted by phone to collect information about patient. In the postoperative period, antineoplastic drugs were not used because the patient owner was rejected the chemotherapy. On the 70th postoperative day, the owner reported a recovery with no signs of recurrence or metastasis (Figures 6).

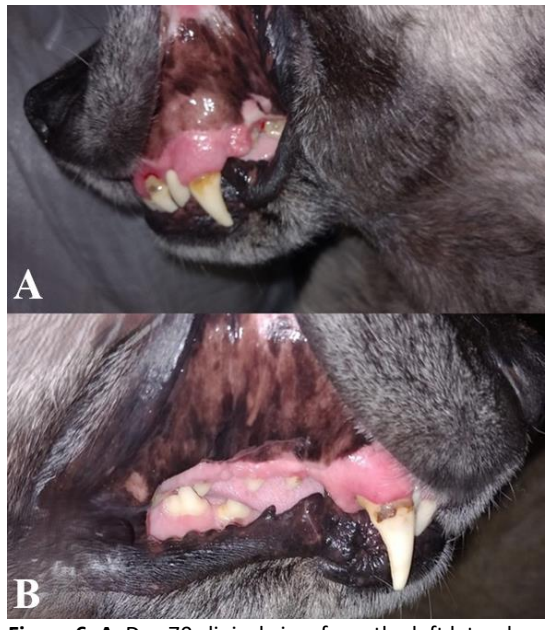

Figure 6. A. Day 70 clinical view from the left lateral aspect **B.** Day 70 clinical view from the right lateral aspect.

DISCUSSION

Canine acanthomatous ameloblastoma (CAA) is a well-defined, benign oral tumor in dogs, previously referred to as acanthomatous epulis. While this pathology has been well-documented in brachycephalic breeds[5], this represents the first reported case of CAA in an Anatolian Shepherd (Kangal) dog. Furthermore, although alternative treatments, such as intralesional bleomycin injections and radiotherapy have been reported in the literature for CAA[8], the current case demonstrates that, in the absence of chemotherapy or radiotherapy, post-surgical recurrence may not be observed even 70 days past over the case.

CAA arises from the odontogenic epithelium and is characterized by local invasion into surrounding tissues, particularly the jawbone. In dogs, it commonly presents as a painless mass and tends to infiltrate the surrounding gingival tissue.[9,10] In this case, the tumor similarly began in the gingiva, eventually spreading to the jawbone, leading to swelling, as reported by the owner.

Radiographic imaging, including X-ray, CT, and MRI, is essential for assessing the extent of these tumors.[11] In the present case, radiographs revealed areas of radiopacity and radiolucency in the alveolar bone, especially around the affected teeth. Notably, canine tooth 104 was displaced due to the tumor growth, indicating local infiltration and disruption of surrounding tissues.

Mayer et al.[2] have suggested that radiation therapy may be appropriate when surgery is not feasible due to functional or cosmetic concerns or if the tumor cannot be completely excised. Radiation therapy has proven to be a

generally safe and effective treatment, with a clinical study of 47 dogs showing good outcomes. However, the risk of recurrence increases in cases of larger tumors, particularly those over 4 cm in diameter (T3 clinical stage). Goldschmidt et al. further suggested that medical therapies may serve as viable alternatives to more invasive surgical procedures.[3] However, in the present study, radical surgical excision of large masses of soft and bone tissues was effective in restoring normal function and preventing malnutrition caused by the tumor's interference with food intake.

Stancu et al.[5] reported that the tumor exhibited a stratified epithelial-like structure and an anastomosing band and the majority of the cells were composed of epithelial cells with round nuclei. Two different cell types, fibroblast and osteoblast, were identified. In this case, it was observed that there were ameloblastomatous islands in the thickening of the stratum spinosum layer and increased vascularization with osseous island formations in the dermis layer.

In the literature, no cases were found where a dog with CAA had a previous history of transmissible venereal tumor (TVT). This raises the possibility that dogs with TVT may have an increased predisposition to developing neoplastic disorders, warranting further investigation.

In conclusion, canine acanthomatous ameloblastoma (CAA) may rarely develop in Anatolian Shepherd (Kangal) dogs and radical surgical excision of the affected soft and bone tissues is necessary when lesions cause significant functional impairments such as malnutrition. Furthermore, the potential association between CAA and transmissible venereal tumor (TVT) warrants further investigation to determine whether the presence of TVT predisposes dogs to subsequent neoplastic conditions.

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Author Contributions: Concept-TA, MGŞ; Design-TA, MGŞ, EM, BB, YA, ÇÖ; Supervision-TA, MGŞ; Resources-TA, MGŞ; Data Collection and/or Processing-TA; Analysis and/or Interpretation-MGŞ, SÇ; Literature Search-TA, MGŞ; Writing Manuscript-TA, MGŞ; Critical Review-TA, MGŞ.

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ATATÜRK ÜNİVERSİTESİ YAYINLARI
ATATURK UNIVERSITY PUBLICATIONS

Case Report *Olgu Sunumu* DOI: 10.5281/zenodo.14638153

A Case of Concurrent Infection with *Ehrlichia canis*, *Anaplasma phagocytophilum/platys*, and *Leishmania infantum* in a Dog

Bir Köpekte *Ehrlichia canis*, *Anaplasma phagocytophilum/platys* ve *Leishmania infantum* ile Eş Zamanlı Enfeksiyon Olgusu

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ABSTRACT

Vector-borne diseases transmitted by arthropods lead to significant threats to animal and human health worldwide. Arthropods of medical and veterinary importance not only cause harm to their hosts through blood-feeding activities that result in allergies, paralysis, and toxicosis, but also serve as vectors for transmitting multiple bacterial, viral, parasitic, and rickettsial diseases to animals and humans. Among the most important vector-borne blood parasites in dogs are leishmaniosis, ehrlichiosis, anaplasmosis, dirofilariosis, and babesiosis. This case report focuses on a 3-year-old male Dogo Argentino dog presenting with clinical signs of anorexia, weakness, and lethargy. Based on physical, hematological, and biochemical examinations, as well as rapid diagnostic test results, the dog was found to be positive for *Ehrlichia canis*, *Anaplasma phagocytophilum/platys*, and *Leishmania infantum*. This case report holds particular significance as it documents the first reported case of concurrent infections with different blood parasites in a dog from the Balıkesir region.

Keywords: Anaplasmosis, Ehrlichiosis, Diagnosis, Dog, Leishmaniosis.

ÖZ

Eklem bacaklılar yoluyla yayılan vektör aracılıklı hastalıklar, dünya genelinde hayvan ve insan sağlığını ciddi şekilde tehdit eden enfeksiyonlardır. Beşerî ve veteriner hekimlikte öneme sahip eklembacaklılar, kan emerek alerji, felç ve toksikasyon meydana getirerek konaklara zarar verebilmesinin yanı sıra bakteriyel, viral, paraziter, riketsiyal gibi birden fazla hastalığı hayvan ve insanlara naklederler. Köpeklerde vektör aracılığıyla bulaşan en önemli kan parazitleri arasında leishmaniosis, ehrlichiosis, anaplasmosis, dirofilariosis ve babesiosis yer almaktadır. Olgu sunumunu, iştahsızlık, zayıflık ve halsizlik bulguları gösteren 3 yaşlı, erkek, Dogo argentino ırkı bir köpek oluşturdu. Fiziksel, hematolojik ve biyokimyasal muayenelerin yanı sıra hızlı test kiti sonuçlarına göre köpekte *Ehrlichia canis, Anaplasma phagocytophilium/platys ve Leishmania infatum* pozitif olarak tespit edildi. Bu olgu sunumu Balıkesir yöresinde bir köpekte farklı kan parazitlerinin birlikte ve aynı anda enfeksiyona neden olduğu ilk vaka raporu olması açısından önem taşımaktadır.

Anahtar Kelimeler: Anaplasmosis, Ehrlichiosis, Teşhis, Köpek, Leishmaniosis.

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INTRODUCTION

Vector-borne diseases such as ehrlichiosis, anaplasmosis, and leishmaniosis threaten to both animal and human health worldwide.[1] These diseases are primarily transmitted by arthropod vectors like ticks (e.g., *Rhipicephalus sanguineus*, *Ixodes persulcatus*) and sandflies (*Phlebotomus* species) and exhibit a broad geographical distribution.[2,3] Clinical signs of blood parasites in dogs include fever, anorexic, depression, cachexia, anemia, lymphadenopathy, epistaxis, and icterus.[2-4] Additionally, leishmaniosis may present with cutaneous lesions (nodular, ulcerative, and pustular) and onychogryphosis (excessive nail growth).[5] The most common laboratory findings in leishmaniosis, ehrlichiosis, and anaplasmosis are thrombocytopenia and anemia. Leukopenia or leukocytosis may also be observed in leishmaniosis and ehrlichiosis cases.[6,7] Diagnosis of leishmaniosis involves microscopic detection of amastigotes in stained smears prepared from infected tissues or organs (bone marrow, lymph nodes, skin, or peripheral blood). For anaplasmosis, morula structures are detected within neutrophils in stained blood smears, while for ehrlichiosis, inclusions within monocytes are identified microscopically.[8] In addition to microscopy, serological tests such as ELISA (Enzyme-Linked Immunosorbent Assay), IFA (Indirect Fluorescent Antibody), and rapid diagnostic kits, as well as molecular tests like PCR (Polymerase Chain Reaction), are used to confirm diagnoses. Treatment of blood parasites typically involves tetracycline or doxycycline for ehrlichiosis and anaplasmosis, whereas miltefosine, allopurinol, and domperidone are used for leishmaniosis.[2-4] This case report aims to describe the diagnosis and treatment of three different blood parasites in a dog.

CASE PRESENTATION

The subject of this case report is a 3-year-old male Dogo Argentino dog brought to the Internal Medicine Clinic of Balıkesir University Faculty of Veterinary Medicine from a private veterinary clinic. According to the anamnesis, the dog had been anorexia, weak, and lethargy for over a week. Physical examination revealed anorexia, lethargy, cachexia, anemia, tachycardia, mildly icteric mucous membranes, and a body temperature of 36°C. Blood samples were collected from the vena cephalica antebrachii into EDTA and anticoagulant-free tubes for hemogram and biochemical analyses. Hematological analyses were conducted using a hematology analyzer (Abacus Vet5, Diatron, Budapest, Hungary), while biochemical analyses were performed using a biochemical autoanalyzer (Monaco, Randox, UK). According to the hemogram results, white blood cell (WBC), lymphocyte, monocyte, and mean corpuscular volüme (MCV) levels were found to be above reference values, while red blood cell (RBC), hemoglobin (HGB), mean corpuscular hemoglobin concentration (MCHC), and platelet (PLT) levels were below reference values. Biochemical analysis revealed elevated levels of alanine aminotransferase (ALT), alkaline phosphatase (ALP), glucose (GLU), creatinine (CRE), and blood urea nitrogen (BUN), whereas albümin (ALB) levels were below the reference range. The hemogram and biochemistry results are presented in Table 1 and Table 2, respectively.[9,10]

Table 1. Hemogram analysis results of the dog positive for *Ehrlichia canis*, *Anaplasma phagocytophilum/platys*, and *Leishmania infantum*.

Parameters	Result	Reference value[9]
WBC (10^9/L)	58,9	5,0-14,1
Lymphocyte (10^9/L)	12,9	0,4-2,9
Monocyte (10^9/L)	2,2	0,1-1,4
Granulocyte (10^9/L)	43,8	5,4-6.0
RBC (10^{12}/L)	1,45	4,95-7,87
HGB (g/dL)	3,6	11,9-18,9
HCT (%)	13,3	35-57
MCV (fL)	91,9	66-77
MCH (pg)	24,8	21,0-26,2
MCHC (g/dL)	27,0	32,0-36,3
RDW (%)	21,8	11-15,5
PLT (10^9/L)	33	211-621
MPV (fL)	8,2	6,1-10,1

WBC; White Blood Cell, RBC; Red Blood Cell, HGB: Hemoglobin, HCT: Hematocrit, MCV: Mean Corpuscular Volume, MCH: Mean Corpuscular Hemoglobin, MCHC: Mean Cell Hemoglobin Concentration, RDW: Red Cell Distribution Width, PLT: Platelet, MPV: Mean Platelet Volume.

Table 2. Biochemical analysis results of the dog positive for *Ehrlichia canis*, *Anaplasma phagocytophilum/platys*, and *Leishmania infantum*.

Parameters	Result	Reference value[9]
ALP (U/L)	176	1-114
GGT (U/L)	< 10	5-14
TBIL (mg/dL)	0.5	0.0-0.3
GLU (mg/dL)	141	76-119
ALB (g/dL)	2.1	2.3-3.1
CRE (mg/dL)	1.96	0.5-1.7
BUN (mg/dL)	105.4	8-28
P (mg/dL)	5.3	2.9-5.3
ALT (U/L)	426	10-109
BUN/CRE	53.8	-

ALP; Alkaline Phosphatase, GGT; Gamma-Glutamyl Transferase, TBIL; Total Bilirubin, GLU; Glucose, ALB; Albumin, CRE; Creatinine, BUN; Blood Urea Nitrogen, P; Phosphorus, ALT; Alanine Aminotransferase, BUN/CRE; Blood Urea Nitrogen/Creatinine Ratio.

Serum samples were tested using a 4-in-1 rapid test kit (CaniV-4, VetExpert, Poland) for the presence of *Ehrlichia canis*, *Anaplasma phagocytophilum/platys*, *Dirofilaria immitis*, and *Leishmania infantum*. The rapid test kit results indicated positive findings for *Ehrlichia canis, Anaplasma phagocytophilum/platys,* and *Leishmania infantum*. The rapid test kit result is shown in Figure 1.

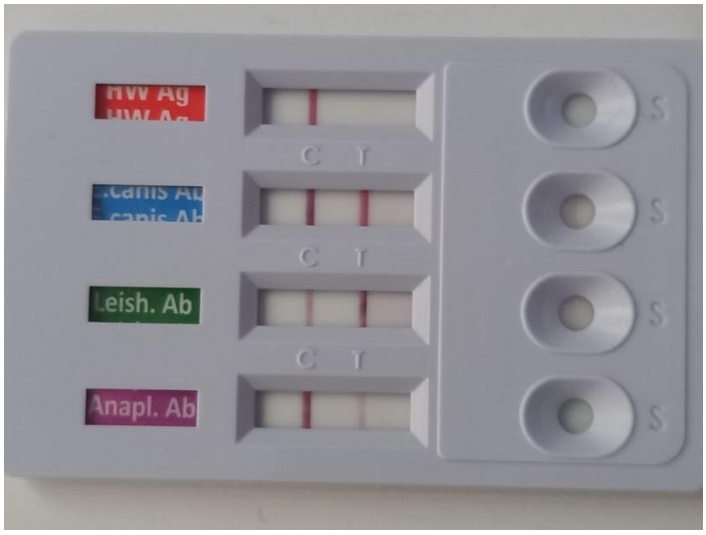

Figure 1. *The result of a four-in-one rapid diagnostic test for a dog positive for Ehrlichia canis, Anaplasma phagocytophilum/platys, and Leishmania infantum. HW: Heartworm.*

For the treatment of ehrlichiosis and anaplasmosis, doxycycline (Monodoks, Deva, Istanbul) was recommended at a dose of 10 mg/kg, administered orally once daily. For the treatment of leishmaniosis, allopurinol (Ürikoliz, Sandoz, Kocaeli) was prescribed at a dose of 10 mg/kg, administered orally once daily, in combination with domperidone (Motilium, Johnson & Johnson, Kırklareli) at a dose of 1 mg/kg, administered orally once daily. The treatment process is ongoing, and periodic evaluations have revealed noticeable improvement in clinical findings as well as significant enhancement in quality of life.

DISCUSSION

Vector-borne diseases in dogs are infectious diseases transmitted by arthropods such as ticks, mosquitoes, fleas, and sandflies (Phlebotomus species). The clinical signs of ehrlichiosis and anaplasmosis in dogs include fever, lethargic, lymphadenopathy, anorexic, epistaxis, ascites, icterus, and chronic weight loss. In leishmaniosis, additional clinical signs such as cutaneous lesions (nodular, ulcerative, and pustular) and onychogryphosis (excessive nail growth) are observed.[2,3,11] In this case, clinical examination of the dog revealed anorexia, cachexia, lethargy, anemia, and mild icterus, findings consistent with the literature. Common laboratory findings in leishmaniosis, ehrlichiosis, and anaplasmosis include anemia, hypoalbuminemia, and elevated levels of ALT, ALP, total bilirubin, BUN, and creatinine due to kidney and liver involvement. In ehrlichiosis and anaplasmosis, moderate to severe thrombocytopenia is also frequently observed.[2,3,12] Additionally, leukopenia or leukocytosis has been reported in cases of leishmaniosis and ehrlichiosis.[12-15] Anemia and thrombocytopenia in these diseases are attributed to immune-mediated mechanisms, including the production of antibodies that bind to erythrocyte and platelet membranes, leading to cell destruction and bone marrow aplasia.[13] In this study, an increase in leukocytes (WBC, particularly granulocytes) was detected. Neutrophilia accompanied by leukocytosis has been reported in leishmaniosis cases and is considered a common hematological abnormality in symptomatic cases.[14] Furthermore, it has been noted that diffuse centrilobular degeneration and chronic active hepatitis caused by ehrlichiosis can lead to increased liver enzyme activities (AST, ALT, ALP, bilirubin) as well as hypoproteinemia and hypoalbuminemia. The hematological findings in this case, including decreased RBC, HGB, MCHC, and PLT levels and increased WBC, lymphocyte, monocyte, and MCV levels, along with biochemical findings such as elevated ALT, ALP, GLU, CRE, and BUN levels and decreased ALB levels, align with data reported in the literature.[15] In the treatment of these diseases, allopurinol, miltefosine, and domperidone are recommended for leishmaniosis, while doxycycline is suggested for anaplasmosis and ehrlichiosis.[2-4] In the presented case, a similar treatment protocol was applied in accordance with the literature.

In conclusion, this case report is significant as it demonstrates the concurrent infection of different blood parasites in a single dog. Moreover, to the best of our knowledge, no previous case report has documented concurrent infections of different blood parasites in dogs in the Balıkesir region.

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