



DOI: 10.33188/vetheder.687446

Olgu Sunumu / Case Report

## Pathological features of fetal anasarca in Pekingese puppies

**Yanad ABOU MONSEF<sup>1,a\*</sup>, Kübra KARAKAŞ KALKAN<sup>2,b</sup>, Gözde YÜCEL TENKECİ<sup>1,c</sup>, Rifki HAZIROĞLU<sup>1,d</sup>**

<sup>1</sup> Ankara University, Faculty of Veterinary Medicine, Department of Pathology, Ankara / TURKEY

<sup>2</sup> Ankara University, Faculty of Veterinary Medicine, Department of Obstetrics and Gynecology, Ankara / TURKEY

ORCID: 0000-0002-4929-9395<sup>a</sup>, 0000-0001-9177-9299<sup>b</sup>, 0000-0002-2586-8346<sup>c</sup>, 0000-0002-1134-3581<sup>d</sup>

### MAKALE BİLGİSİ /

#### ARTICLE INFORMATION:

#### Geliş / Received:

10 Şubat 20

10 February 20

#### Kabul / Accepted:

18 Şubat 20

18 February 20

#### Anahtar Sözcükler:

Fötal anasarca  
Histopatoloji  
Hydrops fetalis  
Köpek  
Pekingese

#### Keywords:

Dog  
Fetal anasarca  
Histopathology  
Hydrops fetalis  
Pekingese

### ABSTRACT:

Fetal anasarca is a congenital condition defined by excessive fluid accumulation throughout the body and subcutaneous edema. A 9-month-old Pekingese bitch with dystocia was presented to the Obstetrics and Gynecology Department of Ankara University, Faculty of Veterinary Medicine. Three stillborn puppies were removed by caesarian section and sent to the Pathology Department of Ankara University, Faculty of Veterinary Medicine for necropsy. Grossly, two of the puppies were larger than normal, had diffuse subcutaneous swelling with visceral effusion and were diagnosed with fetal anasarca. As for the third one, pulmonary hypoplasia was reported. All the fetuses additionally showed palatoschisis, bird tongue and lissencephaly. For histopathological examination, samples from the organs were collected and routinely processed. Severe edematous and degenerative changes were noted in the skin, liver, heart and kidneys of the anasarca fetuses. Extramedullary hematopoiesis was also observed to different degrees in the livers and the spleens of all fetuses. The current case represents the first histopathologically described case of canine fetal anasarca in Turkey and it highlights the predisposition of brachycephalic dogs to fetal anasarca which is referred to be heritable as a recessive trait.

## Pekingese yavrularda fetal anasarkanın patolojik bulguları

### ÖZET:

Fötal anasarca, vücutta aşırı sıvı birikimi ve subkutan ödem ile tanımlanan konjenital bir bozukluktur. Dokuz aylık bir Pekinez dişi köpek Ankara Üniversitesi, Veteriner Fakültesi, Doğum ve Jinekoloji Anabilim Dalı'na, güç doğum şikâyeti ile getirildi. Sezaryen operasyonu ile üç adet ölü doğmuş yavru çıkarıldı ve Ankara Üniversitesi Veteriner Fakültesi Patoloji Anabilim Dalı'na nekropsi amacıyla gönderildi. Makroskopik olarak iki yavru normalden daha büyüktü. Bu yavrularda visseral efüzyon ve subkutan ödeme rastlandı. Üçüncü yavruda ise pulmoner hiperplazi ile karşılaşıldı. Tüm yavrularda ayrıca, palatoşizis, kuş dili ve lissensefali anomalilerine rastlandı. Histopatolojik yönden incelenmesi için organlardan örnekler alınarak rutin doku takibine koyuldu. Anasarca'lı fötusların deri, karaciğer, kalp ve böbreklerinde şiddetli ödem ve dejeneratif değişikliklere rastlandı. Tüm fötusların karaciğer ve dalaklarında farklı derecelerde ekstramedüller hematopoez gözlemlendi. Bu çalışma Türkiye'de histopatolojik olarak köpeklerde tanımlanan ilk fötal anasarca olgusunu oluşturmaktadır. Ayrıca, brakisefalik köpeklerin resesif kalıtsal bir bozukluğu olan fötal anasarkaya yatkınlık gösterdiklerini vurgulamaktadır.

**How to cite this article:** Monsef YA, Kalkan KK, Tenekci GY, Haziroğlu R: Pathological features of fetal anasarca in Pekingese puppies. *Veteriner Hekimler Dernegi Dergisi*, 91(2): 164-168, 2020, DOI: 10.33188/vetheder.687446

\* Sorumlu Yazar e-posta adresi / Corresponding Author e-mail address: yanad.abou.monsef@gmail.com

## 1. Introduction

“Fetal anasarca” also known as “hydrops fetalis”, “congenital edema” and “walrus syndrome” is a condition characterized by massive generalized subcutaneous edema with or without fluid accumulation in body cavities. Affected puppies are typically bigger in size which causes dystocia and neonatal mortality is very high (5, 6). Multiple puppies within the litter or even the whole litter may be affected. Fetal anasarca has been commonly described in bovine and ovine species with less reports in small animals (4, 5, 6, 7).

This report provides a pathomorphological description of canine fetal anasarca associated with various congenital abnormalities that appeared within the same litter of a Pekingese dog. To the authors knowledge this is the first histopathologically described case of canine fetal anasarca in Turkey.

## 2. Case Story

A 9-month-old Pekingese bitch was presented to the Obstetrics and Gynecology Department of Ankara University, Faculty of Veterinary Medicine with a 2-day history of dystocia. After clinical evaluation, the patient was submitted to caesarian section and three stillborn puppies were removed from the uterus. The three stillborn puppies showed different congenital abnormalities and were sent to the Pathology Department of Ankara University, Faculty of Veterinary Medicine for necropsy.

On gross examination, two out of three puppies showed generalized soft tissue edema and filling of abdominal and thoracic cavities with serous fluid and were diagnosed as fetal anasarca (Figure 1).



**Figure 1:** A: Massively enlarged first and second fetuses, fetal anasarca. B: Cleft palate and bird tongue in the third fetus.  
**Şekil 1:** A: Belirgin büyüme gösteren birinci ve ikinci fötüs, fötal anasarca. B: Üçüncü fötusta damak yarığı ve kuş dili.

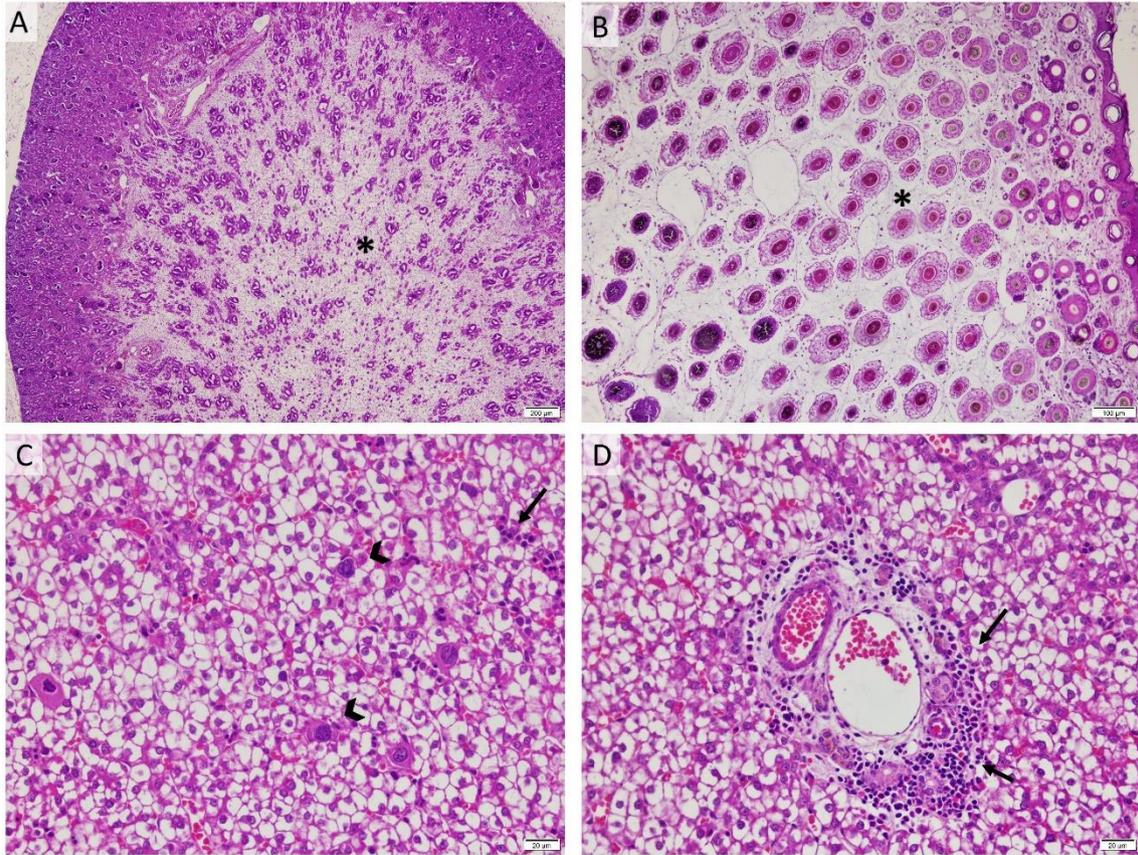


**Figure 2:** A: Thick and shiny subcutaneous tissue on cut section of the skin covering the skull of the first anasarctous fetus. B: Lissencephaly of the third fetus's brain.

**Şekil 2:** A: İlk anasarkalı fötusun kafatası bölgesindeki derinin kesit yüzünde kalın ve ödematöz subkutan doku. B: Üçüncü fötusun beyinde lissensefali.

On skin examination, the subcutaneous tissue appeared diffusely thickened with a wet and shiny cut section (Figure 2). One puppy had no signs of anasarca but showed a significant reduced lung weight in comparison with the other two puppies and was diagnosed as pulmonary hypoplasia. Examination of the oral cavities of all puppies revealed a deep cleft dividing the hard palate and a narrow tongue with folded margins (Figure 1). The previous malformations were respectively defined as palatoschisis or cleft palate and bird tongue. Besides, loss of cerebral gyri was noted in the brain of all fetuses and it was described as lissencephaly or agyria (Figure 2).

Samples from all organs were collected, fixed in 10% buffered formalin solution, processed routinely, embedded in paraffin, sectioned at 4µm thickness and stained with hematoxylin-eosin (HE) for histopathological examination. Histologically, the liver, kidneys, heart and skin of the anasarctous fetuses showed severe edema. Fluid accumulation in the parenchymal organs was shown as severe reticular degeneration in the liver, interfascicular edema in the heart and loose connective tissue cells separated by wide gaps in the skin and kidneys (Figure 3). Extramedullary hematopoiesis was observed to different degrees in the livers and the spleens of all fetuses. While neutrophil leucocytes surrounded the central veins (extramedullary myelopoiesis); nuclear erythrocytes and megakaryocytes were scattered between the hepatocytes and in the portal tracts (extramedullary erythropoiesis) (Figure 3).



**Figure 3:** Histopathology of the kidney(A), skin (B) and liver (C, D). A, B: Edema of the kidney and skin (asterisks), Hematoxylin-eosin stain. C, D: Reticular degeneration of the hepatocytes and extramedullary hematopoiesis: focal aggregates of nucleated red blood cells (arrows) and numerous megakaryocytes (arrowheads), liver, Hematoxylin-eosin stain.

**Şekil 3:** Böbrek (A), deri (B) ve karaciğerin (C, D) histopatolojik görüntüleri. A, B: Böbrekte ve deride ödem (asteriksler), Hematoksilen eozin. C, D: Hepatositlerin retiküler dejenerasyonu ve ekstramedüller hematopoez: fokal çekirdekli eritrosit kümeleri (ok) ve çok sayıda megakaryositler (okbaşı), Hematoksilen eozin.

### 3. Discussion and Conclusion

Fetal anasarca is a congenital abnormality resulting from factors that lead to failure in the homeostasis of fetal fluid. The factors or causative diseases that result in fetal anasarca are different among species and no precise etiology has so far been described in dogs. In human medicine, many factors like alpha-1 thalassemia, primary and secondary cardiac failure, renal vein thrombosis etc. were reported (2, 5, 6). Many literatures referred to fetal anasarca as a heritable anomaly in animals, determined by recessive genes (1, 4, 10). In puppies, cardiac malformations were considered as the most common reason leading to hydrops fetalis but similarly to the present case, no evidence of cardiac abnormality has been determined in many published cases of canine fetal anasarca (1, 4, 10).

On the other hand, genetic predisposition plays a major role in the prevalence of canine hydrops fetalis. Anasarca puppies were specially reported in brachycephalic breeds like Bulldogs, English Bulldogs, French Bulldogs, Boston Terriers, Pugs and Pekingese (2, 10, 11). The former breed was the one reported in the present case.

Additionally, the Pekingese bitch has a family history of dystocia, which may confirm the possibility of familial inheritance of fetal anasarca in dogs.

Brachycephalic breeds are also at high risk of developing other birth defects like cleft palate and are more susceptible to dystocia (9). In our case, along with anasarca, other congenital abnormalities such as cleft palate, bird tongue, lissencephaly and pulmonary hypoplasia were reported. Histologically, extramedullary hematopoiesis was also revealed in the liver and spleen of the fetuses. This latter finding was associated with the majority of previously reported cases of hydrops fetalis in different animals (4, 6). Moreover, extramedullary hematopoiesis is considered a normal condition in new-born puppies (8).

This case describing a case of fetal anasarca in a Pekingese breed dog enlighten the importance of genetic factors in the development of certain congenital abnormalities such as hydrops fetalis. Inbreeding within closed familial lines may have major disadvantages such as the inheritance of undesirable disease-causing genes. These diseases can be developed when two versions of recessive genes are inherited (3). Proper breeding strategies and inbreeding avoidance play a major role in preventing some genetic diseases. This study serves also to promote further investigations of pathological findings of anasarca, wish may also help to clarify more its etiology.

### Acknowledgments

This case was presented as a poster display at the 42th World Small Animal Veterinary Association Congress and FECAVA 23rd Eurocongress, 25-28 September 2017, Copenhagen, Denmark.

### References

1. **Agerholm J S, Arnbjerg J** (2011): *Pulmonary hypoplasia and anasarca syndrome in a belted Galloway calf*. Vet Rec, **168**(7), 190-190.
2. **Cunto M, Zambelli D, Castagnetti C, Linta N, Bini C** (2015): *Diagnosis and treatment of foetal anasarca in two English Bull dog puppies*. Pak Vet J, **35**(2), 251-253.
3. **Farrell LL, Schoenebeck JJ, Wiener P, Clements DN, Summers KM** (2015): *The challenges of pedigree dog health: approaches to combating inherited disease*. Canine Genet Epidemiol, **2**(1), 3.
4. **Hailat N, Lafi Sq, Al-Darraji A, El-Maghraby Hm, Al-Ani F, Fathalla M** (1997): *Foetal anasarca in Awassi sheep*. Aust Vet J, **75**(4), 257-259.
5. **Hopper BJ, Richardson JL, Lester NV** (2004): *Spontaneous antenatal resolution of canine hydrops fetalis diagnosed by ultrasound*. J Small Anim Pract, **45**(1), 2-8.
6. **Monteagudo L, Lujan L, Tejedor T, Climent S, Acín C, Navarro A, Arrug MV** (2002): *Fetal anasarca (Hydrops foetalis) associated with lymphoid tissue agenesis possibly due to an autosomal recessive gene defect in sheep*. Theriogenology, **58**(6), 1219-1228.
7. **Prabaharan V, Sivakumar A, Jayaganthan P, Raja S, Vijayarajan A, Kumar S** (2016): *Dystocia due to fetal anasarca and ascities with live fetus in a doe*. Int J Sci Environ Tech, **5**(4), 2586-2589.
8. **Rothuizen J, Bunch S, Charles J.** (2006): *WSAVA Standards for Clinical and Histological Diagnosis of Canine and Feline Liver Diseases*. Philadelphia, USA: Elsevier Health 373 Sciences.
9. **Sousa CGA, Gonçalves IFL, Souza ALM, Fernandes DA, Hyppolito RRC, Rodrigues ABF** (2018): *Morphological Analysis of the Cleft Palate in Dogs (Canis lupus familiaris)*. J Health Sci, **6**, 427-431.
10. **Smith OF** (2011): *Prenatal Care of the Bitch and Queen*. 735-737. In: Peterson ME, Kutzler M (Ed), Small Animal Pediatrics-E-Book: The First 12 Months of Life, Elsevier, St Louis.
11. **Sridevi P, Reena D, Safiuzamma M** (2016): *Diagnosis of fetal anasarca by real time ultrasonography in a pug bitch and its surgical management*. IJAR, **37**(2), 65-66.