



Varicocele in a Kangal Shepherd Dog: A Rare Case Report

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Abstract: Varicocele is a vascular disorder characterized by abnormal dilation and reflux in the pampiniform plexus, commonly associated with infertility in human males. However, it is rarely reported in dogs, and its clinical relevance remains unclear. A five-year-old, non-castrated male Kangal Shepherd Dog presented with infertility and intermittent scrotal swelling. B-mode ultrasonography revealed serpiginous, anechoic tubular structures in the left pampiniform plexus. Color Doppler confirmed venous reflux and low-velocity turbulent flow, meeting the ultrasonographic criteria for unilateral varicocele. Semen analysis demonstrated low volume (1.2 mL), poor motility (22.5% total, 5.2% progressive), reduced viability (35%), and a high proportion of morphological defects (58%). This case highlights the potential impact of varicocele on semen quality in dogs and underscores the diagnostic value of Doppler ultrasonography in identifying testicular vascular abnormalities. Given the genetic importance of the Kangal breed, early recognition and monitoring of reproductive disorders are essential to maintaining breeding soundness. Varicocele should be considered a differential diagnosis in male dogs presenting with unexplained infertility and scrotal asymmetry.

Keywords: Infertility, kangal shepherd, spermatological parameters, ultrasonography, varicocele

Bir Kangal Çoban Köpeğinde Varikosel: Nadir Bir Olgu Sunumu

Özet: Varikosel, pampiniform pleksus venlerinde anormal genişleme ve reflü ile karakterize vasküler bir bozukluktur ve erkeklerde infertilite ile ilişkilidir. Ancak köpeklerde oldukça nadir bildirilmekte olup, klinik önemi net değildir. Beş yaşında, kısırlaştırılmamış erkek bir Kangal Çoban Köpeği, infertilite ve aralıklı skrotal şişlik şikayetleriyle kliniğimize getirildi. B-mod

ultrasonografide sol pampiniform pleksusta anekoik, serpantin yapılı tübüler oluşumlar izlendi. Renkli Doppler incelemede venöz reflü ve düşük hızlı türbülanslı akım saptandı; bu bulgular unilateral varikosel ile uyumluydu. Semen analizinde düşük ejakülat hacmi (1.2 mL), düşük toplam motilite (%22.5), progresif motilite (%5.2), azalmış canlılık (%35) ve yüksek oranda morfolojik anomali (%58) tespit edildi. Bu olgu, varikoselin köpeklerde sperma kalitesini olumsuz etkileyebileceğini ve testiküler damar anormalliklerinin tanısında Doppler ultrasonografinin önemini ortaya koymaktadır. Kangal ırkının genetik değeri göz önünde bulundurularak, üreme bozukluklarının erken tanısı ve izlenmesi büyük önem taşımaktadır. Açıklanamayan infertilite ve skrotal asimetri durumlarında varikosel, ayırıcı tanılarda mutlaka değerlendirilmelidir.

Anahtar Kelimeler: İnfertilite, kangal çoban, spermatolojik parametreler, ultrasonografi, varikosel

INTRODUCTION

Varicocele is a vascular disorder characterized by abnormal dilatation, venous congestion and reflux in the pampiniform plexus veins responsible for venous drainage of the testis. It is recognized as one of the most common vascular causes of infertility in human males (Baazeem et al., 2011). In the literature, varicocele has been reported to cause increased testicular temperature, oxidative stress and germ cell loss (Agarwal et al., 2014).

In contrast, varicocele in domestic animals is extremely rare and often the diagnosis can be made postmortem (Payan-Carreira, 2011). Varicocele cases in dogs are mostly asymptomatic, presenting only with testicular asymmetry or scrotal swelling, which is noticed only on palpation. Ultrasonography, especially Doppler ultrasonography, is highly valuable in the diagnosis of such cases (Neves et al., 2022). Measurement of vein diameter, evaluation of venous flow direction and demonstration of reflux are critical in the diagnosis.

Early diagnosis of varicocele in dogs is essential, particularly in breeding animals, due to its potential impact on fertility. Even though the pathophysiological mechanisms are not as well established as in humans, it is hypothesized that the same detrimental effects—such as elevated intrascrotal temperature, impaired testicular perfusion, and oxidative damage—may also compromise spermatogenesis in affected dogs (Pintus and Ros-Santaella, 2021). In some studies, testicular blood flow abnormalities have been correlated with alterations

in semen quality, supporting the need for further investigation into subclinical vascular disorders in canine andrology (Venianaki et al., 2023). Furthermore, color and spectral Doppler imaging provide dynamic insights into venous architecture and hemodynamics, allowing for objective assessment of abnormalities such as retrograde flow and decreased venous clearance. Given the silent nature of this condition, routine reproductive screening in male breeding dogs might benefit from incorporating Doppler ultrasonographic evaluation to detect early vascular compromise (Wang et al., 2025). Documenting such rare cases, especially in underreported breeds like the Kangal Shepherd Dog, is vital to expanding the current understanding and awareness of varicocele in veterinary reproductive medicine.

CASE PRESENTATION

A five-year-old, non-castrated Kangal shepherd male dog was brought to our clinic with the complaints of “failure to have offspring despite mating” and periodic “testicular swelling”. General clinical examination revealed no signs of systemic disease. On scrotal palpation, soft, painless swelling and dilated vascular structures were felt in the left testicle.

In the study, sperm volume, motility, progressive motility, sperm concentration, viability, and morphological analysis were evaluated in ejaculate samples.

Ejaculate Volume Measurement

Ejaculate volume was measured in milliliters (ml) directly after collection using a glass tube. Volume measurement was made by considering only the second fraction of the ejaculate containing spermatozoa.

Motility, Progressive Motility and Sperm Density Analysis

Total motility, progressive motility, and sperm concentration of spermatozoa were determined using the computer-aided sperm analysis system (CASA). For this purpose, Sperm Class Analyzer (SCA), Version 6.5.0.91 (Microptic, Barcelona, Spain) was used. 10 μ L of ejaculate was taken from each sample and placed between a slide and a coverslip preheated to 37°C, and at least five different areas from each sample were automatically analyzed by the system.

Viability Assessment

The viability of spermatozoa was assessed by staining with 2% Eosin solution (prepared in 3% sodium citrate). A drop of the ejaculate was mixed with an equal volume of staining solution, spread on the slide, and air dried. Dead cells passed the dye and appeared red/pink, while live cells remained colorless. At least 100 cells from each sample were assessed.

Morphology Analysis

Abnormalities in sperm morphology were assessed with the Sperm Blue® staining kit (Microptic, Spain) used with the morphology module of the CASA system. The staining process was carried out following the manufacturer's instructions. At least 100 sperm cells from each sample were assessed, and the abnormality was classified.

Ultrasonographic Examination

Ultrasonography was performed using the Mindray Vetus 9 ultrasonography system using a micro-convex probe. Testicular examination with Doppler ultrasonography was performed in a quiet room away from disturbing influences with the help of the owner. The probe was placed in the latero-lateral position with the help of fixation only, without sedation. Ultrasound gel was applied to the skin of the testicles and then the probe was placed in the testicle. Initially, the echogenicity, echo-texture and size of the testicle were examined in basic B-mode. Then, the height and depth of the testis in the longitudinal plane were measured. Accurate visualization of the mediastinum testis was used as a reference point for accurate visualization of the entire testis. Each measurement of the right and left testicle was performed three times and then the arithmetic mean was calculated from the measurements. After accurate visualization of the testis in B-mode, the duplex mode was activated and used to visualize testicular blood flow. With color Doppler, vascularization in the region was visualized with alternating blue and red areas. This color change was caused by the detection of a blood flow towards and away from the probe.

RESULTS

On B-mode ultrasonographic imaging, the left pampiniform plexus appeared as a cluster of serpiginous, anechoic tubular structures running cranio-caudally along the spermatic

cord. The largest venous duct measured 3.8 mm in diameter at rest, well above the reference upper limit of ≤ 1 mm reported for healthy adult dogs of comparable size. The adjacent left testicular parenchyma remained homogeneous and isoechoic, with a sharply demarcated mediastinum testis; no intratesticular mass, calcification or fluid accumulation was detected. The epididymal head, body and tail maintained normal size and echo structure, and the scrotum wall thickness was within normal limits.

On color Doppler mapping, slow, mosaic flow signals filled the dilated vessels and there were multiple blue-red flow reversals indicating turbulent circulation.

Minimal respiratory modulation was seen in venous flow, further supporting venous valve insufficiency. In contrast, the left intratesticular arterial branches showed a normal low-resistance pattern.

Asymmetric venous dilatation, increased venous diameter under compression, low velocity turbulent flow and recurrent retrograde jets confined to the left pampiniform plexus fulfill the ultrasonographic criteria for unilateral (left) varicocele. The absence of intratesticular lesions, hydrocele or scrotal wall pathology favors primary varicocele rather than secondary congestion associated with space-occupying processes. Color and pulse wave Doppler ultrasonography examination is shown in Figure 1.

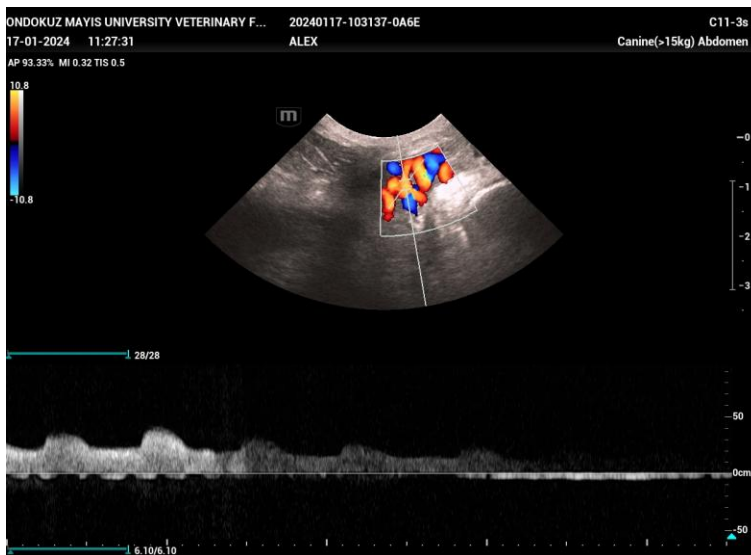


Figure 1. Note the marked dilatation of the left pampiniform plexus veins on color and pulse wave Doppler ultrasonographic examination. Also, slow venous flow and mosaic flow were seen. No pathology was detected in the right testicle; with these findings, a diagnosis of unilateral (left) varicocele was made.

The findings of spermatological analyses are shown in Table 1. The ejaculate sample yielded a volume of 1.2 mL, with a sperm concentration of 45×10^6 cells mL⁻¹. Multiplying volume by concentration gives an estimated total sperm output of $\sim 54 \times 10^6$ cells per ejaculation.

Sperm motion parameters were sub-optimal. Total motility averaged 22.5 %, of which only 5.2 % exhibited progressive forward movement. Accordingly, three-quarters of the cells were immotile or showed only non-progressive motion.

Membrane-integrity assays demonstrated a cell viability of 35 %, indicating that roughly one-third of the sperm population retained intact plasma membranes at the time of assessment.

Morphological evaluation revealed a high proportion of abnormalities (58 %), leaving 42 % structurally normal spermatozoa.

Collectively, these findings point to a modest sperm output accompanied by low motility, reduced viability, and a predominance of morphologically defective cells—all of which are consistent with compromised semen quality.

Table 1. Spermatological analysis findings of the case dog

Parameters	Value
Ejaculate Volume (ml)	1.2
Sperm Concentration (x10 ⁶ /ml)	45
Total Motility (%)	22.5
Progressive Motility (%)	5.2
Viability (%)	35
Abnormal Morphology (%)	58
Normal Morphology (%)	42

DISCUSSION

The infrequent reporting of varicocele cases in dogs complicates both the clinical recognition and pathophysiological understanding of the condition. While varicocele is one of the most studied vascular disorders in human male infertility (Baazeem et al., 2011), its clinical implications in domestic animals remain largely underexplored. In veterinary medicine, the diagnosis is often delayed or entirely missed due to the subclinical or asymptomatic nature of the disease. In this case, the diagnosis of unilateral varicocele was established through B-mode ultrasonography and Doppler flow analysis, revealing classic imaging features such as serpiginous, dilated venous structures, venous reflux, and turbulent low-velocity flow—all of which mirror the diagnostic criteria used in human medicine (Payan-Carreira, 2011; Neves et al., 2022).

The ultrasonographic findings, including significant venous dilation, reflux on Doppler mapping, and minimal respiratory modulation, are consistent with primary venous valve insufficiency rather than secondary congestion. The absence of testicular torsion, intratesticular lesions, or scrotal abnormalities further supports this diagnosis (Agarwal et al., 2014).

The pathophysiological effects of varicocele include testicular hyperthermia, oxidative stress, increased reactive oxygen species (ROS), disruption of the blood-testis barrier, and impaired Leydig and Sertoli cell function, ultimately leading to germ cell apoptosis and subfertility (Agarwal et al., 2014; Santos et al., 2021). In the present case, sperm analysis revealed suboptimal semen quality, characterized by low motility, reduced viability, and a high percentage of morphological defects. These findings are in line with previous reports that suggest impaired thermoregulation and venous congestion can negatively impact spermatogenesis and sperm maturation.

Another key consideration in this case is the breed-specific importance. The Kangal Shepherd Dog is a genetically distinct and nationally protected breed in Turkey, valued for its working capabilities and heritage. Any factor that compromises reproductive potential poses a risk to the breed's genetic sustainability. Thus, early recognition of testicular vascular disorders such as varicocele should be emphasized in routine reproductive

screenings, especially in breeding males with unexplained infertility or subtle scrotal asymmetry.

This case reinforces the clinical importance of including varicocele in the differential diagnosis of testicular swelling, particularly when accompanied by reduced semen quality. The role of Doppler ultrasonography is indispensable, not only in detecting vascular abnormalities but also in distinguishing between primary and secondary causes of testicular dysfunction. Further research is needed to establish prevalence data, risk factors, and long-term reproductive consequences of varicocele in dogs. Until then, each documented case adds valuable insight into this rarely reported but clinically significant vascular disorder.

CONCLUSION

In conclusion, this case represents a rare occurrence of varicocele in a Kangal Shepherd Dog, confirmed through ultrasonographic and Doppler imaging criteria. The observed ultrasonographic findings—marked venous dilatation, reflux, and turbulent low-velocity flow—parallel human diagnostic standards and emphasize the value of Doppler ultrasonography in veterinary reproductive evaluations.

Given the genetic importance of the Kangal breed, early identification of reproductive pathologies such as varicocele is essential to maintain fertility and preserve the breed's genetic integrity.

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