SSR Journal of Medical Sciences (SSRJMS)

Homepage: https://ssrpublisher.com/ssrjms/

Volume 2, Issue 7, 2025 ISSN: 3049-0375

Oxidative Stress and Its Role in Tissue Recovery Following Hematoma in Dogs

Suleiman Kolawole Yusuf[1], Abdulmajeed Isiaku[2], Abdulfatai Aremu[3], Okediran Babatunde Samuel[1]

[1]Department of Veterinary Physiology and Biochemistry, Faculty of Veterinary Medicine, University of Ilorin, P.M.B. 1515, Ilorin, Nigeria
[2]Department of Veterinary Medicine, Faculty Veterinary Medicine, University of Ilorin, P.M.B. 1515, Ilorin, Nigeria
[3]Department of Veterinary Pharmacology and Toxicology, Faculty of Veterinary Medicine, University of Ilorin, P.M.B. 1515, Ilorin Nigeria.

Received: *24.10.2025* | ***Accepted:*** *10.11.2025* | ***Published:*** *17.11.2025*

***Corresponding author:** Suleiman Kolawole Yusuf

DOI: *10.5281/zenodo.17627700*

Abstract **Case Studies**

Hematomas are a frequent clinical presentation in small animal practice, often secondary to trauma or infection, yet breed-specific reports in large, muscular dogs such as the Boerboel remain limited. This case report details the clinical management of a head hematoma in a 1-year-old female Boerboel, integrating diagnostic, surgical, and biochemical evaluation to illustrate a multidisciplinary approach to successful resolution. The patient presented with a turgid, non-painful swelling over the sagittal crest, with normal physiological parameters except mild tachypnoea. Differential diagnoses included abscess, cyst, or neoplasm, but physical findings and aspirate characteristics supported a diagnosis of hematoma. Pre-treatment involved praziquantel, penicillin-streptomycin, and piroxicam pending diagnostic confirmation. Laboratory evaluation revealed normal hematologic indices except mild lymphocytosis suggestive of inflammation, while microbiological culture identified Staphylococcus aureus and Bacillus spp., both sensitive to ciprofloxacin and gentamicin. Surgical drainage and debridement under aseptic conditions were performed, followed by postoperative ciprofloxacin and topical gentamicin. Serial biochemical assays demonstrated increased Glutathione Peroxidase and Catalase activities, coupled with reduced Malondialdehyde levels, reflecting effective oxidative stress modulation and tissue recovery. The patient exhibited complete resolution within eight days with no recurrence during follow-up.

This report underscores the importance of a structured, evidence-based approach to hematoma management in large dog breeds, combining microbiological and oxidative stress assessments to guide therapeutic decisions. It highlights how prompt diagnosis, appropriate antimicrobial selection, and rigorous postoperative care can optimize outcomes, prevent recurrence, and support client education in hematoma management among active canine breeds such as the Boerboel.

Keywords: Hematoma, Boerboel, Veterinary surgery, Microbial sensitivity, Oxidative stress.

Introduction:

Hematomas, characterized as localized collections of blood outside blood vessels, are a common pathological condition encountered in veterinary practice. In dogs, hematomas can develop in various anatomical locations, with a

notably high incidence in the canine aural (ear flap) regions. These aural hematomas often necessitate surgical intervention due to their recurrent nature and potential for complications such as pinna deformation and scarring (Palagiano et al., 2023; Uddin et al., 2017). However, dogs can also present with other types of hematomas, such as subdural, subperiosteal, intramuscular, and intracorneal hematomas, each posing unique diagnostic and therapeutic challenges (Bonelli et al., 2020; Nowak et al., 2021). The Boerboel, a large and robust dog breed, may exhibit particular susceptibilities to conditions such as hematomas, often resulting from trauma or other systemic issues (Ajadi et al., 2020; Ajadi & Doyin-Dada, 2019).

The early diagnosis and treatment of hematomas are paramount for achieving favorable clinical outcomes, particularly in young, rapidly growing dogs. In large breeds like the Boerboel, complications can escalate quickly due to their physiological demands and anatomical considerations (Jia et al., 2024; Zheng et al., 2024). Early and accurate identification of hematomas, along with prompt intervention, is critical to preventing long-term morbidity, especially considering the potential for recurrence and the impact on quality of life. This case report on a 1-year-old Boerboel aims to contribute to the growing body of veterinary knowledge by emphasizing the relevance of early diagnosis, careful clinical evaluation, and tailored therapeutic strategies to optimize patient outcomes. Additionally, it underscores the importance of incorporating veterinary biochemistry into the diagnostic and treatment process to enhance clinical decision-making and minimize complications (Zheng et al., 2024).

The management of hematomas in veterinary practice has been extensively studied, yet specific literature on the incidence, diagnosis, and treatment of hematomas in Boerboels remains scarce. Previous studies have highlighted the general clinical presentation of hematomas in dogs, with aural hematomas being the most common, often presenting as swollen, blood-filled spaces under the skin of the ear flap. These cases are frequently associated with trauma such as scratching or head shaking (Uddin et al., 2017). However, hematomas in larger breeds, such as the Boerboel, may present differently and require more specialized management due to their size and musculoskeletal characteristics. For instance, subperiosteal hematomas, which involve blood accumulation between a bone and the periosteum, have been identified in dogs following acute trauma and present as focal swellings with mineralization visible on computed tomography (CT) scans (Nowak et al., 2021).

Current treatment methodologies for canine hematomas include surgical intervention, drainage, corticosteroid injections, and less invasive alternatives such as Platelet-Rich Plasma (PRP) therapy (Palagiano et al., 2023). While surgical interventions can be effective, they are often associated with recurrence, scarring, and visible signs of deformity, particularly in aural hematomas (Uddin et al., 2017). Recent studies have explored the use of innovative treatments, such as PRP therapy and autologous leukocyte- and platelet-rich plasma (L-PRP), which have shown promise in accelerating healing and reducing recurrence rates but very expensive (Perego et al., 2021). Minimally invasive techniques, such as endoscopic evacuation guided by portable ultrasound, have also been successfully employed in complex cases, such as intracerebral hemorrhages (Han et al., 2024) but not readily available in many veterinary clinics in sub-Sahara Africa.

Despite these advancements, gaps remain in the understanding of breed-specific predispositions and treatment responses for large dog breeds like the Boerboel. While there are reports on the management of hematomas in various dog breeds, there is limited research focused on Boerboels, especially considering their large size and the potential for breed-related anatomical and physiological factors that could influence hematoma formation and treatment outcomes (Ajadi et al., 2020; Roccaro et al., 2024). The present case report aims to fill this gap by providing detailed insights into the diagnosis and management of a hematoma in a 1-year-old Boerboel, contributing valuable information to the veterinary literature, particularly in the context of breed-specific care and the integration

of advanced diagnostic tools and innovative therapeutic strategies.

This case report highlights the importance of a tailored, breed-specific approach to the management of hematomas in large dog breeds, particularly Boerboels, where their size, active nature, and potential for underlying genetic or musculoskeletal conditions may contribute to a unique clinical presentation. The use of available diagnostic tools such as full blood count and Microbiology culture and sensitivity analysis, along with emerging therapies, offers promising avenues for improving clinical outcomes and minimizing the recurrence of hematomas in these dogs. By documenting this case, the report aims to provide valuable insights for clinicians, especially those managing large, active breeds prone to traumatic injuries, and to further the understanding of the role of veterinary biochemistry in managing hematomas and related complications.

Objectives of the Case Report

The primary objective of this case report is to provide a comprehensive account of the clinical management of a 1-year-old Boerboel presenting with a head hematoma. The report aims to:

1. **Document the Clinical Presentation and Diagnostic Approach:**
   - To highlight the significance of early detection and diagnosis in veterinary hematoma cases, with a specific focus on the use of physical examination, laboratory diagnostics, and microbiological investigations for accurate diagnosis.

2. **Evaluate the Efficacy of Combined Therapeutic Interventions:**
   - To assess the outcomes of medical and surgical treatments, including the use of praziquantel, penicillin-streptomycin, piroxicam, and local surgical intervention, in managing hematomas in canine patients.

3. **Explore Microbiological Findings and Treatment Sensitivity:**
   - To discuss the microbiological analysis of the aspirate, including the identification of *Staphylococcus aureus* and *Bacillus spp.*, and the relevance of antimicrobial sensitivity testing in guiding treatment regimens.

4. **Assess Post-Treatment Recovery and Client Education:**
   - To emphasize the importance of post-operative care, including client education on environmental control to prevent recurrence, and monitor the animal's recovery through regular check-ups.

5. **Contribute to Veterinary Literature on Hematoma Management:**
   - To add to the growing body of veterinary literature on the management of traumatic hematomas in dogs, particularly large breeds like the Boerboel, which may have different considerations compared to smaller dog breeds.

This case report seeks to provide valuable insights into the management of a common yet critical condition in canines, thereby contributing to clinical knowledge and potentially improving outcomes in similar cases.

Management of Hematoma in a 1-Year-Old Boerboel: A Case Report

Case Presentation

Signalment:

Species: Canine

Breed: Boerboel

Name: Tracy

Age: 1 year

Sex: Female

Weight: 24 kg

Color: Fawn

History

Tracy was acquired from Lagos in April 2024. She is fed daily with dry feed, rice, and canned food, and drinks water from a borehole. There is another dog in the compound, and her vaccination record is up to date.

Chief Complaint

The owner noticed an increased swelling on Tracy's head two weeks before presentation to the clinic (*Figure 1*).

Vital Parameters on Presentation

Temperature: 38.9°C (Normal range: 37.5°C – 39.5°C)

Respiratory Rate: 48 cycles/min (Normal range: 18 – 34 cycles/min)

Heart Rate: 116 bpm (Normal range: 70 – 120 bpm)

Physical Examination Findings

Upon physical examination, a turgid mass (8 cm length by 4 cm width) was noted overlying the sagittal crest of the skull. No ectoparasites were observed, and Tracy was alert and active.

Differential Diagnosis

- Hematoma
- Abscess
- Tumor
- Cyst

(a) (b)

Figure 1: The dog showed increased swelling on the head, a and b.

Tentative Diagnosis

Hematoma

Laboratory Investigations

Microbiology: Aspirates sent to the microbiology laboratory for culture and sensitivity.
Hematology: Full blood count (FBC) was conducted

Biochemical Analysis: Activities of oxidative stress markers (CAT, SOD and MDA) were evaluated.

Treatment Prior to Laboratory Results

- Praziwormer®: 1 tab/10 kg PO x 1/7
- Penicillin Streptomycin: 20:20 mg [1.2 ml] IM x 5/7
- Piroxicam: 0.3 mg/kg IM x 4/7

The Vital Parameters during Follow-Up Treatment

Day	Temperature	Pulse Rate	Respiratory Rate
1	38.9°C	116 bpm	35 cycles/min
2	38.1°C	136 bpm	36 cycles/min
3	38.6°C	88 bpm	36 cycles/min

Results of Laboratory Investigations

Blood was collected for laboratory tests, including a complete blood count (CBC), microbiology screening, and biochemical analysis, with the results presented below.

Hematology

The hematological parameters were within normal limits, with notable normal results in PCV, Hemoglobin, RBC count, MCV, MCH, and MCHC. However, the lymphocyte count was high, indicating possible ongoing inflammation or infection (Table 1).

Table 1: The complete blood count (CBC)

PARAMETERS	PATIENTS VALUE	REFERENCE RANGE	INFERENCE
PCV (%)	37	35 - 57	Normal
HAEMOGLOBIN (g/dl)	12.6	11.9-18.9	Normal
RBC($x10^6$/µl)	4.83	4.95-7.87	Normal
MCV (Fl)	76.6	66 - 77	Normal
MCH (pg)	26.1	21.0 -26.2	Normal
MCHC(g/l)	34.1	32.0 – 36.3	Normal
WBC ($x10^3$ µl)	14.0	5.0 – 14.1	Normal
Neutrophils ($x10^3$ µl)	9.5	2.9- 12.0	Normal
Band ($x10^3$ µl)	--		
Lymphocyte ($x10^3$ µl)	4.06	0.4 – 2.9	High
Monocyte ($x10^3$ µl)	--		
Eosinophil ($x10^3$ µl)	0.4	0 – 1.3	Normal
Platelet ($x10^3$ µl)	--		

Microbiology Screening

- Organisms Isolated: Staphylococcus aureus and Bacillus spp

- Sensitivity: The organisms were sensitive to ciprofloxacin and gentamycin.

Biochemical Analysis

The GPx (Glutathione Peroxidase) assay results demonstrated significantly increased enzyme activity on the second and third days of treatment compared to the first day of presentation ($p < 0.01$ and $p < 0.0001$, respectively; Figure 2). The CAT (Catalase) assay results showed a progressive increase in catalase activity throughout the treatment period, with the most significant difference observed on day three ($p < 0.0001$) compared to the

presentation day (Figure 3). Additionally, the MDA (Malondialdehyde) assay results revealed a significant decrease in MDA levels across the treatment period compared to the presentation day ($p < 0.0001$; Figure 4).

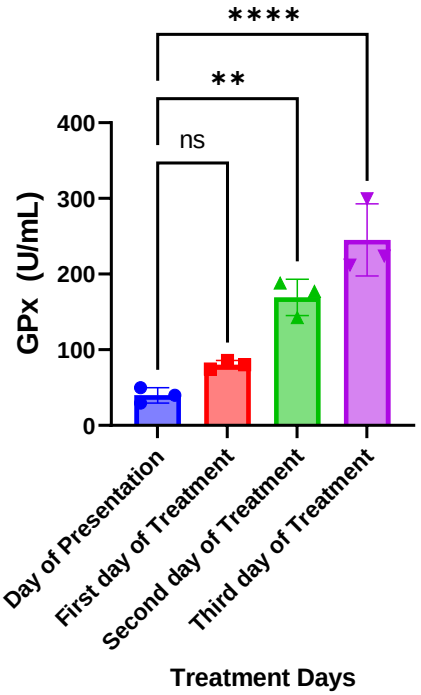

Figure 2: Activities of GPx across three days of treatment

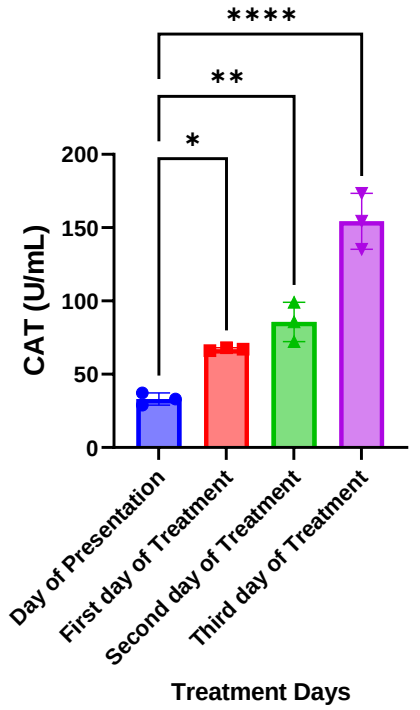

Figure 3: Activities of GPx across three days of treatment

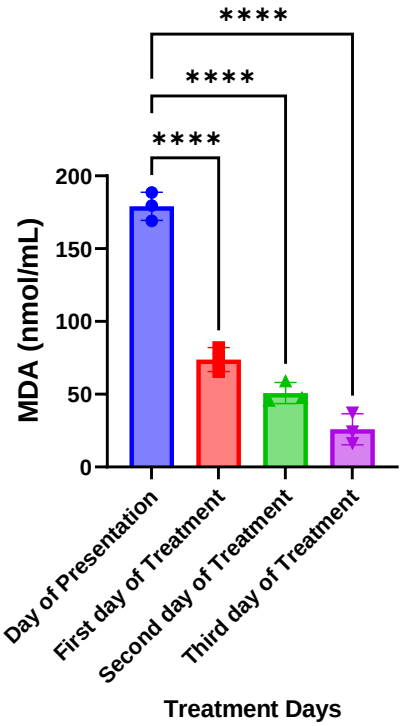

Figure 4: Activities of MDA across three days of treatment

Management and Surgical Intervention

The affected area was shaved and disinfected with methylated spirit. A 1 cm incision was made over the skin, and hydrogen peroxide was used to digest dead tissue, which was then removed with forceps. The area was flushed with normal saline, and gentamycin ointment was applied. A gauze bandage was placed to cover the area (*Figure 5*).

Figure 5: Management and Surgical Intervention

Prescription

Ciprofloxacin: 500 mg BID PO x 5/7

Client Advice

The client was advised to prevent Tracy from coming into contact with dirty environments and to return for a follow-up

check-up after 5 days.

Prognosis

Tracy's condition improved with treatment, and a follow-up examination after eight days showed positive healing progress (*Figure 6*).

Figure 6: Prognosis of Tracy

Discussion

Hematomas are a common clinical finding in veterinary practice, often arising from trauma and leading to localized accumulation of blood within tissues. They are frequently encountered in canines, particularly in active and large-breed dogs, where physical exertion and high energy levels predispose them to injury (Bell et al., 2022). This case report focuses on Tracy, a 1-year-old Boerboel, who presented with a significant hematoma on the sagittal crest of the skull, emphasizing the importance of timely diagnosis, effective intervention, and ongoing management in large-breed dogs (Kim et al., 2025).

Boerboels, known for their strength and vigor, are especially prone to traumatic injuries due to their size and activity levels. Hematomas in these breeds may be particularly challenging to manage because of their robust anatomical features, including thicker skin, substantial muscle mass, and strong immune response (Kim et al., 2025). In this case, the physical examination revealed a swelling over the sagittal crest of the skull, a common site for hematoma formation, and the size of the lesion measured 8 cm by 4 cm. Such swellings may lead to complications if not addressed promptly. In the differential diagnosis, conditions such as abscesses, tumors, or cysts were initially considered (Ugochukwu et al., 2024). However, the localized nature of the swelling and the absence of other systemic signs (such as fever) pointed towards a hematoma rather than an infectious or neoplastic cause (Yamataka et al., 2024).

The hematological findings showed only a mild increase in lymphocyte count, which is often observed in inflammatory or infectious conditions. This finding, in conjunction with the physical examination, directed the clinical focus towards managing the hematoma. While hematomas are typically benign, secondary infections or complications such as tissue necrosis or fibrous encapsulation can result in more serious outcomes, particularly in active, high-energy dogs like Tracy (Holubová et al., 2023).

Microbiological diagnostics played a critical role in the management of Tracy's hematoma. Screening identified *Staphylococcus aureus* and *Bacillus spp.* as the dominant pathogens, both of which are common in canine wound infections (Song et al., 2024). The identification of these pathogens, particularly *Staphylococcus aureus*, which is notorious for its ability to form biofilms

and exhibit multidrug resistance, highlighted the importance of antimicrobial sensitivity testing in guiding the selection of an effective therapeutic regimen (Kaikabo et al., 2025). In Tracy's case, sensitivity to ciprofloxacin and gentamicin was confirmed, which directed the postoperative antibiotic therapy. The use of ciprofloxacin in the treatment of *Staphylococcus aureus* infections is well-documented in veterinary medicine, particularly for soft tissue infections in dogs (Awandkar et al., 2022).

Additionally, the biochemical analysis of oxidative stress markers provided valuable insights into the physiological response to injury and inflammation. Increased activities of Glutathione Peroxidase (GPx) and Catalase (CAT), along with reduced levels of Malondialdehyde (MDA), a marker of lipid peroxidation, reflected a significant oxidative stress response to the trauma, consistent with findings from previous studies (Dearakhshandeh et al., 2019; Paprocki et al., 2020). This suggests that the body was actively engaging antioxidant defenses to mitigate cellular damage. The reduction in MDA levels during treatment indicated effective management of the inflammatory process, providing further validation for the chosen therapeutic protocols (Algefare et al., 2024).

The management approach for Tracy's hematoma combined medical and surgical strategies. Initial medical treatment involved administering praziquantel, penicillin-streptomycin, and piroxicam to address potential parasitic infections and inflammation, respectively (Ugbogu et al., 2024). Surgical intervention was required to drain the hematoma, remove necrotic tissue, and prevent the formation of a persistent fluid collection. The procedure involved a small incision, debridement of necrotic tissue, and irrigation with hydrogen peroxide and saline, which is consistent with standard practice for managing traumatic hematomas in veterinary medicine (Lee et al., 2019). The application of gentamicin ointment post-surgery was aimed at preventing secondary bacterial infections.

The postoperative regimen included ciprofloxacin, a broad-spectrum antibiotic with activity against *Staphylococcus aureus*. This aligns with current guidelines for the management of bacterial infections in veterinary wounds. Postoperative care also included the use of gauze bandages and regular follow-up visits to monitor for recurrence of the hematoma or any signs of infection. In large, active dog breeds, hematomas can recur if not managed properly, making postoperative monitoring and client education critical for ensuring a successful outcome (Gao et al., 2021).

Client education

Educating the client is a cornerstone of effective veterinary care, particularly in the management of hematomas. For Tracy's owner, the importance of preventing contamination during the healing process was emphasized, along with guidance on limiting Tracy's exposure to potential sources of infection. This aspect of care highlights the partnership between veterinary professionals and pet owners in managing complex conditions. Moreover, educating clients on the signs of recurrence and the need for follow-up visits ensures that any complications are addressed promptly (Buranakarl et al 2009).

Conclusion

The management of hematomas in large, active breeds like the Boerboel requires a comprehensive approach that includes accurate diagnosis, microbiological testing, and both medical and surgical interventions. The positive outcome in Tracy's case underscores the importance of early detection, appropriate antimicrobial therapy, and careful postoperative management. This case also illustrates the value of combining clinical examination with biochemical and microbiological diagnostics to guide treatment and improve outcomes. With continued follow-up care and client education, the risk of recurrence and complications can be minimized, contributing to the overall health and well-being of affected animals.

Take-Home Message

This case underscores the critical importance of early diagnosis, prompt intervention, and tailored therapeutic strategies in managing hematomas in large, active dog

breeds like the Boerboel. Key takeaways include:

1. **Breed-Specific Considerations:** Large breeds, particularly the Boerboel, present unique challenges in hematoma management due to their robust musculature and active nature, which predispose them to traumatic injuries. Early detection and breed-specific approaches are essential for optimizing outcomes.
2. **Multidisciplinary Approach:** Combining physical examination, microbiological diagnostics, and biochemical assessments (e.g., oxidative stress markers) is crucial for accurate diagnosis and guiding treatment. The integration of these diagnostic tools enhances clinical decision-making and ensures more targeted and effective interventions.
3. **Microbial Sensitivity and Antimicrobial Therapy:** Identification of *Staphylococcus aureus* and *Bacillus* spp. as causative pathogens highlights the importance of microbiological screening and antimicrobial sensitivity testing. This approach allows for the selection of effective antibiotics, such as ciprofloxacin, tailored to the specific microbial profile.
4. **Surgical and Medical Management:** A combined treatment approach—medical management with anti-inflammatory and antimicrobial agents, followed by surgical intervention for drainage and debridement—proves effective in resolving hematomas and preventing recurrence. Postoperative care, including follow-up and client education, is crucial for ensuring long-term recovery and preventing complications.
5. **Oxidative Stress Modulation:** Biochemical analysis of oxidative stress markers (GPx, CAT, MDA) provides valuable insights into the physiological response to injury and healing. Monitoring these markers can assist in assessing the effectiveness of therapeutic protocols and ensuring optimal tissue recovery.

This case contributes to the growing body of literature on the management of hematomas in large breeds and highlights the role of a comprehensive, evidence-based approach in improving clinical outcomes in veterinary practice.

REFERENCES

Ajadi, R. A., & Doyin-Dada, O. A. (2019). Preliminary evaluation of prevalence of hip and elbow dysplasia in Boerboel dogs. *Sokoto Journal of Veterinary Sciences*, *17*(2), 45. https://doi.org/10.4314/sokjvs.v17i2.6

Ajadi, R. A., Sanni, J. L., Sobayo, E. F., & Ijaopo, O. K. (2020). Evaluation of plasma trace elements and oxidant/antioxidant status in boerboel dogs with hip dysplasia. *Bulgarian Journal of Veterinary Medicine*, *23*(2), 237–247. https://doi.org/10.15547/bjvm.2185

Algefare, A. I., Alfwuaires, M., Famurewa, A. C., Elsawy, H., & Sedky, A. (2024). Geraniol prevents CCl4-induced hepatotoxicity via suppression of hepatic oxidative stress, pro-inflammation and apoptosis in rats. *Toxicology Reports*, *12*, 128–134. https://doi.org/10.1016/j.toxrep.2024.01.007

Awandkar, S. P., Kulkarni, M. B., & Khode, N. V. (2022). Bacteria from bovine clinical mastitis showed multiple drug resistance. *Veterinary Research Communications*, *46*(1), 147–158. https://doi.org/10.1007/s11259-021-09838-8

Bell, A. L., Rozanski, E. A., & Babyak, J. (2022). A multicenter retrospective comparison of trauma in toy breeds versus giant breeds: A Veterinary Committee on Trauma registry study. *Journal of Veterinary Emergency and Critical Care*, *32*(1), 26–33. https://doi.org/10.1111/vec.13136

Bonelli, M. A., Silva, I. C. C., Fernandes, T. H. T., Schwarz, T., & Costa, F. S. (2020). Acute-on-chronic subdural cranial hematoma in a dog: Case report. *Arquivo Brasileiro de Medicina Veterinaria e Zootecnia*, *72*(1), 131–135. https://doi.org/10.1590/1678-4162-10740

Dearakhshandeh, N., Mogheiseh, A., Nazifi, S., Ahrari Khafi, M. S., Abbaszadeh Hasiri, M., & Golchin-Rad, K. (2019). Changes in the oxidative stress factors and inflammatory proteins following the treatment of BPH-induced

dogs with an anti-proliferative agent called tadalafil. *Journal of Veterinary Pharmacology and Therapeutics*, *42*(6), 665–672. https://doi.org/10.1111/jvp.12805

Gao, L., Tang, Z., Li, T., & Wang, J. (2021). Combination of kaempferol and azithromycin attenuates Staphylococcus aureus-induced osteomyelitis via anti-biofilm effects and by inhibiting the phosphorylation of ERK1/2 and SAPK. *Pathogens and Disease*, *79*(8). https://doi.org/10.1093/femspd/ftab048

Han, K., Li, Y., Zhao, L., Zhao, Y., Hou, L., Evins, A. I., & Xu, T. (2024). Portable ultrasound-guided keyhole evacuation of intracerebral hemorrhage: a detailed case report highlighting technical nuances. *Journal of Ultrasound*. https://doi.org/10.1007/s40477-024-00943-3

Holubová, A., Chlupáčová, L., Krocová, J., Cetlová, L., Peters, L. J. F., Cremers, N. A. J., & Pokorná, A. (2023). The Use of Medical Grade Honey on Infected Chronic Diabetic Foot Ulcers—A Prospective Case-Control Study. *Antibiotics*, *12*(9). https://doi.org/10.3390/antibiotics12091364

Jia, T., Zhang, H., & Zeng, Q. (2024). Paralysis of the lower limbs caused by spontaneous spinal epidural hematoma: A case report. *International Journal of Surgery Case Reports*, *114*. https://doi.org/10.1016/j.ijscr.2023.109201

Kaikabo, A. A., Tanko, D. A., Ibrahim, L., & Muhammad, M. (2025). Occurrence of Multidrug Resistance in Coagulase Positive Methicillin Resistant Staphylococcus aureaus from Open Wounds in Dogs in Jos, North Central Nigeria. *Folia Veterinaria*, *69*(1), 59–66. https://doi.org/10.2478/fv-2025-0008

Kim, Y. J., Choi, D. M., Kang, J. Il, Kim, D. Y., Nam, C. S., Lee, K. S., & Park, H. M. (2025). Case Report: Idiopathic intramural hematoma of the jejunum in a French Bulldog. *Frontiers in Veterinary Science*, *12*. https://doi.org/10.3389/fvets.2025.1577989

Lee, C. F., Fan, C. W., Chiang, N. N., Chang, H. C., Chen, C., Huang, Y. S., Wang, H. Y., Lin, W. C., & Chen, F. A. (2019). Protective effect of Corchorus capsularis L. leaves on ethanol-induced acute gastric mucosal lesion in rats. *Journal of Veterinary Medical Science*, *81*(11), 1636–1642. https://doi.org/10.1292/jvms.19-0054

Nowak, A., King, R., & Anson, A. (2021). Canine calvarial subperiosteal hematomas are fluid to soft tissue attenuating mass-like lesions with smoothly marginated peripheral mineralization on CT. *Veterinary Radiology and Ultrasound*, *62*(1), 44–53. https://doi.org/10.1111/vru.12916

Palagiano, P., Graziano, L., Scarabello, W., Berni, P., Andreoli, V., & Grolli, S. (2023). Platelet- Rich Plasma Treatment Supported by Ultrasound Detection of Septa in Recurrent Canine Aural Hematoma: A Case Series. *Animals*, *13*(15). https://doi.org/10.3390/ani13152456

Paprocki, J., Pawłowska, M., Sutkowy, P., Piechocki, J., & Woźniak, A. (2020). Evaluation of Oxidative Stress in Patients with Difficult-to-Heal Skin Wounds Treated with Hyperbaric Oxygen. *Oxidative Medicine and Cellular Longevity*, *2020*. https://doi.org/10.1155/2020/1835352

Perego, R., Spada, E., Moneta, E., Baggiani, L., & Proverbio, D. (2021). Use of autologous leucocyte-and platelet-rich plasma (L-prp) in the treatment of aural hematoma in dogs. *Veterinary Sciences*, *8*(9). https://doi.org/10.3390/vetsci8090172

Roccaro, M., Salini, R., Pietra, M., Sgorbini, M., Gori, E., Dondi, M., Crisi, P. E., Conte, A., Dalla Villa, P., Podaliri, M., Ciaramella, P., Di Palma, C., Passantino, A., Porciello, F., Gianella, P., Guglielmini, C., Alborali, G. L., Rota Nodari, S., Sabatelli, S., & Peli, A. (2024). Factors related to longevity and mortality of dogs in Italy. *Preventive Veterinary Medicine*, *225*. https://doi.org/10.1016/j.prevetmed.2024.106155

Song, M., Tang, Q., Ding, Y., Tan, P., Zhang, Y., Wang, T., Zhou, C., Xu, S., Lyu, M., Bai, Y., & Ma, X. (2024). Staphylococcus aureus and biofilms: transmission, threats, and promising strategies in animal husbandry. *Journal of Animal Science and Biotechnology*, *15*(1). https://doi.org/10.1186/s40104-024-01007-6

Uddin, M. K., Islam, M. M., Hassan, M. Z.,

Rahman, M. M., Islam, M. R., Hoque, M. F., & Das, B. C. (2017). Surgical management of aural hematoma in dog. *Asian-Australasian Journal of Bioscience and Biotechnology*, *2*(3), 247–250. https://doi.org/10.3329/aajbb.v2i3.64420

Ugbogu, E. A., Okoro, H., Emmanuel, O., Ugbogu, O. C., Ekweogu, C. N., Uche, M., Dike, E. D., & Ijioma, S. N. (2024). Phytochemical characterization, anti-diarrhoeal, analgesic, anti-inflammatory activities and toxicity profile of Ananas comosus (L.) Merr (pineapple) leaf in albino rats. *Journal of Ethnopharmacology*, *319*. https://doi.org/10.1016/j.jep.2023.117224

Ugochukwu, I. C., Luca, I., Odigie, A. E., Njoga, E. O., Sani, N. A., Enam, J. S., Rhimi, W., Muhammad, S. T., Abubakar, A., Wakawa, A. M., Otuh, P., Adebiyi, T., Nwufoh, O. C., Udeani, I., Oyeleye, T., Jarikre, T. A., Idris, S. Y., Bada, A., Shehu, Z., … Shoyinka, S. V. O. (2024). Survey of Animal Neoplastic Cases Diagnosed in Nigerian Veterinary Teaching Hospitals, 2000–2017. *Veterinary Sciences*, *11*(4). https://doi.org/10.3390/vetsci11040175

Yamataka, M., Tsutsumi, S., Inami, K., Sugiyama, N., Ueno, H., & Ishii, H. (2024). Acute epidural hemorrhage following burr-hole irrigation for chronic subdural hematoma: A possible association with the diploic veins. *Radiology Case Reports*, *19*(8), 2950–2953. https://doi.org/10.1016/j.radcr.2024.04.026

Zheng, P., Zhang, N., & Chen, Z. (2024). Pulmonary abscess combined with pulmonary vein thrombosis and stroke: A case report. *Journal of Stroke and Cerebrovascular Diseases*, *33*(1). https://doi.org/10.1016/j.jstrokecerebrovasdis.2023.107461