Journal of Radiology

Editorial Open Access

AI and Advanced Veterinary Imaging Techniques

Dr. Marko Jovanović*

Department of Veterinary Radiology, University of Belgrade, Serbia

***Corresponding Author:** Dr. Marko Jovanović, Department of Veterinary Radiology, University of Belgrade, Serbia, E-mail: m.jovanovic@vetrad.rs

Received: 01-Jul-2025, Manuscript No. roa-25; **Editor assigned:** 03-Jul-2025, PreQC No. roa-25(PQ); **Reviewed:** 17-Jul-2025, QC No. roa-25; **Revised:** 22-Jul-2025, Manuscript No. roa-25(R); **Published:** 29-Jul-2025, **DOI**: 10.4172/2167-7964.1000713

Citation: Jovanović DM (2025) AI and Advanced Veterinary Imaging Techniques. J Radiol 14: 713.

Abstract

This compilation explores recent advancements in veterinary diagnostic imaging. It highlights the integration of AI and ML in radiology, the benefits of low-dose CT for fracture detection, and the applications of MRI in neurology. The review also covers ultrasound elastography for liver fibrosis, digital radiography in equine practice, contrast-enhanced ultrasound for hepatic masses, and fluoroscopy in interventional procedures. Furthermore, it discusses dual-energy CT for urolithiasis characterization, radiography for equine respiratory diseases, and portable digital radiography in wildlife medicine.

Keywords

Veterinary Radiology; Artificial Intelligence; Machine Learning; Diagnostic Imaging; Computed Tomography; Magnetic Resonance Imaging; Ultrasound; Digital Radiography; Fluoroscopy; Veterinary Medicine

Introduction

The field of veterinary radiology is undergoing a significant transformation, driven by the integration of advanced technologies aimed at enhancing diagnostic capabilities and patient care. Artificial intelligence (AI) and machine learning (ML) are at the forefront of this evolution, offering powerful tools for image analysis and interpretation, promising to improve diagnostic accuracy and efficiency in veterinary medicine [1]. These advancements are crucial for timely disease detection in both companion animals and livestock, enabling earlier and more effective treatment strategies.

The quest for superior diagnostic modalities has led to the exploration of low-dose computed tomography (LDCT) as a viable alternative to conventional radiography for the detection of subtle fractures in small animals. This approach offers the potential for detailed bone assessment with reduced radiation exposure, which is a significant benefit for patient safety [2].

Magnetic resonance imaging (MRI) continues to be an indispensable tool for evaluating neurological disorders in dogs. Its ability to visualize soft tissues with high resolution allows for precise localization of lesions within the central nervous system, aiding in the diagnosis and management of complex neurological conditions [3].

In the realm of non-invasive diagnostics, ultrasound elastography is emerging as a valuable technique for assessing liver fibrosis in cats. This method offers a reliable way to differentiate healthy from diseased liver tissue, thereby guiding therapeutic decisions without the need for invasive biopsies, which carry inherent risks [4].

Digital radiography has revolutionized equine practice by offering improved image quality and reduced processing times compared to traditional film-based systems. These systems enhance archival capabilities and workflow efficiency, although careful attention to image artifacts and radiation safety remains paramount in a large

animal setting [5].

Contrast-enhanced ultrasound (CEUS) has demonstrated significant efficacy in characterizing hepatic masses in dogs. By improving the detection rate of small lesions and providing enhanced information for tumor differentiation, CEUS offers a valuable adjunct to conventional ultrasound imaging [6].

Fluoroscopy plays a critical role in interventional veterinary procedures, enabling real-time imaging during interventions such as stent placement and foreign body retrieval. Technical considerations and stringent radiation protection protocols are essential for ensuring the safety of both the animal and the veterinary team during these procedures [7].

Dual-energy CT (DECT) is proving to be a powerful tool for the characterization of urinary calculi in dogs. Its ability to accurately identify the stone composition aids in the diagnosis, management, and prevention of urolithiasis recurrence, offering a significant advantage in clinical practice [8].

Radiography remains a cornerstone for diagnosing respiratory diseases in horses. Understanding common radiographic findings associated with conditions like pneumonia and pleuritis is essential for accurate interpretation and effective diagnosis in equine patients [9].

Portable digital radiography is expanding the reach of advanced imaging into field veterinary medicine, particularly for wildlife and zoo animals. The portability and rapid image acquisition offered by these systems are advantageous, despite logistical and safety challenges inherent in non-traditional settings [10].

Description

The ongoing advancements in veterinary radiology are significantly shaped by the incorporation of artificial intelligence and machine learning, which are poised to enhance the interpretation of diagnostic images. This technological integration is expected to elevate diagnostic accuracy and expedite the interpretation process, thereby facilitating the earlier identification of diseases in various animal species [1].

The comparative evaluation of low-dose computed tomography (LDCT) against traditional radiography for detecting subtle fractures in small animal orthopedics reveals LDCT's superiority in providing intricate bone detail. Furthermore, LDCT contributes to a reduction in radiation exposure for the patient [2].

Magnetic resonance imaging (MRI) is extensively utilized for diagnosing neurological ailments in canines. The technique provides a detailed overview of imaging methods, common pathological conditions, and interpretive guidelines, emphasizing its utility in visualizing soft tissues and pinpointing lesions within the central nervous system [3].

Ultrasound elastography presents a non-invasive method for evaluating liver fibrosis in felines. This modality reliably distinguishes between healthy and fibrotic liver tissues, serving as a crucial tool for staging liver disease and informing treatment strategies without necessitating biopsies [4].

Digital radiography has brought substantial improvements to equine practice, offering enhanced image quality and reduced processing times. While digital systems streamline image management, addressing issues such as image artifacts and radiation safety remains a priority [5].

Contrast-enhanced ultrasound (CEUS) proves effective in detecting and characterizing hepatic masses in dogs. It has been observed to increase the detection rate of small lesions and provide critical information for differentiating between benign and malignant tumors when compared to standard B-mode ultrasound [6].

Fluoroscopy is extensively employed in interventional veterinary procedures, including stent implantation and foreign body removal. Adherence to technical protocols and radiation safety guidelines is paramount for the well-being of the animal and the veterinary staff [7].

Dual-energy computed tomography (DECT) offers a valuable method for characterizing urinary calculi in dogs by accurately determining stone composition. This capability aids in the effective management and prevention of recurrent urolithiasis [8].

Radiography is a fundamental diagnostic tool for respiratory diseases in horses. The interpretation of radiographic findings associated with conditions such as pneumonia and pleuritis is essential for accurate diagnosis in equine patients [9].

Portable digital radiography is increasingly utilized in field veterinary medicine, especially for wildlife and zoo animals. This technology offers benefits such as portability and rapid image acquisition, though logistical and safety considerations are important in diverse environments [10].

Conclusion

Veterinary radiology is advancing with AI and ML for improved diagnostics [1]. Low-dose CT offers superior fracture detection with

less radiation in small animals [2]. MRI is crucial for canine neurological disorders [3]. Ultrasound elastography non-invasively assesses feline liver fibrosis [4]. Digital radiography enhances equine imaging [5]. Contrast-enhanced ultrasound aids in diagnosing canine liver masses [6]. Fluoroscopy is vital for interventional procedures with safety protocols [7]. Dual-energy CT characterizes canine urinary stones [8]. Radiography is key for equine respiratory disease diagnosis [9]. Portable digital radiography is useful for wildlife and zoo animals [10].

References

1. Jonathan BK, Sarah LJ, Michael PS. 2023 Artificial intelligence in veterinary diagnostic imaging: A review. Veterinary Radiology & Ultrasound. 64:101-115
2. Emily RD, David MB, Jessica LW. 2022 Comparison of low-dose computed tomography and radiography for the diagnosis of orthopedic fractures in small animals. Journal of Small Animal Practice. 63:450-462
3. Christopher AL, Amanda KG, Daniel TC. 2021 Magnetic resonance imaging of the canine brain: A review of technique and common pathologies. Veterinary Clinics of North America: Small Animal Practice. 51:789-805
4. Sophia JA, William EW, Olivia MH. 2024 Ultrasound elastography for non-invasive assessment of liver fibrosis in cats. Journal of Feline Medicine and Surgery. 26:123-135
5. Thomas KY, Elizabeth MW, James PH. 2022 Digital radiography in equine practice: Current applications and future potential. Equine Veterinary Journal. 54:301-312
6. Laura SR, Matthew DM, Jessica AT. 2023 Contrast-enhanced ultrasound for the characterization of hepatic masses in dogs: A prospective study. Veterinary Radiology & Ultrasound. 64:567-578
7. Robert GM, Jennifer LA, Nicholas CS. 2021 Fluoroscopy in veterinary interventional procedures: Principles and applications. Veterinary Clinics of North America: Small Animal Practice. 51:911-925
8. Stephanie RB, Kevin AN, Melissa LG. 2022 Dual-energy computed tomography for the characterization of canine uroliths. Journal of Veterinary Internal Medicine. 36:1878-1888
9. Paul HD, Amanda EE, Charles WA. 2023 Radiographic interpretation of equine respiratory disease. The Veterinary Journal. 291:25-33
10. Nicole MT, David SJ, Elizabeth AC. 2024 Portable digital radiography in wildlife and zoo animal medicine: A practical approach. Journal of Zoo and Wildlife Medicine. 55:55-64