

In-Depth Review of Animal Anatomy in Veterinary Medicine

Fatima Ayad Hasan

Sarah Kamal Naser

REVIEW

In-depth Review of Animal Anatomy in Veterinary Medicine

Fatima A. Hasan^{*}, Sarah K. Naser

Medical Laboratory Techniques Dept., Medical Technical Institute, Southern Technical University, Iraq

Abstract

This review explores the significance of animal anatomy across different fields, emphasizing both microscopic and macroscopic structures. The text covers teaching methods in veterinary medicine, with a focus on diagnostics and surgery. It also delves into various anatomical and moral issues, alongside contemporary teaching approaches. The importance of anatomy in both biological and clinical contexts continues to be central in advancing veterinary education, even with the presence of various digital tools and cutting-edge imaging technologies.

Keywords: Anatomy, Animals, Organs, Histopathology, Study

1. Introduction

1.1. Historical opinions on anatomical research

The study of anatomy is a crucial element of education in both medicine and veterinary science, often regarded as one of the most vital subjects [1–3]. This significance is largely attributed to its clear importance in surgical procedures [1,4], although the role of anatomy in all areas of healthcare it was reported widely. Previously three decades, following the release of several crucial documents from various regulatory organizations [5–7], both medical and veterinary education programs have undergone significant modernization and reform worldwide. These changes, motivated by the aim to improve clinical and professional skills training [8–10], have resulted in increasing demands on the time allocated for teaching fundamental sciences within educational curricula [3,11–13]. The question of whether or not it's medicinal and veterinary graduates are proficient in anatomy has been hotly debated before, during, and after this period of modernization [3,14–17]. A large portion of the data supporting a drop in medical and veterinary graduates' anatomical knowledge comes

from surveys asking clinical students and recent graduates to rate their readiness for the clinical setting. In a variety of fields of expertise and abilities, new Different levels of clinical practice readiness are self-reported by graduates [9]. A common complaint among clinical students is that they lack trust in their understanding of anatomy [15]. However, the majority (77 %) of medical graduates who were questioned about their anatomical knowledge said they had acquired sufficient knowledge to perform competently [18].

It is evident that some people believe because students present anatomical education is insufficient when evidence of a deterioration in graduates' anatomy knowledge is based on the judgments of more senior, and naturally specialized, clinicians [1,19]. However, there are issues with depending on professional opinions about competence. The capacity to precisely describe and evaluate individuals' anatomy education achievements is exacerbated by disagreements about what students should know. It has been demonstrated that a variety of experts hold significantly different individual opinions regarding A fourth-year medical student's required amount of anatomic understanding [15].

One of the fundamental and frequently regarded as most significant components of medical and

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* Corresponding author.
E-mail address: sara.nasser@stu.edu.iq (F.A. Hasan).

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veterinary education is anatomy [1–3]. Although the importance of anatomy for all facets of health-care has been extensively discussed [3,19], this is definitely partly because of its obvious relevance for surgery [1,4].

This review emphasizes the crucial role of animal anatomy across multiple disciplines, including the examination of both microscopic and macroscopic structures, innovative teaching methods in veterinary medicine, and its significance in diagnostic processes and surgical practices. Modern instructional techniques, as well as ethical and anatomical issues, are covered in the review. Even with the abundance of digital tools and sophisticated imaging methods, veterinary education still benefits greatly from the biological and therapeutic significance of anatomy.

The origins of the study of anatomy date back to ancient civilizations, where scholars from Greece, Egypt, and the Arab world played a prominent role in this field. In veterinary science, the study of anatomy was formally organized during the eighteenth and nineteenth centuries with the establishment of veterinary colleges. Early anatomical atlases created by artists and surgeons contributed to the standardization of anatomical references for animals.

1.2. General anatomy and functional systems of the body

General anatomy involves the study of organs, bones, and systems at the microscopic level. Veterinary medicine students study the systems of movement, digestion, reproduction, and circulation in various species. Understanding the relationship between structure and function enhances veterinarians' ability to recognize abnormalities and guide appropriate treatments.

2. Microscopic anatomy and histopathology

The use of various forms of computer-aided learning in veterinary medicine curricula has grown since the early 1990s. As processing power has increased and become more accessible in recent years, the use of virtual microscopy—which makes use of digital images—has gotten more realistic. While Dee and Meyerholz detailed the deployment of virtual microscopy in their account of teaching medical pathology, an early paper compared teaching histology to medical students using traditional microscopes and glass slides with teaching with digital slides [20]. The effective application of such techniques in instructing veterinary students, including first-year histology, cytopathology, and histopathology, has been

documented in a number of later studies [21]. Students' reactions to virtual microscopy were largely positive, according to each study, which also emphasized a number of perceived benefits over traditional microscopy, such as image quality, accessibility, collaborative learning, and time efficiency [22]. A comparison in the context of veterinary cytopathology [5] examined the applicability of virtual microscopy for assessment in addition to quantifying positive student response.

Although the exam's specifics and an instructor's score were withheld, there was no discernible difference in the performance of students using virtual microscopes compared to those using traditional microscopy [23]. Both the University of Nottingham and Bristol University's veterinary schools provide an introductory course on veterinary pathology in the third year of a five-year program [21,24]. At Bristol, histopathology is taught mostly through hands-on classes using microscopes and glass slides; in prior years of the program, some normal histology instruction was conducted virtually. The primary method of teaching histology and histopathology at the University of Nottingham School of Veterinary Medicine and Science is virtual histology (Digital SlideBox [DSB], Leica Biosystems), which is accessible to students via laptop computers. The software offers the ability to incorporate many quiz formats in addition to basic navigation features; this feature has been acknowledged as one that students value in the context of other The primary method of teaching histology and histopathology at the School of Veterinary Medicine and Science is virtual histology (Digital SlideBox [DSB], Leica Biosystems), which is accessible to students via laptop computers [24]. The software offers various quiz forms in addition to basic navigation features; in the context of some previous computer-aided learning studies, this function has been identified as one that students value [23].

Histological and cellular studies provide insights into the processes occurring at the cellular and tissue levels. These disciplines are essential for diagnosing diseases such as mastitis, enteritis, and tumors. Veterinary pathologists rely on microscopic anatomy to interpret biopsy results and post-mortem examinations.

3. Technological advancements in anatomy education

In this era of rapid change, educational methods are also continuously updated. In order to keep up with the trends, anatomy education must also be updated. Choosing which anatomy education

subjects to teach, as well as how and when to do it, is very important. Additionally, it's critical to forcefully transfer the identified information load. By combining clinical and fundamental medical disciplines, it is possible to make anatomy dynamic. Anatomy classes, which have become more and more like memorization lectures, need to be redesigned in a way that is interesting and fun for students while still being relevant to current affairs and clinical practice [25]. The primary outcome of anatomy instruction is that students acquire relatively little knowledge from the course material. Students that are given a lot of material tend to memorize what they need to know. They frequently hear or commit to memory the same words. This memorization is a cursory learning process that is readily forgotten. Students who are overloaded with information become less motivated to learn. Specifically, these findings decrease students' motivation and time to practice what they have learnt [26].

Stasis goes against the essence of education, which is a process. Because of this, it will eventually be required to change the educational models and programs used in different training facilities. Reform studies can occasionally lead to a variety of issues based on abandoning traditional educational models and programs. Emerging issues may become situations that need to be resolved or they may disappear during the adjustment process [27]. In recent years, a number of businesses and new demands for anatomical data have exposed predicted outcomes associated with computer-based prospects. For students of the younger generation, the use of multimedia resources makes the subject more appealing than unconventional sources. The purpose of these supporting materials was to increase the subject's appeal, make lectures easier to follow and comprehend, offer current and useful supporting materials, strengthen the bond between students and faculty, and improve academic achievement over the long run [28]. Animals are killed and preserved as part of macroscopic veterinary anatomy education [29]. Since the Renaissance, cadaver dissection has aided in the teaching of anatomy. The dissection approach provides students with a three-dimensional representation of animal anatomy and supports and elaborates on the knowledge that instructors have acquired. Through touch, it imparts indirect perception and manipulation skills [5]. Additionally, during courses of study, there were greater exchanges among professors and their pupils. This enables professors to identify concepts in anatomy that are obscure and how they relate to one another, as well as to

motivate students during the lecture's opening [30]. It was asserted that the current cadaver programs had some issues. Whether or not using cadavers was reliable and successful was the most significant of these issues [2].

In Europe, hundreds of thousands of animals are utilized for educational purposes. Researchers reveal that excess animal utilization in education has a major effect on total number of animals used in science. Teachers, students, and cadaver-using technicians are all at risk from the dissection procedure employed in veterinary anatomy instruction. Numerous significant issues are revealed when cadavers are handled for educational, scientific, or commercial purposes [2]. The poisonous substance formaldehyde is used to preserve cadavers. It irritates users' eyes, noses, and throats and evaporates easily. Additionally, at high doses, it causes nasopharyngeal cancer in humans [31]. Furthermore, it might potentially highlight possible health hazards including prion disorders and AIDS. However, cadaver programs are highly costly [2]. Additionally, it is asserted that cadaver dissection is an ineffective teaching tool. For instance, it is impossible to teach ear anatomy using conventional teaching methods due to the complexity of the medium and inner ears and the reality of their integration with small anatomic structures. Due to the small size of the ear pieces and the fact that the ear rests on bone, the highest level of dissection expertise is required, which is truly hard for pupils to possess [32].

3.1. Contemporary, high-quality educational substitutes

Commercially available high-fidelity models and simulations for use in veterinary education are becoming more and more common. Recent advancements in these high-fidelity models have expanded their usefulness for teaching veterinary anatomy, particularly when they are made more anatomically accurate [33]. It has also been demonstrated that a simulator works well for teaching equine cardiac dissection [34]. As an additional illustration, it has been demonstrated that a lot of students may learn to recognize the anatomy they meet during transrectal palpation without the use of cadavers or live animals thanks to the haptic cow, one of the most popular high-fidelity veterinary models [35]. Because anatomy has a strong biological foundation, its teaching strategies have improved with the use of 3D visualization technologies, online courses, and anatomical applications. Although these materials can help students learn, they cannot take the place

of the crucial practical experience. These days, AI is rarely used for anything other than image organization and adaptive learning methods.

4. Teaching approaches in veterinary anatomy

Both digital or computer-based training methods for teaching veterinary anatomy and the technology for creating 3D reconstructions of anatomical structures have significantly improved in recent years. First developed in 1991, digital databases of 3D representations of normal anatomy were used in conjunction with physical dissection to assist students better comprehend the spatial relationships between structures [36]. Later, the usage of compact discs with digital cadaver photos became more common [37]. Interactive panoramic images, a virtual veterinary anatomy application that used specimen photos, was created in the early 2000s and had interactive features to assist students in learning about the canine's dissection, osteology, and radiology [38]. When used as an adjunct, this curriculum has been demonstrated to boost students' efficiency and confidence. Later, the usage of compact discs with digital cadaver photos became more common [39]. Interactive panoramic images, a virtual veterinary anatomy application that used specimen photos, was created in the early 2000s and had interactive features to assist students in learning about the canine's dissection, osteology, and radiology [38]. When used as an adjunct to dissection, this curriculum has been demonstrated to boost students' confidence and productivity.

In recent years, a number of companies have developed anatomical software programs that mimic dissection; these include Biosphera, Sciencein3D, and Anatomage. These programs are commercially available, and there is also an open-source virtual reality headset program that enables outside contributors to add educational materials [1]. The worries of the past about programs having unrealistic visuals or low resolution have all but vanished thanks to these new programs' enhanced capabilities. Significant breakthroughs in methods like plastination have also made it possible to preserve cadaveric material for an extended period of time. Plasmination has gained popularity since its inception in 1977, and tissues preserved in this manner have longer shelf lives and fewer issues with local storage and use of embalmed cadavers, including costs, specialized personnel, facilities, and environmental risks related to formaldehyde exposure. Although it has been suggested that these be used as adjuncts with other resources, institutions who employ plastinated specimens report

that students find them to be valuable and frequently use them [40]. Additionally, it has been demonstrated that polystyrenated specimens are beneficial for teaching anatomy when acquiring intricate procedural skills like endoscopy [41]. Due to its solid biological basis, anatomy has been taught more effectively because of the use of online courses, 3D visualization tools, and anatomy Instructional tactics include cadaver dissections, plastinated models, anatomical atlases, virtual simulations, and traditional lectures. These approaches consider different learning styles and goals. Research shows that integrating multiple techniques boosts memory retention and practical skills.

5. The importance of anatomy in veterinary practice

One of the fundamental and frequently regarded as most significant components of medical and veterinary education is anatomy [1–3]. Although the importance of anatomy for all facets of healthcare has been extensively discussed [1,3,38], this is definitely partly because of its obvious relevance for surgery [1,4]. Following the release of many important documents from several regulatory authorities over the past 30 years [6,7,41]. A strong understanding of anatomy is essential in fields such as surgery, anesthesia, and diagnostic imaging. Veterinary specialists rely on anatomical accuracy to achieve optimal results during orthopedic surgery or in the analysis of X-ray images.

The Ancient Greek verb “*anatemnein*,” which means “to dissect, to cut apart,” and “*temnein*,” which means “to cut up, cut open,” is where the word “anatomy” originates [42]. The research portion of anatomy focusses on the structure of living things and is a subfield of biology and medicine. Embryology, tiny body structure, plus macroscopic (gross) anatomy comprise the entirety of anatomy. Microscopic anatomy is the examination of objects too tiny to view through a light microscope, gross anatomy the study of structures that are visible to the unaided eye, modern anatomy links morphology to function and is terminology shaped more than 2000- illustrates how Greek and Latin have influenced medical terminology.

In 1895, a group of anatomists from various areas and nations proposed a standard list of terminology taken from those used globally. About 7500 human gross anatomical structures are covered by *Terminologia Anatomica* [43].

Nomina Anatomica Veterinaria (NAV) for domestic mammals was published in 1968 by

European Society of Animal Scientists founded the International Committee on Animal Structural Terminology in 1957.

The nomenclature is based on these phrases, which were updated in the fifth edition in 2005 and made available online [43]. The anatomists created anatomical terminology with their definitions and etymologies by utilising roots, suffixes, and prefixes from the old Latin and Greek languages.

For example, the medical phrase “pericarditis” means “inflammation of the outer layer of the heart” and has prefixes before the main term and suffixes after. Three components make up pericarditis: peri-card, of which the prefix “peri” means “surrounding,” the root “card” means “heart,” and the suffix “itis” means “inflammation.” Therefore, pericarditis is an inflammation of the region around the heart, or an inflammation of the pericardium, the outer layer of the heart. Another example is antebrachium, which means arm, and ante-, which means before, so antebrachium the forearm. The study of the bones, muscles, organs, and other structures that comprise the bodies of domestic animals is known as veterinary anatomy. Knowing the normal anatomy of animals contributes in understanding the physiology of the body, establishes the surgical landmark, and facilitates the identification of disease when these structures exhibit abnormal performance [45]. The foundational scientific course required for the majority of veterinary curricula, including the Thai Veterinary Medicine curriculum, is Veterinary Anatomy. Learning and comprehending Using anatomical language can help make the connection between fundamental anatomy and the impacts alterations have on illnesses of animals, morphologic shifts in cells as well as and causes for progression. The fundamental science of anatomy is crucial in clinical courses like pathology, surgery, and medicine [46]. In addition to being divided into regions (such as the neck, thorax, abdomen, pelvis, head, and legs in the case of a dog's body), the anatomy of the body is also broken down into systems based on the functions of the organs, such as the skeletal, muscular, digestive, respiratory, circulatory, endocrine, reproductive, and urinary systems. The majority of animals depend on the skeletal system, which forms the foundation of all bodily systems. Bone and cartilage make up the skeleton, which gives the body's organs structure and protection [4].

When studying the anatomy of dogs, veterinary students are exposed to a wide variety of novel terms and names for anatomical structures, making it difficult for them to recall terminology ambiguities and name meanings. An improved comprehension

of anatomy's language makes studying it easier to understand and more engaging [44].

6. Imaging technologies such as X-ray, ultrasound, CT and MRI

Veterinary medicine has greatly improved as a result of the combination of clinical veterinary anatomy with diagnostic imaging, which has improved surgical planning, treatment approaches, and diagnostic accuracy. The foundational framework for comprehending the composition and operation of animal bodies is provided by veterinary anatomy. In addition, non-invasive techniques for visualizing these structures in both healthy and diseased conditions are provided by imaging modalities. The collaboration of these domains has enhanced the precision of illness diagnosis and opened the door for more sophisticated therapeutic techniques. Veterinary medicine is undergoing a revolutionary change as a result of ongoing developments in scanning technologies, such as statistical evaluations, multifaceted reconstructions, even higher-resolution scanning.

The 14 studies in Research Topic, “The integration of clinical veterinary anatomy and diagnostic imaging,” interdisciplinary approach, they advance our knowledge of anatomical variations, pathological conditions, and cutting-edge diagnostic techniques. Veterinary diagnostics has benefited greatly from the development of imaging technologies. Methods like Ultrasonography, electromagnetic resonance imaging (MRI), and digital tomography (CT) has become essential tools because they offer comprehensive anatomical information that makes it easier to identify diseases that are difficult to find using conventional techniques. These techniques have increased veterinarians' diagnostic capacity, enabling more accurate therapeutic treatments, better treatment monitoring, and early illness diagnosis.

One study described in detail the MRI features of a dog's atypical cervical glioma that is primarily extramedullary in distribution. The case study emphasized how crucial MRI is for distinguishing spinal tumors according to their location, size, and tissue properties, all of which have an immediate impact on treatment strategy. Their imaging results guided the surgical strategy and subsequent care by offering vital information about the tumor's compressive effects on nearby brain tissues. The study also showed that even in cases of severe spinal cord compression, there is a chance for a substantial neurological improvement after the intervention, highlighting the need of early and

precise imaging in maximising therapeutic results. And tissue properties, which have a direct impact on treatment strategy. Their imaging results guided the surgical strategy and subsequent care by offering vital information about the tumor's compressive effects on nearby brain tissues. The study also showed that even in cases of severe spinal cord compression, there is a chance for a substantial neurological recovery after the intervention, highlighting the significance of early and precise imaging for the best possible treatment results. This example illustrates the developing use of MRI in the diagnosis and treatment of complicated spine tumors in veterinary patients by fusing cutting-edge MRI results with histological validation.

CT is still a very useful technique for veterinary diagnostic imaging in addition to MRI. Through the use of sophisticated computed tomography (CT) techniques, such as cone beam, spectral CT. Researchers are increasing non-invasive evaluation methods, therapeutic approaches, and diagnostic accuracy with multidetector radiography, radiography imaging procedures, and (CBCT). Through an increasingly precise appreciation of physical as well as functional distinctions, these advancements enhance clinical decision-making in veterinary medicine.

According to one study investigated the CT and echocardiographic characteristics of a dog's congenital bronchoesophageal artery fistula and hypertrophy. Their research demonstrated the complementing functions of CT angiography and echocardiography in the diagnosis of intricate vascular abnormalities, which are frequently difficult to identify with a single imaging modality. During a normal medical examination, a 4-year-old beagle's right-sided continuous murmur was discovered. Multiple systemic-to-pulmonary shunts were discovered by further imaging, and they were surgically closed. Reduced shunt flow and ventricular overload were verified by postoperative imaging. This study highlights the use of multimodal imaging in diagnosis and treatment, offering important new information on the imaging characteristics and surgical therapy of multi-organ systemic-to-pulmonary shunts.

For imaging the equine carpal region, Hagenbach et al. contrasted multidetector computed tomography (MDCT) and cone beam computed tomography (CBCT). Their research showed that, in comparison to MDCT, CBCT offers fine-grained visualization of soft tissue and bone structures while exposing users to less radiation. CBCT proved useful for evaluating osseous structures and some intraarticular ligaments in a research involving 28 forelimbs from 15

horses, especially after contrast enhancement. Nonetheless, MDCT offered better imaging of cartilage and soft tissue structures. According to these results, CBCT is a valid diagnostic method for equine orthopedic assessments and is especially helpful in identifying musculoskeletal injuries such stress fractures and osteoarthritis early on.

7. Principled obtaining of cadavers

The implementation of alternative methodologies and the prioritization of animal welfare within academic institutions constitute critical considerations. Throughout the educational experience in anatomy, it is imperative to uphold the principles of consent dignity, and acknowledgment for individuals exposed to potential risks. Three distinct sources of It is possible to identify dead bodies to inclusion in veterinarian training schemes: (1) corpses from generally healthy but unwanted animals (such as those from animal shelters), (2) cadavers from individuals bred specifically for that purpose, and (3) cadavers donated by owners following euthanasia, accident, or natural death [28]. However, these three distinct sources are not morally equal, and we shall contend that the first two present ethical questions. Accordingly, corpse donation programs have to be the only authorised source of cadavers for veterinary education, just like they are for people [13]. The decision to use healthy but unwanted animals for veterinary education should not depend on their status, often due to bad luck, this include shelter dogs, stray cats that are not owned, rejected races dog or underperforming horse. Given that these people are more vulnerable than their "wanted" counterparts, this scenario should, if anything, demand more moral care.

This is a good analogy to the use of homeless persons in medical education: the same ethical norms that apply to non-homeless people can still be applied to them despite their circumstances.

Instead, we have a greater moral obligation to homeless individuals rather than a lesser one since they are more likely to experience moral wrongdoing [47]. Therefore, it can be claimed that the fact that an animal is the context of gathering their bodies and cadavers for veterinary education, an asylum or homeless species cannot serve as a sort of unfilled a check, using the same reasoning as for domestic species.

Since euthanasia is a medical procedure, the veterinarian must defend it by citing the animal's best interests in accordance with the principle of beneficence. One important factor that distinguishes

humane killing from euthanasia in the strict meaning (from the Ancient Greek *eu-*, “good,” and *θάνατος*, “death”) is that death must be in the animal's best interests [48]. Unwanted animals and purpose-bred animals both provide the same ethical dilemma because they deviate from the fundamental ideas of beneficence and non-maleficence that ought to guide veterinarian education and practice. Consequently, there are solid ethical grounds for thinking that neither scenario is a morally acceptable source of cadavers. As a result, we can list the medical justification for donation as the first prerequisite for an ethical collection of cadavers for veterinary education: “If an animal is alive, then there should be a medically sound reason to proceed with euthanasia (in a strict sense) before collecting the cadaver for veterinary education.” It is important to remember that a program for body donation may also veterinary education and practice. Consequently, there are solid ethical grounds for thinking that neither scenario is a morally acceptable source of cadavers. As a result, we can list the medical justification for donation as the first prerequisite for an ethical collection of cadavers for veterinary education: “If an animal is alive, then there should be a medically sound reason to proceed with euthanasia (in a strict sense) before collecting the cadaver for veterinary education.” It is important to remember that a body donation scheme can also violate this rule.

Although little is known about the history of corpse use in veterinary education especially, it is challenging to make a direct comparison between medical and veterinary training programs.

Nonetheless, it is plausible to assume that the considerations and views surrounding the use of cadavers are similar given the programs' similarities. While there are less ethical concerns associated with obtaining and utilising animal cadavers than with using human cadavers, using In medical higher education, corpses are not used completely its difficulties. These difficulties include sourcing corpse material, the possibility of pathogenic pathogens, exposure to chemical fixatives, the price of gathering and keeping specimens, as well as the moral dilemmas brought up by the use and acquisition of corpses used in veterinary procedures [49]. According to informal proof, corpses are still used extensively in animal science classes for anatomic instruction. Cadavers are also used in clinical skills labs for practical technical skill practice and in clinical and educational research in veterinary medicine. Teachers are still looking for ways to reduce or eliminate the use of cadavers; frequent strategies include assigning more students to a

single cadaver, using more prosections, and leveraging alternate teaching tools like virtual dissection tables [50]. It would be necessary to carefully consider and implement strong alternatives to remove cadavers from the curriculum because The ability to perform clinical procedures on cadaveric tissues is something that vet school pupils say they appreciate, and they see anatomy as an essential component of their clinical preparation [49].

8. Exploring future trends in veterinary anatomy

Recent innovations in veterinary science education—such as wearable anatomical sensors, AI-driven simulation platforms, have transformed teaching. Expansive digital anatomical repositories also contribute to this change. However, despite these technological strides, the cultivation of essential clinical competencies and the refinement of surgical judgment must remain central to educational priorities. Contemporary anatomy instruction still faces a range of pedagogical and logistical challenges that warrant critical reflection and strategic reform.

Anatomy education today is confronted with several pressing challenges. These include the limited availability of cadavers, the high costs associated with their preservation and storage, and the decreasing number of hours allocated to dissection in modern curricula. Additionally, curriculum developers often struggle to strike a balance between incorporating emerging technologies and preserving traditional hands-on dissection skills.

“The use of animals for scientific or educational purposes should therefore only be considered where a nonanimal alternative is unavailable,” according to EU Directive 2010/63/EU [51].

The argument put forth by those who support the careless use of animals in veterinary education is that, in addition to enhancing clinical and surgical abilities, these methods will help students comprehend topics like anatomy and physiology.

However, there are alternative approaches to achieving these goals that use a different paradigm that upholds high ethical standards while also giving students the practical knowledge and abilities needed to create skilled professionals [28]. The development of exceptional veterinary surgeons requires more than just scientific knowledge and clinical proficiency; as professionals, veterinarians also need a deep comprehension of animal behavior to identify emotional and pain factors linked to distressed states [2].

9. Conclusion

Anatomy continues to be a vital component of veterinary education, serving as a link between scientific knowledge and the practice of medicine. Even with the quick development of computer programs, sophisticated approaches to imaging, as well as lifelike models, more conventional methods like amputation and histology still offer invaluable experience utility. In order to guarantee that students not only get theoretical information but also develop critical diagnostic, surgical, and interpretative abilities, modern curricula must embrace a balanced integration of traditional approaches with cutting-edge technologies. This procedure must continue to be centred on ethical issues related to cadaver collection and animal care in order to promote ethical professional practice. In order to educate graduates for the complex difficulties of modern veterinary medicine, veterinary anatomy education should be based on a constantly evolving, focused on learners structure that integrates practical skills, innovation in technology, and moral integrity.

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Conflict of interest

No conflict of interest.

Ethical Approval

Research was approved by Medical Basra Technical Institute, Southern Technical University.

Data Availability

All relevant data are included within the review.

Author Contributions

Fatima Ayad Hasan: Writing - Original Draft. Sarah Kamal Naser: Writing - Review and Editing. Both authors reviewed the results and approved the final version of the manuscript.

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