Brief Communication

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The relevante of anatomical dissection-based in 21st century

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ABSTRACT

Nowdays human anatomy is no longer considered a dissection-based reaserch-line discipline. Human anatomy teaching/learning is confrorting a significant chance pushed by emerging technological innovations among others Artificial Intelligence apps, Virtual and Augmented reality. But a possible disadvantage of these novel technologies concers the absence of tactile feedback.

Key Words: *Anatomical; dissection; surgical; anatomy; medical school*

For centuries, the whole idea of human *anatomy* teaching/learning is all about anatomical dissection of the human body. In the western civilisation, the first documented systematic anatomical dissections on the human body were carried out around the third century B.C. in Alexandria by Herophilus and Erasistratus. Later on, the anatomical dissection was banned for about 16 centuries. After many centuries, anatomical dissection received legal support across Europe between the eleventh and fourteenth centuries, most countries had low limits on how many anatomical dissections could be performed per year and most allowed only criminals to be the subjects of dissection [1,2]. Between the15th and 20th centuries AD, the performance of anatomical dissection became a widespread form of medical education and the demand for cadavers steadily increased among anatomical schools worldwide, while supply remained limited by legal statute. For the first time in western culture in the United Kingdom the application of the Anatomy Act of 1832 allowed the legal use of unclaimed cadavers to be used as dissection materials. Later this law inspired other laws on this subject in different countries [3]. For generations, the use of cadavers has been the main pillar for teaching/learning human anatomy [4,5]. However, causes such as lack of time to dissect, limited availability of dead bodies, difficulties imposed by the ethical issues for their use have left the medical students and surgical residents with the option of using pre-dissected/prosected specimens of cadavers. The 21st century has incorporated the use of emerging technological innovations, such as Artificial Intelligence apps, 3D models, online resources, augmented reality, virtual reality simulations, and social media for their study. But Anatomical dissection gives medical students first-hand experience in seeing the subject matter. This unique hands-on learning environment can impart an appreciation and understanding of human anatomy, unparalleled by second-hand teaching techniques such as novel technological innovations. The human body is three-dimensional, so seeing and dissecting it gives you a framework to images you see in textbooks, lectures, scans and the emerging technological innovations, which strengthens the teaching/learning experience. The procedure of anatomical dissection still delivers medical students and surgical residents the chance to employ the cadaver for mastering structural knowledge and to develop active learning skills [6,7]. Anatomical dissection exposes medical students to variability of human bodies. This variability helps them appreciate individual differences. Understanding that all bodies are unique is essential in

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medical and surgical practice. But this should have not included the researches of anatomical ultrastructure by professors which claim to turn their outstanding findings in the basic sciences into tools for instructions, reforms and educational policies in anatomical fields. A specific diagnosis of this worrying state of affair exposes more than counterproductive rift in the ranks of medical scientists [8]. The cadaver is the medical student's 'first patient', giving them the chance to perform the professional skills they'll be required to master before they see their real patients. By dissecting a cadaver, the medical student confronts the reality of life, morbidity and mortality, and the responsibility of a medical doctor. Current medical students are the first generation to born in a world of widespread access to the internet by computers, mobile devices, tablets, smartphones, smartwatch and other electronic devices. They are constantly hyper-connected all day long [9]. Medical students (future medical doctors and surgeons) need to know quite enough human anatomy to examine, diagnose and treat patients. But the times are changing and human anatomy is no longer considered a dissection-based, research-led discipline. In the 21st century, human anatomy teaching/learning is confronting a noteworthy change driven by the emerging technological innovations, such as Artificial Intelligence apps, augmented reality, virtual reality simulations, 3D models online resources and social media. But nowadays, there is no agreement on the best methods for teaching/learning human anatomy [10]. Currently, anatomical dissection is complemented by the emerging technological innovations. Within these technological innovations for example, augmented reality allows the presentation of anatomical models in 3D while preserving the user's awareness of their direct surroundings. Virtual reality can provide medical students with a new way of interacting with complex structures and systems that are impracticable with traditional resources, such as cadavers and anatomical atlases. Artificial intelligence algorithms may improve the accuracy and efficiency of anatomical imaging interpretation. The Anatomage Table system can visualize internal and surface anatomy in 3D space dynamically, with high resolution and great accuracy, from performing cuts and exploring anatomical systems to rendering volumes for 3D analysis (6,7). Among social media, YouTube, Instagram, X (former Twitter) and others can display pre-recorder lecture, didactic charts and diagrams and high resolution videos with real human anatomy images. But a possible disadvantage of all these emerging technological innovations concerns the absence of tactile feedback. In the field of embryology, several artificial intelligence-based methods have emerged as objective, standardised, and efficient tools for evaluating human embryos. This emerging technological innovation can be implemented for other clinical aspects of in vitro fertilisation, such as assessing patient reproductive potential and individualising gonadotropin stimulation protocols. As artificial intelligence has the capability to analyse "big" data, the ultimate goal will be to apply artificial intelligence tools to the analysis of all embryological, clinical, and genetic data in an effort to provide patient-tailored treatments (11). Although the literature review revealed that the majority medical students use apps covering anatomy, they prefer traditional cadaveric teaching to other technological interventions (12). These new technological innovations will not replace anatomical dissection but complement it. However, these emerging technological innovations can certain change the profile of human anatomy teaching/learning. Nevertheless, anatomical dissection will continue to be relevant in human anatomy teaching/learning process in the 21st century.

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