

ANATOMY TEACHING TO SPORT SCIENCE STUDENTS

ANATOMIA E DIDATTICA NELLE ATTIVITÀ MOTORIE E SPORTIVE

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Abstract

Anatomy has historically been a cornerstone in medical education regardless of nation, racial background, or medical school system. By learning gross anatomy, medical students get a first "impression" about the structure of the human body which is the basis for understanding pathologic and clinical problems.

Gross anatomy classes are still regarded as an integral part of human biomedical education worldwide.

Dissection of the human body is practiced in most anatomy institutions worldwide despite increasing pressure to reduce material and staff costs, regardless the ongoing debate concerning the suitability of body donors for medical education. Moreover, anatomical teaching skills are also evolving and need to be tailored for the different areas of anatomical expertise students have to acquire therefore, anatomic dissection goes probably beyond the scope of anatomy teaching in some classes such as sports sciences.

However, there is no doubt that a practical approach to the study and teaching of anatomy is surely preferable to basic ex cathedra anatomy lectures. Here, we propose a brief insight into new teaching methods suitable for sports sciences students.

L'anatomia umana è da sempre considerata la scienza di elezione sulla quale costruire una carriera medica in qualunque ambito e, pertanto, il suo studio costituisce ancora oggi una parte consistente dei corsi di studio nelle discipline biomediche nel mondo.

Lo studio dell'anatomia umana tramite la dissezione su cadavere continua, inoltre, ad essere considerato il metodo di elezione per l'insegnamento della materia nonostante i notevoli costi economici e le questioni etiche.

E' tuttavia indubbio che l'insegnamento della materia debba essere adattato alle competenze che gli studenti devono acquisire nei diversi corsi di studio.

A tal proposito viene quindi proposto una breve esamina degli approcci pedagogici usati nell'insegnamento dell'anatomia umana agli studenti di Scienze Motorie, in ambito internazionale

Keywords

Anatomy, Education, Sport Sciences
Anatomia, Educazione, Scienze Motorie

Introduction

“There is no single method that can function as an answer for how anatomy should be taught.it is not about the method you are using, but about how you are using it.” (Bergman, 2015).

In an analysis of teaching and learning, it is necessary to examine the curriculum, the mode of teaching, the quality of how it is delivered, and the infrastructure within which it is delivered (Papa & Vaccarezza, 2013)

Anatomy has historically been a milestone in medical education regardless medical school system. By learning gross anatomy, medical students learn the morphology of the human body and the relations between the structures as well as their special relationships.

Towards the end of 20th century dissection was the core basis in medical education. Even today defining the exact anatomical site of a lesion is crucial for a physician to resolve a problem effectively and safely (Veronica Papa et al., 2019). Gross anatomy classes are therefore still regarded as an integral part of human medical education worldwide. Dissection of the human body is in fact maintained in most anatomy departments despite the increasing pressure to reduce material and staff costs and the ongoing debate concerning the suitability of body donors for medical education. The ways in which medical educators teach the subject is also evolving: traditional anatomy education, based on topographical structural anatomy taught in lectures and gross dissection classes, has been replaced by a multiple range of study modules, including problem-based learning, plastic models or computer-assisted learning and curricula integration (Papa & Vaccarezza, 2013; Periya, 2017; Yammine, 2014).

One of the greatest challenges in anatomical studies is gaining appreciation of the three-dimensional nature of anatomical structures and their positional relationships. Achieving this from books and two-dimensional imaging is difficult and is therefore supplemented with the study of cadaveric specimens or plastic models.

Although we and other strongly suggest that dissection and prosection might still be considered the gold standard for anatomy education, it is also undoubtedly true that the teaching of anatomy should be arranged according to the different skills students need to use in their future practice. Anatomic dissection is therefore not only unsuitable for musculoskeletal system training (due to protein fragmentation (Hayashi et al., 2014) but even beyond the scope of anatomy teaching in some classes such as sports sciences.

Moreover, an unresolved question in modern anatomy teaching (and, even more importantly, learning) is the validity of different anatomical pedagogies and the supposed to be superior effectiveness of dissection versus other tools that are now extensively utilized in biomedical education (McMenamin, Quayle, Mchenry, & Adams, 2014; Meral Savran et al., 2015). Of note (and probably surprisingly), dissection was not superior (and neither inferior) to other teaching tools in anatomy learning as stated by Wilson and coworkers in 2018 (Wilson et al., 2018) and the use of non dissection-based learning tools was not detrimental for students in their academic performance (Vaccarezza, 2018).

Furthermore, there is no doubt that a practical approach to the study and teaching of anatomy is surely preferable to basic ex cathedra anatomy lectures especially in such classes in which dissection is beyond the scope and meanwhile anatomy is basely taught by lectures, such as undergraduate sport science course in non-English countries. Here, therefore, we propose a brief insight into new teaching methods suitable for sports sciences students.

1. Augmented Virtual Reality/3D anatomical software

Anatomical learning is best done in a setting where desired structures can be examined from all angles (Moro, Štromberga, Raikos, & Stirling, 2017); In response to technological advancements, varieties of multimedia information delivery tools have been developed and are currently in use to enhance students' learning outcomes. These supplementary materials include

podcasts, screencasts and educational software available for use on a personal computer and mobile devices, such as smartphones and tablets.

With advances in educational technology these traditional resources can be supplemented by interactive multimedia learning tools (Trelease, 2016) primary anatomical sciences education was relatively unenhanced by advanced technology and dependent on the mainstays of printed textbooks, chalkboard- and photographic projection-based classroom lectures, and cadaver dissection laboratories. But over the past three decades, diffusion of innovations in computer technology transformed the practices of anatomical education and research, along with other aspects of work and daily life. Increasing adoption of first-generation personal computers (PCs) and interactive software that can be accompanied with both auditory and visual information (Taveira-Gomes, Severo, & Ferreira, 2016).

Some advantages of 3D anatomical models in comparison to textbooks or traditional 2D learning modes include enhanced spatial understanding of the inter-relationships between different body structures (Huang & Liaw, 2018). It has been established that exploration of a virtual environment can help to develop spatial knowledge, with the representations being nearly as accurate as those being formed when exploring an object in real life (Hedberg, Harper, & Dalgarno, 2002).

2. Wax models

In 2010, Mazzotti and coworkers, (Mazzotti et al., 2010) studying the *Venerina* a wax removable model by Clemente Susini, clearly demonstrated the proper use of an anatomical model for teaching and diagnostic purposes. Furthermore, Galassi et al. (Galassi, Ruggeri, Petti, & Ashrafiyan, 2015), examining the whole Bologna collection, stressed the importance of anatomical waxes and suggested a reintroduction of these models in the medical curriculum.

Here we suggest that the study of ceroplastic models should be reconsidered as an integral tool in expanding students' understanding of human anatomy.

3. Teach surface anatomy from ancient statues

According to Lambertini, in fact, (1936): “often missing in the teaching of anatomy is the in vivo topography of the muscle so that the student does not appreciate the value of the muscle in a dynamic and aesthetic way and therefore s/he is unable to catch its functional value properly”.

A recent research (Veronica Papa et al., 2019) has outlined the chance to use classic artworks as possible tool to teach and train surface anatomy to sport science undergraduate students.

Anatomy courses are often delivered to sport sciences undergraduates as basic classes during the first and the second year. Unfortunately, in undergraduate courses such as sports sciences (especially in non-English speaking countries such as Italy) practical sessions are less and less implemented, meaning that presentation notes, textbooks, atlas or 3D devices are the only learning tools available for students. Greek and Roman sculptures generally belong to the type of statues depicting an athletic body combined with a face portraiture and thus reflects the aesthetic concept which aimed to give a heroic aura to eminent Romans through athletic nudity. These properties render these sculptures and their 3D- moving posture a valuable tool for teaching surface anatomy.

Conclusion

We therefore strongly suggest anatomy to be integrated vertically into medical education so that students are exposed to anatomy teaching throughout undergraduate (preclinical and clinical), postgraduate, and later in professional training. Modern digitalized methods of teaching anatomy are undoubtedly useful.

Moreover newly developed techniques such 3D-anatomical software, as well as classic artworks and wax models, should be used to enhance and support anatomical teaching and learning in medical education.

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