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REMOTE TEACHING OF ANATOMY OF THE LOCOMOTOR SYSTEM

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Abstract: Due to the Covid-19 pandemic, anatomy classes of the locomotor system were taught via synchronous remote classes in online mode for the Physiotherapy course at ``Universidade de São Paulo``. In these classes, pedagogical methods were created to improve the teaching-learning process, such as: “Minute of Reflection”, “Anatomical Challenge”, slides with anatomical parts and video presentations of practical classes, such as Google Forms exercises answered in thematic rooms. 75 hours of locomotor system anatomy were taught in the 1st semester of 2021. It is concluded that the use of resources contributed to the satisfaction and learning of the synchronous locomotor system anatomy classes.

Keywords: Human Anatomy, Anatomy of the Locomotor System, Active Teaching, Teaching-learning process, synchronous online classes

INTRODUCTION

Human anatomy is recognized as one of the important disciplines for medicine and other health professions in which professionals such as doctors develop their skills (Craig et al., 2010; Granger, 2004). For this reason, it is important that a deep and complete understanding of anatomy is acquired, which results in safe practice in the clinical environment, specifically in the surgical area (Estai, Bunt, 2016). Teaching is a process that undergoes constant evolution, adjusting to various external factors, producing revised approaches that improve the learning method; This is also factual for teaching anatomy (Estai, M.; Bunt, S., 2016).

To teach anatomy effectively, the teacher must constantly review their teaching approach (Moxham, Plaisant, 2007). Constant analysis is also important, as it helps to acquire better approaches, as well as tools that best suit the educational activity (Moxham, Plaisant,

2007). Recently, a decrease in traditional cadaver-based teaching has been described, which is triggered by a shift in system-based or integrated curriculum (Drake et al., 2009). Cost factors, religious beliefs, and temporal factors also contribute immensely to this reduction. Furthermore, it is also worth saying that not much time is devoted to teaching anatomy in medical institutions (Drake et al., 2009).

Brenner et al. [2003] classified teaching tools into six categories: 1) dissection performed by medical students, 2) use of prosection (previously dissected pieces), 3) instruction and didactics, 4) the use of models, 5) learning based on technology, such as computer-based and 6) the use of radiological examinations and the use of the living in anatomy teaching (Tibrewal, 2006). Considering the changes that have occurred in the anatomy curriculum, many studies have explored the attitude of anatomy teachers and students towards teaching modalities (Azer, S.A.; Eizenberg, 2007; Kerby et al., 2011; Moxham; Plaisant, 2010).

In addition to the challenges related to online education, the COVID-19 pandemic also concerns the future of anatomy students. Working with cadavers is considered a crucial part of teaching anatomy and contributes greatly to becoming a professional, whether as a biomedical scientist, dentist or doctor (Smith et al., 2014). The clinical application of anatomical knowledge is essential for the future of healthcare professionals (Collins, 2008; Maani et al., 2023).

Furthermore, in relation to anatomy education, the lack of possibilities to learn about cadavers and perform dissections by students significantly affects learning outcomes (Singal et al., 2020). In addition to educational aspects, increasing feelings of loneliness and isolation have influenced academic achievement and learning during

Covid-19 (Phillips et al., 2022). When comparing students' academic performance before and after Covid-19, a worsening in learning was observed (Salman et al. 2022).

Harmon et al. (2021) showed through a questionnaire with teachers who taught anatomy before and during the Covid-19 pandemic, they demonstrated that teachers used cadavers in laboratories before the pandemic and that during the pandemic there was use of digital platforms and virtual media in teaching anatomy and was used by students.

The objective of this work was to develop pedagogical strategies to facilitate the teaching-learning process in remote online teaching in anatomy classes of the locomotor system during the Covid-19 period.

MATERIAL AND METHOD

The subject Anatomy of the Locomotor System was taught to students in the 1st semester of the Physiotherapy course at ``Universidade de São Paulo``, there were 25 students. The subjects consisted of 75 hours, with classes being taught on Fridays from 8:00 to 12:00 from March to July 2021. In June 2021, Thursdays were also taught in addition to Fridays.

With the Covid-19 pandemic, it was necessary to adapt anatomy teaching with the use of synchronous online or recorded classes. The synchronous classes were recorded and made available on the Google Classroom and MedUSP Digital platforms. Additionally, some topics were made available in recorded class format.

The pedagogical strategies used were:

- a) To maintain student-teacher interaction, it was decided to use remote synchronous classes.
- b) Use of anatomy atlas figures and photos of anatomical parts. So that students would not lose contact with the practical anatomy classes, the slides for the synchronous

classes were made with photos of anatomical parts used in the laboratory.

c) To have student participation in the Synchronous class, the "Anatomical Challenge" was created using the Mentimeter.

d) To have student participation in the Synchronous class, a "Minute of Reflection" was created, which consisted of every 15 to 20 minutes of class, it was interrupted, and 1 minute was given for students to revisit the material taught. From this period onwards, students had doubts that were resolved by the teacher.

e) Use of practical class videos. To ensure that students did not miss the content of the practical classes on anatomy of the locomotor system, videos of practical classes on anatomy of the locomotor system were shown during the synchronous classes. These videos were made in the practical anatomy laboratory of the Department of Anatomy of the Institute of Biomedical Sciences of ``Universidade de São Paulo``. The videos were made available on the digital MedUSP Platform.

f) For fixing the anatomical content. Google Form was used to respond individually or in groups in themed Google Meet rooms. After teaching the class, to establish the concepts of anatomy of the locomotor system, a Google Form was created with photos of the anatomical parts or figures and correspondence exercises for the students to respond to.

RESULTS

Figures 1 and 2 demonstrate what classes were like in synchronous reassembly mode.

Figure 3 shows the presentation of a video made in the anatomy laboratory to demonstrate the locomotor system in the remote class.

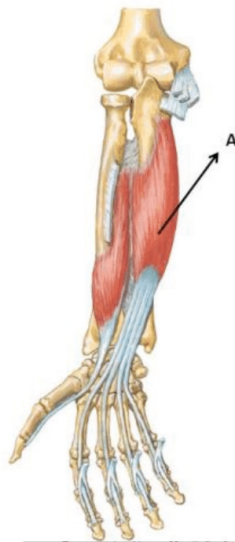
Figure 4 demonstrates an example of the

“Anatomical Challenge” carried out using the Mentimeter.

Figure 5 shows a slide, which was presented at the end of each class, in which the students achieved the objectives determined in the class.

Figure 6 shows an example of a Google Forms exercise in which students performed in groups divided into thematic rooms on Google Meet in the synchronous class part to fix the anatomical content.

4 – Name the correct alternative marked in the letter A



Front side: Netter – 3rd edition – front side

- m. deep flexor of fingers
- m. superficial flexor of fingers
- m. ulnar extensor of the carpus
- m. extensor of the fingers

Figure 6: It demonstrates an example of a Google Forms exercise in which students performed in groups in the synchronous part of the class to establish the anatomical content. Photo: Patricia Castelucci

DISCUSSION

This work analyzed the teaching of Locomotor Apparatus anatomy during the Covid-19 pandemic. The anatomical content was taught in synchronous or recorded classes. Various active teaching methods were used to create pedagogical resources for student-teacher interaction, as well as facilitating the teaching-learning process. The resources created and used were “Minute of Reflection”, Anatomical Challenge, use of videos of practical anatomy classes and figures of anatomical parts.

Faculty who teach anatomy have felt recent pressures from challenges in medical education, with limited resources to teach diverse groups of students (Tworek et al., 2013). Furthermore, it is important for the anatomist to explore active teaching methods that explore deeper learning and develop long-term memory of anatomical knowledge for the professional objective (Ward, 2011; Dias, 2013; Guimaraes et al. 2017).

In the present study, resources used in teaching anatomy of the locomotor system in synchronous classes with the use of videos were qualitatively evaluated, among others, the majority of students liked the videos and other resources, and that the use of these could have contributed to the retention and recognition of anatomical structures. The literature on anatomy teaching has demonstrated that the use of resources that favor the teaching-learning process is recognized by students as very good (Brenner et al. 2003; Estai & Bunt, 2016; Ramman & Pound, 2017; Singh et al. 2019). Furthermore, studies demonstrate that students like resources that facilitate the teaching-learning process (Kerby et al. 2011; Diaz, 2013; Ramman & Pound, 2017; Lewis et al. 2014; Singh et al. 2013, 2019).

Studying human cadavers has advantages such as improving learning, preparing students for their clinical training, preparing

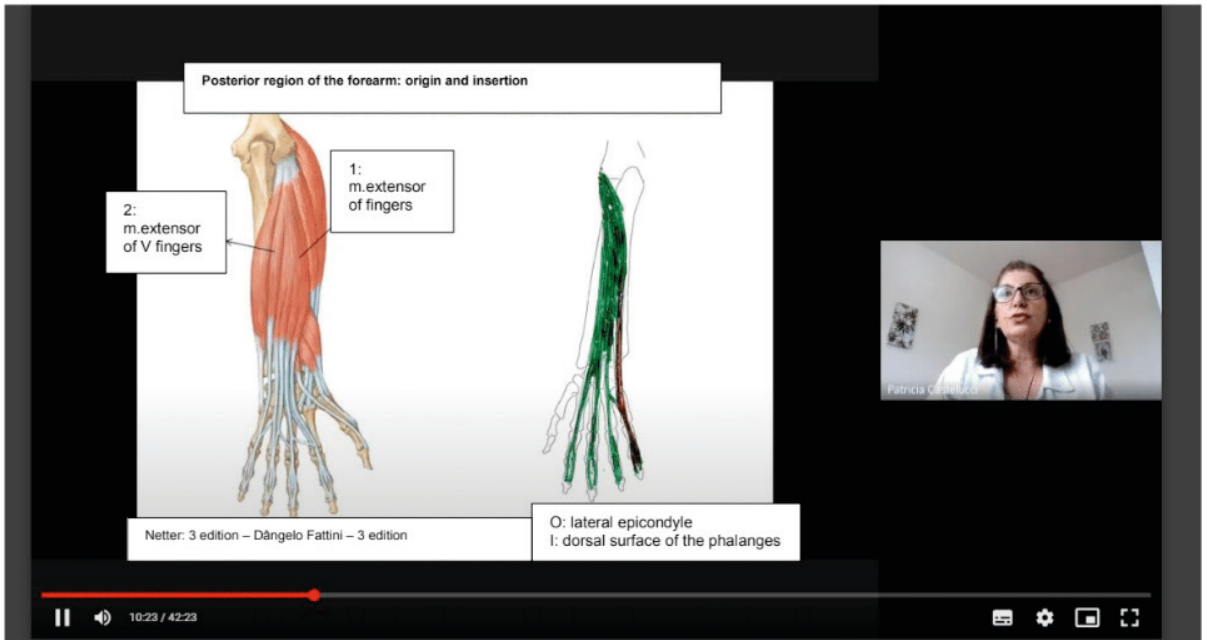


Figure 1. Synchronous anatomy demonstration class. Photo: Patricia Castelucci

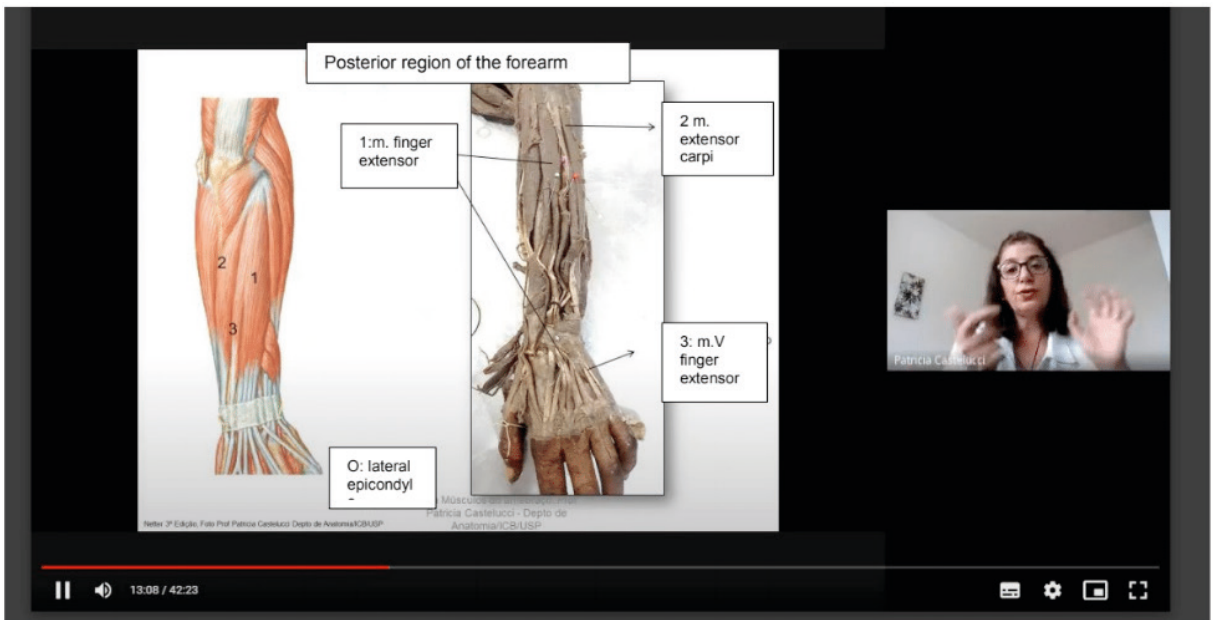


Figure 2: Synchronous anatomy demonstration class. Photo: Patricia Castelucci



Figure 3: It demonstrates a demonstration of a video made in the anatomy laboratory in the synchronous remote class. Photo: Patricia Castelucci

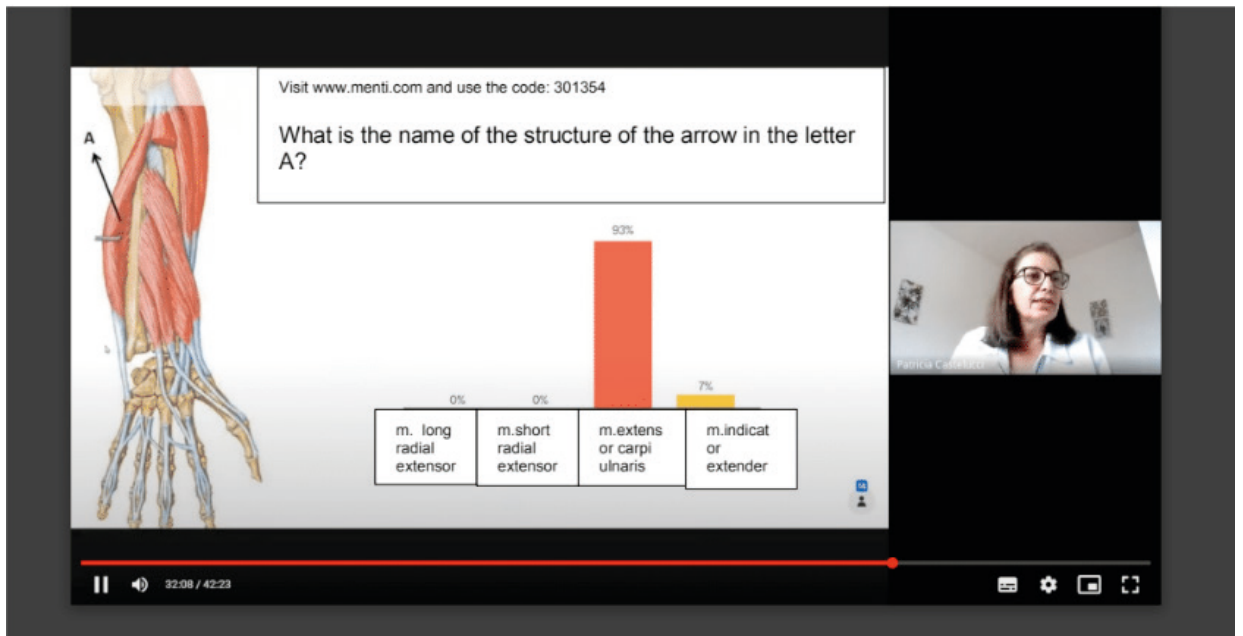


Figure 4. It demonstrates an example of an “Anatomical Challenge” using Mentimeter during a Synchronous Class. Photo: Patricia Castelucci

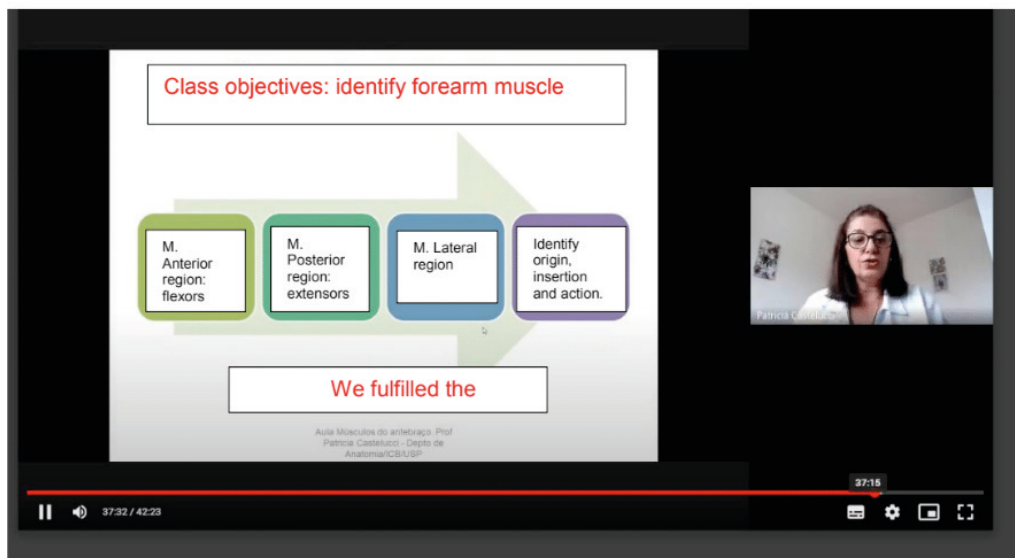


Figure 5: It demonstrates remote synchronous class with the objectives of the class, this slide was demonstrated at the beginning and end of the class. Photo: Patricia Castelucci

for news of death, mastering manual skills and having a solid knowledge of the association between the symptoms experienced by the patient and the pathology, in addition to develop medical professionalism, such as empathy, strategies for dealing with stress, and teamwork competence (Azer; Eizenberg, 2007; Bockers et al., 2010; Fruhstorfer et al., 2011; Maani et al., 2023).

Nowadays, due to Covid-19, anatomy teaching has been impacted due to the traditional way of teaching based on present teaching and anatomy laboratory components. The authors Harmon et al. (2021) studied changes in anatomy teaching and anatomy laboratory instructions during the pandemic period. They observed that the use of digital resources increased during Covid-19, with an increase in the use of Platforms for synchronous

meetings and the use of Complete Anatomy software, demonstrating the ability to adapt in anatomy teaching. Additionally, during this period the changes included implementing the PBL online discipline program in anatomy classes (Alkhowailed et al., 2020).

From the present work it is concluded that the use of active methods in teaching anatomy in synchronous classes in remote mode was effective in improving the satisfaction of the subject as well as the retention and learning of the anatomy of the locomotor system.

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