Spring 5-6-2022

The Effectiveness of Using the Anatomage Table as a Learning Adjunct to Peripheral Nerve Blocks Among Student Registered Nurse Anesthetists

Paige Dickey
Southern Illinois University Edwardsville

Melissa Gerlach
Southern Illinois University Edwardsville

Mary Zerlan
Southern Illinois University Edwardsville

Executive Summary

Title

The Effectiveness of Using the Anatomage Table as a Learning Adjunct to Peripheral Nerve Blocks Among Student Registered Nurse Anesthetists

Authors

Paige Dickey and Melissa Gerlach

Introduction to the Problem

Student registered nurse anesthetists (SRNAs) are clinically trained to perform invasive procedures in practice such as neuraxial anesthesia, tracheal intubation, arterial line placement, peripheral nerve blocks, and other technical skills. Mastering the concepts of anatomy are imperative to learning these techniques. Historically, institutions have used cadaver labs to provide real-life simulations and visual aids to students before entering their clinical training. However, not all programs have the financial means, time, or space to maintain a cadaver lab. The Anatomage Table (AT) is a body-size computer table that uses virtual cadavers based on real cadavers that have been scanned (via Computed Tomography (CT) scan, Magnetic Resonance Imaging (MRI), X-ray, and ultrasound) and converted to virtual format (Martin, Mora, & Henche, 2018). The AT provides rich anatomy content and allows students to dissect, visualize, and reconstruct virtual cadavers.

The use of peripheral nerve blocks (PNB) in anesthesia has been a rapidly rising over the last several years. This increase can be partially attributed to the growing evidence of the benefits of minimizing or eliminating opioid use (Albrecht & Chin, 2020; Turbitt et al., 2020). Regional anesthesia can reduce patient morbidity and mortality, improve mobility, and decrease the length of hospital stays.

The Southern Illinois University Edwardsville Nurse Anesthesia program contains a pain management practicum to provide SRNAs with additional education to manage chronic and acute pain patients. The development of these skills begins in the classroom with substantial gross anatomy knowledge. High-fidelity simulation with the AT serves as an alternative to using real live patients and allows them to learn from their mistakes without causing any harm (Al-Elq, 2010). During the pain management rotation, the SRNAs provide interventions in practice, such as administering quality PNBs.

The SRNA 2023 cohort started the clinical portion of the program in June of 2021. The topic of regional anesthesia is not reviewed didactically in the program until the following spring semester. With various clinical sites across the state, some students were exposed to peripheral nerve blocks, ultrasound, and other regional anesthetic techniques more than other students among the cohort. The lack of access to ultrasound use and limited or no exposure to the administration of PNBs in certain clinical settings were limitations to the base knowledge of regional anesthesia before this workshop.

Literature Review

Anatomage Table

To become a safe provider of PNBs, a solid knowledge of underlying anatomy is essential. The AT provides multiple functions for users to utilize when exploring the human body's anatomy. For instance, users can take away structures systems, "undo" the dissection or remove structures by merely tapping the touchscreen table to edit any mistakes (Life University, 2015). In addition, users can dissect the cadaver using a virtual scalpel and observe anatomy from any plane or axis view (Anatomage, 2018).

Student Learning

For individual students who cannot participate in cadaver dissections or those programs that cannot afford to maintain a cadaver lab, the AT provides an equal educational opportunity for learning the anatomy of the human body (Washmuth et al., 2020). In a 2013-2014 study at Curtin University, students rated the AT as the most helpful educational tool for learning human anatomy and organs' relative size (Fyfe et al., 2018). The AT can help students broaden their gross anatomy knowledge base and produce higher exam scores.

Peripheral Nerve Block Anatomy

Regional techniques have been shown to help critically ill patients, provide analgesia in rescue or emergency situations. They can be used as pain adjuncts to decrease opioid use for surgical patients. Throughout the literature review, regional anesthetic techniques, more specifically PNBs, have attributed to significant pain relief and hemodynamic stability.

Students have rated the AT as a valuable educational resource, which improves exam scores, understanding of anatomy, and technical skills (Frendo et al., 2020). Incorporating the AT to learn and identify the various anatomical landmarks in the upper and lower body used in PNBs, SRNAs will enhance their knowledge base for the detailed anatomy of the landmarks commonly used in regional anesthetic procedures before entering the clinical field.

Project Methods

This project was a non-experimental, educational improvement project for the Southern Illinois University-Edwardsville (SIUE) Nursing Anesthesia program. This project aimed to develop a self-guided supplement to the PNB curriculum. The sample included second-year nurse anesthesia students entering the clinical setting. Students attended a short workshop detailing landmark identification for five PNBs utilizing the AT. Prior to the start of this project,

the Institutional Review Board (IRB) approval was sought and deemed a quality improvement project on May 13, 2021.

Before attending the workshop, students were given a pre-implementation survey to gauge their confidence and knowledge of PNBs. After the workshop, students took a post-implementation survey to assess the effectiveness of the activity.

Evaluation

Surveys

Data was collected via purposeful sampling. Evaluation of this project was completed through a series of anonymous surveys given to the second-year students. The first, an eleven-question pre-implementation survey, was completed prior to beginning the workshop. Questions 1-7 involved using the Likert scale to assess the level of confidence. Questions 8-11 of the pre-implementation survey were designed to collect demographic information from the participants. The second survey was a seven-question, post-implementation survey and was completed at the workshop's conclusion. All seven questions utilize the Likert scale to assess confidence levels after the active workshop. The participants filled out the pre- and post-workshop surveys at the time of their workshop via paper and writing utensils.

Outcomes

A total of 29 SRNAs participated in the lab and accompanying surveys. Completing the pre-and post-implementation surveys for the workshop allowed students to evaluate their confidence level in identifying or performing PNB with or without preceptor guidance. Each PNB exercise in the workshop instructed SRNAs to locate and highlight key structures on the AT. Isolating the landmarks enhanced visual knowledge and understanding in relation to the positioning and location of each structure. When comparing the AT images to the ultrasound

images, participants voiced increased ease in recognizing anatomy. In addition, confidence levels in performing PNBs increased according to survey results. While more students reported having higher confidence in their ability to perform a PNB with a preceptor compared to performing a PNB alone, participants attributed this to having little to no practice with ultrasound imaging in their clinical rotations. For SRNAs who were at facilities using PNBs reported an improved comprehension of ultrasound-guided regional anesthetic techniques.

Limitations

Due to Covid-19 precautions and guidelines set in place by the University, there was limited occupancy in the Anatomage lab at all times with up to five people only. Access to the AT was also limited by the University business hours of operation and key access from the School of Nursing.

Impact on Practice

By implementing self-guided supplementation to the regional anesthesia curriculum, students were able to broaden their knowledge of gross anatomy, which is imperative for PNB administration. The results indicate the incorporation of the AT in a regional anesthesia lab directly impacted students' confidence levels in performing peripheral nerve blocks with the guidance of a preceptor. Through virtual learning with the AT, second-year SRNAs became more familiar with administering PNBs when starting their clinical site rotations and throughout the program. The increased confidence levels can be attributed to improved competency in understanding anatomy and landmarks used to administer PNB. Supplying real ultrasound graphics as visual aids of landmarks for PNBs while simultaneously examining the anatomy on the AT augmented the students' capability and understanding when administering PNBs under ultrasound imaging.

Successful peripheral nerve blocks administered by well-educated providers improve patient safety, reduce mortality and morbidity, and decrease hospital readmissions (Joshi et al., 2016). Combining visual aids with the AT and ultrasound simultaneously optimizes the students' knowledge and training. In turn, patient care, and patient outcomes are enhanced by providing safe and adequate regional anesthetic services in clinical practice. The ongoing advancements and software updates for the AT, such as the pathophysiology, physiology, and radiology, can help future nurse anesthesia students reinforce a better understanding and appreciation of the human anatomy we encounter in day-to-day practice. Patients will benefit from receiving care from well-educated providers that can competently perform procedures due to their knowledge of the human anatomy and hands-on experience.

Conclusion

Incorporating the AT in ultrasound guided PNB lab improved SRNA knowledge of the anatomy associated with each block. Students' self-efficacy in performing PNBs in the clinical setting improved through the lab. The lab fulfilled the needs of SRNAs by filling knowledge gaps and exposing them to regional techniques earlier on in their clinical training. Implementing simulation-based learning in medical programs improves patient safety and provider competency (Al-Elq, 2010).

By creating a self-guided lab, future SRNAs can continue to utilize the AT to learn and understand the anatomy associated with PNBs at their own pace. SRNAs must have a deep understanding of human anatomy and how that translates into clinical applications. In addition, utilization of regional anesthetic techniques is rapidly growing in the perioperative arena. Having resources such as these available to SRNAs will, in turn, lead to the production of strong nurse anesthesiologists.

Author Contact Information

Paige Dickey, SRNA, BSN
Phone Number: 618-218-6168
Email: pedickey1s@gmail.com

Melissa Gerlach, SRNA, BSN
Phone Number: 618-830-5343
Email: mawhite4s@gmail.com