Comparison of the Accuracy of Learner-Performed Point-of-Care-Ultrasound in the Diagnosis of Lower-Extremity Deep Vein Thrombosis.

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Introduction

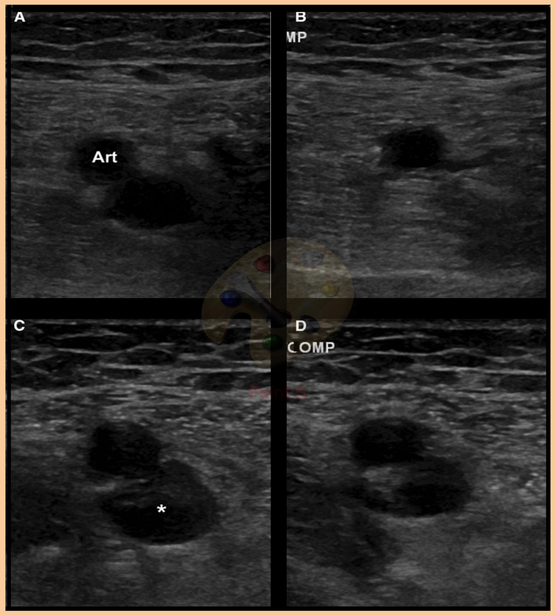
Lower extremity deep venous thrombosis (DVT) has a prevalence rate of 2.5-5% in adults in the United States . In recent years, point-of-care ultrasound (POCUS) has become an increasingly used method for the diagnosis of a lower extremity DVT. Ultrasound has been demonstrated to be both accurate and cost-effective for the diagnosis of a lower extremity DVT. Numerous studies have been conducted to assess the interrater reliability of emergency physicians as compared with radiologist interpretations of POCUS in various suspected diagnoses. With the recent knowledge of the easily accessible and short training required for POCUS, many medical schools are beginning to train first and second year students in various ultrasound procedures. However, there has been limited information and research in whether the ultrasound training provided in medical schools is comparable to accurate diagnosis in clinical years. Since many medical schools have been implementing ultrasound training into the curriculum, it is necessary to research whether medical students can apply this knowledge and be able to diagnose as accurately as a radiologist. Having this information would provide a valuable tool in reducing patient disposition time as well as addressing the gap between medical students/residents and physicians in the clinical setting. Further research in this field can provide information as to how long ultrasound training should be in medical schools, as well as if students should receive ultrasound training just prior to clinical years as well. The information from this study can be interpreted used to create change both within medical school curriculum as well as hospital protocol. Improvements would include medical knowledge advancement, reduced disposition time, and reduced hospital costs.

Methods

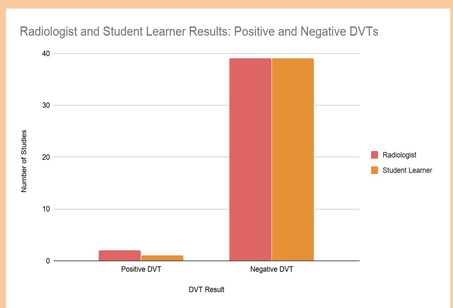
- Adult patients over age 18 at the St. Joseph's Emergency Department were identified by emergency medicine physicians as having a suspected DVT.
- Student learner met with and obtained informed consent from patient.
- Student learner performed POCUS on patient in the emergency department.
  - Ultrasound was conducted from femoral to popliteal veins
  - An ultrasound suggestive for DVT was indicated as the following:
    - Failure to compress the vein
    - Visualization of nonhomogenous hypoechoic material in the venous structure
    - Lack of blood flow through the vein via color Doppler
    - Lack of auscultation of blood flow via Doppler
- A separate investigator not involved in the ultrasound process compared the radiologist's interpretation of the ultrasound to the student learner's interpretation of the ultrasound.
- After collection of 41 patients' data, the study was concluded.

Results

Sample Ultrasounds:



A.Example of lower extremity anatomy with popliteal artery and popliteal vein B. Normal compression test. C. Popliteal vein with thrombus D. Abnormal compression test



Comparison of Radiologist vs Student Interpretation of POCUS

Kappa Analysis:
kappa=0.655
SE of kappa=0.319
95% Confidence Interval:
0.029-1

	A	B	Total
A	1	1	2
B	0	39	39
Total	1	40	41

Conclusion

Medical students have increasingly been provided POCUS ultrasound training throughout their preclinical years. When sent into clinical rotations, students have the opportunity to perform POCUS on patients. There had been little information on students' ability to accurately diagnose via POCUS. Our research shows that students had a 97.6% accuracy in diagnosis via POCUS when compared to the radiologists' interpretation. The research provides support that medical students are able to accurately diagnose a DVT. With this information, medical students can be given more opportunities to assist in the diagnosis of patients. This can decrease the overall time to diagnosis in patients in the emergency department, given that students reliably performing POCUS alleviates overflow in the ultrasound department.

One limitation of our study was obtaining an adequate sample size for the study. We had anticipated a larger volume of potential DVT patients in the emergency department. In further studies, broadening the scope to possibly include the inpatient floors as well might increase numbers and provide additional support ito the original research. Another limitation of the study was the number of students involved in the study. We would like to increase the number of students in future studies to capture a more representative version of medical students.

In the future, we would like to perform additional studies on student accuracy in other forms of ultrasound as well. Such research would provide further strength and support in the use of students performing ultrasounds. Another avenue of research could be to compare the accuracy of students vs. residents vs. radiologists to compare if the skills learned throughout medical school are kept or strengthened during residency.

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