



Prospective comparison of emergency  
physician–performed  
venous ultrasound and CT venography for  
deep  
venous thrombosis

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Venous thromboembolic disease continues to cause significant morbidity and mortality. It is considered to be the third most common acute cardiovascular disease after coronary artery disease and cerebrovascular accident. Estimates of annual deaths attributable to PE in the United States range from 50 000 to 100 000.




In the largest and most recent study, Goodman et al examined the data collected from the PIOPEdII study. More than 700 CTV and lower extremity US examinations were compared, and the study showed that there was 95.5% concordance between CTV and venous US in the diagnosis or exclusion of lower extremity DVT [10]. No study to date has compared the accuracy of CTV and lower extremity venous US solely in the emergency medicine patient population

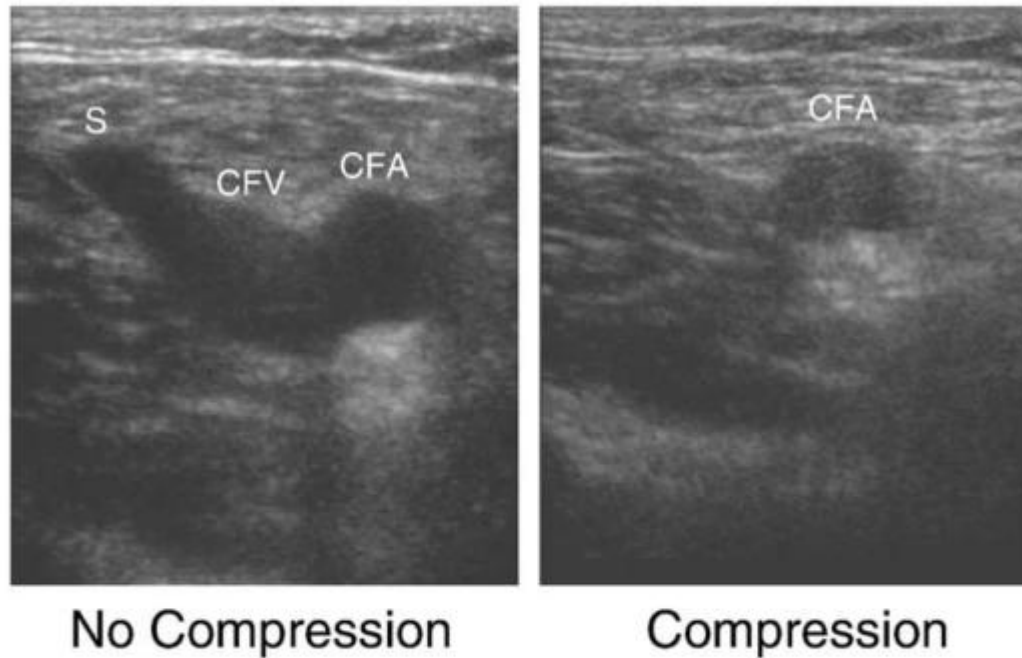
a prospective study comparing CTV to EPPU of the lower extremities in patients undergoing evaluation for a PE. Conducted in the ED of an urban, tertiary care medical center with an annual patient volume of 78000.

A convenience sample, allowing the study investigators to perform all lower extremity venous US studies, was utilized.

The study investigators consisted of an emergency medicine US fellowship director, an emergency medicine US fellow in training, and 2 credentialed faculty members who were not fellowship trained in US. Each had performed at least 100 lower extremity venous US studies before the study Phillips HDI 4000 (Bothell, WA) or a SonoSite MicroMaxx (Bothell, WA)

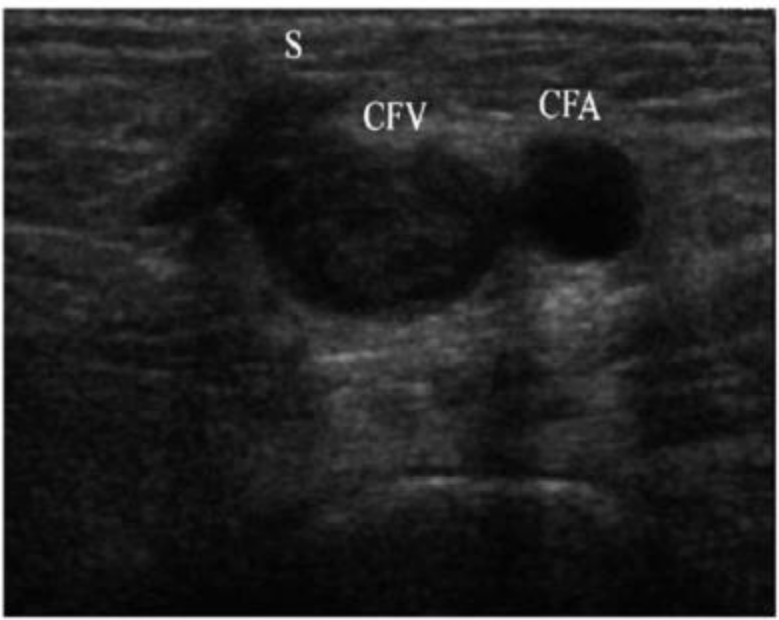


The limited US examination consisted of compression of 3 segments of the lower extremity venous system: (1) the common femoral vein from superior to the saphenous vein to the bifurcation, (2) the proximal superficial and deep femoral vein, and (3) popliteal vein to the trifurcation into the calf veins. Both US systems are capable of color and spectral Doppler, but the use of these techniques was not part of the protocol.

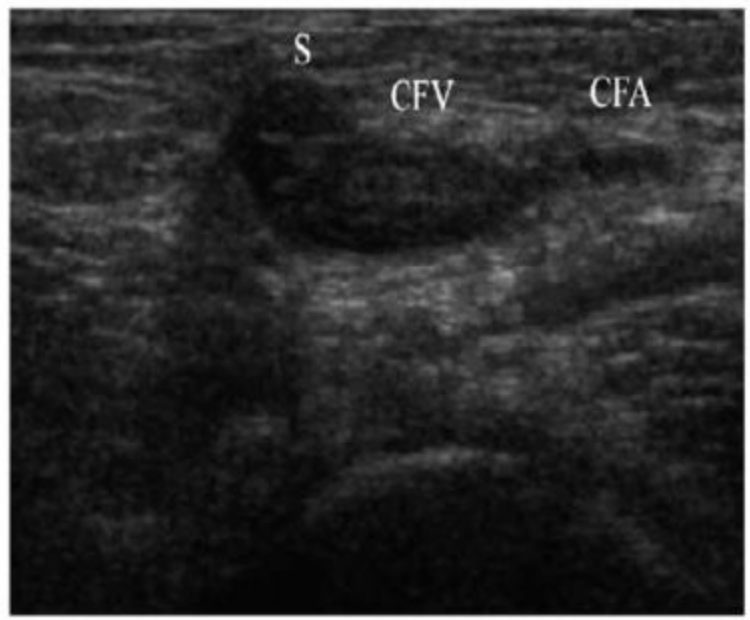


**Fig. 1** Complete obliteration of the venous lumen with compression consistent with the absence of DVT. S indicates saphenous vein; CFV, common femoral vein; CFA, common femoral artery.


**Fig. 2** Incomplete obliteration of the venous lumen with compression consistent with the presence of DVT.



No Compression

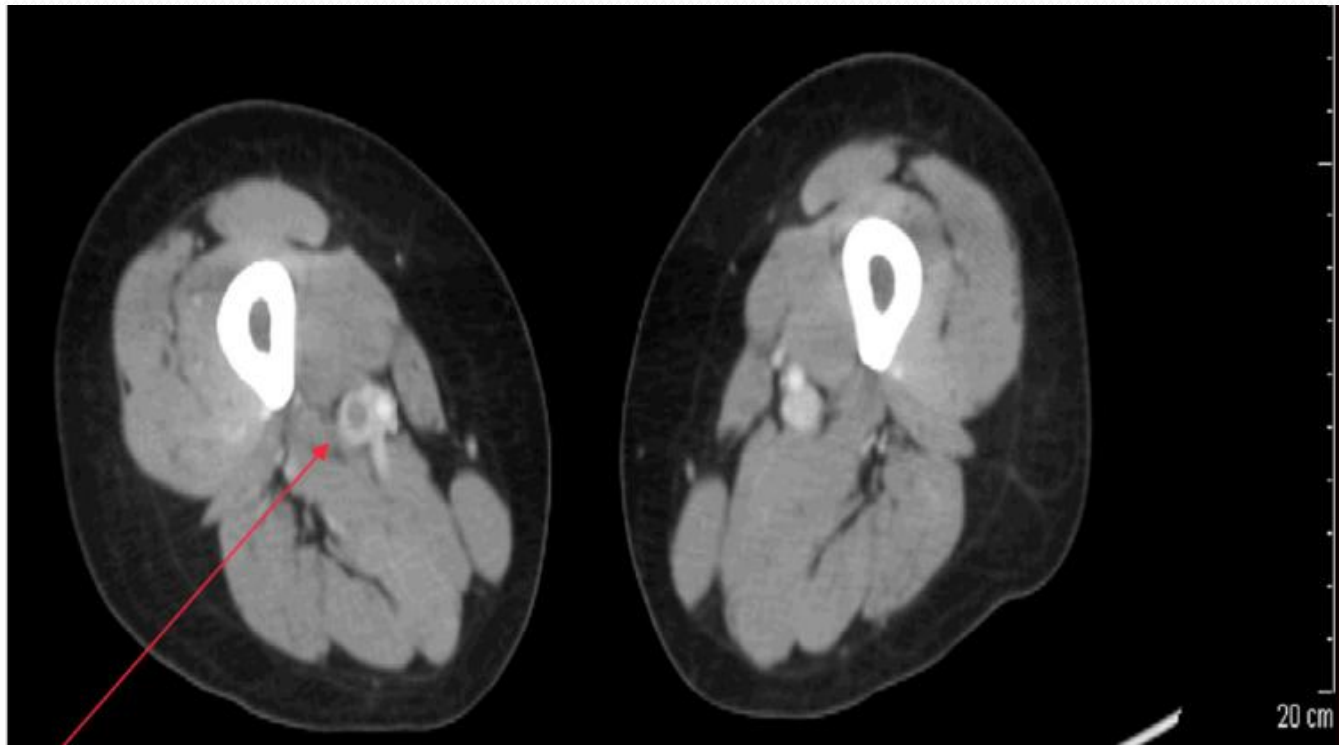


Compression



After lower extremity venous US, the patient underwent CTA of the chest and CTV of the lower extremities using a GE Lightspeed CT scanner. A DVT was diagnosed on CTV when a venous filling defect was noted.







**Fig. 3** Filling defect in the right popliteal vein (arrow) on CTV consistent with the presence of DVT.

A total of 61 patients (female, 41; male, 20) were enrolled.


The mean age of the patients was 43 years. 50 (82%; 95% CI, 72%-91%) had negative workups: no DVT noted on EPPU, no PE noted on CTA of the chest, and no DVT noted on CTV of the lower extremities; 11 (18%; 95% CI, 8%-27%) had evidence of PE on CTA of the chest; and 6 (10%; 95% CI, 2%-17%) were noted to have lower extremity DVT on both EPPU and CTV evaluation.



All patients with DVT (by either EPPU or CTV) were found to have evidence of PE on CTA. The overall sensitivity and specificity of EPPU when compared to CTV in diagnosing DVT was 86% (95% CI, 42%-99%) and 100% (95% CI, 91%-100%), respectively.



A recent meta-analysis done by Burnside et al [20] showed a 95% sensitivity of EPPU of the lower extremity when compared to radiology performed scans. Our study adds to the existing literature of EPPU of the lower extremity as the data show that there is excellent correlation between EPPU and CTV in the diagnosis femoropopliteal DVT



There is no evidence at this time that EPPU can accurately differentiate between acute and chronic thrombosis. In addition, EPPU does not provide an assessment of the calf veins. Currently, there is no Consensus on the clinical significance of calf vein thrombosis and no agreement on what, if any, treatment is warranted



Excellent correlation exists between EPPU of the lower Extremity and CTV in the diagnosis of femoropopliteal DVT.

Proximal thrombotic events, such as those involving only the Larger studies comparing EPPU and CTV are needed to determine the frequency of such proximal thrombotic events in the ED population.