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Ultrasound in Emergency Medicine

CAN EMERGENCY MEDICINE RESIDENTS DETECT ACUTE DEEP VENOUS THROMBOSIS WITH A LIMITED, TWO-SITE ULTRASOUND EXAMINATION?

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□ **Abstract—The purpose of this prospective clinical study was to determine the ability of Emergency Medicine (EM) residents to accurately detect acute deep venous thrombosis (aDVT) after training in a limited, two-site examination. Six residents received a 90-min session consisting of a lecture and a hands-on component. Each resident then performed the examination on symptomatic extremities referred to the vascular laboratory of a community teaching hospital. The examination was limited to the femoral and popliteal sites and was considered normal when the vein completely compressed. A formal examination was completed by the vascular technician (who was blinded to the resident's results) within 30 min of the resident examination. Of the 121 symptomatic extremities, vascular technicians detected nine cases of aDVT in the target area (7% prevalence); resident examinations revealed eight of these (sensitivity 89%). EM residents can perform a limited duplex examination with considerable but not perfect accuracy after receiving very limited instruction.**

□ **Keywords—emergency ultrasound; deep venous thrombosis; DVT; ultrasound; limited duplex examination**

INTRODUCTION

There would be great clinical utility in a limited duplex examination that allowed physicians to safely confirm or refute acute deep venous thrombosis (aDVT) at least until a more formal study could be obtained. Because most Emergency Departments (EDs) do not have vascular technicians available on a 24-h basis, many emergency physicians administer low-molecular weight heparin and discharge the patient home to return the next day for a formal study (1). Such a policy, however, entails significant risk, particularly for patients in whom anticoagulation is problematic.

Although not classically considered a primary indication, the use of ultrasound by emergency physicians to detect acute deep venous thrombosis (aDVT) is a promising application. The purpose of this prospective clinical study was to determine the ability of Emergency Medicine (EM) residents to accurately detect aDVT after training in a limited, two-site examination. The purpose of this study was only to identify resident accuracy in detecting acute clot that prevented compression and occluded the vessel fully.

MATERIALS AND METHODS

This study was conducted at an active community teaching hospital with an annual ED census of 55,000 and an EM residency. During their orientation to the residency, all EM residents receive a 1-day hands-on ultrasound course on the six core ultrasound examinations (aorta, focused assessment with sonography for trauma [FAST], gallbladder, kidneys, intra-uterine pregnancy, and peri-

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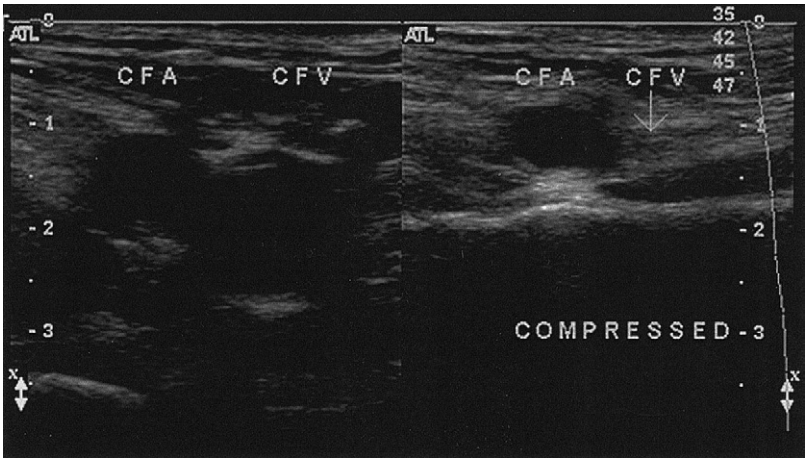

Figure 1. The common femoral vein (CFV) and artery (CFA) are demonstrated without compression and (right) with compression. Note the vein collapsed completely.

cardial effusion). Ultrasound is used routinely in our ED. By the end of the second year of residency, most residents have achieved competency in the six core examinations. Before this study, ultrasound to rule out DVT was not widely taught or performed in the department. A teaching faculty member and a senior resident conducted a 90-min didactic session on the limited compression ultrasound technique to detect aDVT. In addition to static images, a teaching video used to educate vascular technicians was also utilized for the session. The hands-on component of the course was taught by two senior vascular technicians. The residents received their didactic training as a group.

Two residents from each year of a 3-year EM residency received the lecture and hands-on component of the training, which included three limited lower extremity examinations. During a 3-month period, each resident performed the examination on symptomatic extremities (not necessarily ED patients) referred to the vascular laboratory of our hospital. The examination was limited to the femoral (through the bifurcation into deep and superficial femoral veins) and popliteal (through the trifurcation into the anterior and posterior tibial veins and peroneal vein) sites.

A venous ultrasound examination was considered normal when the vein completely compressed (Figure 1). Our pre-defined criterion for a positive result was the presence of acute, non-compressible, occlusive clot in a deep vein in the defined target area (Figure 2). Residents were required to make a decision about whether or not

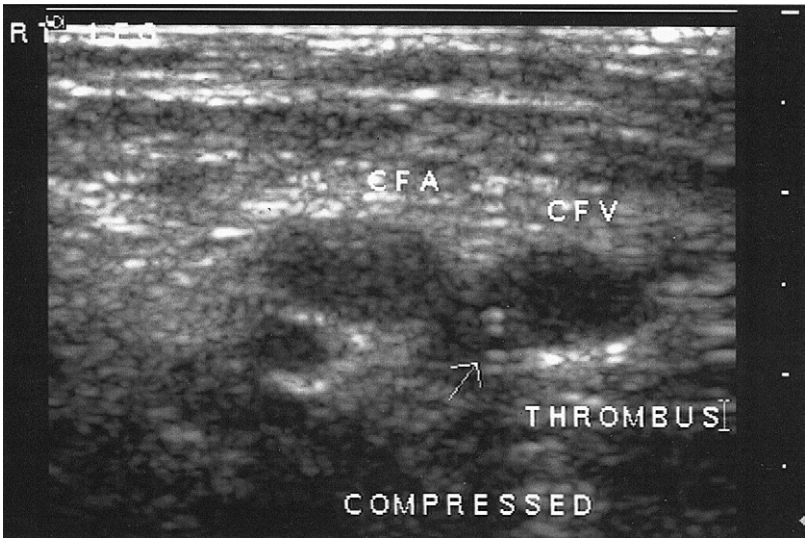

Figure 2. The common femoral vein (CFV) is seen to be non-collapsible despite compression.