Brief Report

Patient follow-up after negative lower extremity bedside ultrasound for deep venous thrombosis in the ED

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Abstract

Objectives: To evaluate the rate of patient compliance with follow-up ultrasound (US) examinations 5 to 7 days after emergency physician EP performed US exams to rule out lower extremity deep venous thrombosis (DVT) in the ED.

Methods: This was a prospective observational study at a level I ED with a residency program, US training program, and an annual census of 75,000. Hospital-based emergency US credentialing is available and derived from American College of Emergency Physicians guidelines. Five US-credentialed emergency physicians participated in the study. All patients who received negative lower extremity DVT US exams were eligible. All higher risk patients were given verbal and written instructions and provided with prescriptions to have a follow-up US examination 5 to 7 days after their examination in the ED. Those classified as “low risk” based on Wells criteria were excluded. After 3 months, patients were contacted via telephone and asked questions regarding their follow-up US examinations, reasons for not following up, continued symptoms, and thromboembolic events. Statistical methods included descriptive statistics.

Results: One hundred fifty-nine patients were eligible for enrollment during the 10-month study period. Eighty-five patients (54%) fell into the higher risk category of these; 54 (64%) were contacted successfully. Fifteen (28%) of the patients contacted had obtained a follow-up US exam. Of the 39 who did not follow-up, 29% were told by their physician that a follow-up US was unnecessary, 21% forgot to follow-up, 8% did not follow-up for financial reasons, 16% felt better, 5% could not arrange a study, 21% were unsure. One patient died from sepsis before a follow-up scan. Two patients were diagnosed with DVT, one at 7 days follow-up and the other 9 months later (this particular patient had their 7-day scan cancelled by their primary care physician).

Conclusion: Patients who were instructed to obtain follow-up lower extremity US examinations to rule out propagation of unseen, distal DVTs did so at a very low rate in our study. One of the largest impediments in our study population was a patients’ primary care physician who may not understand the need for a follow-up US examination.

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1. Introduction

Bedside ultrasound (US) is a useful aid in the diagnosis of a number of emergent conditions. At our institution, as well as others, it is frequently used in the evaluation of emergency patients with signs and symptoms of deep venous thrombosis (DVT) [1-4]. Compression of the common femoral, deep femoral, superficial femoral, and popliteal veins is an effective screen for proximal lower extremity DVT [1,2,5,6]. The ability to perform US examinations for ruling out lower extremity DVT has allowed EPs to save time on patient disposition, thereby improving efficiency [2]. Admission, simply to await a US examination the next morning or next business day, can be safely avoided. Although some EDs discharge possible patients with DVT on low molecular weight heparin and outpatient follow-up, this may not be practical in all settings and can lead to bleeding complications [7].

Using prediction rules such as those developed by Wells can help risk stratify patients with suspicion of DVT [8-10]. However, regardless of the relative comfort physicians may have using such rules, some patients still require a US examination. Many such patients are then found to have no DVT and sent home. One pitfall of lower extremity US is that it is not sensitive for the detection of calf vein thrombosis. A missed calf vein clot may propagate into a proximal vein after a negative US study. Therefore, several medical societies recommend a follow-up US scan on non–low-risk patients at 5 to 7 days [11-13]. The objective of this study was to determine the rate of patient compliance with obtaining the recommended 5- to 7-day follow-up US study and describe reasons why patients may not obtain follow-up.

2. Materials and methods

This was a prospective observational study of patients with a negative EP-performed US for a lower extremity DVT in the ED. We sought to assess the rate of follow-up at 5 to 7 days with a repeat lower extremity US examination. The authors’ human assurance committee approved this study with written consent obtained from each subject before enrollment. This study took place at an urban level I trauma center ED with an annual census of 75,000 visits. The department has an ongoing US education program, and EPs are able to obtain hospital credentialing for emergency US use in accordance with American College of Emergency Physicians guidelines [11]. Standard emergency US credentialing includes evaluation for proximal lower extremity DVT. All patients who are other than low risk by Wells criteria are instructed to obtain a follow-up US examination to rule out a propagating distal DVT into the popliteal vein, if their ED US examination is negative. Patients are given prescriptions and written instructions to obtain the test from their private physician or have a test scheduled for them from the radiology department. Patients were enrolled between August 2003 and June 2004.

Hospital-credentialed emergency medicine US faculty performed all US examinations, and data sheets were filled out at that time. Faculty are credentialed based on American College of Emergency Physicians 2001 guidelines and are required a minimum of 175 US examinations, as well as continuing medical education (CME) minimum, before credentialing. Enrollment was on a convenience basis and depended on physician availability. Patients who obtained a US examination in the radiology department during the visit, those unable or unwilling to give consent, on anticoagulation therapy, or who were low risk for DVT were excluded from the study. All US examinations were performed using an ATL HDI 4000 (Philips Medical Systems, Bothell, Wash) or a Sonosite Titan (Sonosite, Inc, Bothell, Wash). Using the Wells criteria and d-dimer (if available), we instructed all patients not considered to be low risk to have a follow-up scan in 5 to 7 days. There were no stipulations made regarding d-dimer use to avoid interference with physician practice. Patients who were low risk historically but had a positive d-dimer were considered other than low risk. Patients were given a prescription for a US examination and written discharge instructions for follow-up. They had the option to return to the radiology department of our institution or arrange an examination through their primary care physician.

Three months after the initial US examination, we contacted each patient to determine whether they had obtained a follow-up US examination and whether they had any complications relating to DVTs. For those patients not reachable by phone (ie, disconnected number, wrong number, incarcerated, deceased), a thorough review of our institution’s medical records was undertaken to screen for any subsequent follow-up scans. Patients reached by phone were asked a series of questions regarding US follow-up results and if they had experienced any new episodes of chest pain, shortness of breath, hemoptysis, syncope, or had been started on anticoagulation recently or had a diagnosis of DVT or pulmonary embolism. Those patients who did not obtain a repeat examination were asked their primary reason for not doing so. Data were compiled using preformatted data entry forms and entered into a Microsoft Access spreadsheet (Microsoft Corp, Redmond, Wash). All data were exported to an Excel spreadsheet for statistical analysis (Microsoft Corp). Descriptive statistics were used to evaluate the rate of compliance for follow-up and patients’ reasons for not following up when applicable. All analysis was performed using a commercially available statistical software program, StatsDirect (StatsDirect Ltd, Cheshire, UK).

3. Results

A total of 159 patients had a negative lower extremity US examination, performed by an EP. Forty-four of these were
subsequently excluded because they could not be reached by phone, and there were no further encounters in the medical record. Common reasons we were unable to contact patients included disconnected phone, incorrect contact information, leaving area without forwarding address, and serving jail sentences. Of the remaining 115 patients, 85 patients fell into the “higher risk category” and had received instructions to get a follow-up US examination in 5 to 7 days. Fifty-four (64%) of the 85 higher risk patients were reached. Fifteen (28%) of these 54 patients obtained a follow-up examination. Of the 39 patients who were reached but did not follow-up, 11 (29%) reported their primary care physician told them that follow-up was not necessary. Eight patients (21%) stated that they forgot to follow-up. Three patients (8%) did not follow-up because of financial concerns and another 6 patients (16%) felt better and elected not to follow-up. Two (5%) patients could not arrange a follow-up study, with one of these because of lack of transportation to a facility capable of providing lower extremity imaging. The remaining 8 (21%) patients were “not sure.”

There was one death during the study period that resulted from sepsis diagnosed 4 days post initial scan. According to the patient’s family, no follow-up scan was performed. One patient was diagnosed with a proximal DVT at the 7-day follow-up scan but had no embolic complications. Another patient, whose primary care physician did not feel the follow-up scan was needed, was diagnosed with a proximal DVT 9 months later, but this was outside of the 3-month study period. This was discovered through a quality assurance review of the records.

4. Discussion

Emergency US of the lower extremity focuses on the common femoral vein, superficial femoral vein, deep femoral veins, and the popliteal veins to rule out DVT. Patients found to have a DVT, confirmed by lack of vein compressibility on US, are anticoagulated. Because the signs and symptoms of a DVT may precede a positive US examination by several days, standard practice dictates follow-up US examination at 5 to 7 days on all patients who are anything but “low risk” [4,5,14-16]. Patients who have a negative follow-up examination are assumed to have a condition other than DVT as the cause of their complaint. The reported rate of DVT development after a negative follow-up US is less than 0.7% in some studies [5,15].

To our knowledge, no study to date has evaluated the patient compliance rate for follow-up study after an initial negative lower extremity US examination from the ED. Of the 54 patients whom we were able to contact, only 28% had a reported or documented follow-up examination. This number was unexpectedly low and, despite the small sample size, clearly points to the need for further intervention. Even if the 31 patients who were excluded from analysis (because they could not be reached) had all followed up, the follow-up rate would still be very concerning given the potential for embolic sequela. The reasons for not obtaining a follow-up US were somewhat surprising as well. The majority of patients stated that they had forgotten or that their primary physician did not feel that it was needed. We had expected that most would site cost concerns instead.

Regardless of whether the US is performed by an EP or by a radiologist, the need for follow-up is well documented and several implications can be drawn from our poor follow-up rate. The high rate of primary care physician interrupted plans for follow-up examination may be due to a misconception by the primary care physician. Thus, better communication between the EP and primary care physician is needed to allow for education on this critical point. It is unlikely that the primary care physicians knew whether an EP or a radiologist performed the examination and therefore bias was probably not a contributing factor. Some primary care physicians may not be aware of recommendations for follow-up or do not know that higher risk patients are not considered “cleared” by a single US examination. Thus, specific discharge instructions, which include symptoms consistent with progression of a calf vein thrombus, and specific instructions for follow-up examination are critical and should encompass a longer time frame than just 7 days. Because of this low follow-up rate, it has become our practice to offer to patients follow-up in the ED if they are not able to obtain a scan otherwise. Documentation is entered into the chart as necessary so that the next physician is aware of the need for follow-up and the patient’s risks.

As medical systems continue to pursue more efficient use of resources and shift to increasing outpatient treatment rather than lengthy hospitalizations, EPs can contribute by performing lower extremity US examinations to rule out DVT and avoiding admission. However, follow-up may be problematic, at least in settings similar to ours, and plans must be made accordingly.

This study has a number of limitations. Our sample size was relatively small. Of 85 patients identified as higher risk, 31 were lost to follow-up. Despite the small sample size and limited follow-up (64%), we believe that the data show a discouragingly low percentage of patients completing the required follow-up examinations. Patient follow-up rates may vary from institution to institution depending on patient and community resources, and our data may not apply in other settings. However, as primary care physicians were a leading cause for lack of follow-up, a center with most of its patients belonging to primary care physicians may actually see a larger portion of patients not following up.

In summary, patients who are instructed to obtain follow-up lower extremity US examinations to rule out propagation of unseen distal DVTs did so at a very low rate in our study. One of the largest impediments in our study population was a patients’ primary care physician who may not understand the need for a follow-up US examination.
References


