CLINICAL RESEARCH STUDY

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Venous Thromboembolism in Older Adults: A Community-based Study

Frederick A. Spencer, MD,[a,b] Jerry H. Gurwitz, MD,[b,c] Sam Schulman, MD,[a] Lori-Ann Linkins, MD,[a] Mark A. Crowther, MD,[a] Jeffrey S. Ginsberg, MD,[a] Agnes Y.Y. Lee, MD,[d] Jane S. Saczynski, PhD,[b,e] Sonia Anand, MD, PhD,[a] Darleen Lessard, MS,[e] Cathy Emery, RN,[b] Wei Huang, MS,[f] Robert J. Goldberg, PhD[e]

[a]Department of Medicine, McMaster University Medical Center, Hamilton, Ontario, Canada; [b]Department of Medicine, University of Massachusetts Medical School, Worcester; [c]Meyers Primary Care Institute, a joint endeavor of University of Massachusetts Medical School, Reliant Medical Group, and Fallon Community Health Plan, Worcester; [d]Department of Medicine, Vancouver General Hospital, British Columbia, Canada; [e]Department of Quantitative Health Sciences and [f]Department of Surgery, University of Massachusetts Medical School, Worcester.

ABSTRACT

BACKGROUND: While the incidence of venous thromboembolism increases with age, little is known about its contemporary management or outcomes in older patients. Our goal was to compare the characteristics, treatment, and outcomes associated with venous thromboembolism, in patients aged 65-69 years, 70-74 years, 75-79 years, and 80+ years.

METHODS/PARTICIPANTS: We prospectively followed 542 subjects aged ≥65 years with venous thromboembolism from January 2008 through August 2011 at 6 sites. In addition, a retrospective study of 681 additional subjects aged ≥65 years with venous thromboembolism diagnosed in 2007 and 2009 was conducted at the same 6 sites.

RESULTS: With advancing age, patients were more likely to suffer provoked venous thromboembolism but less likely to present with pulmonary embolism. Patients with unprovoked, provoked, or malignancy-associated venous thromboembolism received warfarin for a median of 401 days, 203 days, and 529 days, respectively. Age ≥80 years was not associated with an increased risk of recurrent venous thromboembolism, but there was an increased risk of all-cause mortality.

CONCLUSION: With advancing age, patients are more likely to suffer hospital-associated and provoked venous thromboembolism. Many elderly patients with provoked or unprovoked venous thromboembolism were treated for >3 months or >12 months, respectively. Given that advanced age was not associated with increased risk of recurrent venous thromboembolism, but elderly patients in general have a higher risk of bleeding from continued anticoagulant therapy, such practice is potentially harmful. At the same time, such an argument could be used to more vigorously offer prophylaxis in the first place.

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KEYWORDS: Aged; Deep vein thrombosis; Elderly; Pulmonary embolism

In the Worcester Venous Thromboembolism Study, the incidence rates of venous thromboembolism increased more than 10-fold in individuals aged ≥75 years, compared with patients aged <55 years.[1,2] Older patients represented ≥60% of all cases of venous thromboembolism occurring in residents of the Worcester (MA) area. Despite the high prevalence of venous thromboembolism in older subjects, relatively little is known about the clinical aspects of venous thromboembolism

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Authorship: All authors had access to the data and played a role in writing this manuscript.

Requests for reprints should be addressed to Frederick A. Spencer, MD, Department of Medicine, McMaster University − Faculty of Health Sciences, St. Joseph's Healthcare, 50 Charlton Avenue East, Hamilton, ON L8N 4A6, Canada.

E-mail address: fspence@mcmaster.ca

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in this subset in the community setting. The goals of this multicenter observational study were to characterize and compare the clinical course and characteristics of venous thromboembolism, use of different management practices, and outcomes in patients aged 65-69 years, 70-74 years, 75-79 years, and 80+ years diagnosed with venous thromboembolism.

CLINICAL SIGNIFICANCE

- With advancing age ≥65 years, patients are more likely to suffer provoked or hospital-acquired venous thromboembolism.
- Advancing age was associated with an increased risk of all-cause mortality, a trend toward an increased risk of major bleeding, but not an increased risk of recurrent venous thromboembolism.
- The majority of elderly patients with provoked or unprovoked venous thromboembolism were treated with anticoagulation for >3 months or >12 months, respectively.

METHODS

Study Design

We carried out a prospective study of consenting older adults (≥65 years of age) diagnosed with venous thromboembolism at 2 Worcester (MA) and 4 Hamilton (Ontario, Canada) hospitals from January 2008 through August 2011. Recognizing that we would not be able to capture and perform prospective follow-up of all cases of venous thromboembolism diagnosed at participating hospitals, we also conducted retrospective surveillance through medical record review of cases of venous thromboembolism diagnosed at these sites for 2 study years (2007, 2009). The Research Ethics Board of each participating site approved the study.

Patient Sample

Sample size was one of convenience. However, before embarking on the study, we calculated that a sample size of 800 patients would provide adequate power for a survival analysis with an expected hazard ratio (HR) of at least 1.6.

Study nurses identified potential subjects for the prospective cohort in the inpatient and outpatient services of 6 participating hospitals from January 2008 until August 2011. Subjects included in the retrospective cohort were identified using methods employed in the Worcester Venous Thromboembolism study.[1,2] In brief, we conducted retrospective surveillance through medical record review of all identified cases of venous thromboembolism diagnosed in 2007 and 2009 at the same six sites. Cases of venous thromboembolism were identified using International Classification of Diseases-9th Revision codes as previously described; study nurses using the above diagnostic criteria validated these cases.[1,2]

Patients aged ≥65 years with objectively diagnosed proximal deep vein thrombosis or pulmonary embolism were eligible as per previously described criteria.[1,2] Because the clinical significance of subsegmental pulmonary embolism diagnosed by computed tomography scan is unclear,[3] these individuals were excluded from study consideration. Exclusion criteria included inability to provide consent, venous thromboembolism at other anatomical site(s), or previous enrollment. An episode of "provoked" venous thromboembolism was defined as venous thromboembolism occurring within 3 months of hospitalization, surgery, major trauma, or fracture; "unprovoked" venous thromboembolism was defined as venous thromboembolism occurring in the absence of malignancy (active cancer in the prior 3 months) or any of the above "provoked" characteristics.

Data Collection and Patient Follow-up

Subjects satisfying age and diagnostic criteria, and consenting to prospective follow-up, were interviewed. Sociodemographic, clinical, and medical care information were abstracted onto a standardized data collection instrument. Additional data were collected through review of hospital and outpatient medical records.

All patients underwent follow-up in person or by telephone interview/mailed survey questionnaires at 3 months, 6 months, and then every 6 months thereafter until study completion (April 2012) for a maximum of 3 years of follow-up. Standardized data collection instruments were used at each follow-up contact.

For subjects enrolled in the retrospective cohort, all data (initial event and follow-up) was collected through medical record review by trained data abstractors on a standardized data collection instrument.

Study Outcomes

Information on the development of recurrent venous thromboembolism, major bleeding, and all-cause mortality were obtained via direct patient or family interview or medical chart review. In addition, information on mortality also was obtained by searches of local death registries, obituaries, and death certificates. All cases of suspected recurrent venous thromboembolism and major bleeding were reviewed by the principal investigator (FS) for adjudication and final case classification as per previously defined criteria.[1,2] Major bleeding was defined as bleeding that resulted in death, occurred in a critical site, resulted in transfusion of ≥2 units of blood, or led to a decrease in hemoglobin of ≥2.0 g/dL.[4]

Data Analysis

Differences in the distribution of demographic and clinical characteristics as well as treatment practices in patients stratified according to age (65-69, 70-74, 75-79, ≥80 years) were examined using chi-squared tests for categorical variables (Mantel-Haenszel for trend) and Kruskal-Wallis test for continuous variables. Cumulative incidence rates of venous thromboembolism recurrence, major bleeding (censoring