EDITORIAL COMMENT

Is There a Subgroup of PE Patients Who Benefit From Inferior Vena Cava Filters?*

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In this issue of the *Journal*, Bikdeli et al. (1) showed an increasing use of inferior vena cava filters (IVCFs) in older patients with pulmonary embolism (PE) from 1999 through 2010. The results were based on administrative data from the Medicare enrollment file. The investigators observed an IVCF utilization rate of 16.4% in 2010. These observations are concordant with data in patients of all ages with PE, on the basis of administrative data from the National Hospital Discharge Survey (2,3). From 1979 to 1999, well before the introduction of retrievable IVCFs in 2003 (2), the use of IVCFs in patients with PE increased (2) and continued to increase through 2006 (3). The utilization rate in patients ≥60 years of age increased from 13.3% to 15.4% from 2003 to 2006 (3), which is comparable with the observations of Bikdeli et al. Lower utilization rates were shown in younger patients (3). Regional differences in utilization rates were observed by Bikdeli et al. as well as others (2). Mortality in patients with PE has been decreasing, with and without IVCFs (1,4).

Is mortality lower in patients with PE who receive IVCFs? Bikdeli et al. (1), among 556,548 older adults hospitalized with PE, showed no lower all-cause mortality with IVCFs at 30 days: 11.7% with IVCFs compared with 9.2% without IVCFs. Fatalities at 1 year showed a similar pattern. Data from the Nationwide Inpatient Sample, which included 2,110,320 hospitalized patients of all ages with PE from 1999 to 2008, showed 9.0% in-hospital mortality without IVCFs in unstratified patients and clinically unimportant lower mortality of 8.2% with IVCFs in unstratified patients (5).

Only sparse data are available from 1 randomized controlled trial of patients with PE (6). Mismetti et al. (6), in the PREPIC2 (Prévention du Risque d'Embolie Pulmonaire par Interruption Cave 2) study, investigated patients with PE accompanied by deep or superficial venous thrombosis and at least 1 additional criterion for high risk. They showed no reduction of all-cause mortality, fatal PE, or recurrent PE in those who received retrievable filters plus anticoagulant drugs (n = 200) compared with those treated only with anticoagulant drugs (n = 199).

Do the results of Bikdeli et al. (1), data in unstratified patients from the Nationwide Inpatient Sample (5), and PREPIC2 (6) give the complete answer regarding whether IVCFs reduce mortality from PE? Absolutely not. Bikdeli et al. suggest that investigations of subgroups would be useful. This suggestion is right on target, and we fully agree. Whether IVCFs reduce mortality depends upon the clinical circumstances of the patients with PE. There was no clinically important reduction of mortality with IVCFs in low-risk patients in stable condition (not in shock or on ventilatory support and not receiving thrombolytic therapy) (5). Older low-risk patients in stable condition, >60 years of age, showed somewhat lower mortality with IVCFs, 8.0% compared with 10.2% (unpublished data from Stein et al. [5]) (Table 1). This needs further assessment. Importantly, a huge reduction in mortality was shown in patients in unstable condition (in shock or on ventilatory support) (5), irrespective of age (7) (Table 1). In-hospital mortality in patients in unstable condition who did not receive thrombolytic therapy was 51% without IVCFs and 33% with IVCFs (5). Among patients in unstable

condition who received thrombolytic therapy, mortality was 18% without IVCFs and 8% with IVCFs (5). There are other high-risk groups with PE in which IVCFs may reduce mortality (5,8-10). These observations need to be verified, and data from the Medicare enrollment file would be useful for this.

It is extremely unlikely that a randomized controlled trial of IVCFs in patients with PE in unstable condition will be performed (11). The PRREPC2 trial required 18 centers and 6 years to recruit 399 moderate-risk patients with PE (6). Only a small proportion of patients with PE are in unstable condition (3.4% to 4.5%) (5,12). Therefore, more centers and/or a longer duration of study would be required, and recruitment would be difficult if not unethical in view of the results we already have.

At the moment, the vast majority of IVCFs (91%) are inserted in patients with PE in stable condition (5), and such patients have not been shown to receive a clinically meaningful benefit (1,5,6). Only 27% of those who might benefit, those in unstable condition, receive IVCFs (5). Hopefully, further subgroup analysis by Bikdeli et al. and others will verify the benefit of IVCFs in patients in unstable condition and other high-risk groups and lead to a reversal of these practices in the selection of patients for IVCFs.

TABLE 1 In-Hospital All-Cause Case Fatality Rate According to Stability		
	Number of Patients	Case Fatality Rate, %
All stable	2,038,080	7.9
Stable, low risk,* IVCF	297,700	7.2
Stable, low risk, no IVCF	1,712,800	7.9
Stable, low risk, IVCF, ≤60 yrs	94,647	5.5
Stable, low risk, no IVCF, ≥60 yrs	710,408	4.6
Stable, low risk, IVCF, >60 yrs	204,255	8.0
Stable, low risk, no IVCF, >60 yrs	1,017,137	10.2
All unstable†	73,340	37
Unstable, IVCF	19,505	33
Unstable, no IVCF	52,735	51

Data from Stein et al. (5). Age-related data in patients in stable condition are unpublished from Stein et al. (5). *Stable, low-risk: not in shock or on ventilatory support and did not receive thrombolytic therapy. †Unstable: in shock or on ventilatory support.

IVCF = inferior vena cava filter.

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