Unsuspected Pulmonary Emboli in Oncology Patients Undergoing Routine Computed Tomography Imaging

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Pulmonary embolism is an increasingly recognized occurrence in asymptomatic patients.[1–4] Although the clinical guidelines for the treatment of symptomatic patients with acute pulmonary emboli, based on several large multicenter trials,[5] reduces the risk of fatality to approximately 2%, the details regarding risk, prevalence, usefulness of anticoagulation therapy, and outcome in patients with asymptomatic emboli are less well defined. The study by Browne et al.,[6] reported in this issue of the *Journal of Thoracic Oncology*, adds to the growing body of literature addressing the prevalence and clinical significance of pulmonary emboli in asymptomatic patients. The authors focus on a group of patients at higher risk for pulmonary emboli than the general population. Specifically, the authors report their experience in detecting pulmonary emboli in asymptomatic oncology patients, and their study contributes to a better understanding of the prevalence, predisposing factors, and outcomes of unsuspected pulmonary emboli. Browne et al. prospectively evaluated 407 patients during a 10-month period for the presence of unsuspected/asymptomatic pulmonary embolism and the associated risk factors, and 6-month clinical outcome in those patients with emboli. Browne et al. observed a 4.4% prevalence of unsuspected pulmonary embolism, 6.4% among inpatients, and 3.4% among outpatients. These data correspond well with other reports of a 3% to 6% prevalence of incidental pulmonary emboli among oncology patients.[1–4] In addition, the authors identified recent chemotherapy as the only significant predictor of unsuspected pulmonary embolism.

The authors also evaluated the effect of image slice thickness on the detection of unsuspected emboli. Browne et al. visualized pulmonary emboli confidentially on 1- to 1.5-mm thick images, whereas in 39% of cases these emboli were not detected on 5-mm thick images. This finding is not unexpected as the use of thinner slices is well known to improve the detection of emboli, especially segmental or smaller emboli, in symptomatic patients.[7] Most of the reports on the detection of unsuspected pulmonary emboli have evaluated a slice thickness of $\leq$3.75 mm and yielded similar prevalence among oncology patients. Interestingly, a report of the prevalence of unsuspected pulmonary embolism by Cronin et al.[8] (that includes some of the authors of this study), performed using thick slices, inexplicably (considering that 8-mm thick images were used), reported only a slightly lower prevalence of unsuspected pulmonary embolism of 3.3%.

The distribution of pulmonary emboli reported by Browne et al. is similar to our reported experience[4] in that approximately 50% of patients had lobar or larger emboli, whereas 50% had only segmental or smaller emboli. This high prevalence of segmental or smaller emboli and their poor visualization on thick images highlights the needs for thin images in the evaluation for unsuspected pulmonary embolism. However, the optimal slice thickness for balancing the detection for small abnormalities, such as segmental and subsegmental pulmonary emboli, with radiation dose and image noise of the thinner images, has not been definitively determined. It is likely that evaluation for small pulmonary emboli on routine computed tomography studies requires a slice thickness of

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≤3.75 mm, and this study suggests that 5-mm thick images is not adequate for that evaluation. However, the major question, not addressed by this study, is the clinical significance of the small emboli that would not be detected on the 5-mm thick images. In this regard, Browne et al. report that the detection of unsuspected pulmonary emboli changed patient management and that there was an institution of directed therapy for all but one patient. Other reports on the prevalence of unsuspected emboli also indicate that most patients are treated.[2–5,8–10] However, there is currently no strong evidence to guide the treatment of patients with unsuspected emboli. Although it has been reported that there are no adverse outcomes in untreated patients, recurrent emboli and deep vein thrombosis as well as respiratory-related mortality among patients with small untreated emboli have been reported. Unfortunately, this study does not clarify this issue, although the only untreated patient (who had an unsuspected isolated segmental pulmonary embolism) developed multiple larger, symptomatic emboli 5 weeks after the detection of the initial emboli.

Another interesting observation by Browne et al. is that 2.5% of patients without pulmonary emboli on the initial computed tomography developed symptomatic or unsuspected pulmonary emboli in the 6-month follow-up period. This occurrence would seem to indicate that thromboses and emboli are constantly occurring and resolving in this subset of patients with cancer and complicates the decision whether these patients can be observed without instituting anticoagulation therapy. Because pulmonary emboli can be a marker for subsequent thromboembolic disease, current clinical practice in most institutions includes initiation of anticoagulation therapy in patients with unsuspected pulmonary embolism. However, the identification of those patients at high risk for recurrent emboli and the most appropriate anticoagulation regimen, including the duration of treatment, has not been determined. In this regard, the pertaining published literature is inconclusive and further study is needed to determine who would benefit from anticoagulation and the optimal regimen of anticoagulation among these patients. It is important to state that a significant limitation of this study with respect to evaluating the outcomes of therapy is the relatively small number of patients with pulmonary emboli and the fact that the specific treatment regimens used were not clarified. The authors report that there were no recurrent emboli or therapy-related complications among the treated patients. This absence of any therapy-related complications stands in contrast to the report by Engelke et al.[11] Notably, therapy in the study by Engelke et al. included the use of thrombolytic therapy with its higher risk of bleeding complications.

In summary, Browne et al. have added to the developing literature on the prevalence of unsuspected emboli in oncology patients. In addition to the 4.4% prevalence of asymptomatic pulmonary emboli, they have importantly raised issues pertaining to therapeutic management by reporting a 2.5% incidence of pulmonary emboli in the 6 months after the initial diagnosis in their patient group. Interestingly, the authors have also confirmed that, regardless of size of the emboli, there is an alteration of patient management when pulmonary emboli are detected. Specifically, anticoagulation therapy is typically instituted even though the data supporting therapeutic management is unclear.

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