When atrial fibrillation occurs with pulmonary embolism, is it the chicken or the egg?

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Common clinical wisdom has it that the occurrence of pulmonary embolism engenders any atrial fibrillation that may accompany it. Cases are reported to remind clinicians to be alert to the possibility of pulmonary embolism in patients who present with unexplained atrial fibrillation. To be sure, such cases are seen, and the mechanism of the atrial fibrillation is said to be acute right ventricular dilatation with “strain.”

Suppose that this relation is sometimes reversed, such that atrial fibrillation causes pulmonary embolism. Any new insight into the origin of pulmonary emboli — so-called primary pulmonary emboli — would be welcome, given that a cause cannot be found in 40% of such cases. We know that clots form in the left atrium and that such clotting occurs at a higher rate among patients with atrial fibrillation than among those with sinus rhythm. The experience with stroke and with systemic emboli arising from the left atrium raises the possibility that emboli might also originate from the right atrium. Beyond opinion or case reports, we have 2 threads of information suggesting that such clots could occur. First, cardiace ultrasonographers have correlated spontaneous echo contrast in the left atrium, a finding that resembles that of injected microbubbles, with the subsequent appearance of ultrasonically detectable frank clot. (Thus, this echo contrast finding is presumed to be an antecedent of clotting, perhaps rouleau or other red-cell clumping.) Spontaneous echo contrast has been noted to be an antecedent of clotting, perhaps rouleau or other red-cell clumping. (Thus, this echo contrast finding is presumed to be an antecedent of clotting, perhaps rouleau or other red-cell clumping.) Spontaneous echo contrast has been noted in the right atrium of patients with right ventricular dilatation with “strain.”

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We also have older information that clots do form in the right atrium, particularly in patients with atrial fibrillation. Aberg’s landmark autopsy study of 693 consecutive patients who had had atrial fibrillation during their last illness showed that 12.6% had clots in the left atrium and 7.5% had clots in the right, predominantly in the appendages. It is interesting that the prevalence of pulmonary embolism was similar whether thrombosis had been apparent in the deep veins or not (8.1% and 7.7%, respectively). This suggests that the clots might have an origin other than the
firmed were compared with those in which it proved to be absent. The overall rate of atrial arrhythmia was similar between the 2 groups. However, the proportion of all patients in these studies with atrial fibrillation was 13%, which suggests that patients in whom a diagnosis of pulmonary embolism is suspected and then dismissed are a poor group for purposes of this comparison because they have other risk factors for atrial fibrillation, such as hypertension or coronary artery disease.

The hypothesis that atrial fibrillation leads to pulmonary embolism could be tested more directly. Prospective cohort studies involving atrial fibrillation patients and controls would be ideal because they would establish unequivocally whether the atrial fibrillation antedates the pulmonary embolus. This approach would also provide a reliable estimate of any etiologic fraction attributable to the atrial fibrillation. The fact that this relation has not been evident in those studies already reported suggests that the incidence of pulmonary embolism is lower than the 5% annual incidence of systemic embolism found in these studies. Another explanation for the absence of data on this possible connection is the underdetection of pulmonary embolism. For this reason, prospective studies would have to include some sort of regular surveillance, probably lung scans. A case-control approach might prove more practical because cases would accumulate more quickly. Another advantage of this approach is that it would enable an examination for absence of other causative factors for pulmonary embolism, notably venous thrombosis, other states involving hypercoagulation and cancer. What is needed is a comparison of patients with pulmonary embolism with control patients in terms of history of atrial fibrillation. The controls would need to be selected with care to exclude those with confounding factors that could cause either pulmonary embolism or atrial fibrillation or both. The case-control approach is limited, however, by the fact that atrial fibrillation can be intermittent, potentially causing patients to present with the embolism but without the fibrillation.

The need to establish whether this causal relation exists seems academic, considering that the risk of systemic embolism in atrial fibrillation is, in itself, sufficient reason to recommend anticoagulant therapy. There are, however, pragmatic reasons to find out if the relation is real. If it were known for certain that atrial fibrillation caused a particular pulmonary embolus, intervention might be aimed at the fibrillation directly, in addition to that directed at the clotting. A patient with atrial fibrillation who, for whatever reason, is not receiving anticoagulants might be advised differently once the risk of a pulmonary embolus was added to the particular risk and benefit considerations. Finally, a causal connection, once we know about it, opens the way to new types of interventions, the nature of which we are not able to predict at present.

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References


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