Incidental pulmonary embolism detected by routine CT in patients with cancer

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There is an increased risk of pulmonary embolism (PE) in patients with malignancy. This increased risk is fourfold above the general population and is further increased if the patient is receiving chemotherapy. Between 4 and 28% of cancer patients will develop thromboembolic disease depending on their tumour type and stage. A significant proportion of patients with PE will present with non-specific symptoms or will be asymptomatic. Identification of symptomatic suspected PE by CT pulmonary angiograph (CTPA) is well established. The analysis of smaller peripheral vessels at CTPA is made possible by thinner collimation which improves the degree of certainty by which CT can detect PE. A 40% improvement in detection of sub-segmental PE is observed by decreasing collimation from 3 to 1 mm when performing dedicated CTPA.

While CT scanning for other indications is not primarily aimed at detecting PE, incidental detection of asymptomatic PE has been reported in several series. Using thick collimation between 5 and 10 mm, Winston found incidental PE in 0.96% of 1879 consecutive patients scanned for a variety of indications including trauma and malignancy evaluation. All of the patients with incidental PE had at least one risk factor. Gosselin found unsuspected PE in 1.5% of 785 patients with 5–8 mm collimation. The majority of the study group had malignancy. The highest risk subgroup was inpatients with malignancy in which 9% of 81 patients had incidental PE. In cancer patients I have observed a 2.5% incidence of asymptomatic PE using 5–8 mm collimation in 364 consecutive scans. Observed rates of incidental PE vary with thinner collimation techniques. Shultz found that 24% of 90 trauma patients had incidental PE using a 1.25 mm collimation technique. Only 4 of these (4.5%) had major clot burden which one might expect to have been visible with thicker collimation. In cancer patients a 2.1% incidental PE rate was observed by Boswell in 2085 patients at 2 mm collimation. Of these, only 9 (0.4%) had saddle embol or embol in the right or left pulmonary arteries.

Thus for a thick slice technique of between 5 and 8 mm collimation, one should expect to see incidental PE in between 0.4% and 4.5% of cases.

Cancer patients often undergo multiple CT investigations as part of their cancer staging and treatment monitoring. Review of the pulmonary arterial tree on these examinations will reveal PE in a considerable number. The best method of visualisation is clearly at the workstation using windowing specifically tailored to the pulmonary vascular tree in question. Conventional soft tissue windows often do not show the pulmonary arteries well, as the contrast enhanced blood is too dense when the chest acquisition is made at around 35 s. Such a phenomenon is described for CTPA. I find window settings of approximately width 500, centre 130 to be best but the values are easily optimised for each individual patient at the workstation.

Confident diagnosis of a filling defect at thick slice CT can be difficult with the potential false positives due to partial voluming, movement artefacts and the presence of adjacent lymph nodes. Advice related to interpretation of dedicated CTPA to prevent such pitfalls should be extended to our thicker slice studies. Diagnostic criteria for PE include the requirement to visualise a ‘polo mint’ or ‘railway track’ appearance where embolus is surrounded by contrast enhanced blood or the
requirement that the filling defect is seen on two or more consecutive slices\cite{11}.

It is likely that patients with incidentally detected PE should be treated with anticoagulation if appropriate. Evidence for this can probably only be based on extrapolation from management of symptomatic PE\cite{6}.

In conclusion, where thick slice contrast enhanced CT of the chest is employed in the management of any patient, but especially cancer patients, the pulmonary arterial tree should be systematically reviewed for incidental PE. A workstation should be employed to allow optimisation of viewing windows. Application of criteria to avoid overcalling artefacts should be employed. A ‘polo mint’ or ‘railway track’ sign should be seen or the defect seen on two or more slices. In high risk patients where the chest is being imaged, it may be worth considering changing acquisition protocols to include a thinner collimation technique through the pulmonary arteries to allow more peripherally placed incidental emboli to be detected.

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