

Clinically unsuspected pulmonary embolism— an important secondary finding in oncology CT

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AIM: To determine the rate of finding incidental pulmonary embolisms (PE) at staging or follow-up chest computed tomography (CT) in oncology patients.

MATERIALS AND METHODS: Three hundred and eighty-five consecutive chest CT examinations, performed in patients with cancer, were prospectively assessed during a 9-month period between October 2003 and June 2004. These were spiral acquisitions between 5 and 8 mm collimation acquired 25 s after intravenous contrast medium administration. PE was diagnosed if a filling defect was seen in the central pulmonary arteries on two or more consecutive slices.

RESULTS: Ten of 385 (2.6%) of these patients had incidentally detected PE. This was not attributable to any specific malignancy or chemotherapeutic regimen. These emboli were all central, between the main pulmonary artery and the lobar level. Although the significance of these findings in patients not clinically suspected of having PE could be contentious, all the patients were started on therapeutic anticoagulation as a result of this observation.

CONCLUSION: Over one in 40 oncology patients have incidental central PE visible on the CT images performed to assess their malignancy. Formal review of the pulmonary arteries, using a work station, is advised in patients with malignancy.

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Introduction

There is an increased risk of pulmonary embolism (PE) in patients with malignancy. This increased risk is four-fold above the general population and increases to six-fold if the patient is receiving chemotherapy.¹ PE rates of between 1 and 43% have been reported depending on the tumour type, stage and chemotherapeutic regimen.² A significant proportion of patients with PE will have a non-specific presentation³ or will be asymptomatic.⁴ Incidental PE is occasionally detected in our centre during staging or follow-up computed tomography (CT) examinations of oncology patients. A prospective study was undertaken to determine the rate of this finding in our institution and compare this with rates described in the literature.

Materials and methods

Three hundred and eighty-five consecutive chest CT examinations in patients with malignancy were prospectively evaluated by a single consultant radiologist as part of the standard reporting of these CT images. This radiologist had 2 years experience as a consultant reporting mainly oncology CT. The cases occurred over a 9-month period from October 2003 to June 2004. Review of the pulmonary arteries is standard practice for evaluation of these images,^{5,6} and the reporting process was not altered in any way as a result of this observation being made. During the study period, this radiologist's CT workload also included 109 CT images of the chest in patients without malignant disease, but these patients were not included in the study. Patients who did not have the thorax included in the CT examination or had clinically suspected PE were excluded from the study. Dedicated CT pulmonary angiograms (CTPA) were also excluded. The resulting group studied comprised all patients with malignancy who underwent a CT scan of the chest, in the absence of clinical suspicion of PE, in a single radiologist's practice in a 9 month period.

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(a)



(b)



(c)

Figure 1 A suspicious filling defect seen at 8 mm collimation, in the left lower lobe pulmonary artery (a), is confirmed as a pulmonary embolus at CTPA 1 mm collimation (b) on the axial view and (c) on sagittal reconstruction. Emboli are also seen in the right-sided vessels at CTPA, which were not appreciated on the thick-section study.

The examinations were performed using either 5 or 8 mm collimation using either a Philips Mx 8000 Quad or a Philips PQ5000 CT machine, both machines manufactured by Philips Medical Systems, Reigate, Surrey, UK. Spiral acquisition was made 25 s after intravenous contrast medium administration at pitch 1.5 and reconstructed every 5 or 8 mm. Ultravist 300 (100 ml; Schering AG, Berlin, Germany) was used as the contrast agent and injected at a rate of 3 ml/s. The images were reviewed on a work station (Philips Mx view) and diagnostic criteria used in CTPA were used for the diagnosis of PE. Visualisation of a “polo mint” or “railway track” appearance^{7,8} where embolus is surrounded by contrast-enhanced blood was diagnosed as PE if this was seen on two or more consecutive images.⁹

Implied consent was obtained from all patients in accordance with the Trust guidelines for inclusion in this data collection process.

Results

Of the 385 patients studied, 51% (196/385) were males and 49% (189/385) were females. The average patient age was 61 years (range 22-94 years). Ten patients had visible PE on their CT images. In nine of these PE had not been observed before, this being the first time PE had been diagnosed for the patient. In one (patient 2) PE had been incidentally noted on a staging CT examination 8 weeks earlier, but as the observation at that time was also entirely incidental, it was felt valid to include this patient in the present results.

Of these 10 patients with incidental PE, seven were male and three female. The average age was 65 years ranging from 54-81 years.

Confirmatory dedicated CTPA was felt necessary in two of the 10 patients; both CTPA confirmed the suspected diagnosis. An example of the suspected filling defect and confirmation at thinner section CT is shown in Fig. 1. In the other eight patients, the filling defect was such that a confirmatory study was not felt necessary. Examples of large filling defects not requiring confirmation are shown in Figs. 2 and 3. In addition to having a malignancy, all of these patients were also receiving or had recently completed chemotherapy as shown in Table 1. No particular malignancy was seen to predominate as shown in Table 2.

Discussion

Cancer patients often undergo multiple CT

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