WHEN THE UNEXPECTED IS PREVALENT

A new study highlights the role AI can play in helping to identify incidental pulmonary embolism in oncology patients.

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Research Summary

Unreported incidental pulmonary embolism in patients with cancer: Radiologic natural history and risk of recurrent venous thromboembolism and death

Wiklund, Peder. "Unreported Incidental Pulmonary Embolism in Patients With Cancer: Radiologic Natural History and Risk of Recurrent Venous Thromboembolism and Death." Thrombosis Research, 2023.

STUDY DESIGN

Retrospective, single center study

STUDY PURPOSE

Given the prevalence of venous thromboembolism (VTE) – including pulmonary embolism (PE) and deep venous thrombosis (DVT) – in oncology patients, the study evaluated the risk of recurrent VTE and risk of death in unreported and untreated incidental pulmonary embolism (iPE) patients. The authors sought to determine if cancer-related factors, with or without initial iPE burden, were associated with adverse outcomes.

MATERIALS AND METHODS

- Oncology patients undergoing chest CT between January 2014 and June 2019 were reviewed for unreported iPE. To facilitate review, Aidoc's FDA-cleared algorithm for triage of incidental PE was used. The studies were initially reviewed by the first author – a radiologist with nine years of experience, the Aidoc algorithm or both.
- All studies initially marked as positive by the algorithm were reviewed by the first author. All included iPE cases were reviewed by the first and second author – a radiologist with six years of experience – and final categorization was made by consensus.
- All patients in the study were followed for one year from baseline. VTE was either confirmed or based on information in the patient's EHR and PACS.

SELECTED RESULTS

UNREPORTED IPE WERE COMMON IN PATIENTS WITH CANCER:

3.8%
Total iPE prevalance
(350/9,390)

72%
of iPE were unreported
(252/350)

TWO PATIENT COHORTS WERE INCLUDED IN THE SURVIVAL ANALYSES;

171
unreported iPE
=
29.8%
progression to new emboli
(51/171)

323
no iPE (control)
=
6.5%
progression to new emboli
(21/325)

Unreported iPE patients were excluded if treatment dose anticoagulants at or within five days of the baseline date had occurred.

SIMILAR VTE RECCURENCE RATES AMONG IPE GROUPS:

30.8%
unreported subsegmental with multiple vessel involvement
(4/39)

42.9%
unreported lobar/proximal
(6/14)

32.6%
unreported segmental lobar/proximal
(29/89)

RESULTS

- Unreported iPE were common in patients with cancer, with a total iPE prevalence of 3.8% (350/9,390), of which 72% (252/350) were unreported.
- Two patient cohorts were included in the survival analyses; patients with unreported iPE and controls (no iPE). Unreported iPE patients were excluded if treatment dose anticoagulants at or within five days of the baseline date had occurred.
  - The resulting patient cohort was 171 patients with unreported iPE and 323 controls (no iPE).
  - 29.8% (51/171) of the patients with overlooked iPE had a progression or a new emboli compared to 6.5% (21/323) for the control group.
  - Unreported iPEs were segmental 52.0% (89/171), multiple subsegmental 22.8% (39/171), single segmental 17.0% (29/171) or lobar/proximal 8.2% (14/171).
- Patients with unreported subsegmental iPEs with multiple vessel involvement were associated with similar VTE recurrence rates (30.8%, 4/39) as overlooked lobar/proximal (42.9%, 6/14) or segmental patients (32.6%, 29/89).
- After exclusion of patients with overlooked iPE without a follow-up CT (50/171) a subcohort of 121 patients was identified.
- Patients with overlooked iPE with follow-up CT (121/171) had complete resolution of the initial iPE at the first follow-up CT was observed in 71.1% (86/121) of patients, however 18.7% (16/86) suffered a subsequent recurrent VTE during the follow-up period.

CONCLUSIONS

Cancer-associated iPE when unreported and untreated was associated with the risk of recurrent VTE, however there was no significant association between iPE burden and risk of death.

THE ROLE OF AI IN INCIDENTAL FINDINGS

In a previously published study[1] by Wiklund, the author noted the high sensitivity (90.7%) and specificity (99.8%) of the Aidoc algorithm in flagging iPE. As the body of evidence grows in documenting the prevalence and impact of iPE, so does recognition of augmenting radiologist workloads with a tool that can analyze high volumes of images in real-time and flag suspected findings.

For every **100,000** oncology patient chest CTs

270 iPEs will be missed

of which **80** will progress or develop a new emboli within one year.

1 Wiklund, Peder, et al. "Incidental Pulmonary Embolism in Patients With Cancer: Prevalence, Underdiagnosis and Evaluation of an AI Algorithm for Automatic Detection of Pulmonary Embolism." European Radiology, vol. 33, no. 2, Springer Science and Business Media LLC, Aug. 2022, pp. 1185–93. https://doi.org/10.1007/s00330-022-09071-0.

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