High fever (greater than 39°C) as a clinical manifestation of pulmonary embolism

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Summary: This is a review of seven patients with pulmonary emboli manifested as high fever (temperature greater than 39°C) seen over a 3 year period by an infectious disease consultant for unexplained fever. The patients' ages ranged from 16 to 81 years. Bed confinement was the underlying condition of all but one patient. Fever resolved with intravenous heparin therapy in three patients and one patient recovered without heparin therapy. Three patients died. Regardless of the degree of fever, pulmonary emboli should be among the list of differential diagnoses in patients with unexplained fever, especially in those who are confined to bed.

Introduction

Fever as a clinical manifestation of pulmonary embolism has been mentioned in some current text-books^{1,2} but not in others.^{3,4} Pulmonary embolism should be among the differential diagnoses in hospitalized patients with unexplained fever.⁵ However, it is the general belief that high fever is not seen in patients with bland pulmonary embolism. In the current edition of a standard textbook of medicine, it is stated that if the temperature is greater than 39°C, the diagnosis of pulmonary embolism is unlikely,⁶ although pulmonary embolism associated with temperature greater than 39°C has been reported.^{7,8}

Seven patients with pulmonary embolism manifested as high fever (temperature greater than 39°C) are presented.

Materials and methods

Between 1983 and 1985, the senior author personally saw seven patients who met the following criteria for high fever with pulmonary embolism: (1) the patient had daily elevated temperature of greater than 38°C for at least 48 hours, and the highest temperature was greater than 39°C; (2) no infection or other cause of

fever was detected from results of physical examination, appropriate cultures and other studies; (3) there was no underlying condition that might itself have caused a febrile state; (4) the chest films showed clear lung fields; (5) a lung scan showed perfusion defect or defects not explained by chest roentgenographic findings, or a pulmonary angiogram showed a filling defect. These patients were all seen in consultation for unexplained fever.

Results

The patients' ages ranged from 16 to 79 years. Bed confinement was the most important common underlying condition, except one patient who had multiple pulmonary emboli secondary to non-bacterial vegetations on the right atrial wall (Table I). All patients had temperatures higher than 39°C at some time during their clinical course. The usual clinical manifestations of pulmonary emboli, namely pleuritic chest pain, dyspnoea, cough, haemoptysis, and evidence of deep vein thrombosis were absent. Six patients received intravenous heparin therapy and three became afebrile and recovered. The response to heparin was dramatic and patients usually became afebrile within 72 hours. One of the three patients who died had recurrent multiple pulmonary emboli secondary to non-bacterial vegetations on the right atrial wall. One young patient recovered without intravenous heparin.

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Table 1 Selected clinical features of seven patients who had pulmonary embolism with temperature over 39°C

Patient no.	Age/Sex	Underlying condition	Hospital day	Maximum temp (°C)	PaO ₂ mmHg	Positive lung scan defects	Intravenous heparin	Outcome
1	77/F	Bed confinement	16	40.4	50.3	Entire left lung	yes	recovered
2	19/M	Bed confinement	14	39.3	77.2	Complete cut-off of right main pulmonary artery*	yes	recovered
3	16/M	Bed confinement	6	40.4	69.5	Superior segment of right lower lobe	yes	recovered
4	79/M	Bed confinement	16	39.7	48.5	Antero-lateral segment of right lower lobe and superior segment of lingula of left upper lobe	yes	died
5	81/F	Bed confinement	19	40.9	57.9	Entire left lung	yes	died
6	66/F	Right atrial wall vegetations (non-bacterial)	1	42.2	47.4	Several segmental and subsegmental defects over both lung fields*	yes	died
7	23/M	Bed confinement	1	40.4	67.9	Lateral right mid-lung	no	recovered

* Pulmonary angiogram; † = confirmed at autopsy

Discussion

Israel & Goldstein reported that 78.9% of 90 patients with pulmonary embolism had fever and that 10% of these patients had temperature of 103°F (39.5°C) and above.⁷ Murray and his colleagues found that high fever (temperature greater than 39°C) due to pulmonary thromboembolism may occur early and persist throughout the first few days.⁸ The fever pattern may be intermittent, sustained or even 'hectic' or 'septic' type.⁸

The mechanism of fever in patients with pulmonary emboli has not been clarified. It is probably due to acute inflammatory response from endogenously produced chemotactic factors presumably through tissue injury and/or complement activation.⁹ Fever from pulmonary emboli usually subsides after intravenous heparin therapy, a response analogous to that of patients with pelvic thrombophlebitis where the apparent antipyretic and anti-inflammatory effects of heparin are almost diagnostic.¹⁰

All the patients reported here were referred to an infectious disease specialist because there was no apparent cause for the high fever. The usual symptoms and signs of pulmonary emboli were absent. Obviously patients with the usual clinical features of pulmonary emboli may also have high fever as part of the clinical manifestations.

It is clear that pulmonary emboli can manifest as fever greater than 39°C. The diagnosis of pulmonary emboli requires a high degree of clinical suspicion. In patients who have unexplained fever regardless of how high the fever may be, pulmonary emboli should be among the list of differential diagnoses, especially in patients who are confined to bed. Not infrequently, high or persistently high fever in patients with pulmonary embolism prompts suspicion of infection, leading to unnecessary diagnostic procedures or the initiation of unwarranted antibiotic therapy.

Thus, in patients with unexplained high fever, pulmonary embolism should be included in the differential diagnosis, in addition to drug-induced fever.^{11,12}

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