



REVIEW

Clinical characteristics of septic pulmonary embolism in adults: A systematic review



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KEYWORDS

Septic pulmonary embolism;
Clinical characteristics;
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Summary

Objectives: To describe the clinical characteristics of septic pulmonary embolism in adults in order to improve its diagnosis and treatment.

Methods: Specific search terms were used for retrieval from commonly used Chinese and English databases and the articles were selected in accordance with the inclusion and exclusion criteria. Cases from the included articles were pooled; then the following parameters were analyzed: major risk factors, clinical manifestations, imaging findings, characteristics of pathogenic microorganisms, complications and other clinical characteristics.

Results: After strictly selected by the inclusion and exclusion criteria, 76 articles were selected (2 Chinese articles and 74 English articles) that described 168 cases. The major risk factors for SPE were intravenous drug use ($n = 44$), intravascular indwelling catheter ($n = 21$) and skin or soft tissue purulent infection ($n = 10$). The most frequent clinical manifestations were fever ($n = 144$), dyspnea ($n = 81$), chest pain ($n = 82$) and cough ($n = 69$). Chest CT showed multiple peripheral nodules in both lungs ($n = 89$), cavitation ($n = 75$), focal or wedge-shaped infiltrates ($n = 48$) and pleural effusion ($n = 40$). Echocardiography often revealed vegetations ($n = 52$). Blood cultures grew methicillin-resistant *Staphylococcus aureus* (MRSA) ($n = 27$), methicillin-sensitive *Staphylococcus aureus* (MSSA) ($n = 48$) and *Candida* ($n = 6$). Seventeen cases died and 101 cases were cured.

Conclusions: SPE is a rare disease without specific clinical manifestations. For high-risk groups, such as intravenous drug users or patients with intravascular indwelling catheters, fever and imaging findings of multiple nodules or local infiltrates, with or without cavitation, are highly suggestive of SPE. Early diagnosis and prompt antimicrobial therapy or surgical intervention can lead to a successful treatment outcome.

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Septic pulmonary embolism (SPE) is a rare type of pulmonary embolism in which emboli containing pathogens embolize to the pulmonary artery and cause pulmonary embolism and focal lung abscesses. In 1978, a study [1] reported 60 cases of SPE, 78% of these were intravenous drug users [1]. Due to the increasing use of intravascular devices and catheters, more catheter-related SPE reports have been published [2]; most were small case series or individual case reports. In order to understand more thoroughly the clinical and epidemiological features of SPE, we systematically reviewed reports of SPE published from June 1978 to September 2012. The results are reported below.

Materials and methods

Sources of data

Septic pulmonary embolism was the search term used for retrieval from the Chinese Biomedical Literature Database on Disc, China National Knowledge Infrastructure, Wanfang Data Periodicals System and VIP Chinese Biomedical Journals. In addition, "septic pulmonary embolism" and "septic pulmonary emboli" were the search terms for retrieval from PubMed, EBSCO, SpringerLink, ScienceDirect Editions and EMBASE full-text database. Articles published in the time period June 1, 1978 to September 1, 2012 were included. The retrieval was supplemented by literature tracing to collect relevant articles as comprehensively as possible. First, two investigators independently read the titles and abstracts of the articles retrieved; second, after excluding obviously ineligible reports, we browsed the full texts of articles that might meet the inclusion criteria; third, we cross-checked the results of the included articles. In case of disagreement, eligibility was decided through discussion or by a third investigator.

Inclusion and exclusion criteria

Inclusion criteria were as follows: (1) Eligible study designs included individual case reports, case series, case-control studies or cohort studies. (2) Case definition of SPE included the following [2]: a. focal or multifocal lung infiltrates compatible with septic embolism to the lung, b. presence of active extra pulmonary infection as potential embolic source, c. exclusion of other potential explanation for lung infiltrates and d. resolution of lung infiltrates with appropriate antimicrobial therapy. (3) Study objectives included a descriptive analysis of clinical manifestations of SPE. (4) Study results could be either a qualitative description of clinical manifestations or a quantitative representation of the frequency of various clinical manifestations. (5) **The patients in the studies were older than 14 years of age.**

Exclusion criteria follow: (1) articles that only focused on certain clinical characteristics of SPE, for example, imaging characteristics; (2) articles that repeated another published report or contained data that significantly overlapped with that of another published report; (3) systematic review, guidelines and other descriptive articles and (4) articles without an available full text version or published in languages other than Chinese and English.

Information extraction

EpiData 3.1 software was used to extract the relevant information from the eligible articles, including first author, publication year, number of cases, age, sex, risk factors and number of patients with these risk factors, clinical manifestations, imaging findings, blood culture results and outcomes, etc.

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