



Original Article

Clinical Characteristics and Prognosis of Pulmonary Embolism Caused by Economy Class Syndrome[☆]



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ABSTRACT

Objective: Clinical presentation and short-term prognosis of patients with travel-associated acute pulmonary embolism (PE) (i.e., economy class syndrome [ECS]) is not well understood.

Methods: In this retrospective cohort study of patients with acute PE identified from a single center registry, we assessed the clinical presentation and the association between ECS and the outcomes of all-cause mortality, PE-related mortality, nonfatal venous thromboembolism and nonfatal major bleeding rates through 30 days after initiation of PE treatment.

Results: Of the 2333 patients with acute symptomatic PE, 124 (5.3%; 95% confidence interval, 4.4%–6.3%) had ECS. Patients with ECS were younger and had fewer comorbid diseases (recent bleeding, chronic obstructive pulmonary disease, congestive heart failure), but they presented with more signs of clinical severity (syncope [48% vs 14%; $P<.001$], tachycardia [37% vs 21%; $P<.001$], right ventricular dysfunction [31% vs 19%; $P<.01$] and myocardial injury [57% vs 28%; $P<.001$]) compared to those without ECS. Regression analyses showed a significantly lower risk of all-cause mortality for patients with ECS compared to patients without ECS (1.6% vs 9.6%; $P<.01$). We did not detect a difference in PE-related mortality at 30 days between those with and those without ECS (0.8% vs 3.1%; $P=.18$).

Conclusions: PE patients with ECS are younger and have fewer comorbid diseases compared to those without ECS. Though they present with more signs of clinical severity, their short-term prognosis is excellent.

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Características clínicas y pronóstico de la tromboembolia pulmonar secundaria al síndrome de clase turista

RESUMEN

Objetivo: No se conocen suficientemente las características clínicas y el pronóstico de los pacientes con tromboembolia de pulmón (TEP) aguda sintomática asociada a los viajes prolongados (síndrome de clase turista [SCT]).

Métodos: Se analizaron retrospectivamente las características basales de los pacientes con TEP aguda y se estratificaron según el factor de riesgo desencadenante. Se determinaron la mortalidad por todas las causas, la mortalidad por la propia TEP, las recurrencias trombóticas no fatales y los sangrados mayores no fatales durante los primeros 30 días de seguimiento.

Palabras clave:

Tromboembolia de pulmón

Síndrome de clase turista

Pronóstico

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Resultados: De los 2.333 pacientes incluidos, un total de 124 (5,3%; intervalo de confianza del 95%: 4,4–6,3) fueron diagnosticados de TEP secundaria a SCT. Estos pacientes fueron más jóvenes, presentaron menos frecuentemente comorbilidad y más frecuentemente síncope (48% vs 14%; $p<0,001$), taquicardia (37% vs 21%; $p<0,001$), disfunción de ventrículo derecho (VD) (31% vs 19%; $p<0,01$) y daño miocárdico (57% vs 28%; $p<0,001$) que los demás pacientes con TEP. La mortalidad por todas las causas a 30 días fue significativamente menor para los pacientes con TEP secundaria a SCT (1,6% vs 9,6%; $p<0,01$). La mortalidad a 30 días por TEP no fue diferente entre los dos grupos de pacientes (0,8% vs 3,1%; $p=0,18$).

Conclusiones: Los pacientes con TEP y SCT son más jóvenes y tienen menos comorbilidad que los demás pacientes con TEP. Aunque se presentan más frecuentemente con disfunción de VD y daño miocárdico, el pronóstico a corto plazo es excelente.

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Introduction

Pulmonary embolism (PE) is a disease with a wide spectrum of clinical manifestations, prognoses, and treatments.¹ Depending on the patient's hemodynamic status and right ventricular function at the time of diagnosis, the disease is classified as *high risk* PE (formerly called massive PE), which is characterized by the presence of arterial hypotension or shock, *intermediate risk* PE (formerly submassive PE) that occurs in normotensive patients with right ventricular dysfunction and myocardial damage, or *low risk* PE, in which the patient is hemodynamically stable and right ventricular function is normal.^{2–4}

However, the short-term prognosis of patients with acute symptomatic PE depends not only on the severity of the presentation of the PE, but also on the patient's baseline characteristics and the factor that triggered the thrombotic event. For example, patients with PE associated with cancer have a significantly poorer prognosis than patients with PE due to medical immobilization,⁵ while patients with PE due to major surgery have the best short-term prognosis.⁶ Several studies have shown that prolonged air travel (economy class syndrome [ECS]) is a risk factor for acute symptomatic PE.^{7–9} However, the clinical presentation and the short-term prognosis of patients with ECS is still poorly defined.

The aim of this study was to analyze the baseline characteristics of a cohort of patients with acute symptomatic PE, stratified according to the causative risk factor (ECS vs others). We also compared the short-term prognosis of patients with PE due to ECS with that of patients with idiopathic PE, or PE caused by cancer, immobilization, or surgery.

Method

Design

We conducted an observational, retrospective study to examine the baseline characteristics and short-term prognosis of a cohort of patients with stable and unstable acute symptomatic PE.

Patients and Selection Criteria

All patients with a diagnosis of symptomatic acute PE from the emergency department of the Hospital Ramon y Cajal (Madrid, Spain) between January 2003 and June 2016 were included consecutively. The diagnosis of PE was confirmed by computed tomography (CT) angiography findings of a partial or complete intraluminal defect surrounded by contrast medium or complete occlusion of a pulmonary artery in 2 consecutive CT slices.¹⁰ PE was diagnosed by ventilation/perfusion scintigraphy in patients with a high probability of PE according to PLOPED criteria¹¹ (at least 1 segmental perfusion defect or 2 subsegmental defects with normal ventilation), or with clinical suspicion of PE, an inconclusive scintigraphy and diagnostic ultrasound of the lower limbs showing

incomplete compressibility of the venous lumen as a sign of deep vein thrombosis (DVT).¹²

Interventions

Patients received low molecular weight heparin (LMWH) at weight-adjusted doses every 12 h for at least 5 days. Vitamin K antagonists were started along with LMWH between day 1 and day 3 of treatment, and LMWH was suspended when the international normalized ratio (INR) was stable and greater than 2.0. INR levels were monitored in accordance with the local practices of the center.

Recanalization treatment (thrombolytics, fragmentation or embolectomy) was used in hemodynamically unstable patients at the discretion of the treating physician. In general, mechanical fragmentation and embolectomy were reserved for unstable patients with contraindications for thrombolysis. A vena cava filter was inserted in patients with contraindication for anticoagulation (active bleeding or high risk of bleeding).

Definitions According to Causative Factor

Study patients were classified into one or more of the following groups: ECS, in patients who had made a journey of more than 4 h duration in the month before the diagnosis of PE, irrespective of the mode of transport. Cancer, active or in treatment, in the year prior to the diagnosis of PE. Surgery in the month prior to the diagnosis of PE. Immobilization, in non-surgical patients bedridden for 4 or more days in the month prior to the diagnosis of PE. Pregnancy, postpartum period, use of oral contraceptives in the month prior to the diagnosis of PE. Idiopathic, in the absence of any of the above-mentioned triggers.

Study Episodes

The primary endpoint was defined as all-cause mortality in the month prior to diagnosis. Secondary endpoints were death due to the PE itself, objectively confirmed non-fatal thromboembolic relapse, and non-fatal major bleeding in the month following diagnosis.

Diagnostic criteria of non-fatal thrombotic recurrence were the presence of a new intraluminal defect on CT angiogram, or a new ventilation/perfusion defect on lung scintigraphy; new non-compressible venous segment or increase in the diameter of the thrombus by at least 4 mm on lower limb ultrasonography.¹³

Non-fatal major bleeding was defined as bleeding requiring transfusion of at least 2 units of packed red blood cells, bleeding requiring surgery, or brain, retroperitoneal, or joint bleeding.¹⁴

Statistical Analysis

Continuous variables were expressed as mean±standard deviation or median (interquartile range), as appropriate, and were

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