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Pulmonary embolism manifesting as acute disturbances of behavior in patients with spinal cord injury

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Pulmonary embolism (PE) presented with short lived behavioral disturbances (BD) in four out of 13 consecutive patients with a proven PE. Three patients died of PE with evidence of recurrent thromboembolic disease at autopsy and one survived with PE (demonstrable by lung scanning). It is concluded that an acute behavioral disturbance in the acute spinal cord injury (SCI) patient can indicate PE, and the recognition of this possibility should lead to prompt investigation for pulmonary embolism.

Keywords: spinal cord injury; pulmonary embolism; behavior disturbance; anxiety; apprehension.

Introduction

Recently, a review of 13 consecutive pulmonary thromboembolism (PE) cases, occuring after spinal cord injury,[1] revealed a delayed diagnosis in four of them because of their presentation with an acute behavioral disturbance (BD). The outcome was fatal in three.

Since the recognition of typical PE events (dyspnea, apprehension, hemoptysis or chest pain)[2] usually precedes diagnosis and therapy,[3,4] the description of atypical events (eg screaming, crying, restlessness, hostility), which may be the only symptoms of PE, should be useful and significant.

Patients

The main details of the patients are summarized in Table I.

Discussion

Two features of the behavioral disturbances, suddeness of onset and shortness of duration, excluded the diagnosis of the common psychoses—depression, schizophrenia, and acute brain syndromes due to prescribed or illicit drugs, head injury, renal or hepatic failure, or preexisting cardiopulmonary disease.[5] These features and others, however, suggested the diagnosis of pulmonary embolism.

The sudden onset of the BD indicates cerebral hypoperfusion secondary to massive PE and abrupt attenuation of cardiac output due to insufficient venous return to the left ventricle. Symptoms such as syncope, apprehension, and air hunger secondary to massive PE, have been similarly explained.[6] The short duration of BD is probably due to the breakup of a pulmonary thromboembolus and spontaneous improvement in the circulation.[7]

PE may recur over a period of weeks or even months.[8] The unique study of untreated PE by Barrett & Jordan showed a recurrence rate of 50%.[3] Behavioral disturbance was recurrent with 14 symptoms for periods of 1–5 weeks in our patients. The duration of high risk for pulmonary embolism following spinal cord injury has been reported to be 3–4 months.[9] In our patients the BD fell within this time-frame. A circadian rhythm for pulmonary embolism has been described.[1,10] The incidence of PE between 12 midnight and 12 noon is six times greater than that during the second half of the day. The timing of the 12

Table I Acute behavioral disturbances preceding pulmonary embolism

Patient age	Level of paralysis	Event day	Event	Evidence of thromboembolism
49	T10	11	Inappropriateness	
		11	Hostility	Leg swelling
		12	Apprehension	
		13	Restlessness	
		15	Restlessness	
		20	Crying	
		22[a]	Chest pain Dyspnea	Lung scanning, V/Q mismatch
		25		Positive venogram
40	L3	7	Hyperventilation	
		23	Dyspnea Sudden death	Autopsy, massive PE, old pulmonary infarct
32	C6	6	Crying	
		15	Crying	
		16	Sudden death	Autopsy, massive PE, organized venous thrombosis
22	C4	43	Screaming	
		50	Air hunger	
		61[a]	Agitation	Positive venogram
		63	Screaming	
		63	Arrest	Positive lung scan
		80	Death	Autopsy, submassive PE, organized venous thrombosis

[a]Onset of treatment for PE.
V/Q = ventilation–perfusion lung scanning.

behavioral disturbances was recorded in 11 instances in this report and all occurred between 12 midnight and 12 noon.

Objective evidence for PE at the time of the behavioral disturbance was present clinically in one patient, and at autopsy in three. Both fresh and organizing pulmonary thromboemboli and venous thromboses suggested that thromboemboli preceded the fatal embolic event.[11]

In the event of an acute behavioral disturbance after spinal cord injury, the medical stakes can be high since untreated PE has been fatal in 26% of cases[3] whereas treating PE with anticoagulation or thrombolytic agents has reduced the mortality by 88%.[12]

In summary, acute and recurrent behavior disturbances in the acute spinal cord injury patient may be the initial and sole manifestation of pulmonary embolism and therefore should lead to prompt investigation to enable early treatment of the pulmonary embolus.

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