



## Pathology/Biology Section - 2016

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### H82 Case Report of Cerebral Tissue Pulmonary Embolism (CTPE) Following Blunt Force Head Injuries

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After attending this presentation, attendees will better understand CTPE, be able to identify the finding in similar cases, and understand its significance.

This presentation will impact the forensic science community by highlighting a rare complication of blunt force head injuries.

A case of an adult male who sustained blunt force head injuries and subsequent cerebral tissue pulmonary embolism is reported. The subject was found at the foot of his porch stairs. He was transported to the hospital, where he remained in critical condition for nearly 24 hours until his death. Toxicology indicated acute alcohol intoxication, and investigation of the circumstances leading up to the injury indicated a probable accidental fall from the top step to the ground. Examination showed blunt force injuries of the head including subdural hemorrhage and basilar skull fracture. At autopsy, multiple skull fractures and intracranial hemorrhages were observed, though the dura mater remained intact. Gross examination of the lungs showed no evidence of pulmonary embolism. Microscopic examination of the lung tissue showed multiple CTPE, confirmed by glial fibrillary acidic protein immunohistochemistry stain. In this case, the immunohistochemistry for glial fibrillary acidic protein showed variable positivity, likely due to necrosis of the embolized cerebral tissue.

Cerebral tissue pulmonary embolism is a rare complication of severe blunt force head injuries. It most often occurs in infants following injury associated with a difficult delivery. In adults, CTPE is always associated with severe blunt force injury of the head. CTPE is much less common in adults than in neonates. In one study, over a period of four years from 1989 to 1992, 102 head trauma fatalities were reported. Of those, only ten were discovered to have findings of brain tissue emboli, and only seven of those maintained an intact dura.<sup>1</sup> This indicates that the brain tissue does not need to travel through a large cerebral venous sinus, but can make its way to the lungs via the small meningeal or cerebral veins.

The clinical significance of cerebral tissue pulmonary emboli is variable. On one hand, some findings might be considered incidental, although even in these cases, the high concentration of thromboplastin found normally in neural tissue may contribute to the cause of death when it makes its way into the vasculature. When brain tissue comes in contact with the blood stream, it causes coagulation and shock. Therefore, even the so-called "incidental findings" may have been more contributory to the death of the patient than the term suggests. Conversely, in the cases of obvious macroscopic CTPE, death can be brought about much more directly by obstructing the pulmonary arteries.

#### Reference(s):

1. Collins, K.A. and Davis, G.J., "A Retrospective and Prospective Study of Cerebral Tissue Pulmonary Embolism in Severe Head Trauma," *Journal of Forensic Sciences, JFSCA*, Vol. 39, No. 3, May 1994, pp. 624-628.

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#### Head Trauma, Pulmonary Embolism, Cerebral Tissue