



### G78 The Significance of Gross Adrenal Hemorrhage — Undiagnosed Waterhouse- Friderichsen Syndrome: A Case Series

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After attending this presentation, attendees will understand the importance of finding gross adrenal hemorrhage at autopsy, and that further laboratory studies and clinical-pathologic correlation is warranted to identify the signs and symptoms of pre mortem adrenal dysfunction.

This presentation will impact the forensic science community by addressing how bilateral adrenal hemorrhage can complicate severe sepsis of various origins, not only severe meningococemia. Clinical suspicion of sepsis and septic shock warrants clinical studies to diagnose adrenal hemorrhage and insufficiency. Undiagnosed adrenal hemorrhage will result in an unfavorable outcome despite adequate treatment.

Adrenal hemorrhage and clinical adrenal insufficiency is classically associated with meningococemia as part of the Waterhouse- Friderichsen syndrome. It is proposed that non-traumatic adrenal hemorrhage in cases of sudden unexplained death are associated with

bacterial sepsis of various etiologies and that undiagnosed adrenal insufficiency may contribute to the fulminant clinical course.

Adrenal hemorrhage and resultant clinical adrenal insufficiency has been reported in literature as an uncommon complication of bacterial sepsis and is generally associated with an unfavorable outcome in the majority of cases. Other causes named in the literature include stress, anticoagulation therapy, and hypotensive events. Therefore, the finding of adrenal hemorrhage at autopsy is not necessarily associated with sepsis and pre-mortem functional adrenal insufficiency, as is seen in Waterhouse-Friderichsen syndrome. Four cases of non-traumatic gross adrenal hemorrhage are identified in 800 consecutive forensic autopsies and are described and analyzed, with particular attention paid to the patient's signs and symptoms possibly secondary to adrenal failure and the clinical course. It was found that patients with this grossly identifiable adrenal hemorrhage die suddenly as a consequence of acute illness of several days duration. All subjects were males, of different ethnicities, and with ages ranging from 2 to 47. All subjects have a clinical history suggestive of sepsis. At autopsy the most relevant findings are in the lungs, where findings range from heavy, congested lungs to gross findings of necrotizing pneumonia with abscess formation and empyema. Postmortem cultures yielded positive results in three out of four cases, with *Staphylococcus aureus*, *Streptococcus pneumoniae*, and *Pseudomonas aeruginosa* determined to be the definitive agent and the underlying cause of death in each case respectively. The fourth case had a positive culture with yeast and a coagulase negative staphylococcus. No cases had a positive culture for *Neisseria meningitidis*. In each case, signs and symptoms compatible with pre-mortem adrenal insufficiency were reported; in no instance was the adrenal hemorrhage clinically identified. The precise mechanism(s) of adrenal hemorrhage in sepsis or other initiating condition(s) is unclear. However, once adrenal hemorrhage ensues, significant morbidity and mortality may result from adrenal crisis including shock and death. The pediatric population is statistically at increased risk for this complication. In light of the clinical information and autopsy findings, a component of adrenal failure may have contributed to the grave consequences of infection. Herein, the causes and potential consequences are discussed of adrenal hemorrhage by reviewing a series of four cases in light of the available published literature and conclude that additional autopsy and clinical studies may be warranted to determine the clinico-pathologic correlation of this postmortem finding. **Adrenal Hemorrhage, Waterhouse-Friderichsen, Sepsis**