G53 Determination of Procalcitonin, C-Reactive Protein, Tumor Necrosis Factor-Alpha, Interleukin-6, and Interleukin-8 Levels in Serum, Vitreous Humor, and Cerebrospinal Fluid as Markers of Sepsis

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The goal of this presentation is to evaluate the potential role of procalcitonin, C-reactive protein, tumor necrosis factor alpha, interleukin-6 and interleukin-8 levels in different biological fluids (serum, vitreous humor and cerebrospinal fluid) as markers of sepsis, to evaluate the stability of these markers at different measurement times after collection, and to evaluate additional benefits of combined analysis of the mentioned markers compared to procalcitonin and C-reactive protein alone.

This presentation will impact the forensic science community by evaluating different markers that can be useful in postmortem diagnosis of sepsis.

In forensic pathology routine, a well-documented medical history is often not available for a deceased person and sepsis as the cause of death remain difficult to diagnose. In fact, postmortem blood cultures are often contaminated by putrefaction processes and macroscopic postmortem findings (such as myocardial ischemia, pulmonary edema and hemorrhages, hypoxic liver damage, mesenteric and gastrointestinal hemorrhages, spleen infarctions and septic spleen alterations, kidney ischemia, and brain edema), as well as routine histological findings, may have an infectious or non-infectious origin and are neither specific nor sensitive for recognizing sepsis-associated fatalities.

The observation by Assicot and coworkers that serum procalcitonin levels increase above normal values in patients with bacterial sepsis, but not in patients with viral infection or without infection, has generated considerable interest in this marker.

A large number of clinical studies have investigated procalcitonin levels and courses of procalcitonin levels under various clinical conditions and they concluded that procalcitonin is valuable as a marker of serious bacterial sepsis and show a good correlation with the severity of the disease. In different groups of patients with sepsis, procalcitonin was compared to C-reactive protein (CRP), tumor necrosis factor alpha (TNF-α), interleukin-6 (IL-6), interleukin-2 (IL-2), interleukin-10 (IL-10) and interleukin-8 (IL-8) as a diagnostic and prognostic parameter. The results commonly showed that procalcitonin exhibits a greater sensitivity and specificity in differentiating patients with systemic inflammatory response syndrome (SIRS) from those with sepsis.

Tsokos and co-workers have investigated procalcitonin, C-reactive protein and interleukin-6 in postmortem serum as a marker of sepsis. Their results show that serum procalcitonin levels can be considered as a valuable postmortem marker to distinguish sepsis-associated fatalities from other non-septic causes of death. Compared to other potential biochemical postmortem markers of sepsis, procalcitonin has several advantages: in contrast to tumor necrosis factor alpha and interleukin-6, procalcitonin has a long half-life (25 to 30 hours); in comparison to cytokines, procalcitonin is a very stable protein, even at room temperature; procalcitonin concentrations do not differ in arterial and venous blood samples from living persons; repeated freezing and unfreezing of the blood samples does not significantly influence procalcitonin concentration.

Levels of C-reactive protein and interleukin-6 may increase very rapidly in response to inflammation of infectious origin; however, significantly elevated C-reactive protein and interleukin-6 levels can also be demonstrated in a large number of life-threatening clinical conditions, such as major trauma, extensive surgical procedures or burn injury, as a result of the systemic inflammatory response syndrome, irrespective whether the patient develops a sepsis or not.

Statement of the Method: Postmortem blood, vitreous humour and cerebrospinal fluid samples were collected at autopsy. Two study groups were formed according to whether there was an underlying septic condition as the cause of death based on the subject medical records as well as autopsy findings. Marker levels were measured at different times after collection. In the sepsis group, cause of death was multiple organ failure. In the non-sepsis group, cardiopulmonary resuscitation was not attempted in any case. Autopsy findings did not give any cause to suspect an underlying infectious disease.

Results will be presented and compared with published results in the literature.

Postmortem Chemistry, Sepsis, Diagnostics

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