

Loss of Salivary Cortisol Diurnal Variability in Critically Injured Patients

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Following injury, there is known dysfunction of the hypothalamic-pituitary-adrenocortical axis. Assessment of changes in cortisol release is confounded by standard laboratory assays which measure total - both bound (inactive) and free (active) - cortisol concentrations in blood plasma or serum. Critically ill patients often present with plasma protein derangements; thus the direct measurement of free cortisol may reflect adrenocortical function more accurately. Concentrations of free cortisol in plasma are in equilibrium with those in saliva.

We hypothesize that it is feasible to measure salivary cortisol in critically ill trauma patients and that diurnal salivary cortisol level will differ from normal controls.

Eligible subjects were ≥ 18 y/o, admitted to a single level I trauma ICU for > 72 hrs. Saliva was collected at 0600 and 1600 daily. Cortisol levels were measured by Enzyme-Linked Immunosorbent Assay. Normal controls were assessed with the same protocol. We recorded demographic information, medical history, hospital and ICU length of stay and Injury Severity. Mean AM and PM cortisol values were compared using repeated measures models. Continuous variables for subjects and controls were contrasted using t-tests. Results reported as means \pm standard deviation.

We enrolled 50 subjects: 65% were male, 92% sustained blunt injuries, mean age was 50 ± 19.7 , median (IQR) ISS was 22 (13) and TRISS was 0.9 (0.4). There were 26 normal controls. Comparing subjects to controls: mean PM cortisol concentrations were significantly higher in subjects vs. controls: 9.4 ± 7 vs. 3.1 ± 3.5 ; ($p < 0.001$). However, no difference in mean AM cortisol values, 7.8 ± 6.4 vs. 6.7 ± 4.3 ; ($p = 0.44$) was observed. Regarding diurnal variability, subjects failed to present the expected AM vs. PM decrease in cortisol concentrations 0.5 ± 5.1 vs. -3.5 ± 4.3 ; ($p = 0.002$) seen in controls. No difference in mean AM and PM cortisol values across ISS was observed ($p = 0.75$).

Cortisol levels remain elevated throughout the day, indicating loss of normal diurnal pattern in critically ill trauma patients. There was no relationship between injury severity and mean cortisol level.