The role of failing autonomic nervous system on life-threatening idiopathic systemic capillary leak syndrome

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Background: Idiopathic Systemic Capillary Leak Syndrome (ISCLS) is a rare disease that involves the endothelium and microcirculation, leading to an abrupt shift of fluids and proteins from the intravascular to the interstitial compartment. The consequence of the capillary leakage is a life-threatening hypovolemic shock that can lead to lethal multiple organ dysfunction.The autonomic nervous system (ANS) is central in regulating the cardiovascular response to hypovolemia, but ANS modulation in ISCLS has not yet been investigated. Here we report ANS activity during acute phase of severe ISCLS shock in three patients.

Methods: ANS was studied non-invasively by the spectral analysis of heart rate variability (HRV) with an autoregressive model. A spectral high frequency (HF) component between 0.15 and 0.5 Hz was used as a marker of vagal modulation directed to the heart, while low frequency (LF) component between 0.04 and 0.15 Hz, reflects the sympathetic nerve activity and is partially affected by parasympathetic activity. The ratio LF/HF was considered a marker of the sympatho-vagal balance. Stationary samples of 500 beats length were chosen for the analysis.

Results: The spectral components were almost undetectable during the acute phase accounting for loss of ANS modulation during the life-threatening ISCLS crises. During the recovery, data of two patients were available. After 24 hours, a progressive restore of ANS modulation occurred, and both vagal and sympathetic modulation were fully recovered within three days (figure 1).

Conclusion: The fact that ANS dysfunction reverts in 24 hours rules out a damage of neurologic fibres and accounts for a functional response. Further investigation is warranted to assess whether the ANS failure is an epiphenomenon of multiple organ dysfunction during life-threatening attacks or if it might have a role in the pathogenesis of hemodynamic instability during ISCLS crises.