

An insight into the autonomic mechanisms underlining the reflex syncope in children and adolescents

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Introduction:It has been estimated that around 15% of children and adolescents experience, at least, one episode of syncope until adulthood. Excluding a minority of cases that are due to a potential cardiac disease, the majority of syncopal episodes are of reflex origin and benign in nature. In this situation, a tilt-test (HUT) is performed to reproduce the clinical symptoms, allowing the evaluation of the progressive cardiovascular adaptations to orthostatism. However, the mechanisms underlining a HUT-induced syncopal episode, in these patients, are not yet well defined.

Aim:To investigate the modifications of autonomic activity that occur during a diagnostic HUT for reflex syncope in young patients.

Methods:Seventy-three pts (12 ± 3.5 years, 66% females) with unexplained syncope were enrolled in this study. HUT was performed following a standard protocol. A positive response was defined as a sudden development of syncope or presyncope associated with hypotension, bradycardia, or both. Beat-to-beat RR-intervals (RRI) and arterial pressure (BP) were continuously recorded and data were used to heart rate variability (HRV) analysis.

Results:Thirteen pts (17%, 11 females) experienced syncope after 18 ± 10.2 min of tilting. According to VASIS classification responses included mixed (53%), vasodepressor (30%) and cardioinhibitory (23%) types. Systolic BP (SBP) was significantly different between tilt-positive and tilt-negative pts at 10min (SBP 115 ± 10 vs. 126 ± 12 mmHg, $P=0.02$), 15min (SBP 112 ± 10 vs. 120 ± 10 mmHg, $P=0.04$) and 20min after tilting-up (SBP vs. 98 ± 12 vs. 120 ± 10 mmHg, $P=0.001$). No differences on HR were found between groups. Significant differences were noted in HRV parameters before syncope. In tilt-positive pts, LF changed dynamically during HUT, showing a sudden and initial rise of sympathetic tone (LF 8.5 ± 6.27 vs. 19 ± 15.3 mmHg², $P=0.037$) followed by a second overshoot of activity (LF 7.7 ± 5 vs. 15 ± 8.2 mmHg², $P=0.041$), continued by a steady fall-off 1 to 2min prior to syncope. This pattern occurred in every fainter and was absent in all non-fainters.

Conclusions:This study shows a strong effort by the autonomic nervous system to adapt to orthostatic stress through modifications of sympathetic tone of different magnitudes, before the syncopal event, in tilt-positive patients. These changes suggest an exhaustion of the sympathetic reserve not enabling a time-progressive adaptation leading the individual to faint.