

Heart rate variability and oxygen reserve index during cardiorespiratory events in patients undergoing ophthalmic arterial chemotherapy: a prospective observational study

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Unexpected cardiorespiratory compromise has been reported during ophthalmic arterial chemotherapy in pediatric patients with retinoblastoma. Although the underlying mechanisms remain unclear, autonomic responses are presumed to contribute to these events. We hypothesized that periprocedural heart rate variability would differ between patients with and without events. Between April 2018 and September 2019, 38 patients (age under 7 years) were included. Heart rate variability was analyzed using electrocardiogram, and oxygen reserve index was also monitored. Cardiorespiratory events were defined as > 30% changes in blood pressure or heart rate, > 20% changes in end-tidal carbon dioxide, > 40% changes in peak inspiratory pressure, or pulse oxygen saturation < 90% during ophthalmic artery catheterization. Heart rate variability and oxygen reserve index were compared between patients with and without cardiorespiratory events. Cardiorespiratory events occurred in 13/38 (34%) patients. During the events, end-tidal carbon dioxide was significantly lower (median difference [95% CI], - 2 [- 4 to - 1] mmHg, $p = 0.006$) and the maximum peak inspiratory pressure was higher (30 [25-37] vs. 15 [14-16] hPa, $p < 0.001$), compared to patients without events. Standard deviation of normal-to-normal R-R interval, total power, and very low-frequency power domain increased during selection of the ophthalmic artery in patients with events (all adjusted $p < 0.0001$), without predominancy of specific autonomic nervous alterations. Oxygen reserve index was significantly lower in patients with events than those without throughout the procedure (mean difference [95% CI], - 0.19 [- 0.32 to - 0.06], $p = 0.005$). Enhanced compensatory autonomic regulation without specific autonomic predominancy, and reduced oxygen reserve index was observed in patients with cardiorespiratory events than in patients without events.