Presented at the North American Congress of Clinical Toxicology 2023 – Montreal, Canada

Published in Clinical Toxicology 2023;61:88-89.

183. The Role of the QRS Interval Prolongation in Prognosticating Severe Toxicity in Overdose

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Background: Prior studies have evaluated the role of the QRS interval in prognosticating seizures and ventricular dysrhythmias in tricyclic antidepressants. These findings are often extrapolated to other sodium channel antagonists, although doing so has not been validated. The purpose of this study was to evaluate whether QRS interval prolongation is predictive of severe findings in other xenobiotics.

Methods: This was a secondary analysis of cases reported to the Toxicologic Investigators Consortium (ToxIC) Core Registry between 1 January 2010, and 31 December 2022. All cases with documented QRS interval prolongation were obtained. These data were analyzed to obtain the seven most frequent single agent xenobiotic exposures with QRS interval prolongation. This included ethanol, which was excluded due to the concern that patient intoxication might mask other potential exposures. All cases of single-agent exposure to these xenobiotics were obtained, regardless of QRS interval duration. The inclusion criteria were older than 12 years with a single-agent exposure to one of these six xenobiotics. The variables evaluated were seizure, ventricular dysrhythmia, metabolic acidosis, and death. Statistical analysis was performed using relative risk, sensitivity, specificity, positive predictive value, and negative predictive value calculations. Prolongation of the QRS interval was defined as greater than 120 milliseconds by the ToxIC Core Registry.

Results: There were 1,390 cases of QRS interval prolongation identified of the 94,939 (1.5%) total cases during the study period. Eight-hundred cases were single-agent exposures. The most common single-agent exposures in descending frequency were diphenhydramine, amitriptyline, ethanol, bupropion, quetiapine, nortriptyline, and cocaine. There were 5,191 cases of single-agent exposures to these agents, excluding ethanol, of which 4,655 cases met the inclusion criteria. Patients with QRS interval prolongation had significantly increased relative risks of developing seizure, ventricular dysrhythmia, metabolic acidosis, and death compared to patients with normal QRS duration, except for ventricular dysrhythmia in nortriptyline and metabolic acidosis and death in nortriptyline and quetiapine. A normal QRS duration had a negative predictive value of greater than 90% that patients would not develop metabolic acidosis and 98% or greater that patients would not develop ventricular dysrhythmia or death from these six agents.

Conclusion: Previous studies suggest that a prolonged QRS in tricyclic antidepressant overdose is associated with an increased risk of seizure and ventricular dysrhythmia. This study demonstrates that QRS interval prolongation after exposure to these xenobiotics is associated with an increased risk of seizure, ventricular dysrhythmia, metabolic acidosis, and death. Furthermore, patients without a prolonged QRS are unlikely to develop ventricular dysrhythmias or death.