

Letter to the Editor

Determining the effects of adrenaline and desflurane on QTc interval

Dear Editors,

We read with great interest the article by Bestas et al¹ entitled "The effect of adrenaline on desflurane-induced prolonged QTc interval: a randomized double-blind trial", which is published in the current issue of European Review for Medical and Pharmacological Sciences.

The Authors¹ investigated the effect of adrenaline on desflurane-induced prolonged corrected QT (QTc) interval. They mentioned that adrenaline prolongs QT interval both in patients with long QT syndrome (LQTS) and in normal patients; and adrenaline QT stress test can be a beneficial tool in detecting LQTS in suspected cases. They concluded that desflurane caused progressive prolongation of the QTc interval, and adrenaline shortened QTc interval at application periods, due to increment in heart rate and ventricular contractility. Although, the current study is well-designed and gives detailed information, some comments may be of interest.

Adrenaline activates slowly activating delayed rectifier potassium (*I*_{Ks}) channels responsible for repolarization, resulting in QT interval shortening in healthy individuals². Provocative adrenaline QT stress testing can be resulted in a paradoxical gene specific response characterized by QT lengthening rather than expected shortening appears pathognomonic for individuals with *KCNQ1* mutations (LQTS type 1)³. In patients with LQTS type 1 (LQTS1), unopposed depolarization via calcium (Ca²⁺) channels and sodium-calcium exchanger can be observed, resulting in QT interval lengthening^{3,4}.

Desflurane depresses the delayed outward potassium (K⁺) current associated with significant lengthening of QT interval⁵.

In conclusion, adrenaline QT stress test can be a beneficial tool in unmasking concealed LQTS, particularly LQTS1². Adrenaline shortens QT interval in healthy individuals and prolongs in patients with LQTS1². Desflurane causes progressive prolongation of the QTc interval, as the authors mentioned, due to delayed outward K⁺ current. Adrenaline shortens QTc interval due to not only increment in heart rate and ventricular contractility, but also activating *I*_{Ks} channels responsible for repolarization, as expectedly, contrary to authors' sayings. Further electrophysiological studies are needed to determine the exact mechanism of QT shortening in co-administration of adrenaline and desflurane.

Conflict of Interest

The Authors declare that they have no conflict of interests.

References

- 1) BESTAS A, HANBEYOGLU O, KELES E, BAYAR MK. The effect of adrenaline on desflurane-induced prolonged QTc interval: a randomized double-blind trial. *Eur Rev Med Pharmacol Sci* 2013; 17: 1523-1528.
- 2) KHOSITSETH A, CLAPHAM DE, ACKERMAN MJ. Intracellular signaling and regulation of cardiac ion channels. In: Zipes DP, Jalife J, eds. *Cardiac Electrophysiology: From Cell to Bedside*. Philadelphia, PA: WB Saunders, 2004; pp. 33-41.
- 3) VYAS H, HEJLIK J, ACKERMAN MJ. Epinephrine QT stress testing in the evaluation of congenital long-QT syndrome: diagnostic accuracy of the paradoxical QT response. *Circulation* 2006; 113: 1385-1392.
- 4) DI GRANDE A, GIUFFRIDA C, NARBONE G, LE MOLI C, NIGRO F, DI MAURO A, PIRRONE G, TABITA V, ALONGI B. Management of sodium-channel blocker poisoning: the role of hypertonic sodium salts. *Eur Rev Med Pharmacol Sci* 2010; 14: 25-30.
- 5) PARK WK, KIM MH, AHN DS, CHAE JE, JEE YS, CHUNG N, LYNCH C 3RD. Myocardial depressant effects of desflurane: mechanical and electrophysiologic actions in vitro. *Anesthesiology* 2007; 106: 956-966.

E. Yalcinkaya, B. Bugan¹, M. Celik, S. Yasar, E. Gursoy

Gulhane Military Medical Faculty, Department of Cardiology, Ankara, Turkey

¹Malatya Army Hospital, Department of Cardiology, Malatya, Turkey