High-Fidelity Analysis of Perioperative QTc-Prolongation

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Background: Prolongation of the QTc-interval indicates abnormal cardiac repolarization. In the perioperative setting, several drugs have been individually shown to cause QTc prolongation[1], and a recent study[2] has shown that postoperative QTc prolongation is common.

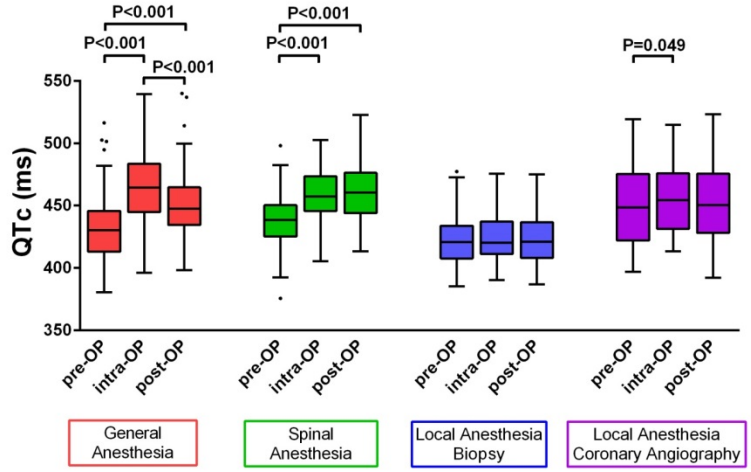
Objective: To determine whether QTc prolongation is an isolated postoperative phenomenon or occurs regularly during surgery, and if the type of anesthesia influences its incidence.

Methods: We conducted a prospective cohort study (n=300) where QTc duration was continuously recorded by 12-lead Holter ECG from 30 minutes preoperatively to up to 60 minutes postoperatively. QTc prolongation was compared between adult patients undergoing general (n=101) or spinal anesthesia (n=99) for orthopedic surgery, or local anesthesia (n=100) for biopsy or diagnostic coronary angiography. QTc intervals were determined as recommended by the International Society for Computerized Electrocardiology, and were corrected by the Fredericia method. Primary outcome was the intraoperative QTc increase (ΔQTc, as defined by the intraoperative-to-preoperative QTc duration difference). The incidence of long QTc (LQTc) episodes (QTc > 500 ms for at least 15 minutes) was determined.

Results: In 300 patients, 57,665 minutes of ECG recordings were reviewed, and 7,563 minutes were excluded because no QT interval could be identified.Significant QTc prolongation occurred during general (+33 ms, IQR+ 22 to 46 ms; median, interquartile range) and spinal (+22 ms, IQR +12 to 29 ms) anesthesia, whereas no QTc prolongation was observed during local anesthesia (biopsy (n=53): +4ms, IQR -4 to +7 ms; coronary angiography(n=47): +6ms, IQR -5 to +16 ms). The relative risk (RR) for an LQTc episode was 5.3 times higher [95% CI: 0.7 to 43.0] with general anesthesia than with spinal anesthesia. Pre-, intra-, and postoperative QTc duration of each cohort is shown in Figure 1.

Conclusion: These results indicate that QTc prolongation is not an isolated postoperative phenomenon and is common during surgery under general and spinal anesthesia.

Figure 1. Perioperative QTc prolongation



The median [IQR] QTc duration in the preoperative (pre-OP), intraoperative (intra-OP), and postoperative (post-OP) period was: 430 [413-446] ms, 464 [445-483] ms, and 447 [434-465] ms in the general anesthesia cohort (red); 438 [425-450] ms, 457 [446-473] ms, and 461 [444-476] ms in the spinal anesthesia cohort (green); 421 [408-434] ms, 420 [411-437] ms, and 421 [408-437] ms in the local anesthesia cohort stratified for biopsy (blue); 448 [422-475] ms, 454 [431-476] ms, and 450 [428-475] ms in the local anesthesia cohort stratified for coronary angiography (purple). Significant P-values of pairwise comparisons are shown.

References:

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