

Anaesthetic Management of Caesarean Section in a Parturient with Congenital Long QT Syndrome and an Implanted Cardioverter-Defibrillator

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Introduction

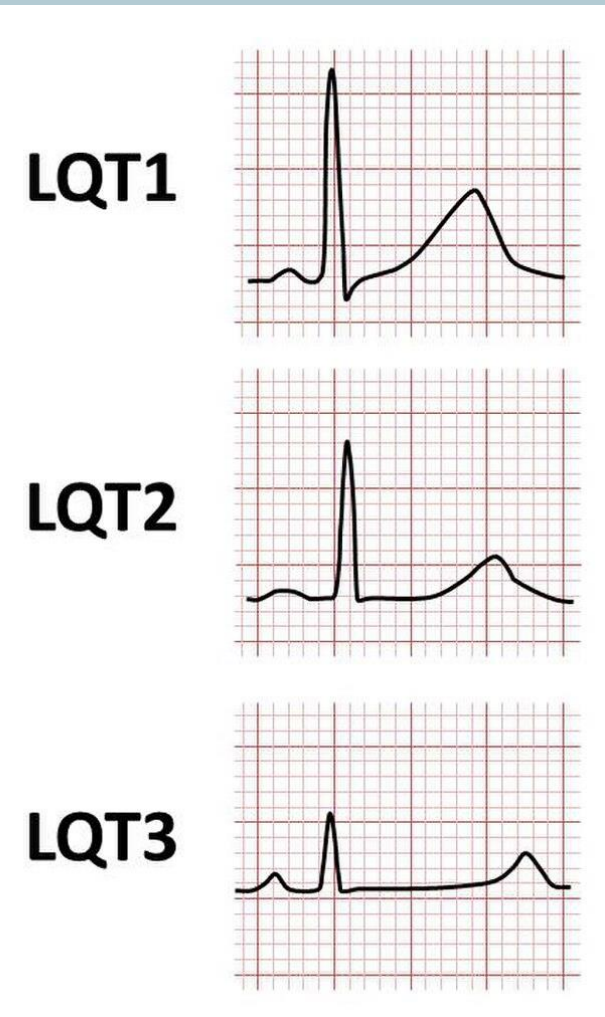
Congenital long QT syndrome (LQTS) is an inherited cardiac condition associated with delayed myocardial repolarisation, predisposing patients to ventricular arrhythmias and sudden cardiac death. It is characterised by prolongation of the QT interval on electrocardiography and may be worsened by physiological or drug-related triggers.

Pregnancy and delivery increase arrhythmic risk due to physiological cardiovascular changes, heightened sympathetic stimulation and exposure to QT-prolonging medications. Pain, anxiety, and changes in heart rate and blood pressure during labour and delivery may further increase the risk of arrhythmias.

Anaesthetic management can be further complicated by the presence of an implanted cardioverter-defibrillator (ICD), as in our case presenting for caesarean section. This requires careful planning, including consideration of device function and close monitoring throughout the perioperative period.

References

1. O'Hare M, Maldonado Y, Munro J, Ackerman MJ, Ramakrishna H, Sorajja D. Perioperative management of patients with congenital or acquired disorders of the QT interval. *British Journal of Anaesthesia*. 2018;120:629-44.
2. DeLeon AM, Lu R, Chen L, Asher Y. Inappropriate implantable cardioverter-defibrillator therapy during total hip arthroplasty: considerations for perioperative ICD management. *Cureus*. 2023;15:e38973.



- LQTS type 1 (LQT1) commonly shows a broad-based T wave pattern,
- LQTS type 2 (LQT2) shows notched or bifurcated T waves
- LQTS type 3 (LQT3) shows a late-appearing T wave with a prolonged ST segment

Adapted from Farwell and Gollob 2007
Can J Cardiol.

Case presentation

A 33-week primigravida was admitted for a planned caesarean section due to fetal growth restriction with borderline umbilical artery Dopplers, and a non-reassuring cardiotocograph (CTG). Her medical history was significant for congenital long QT syndrome type 2 (KCNH2 mutation), diagnosed at age 14, with a single-chamber ICD. Additional comorbidities included asthma, anxiety, and depression. Her regular medications were nadolol and sertraline.

In the antenatal period, she received magnesium sulphate for neuroprotection and corticosteroids to promote fetal lung maturity. A low-dose combined spinal-epidural anaesthetic technique was used. Spinal anaesthesia was achieved with 7.5 mg hyperbaric bupivacaine, 100 micrograms of morphine, and 15 micrograms of fentanyl. This was followed by titration of epidural ropivacaine to establish a T4 sensory block.

A magnet was placed over the ICD to suspend anti-tachycardia therapies, external defibrillator pads were applied prior to surgery and the QT interval was continually monitored. QT-prolonging medications were avoided, used minimal vasopressors, and oxytocin was administered as a bolus without an infusion.

The procedure was completed uneventfully, with stable maternal haemodynamics and no arrhythmic episodes observed intraoperatively.

Discussion

Anaesthetic technique

Neuraxial anaesthesia attenuates the sympathetic response to surgical stimulation without the need for QT-prolonging agents such as suxamethonium or volatile anaesthetics. Various case reports established a safe use of combined spinal-epidural (CSE) technique. Spinal anaesthesia alone to the level of T10 may markedly prolong the QTc, through the corrective increase in sympathetic tone in unblocked cardiac sympathetic fibres (T1-T4).

Pharmacological considerations

A broad range of commonly used perioperative medications can prolong the QT interval and require careful consideration (Figure 1). Oxytocin requires caution due to its vasodilatory and QT-prolonging properties.

ICD management

Electromagnetic interference (EMI) from surgical electrocautery can be misinterpreted by ICD as a shockable rhythm, triggering inappropriate therapy. National guidance from the ASA Practice Advisory recommends against the indiscriminate use of magnets for procedures below the umbilicus, citing the theoretical risk of magnet-induced R-on-T phenomenon in pacing-dependent patients. However, this recommendation must be weighed against the evidence. DeLeon et al. [2] document cases of significant EMI and inappropriate ICD shocks occurring during infra-umbilical procedures, demonstrating that the risk of device interference cannot be dismissed on anatomical grounds alone. In a patient with LQT2 (where an unexpected shock itself constitutes a major stressor capable of provoking further arrhythmia) the risk-benefit calculation shifts in favour of magnet application.

Whilst blanket deactivation is not indicated for infra-umbilical procedures, individualised risk assessment (taking into account LQTS subtype, arrhythmic history, surgical technique etc.) should guide ICD management in each case.

Figure 1. Impact of anaesthetic agents in LQTS

