

## LETTER TO THE EDITOR

### Rethinking spinal anesthetic with bupivacaine for cesarean delivery in parturient with Brugada syndrome



Dear Editor,

Brugada Syndrome (BrS) is a hereditary cardiac rhythm dysfunction that can lead to lethal tachyarrhythmias.<sup>1</sup> It is characterized by right bundle branch block, normal QT interval, and persistent ST segment elevation in right precordial leads without demonstrable structural heart disease.<sup>1</sup> Pregnancy, physical or mental distress, and numerous drugs can trigger lethal arrhythmias,<sup>2</sup> and the only effective prevention of sudden death is an Implantable Cardioverter Defibrillator (ICD).<sup>2</sup> Although prevalence is low (0.05/1000),<sup>1</sup> the obstetrical population has routine exposure to numerous potential triggers. Given the significant potential for sudden cardiac death, particular attention should be paid to labor and perioperative management. The Department of Cardiology at the University of Amsterdam Academic Medical Center, in collaboration with a panel of experts, created an online tool ([www.brugadadrugs.org](http://www.brugadadrugs.org)) listing drugs to avoid.<sup>2</sup> Bupivacaine is generally indicated to be avoided, but literature has not demonstrated that its use leads to morbidity or mortality in parturient under spinal anesthetic.<sup>3</sup> However, the safety of bupivacaine in epidurals is more controversial.<sup>4</sup>

We recently provided care to a parturient with BrS in whom an urgent C-section was indicated due to atypical fetal heart rate during a nonstress test. The patient provided written informed consent. She had an ICD implanted for primary prevention 5 years prior to this pregnancy, and no previous episodes of arrhythmia. Her ICD had never delivered any shocks. The patient was followed by cardiology, and they felt that any mode of delivery would be safe but recommended placing a magnet over her ICD if surgical delivery was warranted. Her care plan included avoidance of propofol infusion, ketamine, tramadol, dimenhydrinate, diphenhydramine, metoclopramide, procainamide, and neostigmine. Regarding bupivacaine, the plan was to avoid high-dose or prolonged exposure in the form of an epidural, but that a low-dose spinal could be safe. Preoperatively, routine metoclopramide was withheld to avoid QT prolongation. Her spinal was performed using a 25G pencil-point spinal needle containing

1.6 mL of 0.75% hyperbaric bupivacaine, 15 µg of fentanyl, and 100 µg of preservative-free morphine. There were no intraoperative adverse events. Post-delivery, she received 100 µg of carbetocin intravenously. She was transferred to the ICU in stable condition. Continuous ECG monitoring continued for 24 h postoperatively. Her postoperative course was uncomplicated with no arrhythmias, and she was discharged from hospital two days later.

BrS brings challenges to a patient's anesthetic care due to the many medications used in general and regional anesthesia that can exacerbate the condition or trigger lethal arrhythmias. A thorough understanding of appropriate medications is critical to the safe anesthetic care of these patients. Propofol, thiopental, midazolam, and opioids like fentanyl and remifentanyl have been used successfully, while ketamine should be avoided.<sup>4</sup> However, prolonged high dose propofol infusions should be avoided.<sup>5</sup> Neostigmine may theoretically produce ST elevation, but this is undocumented.<sup>4</sup> Nitrous oxide, isoflurane, and sevoflurane have all been used without complications.<sup>4</sup>

For regional (particularly neuraxial) anesthesia, commonly used local anesthetics in obstetrics include lidocaine, bupivacaine, and ropivacaine. Lidocaine has been shown to be safe as local infiltration and intravenously, although limiting the dose and administering it with adrenaline is recommended.<sup>4</sup> Complete avoidance or cautious use of bupivacaine, the most-used local anesthetic for obstetrics in our center, has been recommended.<sup>2,4</sup> Brugada-like ECG pattern has been reported after prolonged epidural infusions with bupivacaine, with other cases of patients receiving a bupivacaine bolus and infusion via epidural without adverse events.<sup>4</sup> The mechanism responsible is likely due to its effect on the rapid phase of cardiac depolarization, remaining bound to sodium channels longer than other local anesthetics.<sup>3</sup> Although the less cardiotoxic ropivacaine may represent a safer alternative to bupivacaine, current recommendations regarding this are unclear. Procaine, another popular local anesthetic used in spinals for C-sections, should also be avoided.<sup>2</sup>

Multiple medications specific to obstetric practice may be problematic. Among the uterotonics, oxytocin is known to be safe, but ergotamine should be avoided,<sup>2</sup> as should antiemetics such as dimenhydrinate or metoclopramide.<sup>2,4</sup> The anesthetic provider must consider all these medications when caring for a parturient with BrS.

<https://doi.org/10.1016/j.bjane.2022.08.006>

0104-0014/© 2022 Sociedade Brasileira de Anestesiologia. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

We feel strongly that anesthesia providers should be involved early in the care of an obstetric patient with BrS since many drugs used in neuraxial or general anesthesia can theoretically be life-threatening. Given the many challenges and perioperative considerations, a multidisciplinary approach involving anesthesia, obstetrics, cardiology, and nursing is paramount to ensuring a safe delivery. Close follow-up by obstetrics and cardiology throughout pregnancy is important to ensure that pregnancy has not exacerbated their condition. Early on, a thorough discussion between the patient and anesthesiologist will ensure that patients understand potential anesthetic concerns and will have ample time to make informed decisions regarding their delivery care plan.

We also suggest the multidisciplinary team consider the many anesthetic challenges when planning the optimal mode of delivery. For example, providers may consider an elective C-section under a spinal anesthetic. By not having the patient labor and later require a labor epidural, the duration of exposure to local anesthetics is reduced. Should the patient labor with an epidural and subsequently require a C-section, this again leads to greater exposure to local anesthetics via epidural top-up or removal of the epidural to perform a spinal. An elective C-section also decreases the likelihood of a general anesthetic, which is more common with urgent C-sections and poses significant challenges in a parturient with BrS. Furthermore, it greatly reduces the possibility of distress, pain, fever from prolonged ruptured membranes, and sympathetic stimuli that accompany labor – all of which may represent potential triggers (although case reports have demonstrated safe vaginal deliveries).

Currently, evidence exists only in the form of case reports or case series. We encourage clinicians to continue to share their experiences, both positive and negative, in their care of parturients with BrS so that we may all benefit from the collective knowledge gained. Because new cases continue to be published outlining safe management strategies for these patients, we suggest that the next step in building a more

robust level of evidence regarding obstetrical anesthetic management would be to pursue a systematic review.

## Conflicts of interest

The authors declare no conflicts of interest.

## References

1. Vutthikraivit W, Rattanawong P, Putthapiban P, et al. Worldwide prevalence of Brugada syndrome: a systematic review and meta-analysis [published correction appears in *Acta Cardiol Sin.* 2019 Mar;35(2):192] *Acta Cardiol Sin.* 2018;34:267–77.
2. Postema PG, Wolpert C, Amin AS, et al. Drugs and Brugada syndrome patients: review of the literature, recommendations, and an up-to-date website ([www.brugadadrugs.org](http://www.brugadadrugs.org)). *Heart Rhythm.* 2009;6:1335–41.
3. Jarraya A, Chayeb I, Kammoun M, Derbel M, Fatma K, Kolsi K. Spinal anesthesia for a rare case of Brugada syndrome undergoing cesarean section delivery. *Tunis Chir.* 2018;2018 [http://www.tunisiechirurgicale.com/Article\\_240\\_spinal\\_anesthesia\\_for\\_a\\_rare\\_case\\_of\\_brugada\\_syndrome\\_undergoing\\_cesarean\\_section\\_delivery.html](http://www.tunisiechirurgicale.com/Article_240_spinal_anesthesia_for_a_rare_case_of_brugada_syndrome_undergoing_cesarean_section_delivery.html).
4. Kloesel B, Ackerman MJ, Sprung J, Narr BJ, Weingarten TN. Anesthetic management of patients with Brugada syndrome: A case series and literature review. *Can J Anesth.* 2011;58:824–36.
5. Kam PCA, Cardone D. Propofol infusion syndrome. *Anesthesia.* 2007;62:690–701.

Janice Yu \*, Cameron Nishi , Elaheh Adly , Daniel Cordovani 

*McMaster University, Department of Anesthesia, Hamilton, Canada*

\* Corresponding author.

*E-mail:* [janice.yu@medportal.ca](mailto:janice.yu@medportal.ca) (J. Yu).

Received 19 July 2022; accepted 31 August 2022

Available online 9 September 2022