

Interscalene plexus block and general anesthesia in Brugada syndrome

ABSTRACT

Brugada syndrome (BrS) is a channelopathy predisposing to malignant ventricular arrhythmias and sudden cardiac death. Perioperative pharmacological and physiological changes may precipitate these events and cardiac dysfunction. We report the efficacy and safety interscalene brachial plexus block combined with general anesthesia in a patient with BrS. Awake and double-guided interscalene block was performed. After performing the block, general anesthesia was induced with fentanyl, propofol and rocuronium and maintained with oxygen-air/sevoflurane mixture. Sugammadex was administered for neuromuscular reversal. During perioperative period, the patient remained hemodynamically stable with anormal sinus rhythm and no ST segment changes. Hospital discharged occurred 36h after surgery without complications. General recommendations include avoidance of increased vagal tone, correction of electrolytes disturbances, maintenance of normothermia, normocapnia, adequate analgesia, and an adequately deep plane of anesthesia. Interscalene block combined with general anesthesia provided good analgesia, hemodynamic and cardiac electric stability.

Key words: Anesthesia; Brugada syndrome; interscalene block

Introduction

Brugada syndrome (BrS) is a genetic autosomal dominant channelopathy with incomplete penetrance, which presents with electrocardiographic changes in a structurally normal heart, predisposing to malignant ventricular arrhythmias and sudden cardiac death.^[1,2]

Reported experience of anesthesia in BrS is scarce at present. Controlled-trials are not feasible because BrS is a rare disease; therefore, evidence of anesthetic management is obtained by case studies.^[1]

Case History

A 180-cm, 100-kg, 56-year-old man, ASA3 proposed to arthroscopic rotator cuff repair in the lateral recumbent position.


Patient had hypertension, obesity and BrS diagnosed by family history of sudden death. Electrocardiogram revealed a pattern of BrS type 2 and BrS type 1 provoked by sodium channel blockers. Echocardiogram showed a normal heart. In an electrophysiology study, ventricular arrhythmia was induced and an implantable cardiac defibrillator (ICD) was implemented. Hemogram, biochemistry, ionogram, and coagulation studies revealed no alterations.

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Before arrival to the anesthetic room, the informed consent associated to the procedures, the regional and general anesthesia, and the specific BrS associated risks was obtained. Patient gave written permission to publish this report.

After ASA standard monitoring, invasive blood pressure and automatic external defibrillator were placed. ICD was externally disabled in collaboration with the cardiology.

Awake and color Doppler ultrasound-guided interscalene brachial plexus block was performed with 10 mL ropivacaine 0.375%, using linear ultrasound (*SonoSite, M-Turbo®*) and nerve stimulator (*Plexygon, Vygon®*) connected to a 50 mm, 22-gauge needle (*echoplex+, Vygon®*). Local anesthetic (LA) was administered slowly with frequent intermittent negative aspirations. Sensory block was reported 5 min after administration.

After performing the block, general anesthesia was induced with fentanyl 200 µg, propofol 150 mg, and rocuronium 60 mg and maintained with oxygen-air/sevoflurane mixture for BIS between 40 and 60. Multimodal analgesia was completed with ketorolac 30 mg and paracetamol 1 g. Sugammadex 200 mg was administered for neuromuscular reversal and extubation was uneventful. At the end of surgery, patient was transferred to post anesthetic care unit and the internal defibrillator was re-enabled. During perioperative period, the patient remained hemodynamically stable with a normal sinus rhythm and no ST segment changes. In the postoperative period the patient had no pain (pain numerical scale = 0) at rest and movement with ketorolac 30 mg and paracetamol 1 g. Patient was observed by the specialized acute pain team 12, 24, and 36 h after surgery that verified the patient was comfortable with no pain, no motor, or sensitive blocks nor neurological complaints. Hospital discharged occurred 36 h after surgery without complications.

Discussion

Perioperative physiological and pharmacological changes associated with surgery and anesthesia can precipitate malignant arrhythmias in patients with BrS. General recommendations include avoidance of increased vagal tone, correction of electrolytes, maintenance of normothermia, normocapnia, adequate analgesia, and an adequately deep plane of anesthesia.

Traditionally anesthetists chose to avoid regional techniques in patients with BrS because of the theoretical enhanced risk when using LA drugs with channel blocking properties.^[2]

There are some reports concerning the relationship between local anesthetic drugs for regional anesthesia and their complications in BrS. In the Fujiwara *et al.*^[3], a patient developed a polymorphic ventricular tachycardia 50 min following bilateral paravertebral block using 40 mL of 0.5% ropivacaine at T8.

Phillips *et al.*^[4] reported that previously asymptomatic patient developed Brugada, such as ECG changes after a 14-h infusion of a bupivacaine in a thoracic epidural catheter. The changes completely reversed after discontinuation of the epidural bupivacaine infusion. Kaneda *et al.*^[5] described a case of a patient with diagnosed BrS developed ventricular fibrillation postoperatively after undergoing general and epidural anesthesia; however, type of local anesthetic and dose were not reported.

Despite isolated reports of complications during combined general and regional anesthesia, there are several reports in literature of uneventful regional or subcutaneous administration of local anesthetics in BrS. Klose *et al.*^[6] reported no complications after epidural fentanyl and bupivacaine combination for labor analgesia. Duque *et al.*^[5] reported epidural ropivacaine in six cases without complications.^[1]

On the review of literature, we could find three cases of peripheral nerve blocks described in patients with BrS. Brown *et al.*^[7] described an uneventful ultrasound-guided interscalene block using 40 mL of 1.5% mepivacaine for arthroscopic acromioplasty in a symptomatic patient with an implanted ICD. Vasques *et al.*^[8] reported a case that empirically start lipid infusion before ultrasound-guided brachial plexus block through the axillary approach with 18 mL of ropivacaine 0.375%. Chen *et al.*^[9] reported ultrasound-guided ilioinguinal nerve block with 20 mL of ropivacaine 0.25% without complications.

In general, interscalene brachial plexus block is safe and effective but is not without hazards. May be seen cardiovascular instability, such as bradycardia and/or hypotension in up to 29% of the patients operated in sitting position. We decided interscalene block combined with general anesthesia because a secure airway was preferable if the need for defibrillation arise.

LA carry a theoretical risk of arrhythmogenic potential in BrS, but clear evidence is lacking.^[3] Use of bupivacaine, ropivacaine, and mepivacaine have all been safely demonstrated. Ultrasound guidance, experienced hands, aspiration before injection, use of a low dose of LA, and the prompt availability of resuscitation facilities are probably the most

important tools for minimizing the risk of adverse events undergoing peripheral nerve blocks. We used ropivacaine at concentration 0.375% due to its longer duration of action and it is presumably safer, once it dissociates from cardiac sodium channel faster than bupivacaine does and produces a less pronounced inhibition of cardiac sodium channel current.^[10]

There is always a risk of ventricular arrhythmias for a patient with BrS. In any patient with ICD, the device must be disabled immediately before the surgery. However, defibrillator should be on the ward to start advanced life support when necessary. In case of ventricular arrhythmia refractory or recurrent after defibrillation, it should be initiated an isoproterenol perfusion.

After the surgery, ICD should re-enabled as soon as possible and before removing external defibrillator pads.

Good cooperation between anesthesiologists, cardiologists, orthopaedists, and acute pain team is mandatory for the success.

Although more experience and research are needed, ultrasound interscalene plexus block with general anesthesia provided good perioperative and postoperative analgesia and hemodynamic and cardiac electric stability. The authors report a different case from the published reports about BrS and it may be useful to help management of the future cases.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients

understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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