The novel Kv1.5 channel blocker vernakalant for successful treatment of new-onset atrial fibrillation in a critically ill abdominal surgical patient

Editor—New-onset atrial fibrillation (AF) affects 5–10% of postoperative non-cardiothoracic surgical patients admitted to the intensive care unit (ICU).\textsuperscript{1,2} It is associated with significant morbidity and mortality and a prolonged length of ICU stay.\textsuperscript{2} Recently, the novel ion channel blocker vernakalant has been suggested a promising new fast-acting drug for the treatment of new-onset AF.\textsuperscript{3} Among other ion channels, vernakalant interacts with atrial selective potassium channels Kv1.5.\textsuperscript{3} Vernakalant increases atrial refraction with little influence on ventricular electrophysiology.\textsuperscript{3} Despite the significant incidence and clinical impact of AF in postoperative non-cardiac surgical patients,\textsuperscript{1,2} treatment with vernakalant in this group of patients has not been reported. We describe the successful use of vernakalant in a postoperative surgical patient with abdominal sepsis and new-onset AF.

The male patient (69 yr old, 182 cm, 70 kg) underwent an emergency laparotomy for the ileus. The patient had a history of partial resection of the sigmoid colon and the liver for sigmoid carcinoma with liver metastases 20 yr previously. During an emergency laparotomy, two segments of the small intestine were resected due to chronic adhesions causing mechanical bowel obstruction. On the day of the operation, C-reactive protein (CRP) was 43.2 mg litre\textsuperscript{-1} with a normal leucocyte count. The patient was in sinus rhythm with a normal heart rate. Between the first and the second postoperative days, the patient developed AF with a heart rate up to 180 beats min\textsuperscript{-1} and accompanying haemodynamic instability. Laboratory investigation revealed a further increase in the CRP value (252 mg litre\textsuperscript{-1}) and leucocytosis (17.1 nl\textsuperscript{-1}). Serum electrolytes were within the normal range. The patient had a positive fluid balance of 6000 ml within 24 h and needed treatment with norepinephrine and dobutamine. Treatment with magnesium (6 mmol), amiodarone (300 mg bolus followed by continuous loading dose infusion), and digoxin (0.5 mg) was unsuccessful. At 15 h after the onset of AF, all antiarrhythmic therapy was stopped for 5 h in order to allow the use of vernakalant in accordance with the manufacturer’s protocol. Vernakalant infusion (target dose 3 mg kg\textsuperscript{-1} within 10 min) resulted in conversion to a nodal rhythm within 11 min (Fig. 1) and to sinus rhythm after 21 min. At conversion to nodal rhythm, the infusion was stopped at a cumulative dose of 204 mg (2.9 mg kg\textsuperscript{-1}). The patient remained responsive and haemodynamically stable during the treatment and only reported feeling nauseated during the infusion.

So far, studies on the efficacy and safety of vernakalant are limited to medical and cardiac surgical patients.\textsuperscript{3–6} In these studies, vernakalant has been well tolerated by the patients and resulted in rapid conversion of new-onset AF of durations between 3 h and 7 days within 10–15 min.\textsuperscript{3–6} Vernakalant has furthermore shown better efficacy than amiodarone for acute conversion of new-onset AF within 90 min after treatment with a median time to conversion of 11 min.\textsuperscript{6} The rapid onset of vernakalant and the short time to conversion of AF to sinus rhythm make this drug also a possible alternative to electrical cardioversion. Given the high incidence and significant impact of new-onset AF on morbidity and mortality in postoperative non-cardiothoracic surgical

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**Fig 1** Time course of heart rate (HR, beats min\textsuperscript{-1}) before, during treatment with vernakalant (target dose 3 mg kg\textsuperscript{-1} within 10 min), and after treatment with vernakalant (total dose 204 mg, 2.9 mg kg\textsuperscript{-1} within 11 min).
patients, and also the modest efficacy of currently available antiarrhythmic therapy, future trial of vernakalant for the treatment of new-onset AF in this group of patients seems warranted.

**Conflict of interest**

None declared.

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**Xenon anaesthesia for laparoscopic cholecystectomy in a patient with multiple chemical sensitivity**

Editor—The management of general anaesthesia in patients suffering from multiple chemical sensitivity (MCS) poses a challenge. MCS was described first in the 1940s. It occurs in response to diverse stimuli and emerges after exposure to usually harmless doses of environmental chemicals or medications. The pathophysiology of MCS is still only poorly understood. Hypotheses include triggers from unspecific allergic or toxic exposure and neurobiological sensitization. Therefore, patients are exposed to a significant risk of adverse drug interactions while undergoing general anaesthesia.

The noble gas xenon offers many characteristics of an ideal anaesthetic including haemodynamic stability and rapid induction and emergence from anaesthesia, regardless of its duration. Furthermore, as an inert gas, xenon is known to be independent of the patients’ metabolism and biotransformation, hence potentially interacting less with mechanisms possibly involved in the triggering of MCS. Therefore, we used xenon anaesthesia in a patient with MCS undergoing laparoscopic cholecystectomy.

A 53-yr-old female (1.68 m and 68.5 kg) presented with increasing pain due to chronic cholecystolithiasis and a persistent ovarian cyst, and was undergoing elective cholecystectomy and cyst enucleation. Since the early 1980s, the patient had suffered from MCS symptoms with high sensitivity to environmental chemicals, intermittent restlessness, and non-specific breathing problems. Since that time, the patient manifested multiple sensitivities to various drugs, which led to abstinence from all medication for >15 yr.

Preoperative evaluation classified the patient in the ASA II risk category and in a postoperative nausea and vomiting (PONV) risk score of III (Apfel score). The patient did not receive premedication. In the operating theatre, routine monitoring—consisting of three-lead ECG, pulse oximetry, and intermittent arterial pressure measurements—was instituted according to our clinical standards. The patient received 100% oxygen for 3 min and subsequently a bolus of fentanyl 0.15 mg. Induction of anaesthesia was started with a dose of propofol 150 mg followed by a repeated bolus of 100 mg, while the use of neuromuscular blocking agent was avoided. After tracheal intubation, the lungs were ventilated with a closed-circuit anaesthetic machine (TAEMA Felix Dual®, ALMS, France) using volume control. After denitrogenation had been completed, xenon was started aiming at a target concentration of 54%. Two additional doses of fentanyl were given i.v., 0.1 mg before incision and 0.05 mg 45 min after start of surgery. During surgery, neither heart rate nor arterial pressures indicated anaphylaxis (Fig. 1). At end of surgery (185 min), the xenon was stopped. The patient opened her eyes 150 s after termination of xenon, and adequate reaction on verbal command and spontaneous breathing were observed 20 s later, resulting in tracheal extubation 3 min after stopping the xenon. The patient was transferred to the postanaesthesia care unit and discharged 2 h later to the surgical standard care unit. The patient did not have PONV and Aldrete score was >9 throughout the first 6 h after end of surgery. Likewise, postoperative visits on the first and second postoperative days did not show any adverse events or signs of intolerance and the patient’s recovery was appropriate. The patient was interviewed 14 days after discharge and complained of difficulties regarding full mobilization, which she attributed to the surgical procedure but did not exhibit any signs of chemical sensitivity or intolerance during the whole postoperative course.

At present, there is no gold standard for general anaesthesia in patients with MCS. The special characteristics of the noble gas xenon may offer a new approach for safe anaesthesia in patients with MCS.