

Relevance of POCUS in perioperative period: Takotsubo syndrome

Importancia del POCUS perioperatorio: Síndrome de Takotsubo

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ABSTRACT

We report a case concerning a patient with no previous cardiovascular history, scheduled for a moderately complex gastrointestinal procedure, who presents with a sudden arrhythmia after some time of the anesthetic induction. We describe the sequence of events, the cardiac ultrasound assessment performed intraoperatively and the management provided subsequently. Despite the postoperative diagnosis of stress cardiomyopathy (Takotsubo syndrome)[1], the focus of this article is to highlight the importance of anesthesiologists competencies in POCUS[2], since the adequate acquisition and interpretation of images can lead to more objective and measured clinical decisions for the benefit of the patient and the end of the health system itself[2]-[4].

Keywords: Takotsubo syndrome, POCUS, anesthesia.

RESUMEN

Se presenta el caso de una paciente sin antecedentes cardiovasculares, programada para procedimiento gastrointestinal de moderada complejidad, que presenta una arritmia súbita un tiempo después de la inducción anestésica. Se describe la secuencia de eventos, la evaluación ecográfica cardíaca realizada intraoperatoriamente y el manejo brindado posteriormente. A pesar del diagnóstico posoperatorio de miocardiopatía por estrés (síndrome de Takotsubo)[1], el objetivo de este artículo es resaltar la importancia de las competencias de los anestesiólogos en POCUS[2], ya que la adecuada adquisición e interpretación de imágenes puede llevar a decisiones clínicas más objetivas y medidas en beneficio del paciente y del propio sistema de salud[2]-[4].

Palabras clave: Síndrome de takotsubo, POCUS, anestesia.

Clinical case

A 58-year-old female patient, with inflammatory bowel disease scheduled for an ileostomy closure. In her past medical history, she did not have any relevant cardiac, respiratory, neurological, endocrine, renal or allergic considerations, except history of fibromyalgia and migraines. At the time, she was not receiving treatment other than lifestyle manage-

ment. No major complications in previous surgeries regarding anesthesia. However, the patient mentioned having difficulties in a previous surgical event where multiple attempts were needed to obtain an intravenous (IV) access. The patient reports to be physically active, exercise tolerance greater than 4 METs, no previous cardiovascular symptoms: she denies chest pain or tightness, palpitations, shortness of breath or claudication. No other relevant past medical history or symptoms. Patient's weight and

height were 67 kg and 161 cm respectively, and Body Mass Index of 25.8 kg/m². Vital signs within normal limits (Heart rate: 56 beats per minute (bpm), systolic blood pressure (SBP) 120 mmHg, diastolic blood pressure (DBP) 69 mmHg, pulse oximetry 98% and 16 breaths per minute) and the rest of the physical examination including airway was unremarkable. A preoperative complete blood count was normal, as well as the electrolytes (Na: 133 mmol/L, K: 4.9 mmol/L, Cl: 101 mmol/L) and the serum creatinine (65 mmol/L). In an ECG 5 months before the event, the rhythm was sinus, regular, without signs of ischemia or necrosis, with a QT interval of 0.44, with no alterations.

After the preoperative interview including verbal informed consent and safety checklist, an ultrasound assisted IV access with a 20G catheter was obtained in a single attempt in the left forearm. Standard Canadian Anesthesiologists Society monitoring was initiated. Intravenous anesthesia induction was conducted as follows: 100 mg lidocaine 2%, 250 mcg fentanyl, 150 mg propofol, 30 mg rocuronium and 8 mg dexamethasone. The airway was secured with a #7.0 size regular Endotracheal tube (ETT) in a single attempt direct laryngoscopy with a Mac 3 blade and the tube was taped at 21 cm from the lips. ETT placement confirmation was done through capnography and bilateral chest auscultation. Anesthesia maintenance was initiated with sevoflurane at values between 0.9 and 1.1 MAC. At 7 minutes after intubation, the patient presented with severe sinus bradycardia reaching at the lowest rate of 27 bpm and 0.4 mg of glycopyrrolate were rapidly administered. One minute after this, a single episode of monomorphic non-sustained ventricular tachycardia was observed in the monitor, reaching 120 bpm for approximately 25 seconds, followed by high blood pressure values between 210-160 for systolic blood pressure and 140-118 for diastolic pressure for 5 minutes. It should be noted that this episode occurs before the start of the surgical stimulus. An attempt was made to optimize the anesthetic depth by administering an additional bolus of Propofol, and it was verified a sevoflurane MAC of 0.9. In the following minutes the heart rate returned to normal and the blood pressure decreased progressively and remained in normal limits for the rest of the case (around one hour) without the need of using any vasopressor or inotropic medication.

A transthoracic echocardiography was performed intraoperatively within 10 minutes after the dysrhythmia episode. In the 4-chamber view, generalized hypokinesis of the left ventricle (LV) with mild to moderate bulging was observed. Because the patient was undergoing surgery, it was not possible to obtain images from other views. It is worth highlighting that after the self-limited episode of arrhythmia, the patient's clinical condition was stable. However, when considering the findings of the point of care echocardiogram, it was decided to extend the study by requesting troponins, evaluation by cardiology and a formal echocardiogram. At the end of the procedure, the patient was extubated and transferred to the post-anesthesia care unit, from where she was transferred to the ward, remaining stable and asymptomatic during this period and the rest of her hospital stay.

The following day after the cardiology assessment, a transthoracic echocardiogram was performed showing a mildly reduced LV ejection fraction (54%). The distal half of the LV was hypokinetic and there was compensatory hypercontractility of the basal segments. The pattern was suggestive of stress cardiomyopathy, (Figure 1) although left anterior descending ar-

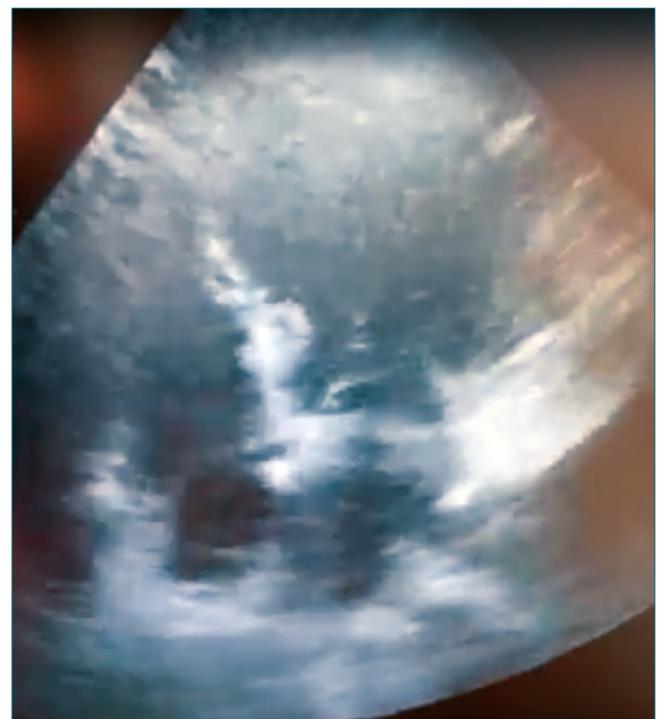


Figure 1.

tery (LAD) territory infarction could not be completely ruled out. Also, no significant valvular abnormalities. The Troponin T curve: Postoperative day (POD) 0: 258 ng/L, POD 1: 145 ng/L, POD 4: 27 ng/L. The report for the follow-up echocardiogram on POD 4 was: Normal left ventricular size and minimally reduced global systolic dysfunction (LVEF 53% by Simpson's). Compared to previous TTE, it was described improvement in the stress cardiomyopathy. Cardiology indicated a coronary angiography for which the patient decided to be followed by her family doctor. She was discharged after a satisfactory postoperative course at POD 5.

Discussion

The increasing popularity of the use of POCUS in the perioperative setting is well deserved[5]. Its low cost, wide availability, and excellent safety profile have made it an invaluable tool among anesthesiologists[6]. In this context applications include airway[7], gastric[8], pulmonary evaluation[9], vascular access, regional anesthesia, cerebral perfusion and the list continues[2],[10].

Specifically for the scenario presented in this clinical case, cardiac POCUS was presented as a tool that allowed us to rule out acute conditions that require specific treatment: cardiac tamponade, pulmonary thromboembolism, valvular abnormalities, ischemia, intravascular volume[11] among others. It is clear that the compounded information obtained from the intraoperative cardiac POCUS and clinical behaviour (wall motion abnormalities, moderate bulging of the left ventricle, in the absence of hypotension or changes on the EKG) allowed the clinician to conduct the proper decision-making and follow-up in the postoperative period. Worth noting, a patient

with profound intraoperative hypotension secondary to acute ischemia may not show changes in the EKG but cardiac ultrasound would demonstrate hypokinesis or akinesia of the walls, contributing to the diagnosis[12].

Point-of-care ultrasound is a useful tool not only in cardiac patients but also in patients with not known formal cardiac risk factor presenting with intraoperative cardiac and hemodynamic events. Depression is a risk factor for stress cardiomyopathy[13], and also fibromyalgia could be associated given the hypothesis of high catecholamine levels in response to emotional stress and a greater cardiac sensitivity to endogenous catecholamine stimulation[14]. However, these medical conditions do not lead to pursue cardiac assessments or further monitorization during an elective surgery due to the consideration of low risk.

According to International Takotsubo diagnostic criteria[15], patients show transient left ventricular dysfunction presenting as apical ballooning or wall motion abnormalities, new EKG abnormalities (St-segment elevation, ST-segment depression, T-wave inversion) or in rare cases bradycardia or ventricular arrhythmias as in this case and levels of biomarkers are moderately elevated. Despite the transient nature of this condition, the traditional concept of being benign may underestimate the risk of in-hospital complications[16],[17] and long-lasting subclinical cardiac dysfunction[18]. Depending on the stress factor, Takotsubo patients related to physical stress showed higher mortality rates than acute coronary syndrome patients during long-term follow-up[19]. In a cohort of 519 patients with a confirmed diagnosis of takotsubo syndrome the recurrence was 7.5% and 16.2% died in a follow up of 5.2 years[20].

In the present case with the intraoperative events and in the absence of the bedside cardiac ultrasound, the patient could have missed the proper follow up by cardiology, troponins and the further risk stratification. We believe that widespread learning of POCUS in the field of anesthesiology and the judicious, goal-directed and structured use[21],[22] of cardiac ultrasound (and other modalities) leads to more accurate decision making-based on more complete information about the patient's situation in perioperative period. The use of bedside cardiac Ultrasound could add information to do a proper screening, follow-up, and management in patients with an unexpected cardiac event that has a potential long-term impact like the one presented in this case report.

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