The Use of Dexmedetomidine During Cardiac Surgery in a Malignant Hyperthermia Prophylaxis Case

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Introduction:
Malignant hyperthermia (MH) is one of the few potentially fatal disorders that is directly related to specific anesthetic agents. The prevalence of MH is estimated at 1:100,000 in general anesthesia procedures. However, the prevalence of MH susceptibility could be as high as 1:3,000 in the general population. We present a rare case of a patient with MH susceptibility that successfully underwent mitral valve repair with cardiopulmonary bypass (CPB).

Case Presentation:
A 67 year old female with extensive PMH most notable for MH susceptibility initially presented to her primary care physician complaining of shortness of breath and fatigue. Workup including a transthoracic echocardiogram revealed severe mitral regurgitation as the likely source of the patient’s symptoms. The patient was scheduled for a mitral valve repair and presented to the Anesthesia preoperative clinic for initial evaluation. Per the history provided by the patient, she has a son with MH, however herself has never been tested for it. She had minor procedures in the past, but again was unable to provide any details regarding the anesthetic that was used. Given the patient’s history, the case was treated as if the patient had MH.

Prior to the start of the case, the anesthesia workstation was prepped first by removing all the vaporizers and the machine was flushed with high flow oxygen for 20 minutes. The circuit and CO2 absorbers were replaced. Additionally, patient was premedicated with 3 mg of midazolam prior to entering the operating room. Standard ASA monitors, arterial line, cerebral oximeter, as well as Bispectral Index (BIS) monitor were used. Induction was uneventful with midazolam, fentanyl, etomidate, and vecuronium. Earlier in the day during a discussion with the surgery team as well as with the perfusionist, it was determined that propofol infusion would not be compatible with the CPB circuit. For this reason, a dexmedetomidine infusion was initiated at the time of induction at 0.5 mcg/kg/hr. Since the infusion was started at the time of induction, a loading dose was not given. Additionally, anesthesia was maintained with a fentanyl infusion at 250 mcg/hr, fentanyl boluses as needed, dexmedetomidine, and vecuronium. Depth of anesthesia was monitored using the BIS monitor and the BIS Index was maintained between 25 and 45. Patient did not require any inotropic infusions, however, received two boluses of phenylephrine during the case. During rewarming, the patient’s temperature reached 37 °C (which was the highest temperature recorded during the case). Symptoms of MH such as unexplained increase in both arterial and expiratory PCO2, acidosis, unexplained hemodynamic instability, rigidity, and hyperthermia were closely monitored. Of note, arterial PCO2 was closely monitored during CPB. There were no complications during the
case and CPB time was approximately 75 minutes. After the cessation of CPB and hemodynamic stability, dexmedetomidine was stopped and a propofol infusion was started. Patient was transferred to ICU with the fentanyl and propofol infusions. Patient had an uneventful recovery and was discharged on post-op day 3.

Discussion:

We present a rare case of a patient with history of MH susceptibility undergoing cardiac surgery with CPB where propofol was not used as part of the total intravenous anesthesia (TIVA). Of the very few reported cases of MH prophylaxis in patients undergoing CPB, most cases used propofol as a hypnotic. No guidelines exist regarding MH prophylaxis when using CPB, however, past cases demonstrated the following. Triggering agents were avoided in all cases, anesthesia was maintain with opiates and intravenous hypnotics, relaxation was maintained using non depolarizing neuromuscular blocking agents, dantrolene prophylaxis was used in some cases, in some of the cases rewarming was done slowly and stopped at 36 °C, and in one case inotropic agents were avoided instead intra-aortic balloon pump was used for hemodynamic stability.

During our case, we followed the recommendations of Malignant Hyperthermia Association of the United States (MHAUS) in regards to preparation of the anesthesia machine. Additionally, as mentioned earlier, this is the only case that we know of where dexmedetomidine was used in combination of fentanyl to provide hypnosis. Dantrolene was not given as prophylaxis and rewarming was performed in the standard manner. Even though patient did not require the support of inotropic agents, we were prepared to use inotropes based on the supportive evidence we found in literature, if needed. Therefore, we present a rare case of MH prophylaxis where we provided anesthesia using dexmedetomidine, making this a unique case.

References:

