

Sudden onset of ventricular bigeminy just before induction of anesthesia in child

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There are many causes of premature ventricular contractions in pediatric patients with structurally or functionally normal hearts. We report a case of a pediatric patient who suddenly developed ventricular bigeminy during the pre-induction period for general anesthesia. Predisposing heart disease was evaluated by urgent cardiac consultation and the cause of the transient ventricular bigeminy was traced to preoperative

anxiety. The child was successfully managed with non-pharmacological preparation. We emphasize that physicians should ruminate on PVCs related to anxiety just before induction and conduct a timely, adequate work-up to exclude underlying cardiac pathology in pediatric patients. (Rawal Med J 202;45:497-499).

Keywords: Ventricular premature complexes, anxiety, pediatrics.

INTRODUCTION

Premature ventricular contractions (PVCs) are frequently seen in pediatric patients with structurally or functionally normal hearts.^{1,2} Ventricular bigeminy is a pattern of PVCs alternating with normal QRS complexes.¹ Although ventricular bigeminy has multifactorial etiology and increases with age is a relatively benign condition, it may progress to intraoperative ventricular tachycardia, fibrillation or cardiac asystole.² Children with ventricular ectopy are at some risk of developing left ventricular dysfunction and should be followed more closely with noninvasive imaging.³ Sometime PVCs in pediatric patients develop during the perioperative period.^{4,5} We present a case of a pediatric patient who suddenly developed ventricular bigeminy related to anxiety in the operating room just before induction of general anesthesia.

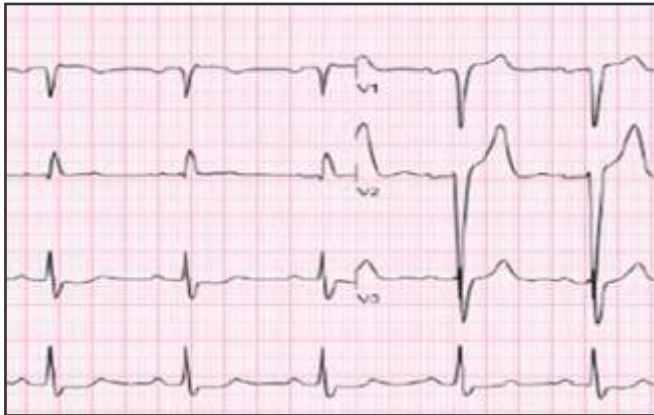
CASE PRESENTATION

A 13-year-old boy weighing 32 kg and with chronic tonsillitis presented for elective tonsillectomy. There was no history pertaining to any underlying major disease. Complete blood cell count, coagulation profile, and serum electrolytes obtained preoperatively were within the normal limits. His

12-lead ECG showed normal sinus rhythm. Family history was negative for any congenital heart disease or arrhythmias. He was not nervous during the pre-anesthetic visit. We did not prescribe anxiolytics as premedication since the patient did not appear to need it. The child showed a smooth and anxiety-free separation from parents before being transferred into the operating room.

When lying on the operating bed for the induction of general anesthesia, initial blood pressure was 128/77 mmHg and Spo2 was 100% on room air. But hi lead II on ECG signal showed frequent PVCs and ventricular bigeminy continued over three minutes with stable hemodynamics (Fig.). He did not complain of any symptoms, including chest pain, palpitations, dizziness, syncope, and presyncope although he looked a little uncomfortable. We requested an urgent consultation with a pediatric cardiologist. After checking the ECG, the physician suggested postponing surgery and evaluating his cardiovascular system. The ventricular bigeminy switched to infrequent ventricular ectopic beats and subsequently, a normal sinus rhythm after the patient was transferred from the operating room to the recovery room. In addition, a 2D-echocardiogram was done and the results came back normal.

Fig. Ventricular bigeminy seen before anesthesia induction.



Follow-up complete blood count, serum electrolytes, and cardiac enzymes, were unremarkable. Work-up did not demonstrate any structural and functional cardiac problem. The pediatric cardiologist reported that the episode was probably a transient ventricular bigeminy due to preoperative anxiety and suggested proceeding with surgery after controlling his anxiety. Although he did not show any discomfort as he did earlier, we gently explained the surgical procedure, anesthetic information, postoperative pain, and potential complications in detail to the child and his parent, as well as what would be done to assure his utmost safety, to reduce anxiety and increase compliance. His parents also encouraged him to manage the stress of surgery. Fortunately, this time, there was no ventricular bigeminy, although lead II of ECG signal showed infrequent PVCs in the operating room during the pre-induction period. Vital signs remained stable and uneventful during the perioperative period without significant dysrhythmia.

DISCUSSION

PVCs can be associated with congenital heart disease, mitral valve prolapse, prolonged QT syndrome, and cardiomyopathies (dilated and hypertrophic). Malignant origins include electrolyte imbalances, drug toxicities (e.g., general anesthesia, digoxin, catecholamines, and sympathomimetics), cardiac injury, cardiac tumor, myocarditis, hypoxia, acidosis, and an intraventricular catheter.¹ In pediatric patients, the common causes of PVCs during the perioperative

period may be the result of a light plane of anesthesia, profound hypoxemia, hypotension, electrolyte disturbance, metabolic derangements, anxiety or other causes, including the use of recreational drugs, myocardial injury, poor hemodynamics, and prior cardiac surgical intervention.^{4,6}

There are no clear guidelines, algorithms or protocols for assessing the detections of cardiac arrhythmias in the pediatric population. However, every child with PVCs should be evaluated for probable cardiac problems and a referral to a pediatric cardiologist is crucial if dysrhythmias are noted.^{2,5} This is because there is an increased potential for ventricular arrhythmias or intraoperative cardiac asystole in patients who have a critical underlying cause.¹ We evaluated the sudden development of ventricular bigeminy just before induction of anesthesia in this child with no history of any heart disease who had a normal preoperative ECG. No abnormal findings on the cardiovascular system were identified.

Children with uniform PVCs, including ventricular bigeminy and trigeminy, do not need to be treated if the cardiac echocardiogram and exercise stress tests are normal, because the prognosis of ventricular arrhythmias in children without underlying disease was generally favorable.⁷ Additionally, there is no convincing evidence to avoid general anesthesia in healthy patients with benign ventricular arrhythmia patterns.⁸

In contrast to adults, methods for assessing preoperative anxiety and distress have generally relied on the observational rating of a child's overt behavior, such as facial expressions, crying, torso movements, kicking, verbal protest, and the need for restraint.⁹ Therefore, it is difficult to objectively evaluate the state of anxiety in pediatric patients. Our patient also did not seem anxious and appeared to be healthy during the pre-anesthetic interview. However, his ventricular bigeminy was assumed to be due to preoperative anxiety.¹⁰ Treating anxiety and distress may reduce endogenous catecholamines, lessening the frequency of PVCs.⁹ In summary, we emphasize that physicians should ruminate on PVCs related to preoperative anxiety and conduct a timely, adequate work-up to exclude cardiac pathology.

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REFERENCES

1. Doniger SJ, Sharieff GQ. Pediatric dysrhythmias. *Pediatr Clin North Am* 2006;53:85-105.
2. Cagdas D, Celiker A, Ozer S. Premature ventricular contractions in normal children. *Turk J Pediatr* 2008;50:260-4.
3. Cohen MI. Frequent premature ventricular beats in healthy children: When to ignore and when to treat? *Curr Opin Cardiol* 2019;34:65-72.
4. Dalal S, Chaudhari V. Persistent ventricular bigeminy during anesthesia in pediatric patients: A case report of an 11-year-old child. *J Basic Clin Physiol Pharmacol* 2017;Dec 12.pii://jbcpp-ahead-of-print/jbcpp-2017-0055.xml. doi: 10.1515/jbcpp-2017-0055.
5. Waxman BN. A 13-year-old girl in trigeminy during anesthesia for outpatient dental surgery: A case report. *Anesth Prog* 2015;62:110-3.
6. Charles J. Cote, Jerrold Lerman, Brian J. Anderson, eds. *A practice of anesthesia for infants and children*. 6th ed. Philadelphia: Elsevier saunders; 2018.
7. Park MK. ed. *Pediatric cardiology for practitioners*. 5th ed. Philadelphia: Mosby; 2008.
8. Shortt R, Ashbury T, Milne B. Anesthetic management of a patient with asymptomatic ventricular tachycardia. *Paediatr Anaesth* 2005;15:782-5.
9. George AG, Dean B. Andropoulos, eds. *Gregory's pediatric anesthesia*. 5th ed. oxford: Blackwell Publishing; 2012.
10. Lampert R. Mental stress and ventricular arrhythmias. *Curr Cardiol Rep* 2016;18:118-21.