

Dexmedetomidine for Transesophageal Echocardiography-Guided Percutaneous Closure of an Atrial Septal Defect in an Infant without Endotracheal Intubation

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To the Editor: Due to the risks of radiation exposure associated with conventional fluoroscopy,^[1] ultrasonography is gradually replacing it in our hospital for percutaneous closure of congenital heart defects. Ultrasound-guided percutaneous closure of congenital heart defects is mostly used for young children; therefore, safe and effective anesthetic management is needed. Here, we report a rare case of transesophageal echocardiography (TEE)-guided percutaneous closure of an atrial septal defect (ASD) in an infant under high-dose dexmedetomidine sedation without endotracheal intubation.

A 2-year-old girl (weight, 13 kg) was scheduled to undergo transthoracic echocardiography (TTE)-guided percutaneous closure of an ASD. The patient fasted for the standard period of time and received no preanesthetic medication. After entering the operating room, the patient was monitored by electrocardiogram, noninvasive blood pressure measurement, and pulse oximetry. Anesthesia was induced with intravenous ketamine 1 mg/kg plus midazolam 0.1 mg/kg. Sevoflurane was then administered via a face mask. When the patient's end-tidal sevoflurane reached 2.0 minimum alveolar concentration, a laryngeal mask airway was inserted. Anesthesia was maintained using a continuous intravenous infusion of dexmedetomidine, supplemented with 1% inhaled sevoflurane. The loading dose of dexmedetomidine was 1 µg/kg with the infusion rate at 50 µg/h, after which the infusion rate of dexmedetomidine was titrated according to the patient's response to pain and the patient's heart rate. During the ASD closure, the sonographer noted that the patient's TTE image was unclear and suggested that TEE was needed to provide adequate ultrasound guidance. The interventional cardiologist suggested that anesthetic management without general anesthesia and endotracheal intubation would be preferable. Thus, the anesthesiologist used an unconventional anesthetic technique with dexmedetomidine as the sole sedative agent. As the sevoflurane was discontinued and the laryngeal mask airway was removed, the dexmedetomidine infusion rate was increased to 100 µg/h, and oxygen was administered via a face mask beside the nose of the patient using the anesthesia circuit. When the patient's heart rate decreased from 100 beats/min to 90 beats/min, the sonographer successfully inserted the pediatric

TEE probe, and the dexmedetomidine infusion rate was decreased to 15 µg/h. The duration of TEE guidance was 6 min, during which time the patient did not move or cough, and her vital signs and oxygen saturation remained stable. At the end of the procedure, the infusion of dexmedetomidine was stopped, and the patient was transferred to the Pediatric Intensive Care Unit where she recovered 1 h later. The patient was discharged home 2 days later without complication.

This case is unique because it required TEE guidance due to unclear TTE imaging during the percutaneous closure of an ASD in an infant. According to the literature, the need for TEE during percutaneous closures of congenital heart defects is rare and is typically limited to obese adults.^[2] The technical advantages of ultrasound guidance over fluoroscopy guidance in infants are diminished if the patient is intubated. Therefore, interventional cardiologists prefer anesthetic management without general anesthesia and endotracheal intubation in this case.

According to a previous study, the TEE probe generally does not obstruct the airway or disrupt spontaneous breathing in children.^[3] Ideal sedative drugs enable infants to tolerate the stimulation due to TEE probe insertion without causing respiratory depression and/or hemodynamic instability. Although propofol has been recognized for use during adult TEE examination without endotracheal intubation,^[4] further evidence is needed before this drug is widely applied to infants.

Dexmedetomidine is a highly selective α_2 -adrenergic agonist. Unlike other sedatives, such as propofol, dexmedetomidine can effectively sedate patients without causing respiratory depression. Dexmedetomidine was approved in 1999 by the U.S. Food and

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Drug Administration for use as a short-term sedative and analgesic agent. Although it has not been reported in the literature, we suggest that dexmedetomidine can be used to safely sedate infants undergoing TEE-guided percutaneous closure of congenital heart defects, as the use of this drug can preserve spontaneous breathing and avoid the need for endotracheal intubation. In the present case, the time it took to achieve the required depth of sedation was shortened using a high initial infusion rate of dexmedetomidine, which caused no significant hemodynamic changes different from those descriptions in the literature.^[5] The decrease in heart rate can be considered as the best clinical indicator of the onset of dexmedetomidine sedation. In addition, this case showed once again that high-dose dexmedetomidine was able to achieve satisfactory sedative and analgesic effects in an infant without causing respiratory depression.

With the increased popularity of ultrasound-guided percutaneous closure of congenital heart defects, it is likely that other infants will require TEE during these procedures in the future. Although endotracheal intubation is generally preferred for securing the airway during general anesthesia, the present case indicates that dexmedetomidine can be used to safely sedate infants undergoing ultrasound-guided percutaneous closure of congenital heart defects without the need for endotracheal intubation. Further studies are needed to validate the findings of this case.

Declaration of patient consent

The authors certify that they have obtained the appropriate patient consent form. In the form, the patient's legal guardian has given his consent for the patient's clinical information to be reported in the journal. The patient's legal guardian understands that the patient's name and initials will not be published and due efforts

will be made to conceal the patient's identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Yakoumakis EN, Gialousis GI, Papadopoulou D, Makri T, Pappouli Z, Yakoumakis N, *et al*. Estimation of children's radiation dose from cardiac catheterisations, performed for the diagnosis or the treatment of a congenital heart disease using TLD dosimetry and Monte Carlo simulation. *J Radiol Prot* 2009;29:251-61. doi: 10.1088/0952-4746/29/2/011.
2. Pan XB, Ou-Yang WB, Pang KJ, Zhang FW, Wang SZ, Liu Y, *et al*. Percutaneous closure of atrial septal defects under transthoracic echocardiography guidance without fluoroscopy or intubation in children. *J Interv Cardiol* 2015;28:390-5. doi: 10.1111/joic.12214.
3. Hanslik A, Moysich A, Laser KT, Mlczech E, Kececioglu D, Haas NA. Percutaneous closure of atrial septal defects in spontaneously breathing children under deep sedation: A feasible and safe concept. *Pediatr Cardiol* 2014;35:215-22. doi: 10.1007/s00246-013-0762-9.
4. Hahn RT, Abraham T, Adams MS, Bruce CJ, Glas KE, Lang RM, *et al*. Guidelines for performing a comprehensive transesophageal echocardiographic examination: Recommendations from the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists. *Anesth Analg* 2014;118:21-68. doi: 10.1213/ANE.0000000000000016.
5. Gallego-Ligorit L, Vives M, Vallés-Torres J, Sanjuán-Villarreal TA, Pajares A, Iglesias M. Use of dexmedetomidine in cardiothoracic and vascular anesthesia. *J Cardiothorac Vasc Anesth* 2018;32:1426-38. doi: 10.1053/j.jvca.2017.11.044.