

gers is the act of a third party ‘sanctioning’ such a consultation. In this scenario it is we, as anaesthetists, who require sanctioning of a change to our practice. Locally we have attempted to do this by now also including propofol (and rocuronium) in our labour ward emergency drug box, in acknowledgement of the status of these agents as acceptable alternatives to the traditional drugs of thiopentone and suxamethonium. However, formal acknowledgement from an authority such as the Obstetric Anaesthetists’ Association, preferably in the form of a published guideline, may be required before the relative trickle of propofol becomes a flood.

Finally, it is right that Desai et al. acknowledge both the original description and the controversial aspects of the classical RSI, now described almost half a century ago.⁵ It is clear that the so-called ‘modified’ RSI of latter-day practice has indeed been altered beyond all recognition: we suggest it is high time that it is renamed the ‘modern’ RSI.

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Transabdominal continuous echocardiographic monitoring of fetuses



Continuous fetal monitoring is important in non-obstetric surgery during pregnancy. Electronic fetal heart rate

monitoring is the main method of continuous fetal monitoring, using Doppler ultrasound to detect the heartbeat. It is indirect and is easily interfered with due to the mother’s blood flow signal.¹ Furthermore, changes of fetal heart rate patterns can be due to maternal hypoglycemia or administration of drugs, in addition to fetal hypoxia.² Continuous echocardiographic monitoring by anesthesiologists has been successfully used to monitor patients.³ Transabdominal continuous echocardiographic monitoring may also be an effective tool for physicians in assessing the status of a fetus.

A 31-year-old woman was scheduled for mitral valve replacement at 25 weeks’ gestation. Another 34-year-old woman underwent the removal of an atrial myxoma at 18 weeks’ gestation. During the surgeries, each fetus was continuously monitored by transabdominal echocardiography. This allowed direct continuous display of the structure and motion of the fetal heart and umbilical blood flow (Fig. 1).

A custom-made transducer holder was developed to affix the 2–5 MHz probe to the abdomen, to acquire the desired fetal echocardiographic images (Image A). Image B (Supplemental Digital Content Video) displays echocardiographic views of the mother’s abdomen and the fetus’s cardiac structures: the left atrium (LA), the left ventricle (LV), the right atrium (RA) and the right ventricle (RV). Image C (Supplemental Digital Content Video) shows the M-mode echocardiograph, used for heart rate calculation. In addition, other organs such as the placenta, uterine wall, umbilical cord and fetal lung were clearly displayed.

Obvious deceleration of the fetal heart was noted with the onset of cardiopulmonary bypass in both the cases. At the same time, the chamber size of the fetal heart reduced. These changes indicated deficient placenta perfusion, so the cardiopulmonary bypass flow was increased and the fetal heart rate recovered. Transabdominal continuous echocardiographic monitoring was not used until the end of the surgery. The anesthesiologists adjusted the blood pressure and acid-base balance of the mother or administered magnesium sulfate to decrease uteroplacental resistance, to promote recovery of the fetal heart rate. After these two cardiac operations, serial fetal ultrasounds revealed normal fetal condition. The first woman subsequently had a normal vaginal delivery at 39 weeks’ gestation and delivered a healthy baby. The second woman chose an induction of labor at 21 weeks’ gestation because she was fearful about fetal malformation.

One of the peri-operative management objectives in non-obstetric surgery during pregnancy is to optimize or maintain uteroplacental blood flow and oxygen delivery. The standard method of continuous fetal monitoring uses Doppler ultrasound to detect the fetal heartbeat. This method is indirect and can be easily interfered with by the mother’s blood flow signal,

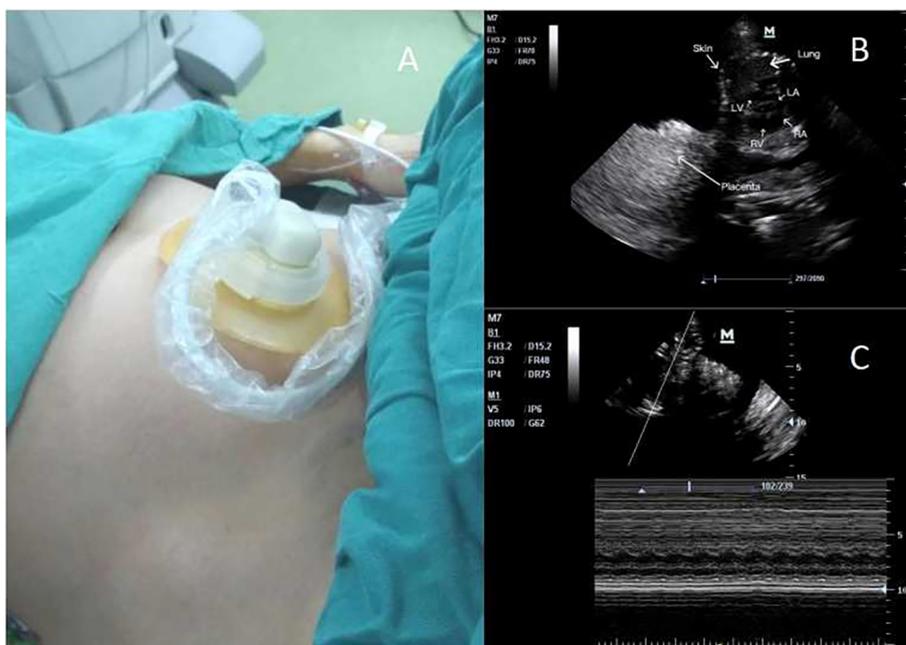


Fig. 1 Transabdominal continuous echocardiographic monitoring of a fetus

especially in the condition of fetal bradycardia. Transabdominal continuous echocardiographic monitoring is able to continuously and precisely show the fetal heart rate, using the M-mode. During the surgery, fetal bradycardia may be caused by maternal hypoglycemia, maternal hypothermia, or maternal or fetal hypoxia. Administration of drugs that transfer through the placenta is another cause; for example, opioids may cause bradycardia and loss of beat-to-beat variability because they readily cross the placental barrier.^{4,5} Transabdominal continuous echocardiographic monitoring could help the anesthesiologist in trying to verify the reason for fetal bradycardia as fetal hypoxia, by also monitoring the umbilical blood flow. Manisha et al. continuously monitored the fetal heart rate and umbilical arterial blood flow by transvaginal ultrasonography, but this is invasive.²

Fetal hypoxia can be induced by reduced uterine perfusion pressure, increased uterine arterial resistance, or decreased oxygen content of the maternal blood. In our two cases, deceleration of the fetal heart rate and decreased chamber size of the fetal heart were noted at the onset of cardiopulmonary bypass. This was likely caused by reduced uterine perfusion pressure and lower return of blood volume to the fetal heart. The uterine wall, placenta and umbilical cord can be clearly displayed by continuous echocardiographic monitoring. The resistive index and pulsatility index of the umbilical cord flow can reflect the uteroplacental resistance.⁶ So transabdominal continuous echocardiographic monitoring of the fetus can help the anesthesiologist ascertain the reasons for fetal hypoxia.

In conclusion, we believe transabdominal continuous echocardiographic monitoring may be an effective method of monitoring the fetus in non-obstetric surgery during pregnancy. It may help to analyze the reason for intrauterine fetal distress and might also prove useful for fetal surgery.

Declaration of interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijoa.2018.12.007>.

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Intravenous dexmedetomidine



I was interested to read the editorial by Sng et al.¹ in which the use of intravenous (IV) dexmedetomidine in obstetric anesthesia is described. My anesthetic group has been using the drug for the last two years to relieve peri-operative shivering during cesarean delivery, this being a distressing symptom for most women, especially following labor. This decision was taken after reading the preliminary results of a study from Montreal² that were first reported at the Society of Obstetric Anesthesia and Perinatology meeting in 2016. The investigators described the benefit of a 30 µg dose of IV dexmedetomidine for the relief of shivering at cesarean delivery. Our experience is that dexmedetomidine, administered as a slow IV bolus of 15–30 µg in this setting, is as or more effective than 25 mg IV meperidine. It works within 45–90 s and it is rare that the patient requires a second dose. Since we are now trying to find ways to limit opioid exposure in our patients, it would seem prudent for IV dexmedetomidine to replace meperidine for shivering during cesarean delivery. Dexmedetomidine can cause a transient, moderate increase in systolic and diastolic blood pressures and a transient, manageable, fall in heart rate which, arguably, is useful after inducing spinal anesthesia. Blood pressure changes, however, are biphasic and there may be a period of hypotension after its use, but this has not been a clinically important finding in our practice. Patients may experience a brief period of sedation and anxiolysis, which has prompted some in our group to use dexmedetomidine for intra-operative anxiety instead of midazolam.

I am aware that other therapies for shivering during cesarean delivery, such as clonidine and tramadol, have been used and evaluated around the globe but our group has no experience with those drugs in this context.^{3–5}

Dexmedetomidine is an inexpensive drug (about US\$2 for a 200 µg vial) and I believe it should be considered as a first-line treatment for shivering, and as an option for the treatment of anxiety during cesarean delivery under neuraxial anesthesia. As such, dexmedetomidine is indeed a very useful “weapon in our armoury”.

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Knowledge and comfort with neonatal resuscitation among practising anesthesiologists



The Neonatal Resuscitation Program (NRP) was developed in 1987 by the American Heart Association and the American Academy of Pediatrics to teach an evidence-based approach to neonatal resuscitation.¹ When obstetric anesthesia became an accredited fellowship in 2011, NRP training became a requirement for graduation. However, most anesthesiologists do not have an obstetric anesthesia fellowship or formal NRP training and most of those who work on the labor and delivery unit do not have NRP training.² We conducted a pilot study, the purpose of which was to develop a reliable and valid survey that assesses anesthesiologists' knowledge and comfort with neonatal resuscitation. A demographics