

THE USABILITY OF DESFLURANE FOR LAPAROSCOPIC ADRENALECTOMY IN PREGNANCY WITH CUSHING'S SYNDROME: A CASE REPORT

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Abstract

Background: Laparoscopic adrenalectomy for Cushing's syndrome during pregnancy is rare because of infertility. Pregnant patients with Cushing's syndrome require careful management for mother and fetus. The usefulness of desflurane in such cases has not been previously reported.

Case presentation: Laparoscopic adrenalectomy was performed under general anesthesia in a pregnant patient with Cushing's syndrome. General anesthesia was relatively stable using desflurane, remifentanyl and rocuronium. Desflurane enabled early neurological evaluation with rapid wakefulness, and no postoperative respiratory depression, nausea, nor adverse fetal effects. Postoperative maternal and neonatal courses were uneventful.

Conclusions: General anesthesia with desflurane could be useful and safe during pregnancy.

Background

Cushing's syndrome is rarely associated with pregnancy, as hypercortisolism prevents normal follicular development and causes ovulatory dysfunction of up to 75%¹. Although laparoscopic adrenalectomy for Cushing's syndrome is safe and effective, careful management of general anesthesia is required regarding the control of vital signs, maternal muscle weakness, neurological complications, and fetal exposure to anesthetic agents.

To our knowledge, the safety and usefulness of desflurane in laparoscopic adrenalectomy for Cushing's syndrome during pregnancy has not been previously reported². In this case report, we describe the successful use of desflurane in laparoscopic adrenalectomy in a pregnant female with Cushing's syndrome.

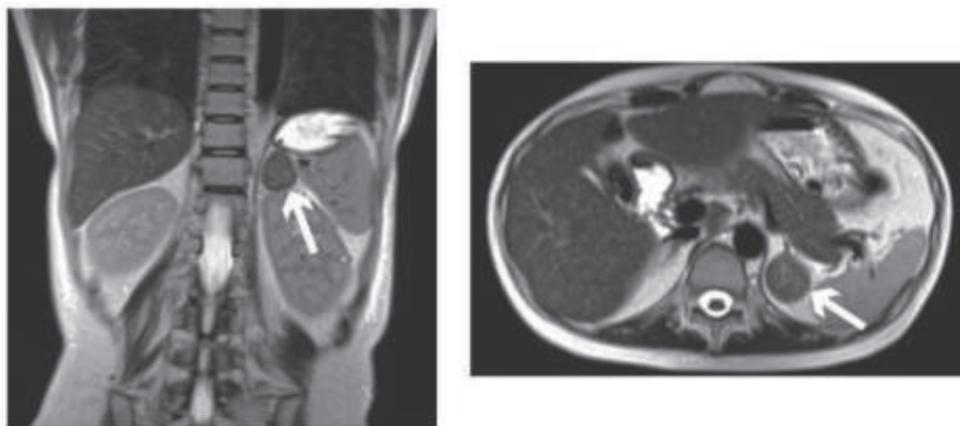
Case presentation

A 35-year-old female (G0P0, body mass index 23 kg/m²) presented with hypertension, buffalo hump, moon face, extensive ecchymosis, emotional lability, and irritability. She was subsequently diagnosed with Cushing's syndrome, with a left adrenal gland tumor detected on magnetic resonance imaging (Fig. 1).

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Fig. 1
Magnetic resonance images.
Left adrenal gland tumor
(27 mm diameter) in coronal
section and in transverse
section.

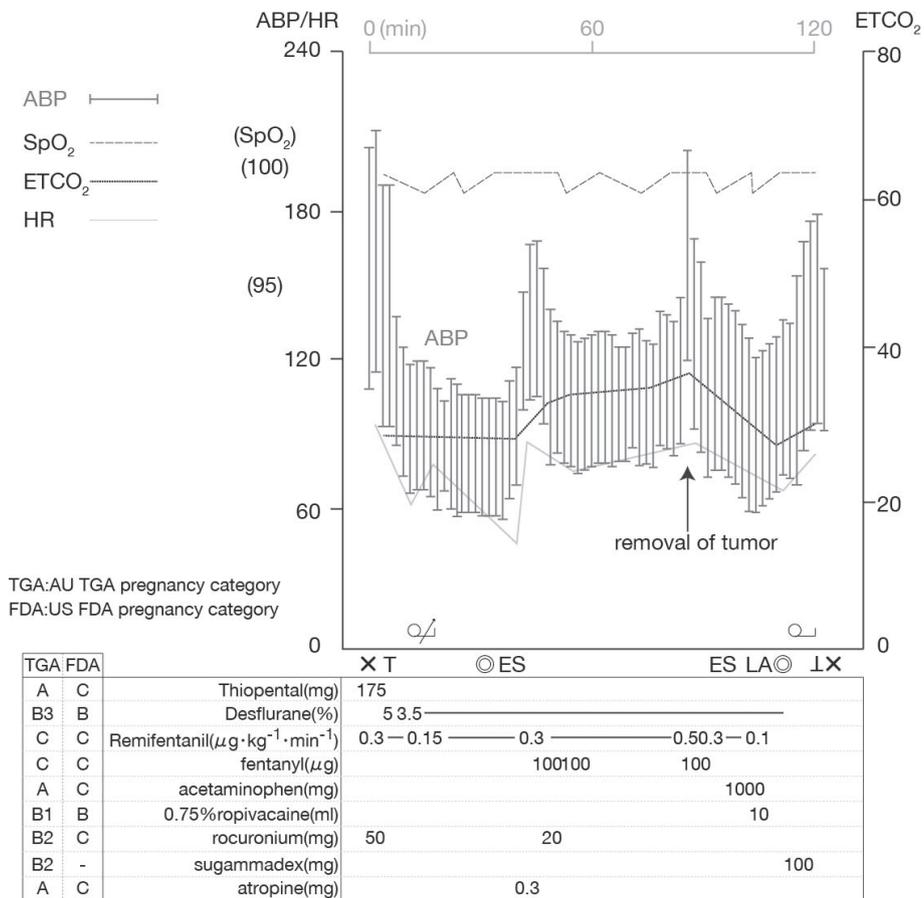


The patient underwent general anesthesia with desflurane at 21 weeks gestation for laparoscopic adrenalectomy (Fig. 2). All drugs used in this case are considered safe for use during pregnancy by the Australian Government Therapeutic Goods Administration (TGA) and the U.S. Food and Drug Administration (FDA)^{3,4}.

After preoxygenation, rapid sequence intubation

was performed using 0.3 µg/kg/ml remifentanyl with a 100 µg loading dose, 175 mg thiopental, and 50 mg rocuronium. Endotracheal intubation was easily performed with a McGrath™ MAC videolaryngoscope (Covidien, Tokyo, Japan). The patient's vital signs remained stable during induction, without arterial blood pressure (ABP) elevation or regurgitation resulting from the decreased lower esophageal sphincter tone

Fig. 2
Anesthetic record. A pregnant
patient with Cushing's syndrome
underwent general anesthesia
with desflurane for laparoscopic
adrenalectomy. The drugs used
during laparoscopic adrenalectomy
were approved by the Australian
Government Therapeutic Goods
Administration and the U.S. Food
and Drug Administration as safe for
the mother and fetus.



caused by muscle weakness in Cushing's syndrome.

General anesthesia was maintained with 3.5-5% desflurane in 50% oxygen with a remifentanyl infusion of 0.15-0.5 µg/kg/min, and we confirmed intraoperative bispectral index (BIS) values in the 40-50.

We managed the ABP at appropriate levels intraoperatively with a few exceptions. After the start of pneumoperitoneum, hypotension associated with bradycardia was successfully treated with atropine. There were occasional premature ventricular contractions with hypertension caused by manipulation of the adrenal gland; however after the resection, the arrhythmia resolved immediately and the ABP returned to previous levels without administration of an antihypertensive agent.

We administered 20 mg of rocuronium one injection at a time until a quantitative train-of-four (TOF) nerve stimulator showed a TOF of 1. At the end of surgery, the blockade was reversed with 2 mg/kg sugammadex (TOF 3).

The patient was administered 6 µg/kg fentanyl and 1,000 mg acetaminophen, and we performed infiltration anesthesia with 75 mg ropivacaine was infiltrated around the wound for postoperative analgesia.

The patient had a rapid awakening and extubation was performed smoothly. There were no neurological complications, memory of intraoperative awareness, postoperative respiratory depression, pain, nor vomiting (which causes the intraabdominal pressure to increase).

The perioperative fetal heart rate detected by Doppler ultrasonography was 150 beats per minute preoperatively, after right lateral positioning, and postoperatively. There were no abnormalities detected in maternal and fetal condition in the intensive care unit.

Discussion

Desflurane produced safe and stable general anesthesia comparable to sevoflurane in a pregnant patient. Desflurane and sevoflurane have relatively low blood-gas partition coefficients and similar effects on the uterus at equivalent MAC for uterine relaxation⁵.

Considering the effect on the fetus, it might

be an advantage that the metabolism of desflurane (0.02%) is less than that of isoflurane (0.17%)⁶. In addition, desflurane has a lower blood-gas partition coefficient (0.45) than sevoflurane (0.65), allowing more rapid uptake and elimination⁶. Consequently, desflurane enables more rapid return of normal muscle coordination, clear wakefulness (which enables early neurological evaluation), and causes less postoperative nausea than sevoflurane⁷, although sevoflurane has a superior safety rating (B2 according to the TGA, and B according to the FDA) compared with desflurane (B3 according to the TGA, and B according to the FDA).

However, it should be noted that desflurane can cause sympathetic stimulation, tachycardia, and hypertension whenever the inhaled concentration is abruptly increased by more than 1 MAC⁸. As in the present case, the combination of remifentanyl with desflurane could be effective to avoid increasing the inhalational agent concentration unnecessarily.

Pregnant patients are considered more sensitive to inhalational anesthetics than nonpregnant patients; they have a reduced MAC for inhalational anesthetics by 28% during the first trimester⁹. However, the limitations of this case include the BIS monitoring; the low estimated values of BIS under general anesthesia via desflurane with remifentanyl infusion could not be completely credible¹⁰. We might usually manage general anesthesia with a higher concentration of desflurane in the range of stable hemodynamics, although the present patient had no intraoperative awareness.

Conclusion

We successfully managed general anesthesia using desflurane during laparoscopic adrenalectomy for Cushing's syndrome in a pregnant patient, without any maternal or fetal complications. Desflurane could play a valuable role in surgery for pregnant patients.

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