



Interference with high-frequency variability index

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To the Editor:

We read with great interest the article “Analgesia nociception index (ANI) and high-frequency variability index (HFVI): promising indicators of relative parasympathetic tone” by Yoshida K and colleagues [1]. The article concerns the effects of antimuscarinic drugs on ANI and HFVI as a limitation, but there is no discussion on the effects of adrenergic agents. We experienced a case in which the use of adrenaline-soaked gauze in the operative field interfered with HFVI.

Case presentation

A 61-year-old woman of 163 cm in height and 70 kg in weight underwent hemi-thyroidectomy and lymph node dissection for papillary thyroid cancer. Preoperatively, she had no arrhythmia including arterial fibrillation, while her blood pressure was poorly controlled at 150/80 mmHg under the condition of antihypertensive medication. Anesthesia was induced with remimazolam at 12 mg/kg/h and remifentanyl at 0.3 µg/kg/h, and muscle relaxation was obtained with 50 mg rocuronium before intubation. Patient Status Index (PSI) and HFVI were monitored during surgery. After induction of anesthesia, we adjusted the dose of remifentanyl to maintain HFVI above 50. When adrenaline-soaked gauze was used twice within several minutes for hemostatic purposes in the operative field, HFVI decreased from 65 to 37

within a few minutes (Fig. 1). Heart rate and blood pressure increased about 10 min after the decrease of HFVI. The low HFVI continued for about 30 min, while heart rate and blood pressure decreased within a few minutes. Adrenaline-soaked gauze was then used five times: on the third gauze use, HFVI dropped from 70 to 53; on the fourth use, HFVI dropped from 63 to 43; on the fifth use, HFVI dropped from 60 to 39. On the third to fifth uses, HFVI remained low for several minutes and increased to their values before they changed, and no increase in heart rate or blood pressure was recorded. Thus, those events were reproducible. Except when the adrenaline-soaked gauze was used, the dose of remifentanyl was tapered off without significant fluctuations in hemodynamics with reference to HFVI. The intraoperative PSI was maintained between 30 and 45 and there were no findings of intraoperative awakening. Emergence from anesthesia and extubation were uneventful. The patient returned to the ward without complaining of pain or nausea.

Written informed consent was obtained from the patient to report the case details.

Discussion and conclusions

In this case, the use of adrenaline-soaked gauze in the operative field may have stimulated the sympathetic nervous system and affected HFVI. While adrenaline has a half-life of 2–3 min, the effects of adrenaline on HFVI continued for a longer duration. This suggests that the effects of adrenaline may continue longer without hemodynamic changes and that HFVI may enable more accurate assessment of the autonomic nervous system. This is consistent with the results of a previous study [2] showing that ANI is more sensitive than heart rate and blood pressure variability for assessment of nociception.

While HFVI may be useful in clinical settings for assessment of the levels of nociception and control of the doses

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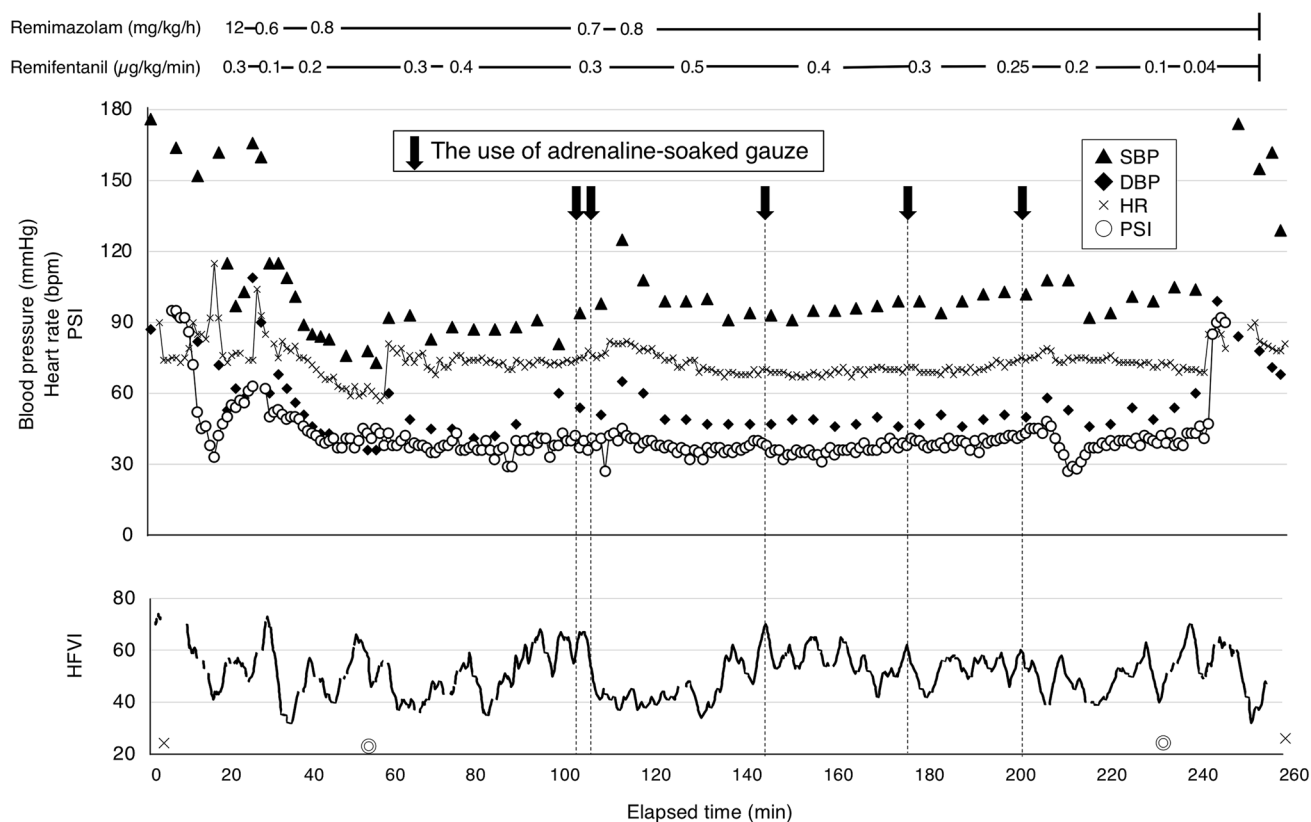


Fig. 1 Changes in hemodynamics, patient status index (PSI) and high-frequency variability index (HFVI) during anesthesia. *SBP* systolic blood pressure, *DBP* diastolic blood pressure, *HR* heart rate, *PSI* patient status index, *HFVI* high-frequency variability index

of opioids [1], anesthesiologists who use an HFVI monitor during the perioperative periods should consider several factors including arrhythmias, type of surgery and agents used including adrenergic and anticholinergic drugs [1, 3, 4].

Declarations

Conflict of interest There are no conflicts of interest regarding the publication of this paper.

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