with the strict interdependence of pre-, intra- and post-operative management is the key to a rational approach to morbidly obese patients.

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The perioperative implications of khat use

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EDITOR:
Khat (*Catha edulis*) is a herb native to East Africa and Southern Arabia that is chewed recreationally by the people of these regions to reduce fatigue and appetite. The social habit of khat chewing is increasingly prevalent in the East African and Southern Arabian communities in Europe [1]. Khat contains the pyrrolizidine alkaloids cathinone, cathine and cathidine, which are sympathomimetic amines. The euphoric, energetic and other effects derived from chewing khat are attributed to cathinone, its major active ingredient, which has a very similar structure and pharmacologic profile as amphetamine [2]. The use of cathinone and amphetamine is restricted in Europe, but khat use is not. The chronic or acute use of khat is associated with adverse cardiovascular and amphetamine-like effects [3,4]. These effects may impact negatively on anaesthesia and perioperative outcome. This is a clinical report and discussion of the perioperative course of three adult patients who chewed khat habitually.

Case 1: A 24-yr-old female of South Asian origin presented for septorhinoplasty. She had no co-morbidities, was a teetotaller, but smoked tobacco. Preoperative airway inspection on the day of surgery revealed particles and discoloration on her tongue, which she attributed to khat chewing from the previous night. Perioperative cardiorespiratory parameters were normal. Anaesthesia was induced with propofol – 200 mg and fentanyl – 100 μg; and a laryngeal mask inserted for airway management. Anaesthesia was maintained with 2% sevoflurane in 65% nitrous oxide. Surgery lasted 1 h. Recovery from anaesthesia was delayed: she woke up 1 h after discontinuation of sevoflurane. The 24-h postoperative course was uneventful.

Case 2: A 33-yr-old Caucasian male presented for eye surgery. He suffered from depression, used antidepressants, smoked tobacco and cannabis, and drank 10 units of alcohol weekly. He had previously abused amphetamine. He chewed khat habitually, with the last chewing session about 8 h before surgery. Perioperative cardiorespiratory parameters were normal. Anaesthesia was induced with propofol – 300 mg and fentanyl – 200 μg; and a

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laryngeal mask inserted for airway management. Anaesthesia was maintained with 3–4% sevoflurane in 65% nitrous oxide. Anaesthesia and surgery were uneventful, recovery was satisfactory and the 24 h postoperative course was uneventful.

Case 3: A 39-yr-old male of East African origin presented for knee arthroscopy. He had no co-morbidities, was a teetotaller, but smoked tobacco and chewed khat. The last khat-chewing session was the previous night. He made an informed choice of spinal anaesthesia; which was achieved with 2 mL of heavy 0.5% bupivacaine. He was not sedated, but was very sleepy perioperatively. The perioperative course was uneventful.

The sympathomimetic effects of khat are produced by cathinone, its main amphetamine-like ingredient. The cardiovascular effects of khat include coronary vasospasm, myocardial ischaemia, negative inotropy, increased myocardial oxygen demand, arrhythmias, tachycardia, vasoconstriction and hypertension [3–6]. These effects are especially pronounced within 4 h of chewing khat [5,6]. None of the patients in this report had chewed khat 4 h preoperatively, hence their normal perioperative cardiovascular parameters. However, vigilant perioperative monitoring was ensured including continuous electrocardiography during postoperative recovery. The effects of chronic khat use such as arrhythmias, hypertension and ischaemic cardiomyopathy are usually present in habitual users and have implications for anaesthesia. Thus, it is important to monitor and treat any perioperative cardiovascular dysfunction. It is also beneficial to use anaesthetics with minimal sympathomimetic or cardiovascular effects.

Cathinone acts like amphetamine by releasing endogenous catecholamines from central and peripheral neurons. Chronic and intense release depletes neuronal catecholamines and the sympathetic response to cardiovascular insufficiency [7]. Thus, refractory hypotension may occur, and should be treated promptly. However, there is a diminished pressor response to ephedrine because of catecholamine depletion. Fortunately, the patients in this report did not have hypotension perioperatively, including the patient who had spinal anaesthesia. Chronic amphetamine use can result in significantly reduced anaesthetic requirement secondary to catecholamine depletion [7], and may account for the delayed recovery observed in Case 1. Chronic use may also lead to the development of tolerance, fatigue and cross-tolerance to other sympathomimetics [7], and this may account for the perioperative sleepiness observed in Case 3 under spinal anaesthesia. Khat chewing is associated with tobacco smoking, as seen in all the cases reported [1,6]. Other effects of chronic khat use include hepatitis, nephropathy and neuropathy [3,8].

Acute khat use may present a serious perioperative challenge because of the prominent adverse cardiovascular effects, especially within 4 h of chewing khat [4,5,6]. It may also increase anaesthetic requirement and this has been observed in acute amphetamine states [7]. The second case in this report chewed khat 8 h preoperatively, which may explain the requirement for relatively high doses of anaesthetics, although he was cardiostable. Other effects of acute khat use include analgesia [9], and delayed gastrointestinal motility [10], which have important anaesthetic and perioperative implications.

Optimal perioperative care of khat users requires careful titration of cardiostable anaesthetic and comprehensive monitoring. Opioid-based general anaesthesia or regional anaesthesia would be beneficial. Patients requiring emergency or major surgery should receive direct arterial pressure measurement, for better cardiovascular monitoring. Direct-acting vasopressors, such as phenylephrine or epinephrine, should be readily available to treat hypotension or bradycardia.

In conclusion, khat chewing is an international socio-medical problem with considerable physiologic and pharmacologic implications. The medical implications of khat should be considered in the health care of patients from communities in which khat use is common.

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Presurgical hypervolaemic haemodilution for saving blood transfusion?

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EDITOR:

Homologous blood transfusion is established as common clinical practice, yet continues to be associated with residual risks of serious complications. Socio-economic pressures, in addition to ethical pressures, have contributed to the development and instigation of blood-saving techniques and now form a priority for anaesthetists and surgeons alike. Among these techniques, presurgical hypervolaemic haemodilution (HHD) is considered very simple to perform, yet continues to attract controversy with regard to its efficacy [1].

In a prospective randomized controlled trial, we analysed the influence of presurgical HHD with 6% hydroxyethyl starch solution (HES) 130/0.4 on intraoperative blood loss, rate of transfusion, haemodynamic and laboratory parameters, complications and costs in comparison to a control group without presurgical haemodilution.

The Ethics Committee approval for the study and informed consent of 80 ASA I–II patients planned for total prostatectomy or total cystectomy for cancer were obtained. Patients were randomized into two equal groups. Group A ($n = 40$) received 15 mL kg^{-1} HES 130/0.4 and 6% (Voluven®; Fresenius Kabi, Germany) presurgical infusion at a constant infusion rate of 30 mL min^{-1}. Group B ($n = 40$) did not receive HHD. Patients of both groups underwent intraoperative infusion with a maximal HES dose of 33 mL kg^{-1} as required. The threshold for transfusion was defined as either haemoglobin <8 g dL^{-1} or haematocrit $<24\%$. All patients received fentanyl, rocuronium and thiopental for induction of general anaesthesia and isoflurane as maintenance.

Preoperative values of haemoglobin and haematocrit showed no significant difference between the two groups. Average blood loss was also comparable (Group A 1954 ± 917 mL vs. Group B 1685 ± 796 mL, n.s.). In Group A, only five patients (12.5%) received a total of 10 units of packed red blood cells. In Group B there was a need for transfusion in 10 patients (25%) with a total amount of 24 units. However, this difference only became statistically significant in a subgroup of patients with an observed blood loss of $>30\%$ total blood volume (estimated as 70 mL kg^{-1}). Postoperative values of haemoglobin were comparable in both groups, allowing exclusion of practice differences in transfusion.

After HHD, central venous pressure (CVP) increased significantly from 2.5 (0–9) mmHg up to 7 (3–15) mmHg ($P < 0.01$) in Group A. No patient showed clinical signs of cardiac decompensation. Coagulation parameters including prothrombin time (Quick-Test), activated partial thromboplastin time, thrombin time, fibrinogen and antithrombin III were evaluated with respect to the influence of HHD. A statistically significant change in these parameters was observed, yet all remained within normal physiological limits and there was no evidence that HHD induced abnormal bleeding. Postoperative measured coagulation parameters in both groups showed normal values.

No adverse effects or postoperative wound complications were noted in any patients. Cost analysis included direct costs for transfused blood components (packed red cells and fresh frozen plasma) and HES. Costs were calculated in total at 1426 € (36 €/patient) in Group A compared to 2726 € (68 €/patient) in Group B.

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