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Use of a Disposable Acupressure Device as Part of a Multimodal Antiemetic Strategy for Reducing Postoperative Nausea and Vomiting

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背景：关于在高危手术患者中处理术后恶心和呕吐（PONV）的最佳策略尚有争议。尽管已有研究证实P6穴位刺激能有效预防PONV，然而以前没有研究评估过这个非药物治疗作为一个多模式止吐方案的一部分时，对患者日常生活的正常活动恢复的影响。因此，我们设计了这个随机、假对照、双盲的研究，以评估一次性穴位按压设备（Pressure Right®; Pressure Point公司, Grand Rapids, MI）联合应用昂丹司琼和地塞米松用于止吐预防时，对呕吐发作的发病率和恢复质量的有效性。

方法：100例进行较大的腹腔镜手术的ASA I级和II级患者被随机分配到对照组（n = 50）或穴位按压组（n = 50），在麻醉诱导前30至60分钟对照组接受一个“假”穴位刺激设备，穴位按压组接受一次性Pressure Right设备，置于双侧P6穴位。所有患者都接受了标准化的全身麻醉。两个研究组均在手术期间联合给予昂丹司琼4mg IV和地塞米松4 mg IV用于止吐预防。在手术后72小时的特定时间间隔，评价恶心和呕吐的发生率和“解救”止
BACKGROUND: There is still controversy regarding the optimal strategy for managing postoperative nausea and vomiting (PONV) in high-risk surgical populations. Although acupuncture at the P6 acupoint has been demonstrated to be effective in preventing PONV, the effect of this nonpharmacologic therapy on the patient's recovery with respect to resumption of normal activities of daily living has not been previously assessed when it is used as part of a multimodal antiemetic regimen. Therefore, we designed this randomized, sham-controlled, and double-blind study to assess the efficacy of a disposable acupressure device (Pressure Right®; Pressure Point Inc., Grand Rapids, MI) on the incidence of emetic episodes and quality of recovery when used in combination with ondansetron and dexamethasone for antiemetic prophylaxis.

METHODS: One hundred ASA physical status I and II patients undergoing major laparoscopic procedures were randomly assigned to either a control group (n = 50) receiving a “sham” acupuncture device or an acupressure group (n = 50) receiving a disposable Pressure Right device placed bilaterally at the P6 point 30 to 60 minutes before induction of anesthesia. All patients received a standardized general anesthetic. A combination of ondansetron, 4 mg IV, and dexamethasone, 4 mg IV, was administered during surgery for antiemetic prophylaxis in both study groups. The incidence of nausea and vomiting and the need for “rescue” antiemetic therapy were assessed at specific time intervals for up to 72 hours after surgery. The recovery profiles and quality of recovery questionnaires were evaluated at 48 hours and 72 hours after surgery. Patient satisfaction with the management of their PONV was assessed at the end of the 72-hour study period.

RESULTS: The 2 study groups did not differ in their demographic characteristics or risk factors for PONV. The incidence of vomiting at 24 hours was significantly decreased in the acupressure group (10% vs 26%, P = 0.04, 95% confidence interval for absolute risk reduction 1%–31%). The overall incidence of vomiting from 0 to 72 hours after surgery was also significantly decreased from 30% to 12% in the acupressure group (P = 0.03, 95% confidence interval 2%–33%). Furthermore, adjunctive use of the acupressure device seemed to enhance patient satisfaction with their PONV management and quality of recovery at 48 hours after surgery. However, the recovery times to hospital discharge, resumption of normal physical activities, and return to work did not differ significantly between the 2 study groups.
CONCLUSION: Use of the Pressure Right acupressure device in combination with antiemetic drugs provided a reduction in the incidence of vomiting from 0 to 72 hours after surgery with an associated improvement in patient satisfaction with their PONV management. However, recovery and outcome variables failed to demonstrate any improvement with the addition of the acupressure device.
BACKGROUND: Glucagon-like peptide-1 (GLP-1) increases insulin secretion and has an important role in maintaining glucose homeostasis. In this study, we evaluated the biophysical and pharmacological properties of GLP-1 by performing in vivo and in vitro experiments to determine the applicability of GLP-1 in glycemic control in rats under isoflurane anesthesia.

METHODS: Levels of portal GLP-1, insulin, and glucose and dipeptidyl peptidase-4 activity were measured in the basal fasting state and after gastric glucose load before, during, and after exposure to 30% O₂ in air (control) or 1.4% isoflurane in a mixture of 30% O₂ and air. The direct effects of isoflurane on GLP-1 secretion were assessed in human enteroendocrine NCI-H716 cells. Insulin release from isolated pancreatic islets was measured using a radioimmunoassay. Single pancreatic β-cell membrane potentials were recorded using whole-cell current-clamp patches perforated by β-escin.

RESULTS: In fasting rats, inhalation of isoflurane led to a decrease in the basal levels of GLP-1 but did not affect insulin and glucose levels. Levels of GLP-1, insulin, and glucose increased after gastric administration of glucose in control rats. However, isoflurane attenuated the glucose-induced increase in GLP-1 and insulin levels and increased plasma glucose levels. In contrast, isoflurane did not affect dipeptidyl peptidase-4 activity before or after gastric glucose loading. Isoflurane (0.35 mM) inhibited GLP-1 release in NCI-H716 cells; this finding was similar to that observed in in vivo studies. In perfusion experiments, isoflurane (0.35 mM) inhibited glucose-induced insulin release, whereas exogenous GLP-1 (10 nM) enhanced insulin release. Importantly, combined administration of isoflurane and GLP-1 enhanced both phases of glucose-induced insulin release to an extent similar to that achieved with GLP-1 alone. Whole-cell patches showed that exposure to GLP-1 (10 nM) led to nearly complete restoration of glucose-stimulated depolarization that had been suppressed by isoflurane (0.35 mM).

CONCLUSIONS: GLP-1 secretion is impaired during isoflurane anesthesia. However, our study showed that the insulinotropic action of GLP-1 was not affected by isoflurane. Furthermore, exposure to GLP-1 increased the membrane activity of pancreatic β-cells, preventing isoflurane-induced impairment of glucose-induced insulin secretion. These results support the hypothesis that GLP-1–based therapy may be a useful approach for achieving intraoperative glycemic control.
BACKGROUND: Many technologies have been developed for minimally invasive monitoring of cardiac output. Estimated continuous cardiac output (esCCO) measurement using pulse wave transit time is one noninvasive method. Because it does not require any additional sensors other than those for conducting 3 basic forms of monitoring (electrocardiogram, pulse oximeter wave, and noninvasive (or invasive) arterial blood pressure measurement), esCCO measurement is potentially useful in routine clinical circulatory monitoring for any patient including low-risk patients. We evaluated the efficacy of noninvasive esCCO using pulse wave transit time in this multicenter study.

METHODS: We compared esCCO and intermittent bolus thermodilution cardiac output (TDCO) in 213 patients, 139 intensive care units (ICUs), and 74 operating rooms (ORs), at 7 participating institutions. We performed electrocardiogram, pulse oximetry, TDCO, and arterial blood pressure measurements in patients in ICUs and ORs; a single calibration was performed to measure esCCO continuously. TDCO measurement was performed once daily for ICU patients and every hour for OR patients, and just before the removal of the pulmonary arterial catheter from patients in both the ICU and OR. We evaluated esCCO against TDCO with correlation analysis and Bland and Altman analysis and also assessed the change of bias over time. Furthermore, we inspected the impact of change in systemic vascular resistance (SVR) on
RESULTS: From among 588 esCCO and TDCO datasets (excluding calibration points), 587 datasets were analyzed for 213 patients. The analysis results show a correlation coefficient of 0.79 ($P < 0.0001$, 95% confidence limits of 0.756–0.819), a bias (mean difference between esCCO and TDCO) of 0.13 L/min (95% confidence interval of bias 0.04–0.22 L/min), and a precision (1 SD) of 1.15 L/min (95% prediction interval was −2.13 to 2.39 L/min). There were no significant differences among 3 defined time intervals over 48 hours after calibration (repeated-measures analysis of variance $P = 0.781$) in the ICU. The influence of SVR on esCCO analysis showed a correlation coefficient between SVR and an error of 0.37 ($P < 0.0001$, 95% confidence interval 0.298–0.438).

CONCLUSION: The efficacy of noninvasive esCCO technology was compared with TDCO in 213 cases. Five hundred eighty-seven datasets comparing esCCO and TDCO showed close correlation and small bias and precision, which were comparable to current arterial waveform analysis technologies.

Can We Make Postoperative Patient Handovers Safer? A Systematic Review of the Literature

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Postoperative patient handovers are fraught with technical and communication errors and may negatively impact patient safety. We systematically reviewed the literature on handover of care from the operating room to postanesthesia or intensive care units and summarized process and communication recommendations based on these findings. From >500 papers, we identified 31 dealing with postoperative handovers. Twenty-four included recommendations for structuring the handover process or information transfer. Several recommendations were broadly supported, including (1) standardize processes (e.g., through the use of checklists and protocols); (2) complete urgent clinical tasks before the information transfer; (3) allow only patient-specific discussions during verbal handovers; (4) require that all relevant team members be present; and (5) provide training in team skills and communication. Only 4 of the studies developed an intervention and formally assessed its impact on different process measures. All 4 interventions improved metrics of effectiveness, efficiency, and perceived teamwork. Most of the papers were cross-sectional studies that identified barriers to safe, effective postoperative handovers including the incomplete transfer of information and other communication issues, inconsistent or incomplete teams, absent or inefficient execution of clinical tasks, and poor standardization. An association between poor-quality handovers and adverse events was also demonstrated. More innovative research is needed to define optimal patient handovers and to determine the effect of handover quality on patient outcomes.

产妇硬膜意外穿破后预防性硬膜外血补片用于防止硬膜穿破后头痛
Prophylactic Epidural Blood Patch After Unintentional Dural Puncture for the Prevention of Postdural Puncture Headache in Parturients
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Anesth Analg July 2012 115:133-136

硬膜意外穿破是产科患者行椎管内麻醉主要发病率的一个原因。本焦点综述中，我们探讨了预防性硬膜外血补片预防硬膜穿破后头痛，尤其在产科人群。尽管硬膜外血补片一直被认为是一种有效治疗硬膜穿破后头痛的方法，目前并无充足证据支持其作为一个预防性操作的应用。

儿童颅面重建术中低血压期间没有心动过速
Absence of Tachycardia During Hypotension in Children Undergoing Craniofacial Reconstruction Surgery
Paul A. Stricker, MD, Elaina E. Lin, MD, John E. Fiadjoe, MD, Emily M. Sussman, BA and David R. Jobes, MD
BACKGROUND: Tachycardia is a baroreceptor-mediated response to hypotension. Heart rate (HR) behavior in the setting of hypotension in anesthetized children is not well characterized. We conducted this study to assess the relationship between HR and hypotension in a population of anesthetized children experiencing massive blood loss. Our primary hypothesis was that HR would be increased with the onset of hypotension associated with hypovolemia in comparison with time points without hypotension.

METHODS: We performed a query of our prospective craniofacial perioperative registry for children younger than 24 months who underwent cranial vault reconstruction surgery. Demographic and perioperative data were extracted, and the intraoperative blood loss was calculated. Vital signs were extracted from our computerized anesthesia record and analyzed. Hypotension was defined as a mean arterial blood pressure <40 mm Hg for at least 3 computerized anesthesia record entries (captured every 15 seconds). The preoperative HR, the average HR over the entire intraoperative period, the HR at the onset of hypotension, and the HR 5 minutes before and 5 minutes after the hypotensive episode were compared.

RESULTS: The registry query yielded data from 57 procedures. There were 29 episodes of hypotension occurring in 10 subjects. There was no significant difference in HR at the onset of hypotension (when mean arterial blood pressure decreased below 40 mm Hg) in comparison with the preoperative HR, the average intraoperative HR, or in comparison with 5 minutes before and 5 minutes after the episode of hypotension.

CONCLUSIONS: In this study of anesthetized children younger than 24 months undergoing surgery with massive blood loss, hypotension was not associated with an increased HR. HR does not appear to be a useful indicator of hypovolemia in this population.
The Effect of Obesity on the ED$_{95}$ of Propofol for Loss of Consciousness in Children and Adolescents

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INTRODUCTION: Anesthesiologists face a dilemma in determining appropriate dosing of anesthetic drugs in obese children. In this study we determined the dose of propofol that caused loss of consciousness in 95% (ED$_{95}$) of obese and nonobese children as determined by loss of eye lash reflex.

METHODS: Forty obese (body mass index [BMI] > 95th percentile for age and gender) and 40 normal weight (BMI 25th to 84th percentile) healthy ASA 1 to 2 children ages 3 to 17 years presenting for surgical procedures were studied using a biased coin design. The primary endpoint was loss of lash reflex at 20 seconds after propofol administration. The first patient in each group received 1.0 mg/kg of IV propofol, and subsequent patients received predetermined propofol doses based on the lash reflex response in the previous patient. If the lash reflex was present, the next patient received a dose increment of 0.25 mg/kg. If the lash reflex was absent, the next patient was randomized to receive either the same dose (95% probability) or a dose decrement of

INTRODUCTION: 麻醉医师在决定肥胖儿童的麻醉药适宜用量时，经常面临两难的局面。本研究在肥胖与非肥胖患儿中，通过睫毛反射的消失，测定了丙泊酚引起95%患儿意识丧失的剂量（ED$_{95}$）。

方法：40名肥胖的（体重指数[BMI]＞同龄同性别儿童的第95百分位数）和40名正常体重的（BMI在第25～第84百分位数之间）、ASA 1~2级、年龄3~17岁行外科手术的的健康儿童参与了本项偏倚硬币设计研究。主要观察指标是丙泊酚注射后20秒睫毛反射消失。每组第一名患儿接受1.0mg/kg丙泊酚静脉注射，此后的患儿根据之前一名患儿的睫毛反射效果，接受预设的丙泊酚剂量。如果睫毛反射存在，则下一名患儿的剂量增加0.25mg/kg。如果睫毛反射消失，则下一名患儿随机接受相同剂量（几率95％）或剂量减少0.25mg/kg（几率5％）。ED$_{95}$和95％可信区间（CI）分别通过保序回归和引导法计算。

结果：丙泊酚引起睫毛反射消失的ED$_{95}$在肥胖患儿中（2.0mg/kg，近似95％可信区间1.8~2.2mg/kg）显著低于非肥胖患儿（3.2mg/kg，近似95％可信区间2.7~3.2mg/kg），P ≤ 0.05。

讨论：决定丙泊酚对3~17岁患儿进行麻醉诱导必须用多少剂量的一个简单方法是为了首先确定该患儿的BMI在性别特异分布图的位置。肥胖儿童（BMI＞同龄同性别儿童的第95百分位数）进行麻醉诱导所需单位体重丙泊酚的剂量低于非肥胖儿童。

（陈彬彬译 马皓琳 李士通校）
0.25 mg/kg (5% probability). The ED$_{95}$ and 95% confidence intervals (CI) were calculated using isotonic regression and bootstrapping methods respectively.

**RESULTS:** The ED$_{95}$ of propofol for loss of lash reflex was significantly lower in obese pediatric patients (2.0 mg/kg, approximate 95% CI, 1.8 to 2.2 mg/kg) in comparison with nonobese patients (3.2 mg/kg, approximate 95% CI, 2.7 to 3.2 mg/kg), $P \leq 0.05$.

**DISCUSSION:** A simple approach to deciding what dose of propofol should be used for induction of anesthesia in children ages 3 to 17 years is to first establish the child's BMI on readily available gender-specific charts. Obese children (BMI >95th percentile for age and gender) require a lower weight-based dose of propofol for induction of anesthesia, than do normal-weight children.

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**Effect of Dexmedetomidine on Brain Edema and Neurological Outcomes in Surgical Brain Injury in Rats**

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**Background:** Surgical brain injury (SBI) is a neurosurgical operation (such as dissection, cautery, suction, and direct mechanical trauma) to functional brain tissue, which can lead to brain edema. Brain edema is a major factor in the causation of inflammation, necrosis, and oxidative stress. An effective treatment for SBI can improve neurological outcomes and reduce the incidence of neurological complications. The efficacy of pharmacologic treatment of SBI has been studied. It has been shown that α2-receptor agonists, such as dexmedetomidine (DEX), can improve neurological outcomes in experimental models of stroke. We hypothesized that DEX could reduce brain edema and improve neurological outcomes in SBI models.

**Methods:** Male SD rats ($n=63$) were randomly divided into 4 groups: sham surgery, sham surgery + saline, sham surgery + 10 mg/kg DEX, and sham surgery + 30 mg/kg DEX. Rats were divided into 4 groups: sham surgery, sham surgery + saline, 10 mg/kg/hr DEX, and 30 mg/kg/hr DEX. The initial dose of DEX was given 20 minutes after SBI, followed by continuous infusions of 2 hours. SBI was performed by placing a needle into the right cerebral hemisphere. The rats were euthanized 24 hours post-injury, and their brains were removed and their wet weights were measured.

**Results:** The sham surgery + saline group had significantly lower brain edema and neurological outcomes than the sham surgery group. There were no significant differences in brain edema and neurological outcomes between the sham surgery + saline and sham surgery + 10 mg/kg/hr DEX groups. However, the sham surgery + 30 mg/kg/hr DEX group had significantly lower brain edema and neurological outcomes than the sham surgery + saline group. The physiological measurements showed that the sham surgery + 10 mg/kg/hr DEX group had significantly lower mean arterial pressure (MAP) and heart rate (HR) than the sham surgery + saline group. The sham surgery + 30 mg/kg/hr DEX group had significantly lower MAP and HR than the sham surgery + saline group.

**Conclusions:** The use of DEX in the treatment of SBI can reduce brain edema and improve neurological outcomes. The use of high-dose DEX can reduce brain edema and improve neurological outcomes more effectively than the use of low-dose DEX.
BACKGROUND: Surgical brain injury (SBI) is damage to functional brain tissue resulting from neurosurgical manipulations such as sharp dissection, electrocautery, retraction, and direct applied pressure. Brain edema is the major contributor to morbidity with inflammation, necrosis, oxidative stress, and apoptosis likely playing smaller roles. Effective therapies for SBI may improve neurological outcomes and postoperative morbidities associated with brain surgery. Previous studies show an adrenergic correlation to blood-brain barrier control. The α-2 receptor agonist dexmedetomidine (DEX) has been shown to improve neurological outcomes in stroke models. We hypothesized that DEX may reduce brain edema and improve neurological outcomes in a rat model of SBI.

METHODS: Male Sprague-Dawley rats (n = 63) weighing 280 to 350 g were randomly assigned to 1 of 4 IP treatment groups: sham IP, vehicle IP, DEX 10 mg/kg, and DEX 30 mg/kg. Treatments were given 30 min before SBI. These treatment groups were repeated to observe the physiologic impact of DEX on mean arterial blood pressure (MAP), heart rate (HR), and blood glucose on SBI naïve animals. Rats were also assigned to 4 postinjury IV treatment groups: sham IV, vehicle IV, DEX 10/5, and DEX 30/15 (DEX group doses were 10 and 30 mg/kg/hr, with 5 and 15 mg/kg initial loading doses, respectively). Initial loading doses began 20 min after SBI, followed by 2 h of infusion. SBI animals were subjected to neurological testing 24 h after brain injury by a blinded observer, promptly killed, and brain water content measured via the dry/wet weight method.

RESULTS: All treatment groups showed a significant difference in ipsilateral frontal brain water content and neurological scores when compared with sham animals. However, there was no difference between DEX-treated and vehicle animals. Physiologic monitoring showed treatment with low or high doses of DEX significantly decreased MAP and HR, and briefly increased blood glucose compared with naïve or vehicle-treated animals.

CONCLUSIONS: DEX administration did not reduce brain edema or improve neurological function after SBI in this study. The statistical difference in brain water content and neurological scores when comparing sham treatment to vehicle and DEX treatments shows consistent reproduction of this model. Significant changes in MAP, HR, and blood glucose after DEX as compared to vehicle and sham treatments suggest appropriate delivery of drug.
BA CKGROUND: Rotational thromboelastometry (ROTEM®)-based FIBTEM is used perioperatively to assess the extent of fibrin polymerization in whole blood. In FIBTEM, cytochalasin D eliminates the contribution of platelets to whole blood clotting, but changing levels in fibrin(ogen) and erythrocytes may differently affect clot formation. Because dynamic changes of hematocrit are not reflected in plasma fibrinogen measurements, we hypothesized that the lack of erythrocytes in isolated plasma measurements would affect the relationship between the Clauss method and whole blood-based FIBTEM during cardiac surgery. Therefore, in the current study we investigated the influence of perioperative hematocrit changes on FIBTEM and fibrinogen measurements.

METHODS: Blood samples were collected from 6 consenting healthy volunteers. FIBTEM tests were run before and after serial in vitro dilutions of whole blood with saline or autologous plasma (5:1, 2:1, and 1:1 v/v). We then evaluated the relationship between FIBTEM-maximal clot firmness (MCF) and the Clauss fibrinogen method in relation to hematocrit values before and after cardiac surgery. Pearson correlation coefficients were determined between laboratory test results and ROTEM variables.

RESULTS: Upon in vitro hematocrit reduction, FIBTEM-MCF was progressively decreased depending on the extent of saline dilution, but it was increased by 31% after 1:1 volume replacement with autologous plasma (P < 0.05). In samples from cardiac patients (150 measurements in 50 patients), the overall correlation coefficient between FIBTEM-MCF and plasma fibrinogen was 0.80 (P < 0.001). In hemodiluted blood samples (during surgery or at intensive care unit), FIBTEM-MCF 10 mm corresponded to plasma fibrinogen levels of 200 mg/dL. In the subgroup analysis (n = 50 each), according to hematocrit levels (<25%, ≥25% to 30%, ≥30%, 200 mg/dL of plasma fibrinogen respectively corresponded to 11 mm/10 mm/8 mm/FIBTEM-MCF. The correlation coefficients were determined between laboratory test results and ROTEM variables.

CONCLUSION: Perioperative changes in hematocrit affect the relationship between FIBTEM-MCF and fibrinogen levels. Low hematocrit levels (<25%), MCF with plasma fibrinogen values showed higher correlation coefficient when compared to high hematocrit levels in surgical patients. FIBTEM is applicable for determining whether to transfuse plasma fibrinogen for bleeding patients during surgery.
30%, ≥30%), plasma fibrinogen levels of 200 mg/dL corresponded to 11 mm, 10 mm, and 8 mm of FIBTEM-MCF, respectively. The correlation between FIBTEM-MCF and plasma fibrinogen was higher at lower hematocrit (<25%) than at higher hematocrit (>30%) (r = 0.88 and 0.67, respectively).

CONCLUSIONS: Perioperative changes in hematocrit affect the correlation between plasma fibrinogen levels and FIBTEM-MCF values. The higher correlation between FIBTEM-MCF and plasma fibrinogen with lower hematocrit (<25%) indicates that FIBTEM is a practical method to determine the need for fibrinogen replacement in bleeding patients who typically develop perioperative anemia.

In a novel rat model, dexmedetomidine prevents alterations of intestinal microcirculation that are induced by surgical stress and pain.

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BACKGROUND: Anesthesia can become inadequate inadvertently or by misjudgment during surgery or emergence, and the surgical stress and pain stimulation will increase without adequate treatment. Overt stimulation may activate the sympathetic nervous system, increase the blood level of catecholamines, and lead to splanchnic arterial vasoconstriction.
METHODS: We divided 30 male Wistar rats into the following 3 groups: control, surgical stress and pain (SSP), and surgical stress and pain + dexmedetomidine (SSP + Dex). The rats received midline laparotomy to exteriorize a segment of terminal ileum for microcirculation examination by a full-field laser perfusion imager and sidestream dark-field video microscope on mucosa, muscle, and Peyer patch. The inspired concentration of isoflurane was decreased from 1.2% to 0.7% in SSP and SSP + Dex groups. In the SSP + Dex group, the rats received an initial loading dose of dexmedetomidine (0.5 μg/kg) and a maintenance infusion (0.5 μg · kg(-1) · h(-1)).

RESULTS: Dexmedetomidine prevented surgical stress and pain-related tachycardia and hypertension, and it attenuated the reduction of the microcirculatory blood flow intensity in intestinal mucosa (1100 ± 185 perfusion units [PU] vs 800 ± 105 PU, P = 0.001) and muscle (993 ± 208 PU vs 713 ± 92 PU, P < 0.001). Dexmedetomidine restored perfused small vessel density in intestinal mucosa and muscle.

CONCLUSIONS: We established a promising rat model to investigate the effect of surgical stress and pain stimulation on the intestinal microcirculation during light anesthesia. Using this rat model, we found that dexmedetomidine can normalize global hemodynamics and prevent the alteration of intestinal microcirculation.

BACKGROUND: Carboetomidate is an etomidate derivative that produces hypnosis without inhibiting adrenal corticosteroid synthesis. Similar to etomidate, carboetomidate modulates γ-aminobutyric acid type A receptors, but its effects on other ion channel targets of general anesthetics are unknown.

METHODS: We compared etomidate and carboetomidate effects on human N-methyl-d-aspartate receptors or neuronal nicotinic acetylcholine receptors (nnAChRs) expressed in Xenopus oocytes, using 2-microelectrode voltage clamp electrophysiology.
RESULTS: Etomidate did not affect either type of receptor at clinically relevant concentrations, whereas carboetomidate concentrations near 50% effective concentration for anesthesia significantly inhibited nnAChRs.

CONCLUSIONS: Compared with etomidate, carboetomidate’s higher hydrophobicity is associated with greater inhibition of nnAChRs.
an unplanned intubation outcome. NSQIP data for the year 2008 (n=176,031) were then used to validate the scoring system.

RESULTS: The variables most predictive of unplanned intubation were patient age (0-4 points), ASA physical status (0-7 points), the presence of preoperative sepsis (3 points), and total operative time (0-4 points). The Unplanned Intubation Risk Index based on the adjusted hazard ratios for these variables, ranging from 0 (lowest risk) to 18 (highest risk), had a 79% accuracy in distinguishing patients requiring unplanned intubation from those not requiring it (area under the receiver operating characteristic curve 0.79, 95% confidence interval 0.79-0.80). When the scoring system was applied to the validation cohort data, its discriminative performance remained virtually unchanged (area under the receiver operating characteristic curve 0.79, 95% confidence interval 0.79-0.80).

CONCLUSIONS: A scoring system based on clinical risk factors was able to accurately predict unplanned intubation after surgery. Further investigation is needed to assess the utility of the Unplanned Intubation Risk Index in reducing the incidence of unplanned intubation through improved risk stratification and management in perioperative care.

Effects of intrathecal morphine on transcranial electric motor-evoked potentials in adolescents undergoing posterior spinal fusion.
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背景：鞘内注射吗啡（ITM）能为后路脊柱融合术（PSF）后提供有效的镇痛。虽然大多数麻醉药对诱发电位有特定的影响，但很少有关于ITM对经颅电刺激动作诱发电位（tceMEPs）影响的数据。我们的这项研究用来评估在ITM给药后30分钟内对tceMEPs的影响。我们假设，与未接受药物的对照组相比，在我们机构目前使用的ITM剂量下，ITM组不会显著影响平均tceMEP振幅和潜伏期。

方法：研究对象为14位11岁到18岁接受PSF的患者，在ITM注射前及注射后5、10、20、30分钟进行tceMEPs记录。将这些记录与行PSF的同龄人但未注射ITM的对照组进行比较，比较2组之间ITM对tceMEP振幅和潜伏期的影响。

结果：ITM组里有14名研究对象，对照组里有16名研究对象。经过对8组肌肉的研究后，两组在基线阶段的平均反应振幅没有显著差异。在30分钟的治疗后阶段中，与对照组相比，ITM组的平均反应幅度并没有显著改变。在基线阶段，所有肌肉的平均反应幅度的下降程度在每个研究对象上没有显著改变 (95% CI = -38% to 45%; P =
BACKGROUND: Intrathecal morphine (ITM) provides effective analgesia after posterior spinal fusion (PSF). Although most anesthetic drugs have well-characterized effects on evoked potentials, there is little data on the effects of ITM on transcranial electric motor-evoked potentials (tceMEPs). We performed this study to assess the effects of ITM on tceMEPs in the first 30 minutes after administration. We hypothesized that administration of ITM in doses currently used at our institution would not significantly affect mean tceMEP amplitudes and latencies of an ITM study group relative to control patients who did not receive the drug.

METHODS: tceMEPs were recorded before ITM injection and 5, 10, 20, and 30 minutes after injection in 14 subjects ages 11 through 18 years undergoing PSF. These recordings were compared to an age-matched control group undergoing PSF in which ITM was not injected. The effects of ITM on tceMEP amplitude and latency were compared between the 2 groups.

RESULTS: Fourteen subjects were enrolled in the ITM group and 16 served as controls. There were no significant differences in the baseline mean response amplitudes of the 2 groups for any of the 8 muscles studied. Mean response amplitudes over the 30-minute posttreatment period in the ITM group did not differ significantly from those of the control subjects. Average response amplitudes collapsed across all muscles for each subject were not significantly different during the baseline period (95% CI = -38% to 45%; P = 0.783), nor were they significantly different between the 2 groups during the posttreatment period (95% CI = -30% to 78%; P = 0.640). There also were no significant differences in the mean response latencies of the 2 groups in either the baseline or posttreatment periods. Average response latencies collapsed across all muscles for each subject were 4% larger for the ITM group than for controls during the baseline period (95% CI = -5% to 13%; P = 0.377), and 3% larger for the ITM group than for controls during the posttreatment period (95% CI = -4% to 12%; P = 0.359).

CONCLUSIONS: Administration of ITM in doses currently used at our institution did not cause more than a 70% attenuation of mean tceMEP amplitudes or latency changes of an ITM study group relative to control subjects during the 30-minute period after injection. Further studies are required to determine if there are delayed effects after this initial time period.

使用Tuohy针行无定向硬膜外穿刺增加慢性头痛的风险
Unintentional dural puncture with a tuohy needle increases risk of chronic headache.
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**BACKGROUND:** Neuraxial analgesia is chosen by almost half of women who give birth in the United States. Unintentional dural puncture is the most common complication of this pain management technique, occurring in 0.4% to 6% of parturients. Severe positional headaches develop acutely in 70% to 80% of these parturients. Acute postdural puncture headaches are well known, but few studies have investigated long-term sequelae. We investigated the incidence of and risk factors for chronic headache and chronic back pain in parturients who experienced unintentional dural puncture with a 17-gauge Tuohy needle compared with matched controls.

**METHODS:** In a case control design, 40 parturients who sustained unintentional dural puncture with a 17-gauge Tuohy needle over an 18-month period and 40 controls matched for age, weight, and time of delivery were recruited by telephone and 2 validated questionnaires were administered assessing headache and back pain symptoms 12 to 24 months after delivery.

**RESULTS:** The incidence of chronic headaches in the study group (28%) was significantly higher than in the matched controls (5%) (OR = 7, \(P = 0.0129\)). Subjects who experienced dural punctures were more likely than controls to report chronic back pain (OR = 4, \(P = 0.0250\)), but treatment with an epidural blood patch was not a risk factor for chronic back pain.

**CONCLUSIONS:** Patients who incur unintentional dural punctures with large-gauge needles are surprisingly likely to continue to suffer chronic headaches. Treatment with an epidural blood patch does not enhance the risk of chronic back pain. The pathophysiology underlying these symptoms and the best treatment for this syndrome are not known.
BACKGROUND: Tolerance to remifentanil during sevoflurane anesthesia may blunt the ability of this drug to reduce anesthetic requirements. Gabapentin has been shown to be effective in reducing postoperative narcotic usage, a reduction that may be associated with a reduction in opioid-induced tolerance and hyperalgesia. We sought to determine whether gabapentin might prevent the observed acute opioid tolerance (AOT) produced by remifentanil in sevoflurane minimum alveolar concentration (MAC).

METHODS: Wistar rats were anesthetized with sevoflurane and the effects of gabapentin alone on sevoflurane MAC were determined at doses of 150 and 300 mg · kg⁻¹. In a second experiment, gabapentin 300 mg · kg⁻¹ was administered before remifentanil (120 and 240 μg · kg⁻¹ · h⁻¹). The MAC was determined before gabapentin administration and 3 more times at 1.5-hour intervals after drug administration to assess AOT. MAC was determined from intratracheal gas samples using a sidestream gas analyzer; tail clamping was used as a supramaximal stimulus. Statistical analysis was performed with the 1-way analysis of variance test.

RESULTS: Remifentanil reduced MAC (2.5 ± 0.2%) by 16% ± 5% and 36% ± 6% (120 and 240 μg · kg⁻¹ · h⁻¹, respectively, P < 0.01) with a further reduction produced by coadministration with gabapentin 300 mg · kg⁻¹ to 39% ± 12% and 62% ± 14%, respectively (P < 0.01 versus remifentanil alone). Gabapentin given alone at 150 and 300 mg · kg⁻¹ reduced MAC by 26% (both doses, P < 0.01). AOT was observed with remifentanil and characterized by a lower degree of MAC reduction, approximately 1.5 hours later (P < 0.05). However, when remifentanil was administered with gabapentin, the AOT to remifentanil was not observed (P > 0.05).

CONCLUSIONS: Gabapentin reduced the sevoflurane MAC and enhanced the MAC reduction produced by remifentanil. This enhancement may limit AOT in rats.
Isoflurane Pretreatment Preserves Adenosine Triphosphate–Sensitive K⁺ Channel Function in the Human Artery Exposed to Oxidative Stress Caused by High Glucose Levels

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背景：在生理和病理情况下，三磷酸腺苷（ATP）敏感的钾通道在器官血流调节机制中发挥着重要的作用。高血糖时通过过氧化物的产生导致动脉内ATP敏感型钾通道活性的损伤，但至今仍缺乏相关研究评价麻醉药对人体内这一病理过程的作用。本试验探究挥发性麻醉药异氟醚对暴露于高血糖引起的氧化应激状态下的人体动脉能否维持其三磷酸腺苷敏感型钾离子通道的功能。

方法：实验中使用了D-葡萄糖(5.5 mmol/L)处理的去内皮化人网膜动脉，使用异氟醚(1.15%或2.3%)及D-葡萄糖或L-葡萄糖(20 mmol/L)处理其中一部分动脉共60min，后仅停用异氟醚，分别用等长张力记录仪及电生理研究评估动脉段在ATP敏感型钾通道开放剂——左克罗卡林作用下，其舒张和超极化情况。使用氢化乙啶荧光检测超氧化物，用免疫组化分析浓缩化烟酰胺腺嘌呤二核苷酸(NADPH)氧化酶p47phox的亚基。最后对数据进行Scheffé检验后根据情况选择重复测量方差分析或多因素方差分析进行数据的分析。

结果：累积量的左克罗卡林(10⁻⁸到10⁻⁵ mol/L)对经L-葡萄糖(20 mmol/L)处理动脉的舒张作用可被ATP敏感型钾通道拮抗剂格列本脲(10⁻⁶ mol/L)消除。而D-葡萄糖(20 mmol/L)的培养作用可破坏左克罗卡林引起的血管舒张，使用选择性NADPH氧化酶NOX2抑制剂gp91ds-tat (10⁻⁶ mol/L)和异氟醚(1.15%及2.3%)预处理可恢复左克罗卡林对经D-葡萄糖(20 mmol/L)处理动脉的舒张反应。在20 mmol/L的D-葡萄糖溶液中，单独使用异氟醚(2.3%)、gp91ds-tat (10⁻⁶ mol/L)，或两者合用恢复左克罗卡林(3×10⁻⁶ mol/L)对经D-葡萄糖(20 mmol/L)处理动脉的超极化能力相似。与此同时，2.3%的异氟醚可减少经20 mmol/L D-葡萄糖溶液处理的动脉中过氧化物的产生及减少细胞内胞质NOX2亚基p47phox向平滑肌细胞膜的移动。

结论：本试验首次证明使用异氟醚预处理对离体人体动脉的保护作用，异氟醚预处理可保护暴露于高血糖引起的氧化应激中的人网膜动脉ATP敏感型钾通道的活性，而这一作用
似乎由NADPH氧化酶的抑制所介导。因此，挥发性麻醉药可能对氧化应激造成的人体心脏动脉功能障碍具有保护作用。

夏苏云 译 陈杰 校

BACKGROUND: Adenosine triphosphate (ATP)-sensitive K⁺ channels contribute to significant regulatory mechanisms related to organ blood flow in both physiological and pathological conditions. High glucose impairs arterial ATP-sensitive K⁺ channel activity via superoxide production. However, the effects of anesthetics on this pathological process have not been evaluated in humans. In the present study, we investigated whether pretreatment with the volatile anesthetic isoflurane preserves ATP-sensitive K⁺ channel activity in the human artery exposed to oxidative stress caused by high glucose.

METHODS: All experiments were performed using human omental arteries without endothelium in the presence of d-glucose (5.5 mmol/L). Some arteries were treated with isoflurane (1.15% or 2.3%) in combination with d- or l-glucose (20 mmol/L) for 60 minutes, and then only isoflurane was discontinued. Relaxation and hyperpolarization of arterial segments in response to an ATP-sensitive K⁺ channel opener levocromakalim were evaluated using the isometric force recording or electrophysiological study, respectively. Superoxide production was determined by dihydroethidium fluorescence. Immunohistochemical analysis for a subunit of reduced nicotinamide adenine dinucleotide phosphate (NADPH) oxidase p47phox was performed. Data were evaluated using repeated-measures analysis of variance or a factorial analysis of variance as appropriate, followed by Scheffé test.

RESULTS: The ATP-sensitive K⁺ channel antagonist glibenclamide (10⁻⁶ mol/L) abolished relaxation induced by cumulative addition of levocromakalim (10⁻⁸ to 10⁻⁵ mol/L) in arteries treated with l-glucose (20 mmol/L). Incubation with d-glucose (20 mmol/L) impaired the vasorelaxation induced by levocromakalim. The selective NADPH oxidase NOX2 inhibitor gp91ds-tat (10⁻⁶ mol/L) and pretreatment with isoflurane (1.15% and 2.3%) restored relaxation in response to levocromakalim in arteries treated with d-glucose (20 mmol/L). Isoflurane (2.3%), gp91ds-tat (10⁻⁶ mol/L), and their combination similarly restored hyperpolarization in response to levocromakalim (3 × 10⁻⁶ mol/L) in arteries treated with d-glucose (20 mmol/L). Along with these results, isoflurane (2.3%) reduced superoxide production and the intracellular mobilization of the cytosolic NOX2 subunit p47phox toward smooth muscle cell membrane in arteries treated with d-glucose (20 mmol/L).

CONCLUSIONS: We have demonstrated for the first time a beneficial effect from the pretreatment with isoflurane on the isolated human artery. Pretreatment with isoflurane preserves ATP-sensitive K⁺ channel activity in the human omental artery exposed to oxidative stress induced by high glucose, whereas the effect seems to be mediated by NADPH oxidase inhibition. Volatile anesthetics may protect human visceral arteries from malfunction caused by oxidative stress.

使用光体积描记术波形的时频分析探究抽取900毫升血液期间变化

Using Time-Frequency Analysis of the Photoplethysmographic Waveform to Detect the Withdrawal of 900 mL of Blood

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背景：此研究目的为确定健康志愿者自主呼吸下抽取900毫升血液期间在心率或动脉血压显著变化前，是否可通过检查光体积描记图（PPG）波形的心率频谱带和/或呼吸频率带随时间变化频谱幅度检测其变化。本研究还探讨耳朵、手指和前额，哪个是用于早期检测血容量损失时PPG探头放置的最佳部位。

方法：八位受试者被抽取900毫升血液后再回输。生理监测包括耳朵、手指和前额部位的PPG的波形、标准心电图、标准血压袖带测量。从心率频段和呼吸频率段在PPG波形随时间变化的振幅序列中提取高分辨率时频谱。这些振幅用于作为失血检测参数。

结果：处理期间受试者心率和血压没有显著变化。使用从耳朵、手指和前额探测部位收集的PPG波形的时频分析，当抽出900ml血液时，发现相对于基线，提取的相对心率的频率振幅信号显著下降（P < 0.05）；在耳部，仅300毫升血液被抽出时相应的信号下降就出现下降。在耳朵、手指和额头三个部位分别进行监测，损失900毫升血液时相对基线的心率分量的振幅分别平均下降45.2%（38.2%），42.0%（29.2%）和42.3%（30.5%），括号中显示95%的置信区间。900毫升血回输后，显示心率的振幅信号向基线恢复。基线和900毫升的血液抽出后之间心率振幅值有一个明显的分离。将心率频率优化分离2簇心率振幅值（基线和失血）而得到的选定耳PPG信号的阈值，其特异性和敏感性均为87.5%，95%置信区间是（47.4%，99.7%）。同时，发现在相应的呼吸频率波段的光谱幅度没有显著变化。

结论：时频光谱法可监测自主呼吸下血压心率显著变化前的血液丢失。发现自主呼吸患者失血时，心率频率带的光谱振幅显著减少，然而呼吸频率带的无显著变化。这项技术可作为手术中和创伤期有价值监测出血的监测方法。

（孙晓琼 译 陈杰 校）

BACKGROUND: We designed this study to determine if 900 mL of blood withdrawal during spontaneous breathing in healthy volunteers could be detected by examining the time-varying spectral amplitude of the photoplethysmographic (PPG) waveform in the heart rate frequency band and/or in the breathing rate frequency band before significant changes occurred in heart rate or arterial blood pressure. We also identified the best PPG probe site for early detection of blood volume loss by testing ear, finger, and forehead sites.

METHODS: Eight subjects had 900 mL of blood withdrawn followed by reinfusion of 900 mL of blood. Physiological monitoring included PPG waveforms from ear, finger, and forehead probe sites, standard electrocardiogram, and standard blood pressure cuff measurements. The time-varying amplitude sequences in the heart rate frequency band and breathing rate frequency band present in the PPG waveform were extracted from high-resolution time-frequency spectra. These amplitudes were used as a parameter for blood loss detection.

RESULTS: Heart rate and arterial blood pressure did not significantly change during the protocol. Using time-frequency analysis of the PPG waveform from ear, finger, and forehead probe sites, the amplitude signal extracted at the frequency corresponding to the heart rate significantly decreased when 900 mL of blood was withdrawn, relative to baseline (all P < 0.05); for the ear, the corresponding signal decreased when only 300 mL of blood was withdrawn.
The mean percent decrease in the amplitude of the heart rate component at 900 mL blood loss relative to baseline was 45.2% (38.2%), 42.0% (29.2%), and 42.3% (30.5%) for ear, finger, and forehead probe sites, respectively, with the lower 95% confidence limit shown in parentheses. After 900 mL blood reinfusion, the amplitude signal at the heart rate frequency showed a recovery towards baseline. There was a clear separation of amplitude values at the heart rate frequency between baseline and 900 mL blood withdrawal. Specificity and sensitivity were both found to be 87.5% with 95% confidence intervals (47.4%, 99.7%) for ear PPG signals for a chosen threshold value that was optimized to separate the 2 clusters of amplitude values (baseline and blood loss) at the heart rate frequency. Meanwhile, no significant changes in the spectral amplitude in the frequency band corresponding to respiration were found.

**CONCLUSION:** A time-frequency spectral method detected blood loss in spontaneously breathing subjects before the onset of significant changes in heart rate or blood pressure. Spectral amplitudes at the heart rate frequency band were found to significantly decrease during blood loss in spontaneously breathing subjects, whereas those at the breathing rate frequency band did not significantly change. This technique may serve as a valuable tool in intraoperative and trauma settings to detect and monitor hemorrhage.

**Modified Rapid Sequence Induction and Intubation: A Survey of United States Current Practice**

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**背景:** 快速顺序诱导和插管是广泛用于防止胃内容物返流和保护气道的技术。改良的RSII在一些特定临床条件下应用。然而改良RSII没有明确定义。因此，本研究调查了全美各地的学术中心的临床医生，以建立改良RSII的确切定义及其目前的使用情况。

**方法:**

本调查意在对改良RSII的定义和具体使用提出问题，并且由测试者证实。给全美131家麻醉住院医师培训机构发送了电子邮件。设计logistic回归模型来评估在接受改良RSII的测试者中有肯定回应及连续回答调查各项问题的百分比。医师状态也同样被计算在内（住院和主治）。

**结果:**

从58个机构中得到了490份调查(44%的机构回应率);93%测试者使用改良RSII,他们中的85%持续完成了调查研究。大多数测试者(71%, 置信区间: 63%–77%)

报告在麻醉诱导前予以吸氧，进行环状软骨压迫，以及在保障气道通气前尝试面罩通气。测试者记录到，当病人中度或病态肥胖(59%, 53%–64%), 有胃食管返流病史但当前无症状(52%, 46%–57%), 食道裂孔疝(42%, 36%–48%), 或者外伤病人禁食8小时以上(39%, 33%–45%)时，他们会使用改良RSII。同样的结果在那些没有持续完成的调查中也有所体现。
BACKGROUND: Rapid sequence induction and intubation (RSII) is a technique commonly used to resist regurgitation of gastric contents and protect the airway. A modification of this technique is implemented in certain clinical circumstances. However, there is currently no standard definition for a modified RSII. Therefore, we surveyed clinicians at academic centers across the United States to establish a working definition of a modified RSII as well as the clinical scenarios in which it is being used.

METHODS: A survey was created that queried the use and definition of modified RSII, and validated with test respondents. We then mailed the survey to all 131 anesthesia residency training programs across the United States. Logistic regression models were created to estimate the percentage of affirmative responses among respondents that performed modified RSII procedures and answered survey items in a consistent manner. Similar quantities were calculated by physician status (resident and attending).

RESULTS: Four hundred ninety surveys were received from 58 institutions (44% institution response rate); 93% of respondents reported using a modified RSII, and of those 85% consistently completed the survey instrument. A majority of respondents (71%, CI: 63%–77%) reported administering oxygen before anesthesia induction, applying cricoid pressure, and attempting to ventilate the lungs via a facemask before securing the airway. Respondents noted that they would use a modified RSII procedure if the patient were either moderately or morbidly obese (each ~59%, 53%–64%), had a history but no current symptoms of gastroesophageal reflux disease (52%, 46%–57%), had a hiatal hernia (42%, 36%–48%) or were a trauma patient who had been NPO for at least 8 h (39%, 33%–45%). Similar RSII results were obtained when repeating the analysis on the subset that did not enforce the consistency requirements.

CONCLUSIONS: Based on our survey we have established three defining features of a modified RSII: (1) oxygen administration before induction; (2) the use of cricoid pressure; and (3) an attempt to ventilate the patient's lungs before securing the airway. Although this definition seems intuitively obvious, no previous work has tested whether it is commonly accepted.

Brief Report: Systemic Inflammatory Response Does Not Correlate with Acute Lung Injury Associated with Mechanical Ventilation Strategies in Normal Lungs

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BACKGROUND: Mechanical ventilation (MV) can lead to ventilator-induced lung injury secondary to trauma and associated increases in pulmonary inflammatory cytokines. There is controversy regarding the associated systemic inflammatory response. In this report, we demonstrate the effects of MV on systemic inflammation.

METHODS: This report is part of a previously published study (Hong et al. Anesth Analg 2010;110:1652–60). Female pigs were randomized into 3 groups. Group H-Vt/3 was ventilated with a tidal volume (Vt) of 15 mL/kg predicted body weight (PBW)/positive end-expiratory pressure (PEEP) of 3 cm H2O; group L-Vt/3 with a Vt of 6 mL/kg PBW/PEEP of 3 cm H2O; and group L-Vt/10 with a Vt of 6 mL/kg PBW/PEEP of 10 cm H2O, for 8 hours. Each group had 6 subjects (n = 6). Prelung and postlung sera were analyzed for inflammatory markers. Hemodynamics, airway mechanics, and arterial blood gases were monitored.

RESULTS: There were no significant differences in systemic cytokines among groups. There were similar trends of serum inflammatory markers in all subjects. This is in contrast to findings previously published demonstrating increases in inflammatory mediators in bronchoalveolar lavage.

CONCLUSION: Systemic inflammatory markers did not correlate with lung injury associated with MV.
BACKGROUND: It has been reported that <50% of neuropathic pain patients are satisfactorily treated with drugs. It is possible that this lack of efficacy of drugs on neuropathic pain might be due to the drugs prescribed, regardless of the origin of pain. We compared the efficacy of orally administered morphine, pregabalin, gabapentin, and duloxetine on mechanical allodynia with that on neuroma pain using the tibial neuroma transposition (TNT) model.

METHODS: In the TNT model, the tibial nerve is transected, and the tibial nerve stump is transpositioned to the lateral aspect of the hindlimb. After TNT injury, mechanical allodynia and neuroma pain are observed. Morphine, pregabalin, gabapentin, and duloxetine were administered orally and were examined for the antiallodynic and antineuroma pain effects.

RESULTS: Morphine, pregabalin, gabapentin, and duloxetine attenuated the level of mechanical allodynia in a dose-dependent manner. Morphine—but not pregabalin, gabapentin, and duloxetine—attenuated the neuroma pain. Morphine was less potent in neuroma pain than in mechanical allodynia. In the 2-drug-combination studies (morphine + pregabalin, morphine + duloxetine, and pregabalin + duloxetine), all drug combinations produced a synergistic effect on mechanical allodynia, but not on neuroma pain.

CONCLUSIONS: These data indicate that the potency of morphine and the efficacy of pregabalin, gabapentin, and duloxetine on mechanical allodynia are different from those on neuroma pain and that combination therapy is one of different therapeutic choices for the treatment of neuropathic pain.

Gabapentin Augments the Antihyperalgesic Effects of Diclofenac Sodium Through Spinal Action in a Rat Postoperative Pain Model
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背景：据报道，<50%的神经痛患者对药物治疗满意。由于开具药物处方时忽略了疼痛的原因，故神经病理性疼痛药物缺乏有效性是有可能的。本文比较了口服吗啡、普瑞巴林、加巴喷丁和度洛西丁在胫骨神经瘤模型（TNT）中对机械痛敏和神经瘤疼痛的疗效。

方法：在TNT模型中，横切胫神经，将胫神经残端嫁接至后肢外侧。TNT模型建立后，观察到机械痛敏和神经瘤痛。给予吗啡、普瑞巴林、加巴喷丁和度洛西丁口服并检查其抗机械痛敏和神经瘤痛疗效。

结果：吗啡、普瑞巴林、加巴喷丁和度洛西丁对机械痛敏有剂量依赖性的治疗作用。吗啡可以减轻神经瘤疼痛，而普瑞巴林、加巴喷丁和度洛西丁无效。吗啡对神经瘤痛的疗效小于其对机械痛敏的疗效。在两种药物合用的研究中（吗啡+普瑞巴林，吗啡+度洛西丁，普瑞巴林+度洛西丁），所有药物合用产生了对治疗机械痛敏的协同效应，但对神经瘤的疼痛治疗无此效应。

结论：这些数据表明与治疗神经瘤性疼痛不同，吗啡及普瑞巴林、加巴喷丁、度洛西丁对治疗机械痛敏更有效，且联合疗法是另一种治疗神经病理性疼痛的方法。
BACKGROUND: Gabapentin and nonsteroidal antiinflammatory drugs (NSAIDs) attenuate postoperative pain and neuropathic pain in humans. The combination of gabapentin and NSAIDs is effective for postoperative pain and enhances functional recovery after surgery. Intrathecal administration of gabapentin or NSAIDs inhibits hyperalgesia in a rat postoperative pain model. However, there is no information on the effects of intrathecal administration of a combination of gabapentin and NSAIDs. We therefore investigated the effects of intrathecal administration of gabapentin and NSAIDs in a rat model of postoperative pain.

METHODS: Rats were prepared for intrathecal catheters under halothane anesthesia. Two days after catheterization, gabapentin (4, 40, or 400 μg per 20 μL of saline), diclofenac sodium, a nonselective cyclooxygenase inhibitor (2, 20, or 200 μg per 20 μL of 6% glucose), 20 μL saline, 20 μL 6% glucose, and a combination of gabapentin and diclofenac (40 μg gabapentin + 20 μg diclofenac and 4 μg gabapentin + 2 μg diclofenac per 20 μL 6% glucose) were injected intrathecally. We performed a hindpaw incision 30 minutes after injection. Each group consisted of 6 rats. The mechanical threshold was measured to evaluate secondary hyperalgesia using von Frey filaments before intrathecal catheterization and at 2 hours, and 1, 3, 5, and 7 days after paw incision.

RESULTS: Gabapentin 400 μg attenuated mechanical hyperalgesia for 7 days compared with the control group. Diclofenac 200 μg inhibited hyperalgesia for 5 days compared with the control group. The 40 μg gabapentin + 20 μg diclofenac group had a significantly reduced secondary hyperalgesic response in 2 hours and 1 day compared with 40 μg gabapentin and 20 μg diclofenac, respectively. The 4 μg gabapentin + 2 μg diclofenac group had a significantly
reduced secondary hyperalgesic response in 2 hours and 1 day compared with 2 μg diclofenac. The withdrawal threshold on the contralateral paw did not change compared with the preincision threshold.

CONCLUSION: Intrathecal administration of gabapentin and diclofenac in combination reduced secondary hyperalgesia at doses having no antihyperalgesic effects when given individually. Our results suggest that gabapentin and diclofenac have an important role in postoperative pain reduction at the spinal level, and that gabapentin augments the antihyperalgesic effects of diclofenac through action in the spinal cord.

超声引导下眼部阻滞是否损伤眼睛？家兔模型下使用两种超声设备评估眶内热量和结构变化的比较研究

Are Ultrasound-Guided Ophthalmic Blocks Injurious to the Eye? A Comparative Rabbit Model Study of Two Ultrasound Devices Evaluating Intraorbital Thermal and Structural Changes

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背景：自1936年Atkinson's描述球后阻滞，以针刺给药为基础的麻醉技术已成为眼科麻醉的主要方法。但是，这项技术有罕见，但严重的并发症，如眼球穿孔。超声技术在外周神经阻滞已广泛运用，但其在眼部麻醉的应用因为顾虑超声可能对脆弱眼组织产生热敏或生物力学伤害而受阻。美国食品和药物管理局(FDA)已制定超声眼科检查指南，但大多数麻醉医师使用的眼部超声设备没有通过FDA批准，因为此类设备产生过多能量。国家监管机构指出，只要不超过组织生理温度水平1.5℃，即可安全进行超声检查。

方法：利用家兔模型，调查长时间使用眼眶超声及非眼眶超声对眼部的温度及机械效应。此双阶段研究旨在检测是否会导致眼外伤，对8只家兔的眼睛进行2种设备连续10分钟的超声检查：(1) the Sonosite Micromaxx（非特定眼眶型） (2) the Sonomed VuMax（特定眼眶型）。第一阶段，通过植入热电偶，在特定的眼部结构连续监测温度（N =4）。 第二阶段，无手术治疗情况下进行超声暴露（n =4）。对所有眼睛行光学显微镜检查，并由眼科病理学家进行不定时组织学评价。

结果：4只家兔的眼睛被检测到温度变化。三只家兔的晶状体（分别在5.0, 5.5,及1.5min）及两只家兔的角膜（均在1.5min）在非特定眼眶型超声下，眼部组织温度超过安全上限（增加> 1.5°C）。

继而进行时间温度分析，发现在3.5min时角膜处，在2.5min时晶状体处，在4.0min时玻璃体处，特定眼眶型及非特定眼眶型组存在明显的统计学差异(Bonferroni校正法 P < 0.05)。两组光学显微镜和组织学检查均未发现眼外伤。
BACKGROUND: Since Atkinson's original description of retrobulbar block in 1936, needle-based anesthetic techniques have become integral to ophthalmic anesthesia. These techniques are unfortunately associated with rare, grave complications such as globe perforation. Ultrasound has gained widespread acceptance for peripheral nerve blockade, but its translation to ocular anesthesia has been hampered because sonic energy, in the guise of thermal or biomechanical insult, is potentially injurious to vulnerable eye tissue. The US Food and Drug Administration (FDA) has defined guidelines for safe use of ultrasound for ophthalmic examination, but most ultrasound devices used by anesthesiologists are not FDA-approved for ocular application because they generate excessive energy. Regulating agencies state that ultrasound examinations can be safely undertaken as long as tissue temperatures do not increase >1.5°C above physiological levels.

METHODS: Using a rabbit model, we investigated the thermal and mechanical ocular effects after prolonged ultrasonic exposure to single orbital- and nonorbital-rated devices. In a dual-phase study, aimed at detecting ocular injury, the eyes of 8 rabbits were exposed to continuous 10-minute ultrasound examinations from 2 devices: (1) the Sonosite Micromaxx (nonorbital rated) and (2) the Sonomed VuMax (orbital rated) machines. In phase I, temperatures were continuously monitored via thermocouples implanted within specific eye structures (n = 4). In phase II the eyes were subjected to ultrasonic exposure without surgical intervention (n = 4). All eyes underwent light microscopy examinations, followed at different intervals by histology evaluations conducted by an ophthalmic pathologist.

RESULTS: Temperature changes were monitored in the eyes of 4 rabbits. The nonorbital-rated transducer produced increases in ocular tissue temperature that surpassed the safe limit (increases >1.5°C) in the lens of 3 rabbits (at 5.0, 5.5, and 1.5 minutes) and cornea of 2 rabbits (both at 1.5 minutes). A secondary analysis of temporal temperature differences between the orbital-rated and nonorbital transducers revealed statistically significant differences (Bonferroni-adjusted P < 0.05) in the cornea at 3.5 minutes, the lens at 2.5 minutes, and the vitreous at 4.0 minutes. Light microscopy and histology failed to elicit ocular injury in either group.

CONCLUSIONS: The nonorbital-rated ultrasound machine (Sonosite Micromaxx) increases the ocular tissue temperature. A larger study is needed to establish safety. Until then, ophthalmic ultrasound-guided blocks should only be performed with ocular-rated devices.

Femoral Nerve Block With Selective Tibial Nerve Block Provides Effective Analgesia Without Foot Drop After Total Knee Arthroplasty: A Prospective, Randomized, Observer-Blinded Study
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BACKGROUND: Sciatic nerve block when combined with femoral nerve block for total knee arthroplasty may provide superior analgesia but can produce footdrop, which may mask surgically induced peroneal nerve injury. In this prospective, randomized, observer-blinded study, we evaluated whether performing a selective tibial nerve block in the popliteal fossa would avoid complete peroneal motor block.

METHODS: Eighty patients scheduled for primary total knee arthroplasty were randomized to receive either a tibial nerve block in the popliteal fossa or a sciatic nerve block proximal to its bifurcation in combination with femoral nerve block as part of a multimodal analgesia regimen. Local anesthetic solution of sufficient volume to encircle the target nerve was administered for the block, up to a maximum of 20 mL. General anesthesia was administered for surgery. After emergence from anesthesia, in the recovery room, the presence or absence of peroneal sensory and motor block was noted. Pain scores and opioid consumption were recorded for 24 hours after surgery.

RESULTS: The tibial nerve block and sciatic nerve block were performed 1.7 cm (99% CI, 1.3 to 2.1) and 9.4 cm (99% CI, 8.3 to 10.5) proximal to the popliteal crease, respectively (99% CI for difference between means: 6.4 to 9.0; P < 0.001). A lower volume of ropivacaine 0.5% was used for the tibial nerve block, 8.7 mL (99% CI, 7.9 to 9.4) versus 15.2 mL (99% CI, 14.9 to 15.5), respectively (99% CI for difference between means, 5.6 to 7.3; P < 0.001). No patient receiving a tibial nerve block developed complete peroneal motor block compared to 82.5% of patients with sciatic nerve block (P < 0.001). There were no significant differences in the pain scores and opioid consumption between the groups.

CONCLUSIONS: Tibial nerve block performed in the popliteal fossa in close proximity to the popliteal crease avoided complete peroneal motor block and provided similar postoperative analgesia compared to sciatic nerve block when combined with femoral nerve block for patients undergoing total knee arthroplasty.