Cardiovascular Anesthesiology

Heart-Type Fatty Acid Binding Protein Is an Independent Predictor of Death and Ventricular Dysfunction After Coronary Artery Bypass Graft Surgery


Anesth Analg November 2010 111:1101-1109; published ahead of print May 10, 2010

Perioperative Mortality in Patients with Pulmonary Hypertension Undergoing Major Joint Replacement

Stavros G. Memtsoudis, Yan Ma, Ya Lin Chiu, J. Matthias Walz, Robert Voswinckel, and Madhu Mazumdar

Anesth Analg November 2010 111:1110-1116; published ahead of print September 14, 2010

Opioid-Mediated Pretreatment Effects Depend on Itpr3 Protein Expression

Anesth Analg November 2010 111:1117-1123; published ahead of print October 15, 2010

Cardiovascular Anesthesiology

心型脂肪酸结合蛋白是冠脉搭桥手术后发生死亡和心室功能障碍的独立预示因子

(唐亮译 马皓琳 李士通校)

肺动脉高压患者接受大关节置换术的围手术期死亡率

(陈毓雯译 陈杰校)

阿片类药物介导的预处理效应需依赖小窝蛋白-3的生物表达

(范羽译 薛张纲校)
Brief Report: Opioid-Induced Preconditioning Is Dependent on Caveolin-3 Expression

- Yasuo M. Tsutsumi,
- Yoshitaka Kawaraguchi,
- Ingrid R. Niesman,
- Hemal H. Patel,
- and David M. Roth

*Anesth Analg* November 2010 111:1117-1121; published ahead of print August 24, 2010

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Ambulatory Anesthesiology

**受控的气管内导管套囊压力与术后并发症的相关性：一项多中心研究**
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- Jianhui Liu,
- Xiaoqing Zhang,
- Wei Gong,
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- Fen Wang,
- Shukun Fu,
- Mazhong Zhang,
- and Yannan Hang

*Anesth Analg* November 2010 111:1133-1137; published ahead of print August 24, 2010

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Anesthetic Pharmacology

**滴注法或喷雾法腹膜内给予罗哌卡因的药代动力学**
(张婷译 陈杰校)

**The Pharmacokinetics of Ropivacaine After Intraperitoneal Administration: Instillation Versus Nebulization**

- Delphine Betton,
- Nicolas Greib,
- Herve Schlotterbeck,
Nefopam Pharmacokinetics in Patients with End-Stage Renal Disease

Nefopam in patients with end-stage renal disease (ESRD) is associated with a longer elimination half-life and lower clearance compared to healthy volunteers. This study aims to investigate the pharmacokinetics of nefopam in patients with ESRD, as it is unclear if nefopam has the same pharmacokinetics in this patient group. Patients with ESRD have altered pharmacokinetics of many medications, and this is the first study to investigate the pharmacokinetics of nefopam in this population.

Improved Accuracy of Methemoglobin Detection by Pulse CO-Oximetry During Hypoxia

Hypoxia is associated with increased methemoglobin levels. Pulse CO-Oximetry (Pulse CO-Ox) is a non-invasive technique that can detect methemoglobin levels in the blood. This study evaluates the use of Pulse CO-Oximetry to detect methemoglobin levels during hypoxia, which can help predict the risk of methemoglobinemia.

A Pilot Study of Respiratory Inductance Plethysmography as a Safe, Noninvasive Detector of Jet Ventilation Under General Anesthesia

Respiratory Inductance Plethysmography (RIP) is a non-invasive technique that measures respiratory movements. This study investigates the use of RIP as a safe, non-invasive method to detect jet ventilation during general anesthesia, which could help reduce the risk of complications associated with jet ventilation.
Joshua H. Atkins,
Jeff E. Mandel,
Gregory S. Weinstein,
and Natasha Mirza


麻醉保护装置(Anaconda©)替代经典汽化设备的准确性
(毛慧译 薛张刚校)

The Accuracy of the Anesthetic Conserving Device (Anaconda©) as an Alternative to the Classical Vaporizer in Anesthesia

Marina Soro, Rafael Badenes, Maria Luisa Garcia-Perez, Lucia Gallego-Ligorit, Francisco J. Martí, Gerardo Aguilar, and F. Javier Belda

Anesth Analg November 2010 111:1176-1179; published ahead of print September 14, 2010

一个关键性回顾：连续性心输出量监护仪测量心输出量动态变化的能力
(周洁译 马皓琳 李士通校)

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Anesth Analg November 2010 111:1180-1192; published ahead of print August 24, 2010

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Implantation of 3951 Long-Term Central Venous Catheters: Performances, Risk Analysis, and Patient Comfort After Ultrasound-Guidance Introduction
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Anesth Analg November 2010 111:1194-1201; published ahead of print September 9, 2010

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Anesth Analg November 2010 111:1207-1210; published ahead of print August 12, 2010

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Anesth Analg November 2010 111:1211-1218; published ahead of print September 14, 2010
Obstetric Anesthesiology

A Double-Blind, Placebo-Controlled Trial of Four Fixed Rate Infusion Regimens of Phenylephrine for Hemodynamic Support During Spinal Anesthesia for Cesarean Delivery

- Terrence K. Allen,
- Ronald B. George,
- William D. White,
- Holly A. Muir,
- and Ashraf S. Habib

Anesth Analg November 2010 111:1221-1229; published ahead of print May 21, 2010

The Dose-Dependent Effects of Phenylephrine for Elective Cesarean Delivery Under Spinal Anesthesia

- Adrienne Stewart,
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- Sarah McDonald,
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Anesth Analg November 2010 111:1230-1237; published ahead of print September 14, 2010

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Anesth Analg November 2010 111:1252-1258; published ahead of print August 24, 2010

唐氏综合征患儿使用七氟醚麻醉诱导过程中发生的心动过缓

(滕凌雅 译 马皓琳 李士通 校)
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*Anesth Analg November 2010 111:1264-1274; published ahead of print September 14, 2010*

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Anesth Analg November 2010 111:1285-1289; published ahead of print September 14, 2010

The Analgesic and Antihyperalgesic Effects of Transcranial Electrostimulation with Combined Direct and Alternating Current in Healthy Volunteers

V. Nekhendzy, H. J. Lemmens, M. Tingle, M. Nekhendzy, and M. S. Angst

Anesth Analg November 2010 111:1301-1307; published ahead of print June 8, 2010

The Use of Prolonged Peripheral Neural Blockade After Lower Extremity Amputation: The Effect on Symptoms Associated with Phantom Limb Syndrome

Anesth Analg November 2010 111:1359-1360; published ahead of print September 29, 2010

Propofol能减少帕金森氏症患者丘脑下核神经元群峰电位活动

Aeyal Raz, Dan Eimerl, Adam Zaidel, Hagai Bergman, and Zvi Israel

Anesth Analg November 2010 111:1279-1284; published ahead of print September 29, 2010

联合应用直流和交流经颅电刺激对健康志愿者的镇痛和抗痛觉过敏作用

V. Nekhendzy, H. J. Lemmens, M. Tingle, M. Nekhendzy, and M. S. Angst

Anesth Analg November 2010 111:1301-1307; published ahead of print June 8, 2010

低位肢端截肢术后使用长期外周神经阻滞:对幻肢综合征相关症状的效果

Anesth Analg November 2010 111:1279-1284; published ahead of print September 29, 2010

Analgesia

Pain Medicine

The Analgesic and Antihyperalgesic Effects of Transcranial Electrostimulation with Combined Direct and Alternating Current in Healthy Volunteers

V. Nekhendzy, H. J. Lemmens, M. Tingle, M. Nekhendzy, and M. S. Angst

Anesth Analg November 2010 111:1301-1307; published ahead of print June 8, 2010

The Use of Prolonged Peripheral Neural Blockade After Lower Extremity Amputation: The Effect on Symptoms Associated with Phantom Limb Syndrome
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8-OH-DPAT 阻止吗啡导致的大鼠背缝神经核的凋亡：减少吗啡耐受的一个可能机制
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- Albert Yoon,
- Michael R. Boland,
- and Simon Chinchanwala

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**Pulmonary Hypertension**

**Perioperative Mortality in Patients with Pulmonary Hypertension Undergoing Major Joint Replacement**

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**Background:** Currently, data on pulmonary hypertension (PHTN) patients undergoing noncardiac surgery are lacking. Therefore, clinical assessment of the complication rate and mortality rate in such patients is inaccurate. In this study, the authors evaluated the complications and mortality rate of patients undergoing total hip (THA) or total knee replacement (TKA) surgery, as well as the average annual death rate of PHTN patients in THA and TKA surgery. The authors also investigated the outcomes of patients with primary PHTN undergoing THA surgery. The complications of patients who underwent PHTN surgery were compared with those of healthy patients.

**Methods:** All data were obtained from the American Society of Anesthesiologists database. The authors collected data from 1998 to 2006 and compared the mortality rate of patients with PHTN undergoing THA and TKA surgery with that of healthy patients. The authors also conducted a multivariate analysis to determine the factors affecting mortality rate.

**Results:** A total of 670,516 patients underwent TKA surgery, and 359,119 patients underwent THA surgery. In patients with PHTN, the mortality rate was 4.7% in TKA surgery and 2.6% in THA surgery. In patients with primary PHTN, the mortality rate was 5% in THA surgery.

**Conclusion:** The analysis showed that patients with PHTN undergoing THA or TKA surgery have a higher mortality rate than healthy patients. Therefore, further studies are needed to identify effective interventions to reduce the mortality rate in these patients.
BACKGROUND: There is a paucity of perioperative outcomes data for patients with chronic pulmonary hypertension (PHTN) undergoing noncardiac surgery. Clinicians, therefore, have little information on which to evaluate the risk for morbidity and mortality in this patient population. In this study, we evaluated the incidence and risks of perioperative morbidity and mortality in patients with PHTN undergoing primary total hip arthroplasty (THA) and total knee arthroplasty (TKA).

METHODS: Using the largest inpatient database in the United States (National Inpatient Sample), we identified entries for THA and TKA between the years of 1998 and 2006. Patients with the diagnosis of PHTN were identified and matched to those without the disease based on health-related demographic variables. Perioperative mortality was considered the primary outcome. Multivariate logistic regression models were fitted to assess the impact of PHTN on in-hospital mortality.

RESULTS: We identified 670,516 entries for TKA and 360,119 for THA. Of those patients, 2184 (0.3%) and 1359 (0.4%), respectively, had the diagnosis of PHTN (average annual rate of 1180 for TKA [range, 507–2073] and 739 for THA [range, 467–1054]). Patients with PHTN undergoing THA experienced an approximately 4-fold increased adjusted risk of mortality (2.4% vs 0.6%), and those undergoing TKA a 4.5-fold increased adjusted risk of mortality (0.9% vs 0.2%) compared with patients without PHTN in the matched sample (P < 0.001 for each comparison). Patients with primary PHTN undergoing THA experienced the highest mortality rate (5% [95% CI, 2.3%–7.7%]).

CONCLUSIONS: This analysis demonstrates that patients with PHTN are at increased risk for perioperative mortality after THA and TKA.

滴注法或喷雾法腹膜内给予罗哌卡因的药代动力学

The Pharmacokinetics of Ropivacaine After Intraperitoneal Administration: Instillation Versus Nebulization
Delphine Betton, PharmD*, Nicolas Greib, MD†‡, Herve Schlotterbeck, MD, PhD†, Girish P. Joshi, MBBS, MD, FFARCSI§, Genevieve Ubeaud-Sequier, PharmD, PhD* ‖ and Pierre Diemunsch, MD, PhD†
From the Departments of Pharmacy and Anesthesiology, Hautepierre University Hospital, Strasbourg; †Clinique des Diaconesses, Strasbourg, France; ‡Department of Anesthesiology and Pain Management, University of Texas Southwestern Medical Center, Dallas, Texas; and †UMR CNRS 7200, Laboratoire d’Innovation Thérapeutique, Département de Pharmacocinétique, University of Strasbourg, Illkirch, France.
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背景：腹腔镜手术中，在腹膜内给予局麻药可以起到围手术期镇痛的效果。本研究比较了两种不同的腹膜内罗哌卡因给药途径，即滴注法和喷雾法的药代动力学。方法：本研究用5只猪进行病例交叉试验，这5只猪都给予标准的麻醉方法，其CO2气腹压为12mMgH，各维持1小时。每只猪都以其本身为对照组，间隔8天分别进行两次试验，试验顺序随机。即按3mg/kg罗哌卡因的剂量在气腹排气的时候以滴注法给药或在气腹时连续喷雾给药。每隔10min采取动脉血样直到给药后120min，然后每隔1h直到6h。用高效液相色谱仪和紫外可见光检测仪测量罗哌卡因的血药浓度。
BACKGROUND: Intraperitoneal local anesthetic administration provides perioperative analgesia during laparoscopic procedures. We compared the pharmacokinetics of intraperitoneal ropivacaine administered by instillation or nebulization.

METHODS: A crossover study was performed on 5 pigs under standardized general anesthesia with a carbon dioxide pneumoperitoneum of 12 mm Hg for 1 hour. Each animal, acting as its own control, was studied twice with an 8-day interval and received, in a randomized sequence, 3 mg/kg ropivacaine either by intraperitoneal instillation at the time of pneumoperitoneum exsufflation or by continuous nebulization in the carbon dioxide insufflation tubing. Arterial blood samples were taken every 10 minutes up to 120 minutes, and then hourly up to 6 hours. Ropivacaine concentrations were measured using high-performance liquid chromatography with ultraviolet-visible detection. The plasma-free fraction was evaluated after plasma ultracentrifugation. Pharmacokinetic parameters were calculated using both noncompartmental and compartmental analysis. The mean values were compared using the Student t test, or Wilcoxon test for paired series.

RESULTS: The data were described by a 1-compartment model for both ropivacaine administration techniques, with a delay of 10 minutes for the nebulization group. The maximal ropivacaine concentrations were 0.96 μg/mL for the nebulization group and 0.92 μg/mL for the instillation group (P = 0.66). The ropivacaine absorption constant was lower in the nebulization group (0.043 vs 0.083 min⁻¹, P = 0.02). There were no differences in the elimination half-life, elimination constant, mean total body clearance, distribution volume, mean area under the curve, and mean residence time. The free fraction of ropivacaine was also similar in the 2 groups.

CONCLUSIONS: The pharmacokinetic profile of ropivacaine nebulization is similar to direct intraperitoneal instillation, but with a lower absorption rate.

A Pilot Study of Respiratory Inductance Plethysmography as a Safe, Noninvasive Detector of Jet Ventilation Under General Anesthesia
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BACKGROUND: High-frequency jet ventilation is an optimal mode of ventilation for many surgical procedures of the trachea and larynx but has limited monitoring modalities to assess adequacy of oxygenation and/or ventilation. Respiratory inductance plethysmography is a noninvasive monitor of chest and abdominal wall movement with well-established applications in the sleep laboratory. We performed an observational pilot study of respiratory inductance plethysmography as a detector of jet ventilation.

METHODS: Twenty-five patients underwent microdirect suspension laryngoscopy with high-frequency jet ventilation under general anesthesia with total IV anesthesia. Inductotrace® bands (Ambulatory Monitoring Inc., Ardsley, NY) were applied to the chest and abdomen in all patients and data collected from oxygen administration through emergence at 50-Hz sampling frequency in the DC mode using a 12-bit A-D converter and custom programmed LabVIEW interface. The raw data were filtered and a detector was developed based on a type I, IIR peak comb filter to differentiate apnea, cardiogenic oscillations, and jet ventilation–associated respiratory excursion. The primary end point was the ability of the detector to identify the presence of jet ventilation. Receiver operating characteristic curves were generated for the aggregate data of all patients.

RESULTS: Respiratory inductance plethysmography reliably detected jet ventilation. The data analysis program effectively extracted a relatively small amplitude jet ventilation signal from a baseline signal contaminated by cardiogenic noise. Sensitivity was in the range of 85%, with a filter bandwidth of 0.055 Hz. Increased sensitivity with increasing filter bandwidth was offset by a detection delay of 12.5 seconds.

CONCLUSIONS: Respiratory inductance plethysmography was successfully used to detect high-frequency jet ventilation in patients undergoing laryngotracheal surgery. This
pilot study demonstrates the feasibility of respiratory inductance plethysmography as a monitor for use during jet ventilation.

**3951例超声引导下中心静脉长期埋管：操作情况、风险分析以及患者舒适度**

**Implantation of 3951 Long-Term Central Venous Catheters: Performances, Risk Analysis, and Patient Comfort After Ultrasound-Guidance Introduction**

Adriano Peris, MD*, Giovanni Zagli, MD*, Manuela Bonizzoli, MD*, Giovanni Cianchi, MD*, Marco Cialetti, MD*, Rosario Spina, MD*, Valentina Anichini, MD*, Francesco Lapi, PharmD, PhD† and Stefano Batacchi, MD*

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**BACKGROUND:** Despite evidence demonstrating improved safety with ultrasound-guided placement of central venous catheters (CVC) in comparison with the use of anatomical landmarks, ultrasound guidance is still not routinely used by all physicians when obtaining central venous access.

**METHODS:** We report data pertaining to the placement of long-term CVCs in a 7-year period before and after ultrasound guidance was introduced. We included 3951 procedures (total of 1,642,402 catheter days) in our study: 1584 using the anatomical landmark method (landmark group, January 2000 to May 2003), and 2367 with ultrasound guidance (ultrasound group, June 2003 to May 2007). All procedures were performed by the same team of intensivists. Comparison criteria included procedural data, complications, patient’s comfort, and perceptions. Variables were analyzed with Student's
$t$ test and $\chi^2$ test. Multivariate analysis was performed according to the Cox proportional hazards regression model.

**RESULTS:** Using ultrasound guidance, we noted a significant reduction in procedure time in both port (mean difference 4.9 ± 0.4 minutes, confidence interval [CI] 4.1 to 5.7) and tunneled catheter (mean difference 2.4 ± 0.8 minutes, CI 0.9 to 3.8) placement. The landmark method was associated with an increased risk of overall perioperative complications (4.5, CI 3.6 to 5.6). Among disease entities, acute leukemia patients had a significantly higher risk of CVC-related infections (2.6, CI 2.1 to 3.8). On the basis of questionnaires submitted to patients from both groups, ultrasound guidance was associated with improved patient comfort and satisfaction.

**CONCLUSIONS:** Ultrasound guidance reduces complications and improves patient comfort. Further studies are needed to define whether acute leukemia patients should be considered a separate category with regard to the higher incidence of infections.

**腰麻下剖腹产术期间四个固定速率苯肾上腺素输注方案维持血流动力学稳定的双盲、安慰剂、对照研究**

A Double-Blind, Placebo-Controlled Trial of Four Fixed Rate Infusion Regimens of Phenylephrine for Hemodynamic Support During Spinal Anesthesia for Cesarean Delivery

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This study was presented in part at the Annual Scientific Meeting of the Society for Obstetric Anesthesia and Perinatology, Chicago, IL, May 2008.

Anesth Analg November 2010 111:1221-1229;

**背景：**预防性输注苯肾上腺素联合扩容可有效地减少腰麻下剖腹产术期间产妇低血压。但还缺少一个理想的给药剂量方案。本研究中，作者探讨了维持不低于产妇收缩压 20%的苯肾上腺素的固定输注的合适速率。

**方法：**行择期剖腹产的待产妇随机分组，腰麻后给予安慰剂或不同速率的预防性苯肾上腺素输注（每分钟 25，50，75 或 100μg 组），每组给药同时给予 2L 的液体负荷。使用预定方法来维持产妇收缩压在特定的范围内。比较各组的医生干预次数、血流动力学表现、手术操作引起的恶心呕吐及脐带血气。

**结果：**共分析了 101 例病人。安慰组和苯肾上腺素组在维持产妇收缩压在预定范围内的医生干预次数上没有差别。苯肾上腺素 25μg/min 组和 50μg/min 组 相对与 100μg/min 组，干预次数有显著差异($P = 0.004$ vs 50 μg/min, $P = 0.02$ vs 25 μg/min)。对照组的产前低血压发生率比所有苯肾上腺素组高。苯肾上腺素 75μg/min 组和 100μg/min 的产前高血压发生率比对照组显著增高($P < 0.001$ vs 75 μg/min and 100 μg/min)。随着苯肾上腺素输注速率提高，收缩压相对于基线的波动有增加趋势（$P=0.06$）且越来越高于基线值（P<0.001）。各组间手术操作引起的恶心呕吐发生率、严重程度和脐带血气没有差别。
BACKGROUND: The administration of prophylactic phenylephrine infusions in combination with fluid cohydration significantly reduces the incidence of hypotension in women having cesarean delivery under spinal anesthesia. The ideal dosing regimen for this purpose is not known. In this study, we investigated the dose of phenylephrine that, when administered as a prophylactic fixed rate infusion, is associated with the least interventions needed to maintain maternal systolic blood pressure (SBP) within 20% of baseline.

METHODS: Women undergoing elective cesarean delivery were randomly allocated to receive placebo or prophylactic phenylephrine infusion at 25, 50, 75, or 100 μg/min immediately after spinal anesthesia in combination with a 2-L fluid coload. Maternal SBP was maintained within the target range using a predetermined algorithm. The number of physician interventions, hemodynamic performance, intraoperative nausea and vomiting, and umbilical cord blood gases were compared among the groups.

RESULTS: One hundred one patients were included in the analysis. There were no differences between the placebo and phenylephrine groups in the number of interventions needed to maintain maternal SBP within the target range. Doses of phenylephrine of 25 and 50 μg/min were associated with significantly fewer interventions when compared with 100 μg/min (P = 0.004 vs 50 μg/min, P = 0.02 vs 25 μg/min). Predelivery hypotension was more frequent in the control group compared with all phenylephrine groups. Phenylephrine 75 and 100 μg/min groups were associated with a significantly higher incidence of predelivery hypertension compared with control (P < 0.001 vs 75 μg/min and 100 μg/min). There was a trend toward an increase in median magnitude of deviations of SBP above or below baseline (P = 0.006), and the bias of SBP to be above baseline (P < 0.001) with increasing rates of phenylephrine infusion. There were no differences in the incidence and severity of intraoperative nausea and vomiting and umbilical cord blood gases among the groups.

CONCLUSIONS: The use of prophylactic fixed rate phenylephrine infusions did not significantly reduce the number of physician interventions needed to maintain maternal predelivery SBP within 20% of baseline compared with placebo. However, prophylactic phenylephrine infusions reduced the incidence and severity of maternal predelivery hypotension. Phenylephrine 25 and 50 μg/min administered as a prophylactic fixed rate infusion provided greater maternal hemodynamic stability than phenylephrine 75 and 100 μg/min. Prophylactic fixed rate infusions may have limited application in clinical practice, and future studies assessing the accuracy of hemodynamic control with variable rate phenylephrine infusions are needed.

The Relationship Between Inflammatory Activation and Clinical Outcome After Infant Cardiopulmonary Bypass
体外循环（CPB）可诱导全身性炎症反应。这种反应对婴幼儿的重要性和后果仍不清楚。作者评估了接受体外循环的婴幼儿其炎症状态与临床预后的关系。

**方法：**测量≤9个月的婴幼儿血液白介素（IL）-6的和 IL-8 和 IL-10，肿瘤坏死因子 α (TNF-α) 和 IL-1β 和 C-反应蛋白（CRP）的浓度变化。时间点分别为 CPB 前，CPB 后即刻，以及 CPB 后 6 h，12 h 和 24 h，对围术期临床资料进行前瞻性研究。

**结果：**入组的 93 例患儿其临床诊断包括大动脉转位（40 例），法洛四联症（28 例），室间隔缺损（21 例），动脉干（2例），完全性房室通道（2例）。其平均年龄为 37 天（范围为 2-264 天）。低龄婴幼儿 CPB 前 IL-6 和 CRP 水平相对高，但与术后炎症介质的浓度或临床预后并无相关性。CPB 后 IL-6 浓度升高（CPB 前中位数为 3.2 pg/mL，CPB 后即刻为 24.2，6 h 为 95.4，24h 为 90.3；所有 P < 0.001）。CPB 后 C 反应蛋白浓度增加，峰值出现在 24h（CPB 后 24h 中位数为 27.5，CPB 前为 0.3；P < 0.001）。IL-10 和 IL-8 在 CPB 后即升高。在对年龄和诊断因素进行校正后，术后 IL-6 和 IL-8 的水平与监护室停留时间长短以及术后血液制品输注相关。其中，对 IL-8 而言，还与术后 24h 乳酸水平相关。

**结论：**低龄婴幼儿术前高浓度的细胞因子和 C 反应蛋白的产生与其临床预后没有相关性；术后炎症介质的产生和临床预后的关系有统计学意义，但无临床意义。综上，作者认为，对在一个高工作量心脏中心接受低等至中等难度心脏手术的婴幼儿而言，炎症介质的产生对术后生存率的影响有限。

（邹巧群 译 陈杰 校）

**BACKGROUND:** Cardiopulmonary bypass (CPB) induces a systemic inflammatory response. The magnitude and consequences in infants remain unclear. We assessed the relationship between inflammatory state and clinical outcomes in infants undergoing CPB.

**METHODS:** Plasma concentrations of interleukin (IL)-6, IL-8, IL-10, tumor necrosis factor α, IL-1β, and C-reactive protein (CRP) were measured pre-CPB and immediately post-CPB, and at 6, 12, and 24 hours post-CPB in infants ≤9 months old. Perioperative clinical data were collected prospectively.

**RESULTS:** Diagnoses of 93 patients included transposition of the great arteries (40), tetralogy of Fallot (28), ventricular septal defect (21), truncus arteriosus (2), and complete atrioventricular canal (2). The median age was 37 days (range = 2 to 264). Pre-CPB IL-6 and CRP were higher in younger infants but were not associated with postoperative inflammatory mediator concentrations or measured clinical outcomes. IL-6 increased post-CPB (median 3.2 pg/mL pre-CPB, 24.2 post-CPB, 95.4 at 6 hours, and 90.3 at 24 hours; all P < 0.001). CRP increased post-CPB, peaking at 24 hours (median 27.5 at 24 hours, 0.3 pre-CPB; P < 0.001). IL-10 and IL-8 increased immediately post-CPB. After adjusting for age and diagnosis, postoperative IL-6 and IL-8 correlated with
intensive care unit length of stay and postoperative blood product administration and, for IL-8, 24-hour lactate.

CONCLUSIONS: Greater preoperative cytokine and CRP production in younger infants did not correlate with postoperative outcomes; correlation between postoperative inflammatory mediator production and clinical course was statistically significant but clinically modest. We conclude that in infants undergoing low-to-moderate-complexity cardiac surgery in a single high-volume center, the contribution of inflammatory mediator production to postoperative morbidity is relatively limited.

综述：遗传学对小儿麻醉医师意义：先天畸形、遗传药理学、蛋白质组学的基础

Review Article: Genetics for the Pediatric Anesthesiologist: A Primer on Congenital Malformations, Pharmacogenetics, and Proteomics

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Molecular genetics is the study, at the molecular level, of how genetic information is stored, inherited, and expressed and of how it influences the structure and function of cells in health and in disease. Although molecular approaches have been used for decades in the laboratory and are at the core of modern medical education, they are only now beginning to influence clinical practice. A variety of sophisticated techniques permit rapid and affordable DNA sequencing, gene expression profiling, gene cloning, gene manipulation, gene transfer, recombinant protein production, and other technologies of enormous biomedical importance. Success in genomics has spawned additional ambitious endeavors, including proteomics, pharmacogenomics, and bioinformatics. These techniques are providing new diagnostic, prognostic, and therapeutic opportunities in all areas of medicine, including anesthesiology. With the use of molecular criteria and the diminishing cost of analytic technologies, anesthetic practice will become more individualized, and greater emphasis will be placed on the patient's genetic makeup. Both
surgical and nonsurgical decisions will increasingly accommodate molecular data crucial to perioperative anesthetic management. In this article we have summarized three lectures on congenital malformations, pharmacogenetics, and proteomics presented at the 22nd Annual Meeting of the Society for Pediatric Anesthesia.

联合应用直流和交流经颅电刺激对健康志愿者的镇痛和抗痛觉过敏作用

The Analgesic and Antihyperalgesic Effects of Transcranial Electrostimulation with Combined Direct and Alternating Current in Healthy Volunteers

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背景：有报道显示经颅电刺激能产生显著的临床镇痛作用，但缺乏随机和双盲的试验。本文作者研究了经颅电刺激在人类实验性疼痛模型中的镇痛和抗痛觉过敏的作用。

方法：选择20名健康男性志愿者用60Hz和100Hz经颅电刺激对紫外线B灼伤皮肤和正常皮肤对实验性热和机械性痛的镇痛和抗痛觉过敏的作用。作者实验室先前的动物研究显示60Hz经颅电刺激有显著的镇痛作用，而100Hz经颅电刺激有合适的镇痛作用。该试验应用双盲，随机，两种方法交叉的方法。应用经颅电刺激35分钟，在经颅电刺激之前，之中，和45分钟之后定量感觉测试评估热和机械痛阈。

结果：经颅电刺激TES（TES60Hz＞TES100Hz）能诱发紫外线B病灶显著的热和机械的抗痛觉过敏作用，而不影响没有受损皮肤的热痛觉。在本研究中并未显示单一的经颅电刺激产生长久的镇痛和抗痛觉过敏作用。

结论：经颅电刺激能产生显著的，频率相关的抗痛觉过敏和镇痛作用。经颅电刺激作用的特点很可能是由于它共同调节伤害的外周感受器和中枢过度兴奋。

（陈灵科 译 陈杰 校）

BACKGROUND: Transcranial electrostimulation (TES) has been reported to produce clinically significant analgesia, but randomized and double-blind studies are lacking. We investigated the analgesic and antihyperalgesic effects of TES in validated human experimental pain models.

METHODS: In 20 healthy male subjects we evaluated the analgesic and antihyperalgesic effects of TES60Hz and TES100Hz to heat and mechanical pain in experimentally induced ultraviolet B skin sunburns and in normal skin. Previous animal studies in our laboratory predicted that TES60Hz would provide significant analgesia, and TES100Hz was a suitable active control. The study was conducted in a double-blind, randomized, 2-way cross-over fashion. TES was administered for 35 minutes. Quantitative sensory testing evaluating heat and mechanical pain thresholds was conducted before TES, during TES, and 45 minutes after TES.

RESULTS: TES (TES60Hz > TES100Hz) evoked rapidly developing, significant thermal and mechanical antihyperalgesic effects in the ultraviolet B lesion, and attenuated thermal pain in unimpaired skin. No long-lasting analgesic and antihyperalgesic effects of a single TES treatment were demonstrated in this study.
CONCLUSIONS: TES produces significant, frequency-dependent antihyperalgesic and analgesic effects in humans. The characteristics of the TES effects indicate a high likelihood of its ability to modulate both peripheral sensitization of nociceptors and central hyperexcitability.

简要报告：椎管内阻滞后硬膜外血肿：来自中国的回顾性报告

Brief Reports: Epidural Hematoma After Neuraxial Blockade: A Retrospective Report from China

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Abstract

We conducted a detailed 54-year retrospective review of patients who developed epidural hematoma after neuraxial blockade in a university hospital and throughout Mainland China. Incidence, risk factors, and outcomes in the Chinese population were identified. The incidence of epidural hematoma after neuraxial blockade was 2.14 of 100,000 (95% confidence interval: 0.44–6.25 of 100,000). Patients who had a bacterial infection and required emergency surgery were at increased risk of developing epidural hematoma. There is a significant correlation between good neurologic recovery and short interval to decompressive surgery.

心型脂肪酸结合蛋白是冠脉搭桥手术后发生死亡和心室功能障碍的独立预示因子

Heart-Type Fatty Acid Binding Protein Is an Independent Predictor of Death and Ventricular Dysfunction After Coronary Artery Bypass Graft Surgery

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背景：心型脂肪酸结合蛋白(hFABP)充当了心肌脂肪酸的转运蛋白，在心肌损伤的早期被释放进入循环。我们假设hFABP在冠脉搭桥(CABG)手术后优于常规的心脏生物标记物来预示围手术早期的心肌损伤。
方法：我们在 2 个医院对 1298 例进行在体外循环下的初次 CABG 患者进行了前瞻性队列研究。在围手术期的 7 个时间点检测四种血浆心肌损伤生物标记物（hFABP; 心肌肌钙蛋白 I [cTnI]; 肌酸激酶 MB [CK-MB] 部分和肌红蛋白）。用 Cox 比例风险模型分析围手术期心脏生物标记物和心室功能障碍、住院时间 (HLOS) 以及术年 5 年死亡率（中位数 3.3 年）之间的联系。我们定义院内心室功能障碍为在脱离 CPB 后的手术阶段或者在术后重症监护室内新需要 2 种或 2 种以上正性肌力药物、或者新置入主动脉内球囊辅助、或者心室辅助装置。

结果：对于 hFABP 死亡率的阳性及阴性预测价值分别是 13%（95% 可信区间 [CI], 9%–19%）和 95% (95% CI, 94%–96%)，都高于 cTnI 和 CK-MB。调节临床预示因子之后，术后（POD）1 天和 hFABP 峰值水平都是 CABG 术后心室功能障碍 (P < 0.0001)、HLOS (P < 0.05) 和 5 年死亡率 (P < 0.0001) 的独立预示因子。此外，POD1 和 hFABP 峰值水平显著优于其他被评估的预示死亡率的生物标记物。在一个重复检测分析中，hFABP 超越其他所有适合 HLOS 的模型。POD2 的 hFABP 水平高于 CPB 后 hFABP 水平的患者，较那些 POD2 的 hFABP 水平低于 CPB 后水平的患者的死亡率增加（危险比，10.9; 95% CI, 5.0–23.7; P = 7.2 × 10^{-10})。120 例（10%）的 hFABP 峰值延迟的患者的死亡率是 18.3%，而峰值无延迟的患者死亡率是 4.7%。无论是 cTnI 还是 CK-MB，两者均未检测出死亡率的差异。

结论：与 CABG 术后传统的心肌损伤标记物比较，hFABP 峰值较早并且是一个较好的术后死亡率和心室功能障碍的独立预示因子。

（唐亮 译 马皓琳 李士通 校）

BACKGROUND: Heart-type fatty acid binding protein (hFABP) functions as a myocardial fatty acid transporter and is released into the circulation early after myocardial injury. We hypothesized that hFABP is superior to conventional cardiac biomarkers for predicting early perioperative myocardial injury after coronary artery bypass graft (CABG) surgery.

METHODS: A prospective cohort study of 1298 patients undergoing primary CABG with cardiopulmonary bypass (CPB) was performed at 2 institutions. Four plasma myocardial injury biomarkers (hFABP; cardiac troponin I [cTnI]; creatine kinase, MB [CK-MB] fraction; and myoglobin) were measured at 7 perioperative time points. The association among perioperative cardiac biomarkers and ventricular dysfunction, hospital length of stay (HLOS), and up to 5-year postoperative mortality (median 3.3 years) was assessed using Cox proportional hazard models. We defined in-hospital ventricular dysfunction as a new requirement for 2 or more inotropes, or new placement of an intraaortic balloon pump, or ventricular assist device either during the intraoperative period after the patient separated from CPB or postoperatively in the intensive care unit.

RESULTS: The positive and negative predictive values of mortality for hFABP are 13% (95% confidence interval [CI], 9%–19%) and 95% (95% CI, 94%–96%), respectively, which is higher than for cTnI and CK-MB. After adjusting for clinical predictors, both postoperative day (POD) 1 and peak hFABP levels were independent predictors of ventricular dysfunction (P < 0.0001), HLOS (P < 0.05), and 5-year mortality (P < 0.0001) after CABG surgery. Furthermore, POD1 and peak hFABP levels were significantly superior to other evaluated biomarkers for predicting mortality. In a repeated-measures analysis, hFABP outperformed all other models of fit for HLOS. Patients with POD2 hFABP levels higher than post-CPB hFABP levels had an increased mortality compared
with those patients whose POD2 hFABP levels decreased from their post-CPB level (hazard ratio, 10.9; 95% CI, 5.0–23.7; \( P = 7.2 \times 10^{-10} \)). Mortality in the 120 patients (10%) with a later hFABP peak was 18.3%, compared with 4.7% in those who did not peak later. Alternatively, for cTnI or CK-MB, no difference in mortality was detected. **CONCLUSION:** Compared with traditional markers of myocardial injury after CABG surgery, hFABP peaks earlier and is a superior independent predictor of postoperative mortality and ventricular dysfunction.

**Correlations Between Controlled Endotracheal Tube Cuff Pressure and Postprocedural Complications: A Multicenter Study**

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**Background:** Endotracheal tube cuff pressures are commonly measured and used to prevent or manage airway and tracheal trauma. In this study, we measured and controlled endotracheal tube cuff pressure (ETTc) for short-term (hourly) effects on postoperative respiratory complications.

**Methods:** We enrolled 509 patients undergoing elective surgery under general anesthesia at four major teaching hospitals in Shanghai. They were randomized into two groups: the control group did not measure ETTc pressure, while the test group measured ETTc pressure and adjusted it. We recorded the duration of anesthesia and endotracheal intubation. We selected 20 patients with intubation time of 120 to 180 minutes and performed bronchoscopy immediately after extubation. We documented the occurrence of respiratory complications in the 24 hours after extubation.

**Results:** The groups were comparable in terms of gender, age, height, weight, duration of anesthesia, and endotracheal intubation. In the test group, the cuff pressure measured by the cuff pressure gauge was 43 ± 23.3 mmHg (range: 210 mmHg), while the measured cuff pressure was 20 ± 3.1 mmHg (\( P < 0.001 \)). The occurrence of respiratory complications and hoarseness was significantly higher in the control group than in the test group. In the control group, the occurrence of hoarseness and hoarseness increased significantly with the duration of intubation.

**Conclusion:** Personal experience-based cuff pressure estimation is likely to overestimate cuff pressure. Accurate cuff pressure control helps to reduce the occurrence of airway complications, especially in shorter surgeries. **(陈祖明 译 马皓琳 李士通 校)**
**BACKGROUND:** Postoperative respiratory complications related to endotracheal intubation usually present as cough, sore throat, hoarseness, and blood-streaked expectorant. In this study, we investigated the short-term (hours) impact of measuring and controlling endotracheal tube cuff (ETTc) pressure on postprocedural complications.

**METHODS:** Five hundred nine patients from 4 tertiary care university hospitals in Shanghai, China scheduled for elective surgery under general anesthesia were assigned to a control group without measuring ETTc pressure, and a study group with ETTc pressure measured and adjusted. The duration of the procedure and duration of endotracheal intubation were recorded. Twenty patients whose duration of endotracheal intubation was between 120 and 180 minutes were selected from each group and examined by fiberoptic bronchoscopy immediately after removing the endotracheal tube. Endotracheal intubation–related complications including cough, sore throat, hoarseness, and blood-streaked expectorant were recorded at 24 hours postextubation.

**RESULTS:** There was no significant difference in sex, age, height, weight, procedure duration, and duration of endotracheal intubation between the 2 groups. The mean ETTc pressure measured after estimation by palpation of the pilot balloon of the study group was 43 ± 23.3 mm Hg before adjustment (the highest was 210 mm Hg), and 20 ± 3.1 mm Hg after adjustment (P < 0.001). The incidence of postprocedural sore throat, hoarseness, and blood-streaked expectoration in the control group was significantly higher than in the study group. As the duration of endotracheal intubation increased, the incidence of sore throat and blood-streaked expectoration in the control group increased. The incidence of sore throat in the study group also increased with increasing duration of endotracheal intubation. Fiberoptic bronchoscopy in the 20 patients showed that the tracheal mucosa was injured in varying degrees in both groups, but the injury was more severe in the control group than in the study group.

**CONCLUSIONS:** ETTc pressure estimated by palpation with personal experience is often much higher than measured or what may be optimal. Proper control of ETTc pressure by a manometer helped reduce ETT-related postprocedural respiratory complications such as cough, sore throat, hoarseness, and blood-streaked expectoration even in procedures of short duration (1–3 hours).

**缺氧时利用脉搏 CO-血氧测量仪提高高铁血红蛋白测量的精确性**

**Improved Accuracy of Methemoglobin Detection by Pulse CO-Oximetry During Hypoxia**

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**背景：**血液中的高铁血红蛋白无法用传统血氧测定法检测，并可能使血氧测量仪对真实的动脉功能血氧含量（SaO₂）的估计值（SpO₂）产生偏倚。最近引进的“脉搏 CO-血氧测量仪”（Masimo Rainbow SET® Radical-7）可测量 SpMet，是一种无创的测量动脉血中高铁血红蛋白比率(%MetHb)的方法，研究显示这种方法在缺氧时测量值呈假性升高。我们通过本实验试图确定制造商的修正是否改善了设备同时发现并精确测量高铁血红蛋白及脱氧血红蛋白的能力。
BACKGROUND: Methemoglobin in the blood cannot be detected by conventional pulse oximetry and may bias the oximeter’s estimate (SpO2) of the true arterial functional oxygen saturation (SaO2). A recently introduced “pulse CO-oximeter” (Masimo Rainbow SET® Radical-7) that measures SpMet, a noninvasive measurement of the percentage of methemoglobin in arterial blood (%MetHb), was shown to read spuriously high values during hypoxia. In this study we sought to determine whether the manufacturer’s modifications have improved the device’s ability to detect and accurately measure methemoglobin and deoxyhemoglobin simultaneously.

METHODS: Twelve healthy adult volunteer subjects were fitted with sensors on the middle finger of each hand, and a radial arterial catheter was placed for blood sampling. Intravenous administration of ~300 mg of sodium nitrite elevated subjects' methemoglobin levels to a 7% to 11% target level, and hypoxia was induced to different levels of SaO2 (70% to 100%) by varying fractional inspired oxygen. Pulse CO-oximeter readings were compared with arterial blood values measured with a Radiometer ABL800 FLEX multi-wavelength oximeter. Pulse CO-oximeter methemoglobin reading performance was analyzed by the bias (SpMet-%MetHb), and by observing the incidence of meaningful reading errors and predictive value at the various hypoxia levels. SpO2 bias (SpO2 – SaO2), precision, and root-mean-square error were evaluated during conditions of elevated methemoglobin.

RESULTS: Observations spanned 74% to 100% SaO2 and 0.4% to 14.4% methemoglobin with 307 blood draws and 602 values from the 2 oximeters. Masimo methemoglobin reading bias and precision over the full SaO2 span was 0.16% and 0.83%, respectively, and was similar across the span. Masimo SpO2 readings were biased −1.93% across the 70% to 100% SaO2 range.

CONCLUSIONS: The Rainbow’s methemoglobin readings are acceptably accurate over an oxygen saturation range of 74%—100% and a methemoglobin range of 0%—14%.
A Critical Review of the Ability of Continuous Cardiac Output Monitors to Measure Trends in Cardiac Output
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Numerous cardiac output (CO) monitors have been produced that provide continuous rather than intermittent readings. Bland and Altman has become the standard method for validating their performance against older standards. However, the Bland and Altman method only assesses precision and does not assess how well a device detects serial changes in CO (trending ability). Currently, there is no consensus on how trending ability, or trend analysis, should be performed. Therefore, we performed a literature review to identify articles published between 1997 and 2009 that compared methods of continuous CO measurement. Identified articles were grouped according to measurement technique and statistical methodology. Articles that analyzed trending ability were reviewed with the aim of finding an acceptable statistical method. Two hundred two articles were identified. The most popular methods were pulse contour (69 articles), Doppler (54), bioimpedance (38), and transpulmonary or continuous thermodilution (27). Forty-one articles addressed trending, and of these only 23 provided an in-depth analysis. Several common statistical themes were identified: time plots, regression analysis, Bland and Altman using change in CO (ΔCO), and the 4-quadrant plot, which used direction of change of ΔCO to determine the concordance. This plot was further refined by exclusion of data when values were small. Receiver operating characteristic curves were used to
define the exclusion zone. In animal studies, a reliable reference standard such as an aortic flowprobe was frequently used, and regression or time plots could be used to show trending. Clinical studies were more problematic because data collection points were fewer (8–10 per subject). The consensus was to use the 4-quadrant plot with exclusion zones and apply concordance analysis. A concordance rate of >92% when using a 15% zone indicated good trending. A new method of presenting trend data (ΔCO) on a polar plot is proposed. Agreement was shown by the angle with the horizontal axis and ΔCO by the distance from the center. Trending can be assessed by the vertical limits of the data, similar to the Bland and Altman method.

**Decision tree model used to predict the outcome of extubation in elderly patients after successful spontaneous breathing trial**

A Decision-Tree Model for Predicting Extubation Outcome in Elderly Patients After a Successful Spontaneous Breathing Trial

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**Background:** The single test most commonly used to predict the outcome of extubation is based on a single measurement of a physiological variable, and this is very unreliable because it only detects the functional aspects of the organ system of interest. We assume that a decision-tree model (which contains multiple variables and considers their changes) can more accurately predict the success rate of extubation.

**Methods:** This was a prospective observational study. A total of 113 elderly patients who had been on mechanical ventilation for more than 48 hours were included. All patients underwent a 60-min spontaneous breathing trial (SBT) with a positive end-expiratory pressure of 5 cmH₂O, auto-PEEP, and 100% oxygen. Patients who could tolerate the SBT were extubated immediately. The oral closing pressure (P₀.1), respiratory rate index (RSBI) and their product (P₀.1 × RSBI) were recorded at 1 minute, 30 minutes, and 60 minutes of the SBT. The change in RSBI at 30 minutes (ΔRSBI₃₀) and 60 minutes (ΔRSBI₆₀) were assessed as a ratio of RSBI₃₀ or RSBI₆₀ to RSBI at 1 minute of SBT (RSBI₁).

**Results:** Of the 113 patients, 22 (19.5%) failed the SBT and were excluded; 91 patients were extubated successfully. At 48 hours post-extubation, 28 (19.8%) patients required reintubation (extubation failure). Of the 73 patients (80.2%) who were extubated successfully, 65 patients (88.7%) did not need reintubation. Patients who were extubated successfully (118 ± 34% of ΔRSBI₃₀) had a significantly lower rate of reintubation (93% ± 35%, P = 0.01) compared to the subgroup with ΔRSBI₃₀ <98%. ROC analysis revealed that the area under the curve (AUC) was 0.76. A decision tree was used to select 3 variables (P₀.1 × RSBI₃₀, RSBI₁, ΔRSBI₃₀) to predict extubation success. When P₀.1 × RSBI₃₀ >474 cmH₂O* min⁻¹, ΔRSBI₃₀ >98% was defined as failure. If ΔRSBI₃₀ ≤98%, it was defined as success. For P₀.1 × RSBI₃₀ ≤474 cmH₂O* min⁻¹, ΔRSBI₃₀ >98% was defined as success. If ΔRSBI₃₀ ≤98%, it was defined as success.
BACKGROUND: The commonly used single tests, based on a 1-time measurement of a physiologic variable, are often poorly predictive of tracheal extubation outcome because they examine only a single aspect of physiological function that affects the extubation outcome. We hypothesized that the construction of a decision-tree model, which includes multiple variables and considers the changes of these variables, may more accurately predict successful extubation.

METHODS: This was a prospective observational study. From 2007 to 2008, 113 elderly patients in the medical intensive care unit on ventilation for >48 hours were enrolled. All patients underwent a 60-minute spontaneous breathing trial (SBT) [positive end-expiratory pressure of 5 cm H₂O; automatic tube compensation, 100%]. Patients tolerating the trial were extubated immediately. The mouth occlusion pressure (P₀.₁ × RSBI₃₀), rapid shallow breathing index (RSBI₁), and their combination (P₀.₁ × RSBI₃₀) were recorded at the first, 30th, and 60th minute of the SBT. The changes in RSBI, which were determined at the 30th and 60th minute of the SBT (ΔRSBI₃₀, ΔRSBI₆₀), were assessed as the ratio (of RSBI₃₀ or RSBI₆₀) to RSBI at the first minute of the SBT.

RESULTS: Twenty-two patients (19.5%) failed the SBT and were not included in the analysis, and 91 tolerated the trial and were extubated. At 48 hours, 73 (80.2%) remained extubated (successful extubation), and 18 (19.8%) required reintubation (extubation failure). Although the ΔRSBI₃₀ was significantly higher in the extubation failure patients (118% ± 34%) than that in the successful extubation patients (93% ± 35%, P = 0.01), the receiver operating characteristic (ROC) analysis demonstrated that this index, with the threshold of <98%, presented poor performance in predicting successful extubation with area under the ROC curve (AUC) of only 0.76. The classification and regression-tree analysis selected 3 variables (P₀.₁ × RSBI₃₀, RSBI₁, ΔRSBI₃₀) and began with P₀.₁ × RSBI₃₀. For patients with P₀.₁ × RSBI₃₀ >474 cmH₂O*breaths/min/L, ΔRSBI₃₀ >98% defined a group including all failure patients but no success patients, whereas ΔRSBI₃₀ ≤98% included all success patients with no failure patients. For patients with P₀.₁ × RSBI₃₀ ≤474 cm H₂O*breaths/min/L, the combination of both a P₀.₁ × RSBI₃₀ >328 cm H₂O*breaths/min/L and RSBI₁ >112 breaths/min/L also defined a group including all success patients but no failure patients. Indeed, the diagnostic accuracy (DA) of the tree model, which was 89.1% with only the P₀.₁ × RSBI₃₀ included, increased to 94.5% when both the P₀.₁ × RSBI₃₀ and ΔRSBI₃₀ were included. The final tree model with the inclusion of all 3 discriminators could capture the successful extubation with diagnostic accuracy of 96.7%, AUC of 0.94 (95% confidence interval [CI], 0.87 to 0.98).

CONCLUSION: If the current tree model is confirmed by a prospective study with a larger sample size, it would be useful in guiding physicians making extubation decisions in elderly medical intensive care unit patients.
Neuraxial Morphine and Oral Herpes Reactivation in the Obstetric Population
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椎管内注射吗啡镇痛是剖宫产后镇痛的常规策略。吗啡通过此途径增加了分娩期妇女的一个常见疾病——唇疱疹（口腔疱疹）的复发。人们最关注的问题是病毒再活化后由母体传染给新生儿的风险。并没有研究显示复发性疱疹可导致严重的新生儿发病率，因此，母亲接受此种方法镇痛的益处大于母体疱疹复发导致的产后获得性新生儿疱疹的风险。

Neuraxial morphine administration is a common strategy for providing postcesarean delivery analgesia. Morphine delivered via this route increases the risk of herpes labialis (oral herpes) reactivation, a disease common in women of childbearing age. A primary concern is risk of transmission to the neonate from maternal reactivation. The benefits to the mother of this form of analgesia outweigh the risk of neonatal herpes acquired postpartum from maternal recurrence because serious neonatal morbidity from recurrent herpes has not been described.

Bradyocardia During Induction of Anesthesia with Sevoflurane in Children with Down Syndrome
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背景：心动过缓是唐氏综合征患儿中与使用氟烷吸入麻醉诱导相关的并发症。虽然有报告这些儿童使用七氟醚麻醉诱导后发生了心动过缓，但其发生率是未知的。
目的：在这项研究中我们比较了健康对照儿童和唐氏综合征患儿使用七氟醚诱导后发生心动过缓的发生率和特征。
方法：我们回顾了八年间使用七氟醚吸入麻醉诱导的 209 例唐氏综合征患儿和 268 例健康对照组儿童的电子麻醉记录。从医疗记录中提取以下信息：一般资料、有无先心病史、心率、氧合血红蛋白浓度、呼气末七氟醚浓度、动脉血压和麻醉诱导开始后 360 秒内对心动过缓的所有处理。心动过缓和低血压被定义为建议激活儿科快速反应队列。
Bradycardia is a complication associated with inhaled induction of anesthesia with halothane in children with Down syndrome. Although bradycardia has been reported after anesthetic induction with sevoflurane in these children, the incidence is unknown.

OBJECTIVES: In this study we compared the incidence and characteristics of bradycardia after induction of anesthesia with sevoflurane in children with Down syndrome to healthy controls.

METHODS: We reviewed electronic anesthetic records of 209 children with Down syndrome and 268 healthy control patients who had inhaled induction of anesthesia with sevoflurane over an 8-year period. Data extracted from the medical record included demographics, history of congenital heart disease, heart rate, oxyhemoglobin saturation, expired sevoflurane concentrations, arterial blood pressure, and any treatment of bradycardia during the first 360 seconds after the start of induction of anesthesia. Bradycardia and hypotension were defined as heart rate and arterial blood pressure below the critical limits recommended for activating a pediatric rapid response team to the bedside of a hospitalized child for quick intervention. Factors associated with bradycardia were identified in a univariate analysis. A step-wise backward multiple logistic regression model was used to identify independent factors. Differences between the 2 groups were computed using Fisher's exact test or $\chi^2$ tests for categorical data and t tests for continuous data.

RESULTS: Univariate analysis demonstrated that Down syndrome, low ASA physical status, congenital heart disease, and mean sevoflurane concentrations were factors associated with bradycardia. However, multivariate analysis showed that only Down syndrome and low ASA physical status remained as independent factors associated with bradycardia.

CONCLUSION: Bradycardia during anesthetic induction with sevoflurane was common in children with Down syndrome, with and without a history of congenital heart disease.
BACKGROUND: Implantation of deep brain stimulation (DBS) electrodes in the subthalamic nucleus (STN) for the treatment of Parkinson disease is often performed using microelectrode recording (MER) of STN population spike activity. The extent to which sedative drugs interfere with MER is unknown. We recorded the population activity of STN neurons during propofol sedation and examined its effect on neuronal activity.

METHODS: The procedure was performed during DBS surgery for Parkinson disease. We administered propofol (50 μg/kg/min) at a constant electrode location in the STN until stable sedation was achieved. We recorded the electrical activity, and calculated its root mean square (RMS) before, during, and after the propofol infusions.

RESULTS: The activity of 24 electrode trajectories was recorded in 16 patients. The RMS of STN activity decreased significantly after propofol administration in 18 of the 24 trajectories. The average normalized RMS decreased by 23.2%± 9.1% (mean ± SD) during propofol administration (P < 0.001), and returned to baseline 9.3 ± 4.0 minutes after it was stopped.

CONCLUSIONS: Propofol administration leads to a significant decrease of STN neuronal activity. Thus, it may interfere with MER identification of the STN borders. However, activity returns to baseline shortly after administration stops. Therefore, propofol can be safely used until shortly before MER for DBS.
8-OH-DPAT Prevents Morphine-Induced Apoptosis in Rat Dorsal Raphe Nucleus: A Possible Mechanism for Attenuating Morphine Tolerance

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BACKGROUND: Previously, we found that activation of serotonin 1A (5-HT1A) receptors in the dorsal raphe nucleus (DRN) decreased the development of tolerance to the analgesic effect of morphine. It has been indicated that tolerance to the analgesic effect of morphine is associated with apoptosis in the central nervous system. In this investigation we attempted to evaluate the effect of 8-OH-DPAT (8-hydroxy-2-[di-n-propylamino]tetralin), a specific 5-HT1A receptor agonist, on morphine-induced tolerance and apoptosis in rat DRN.

METHODS: Nociception was assessed using a hotplate apparatus. The terminal deoxynucleotidyl transferase-mediated dUTP nick-end labeling (TUNEL) method was used to analyze apoptosis.

RESULTS: Tolerance to the analgesic effect of morphine was complete by 10 days after morphine administration (5 mg/kg/d, i.p.), whereas a significant analgesic effect was observed through the 10th day in 8-OH-DPAT–treated animals. Furthermore, the results showed that the number of TUNEL positive cells had been increased in morphine-tolerant rats (control group: morphine, i.p. + saline, intra-DRN) in comparison with the saline-treated animals. The results also indicated that 8-OH-DPAT (2, 4, and 8 μg/rat/d) attenuated the number of apoptotic cells in the DRN in comparison with the control group.
However, 8-OH-DPAT (8 μg/rat/d, intra-DRN) failed to reduce morphine-induced apoptosis in the presence of the 5-HT1A receptor antagonist, NAN-190 (6 μg/rat/d, intra-DRN).

**CONCLUSION:** We found that intra-DRN injection of a specific 5-HT1A receptor agonist attenuated morphine-induced apoptosis in rat DRN, which may have a key role in morphine tolerance.

**阿片类药物介导的预处理效应需依赖小窝蛋白-3的生物表达**

*Opioid-Induced Preconditioning Is Dependent on Caveolin-3 Expression.*

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此次研究验证了该假说，即小窝蛋白-3（Cav-3）对于体内阿片类药物介导的预处理效应至关重要。将 Cav-3 过度表达小鼠、Cav-3 基因敲除小鼠及对照组小鼠分别暴露于载有 SNC-121（SNC）（选择性 δ 阿片受体激动剂）或纳络酮（非选择性阿片受体拮抗剂）的心肌缺血/再灌注（I/R）损伤模型。其中，对照组小鼠因接受 SNC 减少了 I/R 损伤。而接受 SNC 的 Cav-3 基因敲除小鼠并未产生保护作用。与应用纳络酮拮抗的对照组小鼠相比，Cav-3 过度表达小鼠表现出对 I/R 损伤的固有保护作用。此次研究结果证实，阿片类药物介导的预处理效应需依赖小窝蛋白-3的生物表达，而 Cav-3 过度表达小鼠产生的内源性保护作用也需依赖阿片类药物实现。

（范羽译 薛张纲校）

We tested the hypothesis that caveolin-3 (Cav-3) is essential for opioid-induced preconditioning in vivo. Cav-3 overexpressing mice, Cav-3 knockout mice, and controls were exposed to myocardial ischemia/reperfusion (I/R) in the presence of SNC-121 (SNC), a delta-selective opioid agonist, or naloxone, a nonselective opioid antagonist. Controls were protected from I/R injury by SNC. No protection was produced by SNC in Cav-3 knockout mice. Cav-3 overexpressing mice showed innate protection from I/R compared with controls that was abolished by naloxone. Our results show that opioid-induced preconditioning is dependent on Cav-3 expression and that endogenous protection in Cav-3 overexpressing mice is opioid dependent.

**奈福泮在终末期肾病患者中的药代动力学**

*Nefopam Pharmacokinetics in Patients with End-Stage Renal Disease*

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背景：终末期肾病患者的术后严重疼痛的治疗一直是麻醉医生所面临的问题。因为这些患者中存在着大量的药物蓄积和代谢转化的风险。奈福泮是一种具有潜在镇痛作用而不引起呼吸抑制的药物。它由肝脏代谢并且少量以原型从肾脏排出。这使得它在用于终末期肾病患者中具有一定的优势。然而肾功能衰竭对于奈福泮的药物分布的影响却从未有过研究。

方法：我们在研究了12名终末期肾病患者（肌酐清除率<20ml/min，平均年龄57±13岁）。他们在全身麻醉下接受了动静脉造瘘手术。术后从全身麻醉中苏醒30分钟后，每位患者均接受一次20mg的奈福泮静脉注射。48小时后采集血样，通过液相色谱-串联质谱法测量血浆中奈福泮和双甲基奈福泮的药物浓度。与此同时，12名50至60岁的健康志愿者在30分钟内接受一次20mg奈福泮静脉注射，使用的是普通人群的药代动力学参数。比较两者所得到的药代动力学参数的数值。

结果：健康志愿者和终末期肾病患者的一般情况具有可比性。与健康志愿者相比，终末期患者的中央室容积比较小（健康志愿者的中央室容积为264L，尚未接受血液透析的患者中央室容积为115L，长期血液透析患者中央室容积为53L，差异均有统计学意义）；奈福泮的平均清除速率比较慢（在健康志愿者，尚未接受血液透析和长期血液透析患者中分别为52.9L/h, 37.0L/h和27.3L/h，差异显著），并且因此使得终末期肾病患者中奈福泮的药物峰浓度较高（在健康志愿者，尚未接受血液透析和长期血液透析患者中分别为61ng/ml, 121ng/ml和223ng/ml，差异显著）。

结论：奈福泮在终末期肾病患者中的分布和消除与普通人群不同。在终末期肾病患者中奈福泮的有效作用浓度增加。为了避免药物过量，建议将终末期肾病患者的奈福泮用量减少50%。

（黄剑译 薛张纲校）

BACKGROUND: Treatment of intense postoperative pain in patients with end-stage renal disease (ESRD) is a recurrent problem for anesthesiologists because of the risk of accumulation of numerous molecules and their metabolites. Nefopam is a potent analgesic metabolized by the liver and weakly eliminated intact in urine that may offer advantages for use in patients with ESRD because it lacks respiratory-depressive effects. However, the effects of renal failure on nefopam disposition have never been investigated.

METHODS: We studied 12 ESRD patients (creatinine clearance < 20 mL/min, mean age 57 ± 13 years) having surgery under general anesthesia to create or repair an arteriovenous fistula. Postoperatively, after complete recovery from anesthesia, each patient received a single 20-mg dose of nefopam IV over 30 minutes. Nefopam and desmethyl-nefopam concentrations in plasma samples obtained over 48 hours were determined by liquid chromatography-tandem mass spectrometry. The pharmacokinetic parameter values obtained were compared with those of 12 healthy 50- to 60-year-old volunteers who also received a single 20-mg nefopam infusion over 30 minutes using a population pharmacokinetic approach.
RESULTS: Healthy volunteers and ESRD patients had comparable demographic characteristics. In comparison with those volunteers, ESRD patients had a lower volume of central compartment (115 and 53 L vs. 264 L for patients not yet hemodialyzed and on chronic hemodialysis, respectively; P < 0.001) and lower mean nefopam clearance (37.0 and 27.3 L/h vs. 52.9 L/h, P < 0.001), resulting in higher mean nefopam peak concentration (121 and 223 ng/mL vs. 61 ng/mL, P < 0.001).

CONCLUSIONS: Nefopam distribution and elimination are altered in patients with ESRD, resulting in heightened exposure. To avoid too-high concentration peaks, it is suggested that the daily nefopam dose be reduced by 50%.

麻醉保护装置(Anaconda©)替代经典汽化设备的准确性
The Accuracy of the Anesthetic Conserving Device (Anaconda©) as an Alternative to the Classical Vaporizer in Anesthesia
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背景：麻醉保护装置ACD和传统汽化设备做过对比。然而，挥发性麻醉剂给药浓度的精度尚未验证。现研究ACD用作携帯式蒸发器的精度度。

方法：此项前瞻性研究包括30名ASA I–III级的全麻择期手术病人，随机分为3组，每组十人。每组七氟醚分别为1.0 vol%, 1.5 vol%和2.0 vol%肺泡浓度。每两分钟记录一次流动力学数据，双频指数，呼气末七氟醚浓度。

结果：分析来自30名病人的801份数数据显示，当靶浓度为1.0 vol%, 时候，呼气末七氟醚浓度和靶浓度的平均差异是靶浓度的-11.0±9.3%。当靶浓度为1.5 vol%时是-5.4±6.4%。当靶浓度为2.0 vol%是-4.0±7.4%。在目标浓度误差里无显著性差异。

结论：证明ACD比传统汽化器更有效。使用方便，只需每小时调节一次给药速度。麻醉药储备不依赖回路和新鲜气体流速。

（毛慧译 薛张刚校）

BACKGROUND: The Anesthetic Conserving Device—AnaConDa_ (ACD)—has been compared with a conventional vaporizer. However, the accuracy of the administered concentration of volatile anesthetics was not examined. In the present study we measured the accuracy of the ACD when used as a portable vaporizer.

METHODS: This prospective study included 30 ASA I–III patients scheduled for elective surgery under general anesthesia. The patients were randomly organized into 3 groups of 10 patients per group. In each group, the sevoflurane infusion rate was adjusted to deliver 1.0 vol%, 1.5 vol%, and 2.0 vol% alveolar concentration. Hemodynamic data, bispectral index, and end-tidal sevoflurane concentrations were recorded every 2 minutes.

RESULTS: We analyzed 801 data points from 30 patients. The mean difference between the end-tidal sevoflurane concentration and the target concentration was – 11.0±9.3% of the target when the target was 1.0 vol%, -5.4±6.4% when the target was 1.5 vol%, and –
4.0 ±7.4% when the target was 2.0 vol%. No significant differences were found in the error at the different target concentrations.

CONCLUSIONS: We found that the ACD may be a valid alternative to the conventional vaporizer. The ACD is very simple to use, delivery rate needs to be adjusted only once per hour, and the anesthetic savings are independent of the circuit characteristics and fresh gas flow rate.

卡维地洛在气道阻塞致心搏骤停大鼠模型的心肺复苏中的作用
The Effects of Carvedilol Administration on Cardiopulmonary Resuscitation in a Rat Model of Cardiac Arrest Induced by Airway Obstruction
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BACKGROUND:
Carvedilol is a nonselective β-adrenoceptor and selective α(1)-adrenoceptor blocker and is widely used in the treatment of patients with hypertensive and/or chronic heart failure because, unlike classic β-blockers, this drug has additional endothelium-dependent vasodilatory effects. We evaluated the effects of oral administration of carvedilol on cardiopulmonary resuscitation (CPR) in a rat model of cardiac arrest (CA) induced by airway obstruction.

METHODS: Twenty-four rats were randomly assigned to 2 groups: control group (no medication) and treatment group (oral administration of carvedilol [10 mg/kg/d] for 5 days) (n = 12 per group). All the animals were anesthetized, and CA was induced by obstructing the airway. Three minutes after CA, the animals were revived by administering CPR. The rate of chest compressions (CCs) was 240 to 260 CCs/min and the depth of CCs was adjusted to maintain the diastolic arterial blood pressure between...
25 to 30 mm Hg in both groups. Epinephrine (0.02 mg/kg) was administered after 5 minutes of CPR. No other therapy was administered before, during, or after CA.

**RESULTS:** The time interval between airway obstruction and CA in the treatment group was significantly longer than in the control group (230 ± 27 vs 203 ± 24 seconds; P < 0.05). The rate of return of spontaneous circulation in the treatment group was significantly higher than in the control group (92% vs 50%; P < 0.05). Acidosis and increased glucose and tumor necrosis factor-α concentrations in the treatment group were significantly lower than in the control group.

**CONCLUSIONS:** The results of our study showed that rats that had been administered oral carvedilol for several days were more resistant to CA induced by airway obstruction, and when CA did occur, were more likely to be resuscitated. These findings suggest that carvedilol may prolong the safe ischemic time induced by respiratory failure.

**在实行蛛网膜下腔阻滞的剖宫产手术中新福林的剂量依赖作用。**
The dose-dependent effects of phenylephrine for elective cesarean delivery under spinal anesthesia.
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**背景：**低血压是采用蛛网膜下腔阻行剖宫产手术时最常见的严重副作用。最近越来越多的医生采用新福林作为血管加压素，来提高孕妇心血管的稳定性和婴儿的安全产出。虽然在择期手术中新福林是安全的，但是仍然有很多人关注它所带来的母亲后负荷的增加和压力感受器介导的心动过缓，进而引起母亲的心输出量减少。为了能了解新福林对母亲心血管稳定性的剂量依赖作用，我们采用无创的方法来检测母亲的心输出量。如果有影响，那么它对婴儿的出生是否有影响。

**方法：**我们采用随机分组双盲的研究方法，75名择期行剖宫产的孕妇分别给予新福林 25ug/min,50ug/min,100ug/min。我们从蛛网膜下腔阻滞开始至婴儿产出，用新福林滴定的方式来维持母亲的基础收缩压。我们记录母亲的心血管变化，包括心率和收缩压。我们分别在术前，蛛网膜阻滞开始后20分钟内每隔5分钟，在胸骨上方用多普勒超声监测母亲的心输出量，每搏输出量，静脉回流和心肌收缩力。同时我们记录婴儿的 Apgar 评分和脐带血的血气。

**结果：**各组的收缩压都比较理想，但是和其他低剂量组相比，新福林 100ug/min 组却需要更大的剂量才能使血压维持好。各组在收缩压低于基础值的 80%出现的次数，和在使用麻黄素或者新福林使收缩压高于基础值的 80%的次数方面都没有显著性差异。各组中新福林引起的心率减慢和心输出量减少都与时间和剂量依赖都有显著性差异，如果各组中心率和心输出量随新福林使用的时间越长而越低，随其使用的浓度越高而越低。整个过程中每搏输出量都是稳定的。各组中的 Apgar 评分和脐带血气都是相似的。

**结论：**给予高浓度的新福林（100ug/min）,我们会使母亲与婴儿需要更大剂量的新福林来维持血压，同时会引起心率和心输出量明显的下降（达 20%的下降）。
Background: Hypotension is the most common serious side effect of spinal anesthesia for cesarean delivery. There has been a move recently toward the use of phenylephrine as a vasopressor infusion to improve maternal cardiovascular stability and fetal outcome. Although it seems safe in the elective setting, there have been concerns about its propensity for causing an increase in afterload and a baroreceptor-mediated bradycardia in the mother, with a consequent reduction in maternal cardiac output (CO). Using a noninvasive measure of CO, our aim was to investigate whether there were any dose-dependent effects of phenylephrine on maternal cardiovascular stability and, if so, any impact on fetal outcome.

Methods: In this randomized, double-blind study, 75 women scheduled for elective cesarean delivery were allocated to receive a phenylephrine infusion at 25 μg/min, 50 μg/min, or 100 μg/min. This infusion was titrated to maintain maternal baseline systolic blood pressure (SBP), from induction of spinal anesthesia until delivery. The maternal cardiovascular variables recorded included heart rate (HR) and SBP. A suprasternal Doppler monitor measured CO and stroke volume, as well as measures of venous return (corrected flow time) and contractility, at baseline, and then every 5 minutes for 20 minutes after initiation of spinal anesthesia. Apgar scores and umbilical cord blood gases were recorded.

Results: SBP control was satisfactory in all groups; however, the group receiving phenylephrine 100 μg/min required significantly higher doses to achieve arterial blood pressure control compared with the lower infusion rates. There were no significant differences in the number of times SBP decreased below 80% of baseline, or the numbers of boluses of ephedrine or phenylephrine required to maintain SBP above 80% of baseline. There were significant time and dose-dependent reductions in HR and CO with phenylephrine, such that HR and CO were seen to decrease with time in each group, and also with increasing concentrations of phenylephrine. Stroke volume remained stable throughout. Apgar scores and umbilical cord blood gases were similar among groups.

Conclusion: By infusing a higher concentration (100 μg/min), we subject the mother and fetus to a much higher dose of phenylephrine, with significant effects on maternal HR and CO (up to a 20% reduction). Future investigation is required to determine whether this reduction in maternal CO has detrimental effects when providing anesthesia for an emergency cesarean delivery for a compromised fetus.

Oral contrast for abdominal computed tomography in children: the effects on gastric fluid volume.

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背景：口服肠道造影剂（ECM）应用 CT 扫描腹部时通常需要口服肠道造影剂来分辨胃肠道。但在镇静/麻醉前 2h 内给予口服 ECM 违背禁食指南，而且理论上会增
Background: Oral enteric contrast medium (ECM) is frequently administered to achieve visualization of the gastrointestinal tract during abdominal evaluation with computed tomography (CT). Administering oral ECM less than 2 hours before sedation/anesthesia violates the nothing-by-mouth guidelines and in theory may increase the risk of aspiration pneumonia. In this study we measured the residual gastric fluid when using a protocol in which ECM is administered up to 1 hour before anesthesia/sedation. We hypothesized that patients receiving ECM 1 hour before anesthesia/sedation would have residual gastric fluid volume (GFV) >0.4 mL/kg.

Methods: Anesthesia and radiology reports, CT images, and department incident reports were reviewed between January 2005 and June 2009 for all patients who required sedation/anesthesia for abdominal CT. For each patient, the volume of contrast or stomach fluid was calculated using a region of interest outlining the stomach portion containing high-attenuation fluid and low-attenuation of other gastric contents. Information obtained from anesthesia/sedation reports included demographic characteristics, presenting pathology, drugs used for anesthesia/sedation induction and maintenance, airway interventions, method for securing endotracheal tube, and complications related to ECM administration, including oxygen desaturation, vomiting, coughing, bronchospasm, laryngospasm, and aspiration.

Results: We identified 365 patients (mean age = 32 months; range = 0.66 to 211.10 months) who received oral/IV contrast material before anesthesia/sedation for abdominal
CT and 47 patients (mean age = 52 months; range = 0.63 to 215.84 months) who received only IV contrast material and followed the traditional fast. For those who received oral contrast, the mean contrast volume administered was 18.10 mL/kg (range = 1.5 to 82.76 mL/kg). The median GVF 1 hour after completing the oral contrast was significantly higher than that in patients who received only IV contrast (0.38 mL/kg vs. 0.15 mL/kg, P = 0.0049). GVF exceeded 0.4 mL/kg in 189 patients (178 of 365 [49%] in the oral contrast group vs. 11 of 47 [23%] in the IV contrast group) (χ² = 10.7874, P = 0.0010). Among those who received oral contrast, 207 patients had general anesthesia and 158 patients had deep sedation. Two cases of vomiting were reported in the general anesthesia group with no evidence of pulmonary aspiration identified.

**Conclusion:** For children receiving an abdominal CT, the residual GVF exceeded 0.4 mL/kg in 49% (178/365) of those who received oral ECM up to 1 hour before anesthesia/sedation in comparison with 23% (11/47) of those who received IV-only contrast.

**咪达唑仑和异丙酚镇静对于大脑动态自动调节的不同效应**

**The Different Effects of Midazolam and Propofol Sedation on Dynamic Cerebral Autoregulation**

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**背景:** 虽然咪达唑仑和异丙酚通过作用于自主神经系统和内皮细胞介导的松弛作用降低脑血流。咪达唑仑介导的以交感神经为主，而异丙酚以副交感为主。咪达唑仑没有内皮细胞介导的松弛作用，然而异丙酚抑制内皮细胞依赖的松弛作用。而且，咪达唑仑明显使脑动脉收缩。因此我们假设咪达唑仑和异丙酚对于大脑动态自动调节具有不同效应。

**方法:** 十名健康男性受试者接受了咪达唑仑、异丙酚和安慰剂的注射，这是一个随机、单盲、交叉的临床试验。修改的 评分评价镇静深度。在达到目标镇静深度或普通生理盐水作为安慰剂注射15分钟后，用经张力测量法测挠动脉平均动脉压变异，经颅多普勒超声测得大脑中动脉血流变异的分析来评估大脑动态自动调节。

**结果:** 咪达唑仑和异丙酚能显著降低稳态脑血流(显著的相互作用, p=0.024)。然而在低频状态下转移函数斜率的显著下降只在咪达唑仑注射时发生（显著的相互作用, p=0.015），提示咪达唑仑镇静期间平均动脉压变化引起的脑血流波动减小。

**结论:** 我们的研究结果显示咪达唑仑和异丙酚在脑血流的自动调节方面具有不同的效应，虽然在降低稳态脑血流方面具相同效应。只有咪达唑仑可能改善脑血流自动调节功能。

（姚敏敏译 薛张纲校）

**BACKGROUND:** Although midazolam and propofol reduce cerebral blood flow (CBF) similarly, they generate different effects on the autonomic nervous system and endothelium-induced relaxation. Midazolam induces sympathetic dominance, whereas
propofol induces parasympathetic dominance. Midazolam has no effect on endothelium-dependent relaxation, whereas propofol suppresses endothelium-dependent relaxation. Moreover, midazolam apparently constricts cerebral arterioles. We therefore hypothesized that midazolam and propofol have different effects on dynamic cerebral autoregulation.

METHODS: Ten healthy male subjects received midazolam, propofol, and placebo administrations in a randomized, single-blind, crossover study. The modified Observer's Assessment of Alertness/Sedation scale was used to assess sedation depth. After reaching a target depth of sedation (Observer's Assessment of Alertness/Sedation scale score 3, responds only after name is called loudly and/or repeatedly) or after 15 minutes of normal saline administration as placebo, dynamic cerebral autoregulation was evaluated by spectral and transfer function analyses between mean arterial blood pressure variability in the radial artery measured by tonometry, and CBF velocity variability in the middle cerebral artery measured by transcranial Doppler ultrasonography.

RESULTS: Steady-state CBF velocity decreased significantly with midazolam and propofol administration (significant interaction effects, \( P = 0.024 \)). However, transfer function gain in the low-frequency range decreased significantly only with midazolam administration (significant interaction effects, \( P = 0.015 \)), suggesting a reduced magnitude of transfer from mean arterial blood pressure oscillations to CBF fluctuations during midazolam sedation.

CONCLUSION: Our results suggest that midazolam and propofol sedation have different effects on dynamic cerebral autoregulation despite causing equivalent decreases in steady-state CBF velocity. Only midazolam sedation is likely to improve dynamic cerebral autoregulation.
级量表（VRS）评估，0级无痛，至4级无法忍受，幻肢感用存在或不存在评估。如果VRS>1分，或有显著的幻肢感，立即恢复以5mL/h的速度输注罗哌卡因。如果VRS保持0到1且患者48小时无幻肢感，罗哌卡因停止输注并拔除导管。

结果：输注局部麻醉剂时间的中位数为30天（置信区间95%，25到30天）。术后第一天73%患者主诉从严重到无法忍受的疼痛（视觉模拟量表>2）。但这一评价在第12个月的尾期仅出现在3%的患者中，患者VRS疼痛评分结果：84%=0，10%=1，3%=2，3%=3，4%=无。但是幻肢感在第12个月的尾期出现在39%的患者中。每个病人都会使用可调控输注系统。

结论：长期外周神经输注0.5%罗哌卡因似乎是低位截肢术后治疗幻肢痛和幻肢感的有效方法。

（张玥琪译，薛张纲校）

BACKGROUND: Phantom limb syndrome (PLS) is common after limb amputations, involving up to 90% of amputees. Although many different therapies have been evaluated, none has been found to be highly effective. Therefore, we evaluated the efficacy of a prolonged perineural infusion of a high concentration of local anesthetic solution in preventing PLS.

METHODS: A perineural catheter was placed immediately before or during surgery in 71 patients undergoing lower extremity amputation. A continuous infusion of 0.5% ropivacaine was started intraoperatively at 5 mL/h using an elastomeric (nonelectronic) pump, and continued for 4 to 83 days after surgery. PLS was evaluated on the first postoperative day and then 1, 2, 3, and 4 weeks, and 3, 6, 9, and 12 months after surgery. To evaluate the presence and severity of PLS while the patient was receiving the ropivacaine infusion, it was discontinued for 6 to 12 hours before each assessment period (i.e., until the sensation in the extremity returned). The severity of phantom limb and stump pain was assessed using a 5-point verbal rating scale (VRS), with 0 = no pain to 4 = intolerable pain, and “phantom” sensations were recorded as present or absent. If the VRS score was >1 or significant phantom sensations were present, the ropivacaine infusion was immediately restarted at 5 mL/h. If the VRS score remained at 0 to 1 and the patient had not experienced phantom sensations for 48 hours, the infusion was permanently discontinued and the catheter was removed.

RESULTS: Median duration of the local anesthetic infusion was 30 days (95% confidence interval, 25–30 days). On postoperative day 1, 73% of the patients complained of severe-to-intolerable pain (visual analog scale >2). However, the incidence of severe-to-intolerable phantom limb pain was only 3% at the end of the 12-month evaluation period. At the end of the 12-month period, the percentage of patients with VRS pain scores were 0 = 84%, 1 = 10%, 2 = 3%, 3 = 3%, and 4 = none. However, phantom limb sensations were present in 39% of patients at the end of the 12-month evaluation period. All patients were able to manage the elastomeric catheter infusion system at home.

CONCLUSION: Use of a prolonged postoperative perineural infusion of ropivacaine 0.5% seems to be an effective therapy for the treatment of phantom limb pain and sensations after lower extremity amputation.
Single Versus Triple Injection Ultrasound-Guided Infraclavicular Block: Confirmation of the Effectiveness of the Single Injection Technique

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背景：超声引导锁骨下阻滞时局麻药注射的最佳位点仍存在争议。

方法：患者随机分入接受 2%利多卡因 30mL 腋动脉后单点注射组 (n=51) 或理想的接近臂丛每个分支注射的三点注射组 (n=49)。20 分钟后评估远端 4 个神经阻滞区域的针刺感和运动阻滞（3=未阻滞, 0=完全阻滞）。

结果：单点注射没有显著的劣势（单点对比三点 20 分钟总阻滞分值均数 [四分位间距]：5[2-9] 对 7[3.5-11]），但是却有明显的优势（2-tailed test, P = 0.043）。单点注射技术与操作时间少量缩短相关。

结论：超声引导锁骨下阻滞局麻药注射最佳位置是腋动脉后方单点注射。

（朱兰芳译，薛张纲校）

BACKGROUND: The optimal site for local anesthetic placement during ultrasound-guided infraclavicular block remains controversial.

METHODS: Patients were randomized to receive lidocaine 2% 30 mL as a single injection posterior to the axillary artery (n = 51) or a triple injection ideally adjacent to each brachial plexus cord (n = 49). Pinprick sensory and motor block (3 = no block, 0 = complete block) were assessed to 20 minutes in the 4 distal nerve territories.

RESULTS: The single injection group was not significantly inferior (single versus triple injection median [interquartile range] 20-minute aggregate block score: 5 [2–9] vs 7 [3.5–11]) but also demonstrated superiority (2-tailed test, P = 0.043). The single injection technique was associated with a small reduction in procedural time.

CONCLUSIONS: The optimal site for local anesthetic placement during ultrasound-guided infraclavicular block is a single point injection posterior to the axillary artery.