

# Table of Contents

April 2011

## Cardiovascular Anesthesiology

[MP4OX 治疗脊麻下初次髋关节成形术患者围术期低血压的一项随机双盲多中心临床研究](#)

(范羽译 薛张纲校)

**A Double-Blind, Randomized, Multicenter Study of MP4OX for Treatment of Perioperative Hypotension in Patients Undergoing Primary Hip Arthroplasty Under Spinal Anesthesia**

- Philippe van der Linden,
- Tadeusz S. Gazdzik,
- David Jahoda,
- René J. Heylen,
- Jan C. Skowronski,
- David Pellar,
- Ivo Kofranek,
- Andrzej Z. Górecki,
- Bengt Fagrell,
- Peter E. Keipert,
- Yun J. Hardiman,
- Howard Levy,
- and The 6090 Study Investigators

*Anesth Analg April 2011 112:759-773; published ahead of print February 11, 2011*

[简报：心脏手术病人应用抗血小板因子 4/肝素免疫分析高剂量肝素确诊试验的诊断价值](#)

(孙晓琼译 陈杰校)

**Brief Report: The Diagnostic Value of the Anti-PF4/Heparin Immunoassay High-Dose Heparin Confirmatory Test in Cardiac Surgery Patients**

- Sixten Selleng,
- Natalie Schreier,
- Hans-Georg Wollert,
- and Andreas Greinacher

*Anesth Analg April 2011 112:774-776; published ahead of print March 8, 2011*

[急性冠状动脉综合征患者的急诊心脏手术：一项针对医药和机械治疗的证据和围术期诊断的综述](#)

(杨秀娟译 马皓琳 李士通校)

**Review Article: Emergency Cardiac Surgery in Patients with Acute Coronary Syndromes: A Review of the Evidence and Perioperative Implications of Medical and Mechanical Therapeutics**

- Charles Brown,
- Brijen Joshi,
- Nauder Faraday,
- Ashish Shah,
- David Yuh,
- Jeffrey J. Rade,
- and Charles W. Hogue

*Anesth Analg April 2011 112:777-799; published ahead of print March 8, 2011*

## **Ambulatory Anesthesiology**

[Rolapitant用于预防术后恶心呕吐：一项前瞻性、双盲、安慰剂对照、随机试验](#)

(黄剑译 薛张纲校)

**Rolapitant for the Prevention of Postoperative Nausea and Vomiting: A Prospective, Double-Blinded, Placebo-Controlled Randomized Trial**

- Tong J. Gan,
- Jiezhun Gu,
- Neil Singla,
- Frances Chung,
- Michael H. Pearman,
- Sergio D. Bergese,
- Ashraf S. Habib,
- Keith A. Candiotti,
- Yi Mo,
- Susan Huyck,
- Mary R. Creed,
- Marc Cantillon,
- and for the Rolapitant Investigation group

*Anesth Analg April 2011 112:804-812; published ahead of print March 8, 2011*

[阿瑞匹坦联合地塞米松与昂丹司琼联合地塞米松在预防开颅术后病人恶心呕吐的比较](#)

(孙晓琼译 陈杰校)

**A Comparison of the Combination of Aprepitant and Dexamethasone Versus the Combination of Ondansetron and Dexamethasone for the Prevention of Postoperative Nausea and Vomiting in Patients Undergoing Craniotomy**

- Ashraf S. Habib,
- John C. Keifer,
- Cecil O. Borel,
- William D. White,
- and Tong J. Gan

*Anesth Analg April 2011 112:813-818; published ahead of print November 16, 2010*

[于 P6 穴位的一些神经肌肉监测模式对于预防术后恶心呕吐的作用](#)

(毛祖旻译 马皓琳 李士通校)

**The Efficacy of Several Neuromuscular Monitoring Modes at the P6 Acupuncture Point in Preventing Postoperative Nausea and Vomiting**

- Yong H. Kim,
- Kyo S. Kim,
- Hee J. Lee,
- Jae C. Shim,
- and Sung W. Yoon

*Anesth Analg April 2011 112:819-823; published ahead of print March 8, 2011*

[简报：代谢综合征与术前异常 P 波和 QT 间期](#)

(毛慧译，薛张刚校)

**Brief Report: Preoperative Abnormal P and QTc Dispersion Intervals in Patients with Metabolic Syndrome**

- Volkan Hancı,
- Serhan Yurtlu,
- Mustafa Aydın,
- Serhat Bilir,
- Gülay Erdoğan,
- Rahşan Dilek Okyay,
- Hilal Ayoğlu,
- and Işıl Özkoçak Turan

*Anesth Analg April 2011 112:824-827; published ahead of print September 22, 2010*

## **Anesthetic Pharmacology**

[镇静药调节 T 细胞和淋巴细胞功能相关抗原-1 功能](#)

(王海涛 译；马皓琳 李士通 校)

**Sedative Drug Modulates T-Cell and Lymphocyte Function-Associated Antigen-1 Function**

- Koichi Yuki,
- Sulpicio G. Soriano,
- and Motomu Shimaoka

*Anesth Analg April 2011 112:830-838; published ahead of print March 8, 2011*

[利多卡因对高速泳动簇框 1 在脂多糖刺激后巨噬细胞中释放的抑制作用](#)

(任云译 薛张纲校)

**The Inhibitory Effect of Lidocaine on the Release of High Mobility Group Box 1 in Lipopolysaccharide-Stimulated Macrophages**

- Huan-Liang Wang,
- Wen-Hua Zhang,
- Wei-Fu Lei,
- Chang-Qing Zhou,
- and Ting Ye

*Anesth Analg April 2011 112:839-844; published ahead of print February 2, 2011*

[神经肽 S 对大鼠全身麻醉的影响](#)

(瞿亦枫 译 马皓琳 李士通校)

**The Effects of Neuropeptide S on General Anesthesia in Rats**

- Tetsuya Kushikata,
- Hitoshi Yoshida,
- Mihoko Kudo,
- Severo Salvadori,
- Girolamo Calo,
- and Kazuyoshi Hirota

*Anesth Analg April 2011 112:845-849; published ahead of print February 2, 2011*

## **Technology, Computing, and Simulation**

[带有多普勒超声探头的肺动脉导管进行持续的心输出量监测。](#)

(翁梅琳译 薛张纲校)

**Continuous Cardiac Output Measurement with a Doppler-Equipped Pulmonary Artery Catheter**

- Shigeru Akamatsu,

- Yuji Kondo,
- Norio Ueda,
- Akiko Kojima,
- Naokazu Fukuoka,
- Motoshi Takada,
- Shuji Dohi,
- and Tomoki Hashimoto

*Anesth Analg April 2011 112:851-857; published ahead of print February 2, 2011*

### [脊柱手术患者血红蛋白的三种监测方法的比较](#)

(陆秉玮译 陈杰校)

#### **A Comparison of Three Methods of Hemoglobin Monitoring in Patients Undergoing Spine Surgery**

- Ronald D. Miller,
- Theresa A. Ward,
- Stephen C. Shiboski,
- and Neal H. Cohen

*Anesth Analg April 2011 112:858-863; published ahead of print March 8, 2011*

## **Patient Safety**

### [可视喉镜（Airway Scope）在侧卧位气管插管中的应用](#)

(陆秉玮译 陈杰校)

#### **Airway Scope for Tracheal Intubation in the Lateral Position**

- Ryu Komatsu,
- Kotoe Kamata,
- Jing You,
- Daniel I. Sessler,
- and Yusuke Kasuya

*Anesth Analg April 2011 112:868-874; published ahead of print March 8, 2011*

## **Critical Care, Trauma, and Resuscitation**

### [高危病人行非心脏手术后死亡的早期决定因素是多器官功能衰竭](#)

(张婷译 陈杰校)

#### **Early Determinants of Death Due to Multiple Organ Failure After Noncardiac Surgery in High-Risk Patients**

- Suzana M. Lobo,

- Ederlon Rezende,
- Marcos F. Knibel,
- Nilton B. Silva,
- José A. Páramo,
- Flávio E. Nácul,
- Ciro L. Mendes,
- Murilo Assunção,
- Rubens C. Costa,
- Cíntia C. Grion,
- Sérgio F. Pinto,
- Patricia M. Mello,
- Marcelo O. Maia,
- Péricles A. Duarte,
- Fernando Gutierrez,
- João M. Silva, Junior,
- Marcel R. Lopes,
- José A. Cordeiro,
- and Charles Mellot

*Anesth Analg April 2011 112:877-883; published ahead of print June 8, 2010*

[肾上腺素能提高持续室颤猪模型的 24 小时生存率且早期骨内注射优于延迟静脉注射](#)

(吴少勇译 薛张纲校)

**Epinephrine Improves 24-Hour Survival in a Swine Model of Prolonged Ventricular Fibrillation Demonstrating that Early Intraosseous Is Superior to Delayed Intravenous Administration**

- Mathias Zuercher,
- Karl B. Kern,
- Julia H. Indik,
- Michael Loedl,
- Ronald W. Hilwig,
- Wolfgang Ummenhofer,
- Robert A. Berg,
- and Gordon A. Ewy

*Anesth Analg April 2011 112:884-890; published ahead of print March 8, 2011*

[综述：高风险性手术：流行病学和预后](#)

(张婷译 陈杰校)

**Review Article: High-Risk Surgery: Epidemiology and Outcomes**

- Suneetha Ramani Moonesinghe,
- Michael Gerard Mythen,
- and Michael Patrick William Grocott

*Anesth Analg April 2011 112:891-901; published ahead of print May 21, 2010*

## **Obstetric Anesthesiology**

[分娩硬膜外镇痛时控制计划性间断给药的时间间隔和给药剂量对总药物用量的影响：一个随机对照试验](#)

(徐妍君译，马皓琳 李士通校)

**The Effect of Manipulation of the Programmed Intermittent Bolus Time Interval and Injection Volume on Total Drug Use for Labor Epidural Analgesia: A Randomized Controlled Trial**

- Cynthia A. Wong,
- Robert J. McCarthy,
- and Bradley Hewlett

*Anesth Analg April 2011 112:904-911*

[产科麻醉的知情同意](#)

(龚寅译 马皓琳 李士通校)

**Focused Review: Informed Consent in Obstetric Anesthesia**

- Brian M. Broaddus and
- Shobana Chandrasekhar

*Anesth Analg April 2011 112:912-915*

## **Pediatric Anesthesiology**

[家长对于麻醉信息的回忆:为知情同意的实践提供信息](#)

(姚敏敏译 薛张纲校)

**Parental Recall of Anesthesia Information: Informing the Practice of Informed Consent**

- Alan R. Tait,
- Terri Voepel-Lewis,
- and Virginia Gauger

*Anesth Analg April 2011 112:918-923; published ahead of print February 2, 2011*

# Neuroscience in Anesthesiology and Perioperative Medicine

[等比重局麻液脊麻前输注晶体液与胶体液对局麻药扩散及脑脊液流动影响的比较](#)

(陈毓雯译 陈杰校)

## **A Comparison of the Effects of Preanesthetic Administration of Crystalloid Versus Colloid on Intrathecal Spread of Isobaric Spinal Anesthetics and Cerebrospinal Fluid Movement**

- Byung Seop Shin,
- Chung Su Kim,
- Woo Seok Sim,
- Chul Joong Lee,
- Sung Tae Kim,
- Gunn Hee Kim,
- Si Ra Bang,
- Sang Hyun Lee,
- Sun Ji Hyun,
- and Gaab Soo Kim

*Anesth Analg April 2011 112:924-930; published ahead of print February 2, 2011*

[七氟烷预处理在大鼠通过活性氧介导的抗氧化酶上调产生神经保护作用](#)

(江继宏 译 马皓琳 李士通 校)

## **Sevoflurane Preconditioning Induces Neuroprotection Through Reactive Oxygen Species-Mediated Up-Regulation of Antioxidant Enzymes in Rats**

- Qianzi Yang,
- Hui Dong,
- Jiao Deng,
- Qiang Wang,
- Ruidong Ye,
- Xuying Li,
- Sheng Hu,
- Hailong Dong,
- and Lize Xiong

*Anesth Analg April 2011 112:931-937; published ahead of print March 8, 2011*

## **Analgesia**

### **Pain Mechanisms**



[加巴喷丁的鞘内注射和全身用药对脊髓 P 物质释放的影响](#)

(张玥琪译，薛张纲校)

**The Effects of Intrathecal and Systemic Gabapentin on Spinal Substance P Release**

- Toshifumi Takasusuki and
- Tony L. Yaksh

*Anesth Analg April 2011 112:971-976; published ahead of print March 8, 2011*

[利多卡因抑制小鼠培养皮层神经元酸敏感离子通道电流](#)

(陈毓雯译 陈杰校)

**Inhibition of Acid Sensing Ion Channel Currents by Lidocaine in Cultured Mouse Cortical Neurons**

- Jun Lin,
- Xiangping Chu,
- Samaneh Maysami,
- Minghua Li,
- Hongfang Si,
- James E. Cottrell,
- Roger P. Simon,
- and Zhigang Xiong

*Anesth Analg April 2011 112:977-981; published ahead of print March 8, 2011*

**Regional Anesthesia**

[结合超声引导进行的持续股神经阻滞是否必然会发生髌骨运动反应？](#)

(唐亮译 马皓琳 李士通校)

**Is a Patella Motor Response Necessary for Continuous Femoral Nerve Blockade Performed in Conjunction with Ultrasound Guidance?**

- Richard Brull,
- G. Arun Prasad,
- Rajiv Gandhi,
- Reva Ramlogan,
- Masood Khan,
- and Vincent W. S. Chan

*Anesth Analg April 2011 112:982-986; published ahead of print February 2, 2011*

[简报报道：与传统方法相比低位肌间沟臂丛阻滞可产生更远的感觉运动阻滞覆盖效果](#)

(朱兰芳译，薛张纲校)

**Brief Report: A Low Approach to Interscalene Brachial Plexus Block Results in More Distal Spread of Sensory-Motor Coverage Compared to the Conventional Approach**

- Jung H. Kim,
- Junping Chen,
- Henry Bennett,
- Jonathan B. Lesser,
- Francesco Resta-Flarer,
- Anna Barczewska-Hillel,
- Peter Byrnes,
- and Alan C. Santos

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**简报：心脏手术病人应用抗血小板因子 4/肝素免疫分析高剂量肝素确诊试验的诊断价值**

**Brief Report: The Diagnostic Value of the Anti-PF4/Heparin Immunoassay High-Dose Heparin Confirmatory Test in Cardiac Surgery Patients**

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现有关于验证使用高剂量肝素会改善抗血小板因子 4/肝素酶免疫分析对肝素诱导的血小板减少症（HIT）诊断特异性的数据有限且存在争议。作者调查了来自最近发表的一项关于心脏手术病人研究的血清，发现在肝素诱导的血小板激活试验阳性的血清中只有一半是能够在酶免疫分析中被高剂量的肝素（100 IU/mL）抑制（吸收度<40%）。更重要的是，伴有明确 HIT 的 3 个病人中只有 2 个是确诊试验阳性。因此，高剂量肝素确诊试验的应用需注意排除血小板激活的抗血小板因子 4/肝素抗体或者临床 HIT。

(孙晓琼 译 陈杰 校)

There are limited and conflicting data on how a confirmatory step using high-dose heparin can improve diagnostic specificity of the antiplatelet factor 4/heparin enzyme immunoassay for heparin-induced thrombocytopenia (HIT). We investigated sera from a recently published study on cardiac surgery patients and found that only half of the sera that were heparin-induced platelet activation assay positive could be inhibited (optical

density <40%) by high-dose heparin (100 IU/mL) in the enzyme immunoassay. More importantly, only 2 of the 3 patients with definite HIT were confirmatory test positive. Therefore, the high-dose heparin confirmatory test should be used with caution to exclude platelet-activating antiplatelet factor 4/heparin antibodies or clinical HIT.

### 阿瑞匹坦联合地塞米松与昂丹司琼联合地塞米松在预防开颅术后病人恶心呕吐的比较

#### A Comparison of the Combination of Aprepitant and Dexamethasone Versus the Combination of Ondansetron and Dexamethasone for the Prevention of Postoperative Nausea and Vomiting in Patients Undergoing Craniotomy

Ashraf S. Habib, MBBCh, MSc, FRCA, John C. Keifer, MD, Cecil O. Borel, MD, William D. White, MPH and Tong J. Gan, MB, MD, MHS, FRCA

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**背景：**开颅术后常常出现恶心呕吐。预防性应用昂丹司琼和地塞米松的患者，术后 48 小时呕吐发生率为 45%。除了会引起患者身体上的不适以外，呕吐的生理反应可能会增加颅内压或脑血管压，危及生理止血和脑灌注。阿瑞匹坦是长效的神经激肽 1 受体拮抗剂且无镇静的副作用。一项在接受腹部手术病人中进行的大型多中心研究中，预防性应用阿瑞匹坦比昂丹司琼能更有效地预防术后 24 小时和 48 小时呕吐发生。作者假设，与昂丹司琼联合地塞米松相比，阿瑞匹坦联合地塞米松将降低全麻开颅手术病人术后呕吐的发生率。

**方法：**此项前瞻性、双盲、随机化的研究纳入对象为行全麻开颅手术病人。病人被随机分为两组：分别在麻醉诱导前 1-3 小时口服阿瑞匹坦 40mg（或安慰剂），或手术结束 30 分钟内静脉注射 4mg 昂丹司琼（或安慰剂）。所有病人在麻醉诱导后给予地塞米松 10mg。施行标准化麻醉。术后 48 小时内由不知情人员定期收集数据。应用 Welcoxon 秩和检验和  $\chi^2$  检验进行统计分析。若  $P < 0.05$  则认为有统计学意义。

**结果：**104 名患者完成了此项研究。阿瑞匹坦组的 48 h 呕吐累积发生率为 16%，而昂丹司琼组为 38% ( $P = 0.0149$ )。且阿瑞匹坦组的 2h 和 24h 呕吐发生率也相应的比昂丹司琼组低，分别为 6% 对 21%， $P = 0.0419$  和 14% 对 36%， $P = 0.0124$ 。0 至 48h 中，两组在恶心发生率(69% 对 60%)、评分、抢救性止吐药需求率(65% 对 60%)、完全有效率（无 PONV，无抢救，22% 对 36%）、PONV 管理的病人满意度方面并无明显差异。

**结论：**阿瑞匹坦联合地塞米松较昂丹司琼联合地塞米松能更有效地预防全麻开颅手术成人的术后呕吐。而恶心发生率、严重度、止吐药需求或者完全有效方面组间并无差异。

（孙晓琼 译 陈杰 校）

**BACKGROUND:** Postoperative nausea and vomiting (PONV) occur commonly after craniotomy. In patients receiving prophylaxis with ondansetron and dexamethasone, vomiting occurred in 45% of patients at 48 hours. In addition to causing patient discomfort, the physical act of vomiting may increase intracranial pressure or cerebral intravascular pressure, jeopardizing hemostasis and cerebral perfusion. Aprepitant is a

neurokin-1 receptor antagonist with a long duration of action and no sedative side effect. In a large multicenter study in patients undergoing abdominal surgery, aprepitant was significantly more effective than was ondansetron in preventing vomiting at 24 and 48 hours postoperatively. We hypothesized that the combination of aprepitant with dexamethasone will decrease the incidence of postoperative vomiting when compared with the combination of ondansetron and dexamethasone in patients undergoing craniotomy under general anesthesia.

**METHODS:** Patients scheduled to undergo craniotomy under general anesthesia were enrolled in this prospective, double-blind, randomized study. Patients were randomized to receive oral aprepitant 40 mg (or matching placebo) 1 to 3 hours before induction of anesthesia or ondansetron 4 mg IV (or placebo) within 30 minutes of the end of surgery. All patients received dexamethasone 10 mg after induction of anesthesia. The anesthetic technique was standardized. Data were collected at regular intervals by blinded personnel for 48 hours after surgery. Statistical analysis was performed using Wilcoxon's ranked sum test and  $\chi^2$  test.  $P < 0.05$  was considered statistically significant.

**RESULTS:** One hundred four patients completed the study. The cumulative incidence of vomiting at 48 hours was 16% in the aprepitant group and 38% in the ondansetron group ( $P = 0.0149$ ). The incidence of vomiting was also decreased in the aprepitant group at 2 hours (6% vs. 21%,  $P = 0.0419$ ) and 24 hours (14% vs. 36%,  $P = 0.0124$ ). From 0 to 48 hours, there was no difference between the aprepitant and ondansetron groups in the incidence of nausea (69% vs. 60%), nausea scores, need for rescue antiemetics (65% vs. 60%), complete response (no PONV and no rescue, 22% vs. 36%), or patient satisfaction with the management of PONV.

**CONCLUSION:** The combination of aprepitant and dexamethasone was more effective than was the combination of ondansetron and dexamethasone for prophylaxis against postoperative vomiting in adult patients undergoing craniotomy under general anesthesia. However, there was no difference between the groups in the incidence or severity of nausea, need for rescue antiemetics, or in complete response between the groups.

### 脊柱手术患者血红蛋白的三种监测方法的比较

#### A Comparison of Three Methods of Hemoglobin Monitoring in Patients Undergoing Spine Surgery

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**背景：**血红蛋白含量可方便地判断是否需要术中输血。目前血红蛋白有两种有创检测方法，一种是实验室的碳氧血氧仪法（tHb），另一种是可即时检测的 HemoCue 法（HCue）。目前一种新型无创连续的光谱传感器（Masimo SpHb）开始在临床应用。本文比较了 SpHb 相对 tHb，Hcuc 相对 tHb 在测定上的准确度。

**方法：**20 名年龄 40 至 80 岁的患者参与本研究。均为俯卧位接受全麻下脊柱手术，通过桡动脉置管获得血液样本。分别在麻醉诱导后手术开始前及手术开始后的

每一个小时测定 SpHb, tHb 和 Hcue。以两种方法测定的结果差值 (SpHb - tHb, HCue - tHb) 作为主要结果。每位患者均用每种方法采集 3-5 个样本。采用多种技术分析差值和绝对差值来评估每种血红蛋白测定方法的准确性。同时研究差值与总血红蛋白水平, 手术时间, 年龄, 体征和灌注指数等变量的关系。

**结果:** 应用 SpHb, tHb 和 Hcue 三种方法共采集了 20 位患者 78 个样本。其中, SpHb 与 tHb 进行比较的结果显示, 61% 样本量的绝对差值小于 1.5 g/dL, 16% 的绝对差值在 1.6 到 2.0 g/dL 之间, 22% 的绝对差值大于 2.0 g/dL。同时发现差值随时间和灌注指数增高呈明显下降态势, 年龄、体重与差值没有系统相关性。除一例结果外, Hcue 与 tHb 的绝对差值小于 1.0g/dL。

**结论:** 尽管 Hcue 法在测定血红蛋白中保持了一贯的准确性, 数据显示 SpHb 在多数情况下与总血红蛋白含量仍有相关性。此研究还提示了在一些患者中, SpHb 可能达不到某些临床需要的准确度。改善持续无创检测技术如 SpHb 的精确性以期能满足临床需要。

(陆秉玮 译 陈杰 校)

**BACKGROUND:** Hemoglobin values (Hb) can facilitate decisions regarding perioperative transfusion management. Currently, Hb can be determined invasively by analyzing blood via laboratory Co-Oximetry (tHb) or by point-of-care HemoCue (HCue). Recently, a new noninvasive, continuous spectrophotometric sensor (Masimo SpHb) was introduced into clinical practice. We compared the accuracy of the SpHb and HCue with tHb.

**METHODS:** Twenty patients, ages 40 to 80 years, were studied. They received general anesthesia and underwent spine surgery in the prone position. All blood samples were obtained from a radial artery catheter. SpHb, tHb, and HCue were determined immediately after induction of anesthesia, but before the start of surgery and approximately every hour thereafter. Primary outcomes were defined on the basis of the following differences between measures: SpHb - tHb or HCue - tHb. All patients had 3 to 5 observations taken on each measure. Differences and absolute differences were analyzed by several techniques to assess accuracy. We also investigated the relationship between observed differences and the following variables: tHb level, duration of surgery, age, weight, and perfusion index.

**RESULTS:** Data consisted of 78 measurements of SpHb, tHb, and HCue made on the 20 patients. Absolute differences between SpHb and tHb were <1.5 g/dL for 61% of observations, between 1.6 to 2.0 g/dL for 16% and >2.0 g/dL for 22% of the observations. Observed differences displayed significant decreases with time and higher perfusion index values. No systematic relationships were observed with age or weight. Except for 1 value, all of the HCue values were <1.0 g/dL of tHb.

**CONCLUSIONS:** Although HCue was consistently accurate, our data confirm that SpHb often correlated well with tHb values. Yet our study indicates that SpHb may not be as accurate as clinically necessary in some patients. Improved refinement of continuous, noninvasive technology, such as SpHb, could address important clinical requirements.

## 可视喉镜 (Airway Scope) 在侧卧位气管插管中的应用

### Airway Scope for Tracheal Intubation in the Lateral Position

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**背景：**因为侧卧位时直接喉镜暴露的视野条件不佳，此时气管插管就很困难。Airway Scope 可以在直接喉镜视野暴露较差的情况下，在侧卧位时，使插管更便利。为此作者比较了仰卧位与左或右侧卧位的手术病人运用 Airway Scope 后的插管效率。

**方法：**成年患者在接受麻醉随机分为三组：仰卧位组，左侧卧位组，右侧卧位组（每组 43 人， $n=43$ ）。指定体位放置后采用 Macintosh 喉镜暴露喉部视野，采用 Airway Scope 进行气管插管。同时验证在此条件下，左或右侧卧位的插管时间较仰卧位增加不超过 10 秒的假说。

**结果：**2 组侧卧位的插管成功率均为 100%，仰卧位的成功率为 98%。三组插管时间相近，左侧卧位为  $24\pm 5$  秒，右侧为  $24\pm 6$  秒，仰卧位为  $22\pm 7$  秒。插管次数在两组侧卧位以及仰卧位和左侧卧位间相似。但仰卧位插管次数较右侧卧位多（ $p=0.004$ ）。三组的气道并发症发生率相近。没有发生低氧，牙齿损伤以及食道插管。改良 Cormack – Lehane 评分和使用 Macintosh 喉镜时声门暴露评分在侧卧位组中没有差异，但仰卧位的评分高于任意一组侧卧位（ $p$  均 $<0.001$ ）。

**结论：**尽管左或右侧卧位喉镜暴露的视野都比仰卧位的病人差，采用 Airway Scope 的插管依然有较高的成功率。另外，采用 Airway Scope 后左或右侧卧位的插管时间较仰卧位增加均不超过 10 秒。因此，Airway Scope 在侧卧位的气管插管时可能是一个有用的工具。

（陆秉玮 译 陈杰 校）

**BACKGROUND:** Tracheal intubation in the lateral position is difficult because the laryngeal view is compromised during direct laryngoscopy. The Airway Scope facilitates intubation even when laryngeal views are poor with direct laryngoscopy, as they often are in the lateral position. We thus compared the efficacy of the Airway Scope in supine patients with those in the left- and right-lateral positions.

**METHODS:** Anesthetized adults were randomly assigned to supine, left-lateral, or right-lateral position ( $n = 43$  for each group). Laryngeal views were obtained in the designated position with a Macintosh laryngoscope, and patients' tracheas were subsequently intubated with the Airway Scope. Specifically, we tested the hypothesis that the time required for intubation in the left- and right-lateral positions is not increased by  $>10$  seconds compared with tracheal intubation in the supine position.

**RESULTS:** Overall intubation success was 100% in the 2 lateral positions, and 98% in the supine position. Intubation times were similar in the left-lateral (24 [5] seconds, mean [SD]), right-lateral (24 [6] seconds), and supine (22 [7] seconds) positions. The numbers of required intubation attempts were similar in the 2 lateral positions and in the supine and left-lateral positions. However, more intubation attempts were required in the supine

position than in the right-lateral position ( $P = 0.004$ ). The incidences of airway complications were similar in each position; no hypoxia, dental injury, or esophageal intubation was observed. Modified Cormack-Lehane and the percentage of glottic opening scores obtained with the Macintosh laryngoscope did not differ between the 2 lateral positions, but the modified Cormack-Lehane and percentage of glottic opening scores were superior in the supine position (all  $P < 0.001$ ) compared with either of the lateral positions.

**CONCLUSIONS:** Despite worse laryngoscopic views in either lateral position than when patients were supine, intubation with the Airway Scope offered high success rates. Furthermore, intubation time using the Airway Scope in either lateral position was not longer by  $>10$  seconds than in the supine position. The Airway Scope thus seems to be a useful tool when tracheal intubation is required in a laterally positioned patient.

### 高危病人行非心脏手术后死亡的早期决定因素是多器官功能衰竭

#### Early Determinants of Death Due to Multiple Organ Failure After Noncardiac Surgery in High-Risk Patients

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**背景：**在非心脏手术病人管理方面，预测围术期心脏并发症是非常重要的。这些病人通常死于脓毒症所导致的原发性或继发性器官功能衰竭（MOF）。本文研究手术病人院内 MOF 所致死亡的早期围术期危险因素。

**方法：**此项前瞻性、多中心、观察性队列研究，共有 21 个巴西重症监护室（ICU）参与。研究对象为行非心脏手术后 24 小时内转入 ICU 的病人。多器官功能衰竭的定义是至少有两个器官功能衰竭。用 Logistic 回归的多因素分析方法评估 MOF 所致的院内死亡的相对风险。

**结果：**共有 587 个病人入选（平均年龄：62.4±17 岁）。ICU 和院内病死率分别为 15% 和 20.6%。死亡的主要原因为 MOF（53%）。入院时存在的腹膜炎（相对风险 4.17, 95% 可信区间 1.38–12.6）、糖尿病（相对风险 3.63, 95% 可信区间 1.17–11.2）、急诊手术（相对风险 3.62, 95% 可信区间 1.18–11.0）、高龄（相对风险 1.04, 95% 可信区间 1.01–1.08）、乳酸升高（相对风险 1.52, 95% 可信区间 1.14–2.02）、中心静脉压升高（相对风险 1.12, 95% 可信区间 1.04–1.22）、心率加快（相对风险 3.63, 95% 可信区间 1.17–11.2）和 pH 值（相对风险 0.04, 95% 可信区间 0.0005–0.38）都是多器官功能衰竭后死亡的独立危险因素。

**结论：**多器官功能衰竭是高危病人术后死亡的主要原因。多器官功能衰竭后所致死亡的危险因素对于风险评分是重要的，同时可指导临床诊疗。

（张婷 译 陈杰 校）

**BACKGROUND:** Prediction of perioperative cardiac complications is important in the medical management of patients undergoing noncardiac surgery. However, these patients frequently die as a consequence of primary or secondary multiple organ failure (MOF), often as a result of sepsis. We investigated the early perioperative risk factors for in-hospital death due to MOF in surgical patients.

**METHODS:** This was a prospective, multicenter, observational cohort study performed in 21 Brazilian intensive care units (ICUs). Adult patients undergoing noncardiac surgery who were admitted to the ICU within 24 hours after operation were evaluated. MOF was characterized by the presence of at least 2 organ failures. To determine the relative risk (RR) of in-hospital death due to MOF, we performed a logistic regression multivariate analysis.

**RESULTS:** A total of 587 patients were included (mean age,  $62.4 \pm 17$  years). ICU and hospital mortality rates were 15% and 20.6%, respectively. The main cause of death was MOF (53%). Peritonitis (RR 4.17, 95% confidence interval [CI] 1.38–12.6), diabetes (RR 3.63, 95% CI 1.17–11.2), unplanned surgery (RR 3.62, 95% CI 1.18–11.0), age (RR 1.04, 95% CI 1.01–1.08), and elevated serum lactate concentrations (RR 1.52, 95% CI 1.14–2.02), a high central venous pressure (RR 1.12, 95% CI 1.04–1.22), a fast heart rate (RR 3.63, 95% CI 1.17–11.2) and pH (RR 0.04, 95% CI 0.0005–0.38) on the day of admission were independent predictors of death due to MOF.

**CONCLUSIONS:** MOF is the main cause of death after surgery in high-risk patients. Awareness of the risk factors for death due to MOF may be important in risk stratification and can suggest routes for therapy.

### 综述：高风险性手术：流行病学和预后

#### Review Article: High-Risk Surgery: Epidemiology and Outcomes

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术后并发症仍是世界范围内较为关注的公共健康问题。每年大约有超过 2.3 亿台手术，其术后死亡率至少有 0.4%，术后并发症发生率为 3%-7%。由于围术期并发症与长期生存率的下降有关，故复杂的围术期管理有其深远的意义。在本文中，研究了与手术预后有关的一些重要因素。有关卫生保健提供的相关问题，如结构、进程和资源利用在各个研究所之间有差异性，因而导致统计所得术后死亡率和并发症发生率也有所不同。与病人相关的因素，尤其是否有合并症，功能性能力以及心血管状态都与围术期危险有关，这些情况可通过危险分层模型，运动试验和生物标记来评估。这些评估方法的优缺点在文中均有阐述。本文同时还介绍了用于评估手术预后的方法的优缺点，这些方法包括以病人为中心的一些变量比如病死率和并发症评分、病人相关预后测量方法等。最后，作者认为将来的重点应放在提高那些评估围



术期风险方法的准确性，以及提高评估手术医疗预后和质量方法的准确性。这些工具是高质量临床试验、流行病学研究和质量改进计划的基础。

(张婷 译 陈杰 校)

Surgical morbidity is a significant public health issue worldwide. It is estimated that >230 million surgical procedures are performed each year, with an estimated mortality of at least 0.4% and morbidity of between 3% and 17%. Furthermore, there are potentially far-reaching consequences of a complicated perioperative course, because perioperative morbidity is associated with reduced long-term survival. In this review, we examine the factors that are associated with surgical outcomes. Issues related to the delivery of health care, such as structure, process, and resource utilization, have been shown to vary within and between institutions, leading to differences in both morbidity and mortality after surgery. Patient-related factors, in particular comorbid illness, functional capacity, and cardiovascular health, are also related to perioperative risk, and may be assessed using risk stratification models, exercise testing, and biomarker assays. The strengths and weaknesses of each of these techniques are discussed. We also review the strengths and limitations of the measures used to assess outcome after surgery, including patient-centered variables such as mortality and morbidity scores, and patient-related outcome measures. Finally, we suggest the direction of future work, which should be aimed at improving the precision of tools for describing perioperative risk, and of the measures used to assess the outcomes and quality of surgical health care. These tools are the building blocks of high-quality clinical trials, epidemiological studies, and quality improvement programs.

### 等比重局麻液脊麻前输注晶体液与胶体液对局麻药扩散及脑脊液流动影响的比较

#### A Comparison of the Effects of Preanesthetic Administration of Crystalloid Versus Colloid on Intrathecal Spread of Isobaric Spinal Anesthetics and Cerebrospinal Fluid Movement

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**背景：**等比重液脊麻时脑脊液（CSF）流动是影响麻醉药扩散的最重要因素之一。由于不同的物理特性，麻醉前快速输注胶体液或晶体液可导致脑脊液不同流向。作者研究了麻醉前预注晶体液或胶体液是否导致不同的脑脊液流向，是否影响麻醉药的扩散。

**方法：**在一项等比重液脊麻的临床研究中，患者随机分为2组：分别在0.5%等比重丁卡因液行脊麻前根据随机分组预注晶体液（n=30）或胶体液（n=30）。另外，23名健康志愿者在预输晶体液或胶体液后0，30，60min行L2-3间隙及大脑导水管中部磁共振显像检查以研究脑脊液流动性。

**结果：**临床研究显示：晶体液组（ $27.2 \pm 17.8\text{min}$ ;  $P < 0.01$ ）相比于胶体液组（ $13.9 \pm 7.0\text{min}$ ）达到最高感觉阻滞水平的时间明显延长。晶体液组感觉阻滞平面的中位数分别为 T10（15min 时）和 T9.5（20min 时），明显低于胶体液组（T8, T7;  $P < 0.05$ ）。磁共振成像研究显示：晶体液组预注后 30min，L2-3 间隙颅向 CSF 搏动性定向运动显著下降，但胶体液组无此现象。晶体液组预注后 30min 时脑脊液生成率较基础值（ $448\mu\text{L}/\text{min}$ ）明显增加（ $637\mu\text{L}/\text{min}$ ,  $P < 0.05$ ），60min 后略有下降（ $609\mu\text{L}/\text{min}$ ）。胶体组的脑脊液生成率相比于基础值无明显差异（基础状态，30min 和 60min 后分别为 464, 512 和  $542\mu\text{L}/\text{min}$ ）。

**结论：**等比重脊麻时，与前负荷胶体液（效应相当于未作液体负荷）相比，前负荷晶体液能延长到达最高感觉阻滞平面的时间，可能由于 CSF 搏动性运动显著降低有关。晶体液前负荷组 CSF 搏动性运动减弱的原因可能由于 CSF 产生增加所致。

（陈毓雯 译 陈杰 校）

**BACKGROUND:** Movement of the cerebrospinal fluid (CSF) is one of the most important factors in determining the intrathecal spread of isobaric spinal anesthetics. Preanesthetic administration of either crystalloid or colloid immediately before spinal anesthesia (preload) may result in different CSF pulsatile movement because of their different physical properties. We examined whether preload of crystalloid versus colloid may have different effects on the intrathecal spread of isobaric spinal anesthetics as a result of their different CSF dynamics regarding its pulsatile movement.

**METHODS:** In a clinical study of isobaric spinal anesthesia, patients were allocated into 1 of 2 groups according to preload with either crystalloid ( $n = 30$ ) or colloid ( $n = 30$ ) before spinal anesthesia with 0.5 isobaric tetracaine. The pulsatile movements of CSF at the L2-3 intervertebral space and midportion of the aqueduct of Sylvius were also examined by magnetic resonance images in healthy volunteers ( $n = 23$ ) at 0, 30, and 60 minutes after administering either crystalloid or colloid.

**RESULTS:** In the clinical study, the time to reach the peak sensory block level was delayed significantly in the crystalloid preload group ( $27.2 \pm 17.8$  minutes;  $P < 0.01$ ) compared with the colloid preload group ( $13.9 \pm 7.0$  minutes). The median sensory block levels of the crystalloid preload group at 15 minutes (T10,  $P < 0.05$ ) and 20 minutes (T9.5,  $P < 0.05$ ) were significantly lower than those (T8, T7, respectively) of the colloid preload group. In the magnetic resonance imaging study, cranially directed CSF pulsatile movement decreased significantly at the L2-3 intervertebral intrathecal space at 30 minutes after crystalloid administration, but not after colloid administration. The CSF production rate significantly increased at 30 minutes ( $637 \mu\text{L}/\text{min}$ ,  $P < 0.05$ ) after crystalloid preload compared with the baseline measurement ( $448 \mu\text{L}/\text{min}$ ), and then slightly decreased ( $609 \mu\text{L}/\text{min}$ ) at 60 minutes. In the colloid preload group, the CSF production rate was not statistically significant compared with the baseline measurement ( $464, 512, \text{ and } 542 \mu\text{L}/\text{min}$  at baseline, 30, and 60 minutes, respectively).

**CONCLUSIONS:** Compared with a colloid preload, which may be comparable to the no-preload condition, crystalloid preload prolonged the time to reach the peak sensory block level in isobaric spinal anesthesia, which might have been caused by a significant decrease in CSF pulsatile movement. This attenuated CSF pulsatile movement in the crystalloid preload group might have resulted from significant increases of CSF production.

## 利多卡因抑制小鼠培养皮层神经元酸敏感离子通道电流

### Inhibition of Acid Sensing Ion Channel Currents by Lidocaine in Cultured Mouse Cortical Neurons

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**背景：**利多卡因是一种局部麻醉药，有多种药理作用包括抗心律失常，抗伤害作用以及神经保护。酸敏感离子通道（ASIC）是质子-门控阳离子通道，属于上皮钠通道/退化蛋白超（ENaC/DEG）家族成员。质子激活 ASIC 使钠和钙离子内流。ASICs 参与各种生理过程包括学习/记忆，伤害和酸中毒介导的神经元损伤。在这项研究中，作者研究了利多卡因对培养小鼠皮层神经元 ASICs 的影响。

**方法：**应用全细胞膜片钳技术激活培养的小鼠皮层神经元 ASIC 电流并记录。使用不同浓度的利多卡因进行实验。为确定利多卡因阻断 ASIC 电流是否有亚基特异性，作者研究了利多卡因对中国仓鼠卵巢细胞中 ASIC1a 和 ASIC2a 表达的影响。

**结果：**利多卡因显著抑制小鼠皮层神经元的 ASIC 电流。抑制作用是可逆的，并呈剂量依赖性。利多卡因浓度为 0.3 mM 时检测出抑制作用。在 30 mM 时 ASIC 电流约 90% 被抑制。剂量-反应关系得出半数抑制浓度为  $11.79 \pm 1.74$  mM，最大抑制浓度为  $2.7 \pm 0.5$  mM ( $n = 10$ )。抑制效果迅速，且不依赖于 pH 值。在中国仓鼠卵巢细胞表达不同的 ASIC 亚基，利多卡因抑制 ASIC1a 而不影响 ASIC2a 电流。

**结论：**利多卡因能显著抑制 ASIC 电流。本研究发现了利多卡因对神经元的一种新的药理作用。

（陈毓雯 译 陈杰 校）

**BACKGROUND:** Lidocaine is a local anesthetic that has multiple pharmacological effects including antiarrhythmia, antinociception, and neuroprotection. Acid sensing ion channels (ASICs) are proton-gated cation channels that belong to the epithelial sodium channel/degenerin superfamily. Activation of ASICs by protons results in sodium and calcium influx. ASICs have been implicated in various physiological processes including learning/memory, nociception, and in acidosis-mediated neuron injury. In this study, we examined the effect of lidocaine on ASICs in cultured mouse cortical neurons.

**METHODS:** ASIC currents were activated and recorded using a whole-cell patch-clamp technique in cultured mouse cortical neurons. The effects of lidocaine at different concentrations were examined. To determine whether the inhibition of lidocaine on ASIC currents is subunit specific, we examined the effect of lidocaine on homomeric ASIC1a and ASIC2a currents expressed in Chinese hamster ovary cells.

**RESULTS:** Lidocaine significantly inhibits the ASIC currents in mouse cortical neurons. The inhibition was reversible and dose dependent. A detectable effect was noticed at a concentration of 0.3 mM lidocaine. At 30 mM, ASIC current was inhibited by approximately 90%. Analysis of the complete dose-response relationship yielded a half-

maximal inhibitory concentration of  $11.79 \pm 1.74$  mM and a Hill coefficient of  $2.7 \pm 0.5$  ( $n = 10$ ). The effect is rapid and does not depend on pH. In Chinese hamster ovary cells expressing different ASIC subunits, lidocaine inhibits the ASIC1a current without affecting the ASIC2a current.

**CONCLUSION:** ASIC currents are significantly inhibited by lidocaine. Our finding reveals a new pharmacological effect of lidocaine in neurons.

### 急性冠状动脉综合征患者的急诊心脏手术：一项针对医药和机械治疗的证据和围术期诊断的综述

#### Emergency Cardiac Surgery in Patients with Acute Coronary Syndromes: A Review of the Evidence and Perioperative Implications of Medical and Mechanical Therapeutics

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需行急诊心脏手术的急性冠脉综合征患者面临复杂的管理挑战。抗血小板和抗血栓药物的早期使用可以提高急性心肌梗死病人的总体生存率，但为了发挥药物的最大好处，这些药物往往在冠脉解剖状况明确前和施行经皮冠状动脉介入治疗或外科血运重建术前就被使用。接受这些药物治疗的急性冠脉综合征患者的死亡率增高与这些药物导致的大出血事件有关，这可能是由于随后停用了在其他方面能降低死亡率、中风率或心梗复发率的抗血小板和抗血栓药物。心脏手术的患者术前接受如此强效的抗血小板和抗血栓药物治疗急性冠脉综合征所导致的出血和输血风险的增大是否影响患者长期的死亡率还不能确定。对于确定接受手术的患者，减少出血的策略包括停止抗凝治疗，考虑血小板和/或凝血因子输注，在可能的情况下对难治性出血输注重组活化因子 VIIa。机械血流动力学的支持已经成为对急性冠脉综合征心源性休克患者的一种重要选择。对于这些患者，围术期的注意事项包括保持适度的抗凝，确保设备的稳定运作，以及定期检验正确的设备配置。支持这些设备应用的数据来源于没有研究术后远期预后的小试验。继续使用能降低心肌缺血风险的抗血小板和抗血栓药，还是对将接受手术的患者做更好的围术期出血风险分级和评估新的可逆性药物的有效性，达到这两者之间的平衡，这将是未来研究的方向。而机械血流动力学支持对患者长期预后的影响需要更严格的分析。

(杨秀娟 译 马皓琳 李士通 校)

Patients with acute coronary syndromes who require emergency cardiac surgery present complex management challenges. The early administration of antiplatelet and antithrombotic drugs has improved overall survival for patients with acute myocardial infarction, but to achieve maximal benefit, these drugs are given before coronary anatomy is known and before the decision to perform percutaneous coronary interventions or surgical revascularization has been made. A major bleeding event secondary to these drugs is associated with a high rate of death in medically treated patients with acute coronary syndrome possibly because of subsequent withholding of

antiplatelet and antithrombotic therapies that otherwise reduce the rate of death, stroke, or recurrent myocardial infarction. Whether the added risk of bleeding and blood transfusion in cardiac surgical patients receiving such potent antiplatelet or antithrombotic therapy before surgery specifically for acute coronary syndromes affects long-term mortality has not been clearly established. For patients who do proceed to surgery, strategies to minimize bleeding include stopping the anticoagulation therapy and considering platelet and/or coagulation factor transfusion and possibly recombinant-activated factor VIIa administration for refractory bleeding. Mechanical hemodynamic support has emerged as an important option for patients with acute coronary syndromes in cardiogenic shock. For these patients, perioperative considerations include maintaining appropriate anticoagulation, ensuring suitable device flow, and periodically verifying correct device placement. Data supporting the use of these devices are derived from small trials that did not address long-term postoperative outcomes. Future directions of research will seek to optimize the balance between reducing myocardial ischemic risk with antiplatelet and antithrombotics versus the higher rate perioperative bleeding by better risk stratifying surgical candidates and by assessing the effectiveness of newer reversible drugs. The effects of mechanical hemodynamic support on long-term patient outcomes need more stringent analysis.

#### 于 P6 穴位的一些神经肌肉监测模式对于预防术后恶心呕吐的作用

#### The Efficacy of Several Neuromuscular Monitoring Modes at the P6 Acupuncture Point in Preventing Postoperative Nausea and Vomiting

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**背景：**在本研究中，我们测试了对 P6 穴位的几种神经肌肉监测模式对于预防术后恶心呕吐（PONV）的作用。

**方法：**在本次前瞻性、双盲随机、安慰剂对照的试验中，我们评估了 264 名行腹腔镜下子宫切除术的妇女 PONV 的情况。用加速度法在尺神经处 1Hz 的单个刺激（ST）（n=54，对照组）和对正中神经上 P6 穴位的单个刺激（n=52）、四个成串刺激（n=53）、双重爆发刺激（n=53）或强直刺激（n=52）来监测神经肌肉阻滞情况。

**结果：**在强直刺激 6 小时后，干预组较对照组病人的 PONV 的发生率（P=0.022）、病人自控镇痛要求的次数（P=0.009）和病人自控镇痛的总药量（P=0.042）均显著减少。总之，行强直刺激的干预组较对照组的病人对于 PONV 处理的满意度更高。

**结论：**P6 穴位处的强直刺激较尺神经处的单次刺激可减轻腹腔镜下子宫切除术病人 PONV 的情况，这使病人的满意度大幅提高。而对于 P6 穴位的单次刺激、四个成串刺激、双重爆发刺激均未显著影响 PONV。

(毛祖旻 译 马皓琳 李士通 校)

**BACKGROUND:** In this study, we tested the efficacy of several neuromuscular monitoring modes at the P6 acupuncture point for preventing postoperative nausea and vomiting (PONV).

**METHODS:** In this prospective, double-blind, randomized, placebo-controlled trial, 264 women undergoing laparoscopic hysterectomy were evaluated for PONV.

Neuromuscular blockade was monitored by acceleromyography with 1-Hz single twitch (ST) over the ulnar nerve ( $n = 54$ , control), and ST ( $n = 52$ ), train-of-four ( $n = 53$ ), double-burst stimulation ( $n = 53$ ), or tetanus ( $n = 52$ ) over the median nerve stimulating at the P6 acupuncture point.

**RESULTS:** The incidence of PONV ( $P = 0.022$ ), the number of requests for patient-controlled analgesia ( $P = 0.009$ ), and total patient-controlled analgesia volume ( $P = 0.042$ ) 6 hours after tetanic stimulation were significantly reduced in the treatment group compared with the control group. Overall, patients in the tetanus group were more satisfied with the management of PONV compared with patients in the control group.

**CONCLUSION:** Tetanic stimulation applied to the P6 acupuncture point can reduce PONV after laparoscopic hysterectomy compared with ST stimulation of the ulnar nerve, resulting in a greater degree of patient satisfaction. None of the stimulations, ST, train-of-four, or double-burst, applied to the P6 acupuncture point significantly affected PONV.

### 镇静药调节 T 细胞和淋巴细胞功能相关抗原-1 功能

#### Sedative Drug Modulates T-Cell and Lymphocyte Function-Associated Antigen-1 Function

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**背景：**镇静药能通过几个机制调节免疫细胞功能。然而，之前主要研究镇静药对中性粒细胞和巨噬细胞免疫功能的影响，对淋巴细胞研究较少。淋巴细胞功能相关抗原-1 (LFA-1) 是个粘连分子，它在调节淋巴细胞免疫功能方面（包括白介素-2 的产生和淋巴细胞的增殖）发挥着重要作用。过去的临床研究报道：异丙酚和异氟醚能减少病人的 IL-2 水平，但是咪达唑仑则不能。我们之前证实过异氟醚抑制了 LFA-1 与其反配体——细胞间粘附分子-1 (ICAM-1) 的结合，这或许促成了 IL-2 水平的减少。在本研究中，我们检测了异丙酚、咪达唑仑和右美托咪定对 LFA-1/ICAM-1 结合的影响以及随后的生物学反应。

**方法：**通过对人类外周血单核细胞的测热试验来测量镇静药对 T 细胞增殖和 IL-2 产生的影响。因为 LFA-1/ICAM-1 的结合对 T 细胞增殖和 IL-2 产生至关重要，所

以我们检测镇静药对 ICAM-1 结合到 LFA-1 蛋白的影响（无细胞试验）。随后，我们通过流式细胞仪分析表达在 T 细胞上的 LFA-1 与 ICAM-1 的结合（细胞试验）。为了确定药物/LFA-1 相互作用是由竞争性还是由变构性抑制引起，我们分析了镇静药对野生型和高亲和力 LFA-1 的影响以及对一组与 LFA-1 不同区域结合的单克隆抗体的影响。

**结果：**在无细胞和细胞试验中，异丙酚（10~100 $\mu$ M）均抑制了 ICAM-1 和 LFA-1 的结合（ $P < 0.05$ ）。然而，右美托咪定和咪达唑仑不影响 LFA-1/ICAM-1 的结合。异丙酚与靠近 ICAM-1 接触区域的位点以竞争性方式结合，从而直接抑制了 LFA-1 和 ICAM-1 的结合。在临床相关浓度下，异丙酚，而非右美托咪定或咪达唑仑，抑制了 IL-2 的产生（ $P < 0.05$ ）。另外，异丙酚抑制了淋巴细胞的增殖（ $P < 0.05$ ）。

**结论：**我们的研究表明：异丙酚竞争性抑制 T 细胞上的 LFA-1 与 ICAM-1 的结合，并且抑制了 T 细胞增殖和 IL-2 的产生，然而右美托咪定和咪达唑仑对这些免疫学试验无明显影响。

（王海涛 译；马皓琳 李士通 校）

**BACKGROUND:** Sedative drugs modify immune cell functions via several mechanisms. However, the effects of sedatives on immune function have been primarily investigated in neutrophils and macrophages, and to the lesser extent lymphocytes. Lymphocyte function-associated antigen-1 (LFA-1) is an adhesion molecule that has a central role in regulating immune function of lymphocytes including interleukin-2 (IL-2) production and lymphocyte proliferation. Previous clinical studies reported that propofol and isoflurane reduced IL-2 level in patients, but midazolam did not. We previously demonstrated that isoflurane inhibited LFA-1 binding to its counter ligand, intercellular adhesion molecule-1 (ICAM-1), which might contribute to the reduction of IL-2 levels. In the current study, we examined the effect of propofol, midazolam, and dexmedetomidine on LFA-1/ICAM-1 binding, and the subsequent biological effects.

**METHODS:** The effect of sedative drugs on T-cell proliferation and IL-2 production was measured by calorimetric assays on human peripheral blood mononuclear cells. Because LFA-1/ICAM-1 binding has an important role in T-cell proliferation and IL-2 production, we measured the effect of sedative drugs on ICAM-1 binding to LFA-1 protein (cell-free assay). This analysis was followed by flow cytometric analysis of LFA-1 expressing T-cell binding to ICAM-1 (cell-based assay). To determine whether the drug/LFA-1 interaction is caused by competitive or allosteric inhibition, we analyzed the sedative drug effect on wild-type and high-affinity LFA-1 and a panel of monoclonal antibodies that bind to different regions of LFA-1.

**RESULTS:** Propofol at 10 to 100  $\mu$ M inhibited ICAM-1 binding to LFA-1 in cell-free assays and cell-based assays ( $P < 0.05$ ). However, dexmedetomidine and midazolam did not affect LFA-1/ICAM-1 binding. Propofol directly inhibits LFA-1 binding to ICAM-1 by binding near the ICAM-1 contact area in a competitive manner. At clinically relevant concentrations, propofol, but not dexmedetomidine or midazolam, inhibited IL-2 production ( $P < 0.05$ ). Additionally, propofol inhibited lymphocyte proliferation ( $P < 0.05$ ).

**CONCLUSIONS:** Our study suggests that propofol competitively inhibits LFA-1 binding to ICAM-1 on T-cells and suppresses T-cell proliferation and IL-2 production, whereas dexmedetomidine and midazolam do not significantly influence these immunological assays.

## 神经肽 S 对大鼠全身麻醉的影响

### The Effects of Neuropeptide S on General Anesthesia in Rats

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**背景：**神经肽 S (NPS) 及其受体(NPSR)是一种新的调节觉醒及焦虑的神经肽系统。自然睡眠与全麻之间的关联已被提出。因此，我们假设 NPS 神经元系统可能也参与调节了全身麻醉。

**方法：**测定脑室内 NPS 和一种肽类 NPSR 拮抗剂[D-Cys(tBu)<sup>5</sup>]NPS 对氯胺酮及硫喷妥钠在大鼠的麻醉时间的影响。麻醉时间的定义为从正相反射消失到恢复之间的时间。

**结果：**脑室内 1~30 nmol 的 NPS 显著减少了氯胺酮麻醉时间，显示出钟形剂量效应曲线。20 nmol [D-Cys(tBu)<sup>5</sup>]NPS 可拮抗 1 nmol NPS 的效应，而且本身可以增加氯胺酮的麻醉时间。在硫喷妥钠的麻醉时间中得到了类似的结果，麻醉时间在 NPS 作用下显著减少，而在[D-Cys(tBu)<sup>5</sup>]NPS 作用下显著延长。

**结论：**NPS 通过选择性激活 NPSR 刺激觉醒加速途径，因此缩短了麻醉时间。内源性 NPS/NPSR 系统似乎张力性地控制了这些途径。

(瞿亦枫 译 马皓琳 李士通校)

**BACKGROUND:** Neuropeptide S (NPS) and its receptor (NPSR) is a novel neuropeptide system that regulates arousal and anxiety. A link between natural sleep and general anesthesia has been suggested. Therefore, we hypothesized that the NPS neuronal system may also modulate general anesthesia.

**METHODS:** The effects of intracerebroventricular NPS and [D-Cys(tBu)<sup>5</sup>]NPS, a peptide NPSR antagonist, on ketamine and thiopental anesthesia time were measured in rats. Anesthesia time was defined as the interval between the loss of righting reflex and its recovery.

**RESULTS:** Intracerebroventricular NPS 1 to 30 nmol significantly reduced ketamine anesthesia time, showing a bell-shaped dose-response curve. [D-Cys(tBu)<sup>5</sup>]NPS 20 nmol antagonized NPS 1 nmol effects and was per se able to increase ketamine anesthesia time. Similar results were obtained investigating thiopental anesthesia time that was significantly reduced by NPS and prolonged by [D-Cys(tBu)<sup>5</sup>]NPS.

**CONCLUSION:** NPS via selective NPSR activation stimulates the wakefulness-promoting pathway, thus reducing anesthesia duration. The endogenous NPS/NPSR system seems to tonically control these pathways.



分娩硬膜外镇痛时控制计划性间断给药的时间间隔和给药剂量对总药物用量的影响：一个随机对照试验

**The Effect of Manipulation of the Programmed Intermittent Bolus Time Interval and Injection Volume on Total Drug Use for Labor Epidural Analgesia: A Randomized Controlled Trial**

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**背景：**硬膜外计划性地间断给麻醉药溶液与持续输注给药相比，能减少麻醉药的用量，提高患者满意度。本研究为随机双盲试验，在硬膜外分娩镇痛维持过程中控制计划性间断给药的间隔时间和单次给药剂量，我们评估了布比卡因及其他镇痛药的消耗量。

**方法：**入选健康、足月并要求自然分娩的初产妇，实施腰硬联合镇痛，先予鞘内注射布比卡因 1.25mg+芬太尼 15 $\mu$ g，然后给予硬膜外试验剂量（利多卡因 45mg+肾上腺素 15 $\mu$ g）。将受试者随机分入 3 组，每组采用不同的间断给药方案：每 15min 给予 2.5mL 组（2.5/15），每 30min 给予 5mL 组（5/30），或每 60min 给予 10mL 组（10/60）。硬膜外维持溶液包含有布比卡因 0.625mg/mL 和芬太尼 1.95 $\mu$ g/mL。对于突破性疼痛的处理，首先由产妇自控硬膜外给药，随后如有必要可由麻醉医生手动给药。主要观察指标为产程中每小时布比卡因的总用量。用线性混合效应模型来拟合每位产妇每小时布比卡因的总用量；混合效应为基础布比卡因使用率，随机效应为疼痛评分-时间曲线下的面积。

**结果：**本实验有 190 位产妇入选。10/60 组产程中每小时布比卡因修正用量中位数（四分位数间距）为 8.8mg（8.0-9.7mg），5/30 组为 10.0mg（9.3-10.8mg），2.5/15 组为 10.4mg（9.6-11.2mg）（ $P=0.005$ ）。疼痛评分-时间曲线下的面积、分娩时的疼痛评分、产妇自控硬膜外镇痛药的需求或给予、手动给药以缓解突破性疼痛的次数、距第一次产妇自控硬膜外镇痛或手动给药的时间、以及产妇对分娩镇痛的满意度 3 组间没有显著性差异。

**结论：**将计划性间断给药的时间间隔从 15min 延长到 60min，给药剂量从 2.5mL 增加到 10mL，可以减少布比卡因的用量，而不影响产妇的舒适度和满意度。

（徐妍君译，马皓琳 李士通校）

**BACKGROUND:** Programmed intermittent bolus administration of epidural anesthetic solution compared with continuous infusion results in decreased anesthetic consumption and increased patient satisfaction. In this randomized and blinded study, we evaluated bupivacaine consumption and other analgesic outcomes when the programmed intermittent bolus time interval and volume were manipulated during the maintenance of epidural labor analgesia.

**METHODS:** Healthy, term, nulliparous women in spontaneous labor had combined spinal-epidural labor analgesia initiated with intrathecal bupivacaine 1.25 mg and fentanyl 15  $\mu$ g, followed by an epidural test dose (lidocaine 45 mg with epinephrine 15  $\mu$ g). Subjects were randomized to 1 of 3 programmed intermittent bolus dose regimens for maintenance of analgesia: 2.5 mL every 15 minutes (2.5/15), 5 mL every 30 minutes

(5/30), or 10 mL every 60 minutes (10/60). The maintenance epidural solution consisted of bupivacaine 0.625 mg/mL with fentanyl 1.95 µg/mL. Breakthrough pain was treated initially with patient-administered epidural bolus doses, followed by manual boluses administered by the anesthesiologist if necessary. The primary outcome was total bupivacaine consumption per hour of labor. A linear mixed-effects model was used to model each patient's overall bupivacaine consumption per hour; the fixed effect was basal bupivacaine administration rate and the random effect was the area under the pain score versus time curve.

**RESULTS:** One hundred ninety women were studied. The median (interquartile range) adjusted bupivacaine consumption per hour of labor was 8.8 mg (8.0–9.7 mg) in group 10/60 compared with 10.0 mg (9.3–10.8 mg) in group 5/30 and 10.4 mg (9.6–11.2 mg) in group 2.5/15 ( $P = 0.005$ ). There were no differences in area under the pain score versus time curve, pain scores at delivery, patient-controlled epidural analgesia requests or administrations, number of manual bolus doses for breakthrough pain, time to first patient-controlled epidural analgesia or manual bolus dose, or patient satisfaction with labor analgesia.

**CONCLUSIONS:** Extending the programmed intermittent bolus interval and volume from 15 minutes to 60 minutes, and 2.5 mL to 10 mL, respectively, decreased bupivacaine consumption without decreasing patient comfort or satisfaction.

### 产科麻醉的知情同意

#### Informed Consent in Obstetric Anesthesia

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产科麻醉以及镇痛的病人知情同意除了基础的知情项目外还包括许多使人混淆的内容。这些内容包括产程活跃期容量、母胎冲突以及未成年人怀孕的照顾。在这篇综述中我们集中讨论这些特别知情项目。除了疼痛以及焦虑，女性保持理解以及回忆产程中告知的信息的能力。麻醉医师通常揭露高发病率以及高死亡率的副作用以及并发症。文字资料的应用以及早期的产前教育可以改善信息的保留以及母亲的满意度。知情同意过程的成功导航需要对控制麻醉提供者管辖权的指导方针以及法律的知识。

(龚寅 译 马皓琳 李士通 校)

Patient consent for obstetric analgesia and anesthesia involves several confounding issues in addition to the basic elements of consent. These include capacity during active labor, maternal-fetal conflict, and the care of pregnant minors. In this review, we focus on these unique consent issues. Despite pain and anxiety, women maintain the capacity to understand and recall information imparted during labor. Anesthesia providers generally disclose high-frequency and high-morbidity side effects and complications. The use of written materials and early antenatal education may improve retention of information and maternal satisfaction. Successful navigation of the consent process requires knowledge of the guidelines and laws that govern each provider's individual jurisdiction.

## 七氟烷预处理在大鼠通过活性氧介导的抗氧化酶上调产生神经保护作用

### Sevoflurane Preconditioning Induces Neuroprotection Through Reactive Oxygen Species-Mediated Up-Regulation of Antioxidant Enzymes in Rats

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**背景：**据报道七氟烷预处理具有神经保护作用，但是其机理还不甚清楚。我们设计此研究试图验证这样一个假设，即在引起缺血损伤前，给予七氟烷预处理能通过活性氧（ROS）的产生上调抗氧化酶活性减轻缺血再灌注损伤。

**方法：**预处理组中选取成年雄性 SD 大鼠，连续 5 天分别给予 1%、2% 或 4% 七氟烷预处理 1 h。于最后一次处理后第 24 h，所有大鼠通过闭塞大脑中动脉 120 min 诱导局部脑缺血，随后 72 h 再灌注。通过每次预处理前给予自由基清除剂二甲基硫脲和抗氧化剂 N-乙酰半胱氨酸的方法，评估缺血耐受过程中 ROS 的作用。用神经学行为分数和脑梗死体积估算评估脑缺血损伤。检测最后一次七氟烷预处理后第 24 h 时，脑组织和血清中抗氧化酶（超氧化物歧化酶、过氧化氢酶和谷胱甘肽过氧化酶[GSH-px]）的活性。

**结果：**七氟烷预处理剂量依赖性地减少梗死面积和改善神经行为学结果。二甲基硫脲和 N-乙酰半胱氨酸可以消除七氟烷预处理的神经保护作用。缺血损伤前接受七氟烷预处理可以提升脑组织中过氧化氢酶和谷胱甘肽过氧化酶(GSH-px)的活性。血清中 GSH-px 活性上调与脑组织梗死体积百分比成负相关。

**结论：**大鼠脑缺血损伤前七氟烷预处理，以剂量—反应方式通过 ROS 释放和紧随的抗氧化酶活性上调产生脑缺血耐受效应。血清 GSH-px 活性可以作为评估缺血前七氟烷预处理有效性的一个标志物。

(江继宏 译 马皓琳 李士通 校)

**BACKGROUND:** It has been reported that sevoflurane preconditioning can induce neuroprotection, the mechanisms of which, however, are poorly elucidated. We designed the present study to examine the hypothesis that sevoflurane preconditioning could reduce cerebral ischemia–reperfusion injury through up-regulating antioxidant enzyme activities before ischemic injury by generating reactive oxygen species (ROS).

**METHODS:** In preconditioning groups, adult male Sprague–Dawley rats were pretreated with 1 hour sevoflurane exposure at a dose of 1%, 2%, or 4% for 5 consecutive days. At 24 hours after the last exposure, all rats were subjected to focal brain ischemia induced by middle cerebral artery occlusion for 120 minutes followed by 72-hour reperfusion. The role of ROS in ischemic tolerance was assessed by administration of the free radical scavenger dimethylthiourea and antioxidant N-acetylcysteine before each preconditioning. Brain ischemic injury was evaluated by neurologic behavior scores and brain infarct volume calculation. Antioxidant enzyme activities (superoxide dismutase, catalase, and glutathione peroxidase [GSH-px]) of brain tissue and blood serum were tested at 24 hours after the last sevoflurane preconditioning.

**RESULTS:** Sevoflurane preconditioning reduced infarct size and improved neurobehavioral outcome in a dose-dependent manner. The neuroprotective effects of sevoflurane preconditioning were abolished by dimethylthiourea and *N*-acetylcysteine. The activities of catalase and glutathione peroxidase (GSH-px) in the brain tissue were elevated by sevoflurane preconditioning before ischemic injury. The up-regulated activity of GSH-px in serum negatively correlated with brain infarct volume percentage.

**CONCLUSION:** Sevoflurane preconditioning induces cerebral ischemic tolerance in a dose– response manner through ROS release and consequent up-regulation of antioxidant enzyme activity before ischemic injury in rats. Serum GSH-px activity could be developed as a marker to assess the effectiveness of sevoflurane preconditioning before ischemia.

### 结合超声引导进行的持续股神经阻滞是否必然会发生髌骨运动反应？

#### Is a Patella Motor Response Necessary for Continuous Femoral Nerve Blockade Performed in Conjunction with Ultrasound Guidance?

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**背景：**成功的持续股神经阻滞（CFNB）在针刺和导管置入时往往能够诱发髌骨运动反应。我们评估在结合超声（US）引导进行的CFNB时是否必然会发生髌骨运动反应。

**方法：**在本同期组的观察研究中，98例患者接受CFNB（联合坐骨神经阻滞和脊髓）以行全膝关节成形术。单独使用平面外US引导时，绝缘的Tuohy针针尖定位在短轴直视下的股神经中点位置的表面。开启神经刺激器，记录运动反应模式（髌骨还是中间肌）和来自于针的最小刺激电流。接着置入刺激导管，记录运动反应的模式和来自于导管的最小电流。10毫升2%的甲哌卡因通过导管注入。最先出现的效果是感觉阻滞，定义为注射甲哌卡因20分钟后大腿远端前面的针刺感消失。

**结果：**43例患者出现了髌骨运动反应，43例出现中间运动反应，以及12例对于导管刺激没有运动反应。出现感觉阻滞的患者比例根据对导管刺激的运动反应不同而各不相同(髌骨[98%], 中间[91%], 没有运动反应[75%];  $P = 0.02$ )，但是对于导管刺激出现髌骨（98%）和中间（91%）运动反应之间没有显著性差异（ $P=0.58$ ）。局麻药注射后20分钟出现运动阻滞的患者比例根据对导管刺激的运动反应不同也是各不相同(髌骨[95%], 中间[77%], 没有运动反应[67%];  $P = 0.03$ )。另外，导管刺激引出的髌骨（95%）和中间（77%）运动反应之间有显著性差异（ $P=0.01$ ）。导管诱发髌骨和中间运动反应的平均最小刺激电流没有差异（ $P=0.06$ ）。不管导管刺激引发什么类型的运动反应，术后疼痛和镇痛药的消耗都相同。

**结论：**基于观察得到的数据，当结合平面外US引导进行CFNB时，导管刺激诱导出的髌骨或者中间运动反应相似地导致大腿前面感觉阻滞。

（唐亮 译 马皓琳 李士通 校）

**BACKGROUND:** Successful continuous femoral nerve blockade (CFNB) has been associated with the elicitation of a patella motor response during needle and catheter insertion. We evaluated whether a patella motor response is necessary when CFNB is performed in conjunction with ultrasound (US) guidance.

**METHODS:** Ninety-eight patients undergoing CFNB (along with sciatic nerve block and spinal anesthetic) for total knee arthroplasty participated in this cohort observational study. Using out-of-plane US guidance alone, the tip of an insulated Tuohy needle was positioned superficial to the midpoint of the femoral nerve visualized in short axis. A nerve stimulator was turned on and the type of motor response (patella versus medial muscle) and minimum stimulating current from the needle were recorded. A stimulating catheter was then inserted and the type of motor response and minimum current from the catheter were recorded. Ten milliliters mepivacaine 2% was injected through the catheter. The primary outcome was sensory block defined as loss of sensation to pinprick on the anterior surface of the distal thigh measured 20 minutes after mepivacaine injection.

**RESULTS:** Forty-three patients demonstrated a patella motor response, 43 demonstrated a medial motor response, and 12 demonstrated no motor response from the catheter. The proportion of patients with sensory block differed according to motor response from the catheter (patella [98%], medial [91%], and no motor response [75%];  $P = 0.02$ ), but there was no significant difference between a patella (98%) and medial (91%) motor response from the catheter ( $P = 0.58$ ). The proportion of patients with motor block 20 minutes after local anesthetic injection also differed according to motor response from the catheter (patella [95%], medial [77%], and no motor response [67%];  $P = 0.03$ ). In addition, there was a significant difference between a patella (95%) and medial (77%) motor response from the catheter ( $P = 0.01$ ). The mean minimum stimulating currents did not differ between patella and medial motor responses elicited from the catheter ( $P = 0.06$ ). Postoperative pain and analgesic consumption were similar regardless of the type of motor response from the catheter.

**CONCLUSION:** Based on observational data, a patella or medial motor response from the catheter similarly results in sensory block of the anterior thigh when CFNB is performed in conjunction with out-of-plane US guidance.

### **MP4OX 治疗脊麻下初次髋关节成形术患者围术期低血压的一项随机双盲多中心临床研究**

#### **A Double-Blind, Randomized, Multicenter Study of MP4OX for Treatment of Perioperative Hypotension in Patients Undergoing Primary Hip Arthroplasty Under Spinal Anesthesia.**

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Authors' affiliations are listed at the end of the article.

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**背景：**作为一种新型氧治疗剂，MP4OX（氧化聚乙二醇修饰血红蛋白）可显著增强处于缺血或缺氧风险时组织的氧合和灌注。此项试验旨在研究 MP4OX 处置围术期低血压的能力，并评判其在较大规模手术群体中的耐受性情况。

**方法：**将来自 5 个国家 21 个研究中心、预定于脊髓麻醉下行初次髋关节成形术的患者以双盲方式随机分配接受 MP4OX 或羟乙基淀粉（贺斯）溶液（万汶®；贺斯 130/0.4）治疗。当患者收缩压下降至预定义触发值时接受首次 250ml 试验药物。在初次给药后，仅当收缩压再次下降至预定义触发水平时给予第二次 250ml 试验药物。主要的疗效结果为手术期间及皮肤缝合后最初 6 小时内低血压发生的持续时间。

**结果：**在 474 名随机患者中，共有 405 名患者达到了触发水平并接受了至少一个剂量的试验药物。较贺斯组（ $137.6 \pm 120.21$  分钟；极差，5-435 分钟）而言，MP4OX 组（ $52.4 \pm 71.50$  分钟；极差，3-442 分钟）患者发生低血压的持续时间明显缩短（ $P < 0.0001$ ）。MP4OX 组与贺斯组中意向性治疗人群不良事件（AEs）的总体发生率相似（75.2% vs 73.4%； $P = 0.733$ ）。相对贺斯对照组，有较多 MP4OX 组患者在天冬氨酸氨基转移酶（13.4% vs 7.4%； $P = 0.052$ ）、丙氨酸氨基转移酶（6.9% vs 4.9%； $P = 0.409$ ）、脂肪酶（9.7% vs 3.6%； $P = 0.015$ ）及肌钙蛋白（8.1% vs 2.0%； $P = 0.006$ ）等实验室检查中呈现短暂升高。两组中严重不良事件的发生率无显著差异（MP4OX 组 6.4% vs 贺斯对照组 3.0%； $P = 0.106$ ）。但在 MP4OX 组中，某些不良事件，譬如恶心（23.8% vs 14.3%； $P = 0.016$ ）、心动过缓（14.9% vs 5.9%； $P = 0.003$ ）、高血压（8.4% vs 2.5%； $P = 0.009$ ）及少尿（5.9% vs 1.5%； $P = 0.019$ ）等确实更为频繁地发生。复合发病率与缺血终点并未显示两治疗组有任何差异。

**结论：**MP4OX 的使用达到了治疗脊麻下初次髋关节成形术患者围术期低血压的疗效终点。但此项研究未能证明基于复合发病率或缺血终点的临床效益。虽然有充足的证据证实 MP4OX 获得了疗效终点，但由于此项研究的安全性分析尚不能支持手术的风险收益情况，故并不建议在常规手术中使用 MP4OX。

（范羽译 薛张纲校）

**Background:** MP4OX (oxygenated polyethylene glycol-modified hemoglobin) is a novel oxygen therapeutic agent specifically developed to perfuse and oxygenate tissue at risk for ischemia and hypoxia. In this study, we investigated the ability of MP4OX to treat hypotensive episodes. In addition, the tolerability profile of MP4OX in a large surgical population was established.

**Methods:** Patients from 21 study sites in 5 countries, scheduled to undergo primary hip arthroplasty under spinal anesthesia, were randomized in a double-blind manner to receive MP4OX or hydroxyethyl starch (HES) solution (Voluven®; HES 130/0.4). Patients received the first 250-mL dose of investigational product when systolic blood pressure decreased to the predefined dosing trigger. A second 250-mL dose was given only if the systolic blood pressure decreased to the same trigger level after administration of the first dose. The primary efficacy outcome was total duration of all hypotensive episodes during surgery and the first 6 hours after skin closure.

**Results:** Of the 474 patients randomized, 405 reached the dosing trigger and received at least 1 dose. The mean total duration of all hypotensive episodes was significantly shorter ( $P < 0.0001$ ) in the MP4OX group ( $52.4 \pm 71.50$  minutes; range, 3-442 minutes)

compared with the HES group ( $137.6 \pm 120.21$  minutes; range, 5-435 minutes). The overall incidence of adverse events (AEs) in the intent-to-treat population was similar between the MP4OX and HES groups (75.2% vs 73.4%;  $P = 0.733$ ). Transient increases in laboratory values were reported in more patients in the MP4OX group versus HES controls for aspartate aminotransferase (13.4% vs 7.4%;  $P = 0.052$ ), alanine aminotransferase (6.9% vs 4.9%;  $P = 0.409$ ), lipase (9.7% vs 3.6%;  $P = 0.015$ ), and troponin (8.1% vs 2.0%;  $P = 0.006$ ). There was no significant difference in the incidence of serious AEs reported (6.4% in MP4OX group vs 3.0% in HES controls;  $P = 0.106$ ). Certain AEs did occur more frequently in the MP4OX group, including nausea (23.8% vs 14.3%;  $P = 0.016$ ), bradycardia (14.9% vs 5.9%;  $P = 0.003$ ), hypertension (8.4% vs 2.5%;  $P = 0.009$ ), and oliguria (5.9% vs 1.5%;  $P = 0.019$ ). The composite morbidity and ischemia end points did not reveal any differences between the 2 treatment groups.

**Conclusions:** Administration of MP4OX achieved the end point of treating perioperative hypotension in patients undergoing primary hip arthroplasty under spinal anesthesia. The study was not powered to demonstrate clinical benefit based on the composite morbidity or ischemia outcomes. Although efficacy end points with sufficient power were met, MP4OX is not being proposed for use in routine surgery where the risk-benefit profile would not be favorable based on the safety profile demonstrated in this study.

### **Rolapitant用于预防术后恶心呕吐：一项前瞻性、双盲、安慰剂对照、随机试验**

#### **Rolapitant for the Prevention of Postoperative Nausea and Vomiting: A Prospective, Double-Blinded, Placebo-Controlled Randomized Trial.**

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**背景：**术后恶心呕吐(PONV)为一种常见的术后并发症。神经激肽-1 (NK1) 受体拮抗剂已被证实用于预防和治疗人类PONV安全有效。Rolapitant为一种吸收迅速、半衰期相当长 (达180 h) 的强效选择性NK1受体拮抗剂，潜在的药物相互作用低。本项研究评价了Rolapitant在PONV高危人群中预防作用的量效关系，以后对于术后5天内发生的迟发性PONV的预防作用。

**方法：**这项Rolapitant随机、多中心、双盲、剂量范围研究设有安慰剂和阳性对照组，纳入619例行开腹手术的成年妇女，基于PONV或晕动病史进行分层，按照相同的比例将其随机分入下列6个研究组之一：rolapitant口服剂量 5 mg组、20 mg组、70 mg组或200 mg组，昂丹司琼4 mg I.V. 组或安慰剂组。主要研究终点为，不考虑急救用药，拔管后24 h无呕吐次数。

**结果：**Rolapitant 5 mg、20 mg、70 mg或200 mg组患者的术后24 h无呕吐发生率高于安慰剂组。Rolapitant剂量与主要转归呈线性相关。与安慰剂组相比，rolapitant 70 mg 和 200 mg组的呕吐次数明显更低（ $P \leq 0.001$ ，时序检验）。尽管术后24 h无呕吐次数在Rolapitant组和阳性对照组（昂丹司琼）没有明显差异，但Rolapitant 200 mg组和70 mg 组的术后72 h和120 h无呕吐发生率更高（不考虑急救用药）。

**结论：**Rolapitant降低术后呕吐的疗效优于安慰剂，还可以剂量依赖的方式降低呕吐发生率，并且Rolapitant与安慰剂在不良反应方面没有差异。

（黄剑译 薛张纲校）

**BACKGROUND:** Postoperative nausea and vomiting (PONV) are common complications after surgery. Neurokinin-1 (NK1) receptor antagonists have been shown to be safe and effective for the prevention and treatment of PONV in humans. Rolapitant is a potent, selective NK1 receptor antagonist that is rapidly absorbed, has a remarkably long half-life (up to 180 hours), and appears to have a low potential for drug-drug interactions. We evaluated the dose response for rolapitant for the prevention of PONV in subjects at high risk for this condition, and rolapitant's effects on preventing delayed PONV were explored up to 5 days after surgery.

**METHODS:** A randomized, multicenter, double-blind, dose-ranging study of rolapitant was conducted with placebo and active control groups. Six hundred nineteen adult women undergoing open abdominal surgery were randomly assigned in equal ratios to 1 of 6 study arms: oral rolapitant in 5-mg, 20-mg, 70-mg, or 200-mg doses; IV ondansetron 4 mg; or placebo, stratified by history of PONV or motion sickness. The primary study endpoint was absence of emetic episodes, regardless of use of rescue medication, at 24 hours after extubation.

**RESULTS:** Groups assigned to rolapitant 20-mg, 70-mg, and 200-mg had a higher incidence of no emesis in comparison with placebo at 24 hours after surgery. A linear relationship between rolapitant dose and primary outcome was seen. The probability of an emetic episode was significantly lower in the rolapitant 70-mg and 200-mg groups in comparison with placebo ( $P \leq 0.001$  based on the log-rank test). No significant differences were noted between rolapitant and the active control (ondansetron) at 24 hours after surgery, but there was a higher incidence of no emesis (regardless of rescue medication use) in the rolapitant 200- and 70-mg groups at 72 and 120 hours, respectively.

**CONCLUSION:** Rolapitant is superior to placebo in reducing emetic episodes after surgery and reduces the incidence of vomiting in a dose-dependent manner. No differences in side effect profile were observed between rolapitant and placebo.

**简报：代谢综合征与术前异常 P 波和 QT 间期**

**Brief Report: Preoperative Abnormal P and QTc Dispersion Intervals in Patients with Metabolic Syndrome**



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我们评估 P 波离散度 (Pw<sub>d</sub>)，QT 间期，校正的 QT 间期 (QT<sub>c</sub>)，QT 间期离散度和校正的 QT 间期离散度 (QT<sub>cd</sub>) 与代谢综合征 (MetS) 的关系。选择择期非心脏手术患者进行研究。记录所有患者的主要诊断、人体测量、腰围、BMI、心电图、电解质、血清葡萄糖和脂代谢。运用 Bazett 公式计算 QT<sub>c</sub>、QT<sub>cd</sub> 时间间隔。MetS 组 (M 组，n=36)，均经成人教育组第三次报告 (ATPIII) 确诊。对照组 (C 组，n=40) 均为年龄和性别与 M 组匹配的无代谢综合症者。两组之间在年龄，性别，血清电解质水平没有差异 (P>0.05)。腰围、BMI、血糖、甘油三酯指标 M 组均明显高于 C 组 (P<0.001)。M 组 Pw<sub>d</sub>，QT<sub>c</sub>，QT 离散度及 QT<sub>cd</sub> 间隔显著高于 C 组 (P<0.001)。这些发现与我们的回顾性分析表明，这些患者可能会面临更大的围术期心律失常的风险。

(毛慧译，薛张刚校)

We evaluated P wave dispersion (Pw<sub>d</sub>), QT, corrected QT (QT<sub>c</sub>), QT dispersion, and corrected QT dispersion (QT<sub>cd</sub>) intervals in patients with metabolic syndrome (MetS). Patients scheduled to undergo elective noncardiac surgery were included in the study. The main diagnoses, anthropometric measurements, waist circumferences, body mass index, electrocardiograms, serum levels of electrolytes, glucose, and lipids were recorded for all patients. QT<sub>c</sub>, QT<sub>cd</sub> intervals were determined with the Bazett formula. MetS (group M, n = 36) was diagnosed using the Adult Treatment Panel III. Controls (group C, n = 40) were chosen on the basis of patients with no MetS and matched for age and gender. There were no differences between groups in terms of age, sex, or serum electrolyte levels (P > 0.05). Waist circumferences, body mass index, serum glucose, and triglyceride values in group M were significantly higher than those in group C (P < 0.001). In group M, Pw<sub>d</sub>, QT<sub>c</sub>, QT dispersion and QT<sub>cd</sub> intervals were significantly longer than those in group C (P < 0.001). This finding and our retrospective analysis suggest that these patients may be at greater risk of perioperative arrhythmias.

### 利多卡因对高速泳动族框 1 在脂多糖刺激后巨噬细胞中释放的抑制作用

#### The inhibitory effect of lidocaine on the release of high mobility group box 1 in lipopolysaccharide-stimulated macrophages.

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**背景：**高速泳动族框 1(HMGB1)是一种关键炎症介质，在脓毒症时抑制凋亡细胞的吞噬作用。利多卡因已被证实可通过减弱细胞因子产生而在脓毒性腹膜炎小鼠中保

护巨噬细胞。但目前利多卡因是否也可影响 HMGB1 仍不明确。在本试验中，我们在脂多糖刺激后的 RAW264.7 巨噬细胞中探寻了利多卡因对 HMGB1 释放的作用。  
**方法：**由脂多糖和不同浓度利多卡因孵育的 RAW264.7 细胞上清液中的 HMGB1 水平是由酶联免疫吸附法测定的。HMGB1 的 mRNA 表达由实时聚合酶链反应所测定。HMGB1 从细胞核到细胞质的释放和易位是由细胞免疫化学监测的。在 RAW264.7 细胞核部分的细胞核因子(NF)-κB 水平是由 Active Motif 的 NF-κB 家族试剂盒测定的。

**结果：**我们发现利多卡因抑制了 HMGB1 从细胞核到细胞质的易位，并减少了 HMGB1 在脂多糖诱导的 RAW264.7 细胞 mRNA 中的表达。此外，脂多糖刺激后的 NF-κB 从细胞质到细胞核的易位被利多卡因剂量相关性抑制。

**结论：**我们的数据表明：通过抑制 HMGB1 mRNA 的表达、HMGB1 和 NF-κB 从细胞核到细胞质的易位，利多卡因有着抗炎作用。阐明这些作用的机制可能比较棘手，但至少通过抑制了 NF-κB 信号通路。

(任云译 薛张纲校)

**BACKGROUND:** High mobility group box 1 (HMGB1), a key mediator of inflammation, has been shown to inhibit phagocytosis of apoptotic cells in sepsis. Lidocaine has been proven to protect macrophages in mice with septic peritonitis by attenuating the production of cytokines. However, it is currently unknown whether lidocaine also affects HMGB1. In this study, we sought to detect the effect of lidocaine on the release of HMGB1 from RAW264.7 macrophages after lipopolysaccharide (LPS) stimulation.

**METHODS:** The levels of HMGB1 in the supernatant of RAW264.7 cells incubated with LPS and different concentrations of lidocaine were measured by enzyme-linked immunosorbent assays. HMGB1 mRNA expression was assessed by real-time polymerase chain reaction. The immunocytochemistry was used to detect the release and translocation of HMGB1 from the nucleus to cytoplasm. Nuclear factor (NF)-κB levels in the nuclear fraction of RAW264.7 cells were measured with the Active Motif NF-κB family kit.

**RESULTS:** We found that lidocaine suppressed the translocation of HMGB1 from the nucleus to cytoplasm and decreased the expression of HMGB1 mRNA in RAW264.7 cells induced by LPS. Furthermore, the LPS-stimulated translocation of NF-κB from the cytoplasm to nucleus was inhibited by lidocaine in a dose-dependent manner.

**CONCLUSIONS:** Our data suggest that lidocaine functions as an antiinflammatory by inhibiting expression of HMGB1 mRNA, and translocating both HMGB1 and NF-κB from the nucleus to cytoplasm. The mechanism of these effects might be involved, at least partly, in the inhibition of the NF-κB signal pathway.

**带有多普勒超声探头的肺动脉导管进行持续的心输出量监测。**

**Continuous Cardiac Output Measurement with a Doppler-Equipped Pulmonary Artery Catheter**

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**背景：**我们开发了一种带有多普勒探头的肺动脉导管来持续监测主肺动脉的血流速度，而与肺动脉导管的成角和主肺动脉血流量无关。这个设备采用两套正交相伴的多普勒换能器，从三角力学上来纠正每个换能器因血流成角带来的差异。我们在动物身上用带有多普勒探头的肺动脉导管来持续监测心输出量，通过和其它方法比较来测试这一方法的准确性。

**方法：**我们采用带有多普勒探头的肺动脉导管来监测狗的心输出量。一对多普勒超声换能器被安装在肺动脉导管的远端。多普勒的转换是通过两个在主肺动脉相邻位置的换能器完成的。这两个转换数据通过电脑计算出血流的速度。主肺动脉的血流速度可通过具体的公式计算而来。心输出量和主肺动脉血流速度一样，都是靠变异系数相乘得来的。变异系数是由其他普通的测量方法测得的心输出量和每次实验最初的主肺动脉血流速度来计算的。我们对狗实施开胸术后，将一个电磁流量探头放入它的主肺动脉内。心输出量就会自动通过带有多普勒探头的肺动脉导管，电磁流量计和热稀释法来测得。心输出量通过多巴酚丁胺和普萘洛尔来调节。

**结果：**带有多普勒的肺动脉导管测得的心输出量通过电磁流量计和热稀释法来进行矫正。电磁流量计和多普勒肺动脉导管的偏差是-0.02 升/分，95%可信区间在-0.32 to 0.28 升/分。百分误差在 16%。热稀释法和多普勒肺动脉导管的偏差在 0.18 升/分，95%的可信区间在-0.62 to 0.98 升/分。

**总结：**新开发的多普勒超声肺动脉导管有两套正交相伴的多普勒换能器，可以更加准确地，持续地监测心输出量，而与肺动脉导管的成角和主肺动脉导管的血流量无关。

(翁梅琳译 薛张纲校)

**BACKGROUND:** We developed a Doppler-equipped pulmonary artery catheter that provides continuous measurement of the true main pulmonary blood flow velocity independent of the angle of incidence formed by the pulmonary artery catheter and the main pulmonary artery blood flow. This device uses 2 orthogonally positioned Doppler transducers that allow trigonometric correction for differences in the angle of blood flow between each transducer. We tested the accuracy of the Doppler-equipped pulmonary artery catheter by comparing its cardiac output measurements with those done by conventional techniques in animals.

**METHODS:** The Doppler-equipped pulmonary artery catheter was evaluated in dogs. A pair of ultrasound Doppler transducers positioned at a fixed angle (90°) was mounted on the distal part of the thermodilution pulmonary artery catheter. The Doppler shifts ( $\Delta f_1$ ,  $\Delta f_2$ ) were detected by the 2 transducers sampling at 2 closely spaced points in the main pulmonary artery. The values of  $\Delta f_1$  and  $\Delta f_2$  were used to compute 2 velocity measurements. The true flow velocity of the main pulmonary artery was calculated with

the following equation:  $V_{\text{pulm}} = \{(V_{\text{transducer1}})^2 + (V_{\text{transducer2}})^2\}^{1/2}$  ( $V_{\text{pulm}}$  = true main pulmonary artery velocity;  $V_{\text{transducer1}}$  and  $V_{\text{transducer2}}$  = velocity detected by transducers 1 and 2, respectively). The flow velocities were calculated by using a phase differential technique. Cardiac output was calculated as  $V_{\text{pulm}}$  multiplied by a coefficient value. The coefficient value was calculated by dividing cardiac output, derived from conventional techniques, by  $V_{\text{pulm}}$  at the beginning of each experiment. After thoracotomy, an electromagnetic flowprobe was placed around the main pulmonary artery in dogs. Cardiac output was simultaneously measured by the Doppler-equipped pulmonary artery catheter (CO-Doppler), and the electromagnetic flowmeter (CO-EMF) or the thermodilution technique (CO-Thermo). Cardiac output was manipulated by dobutamine and propranolol.

**RESULTS:** CO-Doppler was highly correlated with CO-EMF ( $y = 1.16 \times -0.26$ ,  $r^2 = 0.99$ ,  $P < 0.001$ ) and CO-Thermo ( $y = 1.24 \times -0.90$ ,  $r^2 = 0.85$ ,  $n = 48$ ,  $P < 0.001$ ). The bias between CO-EMF and CO-Doppler was  $-0.02$  L/min; 95% limits of agreement were  $-0.32$  to  $0.28$  L/min. The percentage error was 16%. The bias between CO-Thermo and CO-Doppler was  $0.18$  L/min; 95% limits of agreement were  $-0.62$  to  $0.98$  L/min.

**CONCLUSIONS:** The newly developed Doppler-equipped pulmonary artery catheter with 2 orthogonally positioned Doppler transducers allowed accurate and continuous measurements of cardiac output independent of the angle of incidence formed by the pulmonary artery catheter and the main pulmonary artery blood flow.

## 肾上腺素能提高持续室颤猪模型的 24 小时生存率且早期骨内注射优于延迟静脉注射

### Epinephrine Improves 24-Hour Survival in a Swine Model of Prolonged Ventricular Fibrillation Demonstrating that Early Intraosseous Is Superior to Delayed Intravenous Administration

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**背景：**在行心肺复苏时，不能及时静脉输注（IV）升压药就不能提高生存率。骨内注射（IO）能提供更早的输注途径。我们假设在未经治疗长达 10 min 的室颤（VF）致心脏停搏行心肺复苏（CPR）1 min 后 IO 肾上腺素（一种“最佳的” IO 方案），与 CPR 8 min 后 IV 肾上腺素（一种“现实存在的”方案）或 IV 不含肾上腺素的安慰剂相比，能改善结局。

**方法：**30 只猪随机分为 IO 肾上腺素组，IV 肾上腺素组或安慰剂组。重要的结局包括恢复自主循环（ROSC）情况、24 h 生存率和获得良好神经学结局（大脑表现分类为 1 级）的 24 h 生存率。

**结果：**10 min 仍未处理 VF 且未注射肾上腺素，则获得 ROSC 的概率很低（1/10），而无论是 IO 肾上腺素还是延迟 IV 肾上腺素，其 ROSC 的几率相似（分别为 10/10 和 9/10，两组和安慰剂组比较， $P = 0.001$ ）。IO 肾上腺素的 24 h 生存率明显高于 IV 肾上腺素（10/10 vs. 4/10， $P = 0.001$ ），而安慰剂组 24 h 生存率为 0。IO 肾上腺素组获得良好神经学结局的生存率明显高于安慰剂组（6/10 vs. 0/10， $P = 0.011$ ），而延迟 IV 肾上腺素组中只有 3/10 获得良好神经学结局（与 IO 组和安慰剂组相比无显著差异）。

**结论：**在持续性 VF 致心脏停搏的猪模型中，CPR 时注射肾上腺素能改善结局。此外，与延迟 IV 肾上腺素相比，早期骨内注射(IO)肾上腺素能改善结局。

（吴少勇译 薛张纲校）

**BACKGROUND:** Vasopressors administered IV late during resuscitation efforts fail to improve survival. Intraosseous (IO) access can provide a route for earlier administration. We hypothesized that IO epinephrine after 1 minute of cardiopulmonary resuscitation (CPR) (an “optimal” IO scenario) after 10 minutes of untreated ventricular fibrillation (VF) cardiac arrest would improve outcome in comparison with either IV epinephrine after 8 minutes of CPR (a “realistic” IV scenario) or placebo controls with no epinephrine.

**METHODS:** Thirty swine were randomized to IO epinephrine, IV epinephrine, or placebo. Important outcomes included return of spontaneous circulation (ROSC), 24-hour survival, and 24-hour survival with good neurological outcome (cerebral performance category 1).

**RESULTS:** ROSC after 10 minutes of untreated VF was uncommon without administration of epinephrine (1 of 10), whereas ROSC was nearly universal with IO epinephrine or delayed IV epinephrine (10 of 10 and 9 of 10, respectively;  $P = 0.001$  for either versus placebo). Twenty-four hour survival was substantially more likely after IO epinephrine than after delayed IV epinephrine (10 of 10 vs. 4 of 10,  $P = 0.001$ ). None of the placebo group survived at 24 hours. Survival with good neurological outcome was more likely after IO epinephrine than after placebo (6 of 10 vs. 0 of 10,  $P = 0.011$ ), and only 3 of 10 survived with good neurological outcome in the delayed IV epinephrine group (not significant versus either IO or placebo).

**CONCLUSION:** In this swine model of prolonged VF cardiac arrest, epinephrine administration during CPR improved outcomes. In addition, early IO epinephrine improved outcomes in comparison with delayed IV epinephrine.

### 家长对于麻醉信息的回忆:为知情同意的实践提供信息

#### Parental Recall of Anesthesia Information: Informing the Practice of Informed Consent

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**背景：**知情同意是为保障儿童家长做决定而提供信息的过程。虽然知情同意的过程在麻醉实践过程中很重要,很少有人核查这个过程。正因如此,关于这方面的资料很少,特别在儿童方面。因此,我们设计了这个试验来调查家长回忆的关于他们孩子的麻醉信息,例如告知他们的,谁告知他们的,以及他们能回忆出的信息量。

**方法：**进行多种类型择期手术的儿童家长在他们的孩子进行手术时被纳入研究。家长就他们孩子的麻醉计划、术后镇痛和相关的风险和获益方面进行访谈，同时调查了他们所关心的问题 and 被告知的信息，以及他们对于这些信息的满意度。

**结果：**共调查了 263 名家长。虽然大多数家长（96.2%）都被告知了他们的孩子将怎样被麻醉，但是只有 51.1% 家长记得被告知了麻醉的风险，42.4% 的家长记得麻醉的副反应如何处理。家长关于麻醉信息的综合评分总体很差（ $4.9 \pm 2.5$ ，总分 10 分）。另外，有 50% 和 55.7% 的家长不记得麻醉的风险和益处，82.9% 的家长不记得麻醉药的副作用。比起外科医生进行麻醉知情同意，由麻醉医生进行时家长能回忆的信息很多（ $P < 0.01$ ）。

**结论：**结果显示家长获得的麻醉信息通常是不完整的，所以他们记得的东西很少。调查发现比起外科医生进行麻醉知情同意，由麻醉医生进行时家长能回忆的信息很多，由此在由谁进行麻醉信息告知这一问题的争论中提出了依据。

（姚敏敏译 薛张纲校）

**BACKGROUND:** Informed consent is a process of sharing information that facilitates the individual patient's right to self-determination. Despite its importance in anesthesia practice, the process of informed consent is rarely audited or examined. As such, there are only limited data with respect to anesthesia consent practices, particularly within the pediatric setting. We designed this study, therefore, to examine the information that parents seek regarding their child's anesthesia, what they are told, who told them, and how much of the information they recall.

**METHODS:** Parents of children undergoing a variety of elective surgical procedures were recruited while their child was in surgery. Parents were interviewed to determine their recall of their child's anesthetic plan, postoperative pain management, and attendant risks and benefits; and then surveyed regarding what information was sought and received, and how satisfied they were with the information.

**RESULTS:** Two hundred sixty-three parents were included. Although the majority (96.2%) recalled receiving information about how their child's anesthesia would be administered, only 51.1% recalled being given information about the risks of anesthesia and 42.4% recalled how side effects would be managed. Composite scores for parental recall of anesthesia information were generally poor ( $4.9 \pm 2.5$  of 10). Furthermore, 50% and 55.7% of parents had no recall of the risks or benefits of anesthesia, respectively, and 82.9% could not recall pain medication side effects. Recall of consent information provided by anesthesia providers was significantly better than when provided by surgical personnel ( $P < 0.01$ ).

**CONCLUSIONS:** Results showed that disclosure of anesthesia information to parents was often incomplete, and their recall thereof, was poor. The finding that recall of consent information provided by anesthesia providers was better than when provided by surgical personnel may serve to further the debate regarding the appropriate vehicles for anesthesia consent.

**加巴喷丁的鞘内注射和全身用药对脊髓 P 物质释放的影响**

**The Effects of Intrathecal and Systemic Gabapentin on Spinal Substance P Release**  
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**背景：**加巴喷丁与细胞外电压门控钙离子通道的  $\alpha_1$  亚基结合。一些电压门控钙离子通道控制着 P 物质的初级传入。我们试图探明在体内加巴喷丁的脊髓和全身镇痛剂量的用药是否会影响 P 物质的释放。

**方法：**置入鞘内导管的大鼠在鞘内应用 vehicle 或加巴喷丁 10 分钟后行 50 毫升 5% 福尔马林鞘内注射。全身实验时 vehicle 或加巴喷丁则通过外周注射，15 分钟后注射福尔马林。在不同的组里，为了评估鞘内或静脉注射加巴喷丁对福尔马林诱发 P 物质释放的影响，实验动物接受了类似的处理即在注射福尔马林 10 分钟后经行心内 4% 聚合福尔马林灌注，并通过退缩反应来评估。P 物质的释放通过同侧和对侧表面免疫组织内的神经激肽-1 受体的产生来判断。

**结果：**福尔马林鞘内注射后刺激单侧足底会诱发双侧肢体退缩反应。与对照组大鼠相比鞘内注射加巴喷丁（100 和 200 克）和外周注射加巴喷丁（100 和 200mg/kg）导致剂量依赖性的 2 相的退缩反射的减退而不是 1 相的减退。鞘内注射福尔马林导致同侧而非对侧的脊髓背角 NK1r 内化。与对照组比鞘内注射加巴喷丁（200g 而非 100g）和外周注射加巴喷丁（200mg/kg 而非 100mg/kg）显著地减少了同侧 NK1r 内化。

**结论：**全身和脊髓内用加巴喷丁有继续抑制 P 物质释放的初级传入，且同时有抑制疼痛敏化的效应。

（张玥琪译，薛张纲校）

**BACKGROUND:** Gabapentin binds at the extracellular  $\alpha_1$  subunit of voltage-sensitive calcium channels. Some voltage-sensitive calcium channels regulate substance P release from small primary afferents. We sought to determine in vivo whether spinal and systemic gabapentin at antihyperalgesic doses will attenuate substance P release.

**METHODS:** Rats prepared with chronic intrathecal (IT) catheters received IT vehicle or gabapentin 10 minutes before intraplantar formalin (5%, 50  $\mu$ L) injection. For systemic studies, vehicle or gabapentin was delivered intraperitoneally (IP) 15 minutes before formalin injection. In separate groups of rats, to assess the effect of IT or IP gabapentin upon formalin-evoked substance P release, animals received similar treatment for assessment of flinching, but underwent transcardial perfusion with 4% paraformaldehyde 10 minutes after the formalin injection. Substance P release was determined by the incidence of neurokinin 1 receptor (NK1r) internalization in the ipsilateral and contralateral superficial dorsal horn in immunofluorescent stained tissues.

**RESULTS:** Unilateral intraplantar formalin evoked biphasic hindpaw flinching. IT gabapentin (100 and 200 g) and IP gabapentin (100 and 200 mg/kg) resulted in a dose-dependent reduction in phase 2, but not phase 1, flinching in comparison with vehicle-treated rats. Intraplantar formalin resulted in NK1r internalization in the ipsilateral, but not contralateral, superficial dorsal horn. IT gabapentin (200 g, but not 100 g) and IP gabapentin (200 mg/kg, but not 100 mg/kg) significantly reduced ipsilateral NK1r internalization in comparison with vehicle-treated control. Importantly, internalization evoked by IT substance P was not blocked by IT gabapentin.

**CONCLUSION:** Systemic and spinal gabapentin have an acute inhibitory effect on the release of substance P from small primary afferents and a concurrent effect upon the initiation of facilitated pain states.

**简要报道：与传统方法相比低位肌间沟臂丛阻滞可产生更远的感觉运动阻滞覆盖效果**

**Brief Report: A Low Approach to Interscalene Brachial Plexus Block Results in More Distal Spread of Sensory-Motor Coverage Compared to the Conventional Approach**

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低位肌间沟阻滞与传统肌间沟阻滞相比能使局麻药臂丛向尾端扩散得更远。我们比较了 254 例行上肢手术的患者低位肌间沟阻滞与传统肌间沟阻滞远端肢体麻醉的效果。传统肌间沟阻滞最常引起运动反应的是三角肌，而低位肌间沟阻滞是腕部。与传统肌间沟阻滞相比低位肌间沟阻滞能产生更大的肘以下区域的感觉运动阻滞（感觉与运动  $P < 0.001$ ）。我们的数据表明低位肌间沟阻滞引起更高机率的远端运动反应和更好的腕和手的感觉运动（朱兰芳译，薛张纲校）

A low approach to the interscalene block (LISB) deposits local anesthetic farther caudad on the brachial plexus compared with the conventional interscalene block (ISB). We compared the efficacy of LISB and ISB in achieving anesthesia of the distal extremity in 254 patients having upper extremity surgery. The most frequent elicited motor response was the deltoid for ISB and wrist for LISB. There was significantly greater sensory-motor block of regions below the elbow with the LISB compared with ISB ( $P < 0.001$  for both sensory and motor coverage). Our data indicate that LISB results in a higher incidence of distal elicited motor response and greater sensory-motor blockage of the wrist and hand.