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*Anesth Analg July 2012 115:82-87; published ahead of print March 30, 2012*

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*Anesth Analg July 2012 115:133-136; published ahead of print April 20, 2012*

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*Anesth Analg July 2012 115:154-159; published ahead of print May 14, 2012*

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*Anesth Analg July 2012 115:194-201; published ahead of print April 13, 2012*

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*Anesth Analg July 2012 115:202-206; published ahead of print April 27, 2012*

## 一次性穴位按压设备作为一个多模式止吐策略的一部分用于减少术后恶心和呕吐的应用

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

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Anesth Analg July 2012 115:31-37

**背景：**关于在高危手术患者中处理术后恶心和呕吐（PONV）的最佳策略尚有争议。尽管已有研究证实在P6穴位刺激能有效预防PONV，然而以前没有研究评估过这个非药物治疗作为一个多模式止吐方案的一部分时，对患者日常生活的正常活动恢复的影响。因此，我们设计了这个随机、假对照、双盲的研究，以评估一次性穴位按压设备（Pressure Right®; Pressure Point公司., Grand Rapids,
MI）联合应用昂丹司琼和地塞米松用于止吐预防时，对呕吐发作的发病率和恢复质量的有效性。
**方法：**100例进行较大的腹腔镜手术的ASA I级和II级患者被随机分配到对照组（*n* = 50）或穴位按压组（*n* =
50），在麻醉诱导前30至60分钟对照组接受一个“假”穴位刺激设备，穴位按压组接受一次性Pressure
Right设备，置于双侧P6穴位。所有患者都接受了标准化的全身麻醉。两个研究组均在手术期间联合给予昂丹司琼4mg IV和地塞米松4 mg
IV用于止吐预防。在手术后72小时的特定时间间隔，评价恶心和呕吐的发生率和“解救”止

吐药的需要。在术后48小时和72小时评估恢复情况和恢复质量的问卷。在72小时的研究阶段结束时，评估了病人对其PONV管理的满意度。
**结果：**两个研究组在他们的人口学特征和PONV的危险因素方面没有差异。穴位按压组在24小时时的呕吐发病率显着下降（10%比26%，*P*=
0.04，绝对风险降低的95％置信区间1%–
31%）。穴位按压组从术后0到72小时，呕吐的总体发病率也显着从30%下降至12%的（*P*=0.03，95%置信区间2%-
33%）。此外，穴位按压设备的辅助使用似乎提高了患者对PONV管理的满意度和术后48小时时的恢复质量。然而，达到出院、恢复正常生理活动及恢复工作的恢复时间在两组之间无显著差异。
**结论：**联合使用Pressure
Right穴位按压设备和止吐药物能降低从术后0到72小时的呕吐发生率，并且改善病人对PONV管理的满意度。然而，恢复和预后参数无法证实穴位设备的增加有任何改善作用。
（马皓琳 译 李士通 校）
**BACKGROUND:** There is still controversy regarding the optimal strategy for managing postoperative nausea and vomiting (PONV) in high-risk surgical populations. Although acustimulation at the P6 acupoint has been demonstrated to be effective in preventing PONV, the effect of this nonpharmacologic therapy on the patient's recovery with respect to resumption of normal activities of daily living has not been previously assessed when it is used as part of a multimodal antiemetic regimen. Therefore, we designed this randomized, sham-controlled, and double-blind study to assess the efficacy of a disposable acupressure device (Pressure Right® ; Pressure Point Inc., Grand Rapids, MI) on the incidence of emetic episodes and quality of recovery when used in combination with ondansetron and dexamethasone for antiemetic prophylaxis.
**METHODS:** One hundred ASA physical status I and II patients undergoing major laparoscopic procedures were randomly assigned to either a control group ($n$ = 50) receiving a “sham” acustimulation device or an acupressure group ($n$ = 50) receiving a disposable Pressure Right device placed bilaterally at the P6 point 30 to 60 minutes before induction of anesthesia. All patients received a standardized general anesthetic. A combination of ondansetron, 4 mg IV, and dexamethasone, 4 mg IV, was administered during surgery for antiemetic prophylaxis in both study groups. The incidence of nausea and vomiting and the need for “rescue” antiemetic therapy were assessed at specific time intervals for up to 72 hours after surgery. The recovery profiles and quality of recovery questionnaires were evaluated at 48 hours and 72 hours after surgery. Patient satisfaction with the management of their PONV was assessed at the end of the 72-hour study period.
**RESULTS:** The 2 study groups did not differ in their demographic characteristics or risk factors for PONV. The incidence of vomiting at 24 hours was significantly decreased in the acupressure group (10% vs 26%, $P$ = 0.04, 95% confidence interval for absolute risk reduction 1%–31%). The overall incidence of vomiting from 0 to 72 hours after surgery was also significantly decreased from 30% to 12% in the acupressure group ($P$ = 0.03, 95% confidence interval 2%–33%). Furthermore, adjunctive use of the acupressure device seemed to enhance patient satisfaction with their PONV management and quality of recovery at 48 hours after surgery. However, the recovery times to hospital discharge, resumption of normal physical activities, and return to work did not differ significantly between the 2 study groups.

**CONCLUSION:** Use of the Pressure Right acupressure device in combination with antiemetic drugs provided a reduction in the incidence of vomiting from 0 to 72 hours after surgery with an associated improvement in patient satisfaction with their PONV management. However, recovery and outcome variables failed to demonstrate any improvement with the addition of the acupressure device.

## 异氟醚麻醉下大鼠胰高血糖素样肽-1的生物物理学及药理学特性

**Biophysical and Pharmacological Properties of Glucagon-Like Peptide-1 in Rats Under Isoflurane Anesthesia**

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Anesth Analg July 2012 115:62-69

**背景：**胰高血糖素样肽1（CLP-1）可促进胰岛素分泌，对维持血糖稳态具有重要作用。本研究从在体和离体实验两方面评估GLP-1的生物物理学及药理学特性，从而明确GLP-1在大鼠异氟醚麻醉下血糖调控中的可应用性。

**方法：**研究分为两组：对照组吸入氧浓度为30%的空气，实验组吸入1.4%浓度的异氟醚，测定两组吸入前、吸入中和吸入后禁食和经胃给予葡萄糖负荷后门静脉GLP-1、胰岛素、血糖和二肽肽酶-4的活性。在人肠内分泌细胞NCL-H716细胞株测定异氟醚对GLP-1分泌的直接作用。用放射免疫法测定分离的胰岛组织胰岛素的释放。用β-七叶素穿孔的全细胞电流膜片钳测定单个胰脏β细胞的膜电位。

**结果：**禁食大鼠吸入异氟醚可导致GLP-1基础值的下降，但不影响胰岛素和血糖水平。对照组给予葡萄糖后，GLP-1、胰岛素和血糖水平升高。而异氟醚可减轻葡萄糖引起的GLP-1、胰岛素和血糖水平的升高。相反，异氟醚并不影响经胃给予葡萄糖负荷前和给予后的二肽肽酶-4的活性。0.35 mM的异氟醚可抑制NCI-H716 细胞中GLP-1的释放；该结果与以往报道的在体研究的结果相一致。在表面灌流实验中，0.35 mM的异氟醚可抑制糖诱导的胰岛素的释放，而给予外源性10 nM的 GLP-1可促进胰岛素的释放。重要的是，联合给予七氟醚和GLP-1延长了葡萄糖诱发岛素的释放的两个时相到与单独给与GLP-1相似的程度。全细胞膜片钳结果表明： 0.35 mM异氟醚可抑制糖刺激的去极化，而10 nM的GLP-1几乎可完全使之恢复。

**结论：**以往研究显示异氟醚麻醉下GLP-1分泌功能受损。而本研究证实异氟醚并不影响GLP-1的促胰岛素样作用，而且给予GLP-

1可增加胰脏β细胞的膜活性，预防异氟醚引起的葡萄糖诱导的胰岛素分泌的受损。这些结果支持基于GLP-1的治疗可有效维持术中血糖调控的假说。
（邱郁薇 译 马皓琳 李士通 校）

**BACKGROUND:** Glucagon-like peptide-1 (GLP-1) increases insulin secretion and has an important role in maintaining glucose homeostasis. In this study, we evaluated the biophysical and pharmacological properties of GLP-1 by performing in vivo and in vitro experiments to determine the applicability of GLP-1 in glycemic control in rats under isoflurane anesthesia.
**METHODS:** Levels of portal GLP-1, insulin, and glucose and dipeptidyl peptidase-4 activity were measured in the basal fasting state and after gastric glucose load before, during, and after exposure to 30% $O_2$ in air (control) or 1.4% isoflurane in a mixture of 30% $O_2$ and air. The direct effects of isoflurane on GLP-1 secretion were assessed in human enteroendocrine NCI-H716 cells. Insulin release from isolated pancreatic islets was measured using a radioimmunoassay. Single pancreatic β-cell membrane potentials were recorded using whole-cell current-clamp patches perforated by β-escin.
**RESULTS:** In fasting rats, inhalation of isoflurane led to a decrease in the basal levels of GLP-1 but did not affect insulin and glucose levels. Levels of GLP-1, insulin, and glucose increased after gastric administration of glucose in control rats. However, isoflurane attenuated the glucose-induced increase in GLP-1 and insulin levels and increased plasma glucose levels. In contrast, isoflurane did not affect dipeptidyl peptidase-4 activity before or after gastric glucose loading. Isoflurane (0.35 mM) inhibited GLP-1 release in NCI-H716 cells; this finding was similar to that observed in in vivo studies. In perifusion experiments, isoflurane (0.35 mM) inhibited glucose-induced insulin release, whereas exogenous GLP-1 (10 nM) enhanced insulin release. Importantly, combined administration of isoflurane and GLP-1 enhanced both phases of glucose-induced insulin release to an extent similar to that achieved with GLP-1 alone. Whole-cell patches showed that exposure to GLP-1 (10 nM) led to nearly complete restoration of glucose-stimulated depolarization that had been suppressed by isoflurane (0.35 mM).
**CONCLUSIONS:** GLP-1 secretion is impaired during isoflurane anesthesia. However, our study showed that the insulinotropic action of GLP-1 was not affected by isoflurane. Furthermore, exposure to GLP-1 increased the membrane activity of pancreatic β-cells, preventing isoflurane-induced impairment of glucose-induced insulin secretion. These results support the hypothesis that GLP-1–based therapy may be a useful approach for achieving intraoperative glycemic control.

## 验证应用脉搏波通过时间无创测定连续心输出量的方法的多中心研究：与间断推注热稀释法心输出量比较

**Multicenter Study Verifying a Method of Noninvasive Continuous Cardiac Output Measurement Using Pulse Wave Transit Time: A Comparison with Intermittent Bolus Thermodilution Cardiac Output**

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Anesth Analg July 2012 115:82-87

**背景：**许多技术已经为心输出量的微创监测而开发。应用脉搏波通过时间的连续预估心输出量（esCCO）测量法是一个无创的方法。在为任何病人包括低风险的病人进行常规临床循环监测中，esCCO测量法是潜在有用的。因为除了那些用于实施3种基本类型监测的方法（如心电图、脉搏氧饱和度和无创或有创的动脉血压测量法）所需的传感器以外，它不需要任何额外的传感器。在本多中心研究中，我们评估了应用脉搏波通过时间的无创esCCO的功效。

**方法：**在7个参与机构中，我们选取213名病人比较esCCO和间断推注热稀释法心输出量（TDCO），其中重症监护病房（ICUs）139名，手术室（ORs）74名。在ICUs和ORs，我们对在ICU和OR里的病人做了心电图、脉搏氧饱和度、TDCO和动脉血压的监测。施行一个单一标定一连续测量esCCO。在ICU和OR病人移除肺动脉导管之前，为ICU病人每日一次以及OR病人每小时进行TDCO测量。我们评估了esCCO相对于TDCO的相关性分析和Bland-
Altman分析，同时也评估了偏差随时间的变化。此外，我们观察了全身血管阻力（SVR）改变对偏差变化的影响，因为异常的SVR被假定为促使这种偏差变化的一个因素。

**结果：**在588个esCCO和TDCO数据集中（除了标定点），分析了213名病人的587个数据集。分析结果显示相关系数为0.79（*P*<0.0001，95%可信区间为0.756–
0.819），偏差（指esCCO和TDCO之间的平均差）为0.13 L/min
（偏差的95%可信区间为0.04–0.22 L/min），以及精度（1个标准差）为1.15
L/min（95%可信区间为−2.13至2.39
L/min）。在ICU，定标后超过48小时的3个确定的时间区间之间没有显著的差异（重复测量方差分析*P* =
0.781）。SVR对esCCO分析的影响显示SVR和误差之间的相关系数为0.37（*P*<0.0001，95%可信区间为0.298–0.438）。

**结论：**在213例病例中比较了无创esCCO技术和TDCO的功效。587个数据集显示esCCO和TDCO之间相关密切、偏差较小且精确，可与当前的动脉波形分析技术相媲美。

（唐莹 译 马皓琳 李士通 校）

**BACKGROUND:** Many technologies have been developed for minimally invasive monitoring of cardiac output. Estimated continuous cardiac output (esCCO) measurement using pulse wave transit time is one noninvasive method. Because it does not require any additional sensors other than those for conducting 3 basic forms of monitoring (electrocardiogram, pulse oximeter wave, and noninvasive (or invasive) arterial blood pressure measurement), esCCO measurement is potentially useful in routine clinical circulatory monitoring for any patient including low-risk patients. We evaluated the efficacy of noninvasive esCCO using pulse wave transit time in this multicenter study.

**METHODS:** We compared esCCO and intermittent bolus thermodilution cardiac output (TDCO) in 213 patients, 139 intensive care units (ICUs), and 74 operating rooms (ORs), at 7 participating institutions. We performed electrocardiogram, pulse oximetry, TDCO, and arterial blood pressure measurements in patients in ICUs and ORs; a single calibration was performed to measure esCCO continuously. TDCO measurement was performed once daily for ICU patients and every hour for OR patients, and just before the removal of the pulmonary arterial catheter from patients in both the ICU and OR. We evaluated esCCO against TDCO with correlation analysis and Bland and Altman analysis and also assessed the change of bias over time. Furthermore, we inspected the impact of change in systemic vascular resistance (SVR) on

change in bias because abnormal SVR was assumed to be a factor contributing to the change of the bias.
**RESULTS:** From among 588 esCCO and TDCO datasets (excluding calibration points), 587 datasets were analyzed for 213 patients. The analysis results show a correlation coefficient of 0.79 ($P < 0.0001$, 95% confidence limits of 0.756–0.819), a bias (mean difference between esCCO and TDCO) of 0.13 L/min (95% confidence interval of bias 0.04–0.22 L/min), and a precision (1 SD) of 1.15 L/min (95% prediction interval was −2.13 to 2.39 L/min). There were no significant differences among 3 defined time intervals over 48 hours after calibration (repeated-measures analysis of variance $P = 0.781$) in the ICU. The influence of SVR on esCCO analysis showed a correlation coefficient between SVR and an error of 0.37 ($P < 0.0001$, 95% confidence interval 0.298–0.438).
**CONCLUSION:** The efficacy of noninvasive esCCO technology was compared with TDCO in 213 cases. Five hundred eighty-seven datasets comparing esCCO and TDCO showed close correlation and small bias and precision, which were comparable to current arterial waveform analysis technologies.

## 我们能使术后患者的交接班更安全吗？一篇相关文献资料的系统综述

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

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Anesth Analg July 2012 115:102-115

术后患者交接班经常会出现技术上的失误和沟通上的误差，不利于患者的安全。我们系统性地回顾了有关从手术室至麻醉后苏醒室或重症监护室的护理交接班的文献资料，并归纳总结了基于这些结果的程序和沟通建议。在超过500篇文章中，我们找到31篇处理术后交接班问题的文章。其中24篇文章含有组织交接班程序或者信息传递的建议。其中一些建议得到了广泛支持，包括：(1)标准化程序（例如通过使用清单和协议交接班）；(2)在信息传递之前完成紧急临床工作；(3)
在进行口头交接班时只允许讨论患者特殊病情；(4)要求所有相关团体成员到场；(5)给团体成员提供技巧和沟通培训。只有4项研究形成了干预措施，且正式地评估了其对不同程序方法的影响。这4种干预措施均改善了效力和效率指标及团队的协作。大多数文章为横向研究，找出对安全有效术后交接班的障碍，包括未完整的信息传递和其他交流问题、意见不一或队伍不完整的团队、临床工作的缺失或者无效执行以及标准化较差。还证实了低质量的交接班质量和不良事件之间的关系。需要进行更多创新研究以明确最佳的患者交接班方案并确定交接班质量对患者预后的影响。

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

## 产妇硬膜意外穿破后预防性硬膜外血补片用于防止硬膜穿破后头痛

**Prophylactic Epidural Blood Patch After Unintentional Dural Puncture for the Prevention of Postdural Puncture Headache in Parturients**

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Anesth Analg July 2012 115:133-136

硬膜意外穿破是产科患者行椎管内麻醉主要发病率的一个原因。本焦点综述中，我们探讨了预防性硬膜外血补片预防硬膜穿破后头痛，尤其在产科人群。尽管硬膜外血补片一直被认为是一种有效治疗硬膜穿破后头痛的方法，目前并无充足证据支持其作为一个预防性操作的应用。
(许辛译 马皓琳 李士通 校)
Unintentional dural puncture is a source of significant morbidity in obstetric patients undergoing neuraxial anesthesia. In this focused review, we discuss the use of a prophylactic epidural blood patch to prevent postdural puncture headache, particularly as it relates to the obstetric population. Although epidural blood patch is thought to be an effective treatment for postdural puncture headache, there is insufficient evidence to support its use as a prophylactic procedure.

## 儿童颅面重建术中低血压期间没有心动过速

**Absence of Tachycardia During Hypotension in Children Undergoing Craniofacial Reconstruction Surgery**

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Anesth Analg July 2012 115:139-146

**背景：**心动过速是一种压力感受器介导的对低血压的反应。麻醉期间儿童在发生低血压时的心率（HR）表现的特征不是很明显。我们进行了这项研究来评估经历大量失血的麻醉儿童人群中HR与低血压之间的关系。我们主要的假设是在低血容量引起低血压时心率会较无低血压时增快。
**方法：**我们对于行颅顶重建术的两岁以内儿童，查询了预期颅面手术围术期登记。提取人口统计学和围术期数据，计算术中失血量。从计算机化的麻醉记录提取生命体征并分析。低血压的定义为平均动脉压小于40mmHg持续至少三个计算机化麻醉记录（每15秒捕获一次）。比较术前HR、整个手术期间的平均HR、低血压开始发生时的HR及低血压前后五分钟的HR。
**结果：**病历查询产生的数据来自57例手术。在10个病例中有29次低血压发生。低血压（平均动脉压低于40mmHg时）开始发生时的HR与术前HR、术中平均HR以及低血压前后五分钟时的HR无明显差异。
**结论：**在这项针对术中出现大量失血的麻醉期间2岁以内儿童的研究中，低血压未引起心率增快。在这类人群中，心率对于低血容量似乎不是有用的指标。
（张怡 译 马皓琳 李士通校）
**BACKGROUND:** Tachycardia is a baroreceptor-mediated response to hypotension. Heart rate (HR) behavior in the setting of hypotension in anesthetized children is not well characterized. We conducted this study to assess the relationship between HR and hypotension in a population of anesthetized children experiencing massive blood loss. Our primary hypothesis was that HR would be increased with the onset of hypotension associated with hypovolemia in comparison with time points without hypotension.
**METHODS:** We performed a query of our prospective craniofacial perioperative registry for children younger than 24 months who underwent cranial vault reconstruction surgery. Demographic and perioperative data were extracted, and the intraoperative blood loss was calculated. Vital signs were extracted from our computerized anesthesia record and analyzed. Hypotension was defined as a mean arterial blood pressure <40 mm Hg for at least 3 computerized anesthesia record entries (captured every 15 seconds). The preoperative HR, the average HR over the entire intraoperative period, the HR at the onset of hypotension, and the HR 5 minutes before and 5 minutes after the hypotensive episode were compared.
**RESULTS:** The registry query yielded data from 57 procedures. There were 29 episodes of hypotension occurring in 10 subjects. There was no significant difference in HR at the onset of hypotension (when mean arterial blood pressure decreased below 40 mm Hg) in comparison with the preoperative HR, the average intraoperative HR, or in comparison with 5 minutes before and 5 minutes after the episode of hypotension.
**CONCLUSIONS:** In this study of anesthetized children younger than 24 months undergoing surgery with massive blood loss, hypotension was not associated with an increased HR. HR does not appear to be a useful indicator of hypovolemia in this population.

# 肥胖在儿童和青少年患者中对丙泊酚引起意识丧失$ED_{95}$的影响

**The Effect of Obesity on the $ED_{95}$ of Propofol for Loss of Consciousness in Children and Adolescents**

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Anesth Analg July 2012 115:147-153

**介绍：**麻醉医师在决定肥胖儿童的麻醉药适宜用量时，经常面临两难的局面。本研究在肥胖与非肥胖患儿中，通过睫毛反射的消失，测定了丙泊酚引起95%患儿意识丧失的剂量（$ED_{95}$）。
**方法：**40名肥胖的（体重指数[BMI]＞同龄同性别儿童的第95百分位数）和40名正常体重的（BMI在第25~第84百分位数之间）、ASA 1~2级、年龄3~17岁行外科手术的的健康儿童参与了本项偏倚硬币设计研究。主要观察指标是丙泊酚注射后20秒睫毛反射消失。每组第一名患儿接受1.0mg/kg丙泊酚静脉注射，此后的患儿根据之前一名患儿的睫毛反射效果，接受预设的丙泊酚剂量。如果睫毛反射存在，则下一名患儿的剂量增加0.25mg/kg。如果睫毛反射消失，则下一名患儿随机接受相同剂量（几率95%）或剂量减少0.25mg/kg（几率5%）。$ED_{95}$和95%可信区间（CI）分别通过保序回归和引导法计算。
**结果：**丙泊酚引起睫毛反射消失的$ED_{95}$在肥胖患儿中（2.0mg/kg，近似95%可信区间1.8~2.2mg/kg）显著低于非肥胖患儿（3.2mg/kg，近似95%可信区间2.7~3.2mg/kg），$P \leq 0.05$。
**讨论：**决定丙泊酚对3~17岁患儿进行麻醉诱导必须用多少剂量的一个简单方法是为了首先确定该患儿的BMI在性别特异分布图的位置。肥胖儿童（BMI＞同龄同性别儿童的第95百分位数）进行麻醉诱导所需单位体重丙泊酚的剂量低于非肥胖儿童。
（陈彬彬译 马皓琳 李士通校）

**INTRODUCTION:** Anesthesiologists face a dilemma in determining appropriate dosing of anesthetic drugs in obese children. In this study we determined the dose of propofol that caused loss of consciousness in 95% ($ED_{95}$) of obese and nonobese children as determined by loss of eye lash reflex.
**METHODS:** Forty obese (body mass index [BMI] > 95th percentile for age and gender) and 40 normal weight (BMI 25th to 84th percentile) healthy ASA 1 to 2 children ages 3 to 17 years presenting for surgical procedures were studied using a biased coin design. The primary endpoint was loss of lash reflex at 20 seconds after propofol administration. The first patient in each group received 1.0 mg/kg of IV propofol, and subsequent patients received predetermined propofol doses based on the lash reflex response in the previous patient. If the lash reflex was present, the next patient received a dose increment of 0.25 mg/kg. If the lash reflex was absent, the next patient was randomized to receive either the same dose (95% probability) or a dose decrement of

0.25 mg/kg (5% probability). The $ED_{95}$ and 95% confidence intervals (CI) were calculated using isotonic regression and bootstrapping methods respectively.
**RESULTS:** The $ED_{95}$ of propofol for loss of lash reflex was significantly lower in obese pediatric patients (2.0 mg/kg, approximate 95% CI, 1.8 to 2.2 mg/kg) in comparison with nonobese patients (3.2 mg/kg, approximate 95% CI, 2.7 to 3.2 mg/kg), $P \leq 0.05$.
**DISCUSSION:** A simple approach to deciding what dose of propofol should be used for induction of anesthesia in children ages 3 to 17 years is to first establish the child's BMI on readily available gender-specific charts. Obese children (BMI >95th percentile for age and gender) require a lower weight–based dose of propofol for induction of anesthesia, than do normal-weight children.

## 右美托咪啶在大鼠中对手术脑损伤的脑水肿及神经病学转归的影响

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

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Anesth Analg July 2012 115:154-159

**背景:**手术脑损伤(SBI)是神经外科操作（比如锐性剥离、电灼、吸引、直接施加的压迫）对功能性脑组织所造成的损害。脑水肿是促成炎症、坏死、氧化性应激这些损害发生的主要因素，而对细胞凋亡起的作用可能较小。针对SBI的有效治疗可以改善神经病学预后并减少神经外科手术相关的术后并发症的发生。以往的研究表明血脑屏障的控制与肾上腺素有相关性。已有研究显示α-2受体激动剂右美托咪定（DEX）可以改善中风模型的神经病学转归。我们假设在SBI大鼠模型中，DEX可以减少脑水肿并改善神经病学预后。
**方法：**将体重280-350g的雄性SD大鼠（*n*=63）随机分为4个IP处置组：假手术IP组、溶剂IP组、DEX 10mg/kg组和DEX 30mg/kg组。在SBI前30分钟给予相应的处置。反复观察DEX对首次发生SBI动物的平均动脉压（MAP）、心率（HR）和血糖的生理影响。大鼠还被随机分为4个损伤后IV处置组:假手术IV组、溶剂IV组、DEX 10/5组和DEX 30/15组（DEX治疗组剂量分别为10和30 mg/kg/hr，初始负荷剂量分别为5和15 mg/kg/hr）。初始负荷剂量的给予开始于SBI后20分钟，之后持续输注2小时。SBI动物在脑损伤后24小时将由不知分组情况的观察员进行神经病学检测，它们被立即致死，通过干/湿测重法测量脑组织含水量。
**结果：**各治疗组与假手术组动物相比，在同侧额叶脑组织含水量和神经系统的评分方面表现出显著差异。然而，DEX治疗组和溶剂组之间没有区别。生理监测表明不论是高或低剂量DEX治疗相对于无任何处置的动物或者安慰剂组动物，都显著降低MAP和HR，并且造成短暂的血糖升高。

**结论：**在本研究中，DEX的使用并未能在SBI后减轻脑水肿或改善神经功能。在假手术组与安慰剂组、DEX治疗组之间脑组织含水量以及神经学评分的统计学差异在此模型的一致再现性。使用DEX后的MAP、HR以及血糖相较于溶剂组和假手术组有显著变化，提示给药恰当。

（余亦南 译 马皓琳 李士通 校）

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

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

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

**CONCLUSIONS:** DEX administration did not reduce brain edema or improve neurological function after SBI in this study. The statistical difference in brain water content and neurological scores when comparing sham treatment to vehicle and DEX treatments shows consistent reproduction of this model. Significant changes in MAP, HR, and blood glucose after DEX as compared to vehicle and sham treatments suggest appropriate delivery of drug.

## 通过旋转血栓弹力测定方法评价红细胞比容对纤维凝块形成的影响

**The impact of hematocrit on fibrin clot formation assessed by rotational thromboelastometry.**

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Anesth Analg July 2012 115:16-21

**背景**：以FIBTEM为基础的旋转血栓弹力测定法用来评估围术期全血细胞的纤维聚合程度。在TIBETEM中，松胞素D降低血小板的凝血作用，但松胞素D也改变纤维蛋白的水平，而且红细胞也会对血凝块形成起不同的作用。因为血浆纤维蛋白原测定不会反映红细胞比容的动态变化，假设分离血浆测定中没有红细胞，这将影响心外科手术期间的凝血酶法和以血液为基础的FIBTEM法的相关性。因此，现在研究围术期血细胞比容改变对FIBTEM和纤维蛋白原测定的影响。
**方法**：从六名健康志愿者取血样本，FIBTEM实验组分为：全血不稀释组，全血用盐水稀释组，和分别用自体血浆（浓度5:1, 2:1,和
1:1）稀释组，然后评估FIBTEM的最大凝固程度（MCF）与凝血酶原测定法的相关性，判断心脏手术前后红细胞比容的价值。皮尔斯相关系数在实验数据和ROTEM参数之间起决定性作用。
**结果**：由于离体后红细胞减少，FIBTEM-
MCF随盐水浓度降低逐渐减少，而在1:1的自体血浆中MCF增加31%（P《0.05）。在来自心脏病患者（在50人身上完成150次测试）的样本中，所有MCF和血浆纤维蛋白原间的相关参数为0.8（P《0.001）；在稀释的血液样本组（术中和监护室），MCF10mm相当于血浆纤维蛋白原 200 mg/dL。 小样本分析的红细胞比容分别为<25%, ≥25% to 30%, ≥30%, 200 mg/dL的血浆纤维蛋白原分别相当于11 mm/10
mm/8mm的MCF。红细胞比容越低，MCF与血浆纤维蛋白原相关性越高。
**结论**：围术期改变红细胞比容影响血浆纤维蛋白原和MCF的相关性。低红细胞比容时（<25%）,MCF与血浆纤维蛋白原相关性较高，提示FIBTEM适用于决定是否需要对术中贫血的出血病人进行血浆纤维蛋白原置换。
（韩旭译 薛张纲校）
**BACKGROUND**: Rotational thromboelastometry (ROTEM® )-based FIBTEM is used perioperatively to assess the extent of fibrin polymerization in whole blood. In FIBTEM, cytochalasin D eliminates the contribution of platelets to whole blood clotting, but changing levels in fibrin(ogen) and erythrocytes may differently affect clot formation. Because dynamic changes of hematocrit are not reflected in plasma fibrinogen measurements, we hypothesized that the lack of erythrocytes in isolated plasma measurements would affect the relationship between the Clauss method and whole blood-based FIBTEM during cardiac surgery. Therefore, in the current study we investigated the influence of perioperative hematocrit changes on FIBTEM and fibrinogen measurements.
**METHODS**: Blood samples were collected from 6 consenting healthy volunteers. FIBTEM tests were run before and after serial in vitro dilutions of whole blood with saline or autologous plasma (5:1, 2:1, and 1:1 v/v). We then evaluated the relationship between FIBTEM-maximal clot firmness (MCF) and the Clauss fibrinogen method in relation to hematocrit values before and after cardiac surgery. Pearson correlation coefficients were determined between laboratory test results and ROTEM variables.
**RESULTS**: Upon in vitro hematocrit reduction, FIBTEM-MCF was progressively decreased depending on the extent of saline dilution, but it was increased by 31% after 1:1 volume replacement with autologous plasma ($P < 0.05$). In samples from cardiac patients (150 measurements in 50 patients), the overall correlation coefficient between FIBTEM-MCF and plasma fibrinogen was 0.80 ($P < 0.001$). In hemodiluted blood samples (during surgery or at intensive care unit), FIBTEM-MCF 10 mm corresponded to plasma fibrinogen levels of 200 mg/dL. In the subgroup analysis (n = 50 each), according to hematocrit levels (<25%, ≥25% to

30%, ≥30%), plasma fibrinogen levels of 200 mg/dL corresponded to 11 mm, 10 mm, and 8 mm of FIBTEM-MCF, respectively. The correlation between FIBTEM-MCF and plasma fibrinogen was higher at lower hematocrit (<25%) than at higher hematocrit (>30%) (r = 0.88 and 0.67, respectively).
**CONCLUSIONS**: Perioperative changes in hematocrit affect the correlation between plasma fibrinogen levels and FIBTEM-MCF values. The higher correlation between FIBTEM-MCF and plasma fibrinogen with lower hematocrit (<25%) indicates that FIBTEM is a practical method to determine the need for fibrinogen replacement in bleeding patients who typically develop perioperative anemia.

在一种新型的大鼠模型中，右美托咪啶防止外科手术应激和疼痛引起的肠道微循环改变

**Dexmedetomidine prevents alterations of intestinal microcirculation that are induced by surgical stress and pain in a novel rat model.**

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Anesth Analg July 2012 115:46-53

**背景**：麻醉可以在不经意间产生不足或在手术过程中出现误判，手术应激和疼痛刺激没有得到适当的治疗会增加。明显的刺激可以激活交感神经系统，增加血液儿茶酚胺水平，并引起内脏动脉血管收缩。
**方法**：我们将30只雄性大白鼠分为以下三组：控制组，手术应激和疼痛组（SSP）及手术应激和疼痛+右美托咪定组（SSP+
Dex）。我们将大鼠沿中线剖腹，取出末端回肠一部分，通过一个全视野激光灌注成像和侧流暗场视频显微镜对大白鼠的黏膜、肌肉和集合淋巴小结进行微循环检查。SSP组和SSP+Dex组异氟醚吸入浓度从1.2％下降到0.7％。在 SSP + Dex
组，大鼠接受右美托咪定的初始负荷剂量（0.5μg/kg）和维持输注剂量(0.5 μg · kg(-1) ·h(-1))。
**结果**：右美托咪啶可以防止手术应激和疼痛相关性心动过速和高血压，并且可以减弱肠黏膜(1100 ± 185 perfusion units [PU] vs 800 ± 105 PU, P = 0.001)和肌肉(993 ± 208 PU vs 713 ± 92 PU, P <
0.001)微循环血流量降低的强度。右美托咪啶修复肠黏膜和肌肉中的小血管灌注。
**结论**：我们建立了一个有效的大鼠模型，研究在浅麻醉时手术应激和疼痛刺激对肠道微循环的影响。利用此大鼠模型，我们发现，右美托咪定能使全身血流动力学趋于稳定，防止肠道微循环的改变。
（贺盼译 薛张纲校）

**BACKGROUND**: Anesthesia can become inadequate inadvertently or by misjudgment during surgery or emergence, and the surgical stress and pain stimulation will increase without adequate treatment. Overt stimulation may activate the sympathetic nervous system, increase the blood level of catecholamines, and lead to splanchnic arterial vasoconstriction.

**METHODS**: We divided 30 male Wistar rats into the following 3 groups: control, surgical stress and pain (SSP), and surgical stress and pain + dexmedetomidine (SSP + Dex). The rats received midline laparotomy to exteriorize a segment of terminal ileum for microcirculation examination by a full-field laser perfusion imager and sidestream dark-field video microscope on mucosa, muscle, and Peyer patch. The inspired concentration of isoflurane was decreased from 1.2% to 0.7% in SSP and SSP + Dex groups. In the SSP + Dex group, the rats received an initial loading dose of dexmedetomidine (0.5 μg/kg) and a maintenance infusion (0.5 μg · kg(-1) ·h(-1)).
**RESULTS**: Dexmedetomidine prevented surgical stress and pain-related tachycardia and hypertension, and it attenuated the reduction of the microcirculatory blood flow intensity in intestinal mucosa (1100 ± 185 perfusion units [PU] vs 800 ± 105 PU, P = 0.001) and muscle (993 ± 208 PU vs 713 ± 92 PU, P < 0.001). Dexmedetomidine restored perfused small vessel density in intestinal mucosa and muscle.
**CONCLUSIONS**: We established a promising rat model to investigate the effect of surgical stress and pain stimulation on the intestinal microcirculation during light anesthesia. Using this rat model, we found that dexmedetomidine can normalize global hemodynamics and prevent the alteration of intestinal microcirculation.

## 泰嘉依托咪酯抑制alph4/beta2神经元乙酰胆碱受体浓度对动物的影响

**Brief report: carboetomidate inhibits alpha4/beta2 neuronal nicotinic acetylcholine receptors at concentrations affecting animals.**

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Anesth Analg July 2012 115:70-72;

**背景**：泰嘉依托咪酯是一种依托咪酯的衍生物，产生催眠作用并且不抑制肾上腺皮质类固醇激素的合成。和依托咪酯相似，泰嘉依托咪酯作用于γ-氨基丁酸A受体，但其对全身麻醉中其他离子通道的影响尚未知。
**方法**：我们比较了依托咪酯和泰嘉依托咪酯影响人类N-甲基-D-天冬氨酸受体及在卵母细胞中表达的神经元烟碱型乙酰胆碱受体，通过利用2-微电极电生理技术。
**结果**：依托咪酯在临床相关浓度中对这两种类型的受体没有影响，然而泰嘉依托咪酯将近50%有效浓度在麻醉中对神经元烟碱型乙酰胆碱受体有显著的抑制。
**结论**：与依托咪酯相比较，泰嘉依托咪酯的高疏水性使其对神经元烟碱型乙酰胆碱受体有更大的抑制作用。
（胡晓清译 薛张纲校）

**BACKGROUND**: Carboetomidate is an etomidate derivative that produces hypnosis without inhibiting adrenal corticosteroid synthesis. Similar to etomidate, carboetomidate modulates γ-aminobutyric acid type A receptors, but its effects on other ion channel targets of general anesthetics are unknown.
**METHODS**: We compared etomidate and carboetomidate effects on human N-methyl-d-aspartate receptors or neuronal nicotinic acetylcholine receptors (nnAChRs) expressed in Xenopus oocytes, using 2-microelectrode voltage clamp electrophysiology.

**RESULTS**: Etomidate did not affect either type of receptor at clinically relevant concentrations, whereas carboetomidate concentrations near 50% effective concentration for anesthesia significantly inhibited nnAChRs.
**CONCLUSIONS**: Compared with etomidate, carboetomidate's higher hydrophobicity is associated with greater inhibition of nnAChRs.

## 对于进行重大外科手术病人预期无计划插管的评分系统

**A scoring system to predict unplanned intubation in patients having undergone major surgical procedures.**

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Anesth Analg July 2012 115:88-94

**背景**：手术后无计划的气管插管一直伴随着高死亡率。很少有研究探讨此并发症的危险因素。
**方法**：美国外科医师学会国家外科质量改进计划(NSQIP)是一个关于施行重大外科手术病人的多中心的，有前瞻性的，以结果为导向的数据库。我们使用NSQIP数据库中2005年至2007年组的数据（n =231548）和Cox比例风险模型，分析了风险因素，并用他们得出一个评分系统来分层病人的意外插管结果的风险。2008（N=176031）NSQIP数据用来验证此评分系统。
**结果**:对于无计划插管最有预测性的变量因素是: 患者年龄（0-4分），ASA评分（0-7分），术前败血症的存在（3分），总手术时间（0-4分）。根据这些变量调整后的危险比从0（最低风险）至18（最高风险），无计划插管的风险指数在区分病人是否需要无计划插管上具有79%的准确性，（接受操作特性曲线下面积0.79，95％可信区间0.79-0.80）。当记分系统应用到验证队列数据，其识别性能大致维持不变（接受操作特性曲线下面积0.79，95％可信区间0.79-0.80）。
**结论**：根据临床危险因素而建立的评分系统能够准确地预测手术后意外插管。计划外插管风险指数在通过改良的危险分层和围手术期护理管理而减少意外插管的发生率的有效性方面需要进一步的研究。
（李丽红译 薛张纲校）
**BACKGROUND**:Unplanned tracheal intubation after surgery has been associated with high mortality. Few studies have examined the risk factors for this complication.
**METHODS**:The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) is a multicenter, prospective, outcome-oriented database for patients having undergone major surgical procedures. Using the NSQIP data for the years 2005 to 2007 (n = 231,548) and Cox proportional hazards modeling, we identified risk factors and used them to derive a scoring system to stratify patients' risk of having

an unplanned intubation outcome. NSQIP data for the year 2008 (n = 176,031) were then used to validate the scoring system.
**RESULTS**:The variables most predictive of unplanned intubation were patient age (0-4 points), ASA physical status (0-7 points), the presence of preoperative sepsis (3 points), and total operative time (0-4 points). The Unplanned Intubation Risk Index based on the adjusted hazard ratios for these variables, ranging from 0 (lowest risk) to 18 (highest risk), had a 79% accuracy in distinguishing patients requiring unplanned intubation from those not requiring it (area under the receiver operating characteristic curve 0.79, 95% confidence interval 0.79-0.80). When the scoring system was applied to the validation cohort data, its discriminative performance remained virtually unchanged (area under the receiver operating characteristic curve 0.79, 95% confidence interval 0.79-0.80).
**CONCLUSIONS**:A scoring system based on clinical risk factors was able to accurately predict unplanned intubation after surgery. Further investigation is needed to assess the utility of the Unplanned Intubation Risk Index in reducing the incidence of unplanned intubation through improved risk stratification and management in perioperative care.

青少年后路脊柱融合术中鞘内注射吗啡对经颅电刺激动作诱发电位的影响。

**Effects of intrathecal morphine on transcranial electric motor-evoked potentials in adolescents undergoing posterior spinal fusion.**

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Anesth Analg July 2012 115:160-169;

**背景**：鞘内注射吗啡（ITM）能为后路脊柱融合术（PSF）后提供有效的镇痛。虽然大多数麻醉药对诱发电位有特征的影响，但很少有ITM对经颅电刺激动作诱发电位（tceMEPs）的影响的数据。我们的这项研究用来评估在ITM给药后30分钟内对tceMEPs的影响。我们假设，与未接受药物的对照组相比，在我们机构目前使用的ITM剂量下，ITM组不会显著影响平均tceMEP振幅和潜伏期。
**方法**：研究对象为14位11岁到18岁接受PSF的患者，在ITM注射前及注射后5、10、20、30分钟进行tceMEPs记录。将这些记录与行PSF的同龄人但未注射ITM的对照组进行比较，比较2组之间ITM对tceMEP幅度和潜伏期的影响。
**结果**：ITM组里有14名研究对象，对照组里有16名研究对象。经过对8组肌肉的研究后，两组在基线阶段的平均反应振幅没有显著差异。在30分钟的治疗后阶段中，与对照组相比，ITM组的平均反应幅度并没有显著改变。在基线阶段，所有肌肉的平均反应幅度的下降程度在每个研究对象上没有显著改变 (95% CI = -38% to 45%; P =

0.783)，同时，在治疗后阶段也没有显著改变(95% CI = -30% to 78%; P = 0.640)。此外，在基线和治疗后阶段，两组的平均反应潜伏期也没有显著差异。在每个研究对象的所有肌肉的平均反应潜伏期的下降程度方面，基线阶段ITM组比对照组大4%(95% CI = -5% to 13%; P = 0.377)，而在治疗后阶段大了3% (95% CI = -4% to 12%; P = 0.359)。

**结论**：在我们机构目前使用的ITM剂量下，与对照组相比，ITM组在注射后30分钟内并不能减少平均tceMEP幅度或潜伏期70%以上。需要进一步研究在这个初始阶段后是否存在延迟效应。

（周玲译 薛张纲校））

**BACKGROUND**: Intrathecal morphine (ITM) provides effective analgesia after posterior spinal fusion (PSF). Although most anesthetic drugs have well-characterized effects on evoked potentials, there is little data on the effects of ITM on transcranial electric motor-evoked potentials (tceMEPs). We performed this study to assess the effects of ITM on tceMEPs in the first 30 minutes after administration. We hypothesized that administration of ITM in doses currently used at our institution would not significantly affect mean tceMEP amplitudes and latencies of an ITM study group relative to control patients who did not receive the drug.

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

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

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

## 使用**Tuohy**针行无定向硬膜外穿刺增加慢性头痛的风险

**Unintentional dural puncture with a tuohy needle increases risk of chronic headache.**

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Anesth Analg July 2012 115:124-132

**背景**：在美国约半数的孕妇选择椎管内镇痛。硬脊膜意外穿破是这项镇痛技术最常见的并发症。在这些发生并发症的产妇中，70%至80%的病人会发生严重的位置相关的头痛。急性硬膜穿刺后头痛已被广泛知晓，但少有研究探讨长期预后。我们以被17号Tuohy针无意穿破硬脊膜的产妇为研究对象，研究其术后慢性头痛及慢性背痛的发生率和危险因素
**方法**：病例对照实验中，40名孕产时间大于18个月且被17号Tuohy针刺破硬脊膜的产妇通过电话随访，根据年龄、体重及分娩时长分组，回答2项有效问卷并评估产后12至24个月的头痛及背痛。
**结果**：研究组慢性头痛的发生率（28%）明显高于对照组（5%）(OR = 7, P = 0.0129)。硬膜被穿破的研究对象相比对照组更易发生慢性背痛(OR = 4, P = 0.0250)。但是血补丁治疗并不是增加慢性背痛发生的危险因素。
**结论**：硬膜被大号穿刺针无意穿破的患者令人惊讶的易发生术后慢性头痛。治疗使用硬膜外血补丁并不会增加慢性背痛的发生率。其病理生理以解释这项症状以及最佳的治疗方法尚未知。
（杨琰译 薛张纲校）

**BACKGROUND**: Neuraxial analgesia is chosen by almost half of women who give birth in the United States. Unintentional dural puncture is the most common complication of this pain management technique, occurring in 0.4% to 6% of parturients. Severe positional headaches develop acutely in 70% to 80% of these parturients. Acute postdural puncture headaches are well known, but few studies have investigated long-term sequelae. We investigated the incidence of and risk factors for chronic headache and chronic back pain in parturients who experienced unintentional dural puncture with a 17-gauge Tuohy needle compared with matched controls.
**METHODS**: In a case control design, 40 parturients who sustained unintentional dural puncture with a 17-gauge Tuohy needle over an 18-month period and 40 controls matched for age, weight, and time of delivery were recruited by telephone and 2 validated questionnaires were administered assessing headache and back pain symptoms 12 to 24 months after delivery.
**RESULTS**: The incidence of chronic headaches in the study group (28%) was significantly higher than in the matched controls (5%) (OR = 7, P = 0.0129). Subjects who experienced dural punctures were more likely than controls to report chronic back pain (OR = 4, P = 0.0250), but treatment with an epidural blood patch was not a risk factor for chronic back pain.
**CONCLUSIONS**: Patients who incur unintentional dural punctures with large-gauge needles are surprisingly likely to continue to suffer chronic headaches. Treatment with an epidural blood patch does not enhance the risk of chronic back pain. The pathophysiology underlying these symptoms and the best treatment for this syndrome are not known.

## 加巴喷丁对七氟醚麻醉下大鼠的瑞芬太尼急性阿片药物耐受的影响

**The Effects of Gabapentin on Acute Opioid Tolerance to Remifentanil Under Sevoflurane Anesthesia in Rats**

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Anesth Analg July 2012 115:40-45

**背景**：在七氟醚麻醉过程中出现瑞芬太尼耐受可能会降低其减少麻醉药使用量的能力。加巴喷丁被证实能有效降低术后麻醉药物使用量，这种作用可能与降低阿片类药物耐受及痛觉过敏有关。本试验研究加巴喷丁是否能在七氟醚最低肺泡有效浓度下（MAC）预防由瑞芬太尼引起明显的急性阿片类药物耐受（AOT）
**方法**：用七氟醚麻醉Wistar大鼠，给予加巴喷丁150mg/kg或300mg/kg，观察其对七氟醚MAC的单独效应。第二个实验：在使用瑞芬太尼前（120μg · $kg^{-1}$ · $h^{-1}$和240μg · $kg^{-1}$ · $h^{-1}$）给予加巴喷丁300mg/kg。在给予加巴喷丁前测定MAC，并在给予后每1.5小时测定MAC共3次，以评估AOT。从气道采样并使用测流气体分析仪来测定MAC；使用鼠尾夹来给予阈上刺激。统计分析采用单因素方差分析。
**结果**：瑞芬太尼120μg · $kg^{-1}$ · $h^{-1}$和240μg · $kg^{-1}$ · $h^{-1}$分别降低七氟醚MAC（2.5±0.2%）16%±5%和36%±6%，在同时应用加巴喷丁（300mg/kg）时七氟醚MAC进一步降低分别达39%±12%和62%±14% (与单独使用瑞芬太尼相比，$P < 0.01$)。单独使用加巴喷丁时（150mg/kg和300mg/kg）降低七氟醚MAC 26%（两组，$P < 0.01$）。1.5小时以后，通过观察MAC降低程度的减少来确定发生了瑞芬太尼AOT。当瑞芬太尼与加巴喷丁同时使用时，未观察到瑞芬太尼的AOT ($P > 0.05$)。
**结论**：加巴喷丁降低七氟醚的MAC，与瑞芬太尼合用时降低七氟醚MAC有增强作用。此增强作用可能限制大鼠AOT的产生。
（范逸臣　译　陈杰　校）

**BACKGROUND:** Tolerance to remifentanil during sevoflurane anesthesia may blunt the ability of this drug to reduce anesthetic requirements. Gabapentin has been shown to be effective in reducing postoperative narcotic usage, a reduction that may be associated with a reduction in opioid-induced tolerance and hyperalgesia. We sought to determine whether gabapentin might prevent the observed acute opioid tolerance (AOT) produced by remifentanil in sevoflurane minimum alveolar concentration (MAC).
**METHODS:** Wistar rats were anesthetized with sevoflurane and the effects of gabapentin alone on sevoflurane MAC were determined at doses of 150 and 300 mg · $kg^{-1}$. In a second experiment, gabapentin 300 mg · $kg^{-1}$ was administered before remifentanil (120 and 240 μg · $kg^{-1}$ · $h^{-1}$). The MAC was determined before gabapentin administration and 3 more times at 1.5-hour intervals after drug administration to assess AOT. MAC was determined from intratracheal gas samples using a sidestream gas analyzer; tail clamping was used as a supramaximal stimulus. Statistical analysis was performed with the 1-way analysis of variance test.
**RESULTS:** Remifentanil reduced MAC (2.5 ± 0.2%) by 16% ± 5% and 36% ± 6% (120 and 240 μg · $kg^{-1}$ · $h^{-1}$, respectively, $P < 0.01$) with a further reduction produced by coadministration with gabapentin 300 mg · $kg^{-1}$ to 39% ± 12% and 62% ± 14%, respectively ($P < 0.01$ versus remifentanil alone). Gabapentin given alone at 150 and 300 mg · $kg^{-1}$ reduced MAC by 26% (both doses, $P < 0.01$). AOT was observed with remifentanil and characterized by a lower degree of MAC reduction, approximately 1.5 hours later ($P < 0.05$). However, when remifentanil was administered with gabapentin, the AOT to remifentanil was not observed ($P > 0.05$).
**CONCLUSIONS:** Gabapentin reduced the sevoflurane MAC and enhanced the MAC reduction produced by remifentanil. This enhancement may limit AOT in rats.

# 异氟醚预处理可维持暴露于高血糖引起的氧化应激状态下人体动脉的三磷酸腺苷敏感的钾离子通道的功能

**Isoflurane Pretreatment Preserves Adenosine Triphosphate–Sensitive $K^+$ Channel Function in the Human Artery Exposed to Oxidative Stress Caused by High Glucose Levels**

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Anesth Analg July 2012 115:54-61;

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

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

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

**结论：**本试验首次证明使用异氟醚预处理对离体人体动脉的保护作用，异氟醚预处理可保护暴露于高血糖引起的氧化应激中的人网膜动脉ATP敏感型钾通道的活性，而这一作用

似乎由NADPH氧化酶的抑制所介导。因此，挥发性麻醉药可能对氧化应激造成的人体内脏动脉功能障碍具有保护作用。
（夏苏云　译　陈杰　校）

**BACKGROUND:** Adenosine triphosphate (ATP)-sensitive $K^+$ channels contribute to significant regulatory mechanisms related to organ blood flow in both physiological and pathological conditions. High glucose impairs arterial ATP-sensitive $K^+$ channel activity via superoxide production. However, the effects of anesthetics on this pathological process have not been evaluated in humans. In the present study, we investigated whether pretreatment with the volatile anesthetic isoflurane preserves ATP-sensitive $K^+$ channel activity in the human artery exposed to oxidative stress caused by high glucose.
**METHODS:** All experiments were performed using human omental arteries without endothelium in the presence of d-glucose (5.5 mmol/L). Some arteries were treated with isoflurane (1.15% or 2.3%) in combination with d- or l-glucose (20 mmol/L) for 60 minutes, and then only isoflurane was discontinued. Relaxation and hyperpolarization of arterial segments in response to an ATP-sensitive $K^+$ channel opener levcromakalim were evaluated using the isometric force recording or electrophysiological study, respectively. Superoxide production was determined by dihydroethidium fluorescence. Immunohistochemical analysis for a subunit of reduced nicotinamide adenine dinucleotide phosphate (NADPH) oxidase p47phox was performed. Data were evaluated using repeated-measures analysis of variance or a factorial analysis of variance as appropriate, followed by Scheffé test.
**RESULTS:** The ATP-sensitive $K^+$ channel antagonist glibenclamide ($10^{-6}$ mol/L) abolished relaxation induced by cumulative addition of levcromakalim ($10^{-8}$ to $10^{-5}$ mol/L) in arteries treated with l-glucose (20 mmol/L). Incubation with d-glucose (20 mmol/L) impaired the vasorelaxation induced by levcromakalim. The selective NADPH oxidase NOX2 inhibitor gp91ds-tat ($10^{-6}$ mol/L) and pretreatment with isoflurane (1.15% and 2.3%) restored relaxation in response to levcromakalim in arteries treated with d-glucose (20 mmol/L). Isoflurane (2.3%), gp91ds-tat ($10^{-6}$ mol/L), and their combination similarly restored hyperpolarization in response to levcromakalim ($3 \times 10^{-6}$ mol/L) in arteries treated with d-glucose (20 mmol/L). Along with these results, isoflurane (2.3%) reduced superoxide production and the intracellular mobilization of the cytosolic NOX2 subunit p47phox toward smooth muscle cell membrane in arteries treated with d-glucose (20 mmol/L).
**CONCLUSIONS:** We have demonstrated for the first time a beneficial effect from the pretreatment with isoflurane on the isolated human artery. Pretreatment with isoflurane preserves ATP-sensitive $K^+$ channel activity in the human omental artery exposed to oxidative stress induced by high glucose, whereas the effect seems to be mediated by NADPH oxidase inhibition. Volatile anesthetics may protect human visceral arteries from malfunction caused by oxidative stress.

## 使用光体积描记术波形的时频分析探究抽取900毫升血液期间变化

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

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Anesth Analg July 2012 115:74-81

**背景**：此研究目的为确定健康志愿者自主呼吸下抽取900毫升血液期间在心率或动脉血压显著变化前，是否可通过检查光体积描记图（PPG）波形的心率频谱带和/或呼吸频谱带随时间变化频谱幅度检测其变化。本研究还探讨耳朵、手指和前额，哪个是用于早期检测血容量损失时PPG探头放置的最佳部位。
**方法**：八位受试者被抽取900毫升血液后再回输。生理监测包括耳朵、手指和前额部位的PPG的波形、标准心电图、标准血压袖带测量。从心率频段和呼吸频率段在PPG波形随时间变化的振幅序列中提取高分辨率时频谱。这些振幅用于作为失血检测参数。
**结果**：处理期间受试者心率和血压没有显着变化。使用从耳朵、手指和前额探测部位收集的PPG波形的时频分析，当抽出900ml血液时，发现相对于基线，提取的相对心率的频率振幅信号显著下降（P
<0.05）；在耳部，仅300毫升血液被抽出时相应的信号下降就出现下降。
在耳朵、手指和额头三个部位分别进行监测，损失900毫升血液时相对基线的心率分量的振幅分别平均下降45.2%（38.2%），42.0%（29.2%）和42.3%（30.5%），括号中显示95%的置信区间。
900毫升血回输后，显示心率的振幅信号向基线恢复。基线和900毫升的血液抽出后之间心率振幅值有一个明显的分离。将心率频率优化分离2簇心率振幅值（基线和失血）而得到的选定耳PPG信号的阈值，其特异性和敏感性都为87.5%，95%置信区间是（47.4%，99.7%）。同时，发现在相应的呼吸频率波段的光谱幅度没有显着变化。
**结论**：时频光谱法可监测自主呼吸下血压心率显著变化前的血液丢失。发现自住呼吸患者失血时，心率频率带的光谱振幅显著减少，然而呼吸频率带的无显著变化。这项技术可作为手术中和创伤期有价值监测出血的监测方法。
（孙晓琼　译　陈杰　校）

**BACKGROUND:** We designed this study to determine if 900 mL of blood withdrawal during spontaneous breathing in healthy volunteers could be detected by examining the time-varying spectral amplitude of the photoplethysmographic (PPG) waveform in the heart rate frequency band and/or in the breathing rate frequency band before significant changes occurred in heart rate or arterial blood pressure. We also identified the best PPG probe site for early detection of blood volume loss by testing ear, finger, and forehead sites.
**METHODS:** Eight subjects had 900 mL of blood withdrawn followed by reinfusion of 900 mL of blood. Physiological monitoring included PPG waveforms from ear, finger, and forehead probe sites, standard electrocardiogram, and standard blood pressure cuff measurements. The time-varying amplitude sequences in the heart rate frequency band and breathing rate frequency band present in the PPG waveform were extracted from high-resolution time-frequency spectra. These amplitudes were used as a parameter for blood loss detection.
**RESULTS:** Heart rate and arterial blood pressure did not significantly change during the protocol. Using time-frequency analysis of the PPG waveform from ear, finger, and forehead probe sites, the amplitude signal extracted at the frequency corresponding to the heart rate significantly decreased when 900 mL of blood was withdrawn, relative to baseline (all $P < 0.05$); for the ear, the corresponding signal decreased when only 300 mL of blood was withdrawn.

The mean percent decrease in the amplitude of the heart rate component at 900 mL blood loss relative to baseline was 45.2% (38.2%), 42.0% (29.2%), and 42.3% (30.5%) for ear, finger, and forehead probe sites, respectively, with the lower 95% confidence limit shown in parentheses. After 900 mL blood reinfusion, the amplitude signal at the heart rate frequency showed a recovery towards baseline. There was a clear separation of amplitude values at the heart rate frequency between baseline and 900 mL blood withdrawal. Specificity and sensitivity were both found to be 87.5% with 95% confidence intervals (47.4%, 99.7%) for ear PPG signals for a chosen threshold value that was optimized to separate the 2 clusters of amplitude values (baseline and blood loss) at the heart rate frequency. Meanwhile, no significant changes in the spectral amplitude in the frequency band corresponding to respiration were found.
**CONCLUSION:** A time-frequency spectral method detected blood loss in spontaneously breathing subjects before the onset of significant changes in heart rate or blood pressure. Spectral amplitudes at the heart rate frequency band were found to significantly decrease during blood loss in spontaneously breathing subjects, whereas those at the breathing rate frequency band did not significantly change. This technique may serve as a valuable tool in intraoperative and trauma settings to detect and monitor hemorrhage.

## 改良快速顺序诱导和插管: 美国最新临床调查

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

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Anesth Analg July 2012 115:95-101

**背景:** 快速顺序诱导插管 (RSII)
是一种广泛用于防止胃内容物返流和保护气道的技术。改良的RSII在一些特定临床条件下应用。然而改良RSII没有明确定义。因此，本研究调查了全美各地的学术中心的临床医生，以建立改良RSII的确切定义及其目前的使用情况。
**方法:**
本调查意在对改良RSII的定义和具体使用提出问题，并且由测试者证实。给全美131家麻醉住院医师培训机构发送了电子邮件。设计logistic回归模型来评估在接受改良RSII的测试者中有肯定回应及连续回答调查各项问题的百分比。医师状态也同样被计算在内（住院和主治）。
**结果:**
从58个机构中得到了490份调查(44%的机构回应率);93%测试者使用改良RSII,他们中的85% 持续完成了调查研究。大多数测试者(71%, 置信区间: 63%–77%)
报告在麻醉诱导前予以吸氧，进行环状软骨压迫，以及在保障气道通气前尝试面罩通气。测试者记录到，当病人中度或病态肥胖(59%, 53%–64%)，有胃食管返流病史但当前无症状(52%, 46%–57%)，食道裂孔疝(42%, 36%–48%)或者外伤病人禁食8小时以上(39%, 33%–45%)时，他们会使用改良RSII。同样的结果在那些没有持续完成的调查中也有所体现。

**结论:** 在调查基础上，本研究确定了3个改良RSII的特征: (1) 诱导前吸氧; (2) 环状软骨压迫; (3) 气道保障前尝试病人肺部通气。这一定义很显而易见，尽管如此被公众接受，但之前却没有相关试验数据。
（俞劼晶　译　陈杰　校）
**BACKGROUND:** Rapid sequence induction and intubation (RSII) is a technique commonly used to resist regurgitation of gastric contents and protect the airway. A modification of this technique is implemented in certain clinical circumstances. However, there is currently no standard definition for a modified RSII. Therefore, we surveyed clinicians at academic centers across the United States to establish a working definition of a modified RSII as well as the clinical scenarios in which it is being used.
**METHODS:** A survey was created that queried the use and definition of modified RSII, and validated with test respondents. We then mailed the survey to all 131 anesthesia residency training programs across the United States. Logistic regression models were created to estimate the percentage of affirmative responses among respondents that performed modified RSII procedures and answered survey items in a consistent manner. Similar quantities were calculated by physician status (resident and attending).
**RESULTS:** Four hundred ninety surveys were received from 58 institutions (44% institution response rate); 93% of respondents reported using a modified RSII, and of those 85% consistently completed the survey instrument. A majority of respondents (71%, CI: 63%–77%) reported administering oxygen before anesthesia induction, applying cricoid pressure, and attempting to ventilate the lungs via a facemask before securing the airway. Respondents noted that they would use a modified RSII procedure if the patient were either moderately or morbidly obese (each ~59%, 53%–64%), had a history but no current symptoms of gastroesophageal reflux disease (52%, 46%–57%), had a hiatal hernia (42%, 36%–48%) or were a trauma patient who had been NPO for at least 8 h (39%, 33%–45%). Similar RSII results were obtained when repeating the analysis on the subset that did not enforce the consistency requirements.
**CONCLUSIONS:** Based on our survey we have established three defining features of a modified RSII: (1) oxygen administration before induction; (2) the use of cricoid pressure; and (3) an attempt to ventilate the patient's lungs before securing the airway. Although this definition seems intuitively obvious, no previous work has tested whether it is commonly accepted.

## 简报：全身炎性反应与正常肺机械通气策略相关性急性肺损伤无关

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

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Anesth Analg July 2012 115:118-121

**背景**：机械通气（MV）可引起继发于创伤的通气诱导肺损伤，且与肺炎症因子增加相关。关于肺损伤与全身炎性反应的关系尚存争议。本报告阐明了机械通气对全身炎症的影响。

**方法**：本报告是先前已发表的一篇研究的部分内容（Hong et al. Anesth Analg 2010;110:1652–60）。雌猪随机分为三组。H-Vt/3组根据预计体重（PBW）给予潮气量（VT）15ml/kg机械通气/呼气末正压（PEEP）为3cm H2O；L-Vt/3组根据预计体重给予6ml/kg潮气量/PEEP为3cm H2O机械通气；L-VT/10根据预计体重给予6ml/kg潮气量/PEEP为10cm H2O机械通气，共机械通气8小时。每组6个样本（n=6）。
抽取机械通气前后的血清进行炎性标志检测。同时监测血流动力学，气道力学及动脉血气。

**结果**：组间的全身炎症因子没有显著差异。所有样本的血清炎性标志物的变化趋势相似。此结果与先前发表的支气管肺泡灌洗物中炎性介质升高的结果矛盾。

**结论**：全身炎性标志物和机械通气相关性肺损伤不相关。

（陆秉玮　译　陈杰　校）

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

**METHODS:** This report is part of a previously published study (Hong et al. Anesth Analg 2010;110:1652–60). Female pigs were randomized into 3 groups. Group H-Vt/3 was ventilated with a tidal volume (Vt) of 15 mL/kg predicted body weight (PBW)/positive end-expiratory pressure (PEEP) of 3 cm $H_2O$; group L-Vt/3 with a Vt of 6 mL/kg PBW/PEEP of 3 cm H2O; and group L-Vt/10 with a Vt of 6 mL/kg PBW/PEEP of 10 cm $H_2O$, for 8 hours. Each group had 6 subjects ($n$ = 6). Prelung and postlung sera were analyzed for inflammatory markers. Hemodynamics, airway mechanics, and arterial blood gases were monitored.

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

**CONCLUSION:** Systemic inflammatory markers did not correlate with lung injury associated with MV.

## 吗啡、普瑞巴林、加巴喷丁和度洛西丁在大鼠病理性疼痛模型中对机械痛敏和神经瘤疼痛的不同作用

**The Efficacy of Morphine, Pregabalin, Gabapentin, and Duloxetine on Mechanical Allodynia Is Different from That on Neuroma Pain in the Rat Neuropathic Pain Model**

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Anesth Analg July 2012 115:182-188;

**背景**：据报道，<50%的神经痛患者对药物治疗满意。由于开具药物处方时忽略了疼痛的原因，故神经病理性疼痛药物缺乏有效性是有可能的。本文比较了口服吗啡、普瑞巴林、加巴喷丁和度洛西丁在胫骨神经瘤换位模型（TNT）中对机械痛敏和神经瘤疼痛的疗效。
**方法**：在TNT模型中，横切胫神经，将胫神经残端嫁接至后肢外侧。TNT模型建立后，观察到机械痛敏和神经瘤痛。给予吗啡、普瑞巴林、加巴喷丁和度洛西丁口服并检查其抗机械痛敏和神经瘤痛疗效。
**结果**：吗啡、普瑞巴林、加巴喷丁和度洛西丁对机械痛敏有剂量依赖性的治疗作用。吗啡可以减轻神经瘤疼痛，而普瑞巴林、加巴喷丁和度洛西丁无效。吗啡对神经瘤痛的疗效小于其对机械痛敏的疗效。在两种药物合用的研究中（吗啡+普瑞巴林，吗啡+度洛西丁，普瑞巴林+度洛西丁），所有药物合用产生了对治疗机械痛敏的协同效应，但对神经瘤的疼痛治疗无此效应。
**结论**：这些数据表明与治疗神经瘤性疼痛不同，吗啡及普瑞巴林、加巴喷丁、度洛西丁对治疗机械痛敏更有效，且联合疗法是另一种治疗神经病理性疼痛的方法。
（滕凌雅　译　陈杰　校）

**BACKGROUND:** It has been reported that <50% of neuropathic pain patients are satisfactorily treated with drugs. It is possible that this lack of efficacy of drugs on neuropathic pain might be due to the drugs prescribed, regardless of the origin of pain. We compared the efficacy of orally administered morphine, pregabalin, gabapentin, and duloxetine on mechanical allodynia with that on neuroma pain using the tibial neuroma transposition (TNT) model.
**METHODS:** In the TNT model, the tibial nerve is transected, and the tibial nerve stump is transpositioned to the lateral aspect of the hindlimb. After TNT injury, mechanical allodynia and neuroma pain are observed. Morphine, pregabalin, gabapentin, and duloxetine were administered orally and were examined for the antiallodynic and antineuroma pain effects.
**RESULTS:** Morphine, pregabalin, gabapentin, and duloxetine attenuated the level of mechanical allodynia in a dose-dependent manner. Morphine—but not pregabalin, gabapentin, and duloxetine—attenuated the neuroma pain. Morphine was less potent in neuroma pain than in mechanical allodynia. In the 2-drug-combination studies (morphine + pregabalin, morphine + duloxetine, and pregabalin + duloxetine), all drug combinations produced a synergistic effect on mechanical allodynia, but not on neuroma pain.
**CONCLUSIONS:** These data indicate that the potency of morphine and the efficacy of pregabalin, gabapentin, and duloxetine on mechanical allodynia are different from those on neuroma pain and that combination therapy is one of different therapeutic choices for the treatment of neuropathic pain.

## 在大鼠术后疼痛模型中加巴喷丁通过脊髓作用加强双氯芬酸钠的抗痛觉过敏效果

**Gabapentin Augments the Antihyperalgesic Effects of Diclofenac Sodium Through Spinal Action in a Rat Postoperative Pain Model**

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Anesth Analg July 2012 115:189-193

**背景**：加巴喷丁及非甾体类抗炎药物(NSAIDs)
缓解人术后疼痛和神经病理性疼痛。加巴喷丁和非甾体抗炎药的组合对治疗术后疼痛和增

强手术后功能恢复是有效的。鞘内注射加巴喷丁或NSAIDs在大鼠术后疼痛模型中可抑制痛觉过敏。然而,没有资料提示在鞘内混合注射加巴喷丁和非甾体抗炎药有何效果。因此,本试验研究鞘内注射加巴喷丁和非甾体抗炎药物在老鼠术后疼痛模型中的作用。
**方法**：大鼠在氟烷麻醉下行鞘内置管。置管后两天,分组并鞘内注射加巴喷丁(4,40,或400μg每20μL盐水)，双氯芬酸钠－－非选择性环氧合酶抑制剂
(2、20或200ug每20μL6%葡萄糖溶液),20μL生理盐水,20μL
6%葡萄糖,加巴喷丁和双氯芬酸混合液(40μg加巴喷丁+ 20μg双氯芬酸和4μg加巴喷丁+ 2μg双氯芬酸每20μL
6%葡萄糖)。注射后30分钟行后爪切开。每个小组由6只大鼠组成。分别在鞘内置管前和后2小时,和后爪切开后1、3、5和7天通过使用von
Frey纤维检测机械阈值来评估继发性痛敏
**结果**：与对照组相比，加巴喷丁400μg组持续7天减轻了机械性痛敏。200μg双氯芬酸与对照组相比抑制痛敏长达5天。与单独使用加巴喷丁40μg或双氯芬酸20μg相比，加巴喷丁40 μg
+双氯芬酸组20μg在术后2小时、1天显著降低继发性痛敏。与双氯芬酸2μg组相比，加巴喷丁4μg
+双氯芬酸显著2μg减轻了术后2小时、1天的痛敏。与切开前阈值相比，对侧爪的缩足反射阈值并未改变。
**结论**：鞘内混合注射加巴喷丁和双氯芬酸可减轻继发性痛敏，单独应用时并无作用。此研究结果表明,
在脊髓水平减少术后疼痛中加巴喷丁和双氯芬酸起到重要作用,加巴喷丁通过脊髓作用增强双氯芬酸的抗痛敏效果。
（龚寅　译　陈杰　校）
**BACKGROUND:** Gabapentin and nonsteroidal antiinflammatory drugs (NSAIDs) attenuate postoperative pain and neuropathic pain in humans. The combination of gabapentin and NSAIDs is effective for postoperative pain and enhances functional recovery after surgery. Intrathecal administration of gabapentin or NSAIDs inhibits hyperalgesia in a rat postoperative pain model. However, there is no information on the effects of intrathecal administration of a combination of gabapentin and NSAIDs. We therefore investigated the effects of intrathecal administration of gabapentin and NSAIDs in a rat model of postoperative pain.
**METHODS:** Rats were prepared for intrathecal catheters under halothane anesthesia. Two days after catheterization, gabapentin (4, 40, or 400 μg per 20 μL of saline), diclofenac sodium, a nonselective cyclooxygenase inhibitor (2, 20, or 200 μg per 20 μL of 6% glucose), 20 μL saline, 20 μL 6% glucose, and a combination of gabapentin and diclofenac (40 μg gabapentin + 20 μg diclofenac and 4 μg gabapentin + 2 μg diclofenac per 20 μL 6% glucose) were injected intrathecally. We performed a hindpaw incision 30 minutes after injection. Each group consisted of 6 rats. The mechanical threshold was measured to evaluate secondary hyperalgesia using von Frey filaments before intrathecal catheterization and at 2 hours, and 1, 3, 5, and 7 days after paw incision.
**RESULTS:** Gabapentin 400 μg attenuated mechanical hyperalgesia for 7 days compared with the control group. Diclofenac 200 μg inhibited hyperalgesia for 5 days compared with the control group. The 40 μg gabapentin + 20 μg diclofenac group had a significantly reduced secondary hyperalgesic response in 2 hours and 1 day compared with 40 μg gabapentin and 20 μg diclofenac, respectively. The 4 μg gabapentin + 2 μg diclofenac group had a significantly

reduced secondary hyperalgesic response in 2 hours and 1 day compared with 2 μg diclofenac. The withdrawal threshold on the contralateral paw did not change compared with the preincision threshold.
**CONCLUSION:** Intrathecal administration of gabapentin and diclofenac in combination reduced secondary hyperalgesia at doses having no antihyperalgesic effects when given individually. Our results suggest that gabapentin and diclofenac have an important role in postoperative pain reduction at the spinal level, and that gabapentin augments the antihyperalgesic effects of diclofenac through action in the spinal cord.

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

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

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Anesth Analg July 2012 115:194-201

**背景**：自1936年Atkinson's描述球后阻滞，以针刺给药为基础的麻醉技术已成为眼科麻醉的主要方法。但是，这项技术有罕见，但严重的并发症，如眼球穿孔。超声技术在外周神经阻滞已广泛运用，但其在眼部麻醉的应用因为顾虑超声可能对脆弱眼组织产生热敏或生物力学伤害而受阻。美国食品和药物管理局（FDA）已制定超声眼科检查指南，但大多数麻醉医师使用的眼部超声设备没有通过FDA批准，
因为此类设备产生过多能量。国家监管机构指出，只要不超过组织生理温度水平1.5℃，即可安全进行超声检查。
**方法**：利用家兔模型，调查长时间使用眼眶超声及非眼眶超声对眼部的温度及机械效应。此双阶段研究旨在检测是否会导致眼外伤，对8只家兔的眼睛进行2种设备连续10分钟的超声检查：(1) the Sonosite Micromaxx（非特定眼眶型） (2) the Sonomed VuMax（特定眼眶型）。第一阶段，通过植入热电偶，在特定的眼部结构连续监测温度（N =4）。 第二阶段，无手术治疗情况下进行超声暴露（n =4）。对所有眼睛行光学显微镜检查，并由眼科病理学家进行不定时组织学评价。
**结果**：4只家兔的眼睛被检测到温度变化。三只家兔的晶状体（分别在5.0, 5.5, 及1.5min）及两只家兔的角膜（均在1.5min）在非特定眼眶型超声下下，眼部组织温度超过安全上限（增加>1.5℃）。
继而进行时间温度分析，发现在3.5min时角膜处，在2.5min时晶状体处，在4.0min时玻璃体处，特定眼眶型及非特定眼眶型组存在明显的统计学差异(Bonferroni校正法 $P < 0.05$)。两组光学显微镜和组织学检查均未发现眼外伤。

结论：非特定眼眶型超声(Sonosite Micromaxx)会增加眼部组织的温度。需进行更大更多的调查研究来证实其安全性。目前，眼科超声引导阻滞应仅在特定眼眶型设备下进行。
（陈毓雯　译　陈杰　校）

**BACKGROUND:** Since Atkinson's original description of retrobulbar block in 1936, needle-based anesthetic techniques have become integral to ophthalmic anesthesia. These techniques are unfortunately associated with rare, grave complications such as globe perforation. Ultrasound has gained widespread acceptance for peripheral nerve blockade, but its translation to ocular anesthesia has been hampered because sonic energy, in the guise of thermal or biomechanical insult, is potentially injurious to vulnerable eye tissue. The US Food and Drug Administration (FDA) has defined guidelines for safe use of ultrasound for ophthalmic examination, but most ultrasound devices used by anesthesiologists are not FDA-approved for ocular application because they generate excessive energy. Regulating agencies state that ultrasound examinations can be safely undertaken as long as tissue temperatures do not increase >1.5°C above physiological levels.
**METHODS:** Using a rabbit model, we investigated the thermal and mechanical ocular effects after prolonged ultrasonic exposure to single orbital- and nonorbital-rated devices. In a dual-phase study, aimed at detecting ocular injury, the eyes of 8 rabbits were exposed to continuous 10-minute ultrasound examinations from 2 devices: (1) the Sonosite Micromaxx (nonorbital rated) and (2) the Sonomed VuMax (orbital rated) machines. In phase I, temperatures were continuously monitored via thermocouples implanted within specific eye structures ($n = 4$). In phase II the eyes were subjected to ultrasonic exposure without surgical intervention ($n = 4$). All eyes underwent light microscopy examinations, followed at different intervals by histology evaluations conducted by an ophthalmic pathologist.
**RESULTS:** Temperature changes were monitored in the eyes of 4 rabbits. The nonorbital-rated transducer produced increases in ocular tissue temperature that surpassed the safe limit (increases >1.5°C) in the lens of 3 rabbits (at 5.0, 5.5, and 1.5 minutes) and cornea of 2 rabbits (both at 1.5 minutes). A secondary analysis of temporal temperature differences between the orbital-rated and nonorbital transducers revealed statistically significant differences (Bonferroni-adjusted $P < 0.05$) in the cornea at 3.5 minutes, the lens at 2.5 minutes, and the vitreous at 4.0 minutes. Light microscopy and histology failed to elicit ocular injury in either group
**CONCLUSIONS:** The nonorbital-rated ultrasound machine (Sonosite Micromaxx) increases the ocular tissue temperature. A larger study is needed to establish safety. Until then, ophthalmic ultrasound-guided blocks should only be performed with ocular-rated devices.

## 股神经阻滞联合选择性胫神经阻滞可提供有效的全膝关节置换术后镇痛，同时避免足下垂发生：一项前瞻性，随机，观察者盲法研究

## Femoral Nerve Block With Selective Tibial Nerve Block Provides Effective Analgesia Without Foot Drop After Total Knee Arthroplasty: A Prospective, Randomized, Observer-Blinded Study

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Anesth Analg July 2012 115:202-206

**背景**：坐骨神经阻滞联合股神经阻滞对于全膝关节置换术，可提供优越的镇痛效果，但会产生足下垂的并发症，这可能掩盖了手术引起的腓总神经损伤。这项前瞻性，随机，观察者盲法的研究目的是评估在腘窝行选择性胫神经阻滞是否能避免完全的腓运动神经阻滞。

**方法**：择期行膝关节置换术的患者80例，随机接受腘窝处的胫神经阻滞或坐骨神经分叉处阻滞，并联合股神经阻滞，作为多模式镇痛的一部分。为了阻滞目标神经需要足够的局部麻醉剂量，最多20毫升。手术中使用全身麻醉。麻醉苏醒后，在恢复室需评价腓神经感觉阻滞和运动阻滞是否存在。同时记录术后24小时疼痛评分和阿片类的用量。

**结果**：胫神经阻滞和坐骨神经阻滞分别在腘横纹近端1.7cm处（99％置信区间为1.3～2.1）和9.4cm处（99％CI，8.3到10.5）进行，（均数间差异的99％CI为6.4至9.0，P<0.001）。低剂量的0.5％罗哌卡因用于胫神经阻滞，分别为8.7ml（99％CI，7.9～9.4）与15.2ml（99％CI，14.9至15.5），（均数间差异的99％CI为5.6 7.3;
P<0.001）。接受胫神经阻滞的病人中无人发生完全性腓运动神经阻滞，而行坐骨神经阻滞的病人中则有82.5％发生这种并发症（P
<0.01）。疼痛评分和阿片类药物用量在两组之间没有显著差异。

**结论**：对于接受全膝关节置换术的患者联合股神经阻滞情况下，在腘窝靠近腘横纹处行胫神经阻滞可以避免完全的腓运动神经阻滞，又能提供与坐骨神经阻滞类似的镇痛效果。（张婷　译　陈杰　校）

**BACKGROUND:** Sciatic nerve block when combined with femoral nerve block for total knee arthroplasty may provide superior analgesia but can produce footdrop, which may mask surgically induced peroneal nerve injury. In this prospective, randomized, observer-blinded study, we evaluated whether performing a selective tibial nerve block in the popliteal fossa would avoid complete peroneal motor block.

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

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

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