心脏术中体外循环泵操作和抗凝：来自全球心肺转流术的调查结果

Pump Priming Practices and Anticoagulation in Cardiac Surgery: Results From the Global Cardiopulmonary Bypass Survey

Miles, Lachlan F. MBBS (Hons), PGCertCU, FANZCA[*]; Coulson, Timothy G. MBBS, FANZCA[†]; Galhardo, Carlos MD[‡]; Falter, Florian MD, FRCA, FFICM, PhD[†]

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背景:在心肺转流实践中，由于对泵预充胶体和晶体以及不同类型液体之间的最佳选择偏好存在着相互矛盾的证据，而使得对这方面的了解知之甚少。根据文献报道的不同，我们推测在体外循环的实践中存在相当大的区域差异，尤其是在体外循环预充液体类型方面。

方法:由不同地区专家协会发起了一个针对成人心脏麻醉医师的由 16 个问题组成的网络调查。其中一个问题与激活凝血时间直接相关，5 个问题与预充液选择的晶体和胶体类型及添加剂有关。剩下的问题与心脏停跳液的选择有关。该调查从 2015 年 6 月持续至 2016 年 5 月。

结果:一共分析了 923 份调查回复。欧洲、北美、澳大利亚、新西兰和南美的估计回馈率分别为 19.77%、8.06%、16.30%和 1.68%。世界范围内的大多数(92.5%)被调查者认为激活凝血时间< 400 秒对于体外循环来说是不安全的。虽然与胶体(23.8%)的组合也很受欢迎，但晶体作为唯一液体仍然是世界上最常见的预充液组成形式(38.1%)。17.9%的受访回复使用逆行自体血液预充。肝素是最常用的预充添加剂(43.0%)，其次是甘露醇(35.2%)。这些范畴内的不同反映了地区实践的差异。

结论：区域性体外循环技术在泵预充和抗凝实践方面存在着差异。这些差异对病人预后的影响是不确定的，有待进一步的研究。

(刘玉琦译 李士通校)

BACKGROUND: Regional patterns of practice in cardiopulmonary bypass remain poorly understood with conflicting evidence regarding the best choices in pump priming preferences with respect to colloid and crystalloid and different types of fluid within these categories. In light of the variation in the literature, we hypothesized there would be considerable regional differences in cardiopulmonary bypass practice, particularly with respect to the type of fluid used to prime the extracorporeal circuit.

METHODS: A 16-question, Internet-based survey was distributed by various regional specialist societies, targeting adult cardiac anesthesiologists. One question was directly relevant to activated clotting time and 5 concerned pump priming choices with respect to crystalloid and colloid types and additives. The remaining questions concerned cardioplegia choices. The survey remained open from June 2015 to May 2016.

RESULTS: A total of 923 responses were analyzed. Estimated response rates from Europe, North America, Australia/New Zealand, and South America were 19.77%, 8.06%, 16.30%, and 1.68%, respectively. The majority of respondents worldwide considered an activated clotting time of <400 seconds as unsafe for bypass (92.5%). Crystalloid as a sole fluid type remains the most common priming solution worldwide (38.1%) although combinations with colloid (23.8%) were also popular. Retrograde autologous priming was used by 17.9% of respondents. Heparin was the most

frequently used prime additive (43.0%) followed by mannitol (35.2%). Variation was demonstrated within some of these categories reflective of differences in regional practices.
CONCLUSIONS: Differences exist in some specific areas between regional cardiopulmonary bypass techniques with respect to pump priming and anticoagulation practices. The significance of these differences with respect to patient outcome is uncertain and requires further study.

手术室内的保护性通气的呼气末闭塞试验预测患者的液体反应性

End-Expiratory Occlusion Test Predicts Fluid Responsiveness in Patients With Protective Ventilation in the Operating Room

Biais, Matthieu MD, PhD[*†]; Larghi, Mathilde MD[*]; Henriot, Jeremy MD[*]; de Courson, Hugues MD[*]; Sesay, Musa MD[*]; Nouette-Gaulain, Karine MD, PhD[*‡]
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背景：呼气末闭塞试验(EEOT)被提出用于预测重症监护病房机械通气患者的液体反应性。该试验在低潮气量通气条件下的效用仍不确定。本研究旨在确定 EEOT 诱导的血流动力学变化是否能够预测手术室内保护性通气患者的扩容效果。
方法：本研究选择 41 例接受神经外科手术的患者。持续记录利用脉搏轮廓分析 EEOT 之前和之后 30 秒以及扩容(超过 10 分钟输入 250 毫升生理盐水)后的每搏量和脉压变化。患者扩容后每搏量≥10%被定义为有反应者。
结果：20 名患者是对液体管理的有反应者。EEOT 引起心博量的显著增加，与扩容引起的心博量变化相关(r= 0.55，和 p< . 0001)。EEOT 诱导心博量增加 5%，区别于扩容引起的每搏量增加，灵敏度为 100%(95%置信区间[CI]为 83% - 100%)，特异性为 81%(95% CI 为 58% - 95%)，阳性预测值为 84%(95% CI 为 64% - 96%)，阴性预测值为 100%(95% CI 为 80% - 100%)。灰色地带的范围从 4%到 8%不等，包括 17%的患者。最佳脉搏压力变化阈值为 9%，灵敏度为 60%(95% CI 为 36% - 81%)，特异性为 86%(95% CI 为 64% - 97%)。提示由 EEOT(0.91,95% CI 为 0.81 - 1.00)诱导产生的每博量变化的接受者工作特性曲线下面积显著高于由脉搏压力变化获得的结果(0.75,95% CI 为 0.60 - 0.90)和 p<0.05。
结论：EEOT 诱导的每博指数的变化可以预测手术室内保护性通气患者的液体反应性。此试验可能有潜在的临床应用价值。
（刘玉琦译 李士通校）

BACKGROUND: End-expiratory occlusion test (EEOT) has been proposed to predict fluid responsiveness in mechanically ventilated intensive care unit patients. The utility of this test during low-tidal-volume ventilation remains uncertain. This study aimed to determine whether hemodynamic variations induced by EEOT could predict the effect of volume expansion in patients with protective ventilation in the operating room.
METHODS: Forty-one patients undergoing neurosurgery were included. Stroke volume and pulse pressure variations were continuously recorded using pulse contour analysis before and immediately after a 30-second EEOT and after volume expansion

(250 mL saline 0.9% given over 10 minutes). Patients with an increase in stroke volume ≥ 10% after volume expansion were defined as responders.

RESULTS: Twenty patients were responders to fluid administration. EEOT induced a significant increase in stroke volume, which was correlated with the stroke volume changes induced by volume expansion ($r^2 = 0.55$, $P < .0001$). A 5% increase in stroke volume during EEOT discriminated responders to volume expansion with a sensitivity of 100% (95% confidence interval [CI], 83%–100%), a specificity of 81% (95% CI, 58%–95%), a positive predictive value of 84% (95% CI, 64%–96%), and a negative predictive value of 100% (95% CI, 80%–100%). The gray zone ranged from 4% to 8%, including 17% of patients. The best pulse pressure variation threshold was 9%, with a sensitivity of 60% (95% CI, 36%–81%) and specificity of 86% (95% CI, 64%–97%). The area under the receiver operating characteristics curve generated for changes in stroke volume induced by EEOT (0.91, 95% CI, 0.81–1.00) was significantly higher than the one obtained for pulse pressure variations (0.75, 95% CI, 0.60–0.90); $P < .05$.

CONCLUSIONS: Changes in stroke volume index induced by EEOT can predict fluid responsiveness in patients with protective ventilation in the operating room. This test may have potential applications.

小儿全麻患者无创呼吸容量的监测评估

The Evaluation of a Noninvasive Respiratory Volume Monitor in Pediatric Patients Undergoing General Anesthesia

Gomez-Morad, Andrea D. MD[*]; Cravero, Joseph P. MD[*]; Harvey, Brian C. PhD[†]; Bernier, Rachel MPH[*]; Halpin, Erin MSN, RN[*]; Walsh, Brian PhD, RRT-NPS[*]; Nasr, Viviane G. MD[*]

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背景：由于年龄、并发症、手术类型的不同，术后小儿患者都存在着呼吸功能损害的风险，如通气不足或低氧血症。对于非插管的婴儿/儿童患者，对其通气功能的精确测量是非常困难的。目前对非插管患者的呼吸功能评估依赖于血氧监测指标，呼吸频率（RR）监测和主观临床评估，尚无客观测量的呼吸参数可以用于预测早期呼吸功能损害。技术和数字信号处理方面的新进展使阻抗式呼吸容量监测器（RVM，ExSpiron，Respiratory Motion，Inc，Waltham，MA）也得到了新的发展。 RVM 已被证明能够为成人患者提供准确、实时、持续、无创的潮气量（TV）、分钟通气量（MV）和呼吸频率（RR）的监测。

在这个前瞻性的观察研究中，我们的最初目的是明确 RVM 能否精确地测量儿童患者的 TV，RR 和 MV。

方法：共纳入 72 名 ASA 分级 I~III 的全身麻醉气管插管的儿童患者（27 名女童，45 名男童）。气管插管后，通过 RVM 和联机的肺活量监测计（NM3 监测仪，Phillips Healthcare）连续记录 MV，TV 和 RR 数据。比较 RVM 和 NM3 在划皮前 10 分钟（“术前”）和手术结束后 10 分钟（“术后”）MV，TV 和 RR 的测量值。在 10 分钟的时间段内计算每 1 分钟的相对误差。所有数据进行配对差异等效性检验，采用 Bland-Altman 法分析计算偏离率，精确度和准确性。

结果：在整个术前和术后期间，RVM 对分 MV 的平均测量偏差（RVM-NM3 测量）为-3.8％（95％置信区间）（±1.96 SD）:（-19.9％至 12.2％），对 TV 为-4.9（-21.0％至 11.3％），对 RR 为 1.1％（-4.1％至 6.2％）。 MV，TV 和 RR 的平均测量精度分别为 11.9％，12.0％和 4.2％（0.6 次呼吸/分钟）。注意，精度较低的数据对应于更精确的 RVM 测量。等效性检验否定了 RVM 和 NM3 具有不同平均值的零假设，并以 90％可信度得出结论：RVM 和 NM3 对 MV，TV 和 RR 的测量值基本相当（偏差值±10％）。
结论：我们的数据表明在小儿机械通气患者中 RVM 和 NM3 测量值基本一致。对于 RVM 在其他临床境况下对呼吸功能损害的检测能力仍需未来的进一步研究。
（王芳译 李士通校）

BACKGROUND: Pediatric patients following surgery are at risk for respiratory compromise such as hypoventilation and hypoxemia depending on their age, comorbidities, and type of surgery. Quantitative measurement of ventilation in nonintubated infants/children is a difficult and inexact undertaking. Current respiratory assessment in nonintubated patients relies on oximetry data, respiratory rate (RR) monitors, and subjective clinical assessment, but there is no objective measure of respiratory parameters that could be utilized to predict early respiratory compromise. New advances in technology and digital signal processing have led to the development of an impedance-based respiratory volume monitor (RVM, ExSpiron, Respiratory Motion, Inc, Waltham, MA). The RVM has been shown to provide accurate real-time, continuous, noninvasive measurements of tidal volume (TV), minute ventilation (MV), and RR in adult patients.
In this prospective observational study, our primary aim was to determine whether the RVM accurately measures TV, RR, and MV in pediatric patients.
METHODS: A total of 72 pediatric patients (27 females, 45 males), ASA I to III, undergoing general anesthesia with endotracheal intubation were enrolled. After endotracheal intubation, continuous data of MV, TV, and RR were recorded from the RVM and an in-line monitoring spirometer (NM3 monitor, Phillips Healthcare). RVM and NM3 measurements of MV, TV, and RR were compared during a 10-minute period prior to the incision ("Presurgery") and a 10-minute period after the end of surgery ("Postsurgery"). Relative errors were calculated over 1-minute segment within each 10-minute period. Bias, precision, and accuracy were calculated using Bland-Altman analyses and paired-difference equivalence tests were performed.
RESULTS: Combined across the Presurgery and Postsurgery periods, the RVM's mean measurement bias (RVM − NM3 measurement) for MV was −3.8% (95% limits of agreement) (±1.96 SD): (−19.9% to 12.2%), for TV it was −4.9 (−21.0% to 11.3%), and for RR it was 1.1% (−4.1% to 6.2%). The mean measurement accuracies for MV, TV, and RR were 11.9%, 12.0%, and 4.2% (0.6 breaths/min), respectively. Note that lower accuracy numbers correspond to more accurate RVM measurements. The equivalence tests rejected the null hypothesis that the RVM and NM3 have different mean values and conclude with 90% power that the measurements of MV, TV, and RR from the RVM and NM3 are equivalent within ±10%.

CONCLUSIONS: Our data indicate acceptable agreement between RVM and NM3 measurements in pediatric mechanically-ventilated patients. Future studies assessing the capability of the RVM to detect respiratory compromise in other clinical settings are needed.

延迟发现气管插管误入食管麻醉事故索赔：一系列病例事件简报
Delayed Detection of Esophageal Intubation in Anesthesia Malpractice Claims: Brief Report of a Case Series
Honardar, Marzieh R. MD; Posner, Karen L. PhD; Domino, Karen B. MD, MPH
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本回顾性病例系列分析了 45 例延迟发现气管插管误入食管的麻醉封闭式索赔项目事故案例。纳入标准为来自 1995 年至 2013 年间，采用 ASA 制定的以呼气二氧化碳作为判断气管插管正确位置的监测标准。其中 49%（95%可信区间为 34%-64%）发生在手术室或其他理应配备 CO2 检测设备的麻醉场所。导致延迟发现的最常见原因是不使用，忽略或曲解二氧化碳读数。与支气管痉挛一样，其误诊率高达 33%（95%可信区间为 20%）。
（王芳译 李士通校）
This retrospective case series analyzed 45 malpractice claims for delayed detection of esophageal intubation from the Anesthesia Closed Claims Project. Inclusion criteria were cases from 1995 to 2013, after adoption of identification of CO_2 in expired gas to verify correct endotracheal tube position as a monitoring standard by the American Society of Anesthesiologists. Forty-nine percent (95% confidence interval 34%–64%) occurred in the operating room or other anesthesia location where CO_2 detection equipment should have been available. The most common factors contributing to delayed detection were not using, ignoring, or misinterpreting CO_2 readings. Misdiagnosis, as with bronchospasm, occurred in 33% (95% confidence interval 20%).

高位或低位硬膜外间隙置管位置对初产妇分娩镇痛需求的随机比较
The Labor Analgesia Requirements in Nulliparous Women Randomized to Epidural Catheter Placement in a High or Low Intervertebral Space
Moore, Albert MD; Villeneuve, Valerie MD; Bravim, Bruno MD; el-Bahrawy, Aly MD; el-Mouallem, Eva MD; Kaufman, Ian MD; Hatzakorzian, Roupen MD; Li Pi Shan, William MD
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背景：我们假设分娩镇痛时放置在较低位间隙的硬膜外导管所需药量较少。
方法：椎管内分娩镇痛的初产妇硬膜外导管由超声定位随机放置在 L1-2 或 L4-5 间隙。病人自控硬膜外镇痛和硬膜外负荷量为内含 50μg 芬太尼的 0.125%布比卡因 10 毫升或 2%利多卡因 8 ml。标准硬膜外镇痛开始后 30 和 60 分钟评估腹部和会阴疼痛评分。分娩后评估分娩过程中的疼痛评分。主要结果是患者所需追加量的比例并采用 x 2 检验进行比较。其次，我们用 x 2 检验分析了早期（分娩前 4

小时）和分娩晚期追加量的次数，疼痛评分采用 Mann-Whitney U 检验分析，多重检验由 P 值调整。

结果：我们分析了 148 例患者。总的来说，患者在低位间隙和高位间隙组所需负荷量百分比分别为 46%和 51%（P = 1）。对 56 例阴道分娩者，低位间隙硬膜外组分娩早期与晚期需要追加量例数和百分比分别是 22（52%）和 20（48%），而高位间隙硬膜外组分别是 9（20%）和 36（80%）（P =0.014）。患者自控硬膜外镇痛需要追加量与患者满意度之间差异无统计学意义。比较高、低位间隙组疼痛评分的中位数（四分位距）：在 30 分钟时腹部疼痛疼痛评分分别为 3（1, 6）和 0（0, 2）（P = 0.013），在 60 分钟的腹部疼痛分别为 1（1, 3）和 0（0, 1）（P =0.013）；在相同的时间点的会阴疼痛分别为 0（0, 2）、1（1, 3）（P =0 .36）和 0（0, 1）、1（1, 3）（P =0.014）；分娩用力时腹部疼痛评分分别为 1（0, 5）和 0（0, 3）（P =0 .9），会阴疼痛评分分别为 2（0, 5）和 4（1, 8）（P =0.025）。低位间隙和高位间隙硬膜外镇痛需要接受阴道助产的患者比例分别为 15%和 5%（P=0.06）。

结论：L4-5 间隙的硬膜外置管最初可轻微缓解腹部疼痛，但可以较好缓解会阴分娩痛。L4-5 间隙置管的患者在分娩早期与分娩晚期相比，需要更多的追加量。低位间隙硬膜外置管与阴道助产之间的可能联系有待进一步研究。

（周宇译 李士通校）

BACKGROUND: We hypothesized that an epidural catheter placed in a lower vertebral interspace will require less medication for labor analgesia.

METHODS: Nulliparous women requesting neuraxial labor analgesia were randomized to epidural catheter placement at the ultrasound-confirmed L1-2 or L4-5 interspace. Patient-controlled epidural analgesia and breakthrough manual epidural boluses of 10 mL of 0.125% bupivacaine with 50 μg of fentanyl or 8 mL of 2% lidocaine were utilized. Abdominal and perineal pain scores were assessed at 30 and 60 minutes after standardized initiation of epidural analgesia. Pain scores during pushing were assessed after delivery. The primary outcome was the proportion of patients requiring manual boluses and was compared using a χ^2 test. Secondarily, we analyzed the number of boluses given in early (up to 4 hours before delivery) versus late labor using χ^2 tests and the pain scores using Mann-Whitney *U* tests, with adjustment of *P* values for multiple testing.

RESULTS: We analyzed 148 patients. Overall, the percentage of patients in the low versus high groups who required manual boluses was 46% vs 51% (*P* = 1.0). For the 56 patients in each group who delivered vaginally, 22 (52%) vs 20 (48%) manual boluses were given to the low epidural group in early versus late labor, compared to 9 (20%) vs 36 (80%) in the high epidural group (*P* = .014). There was no statistical difference in patient-controlled epidural analgesia requirements or patient satisfaction. Comparing the low versus high groups, the median (interquartile range) pain scores were: 3 (1, 6) vs 0 (0, 2) (*P* = .013) at 30 minutes and 1 (1, 3) vs 0 (0, 1) (*P* = .013) at 60 minutes for abdominal pain; 0 (0, 2) vs 1 (1, 3) (*P* = .36) and 0 (0, 1) vs 1 (1, 3) (*P* = .014) at these same time points for perineal pain; and 1 (0, 5) vs 0 (0, 3) (*P* = .9) for abdominal and 2 (0, 5) vs 4 (1, 8) (*P*= .025) for perineal pain during pushing. The percentage of patients who underwent instrumental delivery was 15% vs 5% (*P* = .06) for the low versus high group.

CONCLUSIONS: An L4-5 epidural catheter initially provides less relief of abdominal pain but more relief of perineal labor pain. Patients with an L4-5 catheter require more manual boluses during early labor but less during late labor. The possible association of low epidural catheters with instrumental delivery merits further investigation.

顽固性颅内高压：颅骨切除减压术的作用

Refractory Intracranial Hypertension: The Role of Decompressive Craniectomy

Smith, Martin MBBS, FRCA, FFICM*†

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颅内压增高与急性脑损伤后的较差预后有关，临床指南提倡用于早期治疗颅内高压。降低 ICP 的治疗通常采用逐步的方式，对难治性颅内高压患者保留更高风险的选择同时，从更安全的一线干预开始。去骨瓣减压术是一种外科手术，去除部分颅骨并打开底层硬脑膜以降低与脑肿胀相关的 ICP 增高；它可以作为一个主要的或次要的手术选择。创伤性脑损伤后，二次开颅去骨瓣减压术作为重度顽固性颅内高压患者降低颅内压阶梯治疗的最后一级，是最常用的治疗方法。虽然去骨瓣减压术已被应用于很多情况，但其价值仅在创伤性脑损伤和急性缺血性脑卒中的随机对照试验中进行了评估。创伤性脑损伤后，去骨瓣减压术与造成较高比率的植物人状态和严重残疾的常规治疗相比，死亡率较低。与卒中相关的恶性大脑半球梗死患者中，部分颅骨切除术显著降低死亡率并改善 60 岁以下成年患者的功能恢复。手术也降低了大于 60 岁患者的死亡率，但导致此年龄组幸存者中较高比例的严重残疾。建议施行去骨瓣减压术的决定不仅取决于其临床适应症，也要考虑患者的个人意愿及其对生活质量的预期。本叙述性综述讨论了成人顽固性颅内高压的管理，重点讨论了对创伤性脑损伤和急性缺血性脑卒中患者施行去骨瓣减压术的作用。

（周宇译 李士通校）

Raised intracranial pressure (ICP) is associated with worse outcomes after acute brain injury, and clinical guidelines advocate early treatment of intracranial hypertension. ICP-lowering therapies are usually administered in a stepwise manner, starting with safer first-line interventions, while reserving higher-risk options for patients with intractable intracranial hypertension. Decompressive craniectomy is a surgical procedure in which part of the skull is removed and the underlying dura opened to reduce brain swelling–related raised ICP; it can be performed as a primary or secondary procedure. After traumatic brain injury, secondary decompressive craniectomy is most commonly undertaken as a last-tier intervention in a patient with severe intracranial hypertension refractory to tiered escalation of ICP-lowering therapies. Although decompressive craniectomy has been used in a number of conditions, it has only been evaluated in randomized controlled trials after traumatic brain injury and acute ischemic stroke. After traumatic brain injury, decompressive craniectomy is associated with lower mortality compared to medical management but with higher rates of vegetative state or severe disability. In patients with stroke-related malignant hemispheric infarction, hemicraniectomy significantly decreases mortality and improves functional outcome in adults <60 years of age. Surgery also reduces mortality

in those >60 years, but results in a higher proportion of severely disabled survivors compared to medical therapy in this age group. Decisions to recommend decompressive craniectomy must always be made not only in the context of its clinical indications but also after consideration of an individual patient's preferences and quality of life expectations. This narrative review discusses the management of intractable intracranial hypertension in adults, focusing on the role of decompressive craniectomy in patients with traumatic brain injury and acute ischemic stroke.

肝移植手术中即时红细胞压积测定的可靠性

Reliability of Point-of-Care Hematocrit Measurement During Liver Transplantation

Kim, Won Ho MD, PhD; Lee, Hyung-Chul MD; Ryu, Ho-Geol MD, PhD; Chung, Eun-Jin MD; Kim, Borim MD; Jung, Hoiin DDS, PhD; Jung, Chul-Woo MD, PhD

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背景：尽管即时（POC）分析仪器在肝移植手术中（LT）已经普及，然而POC分析仪器测定红细胞压积的准确性还没有得到评估。在本项回顾性观察研究中，我们旨在评估LT中使用POC分析仪器测定红细胞压积的准确性，确认LT术中其测量误差的潜在影响因素和及其对于错误输恤的影响。

方法：我们，回顾性的收集了901名患者6461对LT术中同时使用POC分析仪器和实验室仪器测定红细胞压积的数据。对于红细胞压积反复测量数据的一致性，我们使用重复测量Bland-Altman分析进行评估。而红细胞压积测定误差的发生率及程度在16个不同的实验室异常类型中做了比较。本实验采用广义估计方程分析来确定导致POC红细胞压积测量值低的错误的潜在影响因素。此外，我们也明确了由于POC测量红细胞压积＜20%而实验室测量红细胞压积≥20%的患者潜在的“过度输血”可能，并且研究了其与术中输血的相关性。

结果：70.3%（4541/6461）的POC红细胞压积测量数据虚低于实验室测量数据。红细胞压积测量误差的中位数（四分位间距）是-1.20（-2.60到0.20）。Bland-Altman分析发现24.5%（1583/6461）的测量误差超出了我们预先设定的临床可接受范围±3%。当并存低白蛋白血症和低蛋白血症时，红细胞压积测量值虚低的发生率明显增高。低白蛋白血症合并高血糖时，红细胞压积测量误差明显增高。低白蛋白血症、低蛋白血症和高血糖是红细胞压积测量虚低的预测指标。而且，在失血量相似的情况下，过度输血组比充分输血组输血量更大，中位数差两个单位（95%可信区间［0-4］，P=0.039）。

结论：在LT手术中，使用POC设备测定红细胞压积的值往往比实验室测定值要低。在LT术中，我们经常会遇到导致POC红细胞压积测量虚低的患者实验指标异常，例如低白蛋白血症、低蛋白血症和高血糖。仔细分析该类混杂因素，有助于减少由于POC红细胞压积测量值偏低而导致的过度输血。

（张霄迪译 李士通校）

BACKGROUND: Although point-of-care (POC) analyzers are commonly used during liver transplantation (LT), the accuracy of hematocrit measurement using a POC analyzer has not been evaluated. In this retrospective observational study, we aimed to evaluate the accuracy of hematocrit measurement using a POC analyzer and identify potential contributors to the measurement error and their influence on mistransfusion during LT.

METHODS: We retrospectively collected 6461 pairs of simultaneous intraoperative hematocrit measurements using POC analyzers and laboratory devices during LTs in 901 patients. The agreement of hematocrit measurements was assessed using Bland-Altman analysis for repeated measurements, while the incidence and magnitude of hematocrit measurement error were compared among 16 different laboratory abnormality categories. A generalized estimating equation analysis was performed to identify potential contributors to falsely low-measured POC hematocrit. Additionally, we defined potential "overtransfusion" in the case when POC hematocrit was <20% and laboratory hematocrit was ≥20% and investigated its association with intraoperative transfusion.

RESULTS: The POC hematocrit measurements were falsely lower than the laboratory hematocrit measurements in 70.3% (4541/6461) of pairs. The median (interquartile range) of hematocrit measurement error was −1.20 (−2.60 to 0.20). Bland-Altman analysis showed that 24.5% (1583/6461) of the errors were outside our a priori defined clinically acceptable limits of ±3%. The incidence of falsely low-measured hematocrit was significantly higher with the presence of concomitant hypoalbuminemia and hypoproteinemia. Hypoalbuminemia combined with hyperglycemia showed significantly larger hematocrit measurement error. Hypoalbuminemia, hypoproteinemia, and hyperglycemia were predictors of falsely low-measured hematocrit. Furthermore, the overtransfusion group showed larger amount of transfusion than the adequately transfused group, with a median difference of 2 units (95% confidence interval [0–4], P = .039), despite similar amount of blood loss.

CONCLUSIONS: Hematocrit measured using the POC device tends to be lower than the laboratory hematocrit measured during LT. Commonly encountered laboratory abnormalities during LT include hypoalbuminemia, hypoproteinemia, and hyperglycemia, which may contribute to falsely low-measured POC hematocrit. Careful consideration of these confounders may help reduce overtransfusion that occurs due to falsely low-measured POC hematocrit.

静脉应用联合地塞米松联合骶尾部局部麻醉改善术后镇痛的疗效：试验序贯分析的系统评价和Meta分析

Effect of an Intravenous Dexamethasone Added to Caudal Local Anesthetics to Improve Postoperative Pain: A Systematic Review and Meta-analysis With Trial Sequential Analysis

Kawakami, Hiromasa MD*; Mihara, Takahiro MD, PhD*†; Nakamura, Nobuhito MD*; Ka, Koui MD*; Goto, Takahisa MD, PhD†

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背景：骶尾部麻醉已经应用于儿科患者的术后镇痛，然而镇痛作用的持续时间有时不合人意。在某些手术中，静脉应用类固醇对于术后镇痛是有效的。本项序贯式分析（TSA）的meta分析旨在评估类固醇联合骶尾部麻醉的镇痛疗效。

方法：本研究是一项系统评价和Meta分析。本研究通过MEDLINE、EMBASE、Web of Science和Cochrane Central Register of Controlled Trials数据库以及临床试验注册网站进行文献检索。本研究纳入的为随机对照试验，主要对比实施骶尾部麻醉的儿科患者使用类固醇和安慰剂的区别。本项meta分析的主要结果是镇痛时间和需要额外镇痛的患者数目。镇痛时间和额外镇痛的发生率分别使用均差或风险比以及97.5%可信区间（CI）进行总结。如果均差或风险比的97.5%CI包括0或1，我们就认为差异没有统计学意义。我们使用随机效应模型合并结果。异质性通过I2进行量化。我们使用Cochrane系统评价方法对临床试验进行质量评估。而且，我们在2.5%的1类错误发生率和90%功效的情况下进行了TSA。我们将具有临床意义的镇痛时间差值最小值定为3h。meta分析的目标样本大小也通过TSA计算。本研究也对不良事件的发生率进行了评估。

结果：本研究纳入了 6 项临床试验，包括 424 名患者; 其中 211 名患者接受了静脉类固醇. 所有的临床试验对比了地塞米松（≥0.5mg/kg）和安慰剂的镇痛疗效。地塞米松延长了骶尾部麻醉的时间（均差：244min；97.5% CI：188-300）。异质性检验 I2 的值为 94.8%。试验证据的质量较低。 TSA 显示仅仅 17.0%的目标样本量达到要求，但是累积 Z 值涵盖了试验序贯监测边界说明其是有益的。在四项研究（包含 260 名患者）中报道了额外镇痛。在地塞米松组额外镇痛没有明显减少 (风险比：0.53；97.5% CI：0.09 – 3.30; I 2 =98.7%)。不良事件发生率也没有增加。

结论：静脉应用地塞米松延长了骶尾部麻醉的镇痛时间。关于探索更低剂量的地塞米松延长麻醉疗效试验非常值得研究。未来的研究中低风险的临床试验是非常必要的。

(张霄迪译 李士通校)

BACKGROUND: Caudal anesthesia has been used for postoperative pain control in pediatric surgical patients, but the duration of the analgesic effect is occasionally unsatisfactory. Intravenous steroids have been shown to be effective for postsurgical pain management after certain surgeries. The aim of this meta-analysis with trial sequential analysis (TSA) was to evaluate the analgesic effect of steroids in patients administered with caudal anesthesia.

METHODS: This study was a systematic review and meta-analysis. A search of published literature was conducted in the MEDLINE, EMBASE, Web of Science, and Cochrane Central Register of Controlled Trials databases and in trial registration sites. Randomized controlled trials that compared intravenous steroids with a placebo in pediatric patients who had received caudal anesthesia for surgery were included in the study. The primary outcomes from the present meta-analysis were the analgesic duration and the number of patients who required rescue analgesics. The analgesic duration and incidence of rescue use were summarized using mean difference or risk ratio with a 97.5% confidence interval (CI), respectively. If the 97.5% CI of the mean difference or risk ratio included a value of 0 or 1, respectively, we considered the difference not to be significant. We used the random effects model to combine the results. Heterogeneity was quantified with the I^2 statistic. The quality of the trials was evaluated using the Cochrane methodology. Moreover, a TSA with a risk of type 1 error of 2.5% and power of 90% was performed. We established the minimum clinically meaningful difference of analgesic duration as 3 hours. The target sample size for meta-analysis was also calculated in the TSA. We also assessed adverse events.

RESULTS: Six trials with 424 patients were included; 211 patients received intravenous steroids. All trials compared dexamethasone of at least 0.5 mg/kg dose with a placebo. Dexamethasone prolonged the duration of caudal analgesia (mean difference, 244 minutes; 97.5% CI, 188–300). Heterogeneity was considerable with an I^2 value of 94.8%. Quality of evidence was very low. The TSA suggested that only 17.0% of the target sample size had been reached, but the cumulative *Z* score crossed the trial sequential monitoring boundary to indicate a benefit. Rescue use was reported in 4 studies with 260 patients. Rescue use was not significantly reduced in the dexamethasone group (risk ratio, 0.53; 97.5% CI, 0.09–3.30; I^2 , 98.7%). No increase in adverse events was reported.

CONCLUSIONS: Intravenous dexamethasone prolongs the analgesic duration of caudal anesthesia. Trials to investigate the effectiveness of a lower dose of the dexamethasone in prolonging analgesic effects would be of interest. Further trials with a low risk of bias are necessary.

急性骨折疼痛治疗中运用数字药片的羟考酮摄入模式

Oxycodone Ingestion Patterns in Acute Fracture Pain With Digital Pills

Chai, Peter R. MD, MMS[*]; Carreiro, Stephanie MD[†]; Innes, Brendan J. BS[†]; Chapman, Brittany BS[†]; Schreiber, Kristin L. MD, PhD[‡]; Edwards, Robert R. PhD[‡]; Carrico, Adam W. PhD[§]; Boyer, Edward W. MD, PhD[*]

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背景：急性疼痛阿片类药物治疗中通常采用按需（PNR）给药方式。事实上患者实际按需服用阿片类药物剂量的不确定性，以及对于完全缓解疼痛的渴望，导致不定的和过量的阿片类药物处方，引起阿片药物的盈余。阿片类药物的盈余成为阿片类药物转移至市场和非医疗用途产生的来源。了解急性疼痛情况下的阿片类药物的摄取情况，可以给临床医生提供阿片类药物安全使用的建议，并且可以在

阿片类药物自用剂量逐步增加时及时发现并采取干预措施，以防止药物耐受和成瘾的发生。

方法：我们使用了一种新型的羟考酮数字药片系统（结合有可吸收生物传感器的标准含 5mg 羟考酮胶囊），在胃中被氯离子梯度激活，从而释放出一个能被可穿戴阅读器捕捉到的射频信号。阅读器将摄入数据传输到云端服务器供研究团队分析。我们为从急诊科出院的未使用阿片类药物的骨折急性痛患者提供羟考酮数字药丸。研究参与者接受了数字药丸的使用培训，并携带 21 颗 5mg 羟考酮数字药丸出院。他们被要求出院后按需服用数字药丸缓解疼痛。我们在研究开始后 7 天对研究参与者进行了一个简单的回访，并在同一时间参与者返回了数字药丸系统。我们通过数字药丸系统的数据实时识别出了药物摄取情况，并在回访时进行了药丸计数，以验证药物摄食的数字药片报告。

结果：本研究走访了 26 人，16 个研究参与者中有 15 人完成了研究。参与者在超过 7 天的时间里摄入了中位数为 6(3 - 9.5)的羟考酮电子药丸，其中 82%的羟考酮在受试的最初 3 天摄入。在需要进行手术修复的患者中，86%(N = 6)的患者在一周内继续摄取阿片类药物。个体间摄入模式存在极大变异性。

结论：急性骨折疼痛患者的个体使用模式可以被数字药丸系统捕获，并显示在超过 7 天的急性疼痛中，摄入的阿片类药物中位数相当于 45 毫克吗啡。尽管发现手术修复和阿片类药物使用时间有关，7 位研究参与者仍然在从急诊出院 4 天内停止使用阿片类药物。这一数字药丸系统能够测量个体之间存在差异的阿片类药物自我服用剂量和使用模式的变化。

（王子钰译 李士通校）

BACKGROUND: Opioid analgesics are commonly prescribed on an as-needed (PRN) basis for acute painful conditions. Uncertainty of how patients actually take PRN opioids, coupled with a desire to completely cover pain, leads to variable and overly generous opioid prescribing practices, resulting in a surplus of opioids. This opioid surplus becomes a source for diversion and nonmedical opioid use. Understanding patterns of actual opioid ingestion after acute painful conditions can help clinicians counsel patients on safe opioid use, and allow timely recognition and intervention when escalating opioid self-dosing occurs, to prevent tolerance and addiction.

METHODS: We used a novel oxycodone digital pill system (ingestible biosensor within a standard gelatin capsule combined with 5-mg oxycodone) that when ingested, is activated by the chloride ion gradient in the stomach thereby emitting a radiofrequency signal captured by a wearable reader. The reader relays ingestion data to a cloud-based server that displays ingestion events to the study team. We deployed the oxycodone digital pill among opioid-naive individuals discharged from the emergency department with acute fracture pain. Participants were trained on digital pill operation and discharged with twenty-one 5-mg oxycodone digital pills. They were instructed to take digital pills PRN for pain on discharge. We conducted a brief interview 7 days after study enrollment, at which point participants returned the digital pill system. We identified oxycodone ingestion events in real time by data from the digital pill system and performed pill counts at the return visit to validate digital pill reporting of medication ingestion.

RESULTS: In this study, 26 individuals were approached; 16 enrolled with 15 completing the study. Participants ingested a median of 6 (3–9.5) oxycodone digital pills over the course of 7 days, with 82% of the oxycodone dose ingested in the first 3 days. In individuals who required operative repair, 86% (N = 6) continued to ingest opioids at 1 week. There was substantial variability in ingestion patterns between individuals.
CONCLUSIONS: The utilization patterns of individuals with acute fracture pain could be captured using a digital pill system and revealed a median opioid ingestion of 45-mg morphine equivalents for acute pain over 7 days. Seven participants ceased using opioids within 4 days after discharge from the emergency department, although operative repair was associated with longer use. This digital pill system was able to measure changes in and patterns of opioid self-dosing, which varied between patients.

近足月妊娠大鼠的非感染性发热诱发胎儿脑炎:一种硬膜外相关的母体发热模型

Noninfectious Fever in the Near-Term Pregnant Rat Induces Fetal Brain Inflammation: A Model for the Consequences of Epidural-Associated Maternal Fever

Segal, Scott MD, MHCM[*]; Pancaro, Carlo MD[†]; Bonney, Iwona PhD[‡]; Marchand, James E. PhD[‡]
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背景：选择硬膜外分娩镇痛的产妇发热几率高于采用其他镇痛方式的产妇，而产褥热与许多不良并发症有关，包括胎儿大脑损伤。我们制备了近足月妊娠大鼠非感染性炎症发热模型来模拟硬膜外相关发热的病理生理模型并且假设其会导致胎儿脑部炎症的发生。
方法：对 24 只孕 20 天(孕期 22 天)的 SD 大鼠进行了研究。母鼠每间隔 90 分钟被注射大鼠重组白细胞介素（IL）6 或者赋形剂，并每隔 30 分钟监测一次体温。第一次注射后 8 小时使母鼠生下胎儿并被处死。测定分娩过程中母鼠的 IL-6 量。胎鼠脑（n=24）处理后用 ED-1 或 CD68 染色，活化小胶质细胞作为标记物，并对胼胝体外侧和脑海马区域进行细胞计数。胎鼠脑也用神经炎症下游标记物环氧合酶-2（COX-2）染色。8 只胎鼠前脑 COX-2 表达以蛋白印迹法定量分析，并与 β-肌动蛋白标准对比。不同处理组母鼠体温和 IL-6 水平进行比较，同时进行细胞计数，COX-2 染色，并且 COX-2 水平酌情采用 U 检验、重复测量方差分析，或 Fisher 精确检验分析。
结果： 90 分钟时间间隔注射大鼠重组白细胞介素-6 的母鼠体温较对照组升高（P<0.0001）。而且与对照组相比，实验组母鼠分娩时 IL-6 水平升高到临床相关水平（均值±标准差为 923 ± 97 pg/mL，对照组为 143 ± 94 pg/mL， P= 0.0006）。IL-6 处理组（实验组）的胎鼠大脑中的 ED-1 染色细胞计数显著高于注射盐水的母鼠分娩的胎鼠大脑（对照组）（中位数[间距范围]：海马末端，99 [94-104]和 57[64-68]，P=0.002；侧间隔，102 [96-111]和 68[65-69]，P =0.002。），同时 COX-2 免疫组化染色（侧间隔，22 [20-26]和 17[15-18]，P=0.005；背侧海马 27[22-32]和 16[14-19]，P =0.013。）以及蛋白印迹法 COX-2 定量 （均

值±均值标准误：0%β-肌动蛋白强度对照组与实验组相比为 41.5%±24%，P < 0.001。）

结论：给近足月妊娠大鼠注射相当于人体硬膜外分娩镇痛水平的 IL-6 诱发非感染性发热。母体注射 IL-6 引起胎儿神经炎症。

（王子钰译 李士通校）

BACKGROUND: Women laboring with epidural analgesia experience fever much more frequently than do women who chose other forms of analgesia, and maternal intrapartum fever is associated with numerous adverse consequences, including brain injury in the fetus. We developed a model of noninfectious inflammatory fever in the near-term pregnant rat to simulate the pathophysiology of epidural-associated fever and hypothesized that it would produce fetal brain inflammation.

METHODS: Twenty-four pregnant Sprague-Dawley rats were studied at 20 days gestation (term: 22 days). Dams were treated by injection of rat recombinant interleukin (IL)-6 or vehicle at 90-minute intervals, and temperature was monitored every 30 minutes. Eight hours after the first treatment, dams were delivered of fetuses and then killed. Maternal IL-6 was measured at delivery. Fetal brains (n = 24) were processed and stained for ED-1/CD68, a marker for activated microglia, and cell counts in the lateral septal and hippocampal brain regions were measured. Fetal brains were also stained for cyclooxygenase-2 (COX-2), a downstream marker of neuroinflammation. Eight fetal brains were further analyzed for quantitative forebrain COX-2 by Western blotting compared to a β-actin standard. Maternal temperature and IL-6 levels were compared between treatments, as were cell counts, COX-2 staining, and COX-2 levels by Mann-Whitney *U* test, repeated-measures analysis of variance, or Fisher exact test, as appropriate.

RESULTS: Injection of rat IL-6 at 90-minute intervals produced an elevation of maternal temperature compared to vehicle ($P < .0001$). IL-6 levels were elevated to clinically relevant levels at delivery in IL-6 compared to vehicle-treated animals (mean ± standard deviation: 923 ± 97 vs 143 ± 94 pg/mL, $P = .0006$). ED-1–stained cells were present in significantly higher numbers in fetal brains from IL-6 compared to saline-treated dams (median [interquartile range]: caudal hippocampus, 99 [94–104] and 64 [57–68], respectively, $P = .002$; lateral septum, 102 [96–111] and 68 [65–69], respectively, $P = .002$), as well as COX-220 (lateral septum, 22 [20–26] and 17 [15–18], respectively, $P = .005$; dorsal hippocampus, 27 [22–32] and 16 [14–19], respectively, $P = .013$) and quantitative COX-2 Western blotting activity (mean ± standard error of the mean: vehicle, 0% of β-actin intensity versus IL-6, 41.5% ± 24%, $P < .001$).

CONCLUSIONS: Noninfectious inflammatory fever is inducible in the near-term pregnant rat by injection of IL-6 at levels comparable to those observed during human epidural labor analgesia. Maternal IL-6 injection causes neuroinflammation in the fetus.

尿液药物检测在目前阿片类流行病中的作用

Role of Urine Drug Testing in the Current Opioid Epidemic

Mahajan, Gagan MD

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虽然慢性阿片类药物治疗患者的尿液药物检测的证据不足，但许多医学协会、州和联邦管理机构制定的指南建议：将其纳入监测患者是否使用慢性阿片类药物治疗的工具之一。为了达到最全面的结果，临床医生应该同时订购免疫分析屏和确认尿液药物检测的机器。免疫分析屏可以作为办公室内的护理测试点或实验室测试点，是一个便宜而便利的研究器械。然而，免疫分析屏的局限性包括高检测性阈值和仅对选定数量的药物种类提供有质量的信息。由于这些限制，临床医生应该明白，免疫分析屏具有高假阳性和高假阴性。尽管有这些限制，但其结果有助于临床医生作出初步治疗决定。相比之下，确诊性尿液药物检测只能作为实验室检测，其检测阈值低，同时可提供定性和定量信息。与免疫分析屏相比，尿液药物测试有更高的特异性，假阴性率和假阳性率更低。像其他任何诊断测试一样，免疫分析屏和确诊性尿药测试都具有限制。临床医生在解释一个意想不到的测试结果时，必须牢记这一点：在怀疑测试结果含义的同时咨询他们的实验室，以避免做出对病人和临床医生有负面影响的错误决定。

（刘娟兰译 潘艳、薛张纲校）

While the evidence for urine drug testing for patients on chronic opioid therapy is weak, the guidelines created by numerous medical societies and state and federal regulatory agencies recommend that it be included as one of the tools used to monitor patients for compliance with chronic opioid therapy. To get the most comprehensive results, clinicians should order both an immunoassay screen and confirmatory urine drug test. The immunoassay screen, which can be performed as an in-office point-of-care test or as a laboratory-based test, is a cheap and convenient study to order. Limitations of an immunoassay screen, however, include having a high threshold of detectability and only providing qualitative information about a select number of drug classes. Because of these restrictions, clinicians should understand that immunoassay screens have high false-positive and false-negative rates. Despite these limitations, though, the results can assist the clinician with making preliminary treatment decisions. In comparison, a confirmatory urine drug test, which can only be performed as a laboratory-based test, has a lower threshold of detectability and provides both qualitative and quantitative information. A urine drug test's greater degree of specificity allows for a relatively low false-negative and false-positive rate in contrast to an immunoassay screen. Like any other diagnostic test, an immunoassay screen and a confirmatory urine drug test both possess limitations. Clinicians must keep this in mind when interpreting an unexpected test result and consult with their laboratory when in doubt about the meaning of the test result to avoid making erroneous decisions that negatively impact both the patient and clinician.

年龄对腰麻下行下肢骨科手术患者右美托咪定镇静作用敏感性的影响

The Influence of Age on Sensitivity to Dexmedetomidine Sedation During Spinal Anesthesia in Lower Limb Orthopedic Surgery

Xu, Bo MD[*]; Li, Zhitao MS[†]; Zhou, Dongxu MS[‡]; Li, Liuxun MS[*]; Li, Pingyue MD[§]; Huang, Huayang MS[§]

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为了观察年龄对成年患者右美托咪定镇静作用敏感性的影响，我们纳入 79 个择期腰麻下行下肢手术患者确定不同年龄组达到足够镇静程度的右美托咪定 ED_{50}. 腰麻完成后，在 15 分钟内采用 Dixon 序贯法确定右美托咪定用量。老年组 ED_{50} 值相较于其他两组更低（老年组 0.88±0.07；中年组：1.16±0.08；青年组：1.21±0.06；均 P＜0.01）。青年组与中年组无差别（P=0.660）
（曹雪译 潘艳、薛张纲校）

To investigate the influence of age on sensitivity to dexmedetomidine sedation in adult patients,we selected 79 patients scheduled for lower limb orthopedic surgery under spinal anesthesia to identify the dexmedetomidine ED_{50} for adequate sedation among different age groups.After a spinal anesthesia was placed,a dose of dexmedetomidine determined by the Dixon up-and-down method was administered over 15 minutes.The ED_{50} in the elderly group was lower than in the other 2 groups(elderly:0.88±0.07;middle aged:1.16±0.08; young:1.21±0.06ug/kg;both*P*＜.001).There was no difference between the young and middle-aged groups(P=.160).

儿童中手术与麻醉暴露的年龄以及精神疾病诊断的关系

Age at Exposure to Surgery and Anesthesia in Children and Association With Mental Disorder Diagnosis

Chang, Aaron J. MSE[*]; Nomura, Yohei MD[†]; Barodka, Viachaslau M. MD[‡]; Hori, Daijiro MD[†]; Magruder, Jonathan T. MD[†]; Katz, Nevin M. MD[†]; Berkowitz, Dan E. MD[‡]; Hogue, Charles W. MD[§]

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背景：动物在脑发育特定时期暴露于麻醉药物经受的神经毒性作用在随后的成年时期可以观察到相应的神经发育的改变。而相应的儿童的易感年龄至今未知。
方法：我们收集了 1999 年到 2010 年德州和纽约的个人医疗补助资料组成纵向资料组进行了一个观察性队列研究。我们评估了这份资料以便得知儿童小于 5 岁麻醉进行单一普通手术的时机是否与诊断为精神异常或特发性发育延迟（例如阅读与语言障碍、小儿多动症）的风险增加相关。根据暴露于手术与麻醉的年龄，我们设置了 11 组：≤28 天、28 天-6 个月、6 个月-1 岁、大于 1 岁小于等于 5 岁每隔 6 个月设置一组。为每个暴露儿童根据社会统计学和临床协变量计算出的倾向指数匹配五个儿童用于比较。Cox 比例风险模型用于评估诊断为精神异常的风险与手术麻醉暴露之间的联系。
结局：单一暴露下的 38，493 名受试儿童与 192，465 名五岁之前未暴露于麻醉手术的倾向指数评分匹配儿童纳入分析。分析指出，实验组中纳入的所有年龄段

孩子诊断为精神紊乱的风险均升高，风险比率为1.26（95%可信区间：1.22-1.30），暴露时间的不同在统计学上并未造成差异。对于DD和ADHD之间的分析也一样，升高的风险比率在各年龄段均衡分布，DD整体风险比率为1.26（95%可信区间：1.20-1.32），ADHD整体风险比率为1.31（95%可信区间：1.25-1.37）。

结论：五岁以下小儿进行麻醉下短小手术诊断为精神紊乱和AD及ADHD的风险在统计学层面上轻度增加，但是外科手术操作的时间并不改变增加的风险。基于这些事实，推迟短小手术来降低麻醉对小儿可能产生的远期神经发育风险的做法并无理论支持。在评估暴露年龄的相关影响时，需考虑包含的手术操作类型，例如某些手术可能与特定的并存疾病有关，并且只出现于特定年龄。

（胡翔翔译 潘艳、薛张纲校）

BACKGROUND: Animals exposed to anesthetics during specific age periods of brain development experience neurotoxicity, with neurodevelopmental changes subsequently observed during adulthood. The corresponding vulnerable age in children, however, is unknown.

METHODS: An observational cohort study was performed using a longitudinal dataset constructed by linking individual-level Medicaid claims from Texas and New York from 1999 to 2010.This dataset was evaluated to determine whether the timing of exposure to anesthesia ≤5 years of age for a single common procedure (pyloromyotomy, inguinal hernia, circumcision outside the perinatal period, or tonsillectomy and/or adenoidectomy) is associated with increased subsequent risk of diagnoses for any mental disorder, or specifically developmental delay (DD) such as reading and language disorders, and attention deficit hyperactivity disorder (ADHD). Exposure to anesthesia and surgery was evaluated in 11 separate age at exposure categories: ≤28 days old, >28 days and ≤6 months, >6 months and ≤1 year, and 6-month age intervals between >1 year old and ≤5 years old. For each exposed child, 5 children matched on propensity score calculated using sociodemographic and clinical covariates were selected for comparison. Cox proportional hazards models were used to measure the hazard ratio of a mental disorder diagnosis associated with exposure to surgery and anesthesia.

RESULTS: A total of 38,493 children with a single exposure and 192,465 propensity scorematched children unexposed before 5 years of age were included in the analysis. Increased risk of mental disorder diagnosis was observed at all ages at exposure with an overall hazard ratio of 1.26 (95% confidence interval [CI], 1.22–1.30), which did not vary significantly with the timing of exposure. Analysis of DD and ADHD showed similar results, with elevated hazard ratios distributed evenly across all ages, and overall hazard ratios of 1.26 (95% CI, 1.20–1.32) for DD and 1.31 (95% CI, 1.25–1.37) for ADHD.

CONCLUSIONS: Children who undergo minor surgery requiring anesthesia under age 5 have a small but statistically significant increased risk of mental disorder diagnoses and DD and ADHD diagnoses, but the timing of the surgical procedure does not alter the elevated risks. Based on these

findings, there is little support for the concept of delaying a minor procedure to reduce long-term neurodevelopmental risks of anesthesia in children. In evaluating the influence of age at exposure, the types of procedures included may need to be considered, as some procedures are associated with specific comorbid conditions and are only performed at certain ages.

体外循环心脏手术中氨甲环酸的使用：对目前在加拿大学术中心工作的麻醉医生的调查

Tranexamic Acid Administration During On-Pump Cardiac Surgery: A Survey of Current Practices Among Canadian Anesthetists Working in Academic Centers

Spence, Jessica MD*†‡; Long, Steven BSc§; Tidy, Antonella BSc*; Raymer, Karen MD, MSc, FRCPC*; Devereaux, P. J. MD, PhD, FRCPC†‡//; Lamy, Andre MD, MHSc, FRCSC†‡¶; Whitlock, Richard MD, PhD, FRCSC†‡¶; Syed, Summer BSc, MD, MSc, FRCPC*

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背景：氨甲环酸通常用于减少体外循环心脏手术中的出血。但是，目前仍没有公认的最佳给药方法，最近研究显示，大剂量的氨甲环酸会引发癫痫。目前心脏麻醉医生如何使用氨甲环酸还不清楚。

方法：我们联系了加拿大所有的心脏麻醉医生，作为我们的抽样范围。参与调查者的基本情况、氨甲环酸使用剂量和使用具体方法被记录下来。并对结果进行描述性统计分析。为了比较剂量，我们假设 80kg 的患者用药 3 小时。K-W 检验用来比较平均剂量。

结果：341 名心脏麻醉医生中有 234 名回复了我们（回复率 68.2%）。其中 86.3%的医生对所有患者使用氨甲环酸；13.7%的医生仅对一部分的患者使用氨甲环酸。大部分医生（68.4%）在一次初始剂量后持续输注氨甲环酸；其他使用方法包括持续输注(4.7%)、单次注射（13.2%）、多次注射（12%）、其他方法（1.7%）。平均给药剂量（标准差）49 mg/kg (24)，给药范围 10 至 100 mg/kg。各地区给药剂量差异在 23 至 55 mg/kg 之间 (P = .001)。

结论：氨甲环酸几乎用于加拿大学术中心行体外循环手术的所有患者。但是，不同地区和不同人的使用方法有显著差异。需要进一步的研究来确定最佳剂量从而达到最佳效果减少副作用。

（潘波译 潘艳、薛张纲校）

BACKGROUND: Tranexamic acid (TXA) is commonly administered during on-pump cardiac surgery to minimize bleeding. However, an optimal dosing regimen has not been described, and recent studies suggest that higher doses may be associated with seizure. Little is known about current practice among cardiac anesthetists.

METHODS: We contacted all academic anesthesia departments in Canada to identify cardiac anesthetists, who represent the majority of practitioners. This group constituted our sampling frame. Information regarding participant demographics, TXA dose,

andadministration details were obtained by electronic survey. Responses were analyzed descriptively. To compare dose, we assumed an 80-kg patient and 3 hours of infusion time. The Kruskal-Wallis test was used to compare average dose across provinces.
RESULTS: Among 341 Canadian academic cardiac anesthetists, 234 completed the survey (68.2% response rate). Among respondents, 86.3% administer TXA to all patients; 13.7% administer it to some. Most (68.4%) administer an infusion after a bolus; other modes included infusion (4.7%), single bolus (13.2%), 2 or more boluses (12.0%), or another regimen (1.7%). The mean (standard deviation) dose given was 49 mg/kg (24), with a range from 10 to 100 mg/kg. The mean dose varied across provinces from 23 to 55 mg/kg (P = .001).
CONCLUSIONS: TXA is given to nearly all patients undergoing on-pump cardiac surgery at academic hospitals in Canada. However, there is significant heterogeneity in practice between individuals and across provinces. Further research is needed to determine the TXA dose that maximizes efficacy and minimizes side effects.

内吗啡肽-1 和内吗啡肽-2 在选择性神经损伤模型小鼠神经病理性疼痛中的抗痛觉超敏作用

Antiallodynic Effects of Endomorphin-1 and Endomorphin-2 in the Spared Nerve Injury Model of Neuropathic Pain in Mice

Wang, Chang-lin PhD; Yang, Dai-jun MSc; Yuan, Bi-yu MSc; Qiu, Ting-ting MSc

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背景：选择性神经损伤（SNI）模型是一种新的动物模型，可以模拟临床神经性疼痛的几个特征。 阿片类药物被推荐为治疗神经性疼痛。 因此，本研究旨在探讨内吗啡肽-1（EM-1）和内吗啡肽-2（EM-2）在小鼠神经性疼痛 SNI 模型的中枢和外周给药的抗痛觉超敏作用。
方法：SNI 模型选择保留腓肠神经完整的小鼠，即当坐骨神经 3 个末端分支中的另外 2 个（腓总神经和胫神经）被紧密结扎和切割时。 Von Frey 单丝用于测量 SNI 诱导的机械性异常疼痛样行为。 在神经病理性疼痛 SNI 模型的中枢和外周给药后，测定 EM-1 和 EM-2 的抗痛觉超敏作用。 而且，使用特定的阿片受体拮抗剂来确定参与神经性疼痛的内啡肽的阿片样机制。 数值表示为平均值±标准偏差。
结果：我们的研究结果表明，SNI 小鼠术后在同侧爪中出现了延长的机械性异常疼痛行为，14 天后阈值缩小为 0.061 ±0.02g。 EM-1 和 EM-2 脑室内（i.c.v.）给药后在同侧爪产生显着的抗异常疼痛效应，比吗啡更有效。注射 10nmol EM-1 和 EM-2，5 分钟后 EM-1 和 EM-2 的峰值撤退阈值分别为 0.92±0.36 和 0.87±0.33g，高于吗啡（0.46±0.20g）。此外，两种 EM（10nmol，i.c.v.）在对侧爪中发挥显着的抗异常性疼痛效果，而等摩尔剂量吗啡给药后在脑室内未见显著的抗伤害感受活性。值得注意的是，EM-1 和 EM-2 通过不同的 μ1-和 μ2-阿片受体亚型产生抗伤害感受，EM-2 诱导的抗异常疼痛包括由内源性强啡肽 A 释放介导的另外组分，作用于 κ 阿片受体。此外，还研究了 EM-1，EM-2 和吗啡

外周给药的抗异常性疼痛活性。 EM-1 和 EM-2 在皮内给药，而不是皮下给药，也显示有效的抗伤害感受作用，建立了外周和局部效应。 μ1-和 μ2-阿片受体亚型，而不是 δ-或 κ-阿片受体，都参与 EMs 的外周抗异常疼痛作用。
结论：目前的研究表明 EM-1 和 EM-2 在 SNI 小鼠通过中枢和外周给予均产生有效的抗哇巴因作用，并且涉及不同的阿片样机制。
（吴静怡译 潘艳、薛张纲校）

BACKGROUND: The spared nerve injury (SNI) model is a new animal model that can mimic several characteristics of clinicalneuropathic pain. Opioids are recommended as treatment of neuropathic pain. Therefore, the present study was conducted to investigate the antinociceptive effects of endomorphin-1 (EM-1) and endomorphin-2 (EM-2) given centrally and peripherally in the SNImodel of neuropathic pain in mice.
METHODS: The SNI model was made in mice by sparing the sural nerve intact, when the other 2 of 3 terminal branches of the sciaticnerve (common peroneal and tibial nerves) were tightly ligated and cut. Von Frey monofilaments were used to measure the SNI-induced mechanical allodynia-like behavior. The antiallodynic effects of EM-1 and EM-2 were determined after central and peripheral administration in the SNI model of neuropathic pain. Also, the specific opioid receptor antagonists were used to determine the opioid mechanisms of EMs involved in neuropathic pain. Values were expressed as the mean ± standard deviation.
RESULTS: Our results showed that the SNI mice developed prolonged mechanical allodynia-like behavior in ipsilateral paw after surgery, with the withdrawal threshold value being 0.061 ± 0.02 g after 14 days. EM-1 and EM-2 produced significant antiallodyniceffects in ipsilateral paw after intracerebroventricular (i.c.v.) administration, more effective than that of morphine. The peak withdrawal thresholds of 10 nmol EM-1 and EM-2 determined at 5 minutes after injection were 0.92 ± 0.36 and 0.87 ± 0.33 g, respectively, higher than that of morphine (0.46 ± 0.20 g). Moreover, both EMs (10 nmol, i.c.v.) exerted significant antiallodynic effects in the contralateral paw, whereas no significant antinociceptive activity was seen after i.c.v. administration of morphine with equimolar dose. It was noteworthy that EM-1 and EM-2 produced antinociception through distinct μ1- and μ2-opioid receptor subtypes, and the EM-2-induced antiallodynia contained an additional component that was mediated by the release of endogenous dynorphin A, acting on κ-opioid receptor. In addition, the antiallodynic activities of peripheral administration of EM-1, EM-2, and morphine were also investigated. Intraplantar, but not subcutaneous administration of EM-1 and EM-2 also exhibited potent antinociception, establishing the peripheral and local effects. Both

μ1- and μ2-opioid receptor subtypes, but not the δ- or κ-opioid receptors were involved in the peripheral antiallodynia of EMs.
CONCLUSIONS: The present investigation demonstrated that both EM-1 and EM-2 given centrally and peripherally produced potentantiallodynic activities in SNI mice, and differential opioid **mechanisms were involved.**

阻塞性睡眠呼吸暂停患者的心脏术后结局：一项比较研究的系统回顾和 Meta 分析

Postoperative Outcomes in Obstructive Sleep Apnea Patients Undergoing Cardiac Surgery: A Systematic Review and Meta-analysis of Comparative Studies

Nagappa, Mahesh MD*; Ho, George BSc†; Patra, Jayadeep PhD†; Wong, Jean FRCPC†; Singh, Mandeep FRCPC†; Kaw, Roop MD‡§; Cheng, Davy FRCPC//¶; Chung, Frances MD, FRCPC†

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背景：阻塞性睡眠呼吸暂停（Obstructive sleep apnea，OSA）是心脏手术患者常见合并症，可能导致患者术后并发症。这项 Meta 分析的目的是为 OSA 患者心脏手术后并发症提供证据。
方法：2016 年 10 月前完成的一项文献搜集，在 Cochrane 系统评价数据库、MEDLINE 文献检索、检索过程中、Web of Science、SCOPUS、EMBASE 、循证医学对照试验登记和 CINAHL 数据库中进行。这项研究局限于诊断或可疑 OSA 的成人心脏外科手术患者中。所有纳入的研究至少必须报告有 1 例术后并发症。主要结果是术后 30 天的主要不良心脑血管事件（MACCEs），包括 30 天全因死亡，心肌梗死，心肌损伤，非致命性心脏骤停，血运重建过程中，肺栓塞，深静脉血栓形成，术后心房颤动（房颤的新记录），中风和充血性心力衰竭。次要结果是房颤的新记录。其他探索性结果包括：（1）术后气管插管和机械通气；（2）感染和/或败血症；（3）非计划性入 ICU）；（4）住院时间和住 ICU 时间。Meta 分析和回归分别使用循证回顾分析 5.3（循证医学，伦敦，英国）和 Open BUGS v3.0 处理。
结果：总共纳入 11 项对比研究（1801 例患者，OSA 688 人，非 OSA 1113 人）。与非 OSA 患者相比较，OSA 的主要不良心脑血管事件（MACCEs）高 33.3%（OSA 与非 OSA：31% vs 10.6%；OR=2.4；95%CI，1.38~4.2；P =0. 002）。与非 OSA 患者相比较，OSA 新发的房颤较高（OSA 与非 OSA：31% vs 21%；OR=1.94；95% CI，1.13~3.33；P =0. 02）。尽管在 OSA 患者中术后气管插管和机械通气显著增加（OSA 与非 OSA：13% vs 5.4%；OR=2.67；95% CI，1.03~6.89；P = 0.04），但 ICU 停留时间和住院时间与非 OSA 相比较并无明显延长。大多数 OSA 患者没有持续气道正压治疗。亚组的 Meta 回归和灵敏度分析显示 OSA 和非 OSA 组的术后并发症 OR 没有差别。
结论：我们的研究表明，与非 OSA 患者相比，OSA 患者心脏手术后主要不良心脑血管事件(MACCEs)和新发的术后房颤(POAF)的发生率分别增加 33.3%和 18.1%。
（吴俊梅译 潘艳、薛张纲校）

BACKGROUND: Obstructive sleep apnea (OSA) is a common comorbidity in patients undergoing cardiac surgery and may predispose patients to postoperative complications. The purpose of this meta-analysis is to determine the evidence of postoperative complications associated with OSA patients undergoing cardiac surgery.
METHODS: A literature search of Cochrane Database of Systematic Reviews, Medline, Medline In-process, Web of Science, Scopus, EMBASE, Cochrane Central Register of Controlled Trials, and CINAHL until October 2016 was performed. The search was constrained to studies in adult cardiac surgical patients with diagnosed or suspected OSA. All included studies must report at least 1 postoperative complication. The primary outcome is major adverse cardiac or cerebrovascular events (MACCEs) up to 30 days after surgery, which includes death from all-cause mortality, myocardial infarction, myocardial injury, nonfatal cardiac arrest, revascularization process, pulmonary embolism, deep venous thrombosis, newly documented postoperative atrial fibrillation (POAF), stroke, and congestive heart failure. Secondary outcome is newly documented POAF. The other exploratory outcomes include the following: (1) postoperative tracheal intubation and mechanical ventilation; (2) infection and/or sepsis; (3) unplanned intensive care unit (ICU) admission; and (4) duration of stay in hospital and ICU. Meta-analysis and meta- regression were conducted using Cochrane Review Manager 5.3 (Cochrane, London, UK) and OpenBUGS v3.0, respectively.
RESULTS: Eleven comparative studies were included (n = 1801 patients; OSA versus non-OSA: 688 vs 1113, respectively). MACCEs were 33.3% higher odds in OSA versus non-OSA patients (OSA versus non-OSA: 31% vs 10.6%; odds ratio [OR], 2.4; 95% confidence interval [CI], 1.38-4.2; P = .002). The odds of newly documented POAF (OSA versus non-OSA: 31% vs 21%; OR, 1.94; 95% CI, 1.13-3.33; P = .02) was higher in OSA compared to non-OSA. Even though the postoperative tracheal intubation and mechanical ventilation (OSA versus non-OSA: 13% vs 5.4%; OR, 2.67; 95% CI, 1.03-6.89; P = .04) were significantly higher in OSA patients, the length of ICU stay and hospital stay were not significantly prolonged in patients with OSA compared to non-OSA. The majority of OSA patients were not treated with continuous positive airway pressure therapy. Meta-regression and sensitivity analysis of the subgroups did not impact the OR of postoperative complications for OSA versus non-OSA groups.
CONCLUSIONS: Our meta-analysis demonstrates that after cardiac surgery, MACCEs and newly documented POAF were 33.3% and 18.1% higher odds in OSA versus non-OSA patients, respectively.

实时分钟尿量的监测及其在心脏手术中应用的临床可行性

Validation of a Real-Time Minute-to-Minute Urine Output Monitor and the Feasibility of Its Clinical Use for Patients Undergoing Cardiac Surgery

Chang, Aaron J. MSE*; Nomura, Yohei MD†; Barodka, Viachaslau M. MD‡; Hori, Daijiro MD†; Magruder, Jonathan T. MD†; Katz, Nevin M. MD†; Berkowitz, Dan E. MD‡; Hogue, Charles W. MD§
Anesthesia & Analgesia: 2017 125 1883–1886

心脏手术后发生急性肾损伤与死亡率增加有关。实时监测尿量的方法相比于目前现行的护理标准即在一段时间后目测尿量的方法更能确保肾灌注。在这项研究中，我们描述了一种在体外循环中连续监测尿量的精确方法。这可能提供了一种手段，将患者血压和心肺转流的具体指标设定为降低急性肾损伤的潜在策略
（叶志祥译 潘艳、薛张纲校）
Acute kidney injury after cardiac surgery is associated with increased morbidity and mortality. Methods for measuring urine output in real time may better ensure renal perfusion perioperatively in contrast to the current standard of care where urine output is visually estimated after empiric epochs of time. In this study, we describe an accurate method for monitoring urine output continuously during cardiopulmonary bypass. This may provide a means for setting patient-specific targets for blood pressure and cardiopulmonary bypass flow as a potential strategy to reduce the risk for acute kidney

美国麻醉医师学会关于成年多发伤患者体格状态分级的制定：一项调查的结果和未来的相关考虑
The Assignment of American Society of Anesthesiologists Physical Status Classification for Adult Polytrauma Patients: Results From a Survey and Future Considerations
Kuza, Catherine M. MD*; Hatzakis, George MD, PhD, BS, MS*[and]; Nahmias, Jeffry T. MD, MHPE†‡
Anesthesia & Analgesia: 2017 125 1960–1966

背景：美国麻醉医师学会（ASA）通过体格状态分级系统来评估患者术前健康情况。之前的研究显示评判间信度较弱且 ASA 体格状态评分存在变异性，在创伤患者尤为明显。目前很少有研究对创伤患者的 ASA 体格状态评分制定进行评估，而对严重多发伤患者尚未有研究对其 ASA 体格状态评分的制定进行评估。我们的研究目的在于评估评判间信度，同时确定麻醉医生和创伤科医生对多发伤成年患者制定 ASA 体格状态评分差异的原因。
方法：一项网上调查通过邮件将一些问题发送给麻醉医生和创伤科医生，用于评估他们对于 ASA 体格状态分级、人口统计信息和 8 例虚构的创伤病例的看法。参与者需要对每一个病例进行 ASA 体格状态评分并对其作出的评分进行相应解释。我们使用 Fleiss 卡帕分析对回答者的失误参考对比和评判间信度进行统计分析。
结果：总共 349 名参与者完成了调查。结果显示，8 例病例的 ASA 体格状态评分结果不一致，其中有几个病例的评分结果范围在一级到六级并且存在可变的急诊评分。选择其中的 201 名应答者（101 名创伤科医生[S]和 100 名麻醉医生[A]）的调查结果进行加权后的卡帕分析，我们发现中等的评分者间参考对比的可靠性。

评分者间可靠性具有公平性（Kw = 0.43; SE = 0.037; 95%的置信区间 0.360-0.491; P < .001）。

结论：这项研究显示出麻醉医生和创伤科医生在对成年多发伤患者进行 ASA 体格状态评分时的公平的评分者间信度。尽管 ASA 体格状态分级用于一些创伤风险分层模型，但用于创伤病例的 ASA 体格状态评分之间的差异仍然存在。将来对于 ASA 体格状态指南的修正需要致力于该评分在创伤患者的评分者间信度的提高和改善。ASA 体格状态评分作为多发性创伤的评估标准的价值性需要进一步研究进行证明。

（赵明晔译 潘艳、薛张纲校）

BACKGROUND: The American Society of Anesthesiologists (ASA) physical status (PS) classification system assesses the preoperative health of patients. Previous studies demonstrated poor interrater reliability and variable ASA PS scores, especially in trauma scenarios. There are few studies that evaluated the assignment of ASA PS scores in trauma patients and no studies that evaluated ASA PS assignment in severely injured adult polytrauma patients. Our objective was to assess interrater reliability and identify sources of discrepancy among anesthesiologists and trauma surgeons in designating ASA PS scores to adult polytrauma patients.

METHODS: A link to an online survey containing questions assessing attitudes regarding ASA PS classification, demographic information, and 8 fictional trauma cases was e-mailed to anesthesiologists and trauma surgeons. The participants were asked to assign an ASA PS score to each scenario and explain their choice. Rater-versus-reference and interrater reliability, beyond that expected by chance, among respondents was analyzed using the Fleiss kappa analysis.

RESULTS: A total of 349 participants completed the survey. All 8 cases had inconsistent ASA PS scores; several cases had scores ranging from I to VI and variable emergency (E) designations. Using weighted kappa (Kw) analysis for a subset of 201 respondents (101 trauma surgeons [S] and 100 anesthesiologists [A]), we found moderate (Kw = 0.63; SE = 0.024; 95% confidence interval, 0.594-0.666; P < .001) interrater-versus-reference reliability. The interrater reliability was fair (Kw = 0.43; SE = 0.037; 95% confidence interval, 0.360-0.491; P < .001).

CONCLUSIONS: This study demonstrates fair interrater reliability beyond that expected by chance of the ASA PS scores among anesthesiologists and trauma surgeons when assessing adult polytrauma patients. Although the ASA PS is used in some trauma risk stratification models, discrepancies of ASA PS scores assigned to trauma cases exist. Future modifications of the ASA PS guidelines should aim to improve the interrater reliability of ASA PS scores in trauma patients. Further studies are warranted to determine the value of the ASA PS score as a trauma prognostic metric.

神经阻滞复合全麻与全麻应用于主要躯干和下肢手术:系统回顾和 Meta 分析

Neuraxial and Combined Neuraxial/General Anesthesia Compared to General Anesthesia for Major Truncal and Lower Limb Surgery: A Systematic Review and Meta-analysis

Smith, Lauren M. MD*; Cozowicz, Crispiana MD†‡; Uda, Yoshiaki MBBS, FANZCA*; Memtsoudis, Stavros G. MD, PhD†‡; Barrington, Michael J. MBBS, FANZCA, PhD*§

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与全身麻醉相比，神经轴阻滞麻醉可改善围手术期结果;然而,这是有争议的。我们采用随机对照试验和从 2010 年到 2016 年 5 月 31 日在 MEDLINE、PubMed 和 EMBASE 中发现的基于人群的观察研究进行了系统的评估和 meta 分析。研究对象包括接受大躯干和下肢大手术的成年病人，报告有 30 天死亡率(主要结果)、心肺发病率、手术部位感染、血栓栓塞事件、输血和资源使用。手术后的结果与一般麻醉下的下列亚组比较:单纯全麻与全麻复合神经阻滞。为了确定麻醉技术对结果的影响，计算概率比(ORs)和 99%置信区间(CIs)。27 项观察性研究和 11 项随机对照试验。这项分析包括来自观察性研究或数据库的 1082,965 项记录，以及 1134 名随机对照试验患者的记录。与单纯全麻(或 0.88)比较，全麻联合神经阻滞后方式 30 天死亡率无明显差异;99% CI,0.77 - 1.01)，或与全身麻醉(或 0.98;99%可信区间,0.92 - -1.04)。在全麻联合神经阻滞与单纯全麻相比较时，联合神经轴全身麻醉与肺并发症发生率降低相关(或 0.84;99% CI,0.79 - 0.88，手术部位感染(或 0.93;99% CI,0.88 - 0.98,输血(或 0.90;99% CI,0.87 - 0.93)，血栓栓塞事件(或 0.84;99% CI,0.73 - 0.98)，留长(平均差- 0.16 天;99% CI，- 0.17 - 0.15)，重症监护室入院(或 0.77;99%可信区间,0.73 - -0.81)。全麻联合神经阻滞麻醉下，心肌梗死几率增加(或 1.18;99%可信区间,1.01 - -1.37)。在患肺炎的几率上没有差异(或 0.94;99% CI,0.87 - 1.02)或心脏并发症(或 1.04;全麻联合神经阻滞麻醉子组 99% CI,1.00 - 1.09。当全麻联合神经阻滞与单纯全麻相比较时，出现任何肺部并发症的几率会降低(或 0.38;99% CI,0.36 - 0.40，手术部位感染(或 0.76;99% CI,0.71 - 0.82,输血(或 0.85;99% CI,0.82 - 0.88)，血栓栓塞事件(或 0.79;99% CI,0.68 - 0.91),停留长度(平均差- 0.29 天;99% CI，- 0.29 - 0.28)，重症监护室入院(或 0.50;99%可信区间,0.48 - -0.53)。心脏并发症的发生率没有差异(或 0.99;99% CI,0.94 - 1.03)心肌梗死(或 0.91;99% CI,0.81 - 1.02)，或肺炎(或 0.92;99%可信区间,0.84 - -1.01)。随机对照试验显示输血要求无差异(RR 1.05;99% CI,0.65 - 1.71)，持续时间缩短(平均差- 0.15 天;99% CI，- 0.27 - 0.04)。全麻联合神经阻滞或单独使神经阻滞与 30 天的死亡率没有关系。与全身麻醉相比，神经阻滞麻醉可改善肺结果，减少药物使用。然而，由于观察性研究包括在此分析中，存在着残留混淆的风险，因此应谨慎解释这些结果。

（曹雨枫译 潘艳、薛张纲校）

Neuraxial anesthesia may improve perioperative outcomes when compared to general anesthesia; however, this is controversial. We performed a systematic review and meta-analysis using randomized controlled trials and population-based observational studies identified in MEDLINE, PubMed, and EMBASE from 2010 to May 31, 2016. Studies were included for adult patients undergoing major surgery of the trunk and lower extremity that

reported: 30-day mortality (primary outcome), cardiopulmonary morbidity, surgical site infection, thromboembolic events, blood transfusion, and resource use. Perioperative outcomes were compared with general anesthesia for the following subgroups: combined neuraxial-general anesthesia and neuraxial anesthesia alone. Odds ratios (ORs) and 99% confidence intervals (CIs) were calculated to identify the impact of anesthetic technique on outcomes. Twenty-seven observational studies and 11 randomized control trials were identified. This analysis comprises 1,082,965 records from observational studies or databases and 1134 patients from randomized controlled trials. There was no difference in 30-day mortality identified when combined neuraxial-general anesthesia was compared with general anesthesia (OR 0.88; 99% CI, 0.77-1.01), or when neuraxial anesthesia was compared with general anesthesia (OR 0.98; 99% CI, 0.92-1.04). When combined neuraxial-general anesthesia was compared with general anesthesia, combined neuraxial-general anesthesia was associated with a reduced odds of pulmonary complication (OR 0.84; 99% CI, 0.79-0.88), surgical site infection (OR 0.93; 99% CI, 0.88-0.98), blood transfusion (OR 0.90; 99% CI, 0.87-0.93), thromboembolic events (OR 0.84; 99% CI, 0.73-0.98), length of stay (mean difference -0.16 days; 99% CI, -0.17 to -0.15), and intensive care unit admission (OR 0.77; 99% CI, 0.73-0.81). For the combined neuraxial-general anesthesia subgroup, there were increased odds of myocardial infarction (OR 1.18; 99% CI, 1.01-1.37). There was no difference identified in the odds of pneumonia (OR 0.94; 99% CI, 0.87-1.02) or cardiac complications (OR 1.04; 99% CI, 1.00-1.09) for the combined neuraxial-general anesthesia subgroup. When neuraxial anesthesia was compared to general anesthesia, there was a decreased odds of any pulmonary complication (OR 0.38; 99% CI, 0.36-0.40), surgical site infection (OR 0.76; 99% CI, 0.71-0.82), blood transfusion (OR 0.85; 99% CI, 0.82-0.88), thromboembolic events (OR 0.79; 99% CI, 0.68-0.91), length of stay (mean difference -0.29 days; 99% CI, -0.29 to -0.28), and intensive care unit admission (OR 0.50; 99% CI, 0.48-0.53). There was no difference in the odds of cardiac complications (OR 0.99; 99% CI, 0.94-1.03), myocardial infarction (OR 0.91; 99% CI, 0.81-1.02), or pneumonia (OR 0.92; 99% CI, 0.84-1.01). Randomized control trials revealed no difference in requirement for blood transfusion (RR 1.05; 99% CI, 0.65-1.71) and a decreased length of stay (mean difference -0.15 days; 99% CI, -0.27 to -0.04). Neuraxial anesthesia when combined with general anesthesia or when used alone was not associated with decreased 30-day mortality. Neuraxial anesthesia may improve pulmonary outcomes and reduce resource use when compared with general anesthesia. However, because observational studies were included in this analysis, there is a risk of residual confounding and therefore these results should be interpreted with caution.

全身麻醉对于具有头颈部放疗史的患者将导致心率血压调节相关的副作用

General Anesthesia Imposes Negative Effects on Heart Rate and Blood Pressure Regulation in Patients With a History of Head and Neck Radiation Therapy.

Zheng, Gang MD*; Dong, Wenli MD, MS†; Lewis, Carol M. MD, MPH‡

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背景：头颈部放疗会降低压力感受器反射的敏感度，并且可能加强全麻对于心率和血压调节的影响。近年来，头颈部放疗对于全麻下心率血压的影响尚不明确。
方法：本研究纳入了 472 名处于不同时期的原发口腔或口咽肿瘤的病人。其中，半数患者接受了头颈部放疗加手术治疗，另外半数患者仅接受手术治疗。两组患者根据年龄、性别和 BMI 以 1:1 的比例匹配。两组患者在麻醉诱导、划皮、麻醉苏醒期时的血压和心率进行回顾性对照研究。术中心率和血压与头颈部放疗的联系是通过应用非结构化协方差矩阵进行重复测量的多变量模型研究，其根据基础心率和血压、时间、β 受体阻滞剂、化疗病史和 ASA 评分进行调整。血压和心率每 5 分钟收集一次，基础心率和血压测量仅作为基线，不计入最终结果。
结果：和对照组相比，治疗组的基础心率明显更高（P = .0012），而基础收缩压更低（P < .0001），基础舒张压无显著差异（P = .6411）。接受头颈部放疗的患者较对照组使用 β 受体阻滞剂的人数更少（17% vs 28%; P = .0041）。多变量分析显示，头颈部放疗与麻醉诱导时心率下降（−2.21 [95% CI, −4.42 to −0.01]; P = .0492）、划皮时心率下降(−2.66 [95% CI, −5.16 to −0.16]; P = .0373）、麻醉诱导时收缩压下降(−6.88 [95% CI, −10.99 to −2.78]; P = .0011)和划皮时收缩压下降(−15.87 [95% CI, −20.45 to −11.29]; P < .001)显著相关。然而，头颈部放疗对于舒张压的下降仅存在于划皮时(−6.50 [95% CI, −9.47 to −3.53]; P < .0001)。
结论：研究中的重要发现是头颈部放疗组接受全麻时对心率存在负性变时效应。因此，应该注意这些患者可能发生心动过缓，尤其是血压偏低的患者。当心动过缓和低血压完全进展时，其血流动力学可能迅速进入不稳定状态。
（刘雯珺译 潘艳、薛张纲校）

BACKGROUND: Head and neck radiation therapy (HNRT) impairs baroreflex sensitivity, and it may potentiate the effects of anesthetics on heart rate (HR) and blood pressure (BP) regulation. Currently, the impacts of HNRT on HR and BP under anesthesia remain unclear.
METHODS: In this study, 472 patients with primary oral cavity or oropharyngeal cancer at all stages were examined. Half of the patients underwent HNRT plus surgery. The other half underwent surgery only and was matched with the treatment patients according to age, sex, and body mass index at a 1:1 ratio. The HRs and BPs in the 2 groups during anesthetic induction, skin incision, and emergence were compared retrospectively.

A multivariable model of repeated measures with unstructured covariance structure was used to examine the associations of HNRT with intraoperative HRs and BPs after adjusting for baseline HR and BP, time, use of β-blockers, history of chemotherapy, and American Society of Anesthesiologists physical status score. BPs and HRs were collected every 5 minutes. The baseline HR and BP measurements were not included in the outcome vector and were only used as adjustment for baselines.

RESULTS: Compared with corresponding baseline values in controls, the baseline HR was significantly higher ($P = .0012$) and the baseline systolic BP was lower ($P < .0001$) in the treatment group. The baseline diastolic BP levels did not differ significantly ($P = .6411$). Fewer patients receiving HNRT than controls took β-blockers daily (17% vs 28%; $P = .0041$). Comparing the corresponding values in control and treatment groups, multivariable analysis revealed significant associations of HNRT with decreases in HR during anesthesia induction (−2.21 [95% confidence interval {CI}, −4.42 to −0.01]; $P = .0492$) and skin incision (−2.66 [95% CI, −5.16 to −0.16]; $P = .0373$) and of HNRT with decreases in systolic BP during anesthesia induction (−6.88 [95% CI, −10.99 to −2.78]; $P = .0011$) and skin incision (−15.87 [95% CI, −20.45 to −11.29]; $P < .001$). However, we observed a significant association of HNRT with decrease in diastolic BP only during skin incision (−6.50 [95% CI, −9.47 to −3.53]; $P < .0001$).

CONCLUSIONS: The significant finding in the study was that general anesthesia imposed a negative chronotropic effect on HR in the group given HNRT. Therefore, one should be watchful for bradycardia in these patients; particularly those with low BPs. Their hemodynamics may rapidly progress into an unstable status when bradycardia and hypotension develop altogether.

中国心血管麻醉的现状

Current Status of Cardiovascular Anesthesia in China

Lu, Jiakai MD[*]; Wang, Weipeng MD[†]; Cheng, Weiping MD[*]; Chen, Lei MD[†]; Huang, Jeffrey MD[‡]; Ethridge, Chris A. MD[§]; Huang, Jiapeng MD, PhD[‖]

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高质量和安全的心脏麻醉是心脏治疗成功的先决条件。近年来，中国的心脏手术发展迅速。由于语言障碍，目前中国心脏麻醉的现状并不为西方国家所熟知。为了评估中国心血管麻醉医师的实践模式，数量，劳动力和培训要求，研究者们调查了中国 92 个主要心血管中心的麻醉实践，监测技术，资源，人员和工作时间。概述中国心脏麻醉实践模式的历史，发展以及现状。目的是让西方读者了解中国心血管麻醉学的独特成就和挑战，从而促进中国心血管麻醉医师与国际同行间的进一步交流。

（张松 译　陈杰 校）

High quality and safe cardiac anesthesia is a prerequisite for success in cardiac care. Cardiac surgery has developed rapidly over recent years in China. Because of language barriers, the current status of cardiac anesthesia in China is not well known to Western countries. To assess practice patterns, volume, workforce, and training requirements of Chinese cardiovascular anesthesiologists, we surveyed 92 major cardiovascular centers in China regarding their anesthesia practice, monitoring techniques, resources, staffing, and work hours. We aim to provide a review of the history, new developments, and a current cross section of cardiac anesthesia practice patterns in China. The goal is to allow Western readers to understand the unique achievements and challenges in Chinese cardiovascular anesthesiology, thus promoting further communications with Chinese cardiovascular anesthesiologists.

围术期心脏超声的使用：一项目前现状和观点的调查

Perioperative Use of Focused Transthoracic Cardiac Ultrasound: A Survey of Current Practice and Opinion

Conlin, Frederick MD[*†]; Connelly, Neil R. MD[*†]; Eaton, Michael P. MD[‡]; Broderick, Patrick J. DO[*†]; Friderici, Jennifer MSPH[*§]; Adler, Adam C. MS, MD, FAAP[‖]

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背景：近年来便携式超声设备的出现，使围手术期和危重病人的心脏超声（FoCUS）获得了更大的可用性。据研究者们所知，麻醉科医生对心脏超声的使用尚不明确。研究者们试图评估心血管麻醉医师协会（SCA）的成员在临床实践中对 FoCUS 的使用情况，以确定其应用的变化，概述其使用限制，并了解使用该技术的医生的培训水平。

方法：一个由 26 个问题组成的匿名和自愿的网上调查，评估参与者的培训水平与使用心脏超声频率，以及关于将其纳入住院培训和发展基本认证途径的意见。调查通过电子邮件发给了 SCA 的成员。

结果：SCA 的 3660 名成员中有 379 名（10％）完成了调查。在受访者中，大部分（67％）完成了心血管麻醉学研究，58％的人认为他们的实践停留在学术层面，37％表示他们是私人培训，6％是军人/退伍军人管理。大部分（84％）的受访者

在北美执业。81%的人表示熟悉 FoCUS，而 47％的人表示他们在临床实践中使用它。与其他受访者相比，那些在北美执业的人在实践中使用 FoCUS 的可能性要小得多。在培训和认证方面，88％的人认为 FoCUS 教育应该被纳入到住院培训项目中，74％的人认为 FoCUS 应该有一个基本的认证途径。
结论：大多数心血管麻醉医师熟悉 FoCUS，但是只有少数人已将其纳入实践。诸如缺乏培训，误诊的恐惧，缺乏资源以及缺乏正式认证过程等障碍必须加以解决，以便更广泛地使用围术期心脏超声。
（崔璀 译　陈杰 校）
BACKGROUND: The advent of portable ultrasound machines in recent years has led to greater availability of focused cardiac ultrasound (FoCUS) in the perioperative and critical care setting. To our knowledge, its use in the perioperative setting among anesthesiologists remains undefined. We sought to assess the use of FoCUS by members of the Society of Cardiovascular Anesthesiologists (SCA) in clinical practice, to identify variations in its application, to outline limits to its use, and to understand the level of training of physicians using this technology.
METHODS: A 26-question anonymous and voluntary online survey assessing the participants' training level with FoCUS, frequency of use, and opinions regarding incorporating it into residency training and developing a pathway to basic certification. The survey was distributed to the members of the SCA via email.
RESULTS: The survey was completed by 379 of 3660 members of the SCA (10%). Of the respondents, the majority (67%) had completed a cardiovascular anesthesiology fellowship with 58% identifying their practice as academic, while 37% stated they were in private practice, and 6% were military/Veterans Administration. Most (84%) of the respondents practiced in North America. Eighty-one percent reported familiarity with FoCUS, while 47% stated they use it in their clinical practice. Those practicing in North America were significantly less likely to utilize FoCUS in their practice as compared to other respondents. With regard to training and certification, 88% believe FoCUS education should be integrated into residency training programs and 74% believe there should be a pathway to basic certification for FoCUS.
CONCLUSIONS: While most cardiovascular anesthesiologists are familiar with FoCUS, a minority have integrated it into their practice. Roadblocks such as lack of training, the fear of missing diagnoses, lack of resources, and the lack of a formal certification process must be addressed to allow for more widespread use of perioperative cardiac ultrasound.

右美托咪定的相关高热：9 例病例和文献回顾

Dexmedetomidine-Associated Hyperthermia: A Series of 9 Cases and a Review of the Literature

Krüger, Bernard D. MD[*]; Kurmann, Judith MM[*]; Corti, Natascia MD[†]; Spahn, Donat R. MD[*]; Bettex, Dominique MD[*]; Rudiger, Alain MD[*]
Anesthesia & Analgesia: 2017 125 1898–1906

右美托咪定是 α2-肾上腺素能激动剂，可用于在危重病人中进行轻度至中度镇静。在这个病例系列中， 9 个心血管重症监护室的患者在右美托咪定给药期间的高热，提示药物引起的发热。在右美托咪定 1.0（0.8-1.3）μg/ kg / h 的起始剂量下，并于 3（1-8）小时后停用右美托咪定，患者在 6（4-10）小时（中位数[四分位间距范围]）发生高热（> 38.5℃）。所有患者都进行了高热的感染和非感染的筛选并采用 2 种药物不良反应（ADR）评估方法 - 世界卫生组织 - 乌普萨拉监测中心（WHO-UMC）因果关系评估和 Naranjo ADR 量表进行分析。WHO 的评估结果显示所有 9 例患者很大可能是 ADR，Naranjo 量表显示 1 例很大可能，8 例较小可能是 ADR。本病例系列支持已发表的病例报告，提示右美托咪定给药可能与临床相关的高热的发生有关。潜在的机制和风险因素是不确定的，需要进一步的研究。

（陈聪 译 陈杰 校）

Dexmedetomidine, an α2-adrenergic agonist, can be used to perform mild to moderate sedation in critically ill patients. In this case series, 9 cardiovascular intensive care unit patients with hyperthermia during dexmedetomidine administration, suggestive of drug fever, are presented. Hyperthermia (>38.5°C) occurred 6 (4-10) hours (median [interquartile range]) after dexmedetomidine initiation at a dose of 1.0 (0.8-1.3) μg/kg/h and was resolved 3 (1-8) hours after discontinuation of dexmedetomidine. All patients were screened for infectious and noninfectious causes of hyperthermia, and the findings were analyzed by 2 adverse drug reaction (ADR) assessment methods-the World Health Organization-Uppsala Monitoring Centre (WHO-UMC) Causality Assessment and the Naranjo ADR scale. This resulted in a "probable" ADR in all 9 patients (WHO) and a "probable" and "possible" ADR in 1 and 8 patients (Naranjo), respectively. This case series supports published case reports, suggesting that dexmedetomidine administration may be associated with the occurrence of clinically relevant hyperthermia. The underlying mechanisms and risk factors are uncertain and require further research.

用力肺活量在预测低肺顺应性和胸外科手术中选择恰当的潮气量的运用

Utilizing Forced Vital Capacity to Predict Low Lung Compliance and Select Intraoperative Tidal Volume During Thoracic Surgery

Hoftman, Nir MD*; Eikermann, Eric MD*; Shin, John MD*; Buckley, Jack MD*; Navab, Kaveh MD*; Abtin, Fereidoun MD†; Grogan, Tristan MS‡; Cannesson, Maxime MD, PhD*; Mahajan, Aman MD, PhD*

Anesthesia & Analgesia: 2017 125 1922–1930

背景：目前，机械通气期间潮气量的选择仅考虑患者预测体重(PBW)的公式。在本项实验中，研究者们探究了（1）与 PBW 相比，FVC 是否与总肺顺应性的关联度更好；（2）FVC 能否预测低肺顺应性；（3）FVC 能否提供计算术中潮气量的替代方法。

方法：130 名胸科手术患者采用 2 种方法评估术前总肺顺应性（TLC），分别是（1）肺功能检查（PFT，TLCPFT）和（2）计算机断层扫描三维重建（TLCCT）。比较 TLC 和 PBW 之间的相关性，以及 TLC 和 FVC 之间的相关性从而确定何种相关性更强。然后根据术中呼吸机数据和 logistic 回归模型计算动态肺顺应性，

以确定哪种临床检测更能预测低肺顺应性。TV/FVC 与吸气压力峰值的比值作为新的模型用来计算潮气量（TV）。然后将由该模型计算得出的潮气量与由标准肺保护性通气策略 Vt=7cc/kg 相比。

结果：与 PBW 和 TLC 的相关性（TLCPFT 为 0.65，TLCCT 为 0.58）相比，FVC 和 TLC 之间的相关性（TLCPFT 为 0.82，TLCCT 为 0.76）更好。与肺顺应性正常的患者相比，低肺顺应性患者的肺容量明显减小（第 1 秒用力呼吸容积，FVC，TLC）和肺一氧化碳弥散能力的降低。FVC 的截止值为 3470cc 时预测低肺顺应性的敏感性为 100%，特异性为 51%。所提出的计算公式 Vt=FVC/8 能够明显降低肺顺应性患者的潮气量（平均差为 22.5%），同时并不影响正常肺顺应性患者的平均潮气量（平均差为 0.9%）。

结论：FVC 与 TLC 之间的相关性高于 PBW，截止值为 3.5L 时可用于预测低肺顺应性。方程 Vt=FVC/8 能够降低低肺顺应性患者的平均计算潮气量。

（丁曦冰 译　陈杰 校）

BACKGROUND: Tidal volume selection during mechanical ventilation utilizes dogmatic formulas that only consider a patient's predicted body weight (PBW). In this study, we investigate whether forced vital capacity (FVC) (1) correlates better to total lung capacity (TLC) than PBW, (2) predicts low pulmonary compliance, and (3) provides an alternative method for tidal volume selection.

METHODS: One hundred thirty thoracic surgery patients had their preoperative TLC calculated via 2 methods: (1) pulmonary function test (PFT; TLCPFT) and (2) computed tomography 3D reconstruction (TLCCT). We compared the correlation between TLC and PBW with the correlation between TLC and FVC to determine which was stronger. Dynamic pulmonary compliance was then calculated from intraoperative ventilator data and logistic regression models constructed to determine which clinical measure best predicted low compliance. Ratios of tidal volume/FVC plotted against peak inspiratory pressure were utilized to construct a new model for tidal volume selection. Calculated tidal volumes generated by this model were then compared with those generated by the standard lung-protective formula Vt = 7 cc/kg.

RESULTS: The correlation between FVC and TLC (0.82 for TLCPFT and 0.76 for TLCCT) was stronger than the correlation between PBW and TLC (0.65 for TLCPFT and 0.58 for TLCCT). Patients with very low compliance had significantly smaller lung volumes (forced expiratory volume at 1 second, FVC, TLC) and lower diffusion capacity of the lungs for carbon monoxide when compared with patients with normal compliance. An FVC cutoff of 3470 cc was 100% sensitive and 51% specific for predicting low compliance. The proposed equation Vt = FVC/8 significantly reduced calculated tidal volume by a mean of 22.5% in patients with low pulmonary compliance without affecting the mean tidal volume in patients with normal compliance (mean difference 0.9%).

CONCLUSIONS: FVC is more strongly correlated to TLC than PBW and a cutoff of about 3.5 L can be utilized to predict low pulmonary compliance. The equation Vt = FVC/8 reduced mean calculated tidal volume in patients with low pulmonary compliance and/or small lungs.

艾司洛尔用于控制绵羊腹膜炎模型的心动过速

Esmolol Administration to Control Tachycardia in an Ovine Model of Peritonitis

Hosokawa, Koji MD; Su, Fuhong MD, PhD; Taccone, Fabio Silvio MD, PhD; Post, Emiel Hendrik MD; Pereira, Adriano José MD; Herpain, Antoine MD; Creteur, Jacques MD, PhD; Vincent, Jean-Louis MD, PhD

Anesthesia & Analgesia: 2017 125 1952–1959

背景：过多的肾上腺素信号在脓毒症中可能有害。运用 β 受体阻断剂减弱交感神经过度活跃可以缓解脓毒症引发的心血管、新陈代谢、免疫和凝血改变。运用排泄物导致的绵羊腹膜炎模型，研究短效 β 受体阻断剂艾司洛尔能否控制心动过速而不破坏血液动力学、肾灌注、脑灌注、脑代谢和结果。

方法：14 只母绵羊被排泄物诱发腹膜炎之后，麻醉下机械通气，监测血液动力学，随机接受艾司洛尔血管内持续输注控制心率在 80-100bpm（n=7）或生理盐水输注（对照组，n=7）。平均动脉压降至 60mmHg 以下则停用艾司洛尔。采用液体复苏保证肺动脉压力在基线水平。除了标准血液动力学参数，左肾血液流量和脑皮质灌注和代谢也被监测。

结果：艾司洛尔输注 11（9-14）小时，使排泄物感染后 3-8 小时绵羊心率达到 80-100bpm。在输注的最初 5 小时，心率下降继而心脏每搏量代偿性增高。之后，每搏量在两组间没有显著差异，艾司洛尔组心脏做功比对照组少。艾司洛尔组低血压（平均动脉压<60mmHg）发生比对照组早(10 [8-12] vs 14 [11-20] 小时; P= .01)。艾司洛尔组肾血流量降低更早，但是排尿、脑皮质灌注、代谢和生存率在两组间没有显著差异。

结论：绵羊腹膜炎模型中，早期使用艾司洛尔控制心动过速会引起每搏量短暂升高，继而发生早期低血压。在脑灌注、脑代谢、尿量和生存率方面两组并无显著差异。

（葛家希 译 陈杰 校）

BACKGROUND: Excessive adrenergic signaling may be harmful in sepsis. Using β-blockers to reduce sympathetic overactivity may modulate sepsis-induced cardiovascular, metabolic, immunologic, and coagulation alterations. Using a randomized ovine fecal peritonitis model, we investigated whether administration of a short-acting β-blocker, esmolol, could control tachycardia without deleterious effects on hemodynamics, renal perfusion, cerebral perfusion, cerebral metabolism, or outcome.

METHODS: After induction of fecal peritonitis, 14 anesthetized, mechanically ventilated, and hemodynamically monitored adult female sheep were randomly assigned to receive a continuous intravenous infusion of esmolol to control heart rate between 80 and 100 bpm (n = 7) or a saline infusion (control group, n = 7). Esmolol was discontinued when the mean arterial pressure decreased below 60 mm Hg. Fluid resuscitation was titrated to maintain pulmonary artery occlusion pressure at baseline values. Left renal blood flow and cerebral cortex perfusion and metabolism were monitored in addition to standard hemodynamic variables.

RESULTS: Esmolol was infused for 11 (9-14) hours; the target heart rate (80-100 bpm) was achieved between 3 and 8 hours after feces injection. In the first 5 hours after the start of the infusion, the decrease in heart rate was compensated by an increase in stroke volume index; later, stroke volume index was not statistically

significantly different in the 2 groups, so that the cardiac work index was lower in the esmolol than in the control group. Hypotension (mean arterial pressure <60 mm Hg) occurred earlier (10 [8-12] vs 14 [11-20] hours; P= .01) in the esmolol group than in the control animals. Renal blood flow decreased earlier in the esmolol group, but there were no differences in urine output, cerebral cortex perfusion, metabolism, or survival between the groups.
CONCLUSIONS: In this ovine model of abdominal sepsis, early control of tachycardia by esmolol was associated with a transient increase in stroke volume, followed by earlier hypotension. There were no significant effects of esmolol on cerebral perfusion, metabolism, urine output, or survival.

主动脉下腔静脉压迫综合征：重新审视既往教义的时代
Aortocaval Compression Syndrome: Time to Revisit Certain Dogmas
Lee, Allison J. MD; Landau, Ruth MD
Anesthesia & Analgesia: 2017 125 1975–1985

70 多年前研究者们发现，孕晚期的健康妇女在仰卧位时会出现体位性休克的现象。此后，避免仰卧位已成为临床实践的重要组成部分。实际上，采取骨盆侧卧体位以避免下腔静脉受压已成为孕产妇手术，尤其是在剖宫产手术中的普遍采取的措施。几十年前基于此的研究基本为大型非随机，同时复合多项麻醉技术，并且是在避免使用血管加压药的情况下进行的。在当代临床实践中，最新的研究证据正在逐步完善对于下腔静脉压迫综合症其生理学改变的认识。例如，核磁共振检测孕期妇女仰卧位和侧卧位血流，结果对侧卧位 15 度足够减轻下腔静脉压迫的说法提出质疑。一项健康产妇脊髓麻醉下择期剖宫产的临床研究表明，如果产妇的收缩压通过晶体液补充和预防性新福林输注维持于基础水平，无论产妇采取侧卧位 15 度倾斜还是仰卧位，新生儿的酸碱水平没有明显差异。本综述重新审视紧扣这一主题数年的研究证据，并提出对关于既往已固定的体位摆放操作的当前指南进行重新评估与制定。
（徐侨翌 译　陈杰 校）
More than 70 years ago, the phenomenon of “postural shock” in the supine position was described in healthy women in late pregnancy. Since then, avoidance of the supine position has become a key component of clinical practice. Indeed, performing pelvic tilt in mothers at term to avoid aortocaval compression is a universally adopted measure, particularly during cesarean delivery. The studies on which this practice is based are largely nonrandomized, utilized a mix of anesthetic techniques, and were conducted decades ago in the setting of avoidance of vasopressors. Recent evidence is beginning to refine our understanding of the physiologic consequences of aortocaval compression in the context of contemporary clinical practice. For example, magnetic resonance imaging of women at term in the supine and tilted positions has challenged the dogma that 15° of left tilt is sufficient to relieve inferior vena cava compression. A clinical investigation of healthy term women undergoing elective cesarean delivery with spinal anesthesia found no difference in neonatal acid-base status between women randomized to be either tilted to the left by 15° or to be in the supine position, if maternal systolic blood pressure is maintained at baseline with a crystalloid coload

and prophylactic phenylephrine infusion. This review presents a fresh look at the decades of evidence surrounding this topic and proposes a reevaluation and appraisal of current guidelines regarding entrenched practices.

持续脉搏血氧饱和度和二氧化碳监测用于术后呼吸系统抑制和不良事件：系统回顾和荟萃分析

Continuous Pulse Oximetry and Capnography Monitoring for Postoperative Respiratory Depression and Adverse Events: A Systematic Review and Meta-analysis

Lam, Thach MD[*]; Nagappa, Mahesh MD[†]; Wong, Jean MD[*]; Singh, Mandeep MD, MSc[*]; Wong, David MD[*]; Chung, Frances MBBS[*]

Anesthesia & Analgesia: 2017 125 2019–2029

背景:因未被确认的术后呼吸抑制(PORD)引起的死亡和缺氧性脑损害是患者安全的一个重要问题。美国患者安全基金会呼吁对所有在术后接受阿片类药物的患者进行持续的电子监控。这些建议在很大程度上是基于目前有限证据的一致意见。本研究的目的是回顾连续脉搏血氧仪(CPOX)与常规护理治疗的有效性，以及在有或没有脉搏血氧仪的情况下行持续二氧化碳波形监测的有效性，以用来在外科病房中检测 PORD 以及预防术后不良事件。

方法:研究者对 1946 年至 2017 年 5 月发表的文献数据库进行系统检索。选择的研究包含以下几点:(1)行外科手术的成人患者(18 岁以上);(2)术后使用阿片类药物;(3)用 CPOX 和/或二氧化碳波形监测;(4)主要结果用氧饱和度、呼吸过缓、高碳酸血症、救护队激活、重症监护室(ICU)入院或死亡来衡量;(5)以英语发表的研究。荟萃分析是使用 Cochrane 综述管理器 5.3 进行。

结果:在本系统回顾中包括 9 个研究(4 个检查 CPOX 和 5 个检查连续二氧化碳波形)。在 CPOX 文献中，一项随机对照试验显示在 ICU 转移(6.7%和 8.5%，P=.33)或死亡率(2.3%和 2.2%)方面没有差别。一项前瞻性的历史对照试验表明，在使用 CPOX 时，转入 ICU 人数(每 1000 个病人的天数为 5.6-1.2;P=.01)和启动救援小组(每 1000 个病人的天数为 3.4-2.2)。总的来说，比较 CPOX 组和标准的监测组，转入 ICU 的风险降低了 34%(P=.06)，并且识别去饱和的几率(氧饱和度值小于 90%大于 1 小时)增高了 15 倍(P 小于.00001)。来自 3 个二氧化碳波形监测研究的汇总数据显示，连续的二氧化碳波形监测组比脉搏血氧学监测组(CO2 组和 SpO2 组:分别为 11.5%和 2.8%，P 小于.00001)多辨认 8.6%PORD。二氧化碳波形监测组鉴别 PORD 的几率几乎是脉搏血氧监测组的 6 倍(优势比:5.83，95%可信区间，3.54-90.63;P 小于.00001)。没有连续二氧化碳波形监测对减少救援团队的启动、ICU 转移或死亡率的影响的相关研究。

结论:在外科病房中使用 CPOX 与间歇式护理抽查相比，监测氧饱和度下降有显著的提高。与标准监测相比，使用 CPOX 的 ICU 转移趋势较少。关于监测到氧饱和度下降是否会降低救援小组的启动和死亡率的证据是不确定的。二氧化碳波形监测在氧饱和度下降之前提供了早期预警，特别是在补充氧气的情况下。需要关于监测的改进的教育和高质量的随机对照试验的进一步研究。

（杨柳 译　陈杰 校）

BACKGROUND: Death and anoxic brain injury from unrecognized postoperative respiratory depression (PORD) is a serious concern for patient safety. The American

Patient Safety Foundation has called for continuous electronic monitoring for all patients receiving opioids in the postoperative period. These recommendations are based largely on consensus opinion with currently limited evidence. The objective of this study is to review the current state of knowledge on the effectiveness of continuous pulse oximetry (CPOX) versus routine nursing care and the effectiveness of continuous capnography monitoring with or without pulse oximetry for detecting PORD and preventing postoperative adverse events in the surgical ward.
METHODS: We performed a systematic search of the literature databases published between 1946 and May 2017. We selected the studies that included the following: (1) adult surgical patients (>18 years old); (2) prescribed opioids during the postoperative period; (3) monitored with CPOX and/or capnography; (4) primary outcome measures were oxygen desaturation, bradypnea, hypercarbia, rescue team activation, intensive care unit (ICU) admission, or mortality; and (5) studies published in the English language. Meta-analysis was performed using Cochrane Review Manager 5.3.
RESULTS: In total, 9 studies (4 examining CPOX and 5 examining continuous capnography) were included in this systematic review. In the literature on CPOX, 1 randomized controlled trial showed no difference in ICU transfers (6.7% vs 8.5%; P = .33) or mortality (2.3% vs 2.2%). A prospective historical controlled trial demonstrated a significant reduction in ICU transfers (5.6–1.2 per 1000 patient days; P = .01) and rescue team activation (3.4–1.2 per 1000 patient days; P = .02) when CPOX was used. Overall, comparing the CPOX group versus the standard monitoring group, there was 34% risk reduction in ICU transfer (P = .06) and odds of recognizing desaturation (oxygen saturation [SpO2] <90% >1 hour) was 15 times higher (P < .00001). Pooled data from 3 capnography studies showed that continuous capnography group identified 8.6% more PORD events versus pulse oximetry monitoring group (CO2 group versus SpO2 group: 11.5% vs 2.8%; P < .00001). The odds of recognizing PORD was almost 6 times higher in the capnography versus the pulse oximetry group (odds ratio: 5.83, 95% confidence interval, 3.54–9.63; P < .00001). No studies examined the impact of continuous capnography on reducing rescue team activation, ICU transfers, or mortality.
CONCLUSIONS: The use of CPOX on the surgical ward is associated with significant improvement in the detection of oxygen desaturation versus intermittent nursing spot-checks. There is a trend toward less ICU transfers with CPOX versus standard monitoring. The evidence on whether the detection of oxygen desaturation leads to less rescue team activation and mortality is inconclusive. Capnography provides an early warning of PORD before oxygen desaturation, especially when supplemental oxygen is administered. Improved education regarding monitoring and further research with high-quality randomized controlled trials is needed.

大量输血方案的启动和终止：当前战略和未来前景

Initiation and Termination of Massive Transfusion Protocols: Current Strategies and Future Prospects

Foster, John C. MD[*]; Sappenfield, Joshua W. MD[†]; Smith, Robert S. MD[‡]; Kiley, Sean P. MD[†]

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大量输血方案（MTP）的出现对创伤患者并发症发生率和死亡率有显着的正面影响。尽管如此，学术机构的社会 MTP 指南和个人 MTP 指南仍然对 MTP 至关重要的议题提出反对意见。本文叙述性评论讨论了大量输血方案的启动和终止的最新信息。每个讨论都是来自美国麻醉医师协会，美国外科医师学会和创伤出血高级护理工作组这三所研究机构对 MTP 指南提出的建议和支持文献。随后对这些建议中的主要内容进行深入分析。有关创伤出血患者 MTP 启动的社会推荐强调使用回顾性验证的大量输血（MT）预测评分，特别是血液消耗量评估和创伤相关严重出血评分。研究验证表明，两个评分系统的表现相似。这两个评分能准确地识别不需要 MT 的患者，同时高估 MT 的需求。然而，每个评分系统都有其独特的优劣势，此评论探讨每个评分系统的具体方面如何影响广泛的适用性和统计表现。此外，作者还探讨在非创伤患者中常常忽视的启动 MT 的主题以及医生在这个独特的环境中指导 MT 启动决策的具体工具。尽管输入量大的血液制品可能产生严重的并发症，但与 MTP 终止相关的研究相当少。社会关于 MTP 终止的推荐强调应用临床推理来识别出血源控制和充分复苏的患者。然而，这篇综述主要集中在创伤 MTP 指南中的高级出血治疗提出的建议，这些建议要求迅速终止算法引导的复苏模型，并迅速过渡到由实验室检查结果指导的复苏模型。作者还讨论了支持实验室结果指导复苏的证据，以及最近有关粘弹性止血测定的文献虽然有限，但是强调了通过这种复苏方法获得额外益处的潜力。
（俞苏洋 译　陈杰 校）

The advent of massive transfusion protocols (MTP) has had a significant positive impact on hemorrhaging trauma patient morbidity and mortality. Nevertheless, societal MTP guidelines and individual MTPs at academic institutions continue to circulate opposing recommendations on topics critical to MTPs. This narrative review discusses up-to-date information on 2 such topics, the initiation and termination of an MTP. The discussion for each begins with a review of the recommendations and supporting literature presented by MTP guidelines from 3 prominent societies, the American Society of Anesthesiologists, the American College of Surgeons, and the task force for Advanced Bleeding Care in Trauma. This is followed by an in-depth analysis of the main components within those recommendations. Societal recommendations on MTP initiation in hemorrhaging trauma patients emphasize the use of retrospectively validated massive transfusion (MT) prediction score, specifically, the Assessment of Blood Consumption and Trauma-Associated Severe Hemorrhage scores. Validation studies have shown that both scoring systems perform similarly. Both scores reliably identify patients that will not require an MT, while simultaneously overpredicting MT requirements. However, each scoring system has its unique advantages and disadvantages, and this review discusses how specific aspects of each scoring system can affect widespread applicability and statistical performance. In addition, we discuss the often overlooked topic of initiating MT in nontrauma patients and the specific tools physicians have to guide the MT initiation decision in this unique setting. Despite the serious complications that can arise with transfusion of large volumes of blood products, there is considerably less research pertinent to the topic of MTP termination. Societal recommendations on MTP

termination emphasize applying clinical reasoning to identify patients who have bleeding source control and are adequately resuscitated. This review, however, focuses primarily on the recommendations presented by the Advanced Bleeding Care in Trauma's MTP guidelines that call for prompt termination of the algorithm-guided model of resuscitation and rapidly transitioning into a resuscitation model guided by laboratory test results. We also discuss the evidence in support of laboratory result-guided resuscitation and how recent literature on viscoelastic hemostatic assays, although limited, highlights the potential to achieve additional benefits from this method of resuscitation.

中西医结合疼痛治疗管理：现有证据的评价

Using Integrative Medicine in Pain Management: An Evaluation of Current Evidence

Lin, Yuan-Chi MD, MPH[*†]; Wan, Limeng BS[‡]; Jamison, Robert N. PhD[‡]

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补充药物疗法经常用于治疗疼痛，如头痛，颈部，背部和关节疼痛。慢性疼痛，即持续时间超过3-6个月的疼痛，是一种可以产生显著社会经济影响的虚弱状况。药物治疗方法常用于缓解慢性疼痛，但由于担心耐受，依赖性和成瘾性，近年来医生们不愿开具阿片类药物治疗慢性非癌痛。因此，人们对综合性药物治疗策略的兴趣日益增加，以帮助控制疼痛，减少疼痛管理中对处方类阿片药物的依赖。本文对用于治疗慢性疼痛的中西医结合疗法（包括营养补充剂，瑜伽，放松，太极拳，按摩，脊柱推拿和针灸）进行了简短的评论。本文目的是明确那些显示疗效证据的治疗方法，并找出需要进一步研究和对照试验的文献中的差距。对PubMed，Cochrane Library，EMBASE，PsycINFO 和 Science Citation Index Expanded 等数据库进行电子检索。总之，瑜伽，放松，太极拳，按摩和脊柱推拿的阳性证据较弱。针灸作为慢性疼痛的补充治疗并能减少阿片类药物使用的证据较强。很少有研究发现使用中西医结合的方法来解决慢性疼痛患者中阿片类药物误用和滥用的问题。还需要额外的对照试验来进一步研究中西医结合治疗方法在疼痛管理中的应用。

（黄莉莉 译　陈杰 校）

Complementary medicine therapies are frequently used to treat pain conditions such as headaches and neck, back, and joint pain. Chronic pain, described as pain lasting longer than 3-6 months, can be a debilitating condition that has a significant socioeconomic impact. Pharmacologic approaches are often used for alleviating chronic pain, but recently there has been a reluctance to prescribe opioids for chronic noncancer pain because of concerns about tolerance, dependence, and addiction. As a result, there has been increased interest in integrative medicine strategies to help manage pain and to reduce reliance on prescription opioids to manage pain. This article offers a brief critical review of integrative medical therapies used to treat chronic pain, including nutritional supplements, yoga, relaxation, tai chi, massage, spinal manipulation, and acupuncture. The goal of this article is to identify those treatments that show evidence of efficacy and to identify gaps in the literature where additional studies and controlled trials are needed. An electronic search of the

databases of PubMed, The Cochrane Library, EMBASE, PsycINFO, and Science Citation Index Expanded was conducted. Overall, weak positive evidence was found for yoga, relaxation, tai chi, massage, and manipulation. Strong evidence for acupuncture as a complementary treatment for chronic pain that has been shown to decrease the usage of opioids was found. Few studies were found in which integrative medicine approaches were used to address opioid misuse and abuse among chronic pain patients. Additional controlled trials to address the use of integrative medicine approaches in pain management are needed.

用于治疗出院后儿童急性疼痛的阿片类处方的研究

Opioid Prescribing for the Treatment of Acute Pain in Children on Hospital Discharge

Monitto, Constance L. MD[*]; Hsu, Aaron MHS[*]; Gao, Shuna BA[*]; Vozzo, Paul T. BA[*]; Park, Paul S. BS[*]; Roter, Deborah DrPh[†]; Yenokyan, Gayane MD, MPH, PhD[‡]; White, Elizabeth D. RN[*]; Kattail, Deepa MD, MHS[*]; Edgeworth, Amy E. RN, MSN, CRNP[*]; Vasquenza, Kelly J. RN, MSN, CPNP[*]; Atwater, Sara E. RN, MSN, CPNP[*]; Shay, Joanne E. MD, MBA[*]; George, Jessica A. MD, MEd[*]; Vickers, Barbara A. MD, MPH[*]; Kost-Byerly, Sabine MD[*]; Lee, Benjamin H. MD, MPH[*]; Yaster, Myron MD[*]
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背景：使用的合法开具而未使用的处方阿片类药物将加剧了其在非医疗用途中的滥用。为了更好地了解儿科患者处方阿片类药物对这一问题的影响，作者对控制疼痛的阿片类药物在出院后配发和使用的情况，以及剩余的阿片类药物合理处置情况进行了量化分析。本研究的次要目的包括研究与阿片类药物的发放、消耗以及治疗结束后剩余量相关的患者因素。

方法：对一所大学儿童医院中 343 名接受治疗的住院患儿（98％术后）的家长进行 10 分钟的专访，访问时间分别为出院后 48 小时内和出院后 10 至 14 天，以确定开具和使用的阿片类药物的量、治疗的持续时间以及对未使用阿片类药物的处置情况。使用多元线性回归分析得出阿片类药物处方、消耗量和剩余剂量的预测因子。

结果：配发阿片类药物的中位数为 43（%？）（四分位距，30-85 次（%？）），治疗时间中位数为 4 天（四分位距，1-8 天）。接受骨科或微创漏斗胸矫形术（Nuss）手术的患儿比接受其他类型手术的患儿使用剂量高出 25.42（%？）（95％置信区间，19.16-31.68）（P <.001），而且使用的剂量与出院后的疼痛评分呈正相关（ P = 0.032）。总体而言，配发剂量的 58％（95％置信区间，54％-63％）未被使用，并且配发剂量是剩余剂量的最有力预测因子（P <.001）。19%的家庭被告知如何处置剩下的阿片类药物，但只有 4％（211 例中有 8 例）按告知处置了剩余的药物。

结论：儿科医生常常开具多于治疗疼痛所需的阿片类药物。这些未被使用的阿片类药物可能会导致处方阿片类药物的非医学使用的流行。本研究结果表明：应开展更多研究以开发用于治疗儿童急性疼痛的阿片类药物处方指导方针。

（张金源 译　　陈杰 校）

BACKGROUND: The epidemic of nonmedical use of prescription opioids has been fueled by the availability of legitimately prescribed unconsumed opioids. The aim of

this study was to better understand the contribution of prescriptions written for pediatric patients to this problem by quantifying how much opioid is dispensed and consumed to manage pain after hospital discharge, and whether leftover opioid is appropriately disposed of. Our secondary aim was to explore the association of patient factors with opioid dispensing, consumption, and medication remaining on completion of therapy.
METHODS: Using a scripted 10-minute interview, parents of 343 pediatric inpatients (98% postoperative) treated at a university children's hospital were questioned within 48 hours and 10 to 14 days after discharge to determine amount of opioid prescribed and consumed, duration of treatment, and disposition of unconsumed opioid. Multivariable linear regression was used to examine predictors of opioid prescribing, consumption, and doses remaining.
RESULTS: Median number of opioid doses dispensed was 43 (interquartile range, 30-85 doses), and median duration of therapy was 4 days (interquartile range, 1-8 days). Children who underwent orthopedic or Nuss surgery consumed 25.42 (95% confidence interval, 19.16-31.68) more doses than those who underwent other types of surgery ($P < .001$), and number of doses consumed was positively associated with higher discharge pain scores ($P = .032$). Overall, 58% (95% confidence interval, 54%-63%) of doses dispensed were not consumed, and the strongest predictor of number of doses remaining was doses dispensed ($P < .001$). Nineteen percent of families were informed how to dispose of leftover opioid, but only 4% (8 of 211) did so. **CONCLUSIONS:** Pediatric providers frequently prescribed more opioid than needed to treat pain. This unconsumed opioid may contribute to the epidemic of nonmedical use of prescription opioids. Our findings underscore the need for further research to develop evidence-based opioid prescribing guidelines for physicians treating acute pain in children.