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简要报告：胸外科手术围手术期连续硬膜外输注S(+)-氯胺酮的镇痛疗效和血药浓度。
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Color Flow Doppler Ultrasonography Can Distinguish Caudal Epidural Injection from Intrathecal Injection

Ban Tsui, Carl Leipoldt, and Sunil Desai


Heparin resistance during cardiac surgery is defined as the inability of an adequate heparin dose to increase the activated clotting time (ACT) to the desired level. Failure to attain the target ACT raises concerns that the patient is not fully anticoagulated and initiating cardiopulmonary bypass may result in excessive activation of the hemostatic system. Although antithrombin deficiency has generally been thought to be the primary mechanism of heparin resistance, the reasons for heparin resistance are both complex and multifactorial. Furthermore, the ACT is not specific to heparin’s anticoagulant effect and is affected by multiple variables that are commonly present during cardiac surgery. Due to these many variables, it remains unclear whether decreased heparin responsiveness as measured by the ACT represents inadequate anticoagulation. Nevertheless, many clinicians choose a target ACT to assess anticoagulation, and interventions aimed at achieving the target ACT are routinely performed in the setting of heparin resistance. Treatments for heparin resistance/alterations in heparin responsiveness include additional heparin or antithrombin supplementation. In this review, we discuss the variability of heparin potency, heparin responsiveness as measured by the ACT, and the current management of heparin resistance.
BACKGROUND: Carboetomidate is a pyrrole etomidate analog that is 3 orders of magnitude less potent an inhibitor of in vitro cortisol synthesis than etomidate (an imidazole) and does not inhibit in vivo steroid production. Although carboetomidate’s reduced functional effect on steroid synthesis is thought to reflect lower binding affinity to 11β-hydroxylase, differential binding to this enzyme has never been experimentally demonstrated. In the current study, we tested the hypothesis that carboetomidate and etomidate bind with differential affinity to 11β-
hydroxylase by comparing their abilities to inhibit photoaffinity labeling of purified enzyme by a photoactivatable etomidate analog and to modify the enzyme’s absorption spectrum in a way that is indicative of ligand binding. In addition, we made a preliminary exploration of the manner in which etomidate and carboetomidate might differentially interact with this site using spectroscopic methods as well as molecular modeling techniques to better understand the structural basis for their selectivity.

METHODS: The ability of azi-etomidate to inhibit cortisol synthesis was tested by assessing its ability to inhibit cortisol synthesis by H295R cells. The binding affinities of etomidate and carboetomidate to 11β-hydroxylase were compared by assessing their abilities to (1) inhibit photoincorporation of the photolabile etomidate analog [3H]azi-etomidate into the enzyme and (2) modify the absorption spectrum of the enzyme’s heme group. In silico docking studies of etomidate, carboetomidate, and azi-etomidate binding to 11β-hydroxylase were performed using the computer software GOLD.

RESULTS: Similar to etomidate, azi-etomidate potently inhibits in vitro cortisol synthesis. Etomidate inhibited [3H]azi-etomidate photolabeling of 11β-hydroxylase in a concentration-dependent manner. At a concentration of 40 µM, etomidate reduced photoincorporation of [3H]azi-etomidate by 96% ± 1% whereas carboetomidate had no experimentally detectable effect. On addition of etomidate to 11β-hydroxylase, a type 2 difference spectrum was produced indicative of etomidate complexation with the enzyme’s heme iron; carboetomidate had no effect whereas azi-etomidate produced a reverse type 1 spectrum. Computer modeling studies predicted that etomidate, carboetomidate, and azi-etomidate can fit into the heme-containing pocket that forms 11β-hydroxylase’s active site and pose with their carbonyl oxygens interacting with the heme iron and their phenyl rings stacking with phenylalanine-80. However, additional unique poses were identified for etomidate and azi-etomidate that likely account for their higher affinities.

CONCLUSIONS: Carboetomidate’s reduced ability to suppress in vitro and in vivo steroid synthesis as compared with etomidate reflects its lower binding affinity to 11β-hydroxylase and may be attributed to carboetomidate’s inability to form a coordination bond with the heme iron located at the enzyme’s active site.

综述：麻醉医师对胎儿的评估：你是否评估另一位病人？

Review Article: Fetal Assessment for Anesthesiologists: Are You Evaluating the Other Patient?

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Suboptimal communication between anesthesiologists and obstetricians can be associated with unintended poor maternal and neonatal outcomes, especially for emergency cesarean deliveries. Obstetricians use the results of antepartum and intrapartum fetal assessments to assess fetal well-being and to make decisions about the timing and method of delivery. Because abnormal results may lead to the need for urgent or emergency cesarean deliveries, these decisions may directly impact anesthetic care. Lack of familiarity with fetal assessments and the significance of the results may thus hinder the communication necessary for optimal patient care. In this review article, we discuss the current antepartum and intrapartum fetal assessment modalities, including the nonstress test, biophysical profile, Doppler velocimetry, electronic fetal heart rate monitoring, fetal electrocardiogram (STAN-ST waveform analysis), and fetal pulse oximetry. The physiologic basis behind these modalities and the available evidence regarding their utility in clinical practice are also reviewed. The 2008 National Institute of Child Health and Human Development workshop report on electronic fetal monitoring categories, which are incorporated into the American College of Obstetricians and Gynecologists guidelines for intrapartum care, is examined. The implications of test interpretation to the practice of obstetric anesthesiology is also discussed. Anesthesia provider understanding of fetal assessment modalities is essential in improving communication with obstetricians and improving the planning of cesarean deliveries for high-risk obstetric patients.

Intraocular Pressure in Pediatric Patients During Prone Surgery
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Background: Intraocular pressure (IOP) in pediatric patients undergoing prone positioning for surgery is not well understood. This study aimed to determine IOP in pediatric patients undergoing prone positioning during surgical procedures.

Methods:
Thirty-five pediatric patients undergoing prone positioning for surgical procedures were enrolled. Preoperative and postoperative IOP measurements were obtained in the supine position and immediately before and after surgery in the prone position. The IOP measurements were analyzed using a mixed-effects model with intra-individual correlation.

Results:
The average IOP in the supine position was 14.2 mm Hg (SD 1.5), and in the prone position immediately before surgery was 16.5 mm Hg (SD 2.3). The IOP decreased significantly to 12.7 mm Hg (SD 1.8) immediately after surgery. The IOP remained stable during the surgery.

Conclusions:
Intraocular pressure in pediatric patients undergoing prone positioning for surgery is reduced immediately after surgery, and remains stable during surgery. Further studies are needed to evaluate the long-term effects of prone positioning on IOP.
结果：俯卧位时眼压平均每小时增加2.2 mmHg（P < 0.001）。俯卧位时63%的患者（95%可信区间[CI]为46%–81%）至少有一次眼压值超过30 mmHg，13%的患者（95%可信区间[CI]为1%–25%）至少有一次眼压值超过了40 mmHg。从仰卧位变为俯卧位后眼压增加了7 mmHg（95%可信区间[CI]为6%–9%）（P < 0.001），而从俯卧位变回仰卧位时眼压减少了10 mmHg（95%可信区间[CI]为9%–12%）（P < 0.001）。

结论：从仰卧位至俯卧位的体位改变显著增加麻醉后儿科患者的眼压。此外，尤其是在常见平均动脉血压较低的大手术中，可发生眼压持续增加并可产生潜在危害。

BACKGROUND: Intraoperative intraocular pressure (IOP) in the prone position and IOP changes over time have not been evaluated in pediatric surgical patients. We sought to determine time-dependent changes in IOP in children undergoing surgery in prone position.

METHODS: Thirty patients undergoing neurosurgical procedures in prone position were included. Using a pulse-mode pneumatonometer, IOP was measured in supine position after induction and before emergence of anesthesia and in prone position before the start and after the end of surgery. IOP changes over time in the prone position were assessed with a linear mixed model (i.e., random slope and intercept model) to adjust for the within-patient correlation.

RESULTS: IOP in prone position increased by an average of 2.2 mm Hg per hour (P < 0.001). Sixty-three percent of patients (95% confidence interval [CI], 46%–81%) had at least 1 IOP value exceeding 30 mm Hg, and 13% (95% CI, 1%–25%) had at least 1 IOP value exceeding 40 mm Hg while prone. Mean IOP increased 7 mm Hg (95% CI, 6–9) during the position change from supine to prone (P < 0.001) and decreased 10 mm Hg (95% CI, 9–12) after changing the position from prone back to supine (P < 0.001).

CONCLUSIONS: Changing position from supine to prone significantly increases IOP in anesthetized pediatric patients. Moreover, the IOP continued to increase during surgery and reached potentially harmful values, especially when combined with low mean arterial blood pressures that are common during major surgery.

难治性癌痛的鞘内镇痛泵输注治疗：一个避免椎管内试验的运算法则

Intrathecal Pain Pump Infusions for Intractable Cancer Pain: An Algorithm for Dosing Without a Neuraxial Trial

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背景：晚期癌症伴有疼痛的患者往往生存期有限。在这些患者中为了放置鞘内泵而接受硬膜外试验可能耗费其有限的生存时间。本研究试图分析该癌症中心既往数据得出一种基于操作前全身给予阿片类药物方法，可预测初始鞘内泵注剂量的运算法则，如此可避免硬膜外试验并将住院时间最少化。

方法: 分析46例使用全身性阿片类药物并在最后6年使用鞘内镇痛泵置入的癌症病人镇痛泵使用前以及使用后的数据，所有对象在使用镇痛泵前均接受了硬膜外穿刺试验。

结果: 通过使用多元回归分析出院时鞘内阿片类药物剂量（静脉吗啡等效量）与年龄、疼痛类型、癌症类型、置管前阿片类药物剂量和置管前疼痛评分的关系，创造了一种基于镇痛泵使用前全身阿片类药物剂量，可预测癌症病人鞘内镇痛泵起始剂量的运算法则，由此避免了硬膜外试验。当所指的试验可行时，这个预估值有很宽的95%可信区间（−122.7%到147.6%）。

结论: 当癌痛患者的硬膜外试验不可行且需要鞘内镇痛泵时，通过基于全身使用阿片类药物的剂量来预计鞘内镇痛泵的初始剂量是可能的。这样可以缩短达到满意镇痛效果的时间，早日出院。

（翟亦枫 译 陈杰 校）

BACKGROUND: Patients with pain from advanced cancer often have limited life expectancy. Undergoing an epidural trial for placement of an intrathecal pump in these selected patients can exhaust limited days of life. We sought to analyze historical data at our cancer center to develop an algorithm to predict initial intrathecal pump dosing based on the starting preimplant systemic opioid regimen, thus averting an epidural trial and minimizing hospital stay.

METHODS: We used data pre- and postpump from 46 cancer patients receiving systemic opioids undergoing intrathecal pump placement in the last 6 years, all of whom had undergone an epidural trial before pump placement.

RESULTS: By analyzing intrathecal opioid dosage on discharge (in IV morphine equivalents) to age, type of pain, cancer type, preimplant opioid dose, and preimplant pain score using multiple regression, we created an algorithm that predicts, for cancer patients, an appropriate initial dose for an intrathecal pump based on the prepump systemic opioid dose, thus avoiding an epidural trial. The predicted value does have a broad 95% prediction interval (−122.7% to 147.6%) pointing to the value of a trial when feasible.

CONCLUSIONS: When an epidural trial is not feasible and an intrathecal pump is required in a cancer patient, it is possible to predict an initial dose for the intrathecal pump based on the systemic opioid usage. This minimizes delays in achieving satisfactory analgesia and discharge to home.
Background: This study sought to determine the frequency and outcomes of epidural hematomas after epidural catheterization.

Methods: Eleven centers participating in the Multicenter Perioperative Outcomes Group used electronic anesthesia information systems and quality assurance databases to identify patients who had epidural catheters inserted for either obstetrical or surgical indications. From this cohort, patients undergoing laminectomy for the evacuation of hematoma within 6 weeks of epidural placement were identified.

Results: Seven of 62,450 patients undergoing perioperative epidural catheterizations developed hematoma requiring surgical evacuation. The event rate was 11.2 × 10⁻⁵ (95% confidence interval [CI], 4.5 × 10⁻⁵ to 23.1 × 10⁻⁵). Four of the 7 had anticoagulation/antiplatelet therapy that deviated from American Society of Regional Anesthesia guidelines. None of 79,837 obstetric patients with epidural catheterizations developed hematoma (upper limit of the 95% CI, 4.6 × 10⁻⁵). The hematoma rate in obstetric epidural catheterizations was significantly lower than in perioperative epidural catheterizations (P = 0.003).

Conclusions: In this series, the 95% CI for the frequency of epidural hematoma requiring laminectomy after epidural catheter placement for perioperative anesthesia/analgesia was 1 event per 22,189 placements to 1 event per 4330 placements. Risk was significantly lower in obstetric epidurals.
中国外科手术患者围术期吸烟行为调查
Perioperative Smoking Behavior of Chinese Surgical Patients
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背景：调查显示，与高吸烟率相符，大样本中的中国吸烟者不愿意戒烟。在其他文化中，手术治疗具有强有力的教育意义，是戒烟的动力，使得自发戒烟率上升。我们测定了中国择期手术的吸烟患者围术期烟草的使用行为和与术前戒烟意愿及术后30天里主动上报的吸烟行为有关的因素。确切的说，我们验证了术前戒烟意愿和术后30天内自动上报禁烟行为与对吸烟增加健康风险的认知程度独立有关这一假设。

方法：在中国北京协和医院，≥18周岁择期非心脏手术的患者接受了术前及术后30天内与吸烟行为有关的因素评估，包括吸烟相关健康风险的知识检测。

结果：在227名被调查患者中，大多数患者（164名，72%）在出院后保持禁烟。204名术后30天保持联系的患者中，有126名（62%）仍处于禁烟状态。多变量分析中，与术后维持术前禁烟意愿有关的因素有高龄、戒烟的自我效验和接受大型手术治疗；与戒烟有关的因素包括：高龄、自我效验、大手术和术前戒烟意愿。对戒烟好处的较高认知度与意愿有关，但与戒烟无关。关于吸烟引起健康风险的知识与戒烟意向或戒烟行为均无关，所以，不支持这一假设。

结论：在中国外科手术患者中的戒烟意向和保持戒烟的自我效验看来较以往的中国总吸烟人群调查要高得多，并且大多数外科手术患者在术后至少30天保持戒烟。这些发现显示在中国，外科手术治疗具有强有力的教育意义，是戒烟行为的动力。

（盛嘉君 译 马皓琳 李士通校）

BACKGROUND: Surveys suggest that, consistent with a high smoking prevalence, Chinese smokers in the general population report little interest in quitting. In other cultures, surgery is a powerful teachable moment for smoking cessation, increasing the rate of spontaneous quitting. We determined the perioperative tobacco use behavior of Chinese patients scheduled for elective surgery who smoke cigarettes and factors associated with both preoperative intent to abstain and self-reported smoking behavior at 30 days postoperatively. Specifically, we tested the hypothesis that perception of the health risks of smoking would be independently associated with both preoperative intent to abstain and self-reported abstinence at 30 days postoperatively.

METHODS: Patients ≥18 years of age scheduled for elective noncardiovascular surgery at Peking Union Medical College Hospital in Beijing, China, were assessed preoperatively and up to 30 days postoperatively for factors associated with smoking behavior, including indices measuring knowledge of smoking-related health risks.

RESULTS: Of the 227 patients surveyed at baseline, most (164, 72%) intended to remain abstinent after hospital discharge. For the 204 patients contacted at 30 days postoperatively, 126 (62%) self-reported abstinence. In multivariate analysis, factors associated with preoperative
intent to abstain after surgery included older age, self-efficacy for abstaining, and undergoing major surgery; factors associated with abstinence included older age, self-efficacy, major surgery, and preoperative intent to abstain. Higher perception of benefits from quitting was associated with intent, but not abstinence. Knowledge of the health risks caused by smoking was not found to be associated with either intent or abstinence, so that the hypothesis was not supported.

CONCLUSIONS: Both intent to quit and self-efficacy for maintaining abstinence appear to be much higher in Chinese surgical patients than in prior surveys of the general Chinese population, and the majority of surgical patients maintained abstinence for at least 30 days. These findings suggest that surgery can serve as a powerful teachable moment for smoking cessation in China.

The Effectiveness of a Near-Infrared Vascular Imaging Device to Support Intravenous Cannulation in Children with Dark Skin Color: A Cluster Randomized Clinical Trial
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BACKGROUND: Poor vein visibility can make IV cannulation challenging in children with dark skin color. In the operating room, we studied the effectiveness of a near-infrared vascular imaging device (VascuLuminator) to facilitate IV cannulation in children with dark skin color.

METHODS: In the operating room of a general hospital in Curacao, all consecutive children (0-15 years of age) requiring IV cannulation were included in a pragmatic cluster randomized clinical trial. The VascuLuminator was made available to anesthesiologists at the operating complex in randomized clusters of 1 week.

RESULTS: Success at first attempt was 63% (27/43, 95% confidence interval [CI], 47%-77%) in the VascuLuminator group vs 51% (23 of 45 patients, 95% CI, 36%-66%) in the control group (P = 0.27). Median time to successful cannulation was 53 seconds (interquartile range: 34-154).
in the VascuLuminator group and 68 seconds (interquartile range: 40-159) in the control group (P = 0.54), and hazard ratio was 1.12 (95% CI, 0.73-1.71).

CONCLUSION: The VascuLuminator has limited value in improving success at first attempt of facilitating IV cannulation in children with dark skin color.

An Analysis of Risk Factors for Patient Complaints About Ambulatory Anesthesiology Care

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BACKGROUND:

Anesthesiology groups continually seek data sources and evaluation metrics for ongoing professional practice evaluation, credentialing, and other quality initiatives. The analysis of patient complaints associated with physicians has been previously shown to be a marker for patient dissatisfaction and a predictor of malpractice claims. Additionally, previous
studies in other specialties have revealed a nonuniform distribution of complaints among professionals. In this study, we describe the distribution of complaints among anesthesia providers and identify factors associated with complaint risk in pediatric and adult populations.

**METHODS:** We performed an analysis of a complaint database for an academic medical center. Complaints were recorded as comments during postoperative telephone calls to ambulatory surgery patients regarding the quality of their anesthesiology care. Calls between July 1, 2006 and June 30, 2010 were included. Risk factors were grouped into 3 categories: patient demographics, procedural, and provider characteristics.

**RESULTS:** A total of 22,871 calls placed on behalf of 120 anesthesiologists were evaluated, of which 307 yielded a complaint. There was no evidence of provider-to-provider heterogeneity in complaint risk in the pediatric population. In the adult population, an unadjusted test for the random intercept variance component in the mixed effects model pointed toward significant heterogeneity (P = 0.01); however, after adjusting for a prespecified set of risk factors, provider-to-provider heterogeneity was no longer observed (P = 0.20). Several risk factors exhibited evidence for complaint risk. In the pediatric patient model, risk factors associated with complaint risk included a 10-year change in age, the use of general anesthesia (versus not), and a 1-hour change in the actual minus scheduled start times. Odds ratios were 1.47 (95% confidence interval (CI), 1.04-2.08), 0.22 (95% CI, 0.07-0.62), and 1.27 (95% CI, 1.10-1.47), respectively. In the adult patient model, risk factors associated with complaint risk included male gender, general anesthesia, a 10-year change in provider experience, and speaking with the patient (rather than a family member). Odd ratios were 0.66 (95% CI, 0.47-0.92), 0.67 (95% CI, 0.47-0.95), 1.18 (95% CI, 1.01-1.38), and 1.96 (95% CI, 1.17-3.29), respectively. **CONCLUSIONS:** There was apparent evidence in adult patients to suggest heterogeneity in provider risk for a patient complaint. However, once patient, procedural, and provider factors were acknowledged in analyses, such evidence for heterogeneity is diminished substantially. Further study into how and why these factors are associated with greater complaint risk may reveal potential interventions to decrease complaints.

对日平均周转时间以及白天首例开始延迟的行为研究
A Behavioral Study of Daily Mean Turnover Times and First Case of the Day Start Tardiness
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**背景：** 之前的研究表明在手术日的手术室里的决定中存在有2个心理偏差：手术室控制台上决策者的风险态度和手术室工作人员所做的决定以提高单位时间内他们被分配的临床工作。造成的决定比减少过度利用时间的随机机会更加糟糕。为了将第二种偏差从手术室控制台决定中分离出来，之前有关第二种偏差的研究分析了在非手术室环境下以及在夜间或者周末所作的决定。另外一种将第二种偏差从手术室控制台所产生的决定分离出来的方式是通过研究微乎其微的过度使用手术室时间的仪器设施。我们利用这些仪器得到的数据来检查第二种偏差。
方法：收集来自于一家有5个手术室的医院一年的数据。首先测定使手术室使用时间低效率最小化的分配手术室时间，以确定实际上没有过度利用的手术室时间。同时建立一个结构方程模型用来评估控制其他相关性时变量之间的关系。我们验证了这个假设，即非手术时间不再是与白天相当大的工作负荷成相对较低的关系。

结果：额外的手术室没有消耗效率（即，不同天数之间其平均潜在改善变化范围从21.1% ± 0.2% [SE]到38.9% ± 0.2%），导致非常低的过度使用手术室时间。然而，决策之前有条件地运行额外的手术室，在研究期间分配手术室时间最小化了手术室使用时间低效率。正如前面的结果显示，这类设施适合于这种行为的研究，并且也使得研究得以完成，并且假设关系最终也得以确定。在日常估计的择期病例（总）持续时间每减少一个小时将会给平均周转时间带来管理上不重要的减少(0.41 ± 0.21 分钟, P = 0.053)。如果排除大于两次周转同时出现时的周转，每日（总）持续时间每减少1小时，则平均周转时间无明显减少(0.17 ± 0.24 分钟, P = 0.464)。同样，在排除延后的周转(>60分钟)后，每日（总）持续中每减少1小时，平均周转时间也不会有明显的减少(0.16 ± 0.16 分钟, P = 0.315)。

结论：之前的实验和观测研究发现，许多临床医生在他们被分配的工作时间中单位时间内保持了较高的临床工作量。我们测试和确定了这种偏差应用在整个外科手术组中有规律的安排手术室使用时间的预测。总之，在少量或者几个小时中工作人员在白天工作速度是一样的。手术室工作人员没有减慢，从而弥补了时间间隙。这些结论对信息技术成本运用具有重要的影响，便于对手术日做出管理性决策。

（赵晓 译 马皓琳 李士通 校）

BACKGROUND: Previous research has identified 2 psychological biases in operating room (OR) decisions on the day of surgery: risk attitude of the decision-maker at the OR control desk and decisions made by OR staff to increase clinical work per unit time during the hours they are assigned. Resulting decisions are worse than random chance at reducing overutilized time. To isolate the second bias from decisions at the OR control desk, previous studies of the second bias have analyzed decisions made in non-OR locations and on nights/weekends. Another way to isolate the second bias from decisions at the OR control desk is to study facilities with negligible overutilized OR time. We examined the second bias using data from such a facility.

METHODS: One year of data was collected from a 5-OR hospital. Allocated OR time that minimized the inefficiency of use of OR time was determined first to confirm there was virtually no overutilized OR time. A structural equation model was then built to evaluate the relations among variables while controlling for other correlations. We tested the hypothesis that nonoperative times were no longer on days with little versus relatively large workload.

RESULTS: The extra ORs were not cost efficient (i.e., the mean potential improvement varied among days from 21.1% ± 0.2% [SE] to 38.9% ± 0.2%), resulting in very little overutilized OR time. However, conditioned on the preceding tactical decision of running extra ORs, the allocated OR time during the studied period was that which minimized the inefficiency of use of OR time. As the preceding results showed that the facility was suitable for the behavioral study, the behavioral study was performed, and the hypothesized relation confirmed. Each 1-hour decrease in the daily estimated (total) duration of elective cases resulted in a managerially unimportant decrease in the mean turnover times (0.41 ± 0.21 minutes, P = 0.053). Excluding turnovers when there were >2 turnovers occurring simultaneously, there was no significant decrease (0.17 ± 0.24 minutes, P = 0.464) in the mean turnover times per each 1-hour decrease in
the daily estimated (total) duration. Similarly, after excluding prolonged turnovers (>60 minutes), there was no significant decrease (0.16 ± 0.16 minutes, P = 0.315) in the mean turnover times per each 1-hour decrease in the daily estimated (total) duration.

CONCLUSIONS: Previous experimental and observational studies found many clinicians maintained high clinical work per unit time during the hours to which they were assigned. We tested and confirmed a prediction of this bias as was applied during regularly scheduled OR hours among an entire surgical team. Overall, the staff worked just as quickly on days with few or many hours of cases. The OR staff did not slow down, thus filling the time. These results have important implications for the cost utility of information technologies to facilitate managerial decision-making on the day of surgery.

彩色流动多普勒超声检查可区别骶尾部硬膜外注射与鞘内注射
Color Flow Doppler Ultrasonography Can Distinguish Caudal Epidural Injection from Intrathecal Injection
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背景：彩色流动多普勒超声检查已被用于确定骶尾部硬膜外注射，但其发现意外鞘内注射的能力仍未知。我们假设：彩色多普勒超声检查时，将药液注入硬膜外腔会引起湍流，而鞘内注射则没有彩色流动多普勒信号。

方法：为期2个月的前瞻性试验共包括了两组小儿患者（最大的为6岁）。一组（E组）为适用于用骶尾部硬膜外镇痛的择期手术患儿，另一组（I组）为接受腰椎穿刺行鞘内注射化疗药物的患儿。全身麻醉诱导并将患儿至于侧卧位后，使用8 MHz的弧形阵列探头（Sonosite TITAN, Bothell, 华盛顿州）在腰段（L1-L3）获得一横截面图像。在两次连贯的（间隔为20秒）速度为0.5-1.0mL/s的0.1mL/kg局麻药（25%布比卡因）或化疗药（甲氨喋呤、阿糖胞苷及氢化可的松的混合物）注射过程中，获得并记录彩色流动多普勒的实时影像。在获得研究影像后，用标准方式注入剩余药物。之后由另一不知情的麻醉医师记录影像来测定阳性或阴性结果（阳性为湍流出现时的一混合彩色信号；阴性为没有湍流或彩色信号）。从成功镇痛（组E）及鞘内（组I）注射的病例中计算敏感性、特异性及阴性或阳性预测值。

结果：本研究共囊括了41例患儿的40个记录影像（E组，n=21; I组，n=20）。观察到的敏感性、特异性、阳性预测值和阴性预测值都是100%。95%的置信低限是0.832。

结论：在本研究的背景中，用0.1mL/kg的注射容量和0.5-1.0mL/s的注射速度，彩色流动多普勒超声可以区分6岁以下儿童硬膜外注射及鞘内注射入骶尾腔。

（王赟 译 马皓琳 李士通 校）

BACKGROUND: Color flow Doppler ultrasonography has been used to confirm caudal epidural injection, but its ability to detect accidental intrathecal injection is unknown. We hypothesized that, when using color flow Doppler, the injection of fluid into the epidural space would result in turbulent flow which would appear as a burst of color while intrathecal injection would show an absence of a color flow Doppler signal.
METHODS: Two groups of pediatric patients (up to 6 years of age) were prospectively enrolled for this observational study during a 2-month period. One group (group E) consisted of patients suitable for elective surgery using caudal epidural analgesia, and the other (group I) included patients receiving lumbar puncture for intrathecal chemotherapeutic injection. After induction of general anesthesia and placement of the patient in the lateral position, an 8 MHz curved array probe (Sonosite TITAN, Bothell, WA) was applied to obtain a transverse image of the lumbar region (L1-L3). Real-time images using color flow Doppler were obtained and recorded during initial injections of 2 consecutive (20 seconds apart) aliquots of 0.1 mL/kg medication of local anesthetic (0.25% bupivacaine) or chemotherapy drugs (mixture of methotrexate, cytarabine, and hydrocortisone) at a rate of 0.5 to 1.0 mL/s. After obtaining the study images, the rest of the medication was injected in standard fashion. A blinded anesthesiologist later evaluated the recorded images to determine a positive or negative result (positive = presence of turbulence as illustrated by a medley of color; negative = no turbulence or color). Sensitivity, specificity, and positive and negative predictive values were calculated for those patients who had successful analgesia (group E) and intrathecal (group I) injections.

RESULTS: Forty recorded images from 41 patients (group E, n = 21; group I, n = 20) were included in the analysis. The observed sensitivity, specificity, positive predictive value, and negative predictive values were all 100%. The lower 95% confidence limits were 0.832.

CONCLUSION: In the context of this study, color flow Doppler could differentiate epidural from intrathecal injection into the caudal space of children up to 6 years of age using a 0.1 mL/kg injection volume and injection rate of 0.5 to 1.0 mL/s.
BACKGROUND: Often anesthesia care is provided by nonfaculty anesthesia providers (e.g., anesthesiology residents and certified registered nurse anesthetists [CRNAs]) under the guidance of faculty anesthesiologists. Performance appraisal of faculty anesthesiologists should therefore include evaluation of this guidance.

METHODS: Residents and CRNAs from 3 teaching hospitals gave their "impression of 9 attributes of the hypothetical supervising anesthesiologist who meets … expectations … not … who exceeds expectations or whose activity is below … expectations." Scores were based on the anesthesiologist working with the respondent, not others. A 4-point scale (e.g., 1 = never, 2 = rarely, 3 = frequently, and 4 = always) was used, and the mean was calculated.

RESULTS: The participation rate was 51% among CRNAs (N = 153) and 58% among resident physicians (N = 47). There was no association between years since the start of training and supervision scores that met expectations among CRNAs (Kendall τb = 0.01; 95% confidence interval [CI], ?0.13 to +0.10; P = 0.90) or residents (τb = 0.03; 95% CI, ?0.16 to +0.23; P = 0.77). Most CRNAs (67%) and residents (94%) perceived that supervision that met their expectations was at least "frequent" (score ≥3.0) (both P < 0.0001). The mean ± SD of supervision scores that met expectations was 3.14 ± 0.42 for CRNAs versus 3.40 ± 0.30 for residents. The CRNAs' score mean was 0.26 less than that of residents (P < 0.0001; 95% CI, 0.15 to 0.37 less). There were 30% of CRNAs with scores larger than the residents' mean.

CONCLUSIONS: Most CRNAs and residents at 3 teaching hospitals considered faculty guidance that meets expectations to be at least "frequent," regardless of years in practice.

The Influence of Antithrombin Substitution on Heparin Sensitivity and Activation of Hemostasis During Coronary Artery Bypass Graft Surgery: A Dose-Finding Study
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背景：体外循环常伴有凝血系统激活程度高。补充抗凝血酶（AT）可能会减弱这种激活，并增加患者的肝素易感性。然而，AT适当的剂量还没明确。我们试图确定在心脏手术结束时AT达到100%活性时AT用量和AT对肝素灵敏度的影响。

方法：41例患者加入研究。三十例行体外循环接受冠状动脉搭桥手术的患者被分配到3个AT浓度增加的组中，11个额外的患者作为对照组。测定AT活性和凝血酶生成的分子标志物，并且计算肝素灵敏度。
BACKGROUND: Cardiopulmonary bypass is associated with a high degree of hemostatic system activation. Supplementation of antithrombin (AT) may attenuate this activation and increase a patient’s susceptibility to heparin. However, the appropriate dosage of AT has not been defined. We sought to determine the dosage of AT concentrate necessary to achieve >100% AT activity at the end of cardiac surgery and the influence of AT on heparin sensitivity.

METHODS: Forty-one patients were included. Thirty consecutive patients undergoing primary coronary artery bypass graft surgery with cardiopulmonary bypass were assigned to 3 groups of increasing dosages of AT concentrate. Eleven additional patients served as controls. AT activity and molecular markers of thrombin generation were determined, and heparin sensitivity was calculated.

RESULTS: A median amount of 36.5 U (19.0; 42.8), 47.0 U (41.3; 61.6), and 50.0 U (47.4; 66.6) AT concentrate/kilogram body weight in the low, medium, and high AT group, respectively, was administered. At the end of surgery, AT activity with substitution was 84% (77; 111), 110% (92; 120), and 104% (97; 120) (median [25th; 75th percentile]), respectively, compared with 63% (49; 79) in controls (P < 0.05 all substitution groups versus control). Heparin sensitivity increased from 1.29 (1.17; 1.66) s/U heparin/kg in the control group to 2.02 (1.43; 3.65), 2.56 (1.52; 3.64), 1.72 (1.24; 2.66) s/U heparin/kg in the groups with substitution (P < 0.05 all substitution groups versus control). Compared with preoperative values, AT activity decreased during the postoperative period in all patients with a nadir on postoperative day 3 (P < 0.05 compared with baseline except for the medium AT group). Corresponding to this decrease, an increase in prothrombin fragment 1+2 and D-dimer could be observed postoperatively.

DISCUSSION: High dosages of AT were required to preserve physiologic AT activity during coronary artery bypass graft surgery and to significantly enhance heparin sensitivity, respectively. However, a significant decrease in AT activity, accompanied by high levels of thrombin generation, was encountered up to 5 days postoperatively.

The Protective Effects of Volatile Anesthetics Against the Bronchoconstriction Induced by an Allergic Reaction in Sensitized Rabbit Pups
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BACKGROUND: Volatile inhaled anesthetics exert a differential protective effect against
bronchospasm development after cholinergic stimulation. However, their ability to inhibit the
adverse respiratory consequences of an anaphylactic reaction after exposure to an allergen has
not been characterized. We therefore compared the abilities of isoflurane, sevoflurane, and
desflurane to prevent the lung constriction induced by an allergic reaction in a pediatric model of
an anaphylactic reaction.

METHODS: Low-frequency respiratory input impedance (Zrs) was measured in 4 groups of
ovalbumin (OVA)-sensitized 5-week-old rabbit pups anesthetized with midazolam (group IV)
and with inhaled isoflurane (group ISO), sevoflurane (group SEVO), or desflurane (group DES)
at 1 minimum alveolar concentration. Zrs was measured under baseline conditions and after an
anaphylactic lung response provoked by IV allergen injection (OVA 1 mg), during which the
changes in airway resistance (Raw), tissue damping (G), and elastance obtained from Zrs were
followed for 15 minutes.

RESULTS: Allergen provocation generated immediate severe bronchoconstriction, with no
statistically significant difference in Raw increase among the groups in the first 3 minutes.
Conversely, the inhalation of volatile anesthetics accelerated the recovery from the allergen-
induced bronchoconstriction, particularly in group SEVO where the Raw was significantly lower than that in group IV 4 minutes after the allergen challenge. These changes were paralleled by significant elevations in G in all groups, with a significantly more pronounced deterioration in the animals in group DES. The anesthetic regimen did not statistically significantly affect the sustained increases in elastance after OVA injections.

**CONCLUSIONS:** Our results reveal the lack of potential of the commonly used volatile anesthetics to inhibit the most severe acute phase of the constrictor response to allergen after anaphylaxis in both the central airway and peripheral lung compartments. Inhalation of volatile anesthetics, particularly sevoflurane, promotes an earlier easing of the bronchospasm; this beneficial profile may be advantageous in children with atopic lung diseases.

**增加红细胞输注量与小儿心脏移植患者预后不良相关。**

*Increased red blood cell transfusions are associated with worsening outcomes in pediatric heart transplant patients.*

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**背景：**由于其危险因素的独特性，接受心脏移植手术的儿童患者构成了一个独立的群体。

红细胞（RBC）的输注与其死亡率呈正相关。尽管之前的对于非移植患者的研究焦点主要集中于术后输血的影响，与一般心脏手术患者相比，接受心脏移植手术的患者在围术期需要涉及更多的血液接触与更大量的术中输血。我们研究了心脏移植术中及术后输血量与临床预后之间的关系。假定在小儿心脏移植患者中输注更大量的红细胞与临床预后不良相关。

**方法：**我们查询并分析了数据库中自2004-2010年间108名接受心脏移植手术的患者术前和术后的临床风险因素以及术中和术后48小时输血量。预后情况根据住院时间、气管插管时间、心肺IS评分以及主要不良事件。通过二元及多元分析处理控制风险因素，确定输血量是否是一个独立的危险因素。

**结果：**49例病例完成了包含最终结果的数据采集。其中88%患者接受了红细胞输注，输注量的中位数是38.7毫升/公斤。通过多变量分析纠正其余8个变量使得输血量成为与ICU入住时长正相关的独立变量（MR=1.34；95%可信区间 1.03-1.76；P=0.03），8个变量包括IMPAC（心脏移植后死亡率预测值）、年龄、体重、移植器官的状态、冷缺血和热缺血时间、重复胸骨劈开以及移植前血细胞比容。并且输血量与术后第一个24小时的IS评分（MR=1.25；95%可信区间 1.04-1.52；P=0.04）正相关。大量输血患者的主要不良事件发生率也大大增加（p=0.002）。输血＞60毫升/公斤增加了术后相关主要不良事件的概率（76%）。包括术后败血症、体外循环、开胸以及移植失败。

**结论：**大多数儿科心脏移植的患者行红细胞输注，大量的输血是在手术室中进行的。输血所产生的红细胞数量的提升与ICU入室时长、IS评分及主要不良事件呈正相关。由于移植用的心脏是有限的资源，切实提高输血质量可以促进小儿心脏移植患者的手术预后。

（郭晨跃译 薛张纲校）
BACKGROUND: Red blood cell (RBC) transfusions are associated with increased morbidity. Children receiving heart transplants constitute a unique group of patients due to their risk factors. Although previous studies in nontransplant patients have focused primarily on the effects of postoperative blood transfusions, a significant exposure to blood occurs during the intraoperative period, and a larger percentage of heart transplant patients require intraoperative blood transfusions when compared with general cardiac surgery patients. We investigated the relationship between clinical outcomes and the amount of blood transfused both during and after heart transplantation. We hypothesized that larger amounts of RBC transfusions are associated with worsening clinical outcomes in pediatric heart transplant patients.

METHODS: A database comprising 108 pediatric patients undergoing heart transplantation from 2004 to 2010 was queried. Preoperative and postoperative clinical risk factors, including the amount of blood transfused intraoperatively and 48 hours postoperatively, were analyzed. The outcome measures were length of hospital stay, duration of tracheal intubation, inotrope score, and major adverse events. Bivariate and multivariate analyses were performed to control for simultaneous risk factors and determine outcomes in which the amount of blood transfused was an independent risk factor.

RESULTS: Ninety-four patients with complete datasets were included in the final analysis. Eighty-eight percent received RBC transfusions, with a median transfusion amount of 38.7 mL/kg. A multivariate analysis correcting for 8 covariate risk factors, including the Index for Mortality Prediction After Cardiac Transplantation, age, weight, United Network for Organ Sharing status, warm and cold ischemia time, repeat sternotomy, and pretransplant hematocrit, showed RBC transfusions were independently associated with increased length of intensive care unit stay (mean ratio = 1.34; 95% confidence interval, 1.03-1.76; P = 0.03), and increased inotrope score in the first postoperative 24 hour (mean ratio = 1.26; 95% confidence interval, 1.04-1.52; P = 0.04). Patients suffering major adverse events received significantly larger median amounts of blood RBC transfusions (P = 0.002). Transfusions >60 mL/kg were also associated with increased risk of major adverse events (accuracy 76%) including postoperative sepsis, extracorporeal membrane oxygenation, open chest, dialysis, and graft failure.

CONCLUSION: The majority of pediatric patients undergoing orthotopic heart transplantation receive RBC transfusions, with the largest amount transfused in the operating room. Escalating amounts of RBC transfusions are independently associated with increased length of intensive care unit stay, inotrope scores, and major adverse events. Since heart allografts are a limited resource, improvement in the blood transfusion and conservation practices can enhance clinical outcomes in pediatric heart transplant patients.

坐位或"沙滩椅"位时,5177接受神经外科和骨科手术治疗而无神经系统不良事件患者的血流动力学管理

The hemodynamic management of 5177 neurosurgical and orthopedic patients who underwent surgery in the sitting or "beach chair" position without incidence of adverse neurologic events.

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背景：少数报告提示，坐位或沙滩椅位术后出现缺血性脑脊髓损伤；因为血流动力学细节未知，所以脑脊髓缺血性损伤的发生率以及动脉血压和伤害的关系仍然未知。为增加坐位麻醉数据，我们检查众多未发生此恶性事件的患者的血流动力学情况。

方法：2002年1月1日和2009年12月31日之间，全面回顾了在罗切斯特梅奥诊对5177例在坐姿下行的肩部手术或神经外科的患者电子血流动力学记录。

结果：5177位坐位手术的患者术后没有立即发生灾难性的结果。肩部手术，术中动脉血压在心脏水平，其收缩压下降14.4%±12.7%，绝对值下降75±8毫米汞柱，无创血压下降19.3%±12.6%，绝对值下降74±7毫米汞柱。神经外科的病人动脉血压在心脏水平，其平均动脉压下降17.6%±11.5%，绝对值下降为78±7毫米汞柱。整个手术过程中，52%的神经外科患者和51%骨科患者通过A线监测，骨科48%的患者出现血压降低超过基础值40%时进行无创血压监测。

结论：这项研究提供了一个描述性的总结，术中监测血压，无论换能器或袖带在心脏水平还是头水平（未低于心脏水平），无论是有创还是无创监测，患者在坐位行全麻手术未出现脑脊髓缺血性损伤。
monitored with NIBP experienced ≥1 episodes of systolic blood pressure reduction >40% below baseline.

**CONCLUSION:** This study provides a descriptive summary of intraoperative blood pressure changes, measured either invasively or noninvasively, and referenced to either head or heart level, but never lower than heart level, in patients under general anesthesia in the sitting position who sustained no catastrophic outcomes.

**简要报告：胸外科手术围手术期连续硬膜外输注s(+)氯胺酮的镇痛疗效和血药浓度。**

**BACKGROUND:** In our study, we evaluated the analgesic effect and plasma level time course of subanesthetic doses of intraoperative S(+)-ketamine administered by continuous epidural infusion for postthoracotomic pain.

**METHODS:** A study population of 140 patients undergoing thoracic surgery was randomly assigned to either S(+)-ketamine or ropivacaine by continuous epidural infusion. The outcome measures were as follows: (a) intraoperative fentanyl requirements; (b) postoperative pain intensity; and (c) postoperative rescue analgesics.

**RESULTS:** Intraoperative fentanyl consumption was significantly lower (median of difference: -58.6 μg; 95% confidence interval [CI], -97.2 to -19.6 μg; P = 0.0032) in patients in the ketamine group than those in the ropivacaine group. Postoperative visual analog scale scores were significantly lower in the ketamine group than in controls (Wilcoxon-Mann-Whitney odds at 24 hours = 6.25; 95% CI, 4.07 to 1.97; P < 0.0001). Rescue analgesics were required more frequently in controls than in the ketamine group (percentage difference: 58.6%; 95% CI, 43.3%...
to 69.6%; P < 0.0001). The mean plasma level of ketamine declined rapidly during continuous epidural infusion and decayed slowly after it had stopped.

**CONCLUSIONS:** Our data show that epidural infusion of subanesthetic doses of S(+)-ketamine during thoracic surgery provides better postoperative analgesia than epidural ropivacaine.

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**Determinants, associations, and psychometric properties of resident assessments of anesthesiologist operating room supervision.**

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**Background:** A study by Oliveira et al. validated 9 questions to evaluate Brazilian anesthesiologists’ assessments of operating room supervision. The purpose of this study was to determine if operating room supervision scores were associated with residents' one-year clinical anesthesiology training and/or specific resident training with the institution. We similarly described the relationship between operating room supervision scores and residents' ratings: (1) in the operating room, the residents' experience, (2) residents' clinical skills (family selection), and (3) the institution's teaching effectiveness. Finally, we will examine how Oliveira et al.'s questions were used in the United States anesthesiology residency program.

**Methods:** All 39 residents in the Anesthesiology residency program at the University of Iowa, regardless of their first year (n = 14), second year (n = 13), or third year (n = 12), were evaluated by at least one-third of their department members (N = 49, Intensive Care Unit [N = 10], Pain Management [N = 6]). The department members were responsible for assessing the residents' interactions with faculty members. For all residents, the number of interactions within a department and the interval between the resident's and faculty's supervision were determined. A general research study was conducted to determine the minimum number of resident assessments necessary to ensure reliability and validity.

**Results:** There were no significant associations in the operating room supervision scores and: (1) residents' clinical experience (Kendall’s τB = 0.01, 95% confidence interval [CI], -0.02 to 0.04, P = 0.71), (2) residents' long-term interactions (τB = -0.01; 95% CI, -0.05 to 0.02, P = 0.46), and (3) the time spent with residents in the operating room (τB = 0.01, 95% CI, -0.02 to 0.05, P = 0.49). The operating room and Intensive Care Unit supervision scores were highly correlated (τB = 0.71, 95% CI, 0.63 to 0.78, P < 0.0001). The operating room supervision scores had a high correlation with faculty selection scores (τB = 0.77, 95% CI, 0.70 to 0.84, P < 0.0001), teaching scores (τB = 0.87, 95% CI, 0.82 to 0.92, P < 0.0001), and high reliability and validity (G-φ coefficient > 0.80) in individual anesthesiologists' assessment.

**Conclusion:** All residents' operating room supervision scores were on a par with the institution's resident assessment scores. The assessment of teaching and clinical care quality was highly correlated. When Oliveira et al.'s questions were applied to the United States anesthesiology residency program, at least 15 residents' assessments of the supervision scores were highly reliable and valid.
BACKGROUND: A study by de Oliveira Filho et al. reported a validated set of 9 questions by which Brazilian anesthesia residents assessed faculty supervision in the operating room. The aim of this study was to use this question set to determine whether faculty operating room supervision scores were associated with residents' year of clinical anesthesia training and/or number of specific resident-faculty interactions. We also characterized associations between faculty operating room supervision scores and resident assessments of: (1) faculty supervision in settings other than operating rooms, (2) faculty clinical ability (family choice), and (3) faculty teaching effectiveness. Finally, we characterized the psychometric properties of the de Oliveira Filho et al. question set in a United States anesthesia residency program.

METHODS: All 39 residents in the Department of Anesthesia of the University of Iowa in their first (n = 14), second (n = 13), or third (n = 12) year of clinical anesthesia training evaluated the supervision provided by all anesthesia faculty who staffed in at least 1 of 3 clinical settings (operating room [n = 49], surgical intensive care unit [n = 10], pain clinic [n = 6]). For all resident-faculty pairs, departmental billing data were used to quantitate the number of resident-faculty interactions and the interval between the last interaction and the assessment. A generalizability study was performed to determine the minimum number of resident evaluations needed for high reliability and dependability.

RESULTS: There were no significant associations between faculty mean operating room supervision scores and: (1) resident-faculty patient encounters (Kendall τb = 0.01; 95% confidence interval [CI], -0.02 to +0.04; P = 0.71), (2) resident-faculty days of interaction (τb = -0.01; 95% CI, -0.05 to +0.02; P = 0.46), and (3) days since last resident-faculty interaction (τb = 0.01; 95% CI, -0.02 to 0.05; P = 0.49). Supervision scores for the operating room and surgical intensive care unit were highly correlated (τb = 0.71; 95% CI, 0.63 to 0.78; P < 0.0001).

Supervision scores for the operating room also were highly correlated with family choice scores (τb = 0.77; 95% CI, 0.70 to 0.84; P < 0.0001) and teaching scores (τb = 0.87; 95% CI, 0.82 to 0.92; P < 0.0001). High reliability and dependability (both G- and ϕ-coefficients > 0.80) occurred when individual faculty anesthesiologists received assessments from 15 or more different residents.

CONCLUSION: Supervision scores provided by all residents can be given equal weight when calculating an individual faculty anesthesiologist's mean supervision score. Assessments of supervision, teaching, and quality of clinical care are highly correlated. When the de Oliveira Filho et al. question set is used in a United States anesthesia residency program, supervision scores are highly reliable and dependable when at least 15 residents assess each faculty.