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The Influence of Laboratory Coagulation Tests and Clotting Factor Levels on Rotation Thromboelastometry (ROTEM®) During Major Surgery with Hemorrhage

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BACKGROUND: The aim of this study was to determine the association between standard laboratory tests, coagulation factor concentrations, and Rotation Thromboelastometry (ROTEM® delta, TEM® International GmbH, Munich, Germany) in patients undergoing major surgery with hemorrhage.

METHODS: In 45 patient’s fibrinogen, factor VIII, factor XIII, International Normalized Ratio (INR), activated partial thromboplastin time (aPTT), thrombin time, hemoglobin, leukocytes, and
platelet count were simultaneously measured intraoperatively with ROTEM (EXTEM, INTEM, FIBTEM, APTEM) measurements. ROTEM parameters were: clotting time (CT), clot formation time (CFT), maximum clot firmness (MCF), and α-angle. Demographic and laboratory data were expressed as mean ± SD and median [range]; nonparametric Spearman rank correlations and multiple linear regressions were performed; P-values ≤0.003 were considered significant.

RESULTS: Significant correlations (P ≤ 0.003) were found for CFT, α-angle, and MCF, in EXTEM, INTEM, and APTEM with platelets, INR, and fibrinogen. Factor VIII (18 measurements) showed a strong correlation (r ≥ 0.7 or r ≤ −0.7; all P ≤ 0.003) with MCF, CFT, and α-angle of EXTEM, INTEM, MCF of FIBTEM excluding CT of EXTEM, INTEM, FIBTEM and strong significant correlation for α-angle of APTEM and moderate for CFT and MCF of APTEM. A significant moderate to strong correlation of factor XIII with MCF of EXTEM, INTEM, FIBTEM, and APTEM was found. Hemoglobin was moderately correlated (r = 0.3–0.7 or r = −0.3 to −0.7) with MCF in APTEM (P = 0.003). A moderate to strong correlation of the standard coagulation tests with all ROTEM parameters was found, in particular the CT. The aPTT correlated significantly moderate to strong with CT, CFT, α-angle, and MCF of INTEM. However, multiple linear regressions were not able to show an influence of INR on ROTEM parameters except for APTEM-MCF. A significant impact of the aPTT on INTEM-CT was found. EXTEM, INTEM, and APTEM are significantly influenced by fibrinogen and platelets.

CONCLUSIONS: The results confirm the clinical assumption that EXTEM, INTEM, and APTEM are associated with fibrinogen and platelets levels; INTEM-CT significantly to aPTT; and FIBTEM significantly to fibrinogen. Factor VIII showed a significant correlation with all ROTEM parameters except CT of EXTEM, INTEM, FIBTEM, and CFT and MCF of APTEM.

在缺乏监测情况下使用 Sugammadex 逆转不能排除残余肌松

Reversal with Sugammadex in the Absence of Monitoring Did Not Preclude Residual Neuromuscular Block

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背景：在日本，常规临床监护通常不涉及使用监测仪来指导肌松药或其拮抗剂的使用。虽然很多先前报告表明，sugammadex 能对罗库溴铵引发的肌松效应进行更快、更可靠地拮抗，这种优势在无肌松监测的临床条件下未经证实。此项多中心观察性研究试图确定：当没有肌松监测指导罗库溴铵和拮抗剂使用时，与新斯的明相比，sugammadex 是否能降低术后无力状态的发生率。

方法：此项研究在将 sugammadex 引入日本的临床实践的前后各 5 个月期间进行。五个大学附属教学医院参与研究。第一阶段使用新斯的明来拮抗罗库溴铵诱导的神经肌肉阻滞，第二阶段则使用 sugammadex。在不使用肌松监测仪情况下，由主治麻醉师决定罗库溴铵、新斯的明、sugammadex 的给药时间与剂量。为了确定术后残余无力的发生率，在气管拔管后使用加速度法测定 4 个成串反应的比值（TOFR）。由于参与研究单位的工作常
规通常不涉及加速度测量反应的校准和标准化，TOFR<0.9 和 TOFR<1.0 定义为术后残余肌松的标准。

结果：第一阶段共 109 例患者接受新斯的明（平均剂量 33µg/ kg）给药，23 例患者由于被认为（由临床标准决定）恢复足够故并未进行拮抗（自然恢复组）。在第二阶段，作为对罗库溴铵诱导的拮抗，117 例患者接受 sugammadex（平均剂量为 2.7mg/kg）给药。在自然恢复、使用新斯的明和使用 sugammadex 后 TOFR<0.9 的发生率（95% 置信区间）分别为 13%（2.8%–33.6%）、23.9%（16.2%–33%）和 4.3%（1.7%–9.4%）。而三组 TOFR<1.0 的发生率（95% 置信区间）分别是 69.6%（47.1%–86.6%）、67%（57.3%–75.7%）和 46.2%（36.9%–55.6%）。在新斯的明组中七氟醚的使用、最后一次罗库溴铵给药和 sugammadex 给药之间较短的时间间隔与术后残余无力的较高发生率有关。

结论：这项研究表明，在临床未使用肌松监测（客观或主观）的情况下，气管拔管后使用 sugammadex，其 TOFR<0.9 的风险仍高达 9.4%。此发现强调：即使应用 sugammadex 来拮抗罗库溴铵诱导的神经肌肉阻滞，肌松监测仍然重要。

（孙莉荔 译 陈杰 校）

BACKGROUND: In Japan, routine clinical care does not normally involve the use of a monitoring device to guide the administration of neuromuscular blocking drugs or their antagonists. Although most previous reports demonstrate that sugammadex offers more rapid and reliable antagonism from rocuronium-induced neuromuscular blockade, this advantage has not been confirmed in clinical settings when no neuromuscular monitoring is used. In this multicenter observational study, we sought to determine whether sugammadex reduces the incidence of postoperative residual weakness compared with neostigmine when the administration of rocuronium and its antagonists is not guided by neuromuscular monitoring.

METHODS: This study was conducted in two 5-month periods that preceded and followed the introduction of sugammadex into clinical practice in Japan. Five university-affiliated teaching hospitals participated in this study. Neostigmine was used to antagonize rocuronium-induced neuromuscular blockade in the first phase, and sugammadex was used in the second phase. The timing and doses of rocuronium, neostigmine, and sugammadex were determined by the attending anesthesiologists without the use of neuromuscular function monitoring devices. To ascertain the incidence of postoperative residual neuromuscular weakness, the train-of-four ratio (TOFR) was determined acceleromyographically after tracheal extubation. Since our practice also does not usually involve calibration and normalization of accelerographic responses, both TOFR <0.9 and TOFR <1.0 were used as the criteria for defining postoperative residual weakness.

RESULTS: In the first phase, 109 patients received neostigmine (average dose 33 µg/kg) and 23 patients were considered (by clinical criteria) to have adequate recovery and did not receive neostigmine (spontaneous recovery group). In the second phase, 117 patients received sugammadex (average dose 2.7 mg/kg) for antagonism of rocuronium-induced blockade. The incidence (95% confidence interval) of TOFR <0.9 under spontaneous recovery, after neostigmine, and after sugammadex, was 13.0% (2.8%–33.6%), 23.9% (16.2%–33.0%), and 4.3% (1.7%–9.4%), respectively. The incidence (95% confidence interval) of TOFR <1.0 in these groups was 69.6% (47.1%–86.6%), 67.0% (57.3%–75.7%), and 46.2% (36.9%–55.6%), respectively. The use of sevoflurane in the neostigmine group and the short interval between the administration of the last doses of rocuronium and sugammadex were associated with a higher incidence of postoperative residual weakness.

CONCLUSIONS: This study demonstrated that the risk of TOFR <0.9 after tracheal extubation after sugammadex remains as high as 9.4% in a clinical setting in which neuromuscular monitoring (objective or subjective) was not used. Our finding underscores the importance of neuromuscular monitoring even when sugammadex is used for antagonism of rocuronium-induced neuromuscular block.
前负荷改变前后使用Nexfin进行无创连续心输出量测定：与间歇热稀释法心输出量测定的比较

Noninvasive Continuous Cardiac Output by the Nexfin Before and After Preload-Modifying Maneuvers: A Comparison with Intermittent Thermodilution Cardiac Output

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背景：Nexfin使用一种未校准的脉搏波形方法来连续测定心输出量(CO)，它是完全无创。由于脉搏波形方法和其感知CO变化的能力被一再质疑，本研究将心脏外科手术中前负荷处理前后Nexfin测量的CO(NAPCO)与肺动脉导管测量的CO作比较。

方法：对共28例接受体外循环下心脏手术，其中18例接受血管加压素和/或强心药物治疗的患者在术后若干小时内进行研究。根据临床需要，通过给予补液或下肢被动抬高的形式改变前负荷，在每项干预措施前后同时进行PACCO和NAPCO的测量。

结果：22例患者接受液体负荷，6例患者接受下肢被动抬高处理。这些干预在19名患者中进行重复，共收集47例配对测量数据。基线时，PACCO和NAPCO得到CO的平均值(±平均差)分别为4.9±1.1和5.0±1.4 L•min⁻¹，偏倚为0.1±1.0，95%预测区间−2.5—2.4 L•min⁻¹，误差为39%。前负荷改变后，两方法得到的CO平均值分别为5.6±1.3和5.6±1.5 L•min⁻¹，偏倚为-0.0±1.1，95%预测区间-2.6—2.7 L•min⁻¹，误差为38%。前负荷改变前后PACCO和NAPCO之间的相关系数(r)分别为0.71(95%置信区间[95%CI]，0.53—0.82)和0.70(95%CI，0.52—0.82)。前负荷改变对PACCO和NAPCO引起了相似的绝对值变化(r = 0.9,P < 0.0001)。四个象限散点图显示PACCO和NAPCO之间变化一致率为100%(95%CI:80.5% -100%)。极坐标图分析显示小的极角和协议的径向一致性界限远低于30°基准。作为评估Nexfin感知PACCO增加≥15%的能力的指标，ROC为0.974(95%CI:0.93 —0.99)。

结论：与肺动脉导管相比尽管Nexfin精度有限，但它能可靠地感知对心脏手术后稳定患者使用中等剂量血管加压素和强心药物治疗，前负荷改变引起的CO变化，此能力结合其完全无创、易于放置、便捷使用的特点使Nexfin适用于围手术期连续CO的监测。而当外周阻力发生显著改变时此项仪器是否能可靠感知CO变化仍需进一步研究。

（孙晓琼 译   陈杰 校）

BACKGROUND: The Nexfin uses an uncalibrated pulse contour method for the continuous measurement of cardiac output (CO) in a totally noninvasive manner. Since the accuracy of pulse contour methods and their ability to track changes in CO have been repeatedly questioned, we have compared the CO measured by the Nexfin (NAPCO) with the CO measured by the pulmonary artery catheter (PACCO) in cardiosurgical patients before and after preload-modifying maneuvers.

METHODS: Twenty-eight patients who underwent on-pump cardiac surgery, of whom 18 were receiving vasopressor and/or inotropic therapy, were studied during the first postoperative hours. Preload modification, in the form of either a fluid challenge or a passive leg raising maneuver, was done whenever clinically indicated, with PACCO and NAPCO being simultaneously measured before and after each intervention.

RESULTS: A fluid challenge was administered to 22 patients, and the passive leg raising maneuver was performed in 6 patients. These interventions were repeated in 19 patients
producing a total of 47 pairs of measurements. At baseline, mean (±SD) CO was 4.9 ± 1.1 and 5.0 ± 1.4 L•min⁻¹, for the PACCO and NAPCO, respectively, bias 0.1 ± 1.0, 95% prediction interval –2.5 to 2.4 L•min⁻¹, and 39% of error. After preload modification, the mean CO was 5.6 ± 1.3 and 5.6± 1.5 L•min⁻¹ for the PACCO and NAPCO, respectively, bias –0.0 ± 1.1, 95% prediction interval –2.6 to 2.7 L•min⁻¹, and 38% of error. The correlation coefficients (r) between the PACCO and NAPCO before and after preload modification were 0.71 (95% confidence interval [95% CI], 0.53–0.82) and 0.70 (95% CI, 0.52–0.82), respectively. Preload modification induced similar absolute changes in PACCO and NAPCO (r = 0.9, P < 0.0001). A 4-quadrant scatter plot showed a concordance rate of 100% (95% CI, 80.5%–100%) between the changes in NAPCO and PACCO. Polar plot analysis demonstrated a small polar angle and radial limits of agreement well below the 30° benchmark. The area under a receiver operating characteristic curve, testing the ability of Nexfin to detect an increase of ≥15% in PACCO, was 0.974 (95% CI, 0.93–0.99).

CONCLUSIONS: Although the Nexfin has limited accuracy when compared with the pulmonary artery catheter, it can reliably track preload-induced changes in CO in stable patients after cardiac surgery in the presence of moderate vasopressor and inotropic therapy. This ability, combined with its total noninvasiveness, fast installation, and ease of use, make the Nexfin a suitable monitor for the perioperative continuous measurement of CO. The reliability of this monitor in tracking the CO when significant changes in peripheral resistance take place still needs to be established.

患者保温产生的余热对矫形外科手术室空气流通模式的影响

Patient Warming Excess Heat: The Effects on Orthopedic Operating Room Ventilation Performance

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背景: 基于在普外科手术中应用的得益，使用患者保温装置已成为预防术中意外低体温发生的一项标准监护。然而，这些收益可能无法在易感染手术（例如移植手术）中完全实现，由于患者保温装置释放的余热可能扰乱预期的从天花板到地面的气流流通模式并使外科手术区域遭受额外污染。因此本实验研究在矫形外科手术室中，对一个模拟接受全膝置换手术铺巾方式的人体模型采取两项流行的患者保温技术，暖风机和加温毯，与对照环境中气流流通模式的差异。

方法: 通过在麻醉铺巾头侧的无菌区域释放中性悬浮洗涤剂气泡（“气泡”）来评估空气流通模式。然后监测对人体模型上半身进行加热产生的余热是否会导致“气泡”进入手术野。形式上，可重复设计来评估设备（暖风机，加温毯，对照）和麻醉铺巾高度（低，高）对手术野上方拍摄到的“气泡”数量的影响。

结果: 直接的大量漂浮气流从暖风机中排出，形成热对流气流，并使气泡越过麻醉铺巾上方进入手术野，由于患者加温装置的热能导致“气泡”计数有明显增加（P<0.001）。在各铺巾高度情况下，暖风机组平均“气泡”计数为 132.5，而加温毯组为 0.48（P=0.003），而对照组为 0.01（P=0.008）在所有高度。在各铺巾高度情况下，加温毯组与对照组间的平均“气泡”计数的差异忽略不计（P=0.87）铺巾高度对“气泡”计数无明显影响（P=0.94）
**BACKGROUND:** Patient warming has become a standard of care for the prevention of unintentional hypothermia based on benefits established in general surgery. However, these benefits may not fully translate to contamination-sensitive surgery (i.e., implants), because patient warming devices release excess heat that may disrupt the intended ceiling-to-floor ventilation airflows and expose the surgical site to added contamination. Therefore, we studied the effects of 2 popular patient warming technologies, forced air and conductive fabric, versus control conditions on ventilation performance in an orthopedic operating room with a mannequin draped for total knee replacement.

**METHODS:** Ventilation performance was assessed by releasing neutrally buoyant detergent bubbles (“bubbles”) into the nonsterile region under the head-side of the anesthesia drape. We then tracked whether the excess heat from upper body patient warming mobilized the “bubbles” into the surgical site. Formally, a randomized replicated design assessed the effect of device (forced air, conductive fabric, control) and anesthesia drape height (low-drape, high-drape) on the number of bubbles photographed over the surgical site.

**RESULTS:** The direct mass-flow exhaust from forced air warming generated hot air convection currents that mobilized bubbles over the anesthesia drape and into the surgical site, resulting in a significant increase in bubble counts for the factor of patient warming device (P < 0.001). Forced air had an average count of 132.5 versus 0.48 for conductive fabric (P = 0.003) and 0.01 for control conditions (P = 0.008) across both drape heights. Differences in average bubble counts across both drape heights were insignificant between conductive fabric and control conditions (P = 0.87). The factor of drape height had no significant effect (P = 0.94) on bubble counts.

**CONCLUSIONS:** Excess heat from forced air warming resulted in the disruption of ventilation airflows over the surgical site, whereas conductive patient warming devices had no noticeable effect on ventilation airflows. These findings warrant future research into the effects of forced air warming excess heat on clinical outcomes during contamination-sensitive surgery.

The Surgical Apgar Score Is Strongly Associated with Intensive Care Unit Admission After High-Risk Intraabdominal Surgery

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方法：在一个教学医疗中心进行一项回顾性队列研究，对象是从2003年至2010年进行重大腹腔手术的成年人。根据每个病人术中的心率、平均动脉压和估计失血量计算出SAS（0-10）。采用Logistic回归分析评估SAS与病人术后直接进入ICU决定的相关性。

结果：研究对象包括8501例患者，其中72.7%的患者SAS是7-10分，少于5%患者的SAS是0-4分。其中8.7%的患者术后即刻转入ICU。多因素校正后，SAS和接纳病人进入ICU的决定有较强的相关性。（与SAS7-8的病人相比较，SAS0-2的病人，校正后比值比14.1[95%的可信区间6.88-30.19，p<0.001]；SAS3-4的病人，校正后比值比4.42[95%的可信区间3.19-6.13，p<0.001]；SAS5-6的病人，校正后比值比2.08[95%的可信区间2.08-3.24，p<0.001]）。

结论：SAS与高风险腹腔手术病人术后是否立即转入ICU的临床决定密切相关。这些结果有利于初步理解术中血流动力学变化和血液丢失是否影响术后病人的ICU收治。

背景：理解重症监护病房（ICU）分诊决定对高风险外科病人的最终目标是促进资源分配和改善结果。外科Apgar分数（SAS）是一个简单的分数，它使用术中信息如血流动力学和血液丢失来预测术后并发症和死亡率，分数越低预后越差。我们假设SAS与决定患者术后立即转入ICU有关。

方法：我们进行了一项回顾性队列研究，研究对象是从2003年至2010年在一所学术医学中心进行腹腔手术的成人。我们根据每个病人术中的心率、平均动脉压和估计失血量计算出SAS（0-10）。使用logistic回归分析，我们评估了SAS与决定病人术后直接转入ICU之间的关联。

结果：研究对象包括8501例患者，其中72.7%的SAS为7-10分，少于5%的SAS为0-4分。8.7%的病人术后直接转入ICU。多因素校正后，SAS与决定病人转入ICU之间存在显著相关性。与SAS7-8的病人相比，SAS0-2的病人，校正后比值比为14.1[95%可信区间6.88-30.19，p<0.001]；SAS3-4的病人，校正后比值比为4.42[95%可信区间3.19-6.13，p<0.001]；SAS5-6的病人，校正后比值比为2.08[95%的可信区间2.08-3.24，p<0.001]。

结论：SAS与高风险腹腔手术病人术后是否立即转入ICU的临床决定密切相关。这些结果为初步理解术中血流动力学变化和血液丢失是否影响术后病人的ICU收治提供了一步。

全麻后早期诊断遗忘的低风险患者的风险

Outcomes of Early Delirium Diagnosis After General Anesthesia in the Elderly

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**BACKGROUND:** Postoperative delirium in the elderly, measured days after surgery, is associated with significant negative clinical outcomes. In this study, we evaluated the prevalence and in-hospital outcomes of delirium diagnosed immediately after general anesthesia and surgery in elderly patients.

**METHODS:** Consecutive English-speaking surgical candidates, aged 70 years or older, were prospectively enrolled during July to August 2010. After surgery, each participant was evaluated for a Diagnostic and Statistical Manual of Mental Disorders IV diagnosis of delirium in the postanesthesia care unit (PACU) and repeatedly thereafter while hospitalized. Delirium in the PACU was evaluated for an independent association with change in cognitive function from preoperative baseline testing and discharge disposition.

**RESULTS:** Ninety-one (58% female) patients, 78% of whom were living independently before surgery, were found to have a prevalence of delirium in the PACU of 45% (41/91); 74% (14/19) of all delirium episodes detected during subsequent hospitalization started in the PACU. Early delirium was independently associated with impaired cognition (i.e., decreased category word fluency) relative to presurgery baseline testing (adjusted difference [95% confidence interval] for change in T-score: \(-6.02 [-10.58 \text{ to } -1.45]; P = 0.01\)). Patients whose delirium had resolved by postoperative day 1 showed negative outcomes that were intermediate in severity between those who were never delirious during hospitalization and those whose delirium in the PACU persisted after transfer to hospital wards (adjusted probability [95% confidence interval] of discharge to institution: 3\% [0\%–10\%], 26\% [1\%–51\%], 39\% [0\%–81\%] for the 3 groups, respectively).

**CONCLUSIONS:** Delirium in the PACU is common, but not universal. It is associated with subsequent delirium on the ward, and potentially with a decline in cognitive function and increased institutionalization at hospital discharge.
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**Background:** Abdominal transversus abdominis plane (TAP) block has been shown to provide effective postoperative analgesia in lower abdominal surgery. Subcostal TAP block has also been proposed as a new technique to provide analgesia for the supraumbilical abdomen. We compared the analgesic and opioid-sparing effects of a single-injection subcostal TAP block with continuous thoracic epidural analgesia and IV opioid analgesia.

**Methods:** Ninety patients undergoing elective radical gastrectomy were randomized to receive either combined general–subcostal TAP anesthesia (group TAP), combined general–epidural anesthesia (group EA), or general anesthesia (group GA), and were analyzed on an intention-to-treat basis. In group TAP, a bilateral subcostal TAP block was performed after induction of general anesthesia using 20 mL of 0.375% ropivacaine. In group EA, a thoracic epidural was placed between T8 and T9 and bolused with 8 mL of 0.25% ropivacaine before induction of general anesthesia. The epidural was maintained with 5 mL/h of 0.25% ropivacaine during the surgery. Group GA received standard general anesthesia. In the postanesthesia care unit (PACU), all groups received IV morphine titration for visual analog scale (VAS) pain scores >3. All patients were started on IV patient-controlled analgesia with morphine after morphine titration in the PACU, while group EA also had their epidural maintained with 5 mL/h of 0.125% bupivacaine with 8 μg/mL morphine. Patients were assessed in the PACU and at 1, 3, 6, 24, 48, and 72 hours postoperatively. Primary outcomes measured were morphine consumption at 24 hours and all VAS pain scores.

**Results:** Ninety patients included 82 patients (91.1%). TAP group showed 24 h cumulative morphine consumption reduced (98.75% CI, −29 to −9 mg) and all time point VAS pain scores were non-inferior to GA group, while EA group showed better 24 h cumulative morphine consumption than TAP group (98.75% CI, −23 to −4 mg) and all time point VAS pain scores were non-inferior to TAP group. TAP group showed less morphine consumption in PACU to 6 h but more consumption in 6 h to 24 h.

**Conclusion:** Single injection subcostal TAP block is as effective as IV opioid analgesia and better than TAP block for analgesia and opioid-sparing effects of a single-injection subcostal TAP block with continuous thoracic epidural analgesia and IV opioid analgesia.

**Background:** The transversus abdominis plane (TAP) block has been shown to provide effective postoperative analgesia in lower abdominal surgery. Subcostal TAP block has also been proposed as a new technique to provide analgesia for the supraumbilical abdomen. We compared the analgesic and opioid-sparing effects of a single-injection subcostal TAP block with continuous thoracic epidural analgesia and IV opioid analgesia.

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RESULTS: Data from 82 of 90 (91.1%) patients were included in the study. Group TAP demonstrated decreased cumulative morphine consumption at 24 hours (98.75% confidence intervals, −29 to −9 mg) and noninferiority on VAS pain scores at all measurement times, as compared with group GA with standard opioid analgesia. However, group EA was superior to group TAP regarding cumulative morphine consumption at 24 hours (98.75% confidence intervals, −23 to −4 mg) and noninferior to group TAP on VAS pain scores at all comparison points. Group TAP had reduced morphine consumption from PACU admission to 6 hours as compared with group GA, but increased morphine consumption for 6 to 24 hours as compared with group EA.

CONCLUSION: Single-injection subcostal TAP block was more effective than IV opioid analgesia, while continuous thoracic epidural analgesia was more effective than the single-injection subcostal TAP block.
BACKGROUND: Surgical stress creates a state of insulin resistance which may contribute to the development of hyperglycemia and, subsequently, postoperative complications. Consumption of an oral carbohydrate supplement before surgery may improve insulin sensitivity and reduce hyperglycemia. In this trial, we investigated the effects of carbohydrate supplementation on insulin resistance in coronary artery bypass graft and spinal decompression and fusion surgical patients.

METHODS: Twenty-six patients undergoing coronary artery bypass graft and 12 undergoing spine surgery were randomized to receive 800 mL of an oral carbohydrate supplement the evening before and 400 mL 2 hours before surgery (CHO) or to fasting per standard hospital protocol (FAST). Baseline and postoperative measurements of insulin sensitivity were assessed using the short insulin tolerance test and homeostasis model assessment (HOMA). Interleukin-6, C-reactive protein, and free fatty acid levels were determined at baseline, postoperatively, and 24, 48, and 72 hours after surgery. Adiponectin was measured at baseline. Subjective feelings of well-being were measured immediately before surgery, and intra- and postoperative outcomes were documented.

RESULTS: Postoperative insulin sensitivity did not differ significantly between the FAST and CHO groups whether measured by the short insulin tolerance test (rate of disappearance of blood glucose: 0.29%/min vs 0.38%/min; 99% confidence interval [CI] for difference, −0.17 to 0.32, P = 0.41) or HOMA (insulin resistance at values >1: 2.3 vs 3.3; 99% CI for difference, −0.8 to 2.8, P = 0.14). Circulating blood glucose levels after surgery in the CHO group, 6.2 mmol/L, tended to be lower than the FAST group, 6.9 mmol/L (99% CI for difference, −1.7 to 0.25, P = 0.05) and postoperative β-cell function, measured by HOMA-β (impaired β-cell function at values <100%), tended to be higher in the CHO group, 87%, vs 47.5% in the FAST group (99% CI for difference, −9.4 to 88.4), but these differences were not significant. Adiponectin levels were not different between groups at baseline, and levels of free fatty acid, interleukin-6 and C-reactive protein were not affected by treatment.

CONCLUSIONS: Preoperative carbohydrate loading did not improve postoperative insulin sensitivity. However, the observed postoperative blood glucose levels and β-cell function as well as secondary outcomes warrant further study to reevaluate traditional fasting practices in surgical patients.

对雷莫司琼预防术后恶心呕吐效用的再评价：系统回顾和 meta 分析

Reevaluation of the Effectiveness of Ramosetron for Preventing Postoperative Nausea and Vomiting: A Systematic Review and Meta-Analysis

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背景：先前的 meta 分析结果显示，雷莫司琼对术后恶心呕吐（PONV）有很好的预防作用。然而，这些先前的 meta 分析包括 Fujii 等的很多研究，而 Fujii 等的很多研究现在已被证实是捏造的。本次 meta 分析在除外 Fujii 等人的随机对照试验之后，再次对雷莫司琼预防术后 PONV 的效用进行评估。

方法：我们检索了 Medline、Cochrane、对照临床试验的中央寄存器（CENTRAL）、Embase 和科学网。选取所有有安慰剂或者作为对照的其他药物作对比来检验雷莫司琼对 PONV 预防作用的双盲随机对照试验。手术后的第一个 24h 被划分为早期（0-6 小时）和晚期（6-24 小时）两个时间段，并分别收集相关数据。
结果：总共有 1372 名患者进行了最终分析。与安慰剂相比，雷莫司琼降低术后早期恶心（PON）（相对危险度[RR][95%置信区间]0.59[0.47-0.73]：需要治疗的例数[NNT][95%置信区间]6.0[4.3–9.7]）、术后晚期 PON（RR 0.65 [0.49–0.85]: NNT 7.2 [4.6–16.6]）、早期术后呕吐（POV）(RR 0.48 [0.31–0.74]; NNT 14.8 [8.3–70.4])和晚期 POV(RR 0.50 [0.35–0.73]; NNT 12.3 [7.1–47.6])的发生率。与昂丹司琼相比，雷莫司琼能降低早期 POV(RR 0.50 [0.28–0.90]; NNT 24.1 [10.7–98.0])和晚期 POV(RR 0.53 [0.34–0.81]; NNT 27.2 [12.0–102.0])发生率，而不降低 PON 的发生率。

结论:与安慰剂相比，雷莫司琼对预防 PONV 有重要的意义，但不如之前报道分析的结果明显。与昂丹司琼相比，雷莫司琼能降低早期和晚期 POV 上也有统计学意义，但是由于 NNTs 多，其临床意义可能尚有质疑。

（董静 译 马皓琳 李士通 校）

BACKGROUND: Ramosetron has been shown to have a very strong effect for preventing postoperative nausea and vomiting (PONV) in previous meta-analyses. However, these previous meta-analyses included a number of studies by Fujii et al. which have now been proven to have been fabricated. In the present meta-analysis, we reevaluated the effectiveness of ramosetron in preventing PONV after excluding Fujii et al.’s randomized controlled trials.

METHODS: We searched MEDLINE, Cochrane Central Register of Controlled Trials (CENTRAL), Embase, and Web of Science. All double-blind randomized controlled trials that tested the efficacy of ramosetron compared with a placebo or other drugs as a control in the prophylaxis of PONV were considered to be eligible. The first postoperative 24 hours were divided into early (0–6 hours) and late (6–24 hours) time periods, and we collected these data separately.

RESULTS: A total of 1372 patients were included in the final analysis. Compared with a placebo, ramosetron reduced the incidence of early postoperative nausea (PON) (relative risk [RR] [95% confidence interval] 0.59 [0.47–0.73]; number needed to treat [NNT] [95% confidence interval] 6.0 [4.3–9.7]), late PON (RR 0.65 [0.49–0.85]; NNT 7.2 [4.6–16.6]), early postoperative vomiting (POV) (RR 0.48 [0.31–0.74]; NNT 14.8 [8.3–70.4]), and late POV (RR 0.50 [0.35–0.73]; NNT 12.3 [7.1–47.6]). Compared with ondansetron, ramosetron reduces early POV (RR 0.50 [0.28–0.90]; NNT 24.1 [10.7–98.0]) and late POV (RR 0.53 [0.34–0.81]; NNT 27.2 [12.0–102.0]) but not PON.

CONCLUSIONS: Ramosetron has a significant effect for preventing PONV compared with a placebo, but less than that reported in previous analyses. Ramosetron also has statistically significant differences in preventing early and late POV compared with ondansetron, but the clinical significance may be questioned because the NNTs are large.

丙泊酚通过减少对 γ-氨基丁酸 (GABA) 能神经元的抑制来刺激腹侧外视前核中的去甲肾上腺素抑制性神经元

Propofol Stimulates Noradrenalin-Inhibited Neurons in the Ventrolateral Preoptic Nucleus by Reducing GABAergic Inhibition

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兴奋性中间神经元（NA(+) 神经元）。我们之前的工作表明正常情况下 NA(-) 神经元是处于 NA(+) 神经元的抑制性调控。先前的研究同样表明通过对 GABA 能神经元起作用的试剂如丙泊酚激活 VLPO 的 GABA 能投射性神经元，从而产生对结节乳头核上的觉醒产生抑制的抑制和镇静作用。然而丙泊酚如何激活 VLPO 神经元仍然不清楚。我们研究了丙泊酚通过抑制包括来自于 VLPO NA(+) 神经元的 GABA 能神经传递间接激活 NA(−) 神经元的可能性。

方法：记录大鼠急性脑片中的 VLPO 细胞的电生理活动。

结果：丙泊酚促进 NA(−)神经元的放电，并减少 NA(−)神经元中自发性 GABA 能抑制性突触后电流的频率，但不降低其幅度。相反，丙泊酚抑制 NA(+)神经元的放电。

结论：丙泊酚通过抑制 GABA 能神经传递来兴奋 VLPO 的 NA(-)神经元，至少部分通过抑制 VLPO 上的 NA(+)神经元。这可能是丙泊酚产生镇静作用的一个关键机制。

（杨礼 译 马皓琳 李士通 校）

BACKGROUND: The cellular mechanisms underlying the sedative effect of general anesthetics are not completely understood. Accumulating evidence indicates that the ventrolateral preoptic area (VLPO) of the hypothalamus plays a critical role. The VLPO contains 2 major types of neurons, the noradrenalin-inhibited GABAergic projecting neurons (NA(−) neurons) and the noradrenalin-excited interneurons (NA(+) neurons) which are probably also γ-aminobutyric acid (GABA)-containing neurons. Our previous work suggests that NA(−) neurons are normally under the inhibitory control of NA(+) neurons. Previous studies also show that GABAergic agents including propofol activate GABAergic projecting neurons in the VLPO, which is believed to lead to the inhibition of the arousal-producing nuclei in the tuberomammillary nucleus and sedation. However, how propofol activates VLPO neurons remains unclear. We explored the possibility that propofol activates NA(−) neurons indirectly, by inhibiting GABAergic transmission including those from VLPO NA(+) neurons.

METHODS: Electrophysiological activities were recorded from VLPO cells in acute brain slices of rats.

RESULTS: Propofol facilitates the discharges of NA(−) neurons and reduces the frequency, but not the amplitude of spontaneous GABAergic inhibitory postsynaptic currents in NA(−) neurons. Conversely, propofol suppressed the discharges of NA(+) neurons.

CONCLUSION: Propofol excites VLPO NA(−) neurons by reducing GABAergic transmission, at least in part by inhibiting VLPO NA(+) neurons. This may be a critical mechanism contributing to propofol-induced sedation.

对一项专家系统在人类患者模拟器麻醉期间关键事件检出的评估：一项前瞻随机对照研究

An Evaluation of an Expert System for Detecting Critical Events During Anesthesia in a Human Patient Simulator: A Prospective Randomized Controlled Study

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BACKGROUND: Perioperative monitoring systems produce a large amount of uninterpreted data, use threshold alarms prone to artifacts, and rely on the clinician to continuously visually track changes in physiological data. To address these deficiencies, we developed an expert system that provides real-time clinical decisions for the identification of critical events. We evaluated the efficacy of the expert system for enhancing critical event detection in a simulated environment. We hypothesized that anesthesiologists would identify critical ventilatory events more rapidly and accurately with the expert system.

METHODS: We used a high-fidelity human patient simulator to simulate an operating room environment. Participants managed 4 scenarios (Anesthetic Vapor Overdose, Tension Pneumothorax, Anaphylaxis, and Endotracheal Tube Cuff Leak) in random order. In 2 of their 4 scenarios, participants were randomly assigned to the expert system, which provided trend-based alerts and potential differential diagnoses. Time to detection and time to treatment were measured. Workload questionnaires and structured debriefings were completed after each scenario, and a usability questionnaire at the conclusion of the session. Data were analyzed using a mixed-effects linear regression model; Fisher exact test was used for workload scores.

RESULTS: Twenty anesthesiology trainees and 15 staff anesthesiologists with a combined median (range) of 36 (29–66) years of age and 6 (1–38) years of anesthesia experience participated. For the Endotracheal Tube Cuff Leak, the expert system caused mean reductions of 128 (99% confidence interval [CI], 54–202) seconds in time to detection and 140 (99% CI, 79–200) seconds in time to treatment. In the other 3 scenarios, a best-case decrease of 97 seconds (lower 99% CI) in time to diagnosis for Anaphylaxis and a worst-case increase of 63 seconds (upper 99% CI) in time to treatment for Anesthetic Vapor Overdose were found. Participants were highly satisfied with the expert system (median score, 2 on a scale of 1–7). Based on participant debriefings, we identified avoidance of task fixation, reassurance to initiate invasive treatment, and confirmation of a suspected diagnosis as 3 safety-critical areas.
CONCLUSION: When using the expert system, clinically important and statistically significant decreases in time to detection and time to treatment were observed for the Endotracheal Tube Cuff Leak scenario. The observed differences in the other 3 scenarios were much smaller and not statistically significant. Further evaluation is required to confirm the clinical utility of real-time expert systems for anesthesia.

气管导管套囊漏气:原因、后果及处理

Endotracheal Tube Cuff Leaks: Causes, Consequences, and Management

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气管导管（ETT）套囊漏气的后果可从漏气的气泡声到威胁生命的通气失败。尽管最终解决的方法是更换气管导管，但这通常是不需要且操作起来不安全的。一般来说，导致漏气的原因并不在气管导管的结构性缺陷。套囊充气太少、ETT 向头侧的移位（部分导管拔出）、错误置入的口胃管或鼻胃管、气管导管及气管内径之间的较大差异或者增高的气道峰压值均会导致完整的套囊周围漏气。纠正这些问题就可停止漏气而不更换气管导管。然而，归咎于意外损伤或制造缺陷的气管导管套囊、指示气囊及注气系统的损坏可能就责任重大了。解决这个问题的保守的处理意见（不更换气管导管的处理）已经在之前发表过了。但是，如存在大的结构性缺陷或保守处理措施失败的话，就必须更换气管导管。如喉镜视野较好的话可以通过喉镜直视下实施。当存在困难气道的迹象和/或困难气道史的时候，应该预期到一个困难的更换过程可能导致的气道丢失并有所准备。在做出最有利决策前，针对每个个体情况都应确保做好风险/获益分析。在换管前需提前计划好可供选择的后备通气方案及准备好必要的器材。本综述将针对各种处理问题及方案进行讨论，并提出一简易的气管导管套囊漏气处理步骤。

The consequences of endotracheal tube (ETT) cuff leak may range from a bubbling noise to a life-threatening ventilatory failure. Although the definitive solution is ETT replacement, this is often neither needed nor safe to perform. Frequently, the leak is not caused by a structural defect in the ETT. Cuff underinflation, cephalad migration of the ETT (partial tracheal extubation), misplaced orogastric or nasogastric tubes, wide discrepancy between ETT and tracheal diameters, or increased peak airway pressure can cause leaks around intact cuffs. Correction of these problems will stop the leak without ETT replacement. Alternatively, ETT cuff, pilot balloon, and inflation system damage due to inadvertent trauma or manufacturing defects may be responsible. Conservative management ideas (management without ETT replacement) were previously published to solve the problem. However, when a large structural defect is identified or conservative measures fail, ETT replacement becomes necessary. This can be performed with direct laryngoscopy if laryngeal visualization is adequate. A difficult exchange with possible airway loss should be anticipated, and prepared for, when there are signs and/or history of difficult intubation. A risk/benefit analysis of each individual situation is warranted before decisions are made on how best to proceed. Alternative back-up ventilation plans should be preformulated and the necessary equipment ready before the exchange. In this review, various management concerns and plans are discussed, and a simple algorithm to manage leaky ETT cuff situations is presented.

婴幼儿声门下气道长度的测量新方法
Novel Measurements of the Length of the Subglottic Airway in Infants and Young Children

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BACKGROUND: To date, the lengths of the subglottic and tracheal airway segments have been measured from autopsy specimens. Images of the head and neck obtained from computerized tomography (CT) provide an alternate method. Our objective in this study was to identify anatomic landmarks from CT scans in infants and young children to estimate the lengths of the subglottic and tracheal airway segments and to correlate these lengths with age.

METHODS: We performed a retrospective analysis of CT images of the neck for various diagnostic indications in children ≤3 years. We obtained planes of reconstruction at the level of the vocal cords (VCs), cricoid cartilage, and carina (C) which were parallel to each other and perpendicular to sagittal long axis of the trachea. The lengths of the subglottic airway (LengthSG) and total length of the laryngotracheal airway (LengthVC–C) were measured from the distance between, respectively, the VC versus cricoid cartilage and the VC versus C planes of reconstruction. Tracheal length was then calculated as the difference between LengthVC–C and LengthSG.

RESULTS: Fifty-six children met the inclusion criteria. There were 29 boys. The median weight was 10.7 kg (range 3.1–19.0 kg). Regression analysis yielded mean LengthSG (mm) = 7.8 + 0.03•corrected age (months), r² = 0.07, P = 0.056; in β = 0.03, 95% confidence interval was −0.001 to 0.006. The mean LengthSG was 8.4 mm, with a standard deviation of 1.4 mm. The 95th percentile for LengthSG was 10.8 mm, and the 5% to 95% interquartile range was 4.9 mm. The estimate for the 95% confidence interval of the 95th percentile was between 10.2 and 11.3 mm. LengthVC–C increased with age: mean LengthVC–C (cm) = 5.3 + 0.05•corrected age.
CONCLUSION: We report a novel estimate method for the lengths of the airway segments between the VC and C in 56 infants and young children and suggest that the growth characteristics of the subglottic and tracheal airway may differ.

关于 Horace Wells 在康乃狄克州哈特福德的遗址和遗物

Sites and Artifacts Related to Horace Wells in Hartford, Connecticut

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Horace Wells, a contender for recognition as the discoverer of anesthesia, is celebrated in the town where he conducted most of his work, Hartford, CT. His only descendant was his son, Charles Thomas Wells (1839–1909), an influential and successful business executive at Aetna Insurance Company. He was a man of considerable influence, and he worked tirelessly with city officials and the Connecticut Dental Association in celebrating the 50th anniversary of his father’s contribution to medicine. This discovery is unique because events and individuals in 1 country, the United States, contributed entirely to the birth of a medical specialty. Sites in Jefferson, GA; Hartford, CT; and Boston, MA and their environs celebrate this most precious contribution to modern medicine, especially since the introduction of safe anesthesia permitted the development of surgical specialties and obstetrics. We trace the history and relationship between Horace Wells and several sites and artifacts in Hartford, CT. These sites span the most important, distinctive, and attractive parts of the city: Bushnell Park, Trinity College, Cedar Hill Cemetery, the Athenaeum, and the Connecticut Historical Society.

静脉注射一个剂量利多卡因对最小肺泡浓度七氟醚的影响：一个前瞻，随机，双盲，安慰剂对照试验

The effect of a bolus dose of intravenous lidocaine on the minimum alveolar concentration of sevoflurane: a prospective, randomized, double-blinded, placebo-controlled trial.

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背景：吸入麻醉药的药效通过最小肺泡浓度（MAC）来量化，是指50%的患者在疼痛刺激时的肺泡浓度。吸入麻醉药抑制体动的机制尚未完全阐述，但有些药物会影响MAC。在这个试验中，我们研究了单个剂量静脉注射的利多卡因对七氟醚MAC值的影响。

方法：我们用Dixon“up-and-down”法来确定七氟醚的MAC值。入选行择期手术的患者，分成3组，每组30人，年龄30至65岁。3组分别给予安慰剂，0.75mg/kg利多卡因，1.5mg/kg利多卡因。诱导后15分钟平衡期，然后应用试验药物，3分钟后切皮，记录有无体动。

结果：安慰剂组MAC值1.86% ± 0.40%，0.75mg/kg利多卡因组MAC值1.87% ± 0.45%（P = 1.00）。1.5mg/kg利多卡因组MAC值1.63% ± 0.24%（P = 0.022），明显小于安慰剂组，七氟醚的平均浓度差0.23%，95%CI 0.03-0.43。安慰剂组和0.75mg/kg利多卡因组两者之间没有显著差异，七氟醚的平均浓度差-0.01%，95%CI -0.27 to 0.25，P = 1.00。

结论：静脉注射1.5mg/kg利多卡因降低至少0.03%七氟醚MAC（平均浓度差0.23%，95%CI 0.03-0.43）。我们没有观察到0.75mg/kg利多卡因有相似的效果。

(陈实玉译 薛张纲校)
BACKGROUND: Although transdermal preparations of local anesthetics have been used to reduce pain caused by skin surgery, these preparations cannot effectively penetrate through the epidermis because of the barrier formed by the stratum corneum and the thick epidermis. Ethosomes can effectively transport drugs across the skin because of their thermodynamic stability, small size, high encapsulation efficiency, and percutaneous penetration. We evaluated lidocaine base ethosomes by measuring their loading efficiency, encapsulation efficiency, thermodynamic stability, and percutaneous penetration capability in vitro, and their effectiveness and cutaneous irritation in vivo.

METHODS: Lidocaine base ethosomes were prepared using the injection-sonication-filter method. Size, loading efficiency, encapsulation efficiency, and stability were evaluated using a Zetasizer and high performance liquid chromatography. Formulation was determined by measuring the maximum encapsulation efficiency in the orthogonal test. Percutaneous penetration efficiency in vitro was analyzed using a Franz-type diffusion cell experiment. In vivo effectiveness was analyzed using the pinprick test. Cutaneous irritancy tests were performed on white guinea pigs, followed by histopathologic analysis. The results were compared with lidocaine liposomes as well as lidocaine delivered in a hydroethanolic solution.

RESULTS: Lidocaine base ethosomes composed of 5% (w/w) egg phosphatidyl choline, 35% (w/w) ethanol, 0.2% (w/w) cholesterol, 5% (w/w) lidocaine base, and ultrapure water had a mean maximum encapsulation of 51% ± 4%, a mean particle size of 31 ± 3 nm, and a mean loading efficiency of 95.0% ± 0.1%. The encapsulation efficiency of lidocaine base ethosomes remained stable for 60 days at 25°C ± 1°C (95% confidence interval [CI], -1.12% to 1.34%; P = 0.833). Lidocaine base ethosomes had a shorter onset time and longer effectiveness than did lidocaine delivered in a hydroethanolic solution and liposomes (95% confidence interval [CI], 1129-1818 µg/(cm²•h); P < 0.001).
duration in vivo than did lidocaine base liposomes or lidocaine delivered in a hydroethanolic solution. Lidocaine base ethosomes showed no evidence of dermal irritation in guinea pigs.

CONCLUSIONS: Ethosomes are potential carriers of local anesthetics across the skin and may have applicability for other percutaneous drugs that require rapid onset.

在使用非去极化肌松药的全麻病人的恢复过程中，使用 AMG 和 EMG 的单侧比较。

An Ipsilateral Comparison of Acceleromyography and Electromyography During Recovery from Nondepolarizing Neuromuscular Block Under General Anesthesia in Humans

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BACKGROUND: Residual neuromuscular block is defined as a mechanomyography (MMG) or electromyography (EMG) train-of-four (TOF) ratio <0.90, and is common in patients receiving neuromuscular blocking drugs. Objective neuromuscular monitoring is the only reliable way to detect and exclude residual neuromuscular block. Acceleromyography (AMG) is commercially available and easy to use in the clinical setting. However, AMG is not interchangeable with MMG or EMG. Currently, it is unclear what value must be reached by AMG TOF ratio to reliably exclude residual neuromuscular block.

METHODS: During spontaneous recovery from neuromuscular block, we monitored TOF ratio on the same arm using AMG at the adductor pollicis and EMG at the first dorsal interosseus. AMG and EMG TOF ratios were compared by the Bland–Altman analysis for repeated measurements. The precision of each device was assessed by the repeatability coefficient. A small repeatability coefficient indicates high precision of the device. The agreement between the

背景：残余肌松的定义是 MMG 或者 EMG 显示四个成串刺激比值小于 0.09, 这在使用过去极化肌松药的病人中很常见。相对的神经肌肉监测是判断残余肌松唯一可以相信的指标。AMG 是临床上最经常使用并且使用方便的方式。但是, AMG 并不可以替代 MMG 或者 EMG。至今为止, 排除残余肌松的 AMG TOF 值尚未明确。

方法：在神经肌肉阻滞自发恢复的过程中，我们在同一个手臂的尺侧内收肌上使用 AMG 测试 TOF 值，同时在第一背侧骨间肌使用 EMG。使用 Bland–Altman 分析法重复分析 AMG 和 EMG 的 TOF 值。两个工具的精密度都用重复的系数评估。一个的可重复系数代表仪器的高准确度。仪器的吻合度按照偏移和接近范围为 95% 评估。小的偏移和狭窄的超出范围提示高度的吻合。我们定义了临床上 AMG 和 EMG 可以接受的吻合偏移小于 0.025, 超出范围在−0.05 到 0.05 之间。这就保证了我们的 EMG 与其自己的控制性比较可以满足标准。

结果：在 26 个病人之间，做了 261 次 AMG 和 EMG 之间的比较。AMG 与 EMG 之间的可重复系数为 0.094 和相对的 0.051。AMG 和 EMG 的 TOF 值之间的偏移为 0.176, 同时的吻合范围是 −0.045 到 0.396。

总结：AMG 没有 EMG 精确，且会超出 EMG 的 TOF 值至少 0.15。这个结果未达成一致不能归结于试验的不准确或者判断成功的基线不同。当 AMG 值达到 1.0 时，不能排除残余肌松。

（蒋鑫梅译 薛张纲校）
devices was assessed by the bias and the 95% limits of agreement. Small bias and narrow limits of agreement indicate strong agreement. We defined clinically acceptable agreement between AMG and EMG as a bias <0.025 and limits of agreement within −0.050 to 0.050, provided that the control comparison between EMG and itself can fulfill these criteria.

RESULTS: In 26 patients, 261 comparisons between AMG and EMG were made. The repeatability coefficient of AMG and EMG were 0.094 (95% confidence interval [CI], 0.088–0.100) and 0.051 (95% CI, 0.048–0.055), respectively. The bias between AMG and EMG TOF ratio was 0.176 (95% CI, 0.162–0.190), with limits of agreement −0.045 to 0.396 (95% CI, −0.067 to 0.419).

CONCLUSIONS: AMG is less precise than EMG and overestimates EMG TOF ratio by at least 0.15. The lack of agreement cannot be attributed to instrumental imprecision or the baseline difference between successive measurements during spontaneous recovery of neuromuscular function. Residual neuromuscular block cannot be excluded on reaching an AMG TOF ratio of 1.00.

Non-cardiac surgery hyperchloremia and postoperative mortality: an effects study

Hyperchloremia after noncardiac surgery is independently associated with increased morbidity and mortality: a propensity-matched cohort study

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BACKGROUND: The use of normal saline is associated with hyperchloremic metabolic acidosis. In this study, we sought to determine the incidence of acute postoperative
hyperchloremia (serum chloride > 110 mEq/L) and whether this electrolyte disturbance is associated with an increase in length of hospital stay, morbidity, or 30-day postoperative mortality.

METHODS: Data were retrospectively collected on consecutive adult patients (>18 years of age) who underwent inpatient, noncardiac, nontransplant surgery between January 1, 2003 and December 31, 2008. The impact of postoperative hyperchloremia on patient morbidity and length of hospital stay was examined using propensity-matched and logistic multivariable analysis.

RESULTS: The dataset consisted of 22,851 surgical patients with normal preoperative serum chloride concentration and renal function. Acute postoperative hyperchloremia (serum chloride > 110 mmol/L) is quite common, with an incidence of 22%. Patients were propensity-matched based on their likelihood to develop acute postoperative hyperchloremia. Of the 4955 patients with hyperchloremia after surgery, 4266 (85%) patients were matched to patients who had normal serum chloride levels after surgery. These 2 groups were well balanced with respect to all variables collected. The hyperchloremic group was at increased risk of mortality at 30 days postoperatively (3.0% vs 1.9%; odds ratio = 1.58; 95% confidence interval, 1.25-1.98) (relative risk 1.6 or risk increase of 1.1%) and had a longer hospital stay (7.0 days [interquartile range 4.1-12.3] compared with 6.3 [interquartile range 4.0-11.3]) than patients with normal postoperative serum chloride levels. Patients with postoperative hyperchloremia were more likely to have postoperative renal dysfunction. Using all preoperative variables and measured outcome variables in a logistic regression analysis, hyperchloremia remained an independent predictor of 30-day mortality with an odds ratio of 2.05 (95% confidence interval, 1.62-2.59).

CONCLUSION: This retrospective cohort trial demonstrates an association between hyperchloremia and poor postoperative outcome. Additional studies are required to demonstrate a causal relationship between these variables.
BACKGROUND: Acute renal failure (ARF) is a severe complication of cardiac operations in pediatric patients. Angiography with the exposure to contrast media is a risk factor for ARF. In the present study, we explored the association between timing of angiography, dose of contrast media, and the incidence of ARF after cardiac operations in pediatric patients.

METHODS: We performed a retrospective analysis of prospectively collected data. Angiographic data and other covariates were collected in 277 patients aged ≤12 years receiving angiography and cardiac operations during the same hospital stay. Renal outcome was assessed according to the pediatric Risk, Injury, Failure, Loss of function, End stage score (pRIFLE).

RESULTS: One hundred seventy-seven (64%) patients suffered some degree of postoperative renal dysfunction, and 55 (20%) had ARF (pRIFLE stage Failure). Patients with ARF received a significantly (P < 0.001) larger dose of iodine contrast media (4.6 ± 2.6 g/kg) with respect to the other patients (2.8 ± 2.2 g/kg), with a relative risk increase for ARF of 31% per each incremental iodine dose of 1 g/kg at the univariate analysis. A multivariable risk model demonstrated that the risk for ARF is 20 times higher in patients aged younger than 2 years and 3 times higher in case of postoperative low cardiac output. Within this model, the iodine dose on angiography is confirmed as an independent risk factor for ARF, with a relative risk increase for ARF of 16% per each incremental iodine dose of 1 g/kg.

CONCLUSIONS: Angiography before cardiac surgery is an important risk factor for ARF in pediatric patients. Being a modifiable risk factor, the contrast media dose should be limited to the lowest possible value, avoiding large doses of iodine which, together with other factors (age and postoperative low cardiac output), concur in the determinism of postoperative ARF.
modalities, electrocardiography is still used in approximately 60% to 70% of the epilepsy centers in North America to guide surgical resection of the epileptogenic lesion and to assess for completeness of surgery. In this review, we discuss the principles and intraoperative use of electrocorticography, the effect of anesthetic drugs on electrocorticography, and the use of pharacoactivation for intraoperative localization of epileptogenic zone.

布比卡因，罗哌卡因，甲哌卡因对人体软骨细胞和软骨的细胞毒性。

The cytotoxicity of bupivacaine, ropivacaine, and mepivacaine on human chondrocytes and cartilage.

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BACKGROUND: Intraarticular injections of local anesthetics are frequently used as part of multimodal pain regimens. However, recent data suggest that local anesthetics affect chondrocyte viability. In this study, we assessed the chondrotoxic effects of mepivacaine, ropivacaine, and bupivacaine. We hypothesized that specific cytotoxic potencies directly correlate with angesic potencies, and that cytotoxic effects in intact cartilage are different than in osteoarthritic tissue.

METHODS: Human articular chondrocytes were exposed to equal and equipotent concentrations of bupivacaine, ropivacaine, and mepivacaine for 1 hour. Cell viability, apoptosis, and necrosis were determined at predefined time points using flow cytometry, live-dead staining, and caspase detection. Intact and osteoarthritic human cartilage explants were treated with equipotent concentrations of named drugs to determine cell viability applying fluorescence microscopy.
RESULTS: Chondrotoxic effects increased from ropivacaine to mepivacaine to bupivacaine in a time-dependent and concentration-dependent manner. Compared with control, bupivacaine 0.5% decreased chondrocyte viability to 78% ± 9% (P = 0.0183) 1 hour and 16% ± 10% (P < 0.0001) 24 hours later, as determined by live-dead staining in monolayer cultures. Viability rates were reduced to 80% ± 7% (P = 0.0475) 1 hour and 80% ± 10% (P = 0.0095) 24 hours after treatment with ropivacaine 0.75%. After exposure to mepivacaine 2%, viable cells were scored 36% ± 6% (P < 0.0001) after 1 hour and 30% ± 11% (P < 0.0001) after 24 hours. Ropivacaine treatment was less chondrotoxic than bupivacaine (P = 0.0006) and mepivacaine exposure (P = 0.0059). Exposure to concentrations up to 0.25% of bupivacaine, 0.5% of ropivacaine, and 0.5% of mepivacaine did not reveal significant chondrotoxicity in flow cytometry. However, chondrotoxicity did not correlate with potency of local anesthetics. Immediate cell death was mainly due to necrosis followed by apoptosis. Cellular death rates were clearly higher in osteoarthritic compared with intact cartilage after bupivacaine, mepivacaine, and ropivacaine treatment in a decreasing order.

CONCLUSION: Bupivacaine, ropivacaine, and mepivacaine are chondrotoxic in a time-dependent, concentration-dependent, and drug-dependent manner. Chondrotoxic and analgesic potencies do not directly correlate. Cellular death rates were higher in osteoarthritic compared with intact cartilage after local anesthetic treatment.