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不同胶体导致的稀释性凝血障碍是否可由纤维蛋白原和凝血因子 XIII 浓缩物来逆转

Is Dilutional Coagulopathy Induced by Different Colloids Reversible by Replacement of Fibrinogen and Factor XIII Concentrates?

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Anesthesia & Analgesia: 2013 117：1063–1071

背景：本离体试验评估了使用不同胶体进行 60%血液稀释后对凝血的影响并研究 XIII 因子(FXIII)、纤维蛋白原及两者的复合应用对凝血功能的逆转作用。

方法：取 12 名自愿者的血液，分别在血液稀释前和由 HES 130/0.4 ，明胶或平衡明胶溶液稀释 60%后测定：血气分析，凝血因子浓度（I,II,VII,VIII 和 XIII 因子），阻抗法血小板聚集实验(Multiplate®)，旋转式血栓弹力图(ROTEM®)。然后，给予 XIII 因子（1250IU）或纤维蛋白原 6g 或两者联合加入样本，测定 ROTEM® 指标并测定凝血因子浓度。

结果：胶体稀释后，特别是 HES 能显著降低纤维蛋白原的聚合作用。所有胶体都会损害血小板功能，其中明胶比 HES 和平衡明胶溶液的损害作用更显著（曲线下面积，collagen 试验，P≤0.008）。XIII 因子替代治疗仅不改善凝血块形成。纤维蛋白原替代治疗改善由明胶和平衡明胶溶液稀释后纤维蛋白原的聚合作用（P=0.002），然而它不能纠正 HES 稀释导致的凝血障碍。联合应用 XIII 因子和纤维蛋白原比单纯使用纤维蛋白原对机体凝血功能有更好的效果。

结论：三种胶体都能损害凝血和血小板功能。然而，在离体试验中，明胶比 HES 稀释引起的凝血障碍更具有可逆性。

（边文玉 译 陈杰 校）

BACKGROUND: In this in vitro trial, we assessed the effect on blood coagulation of 60% dilution with different colloids and investigated reversibility by replacement of factor XIII (F XIII), fibrinogen, and the combination of fibrinogen and F XIII.

METHODS: Using the blood of 12 volunteers, the following measurements were performed at baseline and after 60% dilution with (hydroxyethyl starch solutions) HES 130/0.42, gelatin, or balanced gelatin solution: blood gas analyses, coagulation factor concentrations (F I, F II, F VII, F VIII, F XIII), impedance aggregometry (Multiplate®), and rotational thromboelastometry (ROTEM®). Then F XIII and fibrinogen as well as a combination of both were added, in concentrations corresponding to 6 g fibrinogen and 1250 IU F XIII in adults. ROTEM® measurements and determination of factor concentrations were again performed.

RESULTS: Colloid dilution led to a significant reduction of fibrinogen polymerization, especially with HES. Platelet function was impaired by all colloids, with gelatin having a significantly greater effect (area under the curve, collagen Test, P ≤ 0.008) than HES and balanced gelatin solution. The substitution of F XIII only did not improve clot formation. Substitution of fibrinogen improved the polymerization of fibrinogen in dilutions with gelatin and balanced gelatin solution (P = 0.002), whereas HES-induced coagulopathy could not be corrected. The combination of fibrinogen and F XIII showed a better effect than the addition of fibrinogen only for certain variables.

CONCLUSION: Coagulation and platelet function are impaired by all 3 colloids. However, in vitro gelatin-induced coagulopathy was significantly more reversible than HES-induced coagulopathy.

一项在志愿者行肠镜检查时应用多种剂量 Remimazolam (CNS 7056)进行的 Ib 期剂量反应研究

A Phase Ib, Dose-Finding Study of Multiple Doses of Remimazolam (CNS 7056) in Volunteers Undergoing Colonoscopy

Worthington, Mark T. MD*; Antonik, Laurie J. MD†; Goldwater, D. Ronald MD‡; Lees, James P. BSc§; Wilhelm-Ogunbiyi, Karin MD‖ ; Borkett, Keith M. BSc§; Mitchell, Mack C. MD*

Anesthesia & Analgesia: 2013，117 ：1093–1100

背景：这项 remimazolam 多剂量应用研究目的在于评估此药物在肠镜检查期间维持适当镇静作用以及用氟马西尼逆转镇静作用的可行性。

方法：健康志愿者在进行肠镜检查时依次给予芬太尼、remimazolam，后者起镇静作用。分为三个剂量组，每组 15 名志愿者，每组逐渐增加 remimazolam 的初始剂量，再加上补充剂量以维持 30min 镇静。在另一部分的双盲交叉实验中，6 名志愿者在接收单次高剂量的 remimazolam 镇静后使用氟马西尼或安慰剂进行逆转。

结果：70%的受试者在肠镜检查过程中达到足够镇静深度。在整体中位数为 10min 内，受试者术后迅速恢复至充分警觉水平。失败病例是由于无法获得镇静或产生了不良事件，后者为一例受试者发生了低血压（血压 80/40 mmHg）和低血氧饱和度（<90%）。没有严重不良事件报告，也无苯二氮卓类药和芬太尼联合使用后的意外事件发生。这项研究还表明 remimazolam 的镇静作用可被迅速逆转（氟马西尼 1.0min，安慰剂 10.5min），且并不产生再次镇静。

结论：remimazolam 是一种镇静药物，与其他药物的最近研究相比具有相似的成功率。接受肠镜检查的 44 例受试者中 33 例，Remimazolam 能提供足够的镇静，并且它的镇静效果很容易被氟马西尼逆转。

（谈婧华 译 陈杰 校）

BACKGROUND: We performed the first multiple dose study of remimazolam designed to assess both the feasibility of maintaining suitable sedation during colonoscopy and reversing the sedative effects of remimazolam with flumazenil.

METHODS: Healthy volunteers received fentanyl followed by remimazolam for sedation during colonoscopy. Three dose groups of 15 volunteers each received remimazolam in increasing initial doses, plus top-up doses to maintain sedation for a 30-minute period. In a separate double-blind crossover part of the trial, 6 volunteers were sedated with a single high dose of remimazolam, followed by flumazenil or placebo to reverse the sedation.

RESULTS: Successful sedation that was adequate for colonoscopy was achieved in >70% of subjects. After the procedure, subjects rapidly recovered to fully alert, with a median of <10 minutes overall. Failures were due to the inability to sedate or adverse events, with 1 subject failing due to hypotension (arterial blood pressure 80/40) and low SpO2 (<90%). There were no serious adverse events reported, and no events that were unexpected with the combination of a benzodiazepine and fentanyl. The study also showed that sedation was rapidly reversible (1.0 minutes flumazenil vs 10.5 minutes placebo) without resedation.

CONCLUSIONS: Remimazolam has the attributes of a sedative drug, with success rates comparable with recent studies of other drugs. Remimazolam provided adequate sedation in 33 of 44 subjects undergoing colonoscopy, and its sedative effects were easily reversed with flumazenil.

手术期间闭环液体管理与麻醉医师管理用于血液动力学优化和复苏的比较：一项在体研究

Closed-Loop Fluid Administration Compared to Anesthesiologist Management for Hemodynamic Optimization and Resuscitation During Surgery: An In Vivo Study

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Anesthesia & Analgesia: 2013 117 ：1119–1129

背景：闭环系统已被设计用于帮助医生维持临床中各项生理参数的稳定。最近完成了一项新的闭合环路液体管理系统的计算机模拟测试，此系统被设计用于监测和优化心输出量和脉压变异度。本研究的目的是评价此新型系统优化手术期间血流动力学参数的效果。

方法：16 头约克种猪行 2 期出血处理，并通过记忆静脉复苏器闭合环路系统或麻醉医生进行复苏。比较两组间血流动力学参数中值和变异。

结果：在整个实验过程中，闭合环路组的心脏指数(l/min/m2)和每搏指数(ml/m2)高于麻醉医生组(心脏指数：3.7 [3.4–4.1] vs 3.5 [3.2–3.9]；95% Wald 可信区间为−0.5 ~ −0.23；P < 0.0005。每搏指数：40 [34–45] vs 36 [31–38]；95% Wald 可信区间为 −5.9 ~ −3.1；P <

0.0005)。两组间总液体输入量没有显著差异(3685 [3230–4418] vs 3253 [2735–3926] ml; 95%可信区间为−1651~ 431；P = 0.28)。另外，闭合环路组的心脏指数和每搏指数的变异系数较医生组小(心脏指数：11% [10%–16%] vs 22% [18%–23%]；可信区间为0.8%~12.3%；P = 0.02。每搏指数：11% [8%–16%] vs 17% [13%–21%]；可信区间为0.2%~11.4%；P = 0.04)。

结论：此在体研究建立于前期计算机模拟分析，结果显示用于此实验的闭合环路液体管理系统能够完成轻度和重度出血时的液体复苏，并能维持高心输出量和每搏量而降低血流动力学的变化。

（朱浩 译 陈杰 校）

BACKGROUND: Closed-loop systems have been designed to assist practitioners in maintaining stability of various physiologic variables in the clinical setting. In this context, we recently performed in silico testing of a novel closed-loop fluid management system that is designed for cardiac output and pulse pressure variation monitoring and optimization. The goal of the present study was to assess the effectiveness of this newly developed system in optimizing hemodynamic variables in an in vivo surgical setting.

METHODS: Sixteen Yorkshire pigs underwent a 2-phase hemorrhage protocol and were resuscitated by either the Learning Intravenous Resuscitator closed-loop system or an anesthesiologist. Median hemodynamic values and variation of hemodynamics were compared between groups.

RESULTS: Cardiac index (in liters per minute per square meter) and stroke volume index (in milliliters per square meter) were higher in the closed-loop group compared with the anesthesiologist group over the protocol (3.7 [3.4–4.1] vs 3.5 [3.2–3.9]; 95% Wald confidence interval, −0.5 to −0.23; P < 0.0005 and 40 [34–45] vs 36 [31–38]; 95% Wald confidence interval, −5.9 to −3.1; P < 0.0005, respectively). There was no significant difference in total fluid administration between the closed-loop and anesthesiologist groups (3685 [3230–4418] vs 3253 [2735–3926] mL; 95% confidence interval, −1651 to 431; P = 0.28). Closed-loop group animals also had lower coefficients of variance of cardiac index and stroke volume index during the protocol (11% [10%–16%] vs 22% [18%–23%]; confidence interval, 0.8%–12.3%; P = 0.02 and 11% [8%–16%] vs 17% [13%–21%]; confidence interval, 0.2%–11.4%; P = 0.04, respectively).

CONCLUSION: This in vivo study building on previous simulation work demonstrates that the closed-loop fluid management system used in this experiment can perform fluid resuscitation during mild and severe hemorrhages and is able to maintain high cardiac output and stroke volume while reducing hemodynamic variability.

应急手册的实施：认知辅助在突发事件期间是否可帮助将最佳实践应用于患者监护

Implementing Emergency Manuals: Can Cognitive Aids Help Translate Best Practices for Patient Care During Acute Events?

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Anesthesia & Analgesia: 2013 ，117 ：1149 – 1161

本文阐明应急手册是否对于帮助麻醉医生、围手术期团队处理紧急重大事件，是一种已知的有效手段。本文回顾了过去相关健康护理中的认知辅助，以及其他高风险行业中的事例，解释为何应急手册在类似事件中能促进病人的监护工作。本文采用围手术期的具体实例，提出四个重要因素：创建、熟悉、使用和整合，这些对于医疗应急手册的传播、发展和实施很重要。每个因素的细节均来自于医学文件，或是有着长达 30 余年总结经验的麻醉医生模拟和实际重大事件管理观察组。作者强调应急手册在内容、地点以及方式上训练

临床医生的重要性。最后，作者讨论了对于改变所需的文化方面的准备，展示了一套成功整合的系统实例，着重提出对于应急手册实施方面进一步研究的重要性。

（贺加贝 译 陈杰 校）

In this article, we address whether emergency manuals are an effective means of helping anesthesiologists and perioperative teams apply known best practices for critical events. We review the relevant history of such cognitive aids in health care, as well as examples from other high stakes industries, and describe why emergency manuals have a role in improving patient care during certain events. We propose 4 vital elements: create, familiarize, use, and integrate, necessary for the widespread, successful development, and implementation of medical emergency manuals, using the specific example of the perioperative setting. The details of each element are presented, drawing from the medical literature as well as from our combined experience of more than 30 years of observing teams of anesthesiologists managing simulated and real critical events. We emphasize the importance of training clinicians in the use of emergency manuals for education on content, format, and location. Finally, we discuss cultural readiness for change, present a system example of successful integration, and highlight the importance of further research on the implementation of emergency manuals.

内质网应激对于吸入麻醉药引起的神经毒性的影响

The Effect of Endoplasmic Reticulum Stress on Neurotoxicity Caused by Inhaled Anesthetics

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Anesthesia & Analgesia: 2013 117 ：1197–1204

背景：吸入麻醉药引起神经毒性的机制尚未阐明。暴露于吸入麻醉药可引起 Ca2+从细胞质内质网（ER）释放入胞质。异常的 Ca2 +动员可改变 ER 中的蛋白质折叠环境，引起 ER 应激。结合免疫球蛋白（BIP）是一种 ER 伴侣，对 ER 功能维持是至关重要的。由于 ER 应激导致细胞功能障碍和细胞凋亡，从而引起不同的人类疾病，如神经退行性疾病，作者推测 ER 应激可能在吸入麻醉药引起的神经毒性方面起一定作用。

方法：本研究通过表达突变 BIP 的基因敲除小鼠和神经元培养细胞调查 ER 应激与吸入麻醉药引起的神经退行性疾病之间的关系。神经元培养细胞和突变 BIP 怀孕小鼠暴露于 3%七氟醚。 通过对神经元细胞和剖腹产胎鼠大脑进行 Western blot 分析来评估 BIP 和 C / EBP 同源蛋白（CHOP）水平，后者是一种 ER 应激期间细胞死亡相关的转录因子。使用 TUNEL 染色来评估胎鼠大脑的细胞死亡。采用非配对 t 检验和方差分析，之后多重比较来评估是否有统计学意义。

结果：七氟烷暴露增强神经元培养细胞的 BIP 和 CHOP 表达。一种辅助 ER 功能的化学伴侣可减少七氟醚暴露所诱导的 CHOP 表达。在一项在体研究中发现，与野生型相比，突变 BIP 纯合子胎鼠大脑中 CHOP 表达加强，细胞凋亡更显著。七氟醚暴露后，来自突变 BIP 小鼠的胚胎成纤维细胞也表现出 CHOP 和裂解 caspase-3 水平的增强。

结论:七氟醚暴露可引起 ER 应激, 野生型细胞在一定程度上可以耐受。而如存在突变 BIP 的细胞，若无法耐受此种应激，七氟醚暴露导致大脑的细胞死亡，暗示内质网应激可能部分介导了吸入麻醉药引起的神经毒性。此项研究表明一定条件下，如缺血、低氧、发育中大脑、或神经退行性疾病可能对吸入麻醉药较敏感。

（李峰日 译 陈杰 校）

BACKGROUND: The mechanisms by which inhaled anesthetics cause neurotoxicity are not well clarified. Exposure to inhaled anesthetics induces a release of Ca2+ from the endoplasmic reticulum (ER) into the cytosol. Aberrant Ca2+ mobilization may alter the protein-folding environment in the ER, causing ER stress. Binding immunoglobulin protein (BiP) is an ER

chaperone that is critical to ER functions. Because ER stress leads to cellular dysfunction and apoptotic cell death, leading to diverse human disorders such as neurodegenerative diseases, we hypothesized ER stress may play a role in neurotoxicity caused by inhaled anesthetics.

METHODS: We investigated the relationship between ER stress and neurodegeneration caused by inhaled anesthetics by using knock-in mice expressing a mutant BiP and neuronal culture cells. Neuronal culture cells and mutant BiP pregnant mice were exposed to 3% sevoflurane. The levels of BiP and C/EBP homologous protein (CHOP), a transcription factor related to cell death during ER stress, were evaluated by Western blot in neuronal cells and fetal brains delivered by cesarean delivery. Cell death in the fetal brains was evaluated with TUNEL staining. Statistical significance was assessed using unpaired t test and analysis of variance followed by multiple comparison tests.

RESULTS: Sevoflurane exposure enhanced the expression of BiP and CHOP significantly in neuronal culture cells. A chemical chaperone that assisted ER functions reduced the expression of CHOP induced by sevoflurane exposure. In an in vivo study, we observed that an enhanced expression of CHOP and significantly more apoptotic cells in the brains of homozygous mutant BiP fetuses compared with the wild type. Mouse embryonic fibroblasts derived from the mutant BiP mice also exhibited enhanced levels of CHOP and cleaved caspase-3 after sevoflurane exposure.

CONCLUSIONS: Sevoflurane exposure may cause ER stress, which is tolerated to some extent in wild-type cells. When this tolerance is limited, like in cells with mutant BiP, the exposure leads to cell death in the brain, suggesting that ER stress may partially mediate neurotoxicity caused by inhaled anesthetics. This study suggests that patients with certain conditions sensitive to ER stress such as ischemia, hypoxia, developing brain, or neurodegenerative diseases may be vulnerable to inhaled anesthetics.

来自 Charles T. Jackson 包含已知最早的莫顿醚吸入器图示的信件

Correspondence by Charles T. Jackson Containing the Earliest Known Illustrations of a Morton Ether Inhaler

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Anesthesia & Analgesia: 2013 117 ： 1236–1240

一份日期为 1846 年 12 月 1 日，来自 Charles T. Jackson 博士给 Josiah D. Whitney 的回信中包含了以前未报道过的描述莫顿乙醚吸入器和唯一已知的同期这种类型乙醚吸入器的手绘插图。这份回信和另外两份已知的关于乙醚麻醉的回信可能来自马萨诸塞州的波士顿通过明轮船（阿卡迪亚）发往英国利物浦，该船同样载有还有来自 Jacob Bigelow 博士发给 Francis Boott 博士的著名信件。

（林甲票 译 陈杰 校）

A letter, dated December 1, 1846, from Charles T. Jackson, MD, to Josiah D. Whitney contains a previously unreported description of a Morton ether inhaler and the only known contemporaneous hand-drawn illustrations of this type of ether inhaler. This letter and 2 other known letters on ether anesthesia were probably carried from Boston, MA, to Liverpool, United Kingdom, on the same paddle steamer (Acadia) that carried the well-known letter from Jacob Bigelow, MD, to Francis Boott, MD.

对心脏手术的患者，FIBTEM PLUS 可提供一种更好的血栓弹力测试来评价纤维蛋白凝块质量

FIBTEM PLUS Provides an Improved Thromboelastometry Test for Measurement of Fibrin-Based Clot Quality in Cardiac Surgery Patients.

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背景：粘弹性功能纤维蛋白原（FF）和 FIBTEM 分析法可用于测量纤维蛋白对血凝块强度的影响。这些试验都要先经过抑制血小板功能的预处理。我们研究了一种新的测试法，即 FIBTEM PLUS，在心外科手术中与 FF 法和 FIBTEM 法比较。

方法：这是一项前瞻性，观察性研究，入组了 30 例心外科手术需要体外循环的患者。分别在手术开始（体外循环前），停体外循环前 20 分钟，鱼精蛋白中和肝素后 5 分钟，共 3 个时间点提取血样本。所有的血样本分别用 FF、FIBTEM 和 FIBTEM PLUS 法测定 2 次，同时记录其他一些凝血参数，包括血小板计数，血浆纤维蛋白原水平，凝血因子 XIIIa 和肝素浓度。

结果：在所有时间点里，FIBTEM PLUS 测得平均 MCF（maximum clot firmness）最小，尽管 FIBTEM 和 FIBTEM PLUS 的测量只有在基线上有统计学差异（平均值 22 vs 19mm，P = 0.01；FF 测得平均 27.7mm）。体外循环前、循环中和中和肝素后 FF 法测得的 MA（maximum amplitude）相较于 FIBTEM 法测的 MCF 和 FIBTEM PLUS 法测的 MCF 明显升高。FIBTEM 法和 FIBTEM PLUS 法测得的 MCF 的差异与血小板计数有关（r = 0.46;P < 0.001），而 FF 法测得的 MA 和 FIBTEM 法、FIBTEM PLUS 法测得的 MCF 是没有这种相关性(分别为 r = -0.07, P = 0.51；r = 0.16, P = 0.12)。各方法测得值的差异与肝素水平无关。停体外循环前使用鱼精蛋白使肝素水平显著下降（抗凝血因子 IIa 从 2.1 降至 0.1 U/mL，抗凝血因子 Xa 从 2.8 降至 0.2U/mL）。用 FIBTEM PLUS 法重复测量的值与 FIBTEM 一致，FF 法测得偏低。MCF 或 MA 和纤维蛋白原浓度显著正相关（所有 P< 0.001）；最高相关性是 FIBTEM PLUS 测得的 MCF(r = 0.70)。

结论：用 FIBTEM PLUS 法重复测量的值与 FIBTEM 一致，FF 法测得偏低。MCF 或 MA 和纤维蛋白原浓度显著正相关（所有 P< 0.001）；最高相关性是 FIBTEM PLUS 测得的 MCF(r = 0.70)。

（陈实玉译 薛张纲校）

BACKGROUND: The viscoelastic functional fibrinogen (FF) and FIBTEM assays measure the contribution of fibrin to clot strength. Inhibition of platelet function is a necessary precondition for these tests to work. We investigated a novel test for measuring fibrin-based clotting, FIBTEM PLUS, in cardiac surgery and compared it with FF and FIBTEM.

METHODS: A prospective, observational study was performed which included 30 patients undergoing cardiac surgery with cardiopulmonary bypass (CPB). Blood samples were drawn at the beginning of surgery (pre-CPB), approximately 20 minutes before weaning from CPB and 5 minutes after heparin neutralization. FF, FIBTEM, and FIBTEM PLUS tests were performed in duplicate for all blood samples. Additional coagulation parameters, including platelet count, plasma fibrinogen levels, factor XIII activity, and heparin concentration, were also recorded for each sample.

RESULTS: At all time points, the lowest mean maximum clot firmness (MCF) was observed with FIBTEM PLUS, although a statistically significant difference between FIBTEM and

FIBTEM PLUS was observed only at baseline (mean values 22 vs 19 mm, P = 0.01; FF value for comparison: 27.7 mm). FF maximum amplitude (MA) values were significantly higher than FIBTEM MCF and FIBTEM PLUS MCF pre-CPB, during CPB and after heparin neutralization ($P \leq 0.001$ for FF MA versus FIBTEM MCF and for FF MA versus FIBTEM PLUS MCF at all time points). The difference between FIBTEM MCF and FIBTEM PLUS MCF correlated with platelet count ($r = 0.46$;$P < 0.001$), whereas differences between FF MA and FIBTEM MCF, or FF MA and FIBTEM PLUS MCF did not ($r = -0.07$, $P = 0.51$; $r = 0.16$, $P = 0.12$, respectively). Differences between the assays were unrelated to heparin levels, which decreased considerably after protamine administration compared with heparin levels recorded before weaning from CPB (decrease from 2.1 to 0.1 U/mL and from 2.8 to 0.2 U/mL for anti-factor IIa and anti-factor Xa, respectively). Agreement between duplicate measurements was similar with FIBTEM and FIBTEM PLUS assays and lower with FF. Significant positive correlations were found between MCF or MA and fibrinogen concentration (all $P < 0.001$); the highest correlation was with FIBTEM PLUS MCF ($r = 0.70$).

CONCLUSION: The FIBTEM PLUS assay produces precise results. At baseline, it provides greater inhibition of platelets than FIBTEM, but there is no meaningful difference between FIBTEM PLUS and FIBTEM in patients with low platelet counts.

系统综述：肥胖患者如何选择门诊手术

Selection of obese patients undergoing ambulatory surgery: a systematic review of the literature.

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背景：肥胖症的发病率在过去的二十年中有所增加。近年来，一些研究致力于评估接受门诊手术的肥胖患者在围手术期的预后。然而，这些研究结论并未进行系统审查和评估。

方法：研究者对 1948 年至 2012 年 5 月发表的研究进行了系统回顾并评估接受门诊手术的成年肥胖患者的围手术期预后。所有的研究均符合纳入标准，即使其围手术期发生并发症包括意外的入院以及再入院。

结果：文献检索一共搜得 23 项研究（13 项前瞻性研究以及 10 项回顾性研究）和一项针对腹腔镜减肥手术的系统回顾。共有 106119 名患者被纳入分析，其中前瞻性试验有 62476 名患者，回顾性试验有 43643 名患者（不包括腹腔镜减肥手术的系统回顾）。其中，有 39548 名患者接受了减肥手术。超级肥胖（体脂指数 BMI）50 公斤/米）的患者出现并发症的风险较高。接受非减肥手术的患者的肥胖程度较低（BMI 约 30 公斤/米）。接受减肥手术的病态肥胖（BMI 大于 40 公斤/米）的患者有较高的合并症风险。然而，该患者群体意外住院率的上升可能与缺乏全面的术前评估以及忽视了患者的合并症相关。

讨论：文献缺乏足够的信息作为有力的证据指标提示肥胖患者是否适合选择做门诊手术。文献显示，超级肥胖（BMI 大于 50 公斤/米）的患者围手术期发生并发症的风险增加，而 BMI 较低的患者在术前发生并发症或者合并症的可能性非常小。本综述填补了该项知识空白并对将来的研究引导了方向，即需要引导肥胖患者如何做出门诊手术的最佳选择。

（陈婉南译 薛张纲校）

BACKGROUND: The incidence of obesity has increased over the past 2 decades. In recent years, several studies have assessed perioperative outcomes in obese patients undergoing ambulatory surgery. However, this evidence has not been reviewed and evaluated systematically.

METHODS: We conducted a systematic review of studies published between 1948 and May 2012, assessing perioperative outcome in adult obese patients undergoing ambulatory surgery. All studies were eligible for inclusion if they reported perioperative complications including unplanned hospital admission and readmission.

RESULTS: A literature search revealed 23 studies (13 prospective and 10 retrospective), and 1 systematic review assessing laparoscopic bariatric surgery. A total of 106,119 patients were included in the analysis with 62,476 patients included in the prospective trials and 43,643 patients included in the retrospective trials (not including the systematic review of laparoscopic bariatric surgery). Of these, 39,548 patients underwent bariatric surgery. The super obese (body mass index [BMI] >50 kg/m) appear to be at higher risk of complications. Patients undergoing nonbariatric surgery had a lower degree of obesity (BMI approximately 30 kg/m). Patients undergoing bariatric surgery were morbidly obese (BMI >40 kg/m), which is associated with a higher comorbidity burden. However, the lack of increase in unanticipated admission rate in this patient population may be related to thorough preoperative assessment and avoidance of patients with comorbid conditions.

DISCUSSION: The literature lacks adequate information to make strong recommendations regarding appropriate selection of the obese patients scheduled for ambulatory surgery. The literature does indicate that the super obese (BMI >50 kg/ m) do present an increased risk for perioperative complications, while patient with lower BMIs do not seem to present any increased risk as long as any comorbidities are minimal or optimized before surgery. This review also identifies knowledge gaps and recommends future research required to guide optimal selection of obese patients scheduled for ambulatory surgery.

闭环式液体复苏：对于体重及心肌收缩性变化时的稳定性

Closed-loop fluid resuscitation: robustness against weight and cardiac contractility variations.

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背景：不同外科手术病人的体型及血容量有着较大范围的变化，在基础容量状态及心功能上有着较大的不同。所有的闭环式液体循环管理系统对面这些变量时必须保持稳定。目前的研究中，我们用了系统工程方法论测试了闭环式液体循环管理系统对面这些变量时的稳定性。

方法：应用独立先前公布的包括血液容量及心功能的血液循环模拟模型，模拟 monte-carlo 系列，包括起始血容量、体重（phase 1，体重 35-100kg），起始血容量、心功能（phase 2，心功能从 1500[严重心衰]到 6000[高动力性]）。在复苏控制组中设置的目标靶点以评估血容量的毫升数作为最佳值的偏差，小于 250ml 的偏差定义为成功。

结果：这项研究中两个阶段分别进行了 1000 例的模拟。阶段 1 示血容量最佳值的偏差± SD 是 25± 59ml. 阶段二示血容量最佳值的偏差± SD 是-60 ± 89 mL.复苏时低于 95%的

clopper-pearson 二项置信度干扰，在最佳血容量偏差在 250ml 内时阶段 1 及阶段 2 分别为 99.6%和 97.1%。

结论：这项研究的结果示控制组在调控最佳血容量及休克血容量时，可忽略体重、心功能及起始血容量

（蒋鑫梅译 薛张纲校）

BACKGROUND: Surgical patients present with a wide variety of body sizes and blood volumes, have large differences in baseline volume status, and may exhibit significant differences in cardiac function. Any closed-loop fluid administration system must be robust against these differences. In the current study, we tested the stability and robustness of the closed-loop fluid administration system against the confounders of body size, starting volume status, and cardiac contractility using control engineering methodology.

METHODS: Using an independently developed previously published hemodynamic simulation model that includes blood volumes and cardiac contractility, we ran a Monte-Carlo simulation series with variation in starting blood volume and body weight (phase 1, weight 35-100 kg), and starting blood volume and cardiac contractility (phase 2, contractility from 1500 [severe heart failure] to 6000 [hyperdynamic]). The performance of the controller in resuscitating to the target set point was evaluated in terms of milliliters of blood volume error from optimal, with <250 mL of error defined as "successful."

RESULTS: One thousand simulations were run for each of the 2 phases of the study. The phase 1 mean blood volume error ± SD from optimal was 25 ± 59 mL. The phase 2 mean blood volume error from optimal was -60 ± 89 mL. The lower 95% Clopper-Pearson binomial confidence interval for resuscitation to within 250 mL of optimal blood volume for phase 1 and 2 was 99.6% and 97.1%, respectively.

CONCLUSION: The results indicate that the controller is highly effective in targeting optimal blood and stroke volumes, regardless of weight, contractility or starting blood volume.

麻醉闭环控制系统:麻醉学家的入门基础

Closed-loop control of anesthesia: a primer for anesthesiologists.

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反馈控制系统普遍存在于自然界和工程学中,使得包括太空旅行到汽车业的广大领域的安全性发生变革。在麻醉学界，尽管由于病人个体差异存在，自动反馈控制系统的效果受到制约，但它优化了麻醉医生的工作负荷，增加了花费于更佳临床状态所需时间，最终改善了临床麻醉的安全性和质量。控制系统的优点没有被健康服务机构及其工作伙伴意识到，更谈不上获得广泛支持。本综述提供了日常麻醉医生所制定使用的控制系统的介绍。我们介绍了重要的概念比如反馈和解决问题的特定数学模型，并展望了确保安全性和可行性的反馈控制系统的设计需要。我们的讨论聚焦于麻醉药物使用的优化。

（李春译 薛张纲校）

Feedback control is ubiquitous in nature and engineering and has revolutionized safety in fields from space travel to the automobile. In anesthesia, automated feedback control holds the promise of limiting the effects on performance of individual patient variability, optimizing the workload of the anesthesiologist, increasing the time spent in a more desirable clinical state, and ultimately

improving the safety and quality of anesthesia care. The benefits of control systems will not be realized without widespread support from the health care team in close collaboration with industrial partners. In this review, we provide an introduction to the established field of control systems research for the everyday anesthesiologist. We introduce important concepts such as feedback and modeling specific to control problems and provide insight into design requirements for guaranteeing the safety and performance of feedback control systems. We focus our discussion on the optimization of anesthetic drug administration.

预防气道着火：不要忽视呼出的氧气浓度

Prevention of airway fires: do not overlook the expired oxygen concentration.

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背景：一般认为，当使用明火源时，呼吸通道中的吸氧浓度（FIO2）应低于 30%，从而帮助防止气道着火。关于将呼吸回路中的吸氧浓度降低到 30%以下所需的时间和条件，尚未有系统的研究。

方法：我们评估了 Aestiva Avance S/5 麻醉机在（减少 FIO2 浓度到 21%后）初始 FIO2 浓度为 100%和 60%，吸入和呼出通道到达浓度小于 30%氧浓度响应时间。我们将该通道连接至一个病患模拟器上，该模拟器的功能残气量为 2 升，肺总容量为 2.8 升，耗氧量为 200 毫升/分钟，呼吸商为 0.8。我们选用 2 升/分钟和 5 升/分钟的新鲜气体流量（FGF），来表现临床上一系列典型的新鲜气体流量（FGF）值。每分通气量设定为 4L/分钟。确定呼吸通道中达到 O2 浓度<30%所需的中位时间，是本研究的首要目标。

结果：在扩展的通道结构中， 5L FGF 初始为 60%时， 吸入和呼出的氧气浓度<30%所需的中位时间（1%-99%的置信区间）分别为 35 （32-36）以及 104（88-122）秒。用 2L 的 FGF，中位时间各自提高至 303（291-313）和 255（232-278）秒。试验中注意到，缩短的通道结构（P=0.006）和更高的 FGF 流速（P<0.0001）则是缩短达到氧浓度为<30%的中位时间的因素。

结论：吸入和呼出通道的氧气浓度可能都需要几分钟减少到<30%，这取决于呼吸回路的长度、FGF 流速和呼吸回路中的初始氧气浓度。在 FIO2 减少的时候，FIO2 处于“安全”范围之后有一段相当长的时间，呼出氧气浓度可能大于 30%。呼出氧气浓度的增加也应视作气道着火的风险增加的因素，而且患者的护理记录或许需要根据进一步的修订。

（刘毅译 薛张纲校）

BACKGROUND: It is generally accepted that when an ignition source is used the inspired oxygen concentration (FIO2) should be <30% in the breathing circuit to help prevent airway fires. The time and conditions required to reduce a high O2% in the breathing circuit to <30% has not yet been systematically studied.

METHODS: We evaluated the inspired and expired circuit oxygen concentration response times of an Aestiva Avance S/5 anesthesia machine to reach an FIO2 of <30% from a starting FIO2 of 100% and 60% after reducing the FIO2 to 21%. The circuit was connected to a human patient simulator which has a functional residual capacity of 2 L, total lung capacity of 2.8 L, an oxygen consumption of 200 mL/min, and respiratory quotient of 0.8. Fresh gas flow (FGF) inputs of 2 L/min and 5 L/min were chosen to represent a spectrum of typical clinical FGF rates. Minute ventilation was set at 4 L/min. Determining the requisite median time to reach an O2 concentration of <30% in the breathing circuit was the primary aim of the study.

RESULTS: The median times (1st-99th percent confidence interval) required to achieve inspiratory and expiratory oxygen concentrations of <30% with the extended circuit configuration when starting at 60% for 5 L FGFs were 35 (32-36) and 104 (88-122) seconds, respectively. With 2 L FGF, these median times increased to 303 (291-313) and 255 (232-278) seconds, respectively. A shortened circuit configuration (P = 0.006) and higher FGF flow rate (P < 0.0001) were noted to be factors decreasing the median time required to achieve an oxygen concentration of <30%.

CONCLUSIONS: Both inspired and expired circuit oxygen concentration may take minutes to decrease to <30% depending on circuit length, FGF rate, and starting circuit oxygen concentration. During the reduction in FIO2, the expiratory oxygen concentration may be >30% for a considerable time after the FIO2 is in a "safe" range. An increased expired oxygen concentration should also be considered an airway fire risk, and patient care protocols may need to be modified based on future studies.

镰状细胞贫血患儿行外科手术的类型及预后

Surgical Procedures and Outcomes Among Children with Sickle Cell Disease

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背景：虽然镰状细胞贫血的儿童经常接受手术，关于这类患者的流行病学数据很有限的。我们对一个数据库进行分析，用来评估这类人群的特征，外科手术及围手术期的结局。

方法：我们查询国家住院病人样本数据库，这个数据库收集了 2000 至 2010 年的诊断为镰状细胞贫血病的 18 岁以下患者，并且接受了一次以上的外科手术。我们使用临床分类软件程序代码和 ICD-9-CM 的程序代码概括手术方式。我们描述了做常见的 6 类手术患儿的特征。

结果：2000 年至 2010 年期间，3.6%（SE0.12）该病患儿进行手术。最常见的手术为胆囊切除术（1.47%[0.08]），扁桃体/腺样体切除术（0.81%[0.06]），脾切除术（0.62%[0.06]），疝修补术（0.19%[0.02]），和阑尾手术（ 0.17%[0.02]）。择期手术患者急性肺部并发症发生率是 3.08%（0.60）。中风的发病率是 0.20%（0.11），死亡病例<11 例（<0.20%）。

结论：镰状细胞贫血患儿行诸如胆囊切除术、扁桃体切除术、脾切除术、疝修补术或阑尾手术总数不多，但所占比例不低。急性肺部并发症是择期手术中最常见的并发症，而中风和死亡是罕见的。

（徐升译 薛张纲校）

BACKGROUND: Although children with sickle cell disease often undergo surgery, there are limited current epidemiological data for this pediatric population. We performed a database analysis to estimate population characteristics, surgical procedures, and perioperative outcomes in this population.

METHODS: We queried the Nationwide Inpatient Sample Database from 2000 to 2010 for discharges pertaining to patients <18 years of age having a diagnosis of sickle cell disease who underwent 1 or more surgical procedures during that admission. We abstracted surgical

procedures using the Clinical Classifications Software procedure codes and the ICD-9-CM procedure codes. We described characteristics of patients undergoing the 6 most common procedures.

RESULTS: During 2000 to 2010, 3.6 % (SE 0.12) of individual hospital discharges were of children with sickle cell disease who had undergone surgical procedures. The most frequent surgical procedures were cholecystectomy (1.47% [0.08]), tonsillectomy/adenoidectomy (0.81% [0.06]), splenectomy (0.62% [0.06]), repair of umbilical hernia (0.19% [0.02]), and appendectomy (0.17% [0.02]). Acute chest syndrome was recorded among 3.08% (0.60) of patients undergoing elective surgery. The incidence of stroke was 0.20% (0.11); death was reported in <11 patients (<0.20%).

CONCLUSION: Surgical procedures such as cholecystectomy, tonsillectomy, splenectomy, hernia repair, and appendectomy account for a small but significant proportion of hospital admissions in children with sickle cell disease. Acute chest syndrome is among the most common complications of elective surgery, while stroke and death are rare.

关于波士顿马萨诸塞州总医院的莫尔顿醚吸入器的研究

Researches regarding the morton ether inhaler at massachusetts general hospital, Boston.

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波士顿的马萨诸塞州总医院拥有莫尔顿醚吸入器的历史可以最早的照片发表追溯到 1906 年。作者认为吸入器是由威廉.莫尔顿，医学博士在 1847 年 1 月赠与麦森.沃伦，医学博士的。吸入器是由沃伦解剖学博物馆在一个未知的日期获得，在 1946 年 10 月租借给马萨诸塞州总医院，并在 1948 年 4 月长期租借给马萨诸塞州总医院。关于吸入器的许多文件都消失了，能确定的只有在 2009，吸入器可能属于 J. 麦森.沃伦，医学博士，但这个吸入器并不认为是 1846 年 10 月 16 日在马萨诸塞州总医院的那个。它是已知的唯一的拥有阀门的莫尔顿醚吸入器（不包括复制品及再生产的吸入器）和类似的设计，于 1846 年 10 月 16 日被莫尔顿使用的吸入器。

（徐峥译 薛张纲校）

The Morton ether inhaler in the possession of Massachusetts General Hospital, Boston, MA, was traced back to 1906 when the earliest known photograph of it was published. The authors believe that the inhaler was given by William T. G. Morton, MD, to J. Mason Warren, MD, in January 1847. The inhaler was acquired by the Warren Anatomical Museum at an unknown date, loaned to Massachusetts General Hospital in October 1946, and placed on permanent loan to Massachusetts General Hospital in April 1948. Many documents relating to the inhaler have disappeared, and it was only identified in 2009 as the inhaler that probably belonged to J. Mason Warren, MD. The inhaler is not believed to be the one that Morton used on October 16, 1846, at Massachusetts General Hospital. It is the only known example of a Morton ether inhaler with valves (excluding replicas or reproduction inhalers) and is probably of similar design to the inhaler that Morton used on October 16, 1846.

外周神经阻滞单次注射脂质体布比卡的剂量反应研究

Liposomal Bupivacaine as a Single-Injection Peripheral Nerve Block: A Dose-Response Study

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背景：使用目前常用的局部麻醉药物实施单次注射外周神经阻滞后，其最长阻滞持续时间不超过 24 小时。最近，FDA 批准了一种脂质体布比卡因制剂（EXPAREL®，Pacira 制药公司，圣迭戈，加利福尼亚州），该剂型可在至少 96 小时内缓慢释放布比卡因，但目前 FDA 批准其仅限于外伤后浸润麻醉使用，而尚未批准其可应用于外周神经阻滞。

方法：对受试的健康志愿者（n=14）采用单次注射进行双侧股神经阻滞。阻滞所使用的药液为脂质体布比卡因 0-80mg 溶于生理盐水中，并配制成总容量 30ml 的研究液。采用随机双盲的方法对每位受试者进行神经阻滞，于双侧股神经分别给予两种不同剂量的研究液。研究观察终点包括股四头肌的最大自主等长收缩（MVIC）及股神经支配区域皮肤的电流刺激耐受性。测量记录基础数据，并收集数据直至双侧股四头肌 MVIC 恢复至基线水平的 80%。

结果：MVIC 及皮肤电流耐受性虽具有显著的剂量相关性，但却与预期结果相反：剂量越大所观察到的阻滞效果越弱（统计学结果分别为 MVIC 0.09%/mg, 标准误=0.03, 95%可信区间 0.04–0.14, P = 0.002；皮肤电流耐受性 -0.03 mA/mg, 标准误=0.01, 95%可信区间 -0.04 to -0.02, P < 0.001）。得出这一反比关系的结论在生物学上难以解释，很有可能是由于样本量太小和测量仪器的主观性质所致。尽管用药后 75%的受试者（95%可信区间 43%-93%）在 24 小时内达到阻滞峰效应，但阻滞持续时间通常更长：布比卡因剂量>40mg 组 100%的病例（95%可信区间 56%-100%）在阻滞后 24 小时内皮肤电流耐受性未恢复至基线的 20%以上；与此一致的是，90%的病例（95%可信区间 54%-100%）在阻滞后 24 小时内 MVIC 未恢复至基线的 20%。运动阻滞持续时间与布比卡因剂量没有相关性（0.06 小时/mg, 标准误=0.14, 95%可信区间 -0.27-0.39, P = 0.707）。

结论：本研究结果提示，在股神经周围应用脂质体布比卡因制剂后，以本研究中所应用最大剂量可产生 24 小时以上的部分感觉和运动神经阻滞效应。然而不同个体间阻滞程度的巨大差异及所得的剂量效应反比关系进一步说明需要具有更大样本容量的 III 期临床试验，也说明本研究应被视作启示性的研究，并需要进一步的研究工作来验证。

(朱怡琦译 薛张纲校)

BACKGROUND: Currently available local anesthetics approved for single-injection peripheral nerve blocks have a maximum duration of <24 hours. A liposomal bupivacaine formulation (EXPAREL® , Pacira Pharmaceuticals, Inc., San Diego, CA), releasing bupivacaine over 96 hours, recently gained Food and Drug Administration approval exclusively for wound infiltration but not peripheral nerve blocks.

METHODS: Bilateral single-injection femoral nerve blocks were administered in healthy volunteers (n = 14). For each block, liposomal bupivacaine (0–80 mg) was mixed with normal saline to produce 30 mL of study fluid. Each subject received 2 different doses, 1 on each side, applied randomly in a double-masked fashion. The end points included the maximum voluntary isometric contraction (MVIC) of the quadriceps femoris muscle and tolerance to cutaneous electrical current in the femoral nerve distribution. Measurements were performed from baseline until quadriceps MVIC returned to 80% of baseline bilaterally.

RESULTS: There were statistically significant dose responses in MVIC (0.09%/mg, SE = 0.03, 95% confidence interval [CI], 0.04–0.14, P = 0.002) and tolerance to cutaneous current (-0.03 mA/mg, SE = 0.01, 95% CI, -0.04 to -0.02, P < 0.001), however, in the opposite direction than expected (the higher the dose, the lower the observed effect). This inverse relationship is biologically implausible and most likely due to the limited sample size and the subjective nature of the measurement instruments. While peak effects occurred within 24 hours after block

administration in 75% of cases (95% CI, 43%–93%), block duration usually lasted much longer: for bupivacaine doses >40 mg, tolerance to cutaneous current did not return to within 20% above baseline until after 24 hours in 100% of subjects (95% CI, 56%–100%). MVIC did not consistently return to within 20% of baseline until after 24 hours in 90% of subjects (95% CI, 54%–100%). Motor block duration was not correlated with bupivacaine dose (0.06 hour/mg, SE = 0.14, 95% CI, -0.27 to 0.39, P = 0.707).

CONCLUSIONS: The results of this investigation suggest that deposition of a liposomal bupivacaine formulation adjacent to the femoral nerve results in a partial sensory and motor block of >24 hours for the highest doses examined. However, the high variability of block magnitude among subjects and inverse relationship of dose and response magnitude attests to the need for a phase 3 study with a far larger sample size, and that these results should be viewed as suggestive, requiring confirmation in a future trial.

瑞芬太尼对豚鼠心脏窦房结的起搏点活动具有轻微的直接作用

Remifentanil Has a Minimal Direct Effect on Sinoatrial Node Pacemaker Activity in the Guinea Pig Heart

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背景：虽然瑞芬太尼引起严重心动过缓，但是其负性变时作用是由对心脏窦房结起搏点活动的直接作用导致还是由增加迷走神经活动的间接作用导致，目前尚无定论。

方法：本研究采用两性霉素 B 多孔细胞膜片钳技术，在 5、10、100 和 1000 nM 的浓度验证瑞芬太尼和芬太尼对豚鼠窦房结细胞自发性动作电位的影响。离体豚鼠心脏分别以 5、10、100 和 1000 nM 浓度的瑞芬太尼进行离体心脏灌流。

结果：在对照情况下，窦房结动作电位的自主发放频率和舒张期去极化速度（DDR）分别为 189.1 ± 14.8 /min 和 74.1 ± 2.9 mV/s (n = 8)，且不受浓度为 5 nM（自主发放频率和 DDR 均 P = 1.0; n = 6）、10 nM (自主发放频率 P = 0.62，DDR P = 0.99; n = 6)或 100 nM (自主发放频率 P = 0.23，DDR P = 0.38; n = 6)瑞芬太尼的显著影响。然而，浓度为 1000 nM 的瑞芬太尼轻度但显著降低了自主发放频率(P = 0.0087)和 DDR (P = 0.0072, n = 6)。瑞芬太尼在浓度为 5 nM (P = 0.98)、10 nM (P = 0.35),或 100 nM (P = 0.24)时对离体灌流的豚鼠心脏的心率无影响，但在 1000 nM 时显著降低心率(P < 0.0001)。芬太尼在浓度为 5 nM (自主发放频率和 DDRP = 1.0)和 10 nM (自主发放频率 P = 0.62，DDR P = 0.79)对自主发放频率和 DDR 无影响，但在 100 nM (自主发放频率 P = 0.00038，DDR P = 0.0080)和 1000 nM (自主发放频率和 DDR P 都< 0.0001)时显著降低自主发放频率和 DDR。

结论：临床相关浓度的瑞芬太尼（nM 级浓度）对内在的心脏自主节律性无显著的直接影响。因此，研究提示临床上由瑞芬太尼引起的心动过缓不依赖于直接的心脏作用。

（陈彬彬 译， 马皓琳、李士通 审校）

BACKGROUND: Whereas remifentanil administration is associated with severe bradycardia, it has yet to be fully investigated whether the negative chronotropic action of remifentanil is mediated by its direct action on sinoatrial (SA) node pacemaker activity in the heart versus indirect results of enhanced vagal activity.

METHODS: We examined the effects of remifentanil and fentanyl on the spontaneous action potentials of guinea pig SA node cells at concentrations of 5, 10, 100, and 1000 nM using the amphotericin B-perforated whole-cell patch-clamp technique. Isolated guinea pig hearts were perfused in a Langendorff mode with 5, 10, 100, and 1000 nM remifentanil.

RESULTS: The spontaneous firing rate and diastolic depolarization rate (DDR) of the SA node action potentials were 189.1 ± 14.8 /min and 74.1 ± 2.9 mV/s (n = 8), respectively, under control conditions, and were not significantly affected by exposure to 5 nM (P = 1.0 for both spontaneous firing rate and DDR; n = 6), 10 nM (P = 0.62 for spontaneous firing rate, P = 0.99 for DDR; n = 6), or 100 nM (P = 0.23 for spontaneous firing rate, P = 0.38 for DDR; n = 6) remifentanil. However, 1000 nM remifentanil modestly but significantly decreased the spontaneous firing rate (P = 0.0087) and DDR (P = 0.0072, n = 6). Remifentanil did not affect the heart rate of isolated Langendorff-perfused guinea pig hearts at concentrations of 5 nM (P = 0.98), 10 nM (P = 0.35), or 100 nM (P = 0.24) but significantly reduced the heart rate at 1000 nM (P < 0.0001). Fentanyl did not affect the spontaneous firing rate and DDR at concentrations of 5 nM (P = 1.0 for both spontaneous firing rate and DDR) and 10 nM (P = 0.62 for spontaneous firing rate, P = 0.79 for DDR), but it significantly reduced both at 100 nM (P = 0.00038 for spontaneous firing rate, P = 0.0080 for DDR) and 1000 nM (P < 0.0001 for both spontaneous firing rate and DDR).

CONCLUSIONS: Clinically relevant concentrations (nanomolar order concentrations) of remifentanil do not produce significant direct effects on intrinsic cardiac automaticity; thus, suggesting that remifentanil-induced bradycardia in the clinical setting is independent of its direct cardiac effects.

用于“脂肪复苏”的脂肪乳剂对开放及布比卡因引发的心脏钠通道 Nav1.5 抑制的特殊功效

The Distinct Effects of Lipid Emulsions Used for “Lipid Resuscitation” on Gating and Bupivacaine-Induced Inhibition of the Cardiac Sodium Channel Nav1.5

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背景：脂肪乳剂的全身应用是已经确定了的用于局部麻醉药中毒的治疗方法。然而，它发挥这项作用的具体机制尚未清楚。亲脂性局部麻醉药布比卡因的高心脏毒性可能是由于其对心脏 Na+通道 Nav1.5 的长时间抑制造成的。在此项研究中，我们探究脂肪乳剂是否功能性地影响 Nav1.5 或者抵消布比卡因对其的抑制作用。

方法：用全细胞膜片钳的方法研究人胚胎肾细胞表达的人类 Nav1.5。研究英脱利匹特® 和力保肪宁® 对功能性特性及对布比卡因诱导引发的通道抑制作用的影响。

结果：英脱利匹特和力保肪宁并不影响通道电压依赖的激活作用，但可以诱导产生稳定快速失活的小的超极化转化，并破坏通道从快速失活的状态恢复。 力保肪宁，诱导产生浓度依赖性的而非电压依赖性的增强阻滞（42%±4%，3%力保肪宁），英脱利匹特不具有此特点。当同时使用脂质时，布比卡因发挥增强阻滞作用的半数最大抑制浓度（IC50）值（50 ± 4 μM）显著增高（5%英脱利匹脱：196±22 μM 和 5%力保肪宁：103 ± 8 μM）。在 10Hz 时，布比卡因的使用依赖性阻滞作用也可以被这两个脂肪乳剂所减轻。此外，在脂质存在的情况下，离子通道从布比卡因诱导阻滞失活状态中恢复的速度加快。

结论：我们的数据证明了脂肪乳剂可以减少而不是增加 Nav1.5 的可利用率。然而，不论是英脱利匹特还是力保肪宁都只能部分缓解布比卡因对 Nav1.5 的阻滞作用。这些作用的产生不但涉及到脂质对 Nav1.5 的直接作用，还可能涉及到脂肪乳剂对布比卡因的吸收，进而减少布比卡因的浓度效应。

（董静 译 马皓琳 李士通 校）

BACKGROUND: Systemic administration of lipid emulsions is an established treatment for local anesthetic intoxication. However, it is unclear by which mechanisms lipids achieve this function. The high cardiac toxicity of the lipophilic local anesthetic bupivacaine probably results from a long-lasting inhibition of the cardiac Na+ channel Nav1.5. In this study, we sought to determine whether lipid emulsions functionally interact with Nav1.5 or counteract inhibition by bupivacaine.

METHODS: Human embryonic kidney cells expressing human Nav1.5 were investigated by whole-cell patch clamp. The effects of Intralipid® and Lipofundin® were explored on functional properties and on bupivacaine-induced inhibition.

RESULTS: Intralipid and Lipofundin did not affect the voltage dependency of activation, but induced a small hyperpolarizing shift of the steady-state fast inactivation and impaired the recovery from fast inactivation. Lipofundin, but not Intralipid, induced a concentration-dependent but voltage-independent tonic block (42% ± 4% by 3% Lipofundin). The half-maximal inhibitory concentration (IC50) values for tonic block by bupivacaine (50 ± 4 μM) were significantly increased when lipids were coapplied (5% Intralipid: 196 ± 22 μM and 5% Lipofundin: 103 ± 8 μM). Use-dependent block by bupivacaine at 10 Hz was also reduced by both lipid emulsions. Moreover, the recovery of inactivated channels from bupivacaine-induced block was faster in the presence of lipids.

CONCLUSIONS: Our data indicate that lipid emulsions reduce rather than increase availability of Nav1.5. However, both Intralipid and Lipofundin partly relieve Nav1.5 from block by bupivacaine. These effects are likely to involve not only a direct interaction of lipids with Nav1.5 but also the ability of lipid emulsions to absorb bupivacaine and thus reduce its effective concentration.

模拟研究显示自动、实时新鲜气体流量指导改变麻醉维持阶段的异氟醚消耗

Automated, Real-Time Fresh Gas Flow Recommendations Alter Isoflurane Consumption During the Maintenance Phase of Anesthesia in a Simulator-Based Study

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背景：低流量向导(LFW)在吸入全麻期间为使用者提供最佳新鲜气体流量(FGF)设置的实时指导。LFW 可以持续告知使用者它测得的他们的 FGF 是否太小、刚好或太大，并且它对使用者执行 FGF 的变化以彩色标记指导意见实时反馈。我们的研究目的是判断在不影响患者监护的前提下，LFW 作为 Dräger Apollo 工作站的一项装置是否会改变 FGF 的选择并因此影响吸入麻醉药的消耗。

方法：为了减少可能的混杂变量，我们使用了一种可以消耗并呼出挥发性麻醉药的病人模拟器。麻醉初始阶段对患者实施标准监护，麻醉诱导后增加有创动脉血压监测。在此项组内研究中，入组的 17 位参与者均由自己完成操作。每位参与者被要求使用一台 Dräger Apollo 工作站对同一位模拟患者实施两次麻醉，第一次不使用 LFW 性能，第二次使用 LFW 性能。挥发性麻醉药使用异氟醚。两次模拟过程的麻醉不同阶段，如诱导、切皮和维持均被设置为相似的时间。未模拟急诊手术麻醉。在每次模拟过程前后使用电子称对异氟醚挥发罐称重来计算挥发性麻醉药的总消耗量。另一方面，用 FGF（由 Apollo 显示）与异氟醚容积浓度（由用于 Apollo 的 FGF 软管上的多气体分析仪取样）的乘积结合时间行积分运算来获得异氟醚的消耗率（使用中麻醉药消耗率测量法）。

结果：行 LFW 显示的麻醉维持阶段异氟醚消耗率和 FGF 较未使用 LFW 显示时明显降低 (P = 0.005)。FGF 平均降低 53.6% (95% 可信区间, 39.2%–67.9%)。肺泡中异氟醚浓度无明显差异(差异<0.1%的 P = 0.13)。计算法与称重法测得异氟醚消耗量相当。

结论：我们在一个模拟的全麻药中的数据显示使用由 LFW 指导的 FGF 显示平均可以降低 53.2%的挥发性麻醉药消耗率。由于中位数的 95%可信区间下限是 39.4%，这项发现或许可以转换为费用的节约和临床装置中产生的和排放到大气中的麻醉废气降低。

（张怡 译 马皓琳 李士通 校）

BACKGROUND: The Low Flow Wizard (LFW) provides real-time guidance for user optimization of fresh gas flow (FGF) settings during general inhaled anesthesia. The LFW can continuously inform users whether it determines their FGF to be too little, efficient, or too much, and its color-coded recommendations respond in real time to changes in FGF performed by users. Our study objective was to determine whether the LFW feature, as implemented in the Dräger Apollo workstation, alters FGF selection and thereby volatile anesthetic consumption without affecting patient care.

METHODS: To reduce potentially confounding variables, we used a human patient simulator that consumes and exhales volatile anesthetics. Standard monitoring was provided for the patient initially with invasive arterial blood pressure added after anesthetic induction. In this within-group study, each of 17 participants acted as his or her own control. Each participant was asked to anesthetize an identical simulated patient twice using a Dräger Apollo workstation, first with the LFW feature disabled and subsequently enabled. The volatile anesthetic was isoflurane. Both simulation runs were set up to have similar time durations for the different phases of anesthesia: induction, incision, and maintenance. Emergence was not simulated. The isoflurane vaporizer was weighed before and after each simulation run on a digital scale to verify total computed volatile liquid anesthetic consumption. In addition, the product of FGF (reported by the Apollo) times the isoflurane volumetric concentration (sampled by a multigas analyzer at the equivalent of the FGF hose for the Apollo) was integrated over time to obtain isoflurane consumption rate (on-the-fly anesthetic consumption rate measurement).

RESULTS: The maintenance isoflurane consumption rate and FGF were significantly lower with the LFW display enabled than without ($P = 0.005$). The mean reduction in FGF was 53.6% (95% confidence interval, 39.2%–67.9%). There was no significant difference in alveolar isoflurane concentration ($P = 0.13$ for differences <0.1%). The isoflurane consumption measurement closely matched the consumption measured via the digital scale.

CONCLUSIONS: Our data in a simulated anesthetic suggest that enabling the display of FGF efficiency data by the LFW results in a median percent reduction in volatile liquid anesthetic consumption rate of 53.2%. Since the lower limit of the 95% confidence interval for the median is 39.4%, this finding is likely to translate into cost savings and less waste anesthetic gas generated in the clinical setting and released into the atmosphere.

认知助手在麻醉紧急事件中的应用--文献回顾

The Use of Cognitive Aids During Emergencies in Anesthesia: A Review of the Literature

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认知助手是设计用来帮助使用者完成一项或一系列任务的提示。它呈现的方式可以是海报、流程图、清单或者甚至是记忆法。既往已有研究显示，使用认知助手可改善在麻醉紧急事件中的表现和病人的预后，然而仍缺乏一系统的证据评估。本文献综述的目的在于明确以下几个问题：（1）认识助手是否可以改善个人及团队的表现；（2）是否可提出对未来的认知助手的设计、测试及实现的建议。本文使用广泛标准搜索医学、护理及心理学的相关数据库来寻找关于麻醉紧急情况下使用认知助手的已报道文献。亦对选用于综述的文献的参考文献进行筛选来明确额外的研究。对选取的描述用于麻醉紧急情况下的认识助手的评价的文献进行综述，以确定如何派生助手的内容、如何评价设计及助手在改善技术和

团队表现的成功率。这样的检索发现了已在 23 个研究中被评估的开发来在麻醉紧急事件中支持临床医生的 22 个认知助手。用模拟的 10 个研究表明，在一些麻醉紧急事件，例如恶性高热、心肺复苏及气道管理中，使用认知助手可提高技术表现。然而在基于模拟的评估的 3 个研究中，参与者在诊断和处理中没有提高表现或者花费更长时间，甚至做出错误诊断。4 个研究调查了助手对于团队的影响，得出了不同的结论。1 个研究表明助手可提高参与者的合作模式，另 1 个则发现助手可提高其决策得分，但另外两个则提示没有提高，甚至提供了在模拟情况下使用认知助手会降低团队交流水平的证据。认知助手的设计很少被考虑到。教育可弥补设计不好的助手，但只在助手可提供较少甚至无指导的情况下使正确行为根深蒂固。认知助手应该在有指南存在的领域根据已建立的临床指南持续发展。它们也将在使用前从更多的基于模拟的广泛使用测试中获益。需要进一步的证据来探讨在麻醉紧急状态下使用认知助手的影响、它们如何影响团队功能及它们的设计考虑。

（王赟译 马皓琳 李士通校）

Cognitive aids are prompts designed to help users complete a task or series of tasks. They may take the form of posters, flowcharts, checklists, or even mnemonics. It has been suggested that the use of cognitive aids improves performance and patient outcomes during anesthetic emergencies; however, a systematic assessment of the evidence is lacking. The aim of this literature review was to determine (1) whether cognitive aids improve performance of individuals and teams and (2) whether recommendations can be made for future cognitive aid design, testing, and implementation. Medical, nursing, and psychology databases were searched using broad criteria to find cognitive aids that have been reported in the literature for use in anesthetic emergencies. The reference lists of the articles selected for review were also screened to identify additional studies. Selected articles that described the evaluation of cognitive aids used in anesthetic emergencies were reviewed to determine how the content of the aid was derived, how the design was evaluated, and the success of the aid in improving technical and team performance. The search yielded 22 cognitive aids developed to support clinicians during anesthetic emergencies that had been evaluated in 23 studies. Ten studies using simulation suggested that technical performance improves with the use of cognitive aids in some anesthetic emergencies such as malignant hyperthermia, cardiopulmonary resuscitation, and airway management. However, in 3 of the simulator-based evaluations, participants had either no improvement or took longer to diagnose and treat and made more incorrect diagnoses. Four studies investigated the effect of the aids on teamwork with differing conclusions. One study suggested improved participants' coordination patterns and one found aids improved their decision-making scores, but 2 other studies indicated that there was no improvement and even provided evidence of reduced levels of team communication when teams used a cognitive aid in simulated conditions. The designs of cognitive aids were rarely considered. Education may compensate for a poorly designed aid, but only by ingraining correct actions for situations in which the aid provides little or no guidance. Cognitive aids should continue to be developed from established clinical guidelines where guidelines exist. They would also benefit from more extensive simulation-based usability testing before use. Further evidence is required to explore the effects of cognitive aids in anesthetic emergencies, how they affect team function, and their design considerations.

使用混合手术组套进行剖腹产：对于高风险产科手术的一项新的前景很好的应用

Cesarean Delivery in the Hybrid Operating Suite: A Promising New Location for High-Risk Obstetric Procedures

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背景：日益增长的剖腹产率和伴随的胎盘植入异常，加上产科人群全身的医疗复杂性，已经驱动改革来使分娩过程中的高风险产妇的护理更优化。法律和多学科的应用和定位可能增强了选择的可能性。

方法：我们回顾了从 2007 年 12 月到 2013 年 3 月期间在应用混合手术组套进行剖腹产且描述为高风险剖腹产的所有 11 个病人的记录。

结果：使用混合手术组套最常见的指征是出血风险的增加，最常归因于异常的胎盘植入。其他的指征包括心血管疾病和颅内病变。

结论：这种混合手术组套可以是剖腹产术的一个位置选择，我们的经验表明这种环境可以为有合并症的病人提供优势。

（王晓莉 译 马皓琳 李士通 校）

BACKGROUND: The increasing cesarean delivery rate and attendant placental implantation abnormalities, coupled with increasing general medical complexity in the obstetric population, has driven innovation to optimize the care of high-risk parturients during delivery. Novel and multidisciplinary approaches and locations may enhance the options available for care.

METHODS: We reviewed the records of all 11 patients who underwent cesarean delivery in our hybrid operating suite between December 2007 and March 2013 and describe the high-risk cesarean deliveries.

RESULTS: The most common indication for the use of the hybrid operating suite was an increased risk of hemorrhage, most commonly due to abnormal placental implantation. Other indications included cardiovascular disease and intracranial pathology.

CONCLUSION: The hybrid operating suite may be an alternative location for obstetric delivery, and our experience suggests that this environment may prove advantageous for patients with a variety of comorbid conditions.

有助于颅内动脉瘤夹闭结扎的腺苷诱导的止流并不会使神经系统预后恶化

Adenosine-Induced Flow Arrest to Facilitate Intracranial Aneurysm Clip Ligation Does Not Worsen Neurologic Outcome

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背景：当究其解剖原因暂时性阻塞上一级动脉有难度时，或者在术中解剖时发生不慎血管瘤破裂时，给予腺苷可用来产生止流和短暂的、有深度的全身低血压，这样有助于颅内动脉瘤夹闭结扎。但是我们关注的是，相较于其他的技术来帮助动脉瘤的夹闭结扎。但是值得关注的是，与便于动脉瘤夹闭结扎的其他方法相比较，由腺苷产生的止流和深度低血压，即使很短暂，也可能会引起脑缺血并因此而恶化神经系统预后。因此，我们进行了一个回顾性的病例对照研究来确定腺苷诱导的止流对于我们的患者神经系统的预后是否有不良效应。

方法：我们回顾了自 2006-08-01 至 2012-07-15 期间所有行颅内动脉瘤手术的患者预后数据的围术期记录。主要的观察指标为是否存在术后 48 小时的神经系统预后欠佳。改良 Rankin 量表得分大于 2 分即可被定义为神经系统预后欠佳。在出院时的神经系统预后是一项次要指标。与心脏疾病有关的次要指标包括需要处理的房性或室性心律失常和符合缺血的心脏生物标记物升高。

结果：在研究期间，在行颅内动脉瘤夹闭结扎术的 413 名患者当中的 27 名（17.4%）使用了腺苷诱导的止流。腺苷诱导组和非腺苷诱导组的神经系统预后欠佳的发生率的差异，在术后 48 小时时不大于 15.7%（P=0.524），在出院时为不大于-12.7%(P=0.741)。另外，在术后 48 小时内心脏疾病的发生率的差别是顽固性心律失常不大于-16.0%（P=0.155），心肌缺血的生物标记物为不大于-9.4%（P=0.898）.

结论：当用来便于颅内动脉瘤夹闭结扎时，腺苷诱导的止流使神经系统预后欠佳的发病率在术后 48 小时时增加不超过 15.7%，在出院的时候减少不超过 12.7%。此外，腺苷使用和围术期心脏发病率（即，持久的心律失常或心肌缺血的生物标记物）没有相关性。

（赵晓 译 马皓琳 李士通 校）

BACKGROUND: When temporary arterial occlusion of the parent artery is difficult for anatomical reasons, or when inadvertent aneurysmal rupture occurs during surgical dissection, adenosine administration can be used to produce flow arrest and brief, profound systemic hypotension that can facilitate intracranial aneurysm clip ligation. There is a concern, however, that the flow arrest and profound hypotension produced by adenosine, although brief, may cause cerebral ischemia and therefore worsen neurologic outcome compared with other techniques to facilitate aneurysm clip ligation. Therefore, we performed a retrospective, case-control study to determine whether adenosine-induced flow arrest had negative effects on the neurologic outcome of our patients.

METHODS: We reviewed the perioperative records of all patients in our intracranial aneurysm surgery outcomes database between August 1, 2006, and June 15, 2012. The primary outcome was the presence or absence of a poor neurologic outcome 48 hours after surgery, with a modified Rankin scale score >2 being defined as a poor neurologic outcome. The neurologic outcome at the time of hospital discharge was a secondary outcome. Secondary outcomes related to cardiac morbidity included atrial or ventricular arrhythmia requiring treatment and elevated cardiac biomarkers consistent with ischemia (i.e., Troponin-I).

RESULTS: During the study period, adenosine-induced flow arrest was used in 72 of the 413 patients (17.4%) who underwent intracranial aneurysm clip ligation. The difference in the incidence of poor neurological outcome, with or without the use of adenosine, was no larger than 15.7% at 48 hours after surgery (P =0.524) or −12.7% at discharge (P = 0.741). In addition, the difference in the incidence of cardiac morbidity was no larger than −16.0% for persistent arrhythmia (P = 0.155) or −9.4% for biomarkers of myocardial ischemia (P = 0.898) in the initial 48 hours after surgery.

CONCLUSION: When used to facilitate intracranial aneurysm clip ligation, adenosine-induced flow arrest was associated with no more than a 15.7% increase or a 12.7% decrease in the incidence of a poor neurologic outcome at either 48 hours or at the time of hospital discharge. In addition, adenosine use was not associated with cardiac morbidity in the perioperative period (i.e., persistent arrhythmia or biomarkers of cardiac ischemia).

Quincke 针型与 Whitacre 针型在 S1 经孔硬膜外类固醇注射中血管内吸收的风险比较：一个 1376 个病例的随机试验

A Comparison of Quincke and Whitacre Needles with Respect to Risk of Intravascular Uptake in S1 Transforaminal Epidural Steroid Injections: A Randomized Trial of 1376 Cases

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背景：经孔硬膜外注射类固醇(TFESI)是很有效的一种镇痛方法。TFESI 的大部分并发症是小而暂时的。但也有发生严重并发症的风险，比如神经损伤、脊髓梗死或截瘫。有些风险与直接损伤血管或是血管内注入类固醇微粒有关。我们预测假设：在 TFESI 时，Whitacre 针型血管内注射的几率低于 Quincke 针型。

方法：本研究是 1376 例在 S1 水平的 TFESI 的随机试验。我们收集的病人资料有：年龄、性别、身高、体重、偏侧（左或右）、腰骶脊柱手术史、停用抗凝药的适当的间隔时间以及基础疾病史。在 S1 水平做 TFESI 期间，我们观察了骶内骨的接触、血液回抽试验及用造影剂对血管内注射的实时 X 线透视。

结果：年龄、性别、身高、体重、是否有高血压、糖尿病病史、偏侧、腰骶脊柱手术史以及合适的停用抗凝药间隔时间与血管内注射的发生率没有明显的相关性。血管内注射的显著相关因素为：血的抽吸试验($P < 0.001$)、针头型号($P = 0.002$)、骶内骨接触($P < 0.001$）及内科医生(部分 $P < 0.05$）。Quincke 针型和骶内骨接触增加了血管内注射的机率。

结论：为了减少血管内注射的风险，更安全且更有效的方法是使用 Whitacre 针型以及避免骶内骨接触。

（王慧娟 译 马皓琳 李士通 校）

BACKGROUND: Transforaminal epidural steroid injection (TFESI) is a useful treatment modality for pain management. Most complications of TFESI are minor and transient. However, there is a risk of serious complications such as nerve injury, spinal cord infarct, or paraplegia. Some of the risks are related to direct injury to the vessel or intravascular injection of the particulate steroid. We prospectively tested the hypothesis that the intravascular injection rate of the Whitacre needle is lower than that of the Quincke needle during TFESI.

METHODS: This study was a randomized trial of 1376 TFESIs at the S1 level. We collected data of age, gender, height, weight, laterality (right/left), history of lumbosacral spine operation, history of appropriate interval discontinuation of anticoagulation medicines, and underlying disease. During the S1 TFESI, intrasacral bone contact, a blood aspiration test, and real-time fluoroscopy of the intravascular injection using contrast media were investigated.

RESULTS: There were no significant differences in the intravascular injection rate with respect to age, gender, height, weight, hypertension, diabetes mellitus, laterality, history of lumbosacral spine operation, or history of appropriate interval discontinuation of anticoagulation medicines. Intravascular injection was significantly associated with a blood aspiration test ($P < 0.001$), needle tip type ($P = 0.002$), intrasacral bone contact ($P < 0.001$), and physicians (some $P < 0.05$). The use of Quincke needles and intrasacral bone contact increased the rate of intravascular injection.

CONCLUSIONS: To reduce the risk of intravascular injection, the use of Whitacre needles without intrasacral bone contact may be a safer and more effective approach.