脑小血管而非大血管疾病，与心肺转流期间脑自主调节受损有关：一项回顾性队列研究

Cerebral Small Vessel, But Not Large Vessel Disease, Is Associated With Impaired Cerebral Autoregulation During Cardiopulmonary Bypass

A Retrospective Cohort Study

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背景：心肺转流（CPB）期间脑血流（CBF）自主调节受损与中风和其他不良结局有关。心脏手术患者中普遍存在大动脉和小动脉的狭窄。我们假设大和/或小血管性脑动脉疾病与 CPB 期间受损的脑自主调节有关。

方法：回顾性队列分析数据来自于 346 名在心肺转流下接受心脏手术的病人，纳入正在进行的自主调节监测前瞻性随机临床试验，进行评估。研究方案包括由训练有素的血管技术员术前通过经颅超声（TCD）评估脑大动脉血流流速并在术后 3 至 5 天之间行脑磁共振成像（MRI）检查。脑 MRI 图像由一位不了解自主调节数据的血管神经病学家盲法评估慢性脑白质的高信号（WMHI）。“大血管”脑血管病的定义是存在与脑大动脉狭窄相关的特征性 TCD 改变。“小血管”脑血管病的定义是根据公认的 WMHI 评分方法。所有患者在手术期间均进行连续 TCD 自动调节监测。

结果：32.4%（112/346 例）的患者出现自动主调节受损。266 例患者中的 67 例（25.2%）术前经 TCD 有完整数据证实存在中到重度大血管狭窄。在调整后的分析中，女性（优势比[OR]0.46；95%置信区间[CI]为 0.25-0.86；P=0.014）和 CPB 期间较高的平均温度（OR 为 1.23；95%CI 为 1.02-1.475；P=0.029），而不是中到重度脑大动脉狭窄（P=0.406）与体外循环（CPB）期间自主调节受损有关。在 119 例有脑 MRI 资料的患者中，42 例（35.3%）显示证实存在 WMHI。小血管性脑血管疾病的发生与年龄、外周血管疾病史、术前血红蛋白水平、术前钙通道阻滞剂治疗后 CBF 自身调节受损（OR 为 3.25；95%CI 为 1.21-8.71；P=0.019）有关。

结论：这些数据证实，受损的 CBF 自身调节在 CPB 期间普遍存在，并分别通过低血压或高血压影响患者导致脑的低灌注或高灌注。小血管，而不是大血管性的脑血管疾病，男性，CPB 期间较高的平均体温似乎与自身调节受损有关。

（吴洁译 李士通校）

BACKGROUND: Impaired cerebral blood flow (CBF) autoregulation during cardiopulmonary bypass (CPB) is associated with stroke and other adverse outcomes. Large and small arterial stenosis is prevalent in patients undergoing cardiac surgery. We hypothesize that large and/or small vessel cerebral arterial disease is associated with impaired cerebral autoregulation during CPB.

METHODS: A retrospective cohort analysis of data from 346 patients undergoing cardiac surgery with CPB enrolled in an ongoing prospectively randomized clinical trial of autoregulation monitoring were evaluated. The study protocol included preoperative transcranial Doppler (TCD) evaluation of major cerebral artery flow velocity by a trained vascular technician and brain magnetic resonance imaging (MRI)

between postoperative days 3 and 5. Brain MRI images were evaluated for chronic white matter hyperintensities (WMHI) by a vascular neurologist blinded to autoregulation data. “Large vessel” cerebral vascular disease was defined by the presence of characteristic TCD changes associated with stenosis of the major cerebral arteries. “Small vessel” cerebral vascular disease was defined based on accepted scoring methods of WMHI. All patients had continuous TCD-based autoregulation monitoring during surgery.

RESULTS: Impaired autoregulation occurred in 32.4% (112/346) of patients. Preoperative TCD demonstrated moderate-severe large vessel stenosis in 67 (25.2%) of 266 patients with complete data. In adjusted analysis, female sex (odds ratio [OR], 0.46; 95% confidence interval [CI], 0.25–0.86; *P* = .014) and higher average temperature during CPB (OR, 1.23; 95% CI, 1.02–1.475; *P* = .029), but not moderate-severe large cerebral arterial stenosis (*P* = .406), were associated with impaired autoregulation during CPB. Of the 119 patients with available brain MRI data, 42 (35.3%) demonstrated WMHI. The presence of small vessel cerebral vascular disease was associated with impaired CBF autoregulation (OR, 3.25; 95% CI, 1.21–8.71; *P* = .019) after adjustment for age, history of peripheral vascular disease, preoperative hemoglobin level, and preoperative treatment with calcium channel blocking drugs.

CONCLUSIONS: These data confirm that impaired CBF autoregulation is prevalent during CPB predisposing affected patients to brain hypoperfusion or hyperperfusion with low or high blood pressure, respectively. Small vessel, but not large vessel, cerebral vascular disease, male sex, and higher average body temperature during CPB appear to be associated with impaired autoregulation.

中剂量与标准剂量舒更葡糖钠逆转哌库溴铵致神经肌肉深度阻滞的对比

Reversal of Deep Pipecuronium-Induced Neuromuscular Block With Moderate Versus Standard Dose of Sugammadex

A Randomized, Double-Blind, Noninferiority Trial

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背景：某些手术可能需要深度的神经肌肉阻滞（NMB）。在气管拔管前逆转这样的深度阻滞是很有挑战性的。由于抗胆碱酯酶在深部阻滞中无效，因此建议用舒更葡糖钠 4mg/kg 逆转罗库溴铵或维库溴铵诱导的深度 NMB。然而，这一推荐剂量需要打开 2 小瓶 200mg 的舒更葡糖钠，会导致用药成本增加。因此，我们试图寻求一种较便宜的诱导和逆转深度 NMB 的方法。虽然目前尚无舒更葡糖钠拮抗哌库溴铵深度阻滞的最佳剂量，但已有对于中度阻滞的资料。因此，我们假设舒更葡糖钠 2mg/kg 是逆转哌库溴铵深度阻滞的合适剂量，以使我们可以避免增加成本。在本研究中，我们比较了舒更葡糖钠 2mg/kg 和标准剂量 4mg/kg 用于逆转哌库溴铵深度阻滞的效果。

方法：这是一项包括 50 例接受丙泊酚、七氟醚、芬太尼和哌库溴铵全身麻醉患者的单中心，随机，双盲，平行分组的非劣效性研究。用加速度肌松监测仪（TOF 手表 SX）进行神经肌肉监测。非劣性界限预先指定为逆转时间的增加不超过 10%（对应于 1 分钟的主要结果）。当块自发地恢复到破伤风计数 1 后，患者随机接收 SuGAMDEX 2 或 4 mg/kg，并测量从注射到四（TOF）比率为 1 的列车的时间。主要结果是在特定患者中达到归一化 TOF 比为 0.9 的时间。剩余或复发的术后 NMB 是附加终点。
结果：每个病人恢复到 0.9 的标准化 TOF 比。2mg/kg 组逆转时间为 1.73±1.03 分钟(95%置信区间[CI],1.33～2.13;n=25),4mg/kg 组逆转时间为 1.42±0.63 分钟(平均±标准差)(95%CI,1.17～1.67;n=25)。两组间逆转时间的平均差异为 0.31 分钟（95%CI，0.18～0.8），CI 的上限低于 1 分钟的非劣性界限。术后未发生阻滞。
结论：舒更葡糖钠 2mg/kg 逆转哌库溴铵造成的强直刺激后计数为 1 的神经肌肉阻滞效果不亚于 4mg/kg。舒更葡糖钠对逆转哌库溴铵深度阻滞也有效果。
（吴洁译 李士通校）

BACKGROUND: Certain surgical interventions may require a deep neuromuscular block (NMB). Reversal of such a block before tracheal extubation is challenging. Because anticholinesterases are ineffective in deep block, sugammadex 4 mg/kg has been recommended for the reversal of rocuronium- or vecuronium-induced deep NMB. However, this recommendation requires opening 2 vials of 200 mg sugammadex, which results in an increase in drug costs. Therefore, we sought a less expensive solution for the induction and reversal of deep NMB. Although the optimal dose of sugammadex for antagonism of deep block from pipecuronium has not been established, data pertaining to moderate block are available. Accordingly, we hypothesized that sugammadex 2 mg/kg would be a proper dose to reverse deep pipecuronium block, enabling us to avoid cost increases. In the present study, we compared sugammadex 2 mg/kg with the standard dose of 4 mg/kg for reversal of deep block from pipecuronium.
METHODS: This single-center, randomized, double-blind, 2 parallel-arms, noninferiority study comprised 50 patients undergoing general anesthesia with propofol, sevoflurane, fentanyl, and pipecuronium. Neuromuscular monitoring was performed with acceleromyography (TOF-Watch SX). Noninferiority margin was specified beforehand as an increase in reversal time of no >10% (corresponding to 1 minute for the primary outcome). When the block spontaneously recovered to posttetanic count 1, the patients randomly received sugammadex 2 or 4 mg/kg, and the time from the injection to the train-of-four (TOF) ratio of 1.0 was measured. Primary outcome was the time to achieve the normalized TOF ratio of 0.9 in a particular patient. Residual or recurrent postoperative NMB was additional end point.
RESULTS: Each patient recovered to the normalized TOF ratio of 0.9. In the 2 mg/kg group, reversal time was 1.73 ± 1.03 minutes (95% confidence interval [CI], 1.33–2.13; n = 25), and in the 4 mg/kg group, reversal time was 1.42 ± 0.63 minutes (mean ± standard deviation) (95% CI, 1.17–1.67; n = 25). The mean difference in reversal times between the 2 groups was 0.31 minutes (95% CI, −0.18 to 0.8), and the upper limit of CI was below the noninferiority margin of 1 minute. Postoperative block did not occur.

CONCLUSIONS: The effect of sugammadex 2 mg/kg was noninferior to that of 4 mg/kg in reversing posttetanic count-1 degree pipecuronium block. Sugammadex reversal of deep pipecuronium block appears to be effective.

超声引导下颈部体表标志的触诊练习可提高环甲膜体外触诊的准确性

Practice of Ultrasound-Guided Palpation of Neck Landmarks Improves Accuracy of External Palpation of the Cricothyroid Membrane

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背景：超声能准确识别环甲膜，但对于随后的体外触诊准确性的影响尚不清楚。在本研究中，我们测试了麻醉参与人员使用超声（US）引导和不使用超声（US）引导下经外部触诊识别环甲膜中点位置的能力。

方法：在获得伦理委员会批准和患者知情同意后，由麻醉住院医师、研究员和执业麻醉助理组成的麻醉学参与人员对颈部体表标志进行了教学指导。然后将参与者随机分为两组，分别在超声引导下（US 组）和不在超声波引导下（非 US[NUS]组）进行了颈部体表标志的触诊训练。在练习期结束后，每个参与者对 10 名志愿者的颈部通过外部触诊来识别环甲膜，并标记了行环甲膜穿刺时的预期进针点(触诊点[PT])。每个志愿者的环甲膜中点位置由独立于研究小组之外的一员在超声引导下预先使用隐形墨水进行了（US 点）标记。主要结果是准确率，即参与者所做尝试中 PT 点到 US 点的距离≤5mm 所占的百分比。使用 Wilcoxon 秩和检验比较 NUS 组和 US 组主要结果的差别。还采用混合效应 logistic 回归或混合效应线性模型来解释聚类结果并调整潜在的混杂。

结果：15 名麻醉参与者被随机分入 US 组（n=8）和 NUS 组（n=7）。两组分别进行了 80 次和 61 次尝试。US 组的准确率中位数大于 NUS 组（65%对 30%，P=0.025），PT-US 点间距离中位数小于 NUS 组（4.0 对 8.0mm，P=0.04）。调整后的平均 PT-US 点间距离 US 组短于 NUS 组（调整后的平均 95%CI 为 3.6[2.9-4.6]对 6.8[5.2-8.9]mm；P<0.001）。

结论：接受超声引导下环甲膜定位触诊的麻醉参与者比未接受超声引导下触诊的参与者能够更好地仅使用盲法触诊来识别环甲膜。在超声引导下触诊颈部体表标志的练习改进了随后单纯通过触诊定位环甲膜的盲目定位法。

（吴洁译 李士通校）

BACKGROUND: Ultrasonography can accurately identify the cricothyroid membrane; however, its impact on the subsequent accuracy of external palpation is not known. In this study, we tested the ability of anesthesia participants to identify the midpoint of the cricothyroid membrane using external palpation with and without ultrasound (US)-guided practice.

METHODS: Following institutional ethics approval and informed consent, anesthesia participants consisting of anesthesia residents, fellows, and practicing anesthesia assistants underwent didactic teaching on neck landmarks. The participants were then randomized to practice palpation of neck landmarks with US guidance (US group) or without ultrasonography (non-US [NUS] group). After the practice session, each participant identified the cricothyroid membrane using external palpation on the

neck of 10 volunteers and marked the anticipated entry point for device insertion (palpation point [PT]). The midpoint of the cricothyroid membrane of each volunteer had been premarked with invisible ink using ultrasonography (US point) by a separate member of the research team. The primary outcome was the accuracy rate defined as the percentage of the attempts with the distance ≤5 mm measured from the PT to US point for the participant. The primary outcome was compared between NUS and US groups using Wilcoxon rank sum test. A mixed-effect logistic regression or mixed-effect linear model was also conducted for outcomes accounting for the clustering and adjusting for potential confounders.

RESULTS: Fifteen anesthesia participants were randomized to US (n = 8) and NUS (n = 7) groups. A total of 80 and 61 attempts were performed by the US and NUS groups, respectively. The median accuracy rate in the US group was higher than the NUS group (65% vs 30%; *P* = .025), and the median PT-US distance in the US group was shorter than in the NUS group (4.0 vs 8.0 mm; *P* = .04). The adjusted mean PT-US distance in the US group was shorter compared to the NUS group (adjusted mean [95% CI], 3.6 [2.9–4.6] vs 6.8 [5.2–8.9] mm; *P* < .001).

CONCLUSIONS: Anesthesia participants exposed to practice with US-guided palpation of the cricothyroid membrane location were better able to identify the cricothyroid membrane using only blind palpation than participants without US-guided practice. Practice with US-guided palpation of neck landmarks improves subsequent blind localization of the cricothyroid membrane using palpation alone.

鼻尖抬高对经鼻气管插管时气管导管经过鼻孔通路顺畅发生率的影响

Influence of Nasal Tip Lifting on the Incidence of the Tracheal Tube Pathway Passing Through the Nostril During Nasotracheal Intubation

A Randomized Controlled Trial

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背景：为了安全地行经鼻气管插管而不造成中鼻甲损伤，气管导管应该穿过位于下鼻甲下方紧靠鼻孔底部的下鼻道。本研究旨在评估抬高鼻尖对经鼻气管插管期间预成型的 RAE 气管导管通过下通道发生率的影响。

方法：患者被随机分成“鼻尖抬高组”或“中位组”。对于鼻尖抬高组的患者，在诱导麻醉后将预制的鼻 RAE 导管插入鼻孔时，一个研究者将鼻尖向头侧方向拉。对于中立位组的病人，在鼻尖处于中立位置时插入一根导管。使用纤维镜检查每个患者气管导管通过的路径。比较两组间导管通过下鼻道的发生率。同时评估鼻出血的发生率。

结果：86 名患者入组并完成研究流程。鼻尖抬高组气管导管通过下鼻道的发生率（79.1%）显著高于中立位组（51.2%）（相对危险度为 1.55；95%可信区间 1.11-2.15；P=0.007）。虽然鼻出血的发生率在两组间没有差别（18.6%对 32.6%，P=0.138），但是当气管导管经下鼻道通过鼻腔时（14.3%）鼻出血的发生率低于

经上鼻道通过鼻腔的发生率（46.7%），而不管随机分组是否调整了潜在的混淆变量（优势比为 0.19；95%可信区间为 0.07-0.54；P=0.002）。
结论：在经鼻气管插管期间，鼻尖抬高动作有助于引导预成型的鼻 RAE 导管进入下通道。
（吴洁译 李士通校）

BACKGROUND: For safe nasotracheal intubation without middle turbinate injury, the tracheal tube should pass through the lower pathway, which is beneath the inferior turbinate and immediately above the nasal floor of the nostril. The purpose of this study was to assess the influence of nasal tip lifting on the incidence of passing preformed nasal Ring-Adair-Elwyn (RAE) tubes through the lower pathway during nasotracheal intubation.
METHODS: Patients were randomly assigned to a "nasal tip lifting group" or a "neutral group." For patients in the nasal tip lifting group, an investigator pulled the nasal tip in a cephalad direction when inserting a preformed nasal RAE tube into the nostril after induction of anesthesia. For patients in the neutral group, a tube was inserted with the nasal tip in a neutral position. The pathway by which the tube passed in each patient was identified using a fiberscope. The incidence of the tube passing through the lower pathway was compared between the 2 groups. The incidence of epistaxis was also evaluated.
RESULTS: Eighty-six patients were enrolled and completed the study protocol. The incidence of the tracheal tube passing through the lower pathway was significantly higher in the nasal tip lifting group (79.1%) than in the neutral group (51.2%) (relative risk, 1.55; 95% confidence interval, 1.11–2.15; *P* = .007). Although the incidence of epistaxis was not different between the groups (18.6% vs 32.6%; *P* = .138), it was lower when the tracheal tube passed nasal cavity through the lower pathway (14.3%) than the upper pathway (46.7%), regardless of the randomized group with adjustment for potentially confounding variables (odds ratio, 0.19; 95% confidence interval, 0.07–0.54; *P* = .002).
CONCLUSIONS: The nasal tip lifting maneuver helped to guide preformed nasal RAE tubes into the lower pathway during nasotracheal intubation.

麻醉期间的低液体挑战：系统评价和 Meta 分析

Low Fluid Challenge During Anesthesia: A Systematic Review and Meta-analysis.
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背景：评估接受手术的患者的血容量状态是麻醉医生常规管理的一部分。该评估通常通过基于机械通气期间的心肺相互作用的动态指数（如果可用）或通过施用液体冲击（FC）来进行。 在手术期间使用液体冲击来优化预定义的血液动力学目标，即所谓的目标导向治疗（GDT），或校正血液动力学不稳定性（非 GDT）。

方法：在本系统评价中，我们考虑了采用目标导向治疗或非目标导向治疗的研究中的液体冲击试验的成分，以评估两种方法之间是否存在差异。此外，我们进行了一项荟萃分析，以确定动态指标脉压变化（PPV）和每搏输出量（SV）变化（SVV）在预测液体反应性方面的有效性。

结果：35 项非目标导向治疗和 33 项目标导向治疗研究符合纳入标准，包括 5017 名患者。在绝大多数非目标导向治疗和目标导向治疗研究中，液体冲击包括胶体给药（分别为 85.7％和 90.9％）。在 29 项非目标导向治疗研究中，输注的胶体是 6％羟乙基淀粉（6％HES;该亚组的 96.6％）。在 20 项目标导向治疗研究中，输注的胶体是 6％HES（该亚组的 66.7％），而在 5 项研究中是明胶（该亚组的 16.7％），在 3 项研究中是未指明的胶体（该亚组的 10.0％），在 1 研究白蛋白（3.3％）或在另一项研究中，HES 6％和明胶（3.3％）。在非目标导向治疗研究中，输注的中位体积为 500 mL；输注时间和血液动力学目标评估液体反应性缺乏标准化。在目标导向治疗研究中，液体冲击通常包括在 10 分钟内（45.4％）施用 250mL 胶体（48.8％），目标是 SV 增加> 10％（57.5％）。仅在 60.6％的目标导向治疗研究中，采用了安全限制。 脉压变化合并曲线下面积（95％置信区间[CI]）为 0.86（0.80-0.92）。预测液体反应性的平均值（标准差）脉压变化阈值为 10.5％（3.2）（范围，8％-15％），而汇总（95％CI）敏感性和特异性为 0.80（0.74-0.85）和 0.83（0.73-）分别为 0.91）。曲线下的每搏输出量变化合并面积（95％CI）为 0.87（0.81-0.93）。预测液体反应性的平均值（标准偏差）每搏输出量阈值为 11.3％（3.1）（范围，7.5％-15.5％），而汇总（95％CI）敏感性和特异性分别为 0.82（0.75-0.89）和 0.77（0.71-0.82）。

结论：液体冲击的关键组成部分包括液体类型（胶体，通常为 6％HES），体积（分别在非目标导向治疗研究和目标导向治疗研究中为 500 和 250 mL）和输注时间（10 分钟）在手术室中非常标准化。 然而，脉压变化和每搏输出量变化的汇总灵敏度和特异性都是有限的。

（彭孟圆 译 潘艳、薛张刚校）

BACKGROUND: Assessing the volemic status of patients undergoing surgery is part of the routine management for the anesthesiologist. This assessment is commonly performed by means of dynamic indexes based on the cardiopulmonary interaction during mechanical ventilation (if available) or by administering a fluid challenge (FC). The FC is used during surgery to optimize predefined hemodynamic targets, the so-called Goal-Directed Therapy (GDT), or to correct hemodynamic instability (non-GDT).

METHODS: In this systematic review, we considered the FC components in studies adopting either GDT or non-GDT, to assess whether differences exist between the 2 approaches. In addition, we performed a meta-analysis to ascertain the effectiveness of dynamic indexes pulse pressure variation (PPV) and stroke volume (SV) variation (SVV), in predicting fluid responsiveness.

RESULTS: Thirty-five non-GDT and 33 GDT studies met inclusion criteria, including 5017 patients. In the vast majority of non-GDT and GDT studies, the FC consisted in the administration of colloids (85.7% and 90.9%, respectively). In 29 non-GDT studies, the colloid infused was the 6% hydroxyethyl starch (6% HES; 96.6% of this subgroup). In 20 GDT studies, the colloid infused was the 6% HES (66.7% of this subgroup), while in 5 studies was a gelatin (16.7% of this subgroup), in 3 studies

an unspecified colloid (10.0% of this subgroup), and in 1 study albumin (3.3%) or, in another study, both HES 6% and gelatin (3.3%). In non-GDT studies, the median volume infused was 500 mL; the time of infusion and hemodynamic target to assess fluid responsiveness lacked standardization. In GDT studies, FC usually consisted in the administration of 250 mL of colloids (48.8%) in 10 minutes (45.4%) targeting an SV increase >10% (57.5%). Only in 60.6% of GDT studies, a safety limit was adopted. PPV pooled area under the curve (95% confidence interval [CI]) was 0.86 (0.80-0.92). The mean (standard deviation) PPV threshold predicting fluid responsiveness was 10.5% (3.2) (range, 8%-15%), while the pooled (95% CI) sensitivity and specificity were 0.80 (0.74-0.85) and 0.83 (0.73-0.91), respectively. SVV pooled area under the curve (95% CI) was 0.87 (0.81-0.93). The mean (standard deviation) SVV threshold predicting fluid responsiveness was 11.3% (3.1) (range, 7.5%-15.5%), while the pooled (95% CI) sensitivity and specificity were 0.82 (0.75-0.89) and 0.77 (0.71-0.82), respectively.

CONCLUSIONS: The key components of FC including type of fluid (colloids, often 6% HES), volume (500 and 250 mL in non-GDT studies and GDT studies, respectively), and time of infusion (10 minutes) are quite standardized in operating room. However, pooled sensitivity and specificity of both PPV and SVV are limited.

氨甲环酸在慢性肾功能不全患者于心脏手术中的应用

Tranexamic Acid Dosing for Cardiac Surgical Patients With Chronic Renal Dysfunction: A New Dosing Regimen.

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背景：氨甲环酸（TXA）是一种常用的抗纤溶药物，在心脏手术用于减少出血。多达 50%的心脏手术患者有慢性肾功能不全（CRD）。对于 CRD 患者使用 TXA 的最佳剂量的研究仍然很少。这很重要，TXA 在 CRD 患者中会堆积。高剂量的 TXA 与术后癫痫发作有关。本研究测量了心脏手术的 CRD 患者的血浆 TXA 浓度，用于药物动力学建模和剂量调整建议。

方法：这项前瞻性队列研究纳入 48 例 1-5 期 CRD 患者，按照“肾脏病预后质量倡议”标准分类。低风险组接受简单的主动脉大桥或单瓣膜修复/置换，并接受 50mg/kg 的 TXA。高危组接受二次，主动脉，多瓣膜或联合手术，并接受了抗纤溶药物试验给药方案的血液保护（负荷剂量 30 mg/kg，首剂量 2 mg/kg 后，以 16 毫克/千克/小时速度泵注）。主要结果辨认 TXA 清除和分布体积的变化，这为剂量调整提供了理论依据。描述性临床结果为评估术后癫痫发作、失血、缺血性血栓并发症、住院死亡率和住院时间。

结果：TXA 浓度升高并持续超过治疗阈值约 12 小时，在根据 CRD 严重程度区分的高危组 3-5 组。

结论：使用药代动力学模型，我们提出了一个简单的新 TXA 给药方案，优化最大抗纤溶作用并避免过量给药。
（庞艳蓉 译 潘艳、薛張刚校）

BACKGROUND: Tranexamic acid (TXA) is a common antifibrinolytic agent used to minimize bleeding in cardiac surgery. Up to 50% cardiac surgical patients have chronic renal dysfunction (CRD). Optimal dosing of TXA in CRD remains poorly investigated. This is important as TXA is renally eliminated with accumulation in CRD. High TXA doses are associated with postoperative seizures. This study measures plasma TXA concentrations in CRD cardiac surgical patients for pharmacokinetic modeling and dose adjustment recommendations.

METHODS: This prospective cohort study enrolled 48 patients with stages 1-5 CRD, classified by Kidney Disease Outcome Quality Initiative. Patients were

separated into 2 treatment groups. A "low-risk" group underwent simple aortocoronary bypass or single-valve repair/replacement and received a 50 mg/kg TXA bolus. A "high-risk" group underwent redo, aortic, multiple valve or combination surgery and received the Blood Conservation Using Anti-fibrinolytics Trial dosing regimen (loading dose 30 mg/kg, infusion 16 mg/kg/h with 2 mg/kg in pump prime). Primary outcome identified changes in TXA clearance and distribution volume, which provided the rationale for dose adjustment. Descriptive clinical outcomes assessed postoperative seizures, blood loss, ischemic-thrombotic complications, in-hospital mortality, and length of hospital stay.

RESULTS: TXA concentrations were elevated and sustained above the therapeutic threshold for approximately 12 hours in high-risk stages 3-5 groups, in accordance to CRD severity.

CONCLUSIONS: Using a pharmacokinetic model, we propose a simple new TXA dosing regimen that optimizes maximal antifibrinolysis and avoids excessive drug dosing.

加用新斯的明和阿托品常规治疗硬膜外穿刺性头痛：一项随机对照试验
Addition of Neostigmine and Atropine to Conventional Management of Postdural Puncture Headache:A Randomized Controlled Trial

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背景：硬膜外穿刺性头痛（PDPH）缺乏标准的循证治疗。用新斯的明治疗严重 PDPH 的患者促进了这项研究

方法：这项随机对照双盲研究比较了新斯的明和阿托品（n = 41）与生理盐水安慰剂（n = 44）治疗 PDPH，以及对 85 名水合和镇痛药患者的保守治疗。 主要结果是干预后 6,12,24,36,48 和 72 小时的视觉模拟评分≤3。次要结果是需要硬膜外血液补丁，颈部僵硬，恶心和呕吐。患者接受新斯的明 20μg/ kg 和阿托品 10μg/ kg 或等体积的盐水。

结果：在干预后的所有时间间隔，使用新斯的明/阿托品的视觉模拟评分得分显着优于（盐水治疗）。 新斯的明/阿托品组中没有患者需要硬膜外血液补片，而安慰剂组为 7（15.9％）（P <.001）。 患者不需要> 2 剂新斯的明/阿托品。 颈部僵硬，恶心或呕吐之间没有组间差异。 新斯的明/阿托品组仅发生腹部痉挛，肌肉抽搐和膀胱亢进等并发症（P <.001）。

结论：新斯的明/阿托品仅在 2 次给药后有效治疗 PDPH。新斯的明可以通过脉络丛，但不能通过血脑屏障。 两种药物的中枢作用均影响脑脊液分泌和脑血管张力，这是 PDPH 的主要病理生理变化。 结果与新斯的明活性的先前研究和临床报告一致。

（许智鸿 译 潘艳、薛張刚校）

BACKGROUND: Postdural puncture headache (PDPH) lacks a standard evidence-based treatment.A patient treated with neostigmine for severe PDPH prompted this study.

METHODS: This randomized, controlled, double-blind study compared neostigmine and atropine(n = 41) versus a saline placebo (n = 44) for treating PDPH in addition to conservative management of 85 patients with hydration and analgesics. The primary outcome was a visual analog scale score of ≤3 at 6, 12, 24, 36, 48, and 72 hours after intervention. Secondary outcomes were the need for an epidural blood patch, neck stiffness, nausea, and vomiting. Patients received either neostigmine 20 μg/kg and atropine 10 μg/kg or an equal volume of saline.

RESULTS: Visual analog scale scores were significantly better (*P*< .001) with neostigmine/atropine than with saline treatment at all time intervals after intervention. No patients in the neostigmine/atropine group needed epidural blood patch compared with 7 (15.9%) in the placebo group (*P*< .001). Patients required no >2 doses of neostigmine/atropine. There were no between-group differences in neck stiffness, nausea, or vomiting. Complications including abdominal cramps, muscle twitches, and urinary bladder hyperactivity occurred only in the neostigmine/atropine group (*P*< .001).

CONCLUSIONS: Neostigmine/atropine was effective in treating PDPH after only 2 doses.Neostigmine can pass the choroid plexus but not the blood–brain barrier. The central effects of both drugs influence both cerebrospinal fluid secretion and cerebral vascular tone, which are the primary pathophysiological changes in PDPH. The results are consistent with previous studies and clinical reports of neostigmine activity.

剖宫产后神经轴性吗啡和二乙酰吗啡相关性呼吸抑制的系统评价

A Systematic Review Evaluating Neuraxial Morphine and Diamorphine-Associated Respiratory Depression After Cesarean Delivery

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剖宫产后椎管内使用阿片类物质引起的临床显著呼吸抑制（CSRD）的发生率尚不清楚。我们试图回顾作者报告的呼吸抑制（ARD）的报道病例，以计算 CSRD 发生率。为了确定在接受剖宫产的产妇中，呼吸抑制继发于椎管内使用吗啡或二乙酰吗啡，我们进行了 6 个数据库的文献检索。计算了 CSRD 的“最高”（确定的和可能的/可能的）和“最低”（肯定）的发生率。次要结果包括：（1）与当前使用剂量的椎管内阿片相关的 CSRD 的发生率，（2）每个研究自己的标准所定义的 ARD 发生率，（3）ARD 病例报告，和（4）麻醉封闭索赔项目数据库在 1990 年到 2010 年间报告的 ARD 报告。我们对 78 篇文章和 18455 名接受椎管内吗啡或二乙酰吗啡剖宫产的产妇进行了鉴定。所有剂量的椎管内阿片类药物引起的 CSRD 的最高和最低发生率分别为 8.67/10000（95%CI，4.20-15.16）和 5.96/10000（95%CI，2.23-11.28）。在使用临床相关剂量的椎管内吗啡治疗的患者， CSRD 的最高和最低发生率分别为 1.63/10000（95%CI，0.62-8.77）和 1.08/10000（95%CI，0.24-7.22）。每篇论文定义的 ARD 发生率为 61/10000（95%CI，51-74）。一份已发表的 ARD 病例报告符合我们的纳入标准，并且没有来自封闭索赔数据库分析的 ARD 病例。这些结果表明，在产科患者中，由椎管内使用吗啡或二乙酰吗啡引起的 CSRD 的发生率较低。
(汤洁 译潘艳、薛張刚校)

The prevalence of neuraxial opioid–induced clinically significant respiratory depression (CSRD) after cesarean delivery is unknown. We sought to review reported cases of author-reported respiratory depression (ARD) to calculate CSRD prevalence. A 6-database literature search was performed to identify ARD secondary to neuraxial morphine or diamorphine, in parturients undergoing cesarean delivery. “Highest” (definite and probable/possible) and “lowest” (definite) prevalences of CSRD were calculated. Secondary outcomes included: (1) prevalence of CSRD associated with contemporary doses of neuraxial opioid, (2) prevalence of ARD as defined by each study’s own criteria, (3) case reports of ARD, and (4) reports of ARD reported by the Anesthesia Closed Claims Project database between 1990 and 2016. We identified 78 articles with 18,455 parturients receiving neuraxial morphine or diamorphine for cesarean delivery. The highest and lowest prevalences of CSRD with all doses of neuraxial opioids were 8.67 per 10,000 (95% CI, 4.20–15.16) and 5.96 per 10,000 (95% CI, 2.23–11.28), respectively. The highest and lowest prevalences of CSRD with the use of clinically relevant doses of neuraxial morphine ranged between 1.63 per 10,000 (95% CI, 0.62–8.77) and 1.08 per 10,000 (95% CI, 0.24–7.22), respectively. The prevalence of ARD as defined by each individual paper was 61 per 10,000 (95% CI, 51–74). One published case report of ARD met our inclusion criteria, and there were no cases of ARD from the Closed Claims database analysis. These results indicate

that the prevalence of CSRD due to neuraxial morphine or diamorphine in the obstetric population is low.

The Perioperative Management of Ascending Aortic Dissection
升主动脉夹层的围术期处理

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急性主动脉综合征是一组涉及主动脉血管壁急性起病的独特的病理性疾病且若不及时治疗可潜在致死。此综合征有≥95%以主动脉夹层为表现。相对于主动脉其他部位的夹层，升主动脉夹层是非常致命的，需要尽早和特殊的手术治疗。升主动脉的外科修复手术给麻醉医生带来多重挑战。围术期有效的管理对于降低疾病的发病率和死亡率很重要。在此篇综述中，作者回顾了升主动脉夹层手术的围术期管理。术前讨论应着重于评估、血流动力学管理和危险分层。术中部分需要除了考虑到麻醉管理、经食管超声心动图评估和凝血疾病等外，应包括可能影响麻醉管理的手术操作。

（陈冬芳 译 陈杰 校 ）

Acute aortic syndromes are a distinct group of pathologies involving the wall of the aorta that present acutely and can be potentially fatal unless treated in a timely fashion. The syndrome is dominated by aortic dissections, which comprise ≥95% of all such presentations. Those involving the ascending aorta are particularly lethal and require specific and early surgical treatment compared to dissections involving other parts of the aorta. The surgical repair of an ascending aortic dissection presents multiple challenges to the anesthesiologist. Thoughtful management throughout the perioperative period is critical for minimizing the significant morbidity and mortality associated with this condition. In this narrative review, we provide an overview of the perioperative management of patients presenting for the surgical repair of an ascending aortic dissection. Preoperative discussion focuses on assessment, hemodynamic management, and risk stratification. The intraoperative section includes an overview of anesthetic management, transesophageal echocardiographic assessment, and coagulopathy, as well as surgical considerations that may influence anesthetic management.

围术期浅低温和心肌损伤的关系：回顾性队列分析

Mild Perioperative Hypothermia and Myocardial Injury ： A Retrospective Cohort Analysis

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背景:本研究主要假设为非心脏手术患者术后 7 天的院内全因死亡和心肌损伤风险增加与术中食道温度相关。次要暴露因素为时间加权的平均术中温度和小于 37° C 的温度范围。
方法:作者将心肌损伤定义为心肌缺血导致术后第四代肌钙蛋白 T≥0.03 ng / mL。采集克利夫兰诊所 2012 至 2015 年之间接受全麻下非心脏手术的住院患者术中食道温度和术后肌钙蛋白常规监测的数据。作者采用多变量 logistic 回归检测了患者最终术中食管温度与不良事件之间经混杂因子校正后的相关性,用同样的方法检测了时间加权的平均术中温度和小于 37° C 的温度范围。
结果:本研究共纳入 2210 名患者。几乎所有患者的最终食道温度在 36° C-37° C 之间。其中，97 名(4.4%)患者发生了心肌损伤，7 名(0.3%)患者出院前死亡。患者的最终术中核心温度与不良事件无相关性:每降低 1° C，OR 值为 0.91(95% CI 为 0.68-1.24)。同样，次要暴露因素与综合风险也无相关性。
结论:作者发现成人非心脏手术的死亡率与围术期的轻度低体温或心肌损伤并无相关性。然而，术终时患者的体温范围波动较小且主要局限于正常范围(36-37° C)。目前仍需进一步研究温度对心肌损伤的影响。
（钱佳红 译 陈杰 校）

BACKGROUND: We tested the primary hypothesis that final intraoperative esophageal temperature is associated with increased odds of a composite of in-hospital all-cause mortality and myocardial injury within 7 days after noncardiac surgery. Secondary exposures were time-weighted average intraoperative temperature and area <37° C threshold.
METHODS: Myocardial injury was defined by postoperative fourth-generation troponin T ≥0.03 ng/mL apparently due to cardiac ischemia. Data were extracted for inpatients who had noncardiac surgery with general anesthesia at the Cleveland Clinic between 2012 and 2015. All had esophageal temperature monitoring and routine postoperative troponin monitoring. We estimated the confounder-adjusted association between final intraoperative esophageal temperature and the collapsed composite with multivariable logistic regression. We similarly estimated associations with time-weighted average intraoperative temperature and area <37° C.
RESULTS: Two thousand two hundred ten patients were included. Nearly all final esophageal temperatures were 36° C – 37° C. Ninety-seven patients (4.4%) had myocardial injury, and 7 (0.3%) died before discharge. Final intraoperative core temperature was not associated with the collapsed composite: odds ratio, 0.91 (95% confidence interval, 0.68 – 1.24) per 1° C decrease. Similarly, neither of the secondary exposures was associated with the composite outcome.
CONCLUSIONS: We did not observe an association between mild perioperative hypothermia and mortality or myocardial injury in adults having noncardiac surgery. However, the range of final intraoperative temperatures was small and largely restricted to the normothermic range

(36° C－37° C). Trials are needed to further assess the effect of temperature on myocardial injury.

同通道滤器减少术后导管相关外周静脉炎

In-Line Filtration Reduces Postoperative Venous Peripheral Phlebitis Associated With Cannulation

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背景：外周静脉置管是接受麻醉和手术患者的常规操作项目。静脉输液同时注入的颗粒物（例如，塑料/玻璃/药物颗粒）是外周静脉炎的重要发病机制。这项研究目的是为了证明同通道滤器在减少短期外周血管置管相关的术后静脉炎发生中的作用。

方法：此项对照研究纳入 268 位手术患者，随机分为同通道过滤组和标准管理组（NCT03193827），比较两组患者在 48 小时内静脉炎发生率（视觉静脉炎定义为 VIP 评分≥2）以及静脉炎的发作和严重程度以及拔管的原因。通过 Kaplan-Meier 曲线来比较同通道和非同通道滤器的静脉置管的使用寿命。

结果：术后 48 小时两组静脉炎的发生率分别为 2.2%和 26.9%（差异，25%[95%CI 12%-36%],优势比 0.05[0.01-0.15]）。非同通道滤器组的病人 VIP 评分高于同通道滤器组（P<0.01）。同通道滤器组的静脉置管使用寿命高于非同通道滤器组（P=0.1）。其中同通道滤器组和非同通道滤器组术后 96 小时仍保留置管的人数分别为 64 人（47.8%）和 56 人（41.8%）。此时，同通道滤器组 100%的患者 VIP 得分<3，而非同通道滤器组只有 50%。同通道滤器是一项避免术后静脉炎（风险比 0.05[95%CI 0.014-0.15]P<0.01）和拔管（风险比 0.7[95% CI 0.52-0.96]P=0.2）的保护性措施。

结论：同通道滤器是一项对外科患者进行外周静脉置管期间避免术后静脉炎和延长置管寿命的保护性措施。

（郭宝超 译 陈杰 校）

BACKGROUND: Peripheral venous cannulation is an everyday practice of care for patients undergoing anesthesia and surgery. Particles infused with intravenous fluids (eg, plastic/glass/drugs particulate) contribute to the pathogenesis of peripheral phlebitis. The aim of this study is to demonstrate the efficacy of in-line filtration in reducing the incidence of postoperative phlebitis associated with peripheral short-term vascular access.

METHODS: In this controlled trial, 268 surgical patients were randomly assigned to in-line filtration and standard care (NCT03193827). The incidence of phlebitis (defined as visual infusion phlebitis [VIP] score, ≥2) within 48 hours was compared between the 2 groups, as well as the onset and severity of phlebitis and the reasons for removal of the cannula. The lifespan of venous cannulae was compared for the in-line filter and no-filter groups through a Kaplan-Meier curve.

RESULTS:The incidence of phlebitis within 48 hours postoperatively was 2.2% and 26.9% (difference, 25% [95% confidence interval {CI}, 12% - 36%]; odds ratio, 0.05 [0.01 - 0.15]), respectively, for the in-line filter and no-filter groups (P < .001). From 24 to 96 hours postoperatively, patients in the no-filter group had higher VIP scores than those in in-line filter group (P < .001). Venous cannulae in the in-line filter group exhibited prolonged lifespan compared to those in the no-filter group (P = .01). In particular, 64 (47.8%) of cannulae in the in-line filter group and 56 (41.8%) of those in the no-filter group were still in place at 96 hours postoperatively. At the same time point, patients with a VIP score <3 were 100% in the in-line filter group and only 50% for the no-filter group. In-line filtration was a protective factor for postoperative phlebitis (hazard ratio, 0.05 [95% CI, 0.014 - 0.15]; P < .0001) and cannula removal (hazard ratio, 0.7 [95% CI, 0.52 - 0.96]; P = .02).
CONCLUSIONS:In-line filtration has a protective effect for postoperative phlebitis and prolongs cannula lifespan during peripheral venous cannulation in surgical patients.

Informed Consent in Pediatric Anesthesia
儿科麻醉的知情同意

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小儿麻醉知情同意书由于其复杂的伦理、医学和法律上的含糊不清通常给执业医师带来挑战。病人作为未成年人的地位并不否定其参与决策过程的重要性，相对而言，更需要对年龄和发展作出微妙的评估，以便使病人适当参与进来。鉴于儿科知情同意在麻醉实践和研究中的复杂性，了解关键利益相关者非常重要。本综述中，作者搜索了 Medline、Cochrane 数据库、PROSPERO 和 clinicaltrials.gov，研究涉及儿童麻醉知情同意书。纳入和排除标准旨在选择包含与知情同意相关问题作为主要结果的研究。从纳入的研究中提取了以下数据:标题、作者、发表日期、研究类型、干预、数据收集方法、参与者类型(即，家长、儿科患者、麻醉提供者)、参与者数量、儿科患者年龄范围、主要结果测量。一共有 22 篇文章被纳入最终审查:小儿麻醉知情同意的研究跨越了知情同意的许多方面。父母的理解被研究最多(7/22 研究)，其次是父母的偏好(5/22 研究)和提供者相关的结果如与患者互动的时间、与知情同意相关的培训数量的主观报告、以及提供者对知情同意过程的满意度(5/22 研究)。与儿童患者本身有关的结果构成最小数量的研究，包括儿童焦虑(1/22)、儿童理解(1/22)和儿童拒绝(1/22)。在参与研究的人群中，父母是这些研究中最常见的研究对象(2719/3805 名研究对象，占所有研究对象的 71%)。儿童患者是调查儿童麻醉知情同意的研究中最不常涉及的受试者(493/3805，占所有受试者的 13%)。麻醉提供者和调查人员作为研究对象(593/3805，占所有研究对象的 16%)，涉及到一系列主题包括与患者交流的时间、与受训者地位有关的知情同意书交谈的性质、对知情同意书

流程的满意度以及知情同意书内容的优先级。本综述旨在总结小儿麻醉知情同意书的研究进展。

（罗琨 译　陈杰 校）

Informed consent for pediatric anesthesia challenges practitioners to navigate complex ethical, medical, and legal ambiguities. A patient's status as a minor does not negate the importance of his or her participation in the decision-making process but, rather, necessitates a nuanced evaluation of age and development to involve the patient to an appropriate extent. Given the complexities involved with pediatric informed consent in anesthesia practice and research, it is important to understand the experience of key stakeholders involved. For this review, we searched Medline, the Cochrane database, PROSPERO, andClinicaltrials.gov for studies involving pediatric anesthesia informed consent. Inclusion and exclusion criteria were designed to select for studies that included issues related to informed consent as primary outcomes. The following data were extracted from included studies: title, authors, date of publication, study type, intervention, data collection method, participant type (ie, parent, pediatric patient, anesthesia provider), number of participants, pediatric patient age range, and primary outcome measures. Twenty-two articles were included for final review: studies of informed consent in pediatric anesthesia span many aspects of informed consent. Parental understanding has been studied most often (7/22 studies), followed by parental preferences (5/22 studies) and provider-related outcomes (5/22 studies) such as time spent interacting with patients, subjective reporting on amount of training related to informed consent, and provider satisfaction with the informed consent process. Outcomes pertaining to pediatric patients themselves constitute the smallest number of studies, including child anxiety (1/22), child understanding (1/22), and child refusal (1/22). Among the parties involved, parents have been most frequently identified as the subjects of these studies (2719/3805 subjects across all included studies, or 71% of all subjects). Pediatric patients are the least frequently involved subjects of studies that investigate informed consent in pediatric anesthesia (493/3805, or 13% of all subjects). Anesthesia providers and investigators have been study subjects (593/3805, or 16% of all subjects) for a range of topics including time spent interacting with patient, nature of informed consent conversation in relation to trainee status, satisfaction with informed consent process, and priorities for informed consent content. The aim of the present narrative review is to summarize the work that has been done on informed consent for pediatric anesthesia.