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Continuous Ultrasound-Guided Adductor Canal Block for Total Knee Arthroplasty: A Randomized, Double-Blind Trial

背景：最近的随机对照实验发现，相对于血红蛋白更低的患者，围术期血红蛋白大于10g/dL的患者输血并无益处，甚至老年患者亦如此。然而相对于年轻患者，外科医生选择给老年患者输血更随意。老年患者围术期输血概率是否较年轻患者更高并未确定。此项研究的目的是确定围术期老年患者输血的概率是否比年轻患者更高。

方法：在一个三级医疗中心进行了此项回顾性、观察队列研究，纳入了2010年1月至2012年2月期间在该中心做过外科手术的住院病人。通过多层多变量逻辑回归分析的方法，并校正了并发症、外科水平、住院期间最低血红蛋白值、性别和术中估测失血量因素和外科医生和手术综合分析，来比较大于65岁患者与更年轻患者输血概率的差异。

结果：在这个分析中纳入了20930个患者。在校正并发症发生率、外科种类、估测外科失血量和住院期间最低血红蛋白值差异后，并以外科医生和手术类型作为随机因素的多层分析模式中，大于65岁患者的输血概率比年轻患者高62%（比值比为1.62，95%可信区间为1.40-1.88；P<0.0001）。当把病人按住院期间最低血红蛋白值分层时（7.00–7.99，8.00–8.99，9.00–9.99，以及大等于10.00g/dL），每层中患者输血概率随着年龄增加（每十岁）而增加，住院期间最低血红蛋白不低于10.00 g/dL的患者除外。当比较年轻和年老患
BACKGROUND: Recent randomized controlled trials have shown no benefit for transfusion to a hemoglobin >10 g/dL compared with lower hemoglobin thresholds in the perioperative period, even among older adults. Nevertheless, physicians may choose to transfuse older adults more liberally than younger adults. It is unclear whether older patients have higher odds than younger patients of being transfused in the perioperative period. Our objective in this study was to determine whether the odds of transfusion are higher in older patients than in younger patients in the perioperative period.

METHODS: We conducted this retrospective observational cohort study at a tertiary care academic medical center. We included adults who had undergone a surgical procedure as an inpatient at our institution from January 2010 to February 2012. The primary analysis compared the odds of transfusion for patients >65 years old with the odds of transfusion in younger patients based on multilevel multivariable logistic regression analyses including adjustment for comorbidities, surgical service, lowest in-hospital hemoglobin value, gender, and estimated surgical blood loss and accounted for clustering by the surgeon and procedure.

RESULTS: We included 20,930 patients in this analysis. In multilevel models adjusted for comorbidities, surgical service, estimated surgical blood loss, and lowest in-hospital hemoglobin value, with surgeon and procedure as random effects, patients >65 years old had 62% greater odds (odds ratio, 1.62; 95% confidence interval, 1.40–1.88; P < 0.0001) of being transfused than did younger patients. When patients were stratified by lowest in-hospital hemoglobin (7.00–7.99, 8.00–8.99, 9.00–9.99, and ≥10.00 g/dL), the odds of transfusion generally increased with each additional decade of age in every stratum, except for that containing patients in whom the lowest in-hospital hemoglobin did not decrease below 10 g/dL. When the odds of transfusion were compared between younger and older patients, significant differences were observed among surgical services (P = 0.02) but not among anesthesia specialty divisions (P = 0.9).

CONCLUSIONS: Older adults have greater odds of receiving red blood cell transfusion in the perioperative period than do younger patients, despite the lack of evidence supporting higher hemoglobin triggers in elderly patients. Further research is needed to determine whether transfusion practice in the elderly is an opportunity for education to improve blood management.

Death or Neurologic Injury after Tonsillectomy in Children with a Focus on Obstructive Sleep Apnea: Houston, We Have a Problem!

Coté, Charles J. MD*; Posner, Karen L. PhD†; Domino, Karen B. MD, MPH†

Anesthesia & Analgesia 2014 118 1276–1283
通过既往有 OSA 病史或之后通过美国麻醉医师协会的 OSA 临床指南确认儿童是否存在 OSA 风险。对比率和连续变量分别采用 Fisher 精确检验和 t 检验方法比较存在风险的儿童和其他儿童之间的区别。

结果：调查回收到的 731 份回复中共有 129 例得到确认，其中 92 例数据齐全符合纳入标准。另外 45 例美国麻醉医师协会已结算案件数据中有 19 例数据齐全得到确认。最终共有 111 例纳入最后分析。共有 86 例（占 77%）死亡或永久性神经损伤分别发生于手术中、麻醉恢复室、病房和家中。63 位患儿 (57%) 符合美国麻醉医师协会的 OSA 风险标准。存在 OSA 风险的患儿相较于其他儿童，肥胖和患有其他合并疾病概率更高 (P < 0.0001)。风险患儿发生窒息的比例较高 (P = 0.016)，反之其他患儿不良事件中出血占的比例较高 (P = 0.006)。

结论：儿童扁桃体切除术后发生窒息相关的死亡和神经损伤表明：如果在恢复期第一、二阶段以及术后第一夜间采用了呼吸监测，至少 16 名患儿能得到及时救助。

背景：在美国，肥胖症已成盛行，而随之而来的是阻塞性睡眠呼吸暂停 (OSA) 的发病率有所增加。有关阿片类药物敏感性及近期文献的报道提示应及时对所有成员的美国儿科麻醉协会进行调查，以了解儿童扁桃体切除术后可能发生的不良事件。

方法：电子问卷被发送给 2377 名美国儿科麻醉协会成员。此外，还从美国麻醉医师协会闭案报告项目中获取了数据。在常规手术及腺样体切除术后儿童发生的不良事件包括在内。存在 OSA 风险的儿童被定义为有 OSA 病史或根据美国麻醉医师协会 OSA 临床指南的后验确认。

结果：总共识别了 129 例不良事件，其中 92 例数据齐全符合纳入标准。另外 19 例从美国麻醉医师协会闭案报告项目中得到确认。最终共有 111 例被纳入最终分析。在 86 例 (77%) 的事件中报告了死亡和永久性神经损伤，其中 63 例 (57%) 符合美国麻醉医师协会的 OSA 风险标准。存在 OSA 风险的儿童相较于其他儿童，肥胖和患有其他合并疾病概率更高 (P < 0.0001)。存在 OSA 风险的儿童发生窒息的比例较高 (P = 0.016)，而其他儿童不良事件中出血占的比例较高 (P = 0.006)。

结论：扁桃体切除术后发生窒息相关的死亡和神经损伤表明，如果在恢复期第一、二阶段以及术后第一夜间采用了呼吸监测，至少 16 名患儿能得到及时救助。需要一个有效的专业儿科风险评分系统来协助判断患儿是否有 OSA 风险，以免被当作一个普通日间患者处理。

(陆秉玮 译 陈杰 校)
背景：药代动力学(PK)模型被用于预测术中使用不同输注方案得到的药物浓度及计算靶控输注系统中的输注速率。对丙泊酚而言，文献中可查到的PK模型主要是由特定的患者群体或麻醉技术发展而来的，在不同病人和临床条件下该模型的精确性并未确定。本研究目的是确定一个对于不同患者和多种临床条件下有着强大预测能力的PK模型。

方法：汇总并分析了先前发表的21个丙泊酚资料集，数据包含了幼儿、儿童、成人、老年及肥胖个体。将体重、年龄、性别和病人状态作为协变量，使用NONMEM软件来估计一个三室异速生长模型。设计出一个术中环境相关的预测性能度量，并结合赤池信息准则来指导模型开发。

结果：数据集包括来自660位个体(年龄分布范围0.25–88岁;体重分布范围5.2–160kg)的10927个药物浓度观察值。对于一位35岁70kg的男性患者估计参数为：V1, V2, V3, CL, Q2和Q3分别为9.77, 29.0, 134 L, 1.53, 1.42, 和0.608 L/min。预测性能优于或类似于专业模型，即使是这些模型衍生出的亚群。

结论：本研究已制定出一个通用的丙泊酚PK模型，适于广泛的患者群体和多种临床条件。但需要对其进行进一步的前瞻性评估。

（梁玉丹 译 陈杰 校）

BACKGROUND: Pharmacokinetic (PK) models are used to predict drug concentrations for infusion regimens for intraoperative displays and to calculate infusion rates in target-controlled infusion systems. For propofol, the PK models available in the literature were mostly developed from particular patient groups or anesthetic techniques, and there is uncertainty of the accuracy of the models under differing patient and clinical conditions. Our goal was to determine a PK model with robust predictive performance for a wide range of patient groups and clinical conditions.

METHODS: We aggregated and analyzed 21 previously published propofol datasets containing data from young children, children, adults, elderly, and obese individuals. A 3-compartmental allometric model was estimated with NONMEM software using weight, age, sex, and patient status as covariates. A predictive performance metric focused on intraoperative conditions was devised and used along with the Akaike information criteria to guide model development.

RESULTS: The dataset contains 10,927 drug concentration observations from 660 individuals (age range 0.25–88 years; weight range 5.2–160 kg). The final model uses weight, age, sex, and patient versus healthy volunteer as covariates. Parameter estimates for a 35-year, 70-kg male patient were: 9.77, 29.0, 134 L, 1.53, 1.42, and 0.608 L/min for V1, V2, V3, CL, Q2, and Q3, respectively. Predictive performance is better than or similar to that of specialized models, even for the subpopulations on which those models were derived.

CONCLUSIONS: We have developed a single propofol PK model that performed well for a wide range of patient groups and clinical conditions. Further prospective evaluation of the model is needed.
While rare, anesthesia breathing system obstruction can have devastating consequences. We created simulated occlusions of the expiratory and inspiratory limb of the circle breathing system in 3 current anesthesia workstations; Aisys, ADU (both by GE Healthcare, Madison WI), and Apollo (Draeger Medical, Telford, PA). The automated electronic checkout specific to each machine was then performed. The Aisys allowed users to accept both faults and initiate simulated patient care; the ADU and Apollo did not. Users must be aware of how to test for breathing circuit obstruction, and whether their own equipment does so adequately in the automated checkout.

Benzodiazepine Site Agonists Differentially Alter Acetylcholine Release in Rat Amygdala

Hambrecht-Wiedbusch, Viviane S. PhD; Mitchell, Melinda F. BBA; Firn, Kelsie A. BS; Baghdoyan, Helen A. PhD; Lydic, Ralph PhD

Anesthesia & Analgesia 2014 118 1293–1300

BACKGROUND: Agonist binding at the benzodiazepine site of γ-aminobutric acid type A receptors diminishes anxiety and insomnia by actions in the amygdala. The neurochemical effects of benzodiazepine site agonists remain incompletely understood. Cholinergic neurotransmission modulates amygdala function, and this study tested the hypothesis that benzodiazepine site agonists alter acetylcholine (ACh) release in the amygdala.
METHODS: Microdialysis and high-performance liquid chromatography quantified ACh release in the amygdala of Sprague-Dawley rats (n = 33). ACh was measured before and after IV administration (3 mg/kg) of midazolam or eszopiclone, with and without anesthesia. ACh in isoflurane-anesthetized rats during dialysis with Ringer’s solution (control) was compared with ACh release during dialysis with Ringer’s solution containing (100 μM) midazolam, diazepam, eszopiclone, or zolpidem.

RESULTS: In unanesthetized rats, ACh in the amygdala was decreased by IV midazolam (−51.1%; P = 0.0029; 95% confidence interval [CI], −73.0% to −29.2%) and eszopiclone (−39.6%; P = 0.0222; 95% CI, −69.8% to −9.3%). In anesthetized rats, ACh in the amygdala was decreased by IV administration of midazolam (−46.2%; P = 0.0041; 95% CI, −67.9% to −24.5%) and eszopiclone (−34.0%; P = 0.0009; 95% CI, −44.7% to −23.3%), and increased by amygdala delivery of diazepam (43.2%; P = 0.0434; 95% CI, 2.1% to 84.3%) and eszopiclone (222.2%; P = 0.0159; 95% CI, 68.5% to 375.8%).

CONCLUSIONS: ACh release in the amygdala was decreased by IV delivery of midazolam and eszopiclone. Dialysis delivery directly into the amygdala caused either increased (eszopiclone and diazepam) or likely no significant change (midazolam and zolpidem) in ACh release. These contrasting effects of delivery route on ACh release support the interpretation that systemically administered midazolam and eszopiclone decrease ACh release in the amygdala by acting on neuronal systems outside the amygdala.

和复水化相比，脱水增强人体大脑疼痛诱发反应

Dehydration Enhances Pain-Evoked Activation in the Human Brain Compared with Rehydration

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Anesthesia & Analgesia 2014 118 1317–1325

背景：脱水对于人脑组织及认知功能的负面影响已经有所报道。本研究检验了脱水情况对于疼痛阈值以及脑皮质中疼痛反应活动的影响，并与口服溶液复水化之后的功能性核磁共振做了对比。

方法：五名成年男性分别于不同的 2 天中入脱水与复水化组。各成员首日的身体情况均为随机。全员在两种情况下均经过了 12 小时禁食，之后用跑步机完成了 40min 的定量体能运动。复水化组，成员在测试日前一晚开始共服用口服溶液最多达 3000 毫升。体能运动后，于核磁共振扫描设备下，在受试者前臂内侧给予疼痛刺激（冷加压试验），并分析疼痛引起的大脑活动激活。

结果：在复水化当日，平均每位受试者服用了 2040 毫升口服溶液（从 1800-2500 毫升不等）。生理指标显示受试者经过体能训练脱水化后体重降低越明显，则其复水化后心率增加水平、鼓膜测温、尿比重也越高。受试者的数据显示受试者们反应在脱水化后感受到的口渴感比口服溶液复水化之后要更强烈，而饥饿、焦虑、情绪并未有显著不同。冷加压试验对疼痛相关的神经网络有着强烈的刺激，尤其是扣带前回、岛叶和丘脑。试验刺激在脱水化个体中的波峰群相比复水化个体更加明显，并伴随着疼痛阈值的下降（P=0.001）

结论：本研究发现说明脱水化将使机体对于疼痛刺激的大脑活动兴奋性增加，同时伴有口渴感的增强，而口服溶液能缓解口渴感，并降低大脑对于疼痛刺激的兴奋性。

（贺加贝 译 陈杰 校）

BACKGROUND: Negative effects of dehydration on the human brain and cognitive function have been reported. In this study, we examined the effects of dehydration on pain thresholds and
cortical activations in response to pain, compared with rehydration with an oral rehydration solution (ORS) by functional magnetic resonance imaging.

**METHODS:** Five healthy adult men were subjected to dehydration and rehydration on 2 different days. The condition on the first day was randomly assigned to each subject. They completed a 40-minute exercise protocol using a walking machine after 12 hours of fasting under both conditions. For rehydration, the subjects consumed up to 3000 mL ORS starting from the night before the test day. After exercise, a painful stimulus (cold pressor test) was applied to the subjects’ medial forearm in a magnetic resonance imaging scanning gantry, and pain-evoked brain activation was analyzed.

**RESULTS:** On the rehydration day, each of the subjects consumed an average of 2040 mL (range; 1800–2500 mL) ORS. Physiological data revealed that subjects when dehydrated lost more weight from exercise than subjects when rehydrated had a larger heart rate increase, a higher tympanic temperature, and a higher urine osmolality. Subjective data revealed that the subjects reported significantly stronger thirst while dehydrated than while rehydrated with ORS, although the levels of hunger and anxiety and mood did not significantly differ between conditions. The cold pressor test robustly activated the pain-related neural network, notably the anterior cingulate cortex, insula, and thalamus. Such activations in the dehydrated subjects were greater than those in the rehydrated subjects in terms of peak and cluster, accompanied by a decrease in pain threshold (P = 0.001).

**CONCLUSION:** Our findings suggest that dehydration brings about increased brain activity related to painful stimuli together with enhanced thirst, whereas rehydration with ORS alleviates thirst and decreases brain activity related to painful stimuli.

**小鼠鞘内注射 Myr-NR2B9c 肽通过干扰 NMDA 受体和 PSD-95 蛋白间作用减轻骨癌疼痛**

**Intrathecal Injection of the Peptide Myr-NR2B9c Attenuates Bone Cancer Pain Via Perturbing N-Methyl-D-Aspartate Receptor-PSD-95 Protein Interactions in Mice**

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**背景：**N-甲基-D-天冬氨酸受体(NMDAR)性中枢致敏在癌症疼痛中具有重要作用。通过突触后 PSD-95 结合 NMDAR 亚单位 2B(NR2B)可偶联 NMDAR 激活细胞内酶如神经性一氧化氮合酶(nNOS)，激活下游信号通路并调节 NMDAR 稳定性，从而调控突触可塑性。本研究检测使用一种模拟肽是否影响脊髓内具有 NR2B 的 NMDAR 和 PSD-95 间的特异作用，进而减轻骨癌相关的疼痛。

**方法：**骨肉瘤细胞被植入 C3H/HeJ 小鼠右股骨骨髓腔内诱发进展性骨癌相关性疼痛。Western blotting 检测脊髓内磷酸化 Tyr1472 NR2B、nNOS 和 PSD-95，并进一步调查轴内注射竞争性破坏 NR2B 和 PSD-95 间作用的模拟肽 Myr-NR2B9c 对伤害性行为以及脊髓内与骨癌疼痛有关的磷酸化 Tyr1472 NR2B、nNOS 和 PSD-95 表达上调的影响。

**结果：**骨肉瘤细胞植入可诱发产生进展性骨癌相关性疼痛，并导致磷酸化 Tyr1472 NR2B、nNOS 和 PSD-95 表达显著上调。轴内注射 Myr-NR2B9c 可减轻骨癌引起的机械性疼痛异常、温痛觉过敏，并降低磷酸化 Tyr1472 NR2B、nNOS 和 PSD-95 表达。

**结论：**轴内注射 Myr-NR2B9c 可减轻骨癌相关性疼痛。脊髓 NR2B 细胞内摄作用和含有 NR2B 的 NMDAR 从下游 nNOS 信号活性分离可有助于 Myr-NR2B9c 的镇痛作用。此方法可能涉及与阻滞 NMDAR 相关的负性结果，可作为治疗骨癌疼痛的一种新方法。

（朱浩 译 陈杰 校）
BACKGROUND: N-methyl-D-aspartate receptor (NMDARs)-dependent central sensitization plays an important role in cancer pain. Binding of NMDAR subunit 2B (NR2B) by postsynaptic density protein-95 (PSD-95) can couple NMDAR activity to intracellular enzymes, such as neuronal nitric oxide synthase (nNOS), facilitate downstream signaling pathways, and modulate NMDAR stability, contributing to synaptic plasticity. In this study, we investigated whether perturbing the specific interaction between spinal NR2B-containing NMDAR and PSD-95, using a peptide-mimetic strategy, could attenuate bone cancer-related pain behaviors.

METHODS: Osteosarcoma cells were implanted into the intramedullary space of the right femurs of C3H/HeJ mice to induce progressive bone cancer-related pain behaviors. Western blotting was applied to examine the expression of spinal phospho-Tyr1472 NR2B, nNOS, and PSD-95. We further investigated the effects of intrathecal injection of the mimetic peptide Myr-NR2B9c, which competitively disrupts the interaction between PSD-95 and NR2B, on nociceptive behaviors and on the upregulation of phospho-Tyr1472 NR2B, nNOS, and PSD-95 associated with bone cancer pain in the spinal cord.

RESULTS: Inoculation of osteosarcoma cells induced progressive bone cancer pain and resulted in a significant upregulation of phospho-Tyr1472 NR2B, nNOS, and PSD-95. Intrathecal administration of Myr-NR2B9c attenuated bone cancer-evoked mechanical allodynia, thermal hyperalgesia, and reduced spinal phospho-Tyr1472 NR2B, nNOS, and PSD-95 expression.

CONCLUSIONS: Intrathecal administration of Myr-NR2B9c reduced bone cancer pain. Internalization of spinal NR2B and dissociation NR2B-containing NMDARs activation from downstream nNOS signaling may contribute to the analgesic effects of Myr-NR2B9c. This approach may circumvent the negative consequences associated with blocking NMDARs, and may be a novel strategy for the treatment of bone cancer pain.

超声引导下内收肌管连续阻滞用于全膝关节置换术：一项随机双盲实验
Continuous Ultrasound-Guided Adductor Canal Block for Total Knee Arthroplasty: A Randomized, Double-Blind Trial

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背景：在减少全膝关节置换术患者术后疼痛方面，内收肌管阻滞已经展现了其潜力。然而没有任何随机对照研究评估在内收肌管中连续输注 0.2%罗哌卡因是否能减少阿片类药物的使用。本文假设连续内收肌管阻滞可以减少术后阿片类药物的使用。

方法：80 例初次行单侧全膝关节置换术患者随机接受超声引导下连续 0.2%罗哌卡因内收肌管阻滞或接受假导管放置。术前所有患者都接受单次股神经阻滞和脊麻，这是本机构的一项标准麻醉方式。在调整基线后，协方差分析评估术后 48 小时累积 IV 吗啡消耗量。次要结果包括静息疼痛评分（numeric rating scale），术后 1 天和 2 天物理治疗时的疼痛高峰评分，股四头肌最大等长收缩，物理治疗时的走动距离，术后恶心、呕吐和对镇痛的满意度。

结果：80 名受试者被随机分配，76 名完成了协议研究。48h 累计吗啡消耗量（阻滞-对照）的最小均方差为 1.668mg（95%可信区间为 -29.78 至 3.59，P = 0.013）。两组 24h 和48h（预测的股神经阻滞效应消失后）之间的吗啡使用总量也有不同，最小均方差为 11.17mg（95%可信区间为 -19.93 至 2.42，P = 0.013）。ITT 分析类似于 PP 分析结果。功能结果显示在术后第 2 天，内收肌管导管组患者有更佳的股四头肌力量（P = 0.010）和更远的走动距离（P = 0.034）。
CONCLUSIONS: A continuous adductor canal block for total knee arthroplasty reduces opioid consumption compared with that of placebo in the first 48 hours after surgery. Other outcomes including quadriceps strength, distance ambulated, and pain scores all show benefit from an adductor canal catheter after total knee arthroplasty but require further study before being interpreted as conclusive.

单次低剂量地塞米松对围手术期患者血糖的影响（一项针对妇科手术患者的随机对照研究）

The effect of single low-dose dexamethasone on blood glucose concentrations in the perioperative period: a randomized, placebo-controlled investigation in gynecologic surgical patients.

Murphy GS1, Szokol JW, Avram MJ, Greenberg SB, Shear T, Vender JS, Gray J, Landry E.
Anesthesia & Analgesia 2014 118 1204–1212

背景：单次低剂量地塞米松对围手术期患者血糖的影响至今尚未明确阐述。本研究我们在麻醉诱导期采取两种不同剂量的地塞米松（4mg 和 8mg）进行注射，并在注射后24小时内进行血糖监测。

方法：对200例女性患者进行随机分组，共6组：早期对照组（生理盐水）；早期试验组-4mg（4mg地塞米松）；早期试验组-8mg（8mg地塞米松）；晚期对照组（生理盐水）；晚期试验组-4mg（4mg地塞米松）；晚期试验组-8mg（8mg地塞米松）。对于早期研究组，血糖监测时间设在给药后0h，1h，2h，3h和4h；对于晚期研究组，则设在给
药后 8h 和 24h。对于给药后发生高血糖患者要进行数量统计（高血糖定义为血糖浓度 >180mg/dL）。

结果：所有对照组和试验组的患者血糖浓度值均在围手术期出现明显增高（由血糖基础值 94mg/dL~102 mg/dL 增高到峰值 141mg/dL~161.5 mg/dL，P < 0.001）。不论给予地塞米松的剂量高低（4mg 或 8mg），在不同时间点测定对照组和试验组血糖后，结果未出现明显差异。此外，在早期组和晚期组发生高血糖的发生率也未出现明显差异（早期组：21%-28%，P = 0.807；晚期组：13%-24%，P = 0.552）。

结论：在围手术期给予单次低剂量地塞米松后，24 小时内患者血糖浓度并没有出现明显差异，故建议临床麻醉医生利用地塞米松预防患者恶心呕吐时，没有必要顾虑反应性高血糖。

（王嘉兴译 薛张纲校）

BACKGROUND: The effect of single low-dose dexamethasone therapy on perioperative blood glucose concentrations has not been well characterized. In this investigation, we examined the effect of 2 commonly used doses of dexamethasone (4 and 8 mg at induction of anesthesia) on blood glucose concentrations during the first 24 hours after administration.

METHODS: Two hundred women patients were randomized to 1 of 6 groups: Early-control (saline); Early-4 mg (4 mg dexamethasone); Early-8 mg (8 mg dexamethasone); Late-control (saline); Late-4 mg (4 mg dexamethasone); and Late-8 mg (8 mg dexamethasone). Blood glucose concentrations were measured at baseline and 1, 2, 3, and 4 hours after administration in the early groups and at baseline and 8 and 24 hours after administration in the late groups. The incidence of hyperglycemic events (the number of patients with at least 1 blood glucose concentration >180 mg/dL) was determined.

RESULTS: Blood glucose concentrations increased significantly over time in all control and dexamethasone groups (from median baselines of 94 to 102 mg/dL to maximum medians ranging from 141 to 161.5 mg/dL, all P < 0.001). Blood glucose concentrations did not differ significantly between the groups receiving dexamethasone (either 4 or 8 mg) and those receiving saline at any measurement time. The incidence of hyperglycemic events did not differ in any of the early (21%-28%, P = 0.807) or late (13%-24%, P = 0.552) groups.

CONCLUSIONS: Because blood glucose concentrations during the first 24 hours after administration of single low-dose dexamethasone did not differ from those observed after saline administrations, these results suggest clinicians need not avoid using dexamethasone for nausea and vomiting prophylaxis out of concerns related to hyperglycemia.

使用地塞米松预防术后恶心呕吐与肿瘤复发和高血糖：更多争议？

Cancer Recurrence and Hyperglycemia with Dexamethasone for Postoperative Nausea and Vomiting Prophylaxis: More Moot Points?

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常规使用地塞米松来预防术后恶心呕吐（PONV），在麻醉医师和麻醉供应商之间争论了很多年。为什么？有明确的资料表明，地塞米松低价高效，是预防术后恶心呕吐的优选药物，被 PONV 共识指南所推荐。与可能是最常用的预防和治疗 PONV 的 5-HT-3 受体阻滞剂昂丹司琼相比较，预防 PONV 的需治疗指数为 4，而昂丹司琼为 6。理想的预防剂量是在麻醉诱导期以 4mg 静脉注射，但是，因为阿片类药物的封顶效应和短暂的恢复期，8mg 静脉注射能够产生额外的缓解疼痛的好处。
争论的原因在于地塞米松是糖皮质激素，在围术期的患者时会产生令人担忧的副作用。这些顾虑包括伤口感染，伤口愈合，围术期出血，皮质醇抑制，神经肌肉无力，高血糖，甚至肿瘤复发。在本期的 Anesthesia & Analgesia，使用地塞米松的两个顾虑，类固醇激素与肿瘤复发和围术期高血糖的关系，都会讨论到。

糖皮质激素和它们在肿瘤患者的使用早已是围术期关注到的话题。手术切除是许多类肿瘤的确切治疗方法，肿瘤复发和转移性疾病是肿瘤手术患者死亡最重要的原因。围术期宿主防御的抑制，麻醉技术和药物选择，它们对宿主免疫的影响越来越受到关注。已经显示出地塞米松对T细胞功能和自然杀伤细胞的抑制，它们都参与了抗肿瘤免疫反应。尽管有这些发现，关于使用皮质醇激素和肿瘤复发的资料很少。

在本问题上，De Oliveira 等发表了一个回顾性观察研究，分析了围手术期地塞米松 4~8mg 用于预防术后恶心呕吐对接受原发性卵巢肿瘤细胞减灭术的妇女对卵巢癌和卵巢癌的复发风险的影响。主要目的是通过对围手术期接受地塞米松和没有接受治疗的妇女相比较，卵巢癌复发的风险是否增加。在研究纳入的 260 例妇女中，178 例癌症复发，这些患者中的 102 例注射过地塞米松。这项研究最终发现在主要手术治疗后，围术期使用地塞米松和卵巢癌复发之间没有显著的关联。这些结果表明，有一些缺陷的研究，如样本量小，缺乏术中和术后镇痛管理的规范化。这是特别重要的，因为一些研究，在围手术期使用阿片类药物可能对血管生成和癌症结果产生影响。已发现阿片样物质通过细胞增殖和细胞凋亡的调节来调节肿瘤细胞；它们引起免疫抑制，以及调节血管形成，通过激活血管生成细胞受体如血管内皮生长因子和血小板衍生的生长因子的相互作用来抑制肿瘤转移和生长。另一项研究提出的证据表明，阿片类药物通过γ-阿片受体的相互影响可能对肿瘤的进展有直接影响。使用地塞米松能预防胰腺癌的复发和转移。Munstedt 等发现，化疗使用地塞米松并不影响卵巢癌的结果，但可能对靶癌有保护作用。

使用地塞米松经常受到关注的风险是术中和术后的高血糖，有一些以前的研究表明使用糖皮质激素引起血糖的升高。研究已证实，糖皮质激素已知会增加肝葡萄糖生成，同时增加胰岛素抵抗和降低葡萄糖的氧化和摄取。高血糖作的这些用可能与危重和术后病人的不良反应相关，如抑制免疫功能，增加促炎性细胞因子，增加全身血管阻力，渗透性利尿，电解质以及酸碱失衡。

IMurphy 等为解决这个问题进行了一项随机，安慰剂对照试验，以确定地塞米松用于妇科手术病人在围术期对血糖浓度的影响。主要的结果是在给予单次的低剂量地塞米松治疗 （4 和 8 毫克）后，记录第一个 24 小时的血糖浓度和高血糖事件的发生率（血糖水平> 180 毫克/分升）。患者行子宫切除术，随机分为接受生理盐水，地塞米松 4 毫克，地塞米松 8 mg 3 组，在围手术期 24 小时内的的时间点为每个组测量血糖。该研究发现，尽管血糖浓度在对照组和地塞米松组均显著增加，但地塞米松组和生理盐水对照组之间在围术期 24 小时的任意时间点之间没有显著性差异。结论表明，围术期不应因考虑高血糖事件而避免给予低剂量地塞米松预防术后的恶心呕吐。这一发现在其它文献中的证据得到支持。Abdalmalak 等人的一项研究表明，进入重大非心脏手术后，接受地塞米松 8 毫克组与安慰剂组均有较高的血糖水平，不管是糖尿病还是非糖尿病患者，其效果都是有限的。在一项类似研究中，Nazar 等调查了 40 例非糖尿病和 30 例 2 型糖尿病行腹腔镜胆囊切除术的患者。患者被随机分为生理盐水组和地塞米松 8 毫克组，结果表明，在使用地塞米松预防手术后恶心呕吐后，型糖尿病患者围术期高血糖的敏感性不比非糖尿病患者高。

我们团队最近在本杂志发表了一篇编者按，名字为：使用地塞米松预防术后恶心呕吐和伤口并发症：一个有争议的问题？我们的结论是，目前的文献不支持如下观点：围术期单次剂量的地塞米松在统计学上显著增加伤口并发症的发生率和最终伤口愈合时间。这和使用单次剂量地塞米松预防术后恶心呕吐与肿瘤复发和术中高血糖进行上的上述评估，再次表明麻醉医师能够安全的使用 4~8mg 的地塞米松预防术后恶心呕吐。

（吴赤译 薛张纲校）

The routine use of dexamethasone for the prophylaxis of postoperative nausea and vomiting (PONV) has been controversial and debated among anesthesiologists and anesthesia providers. This debate is due to the concerns regarding the effects of dexamethasone on wound healing, wound infection, postoperative bleeding, and the potential for tumor recurrence. Some studies have suggested that dexamethasone can inhibit T-cell function and natural killer cell activity, which are involved in antitumor immunity. Despite these findings, there is limited evidence regarding the relationship between the use of glucocorticoids and tumor recurrence.

A retrospective observational study by De Oliveira et al. analyzed the effects of peripartum dexamethasone 4~8mg for the prevention of postoperative nausea and vomiting in women undergoing primary ovarian tumor debulking surgery. The primary objective was to compare the risk of ovarian cancer recurrence between women who received peripartum dexamethasone and those who did not. Among the 260 women included in the study, 178 had cancer recurrence, with 102 receiving dexamethasone. This study ultimately found no significant association between postoperative dexamethasone use and ovarian cancer recurrence after major surgery. However, some studies have shown that opioids may affect tumor progression through γ-opioid receptors by regulating tumor cell proliferation and apoptosis.

A randomized, placebo-controlled trial by IMurphy et al. evaluated the impact of a single dose of dexamethasone (4 and 8 mg) on blood glucose concentrations. Patients undergoing gynecologic surgery were randomly assigned to receive saline, dexamethasone 4 mg, or dexamethasone 8 mg, and blood glucose levels were measured at various time points during the peripartum period. The study found that while blood glucose levels increased in both the saline and dexamethasone groups, there were no significant differences between the groups at any time point. This finding supports the conclusion that peripartum dexamethasone does not increase the risk of postoperative hyperglycemia.

The use of dexamethasone in the perioperative setting is often associated with increased postoperative hyperglycemia. Studies have shown that dexamethasone increases hepatic glucose production, decreases insulin sensitivity, and reduces glucose oxidation and uptake. High glucose levels may contribute to poor postoperative outcomes such as immune suppression, increased inflammatory cellular factors, increased systemic vascular resistance, diuresis, electrolyte, and acid-base imbalances.

A randomized, placebo-controlled study by Abdalmalak et al. examined the effects of a single dose of dexamethasone (8 mg) on blood glucose levels in patients undergoing major non-cardiac surgery. Patients were assigned to receive saline or dexamethasone 8 mg, and blood glucose levels were measured at various time points during the perioperative period. The study found that while blood glucose levels increased in both groups, there were no significant differences between them at any time point. This finding supports the conclusion that perioperative dexamethasone does not increase the risk of postoperative hyperglycemia.

We recently published an editorial in this journal, titled: "Dexamethasone for Prophylaxis of Postoperative Nausea and Vomiting: A Controversial Issue?" Our conclusion is that the current literature does not support the view that a single dose of dexamethasone (4-8mg) increases the risk of wound complications and final wound healing time in the perioperative setting. This is consistent with the findings regarding the use of single doses of dexamethasone to prevent postoperative nausea and vomiting and the assessment of the effects of dexamethasone on tumor recurrence and hyperglycemia.
for many years. Why is this? There are clear data to support that dexamethasone, with its relative low cost and high efficacy, is a preferred antiemetic for the prevention of PONV, as recommended by the PONV Consensus Guidelines. Compared with ondansetron, a 5-HT-3 receptor antagonist, which is likely the most commonly used antiemetic to prevent and treat PONV, the number needed-to-treat to prevent PONV for dexamethasone is 4, compared with 6 to 7 for ondansetron. The ideal prophylactic dosage appears to be 4 mg IV at induction of anesthesia; however, 8 mg IV may provide the additional benefit of pain relief because of opioid-sparing effects as well as shorten recovery time.

The reason for this controversy, of course, is that dexamethasone is a glucocorticoid with many feared side effects when used in the perioperative patient population. There have been concerns regarding the risk of wound infections, wound healing, perioperative bleeding, cortisol suppression, neuromuscular weakness, high blood glucose levels, and even cancer recurrence. In this issue of Anesthesia & Analgesia, 2 concerns of dexamethasone, the association with steroids and the recurrence of cancer, as well as the concern for the induction of perioperative hyperglycemia, are examined.

Glucocorticoids and their use in cancer patients have long been a topic of concern in the perioperative setting. Surgical excision is the primary definitive treatment for many forms of cancer, with tumor recurrence and metastatic disease being the most important cause of mortality in surgical cancer patients. The suppression of host defenses in the perioperative period, as well as the role of anesthetic techniques and drug choices, are becoming increasingly scrutinized regarding their effect on host immunity. Dexamethasone has been shown to suppress T cell function as well as natural killer cell development, both of which are known to participate in antitumor immune responses. Despite these findings, there are few data at this point regarding corticosteroid use and cancer recurrence.

In this issue, De Oliveira et al. present a retrospective observational study that analyzes the effect of perioperative systemic dexamethasone (4–10 mg) for PONV prophylaxis in women who underwent primary ovarian cytoreductive surgery for ovarian cancer and the risk of ovarian cancer recurrence. The primary aim was to determine the overall increase in the risk of ovarian cancer recurrence in these patients by determining tumor recurrence in women given perioperative dexamethasone versus those who did not receive the medication. Of 260 women included in the study, 178 had cancer recurrence; 102 of these patients received dexamethasone. The study ultimately found no significant association between perioperative dexamethasone use and ovarian cancer recurrence after primary surgical treatment and therefore does not support the avoidance of single-dose dexamethasone for PONV prophylaxis. There are some acknowledged weaknesses to the study, such as a small sample size and a lack of standardization of intraoperative and postoperative analgesic management. This is particularly important in that several studies have suggested that the use of opioids in the perioperative setting may have an effect on angiogenesis and cancer outcomes. Opioids have been found to regulate the growth of neoplastic cells through the modulation of cell proliferation and apoptosis; they cause immunosuppression, as well as modulate angiogenesis, aiding tumor metastasis and growth through activation of vascular growth cell receptors such as vascular endothelial growth factor and platelet derived growth factor. Another study presented evidence that opioids may have a direct effect on lung cancer progression through interaction with the µ-opioid receptor. In cancer recurrence from single-dose dexamethasone, there is no clinical evidence in the literature to refute the above findings. In fact, Egberts et al. created an animal model in which dexamethasone had utility in preventing the recurrence and metastasis of pancreatic cancer. A study by Munstedt et al. found that dexamethasone used along with chemotherapy did not affect ovarian cancer outcomes but may have protective effects on bone marrow.

Another often-touted risk of dexamethasone use is the concern for intraoperative and postoperative hyperglycemia, with several previous studies demonstrating a transient rise in glucose levels with the use of glucocorticoids. Glucocorticoids are known to increase hepatic glucose production, while increasing insulin resistance and decreasing glucose oxidation and
uptake. These hyperglycemic effects may be associated with adverse outcomes in the critically ill and postsurgical patients, such as suppression of immune function, increase in proinflammatory cytokines, increased systemic vascular resistance, osmotic diuresis, and electrolyte as well as acid–base imbalances.

Murphy et al. address this concern in this issue with a randomized, placebo-controlled trial to address the effect of dexamethasone on blood glucose concentration in the perioperative environment for gynecologic surgical patients. The primary outcome was to determine the effect of a single low-dose dexamethasone therapy (4 and 8 mg) on blood glucose concentrations during the first 24 hours following administration and to record the incidence of hyperglycemic events (blood glucose level >180 mg/dL). Patients presenting for elective hysterectomies were randomized to receive saline, dexamethasone 4 mg, or dexamethasone 8 mg, with blood glucose measurements at specified times for each group within a 24-hour perioperative period. The study found that while blood glucose concentrations increased significantly in all control and dexamethasone groups, they did not differ significantly between the dexamethasone and saline control groups at any time within the 24-hour perioperative period. Therefore, the results suggest that low-dose dexamethasone used for PONV prophylaxis should not be avoided because of concerns for hyperglycemic events. This finding is supported by other evidence in the literature. One study by Abdelmalak et al. showed that while patients undergoing major noncardiac surgery had higher blood glucose levels after receiving dexamethasone 8 mg versus placebo, the effect was very limited in both diabetic and nondiabetic patients. A similar study by Nazar et al. investigated a group of 40 nondiabetic and 30 type-2 diabetic patients undergoing laparoscopic cholecystectomy. Patients were randomized to receive either saline or dexamethasone 8 mg, and the results showed that there was no higher susceptibility in the type-2 diabetic patients than the nondiabetic patients to develop perioperative hyperglycemia following PONV doses of dexamethasone.

Our group recently wrote an editorial in this journal with the title: Wound complications with dexamethasone for postoperative nausea and vomiting prophylaxis: a moot point? We concluded that the current literature does not support the concern that single-dose use of intraoperative dexamethasone contributes to a statistically significant increase in the incidence of wound complications or time to complete wound healing. This, along with the above evaluations of the concerns of the use of single-dose dexamethasone for PONV and the recurrence of cancer or intraoperative hyperglycemia, suggest again that anesthesiologists can safely use dexamethasone 4 to 8 mg doses for PONV prophylaxis.

心脏外科病人中输注储存的同种异体血而非自体血回收后损伤红细胞的可塑性

Impaired Red Blood Cell Deformability after Transfusion of Stored Allogeneic Blood but Not Autologous Salvaged Blood in Cardiac Surgery Patients

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背景：心脏外科病人中，红细胞的可塑性和聚集性受自体血回收的单一影响很小，但同种异体血输注起负面影响。

方法：本研究采用前瞻性队列研究设计，32 例行心脏外科手术的病人根据输血方式分为 3 组：单独输注自体血红细胞组（Auto，n=12），输注自体血红细胞和少量（<5 单位）同种异体血红细胞组（Auto+Allo min；n=10），和输注自体血红细胞与中等量（>5 单位）同种异体血红细胞（Auto+Allo mod；n=10）。在术前、术中和术后 3 天分别利用激光衍射法检测红细胞的伸长指数（可塑性）和临界剪切应力（聚集性）。
BACKGROUND: Both cardiopulmonary bypass (CPB) and red blood cell (RBC) storage are associated with detrimental changes in RBC structure and function that may adversely affect tissue oxygen delivery. We tested the hypothesis that in cardiac surgery patients, RBC deformability and aggregation are minimally affected by CPB with autologous salvaged blood alone but are negatively affected by the addition of stored allogeneic blood.

METHODS: In this prospective cohort study, 32 patients undergoing cardiac surgery with CPB were divided into 3 groups by transfusion status: autologous salvaged RBCs alone (Auto; n = 12), autologous salvaged RBCs + minimal (<5 units) stored allogeneic RBCs (Auto+Allo min; n = 10), and autologous salvaged RBCs + moderate (≥5 units) stored allogeneic RBCs (Auto+Allo mod; n = 10). Ektacytometry was used to measure RBC elongation index (deformability) and critical shear stress (aggregation) before, during, and for 3 days after surgery.

RESULTS: In the Auto group, RBC elongation index did not change significantly from the preoperative baseline. In the Auto+Allo min group, mean elongation index decreased from 32.31 ± 0.02 (baseline) to 30.47 ± 0.02 (nadir on postoperative day 1) (P = 0.003, representing a 6% change). In the Auto+Allo mod group, mean elongation index decreased from 32.7 ± 0.02 (baseline) to 28.14 ± 0.01 (nadir on postoperative day 1) (P = 0.0001, representing a 14% change). Deformability then dose-dependently recovered toward baseline over the first 3 postoperative days. Changes in aggregation were unrelated to transfusion (no difference among groups). For the 3 groups combined, mean critical shear stress decreased from 359 ± 174 mPa to 170 ± 141 mPa (P = 0.01, representing a 54% change), with the nadir at the end of surgery and returned to baseline by postoperative day 1.

CONCLUSIONS: In cardiac surgery patients, transfusion with stored allogeneic RBCs, but not autologous salvaged RBCs, is associated with a decrease in RBC cell membrane deformability that is dose-dependent and may persist beyond 3 postoperative days. These findings suggest that autologous salvaged RBCs may be of higher quality than stored RBCs, since the latter are subject to the so-called storage lesions.

Inhibition of Voltage-Gated Na+ Channels by the Synthetic Cannabinoid Ajulemic Acid

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背景：合成大麻素 ajulemic 酸已被证实可以缓解患者慢性神经性疼痛。大麻素可与疼痛机制环路中数个分子相互作用，包括对电压门控钠通道的强效抑制作用。在本研究中，我们在神经细胞及非神经细胞钠通道中深入研究了这个特性。
**METHODS:** We investigated the inhibitory effect of ajulemic acid on inward sodium currents in vitro. Human embryonic kidney 293t cells were used as the expression system for Nav1.2, 1.3, 1.4, 1.5, 1.5N406K, 1.5F1760A, and 1.7; Nav1.8 was transiently expressed in ND7/23 cells. Nav1.2, Nav1.3, and Nav 1.8 were from rats, and Nav1.4, Nav1.5, and Nav1.7 were of human origin. Sodium currents were analyzed by means of the whole cell patch-clamp technique. The investigated concentrations of ajulemic acid were 0.1, 0.3, 1, 3, 10, and 30 μmol/L.

**RESULTS:** Ajulemic acid reversibly and concentration-dependently inhibited all voltage-gated sodium channel (Nav) isoforms investigated in this study, including Nav1.2, 1.3, 1.4, 1.5, 1.7, and 1.8. Tonic block of resting channels yielded half-maximal inhibitory concentration values between 2 and 9 μmol/L and was strongly enhanced on inactivated channels, suggesting state-dependent inhibition by ajulemic acid. Tonic block did not differ significantly when comparing Nav1.2 and Nav1.3, Nav1.4 and Nav1.5, and Nav1.7 and Nav1.8. Statistical analysis of other combinations of subunits (e.g., Nav1.2 and Nav1.4) by analysis of variance yielded a significant difference in block. Although we did not observe any relevant use-dependent block, ajulemic acid induced a strong hyperpolarizing shift of the voltage dependency of fast inactivation and modest shift of slow inactivation. The local anesthetic-insensitive Nav1.5 constructs N406K and F1760A displayed a preserved sensitivity to block by ajulemic acid. Finally, we found that low concentrations of ajulemic acid efficiently inhibited Navβ4 peptide-mediated resurgent currents in Nav1.5.

**CONCLUSIONS:** Our data suggest that block of sodium channels can be a relevant mechanism by which ajulemic acid alleviates neuropathic pain. The potent inhibition of resurgent currents and the preserved block on local anesthetic-insensitive channels indicates that ajulemic acid interacts with a conserved but yet unknown site of sodium channels.
可视喉镜辅助可弯曲气管镜对预测为困难气道的患者进行气管插管是否可行？一项前瞻性、随机临床试验

Is Video Laryngoscope-Assisted Flexible Tracheoscope Intubation Feasible for Patients with Predicted Difficult Airway? A Prospective, Randomized Clinical Trial

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背景：插管失败有可能会增加患者的发病率和死亡率。可视喉镜联合可弯曲气管镜相当于一个可弯曲的可视管芯，可以提高困难气道插管的成功率。我们通过研究检验了这种组合方法，发现这不仅易化了预测为困难气道的患者的气管插管，还可以缩短插管时间、减少插管尝试次数。

方法：我们随机、前瞻性地对140例行择期或急诊手术预期为困难气道的患者进行了试验。插入可视喉镜后，患者被随机分配到放置预成型管芯组（对照组）或可弯曲气管镜组（干预组）。研究主要观察的指标是插管成功的时间和气管插管尝试的次数。

结果：研究表明两组间需要2次或以上尝试插管次数的患者人数相似（对照组为14%，干预组为13%，P = 1.0）；两组间需要3次或以上尝试插管次数的患者人数没有显著差异（对照组为8.6%，干预组为1.4%，P = 0.12）。两组间插管时间的分布曲线也没有显著差异（对照组：中位数为66秒，四分位数间距47–89秒；干预组：中位数为71秒，四分位数间距52–100秒，P = 0.35）。

在对照组中，4例颈椎病患，使用可视喉镜和硬质管芯尝试插管失败3次后，采用可视喉镜联合可弯曲气管镜插管成功。对于这4例患者，从决定改变插管方法至可弯曲气管镜成功插管用时为36±14秒。干预组中颈椎患者插管的总体成功概率为100%（20/20），而对照组为80%（16/20），95%置信区间分别为1.4%和44%，P = 0.04。

结论：对于预测为困难气道的患者，可弯曲气管镜辅助可视喉镜插管是仅使用可视喉镜的一个可行的替代方案。可弯曲气管镜联合可视喉镜还可能进一步增加明确有困难气道的择期手术患者气管插管的成功率，特别是当需要保持线性稳定时。

（江凌慧译 薛张纲校）

BACKGROUND: Failed intubation may result in both increased morbidity and mortality. The combination of a video laryngoscope and a flexible tracheoscope used as a flexible video stylet may improve the success rate of securing a difficult airway. We tested the hypothesis that this combination is a feasible way to facilitate intubation in patients with a predicted difficult airway in that it will shorten intubation times and reduce the number of intubation attempts.

METHODS: We conducted a randomized, prospective trial in 140 patients with anticipated difficult airways undergoing elective or urgent surgery. After insertion of video laryngoscope, patients were randomly assigned to either having their tube placed with the use of a preformed stylet (control group) or with a flexible tracheoscope (intervention group). The primary outcome measures were time to successful intubation and number of intubation attempts.

RESULTS: The number of intubations requiring 2 or more intubation attempts was similar in the 2 groups (14% control vs 13% intervention, P = 1.0); the number of patients requiring 3 or more intubation attempts was not significantly different (8.6% control vs 1.4% intervention, P = 0.12). Distribution for time to intubation also did not differ between the control (median of 66 seconds, interquartile range 47–89) and the intervention group (median of 71 seconds, interquartile range 52–100; P = 0.35). In the control group, 4 patients, all with cervical spine pathology, had the trachea intubated successfully with the video laryngoscope plus flexible tracheoscope after 3 failed attempts with video laryngoscope and rigid stylet. For these 4 patients, time from the decision to change the intubation method to successful intubation with a flexible tracheoscope was 36 ± 14 seconds. Overall success probability for cervical spine patients was
100% (20/20) in the intervention group and 80% (16/20) in the control group, with an exact 95% confidence interval for the difference of 1.4% to 44%, *P* = 0.04.

**CONCLUSIONS:** Flexible tracheoscope-assisted video laryngoscopic intubation is a feasible alternative to video laryngoscope only intubation in patients with predicted difficult airways. A flexible tracheoscope used in combination with video laryngoscope may also further increase the success rate of intubation in select patients with a proven difficult airway, particularly when inline stabilization is required.

**Background:** Although blood transfusion is a common therapeutic intervention and a mainstay of treating surgical blood loss, it may be perceived by patients and their physicians as having associated risk of adverse events. Practicing patient-centered care necessitates that clinicians have an understanding of an individual patient's perceptions of transfusion practice and incorporate this into shared medical decision-making.

**Methods:** A paper survey was completed by patients during routine outpatient preoperative evaluation. An online survey was completed by attending anesthesiologists and surgeons at the same institution. Both surveys evaluated perceptions of the overall risk of transfusions, level of concern regarding 5 specific adverse events with transfusion, and perceptions of the frequency of adverse events.

Perceptions about blood transfusion: a survey of surgical patients and their anesthesiologists and surgeons.

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those adverse events. Group differences were evaluated with conventional inferential biostatistics.

RESULTS: A total of 294 patients and 73 physicians completed the surveys. Among the surveyed patients, 20% (95% confidence interval, 15%-25%) perceived blood transfusions as "very often risky" or "always risky." Greater perceived overall bloodtransfusion risk was associated with African American race (P = 0.028) and having a high school or less level of education (P = 0.022). Greater perceived risk of allergic reaction (P = 0.001), fever (P < 0.001), and dyspnea (P = 0.001) were associated with African American race. Greater perceived risk of allergic reaction (P = 0.009), fever (P = 0.039), dyspnea (P = 0.004), human immunodeficiency virus/acquired immune deficiency syndrome and hepatitis (P = 0.003), and medical error (P = 0.039) were associated with having a high school or less level of education. Patients and physicians also differed significantly in their survey responses, with physicians reporting greater overall perceived risk with a bloodtransfusion (P = 0.001).

CONCLUSIONS: Despite improvements in bloodtransfusion safety in the United States and other developed countries, the results of this study indicate that a sizeable percentage of patients still perceive transfusion as having significant associated risk. Furthermore, patients and their anesthesiologists/surgeons differ in their perceptions about transfusion-related risks and complications. Understanding patients' perceptions of bloodtransfusion and identifying groups with the greater specific concerns will better enable health care professionals to address risk during the informed consent process and recommend blood management in accordance with the individual patient's values, beliefs, and fears or concerns.
strategies. Our goal was to determine whether direct injection of BoNT-A into painful muscle groups is effective for cervical and shoulder girdle myofascial pain.

METHODS: An enriched protocol design was used, wherein 114 patients with cervical and shoulder girdle myofascial pain underwent injection of BoNT-A to determine their response to the drug. Fifty-four responders were then enrolled in a 12-week, randomized, double-blind, placebo-controlled trial. Pain scales and quality of life measures were assessed at baseline and at routine follow-up visits until completion of the study after 26 weeks.

RESULTS: Injection of BoNT-A into painful muscle groups improved average visual numerical pain scores in subjects who received a second dose of BoNT-A compared to placebo ($P = 0.019$ [0.26, 2.78]). Subjects who received a second dose of BoNT-A had a reduced number of headaches per week ($P = 0.04$ [0.07, 4.55]). Brief Pain Inventory interference scores for general activity and sleep were improved ($P = 0.046$ [0.038, 3.700] and 0.02 [0.37, 4.33], respectively) in those who received a second dose of BoNT-A.

CONCLUSION: BoNT-A injected directly into painful muscle groups improves average pain scores and certain aspects of quality of life in patients experiencing severe cervical and shoulder girdle myofascial pain.

纳米麻醉：一项由磁石导向的经静脉给予含罗哌卡因纳米颗粒进行踝部关节阻滞的新技术

Nanoanesthesia: a novel, intravenous approach to ankle block in the rat by magnet-directed concentration of ropivacaine-associated nanoparticles.

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背景：我们研究联合静脉注射含罗哌卡因的有磁性的纳米颗粒及踝部磁性导向进行足踝关节阻滞作为目前局部神经阻滞的替代方法的可行性。

方法：我们通过测量鼠足部对热刺激的撤药潜伏期来观察磁性导向的含罗哌卡因的磁性纳米颗粒的麻醉效果。含罗哌卡因的磁性纳米颗粒复合体由 0.7% 罗哌卡因（重量/容积）和含 12% 磁性物质（Fe3O4，重量/重量）的 0.8% 磁性纳米颗粒（重量/容积）构成。我们在注射该复合体 15、30 及 60min 时对有磁性导向的右足及没有磁性导向的左足及传统应用 0.1% 或 0.2% 罗哌卡因进行的踝关节阻滞进行比较，并在 30min 时对单纯注射该复合体的右足与联合磁性导向的右足进行比较。另外，我们还测定了含罗哌卡因的磁性纳米颗粒复合体的药代动力学。

结果：与经过预处理的同侧足掌及没有磁性导向的对侧足掌相比较，静脉注射含罗哌卡因的磁性纳米颗粒联合足部磁性导向可显著增加足掌对热刺激的撤药潜伏期 ($p < 0.0001$)。磁性导向 30min 后踝部组织罗哌卡因绝对浓度及踝部组织/血浆浓度比例均高于单纯注射含罗哌卡因的磁性纳米颗粒复合体（均值 ± 标准差，150 ± 10 ng/g vs 105 ± 15 ng/g 及 6.1 ± 0.8 vs 4.2 ± 0.7）。

结论：我们的研究表明通过静脉注射含罗哌卡因的磁性纳米颗粒复合体联合踝部磁性导向进行踝关节阻滞是可行的，并推荐对该方法进行深入研究。

（郝光伟译 薛张纲校）

BACKGROUND: As an alternative to current methods of local nerve block, we studied the feasibility of producing ankle block in the rat with IV injection of magnetic nanoparticles (MNPs) associated with ropivacaine and application of a magnet at the ankle.
METHODS: The anesthetic effect of magnet-directed ropivacaine-associated MNPs (MNP/Ropiv) was tested in the rat using paw withdrawal latencies from thermal stimuli applied to the hindpaw. The MNP/Ropiv complexes consisted of 0.7% w/v ropivacaine and 0.8% w/v MNPs containing 12% w/w magnetite (Fe3O4). The effect of IV injection of MNP/Ropiv with 15, 30, and 60-minute magnet application to the right ankle was compared with the effect without magnet application on the left hindpaw, to conventional ankle block with 0.1% or 0.2% ropivacaine, and to IV injection of MNPs alone with 30-minute magnet application to the right ankle. In addition, the pharmacokinetics of the MNP/Ropiv complexes were determined.

RESULTS: IV injection of MNP/Ropiv with magnet application at the ankle significantly increased paw withdrawal latencies from thermal stimuli compared with pretreatment baselines in the same paw (P < 0.0001) and compared with the contralateral paw without magnet application (P < 0.0001). IV injection of MNPs alone had no significant effect on paw withdrawal latency. Absolute ropivacaine concentrations in ankle tissue, and ankle tissue-to-plasma concentration ratios were higher in the MNP/Ropiv group with 30-minute magnet application compared with MNP/Ropiv group without magnet application (mean ± SEM, 150 ± 10 ng/g vs 105 ± 15 ng/g, respectively, and 6.1 ± 0.8 vs 4.2 ± 0.7, respectively).

CONCLUSIONS: The current study establishes proof of principle that it is possible to produce ankle block in the rat by IV injection of MNP/Ropiv complexes and magnet application at the ankle. The results indicate that further study of this approach is warranted.

地塞米松与卵巢癌复发有关吗?

Is Dexamethasone Associated with Recurrence of Ovarian Cancer?

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背景：基础科学研究表明在经过可能具有疗效的手术治疗后，围术期免疫损伤可能增加肿瘤复发的风险。尽管地塞米松具有免疫抑制的特性，但为了减少术后恶心呕吐的发生，地塞米松仍普遍应用于肿瘤患者。因此我们对围术期使用地塞米松增加卵巢癌复发风险的假设进行了验证。

方法：我们使用了由西北大学妇产科肿瘤部门建立的数据库，从中选取了1997年1月至2007年10月行原发性卵巢癌细胞减灭术的女性患者。我们将肿瘤复发患者中围术期全身性使用地塞米松（4-10mg）与未使用地塞米松的患者进行比较。研究的主要终点是倾向性匹配到肿瘤复发的时间。复发被定义为癌抗原125>21 U/mL 或 CT 发现肿瘤组织并经过病理证实。我们使用了10000个样本的自助法来计算倾向性匹配组间的差值中位数和95%可信区间。

结果：260名行原发性肿瘤细胞减灭术的卵巢癌女性患者符合入选标准，其中102名患者围术期全身性使用了地塞米松。178名患者被发现肿瘤复发，肿瘤复发时间的总体未调整中位数（IQR）为18（7-50）个月。87例患者与87名对照患者进行倾向性匹配来调整混杂变量。经过倾向性匹配分组，地塞米松组复发时间的IQR为23（6-46）个月，对照组为18（8-53）个月（P=0.63），地塞米松组与对照组间复发时间的差值中位数（95%可信区间）为5（-8至17）个月。

结论：我们并未发现围术期全身性使用地塞米松与原发性肿瘤细胞减灭术后卵巢癌复发之间有联系的证据。本研究结果不支持避免卵巢癌患者围术期使用低剂量地塞米松来预防术后恶心呕吐和疼痛。

（张怡译 李士通 审校）
BACKGROUND: Basic science studies suggest that perioperative immune impairment may augment the risk of cancer recurrence after otherwise potentially curative surgery. Despite its immunosuppressant properties, dexamethasone is commonly given to oncologic patients in an effort to reduce postoperative nausea and vomiting. We therefore tested the hypothesis that perioperative dexamethasone administration increases the risk of ovarian cancer recurrence.

METHODS: Women who had primary ovarian cytoreductive surgery between January 1997 and October 2007 were identified using a database maintained by the division of Gynecologic Oncology at Northwestern University. Tumor recurrence in women given perioperative systemic dexamethasone (4-10 mg) was compared with those who did not receive dexamethasone. The primary outcome was the propensity-matched time to cancer recurrence. Recurrence was defined by a carcinoantigen 125 >21 U/mL or computerized tomography evidence of the disease followed by tissue confirmation. Median difference and 95% confidence interval between the propensity-matched groups were calculated using a 10,000 sample bootstrap.

RESULTS: Among 260 women having primary cytoreductive surgery for ovarian cancer that met our inclusion criteria, 102 subjects were given perioperative systemic dexamethasone. Cancer recurrence was observed in 178 subjects, and the overall unadjusted median (IQR) time to recurrence was 18 (7-50) months. Eighty-seven cases and 87 controls were propensity matched to adjust for confounding covariates. After propensity matching the groups for confounding covariates, the median (IQR) time to recurrence in the dexamethasone group was 23 (6-46) compared with 18 (8-53) months in the control group (P = 0.63) with a median (95% confidence interval) difference of time to recurrence between the dexamethasone and the control group of 5 (-8 to 17) months.

CONCLUSION: We could not find evidence for an association between perioperative systemic dexamethasone administration and ovarian cancer recurrence after primary cytoreductive surgery. Our results do not support avoiding low-dose perioperative dexamethasone for prevention of postoperative nausea, vomiting, and pain in ovarian cancer patients.
Subclinical Carbon Monoxide Limits Apoptosis in the Developing Brain After Isoflurane Exposure

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BACKGROUND: Volatile anesthetics cause widespread apoptosis in the developing brain. Carbon monoxide (CO) has antiapoptotic properties, and exhaled endogenous CO is commonly rebreathed during low-flow anesthesia in infants and children, resulting in subclinical CO exposure. Thus, we aimed to determine whether CO could limit isoflurane-induced apoptosis in the developing brain.

METHODS: Seven-day-old male CD-1 mouse pups underwent 1-hour exposure to 0 (air), 5, or 100 ppm CO in air with or without isoflurane (2%). We assessed carboxyhemoglobin levels, cytochrome c peroxidase activity, and cytochrome c release from forebrain mitochondria after exposure and quantified the number of activated caspase-3 positive cells and TUNEL positive nuclei in neocortex, hippocampus, and hypothalamus/thalamus.

RESULTS: Carboxyhemoglobin levels approximated those expected in humans after a similar time-weighted CO exposure. Isoflurane significantly increased cytochrome c peroxidase activity, cytochrome c release, the number of activated caspase-3 cells, and TUNEL positive nuclei in the forebrain of air-exposed mice. CO, however, abrogated isoflurane-induced cytochrome c peroxidase activation and cytochrome c release from forebrain mitochondria and decreased the number of activated caspase-3 positive cells and TUNEL positive nuclei after simultaneous exposure with isoflurane.

CONCLUSIONS: Taken together, the data indicate that CO can limit apoptosis after isoflurane exposure via inhibition of cytochrome c peroxidase depending on concentration. Although it is unknown whether CO directly inhibited isoflurane-induced apoptosis, it is possible that low-flow anesthesia designed to target rebreathing of specific concentrations of CO may be a desired strategy to develop in the future in an effort to prevent anesthesia-induced neurotoxicity in infants and children.
Transesophageal Echocardiography During MitraClip® Procedure

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The percutaneous mitral valve (MV) repair procedure performed with the MitraClip delivery system is increasingly used to treat severe mitral regurgitation in high-risk patients. The treatment involves percutaneous insertion and positioning of a clip between the MV leaflets. Transesophageal echocardiography (TEE) plays a key role in the procedure by providing information regarding clip navigation, clip alignment to the MV coaptation line, transmitial advancement of the system, leaflet grasping, confirmation of valve tissue catching, and assessment of the final result. Real-time 3-dimensional TEE has increasing value in percutaneous MV repair providing high-quality visualization of both the heart and the intravascular devices. Optimal visualization by 3-dimensional TEE is obtained through both the atrial and ventricular aspects. In contrast to MV surgery, where TEE is involved in the prebypass assessment phase and in evaluation of the final repair, TEE is mandatory to guide management during MitraClip repair. Cardiac anesthesiologists may provide assistance to interventional cardiologists during the procedure itself in addition to their anesthetic-related tasks.
The pulse oximeter is a critical monitor in anesthesia practice designed to improve patient safety. Here, we present an approach to improve the ability of anesthesiologists to monitor arterial oxygen saturation via pulse oximetry through an audiovisual training process. Fifteen residents' abilities to detect auditory changes in pulse oximetry were measured before and after perceptual training. Training resulted in a 9% (95% confidence interval, 4%-14%, P = 0.0004, t166 = 3.60) increase in detection accuracy, and a 72-millisecond (95% confidence interval, 40-103 milliseconds, P < 0.0001, t166 = -4.52) speeding of response times in attentionally demanding and noisy conditions that were designed to simulate an operating room. This study illustrates the benefits of multisensory training and sets the stage for further work to better define the role of perceptual training in clinical anesthesiology.

The Effects on Gastric Emptying and Carbohydrate Loading of an Oral Nutritional Supplement and an Oral Rehydration Solution: A Crossover Study with Magnetic Resonance Imaging

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BACKGROUND: Preoperative administration of clear fluids by mouth has recently been endorsed as a way to improve postoperative outcomes. A carbohydrate-containing beverage supplemented with electrolytes or proteins may have additional benefits for patients' satisfaction. However, effects on gastric residual, nausea, and emesis and the effectiveness of these beverages for improving patients' hydration status have not been well defined.

METHODS: We evaluated changes in gastric volume over time by magnetic resonance imaging, as well as blood glucose levels, before and after administration of 500 mL oral rehydration solution (ORS) containing 1.8% glucose and electrolytes in 10 healthy volunteers. The same volume of an oral nutritional supplement (ONS) containing 18% glucose and supplemental arginine (545 mOsm/kg) was given to the same population using a crossover design.

Method: We evaluated changes in gastric volume over time by magnetic resonance imaging, as well as blood glucose levels, before and after administration of 500 mL oral rehydration solution (ORS) containing 1.8% glucose and electrolytes in 10 healthy volunteers. The same volume of an oral nutritional supplement (ONS) containing 18% glucose and supplemental arginine (545 mOsm/kg) was given to the same population using a crossover design.
RESULTS: The mean (median, 95% confidence interval) gastric fluid volume at 1 hour after oral ingestion was 55.0 (55.3, 39.0-70.9) mL in the ORS group, whereas 409.2 (410.9, 371.4-447.0) mL in the ONS group (P = 0.0002). The gastric fluid volume of all participants in the ORS group returned to <1 mL/kg at 90 minutes after ingestion, whereas none reached <1 mL/kg at 120 minutes in the ONS group. The ONS group showed a sustained increase in the blood glucose level after ingestion (P < 0.0001 to baseline at 30, 60, 120 minutes), while the ORS group showed an initial increase (P < 0.0001, P = 0.01, P = 0.205 at each time point).

CONCLUSIONS: ORS supplemented with a small amount of glucose showed faster gastric emptying, which may make it suitable for preoperative administration. In contrast, ONS supplemented with arginine with a relatively low osmolality was associated with a longer time for gastric emptying, although it showed a sustained increase in blood glucose level.
patients receiving postoperative IV analgesia with fentanyl (IA, n = 368). The median time of follow-up for all patients was 4.2 years (2-9). The rates of recurrence of cancer (37.7% vs 30.7%, P = 0.036) and death (40.6% vs 30.4%, P = 0.003) were higher in the EA group versus IA group. Recurrence-free survival was similar in both the EA and IA groups (hazards ratio 2.224, 95% confidence interval, 0.207-23.893, P = 0.509). Using a multivariate Cox proportional hazards regression adjusted with propensity scores, independent risk factors for long-term survival in patients after resection of hepatocellular carcinoma were ASA physical status, tumor diameter, preoperative α-fetoprotein (+) as well as postoperative epidural analgesia with morphine.

CONCLUSION: Compared with postoperative IV analgesia with fentanyl, postoperative epidural analgesia with morphine was associated with increased cancer recurrence and death but had no significant effect on recurrence-free survival in patients undergoing resection of hepatocellular carcinoma.

姜黄素可减轻切口疼痛及增进功能恢复

Curcumin Treatment Attenuates Pain and Enhances Functional Recovery after Incision

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背景：尽管阿片类药物、辅助药物及区域麻醉不断进步，仍有20%～30%的患者术后发生中至重度疼痛。根据不同手术类型，10%～50%的患者术后持续性疼痛，而目前并没有建立预防方法。姜黄素（diferuloylmethane）是姜黄中的一种酚类成分，在东方传统医学中作为防腐剂，抗氧化剂，抗炎药，镇痛剂使用。它可能对治疗术后疼痛有效果。

方法：我们使用C57BL/6小鼠后爪切口模型，记术后7天内对机械和热刺激的敏感度以及水肿程度和温度。条件性位置偏爱实验（CPP）用于评估切口自发痛，而多参数数字步态分析则评估步态功能的改变。

结果：姜黄素（50 mg/kg）显著降低后爪切口小鼠对机械和热的敏感性。姜黄素对基线疼痛阈值无影响。姜黄素也减轻后爪切口肿胀，提示其有抗炎效果。此外，围手术期姜黄素治疗减轻小鼠后爪切口用前列腺素E2所诱发的痛觉过敏。此外，CPP提示对照组小鼠切口48小时后有自发疼痛，而姜黄素治疗组小鼠无持续性疼痛。同时，小鼠后爪切口引发数个步态相关指数变化，但姜黄素治疗组小鼠正常。姜黄素治疗组小鼠在术后1至3天，体内早期痛觉免疫介质，包括白细胞介素（IL）-1β，IL-6，肿瘤坏死因子α和巨噬细胞炎性蛋白-1α，其围切口期水平没有减少甚至还增强了。相同条件下，抗炎细胞因子IL-10不变，而转化生长因子-β水平增强。

结论：我们的研究表明，姜黄素治疗有效缓解切口诱发的炎症，痛觉过敏，自发痛，和功能步态异常。转化生长因子-β水平增强提示了可能的机制。这些临床研究结果表明姜黄素可能用于预防治疗术后疼痛。

(魏薇 译，李士通 审校)

BACKGROUND: Acute pain after surgery remains moderate to severe for 20% to 30% of patients despite advancements in the use of opioids, adjuvant drugs, and regional anesthesia. Depending on the type of surgery, 10% to 50% of patients experience persistent pain postoperatively, and there are no established methods for its prevention. Curcumin (diferuloylmethane) is one of the phenolic constituents of turmeric that has been used in Eastern traditional medicine as an antiseptic, antioxidant, anti-inflammatory, and analgesic agent. It may be effective for treating postoperative pain.

METHODS: We used the hindpaw incision model with C57BL/6 mice. Sensitization to mechanical and thermal stimuli as well as effects on edema and temperature were measured up
RESULTS: Curcumin (50 mg/kg) significantly reduced the intensity of mechanical and heat sensitization after hindpaw incision in mice. No effects of curcumin on baseline nociceptive thresholds were observed. Curcumin also reduced hindpaw swelling after incision, suggesting an anti-inflammatory effect. In addition, perioperative curcumin treatment attenuated hyperalgesic priming due to incision when mice were subsequently challenged with hindpaw prostaglandin E2 application. Furthermore, while vehicle-treated mice had evidence of spontaneous pain 48 hours after incision in the CPP paradigm, no evidence of ongoing pain was observed in the mice treated with curcumin. Likewise, hindpaw incision caused changes in several gait-related indices, but most of these were normalized in the curcumin-treated animals. The peri-incisional levels of several pronociceptive immune mediators including interleukin (IL)-1β, IL-6, tumor necrosis factor α, and macrophage inflammatory protein-1α were either not reduced or were even augmented 1 and 3 days after incision in curcumin-treated mice. The anti-inflammatory cytokine IL-10 was unchanged, while transforming growth factor-β levels were enhanced under the same conditions.

CONCLUSIONS: Our studies suggest that curcumin treatment is effective in alleviating incision-induced inflammation, nociceptive sensitization, spontaneous pain, and functional gait abnormalities. Augmented transforming growth factor-β production provides one possible mechanism. These preclinical findings demonstrate curcumin’s potential as a preventative strategy in postoperative pain treatment.

随机对照比较双注射法和定向丛内注射法超声引导下锁骨上臂丛神经阻滞

A randomized comparison between double-injection and targeted intracluster-injection ultrasound-guided supraclavicular brachial plexus block.

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背景：在这项前瞻性、随机、观察者盲法的研究中，我们比较了双注射法（DI）超声引导下锁骨上臂丛神经阻滞和新的定向丛内注射技术（TII），这项技术是将局麻药注射在神经束及其周围内（臂丛神经干和分支的汇合处）。

方法：90个病人随机分为两组：DI和 TII，每组 45 人，分别接受超声引导下锁骨上臂丛神经阻滞。所有病人局麻药均采用1.5%利多卡因配伍5μg/ml肾上腺素，用量均为32ml。两组病人都注射半量局麻药（16ml）至主要的神经丛内，在 DI 组，另外半量局麻药注射在第一肋和锁骨下动脉交叉处，在 TII 组，其余半量局麻药等量注射到每个神经节。结果根据总的麻醉相关时间评估（总的手术时间和起效时间）。

结果：与 DI 组相比，TII 组麻醉起效时间更快（均数±标准差：10.1 ± 6.4 vs 18.5 ± 8.3 minutes; P < 0.0001），总的麻醉时间也更短（21.2 ± 7.7 vs 27.7 ± 9.0 minutes; P = 0.001，95%置信区间为 2.90-10.08 minutes）。TII 组没有失败病例，DI 组有三例失败。因此两组具有可比性。神经阻滞相关疼痛评分和不良反应事件在两组均没有组内差异。与 TII 组相比，DI 组需要更少的穿刺途径（平均数 ± 四分位距：4 ± 2 vs 7 ± 3; P < 0.0001）和更短的穿刺时间（8.4 ± 2.9 vs 10.7 ± 2.7 minutes），以及操作时间（9.0 ± 3.2 vs 11.2 ± 3.0 minutes; P = 0.001）。

结论：虽然 DI 法和 TII 法超声引导下锁骨上臂丛神经阻滞似乎成功率相似，但是我们不排除有 17.9%的组内差异可能未被检测出。由于起效时间短，TII 技术可以提供更短的总麻醉相关时间。
BACKGROUND: In this prospective, randomized, observer-blinded study, we compared double-injection (DI) ultrasound-guided supraclavicular block to a novel targeted intracluster-injection (TII) technique, whereby local anesthetic is injected inside the main and satellite neural clusters (confluences of trunks and divisions of the brachial plexus).

METHODS: Ninety patients were randomly allocated to receive a DI (n = 45) or TII (n = 45) technique for ultrasound-guided supraclavicular block. The local anesthetic drug (lidocaine 1.5% with epinephrine 5 μg/mL) and total volume (32 mL) were identical in all subjects. In both groups, half the volume (16 mL) was injected inside the main neural cluster. For the DI technique, the second half (16 mL) was deposited at the "corner pocket" (intersection of the first rib and subclavian artery). In contrast, for the TII technique, the remaining half was divided into equal aliquots and injected inside every single satellite cluster. The main outcome variable was the total anesthesia-related time (sum of performance and onset times).

RESULTS: Due to a quicker onset (mean ± standard deviation (SD): 10.1 ± 6.4 vs 18.5 ± 8.3 minutes; P < 0.0001), the total anesthesia-related time was shorter with the TII technique (21.2 ± 7.7 vs 27.7 ± 9.0 minutes; P = 0.001; 95% confidence interval for the difference of the means: 2.90-10.08 minutes). There were 0 (of 45) and 3 (of 45) surgical failures for the TII and DI group, respectively. Thus, the 2 methods achieved comparable rates of surgical anesthesia (93.3%-100.0%; 95% confidence interval for the difference of the success rates: -2.3% to 17.9%). No intergroup differences were observed in block-related pain scores and adverse events. The DI group required fewer needle passes (median ± interquartile range: 4 ± 2 vs 7 ± 3; P < 0.0001) as well as shorter needling (8.4 ± 2.9 vs 10.7 ± 2.7 minutes; P < 0.0001) and performance (9.0 ± 3.2 vs 11.2 ± 3.0 minutes; P = 0.001) times.

CONCLUSION: Although DI and TII ultrasound-guided supraclavicular blocks seem to provide comparable success rates, we cannot exclude the possibility that an intergroup difference of 17.9% might have gone undetected. Due to its quick onset, the TII technique results in a shorter total anesthesia-related time.