老年患者全膝关节置换术后画钟测试速度变慢

Clock Drawing Performance Slows for Older Adults After Total Knee Replacement Surgery

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背景：画钟是一种用于术前的神经认知筛选工具。本研究探讨了全麻下全膝关节置换术(TKA)后 3 周和 3 个月，对命令和复制试验条件患者画钟的相应变化。
方法：参与者包括年龄大于 60 岁的 67 名手术患者和 66 名非手术患者，他们在 TKA(或假手术日期)前，术后 3 周和 3 个月完成了数字画钟测试。广义线性混合模型评估了数字画钟测试延迟(即完成的总时间、数字放置之间的秒数)和书写输出(即总笔画数、时钟大小)。采用可靠性变化分析检测参与者的百分比，显示参与者的变化超出了非手术同龄人间的差异。
结果：在对年龄、教育程度和基线认知水平进行调整后，手术组和非手术组的数字画钟测试潜伏期指标都有显著差异，其中手术组在命令和复制测试条件下的表现都较慢。术后 3 周的可靠性变化分析发现，在命令和复制指令测试分别有 25%和 21%的手术组患者总完成时间较慢。在术后 3 个月时，18%的手术组患者的速度比非手术组患者慢。书写测量的结果均没有随着时间的推移发生显著的变化。
结论：近四分之一的 TKA 术后患者画钟测试速度减慢，而非手术同龄患者显示出预期的练习效果，即速度从基线到随访时间点不断加快。未来的研究应该探究 TKA 术后这些变化的神经生物学基础。
(张森 译 梁超、潘艳、薛张刚)

BACKGROUND: Clock drawing is a neurocognitive screening tool used in preoperative

settings. This study examined hypothesized changes in clock drawing to command and copy testconditions 3 weeks and 3 months after total knee arthroplasty (TKA) with general anesthesia.
METHODS: Participants included 67 surgery and 66 nonsurgery individuals >60 years whocompleted the digital clock drawing test before TKA (or a pseudosurgery date), and 3 weeks and 3months postsurgery. Generalized linear mixed models assessed digital clock drawing test latency(ie, total time to completion, seconds between digit placement) and graphomotor output (ie, totalnumber of strokes, clock size). Reliable change analyses examined the percent of participants showing change beyond differences found in nonsurgery peers.
RESULTS: After adjusting for age, education, and baseline cognition, both digital clock drawing test latency measures were significantly different for surgery and nonsurgery groups, where thesurgery group performed slower on both command and copy test conditions. Reliable change analyses 3 weeks after surgery found that total time to completion was slower among 25% ofcommand and 21% of copy constructions in the surgery group. At 3 months, 18% of surgeryparticipants were slower than nonsurgery peers. Neither graphomotor measure significantlychanged over time.
CONCLUSIONS: Clock drawing construction slowed for nearly one-quarter of patients afterTKA surgery, whereas nonsurgery peers showed the expected practice effect, ie, speed increasedfrom baseline to follow-up time points. Future research should investigate the neurobiologicalbasis for these changes after TKA.

高度保真模拟的护士培训减少了重症患者 CRRT 治疗期间意外中断的发生:一项模拟随机对照试验

HighFidelity Simulation Nurse Training Reduces Unplanned Interruption of Co ntinuous Renal Replacement Therapy Sessions in Critically Ill Patients: The SimHeR Randomized Controlled Trial

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背景：持续肾脏替代治疗(CRRT)虽然很常见，但意外中断(UI)往往限制了其疗效。在许多单位，护士负责 CRRT 的管理。我们假设，一个建立在高度保真模拟之上的护士培训项目将会减少 CRRT 意外中断的发生。
方法：我们进行了一个两阶段(培训和评估)的随机、单中心、开放性研究: 在培训阶段，重症监护病房护士们接受了 6 小时的培训项目，并在此后随机分配，分别接受(干预组)或不接受(控制组)额外的高度保真模拟培训(6 小时)。在评估阶段，CRRT 期间的管理被随机分配给干预组或对照组护士。意外中断被定义为: CRRT 中断且该中断无已开具的超过 3 小时以上的医嘱处方。
结果：入组研究的护士既往有血透经验，但培训前无 CRRT 经验。干预组护士在理论测试中得分高于对照组护士 (级别，中位数[Q1-Q3]，14 [10.5-15] vs 11 [10-12]/20;P = .044)。在 13 个月的时间里，随机选取共 106 次 CRRT 治疗(n = 53/组)，涉及 50 位患者 (平均年龄 70±13 岁，简化急性生理评分 II（SAPS II）平均

69 分[54-96])。其中 21 个疗程未进行分析(4 个疗.73]; P = .015）。
结论：对护士进行高度保真模拟程未进行，17 位患者在治疗期间死亡)。在分析的干预组 42 次和对照组 43 次中，分别有 25 次(59%)和 38 次(88%)被标记为意外中断治疗（UI）(相对危险度[95% CI]，0.67 [0.51-0.88];P = .002)。干预组护士需要帮助的次数明显减少 (0 次[0-1]vs 3 次[1-4]/疗程;P <.0001)。多水平混合效应逻辑回归分析显示，与 UI 相关的 2 个因素分别为 SOFA 评分(OR，[95% CI]， 0.81 [0.65-99]；P= .047) 和培训干预（OR，0.19 [0.05-0 培训降低了 CRRT 期间意外中断的发生率，减少了护士请求帮助的需求。在护理人员频繁流动的情况下，这种干预可能别有用处。
（丁莹莹 译 梁超、潘艳、薛张校）

BACKGROUND: Although continuous renal replacement therapy (CRRT) is common, unplanned interruptions (UI) often limit its usefulness. In many units, nurses are responsible for CRRT management. We hypothesized that a nurse training program based on high-fidelity simulation would reduce the rate of interrupted sessions.
METHODS: We performed a 2-phase (training and evaluation), randomized, single-center, open study: During the training phase, intensive care unit nurses underwent a 6-hour training program and were randomized to receive (intervention) or not (control) an additional high-fidelity simulation training (6 hours). During the evaluation phase, management of CRRT sessions was randomized to either intervention or control nurses. Sessions were defined as UI if they were interrupted and the interruption was not prescribed in writing more than 3 hours before.
RESULTS: Study nurses had experience with hemodialysis, but no experience with CRRT before training. Intervention nurses had higher scores than control nurses on the knowledge tests (grade, median [Q1-Q3], 14 [10.5-15] vs 11 [10-12]/20; P = .044). During a 13-month period, 106 sessions were randomized (n = 53/group) among 50 patients (mean age 70 ± 13 years, mean simplified acute physiology II score 69 [54-96]). Twenty-one sessions were not analyzed (4 were not performed and 17 patients died during sessions). Among the 42 intervention and 43 control sessions analyzed, 25 (59%) and 38 (88%) were labeled as UI (relative risk [95% CI], 0.67 [0.51-0.88]; P = .002). Intervention nurses required help significantly less frequently (0 [0-1] vs 3 [1-4] times/session; P < .0001). The 2 factors associated with UI in multilevel mixed-effects logistic regression were Sequential Organ Failure Assessment score (odds ratio [95% CI], 0.81 [0.65-99]; P = .047) and the intervention group (odds ratio, 0.19 [0.05-0.73]; P = .015).
CONCLUSIONS: High-fidelity simulation nurse training reduced the rate of UI of CRRT sessions and the need for nurses to request assistance. This intervention may be particularly useful in the context of frequent nursing staff turnover.

美国恶性高热协会推荐的对疑似恶性高热患者使用德尔格宙斯麻醉工作站的准备方法的功效和相关花费

Efficacy of Malignant Hyperthermia Association of the United States–Recommended Methods of Preparation for Malignant Hyperthermia-Susceptible Patients Using Dräger Zeus Anesthesia Workstations and Associated Costs

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背景：本研究的目的是评估美国恶性高热协会推荐的对疑似恶性高热患者使用德尔格宙斯麻醉工作站的准备方法的功效和花费。
方法：我们在 3 台宙斯麻醉工作站上用以下的 3 种准备方法研究了七氟烷、异氟烷和地氟烷的洗脱过程。麻醉工作站事先以 2L/分新鲜气体流量，500mL 潮气量，呼吸频率 12 次/维持 1.2 个最小肺泡浓度的麻醉深度。洗脱分为 2 个阶段实施：高流量（10L/分）直至麻药浓度连续 20 分钟小于 5ppm，然后低流量（3L/分）持续 20 分钟来定义回弹效应。准备方法如下：方法 1，更换耗材（呼吸回路，钠石灰，CO2 采样管和储水罐）；方法 2，在方法 1 的基础上将呼吸系统更换成高压蒸汽处理过的；方法 3，在方法 1 的基础上在呼吸管路的两肢上安装 2 个活性炭过滤器。初步结果包括：在高流量阶段达到麻醉药浓度小于 5pp 的时间，低流量阶段麻醉药浓度的峰值，方法 3 中在低流量阶段去除活性炭过滤器后 70 分钟的麻醉药浓度峰值。进一步的结果包括：各方法中达到麻醉药浓度小于 5ppm 所需的时间和资源的费用分析，以及一台未使用过挥发罐的宙斯麻醉工作站。考虑到每年的花费和疑似恶性高热患者的总人数，使用替代假设进行敏感性分析。
结果：初步结果如下：方法 3 在低流量阶段收到的影响最小，可立即降低麻醉药浓度至小于 1ppm。方法 1（中位数 88 分钟；95%置信区间，69-112 分钟）比方法 2（中位数 11 分钟，95%置信区间，9-15 分钟）所需时间久。方法 1、方法 2 和方法 3 的麻醉药浓度峰值反弹的平均值分别为 15ppm、6ppm 和 1ppm（P＜0.01）。去除活性炭过滤器后麻醉药浓度增长 33 倍（95%置信区间，21-50 倍）。麻醉药物的选择对结果没有影响。进一步结果如下：当考虑到由于洗脱时间导致的手术室时间的损失，方法 3 是花费最少的，如果不考虑这个时间则方法 1 是花费最少的。三种方法考虑到该损失每例的估计花费分别为：方法 1：2670 美元；方法 2：969 美元；方法 3：360 美元。一台未使用过挥发罐的宙斯麻醉工作站：930 美元。三种方法的花费差异主要在于手术室时间和设备的花费。
结论：手术室时间紧张的机构应当考虑方法 3，手术室时间过剩的机构应当考虑方法 1。
(吴兆艺 译 梁超、潘艳、薛张刚校)
BACKGROUND: The objective of this study was to assess the efficacy and cost of Malignant Hyperthermia Association of the United States-recommended methods for

preparing Dräger Zeus anesthesia workstations (AWSs) for the malignant hyperthermia-susceptible patient.
METHODS: We studied washout profiles of sevoflurane, isoflurane, and desflurane in 3 Zeus AWS following 3 preparation methods. AWS was primed with 1.2 minimum alveolar concentration anesthetic for 2 hours using 2 L/min fresh gas flow, 500 mL tidal volume, and 12/min respiratory rate. Two phases of washout were performed: high flow (10 L/min) until anesthetic concentration was <5 parts per million (ppm) for 20 minutes and then low flow (3 L/min) for 20 minutes to identify the rebound effect. Preparation methods are as follows: method 1 (M1), changing disposables (breathing circuit, soda lime, CO2 line, and water traps); method 2 (M2), M1 plus replacing the breathing system with an autoclaved one; and method 3 (M3), M1 plus mounting 2 activated charcoal filters on respiratory limbs. Primary outcomes are as follows: time to obtain anesthetic concentration <5 ppm in the high-flow phase, peak anesthetic concentrations in the low-flow phase, and for M3 only, peak anesthetic concentration after 70 minutes of low-flow phase, when activated charcoal filters are removed. Secondary outcomes are as follows: cost analysis of time and resources to obtain anesthetic concentration <5 ppm in each method and a vapor-free Zeus AWS. Sensitivity analyses were performed using alternative assumptions regarding the costs and the malignant hyperthermia-susceptible caseload per year.
RESULTS: Primary outcomes were as follows: M3 instantaneously decreased anesthetic concentration to <1 ppm with minimal impact of low-flow phase. M1 (median, 88 minutes; 95% confidence interval [CI], 69-112 minutes) was greater than M2 (median, 11 minutes; 95% CI, 9-15 minutes). Means of peak rebound anesthetic concentrations in M1, M2, and M3 were 15, 6, and 1 ppm, respectively (P < .001). Anesthetic concentration increased 33-fold (95% CI, 21-50) after removing charcoal filters (from 0.7 to 20 ppm). The choice of anesthetic agents did not impact the results. Secondary outcomes were as follows: M3 was the lowest cost when the cost of lost operating room (OR) time due to washout was included, and M1 was the lowest cost when it was not included. When the cost of lost OR time due to washout was considered the estimated cost/case of M3 was US $360 (M1, US $2670; M2, US $969; and a "vapor-free" Zeus AWS was US $930). The OR time and equipment costs represent the largest differentiators among the methods.
CONCLUSIONS: Institutions in which demand for OR time has exceeded capacity should consider M3, and institutions with surplus OR capacity should consider M1.

线粒体活性氧途径的 Ryanodine 受体在慢性人类免疫缺陷病毒 gp120MN 诱导的大鼠神经性疼痛中起重要作用

Ryanodine Receptor to Mitochondrial Reactive Oxygen Species Pathway Plays an Important Role in Chronic Human Immunodeficiency Virus gp120MN-Induced Neuropathic Pain in Rats
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背景:慢性疼痛是人类免疫缺陷病毒(HIV)相关感觉神经障碍患者最常见的主诉之一。利阿诺定受体(RyR)和线粒体氧化应激与神经损伤引起的神经痛相关。在此，我们研究了 RyR 和线粒体超氧化物在通过反复鞘内注射 HIV 糖蛋白 120 (gp120)诱导的神经痛中的作用。
方法:我们采用鞘内注射重组 HIV 糖蛋白 gp120MN 来诱导神经性疼痛。我们用 von Frey 丝来测定感觉阈值。我们通过测量后掌表皮内神经纤维密度来评估周围神经纤维数量。我们用 Western blot 法检测脊髓 RyR 的表达量。我们用免疫组化方法检测了脊髓内的 RyR 与神经元核(NeuN;神经元标志物)的共域化、胶质纤维酸性蛋白(GFAP;胶质细胞标志物)或离子钙结合物 1 (Iba1;小胶质细胞标志物)的量。我们检测了 MitoSox 阳性物质(一种线粒体靶向荧光超氧化物指示剂)。我们同样在模型中评估了鞘内给予 RyR 拮抗剂丹曲林(一种临床治疗恶性高热的药物)或选择性线粒体超氧化物清除剂 Mito-Tempol 的作用。
结果:我们发现重复而非单次鞘内注射重组 gp120 蛋白可诱导持续的机械触觉超敏。在 2 周时重复 gp120 组表皮内神经纤维数量较假手术组低，平均相差(95%置信区间)为 8.495 (4.79-12.20)，P = .0014。重复注射 gp120 能增加 RyR 的表达，平均相差(95%置信区间)为 1.50 (0.504-2.495)，P = .007。重复注射 gp120 也能增加了脊髓线粒体超氧化物细胞数量，平均相差(95%置信区间)为 6.99 (5.99-8.00)，P < .0001。抑制脊髓 RyR 或选择性线粒体超氧化物清除剂减少重复注射 gp120 引起的机械触觉超敏，并呈剂量相关。RyR 和线粒体超氧化物在神经元内共存，而在胶质细胞中不共存。在注射 gp120 诱导神经痛模型中，鞘内注射 RyR 抑制剂可降低脊髓背角神经元中线粒体超氧化物的量。
结论:这些数据提示反复鞘内注射 HIV gp120 可诱导大鼠急性至慢性疼痛，脊髓背角神经元的 RyR 和线粒体超氧化物在 HIV 神经性疼痛模型中起重要作用。目前的研究结果为理解 HIV 慢性疼痛的分子机制和治疗 HIV 患者慢性疼痛提供了新的方法。
（陈聿同 译 梁超、潘艳、薛张刚校）
BACKGROUND: Chronic pain is one of the most common complaints in patients with human immunodeficiency virus (HIV)-associated sensory neuropathy. Ryanodine receptor (RyR) and mitochondrial oxidative stress are involved in neuropathic pain induced by nerve injury. Here, we investigated the role of RyR and mitochondrial superoxide in neuropathic pain induced by repeated intrathecal HIV glycoprotein 120 (gp120) injection.
METHODS: Recombinant HIV glycoprotein gp120MN was intrathecally administered to induce neuropathic pain. Mechanical threshold was tested using von Frey filaments. Peripheral nerve fiber was assessed by the quantification of the intraepidermal nerve fiber density in the skin of the hindpaw. The expression of spinal RyR was examined using Western blots. Colocalization of RyR with neuronal nuclei (NeuN; neuron marker), glial fibrillary acidic protein (GFAP; astrocyte marker), or ionizing calcium-binding adaptor molecule 1 (Iba1; microglia marker) in the spinal cord was examined using immunohistochemistry. MitoSox-positive profiles (a mitochondrial-targeted fluorescent superoxide indicator) were examined. The antiallodynic effects of intrathecal administration of RyR antagonist, dantrolene (a

clinical drug for malignant hyperthermia management), or selective mitochondrial superoxide scavenger, Mito-Tempol, were evaluated in the model.
RESULTS: We found that repeated but not single intrathecal injection of recombinant protein gp120 induced persistent mechanical allodynia. Intraepidermal nerve fibers in repeated gp120 group was lower than that in sham at 2 weeks, and the difference in means (95% confidence interval) was 8.495 (4.79-12.20), P = .0014. Repeated gp120 increased expression of RyR, and the difference in means (95% confidence interval) was 1.50 (0.504-2.495), P = .007. Repeated gp120 also increased mitochondrial superoxide cell number in the spinal cord, and the difference in means (95% confidence interval) was 6.99 (5.99-8.00), P < .0001. Inhibition of spinal RyR or selective mitochondrial superoxide scavenger dose dependently reduced mechanical allodynia induced by repeated gp120 injection. RyR and mitochondrial superoxide were colocalized in the neuron, but not glia. Intrathecal injection of RyR inhibitor lowered mitochondrial superoxide in the spinal cord dorsal horn in the gp120 neuropathic pain model.
CONCLUSIONS: These data suggest that repeated intrathecal HIV gp120 injection induced an acute to chronic pain translation in rats, and that neuronal RyR and mitochondrial superoxide in the spinal cord dorsal horn played an important role in the HIV neuropathic pain model. The current results provide evidence for a novel approach to understanding the molecular mechanisms of HIV chronic pain and treating chronic pain in patients with HIV.

在择期剖宫产手术中，新生儿短暂性呼吸急促与产妇脊髓麻醉中低血压有关：一项回顾性队列研究
Transient Tachypnea of Newborns Is Associated With Maternal Spinal Hypotension During Elective Cesarean Delivery: A Retrospective Cohort Study.
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背景：与经阴道分娩相比，择期剖宫产时新生儿出现短暂性呼吸急促的风险高2- 6 倍，而新生儿短暂性呼吸急促是新生儿期呼吸窘迫的常见原因。在此，我们评估了实施脊髓麻醉下选择性剖宫产时，新生儿短暂性呼吸急促与分娩前母体低血压的程度和持续时间之间的关系。
方法：比较 2015 年 7 月至 2016 年 2 月经择期剖宫产分娩的短暂性呼吸急促新生儿(30 例)与呼吸功能正常的健康新生儿(151 例)母亲的人口学数据、麻醉管理细节、血压测量值和分娩前血管加压素需求等方面的差异。通过使用收缩压(SBP)≤90mmHg 和平均动脉压≤65mmHg 时曲线下面积评估低血压的程度和持续时间，调整混杂因素后,运用多变量 logistic 回归评估 SBP 曲线下面积和短暂性新生儿呼吸急促的关系。
结果：短暂性呼吸急促新生儿组的产妇 SBP 曲线下面积中位数(0.94;四分位范围，0-28.7 mm Hg*min)高于健康新生儿组的产妇(0;四分位范围，0-3.30 mm Hg*min;P

=0 .001)。同样，短暂性呼吸急促新生儿组的产妇平均动脉压曲线下面积中位数(0;四分位范围，0-18.6 mm Hg*min)也高于对照组(0;四分位范围，0-1.1 mm Hg*min, P =0 .01)。与对照组相比，短暂性呼吸急促新生儿组的产妇对去氧肾上腺素和麻黄素的消耗量显著增加(P 值分别为 0.001 和 0.01)。因此，短暂性呼吸急促新生儿组给予产妇的总缩血管药物剂量远高于对照组(P = 0.001)。在多变量 logistic 回归中，调整妊娠次数和麻醉类型(脊髓与脊髓复合硬膜外麻醉)后，SBP 曲线下面积与新生儿短暂性呼吸急促显著相关(优势比 1.02;95% CI, 1.01-1.04, P =0 .005)。

结论：我们的研究结果表明，择期剖宫产产妇脊髓麻醉后 SBP < 90mm Hg 的程度和持续时间与新生儿短暂性呼吸急促有关。未来的前瞻性研究应进一步探讨产妇低血压的影响，以及其预防和治疗新生儿短暂性呼吸急促的可行性。

（王甲利 译 梁超、潘艳、薛张刚校）

BACKGROUND: The risk for transient tachypnea of newborns, a common cause of respiratory distress in the neonatal period, is 2- to 6-fold higher during elective cesarean delivery compared to vaginal delivery. Here, we evaluated the association between transient tachypnea of newborns and the degree and duration of predelivery maternal hypotension during spinal anesthesia for elective cesarean delivery.

METHODS: Demographic data, details of anesthetic management, blood pressure measurements, and vasopressor requirement preceding delivery were compared between transient tachypnea newborns (n = 30) and healthy neonates (n = 151) with normal respiratory function born via elective cesarean delivery between July 2015 and February 2016. The degree and duration of hypotension were assessed using area under the curve for systolic blood pressure (SBP) ≤90 mm Hg and area under the curve for mean arterial pressure ≤65 mm Hg. After adjusting for confounders, multivariable logistic regression was used to evaluate the association between area under the curve for SBP and transient tachypnea of newborns.

RESULTS: The median area under the curve for SBP was higher in cases of transient tachypnea of newborns (0.94; interquartile range, 0-28.7 mm Hg*min) compared to healthy controls (0; interquartile range, 0-3.30 mm Hg*min; P = .001). Similarly, median area under the curve for mean arterial pressure was also higher in cases of transient tachypnea of newborns (0; interquartile range, 0-18.6 mm Hg*min) compared to controls (0; interquartile range, 0-1.1 mm Hg*min; P = .01). Mothers of transient tachypnea newborns received significantly higher amounts of phenylephrine and ephedrine compared to controls (P = .001 and 0.01, respectively). Hence, the total vasopressor dose given to mothers in the transient tachypnea of newborn group was much higher than for the control group (P = .001). In the multivariable logistic regression, area under the curve for SBP was significantly associated with transient tachypnea of newborns (odds ratio, 1.02; 95% CI, 1.01-1.04, P = .005) after adjusting for gravidity and the type of anesthetic (spinal versus combined spinal epidural).

CONCLUSIONS :Our results suggest that the degree and duration of maternal SBP <90 mm Hg after neuraxial anesthesia during elective cesarean delivery are associated with transient tachypnea of newborns. Future prospective studies should further explore the effects of maternal hypotension, its prevention, and treatment for transient tachypnea of newborns.

一项新型神经肌肉阻滞监测仪 TOF-Cuff 与加速度仪 TOF-Watch 的比较研究

Comparative Study of TOF-Cuff, a New Neuromuscular Blockade Monitor, and TOF-Watch, an Acceleromyography

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背景：术中对全麻病人行神经肌肉阻滞的定量监测被广泛推荐，这对于确定最佳插管时间及拔管前确认肌松完全恢复具有重要意义。然而，当病人处于俯卧位或手臂紧贴身体等特殊体位时，使用现有的肌松监测仪进行监测可能有点困难。因此，肌松监测仪能否广泛使用依赖于使用的便捷性。最近，一款新型神经肌肉阻滞监测仪 TOF-Cuff 投入使用，这款仪器仅需要一根内置刺激电极的袖带捆绑在患者手臂上，通过监测袖带的内在压力变化，即可记录神经刺激的反应。

方法：研究纳入了 ASAI-III 级、行全身麻醉且无潜在神经肌肉疾病的患者，并排除了年龄小于 15 岁或有肝肾功能疾病的患者。TOF-Cuff 被绑在患者任一手臂的上臂，而 TOF-Watch 则被绑在用于测量血压的手臂的前臂。两款仪器采用相同的测量准则。作者分别在诱导和苏醒两个阶段，同时使用两种监测仪进行肌松监测，在给予罗库溴铵进行诱导和舒更葡糖逆转肌松后，测量给药后 0s、30s、1min、1.5min、2min 共 5 个时间点的肌松情况。研究随机抽取了 20 名患者，由一名独立的研究助理进行标准测试以评价拔管后 5min 内有无肌松残余的表现。研究使用了 Lin 一致性相关系数和 Bland-Altman 测试以评价两种仪器测量 TOF 比的一致性，同时控制 I 类错误在 5%以内；另外，研究对 TOF 比值大于 0.7 的患者进行了亚组分析。

结果：共有 55 例患者纳入分析。对所有的 TOF 比值进行分析后发现，在进行肌松逆转的第 0s，Lin 一致性相关系数的可信区间下限大于 0.9；而在诱导后的第 1.5min 及逆转肌松后的第 30s、第 1min 时，Lin 一致性相关系数尽管没有达到 0.9，但也显示了较高的可信区间（0.80-0.89）。对 TOF 比值大于 0.7 的所有组别进行分析，没有任何组别的一致性系数的下限超过 0.9；此外，TOF 值大于 0.7 的组别的可信区间的宽度大于其他组别。在苏醒的后阶段，与 TOF-Watch 相比，TOF-Cuff 的测量值低估了实际的 TOF 值。所有组别都不存在固定系统误差，除了诱导后的第 1.5min、第 2min 且 TOF 值大于 0.7 的组别，由于其标准差无法估计。逆转肌松后 1min 时，所有组别与 TOF 大于 0.7 的组别，两者间的差异越来越小，考虑到两种方法测量的平均值有所增加，两组的可信区间值分别为----0.17[-0.27，-0.07]、-0.54[-0.85，-0.24]。在拔管后 5 分钟内，没有患者显示出肌松残余的迹象。

结论：无论在诱导阶段还是苏醒阶段，TOF-Cuff 和 TOF-Watch 都表现出了较好的一致性。尽管两种设备都显示出了高准确性和精确性，具有较小的偏倚和较窄的一致性界限，但是在 TOF 值大于 0.7 的组别中，精确度和 Lin 一致性系数都显著下降。除去可能存在的临床实际中的差异，两者的差异异很有可能是由于测量原理的不同造成的。TOF-Cuff 采用的是完全不同的测量原理，因此，采用 TOF 大于 0.9 还是 1.0 作为临床上可以接受的参考值仍然有待商榷。既往也缺乏针对 TOF 值小于 0.9 或 1.0、严格评估术后结局的研究。本文的残余肌松作用的观察

仅局限于拔管后 5 分钟，且观察的例数有点有限。
（王沛 译 梁超、潘艳、薛张刚校）

Quantitative or objective monitoring of neuromuscular blockade in patients under general anesthesia is now widely recommended. It is useful for optimization of the time to intubation1 and to confirm full recovery of neuromuscular blockade before extubation.2 However, it might be difficult to perform measurements using current neuromuscular monitors when the patient is placed in the prone position or with the arms against the body. Therefore, widespread use of quantitative neuromuscular blockade monitors may depend on how quick and easy they are to install. Recently, a new neuromuscular blockade monitor (TOFCuff; RGB Medical Devices, S.A., Madrid, Spain) became commercially available, which only requires placement of a single cuff incorporated stimulating electrodes on the patient's arm. A response to nerve stimulation is detected by the change in the cuff's internal pressure.

METHODS This single-center, open-controlled clinical study was conducted after approval of the study protocol by the ethics committee of our institution (approval No. 272-183) and with the informed consent in writing from all participating patients. The trial was registered before patient enrollment at University hospital Medical Information Network Clinical Trial Registry database (No. R000028727, Principal investigator: M.Y., date of registration: November 24, 2016). We enrolled American Society of Anesthesiologists physical status I–III patients undergoing general anesthesia and who were free from an underlying neuromuscular disorder. Exclusion criteria included patients who were <15 years and had hepatic or renal disorders. Patients were administered a target-controlled infusion of propofol to maintain the bispectral index between 40 and 60, while breathing 100% oxygen with mask ventilation. The rectal temperature of the patients was maintained at 38℃ using a warming blanket. Then, a TOF-Cuff was attached on arbitrary upper arm, while a TOF-Watch was attached to the distal forearm of the arm used for measurement of blood pressure. Neuromuscular monitoring using the TOF-Watch was performed as previously described.3 The same principles of measurement, including calibration, as the TOF-Watch were adopted for the TOF-Cuff. During induction of anesthesia or reversal of neuromuscular blockade, train-of-four ratios were measured by both devices at the same time every 30 seconds after administration of 0.6–1.0 mg/kg rocuronium or 2.0–4.0 mg/kg sugammadex, respectively. Extubation was performed when the train-of-four ratio was >0.9, as estimated by the TOF-Watch. In addition, 20 randomly selected patients were assessed by standardized examination to evaluate for symptoms of residual paresis within 5 minutes after extubation. The examination was designed based on the evidence by Kopman et al.4 To ensure a uniform and consistent evaluation of all subjects, testing was performed by a single research assistant (blinded to the train-of-four ratio data). Patients were asked to perform 10 tests that included 5-second head lift, 5-second hand grip, 5-second eye opening, 5-second tongue protrusion, tongue depressor test, ability to swallow, ability to speak, ability to cough, ability to track objects with eyes, and ability to breathe deeply. Responses were recorded on a 10-point rating scale (0 = most severe muscle weakness, 10 = no muscle weakness).

RESULTS Fifty-five patients were included in the analyses (Supplemental Digital Content, Document, http://links. lww.com/AA/C784). Patients' demographic characteristics were as follows: age, 54 years (39–67 years); and body mass index, 23 kg·m−2 (21–26 kg·m−2). Surgeries included head and neck, abdominal, or gynecologic. In all the patients, sugammadex was given at a train-of-four count of 1–2. When all the train-of-four ratios were analyzed, the lower limit of the Lin concordance correlation coefficient CI exceeded 0.90 in the group of measurements performed 0 second after reversal of neuromuscular blockade. Lin concordance correlation coefficient did not exceed 0.90, but there was relatively high lower limit of the Lin concordance correlation coefficient CI (0.80–0.89) in the group of measurements performed 1.5 minutes after induction of anesthesia and 30 seconds and 1 minute after reversal of neuromuscular blockade (Table). When analysis was limited to data of train-of-four ratio >0.7, there was no group of measurements in which the lower limit of the Lin concordance correlation coefficient exceeded 0.9. In addition, the width of the Lin concordance correlation coefficient CIs of train-of-four ratio >0.7 groups was also large compared to the analysis of all the train-of-four ratios. The TOF-Cuff underestimated train-of-four ratios in comparison with the TOF-Watch in the latter part of the recovery period (Table; Figure). A priori we decide that differences larger than approximately ±0.10 were clinically important, so estimated limits of agreement narrower than that represented good agreement.
CONCLUSIONS We found estimated limits of agreement to be within that range for variables of the group of measurements 2 minutes after induction of anesthesia for all the train-of-four ratio data and the group of measurements 2 minutes after reversal of neuromuscular blockade for all the train-of-four ratio data and train-of-four ratio >0.7 data. There was no fixed error for all groups, except for the groups with train-of-four ratio >0.7 at 1.5 and 2 minutes after the induction of anesthesia, for which the SD of the value could not be estimated. For the group of measurements 1 minute after reversal of neuromuscular blockade for all the train-of-four ratio data and train-of-four ratio >0.7 data, differences tended to become smaller as the mean of the 2 methods increased (estimated slope [95% CI] of −0.17 [−0.27, −0.07] for all the train-of-four ratio data and −0.54 [−0.85, −0.24] for trainof-four ratio >0.7 data). None of the patients showed signs of residual paresis on a standardized examination performed within 5 minutes after extubation (the average score was 9.9 on the 10-point scale).

对医疗保健研究和质量安全计划机构进行证据审查，以改善手术护理和恢复：关注减重手术的麻醉

Evidence Review Conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: Focus on Anesthesiology for Bariatric Surgery

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背景：加快减重手术术后的恢复速度逐渐的被实施，这带来更好的结果、缩短住院时间和节约成本。卫生保健研究机构与美国外科医师学会和约翰霍普金斯医学阿姆斯特朗病人安全和质量研究机构合作，制定了改善手术护理和康复的安全计划。
方法：我们对给减重手术术后护理和恢复带来积极影响的麻醉干预措施进行了一项证据审查。并对每项干预进行文献检索，考虑收集最高水平的可用证据。麻醉相关干预措施包括术前（碳水化合物负荷/空腹、多模式麻醉前药物）、术中（区域麻醉、阿片类药物最小化的多模式镇痛、保护性通气策略、液体最小化的应用）和术后（阿片类药物最小化的多模式镇痛）的护理阶段。
结果：我们总结了最有效的证据，来推荐使用合理的麻醉干预，以增强术后减重手术的护理和恢复。
结论：这篇文献和指南中的证据支持了医疗保健研究和质量安全计划机构，提高了减重手术的手术护理和恢复。
(梁超、潘艳、薛张刚校)
BACKGROUND: Enhanced recovery after surgery protocols for bariatric surgery are increasingly being implemented, and reports suggest that they may be associated with superior outcomes, reduced length of hospital stay, and cost savings. The Agency for Healthcare Research and Quality, in partnership with the American College of Surgeons and the Johns Hopkins Medicine Armstrong Institute for Patient Safety and Quality, has developed the Safety Program for Improving Surgical Care and Recovery.
METHODS: We have conducted an evidence review to select anesthetic interventions that positively influence outcomes and facilitate recovery after bariatric surgery. A literature search was performed for each intervention, and the highest levels of available evidence were considered. Anesthesiology-related interventions for pre- (carbohydrate loading/fasting, multimodal preanesthetic medications), intra- (standardized intraoperative pathway, regional anesthesia, opioid minimization and multimodal analgesia, protective ventilation strategy, fluid minimization), and postoperative (multimodal analgesia with opioid minimization) phases of care are included.
RESULTS: We have summarized the best available evidence to recommend the anesthetic components of care for enhanced recovery after surgery for bariatric surgery.
CONCLUSIONS: There is evidence in the literature, and from society guidelines, to support the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery goals for bariatric surgery.

美国门诊手术患者术前认知障碍的患病率和多变量因素

Prevalence and Multivariable Factors Associated With Preoperative Cognitive Impairment in Outpatient Surgery in the United States

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术前认知功能障碍会增加手术后不良事件的风险，但其在门诊手术中的患病率尚未确定。 我们的目的是确定门诊手术患者认知障碍的患病率和多变量因素。 我们使用了健康和退休研究的数据，这是一项针对美国老年人的纵向小组调查。在报告门诊手术的 1836 名参与者中，我们发现 16.1％的人有认知障碍的证据。 与术前认知障碍相关的显著多变量因素包括非西班牙裔美国人，既往卒中，术前功能依赖以及较低的社会经济状况和教育水平。
(魏婉婷 译 梁超、潘艳、薛张刚校)

Preoperative cognitive impairment increases the risk of adverse events after surgery but its prevalence in outpatient surgery has not been defined. We aimed to determine the prevalence and multivariable factors associated with cognitive impairment in individuals who present for outpatient surgery. We used data from the Health and Retirement Study, a longitudinal panel survey of older Americans. Of 1836 participants who reported having outpatient surgery, we found that 16.1% had evidence of cognitive impairment. Significant multivariable factors associated with preoperative cognitive impairment included non-Hispanic African American race, prior stroke, preoperative functional dependence, and lower socioeconomic status and education level.

产科麻醉新知——2017 年 Gerard W. Ostheimer 讲座
What's New in Obstetric Anesthesia? The 2017 Gerard W. Ostheimer Lecture
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产科麻醉新知讲座每年在产科麻醉与围术期医学协会的年会上举行。该讲座自 1975 年开始举办，向会员们更新上一日历年度发表的一些最相关的文章。1995 年，为了纪念来自布列根和妇女医院的产科麻醉医生 Gerard W. Ostheimer 做出的杰出贡献，该讲座更名为 Ostheimer 讲座。本综述总结了 2018 年 Ostheimer 讲座上呈现的 2017 年发表的重要文章，主要关注于阿片类药物处方、外倒转的麻醉、分娩阵痛、产妇死亡率及全球健康。我们也提供一份基于 2017 年文献的行动建议列表。
（叶姗姗 译 梁超、潘艳、薛张刚校）
The "What's New in Obstetric Anesthesia Lecture" is presented every year at the annual meeting of the Society for Obstetric Anesthesia and Perinatology. This lecture was established in 1975 to update the membership on the most relevant articles that were published in the preceding calendar year. In 1995, the lecture was renamed as the "Ostheimer Lecture" in honor of Gerard W. Ostheimer, an obstetric anesthesiologist from the Brigham and Women's Hospital with significant contributions in the field. This review summarizes key articles published in 2017 that

were presented in the 2018 Ostheimer Lecture with a focus on opioid prescriptions, anesthesia for external cephalic version, labor analgesia, maternal morbidity, and global health. A proposed list of action items based on the 2017 literature is also presented.

环孢菌素 A 抑制慢性钙调神经磷酸酶对异氟烷麻醉后视觉空间学习的影响
Chronic Calcineurin Inhibition via Cyclosporine A Impairs Visuospatial Learning After Isoflurane Anesthesia

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环孢菌素 A 抑制慢性钙调神经磷酸酶对异氟烷麻醉后视觉空间学习的影响

摘要：临床研究暗示了认知并发症的围手术期，越来越多的实验证据表明麻醉剂能影响学习和记忆的神经元过程。钙调磷酸酶是一种依赖于突触可塑性的钙依赖性磷酸酶，在与异氟醚接触后被激活，但其在神经系统对麻醉反应中的作用尚不清楚。我们研究了慢性钙调神经磷酸酶抑制剂对麻醉后认知功能的影响。在慢性环孢菌素 A 方案中，小鼠用异氟醚麻醉 30 分钟进行治疗。在麻醉期间的行为终点进行量化。水径向臂迷宫评估视觉空间学习。测定 α5β3γ2γ-氨基丁酸（GABA）A 型受体的总生物素化表面蛋白表达。还测定了 GABA 合成酶谷氨酸脱羧酶（GAD）- 67 的表达。麻醉前用环孢素 A 治疗的小鼠与假手术组和环孢菌素 A 处理组相比，视觉空间学习有明显的缺陷（每组 10 例，P＝0152，TUKEY 事后测试）。环孢菌素 A 诱导和出现无变化。海马蛋白表达分析显示，异氟烷治疗后 α5 GABA A 型受体亚单位的表面表达增加（P＝019，Dunnett 事后检测），以及 GAD-67 表达减少。环孢素 A 没有挽救任何效果。我们的结果证实了其他人的工作，异氟烷诱导抑制神经网络功能的改变，并排除环孢菌素 A 作为干预的钙调神经磷酸酶抑制。此外，我们的研究表明，钙调神经磷酸酶介导的保护作用，在神经系统的麻醉反应，患者接受环孢素 A 可能是一个风险组的记忆问题与麻醉有关。

（应美晶 译 梁超、潘艳、薛张刚校）

Clinical studies implicate the perioperative period in cognitive complications, and increasing experimental evidence shows that the anesthetic agents can affect neuronal processes that underpin learning and memory. Calcineurin, a Ca-dependent phosphatase critically involved in synaptic plasticity, is activated after isoflurane exposure, but its role in the neurological response to anesthesia is unclear. We investigated the effect of chronic calcineurin inhibition on postanesthetic cognitive function. Mice were treated with 30 minutes of isoflurane anesthesia during a chronic cyclosporine A regimen. Behavioral end points during the perianesthesia period were quantified. Visuospatial learning was assessed with the water radial arm maze. Total and biotinylated surface protein expression of the α5β3γ2 γ-aminobutyric acid (GABA) type A receptors was measured. Expression of the GABA synthesis enzyme glutamate decarboxylase (GAD)-67 was also measured. Mice treated with

cyclosporine A before anesthesia showed significant deficits in visuospatial learning compared to sham and cyclosporine A-treated mice (n = 10 per group, P = .0152, Tukey post hoc test). Induction and emergence were unaltered by cyclosporine A. Analysis of hippocampal protein expression revealed an increased surface expression of the α5 GABA type A receptor subunit after isoflurane treatment (P = .019, Dunnett post hoc testing), as well as a decrease in GAD-67 expression. Cyclosporine A did not rescue either effect. Our results confirm the work of others that isoflurane induces changes to inhibitory network function and exclude calcineurin inhibition via cyclosporine A as an intervention. Further, our studies suggest that calcineurin mediates a protective role in the neurological response to anesthesia, and patients receiving cyclosporine A may be an at-risk group for memory problems related to anesthesia.

一项关于门诊介入性疼痛治疗管理的医疗事故诉讼现状分析: 2009-2016
A Contemporary Medicolegal Analysis of Outpatient Interventional Pain Procedures: 2009-2016.
Abrecht CR1, Saba R2, Greenberg P3, Rathmell JP2, Urman RD2.
Anesthesia & Analgesia . 2019 129 255.

背景：研究已经结案的医疗事故诉讼案件可以发现一些罕见但严重的并发症，这种研究可以为提高患者安全和降低医疗人员责任提供意见
方法：这项回顾性观察分析调查了 2009 年 1 月 1 日到 2016 年 12 月 31 日在风险控制保险公司（CRICO）的 CBS 数据库登记的疼痛治疗相关的医疗事故诉讼，在这个数据库中包括了超过 400 个学术和社区医疗中心的接近 40 万医疗事故诉讼。研究者根据 CRICO 记录的数据和总结性叙述，选取主要围绕介入性疼痛治疗管理的案例。
结果：研究总共发现 126 例结案的医疗事故诉讼案件，其中有 41 例原告获得赔偿，赔偿中位数为 17.5 万美元（范围在 2600 美元到 295 万美元）。在所有诉讼中，最常见的操作是腰椎硬膜外激素注射有关，共有 34 例案件。接下来是颈椎硬膜外激素注射和触痛点注射，分别为 31 例和 13 例。指控最多的注射事件包括操作不正确（38 例）、消毒不完全（17 例）、硬脑膜意外穿破（13 例）、误伤脊髓（11 例）和穿刺针损伤肺部（10 例）。常见的不良后果包括疼痛加重（26 例）、脊髓梗死（16 例）、硬膜外血肿（9 例）、软组织感染（9 例）、硬脑膜穿刺后头痛（9 例）和气胸（9 例）。根据 CRICO 的影响因素系统，引起损伤的因素有 83% 来自于技术操作过程中的失误。
结论：硬膜外激素注射是常见的介入性疼痛治疗操作，但是对于疼痛治疗管理的临床从业者，这项熟悉的技术可能引起严重的神经损伤。触痛点注射通常认为是相对安全的，也可能会引起气胸或其他深部结构的损伤。无论怎样，像诉讼它本身的目的是为了减少医疗人员责任和病人损害，这种努力是需要多方面考虑的。好的结局需要大量的临床训练、学习权威的操作指南、详细的知情同意记录和全面的病人选择。这项研究的局限性在于已经结案的医疗事故诉讼不能包括全部的并发症，特别是更严重并发症的案例。此外，CRICO 公司的 CBS 数据是否独立可靠也无法明确评估。
（周修适 译 梁超、潘艳、薛张刚校）

BACKGROUND: Closed malpractice claim studies allow a review of rare but often severe complications, yielding useful insight into improving patient safety and decreasing practitioner liability.
METHODS: This retrospective observational study of pain medicine malpractice claims utilizes the Controlled Risk Insurance Company Comparative Benchmarking System database, which contains nearly 400,000 malpractice claims drawn from >400 academic and community medical centers. The Controlled Risk Insurance Company Comparative Benchmarking System database was queried for January 1, 2009 through December 31, 2016, for cases with pain medicine as the primary service. Cases involving outpatient interventional pain management were identified. Controlled Risk Insurance Company-coded data fields and the narrative summaries were reviewed by the study authors.
RESULTS: A total of 126 closed claims were identified. Forty-one claims resulted in payments to the plaintiffs, with a median payment of $175,000 (range, $2600-$2,950,000). Lumbar interlaminar epidural steroid injections were the most common procedures associated with claims (n = 34), followed by cervical interlaminar epidural steroid injections (n = 31) and trigger point injections (n = 13). The most common alleged injuring events were an improper performance of a procedure (n = 38); alleged nonsterile technique (n = 17); unintentional dural puncture (n = 13); needle misdirected to the spinal cord (n = 11); and needle misdirected to the lung (n = 10). The most common alleged outcomes were worsening pain (n = 26); spinal cord infarct (n = 16); epidural hematoma (n = 9); soft-tissue infection (n = 9); postdural puncture headache (n = 9); and pneumothorax (n = 9). According to the Controlled Risk Insurance Company proprietary contributing factor system, perceived deficits in technical skill were present in 83% of claims.
CONCLUSIONS: Epidural steroid injections are among the most commonly performed interventional pain procedures and, while a familiar procedure to pain management practitioners, may result in significant neurological injury. Trigger point injections, while generally considered safe, may result in pneumothorax or injury to other deep structures. Ultimately, the efforts to minimize practitioner liability and patient harm, like the claims themselves, will be multifactorial. Best outcomes will likely come from continued robust training in procedural skills, attention paid to published best practice recommendations, documentation that includes an inclusive consent discussion, and thoughtful patient selection. Limitations for this study are that closed claim data do not cover all complications that occur and skew toward more severe complications. In addition, the data from Controlled Risk Insurance Company Comparative Benchmarking System cannot be independently verified.

羟钴胺素（维生素 B12a）在体外循环后难治性低血压患者中的应用：一项病例系列报道

Use of Hydroxocobalamin (Vitamin B12a) in Patients With Vasopressor Refractory Hypotension After Cardiopulmonary Bypass A Case Series

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Anesthesia & Analgesia: 2019 129 e1–e4

羟钴胺素（维生素 B12 a）是一种新兴疗法用于治疗与体外循环（CPB）相关的血管麻痹综合征（VS）。鉴于其成本和病例稀缺性，一项机构指南将其发展作为对疑似 VS 患者的抢救治疗方法。作者对 24 例接受 B12 a 治疗的 CPB 术后患者的血流动力学变量和血管加压剂的需求进行了回顾性分析。尽管 VS 治疗的指导标准不一致，但在接受 B12 a 治疗后，血流动力学参数和血管加压剂的需求发生了良好的变化。这些发现支持了对 CPB 相关 VS 患者使用维生素 B12a 需要进一步研究。

（蒋长青 译　陈杰 校）

Hydroxocobalamin (vitamin B12a) is an emerging treatment for vasoplegic syndrome (VS) associated with cardiopulmonary bypass (CPB). Given its cost and scarcity, an institutional guideline for its use as a rescue treatment in cases of suspected VS was developed. Hemodynamic variables and vasopressor requirements were reviewed for a series of 24 post-CPB patients who received B12a. Favorable changes in hemodynamic parameters and vasopressor requirements were seen after B12a administration although guideline criteria for VS were inconsistently met. These findings support the continued study of B12a in patients with CPB-associated VS.

一个确定择期行首次全髋置换术患者术后不需要延长住院时间的预测模型

A Predictive Model for Determining Patients Not Requiring Prolonged Hospital Length of Stay After Elective Primary Total Hip Arthroplasty

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背景：住院时间（LOS）是全髋置换术的一项重要质量指标。准确预测 LOS 对于期望管理床位利用率和其他医院资源非常重要。作者目标是开发一种预测模型，用于确定不需要长期 LOS 的患者。

方法：这是一项回顾性单中心研究，分析了 2014 年至 2016 年首次接受择期行单侧全髋关节置换术的患者。主要结果是 LOS 小于或等于预期住院时间（定义为 ≤3 天）。应用多因素 logistic 回归生成该结果的模型，并设计基于问题的计算器。该模型建立在一个训练集上，并在一个验证集上进行性能的评估。计算受试者工作特征曲线下面积和 Hosmer-Lemeshow 检验，分别确定辨别能力和拟合度。使用其他机器学习技术（岭回归，拉索回归和随机森林算法）创建预测模型，并比较模型性能。

结果：基于问题的分数计算器包括 9 个变量：年龄、阿片类药物使用、代谢当量得分、性别、贫血、慢性阻塞性肺病、高血压、肥胖和主要麻醉方式。验证集上计算器的受试者工作特征曲线下面积为 0.735（95％置信区间，0.675-0.787），并证明了足够的拟合优度（Hosmer-Lemeshow 检验，$P = 0.37$）。当使用 12 分作为

预测结果的阈值时，阳性预测值为 86.1％。
结论：作者开发了一种预测模型，该模型可以帮助较高概率地识别不需要长期住院的患者，并且可以帮助医院管理者策略性地规划床位，以便与手术量变化一致，减少床位过度拥挤和未充分利用。
（周江平 译　　陈杰 校）
BACKGROUND: Hospital length of stay (LOS) is an important quality metric for total hip arthroplasty. Accurately predicting LOS is important to expectantly manage bed utilization and other hospital resources. We aimed to develop a predictive model for determining patients who do not require prolonged LOS.
METHODS: This was a retrospective single-institution study analyzing patients undergoing elective unilateral primary total hip arthroplasty from 2014 to 2016. The primary outcome of interest was LOS less than or equal to the expected duration, defined as ≤3 days. Multivariable logistic regression was performed to generate a model for this outcome, and a point-based calculator was designed. The model was built on a training set, and performance was assessed on a validation set. The area under the receiver operating characteristic curve and the Hosmer-Lemeshow test were calculated to determine discriminatory ability and goodness-of-fit, respectively. Predictive models using other machine learning techniques (ridge regression, Lasso, and random forest) were created, and model performances were compared.
RESULTS: The point-based score calculator included 9 variables: age, opioid use, metabolic equivalents score, sex, anemia, chronic obstructive pulmonary disease, hypertension, obesity, and primary anesthesia type. The area under the receiver operating characteristic curve of the calculator on the validation set was 0.735 (95% confidence interval, 0.675-0.787) and demonstrated adequate goodness-of-fit (Hosmer-Lemeshow test, P = .37). When using a score of 12 as a threshold for predicting outcome, the positive predictive value was 86.1%.
CONCLUSIONS: A predictive model that can help identify patients at higher odds for not requiring a prolonged hospital LOS was developed and may aid hospital administrators in strategically planning bed availability to reduce both overcrowding and underutilization when coordinating with surgical volume.

预测丙泊酚，氯胺酮，芬太尼和瑞芬太尼混合物的化学稳定性
Predosing Chemical Stability of Admixtures of Propofol, Ketamine, Fentanyl, and Remifentanil

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Anesthesia & Analgesia: 2019 129 e13–e15

通过各种临床相关条件来研究丙泊酚 - 氯胺酮，丙泊酚 - 氯胺酮 - 芬太尼和丙泊酚 - 氯胺酮 - 瑞芬太尼混合物的化学稳定性。 一种新型的高效液相色谱 - 质谱法显示，在 37℃，持续混合或台式存储下孵育 6h 和 24h 后，除在丙泊酚 - 氯胺酮 - 芬太尼混合物中丙泊酚和芬太尼存在不同的恢复率提示可能发生降解，其他没有任何化合物降解。
（宋英才 译 陈杰 校）
Admixtures of propofol-ketamine, propofol-ketamine-fentanyl, and propofol-ketamine-remifentanil were subjected to various clinically relevant conditions to study their chemical stability. A novel high-performance liquid chromatography-mass spectrometry method revealed no degradation of any compound by incubation at 37°C, constant mixing, or table-top storage for 6- and 24-hour time periods, except variable recovery of both propofol and fentanyl in the

admixtures of propofol-ketamine-fentanyl suggesting possible degradation.

.应用脑电双频指数导向的闭环麻醉给药系统麻醉中应用右美托咪定对丙泊酚需求量的影响

The Effect of Dexmedetomidine on Propofol Requirements During Anesthesia Administered by Bispectral Index-Guided Closed-Loop Anesthesia Delivery System

A Randomized Controlled Study

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Anesthesia & Analgesia: 2019 129 84–91

背景：右美托咪定是一种目前被批准用于重症监护室中连续性镇静的选择性 α2 肾上腺能受体激动剂，被广泛认为是一种潜在的麻醉药物。闭环麻醉给药系统（CLADS）是一种利用脑电双频指数（BIS）反馈自动进行丙泊酚全静脉麻醉给药达到更可信的稳定全麻状态的方法。本研究旨在评估右美托咪定是否能有效地进一步降低 CLADS 辅助全静脉麻醉下对丙泊酚的需求量。

方法：经过伦理委员会批准和书面知情同意后，80 例接受择期腹腔镜或者机器人手术的患者被随机分配到 CLADS 介导的静注丙泊酚（复合或不复合右美托咪定）全麻组中。定量分析丙泊酚的用量减少和麻醉深度（主要目的）、术中血流动力学变化、术后不良事件发生率（镇静、镇痛、恶心呕吐）和术中知晓发生率（次要目的）。

结果：右美托咪定组较非右美托咪定组的丙泊酚需求量降低具有统计学意义（右美托咪定组：0.91±0.26 mg/kg；非右美托咪定组：1.07±0.23 mg/kg，平均差异：0.163，95% CI 0.04-0.2），麻醉维持的丙泊酚用量也有明显差异（右美托咪定组：3.25±0.97 mg/kg/h；非右美托咪定组：4.57±1.21 mg/kg/h，平均差异 1.32，95% CI，0.78-1,85；P<0.01）。作为偏倚的 BIS 控制的中位性误差在右美托咪定组(1%[-5.8%，8%])显著低于非右美托咪定组(8% [2%，12%]);P = 0.002)。麻醉深度一致性参数，包括时间 BIS 在靶点±10 以内的百分比 (右美托咪定组:79.5 [72.5,85.3];非右美托咪定组:81 [68,88]、中位绝对性能误差(右美托咪定组:12% [10%，14%];非右美托咪定组:12% [10%，14%];P =0 .777)、 摆动度(右美托咪定组:10% [8%，10%];非右美托咪定组:8% [6%，10%]和总体分数(右美托咪定组:25.2 [23.1,35.8];非右美托咪定组:24.7 [20,38.1];P = 0.387) 均无差异。同样，两组间术中心率百分比和平均动脉压在基线 20%以内的时间无明显差异。然而，右美托咪定与丙泊酚联用增加了明显的心动过缓(右美托咪定组:14 [41.1%];非右美托咪定组:3 [9.1%];低血压(右美托咪定组:9 [26.5%];非右美托咪定组:2 [6.1%];P =0 .045)，以及术后早期镇静的发生率。

结论：CLADS 给药时在丙泊酚中加入右美托咪定在相当的麻醉深度下明显降低丙泊酚用量，但可能会出现血流动力学抑制和术后早期镇静。

（金夏 译 陈杰 校）

BACKGROUND: Dexmedetomidine, a selective α2-adrenergic agonist currently approved for continuous intensive care unit sedation, is being widely evaluated for its role as a potential anesthetic. The closed-loop anesthesia delivery system (CLADS) is a method to automatically administer propofol total intravenous anesthesia using bi-spectral index (BIS) feedback and attain general anesthesia (GA) steady state with greater consistency. This study assessed whether dexmedetomidine is effective in

further lowering the propofol requirements for total intravenous anesthesia facilitated by CLADS.
METHODS: After ethics committee approval and written informed consent, 80 patients undergoing elective major laparoscopic/robotic surgery were randomly allocated to receive GA with propofol CLADS with or without the addition of dexmedetomidine. Quantitative reduction of propofol and quality of depth-of-anesthesia (primary objectives), intraoperative hemodynamics, incidence of postoperative adverse events (sedation, analgesia, nausea, and vomiting), and intraoperative awareness recall (secondary objectives) were analyzed.
RESULTS: There was a statistically significant lowering of propofol requirement (by 15%) in the dexmedetomidine group for induction of anesthesia (dexmedetomidine group: mean ± standard deviation 0.91 ± 0.26 mg/kg; nondexmedetomidine group: 1.07 ± 0.23 mg/kg, mean difference: 0.163, 95% CI, 0.04-0.28; P = .01) and maintenance of GA (dexmedetomidine group: 3.25 ± 0.97 mg/kg/h; nondexmedetomidine group: 4.57 ± 1.21 mg/kg/h, mean difference: 1.32, 95% CI, 0.78-1.85; P < .001). The median performance error of BIS control, a measure of bias, was significantly lower in dexmedetomidine group (1% [-5.8%, 8%]) versus nondexmedetomidine group (8% [2%, 12%]; P = .002). No difference was found for anesthesia depth consistency parameters, including percentage of time BIS within ±10 of target (dexmedetomidine group: 79.5 [72.5, 85.3]; nondexmedetomidine group: 81 [68, 88]; P = .534), median absolute performance error (dexmedetomidine group: 12% [10%, 14%]; nondexmedetomidine group: 12% [10%, 14%]; P = .777), wobble (dexmedetomidine group: 10% [8%, 10%]; nondexmedetomidine group: 8% [6%, 10%]; P = .080), and global score (dexmedetomidine group: 25.2 [23.1, 35.8]; nondexmedetomidine group: 24.7 [20, 38.1]; P = .387). Similarly, there was no difference between the groups for percentage of time intraoperative heart rate and mean arterial pressure remained within 20% of baseline. However, addition of dexmedetomidine to CLADS propofol increased the incidence of significant bradycardia (dexmedetomidine group: 14 [41.1%]; nondexmedetomidine group: 3 [9.1%]; P = .004), hypotension (dexmedetomidine group: 9 [26.5%]; nondexmedetomidine group: 2 [6.1%]; P = .045), and early postoperative sedation.
CONCLUSIONS: The addition of dexmedetomidine to propofol administered by CLADS was associated with a consistent depth of anesthesia along with a significant decrease in propofol requirements, albeit with an incidence of hemodynamic depression and early postoperative sedation.

关于沙滩躺椅位肩部手术的安全性——一项基于现有文献的回顾性研究

Safety of Beach Chair Position Shoulder Surgery

A Review of the Current Literature

Murphy, Glenn S. MD; Greenberg, Steven B. MD; Szokol, Joseph W. MD

Anesthesia & Analgesia: 2019 129 101–118

尽管罕见，在以沙滩躺椅位接受肩部外科手术的患者中依然有严重神经系统不良事件的相关报道。中枢神经系统损伤的推测病因多是在全麻后体位变化而发生的低血压及随后的脑灌注不足。大多数临床试验表明，沙滩躺椅体位可以降低局部脑氧合，脑血流量和颈静脉球氧合，并损伤脑自动调节功能，以及脑电图/脑电图处理变量。目前还需进一步的研究来确定沙滩躺椅体位中神经系统不良事件的发生率，并确定能预测神经认知结果的最佳术中神经监测指标，个体患者术中最低的“安全”可接受的血压，以及治疗术中低血压的最佳干预措施。

（谢婷婷 译 陈杰 校）
Although uncommon, severe neurological events have been reported in patients undergoing shoulder surgery in the beach chair position. The presumed etiology of central nervous system injury is hypotension and subsequent cerebral hypoperfusion that occurs after alterations in positioning under general anesthesia. Most clinical trials have demonstrated that beach chair positioning results in reductions in regional brain oxygenation, cerebral blood flow, and jugular bulb oxygenation, as well as impairment in cerebral autoregulation and electroencephalographic/processed electroencephalographic variables. Further studies are needed to define the incidence of adverse neurological adverse events in the beach chair position, identify the best intraoperative neurological monitors that are predictive of neurocognitive outcomes, the lowest "safe" acceptable blood pressure during surgery for individual patients, and the optimal interventions to treat intraoperative hypotension.

创伤后麻醉监护的频率

Frequency of Operative Anesthesia Care After Traumatic Injury

Sunshine, Jacob E. MD, MS[*]; Humbert, Andrew T. BS[†]; Booth, Benjamin PhD[‡]; Bowman, Steven M. PhD[‡]; Bulger, Eileen M. MD[§,‖]; Sharar, Sam R. MD[*,‖]
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背景：几乎所有麻醉医生都会遇到持续创伤患者；然而，对这一特定患者群体提供手术麻醉监护的频率尚不清楚。作者试图通过搜索一个全面的区域数据库-即华盛顿州创伤登记处（WSTR）的数据，更好地了解麻醉提供者参与手术创伤监护的程度以及在不同级别创伤中心（I-V 级别）的差异程度。作者通过美国外科医师学会关于 II 级创伤中心认证的连续麻醉学覆盖指南来评估手术麻醉护理频率。
方法：作者对 WSTR 登记的患者的手术麻醉监护频率进行了一项回顾性分析。在入院期间接受手术的创伤患者与未接受手术的创伤患者（仅限用药）之间进行单变量比较。此外，还评估了与手术干预相关的临床因素。作者还比较了不同创伤中心（分为 I，II 和 III-V 级）从入院到手术平均时间的差异。
结果：从 2004 年到 2014 年，大约有 176,000 例患者符合 WSTR 纳入标准。这些创伤患者中约有 60％在入院期间接受手术麻醉。在创伤患者入院期间的所有外科手术中，大约 33％发生在 I 级创伤中心内，23％发生在 II 级创伤中心内，44％发生在具有 III，IV 或 V 指征的创伤中心。创伤患者入院期间的主要手术类别是骨科手术。在调整潜在的混杂因素之后，发现入院时出现低血压（P <.01），伤害严重程度评分持续增加（P <.01），较高的急诊科格拉斯哥昏迷评分（P <.01）均与创伤住院期间的手术干预有关。在 I 级创伤中心，对于一般外科手术，手术的中位时间为 2.5 小时;在 II 级创伤中心，中位时间为 1.7 小时。
结论：这项研究强调了麻醉医师在创伤中心 I-V 级别中监护持续创伤患者的频繁作用。在 II 级创伤中心，院内麻醉科覆盖可能对那些需要在 1 小时内进行手术的患者有益，而前美国外科医师学会要求 30min 的院外麻醉科覆盖响应时间可能足以提供对需要手术的患者在 3 小时内给予满意的护理。II 级创伤中心的这种院内麻醉科覆盖的成本是否具有临床获益仍然是一个悬而未决的问题。
（陈冠楠 译 陈杰 校）
BACKGROUND: Virtually all anesthesiologists care for patients who sustain traumatic injuries; however, the frequency with which operative anesthesia care is provided to this specific patient population is unclear. We sought to better understand

the degree to which anesthesia providers participate in operative trauma care and how this differs by trauma center designation (levels I-V), using data from a comprehensive, regional database-the Washington State Trauma Registry (WSTR). We also sought to specifically assess operative anesthesia care frequency vis a vis the American College of Surgeons guidelines for continuous anesthesiology coverage for Level II trauma center accreditation.

METHODS: We conducted a retrospective analysis measuring the frequency of operative anesthesia care among patients enrolled in the WSTR. Univariate comparisons were made between trauma patients who had surgery during their admission and those who did not (medical management only). In addition, clinical factors associated with surgical intervention were measured. We also measured the average times from hospital admission to surgery and compared these times across trauma centers, grouped level I, II, and III-V.

RESULTS: From 2004 to 2014, there were approximately 176,000 encounters meeting WSTR inclusion criteria. Approximately 60% of these trauma encounters included exposure to operative anesthesia during the admission. Among all surgical procedures during the trauma admission, approximately 33% occurred within a level I trauma center, 23% occurred within a level II trauma center, and 44% occurred in a trauma center with a III, IV, or V designation. The predominant procedure category during a trauma admission was orthopedic. The presence of hypotension on admission ($P < .01$), increasing injury severity score ($P < .01$) and higher emergency department Glasgow Coma Score ($P < .01$) were all associated with surgical intervention during the trauma hospitalization, after adjustment for potential confounders. In level I trauma centers, for general surgical procedures, the median time to surgery was 2.5 hours; in level II trauma centers, the median time was 1.7 hours.

CONCLUSIONS: This study highlights the frequent role anesthesiologists play in caring for patients who sustain traumatic injuries, in trauma centers levels I-V. In level II trauma centers, in-house anesthesiology coverage might have benefit for those patients requiring surgery within 1 hour, whereas the former American College of Surgeons requirement of 30-minute response time for out-of-hospital anesthesiology coverage is likely sufficient to provide satisfactory care to patients requiring surgery within 3 hours. Whether the increased cost of such in-house anesthesiology coverage at level II trauma centers is justified by its clinical benefit remains an unanswered question.

一项回顾性观察研究：术前肺功能测试结果与脊柱侧弯儿童脊柱后路融合术后再次气管插管无关

Preoperative Pulmonary Function Test Results Are Not Associated With Postoperative Intubation in Children Undergoing Posterior Spinal Fusion for Scoliosis: A Retrospective Observational Study.

Burjek NE[1,2], Rao KE[2], Wieser JP[1], Evans MA[1,2], Toaz EE[1,2], Balmert LC[3], Sarwark JF[4], Jagannathan N[1,2].

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背景：对于脊柱侧弯接受后路脊柱融合术的儿童，术前肺功能检查是例行的，尽管其作为围手术期风险评估工具的益处并不明确，而且经常发生病人不能提供可接受的结果。这项研究目的是确定术前肺功能测试结果是否与脊柱融合术后气管插管或术后入重症监护病房有关。

方法:回顾了 2012 年 6 月至 2017 年 8 月在一家儿科三级医院接受后路脊柱融合术患者的电子病历。除非因认知障碍而被认为无法进行测试,所有病人都进行了肺功能试验。病例分为原发性或继发性脊柱侧弯。记录每个患者的术前双水平气道正压使用、Cobb 角、术中异体输血及肺功能检测结果是否达标。在肺功能测试结果满意的患者中,记录其用力肺活量和最大吸气压力。主要预后指标为术后气管插管和重症监护入住。使用单因素 logistic 回归模型评估任一可能变量与主要预后指标的相关性。

结果:本研究一共纳入 433 例患者,包括 288 例原发性脊柱侧弯和 145 例继发性脊柱侧弯。在原发性脊柱侧弯患者中,90%的患者肺功能结果达标。 结果术后 0 例留置气管插管,6 例进入重症监护病房。继发性脊柱侧弯患者中,44%无法完成肺功能检查。剩余患者中 30%肺功能结果不达标。研究发现最大肺活量和最大吸气压力与术后插管或术后入重症监护病房无相关性。体重、Cobb 角、术中输血、ASA 体格状况分级和术前双水平气道正压应用都与患者的预后有关。在 357 名接受肺功能测试的患者中,37 例有高风险结果,其中术后仅 1 例留置气管插管。

结论:接受脊柱后路融合术的患者,尤其是继发性脊柱侧弯患者,往往无法充分进行肺功能检查。在可获得肺功能检测结果的患者中,检查结果与术后插管或入住重症监护病房无相关性。所有脊柱侧弯患者的术前常规肺功能检查可能无法用于后路脊柱融合术的风险评估。临床医生应考虑一种有针对性的方法,并将肺功能测试限制在可能对其有术前指导意义的患者。因为这可以改善预后,增加效率,减少成本。

(陈冬芳 译 陈杰 校)

BACKGROUND: Preoperative pulmonary function tests are routinely obtained in children with scoliosis undergoing posterior spinal fusion despite unclear benefits as a perioperative risk assessment tool and frequent inability of patients to provide acceptable results.The goal of this study was to determine whether preoperative pulmonary function test results are associated with the need for postoperative intubation or intensive care unit admission after posterior spinal fusion.

METHODS: The electronic medical records of patients who underwent posterior spinal fusion at a pediatric tertiary hospital between June 2012 and August 2017 were reviewed. Pulmonary function tests were consistently ordered for all patients, unless the patient was deemed unable to perform the test due to cognitive disability. Cases were categorized as primary or secondary scoliosis.Demographic data, preoperative bilevel positive airway pressure use, Cobb angle, intraoperative allogeneic blood transfusion, and ability to produce acceptable pulmonary function

test results were collected for each patient. In patients with satisfactory pulmonary function test results, forced vital capacity and maximum inspiratory pressure were collected. Primary outcomes for analysis were postoperative intubation and intensive care unit admission. Univariable logistic regression models were used to assess the association between each variable of interest and the primary outcomes

RESULTS: The study sample included 433 patients, 288 with primary scoliosis and 145 with secondary scoliosis. Among patients with primary scoliosis, 90% were able to produce acceptable pulmonary function test results, zero remained intubated postoperatively, and 6 were admitted to the intensive care unit. Among patients with secondary scoliosis, 44% could not attempt pulmonary function tests. Among those who did attempt the test, 30% were unable to produce meaningful results. Forced vital capacity and maximum inspiratory pressure were not found to be associated with postoperative intubation or intensive care unit admission. Weight, Cobb angle, intraoperative blood transfusion, American Society of Anesthesiologists physical status classification, and preoperative bilevel positive airway pressure use were associated with patient outcomes. Among 357 total patients who attempted pulmonary function tests, 37 had high-risk results. Only 1 of these 37 patients remained intubated postoperatively

CONCLUSIONS: Patients undergoing posterior spinal fusion, especially those with secondary scoliosis, are frequently unable to adequately perform pulmonary function tests. Among patients with interpretable pulmonary function tests, there was no association between results and postoperative intubation or intensive care unit admission. Routine pulmonary function testing for all patients with scoliosis may not be indicated for purposes of risk assessment before posterior spinal fusion. Clinicians should consider a targeted approach and limit pulmonary function tests to patients for whom results may guide preoperative optimization as this may improve outcomes and reduce inefficiencies and costs.

小鼠的重复高渗盐水试验可用于镇痛药物活性的筛查。

Repeated Testing With the Hypertonic Saline Assay in Mice for Screening of Analgesic Activity.

Asiri YI1, Fung T1, Schwarz SKW1,2, Barr AM1,3, Puil E1, MacLeod BA1.

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背景：活体动物试验是疼痛临床前研究的基础。衡量镇痛药物潜在药效的最佳刺激可重复试验并得到一致的效果。在各种镇痛药作用下，小鼠对足底注射高渗盐水可产生不同的痛觉反应，且无周围组织损伤。因此，作者通过在不同时间和小鼠的不同部位进行重复注射高渗盐水，以观察痛觉是否变化，以及该痛觉是否能被吗啡所缓解。

方法：作者对雌性 CD-1 小鼠进行随机、盲法重复足底注射 10%高渗盐水，以探究其痛觉差异。在第一次注射高渗盐水后，一组小鼠在第 4 小时或第 24 小时或第 7 天第二次接受同侧后爪的高渗盐水注射。另一组小鼠在第 5、10、15 天时均接受同侧后爪的高渗盐水注射。在另一个独立实验中，第一次后爪注射高渗盐水 30 分钟后，小鼠的对侧后爪或同侧前爪接受第二次高渗盐水注射。随后每隔 5

天注射一次吗啡，以检测其镇痛效力。
结果：第 4 小时（84 vs 75 秒;平均差[95％CI]，-9 [-40-23]; P = 0.6）、第 24 小时(122 vs 113 秒; -6 [-24 -12]; P = 0.5)或第 7 天时(112 vs 113 秒; -0.3 [-12 - 11]; P = 0.95) 足底注射高渗盐水与首次注射相比，小鼠对疼痛的反应无明显差异。多次注射的结果亦同（第 0 天 122 秒； vs.第 5 天 121 秒，-0.3 [-28 - 27]，P> 0.99;vs.第 10 天 118 秒; 2.5 [-36 - 41]，P =0 .99; vs.第 15 天，119 秒; 2 [-36 - 38] ，P =0.99）。首次后爪注射也不影响后期对侧后爪（右后爪，93 秒 vs.左后抓，96 秒; -3 [-20 -13]，P =0.7）或同侧前爪（前爪注射高渗盐水为 146 秒，注射 0.9％生理盐水为 149 秒; -3 [-28 - 22]，P =0.8）对痛觉的反应。 吗啡剂量依赖性地降低小鼠对高渗盐水的疼痛反应（对照组为 94 秒,相较于 4mg / kg 吗啡剂量为 66 秒; 29 [-7 - 64]，P =0 .12; 相较于 10mg / kg 吗啡剂量为 27 秒; 67 [44-90]，P <.0001; 4 mg / kg 吗啡剂量相较于 10 mg / kg 吗啡剂量，67 [44-90]，P = 0.03）。
结论：重复足底注射高渗盐水可产生重复一致的疼痛效果，且无周围组织损伤。该研究方法可快速有效地检测镇痛药物效果，并减少所需动物的数量。
（钱佳红 译 陈杰 校）
BACKGROUND: In vivo animal assays are a cornerstone of preclinical pain research. An optimal stimulus for determining the activity of potential analgesics would produce responses of a consistent magnitude on repeated testing. Intraplantar (i.pl.) injection of hypertonic saline (HS) in mice produces robust nociceptive responses to different analgesics, without evidence of tissue damage. Here, we investigated whether the nociceptive response is changed by repeating the injection at different times and sites in a mouse and whether it is attenuated by morphine.
METHODS: We conducted randomized and blinded experiments to assess responses to repeated i.pl. 10% HS in female CD-1 mice. An injection of HS was followed by a second injection into the same hind paw at 4 hours, 24 hours, or 7 days. A separate group of mice each received i.pl. injections at 5, 10, and 15 days. In 2 independent experiments, 30 minutes after initial HS injections in the ipsilateral hind paw, mice received HS injection into the contralateral hind paw or ipsilateral forepaw. The ability of morphine to block the nociceptive responses was examined by injecting morphine at 5-day intervals.
RESULTS: Repeated injection of HS did not alter the responses at 4 hours (84 vs 75 seconds; mean difference [95% CI], -9 [-40 to 23]; P = .6), 24 hours (122 vs 113 seconds; -6 [-24 to 12]; P = .5), or 7 days (112 vs 113 seconds; -0.3 [-12 to 11]; P = .95) or at multiple injections (day 0, 122 seconds vs day 5, 121 seconds; -0.3 [-28 to 27], P > .99; day 10, 118 seconds; 2.5 [-36 to 41], P = .99; day 15, 119 seconds; 2 [-36 to 38], P = .99). A previous hind paw injection did not change the responses of the contralateral hind paw (right, 93 seconds versus left, 96 seconds; -3 [-20 to 13], P = .7) or of the ipsilateral forepaw (forepaw after HS, 146 seconds versus forepaw after 0.9% saline, 149 seconds; -3 [-28 to 22], P = .8). Morphine dose-dependently attenuated HS responses (control, 94 seconds vs 4 mg/kg, 66 seconds; 29 [-7 to 64], P = .12; vs 10 mg/kg, 27 seconds; 67 [44-90], P < .0001; 4 vs 10 mg/kg, 67 [44-90], P = .03).
CONCLUSIONS: The repetition of i.pl. HS produces consistent reproducible responses without tissue damage. This results in efficient, rapid detection of analgesic activity, reducing the number of animals required.

静脉注射氯胺酮治疗慢性疼痛：一篇基于随机对照实验的综述和 Meta 分析
Ketamine Infusions for Chronic Pain: A Systematic Review and Meta-analysis of Randomized Controlled Trials.

Orhurhu V1, Orhurhu MS2, Bhatia A3, Cohen SP4,5.
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背景：静脉注射氯胺酮被广泛用于治疗慢性疼痛患者，但长期影响尚不确定。作者归纳了随机对照试验的证据，以研究静脉注射氯胺酮输注治疗慢性病缓解疼痛的有效性，并确定任何疼痛分类或治疗方案是否与更大的益处相关。
方法：作者从 2017 年 12 月 16 日开始搜索 Medline，Embase 和 Google Scholar，以及 clinicaltrials.gov 网站，纳入比较静脉注射氯胺酮与安慰剂治疗慢性疼痛，且报告干预后≥48 小时预后的随机对照试验。三位作者独立筛选了这些研究，汇总了数据，并评估了偏倚的风险。随机效应模型用于计算疼痛评分和次要结果的加权平均差异。本研究主要结果是停止治疗≥48 小时后记录的最低疼痛评分。次要结果包括应答率和不良反应。
结果：在找到的 696 项研究中，7 项符合纳入标准。除一项外的所有研究均存在高度偏倚风险。这些研究随机分配了 211 例神经病变（n = 2），混合（n = 2）和非神经病变（神经可塑性或伤害性）（n = 3）疼痛的患者。三项研究报告提示氯胺酮较安慰剂有更显著镇痛效果，荟萃分析显示其输注后长达 2 周的弱镇痛效应（疼痛评分的平均差异，0-10 数字评分量表为-1.83 分; 95％CI，-2.35 到-1.31 分; P <.0001）。在报告应答率的 3 项研究中，氯胺酮的阳性结果比例高于安慰剂组（51.3％vs19.4％;相对风险，2.43; 95％CI，1.10-5.40; P =0 .029; I = 0.0％）。根据疼痛分类或病情没有发现差异。与评估非复杂区域疼痛综合征状况的低剂量氯胺酮研究和调查相比，在使用高剂量氯胺酮治疗（P =0.213）或纳入复杂区域疼痛综合征的研究中发现疼痛评分略微但无显着性降低。（P = 0.079）。
结论：证据表明，静脉注射氯胺酮可使难治性慢性疼痛患者获得显着的短期镇痛效果，并有一些量效关系的证据。但是需要更长时间的大型多中心研究以更好地选择患者并确定最佳治疗方案。
（冯昭妍 译 陈杰 校）

Abstract

BACKGROUND: IV ketamine is widely used to treat patients with chronic pain, yet the long-term impact remains uncertain. We synthesized evidence from randomized control trials to investigate the effectiveness of IV ketamine infusions for pain relief in chronic conditions and to determine whether any pain classifications or treatment regimens are associated with greater benefit.
METHODS: We searched Medline, Embase, and Google Scholar, as well as the clinicaltrials.gov website from inception through December 16, 2017 for randomized control trials comparing IV ketamine to placebo infusions for chronic pain that reported outcomes for ≥48 hours after the intervention. Three authors independently screened the studies, pooled the data, and appraised risk of bias. Random-effects model was used to calculate weighted mean differences for pain scores and secondary outcomes. Our primary outcome was the lowest recorded pain score ≥48 hours after cessation of treatment. Secondary outcomes included responder rate and adverse effects.
RESULTS: Among 696 studies assessed for eligibility, 7 met inclusion criteria. All studies except one were at high risk of bias. These studies randomly assigned 211 patients with neuropathic (n = 2), mixed (n = 2), and nonneuropathic (nociplastic or nociceptive) (n = 3) pain. Three studies reported significant analgesic benefit favoring ketamine, with the meta-analysis revealing a small effect up to 2 weeks after the infusion (mean difference in pain scores, -1.83 points on a 0-10 numerical rating scale;

95% CI, -2.35 to -1.31 points; P < .0001). In the 3 studies that reported responder rates, the proportion with a positive outcome was greater in the ketamine than in the placebo group (51.3% vs 19.4%; relative risk, 2.43; 95% CI, 1.10-5.40; P = .029; I = 0.0%). No differences were noted based on pain classification or condition. Compared to low-dose ketamine studies and investigations that evaluated non-complex regional pain syndrome conditions, a small but nonsignificant greater reduction in pain scores was found among studies that either utilized high-dose ketamine therapy (P = 0.213) or enrolled complex regional pain syndrome patients (P = .079).
CONCLUSIONS: Evidence suggests that IV ketamine provides significant short-term analgesic benefit in patients with refractory chronic pain, with some evidence of a dose-response relationship. Larger, multicenter studies with longer follow-ups are needed to better select patients and determine the optimal treatment protocol.

改善发达国家农村和偏远社区的安全麻醉监护条件

Improving Access to Safe Anesthetic Care in Rural and Remote Communities in Affluent Countries.

Orser BA[1,2], Wilson CR[3], Rotstein AJ[2], Iglesias SJ[4], Spain BT[5], Ranganathan P[6], MacDonald WA[7], Ng V[8], O'Leary S[9], Lafontaine A[10].
Anesthesia & Analgesia: 2019 129 294–300

麻醉和手术医疗服务的不足通常被认为是低中等收入国家的问题。然而，包括加拿大，澳大利亚和美国在内的发达国家在农村及偏远社区也面临着麻醉和外科医疗的短缺。服务不足往往对土著居民造成连带影响。缺乏麻醉人员被认为是导致这些地区外科和产科监护短缺的主要因素。本报告总结了在农村和偏远地区提供麻醉服务所面临的挑战。同时也描述了麻醉人员当前及其培训情况。作者还探索创新的策略和新兴技术，以更好地支持在农村和偏远地区工作，由医生主导的麻醉监护团队。最后作者坚信专业的麻醉医生和学术健康科学中心有责任通过与其他利益相关者的合作促进高质量医疗服务的提供。专业医疗组织在确保护理质量和持续的专业发展方面同样发挥着重要作用。加强学术麻醉师和其他利益相关者之间的合作，以应对世界卫生组织为确保所有人获得必须的麻醉和外科服务而发出的挑战。
（倪晨璐 译 陈杰 校）

Inadequate access to anesthesia and surgical services is often considered to be a problem of low- and middle-income countries. However, affluent nations, including Canada, Australia, and the United States, also face shortages of anesthesia and surgical care in rural and remote communities. Inadequate services often disproportionately affect indigenous populations. A lack of anesthesia care providers has been identified as a major contributing factor to the shortfall of surgical and obstetrical care in rural and remote areas of these countries. This report summarizes the challenges facing the provision of anesthesia services in rural and remote regions. The current landscape of anesthesia providers and their training is described. We also explore innovative strategies and emerging technologies that could better support physician-led anesthesia care teams working in rural and remote areas.

Ultimately, we believe that it is the responsibility of specialist anesthesiologists and academic health sciences centers to facilitate access to high-quality care through partnership with other stakeholders. Professional medical organizations also play an important role in ensuring the quality of care and continuing professional development. Enhanced collaboration between academic anesthesiologists and other stakeholders is required to meet the challenge issued by the World Health Organization to ensure access to essential anesthesia and surgical services for all.

.成人嗜睡症围术期管理中的知识空白：呼吁进一步研究
Knowledge Gaps in the Perioperative Management of Adults With Narcolepsy: A Call for Further Research.
Hershner S1, Dauvilliers Y2, Chung F3, Singh M4,5, Wong J3, Gali B6, Kakkar R7,8, Mignot E9, Thorpy M10, Auckley D11.
Anesthesia & Analgesia: 2019 129 204–211

目前睡眠障碍可能与围术期风险有关这一问题日益受到重视。麻醉与睡眠医学协会成立了嗜睡症围术期工作组:(1)调查嗜睡症患者围手术期风险的现状.（2）确定围术期指南的可行性，以便对患者进行管理，（3）描述未来研究目标和临床相关结果。嗜睡症围术期工作组证实，有关证据表明嗜睡症患者围术期风险增加；然而相关证据较少，且基于病例回顾，病例系列报道和回顾性综述。存在一些潜在机制使嗜睡症患者围手术期并发症的风险增加。这些机制包括疾病本身恶化、自主神经功能障碍、嗜睡症相关治疗药物、麻醉相互作用以及嗜睡症相关药物的停用。目前，嗜睡症患者相关研究不足以支持制定其围术期管理的专家共识和指南。现有文献的缺乏凸显了确定嗜睡症患者是否具有增加的围手术期风险以及建立适当的研究方案和明确界定以患者为中心的结果的关键需求。迫切需要在睡眠医学专家，外科医生，麻醉医师和围术期医疗人员之间建立合作研究。未来的相关研究将成为指导方针发展的基础，或者至少更好地理解如何优化嗜睡症患者的围术期监护。
（金黎娜 译 陈杰 校）
There is increasing awareness that sleep disorders may be associated with increased perioperative risk. The Society of Anesthesia and Sleep Medicine created the Narcolepsy Perioperative Task Force: (1) to investigate the current state of knowledge of the perioperative risk for patients with narcolepsy, (2) to determine the viability of developing perioperative guidelines for the management of patients with narcolepsy, and (3) to delineate future research goals and clinically relevant outcomes. The Narcolepsy Perioperative Task Force established that there is evidence for increased perioperative risk in patients with narcolepsy; however, this evidence is sparse and based on case reviews, case series, and retrospective reviews. Mechanistically, there are a number of potential mechanisms by which patients with narcolepsy could be at increased risk for perioperative complications. These include aggravation of the disease itself, dysautonomia, narcolepsy-related medications, anesthesia interactions, and withdrawal of narcolepsy-related medications. At this time, there is inadequate research to develop an expert consensus or guidelines for the perioperative management of patients with narcolepsy. The paucity of available literature highlights the critical need to determine if patients with narcolepsy are at an increased perioperative risk and to establish appropriate research protocols and clearly

delineated patient-centered outcomes. There is a real need for collaborative research among sleep medicine specialists, surgeons, anesthesiologists, and perioperative providers. This future research will become the foundation for the development of guidelines, or at a minimum, a better understanding how to optimize the perioperative care of patients with narcolepsy.

超声辅助技术与解剖定位法在肥胖产妇剖宫产麻醉中的应用比较：一项随机对照试验

Ultrasound-Assisted Technology Versus the Conventional Landmark Location Method in Spinal Anesthesia for Cesarean Delivery in Obese Parturients: A Randomized Controlled Trial.

Li M1, Ni X, Xu Z, Shen F, Song Y, Li Q, Liu Z.

Anesthesia & Analgesia: 2019 129 155–161

背景：由于肥胖产妇难以触及体表标志和放置体位困难，在其剖腹产中腰麻通常难以实施。本研究旨在评估超声辅助技术对肥胖产妇腰麻的作用。

方法：体重指数（BMI）≥30kg/ m²、择期行剖宫产的产妇随机接受常规解剖定位技术（标志组，n = 40）或穿刺前超声检查（超声组，n = 40） 下腰麻。所有受试者均在侧卧位接受腰麻。主要结果是首次尝试成功率。次要结果是皮肤穿刺和针刺次数，手术时间，患者满意度，更换预穿刺间隙以及并发症的发生率。

结果：与标志组相比，超声组的首次尝试成功率更高（87.5％vs 52.5％; P =0 .001），需要> 10 次穿刺次数的病例更少（1 vs17; P <0.001），皮肤穿刺和针刺次数更少（两者均 P <0.001）。在确认穿刺部位所花费的时间上两组间没有显著的统计学差异（202.5 vs272.0 秒; P = 0.580）。标志组的腰麻药物注射时间和总操作时间均更长（P <0.001）。超声组的患者满意度得分更高（P =0 .001）。在 BMI 介于 30-34.9 kg / m²之间的患者中，两组的首次尝试成功率（P =0 .407），> 10 次针刺次数（P =0 .231），腰麻注射时间（P =0 .081），或操作时间（P =0 .729）无统计学差异；但是，超声组需要更多的时间来确认穿刺部位（P <0.001）。对于 BMI 介于 35-43 kg / m²之间的患者，超声组的首次尝试成功率更高（P≤0.441），> 10 次穿刺次数刺更少（P≤0.01），操作时间更短，包括确认穿刺部位所需的时间（P <0.001）。

结论：通过提高首次尝试成功率，减少穿刺次数和穿刺尝试，缩短整个操作过程，穿刺前超声检查可以缩短肥胖产妇（35 kg /m²≤BMI≤43kg / m²）侧卧位腰麻时间，提高患者满意度。

（郭宝超 译 陈杰 校）

BACKGROUND: Spinal anesthesia, which is commonly used in cesarean deliveries, is often difficult to perform in obese parturients because of poorly palpable surface landmarks and positioning challenges. This study aimed to evaluate the benefits of ultrasound-assisted technology for performing spinal anesthesia in obese parturients.

METHODS: Parturients with a body mass index (BMI) ≥30 kg/m scheduled for elective cesarean delivery were randomized to undergo spinal anesthesia using the conventional landmark location technique (landmark group, n = 40) or prepuncture ultrasound examination (ultrasound group, n = 40). All participants underwent spinal anesthesia in the lateral position. The primary outcome was the first-attempt success rate. Secondary outcomes were the number of skin punctures and needle passes, procedure times, patient satisfaction, changes in the intended interspace, and incidence of complications.

RESULTS: The ultrasound group had a significantly higher first-attempt success rate

(87.5% vs 52.5%; P =0 .001), fewer cases requiring >10 needle passes (1 vs 17; P <0 .001), and fewer skin punctures and needle passes (P <0 .001 for both). There was no statistically significant difference in the time taken to identify the needle insertion site between the 2 groups (202.5 vs 272.0 seconds; P =0 .580). Both the spinal injection time and total procedure time were significantly longer in the landmark group (P <0 .001). Patient satisfaction scores were significantly higher in the ultrasound group (P =0 .001). Among patients with BMI between 30 and 34.9 kg/m, there was no statistically significant difference in the first-attempt success rate (P = 0.407), number of cases with >10 needle passes (P =0 .231), spinal injection time (P =0 .081), or total procedure time (P =0 .729); however, more time was required to identify the needle insertion site in the ultrasound group (P <0 .001). For patients with BMI between 35 and 43 kg/m, the ultrasound group had a significantly higher first-attempt success rate ($P \leq 0.041$), fewer cases with >10 needle passes ($P \leq 0.01$), and shorter procedure times, including the time required to identify the needle insertion site (P <0 .001).

CONCLUSIONS: Prepuncture ultrasound examination can facilitate spinal anesthesia in the lateral position in obese parturients (35 kg/m $\leq$ BMI $\leq$ 43 kg/m) by improving the first-attempt success rate, reducing the number of needle passes and puncture attempts, shortening the total procedure time, and improving patient satisfaction.

儿科“新”病变-肺静脉腔内狭窄

Intraluminal Pulmonary Vein Stenosis in Children A “New” Lesion

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肺静脉狭窄（PVS）是一种罕见的导致肺外静脉逐渐狭窄的疾病。儿童和成人都有肺静脉狭窄（PVS）的报道，而且肺静脉狭窄的恶化会导致肺动脉高压、右心功能衰竭和死亡。有关儿童和成人 PVS 病因已经有多个描述。本篇综述将集中在儿童管腔内 PVS。管腔内 PVS 的发病率估计在 0.0017%到 0.03%之间。它与早产、肺支气管发育不良、坏死性小肠结肠炎、Smith-Lemli-Opitz 综合征（小头-小颌-并趾综合征）和唐氏综合征等疾病有关。心导管和肺静脉造影检查是诊断和解剖描述的金标准。其他的成像方式，包括磁共振成像、胸部 X 线断层扫描和经食管超声心动图，也越来越多地被应用。儿童 PVS 的死亡率约为 50%。死亡率的预测因素包括：3 个以上肺静脉受累、双侧肺静脉受累、PVS 发生于婴儿期、肺动脉压升高或收缩期肺动脉与主动脉压之比升高、右心室功能障碍、术后再狭窄、远端/上游病变，以及病变发展到以前未受累及的肺静脉。治疗包括基于导管的肺静脉扩张（无论是否置入支架）、手术干预、药物治疗，以及在某些情况下的肺移植。对 PVS 患者进行心导管检查术包括对肺静脉进行全面的血流动力学和解剖学评估，以及经导管介入治疗的干预。几种手术策略已经使用。目前最常用的是无缝线修补术，但在某些情况下也可使用补片静脉成形术、动脉内膜切除术、肺静脉造口术和再植入术。甲磺酸伊马替尼和贝伐单抗等药物越来越多地被用于抑制PVS患者的心肌成纤维细胞增殖。肺移植已被用于晚期难治性PVS的替代治疗策略。然而，尽管采用了不同的创新方法，PVS 的发病率和死亡率仍然很高。目前，首选的治疗策略是经常对病变进展进行重新评估，以指导结合药物治疗使用基于导管的外科干预措施。（吴洁译 李士通校）

Pulmonary vein stenosis (PVS) is a rare disorder that leads to progressive narrowing

of the extrapulmonary veins. PVS has been reported in both children and adults and in its worse iteration leads to pulmonary hypertension, right ventricular failure, and death. Multiple etiologies of PVS have been described in children and adults. This review will focus on intraluminal PVS in children. Intraluminal PVS has an estimated incidence ranging from 0.0017% to 0.03%. It is associated with conditions such as prematurity, bronchopulmonary dysplasia, necrotizing enterocolitis, Smith-Lemli-Opitz syndrome, and Down syndrome. Cardiac catheterization and pulmonary vein angiography are the gold standard for diagnosis and anatomic delineation. Other imaging modalities including magnetic resonance imaging, chest tomography, and transesophageal echocardiography are increasingly being used. Mortality of PVS in children is approximately 50%. Predictors of mortality include involvement of ≥3 pulmonary veins, bilateral pulmonary vein involvement, onset of PVS in infancy, elevated pulmonary artery pressure or systolic pulmonary artery-to-aortic pressure ratio, right ventricular dysfunction, restenosis after surgery, distal/upstream disease, and disease progression to previously uninvolved pulmonary veins. Treatment includes catheter-based pulmonary vein dilations with or without stenting, surgical interventions, medical therapy, and in some instances, lung transplantation. Cardiac catheterization for PVS involves a comprehensive hemodynamic and anatomic assessment of the pulmonary veins as well as therapeutic transcatheter interventions. Several surgical strategies have been used. Sutureless repair is currently most commonly used, but patch venoplasty, endarterectomy, ostial resection, and reimplantation are used in select circumstances as well. Medical therapies such as imatinib mesylate and bevacizumab are increasingly being used in an effort to suppress the myofibroblastic proliferation seen in PVS patients. Lung transplantation has been used as an alternative treatment strategy for end-stage, refractory PVS. Nonetheless, despite the different innovative approaches used, morbidity and mortality remain high. At present, the preferred treatment strategy is frequent reassessment of disease progression to guide use of catheter-based and surgical interventions in conjunction with medical therapy.

使用无创血流动力学监测（Clearsight 系统）对中危腹部手术患者进行个性化或规范化液体管理的比较

Personalized Versus Protocolized Fluid Management Using Noninvasive Hemodynamic Monitoring (Clearsight System) in Patients Undergoing Moderate-Risk Abdominal Surgery

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无创血流动力学监测系统的发展使目标导向液体疗法得以实现，并可用于微创外科手术。在这项随机对照研究中，我们对 40 例中度风险腹腔镜腹部手术患者使用无创心输出量（Clearsight 系统）监护系统比较了（个性化方法）闭环的辅助目标导向液体疗法和采用规范化液体治疗两种不同补液方法的不同。两组患者的心输出量和每搏量变异度（SVV）无

显著性差异，并在>90%的研究时间中保持在预定目标值内。在这一人群中，个性化的液体疗法似乎没有提供任何血流动力学上的优势。
（吴洁译 李士通校）

Advances in noninvasive hemodynamic monitoring systems allow delivery of goal-directed fluid therapy and could therefore be used in less-invasive surgical procedures. In this randomized controlled trial, we compared closed-loop–assisted goal-directed fluid therapy using a noninvasive cardiac output (Clearsight system) monitor (personalized approach) to a protocolized fluid therapy approach in 40 patients undergoing moderate-risk laparoscopic abdominal surgery. Cardiac output and stroke volume variations were not significantly different in both groups and remained within predefined target values >90% of the study time. Personalized fluid therapy does not seem to offer any hemodynamic advantage over a protocolized approach in this population.

碳酸氢钠与静脉脂质乳剂逆转布比卡因电生理毒性的实验研究

Comparative Effects of Sodium Bicarbonate and Intravenous Lipid Emulsions on Reversing Bupivacaine-Induced Electrophysiological Toxicity in a Porcine Experimental Model

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背景：布比卡因的心脏毒性主要表现为抑制心脏钠通道，从而减慢信号的传导，尤其是在心室的水平。实验研究表明，静脉注射脂质乳剂（ILES）可以降低布比卡因的心脏毒性作用，但这种作用的有效程度存在争议。碳酸氢钠（B）代表着与钠通道阻断药物有关的毒性作用的标准治疗方法。本研究的目的是比较 ILE 类和 B 对布比卡因引起的心电图参数变化的恢复速度的影响。

方法：24 只猪麻醉后分别给予 4 mg/kg 布比卡因。注射布比卡因 3 分钟后，分别给予 ILE 1.5 ml/kg 注射后随之 0.25 ml/kg/min 静脉持续泵注（ILE 组）和 B 2 meq/kg 注射后 1 mg/kg/h 静脉持续泵注（B 组）。对照组（C 组）给予生理盐水 50 毫升，随后 1ml/kg/h 持续泵注。在窦性心律和右心室起搏过程中以若干时间间隔（最多 30 分钟）评估电生理参数。数据分析为前 10 分钟（AUC_{10}）或 30 分钟（AUC_{30}）的曲线下面积（AUC）。

结果：布比卡因增加窦性节律周期长度、PR 间期和 QRS 持续时间。3 组用药后窦性心律 QRS 持续时间的 AUC_{30}有显著差异（P=0.003）。B 组比 C 组（AUC_{10}，P=0.003；AUC_{30}，P=0.003）或 TLE 组（AUC_{10}，P=0.018）恢复更快。在第一分钟，50%的 B 组 QRS 持续时间（相对于 0%的 TLE 组和 C 组）恢复超过了 30%（P=0.011）。TLE 组恢复快于 C 组的趋势没有达到显著性（AUC_{10}，P=0.23；AUC_{30}，P=0.06）。心率 150 bpm 时对 QRS 持续时间的影响更为明显，但两组结果相似（B 组与 C 组：AUC_{10}，P=0.009；AUC_{30}，P=0.009；B 组与 TLE 组：AUC_{10}，P=0.015；AUC_{30}，P=0.024）。所有解毒剂对于起搏 QRS 的恢复过程均较慢。

结论：在闭胸猪模型中，B 是一种有效的治疗由布比卡因毒性引起的心肌电生理变化的方法。在临床剂量下，B 比 TLE 能更快地改善布比卡因的心电图毒性表现。布比卡因的使用依赖效应很明显，并且延迟了两种解毒剂的作用，但是 B 比使用 TLE 恢复更快。

（吴洁译 李士通校）

BACKGROUND: Bupivacaine cardiotoxicity mainly manifests as inhibition of the cardiac sodium channel, which slows conduction, particularly at the ventricular level. Experimental studies have demonstrated that intravenous lipid emulsions (ILEs) can reduce the cardiotoxic effects of bupivacaine, but the extent of these effects is controversial. Sodium bicarbonate (B) represents the standard treatment of toxicity related to sodium channel–blocking drugs. The aim of this study was to compare the effects of ILEs and B on the speed of recovery from bupivacaine-induced effects on the electrocardiographic parameters.

METHODS: Bupivacaine 4 mg/kg was administered to 24 anesthetized pigs. Three minutes after delivering the bupivacaine bolus, the animals were given the following: ILE 1.5 mL/kg followed by 0.25 mL/kg/min (ILE group) and B 2 mEq/kg followed by 1 mEq/kg/h (B group). Controls (C group) were given saline solution, 50 mL followed by 1 mL/kg/h. Electrophysiological parameters were evaluated in sinus rhythm and during right ventricular pacing at several time intervals up to 30 minutes. Data were analyzed as the area under the curve (AUC) for the first 10 minutes (AUC_{10}) or 30 minutes (AUC_{30}).

RESULTS: Bupivacaine increased the sinus cycle length, PR interval, and QRS duration. AUC_{30} of the sinus rhythm QRS duration after antidote administration was significantly different among the 3 groups ($P = .003$). B group experienced faster recovery from intoxication than the C group (AUC_{10}, $P = .003$; AUC_{30}, $P = .003$) or the ILE group (AUC_{10}, $P = .018$). During the first minute, 50% of the B group (versus 0% of the ILE and C groups) had recovered >30% of QRS duration ($P = .011$). The trend toward faster recovery in the ILE group than in the C group did not reach significance (AUC_{10}, $P = .23$; AUC_{30}, $P = .06$). Effects on the paced QRS duration at a rate of 150 bpm were more intense but with similar results (B versus C group: AUC_{10}, $P = .009$; AUC_{30}, $P = .009$; B versus ILE: AUC_{10}, $P = .015$; AUC_{30}, $P = .024$). The recovery process of the paced QRS tended to be slower for all antidotes.

CONCLUSIONS: In a closed-chest swine model, B was an effective treatment for electrophysiological alterations caused by established bupivacaine toxicity. At clinical doses, B ameliorated bupivacaine electrocardiographic toxicity faster than ILE. Use-dependent effects of bupivacaine are prominent and delay the effects of both antidotes, but B produces faster recovery than ILE.

美国恶性高热协会对恶性高热易患病人使用德尔格的宙斯麻醉工作站推荐准备方法的效果和相关费用

Efficacy of Malignant Hyperthermia Association of the United States–Recommended Methods of Preparation for Malignant Hyperthermia-Susceptible Patients Using Dräger Zeus Anesthesia Workstations and Associated Costs

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背景：本研究的目的是评估美国恶性高热协会为恶性高热易感患者推荐准备 Dräger Zeus

麻醉工作站（AWSS）的方法的疗效和成本。

方法：我们研究了七氟醚、异氟醚和地氟醚在3种宙斯系统AWS中3种不同方法的洗出情况。分别使用2 L/min新鲜气流、500 ml潮气量和12/min呼吸速率三种方法以最小肺泡浓度(MAC) 1.2的吸入麻醉药物给AWS灌注2小时。洗出分为两个阶段：以高流量（10 L/min），直到麻醉气体浓度<5ppm持续20分钟，然后低流量（3 L/min）持续20分钟，以确定反弹效果。制备方法如下：方法1（M1）：更换一次性用品（呼吸回路、钠石灰、CO 2管线和存水弯）；方法2（M2）：M1+替换带有高压灭菌器的呼吸管路；方法3（M3）：M1+在呼吸管路上加装2个活性炭过滤器。主要结果如下：高流量阶段麻醉气体浓度达到<5 ppm 的时间，低流量阶段麻醉气体浓度达峰值的时间， M3组中去除活性炭过滤器后在低流量70分钟后麻醉气体浓度达峰值的时间。次要结果如下：分析每一方法和无挥发罐宙斯 AWS 中麻醉气体浓度达<5ppm时所需时间和成本，敏感性分析采用每年成本费用和恶性热疗易感病例数的替代假设。

结果：主要结果如下：在低流量阶段影响最小的情况下，M3瞬间将麻醉气体浓度降低到<1ppm。M1（中位数为88分钟；95%置信区间[CI]为69-112分钟）大于M2（中位数为11分钟；95%置信区间为9-15分钟）。M1、M2和M3中的峰值反弹麻醉气体浓度平均值分别为15、6和1 ppm（P<0.001）。去除活性炭过滤器后，麻醉气体浓度增加了33倍（95%CI为21－50）（从0.7增加到到20 ppm）。麻醉气体的选择对结果没有影响。次要结果如下：当包括因洗出造成手术室（或）时间损失的成本时，M3是最快的；当不包括时，M1是最快的。当考虑因洗出造成的损失或时间成本时，M3的估计成本每病例为360美元（M1，2670美元；M2，969美元；以及“无挥发罐”宙斯AWS为930美元）。手术室时间和设备成本是各种方法之间最大的区别。

结论：对手术室有利用时间需求或对利用时间的需求超过对花费的要求的机构应考虑使用M3方法，而有足够手术间的机构应考虑使用M1方法。

（吴洁译 李士通校）

BACKGROUND: The objective of this study was to assess the efficacy and cost of Malignant Hyperthermia Association of the United States－recommended methods for preparing Dräger Zeus anesthesia workstations (AWSs) for the malignant hyperthermia-susceptible patient.

METHODS: We studied washout profiles of sevoflurane, isoflurane, and desflurane in 3 Zeus AWS following 3 preparation methods. AWS was primed with 1.2 minimum alveolar concentration anesthetic for 2 hours using 2 L/min fresh gas flow, 500 mL tidal volume, and 12/min respiratory rate. Two phases of washout were performed: high flow (10 L/min) until anesthetic concentration was <5 parts per million (ppm) for 20 minutes and then low flow (3 L/min) for 20 minutes to identify the rebound effect. Preparation methods are as follows: method 1 (M1), changing disposables (breathing circuit, soda lime, CO_2 line, and water traps); method 2 (M2), M1 plus replacing the breathing system with an autoclaved one; and method 3 (M3), M1 plus mounting 2 activated charcoal filters on respiratory limbs. Primary outcomes are as follows: time to obtain anesthetic concentration <5 ppm in the high-flow phase, peak anesthetic concentrations in the low-flow phase, and for M3 only, peak anesthetic concentration after 70 minutes of low-flow phase, when activated charcoal filters are removed. Secondary outcomes are as follows: cost analysis of time and resources to obtain anesthetic concentration <5 ppm in each method and a vapor-free Zeus AWS. Sensitivity analyses were performed using alternative assumptions regarding the costs and the malignant hyperthermia-susceptible caseload per year.

RESULTS: Primary outcomes were as follows: M3 instantaneously decreased anesthetic concentration to <1 ppm with minimal impact of low-flow phase. M1 (median, 88 minutes; 95% confidence interval [CI], 69–112 minutes) was greater than M2 (median, 11 minutes; 95% CI, 9–15 minutes). Means of peak rebound anesthetic concentrations in M1, M2, and M3 were 15, 6, and 1 ppm, respectively (P < .001). Anesthetic concentration increased 33-fold (95% CI, 21–50) after removing charcoal filters (from 0.7 to 20 ppm). The choice of anesthetic agents did not impact the results. Secondary outcomes were as follows: M3 was the lowest cost when the cost of lost operating room (OR) time due to washout was included, and M1 was the lowest cost when it was not included. When the cost of lost OR time due to washout was considered the estimated cost/case of M3 was US $360 (M1, US $2670; M2, US $969; and a "vapor-free" Zeus AWS was US $930). The OR time and equipment costs represent the largest differentiators among the methods.

CONCLUSIONS: Institutions in which demand for OR time has exceeded capacity should consider M3, and institutions with surplus OR capacity should consider M1.

表皮葡萄球菌在异丙酚和脂质存在的静脉输液三通死腔内的存活率

Survival of *Staphylococcus epidermidis* in Propofol and Intralipid in the Dead Space of Intravenous Injection Ports

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我们测试了接种表皮葡萄球菌的异丙酚或脂质体是否会促进容易受到细菌污染的部位-静脉注射（IV）三通内的细菌生长。在最佳条件下培养的试管中，表皮葡萄球菌在脂质内生长，但在异丙酚中不生长。相比之下，在室温下用异丙酚或脂质培养的静脉输液三通内，表皮细菌数量随时间减少，12 小时后几乎没有污染。这些数据表明，某些 IV 输注管路并不适合表皮葡萄球菌生长。

（吴洁译 李士通校）

We tested whether propofol or Intralipid inoculated with *Staphylococcus epidermidis* would promote bacterial growth within an intravenous (IV) injection hub, a site prone to bacterial contamination. In tubes incubated under optimal conditions, *S epidermidis* exhibited growth in Intralipid, but not in propofol. In contrast, within the IV hub incubated with either propofol or intralipid at room temperature, *S epidermidis* bacterial numbers declined with time, and virtually no contamination remained after 12 hours. These data suggest that certain IV lines are inhospitable for *S epidermidis* .

未受伤肺患者呼吸机设置的时间变化系统回顾

Temporal Changes in Ventilator Settings in Patients With Uninjured Lungs

A Systematic Review

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Anesthesia & Analgesia: 2019 129 129－140

越来越多的证据表明，小潮气量（VT）改善了重症监护室（ICU）和手术室（OR）中肺未受损伤患者的预后。然而，这一证据在多大程度上转化为肺无损伤患者呼吸机设置的临床变化尚不清楚。为了弄清呼吸机设置是否发生了变化，我们搜索了 Medline、Cochrane 对照试验中心登记册和科学网，获取有关 ICU 或 ORS 侵入性通气的出版文献，不包括有关 18 岁以下或超过 25%的急性呼吸窘迫综合征（ARDS）的患者。我们的主要研究终点是 VT 随时间的变化。次要研究终点是通过相关性分析和线性回归分析确定最大气道压、平均气道压、呼气末正压、吸气氧分压、ARDS 发展（仅 ICU 内研究）及术后肺部并发症（仅手术室内研究）的变化。我们确定了从 1975 年到 2014 年 96 个 ICU 和 96 个 OR 内包含 130316 名患者的研究，观察到在 ICU 中，VT 值每年减少 0.16 ml/kg（-0.19 至-0.12 ml/kg）（P<0.001），而呼气末正压平均增加 0.1mbar/y（0.02 至 0.17mbar/y）（P=0.017）。在手术室中，VT 值每年减少 0.09 ml/kg（每年减少 0.14 至-0.04 ml/kg）（P<0.001）。VT 的变化在 1995 年趋于平稳。其他术中呼吸机设置在研究期间没有改变。ARDS（ICU 研究）和术后肺部并发症（OR 研究）的发生率也没有随时间发生变化。我们发现，从 1975 年至 2014 年的 39 年间，重症监护室和手术室的机械通气临床研究中的 V_TS 显著降低。

（吴洁译 李士通校）

In patients with uninjured lungs, increasing evidence indicates that tidal volume (V_T) reduction improves outcomes in the intensive care unit (ICU) and in the operating room (OR). However, the degree to which this evidence has translated to clinical changes in ventilator settings for patients with uninjured lungs is unknown. To clarify whether ventilator settings have changed, we searched MEDLINE, Cochrane Central Register of Controlled Trials, and Web of Science for publications on invasive ventilation in ICUs or ORs, excluding those on patients <18 years of age or those with >25% of patients with acute respiratory distress syndrome (ARDS). Our primary end point was temporal change in V_T over time. Secondary end points were changes in maximum airway pressure, mean airway pressure, positive end-expiratory pressure, inspiratory oxygen fraction, development of ARDS (ICU studies only), and postoperative pulmonary complications (OR studies only) determined using correlation analysis and linear regression. We identified 96 ICU and 96 OR studies comprising 130,316 patients from 1975 to 2014 and observed that in the ICU, V_T size decreased annually by 0.16 mL/kg (−0.19 to −0.12 mL/kg) ($P < .001$), while positive end-expiratory pressure increased by an average of 0.1 mbar/y (0.02－0.17 mbar/y) ($P = .017$). In the OR, V_T size decreased by 0.09 mL/kg per year (−0.14 to −0.04 mL/kg per year) ($P < .001$). The change in V_Ts leveled off in 1995. Other intraoperative ventilator settings did not change in the study period. Incidences of ARDS (ICU studies) and postoperative pulmonary complications (OR studies) also did not change over time. We found that, during a 39-year period, from 1975 to 2014, V_Ts in clinical studies on mechanical ventilation have decreased significantly in the ICU and in the OR.

含 2-氰基丙烯酸乙酯软组织粘合剂敷料在硬膜外导管固定中的应用效果-开放、随机、平行对照研究

The Effectiveness of Applying Soft Tissue Bonding Adhesive Composed of 2-Ethyl Cyanoacrylate to Epidural Catheter Fixations Using Film Dressings

An Open-Label, Randomized, Parallel-Group Comparative Study

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背景：硬膜外导管固定不牢靠可能导致导管移位，最终导致导管失效。然而，最佳固定方法仍有待确定。Aronα A（2-氰基丙烯酸乙酯）粘合剂经批准可用于临床，可用于外科手术中皮肤和血管的粘合。我们假设在薄膜敷料中添加 Aronα A 粘合剂可持续可靠的固定导管。

方法：在这项研究中，58 名妇女计划在腰硬联合麻醉下行剖宫产。患者随机分为对照组或治疗组。对照组单纯采用贴膜固定导管。在治疗组，在导管的 2 个部位涂抹少量的 Aronα A。然后用贴膜覆盖固定区域。固定后记录导管置入长度（T0），术后即时导管长度（T1），以及术后第 1 天（T2）和取出导管（T3）时导管的置入长度。两组之间导管置入长度从 T0 到 T3 的变化是主要研究结果指标。并记录了导管失效的发生率。在所有比较中，P<0.05 被认为具有统计学意义。

结果：最初，58 名女性被纳入研究，但 3 名患者被排除在外。剩下的 55 名患者中，分别有 27 名和 28 名分配到对照组和治疗组，并进行评估。与治疗组相比，对照组从 T0 到 T3 时点的导管置入长度变化显著（分别为-1.9±2.2 和 0±0 cm；P<0.001）。对照组中，11 个导管（41%）失败；在治疗组中，所有导管在整个研究过程中都提供了有效的镇痛作用（P<0.001）。

结论：硬膜外导管固定采用薄膜敷料贴结合 2-氰基丙烯酸乙酯粘合剂沿导管 2 个部位固定，可使剖宫产术后接受硬膜外镇痛的患者获得牢靠固定。

（吴洁译 李士通校）

BACKGROUND: Insufficient fixation of an epidural catheter may result in migration of the catheter and eventual catheter failure. However, the best fixation method remains to be established. Aron Alpha A (2-ethyl cyanoacrylate) adhesive is approved for clinical use and can be used for surgical adhesion to both skin and blood vessels. We hypothesized that the addition of Aron Alpha A adhesive to film dressing would result in consistent and dependable catheter fixation.

METHODS: In this study, 58 women who were scheduled for cesarean delivery under spinal and epidural anesthesia were recruited. Patients were randomly assigned to a control or treatment group. In the control group, the catheter was fixed solely by film dressing. In the treatment group, a small amount of Aron Alpha A was applied at 2 sites along the catheter. The fixation area was then covered by film dressing. The catheter insertion length was recorded after fixation (T0), immediately postoperatively (T1), on postoperative day 1 (T2), and when the catheter was removed (T3). The change in insertion length from T0 to T3 between the 2 groups was the primary outcome measure. The incidence of catheter failure was also recorded. For all comparisons, $P < .05$ was considered statistically significant.

RESULTS: Initially, 58 women were enrolled; however, 3 patients were excluded. From the remaining 55 patients, 27 and 28 were assigned to the control and treatment groups, respectively, and were evaluated. The change in insertion length from T0 to T3 was significantly more in the control group compared with the treatment group (−1.9 ± 2.2 vs 0 ± 0 cm, respectively; $P < .001$). In the control group, 11 catheters (41%)

failed; in the treatment group, all catheters provided effective analgesia throughout the study (P < .001).

CONCLUSIONS: Epidural catheter fixation using film dressing combined with 2-ethyl cyanoacrylate adhesive application at 2 sites along the catheter resulted in secure fixation in patients receiving postoperative epidural analgesia for cesarean delivery.

“改良动态针尖定位”短轴，平面外，超声引导下新生儿桡动脉插管的随机对照研究

“Modified Dynamic Needle Tip Positioning” Short-Axis, Out-of-Plane, Ultrasound-Guided Radial Artery Cannulation in Neonates

A Randomized Controlled Trial

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Anesthesia & Analgesia: 2019 129 178－183

背景：在新生儿患者中，桡动脉置管是非常具有挑战性的。在此，我们比较了改良动态针尖定位短轴、平面外超声引导技术与传统触诊技术在新生儿桡动脉置管中的成功率。

方法：60 例接受腹部大手术的足月新生儿，采用密封信封法随机分为超声组和触诊组。超声组采用超声装置引导进行桡动脉穿刺置管，传统的动脉搏动触诊用于触诊组。穿刺前超声测量动脉直径和深度。我们记录了年龄、体重、性别和其他基本特征。主要结果包括首次尝试、总成功率和总穿刺程序持续时间。次要结局包括并发症（血肿和血栓形成）的发生率。比较两组数据。

结果： 60 名足月新生儿纳入研究。超声组和触诊组第一次尝试的成功率分别为 40%（n=30）和 10%（n=30）（P= 0.007；相对风险 4.0；95%置信区间为 1.3-12.8）。超声组总成功率为 96.7%，触诊组总成功率为 60.0%（P=0.001；相对危险度为 1.61；95%置信区间为 1.19－2.17）。超声组和触诊组完成桡动脉穿刺置管的平均时间分别为 91.4±55.4 秒和 284.7±153.6 秒（P<0.001；标准差为-193；95%置信区间为-256 到-130）。此外，超声组 3.3%和触诊组 26.7%的患者出现穿刺部位血肿（P=0.026；相对危险度为 0.13；95%置信区间为 0.02－0.94）。

结论：改良动态针尖定位短轴、平面外超声引导下新生儿桡动脉穿刺置管可提高首次尝试成功率和总成功率，缩短穿刺时间，并减少置管相关并发症。

（吴洁译 李士通校）

BACKGROUND: Radial artery cannulation is extremely challenging in neonatal patients. Herein, we compared the success rate of the modified dynamic needle tip positioning short-axis, out-of-plane, ultrasound-guided technique with that of the traditional palpation technique in neonatal radial artery cannulation.

METHODS: Sixty term neonates undergoing major abdominal surgery were randomized into the ultrasound or palpation group via the sealed-envelope method. The ultrasound group underwent radial artery cannulation using an ultrasonic apparatus, while traditional palpation of arterial pulsation was used in the palpation group. The arterial diameter and depth were measured on ultrasound before the puncture. We recorded age, weight, sex, and other background characteristics. The primary outcomes included the first-attempt, total success rates, and the total puncture procedure duration. Secondary outcomes included the incidence of complications (hematoma and thrombosis). Data were compared between the 2 groups.

RESULTS: Sixty term neonates were enrolled in the study. The success rates of the

first attempt in the ultrasound and palpation groups were 40% (n = 30) and 10% (n = 30), respectively (P = .007; relative risk, 4.0; 95% confidence interval, 1.3 - 12.8). The total success rate was 96.7% in the ultrasound group and 60.0% in the palpation group (P = .001; relative risk, 1.61; 95% confidence interval, 1.19 - 2.17). The average time to accomplish radial artery cannulation in the ultrasound and palpation groups was 91.4 ± 55.4 and 284.7 ± 153.6 seconds, respectively (P < .001; estimated difference, -193; 95% confidence interval, -256 to -130). In addition, 3.3% of the patients in the ultrasound group and 26.7% in the palpation group suffered puncture hematoma (P = .026; relative risk, 0.13; 95% confidence interval, 0.02 - 0.94).

CONCLUSIONS: Modified dynamic needle tip positioning short-axis, out-of-plane, ultrasound-guided radial artery cannulation in neonates improves the first-attempt and total success rates and decreases the total procedural time and incidence of cannulation-related complications.

大型学术医疗中心重症监护病房服务人员费用敏感性及控费意识调查

A Survey of Charge Sensitivity and Charge Awareness Among Intensive Care Unit Providers in a Large Academic Medical Center

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Anesthesia & Analgesia: 2019 129 e23 - e26

对美国重症监护病房（ICU）医护人员的费用敏感性或控费意识知之甚少。在一个大型学术医疗中心针对 295 名重症监护病房医护人员进行的调查中，92.5%的受访者认为控制医疗费用是他们的部分责任。然而，87.4%的受访者表示，他们不知道他们开的大多数检查和药物的费用。在被调查的参与者中，医疗程序或检查的正确收费仅为 35%。虽然重症监护室的医护人员绝大多数同意控制费用是他们的责任，但控费意识较低，可能会限制他们做出基于价值的决策的能力。

（吴洁译 李士通校）

Little is known about charge sensitivity or charge awareness among intensive care unit (ICU) providers in the United States. In a survey of 295 ICU providers at a large, academic medical center, 92.5% of respondents agreed that controlling health care expenses is partly their responsibility. However, 87.4% of respondents reported that they did not know the charges for most of the tests and medications they prescribe. Among surveyed participants, the correct charge for a medical procedure or test was selected only 35% of the time. While ICU providers overwhelmingly agree that controlling expenses is their responsibility, charge awareness is low and likely limits their ability to make value-based decisions.

超声引导下开放性上腹部疝修补术后直立肌平面阻滞：前瞻性随机对照研究

Ultrasound-Guided Erector Spinae Plane Block in Patients Undergoing Open Epigastric Hernia Repair

A Prospective Randomized Controlled Study

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Anesthesia & Analgesia: 2019 129 235－240

背景：疝修补术后存在较严重的疼痛。我们研究了超声引导下双侧竖脊肌平面阻滞对上腹部正中切口疝修补术（T6-T9）患者的镇痛效果。
方法：60 名 18-65 岁患者随机分为 2 组。竖脊肌平面阻滞组患者在 T7 横突水平接受双侧超声引导下竖脊肌平面阻滞，每侧使用 0.25%布比卡因 20 ml，对照组使用 1 ml 正常生理盐水模拟双侧竖脊肌平面阻滞。所有患者均在全身麻醉下手术。记录术后 24 小时疼痛严重程度（视觉模拟评分量表）、术中芬太尼用量、首次请求补救镇痛的时间和术后哌替啶用量。
结果：术后 2 小时，与对照组（估计主要疗效为 2.53；p<0.001；95%可信区间为 1.8－3.2）相比，竖脊肌平面阻滞组的视觉模拟量表疼痛评分显著降低，并持续至术后 12 小时（从进入麻醉复苏室到术后 4 小时（p<0.001，到术后 6 小时 P=0.001，术后 8 小时 P=0.025，术后 12 小时 P=0.043）。术后 18 小时和 24 小时时，两组的视觉模拟量表疼痛评分无显著差异（p=0.634 和 0.432）。竖脊肌平面阻滞组 4 例患者术中需要追加芬太尼，而对照组有 27 例。与对照组（94μg[74－130μg]）相比，竖脊肌平面阻滞组术中芬太尼消耗量的中位数（四分位数）显著降低（0μg[0－0μg]）。竖脊肌平面阻滞组 10 例患者需要术后补救追加哌替啶，而对照组有 25 例。与对照组（83 mg[64-109 mg]）相比，竖脊肌平面阻滞组（0 mg[0-33 mg]）术后补救哌替啶消耗量的中位数[四分位数]显著降低。与对照组相比，竖脊肌平面阻滞组首次补救镇痛药物的时间明显延迟（p<0.001）。
结论：超声引导下双侧竖脊肌平面阻滞术后视觉模拟量表疼痛评分较低，术中芬太尼用量和术后补救镇痛药物用量均减少。
（吴洁译 李士通校）

BACKGROUND: Hernia repair is associated with considerable postoperative pain. We studied the analgesic efficacy of bilateral ultrasound-guided erector spinae plane block in patients undergoing open midline epigastric hernia repair (T6－T9).
METHODS: Sixty patients 18－65 years of age were randomly allocated into 2 groups. Patients in the erector spinae plane block group received bilateral ultrasound-guided erector spinae plane block at the level of T7 transverse process using 20 mL of bupivacaine 0.25% on each side, while the control group received bilateral sham erector spinae plane block using 1 mL of normal saline. All patients underwent general anesthesia for surgery. Pain severity (visual analog scale), consumption of intraoperative fentanyl, time to first request of rescue analgesia, and postoperative pethidine consumption were recorded over the first 24 hours postoperatively.
RESULTS: At 2 hours postoperatively, the visual analog scale pain score was significantly lower in the erector spinae plane block group compared to the control group (estimated main effect of 2.53; $P < .001$; 95% CI, 1.8－3.2) and remained lower until 12 hours postoperatively ($P < .001$ from postanesthesia care unit admission to 4 hours postoperatively, .001 at 6 hours, .025 at 8 hours, and .043 at 12 hours). At 18 and 24 hours, visual analog scale pain scores were not significantly different between both groups ($P = .634$ and .432, respectively). Four patients in the erector spinae plane block group required intraoperative fentanyl compared to 27 patients in control group. The median (quartiles) of intraoperative fentanyl consumption in the erector spinae plane block group was

significantly lower (0 μg [0－0 μg]) compared to that of the control group (94 μg [74－130 μg]). Ten patients in the erector spinae plane block group required postoperative rescue pethidine compared to 25 patients in control group. The median [quartiles] of postoperative rescue pethidine consumption was significantly lower in the erector spinae plane block group (0 mg [0－33 mg]) compared to that of the control group (83 mg [64－109 mg]). Time to first rescue analgesic request was significantly prolonged in the erector spinae plane block group compared to control group ($P < .001$).

CONCLUSIONS: Ultrasound-guided bilateral erector spinae plane block provided lower postoperative visual analog scale pain scores and decreased consumption of both intraoperative fentanyl and postoperative rescue analgesia for patients undergoing open epigastric hernia repair.

内源性内啡肽系统在阿立哌唑外周抗伤害性刺激作用中的作用

Role of Endocannabinoid System in the Peripheral Antinociceptive Action of Aripiprazole

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背景：最近，我们证明抗精神病药物多巴胺能和 5-羟色胺能激动剂阿立哌唑能诱导外周抗伤害作用。然而，这种影响的机制尚未完全建立。在这里，我们的目的是确定阿立哌唑的这种作用及其与内源性内啡肽系统之间可能存在的关系。

方法：所有药物体积为 20μl，均局部注射到体重为 30-35 g 的雄性瑞士小鼠右后爪中。足底注射前列腺素 E_2（2μg）可诱发痛觉过敏。在测量前 10 分钟注射阿立哌唑，在阿立哌唑前 10 分钟注射不可逆的阿南达胺水解酶抑制剂（MAFP）、单酰甘油脂肪酶抑制剂（JZL184）和阿南达胺再摄取抑制剂（VDM11）。前列腺素 E_2注射后第 3 小时用痛觉测定仪测量伤害阈值。数据通过方差分析和 Bonferroni 校正进行分析。

结果：阿立哌唑（100μg）诱导的抗伤害作用分别被内啡肽 1 或 2 受体拮抗剂 AM251（40μg[p<0.01]、80μg[p<0.0001]和 160μg[p<0.0001]）和 AM630（100μg[p<0.0001]、200μg[p<0.0001]和 400μg[p<0.0001]）阻断。阿立哌唑（25μg）诱导的外周抗伤害作用通过给予脂肪酸酰胺水解酶抑制剂（MAFP，0.5μg[P<0.0001]）或单酰甘油脂肪酶（JZL184，4μg[P<0.0001]）而增强。此外，阿南达胺再摄取抑制剂（VDM11，2.5μg[p<0.0001]）也观察到类似的增强效应。

结论：这些结果为内啡肽系统参与阿立哌唑诱导的外周抗伤害作用提供了证据。

（吴洁译 李士通校）

BACKGROUND: Recently, we demonstrated that the antipsychotic dopaminergic and serotoninergic agonist aripiprazole induced peripheral antinociception. However, the mechanism underlying this effect has not been fully established. Here, our aim was to identify possible relationships between this action of aripiprazole and the endocannabinoid system.

METHODS: All drugs were given locally into the right hind paw of male Swiss mice weighing 30－35 g in a volume of 20 μL. The hyperalgesia was induced by intraplantar injection of prostaglandin E_2 (2 μg). Aripiprazole was injected 10 minutes before

the measurement, and an irreversible inhibitor of anandamide hydrolase (MAFP), an inhibitor for monoacylglycerol lipase (JZL184), and an anandamide reuptake inhibitor (VDM11) were given 10 minutes before the aripiprazole. Nociceptive thresholds were measured using an algesimetric apparatus in the third hour after prostaglandin E_2 injection. Data were analyzed by ANOVA and Bonferroni tests.

RESULTS: The antinociceptive effect induced by aripiprazole (100 μg) was blocked by cannabinoid 1 or 2 receptor antagonists AM251 (40 μg [$P < .01$], 80 μg [$P < .0001$], and 160 μg [$P < .0001$]) and AM630 (100 μg [$P < .0001$], 200 μg [$P < .0001$], and 400 μg [$P < .0001$]), respectively. The peripheral antinociception induced by aripiprazole (25 μg) was enhanced by administration of the inhibitor of fatty acid amide hydrolase (MAFP, 0.5 μg [$P < .0001$]) or monoacylglycerol lipase (JZL184, 4 μg [$P < .0001$]). Moreover, a similar enhancement was observed with the anandamide reuptake inhibitor (VDM11, 2.5 μg [$P < .0001$]).

CONCLUSIONS: These results provide evidence for the involvement of the endocannabinoid system in peripheral antinociception induced by aripiprazole treatment.

远端缺血预处理预防开胸主动脉全弓置换术后急性肾损伤的双盲随机假对照试验

Remote Ischemic Preconditioning Prevents Postoperative Acute Kidney Injury After Open Total Aortic Arch Replacement

A Double-Blind, Randomized, Sham-Controlled Trial

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背景：急性肾损伤是开胸主动脉全弓置换术后常见的并发症，但缺乏有效的预防策施。远端缺血预处理对肾脏是否有益的结果存在争议，在急性肾损伤的高危患者中可能表现更好。我们研究了远程缺血预处理是否能预防开胸主动脉全弓置换术后急性肾损伤。

方法： 130 名择期进行开胸主动脉全弓置换的患者纳入研究，并将他们随机分为远端缺血预处理组（4 个循环的 5 分钟右上肢缺血和 5 分钟再灌注）和假手术组（4 个循环的 5 分钟右上肢假缺血和 5 分钟再灌注）。每一循环均通过血压袖带充气和放气实现。主要研究终点是根据改善全球肾脏疾病预后标准定义的手术后 7 天内急性肾损伤的发生率。次要终点包括近期临床结果。

结果：与假手术组相比，远端缺血预处理的术后急性肾损伤患者明显减少（55.4%比 73.8%；绝对风险降低 18.5%；95%可信区间为 2.3%－34.6%；p=0.028）。远端缺血预处理显著降低了急性肾损伤 II-III 期的发生率（10.8%对 35.4%；p=0.001）。远端缺血预处理缩短了机械通气时间（18 小时[四分位间距为 14－33]对 25 小时[四分位间距为 17－48]，p=0.01），而其他次要研究结果组间差异无显著性。

结论：远端缺血预处理可预防开胸主动脉全弓置换术后急性肾损伤，特别是严重的急性肾损伤，缩短机械通气时间。观察到的远端缺血预处理的肾保护作用需要在临床研究及其潜在机制进行进一步的研究。

（吴洁译 李士通校）

BACKGROUND: Acute kidney injury is a common complication after open total aortic

arch replacement but lacks effective preventive strategies. Remote ischemic preconditioning has controversial results of its benefit to the kidney and may perform better in high-risk patients of acute kidney injury. We investigated whether remote ischemic preconditioning would prevent postoperative acute kidney injury after open total aortic arch replacement.

METHODS: We enrolled 130 patients scheduled for open total aortic arch replacement and randomized them to receive either remote ischemic preconditioning (4 cycles of 5-minute right upper limb ischemia and 5-minute reperfusion) or sham preconditioning (4 cycles of 5-minute right upper limb pseudo ischemia and 5-minute reperfusion), both via blood pressure cuff inflation and deflation. The primary end point was the incidence of acute kidney injury within 7 days after the surgery defined by the Kidney Disease: Improving Global Outcomes criteria. Secondary end point included short-term clinical outcomes.

RESULTS: Significantly fewer patients developed postoperative acute kidney injury with remote ischemic preconditioning compared with sham (55.4% vs 73.8%; absolute risk reduction, 18.5%; 95% CI, 2.3%–34.6%; $P = .028$). Remote ischemic preconditioning significantly reduced acute kidney injury stage II–III (10.8% vs 35.4%; $P = .001$). Remote ischemic preconditioning shortened the mechanical ventilation duration (18 hours [interquartile range, 14–33] versus 25 hours [interquartile range, 17–48]; $P = .01$), whereas no significant differences were observed between groups in other secondary outcomes.

CONCLUSIONS: Remote ischemic preconditioning prevented acute kidney injury after open total aortic arch replacement, especially severe acute kidney injury and shortened mechanical ventilation duration. The observed renoprotective effects of remote ischemic preconditioning require further investigation in both clinical research and the underlying mechanism.