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Anesthesia & Analgesia. 118(6):1370-1377, June 2014.

老年患者與年輕患者術中輸血概率的對比

Odds of Transfusion for Older Adults Compared to Younger Adults Undergoing Surgery

Brown, Charles H. IV MD, MHS[*]; Savage, William J. MD, PhD[†]; Masear, Courtney G. MD[*]; Walston, Jeremy D. MD[‡]; Tian, Jing MS[§]; Colantuoni, Elizabeth PhD[§]; Hogue, Charles W. MD[*]; Frank, Steven M. MD[*]

Anesthesia & Analgesia 2014 118 1168–1178

背景：最近的隨機對照實驗發現：相對于血紅蛋白更低的患者，對圍術期血紅蛋白大於 10g/ dL 的患者輸血並無益處，甚至老年患者亦如此。然而相對于年輕患者，外科醫生選擇給老年患者輸血更隨意。老年患者圍術期輸血概率是否較年輕患者更高並未確定。此項研究的目的是確定圍術期老年患者輸血的概率是否比年輕患者更高。

方法：在一個三級醫療中心進行了此項回顧性、觀察佇列研究，納入了 2010 年 1 月至 2012 年 2 月期間在該中心做過外科手術的住院病人。通過多層多變數邏輯回歸分析的方法，並校正了併發症、外科水準、住院期間最低血紅蛋白值、性別和術中估測失血量因素和外科醫生和手術綜合分析，來比較大於 65 歲患者與更年輕患者輸血概率的差異。

結果： 在這個分析中納入了 20930 個患者。在校正併發症發生率、外科種類、估測外科失血量和住院期間最低血紅蛋白值差異後，並以外科醫生和手術類型作爲隨機因素的多層分析模式中，大於 65 歲患者的輸血概率比年輕患者高 62%（比值比爲 1.62，95%可信區間爲 1.40-1.88；P<0.0001）。當把病人按住院期間最低血紅蛋白值分層時（7.00–7.99, 8.00–8.99, 9.00–9.99,以及大等於 10.00 g/dL），每層中患者輸血概率隨著年齡增加（每十歲）而增加，住院期間最低血紅蛋白不低於 10.00 g/dL 的患者除外。當比較年輕和年老患

者輸血概率時，可以觀察到外科種類方面的顯著差異（P=0.02）而非麻醉專業差異（P=0.9）。

結論：儘管缺乏證據支持老年患者輸血應有更高的血紅蛋白觸發值，但老年患者圍術期接受紅細胞輸注概率比年輕患者更高。需要進一步研究確定老年患者的輸血實踐是否是一種改善血液管理的教育機遇。

（邊文玉 譯 陳傑 校）

BACKGROUND: Recent randomized controlled trials have shown no benefit for transfusion to a hemoglobin >10 g/dL compared with lower hemoglobin thresholds in the perioperative period, even among older adults. Nevertheless, physicians may choose to transfuse older adults more liberally than younger adults. It is unclear whether older patients have higher odds than younger patients of being transfused in the perioperative period. Our objective in this study was to determine whether the odds of transfusion are higher in older patients than in younger patients in the perioperative period.

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

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

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

關注兒童行扁桃體切除術後因睡眠呼吸暫停而導致的死亡或神經損傷：休士頓，我們有麻煩了！

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

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

Anesthesia & Analgesia 2014 118 1276–1283

背景：在美國，肥胖是種流行病，因此阻塞性睡眠呼吸暫停（OSA）的發病率也隨之增長。阿片藥物敏感性和最近扁桃體切除術後死亡相關的證據是促成開展本次對所有兒科麻醉學會成員調查兒童行扁桃體切除術後發生不良事件的原因。

方法：共有 2377 名兒科麻醉協會成員收到電子調查表。另外也獲得了美國麻醉醫師協會的結案訴訟資料。扁桃體切除(伴或不伴有腺樣體切除)術中或術後發生的不良事件均納

入。通過既往有 OSA 病史或之後通過美國麻醉醫師協會的 OSA 臨床指南確認兒童是否存在 OSA 風險。對比率和連續變數分別採用 Fisher 精確核對總和 t 檢驗方法比較存在風險的兒童和其他兒童之間的區別。

結果：調查回收到的 731 份回復中共有 129 例得到確認，其中 92 例資料齊全符合納入標準。另外 45 例美國麻醉醫師協會已結案訴訟資料中有 19 例資料齊全得到確認。最終共有 111 例納入最後分析。共有 86 例（占 77%）死亡或永久性神經損傷分別發生於手術中、麻醉恢復室、病房和家中。63 位患兒（57%)符合美國麻醉醫師協會的 OSA 風險標準。存在 OSA 風險的患兒相較其他兒童，肥胖和患有其他合併疾病概率更高(P < 0.0001)。風險患兒發生窒息的比例較高(P = 0.016)，反之 其他患兒不良事件中出血占的比例較高 (P = 0.006)。

結論：兒童扁桃體切除術後發生窒息相關的死亡和神經損傷表明：如果在恢復期第一、二階段以及術後第一天夜間採用了呼吸監測，至少 16 名患兒能得到及時救助。需要一個有效的專業兒科風險評分系統協助判斷患兒是否有 OSA 風險，以免被當做一個普通日間患者處理。

（陸秉瑋 譯 陳傑 校）

BACKGROUND: Obesity is epidemic in the United States and with it comes an increased incidence of obstructive sleep apnea (OSA). Evidence regarding opioid sensitivity as well as recent descriptions of deaths after tonsillectomy prompted a survey of all members of the Society for Pediatric Anesthesia regarding adverse events in children undergoing tonsillectomy.

METHODS: An electronic survey was sent to 2377 members of the Society for Pediatric Anesthesia. Additionally, data from the American Society of Anesthesiologists Closed Claims Project were obtained. Adverse events during or after tonsillectomy with or without adenoidectomy in children were included. Children at risk for OSA were identified as either having a positive history for OSA or a post hoc application of the American Society of Anesthesiologists OSA practice guidelines. These children were compared with all other children by Fisher exact test for proportions and t test for continuous variables.

RESULTS: A total of 129 cases were identified from the 731 replies to the survey, with 92 meeting inclusion criteria for having adequate data. Another 19 cases with adequate data were identified from the 45 from the American Society of Anesthesiologists Closed Claims Project. A total of 111 cases were included in the final analysis. Death and permanent neurologic injury occurred in 86 (77%) cases and were reported in the operating room, postanesthesia care unit, on the ward, and at home. Sixty-three (57%) children fulfilled American Society of Anesthesiologists criteria to be at risk for OSA. Children categorized as at risk for OSA were more likely than other children to be obese and to have comorbidities (P < 0.0001). A larger proportion of at risk children had the event attributed to apnea (P = 0.016), whereas all others had a larger proportion of events attributed to hemorrhage (P = 0.006).

CONCLUSIONS: Deaths or neurologic injury after tonsillectomy due to apparent apnea in children suggest that at least 16 children could have been rescued had respiratory monitoring been continued throughout first- and second-stage recovery, as well as on the ward during the first postoperative night. A validated pediatric-specific risk assessment scoring system is needed to assist with identifying children at risk for OSA who are not appropriate to be cared for on an outpatient basis.

一個通用的丙泊酚藥代動力學模型

A General Purpose Pharmacokinetic Model for Propofol

Eleveld, Douglas J. PhD[*]; Proost, Johannes H. PhD[*]; Cortínez, Luis I. MD[†]; Absalom, Anthony R. MD[*]; Struys, Michel M. R. F. MD[*‡]

Anesthesia & Analgesia 2014 118 1221–1237

背景:藥代動力學(PK)模型被用於預測術中使用不同輸注方案得到的藥物濃度及計算靶控輸注系統中的輸注速率。對丙泊酚而言，文獻中可查到的 PK 模型主要是由特定的患者群體或麻醉技術發展而來的，在不同病人和臨床條件下該模型的精確性並未確定。本研究目的是確定一個對於不同患者和多種臨床條件下有著強大預測能力的 PK 模型。

方法:匯總並分析了先前發表的 21 個丙泊酚資料集，資料包含了幼兒、兒童、成人、老年及肥胖個體。將體重、年齡、性別和病人狀態作爲協變數，使用 NONMEM 軟體來估計一個三室異速生長模型。設計出一個術中環境相關的預測性能度量，並結合赤池資訊準則來指導模型開發。

結果：資料集包括來自 660 位個體(年齡分佈範圍 0.25-88 歲;體重分佈範圍 5.2-160kg)的 10927 個藥物濃度觀察值。最終模型用體重、年齡、性別和患者 vs 健康志願者作爲協變數。對於一位 35 歲 70kg 的男性患者估計參數爲：V1, V2, V3, CL, Q2 和 Q3 分別爲 9.77, 29.0, 134 L, 1.53, 1.42, 和 0.608 L/min。預測性能優於或類似於專業模型，即使是這些模型衍生出的亞群。

結論：本研究已制定出一個通用的丙泊酚 PK 模型，適於廣泛的患者群體和多種臨床條件。但需要對其進一步的前瞻性評估。

（梁玉丹 譯 陳傑 校）

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

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

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

CONCLUSIONS: We have developed a single propofol PK model that performed well for a wide range of patient groups and clinical conditions. Further prospective evaluation of the model is needed.

麻醉工作站自動檢測程式在監測和處理呼吸回路梗阻方面表現各異

Automated Checkout Routines in Anesthesia Workstations Vary in Detection and Management of Breathing Circuit Obstruction

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Anesthesia & Analgesia 2014 118 1254–1257

雖然罕見，但麻醉呼吸系統梗阻可造成災難性的後果。本研究在三個當前主流麻醉工作站類比呼吸回路系統中呼氣和吸氣端閉塞的情況： AISYS，ADU（包括通用電氣醫療集團，麥迪森威斯康辛州）和阿波羅（德爾格醫療，德福，PA）。然後開啓每個麻醉機特定的自動檢測程式。AISYS 允許使用者接受故障，並同時啓動類比患者監護;在 ADU 和阿波羅上則無。用戶必須意識到如何測試回路呼吸阻塞，以及他們自己的設備是否能在自動化檢測中表現正常。

（林甲票 譯 陳傑 校）

While rare, anesthesia breathing system obstruction can have devastating consequences. We created simulated occlusions of the expiratory and inspiratory limb of the circle breathing system in 3 current anesthesia workstations; Aisys, ADU (both by GE Healthcare, Madison WI), and Apollo (Draeger Medical, Telford, PA). The automated electronic checkout specific to each machine was then performed. The Aisys allowed users to accept both faults and initiate simulated patient care; the ADU and Apollo did not. Users must be aware of how to test for breathing circuit obstruction, and whether their own equipment does so adequately in the automated checkout.

苯二氮卓位點激動劑差異性改變大鼠杏仁核部位的乙醯膽鹼釋放

Benzodiazepine Site Agonists Differentially Alter Acetylcholine Release in Rat Amygdala

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Anesthesia & Analgesia 2014 118 1293–1300

背景：苯二氮卓受體激動劑與 γ-氨基丁酸 A 型受體的苯二氮卓位點結合通過在杏仁核的作用減少焦慮和失眠。苯二氮卓位元點激動劑的神經化學效應並未完全弄清。膽鹼能神經傳遞調節杏仁核功能。本研究檢驗了關於苯二氮卓位點激動劑改變乙醯膽鹼(ACh)在杏仁核釋放的假說。

方法：利用微量透析和高性能液相色譜量化法定量測定 SD 大鼠(n = 33)的杏仁核釋放的乙醯膽鹼。在麻醉或非麻醉狀態下，靜脈給予咪達唑侖或右佐匹克隆(3mg/kg)前後測定 Ach 含量。比較林格氏溶液透析(對照)的異氟烷麻醉大鼠與包含(100μM)咪達唑侖、安定,右佐匹克隆或唑吡坦林格氏溶液透析的大鼠在透析期間釋放乙醯膽鹼的差異。

結果：未麻醉狀態下，靜脈注射咪達唑侖(−51.1%;P = 0.0029;95%可信區間(CI)−29.2% 73.0%)和右佐匹克隆(−39.6%;P = 0.0222;95%可信區間,−9.3% 69.8%)可使大鼠杏仁核內乙醯膽鹼減少。麻醉狀態下，靜脈注射咪達唑侖(−46.2%;P = 0.0041;95%可信區間,−24.5% 67.9%)和右佐匹克隆(−34.0%;P = 0.0009;95%可信區間,−23.3% 44.7%)使大鼠杏仁核內乙醯膽鹼減少；注射安定(43.2%,P = 0.0434;95%可信區間,2.1%到 84.3%)和右佐匹克隆(222.2%,P = 0.0159;95%可信區間,68.5%到 375.8%)可使大鼠杏仁核內乙醯膽鹼增加。

結論：靜脈注射咪達唑侖和右佐匹克隆使大鼠杏仁核內乙醯膽鹼的釋放減少。直接滲析到杏仁核可引起乙醯膽鹼釋放的增加(右佐匹克隆和安定)或無顯著變化(咪達唑侖和唑吡坦)。這些 Ach 釋放傳遞通路相關的差異性效應支持解釋靜脈給予咪達唑侖和右佐匹克隆引起杏仁核內乙醯膽鹼的釋放增加是杏仁核以外的神經系統所引發的。

（李峰日 譯 陳傑 校）

BACKGROUND: Agonist binding at the benzodiazepine site of γ-aminobutric acid type A receptors diminishes anxiety and insomnia by actions in the amygdala. The neurochemical effects of benzodiazepine site agonists remain incompletely understood. Cholinergic neurotransmission modulates amygdala function, and this study tested the hypothesis that benzodiazepine site agonists alter acetylcholine (ACh) release in the amygdala.

METHODS: Microdialysis and high-performance liquid chromatography quantified ACh release in the amygdala of Sprague-Dawley rats (n = 33). ACh was measured before and after IV administration (3 mg/kg) of midazolam or eszopiclone, with and without anesthesia. ACh in isoflurane-anesthetized rats during dialysis with Ringer's solution (control) was compared with ACh release during dialysis with Ringer's solution containing (100 μM) midazolam, diazepam, eszopiclone, or zolpidem.

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

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

和複水化相比，脫水增強人體大腦疼痛誘發反應

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

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Anesthesia & Analgesia 2014 118 1317–1325

背景：脫水對於人腦組織及認知功能的負面影響已經有所報導。本研究檢驗了脫水情況對於疼痛閾值以及腦皮質中疼痛反應活動的影響，並與口服溶液複水化之後的功能性核磁共振做了比對。

方法：五名成年男性分別於不同的 2 天中入脫水與複水化組。各成員首日的身體情況均爲隨機。全員在兩種情況下均經過了 12 小時禁食，之後用跑步機完成了 40min 的定量體能運動。複水化組，成員在測試日前一晚開始共服用口服溶液最多達 3000 毫升。體能運動後，於核磁共振掃描設備下，在受試者前臂內側給予疼痛刺激（冷加壓試驗），並分析疼痛引起的大腦活動啓動。

結果：在複水化當日，平均每位受試者服用了 2040 毫升口服溶液（從 1800-2500 毫升不等）。生理指標顯示受試者經過體能訓練脫水化後體重降低越明顯，則其複水化後心率增加水準、鼓膜測溫、尿比重也越高。受試者的資料顯示受試者們反應在脫水化後感受到的口渴感比口服溶液複水化之後要更強烈，而饑餓、焦慮、情緒並未有顯著不同。冷加壓試驗對疼痛相關的神經網路有著強烈的刺激，尤其是扣帶前回、島葉和丘腦。試驗刺激在脫水化個體中的波峰群相比複水化個體更加明顯，並伴隨著疼痛閾值的下降（P=0.001）

結論：本研究發現說明脫水化將使機體對於疼痛刺激的大腦活動興奮性增加，同時伴有口渴感的增強，而口服溶液能緩解口渴感，並降低大腦對於疼痛刺激的興奮性。

（賀加貝 譯 陳傑 校）

BACKGROUND: Negative effects of dehydration on the human brain and cognitive function have been reported. In this study, we examined the effects of dehydration on pain thresholds and

cortical activations in response to pain, compared with rehydration with an oral rehydration solution (ORS) by functional magnetic resonance imaging.

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

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

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

小鼠鞘內注射 Myr-NR2B9c 肽通過干擾 NMDA 受體和 PSD-95 蛋白間作用減輕骨癌疼痛

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

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Anesthesia & Analgesia 2014 118 1345–1354

背景：N-甲基-D-天冬氨酸受體(NMDAR)性中樞致敏在癌症疼痛中具有重要作用。通過突觸後 PSD-95 結合 NMDAR 亞單位 2B(NR2B)可偶聯 NMDAR 啓動細胞內酶如神經性一氧化氮合酶(nNOS)，啓動下游信號通路並調節 NMDAR 穩定性，從而調控突觸可塑性。本研究檢測使用一種模擬肽是否影響脊髓內具有 NR2B 的 NMDAR 和 PSD-95 間的特殊作用，進而減輕骨癌相關的疼痛。

方法：骨肉瘤細胞被植入 C3H/HeJ 小鼠右股骨骨髓腔內誘發進展性骨癌相關性疼痛。Western blotting 檢測脊髓內磷酸化 Tyr1472 NR2B、nNOS 和 PSD-95。並進一步調查鞘內注射競爭性破壞 NR2B 和 PSD-95 間作用的模擬肽 Myr-NR2B9c 對傷害性行爲以及脊髓內與骨癌疼痛有關的磷酸化 Tyr1472 NR2B、nNOS 和 PSD-95 表達上調的影響。

結果：骨肉瘤細胞植入可誘發產生進展性骨癌相關性疼痛，並導致磷酸化 Tyr1472 NR2B、nNOS 和 PSD-95 表達顯著上調。鞘內注射 Myr-NR2B9c 可減輕骨癌引起的機械性疼痛異常、溫痛覺過敏，並降低磷酸化 Tyr1472 NR2B、nNOS 和 PSD-95 表達。

結論：鞘內注射 Myr-NR2B9c 可減輕骨癌相關性疼痛。脊髓 NR2B 細胞內攝作用和含有 NR2B 的 NMDAR 從下游 nNOS 信號活性分離可有助於 Myr-NR2B9c 的鎮痛作用。此方法可能涉及與阻滯 NMDAR 相關的負性結果，可作爲治療骨癌疼痛的一種新方法。

（朱浩 譯 陳傑 校）

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

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

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

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

超聲引導下內收肌管連續阻滯用於全膝關節置換術：一項隨機雙盲實驗

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

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Anesthesia & Analgesia 2014 118 1370–1377

背景：在減少全膝關節置換術患者術後疼痛方面，內收肌管阻滯已經展現了其潛力。然而沒有任何隨機對照研究評估在內收肌管中連續輸注 0.2%羅呱卡因是否能減少阿片類藥物的使用。本文假設連續內收肌管阻滯可以減少術後阿片類藥物的使用。

方法：80 例初次行單側全膝關節置換術患者隨機接受超聲引導下連續 0.2%羅呱卡因內收肌管阻滯或者接受假導管放置。術前所有患者都接受單次股神經阻滯和脊麻，這是本機構的一項標準麻醉方式。在調整基線後，協方差分析評價術後 48 小時累積 IV 嗎啡消耗量。次要結果包括靜息疼痛評分（numeric rating scale），術後 1 天和 2 天物理治療時的疼痛高峰評分，股四頭肌最大等長收縮，物理治療時的走動距離，術後噁心、嘔吐和對鎮痛的滿意度。

結果：80 名受試者被隨機分配，76 名完成了協議研究。48h 累計嗎啡消耗量（阻滯−對照）的最小均方差爲−16.68mg（95%置信區間，-29.78- -3.59，P = 0.013）。兩組 24h 和 48h（預測的股神經阻滯效應消失後）之間的嗎啡使用總量也有不同，最小均方差爲−11.17mg（95%可信區間：-19.93 至 2.42，P = 0.013）。ITT 分析類似於 PP 分析結果。功能結果顯示在術後第 2 天，內收肌管導管組患者有更佳的股四頭肌力量（P = 0.010）和更遠的走動距離（P = 0.034）。

結論：在全膝關節置換術後第一個 48h，與使用安慰劑相比，使用連續內收肌管阻滯可減少阿片類藥物使用。其它結果包括：在全膝關節置換術後，股四頭肌力量，行走距離和疼痛評分都可以從內收肌管導管獲益，但這一結果若要作爲結論還需進一步研究。

（談睛華 譯 陳傑 校）

BACKGROUND: Adductor canal blocks have shown promise in reducing postoperative pain in total knee arthroplasty patients. No randomized, controlled studies, however, evaluate the opioid-sparing benefits of a continuous 0.2% ropivacaine infusion at the adductor canal. We hypothesized that a continuous adductor canal block would decrease postoperative opioid consumption.

METHODS: Eighty subjects presenting for primary unilateral total knee arthroplasty were randomized to receive either a continuous ultrasound-guided adductor canal block with 0.2% ropivacaine or a sham catheter. All subjects received a preoperative single-injection femoral nerve block with spinal anesthesia as is standard of care at our institution. Cumulative IV morphine consumption 48 hours after surgery was evaluated with analysis of covariance, adjusted for baseline characteristics. Secondary outcomes included resting pain scores (numeric rating scale), peak pain scores during physical therapy on postoperative days 1 and 2, quadriceps maximum voluntary isometric contraction, distance ambulated during physical therapy, postoperative nausea and vomiting, and satisfaction with analgesia.

RESULTS: Eighty subjects were randomized, and 76 completed the study per-protocol. The least-square mean difference in cumulative morphine consumption over 48 hours (block − sham) was −16.68 mg (95% confidence interval, −29.78 to −3.59, P = 0.013). Total morphine use between 24 and 48 hours (after predicted femoral nerve block resolution) also differed by least-square mean −11.17 mg (95% confidence interval,: −19.93 to −2.42, P = 0.013). Intention-to-treat analysis was similar to the per-protocol results. Functional outcomes revealed subjects in the adductor canal catheter group had better quadriceps strength (P = 0.010) and further distance ambulated (P = 0.034) on postoperative day 2.

CONCLUSIONS: A continuous adductor canal block for total knee arthroplasty reduces opioid consumption compared with that of placebo in the first 48 hours after surgery. Other outcomes including quadriceps strength, distance ambulated, and pain scores all show benefit from an adductor canal catheter after total knee arthroplasty but require further study before being interpreted as conclusive.

單次低劑量地塞米松對圍手術期患者血糖的影響（一項針對婦科手術患者的隨機對照研究）

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

Murphy GS1, Szokol JW, Avram MJ, Greenberg SB, Shear T, Vender JS, Gray J, Landry E.

Anesthesia & Analgesia 2014 118 1204–1212

背景：單次低劑量地塞米松對圍手術期患者血糖的影響至今尚未明確闡述。本研究我們在麻醉誘導期採取兩種不同劑量的地塞米松（4mg 和 8mg）進行注射，並在注射後 24 小時內進行血糖監測。

方法：對 200 例女性患者進行隨機分組，共 6 組：早期對照組（生理鹽水）；早期試驗組-4mg（4mg 地塞米松）；早期試驗組-8mg（8mg 地塞米松）；晚期對照組（生理鹽水）；晚期試驗組-4mg（4mg 地塞米松）；晚期試驗組-8mg（8mg 地塞米松）。對於早期研究組，血糖監測時間設在給藥後 0h，1h，2h，3h 和 4h；對於晚期研究組，則設在給

藥後 8h 和 24h。對於給藥後發生高血糖患者要進行數量統計（高血糖定義爲血糖濃度 >180mg/ dL）。

結果：所有對照組和試驗組的患者血糖濃度值均在圍手術期出現明顯增高（由血糖基礎值 94mg/dL~102 mg/dL 增高到峰值 141mg/dL~161.5 mg/dL，P < 0.001）。不論給予地塞米松的劑量高低（4mg 或 8mg），在不同時間點測定對照組和試驗組血糖後，結果未出現明顯差異。此外，在早期組和晚期組發生高血糖的發生率也未出現明顯差異（早期組：21%-28%, P = 0.807；晚期組：13%-24%, P = 0.552）。

結論：在圍手術期給予單次低劑量地塞米松後，24 小時內患者血糖濃度並沒有出現明顯差異，故建議臨床麻醉醫生利用地塞米松預防患者噁心嘔吐時，沒有必要顧慮反應性高血糖。

（王嘉興譯 薛張綱校）

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

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

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

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

使用地塞米松預防術後噁心嘔吐與腫瘤復發和高血糖：更多爭議？

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

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Anesthesia & Analgesia 2014 118 1154–1156

常規使用地塞米松來預防術後嘔心嘔吐（PONV），在麻醉醫師和麻醉供應商之間爭論了很多年。爲什麼？有明確的資料表明，地塞米松低價高效，是預防術後噁心嘔吐的優選藥物，被 PONV 共識指南所推薦。與可能是最常用的預防和治療 PONV 的 5-HT-3 受體阻滯劑昂丹司瓊相比較，預防 PONV 的需治療指數爲 4，而昂丹司瓊爲 6。理想的預防劑量是在麻醉誘導期以 4mg 靜脈注射，但是，因爲阿片類藥物的封頂效應和短暫的恢復期，8mg 靜脈注射能夠產生額外的緩解疼痛的好處。

爭論的原因在於地塞米松是糖皮質激素，用於圍術期的患者時會產生令人擔憂的副作用。這些顧慮包括傷口感染，傷口癒合，圍術期出血，皮質醇抑制，神經肌肉無力，高血糖，甚至腫瘤復發。在本期的 Anesthesia & Analgesia，使用地塞米松的兩個顧慮，類固醇激素與腫瘤復發和圍術期高血糖的關係，都會討論到。

糖皮質激素和它們在腫瘤患者的使用早已是圍術期關注到的話題。手術切除是許多類腫瘤的確切治療方法，腫瘤復發和轉移性疾病是腫瘤手術患者死亡最重要的原因。圍術期宿主防禦的抑制，麻醉技術和藥物選擇，它們對宿主免疫的影響越來越受到關注。已經顯示出地塞米松對 T 細胞功能和自然殺傷細胞的抑制，它們都參與了抗腫瘤免疫反應。儘管有這些發現，關於使用皮質醇激素和腫瘤復發的資料很少。

在這個問題上，De Oliveira 等發表了一個回顧性觀察研究，分析了圍手術期地塞米松 4~8mg 用於預防術後噁心嘔吐對接受原發性卵巢腫瘤細胞減滅術的婦女對卵巢癌和卵巢癌的復發風險的影響。主要目的是通過對圍手術期接受地塞米松和沒有接受治療的婦女相比較，卵巢癌復發的風險是否增加。在研究納入的 260 例婦女中，178 例癌症復發，這些患者中的 102 例注射過地塞米松。這項研究最終發現在主要手術治療後，圍手術期使用地塞米松和卵巢癌復發之間沒有顯著的關聯，因此不支持避免使用單劑量地塞米松預防術後噁心嘔吐。有一些公認有缺陷的研究，如樣本量小，缺乏術中和術後鎮痛管理的規範化。這是特別重要的，因爲一些研究表明，在圍手術期使用阿片類藥物可能對血管生成和癌症結果產生影響。已發現阿片樣物質通過細胞增殖和細胞凋亡的調製的生長來調節腫瘤細胞；它們引起免疫抑制，以及調節血管形成，通過啓動血管生長細胞受體如血管內皮生長因數和血小板衍生的生長因數來協助腫瘤的轉移和生長。另一項研究提出的證據表明，阿片類藥物通過 μ-阿片受體的相互影響可能對肺癌的進展有直接影響。單劑量地塞米松與癌症復發，在文獻中，沒有臨床證據反駁上述結論。事實上，Egberts 等創建了一個動物模型，使用地塞米松能預防胰腺癌的復發和轉移。Munstedt 等發現，化療使用地塞米松並不影響卵巢癌的結果，但可能對骨髓有保護作用。

使用地塞米松經常受到關注的風險是術中和術後的高血糖，有一些以前的研究表明使用糖皮質激素引起短暫的血糖水準的升高。糖皮質激素已知會增加肝臟葡萄糖生成，同時增加胰島素抵抗和降低葡萄糖的氧化和攝取。高血糖作的這些用可能與危重和術後病人的不良反應相關，如抑制免疫功能，增加促炎性細胞因數，增加全身血管阻力，滲透性利尿，電解質以及酸堿失衡。

IMurphy 等爲解決這個問題進行了一個隨機，安慰劑對照試驗，以確定地塞米松用於婦科手術病人在圍術期對血糖濃度的影響。主要的結果是在給予單次的低劑量地塞米松治療（4 和 8 毫克）後，記錄第一個 24 小時的血糖濃度和高血糖事件的發生率（血糖水準> 180 毫克/分升）。患者行子宮切除術，隨機分爲接受生理鹽水，地塞米松 4 毫克，地塞米松 8 mg 三組，在圍手術期 24 小時內的指定時間點爲每個組測量血糖。該研究發現，儘管血糖濃度在對照組和地塞米松組均顯著增加，但地塞米松組和生理鹽水對照組之間在圍術期 24 小時的任意時間點之間沒有顯著性差異。結論表明，圍術期不應因考慮高血糖事件而避免給予低劑量地塞米松來預防術後的噁心嘔吐。這一發現在其它文獻中的證據得到支持。Abdelmalak 等人的一項研究表明，進行重大非心臟手術後，接受地塞米松 8 毫克組與安慰劑組均有較高的血糖水準，不管是糖尿病還是非糖尿病患者，其效果都是非常有限的。在一項類似研究中，Nazar 等調查了 40 例非糖尿病和 30 例 2 型糖尿病行腹腔鏡膽囊切除術的患者。患者被隨機分爲生理鹽水組和地塞米松 8 毫克組，結果表明，在使用地塞米松預防術後噁心嘔吐後，2 型糖尿病患者圍術期高血糖的敏感性不比非糖尿病患者高。

我們團隊最近在本雜誌發表了一篇編者按，名字爲：使用地塞米松預防術後噁心嘔吐和傷口併發症：一個有爭議的問題？我們的結論是，目前的文獻不支持如下觀點：圍術期單次劑量的地塞米松在統計學上顯著增加傷口併發症的發生率和最終傷口癒合時間。這和使用單次劑量地塞米松預防術後噁心嘔吐與腫瘤復發和術中高血糖進行的上述評估，再次表明麻醉醫師能夠安全的使用 4~8mg 的地塞米松預防術後噁心嘔吐。

（吳赤譯 薛張綱校）

The routine use of dexamethasone for the prophylaxis of postoperative nausea and vomiting (PONV) has been controversial and debated among anesthesiologists and anesthesia providers

for many years. Why is this? There are clear data to support that dexamethasone, with its relative low cost and high efficacy, is a preferred antiemetic for the prevention of PONV, as recommended by the PONV Consensus Guidelines. Compared with ondansetron, a 5-HT-3 receptor antagonist, which is likely the most commonly used antiemetic to prevent and treat PONV, the number needed-to-treat to prevent PONV for dexamethasone is 4, compared with 6 to 7 for ondansetron. The ideal prophylactic dosage appears to be 4 mg IV at induction of anesthesia; however, 8 mg IV may provide the additional benefit of pain relief because of opioid-sparing effects as well as shorten recovery time.

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

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

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

Another often-touted risk of dexamethasone use is the concern for intraoperative and postoperative hyperglycemia, with several previous studies demonstrating a transient rise in glucose levels with the use of glucocorticoids. Glucocorticoids are known to increase hepatic glucose production, while increasing insulin resistance and decreasing glucose oxidation and

uptake. These hyperglycemic effects may be associated with adverse outcomes in the critically ill and postsurgical patients, such as suppression of immune function, increase in proinflammatory cytokines, increased systemic vascular resistance, osmotic diuresis, and electrolyte as well as acid–base imbalances.

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

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

心臟外科病人中輸注儲存的同種異體血而非自體血回收後損傷紅細胞的可塑性

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

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Anesthesia & Analgesia 2014 118 1179–1187

背景：心肺轉流和紅細胞長時間的儲存都與紅細胞結構、功能的損害性改變密切相關，進而影響組織氧運輸。我們假設，在心外科病人中，紅細胞的可塑性和聚集性受自體血回收的單一影響很小，但同種異體血輸注起負面影響。

方法：在這項前瞻性佇列研究中，32 位元行心肺轉流術的病人根據輸血方式分爲 3 組：單獨輸注自體血紅細胞組（Auto，n=12），輸注自體血紅細胞和少量（<5 單位）同種異體血紅細胞組(Auto+Allo min; n=10)，和輸注自體血紅細胞與中等量（>5 單位）同種異體血紅細胞(Auto+Allo mod; n=10)。在術前、術中和術後 3 天分別利用鐳射衍射法檢測紅細胞的伸長指數（可塑性）和臨界剪切應力（聚集性）。

結果：在 Auto 組，紅細胞伸長指數和術前比並沒有明顯變化。在 Auto+Allo min 組，平均伸長指數從術前的 32.31 ± 0.02 下降爲術後第 1 天的 30.47 ± 0.02(P = 0.003)。在 Auto+Allo mod 組，平均伸長指數從術前的 32.7 ± 0.02 下降爲術後第 1 天的 28.14 ± 0.01。可塑性劑量依賴性的由術前向術後 3 天慢慢恢復。聚集性的變化在各組之間無差異，與輸血類型無關。3 組的平均臨界剪切應力從 359 ± 174 mPa 降爲 170 ± 141 mPa（P = 0.01），手術結束時爲最低，術後第 1 天又恢復爲術前水準。

結論：在心臟外科病人中，輸注同種異體血紅細胞，而不是自體血紅細胞，與紅細胞細胞膜的可塑性降低呈劑量依賴性相關，並持續到術後三天。以上結果表明自體血紅細胞比儲存的紅細胞品質更高，因爲後者會導致所謂的儲存損傷。

（呂越昌譯 薛張綱校）

BACKGROUND: Both cardiopulmonary bypass (CPB) and red blood cell (RBC) storage are associated with detrimental changes in RBC structure and function that may adversely affect tissue oxygen delivery. We tested the hypothesis that in cardiac surgery patients, RBC deformability and aggregation are minimally affected by CPB with autologous salvaged blood alone but are negatively affected by the addition of stored allogeneic blood.

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

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

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

合成大麻素 Ajulemic 酸對電壓門控鈉通道的阻滯

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

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Anesthesia & Analgesia 2014 118 1238–1245

背景：合成大麻素 ajulemic 酸已被證實可以緩解患者慢性神經性疼痛。大麻素可與疼痛機制環路中數個分子相互作用，包括對電壓門控鈉通道的強效抑制作用。在本研究中，我們在神經細胞及非神經細胞鈉通道中深入研究了這個特性。

方法：我們在體外研究了 ajulemic 酸對於內向鈉離子電流的抑制作用。人胚胎腎 293t 細胞用於 Nav1.2, 1.3, 1.4, 1.5, 1.5N406K, 1.5F1760A 及 1.7 的表達系統。Nav1.8 僅短暫表達於 ND7/23 細胞中。Nav1.2, Nav1.3 及 Nav 1.8 來源於大鼠，Nav1.4, Nav1.5 及 Nav1.7 則來源於人。應用全細胞膜片鉗技術進行鈉離子電流的分析。研究中使用的 ajulemic 酸的濃度分別爲 0.1, 0.3, 1, 3, 10 和 30 μmol/L。

結果：Ajulemic 酸濃度依賴性的可逆的抑制研究中觀察的所有亞型的電壓門控鈉離子通道（Nav），包括 Nav1.2, 1.3, 1.4, 1.5, 1.7 和 1.8。對靜息通道產生半數最大緊張性阻滯的濃度值在 2 到 9 μmol/L 之間，並且在失活通道中的阻滯作用增強，提示 ajulemic 酸的鈉通道阻滯作用依賴於通道所處的功能狀態。緊張性阻滯在分別在通道 Nav1.2 和 Nav1.3, Nav1.4 和 Nav1.5, 以及 Nav1.7 和 Nav1.8 的對比中並無顯著性差異。通過方差分析對其它亞型組合（比如 Nav1.2 和 Nav1.4）的阻滯進行的統計分析結果差異有顯著統計學意義。雖然我們並未研究任何相關的功能依賴性的阻滯，ajulemic 酸可引起電壓依賴通道快速失活的強烈的超級化改變，以及緩慢失活的輕度超級化改變。對局麻藥不敏感的 Nav1.5 構成 N406K 以及 F1760A，對 ajulemic 酸的阻滯作用表現出內在的敏感性。最後，我們發現低濃度的 ajulemic 酸可有效抑制 Nav1.5 中由 Navβ4 肽段介導的再生電流。

結論：我們的研究資料表明 ajulemic 酸可能通過阻滯鈉離子通道的相關機制來緩解神經性疼痛。對於再生電流的強效的阻滯作用以及對局麻藥不敏感通道的內在阻滯表明 ajulemic 酸與一些尚未被知曉的鈉通道位點相互作用。

(杜芳譯 薛張綱校)

BACKGROUND: The synthetic cannabinoid ajulemic acid has been demonstrated to alleviate pain in patients suffering from chronic neuropathic pain. Cannabinoids interact with several molecules within the pain circuit, including a potent inhibition of voltage-gated sodium channels. In this study, we closely characterized this property on neuronal and nonneuronal sodium channels.

METHODS: The inhibition of sodium inward currents by ajulemic acid was studied in vitro. Human embryonic kidney 293t cells were used as the expression system for Nav1.2, 1.3, 1.4, 1.5, 1.5N406K, 1.5F1760A, and 1.7; Nav1.8 was transiently expressed in ND7/23 cells. Nav1.2, Nav1.3, and Nav 1.8 were from rats, and Nav1.4, Nav1.5, and Nav1.7 were of human origin. Sodium currents were analyzed by means of the whole cell patch-clamp technique. The investigated concentrations of ajulemic acid were 0.1, 0.3, 1, 3, 10, and 30 μmol/L.

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

CONCLUSIONS: Our data suggest that block of sodium channels can be a relevant mechanism by which ajulemic acid alleviates neuropathic pain. The potent inhibition of resurgent currents and the preserved block on local anesthetic-insensitive channels indicates that ajulemic acid interacts with a conserved but yet unknown site of sodium channels.

可視喉鏡輔助可彎曲氣管鏡對預測爲困難氣道的患者進行氣管插管是否可行？一項前瞻性、隨機臨床試驗

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

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Anesthesia & Analgesia 2014 118 1259–1265

背景：插管失敗有可能會增加患者的發病率和死亡率。可視喉鏡聯合可彎曲氣管鏡相當於一個可彎曲的可視管芯，可以提高困難氣道插管的成功率。我們通過研究檢驗了這種組合方法，發現這不僅易化了預測爲困難氣道的患者的氣管插管，還可以縮短插管時間、減少插管嘗試次數。

方法：我們隨機、前瞻性地對 140 例行擇期或急診手術預期爲困難氣道的患者進行了試驗。插入可視喉鏡後，患者被隨機分配到放置預成型管芯組（對照組）或可彎曲氣管鏡組（干預組）。研究主要觀察的指標是插管成功的時間和氣管插管嘗試的次數。

結果：研究表明兩組間需要 2 次或以上嘗試插管次數的患者人數相似（對照組爲 14%，干預組爲 13%，P = 1.0）；兩組間需要 3 次或以上嘗試插管次數的患者人數沒有顯著差異（對照組爲 8.6%，干預組爲 1.4%，P = 0.12）。兩組間插管時間的分佈曲線也沒有明顯差異（對照組：中位數爲 66 秒，四分位數間距 47-89 秒；干預組：中位數爲 71 秒，四分位數間距 52-100 秒，P = 0.35）。在對照組中，4 例頸椎病患，在使用可視喉鏡和硬質管芯嘗試插管失敗 3 次後，採用可視喉鏡聯合可彎曲氣管鏡插管成功。對於這 4 例患者，從決定改變插管方法至可彎曲氣管鏡成功插管用時爲 36±14 秒。干預組中頸椎患者插管的總體成功概率爲 100%（20/20），而對照組爲 80%（16/20），95%置信區間分別爲 1.4%和 44%，P = 0.04。

結論：對於預測爲困難氣道的患者，可彎曲氣管鏡輔助可視喉鏡插管是僅使用可視喉鏡的一個可行的替代方案。可彎曲氣管鏡聯合可視喉鏡還可能進一步增加明確有困難氣道的擇期手術患者氣管插管的成功率，特別是當需要保持線性穩定時。

（江凌慧譯 薛張綱校）

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

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

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

100% (20/20) in the intervention group and 80% (16/20) in the control group, with an exact 95% confidence interval for the difference of 1.4% to 44%, *P* = 0.04.

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

輸血觀念：面向外科病人及其麻醉和外科醫生的一項調查

Perceptions about bloodtransfusion: a survey of surgicalpatients and their anesthesiologists and surgeons.

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Anesthesia & Analgesia 2014 118 1301–1308

背景：雖然輸血較常見並且是治療外科失血的主要措施，但是患者及其醫師可能會認爲其有發生不良反應的風險。以患者爲中心的醫療要求臨床醫生充分瞭解每位元病人對輸血的認識，並且將其納入共同醫療決策內容中。

方法：患者在門診進行常規術前評估時完成紙質問卷。同時該醫療機構中將爲其實施麻醉和手術的醫生在網上完成問卷。這兩份問卷用於評估患者和醫生對輸血的認識，包括輸血的整體風險、對輸血的 5 項特定不良反應的擔憂程度以及對這些不良反應的發生率的認識。組別差異用常規統計學進行計算。

結果：總共 294 位患者和 73 位醫師完成問卷。在被調查的患者中 20%（95%可信區間 15%-25%）認爲輸血“很容易發生風險”或者“經常發生風險”。認爲輸血整體風險較大與非裔美國人（P=0.028）及受到高中及以下教育（P=0.022）有關。認爲過敏反應（P = 0.001)）、發熱(P < 0.001),和呼吸困難(P = 0.001)風險較大與非裔美國人有關。認爲過敏反應（P = 0.009)）、發熱(P=0.039)、呼吸困難(P = 0.004)、HIV/AIDS 和肝炎(P = 0.003)和醫療錯誤(P = 0.039)風險較大與受到高中及以下教育（P=0.022）有關。患者及醫師問卷也有顯著差異：醫師比患者認爲輸血更有風險(P = 0.001)。

結論：儘管在美國和其他發達國家輸血安全得到改善，但是本研究結果表明相當大比例的患者仍然認爲輸血具有較大的風險。而且患者和他們的麻醉醫生/外科醫生對輸血相關風險和併發症的認識有較大差異。充分瞭解患者對輸血的認識、識別那些認爲輸血風險憂慮較多的患者可以使專業醫護人員在知情同意和建議患者輸血時充分考慮個體患者的價值觀、信仰、害怕或者擔心，以求更好地處理風險。

(蓋曉冬譯 薛張綱校))

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

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

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

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

CONCLUSIONS: Despite improvements in bloodtransfusion safety in the United States and other developed countries, the results of this study indicate that a sizeable percentage of patients still perceive transfusion as having significant associated risk. Furthermore, patients and their anesthesiologists/surgeons differ in their perceptions about transfusion-related risks and complications. Understanding patients' perceptions of bloodtransfusion and identifying groups with the greater specific concerns will better enable health care professionals to address risk during the informed consent process and recommend blood management in accordance with the individual patient's values, beliefs, and fears or concerns.

注射 A 型肉毒素治療頸部和肩胛帶筋膜疼痛綜合征的療效觀察

Botulinum Toxin Type A Injections for Cervical and Shoulder Girdle Myofascial Pain Using an Enriched Protocol Design

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Anesthesia & Analgesia 2014 118 1326–1335

背景：肌筋膜疼痛綜合症表現爲局部肌肉疼痛和強直，其典型特徵爲存在受累肌肉組織的觸發點。A 型肉毒素（BoNT-A）已被證實具有鎮痛特性，並可誘導持續的肌肉鬆弛，因此 BoNT-A 比傳統的治療方案有更好的緩解療效。我們旨在瞭解疼痛肌肉組織中直接注射 BoNT-A 是否對治療頸部和肩胛帶筋膜疼痛綜合症有效。

方法：本研究按照嚴格精簡設計標準納入頸部和肩胛帶筋膜疼痛綜合症患者 114 例，接受 BoNT-A 注射並觀察其對藥物的反應。其中 54 例有反應者被納入一項 12 周的隨機、雙盲、安慰劑對照的研究。基線資料記錄疼痛評分和生活品質，常規隨訪至本研究結束後 26 周。

結果：相對於注射安慰劑的對照組，疼痛肌肉群中再次注射 BoNT-A 組患者可提高平均數值視覺疼痛評分(P = 0.019 [0.26, 2.78])。再次接受注射 BoNT-A 組患者每週出現頭痛的比例減少(P = 0.04 [0.07, 4.55])。同時此組患者在平日活動和睡眠中的簡明疼痛量表評分較安慰劑組有明顯改善（P = 0.046 [0.038,3.700]，P=0.02 [0.37,4.33]）。

結論：在頸部和肩胛帶筋膜疼痛患者的疼痛肌肉群中直接注射 BoNT-A 可提高平均疼痛評分和改善生活品質。

(郭寶磊譯 薛張綱校)

BACKGROUND: Myofascial pain syndrome is a regional condition of muscle pain and stiffness and is classically characterized by the presence of trigger points in affected musculature. Botulinum toxin type A (BoNT-A) has been shown to have antinociceptive properties and elicit sustained muscle relaxation, thereby possibly affording even greater relief than traditional

strategies. Our goal was to determine whether direct injection of BoNT-A into painful muscle groups is effective for cervical and shoulder girdle myofascial pain.

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

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

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

納米麻醉：一項由磁石導向的經靜脈給予含羅呱卡因納米顆粒進行鼠踝關節阻滯的新技術

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

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Anesthesia & Analgesia 2014 118 1355–1362

背景：我們研究聯合靜脈注射含羅呱卡因的有磁性的納米顆粒及踝部磁性導向進行鼠踝關節阻滯作爲目前局部神經阻滯的替代方法的可行性。

方法：我們通過測量鼠足部對熱刺激的撤藥潛伏期來觀察磁性導向的含羅呱卡因的磁性納米顆粒的麻醉效果。含羅呱卡因的磁性納米顆粒複合體由 0.7%羅呱卡因（重量/容積）和含 12%磁性物質（Fe3O4，重量/重量）的 0.8%磁性納米顆粒（重量/容積）構成。我們在注射該複合體 15、30 及 60min 時對有磁性導向的右足及沒有磁性導向的左足及傳統應用 0.1%或 0.2%羅呱卡因進行的踝關節阻滯進行比較，並在 30min 時對單純注射該複合體的右足與聯合磁性導向的右足進行比較。另外，我們還測定了含羅呱卡因的磁性納米顆粒複合體的藥代動力學。

結果：與經過預處理的同側足掌及沒有磁性導向的對側足掌相比較，靜脈注射含羅呱卡因的磁性納米顆粒聯合足部磁性導向可顯著增加足掌對熱刺激的撤藥潛伏期（p < 0.0001。磁性導向 30min 後踝部組織羅呱卡因絕對濃度及踝部組織/血漿濃度比例均高於單純注射含羅呱卡因的磁性納米顆粒複合體(均值 ± 標準差, 150 ± 10 ng/g vs 105 ± 15 ng/g 及 6.1 ± 0.8 vs 4.2 ± 0.7)。

結論：我們的研究表明通過靜脈注射含羅呱卡因的磁性納米顆粒複合體聯合踝部磁性導向進行踝關節阻滯是可行的，並推薦對該方法進行深入研究。

（郝光偉譯 薛張綱校）

BACKGROUND: As an alternative to current methods of local nerve block, we studied the feasibility of producing ankle block in the rat with IV injection of magnetic nanoparticles (MNPs) associated with ropivacaine and application of a magnet at the ankle.

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

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

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

地塞米松與卵巢癌復發有關嗎？

Is Dexamethasone Associated with Recurrence of Ovarian Cancer?

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Anesthesia & Analgesia 2014 118 1213–1218

背景：基礎科學研究表明在經過可能具有療效的手術治療後，圍術期免疫損傷可能增加腫瘤復發的風險。儘管地塞米松具有免疫抑制的特性，但爲了減少術後噁心嘔吐的發生，地塞米松仍普遍應用于腫瘤患者。因此我們對圍術期使用地塞米松增加卵巢癌復發風險的假設進行了驗證。

方法：我們使用了由西北大學婦產科腫瘤部門建立的資料庫，從中選取了 1997 年 1 月至 2007 年 10 月行原發性卵巢腫瘤細胞減滅術的女性患者。我們將腫瘤復發患者中圍術期全身性使用地塞米松（4-10mg）與未使用地塞米松的患者進行比較。研究的主要終點是傾向性匹配到腫瘤復發的時間。復發被定義爲癌抗原 125＞21 U/mL 或 CT 發現腫瘤組織並經過病理證實。我們使用了 10000 個樣本的自助法來計算傾向性配對組間的差值中位數和 95%可信區間。

結果：260 名行原發性腫瘤細胞減滅術的卵巢癌女性患者符合入選標準，其中 102 名患者圍術期全身性使用了地塞米松。178 名患者被發現腫瘤復發，腫瘤復發時間的總體未調整中位數（IQR）爲 18（7-50）個月。87 例患者與 87 名對照患者進行傾向性匹配來調整混雜變數。經過傾向性匹配分組，地塞米松組復發時間的 IQR 爲 23（6-46）個月，對照組爲 18（8-53）個月（P=0.63），地塞米松組與對照組間復發時間的差值中位數（95%可信區間）爲 5（-8 至 17）個月。

結論：我們並未發現圍術期全身性使用地塞米松與原發性腫瘤細胞減滅術後卵巢癌復發之間有聯繫的證據。本研究結果不支持避免卵巢癌患者圍術期使用低劑量地塞米松來預防術後噁心嘔吐和疼痛。

（張怡譯 李士通 審校）

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

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

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

CONCLUSION: We could not find evidence for an association between perioperative systemic dexamethasone administration and ovarian cancer recurrence after primary cytoreductive surgery. Our results do not support avoiding low-dose perioperative dexamethasone for prevention of postoperative nausea, vomiting, and pain in ovarian cancer patients.

亞臨床的一氧化碳限制暴露於異氟烷的發育中大腦的凋亡。

Subclinical Carbon Monoxide Limits Apoptosis in the Developing Brain After Isoflurane Exposure

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Anesthesia & Analgesia 2014 118 1284–1292

背景：揮發性麻醉藥會造成廣泛發育中大腦細胞凋亡。一氧化碳有抗凋亡特性。嬰兒及兒童通常在低流量麻醉有呼出的內源性一氧化碳重複吸入，導致了亞臨床的一氧化碳暴露。因此，我們旨在確定一氧化碳是否會限制異氟烷在發育中大腦的誘導細胞凋亡。

方法：將 7 天的雄性 CD-1 幼鼠暴露於含有 0，5 或 10ppm 一氧化碳的空氣中，用含或不含 2%異氟醚處理 1h。我們評估碳氧血紅蛋白水準，細胞色素 C 過氧化物酶活性及接觸後前腦線粒體過氧化物 C 的釋放，測量活化的 capspase-3 陽性細胞及皮質、海馬和下丘腦/丘腦中的 TUNEL 陽性細胞核的數量。

結果：碳氧血紅蛋白水準近似于人類暴露於一氧化碳相同時間。異氟烷顯著增加暴露於空氣中的大鼠的細胞色素 C 過氧化物酶的活性，細胞色素 C 的釋放，活化的 caspase-3 陽性細胞及前腦中 TUNEL 陽性細胞核的數量。然而在同時暴露於異氟烷後，一氧化碳消除了異氟烷誘導的細胞色素 C 過氧化物酶活性及細胞色素 C 從前腦線粒體的釋放，降低了活化的 caspase-3 陽性細胞及 TUNEL 陽性細胞核的數量。

結論：綜上所訴，資料顯示一氧化碳通過濃度依賴性抑制細胞色素 C 過氧化物酶來減少暴露於異氟烷後的細胞凋亡。儘管還不確定一氧化碳是否直接抑制異氟烷誘導的細胞凋亡，但設定低流量麻醉以達到重複吸入特定濃度的一氧化碳可能是防止麻醉藥誘發的嬰幼兒神經毒性的未來發展策略。

（邢怡安譯 李士通 審校）

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

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

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

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

經食道超聲心動圖在 Mitraclip 術的應用

Transesophageal Echocardiography During MitraClip® Procedure

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Anesthesia & Analgesia 2014 118 1188–1196

經皮二尖瓣（MV）修補程式與 MitraClip 輸送系統越來越多地被用於治療高危重度二尖瓣返流。治療過程包括經皮插入和 MV 傳單之間夾定位。經食管超聲（TEE）起著關鍵的作用，在過程中提供關於夾導航資訊，對 MV 接合線夾定位，系統的把握，單張二尖瓣進步，閥門組織捕捉確認，和最終結果的評價。即時三維 TEE 在經皮二尖瓣修復提供了兩個心臟和血管內裝置的高品質的視覺化圖像。通過三維 TEE 最佳的視覺化是通過兩個心房和心室方面獲得的。在 MV 外科手術中， TEE 用於置換前的評估。而在 MitraClip 修復過程中必須要 TEE 的指導。心臟麻醉醫師在手術中除了實施麻醉，還可以爲介入心臟病學家提供更多的幫助用於指導 MV 修復。

（王曉莉 譯，李士通 審校）

The percutaneous mitral valve (MV) repair procedure performed with the MitraClip delivery system is increasingly used to treat severe mitral regurgitation in high-risk patients. The treatment involves percutaneous insertion and positioning of a clip between the MV leaflets. Transesophageal echocardiography (TEE) plays a key role in the procedure by providing information regarding clip navigation, clip alignment to the MV coaptation line, transmitral advancement of the system, leaflet grasping, confirmation of valve tissue catching, and assessment of the final result. Real-time 3-dimensional TEE has increasing value in percutaneous MV repair providing high-quality visualization of both the heart and the intravascular devices. Optimal visualization by 3-dimensional TEE is obtained through both the atrial and ventricular aspects. In contrast to MV surgery, where TEE is involved in the prebypass assessment phase and in evaluation of the final repair, TEE is mandatory to guide management during MitraClip repair. Cardiac anesthesiologists may provide assistance to interventional cardiologists during the procedure itself in addition to their anesthetic-related tasks.

通過多感官知覺訓練來提高麻醉醫生對氧飽和度聲響變化的敏感度

Improving Pulse Oximetry Pitch Perception with Multisensory Perceptual Training.

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Anesthesia & Analgesia 2014 118 1249–1253

爲了提高患者的術中安全，脈搏氧飽和度已成爲臨床麻醉中的常規監測項目。在這裡，我們給大家介紹一個視聽訓練課程，通過這個訓練，麻醉醫生可提升對指脈氧飽和度的監控能力。在知覺訓練之前和之後，我們分別對 15 個麻醉科住院醫師的聽覺能力（通過感知氧飽和度音響變化來判斷氧飽和度的變化）進行了測試。結果顯示，在類比的類似於手術室的嘈雜環境中，訓練之後麻醉醫生判斷氧飽和度變化的準確性提高了 9%（95% 的可信區間, 4%-14%, P = 0.0004, t166 = 3.60）；判斷的時間快了 72 毫秒（95% 的可信區間，40-103 毫秒, P < 0.0001, t166 = -4.52)。本研究闡明了多感官知覺訓練的有益之處，從而爲臨床更好地定義多感官知覺訓練奠定了基礎。

（王慧娟 譯 李士通 校）

The pulse oximeter is a critical monitor in anesthesia practice designed to improve patient safety. Here, we present an approach to improve the ability of anesthesiologists to monitor arterial oxygen saturation via pulse oximetry through an audiovisual training process. Fifteen residents' abilities to detect auditory changes in pulse oximetry were measured before and after perceptual training. Training resulted in a 9% (95% confidence interval, 4%-14%, P = 0.0004, t166 = 3.60) increase in detection accuracy, and a 72-millisecond (95% confidence interval, 40-103 milliseconds, P < 0.0001, t166 = -4.52) speeding of response times in attentionally demanding and noisy conditions that were designed to simulate an operating room. This study illustrates the benefits of multisensory training and sets the stage for further work to better define the role of perceptual training in clinical anesthesiology.

一項利用核磁共振成像技術反應口服營養補充劑和口服補液溶液對胃排空及糖原負荷影響的交叉研究

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

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Anesthesia & Analgesia 2014 118 1268–1273

背景：近日術前口服清亮液體成爲了提高手術後轉歸的一種方法。一種複合電解質或蛋白質的糖原飲料可能對患者有好處。然而，這種飲料對患者胃儲留，噁心嘔吐和水合狀態的影響並不明確。

方法：在給予 10 位健康的志願者口服 500mL 含有 1.8%葡萄糖和電解質口服補液溶液（ORS）前後，我們通過核磁共振成像技術來評估不同時程的胃容量，並測量血糖水準。同樣人數的受試者攝入 500mL 含 18%葡萄糖和精氨酸(545 mOsm/kg)的口服營養溶液（ONS）作爲交叉對照組。

結果：口服溶液 1 小時以後 ORS 組的平均胃液量（中位數，95%可信區間）是 55.0 (55.3, 39.0-70.9) mL ，而 ONS 組是 409.2 (410.9, 371.4-447.0) mL ，(*P* = 0.0002)。攝入 90 分鐘後 ORS 組所有受試者胃液量降至 1mL/kg 以下，而 ONS 組 120 分鐘以後沒有一位受試者降至 1mL/kg 以下。口服溶液後 ONS 組血糖水準持續性上升(30、60、120 分鐘，*P* < 0.0001)，而 ORS 組僅初期有血糖升高(30 分鐘 *P* < 0.0001, 60 分鐘 P = 0.01, 120 分鐘 P = 0.205)。

結論：含少量葡萄糖的 ORS 溶液胃排空較快，適合用於術前。雖然含有精氨酸的 ONS 溶液能維持高血糖水準，但相對滲透壓較低，胃排空較慢。

（盛嘉君 譯，李士通 審校）

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

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

RESULTS: The mean (median, 95% confidence interval) gastric fluid volume at 1 hour after oral ingestion was 55.0 (55.3, 39.0-70.9) mL in the ORS group, whereas 409.2 (410.9, 371.4-447.0) mL in the ONS group (P = 0.0002). The gastric fluid volume of all participants in the ORS group returned to <1 mL/kg at 90 minutes after ingestion, whereas none reached <1 mL/kg at 120 minutes in the ONS group. The ONS group showed a sustained increase in the blood glucose level after ingestion (P < 0.0001 to baseline at 30, 60, 120 minutes), while the ORS group showed an initial increase (P < 0.0001, P = 0.01, P = 0.205 at each time point).

CONCLUSIONS: ORS supplemented with a small amount of glucose showed faster gastric emptying, which may make it suitable for preoperative administration. In contrast, ONS supplemented with arginine with a relatively low osmolality was associated with a longer time for gastric emptying, although it showed a sustained increase in blood glucose level.

長期存活的肝癌切除術後長期存活：與術後鎮痛選擇有關的潛在風險

Long-Term Survival after Resection of Hepatocelluar Carcinoma: A Potential Risk Associated with the Choice of Postoperative Analgesia

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Anesthesia & Analgesia 2014 118 1309–1316

背景：麻醉管理與癌症復發或長期生存率之間相關關係仍不確定的。在這項研究中，我們比較了術後硬膜外嗎啡鎮痛與術後芬太尼靜脈鎮痛對行肝癌切除患者腫瘤復發和長期存活的影響。

方法：對本機構在 1997 年至 2007 年間行肝癌切除術的患者 1846 例進行回顧性佇列研究進行。採用 Kaplan-Meiser 生存預測法評估復發率和長期生存率，使用多變數 Cox 風險回歸進行比較並用傾向性評分進行調整。

結果：819 例患者符合納入標準，隨機分爲 2 組：嗎啡術後硬膜外鎮痛的患者（EA，N = 451）和芬太尼術後靜脈鎮痛患者（IA，N = 368）。所有患者中位隨訪時間爲 4.2 年（2-9）。硬膜外鎮痛組癌症復發率（37.7%比 30.7%，P = 0.036）和死亡率（40.6%比 30.4%，P = 0.003）明顯高靜脈鎮痛組。兩組當中無復發生存率類似（風險比 2.224，95%可信區間爲 0.207-23.893，P = 0.509）。採用多變數 Cox 比例風險回歸分析顯示，肝癌切除術後影響長期生存的獨立風險因素包括： ASA 分級,腫瘤大小，術前 α 甲胎蛋白以及嗎啡術後硬膜外鎮痛。

結論：術後靜脈芬太尼鎮痛相比，硬膜外嗎啡術後鎮痛與肝癌切除患者的癌症復發率和死亡率增加有關，但對無復發生存率無顯著影響。

（楊斌 譯，李士通 審校）

BACKGROUND: Associations between anesthetic management and cancer recurrence or long-time survival remain uncertain. In this study, we compared the effects of postoperative epidural morphine analgesia with that of postoperative IV fentanyl analgesia on cancer recurrence and long-term survival in patients undergoing resection of hepatocellular carcinoma.

METHODS: A retrospective cohort study was performed on patients with hepatocellular carcinoma receiving hepatic resection at this institution (n = 1846, 1997-2007). Recurrence-free survival and long-term survival were assessed using Kaplan-Meier survival estimates and compared using a multivariate Cox proportional hazards regression, adjusted with propensity scores.

RESULTS: Eight hundred nineteen patients met the inclusion criteria and were divided into 2 groups: patients receiving postoperative epidural analgesia with morphine (EA, n = 451) and

patients receiving postoperative IV analgesia with fentanyl (IA, n = 368). The median time of follow-up for all patients was 4.2 years (2-9). The rates of recurrence of cancer (37.7% vs 30.7%, P = 0.036) and death (40.6% vs 30.4%, P = 0.003) were higher in the EA group versus IA group. Recurrence-free survival was similar in both the EA and IA groups (hazards ratio 2.224, 95% confidence interval, 0.207-23.893, P = 0.509). Using a multivariate Cox proportional hazards regression adjusted with propensity scores, independent risk factors for long-term survival in patients after resection of hepatocellular carcinoma were ASA physical status, tumor diameter, preoperative α-fetoprotein (+) as well as postoperative epidural analgesia with morphine.

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

薑黃素可減輕切口疼痛及增進功能恢復

Curcumin Treatment Attenuates Pain and Enhances Functional Recovery after Incision

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Anesthesia & Analgesia 2014 118 1336–1344

背景：儘管阿片類藥物、輔助藥物及區域麻醉不斷進步，仍有 20%～30%的患者術後發生中至重度疼痛。根據不同手術類型，10%～50%的患者術後持續性疼痛，而目前並沒有建立預防方法。薑黃素（diferuloylmethane）是薑黃中的一種酚類成分，在東方傳統醫學中作爲防腐劑，抗氧化劑，抗炎藥，鎮痛劑使用。它可能對治療術後疼痛有效果。

方法：我們使用 C57BL / 6 小鼠後爪切口模型，記術後 7 天內對機械和熱刺激的敏感度以及水腫程度和溫度。條件性位置偏愛實驗（CPP）用於評估切口自發痛，而多參數數位步態分析則評估步態功能的改變。

結果：薑黃素（50 mg/kg）顯著降低後爪切口小鼠對機械和熱的敏感性。薑黃素對基線疼痛閾值無影響。薑黃素也減輕後爪切口腫脹，提示其有抗炎效果。此外，圍手術期薑黃素治療減輕小鼠後爪切口用前列腺素 E2 所誘發的痛覺過敏。此外，CPP 提示對照組小鼠切口 48 小時後有自發疼痛，而薑黃素治療小鼠無持續性疼痛。同時，小鼠後爪切口引發數個步態相關指數變化，但薑黃素治療組小鼠正常。薑黃素治療組小鼠在術後 1 至 3 天，體內早期痛覺免疫介質，包括白細胞介素（IL）-1β，IL-6，腫瘤壞死因數α和巨噬細胞炎性蛋白-1α，其圍切口期水準沒有減少甚至還增強了。相同條件下，抗炎細胞因數 IL-10 不變，而轉化生長因數-β水準增強。

結論：我們的研究表明，薑黃素治療有效緩解切口誘發的炎症，痛覺過敏，自發痛，和功能步態異常。轉化生長因數-β水準增強提示了一種可能的機制。這些臨床研究結果表明薑黃素可能用於預防治療術後疼痛。

（魏薇 譯，李士通 審校）

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

METHODS: We used the hindpaw incision model with C57BL/6 mice. Sensitization to mechanical and thermal stimuli as well as effects on edema and temperature were measured up

to 7 days after surgery. Spontaneous pain after incision was assessed by using conditioned place preference (CPP), and alterations in gait function were assessed using multiparameter digital gait analysis.

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

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

隨機對照比較雙注射法和定向叢內注射法超聲引導下鎖骨上臂叢神經阻滯

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

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Anesthesia & Analgesia 2014 118 1363–1369

背景：在這項前瞻性、隨機、觀察者盲法的研究中，我們比較了雙注射法（DI）超聲引導下鎖骨上臂叢神經阻滯和新的定向叢內注射法技術（TII），這項技術是將局麻藥注射在神經束及其周圍內（臂叢神經幹和分支的彙集處）。

方法：90 個病人隨機分爲兩組：DI 和 TII，每組 45 人，分別接受超聲引導下鎖骨上臂叢神經阻滯。所有病人局麻藥均採用 1.5%利多卡因配伍 5 μg/ml 腎上腺素，用量均爲 32 ml。兩組病人都注射半量局麻藥（16 ml）至主要的神經叢內，在 DI 組，另外半量局麻藥注射在第一肋和鎖骨下動脈交叉處，在 TII 組，餘下半量局麻藥等量注射到每個神經節。結果根據總的麻醉相關時間評估（總的操作時間和起效時間）。

結果：與 DI 組相比，TII 組麻醉起效時間更快（均數±標準差：10.1 ± 6.4 vs 18.5 ± 8.3 minutes; P < 0.0001),，總的麻醉時間也更短（(21.2 ± 7.7 vs 27.7 ± 9.0 minutes; P = 0.001，95%置信區間爲 2.90-10.08 minutes)。TII 組沒有失敗病例，DI 組有三例失敗。因此兩組具有可比性。神經阻滯相關疼痛評分和不良反應事件在兩組均沒有組內差異。與 TII 組相比，DI 組需要更少的穿刺途徑(平均數 ± 四分位元距: 4 ± 2 vs 7 ± 3; P < 0.0001)和更短的穿刺時間(8.4 ± 2.9 vs 10.7 ± 2.7 minutes 以及操作時間(9.0 ± 3.2 vs 11.2 ± 3.0 minutes; P = 0.001)。

結論：雖然 DI 法和 TII 法超聲引導下鎖骨上臂叢神經阻滯似乎成功率相似，但是我們不排除有 17.9%的組內差異可能未被檢測出。由於起效時間短，TII 技術可以提供更短的總麻醉相關時間。

（湯唯香 譯，李士通 審校）

BACKGROUND: In this prospective, randomized, observer-blinded study, we compared double-injection (DI) ultrasound-guided supraclavicular block to a novel targeted intracluster-injection (TII) technique, whereby local anesthetic is injected inside the main and satellite neural clusters (confluences of trunks and divisions of the brachial plexus).

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

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

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