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内皮多糖在齧齒類動物出血性休克模型中的血漿修復作用

Plasma Restoration of Endothelial Glycocalyx in a Rodent Model of Hemorrhagic Shock

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背景:在有出血性休克的創傷患者中使用以血漿為基礎的復蘇療法可降低死亡率。儘管一些人提出通過凝血蛋白替換產生有益效果，但血漿給予保護效果的確切機制仍不清楚。我們先前證實在一個細胞培養模型中血漿與晶體液相比降低了內皮細胞的通透性。由蛋白聚糖和糖蛋白組成的內皮多糖包被粘附到多配體聚糖骨架上，它們共同保護下面的內皮層。我們假設出血性休克後血漿產生的內皮細胞保護作用是部分由於其對內皮多糖包被的修復作用和多配體聚糖-1的保護作用。

方法:大鼠遭受出血性休克後，達到平均動脈血壓 30mmHg 並持續 90 分鐘。隨後接受乳酸林格氏液或新鮮血漿復蘇，達到平均動脈血壓 80mmHg，並與假手術組和單純休克組作對比。2 小時後取出肺檢測多配體聚糖 mRNA、用抗多配體聚糖-1 免疫染色，或者用蘇木素和曙紅染色。為了特異性檢測血漿對內皮的作用，我們從小腸系膜灌注標記的溶液來識別小靜脈，並通過電子顯微鏡使多糖包被顯影。所有資料用均數±標準誤表示。用單因素方差分析和 Tukey 後續檢驗來分析結果。

結果:電子顯微鏡顯示出血性休克後多糖包被降解，這被血漿而不是乳酸林格氏液所部分緩解。在接受血漿復蘇的動物組肺部多配體聚糖-1 mRNA 的表達(2.76 ± 0.03)要高於單純休克組(1.39 ± 0.22)和乳酸林格氏液組(0.82 ± 0.03)，並且和細胞表面多配體聚糖-1 免疫染色相關。組織學評分是(1.63 ± 0.26)顯示休克也導致明顯的肺部損傷，此作用可血漿復蘇減輕(0.67 ± 0.17)，而不是乳酸林格氏液(2.0 ± 0.25)。

結論:血漿在出血性休克後的保護效果可能是部分由於其修復內皮多糖包被和保護多配體聚糖-1的能力。

(劉朝輝譯 馬皓琳 李士通校)
**BACKGROUND:** The use of plasma-based resuscitation for trauma patients in hemorrhagic shock has been associated with a decrease in mortality. Although some have proposed a beneficial effect through replacement of coagulation proteins, the putative mechanisms of protection afforded by plasma are unknown. We have previously shown in a cell culture model that plasma decreases endothelial cell permeability in comparison with crystalloid. The endothelial glycocalyx consists of proteoglycans and glycoproteins attached to a syndecan backbone, which together protect the underlying endothelium. We hypothesize that endothelial cell protection by plasma is due, in part, to its restoration of the endothelial glycocalyx and preservation of syndecan-1 after hemorrhagic shock.

**METHODS:** Rats were subjected to hemorrhagic shock to a mean arterial blood pressure of 30 mm Hg for 90 minutes followed by resuscitation with either lactated Ringer's (LR) solution or fresh plasma to a mean arterial blood pressure of 80 mm Hg and compared with shams or shock alone. After 2 hours, lungs were harvested for syndecan mRNA, immunostained with antis Syndecan-1, or stained with hematoxylin and eosin. To specifically examine the effect of plasma on the endothelium, we infused small bowel mesentery with a lanthanum-based solution, identified venules, and visualize d the glycocalyx by electron microscopy. All data are presented as mean ± SEM. Results were analyzed by 1-way analysis of variance with Tukey post hoc tests.

**RESULTS:** Electron microscopy revealed degradation of the glycocalyx after hemorrhagic shock, which was partially restored by plasma but not LR. Pulmonary syndecan-1 mRNA expression was higher in animals resuscitated with plasma (2.76 ± 0.03) in comparison with shock alone (1.39 ± 0.22) or LR (0.82 ± 0.03) and correlated with cell surface syndecan-1 immunostaining. Shock also resulted in significant lung injury by histopathology scoring (1.63 ± 0.26), which was mitigated by resuscitation with plasma (0.67 ± 0.17) but not LR (2.0 ± 0.25).

**CONCLUSION:** The protective effects of plasma may be due in part to its ability to restore the endothelial glycocalyx and preserve syndecan-1 after hemorrhagic shock.

**異氟烷選擇性抑制漂亮新小杆線蟲中遠端線粒體複合物 I**

Isoflurane Selectively Inhibits Distal Mitochondrial Complex I in Caenorhabditis Elegans

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**背景**：線粒體電子傳遞鍊（ETC）中的複合物 I 是揮發性麻醉劑（Vas）的一個可能靶點。複合物 I 酶的活性能夠被 Vas 抑制，而複合物 I 功能障礙則能夠導致蠕蟲和人對 Vas 的超敏反應。漂亮新小杆線蟲（C. elegans）的突變分析提示 Vas 可以在複合物 I 底物泛醌結合部位特異性地干擾複合物 I 功能。我們假設異氟烷通過與泛醌競爭結合複合物 I 而抑制電子傳遞。
BACKGROUND: Complex I of the electron transport chain (ETC) is a possible target of volatile anesthetics (VAs). Complex I enzymatic activities are inhibited by VAs, and dysfunction of complex I can lead to hypersensitivity to VAs in worms and in people. Mutant analysis in Caenorhabditis (C.) elegans suggests that VAs may specifically interfere with complex I function at the binding site for its substrate ubiquinone. We hypothesized that isoflurane inhibits electron transport by competing with ubiquinone for binding to complex I.

METHODS: Wildtype and mutant C. elegans were used to study the effects of isoflurane on isolated mitochondria. Enzymatic activities of the ETC were assayed and dose–response curves determined using established techniques. Two-dimensional native gels of mitochondrial proteins were performed after exposure of mitochondria to isoflurane.

RESULTS: Complex I is the most sensitive component of the ETC to isoflurane inhibition; however, the proximal portion of complex I (the flavoprotein) is relatively insensitive to isoflurane. Isoflurane and quinone do not compete for a common binding site on complex I. The absolute rate of complex I enzymatic activity in vitro does not predict immobilization of the animal by isoflurane. Isoflurane had no measurable effect on stability of mitochondrial supercomplexes. Reduction of ubiquinone by complex I displayed positive cooperative kinetics not disrupted by isoflurane.

CONCLUSIONS: Isoflurane directly inhibits complex I at a site distal to the flavoprotein subcomplex. However, we have excluded our original hypothesis that isoflurane and ubiquinone compete for a common hydrophobic binding site on complex I. In addition, immobilization of the nematode by isoflurane is not due to limiting absolute amounts of complex I electron transport as measured in isolated mitochondria.
BACKGROUND: Although regional cerebral oxygen saturation (rSO2) measurements can detect disturbances in cerebral oxygenation, their usefulness is limited in patients with hyperbilirubinemia. We examined the relationship between rSO2 and other laboratory variables that may affect interpretation of low rSO2 in awake patients with end-stage liver disease before liver transplantation surgery.

METHODS: Before induction of general anesthesia, rSO2 was measured in 164 patients with liver cirrhosis (Child class A/B/C = 19/41/104) and 8 with fulminant hepatic failure. Patients with West Haven hepatic encephalopathy of grade 3 or 4 were excluded. Relationships between rSO2 and laboratory variables were evaluated by correlation and multivariate regression, and by receiver operating characteristic curve analysis.

RESULTS: Univariate analyses showed that rSO2 (median 58.5%, range 15% to 82%) correlated with serum total bilirubin, hemoglobin (Hb), creatinine, sodium, and magnesium concentrations, and prothrombin time ($P < 0.001$ each), but not with serum concentrations of glucose, albumin, potassium, and ammonia. Multiple logistic regression analysis showed that only elevated total bilirubin (range 0.4 to 66 mg/dL; odds ratio [OR] = 1.31; 95% confidence interval [CI] = 1.18 to 1.45) and low Hb (range 5.3 to 15.7 g/dL; OR = 0.21; 95% CI = 0.11 to 0.43) were independently related to rSO2 <50%. The
optimum cutoff points for observing an rSO$_2$ <50% were total bilirubin >7.2 mg/dL (sensitivity 89%, specificity 90%) and Hb <9.6 g/dL (sensitivity 70%, specificity 82%).

CONCLUSIONS: High total bilirubin and low Hb concentrations were independently associated with rSO$_2$ values below 50% in end-stage liver disease patients awaiting liver transplantation. The results of this study identify patients in whom a low rSO$_2$ may be an artifact rather than cerebral ischemia.

Activated Charcoal Effectively Removes Inhaled Anesthetics from Modern Anesthesia Machines
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INTRODUCTION: If a malignant hyperthermia–susceptible patient is to receive an anesthetic, an anesthesia machine that has been used previously to deliver volatile anesthetics should be flushed with a high fresh gas flow. Conflicting results from previous studies recommend flush times that vary from 10 to 104 minutes. In a previously proposed alternative decontamination technique, other investigators placed an activated charcoal filter in the inspired limb of the breathing circuit.

METHODS: We placed activated charcoal filters on both the inspired and expired limbs of several contaminated anesthesia machines and measured the time needed to flush the machine so that the delivered concentrations of isoflurane, sevoflurane, and desflurane would be <5 parts per million (ppm). We next simulated the case for which malignant hyperthermia is diagnosed 90 minutes after induction of anesthesia and measured how well activated charcoal filters limit further exposure.
RESULTS: Activated charcoal filters decrease the concentration of volatile anesthetic delivered by a contaminated machine to an acceptable level in <2 minutes. The concentrations remained well below 5 ppm for at least 60 minutes. When malignant hyperthermia is diagnosed after induction of anesthesia, we found that with charcoal filters in place, the current anesthesia machine may be used for at least 67 minutes before the inspired concentration exceeds 5 ppm.

CONCLUSIONS: Activated charcoal filters provide an alternative approach to the 10 to 104 minutes of flushing that are normally required to prepare a machine that has been used previously to deliver a volatile anesthetic.

維持高危手術患者的組織灌注：一項隨機臨床試驗的系統回顧
Maintaining Tissue Perfusion in High-Risk Surgical Patients: A Systematic Review of Randomized Clinical Trials
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Anesth Analg June 2011 112:1384-1391

背景：器官儲備有限的手術患者被認爲是高危病人，有更高的圍術期死亡率。為此，他們需要更嚴密的圍術期血流動力學控制方案，以避免組織低灌注。本研究中，我們系統回顧了通過運用血流動力學治療方案來對高危手術患者維持充足組織灌注的隨機對照臨床試驗。

方法：我們搜索了 MEDLINE、Embase、LILACS 和 Cochrane 資料庫來確認通過對高危手術患者圍術期組織灌注的血流動力學治療方案以期降低死亡率和發病率的隨機對照臨床試驗。發病的特徵為術後出現至少一個臟器功能障礙。為了明確的結果，計算出混合優勢比（POR）和 95%可信區間（CI）。

結果：選出 32 項臨床試驗，包含 5056 例高危手術患者。總體的薈萃分析顯示當用血流動力學治療方案來維持組織灌注時，死亡率（POR: 0.67; 95% CI: 0.55–0.82; P < 0.001）和術後器官功能障礙發生率（POR: 0.62; 95% CI: 0.55–0.70; P < 0.0001）顯著降低。當對照組的死亡率>20%時，血流動力學治療方案以使組織最佳化的應用進一步降低死亡率（POR: 0.32; 95% CI: 0.21–0.47; P < 0.0001）。通過肺動脈導管監測心輸出量及增加氧的運輸和/或減少消耗也顯著降低了死亡率（分別為 POR: 0.67; 95% CI: 0.54–0.84; P < 0.001 和 POR: 0.71; 95% CI: 0.57–0.88; P < 0.05）。以增加混合或中心靜脈氧飽和度為目標的治療不能顯著降低死亡率（ POR: 0.68; 95% CI: 0.22–2.10; P > 0.05）。唯一一項用乳酸作爲組織灌注標誌的實驗未能顯示死亡率的統計學上顯著下降（OR: 0.33; 95% CI: 0.07–1.65; P > 0.05）。

結論：對高危手術病人用血流動力學治療方案來維持組織灌注可減少死亡率及術後器官衰竭。監測心輸出量計算氧的運輸和消耗有助於指導治療。有必要進行另外的隨機對照臨床試驗來分析監測混合或中心靜脈血氧飽和度以及乳酸對高危手術病人價值。

（瞿亦楓 譯 馬皓琳 李士通校）
BACKGROUND: Surgical patients with limited organic reserve are considered high-risk patients and have an increased perioperative mortality. For this reason, they need a more rigorous perioperative protocol of hemodynamic control to prevent tissue hypoperfusion. In this study, we systematically reviewed the randomized controlled clinical trials that used a hemodynamic protocol to maintain adequate tissue perfusion in the high-risk surgical patient.

METHODS: We searched MEDLINE, Embase, LILACS, and Cochrane databases to identify randomized controlled clinical studies of surgical patients studied using a perioperative hemodynamic protocol of tissue perfusion aiming to reduce mortality and morbidity; the latter characterized at least one dysfunctional organ in the postoperative period. Pooled odds ratio (POR) and 95% confidence interval (CI) were calculated for categorical outcomes.

RESULTS: Thirty-two clinical trials were selected, comprising 5056 high-risk surgical patients. Global meta-analysis showed a significant reduction in mortality rate (POR: 0.67; 95% CI: 0.55–0.82; P < 0.001) and in postoperative organ dysfunction incidence (POR: 0.62; 95% CI: 0.55–0.70; P < 0.00,001) when a hemodynamic protocol was used to maintain tissue perfusion. When the mortality rate was >20% in the control group, the use of a hemodynamic protocol to maintain tissue optimization resulted in a further reduction in mortality (POR: 0.32; 95% CI: 0.21–0.47; P < 0.00,001). Monitoring cardiac output with a pulmonary artery catheter and increasing oxygen transport and/or decreasing consumption also significantly reduced mortality (POR: 0.67; 95% CI: 0.54–0.84; P < 0.001 and POR: 0.71; 95% CI: 0.57–0.88; P < 0.05, respectively). Therapy directed at increasing mixed or central venous oxygen saturation did not significantly reduce mortality (POR: 0.68; 95% CI: 0.22–2.10; P > 0.05). The only study using lactate as a marker of tissue perfusion failed to demonstrate a statistically significant reduction in mortality (OR: 0.33; 95% CI: 0.07–1.65; P > 0.05).

CONCLUSIONS: In high-risk surgical patients, the use of a hemodynamic protocol to maintain tissue perfusion decreased mortality and postoperative organ failure. Monitoring cardiac output calculating oxygen transport and consumption helped to guide therapy. Additional randomized controlled clinical studies are necessary to analyze the value of monitoring mixed or central venous oxygen saturation and lactate in high-risk surgical patients.

一氧化氮吸入用於成人和兒童的急性呼吸窘迫綜合征及急性肺損傷：一項用薈萃分析和試驗序貫分析進行的系統綜述

Inhaled Nitric Oxide for Acute Respiratory Distress Syndrome and Acute Lung Injury in Adults and Children: A Systematic Review with Meta-Analysis and Trial Sequential Analysis

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BACKGROUND: Acute hypoxemic respiratory failure, defined as acute lung injury and acute respiratory distress syndrome, are critical conditions associated with frequent mortality and morbidity in all ages. Inhaled nitric oxide (iNO) has been used to improve oxygenation, but its role remains controversial. We performed a systematic review with meta-analysis and trial sequential analysis of randomized clinical trials (RCTs). We searched CENTRAL, Medline, Embase, International Web of Science, LILACS, the Chinese Biomedical Literature Database, and CINHAL (up to January 31, 2010). Additionally, we hand-searched reference lists, contacted authors and experts, and searched registers of ongoing trials. Two reviewers independently selected all parallel group RCTs comparing iNO with placebo or no intervention and extracted data related to study methods, interventions, outcomes, bias risk, and adverse events. All trials, irrespective of blinding or language status were included. Retrieved trials were evaluated with Cochrane methodology. Disagreements were resolved by discussion. Our primary
outcome measure was all-cause mortality. We performed subgroup and sensitivity analyses to assess the effect of iNO in adults and children and on various clinical and physiological outcomes. We assessed the risk of bias through assessment of trial methodological components. We assessed the risk of random error by applying trial sequential analysis.

RESULTS: We included 14 RCTs with a total of 1303 participants; 10 of these trials had a high risk of bias. iNO showed no statistically significant effect on overall mortality (40.2% versus 38.6%) (relative risks [RR] 1.06, 95% confidence interval [CI] 0.93 to 1.22; I² = 0) and in several subgroup and sensitivity analyses, indicating robust results. Limited data demonstrated a statistically insignificant effect of iNO on duration of ventilation, ventilator-free days, and length of stay in the intensive care unit and hospital. We found a statistically significant but transient improvement in oxygenation in the first 24 hours, expressed as the ratio of PO₂ to fraction of inspired oxygen (mean difference [MD] 15.91, 95% CI 8.25 to 23.56; I² = 25%). However, iNO appears to increase the risk of renal impairment among adults (RR 1.59, 95% CI 1.17 to 2.16; I² = 0) but not the risk of bleeding or methemoglobin or nitrogen dioxide formation.

CONCLUSION: iNO cannot be recommended for patients with acute hypoxemic respiratory failure. iNO results in a transient improvement in oxygenation but does not reduce mortality and may be harmful.
麻醉相關性死亡的發生日率為 1/101,888 或 0.98/10,000（95% 可信區間為 0.5-1.8）。在這 10 個病例中，基礎疾病被認爲是導致患兒死亡的重要因素。其中 5 例（50%）患兒合併肺動脈高壓。

結論：麻醉相關死亡率在心臟病患兒中較高，尤其是合併肺動脈高壓的患兒。無重大合併症患兒沒有麻醉相關性死亡，這支持了健康兒童中小兒麻醉的安全性。

（陳彬彬譯 馬皓琳 李士通校）

BACKGROUND: Mortality is a basic measure for quality and safety in anesthesia. There are few anesthesia-related mortality data available for pediatric practice. Our objective for this study was to determine the incidence of 24-hour and 30-day mortality after anesthesia and to determine the incidence and nature of anesthesia-related mortality in pediatric practice at a large tertiary institution.

METHODS: Children ≤18 years old who had an anesthetic between January 1, 2003, and August 30, 2008, at the Royal Children's Hospital, Melbourne, Australia, were included for this study. Data were analyzed by merging a database for every anesthetic performed with an accurate electronic record of mortality of children who had ever been a Royal Children's Hospital patient. Cases of children dying within 30 days and 24 hours of an anesthetic were identified and the patient history and anesthetic record examined. Anesthesia-related death was defined as those cases whereby a panel of 3 senior anesthesiologists all agreed that anesthesia or factors under the control of the anesthesiologist more likely than not influenced the timing of death.

RESULTS: During this 68-month period, 101,885 anesthetics were administered to 56,263 children. The overall 24-hour mortality from any cause after anesthesia was 13.4 per 10,000 anesthetics delivered and 30-day mortality was 34.5 per 10,000 anesthetics delivered. The incidence of death was highest in children ≤30 days old. Patients undergoing cardiac surgery had a higher incidence of 24-hour and 30-day mortality than did those undergoing noncardiac surgery. From 101,885 anesthetics there were 10 anesthesia-related deaths. The incidence of anesthesia-related death was 1 in 10,188 or 0.98 cases per 10,000 anesthetics performed (95% confidence interval, 0.5 to 1.8). In all 10 cases, preexisting medical conditions were identified as being a significant factor in the patient's death. Five of these cases (50%) involved children with pulmonary hypertension.

CONCLUSIONS: Anesthesia-related mortality is higher in children with heart disease and in particular those with pulmonary hypertension. The lack of anesthetic-related deaths in children who did not have major comorbidities reinforces the safety of pediatric anesthesia in healthy children.

周圍神經的局部麻醉藥阻滯用於神經痛治療：系統分析
Local Anesthetic Blockade of Peripheral Nerves for Treatment of Neuralgias: Systematic Analysis
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Anesth Analg June 2011 112:1487-1493
BACKGROUND: Nerve blocks with local anesthetics have been used in the diagnosis and treatment of neuralgias. Usually these blocks were administered in combination with corticosteroids and other drugs that can be effective by themselves. Although lasting benefits from nerve blocks in neuralgias have long been described, definitive evidence is lacking. We had the following objectives in this systematic review: to analyze the evidence behind the practice of peripheral nerve blockade with local anesthetics in patients with neuralgias and radicular pain syndromes; to assess the duration of pain relief after conduction block resolution; and to evaluate the effectiveness of the treatment of these syndromes with a series of blocks.

METHODS: We searched Medline, Embase, narrative reviews, and book chapters. Only articles published in English were collected. The list of 3347 identified articles was reduced to 39 articles that were read entirely, 12 of which met inclusion criteria.

RESULTS: Twelve included articles were analyzed. Each can be classified as a single case report or case series; there were no controlled studies among them. Nine reports assessed a single block outcome; all recorded pain relief beyond the duration of conduction blockade. Those 9 reports represented a total of 69 patients, 30 of whom had complete pain relief and 10 had relief ≥50%. Seven reports with the assessment of continuous pain ≥1 week after a single block reported complete or profound pain relief in 11 of 17 patients. All 3 reports with the assessment of a series of blocks in a large number of patients (total of 270) reported overall positive results.

CONCLUSION: Because all reviewed articles were only single case reports or case series, no reliable conclusion could be drawn concerning the effectiveness of nerve blocks with local anesthetics in neuralgia. However, 2 features of the analyzed reports—
the large magnitude of the effect and the high consistency of the reported outcome—indicate that future research efforts are warranted.

腹橫肌平面阻滯的新途徑對於結直腸術後鎮痛的有效性
The Efficacy of a Novel Approach to Transversus Abdominis Plane Block for Postoperative Analgesia After Colorectal Surgery
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背景：腹横肌平面（TAP）阻滞的镇痛效应在进行腹部手术患者已确立。我们评估一种新的 TAP 阻滞途径对于结直肠手术术后的镇痛有效性。

方法：招募了 40 例 ASA 分级 I 至 III 级进行结直肠手术的成年患者到这一双盲随机对照试验。使用一个标准化的全麻技术。在手术结束时，用 22G 的钝针在脐水平和腋中线处，从腹壁内侧穿透到腹横肌，进行 TAP 阻滞。这些患者随机分配接受 20mL 的 0.25% 布比卡因（TAP 组）或生理盐水（对照组）注射腹壁的每一侧。每一患者在术后 0、0.5、1、2、4、8、12 和 24 小时的评估静息与咳嗽时的疼痛视觉类比评分。用静脉注射吗啡作为术后补救镇痛。记录第一次需要补救镇痛的时间、24 小时内总吗啡需求量、2、4、6、12 和 24 小时累积的吗啡消耗量以及副作用情况（呼吸抑制、嗜睡、恶心/呕吐）。

结果：TAP 组 24 小时总吗啡消耗量比对照组减少 65% (P < 0.0001)。在所有时间点上，TAP 组的累积吗啡需求量明显低于。虽然第一次需要吗啡注射的时间两点相当，但是后续吗啡剂量所需的间隔时间 TAP 组明显长于对照组。在所有评估的时

间点上，TAP 组患者静息和咳嗽时的疼痛评分都明显低于对照组。在术后 1、2、4 和 6 小时，TAP 组中嗜睡的发生率较低 (P < 0.05)。

结论：这一新的 TAP 阻滞方法作为结直肠手术提供了有效的术后镇痛。

（唐明 訳 马皓琳 李士通 校）

BACKGROUND: The analgesic efficacy of transversus abdominis plane (TAP) block has been established for patients undergoing abdominal surgery. We evaluated the efficacy of a novel approach to TAP block for postoperative analgesia after colorectal surgery.

METHODS: Forty adult ASA physical status I to III patients undergoing colorectal surgery were recruited to this double-blind randomized controlled trial. A standard general anesthetic technique was used. TAP block was performed at the end of surgery by piercing the transversus abdominis muscle from inside the abdominal wall at the midaxillary line at the level of the umbilicus with a 22-gauge blunt needle. The patients were randomly assigned to receive either 20 mL of 0.25% bupivacaine (TAP group) or normal saline (control group) on each side of the abdominal wall. Each patient was assessed at 0, 0.5, 1, 2, 4, 8, 12, and 24 hours postoperatively for pain at rest and on coughing using a visual analog scale. IV morphine was used for postoperative rescue analgesia. Time to first request for rescue analgesia, total morphine requirement in 24
hours, cumulative morphine consumption at 2, 4, 6, 12, and 24 hours, and adverse effects (respiratory depression, sedation, nausea/vomiting) were recorded.

**RESULTS:** A 65% decrease in 24-hour total morphine consumption was observed in the TAP group compared with the control group ($P < 0.0001$). The cumulative morphine requirement was also significantly lower in the TAP group at all time points. Although the time to first request for morphine was comparable, the subsequent doses of morphine were required at significantly longer time intervals in the TAP group than in the control group. TAP group patients had significantly lower pain scores at rest and on coughing as compared with the control group, at all time points assessed. The incidence of sedation was also less in the TAP group at 1, 2, 4, and 6 hours postoperatively ($P < 0.05$).

**CONCLUSIONS:** This new approach to the TAP block provides effective postoperative analgesia after colorectal surgery.

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**Hydration Status After Overnight Fasting as Measured by Urine Osmolality Does Not Alter the Magnitude of Hypotension During General Anesthesia in Low Risk Patients**

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**背景:** 細胞間隙中晶體溶液分佈增加可能會降低患者血管內容量擴充的有效性。作者研究通宵禁食患者的術前水化狀態是否會影響組織間液再分佈和全身麻醉中低血圧的發生。

**方法:** 60例接受鼓室成形術 ASA I / II 級患者，午夜開始禁食。麻醉誘導用芬太尼、異丙酚，麻醉維持用七氟醚和瑞芬太尼。麻醉誘導時，輸注 15mL/kg 醫醋林格氏溶液 60 分鐘，之後給予 1mL/kg 醫醋林格氏液 30 分鐘。在麻醉誘導後以及實驗過程中測定尿滲透壓 (pre-U_osm, post-U_osm)，實驗結束後測定全身細胞外液生物電阻抗與基礎值相比下降的百分比 ($\Delta Re$)。根據患者 pre-U_osm <25% 或 pre-U_osm >75% 分別進入水化組及脫水組。對一系列變數，包括在相對於基線 30 - 90 分鐘期間平均動脈壓和 $\Delta Re$ 進行組間比較。

結果：脫水組 (pre-U_osm >759.5 mOsm/kg, n = 15) 相對水化組 (pre-U_osm <378.5 mOsm/kg, n = 15)，年齡較小 (44 vs 52 歲，$P = 0.049$)，並有較高的 post-U_osm (181 vs 55 mOsm/kg，$P = 0.001$)。且相對於基線 30 - 90 分鐘期間平均動脈壓變化 (0.67 vs 0.67, $P = 0.85$)，95%的置信間隔 ($-0.070$ 到 $0.084$) 和 $\Delta Re$ (5.6% vs 6.0%，$P = 0.58$)，95%的置信區間 (-1.185% 至 1.06%) 方面，脫水組與水化組相似。

**結論:** 利用尿滲透壓監測術前通宵禁食導致脫水並不改變全身麻醉期間低血圧。這一結果表明，使用晶體液對術前通宵禁食患者進行血管內容量擴充，防止全身麻醉期間低血圧的做法並無根據。（陳毓雯 譯 陳傑 校）
BACKGROUND: The increased distribution of crystalloid solution into the interstitial space may decrease the effectiveness of intravascular volume loading in patients. We investigated whether preoperative hydration status after overnight fasting affects interstitial fluid redistribution and thus the magnitude of hypotension during general anesthesia.

METHODS: Sixty ASA physical status I/II patients undergoing tympanoplasty fasted from midnight. Anesthesia was induced by fentanyl and propofol and maintained with sevoflurane and remifentanil. Coinciding with the induction of anesthesia, 15 mL/kg acedet Ringer solution was infused IV over 60 minutes followed by 1 mL/kg acedet Ringer solution over the next 30 minutes. Urine osmolalities after induction of anesthesia and during the study period (pre-U\textsubscript{osm}, post-U\textsubscript{osm}) and percent decreases of whole-body bioelectrical resistance for extracellular fluid relative to baseline at the end of the study period (\(\Delta R_e\)) were measured. Patients with a pre-U\textsubscript{osm} < the 25th percentile or with a pre-U\textsubscript{osm} > the 75th percentile of pre-U\textsubscript{osm} were categorized in the hydrated or the dehydrated group, respectively. A range of variables, including mean arterial blood pressure during the 30- to 90-minute period relative to baseline, and \(\Delta R_e\), were compared between the groups.

RESULTS: The dehydrated group (pre-U\textsubscript{osm} > 759.5 mOsm/kg, \(n = 15\)) had a lower age (44 vs 52 years, \(P = 0.049\)) and had a higher post-U\textsubscript{osm} (181 vs 55 mOsm/kg, \(P = 0.001\)) compared with the hydrated group (pre-U\textsubscript{osm} < 378.5 mOsm/kg, \(n = 15\)). Mean arterial blood pressure during the 30- to 90-minute period relative to baseline (0.67 vs 0.67, \(P = 0.85\)) with 95% confidence interval for the difference of means (−0.070 to 0.084) and \(\Delta R_e\) (5.6% vs 6.0%, \(P = 0.58\)) with 95% confidence interval for the difference of means (−1.85% to 1.06%) were similar for the hydrated and dehydrated groups.

CONCLUSIONS: Preoperative dehydration after overnight fasting as measured by urine osmolality did not alter the magnitude of hypotension during general anesthesia. This finding suggests that intravascular volume loading with crystalloid solution to prevent hypotension during general anesthesia is an unfounded practice for low risk patients after overnight fasting.

阿替卡因的濃度依賴性神經毒性：大鼠坐骨神經電生理和體視學研究

Concentration-Dependent Neurotoxicity of Articaine: An Electrophysiological and Stereological Study of the Rat Sciatic Nerve

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背景：本研究採用大鼠坐骨神經內分別注射50ul的生理鹽水、2%的阿替卡因和4%的阿替卡因的方法，定量分析阿替卡因的神經毒性。
方法：研究中分別在給藥前、給藥後即刻以及給藥後 3 星期記錄刺激坐骨神經的誘發脊髓電圖。試驗藥物均注射在右側坐骨神經，而未作處理的左側坐骨神經作爲對照組。3 星期後將動物處死，取得坐骨神經橫斷標本進行體視學研究。

結果：與生理鹽水組相比，注射阿替卡因組的大鼠在注射藥物後即刻就出現誘發脊髓區域的神經電位逐漸衰減；且神經電位的衰減隨阿替卡因濃度的增加而相應增加，在給藥後 3 個星期更明顯。對照組均無明顯反應。相應處理不影響有髓鞘軸突的數量。從坐骨神經的橫斷面上看，注射 4% 阿替卡因組大鼠的軸突平均區域和髓鞘的平均厚度明顯減少。

結論：注射不同劑量的阿替卡因（2% 和 4%），神經損傷有明顯的區別，這說明阿替卡因的神經毒性是濃度依賴性的。而注射生理鹽水時的機械性損傷對神經傳導和組織學沒有顯著影響。

(張婷譯陳傑校)

BACKGROUND: We performed this study to quantify the detrimental effect of intraneural injection of 50 μL of saline, articaine 2%, or articaine 4% in the rat sciatic nerve.

METHODS: Lumbar-evoked electrospinograms from stimulation of the sciatic nerve were recorded before and immediately after injection and again after 3 weeks. Test substance was injected into the right sciatic nerve, and the untreated left sciatic nerve served as control. The animals were killed after the 3-week follow-up, and cross-sections of the sciatic nerve were examined stereologically.

RESULTS: The evoked spinal cord field potential in the articaine groups faded away immediately after injection and was concentration-dependently, significantly more reduced at the 3-week follow-up in comparison with the saline group. The response from the control sides was unaffected in all groups. The number of myelinated axons was unaffected by the treatment. The mean cross-sectional axon area and the mean myelin sheath thickness were significantly reduced in animals injected with articaaine 4%.

CONCLUSIONS: These observations indicate concentration-dependent neurotoxic injuries after injection of articaine with a significant difference between 2% and 4% formulations. The mechanical injury of needle penetration with saline injection had no significant effect on nerve conduction or histomorphology.
有關的三個氧供成分之一，它並不反映區域氧供是否是足夠。而借助周圍或區域靜脈氧飽和度（SxvO₂）可進行區域氧供和氧需的分析。本研究目標是評估在3個解剖部位上使用SxvO₂經皮評估的可行性。

方法：將Nonin血氧飽和度探頭（由明尼蘇達州，普利茅茨，Nonin Medical公司提供）直接放置在10名志願者前臂，頸外，頸內靜脈上，測量紅色和紅外線電磁輻射的吸收度。對這些吸收波形進行快速傅里葉變換。將不同的頻率下紅光和紅外線輻射的脈衝吸收比與非脈衝吸收比作比較，並且基於以往經驗得出的相關性計算SxvO₂。

結果：經皮SxvO₂估計範圍介於41%至97%，其中在前臂、頸外和頸內靜脈處測量的平均值分別為75%、80%、80%。總體而言，93%的SxvO₂預測值<90%。

結論：這一技術的審定和隨後的改進需要我們將其與靜脈血氣測量的結果相關聯，其次是需要聯合相關領域氧飽和度測量技術（胎兒反射式血氧儀和近紅外光譜）和先進的信號處理技術。

(孫曉瓊譯 陳傑校)

BACKGROUND: The arterial pulse oximeter, which was introduced clinically in the 1970s, is a convenient, useful, and now ubiquitous anesthesia monitor. Unfortunately, although percent saturation of arterial hemoglobin is, along with cardiac output and concentration of hemoglobin, one of 3 components of oxygen delivery, it does not indicate whether oxygen delivery to a region of interest is adequate. Knowledge of peripheral or regional venous oxygen saturation (SxvO₂) may lend insight into analysis of regional oxygen supply and demand. Our goal was to assess the suitability of 3 anatomic sites for the transcutaneous assessment of SxvO₂.

METHODS: Using a Nonin reflectance oximetry probe (provided by Nonin Medical, Plymouth, MN) placed directly over the antecubital, external jugular, and internal jugular veins in 10 volunteers, we measured the absorbance of red and infrared electromagnetic radiation. We performed fast Fourier transformation on these absorbance waveforms. The ratio of pulsatile absorbance of red and infrared radiation at different frequencies was compared with nonpulsatile absorption, and SxvO₂ was calculated based on previously derived empiric correlations.

RESULTS: Estimates of transcutaneous SxvO₂ ranged from 41% to 97%, with mean values of 75%, 80%, and 80% at the antecubital, external jugular, and internal jugular veins, respectively. Overall, 93% of predicted SxvO₂ values were <90%.

CONCLUSION: Validation and subsequent improvement of this technique requires correlation of our results with venous blood gas measurements, followed by incorporation of technologies from related fields in oximetry (fetal reflectance oximetry and near-infrared spectroscopy), as well as the development of advanced signal processing techniques.

通過沿中心靜脈走行的體表標誌估計右及左側中心靜脈導管置入深度的效果評估

An Estimation of Right- and Left-Sided Central Venous Catheter Insertion Depth Using Measurement of Surface Landmarks Along the Course of Central Veins

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BACKGROUND: In this study we sought to determine whether the topographical measurement along the course of the central veins can estimate the approximate insertion depths of central venous catheters (CVC).

METHODS: Two hundred central venous catheterizations were performed via the right and left internal jugular vein (IJV) or subclavian vein (SCV). The anterior approach, using the sternocleidomastoid muscle as a landmark, was used for IJV catheterization and the infraclavicular approach for SCV. Topographical measurement was performed by placing the catheter with its own curvature over the draped skin starting from the insertion point of the needle through the ipsilateral clavicular notch, and to the insertion point of the second right costal cartilage to the manubriosternal joint. The CVC was inserted and secured to a depth determined topographically. The distance between the CVC tip and the carina and the angle of the left-sided CVC tip to the vertical were measured on the postoperative chest radiograph.

RESULTS: The mean (SD) tip position of 50 CVCs placed via the right IJV was 0.1 (1.1) cm above the carina; right SCV, 0.0 (0.9) cm; left IJV, 0.3 (1.0) cm above the carina, and left SCV, 0.2 (0.9) cm below the carina. CVC locations could be predicted with a margin of error between 2.2 cm below the carina and 2.3 cm above the carina in 95% of patients. There were steeper (≥40°) angles to the vertical in the left-sided CVCs whose tips were above the carina (17 out of 54) than below the carina (2 out of 46).

CONCLUSIONS: The approximate insertion depth of a CVC can be estimated using measurement of surface landmarks along the pathway of central veins.
A Systematic Review and Meta-Analysis on the Use of Preemptive Hemodynamic Intervention to Improve Postoperative Outcomes in Moderate and High-Risk Surgical Patients
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BACKGROUND: Complications from major surgery are undesirable, common, and potentially avoidable. The long-term consequences of short-term surgical complications have recently been recognized to have a profound influence on longevity and quality of life in survivors. In the past 30 years, there have been a number of studies conducted attempting to reduce surgical mortality and morbidity by deliberately and preemptively manipulating perioperative hemodynamics. Early studies had a high control-group mortality rate and were criticized for this as being unrepresentative of current practice and raised opposition to its implementation as routine care. We performed this review to update this body of literature and to examine the effect of changes in current practice and quality of care to see whether the conclusions from previous quantitative analyses of this field remain valid.

METHODS: Randomized clinical trials evaluating the use of preemptive hemodynamic intervention to improve surgical outcome were identified using multiple methods. Electronic databases (MEDLINE, EMBASE, and the Cochrane Controlled Clinical Trials register) were screened for potential trials, reference lists of identified trials were
examined, and additional sources were sought from experts and industry representatives. Identified studies that fulfilled the entry criteria were examined in full and subjected to quantifiable analysis, subgroup analysis, and sensitivity analysis where possible.

**RESULTS:** There were 29 studies identified, 23 of which reported surgical complications. In total, the 29 trials involved 4805 patients with an overall mortality of 7.6%. The use of preemptive hemodynamic intervention significantly reduced mortality (pooled odds ratio [95% confidence interval] of 0.48 [0.33–0.78]; \( P = 0.0002 \)) and surgical complications (odds ratio 0.43 [0.34–0.53]; \( P < 0.0001 \)). Subgroup analysis showed significant reductions in mortality for studies using a pulmonary artery catheter, supranormal resuscitation targets, studies using cardiac index or oxygen delivery as goals, and the use of fluids and inotropes as opposed to fluids alone. By contrast, there was a significant reduction in morbidity for each of the 4 subgroups analyzed.

**CONCLUSION:** The use of a preemptive strategy of hemodynamic monitoring and coupled therapy reduces surgical mortality and morbidity.

椎管內麻醉下的分娩鎮痛對兒童學習障礙的影響

Neuraxial Labor Analgesia for Vaginal Delivery and Its Effects on Childhood Learning Disabilities

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**背景**：先前研究表明椎管內麻醉進行剖宮產的兒童學習障礙的發病率較低於陰道分娩。作者推測，椎管內麻醉能夠減少分娩中的應激反應，而應激則與以後的神經發育相關。為了進一步探討這種可能性，作者在以人口為基礎的陰道分娩出生兒童的佇列中分析了椎管內麻醉下鎮痛分娩與兒童學習障礙的關係。

**方法**：作者回顧了在Olmsted County, 明尼蘇達州的5個小鎮從1976到1982年出生並在原社區居住至5歲的兒童的所有教育和醫療記錄，篩選出在此人群中確診為有學習障礙的對象。Cox回歸模型被用於比較在分娩中使用或不使用椎管內麻醉的兒童成長後學習障礙的發生率，包括對那些與臨床有潛在相關性的因素或者單變數分析2組之間存在差異進行校準的分析。

**結果**：在這個研究佇列中，4686名產婦經過陰道分娩，其中1495例接受了椎管內麻醉鎮痛。在這個佇列中兒童學習障礙的發生與椎管內麻醉鎮痛的使用沒有相關性。（校準危險比 1.05；95%可信區間，0.85-1.31，\( P=0.63 \))

**討論**：分娩期間是否使用椎管內麻醉與在19歲之前確診的學習障礙沒有獨立的相關性。未來的研究需要評估早先發表的關於學習障礙的發生率在椎管內麻醉下剖宮產的兒童低於經陰道自然順產的兒童的潛在的機制。
Abstract

BACKGROUND: In prior work, children born to mothers who received neuraxial anesthesia for cesarean delivery had a lower incidence of subsequent learning disabilities compared with vaginal delivery. The authors speculated that neuraxial anesthesia may reduce stress responses to delivery, which could affect subsequent neurodevelopmental outcomes. To further explore this possibility, we examined the association between the use of neuraxial labor analgesia and development of childhood learning disabilities in a population-based birth cohort of children delivered vaginally.

METHODS: The educational and medical records of all children born to mothers residing in the area of 5 townships of Olmsted County, Minnesota from 1976 to 1982 and remaining in the community at age 5 years were reviewed to identify those with learning disabilities. Cox proportional hazards regression was used to compare the incidence of learning disabilities between children delivered vaginally with and without neuraxial labor analgesia, including analyses adjusted for factors of either potential clinical relevance or that differed between the 2 groups in univariate analysis.

RESULTS: Of the study cohort, 4684 mothers delivered children vaginally, with 1495 receiving neuraxial labor analgesia. The presence of childhood learning disabilities in the cohort was not associated with use of labor neuraxial analgesia (adjusted hazard ratio, 1.05; 95% confidence interval, 0.85–1.31; \( P = 0.63 \)).

CONCLUSION: The use of neuraxial analgesia during labor and vaginal delivery was not independently associated with learning disabilities diagnosed before age 19 years. Future studies are needed to evaluate potential mechanisms of the previous finding indicating that the incidence of learning disabilities is lower in children born to mothers via cesarean delivery under neuraxial anesthesia compared with vaginal delivery.

The Effect of Lung Deflation on the Position and Size of the Subclavian Vein in Mechanically Ventilated Infants and Children

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背景：如果肺的萎陷增加了鎖骨下靜脈（SCV）到胸膜的距離以及靜脈的直徑，那麼它可能減少氣胸的風險並增加鎖骨下靜脈穿刺置管的成功率。本研究評估機械通氣的小兒患者肺萎陷對鎖骨下靜脈到胸膜的距離和對鎖骨下靜脈橫截面積的影響。

方法：50名患者（25名不到一歲的嬰兒和25名一到八歲的兒童）取肩部墊高仰臥位，機械通氣的潮氣量為6至7 mL/kg。將氣管連通大氣實現肺的萎陷。用超聲分別在肺膨脹末期及肺萎陷後的0，30，60，90和120秒測量鎖骨下靜脈到胸膜的距離和鎖骨下靜脈的橫截面積。P值<0.05被認為有統計學意義。距離增加5%及橫截面積增加25%被認為有臨床相關性。
BACKGROUND: If lung deflation increases the distance from the subclavian vein (SCV) to the pleura and the diameter of the vein, it might decrease the risk of pneumothorax and increase the success rate of subclavian venous cannulation. We evaluated the effect of lung deflation on the distance from the SCV to the pleura (SCV-pleura distance) and on the cross-sectional area (CSA) of the SCV in mechanically ventilated pediatric patients.

METHODS: Fifty patients (25 infants younger than 1 year and 25 children aged 1 to 8 years) were placed supine over a shoulder roll, and their lungs were ventilated with a tidal volume of 6 to 7 mL/kg. Lung deflation was achieved by opening the endotracheal tube to the atmosphere. The SCV-pleura distances and the SCV CSAs were measured using ultrasound at the end of inflation and 0, 30, 60, 90, and 120 seconds after lung deflation. A \( P \) value <0.05 was considered statistically significant. Increases of 5\% in the distance and 25\% in the CSA were defined as clinically relevant.

RESULTS: The available data from 43 patients, 22 infants and 21 children, were analyzed. No clinically relevant changes in the SCV-pleura distance or in the SCV CSA were induced by lung deflation. Neither the SCV-pleura distance nor the CSA showed any further increase with time.

CONCLUSIONS: Lung deflation failed to increase the SCV-pleura distance and the CSA of the SCV. Its application is unlikely to be advantageous in avoiding pneumothorax or improving the success rate of subclavian venous cannulation.
苯基-2-丙醇 (R - PIA) 和 K<sub>ATP</sub> 通道關係，以確定是否 R - PIA 的抗痛覺異常療效也由 K<sub>ATP</sub> 通道介導。

方法：由牢固結紮左腰椎第五和第六脊椎神經誘發機械性痛敏。左後爪的機械痛敏以 von Frey 暗條測痛法測量縮爪閾值來評估。鞘內注射 R - PIA (0.5，1 或 2μg) 誘導抗痛覺異常療效。我們評估 K<sub>ATP</sub> 通道阻滯劑格列本脲或 5-羥色胺(5-HT) 預處理是否能逆轉 R - PIA 的抗痛覺異常效果。此外，作者評估了 K<sub>ATP</sub> 通道開放劑二氮嗪是否有抗痛覺異常效果並促進了 R - PIA 的作用。最後，研究電壓依賴的鉀通道阻斷劑 4 - 氨基吡啶是否削弱了 R - PIA 的效果。

結果：鞘內注射 R - PIA 濃度為 2μg 時能產生最大的抗痛覺異常療效（P < 0.05）。鞘內注射格列本脲預處理和腹腔內預注 5-HT 顯著降低了 R - PIA 的抗痛覺異常療效。二氮嗪產生了抗痛覺異常效果，也增強了 R - PIA 的作用。4 - 氨基吡啶並沒有對 R - PIA 的作用有影響。

結論：在大鼠結紮神經損傷模型中，腺苷 A1 受體刺激的抗痛覺異常療效可能與 K<sub>ATP</sub> 通道的活動有關。

BACKGROUND: Nerve injury can generate neuropathic pain. The accompanying mechanical allodynia may be reduced by the intrathecal administration of adenosine. The neuroprotective effects of adenosine are mediated by the adenosine triphosphate (ATP)-sensitive potassium (K<sub>ATP</sub>) channel. We assessed the relationship between the adenosine A1 receptor agonist, N<sup>6</sup>-[R]-phenylisopropyl adenosine (R-PIA), and K<sub>ATP</sub> channels to determine whether the antiallodynic effects of R-PIA are also mediated through K<sub>ATP</sub> channels in a rat nerve ligation injury model of neuropathic pain.

METHODS: Mechanical allodynia was induced by tight ligation of the left lumbar fifth and sixth spinal nerves. Mechanical allodynia in the left hindpaw was evaluated using von Frey filaments to measure withdrawal thresholds. R-PIA (0.5, 1, or 2 μg) was administered intrathecally to induce allodynia. We assessed whether pretreatment with the K<sub>ATP</sub> channel blockers glibenclamide or 5-hydroxydecanoate reversed the antiallodynic effect of R-PIA. Also, we evaluated whether diazoxide, a K<sub>ATP</sub> channel opener, had an antiallodynic effect and promoted the antiallodynic effect of R-PIA. Lastly, we investigated whether the voltage-activated K channel blocker 4-aminopyridine attenuated the effect of R-PIA.

RESULTS: Intrathecal R-PIA produced maximal antiallodynia at 2 μg (P < 0.05). Intrathecal pretreatment with glibenclamide and intraperitoneal pretreatment 5-hydroxydecanoate significantly reduced the antiallodynic effect of R-PIA. Diazoxide produced an antiallodynic effect and also enhanced the antiallodynic action of R-PIA. 4-Aminopyridine had no effect on the antiallodynic action of R-PIA.

CONCLUSIONS: The antiallodynic effects of adenosine A1 receptor stimulation may be related to K<sub>ATP</sub> channel activity in a rat model of nerve ligation injury.

短互動式動畫視頻資訊對麻醉前焦慮、麻醉知識瞭解及術前訪視時間的影響：一項隨機對照試驗

The Effects of Short Interactive Animation Video Information on Preanesthetic Anxiety, Knowledge, and Interview Time: A Randomized Controlled Trial.

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Background: We designed an interactive animated video that provides a basic explanation—including the risks, benefits, and alternatives—of anesthetic procedures. We hypothesized that this video would improve patient understanding of anesthesia, reduce anxiety, and shorten the interview time.

Methods: Two hundred eleven patients scheduled for cancer surgery under general anesthesia or combined general and epidural anesthesia, who were admitted at least 1 day before the surgery, were randomly assigned to the video group (n = 106) or the no-video group (n = 105). The patients in the video group were asked to watch a short interactive animation video in the ward. After watching the video, the patients were visited by an anesthesiologist who performed a preanesthetic interview and routine risk assessment. The patients in the no-video group were also visited by an anesthesiologist, but were not asked to watch the video. In both groups, the patients were asked to complete the State-Trait Anxiety Inventory and a 14-point scale of knowledge test before the anesthesiologist's visit and on the day of surgery. We also measured interview time.

Results: There was no demographic difference between the 2 groups. The interview time was 34.4% shorter (video group, 12.2 ± 5.3 minutes, vs. no-video group, 18.6 ± 6.4 minutes; 95% confidence interval [CI] for the percentage reduction in time: 32.7%-44.3%), and knowledge of anesthesia was 11.6% better in the video group (score 12.5 ± 1.4 vs. no-video group score 11.2 ± 1.7; 95% CI for the percentage increase in knowledge: 8.5%-13.9%). However, there was no difference in preanesthetic anxiety between the 2 groups.

Conclusion: Our short interactive animation video helped patients' understanding of anesthesia and reduced anesthesiologists' interview time.
The Mechanisms of Propofol-Induced Vascular Relaxation and Modulation by Perivascular Adipose Tissue and Endothelium

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Background: Propofol causes hypotension due to relaxation of vascular smooth muscle cells through its direct or indirect vasodilator effects. Perivascular adipose tissue (PVAT) and endothelium attenuate vascular contraction, and the function of PVAT is altered in hypertension and diabetes. Whether PVAT affects the action of anesthetics on vascular function is unknown. We studied the mechanisms of propofol-induced relaxation in relation to the involvement of PVAT and endothelium.

Methods: Thoracic aortic rings from Wistar rats were prepared with or without PVAT (PVAT+ and PVAT-), intact endothelium (E+), or both, or with the endothelium removed (E-) for functional studies.

Results: In phenylephrine precontracted vessels, propofol-induced relaxation was highest with both PVAT and E+ and lowest in vessels denuded of both PVAT and endothelium. Propofol-induced relaxation occurred via both endothelium-dependent and -independent mechanisms. The relaxation response induced by propofol was significantly reduced by nitric oxide synthase inhibitor (L-NNA), K(+) channel blockers (tetraethylammonium and glibenclamide) in E+ and E- vessels, and by soluble guanylyl cyclase inhibitor 1H-[1,2,4] oxadiazolo (4,3-a) quinazoline-1-one and hydrogen peroxide scavenger (catalase) in E- vessels. The presence of PVAT significantly enhanced the relaxation response induced by propofol. In contrast to phenylephrine precontracted vessels in which the presence of PVAT or endothelium had an effect, in vessels precontracted with KCl, propofol-induced relaxation was similar among the 4 types of vessel preparation.
Conclusions: PVAT enhances the relaxation effect induced by propofol in rat aorta through both endothelium-dependent and endothelium-independent pathways thus highlighting the clinical importance of PVAT.

Brief report: suppression of cautery-induced electromagnetic interference of cardiac implantable electrical devices by closely spaced bipolar sensing.

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BACKGROUND: Electromagnetic interference (EMI) induced by electrocautery during surgery in patients with cardiac pacemakers or implanted cardioverter-defibrillators (ICDs) may inhibit pacing and cause inappropriate tachyarrhythmia oversensing. In particular, susceptibility to EMI may be enhanced in ICDs by frequently used wide interelectrode sensing (i.e., integrated bipolar sensing). Consequently, ICD function is usually disabled preoperatively and restored later by noninvasive programming. Because sensing by closely spaced electrodes (i.e., true bipolar) may be less susceptible to EMI, preoperative programming to a true bipolar mode may minimize the need for perioperative programming while preserving device function.

背景：手術中使用電刀等設備產生的電磁干擾可以使心臟起搏器或者植入式除顫器受抑制或者高敏而導致心律失常。特別需要指出的是，頻繁使用廣泛間距傳感裝置(如整合的雙極傳感)可以使植入式除顫器對電磁干擾更加敏感性。因此通常會使用無創程式在手術前關閉自動除顫功能並且在手術後重新開啓。間距緊密傳感裝置(如真正的雙極)受電磁干擾的影響最小，因此手術中使用雙極電凝可以儘量避免手術前對植入式除顫器的重新編程並且保護起搏裝置的功能。

方法：我們的研究物件包括了23名新接受植入式除顫器或者正在接受植入式除顫脈衝發生器治療的患者。每個病人都分別嘗試電灼引起的電磁干擾對於間距緊密傳感裝置和廣泛間距傳感裝置的影響。

結果：比較這兩種感應模式，在廣泛間距雙極感應時，心電圖右心室振幅明顯增大並且電磁干擾的雜訊幅度也較大。此外，廣泛間距雙極感應時，有22人發生了植入式除顫器起搏功能抑制，並且有17人檢出了錯誤的"心室顫動"。相反，緊密雙極感應則不伴有起搏抑制或者錯誤的心室顫動感知。

結論：間隔緊密的雙極感應(即真正的雙極性)可以很好地屏除電灼引起的電磁干擾。對於植入式起搏裝置採用間隔緊密的雙極感應可以減少圍手術期重新編程同時保持手術中的正常功能。

（黃劍譯 薛張綱校）
METHODS: Our study population consisted of 23 consecutive patients either receiving a new ICD or undergoing ICD pulse generator change. In each patient, electrocautery-induced EMI was initiated with the ICD in the closely spaced sensing configuration and again during widely spaced sensing.

RESULTS: In comparing the 2 sensing modes, right ventricular electrogram amplitude was significantly greater and EMI noise amplitude tended to be greater with widely spaced bipolar sensing. Furthermore, widely spaced bipolar sensing was associated with ICD pacing inhibition in 22 of 23 patients and incorrect "ventricular fibrillation" detection in 17 of 23 patients. Conversely, closely spaced bipolar sensing was not accompanied by either pacing inhibition or incorrect ventricular fibrillation sensing.

CONCLUSION: Closely spaced bipolar sensing (i.e., true bipolar) appropriately rejects electrocautery-induced EMI. Programming implanted devices to closely spaced bipolar sensing may minimize the need for perioperative reprogramming while preserving intraoperative device operation.

慢性腎臟疾病與擇期整形手術術後死亡率得關係

Chronic Kidney Disease and Postoperative Morbidity After Elective Orthopedic Surgery

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背景：eGFR 被認爲與增加心血管的風險和各種原因的死亡聯繫緊密。擇期中危的非心血管的手術的風險沒有被發現有相關性。我們假設 CKD 與擇期中危的整形科的手術的高發病率相關。

方法：研究擇期整形手術的關節的置換術後，顯示在大部分全球的手術過程，麻醉和手術操作的特徵都是及其相似的。eGFR 是用修改後的腎臟疾病的飲食的公式，從常規的肌酐酸酐的測量結果中計算出來的。CKD 是 eGFR <60 mL/min/1.73 m²。心臟風險（修改後的心臟風險指南），循證醫學，圍手術期的因素與圍手術期的發病率（手術的時間，失血量，手術時的溫度）的相關性也是有記錄的。主要的要點是手術後的發病率，儘量用手術後的發病率的調查來報告。發病率的差異是在有 CKD 的病人和腎臟功能正常的病人（用 X2 的測試）用 HR 或 OR 或 95% Cis 進行分析的。第二個要點是在有 ckd 和腎功能正常的病人中比較出院的時間和變成沒有發病的時間（用 log-rank 的測試來分析）。多元回歸分析顯示 ckd，圍手術期的因素和發病率，和住院的時間都相關。

結果：手術後的發病率的調查結果記錄了 526 個進行擇期的整形手術的病人中。Ckd 的病人(n = 142; 27%)在手術後的第 5 日(OR 2.1 [95% CI: 1.2–3.7]; P < 0.0001) 有很高發病率。ckd 得病人用更長的時間(HR 1.6 [95% CI: 1.2–1.9])去變成復發的病人。
(HR 1.4 [95% CI: 1.2–1.7]; \(P = 0.0001\); log-rank test). ckd 病人的出院时间被延误 4 日。ckd 病人患肺部疾病，感染，心血管疾病，肾脏疾病，神經系的疾病，還有疼痛的發病是較爲持久的。進一步將 ckd 得病人分群後顯示術前 eGFR ≤50 mL/min/1.73 m\(^2\) 與高發病率，住院時間長相關，與年齡無關。多元還原分析顯示術前 ckd (\(P = 0.006\)) 和充血性心衰 (\(P = 0.002\)) 與住院時間延長相關。

結論：大致上小部分的有 ckd 的病人進行擇期整形科手術是有長時間發病和長時間的住院時間的比例是增加的。術前 eGFR 可能比其餘的危險因素更增加圍術期的風險。

（劉玨瑩譯 薛張綱校）

**BACKGROUND:** Reduced estimated glomerular filtration rate (eGFR) is strongly associated with increased cardiovascular risk and all-cause mortality. Associations with morbidity in elective, moderate-risk noncardiac surgery have not been explored. We hypothesized that chronic kidney disease (CKD) would be associated with excess morbidity after elective, moderate-risk orthopedic surgery.

**Methods:** Patients undergoing elective orthopedic joint replacement procedures were studied, representing a large proportion of global surgical procedures and characterized by highly homogeneous anesthetic and surgical practice. eGFR was calculated from routine creatinine measurements using the Modification of Diet in Renal Disease equation. CKD was defined as eGFR <60 mL/min/1.73 m\(^2\). Cardiac risk (Revised Cardiac Risk Index) and evidence-based, perioperative factors associated with perioperative morbidity (operative time, blood loss, perioperative temperature) were also recorded prospectively. The primary end point was postoperative morbidity, recorded prospectively using the postoperative morbidity survey. Morbidity differences were analyzed between patients with CKD and normal preoperative renal function (\(\chi^2\) test for trend) and presented as hazard ratio (HR) or odds ratio (OR) with 95% confidence intervals (95% CIs). The secondary end points were time to hospital discharge and time to become morbidity free (analyzed by log-rank test), both between and within CKD compared with normal renal function patients. Multiple regression analysis was performed to assess the association of CKD, perioperative factors with morbidity, and length of hospital stay.

**Results:** Postoperative morbidity survey was recorded in 526 patients undergoing elective orthopedic surgery. CKD patients (\(n = 142; 27\%\)) sustained excess morbidity on postoperative day 5 (OR 2.1 [95% CI: 1.2–3.7]; \(P < 0.0001\)). CKD patients took longer (HR 1.6 [95% CI: 1.2–1.9]) to become morbidity free (log-rank test, \(P < 0.0001\)). Time to hospital discharge was delayed by 4 days in CKD patients (HR 1.4 [95% CI: 1.2–1.7]; \(P = 0.0001\); log-rank test). CKD patients sustained more pulmonary (OR 2.2 [95% CI: 1.3–3.6]; \(P = 0.002\)), infectious (OR 1.7 [95% CI: 1.1–2.7]; \(P = 0.01\)), cardiovascular (OR 2.4 [95% CI: 1.2–4.8]; \(P = 0.01\)), renal (OR 2.3 [95% CI: 1.5–3.5]; \(P < 0.0001\)), neurological (OR 4.3 [95% CI: 1.3–17.7]; \(P = 0.005\)), and pain (OR 1.8 [95% CI: 1.03–3.1]; \(P = 0.04\)) morbidities. Further stratification of CKD revealed preoperative eGFR ≤50 mL/min/1.73 m\(^2\) to be associated with more frequent morbidity and longer hospital stay, independent of age. Multiple regression analysis identified CKD (\(P = 0.006\)) and congestive cardiac failure (\(P = 0.002\)) as preoperative factors associated with prolonged hospital stay.
Conclusions: A substantial minority of patients with CKD undergoing elective orthopedic procedures are at increased risk of prolonged morbidity and hospital stay. Preoperative eGFR may enhance perioperative risk stratification beyond traditional risk factors.

腺病毒依附的血管生成素-1加速內毒素誘導的急性肺損傷小鼠模型對炎症的的反應

Adenovirus-Delivered Angiopoietin 1 Accelerates the Resolution of Inflammation of Acute Endotoxic Lung Injury in Mice
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背景：免疫系統在保護機體免受感染中起著關鍵的作用。免疫系統可以及時處理炎症反應，保護機體免受內環境穩定，保持正常的器官功能中起至關重要的作用。血管生成素—1 可以防止作為炎症反應的病原體的一部分的內皮細胞的啓動，並在急性肺損傷中起抗炎作用。我們設計這項研究，通過增加血清血管生成素-1 的含量，研究是否可以加速內毒素誘導的急性肺損傷小鼠模型對炎症的的反應。

方法：氣管內注入脂多糖誘導動物急性肺損傷模型，這些小鼠 24 小時前分別用腺病毒载体或腺病毒 GFP–GFP – 血管生成素-1 預處理過。每組額外的 6 只已預處理過小鼠在滴入脂多糖前被處死作為對照。分析他們的炎症指數。用螢光啓動細胞分選測定凋亡多形核白細胞和巨噬細胞的吞噬功能。對組織中的血管生成素-1 和支氣管肺泡灌洗液中粒細胞巨噬細胞集落刺激因數的的表達進行了測量。

結果：脂多糖誘導的白細胞浸潤到肺泡中，48 小時後滴入脂多糖滲透幅度達到最大。用腺病毒- GFP – 血管生成素-1 預處理過血管生成素-1 顯著表達，減少白細胞和中性粒細胞浸潤，炎症的持續時間縮短。腺病毒- GFP – 血管生成素-1 預處理組粒細胞巨噬細胞集落刺激因數的幅度沒有改變。

結論：我們的研究結果表明：血管生成素-1 預處理過的小鼠在內毒素誘導的急性肺損傷模型中通過加速了中性粒細胞和巨噬細胞的凋亡大大促進炎症反應。

（陸麗虹譯 薛張綱校）

BACKGROUND: The immune system plays a key role in protecting the organism from infection. Timely resolution of the inflammatory response to infection plays a vital role in returning homeostasis and maintaining normal organ function. Angiopoietin1 prevents endothelial activation, part of the inflammatory response to a pathogen, and has an anti-inflammatory effect in acute lung injury. We designed this study to investigate whether increasing serum production of angiopoietin1 by IV administration of adenoviral-delivered angiopoietin1 could accelerate the resolution of inflammation in endotoxin-induced acute lung injury in mice.

METHODS: Lipopolysaccharide was intratracheally instilled to induce acute lung injury in animals pretreated for 24 hours with adenoviral-GFP vector or adenoviral-GFP-angiopoietin1, respectively. An additional 6 mice in each pretreatment group were killed before lipopolysaccharide instillation to serve as controls. Indices of resolution of
inflammation were analyzed. Apoptotic polymorphonuclear leukocytes and their phagocytosis by macrophages were determined by fluorescent activated cell sorter. The expression of angiopoietin1 in tissues and granulocyte macrophage colony-stimulating factor in the bronchoalveolar lavage fluid were measured.

RESULTS: Lipopolysaccharide induced leukocyte infiltration into air spaces, with maximal infiltration 48 hours after lipopolysaccharide instillation. Pretreatment with adenovirus-GFP-angiopoietin1 markedly increased angiopoietin1 expression, reduced leukocyte, and neutrophil infiltration and shortened the duration of inflammation. Adenovirus-GFP-angiopoietin1 pretreatment augmented the magnitude without altering the time course of granulocyte macrophage colony-stimulating factor.

CONCLUSIONS: Our results suggest that angiopoietin1 pretreatment promotes resolution of inflammation in endotoxin-induced acute lung injury in mice by accelerating the apoptosis of neutrophils and their phagocytosis by macrophages.

在脊麻剖宮產中母體和胎兒β2腎上腺素受體和一氧化氮合酶基因型對血管加壓素需求和胎兒酸堿狀態的影響

The Effect of Maternal and Fetal (beta)2-Adrenoceptor and Nitric Oxide Synthase Genotype on Vasopressor Requirement and Fetal Acid-Base Status During Spinal Anesthesia for Cesarean Delivery

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背景：先前的研究證實了在剖宮產術中β2腎上腺素受體基因(ADRB2)的母體單元型影響了麻黃堿的需要量。與純α腎上腺素受體激動劑如去氧腎上腺素對比，麻黃堿的使用與臍動脈(UA)血pH降低有關，這被認為繼發於增加的胎兒代謝。沒有資料評估了胎兒或新生兒基因型對母體給予血管加壓素後胎兒代謝反應的影響。我們假設新生兒 ADRB2基因型會影響新生兒酸血症的程度。我們同時研究了在低血壓時，母體 ADRB2 和內皮細胞氮合酶基因(NOS3)對麻黃薬和去氧腎上腺素需求的影響。

方法：共有 104 名在脊麻下行剖宮產術的中國婦女入選了這項雙盲隨機臨床試驗，評估了麻黃薬和去氧腎上腺素輸注對母體和新生兒的影響。血樣採自於臍動脈、臍靜脈和母體橈動脈，試驗測量了血氣值、乳酸、麻黃薬和去氧腎上腺素濃度，並在 ADRB2 密碼子 16(rs1042713)和 27 (rs1042714)以及 NOS 密碼子 298 (rs1799983)用非同義單核苷酸多態性確定母體和新生兒基因型。臨床變數(臍動脈血pH、乳酸和血管加壓素的劑量)在不同基因型中對照，回歸分析被創建來評價基因型對血管加壓素劑量和胎兒酸堿狀態的影響。
結論：母體 ADRB2 基因型不影響麻黃堿用量。新生兒基因型密碼子 16 影響了胎兒酸堿狀態。臍動脈血 pH 在精氨酸 16 純合子新生兒中升高(7.31 ± 0.03 在 p.16Arg/Arg 對比 7.25 ± 0.11 在 p.16 Arg/Gly 和 p.16 Gly/Gly; P < 0.001, 差異的 95%置信區間(CI)為 0.03 ～ 0.09), 臍動脈血乳酸值降低(2.67 mmol/L ± 0.99 在 p.16Arg/Arg 對比 4.28 mmol/L ± 2.79 在 p.16 Arg/Gly 和 p.16 Gly/Gly; P < 0.001, 差異的 95%置信區間(CI)為-2.40 ～ -0.82)。在母親接受麻黃堿的新生兒中，基因型間的差異程度更大(pH 7.30 ± 0.02 在 p.16Arg/Arg 對比 7.19 ± 0.10 在 p.16 Arg/Gly 和 p.16 Gly/Gly; P < 0.001, 差異的 95%置信區間(CI)為 0.07 ～ 0.14), 臍動脈血乳酸含量更低(3.66 mmol/L ± 1.30 在 p.16Arg/Arg 對比 5.79 mmol/L ± 2.88 在 p.16 Arg/Gly 和 p.16 Gly/Gly; P = 0.003, 差異的 95%置信區間(CI)為-3.48 ～ -0.80)。在多元線性回歸模型中(R(2) = 63.6%; P = 0.03), 新生兒 ADRB2 基因型(p.16Arg/Arg 和 p.27Gln/Glu)和更低的新生兒出生體重預示了更低的臍動脈血乳酸濃度。去氧腎上腺素劑量不為母體 ADRB2 或 NOS3 基因型所改變，胎兒型 NOS3 基因型不影響臍動脈血 pH 和乳酸值。

結論：與之前北美人群研究對比，在中國人群行擇期剖宮產手術中，母體型 ADRB2 基因型不影響麻黃堿需求。儘管如此，我們的研究顯示新生兒 ADRB2 p.Arg16 純合子基因型對麻黃堿誘導的胎兒酸血症有保護作用。

（任雲譯 薛張綱校）

BACKGROUND: Previous work demonstrated that maternal haplotypes of the β(2)-adrenoceptor gene (ADRB2) influence ephedrine requirements during cesarean delivery. The use of ephedrine versus a pure α-adrenergic agonist such as phenylephrine has been associated with lower umbilical artery (UA) pH, thought to be secondary to increased fetal metabolism. There are no data evaluating the effect of fetal/neonatal genotypes on the metabolic response to maternally administered vasopressors. We hypothesized that neonatal ADRB2 genotype would affect the extent of neonatal acidemia. We also examined the effect of maternal ADRB2 and the endothelial nitric oxide synthase gene (NOS3) on ephedrine and phenylephrine requirements for treatment of maternal hypotension.

METHODS: The study was performed on 104 Chinese women scheduled for cesarean delivery under spinal anesthesia who were participating in a double-blind randomized clinical trial evaluating the maternal and neonatal effects of ephedrine versus phenylephrine infusions. Blood samples were drawn from the UA, umbilical vein, and maternal radial artery to measure blood gas values and lactate, ephedrine, and phenylephrine concentrations, and to determine maternal and neonatal genotype at nonsynonymous single nucleotide polymorphisms at codons 16 (rs1042713) and 27 (rs1042714) of ADRB2 and codon 298 (rs1799983) of NOS. Clinical variables (UA pH, UA lactate, and dose of vasopressors) among genotypes were compared, and regression models were created to assess the effect of genotype on vasopressor dose and fetal acid-base status.

RESULTS: Maternal ADRB2 genotype did not affect the ephedrine dose. Neonatal genotype at codon 16 influenced fetal acid-base status. UA pH was higher in Arg16 homozygous neonates (7.31 ± 0.03 in p.16Arg/Arg vs. 7.25 ± 0.11 in p.16 Arg/Gly and p.16 Gly/Gly; P < 0.001, 95% confidence interval (CI) of difference 0.03 ～ 0.09) and UA lactate was lower (2.67 mmol/L ± 0.99 in p.16Arg/Arg vs 4.28 mmol/L ± 2.79 in. p.16 Arg/Gly and p.16 Gly/Gly; P < 0.001, 95% confidence interval (CI) of difference 0.03 ～ 0.09).
Arg/Gly and p.16 Gly/Gly; \( P < 0.001, 95\% \text{ CI of difference} -2.40 \sim -0.82 \). In neonates born to mothers receiving ephedrine, the magnitude of the difference among genotypes was even greater (pH 7.30 ± 0.02 in p.16Arg/Arg vs. 7.19 ± 0.10 in p.16 Arg/Gly and p.16 Gly/Gly; \( P < 0.001, 95\% \text{ CI of difference} 0.07 \sim 0.14 \)) and UA lactate was lower (3.66 mmol/L ± 1.30 in p.16Arg/Arg vs. 5.79 mmol/L ± 2.88 in p.16 Arg/Gly and p.16 Gly/Gly; \( P = 0.003, 95\% \text{ CI of difference} -3.48 \sim -0.80 \)). In a multiple linear regression model (R\(^2\) = 63.6%; \( P = 0.03 \)), neonatal ADRB2 genotypes (p.16Arg/Arg and p.27Gln/Glu) and lower neonatal birth weight predicted lower UA lactate concentrations. Phenylephrine dose was not affected by maternal ADRB2 or NOS3 genotypes, and neonatal NOS3 genotype did not affect UA pH or UA lactate.

**CONCLUSION:** In contrast to previous findings in a North American cohort, maternal ADRB2 genotype did not affect ephedrine requirements during elective cesarean delivery in a Chinese cohort. However, our findings suggest that neonatal ADRB2 p.Arg16 homozygosity confers a protective effect against developing ephedrine-induced fetal acidemia.

Background: Certain classes of antihypertensive drugs have been associated with intraoperative hypotension, and frequently, patients are receiving multiple classes of...
antihypertensive medications. We sought to determine whether one class of antihypertensive medication either alone, or in combination with other classes of antihypertensive medications, increased the probability of intraoperative hypotension, determined by the amount of vasopressor required during carotid endarterectomy (CEA) performed under general anesthesia with specific arterial blood pressure management.

**Methods:** This is a post hoc analysis of 252 patients scheduled for elective CEA under general anesthesia, all of whom participated in a prospective evaluation of cognitive dysfunction. Patients were characterized by class and number of preoperative antihypertensive medications taken. A predetermined anesthetic regimen was administered to all patients, with a phenylephrine infusion titrated to maintain mean arterial blood pressure at baseline before clamping the carotid artery, and approximately 20% above baseline during clamping. Computerized anesthesia records were used to record hemodynamics and to quantify medication administered intraoperatively.

**Results:** Patients taking diuretics as part of their antihypertensive regimen required significantly more (1.6 times) total intraoperative phenylephrine than those not taking diuretics, independently of the number of other antihypertensive medications. This difference in the phenylephrine requirement occurs only during the preclamp period, i.e., from induction to application of carotid artery clamping for the maintenance of preoperative blood pressure. However, in contrast to this result, there is no difference in pressor requirement comparing classes of antihypertensive medications to increase the mean arterial blood pressure 20% above baseline during the period when the carotid artery is clamped.

**Conclusion:** Diuretics are associated with increased vasopressor requirements in patients having a CEA under general anesthesia in the preclamp period, which is likely true for any patient having a general anesthetic.

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**Low Dose Alpha-2 Antagonist Paradoxically Enhances Rat Norepinephrine and Clonidine Analgesia**

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Ultralow-dose opioid antagonists prolong opioid antinociception and block tolerance. In this study we determined whether low doses of the α-2 adrenergic receptor (A2-R)
antagonist, atipamezole, similarly influenced A2-R-induced antinociception and tolerance. In rats, intrathecal norepinephrine (NE) or clonidine in combination with atipamezole was tested using tail-flick and paw pressure tests. Acute tolerance to NE was induced by serial injections. Low-dose atipamezole significantly prolonged NE and clonidine-induced antinociception. Coadministration of atipamezole with A2-R agonists also prevented loss of agonist potency in the acute tolerance model. This study demonstrates paradoxical effects of low-dose A2-R antagonists augmenting A2-R agonist-induced analgesia.