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Anesth Analg September 2010 111:813-816; published ahead of print June 25, 2010

The anticoagulant effect of protamine sulfate is attenuated in the presence of platelets or elevated factor VIII concentrations.
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背景：作為肝素的特異拮抗劑，過量使用硫酸魚精蛋白也可產生微弱的抗凝效應。
方法：此次研究共選取6名健康志願者，通過測量組織因數或肌動蛋白啓動後貧血
小板血漿和富血小板血漿中凝血酶原時間與稀釋印度蝮蛇毒磷脂時間的改變，及貧
血小板血漿和全血中血栓彈力圖的變化來評估不同濃度下魚精蛋白（0-24 微克/毫
升）抑制凝血酶增殖的效應。重組VIIa因數或Ⅷ因數/血管性血友病因數複合物對於
過量魚精蛋白的逆轉作用也需被檢測。

結果：硫酸魚精蛋白可劑量依賴性地延長凝血酶原時間和稀釋印度蝮蛇毒磷脂時
間。硫酸魚精蛋白還可增加延滯時間並降低組織因數或肌動蛋白啓動後貧血小板血
漿中凝血酶的生成峰值。在擁有50-200x10^3/微升血小板的富血小板血漿中，魚精
蛋白（24 微克/毫升）可延長延滯時間，但對凝血酶的生成峰值無影響。只有在Ⅷ
因數/血管性血友病因數複合物（1.5-3.0 單位/毫升）逆轉魚精蛋白（24 微克/毫
升）的貧血小板血漿中，硫酸魚精蛋白才減少延滯時間並提高肌動蛋白啓動後凝血
酶生成的峰值。重組VIIa因數的治療濃度（60nM）僅對肌動蛋白啓動後凝血酶生
成的延滯時間有影響。此外，通過血栓彈力圖的比較，與全血相比，硫酸魚精蛋白
可顯著提高貧血小板血漿的凝血時間。

結論：此次試驗證明硫酸魚精蛋白可影響凝血酶的生成，但該作用可被血小板或
高濃度的Ⅷ因數/血管性血友病因數複合物部分逆轉。現有資料表明，在嚴重的血
小板減少症或低Ⅷ因數情況下，過量的魚精蛋白可潛在增加出血風險。

（范羽譯 薛張綱校）

BACKGROUND: Protamine sulfate is the antidote for heparin, but in excess it exerts
weak anticoagulation.

METHODS: We evaluated the effects of increasing protamine concentrations (0 to 24
microg/mL) on prothrombin time and diluted Russell's viper venom time measurements
on thrombin generation in platelet-poor and platelet-rich plasma after activation by tissue
factor or actin, and on thromboelastometry in platelet-poor plasma and whole blood from
6 healthy volunteers. The reversibility of excess protamine (24 microg/mL) by
recombinant factor VIIa or factor VIII/von Willebrand factor concentrate was also tested.

RESULTS: Protamine prolonged prothrombin time and Russell's viper venom time,
concentration dependently. Protamine also increased lag time and decreased peak of
thrombin generation in platelet-poor plasma after tissue factor and actin activation. In
platelet-rich plasma with platelets at 50 to 200 x 10^3/microL, protamine (24 microg/mL)
prolonged the lag time, but had no effect on peak thrombin generation. The addition of
factor VIII/von Willebrand factor (1.5-3.0 U/mL) to platelet-poor plasma with protamine
(24 microg/mL) decreased lag time and increased peak thrombin generation with actin
activation. A therapeutic concentration of recombinant factor VIIa (60 nM) only affected
the lag time of thrombin generation triggered with actin. In agreement, protamine
increased coagulation time evaluated by thromboelastometry significantly more in
platelet-poor plasma than in whole blood.

CONCLUSIONS: We demonstrated that protamine affects the propagation of thrombin
generation, which is partially reversed by platelets or increased factor VIII/von
Willebrand factor concentrations. The present data suggest that excess protamine might
potentially increase bleeding in the case of severe thrombocytopenia or low factor VIII.
Arterial and venous pharmacokinetics of morphine-6-glucuronide and impact of sample site on pharmacodynamic parameter estimates.

Olofsen E, Mooren R, van Dorp E, Aarts L, Smith T, den Hartigh J, Dahan A, Sarton E. Department of Anesthesiology, Leiden University Medical Center, P5-Q, 2300 RC Leiden, The Netherlands.


BACKGROUND: In pharmacokinetic-pharmacodynamic modeling studies, venous plasma samples are sometimes used to derive pharmacodynamic model parameters. In the current study the extent of arteriovenous concentration differences of morphine-6-glucuronide (M6G) was quantified. We used simulation studies to estimate possible biases in pharmacodynamic model parameters when linking venous versus arterial concentrations to effect.

METHODS: Seventeen healthy volunteers received an IV 90-second infusion of 0.3 mg/kg morphine-6-glucuronide (M6G). Arterial and venous blood samples, from the radial artery and cubital vein, respectively, were obtained. An extended pharmacokinetic model was constructed linking arterial and venous compartments. The extent of bias in pharmacodynamic model parameter estimates was explored in simulation studies with NONMEM, simulating M6G effect using first-order effect-compartment-inhibitory
sigmoid E(MAX) models. M6G effect was simulated at various values for the arterial blood-effect-site equilibration half-lifes (t(1/2)k(E0)), ranging from 5 to 240 minutes.

**RESULTS:** Arteriovenous concentration differences were apparent, with higher arterial plasma concentrations just after infusion, whereas at later times (>60 minutes) venous M6G concentrations exceeded arterial concentrations. The extended pharmacokinetic model adequately described the data and consisted of 3 arterial compartments, 1 central venous compartment, and 1 peripheral venous compartment. The simulation studies revealed large biases in model parameters derived from venous concentration data. The biases were dependent on the value of t(1/2)k(E0). Assuming that the true values of M6G t(1/2)k(E0) range from 120 to 240 minutes (depending on the end point measured), we would have underestimated t(1/2)k(E0) by 30%, whereas the potency parameter would have been overestimated by about 40%, when using venous plasma samples.

**CONCLUSIONS:** Because of large arteriovenous differences in M6G plasma, concentration biases in pharmacodynamic model parameters will occur when linking venous concentration to effect, using a traditional effect-compartment model.

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**兒科氣道管理器械的電腦模型和原型製作**

Computational Modeling and Prototyping of a Pediatric Airway Management Instrument

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Anesth Analg 2010;111:649–52

**背景：** 以前兒科纖支鏡插管時壓舌是為了增加上氣道的開放度。用Magill鉗作爲舌拉鉗可以做到，但是舌頭往往不固定而且容易受傷。我們的研究就是應用電腦輔助工程改進以獲得穩定的舌拉鉗。

**方法：** 我們運用解析和試驗方法分析標準Magill鉗的幾何學和機械性能。這項設計應用電腦輔助設計技術可獲得3維立體模型利於進一步進行幾何精煉和數學測試, 使原型能夠速成。

**結論：** 在試驗發現的基礎上我們調整設計約束以優化舌拉鉗。老套的原型設計生產出一個部分功能塑膠模型以進一步評估功能和設計改進對人類環境改造學的作用。為減少常規Magill鉗對舌頭的壓力，我們整合 (1) 增大頂端直徑已獲得更好的舌部壓力分佈圖，(2) 設計棘輪以穩固這個壓力，(3) 便於抓握的柔軟可塑性好的頂部。

**結論：** 電腦輔助工程可用來重新設計並製作出一個簡單的氣道管理工具模型。基於電腦模型，我們在保留最初的幾何學和通用性上改良了Magill鉗以獲得穩定的收縮力度，它應用於人體及在兒科纖支鏡插管中的實用性還有待於研究。

（毛慧譯，薛張剛校）
BACKGROUND: Anterior retraction of the tongue is used to enhance upper airway patency during pediatric fiberoptic intubation. This can be achieved by the use of Magill forceps as a tongue retractor, but lingual grip can become unsteady and traumatic. Our objective was to modify this instrument using computer-aided engineering for the purpose of stable tongue retraction.

METHODS: We analyzed the geometry and mechanical properties of standard Magill forceps with a combination of analytical and empirical methods. This design was captured using computer-aided design techniques to obtain a 3-dimensional model allowing further geometric refinements and mathematical testing for rapid prototyping.

RESULTS: On the basis of our experimental findings we adjusted the design constraints to optimize the device for tongue retraction. Stereolithography prototyping was used to create a partially functional plastic model to further assess the functional and ergonomic effectiveness of the design changes. To reduce pressure on the tongue by regular Magill forceps, we incorporated (1) a larger diameter tip for better lingual tissue pressure profile, (2) a ratchet to stabilize such pressure, and (3) a soft molded tip with roughened surface to improve grip.

CONCLUSION: Computer-aided engineering can be used to redesign and prototype a popular instrument used in airway management. On a computational model, our modified Magill forceps demonstrated stable retraction forces, while maintaining the original geometry and versatility. Its application in humans and utility during pediatric fiberoptic intubation are yet to be studied.

Systemic Lupus Erythematosus: A Review for Anesthesiologists
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Anesth Analg 2010 111:665-676

Systemic lupus erythematosus (SLE) is a chronic autoimmune connective tissue disorder, with a heterogeneous presentation. Disease severity is wide ranging, with most suffering milder forms; however, it is potentially fatal depending on organ involvement. The disorder was recognized as early as the Middle Ages, with the 12th-century physician Rogerius being the first to apply the term lupus to the classic malar rash, and in 1872, Moric Kaposi first recognized the systemic nature of the disease. Perioperatively, SLE
can present major challenges to the anesthesiologist because of accrued organ damage, coagulation defects, and complex management regimes. In this article I highlight adult SLE manifestations and treatments pertinent to the anesthesiologist and discuss perioperative management of these complex patients.

**Rescue Therapies for Acute Hypoxemic Respiratory Failure**

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Anesth Analg 2010 111:693-702

The recent H1N1 epidemic has resulted in a large number of deaths, primarily from acute hypoxemic respiratory failure. We reviewed the current strategies to rescue patients with severe hypoxemia. Included in these strategies are high-frequency oscillatory ventilation, airway pressure release ventilation, inhaled vasodilators, and the use of extracorporeal life support. All of these strategies are targeted at improving oxygenation, but improved oxygenation alone has yet to be demonstrated to correlate with improved survival. The risks and benefits of these strategies, including cost-effectiveness data, are discussed.

**Positional blood pressure change and the risk of hypotension during spinal anesthesia for cesarean delivery: an observational study.**

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Anesth Analg 2010 111:712-715

**背景**：我們研究了術前體位性動脈血壓變化是否可預測脊麻下剖宮產中低血壓的發生及是否需要麻黃素。

**方法**：測量了 66 名接受脊麻下剖腹產手術且右側仰臥位的婦女的動脈血壓。體位性血壓變化指右側仰臥位時血壓與平均動脈壓的差異。 記錄低血壓（<80%的基準）和需要麻黃素治療的嚴重低血壓（<70%的基準）。

**結果**：體位性血壓變化的平均值（範圍）為 11（3-29）毫米汞柱，而低血壓的發生率是 41%。 體位性血壓和心率的變化與低血壓（P < 0.001）和麻黃素的需求（P
BACKGROUND: We investigated whether preoperative positional arterial blood pressure change predicted hypotension and ephedrine requirement during spinal anesthesia for cesarean delivery.

METHODS: Arterial blood pressure was measured in 66 women undergoing cesarean delivery in the supine and the right lateral positions. Positional blood pressure change was defined as the difference between mean blood pressure in the right lateral and supine positions. Hypotension (<80% baseline) was recorded, and severe hypotension (<70% baseline) was treated with ephedrine.

RESULTS: The mean (range) positional blood pressure change was 11 (3-29) mm Hg, and the incidence of hypotension was 41%. Positional blood pressure change and heart rate correlated with hypotension (P < 0.001 for both) and ephedrine requirement (P = 0.004). Positional blood pressure change in those who developed hypotension was higher than for those without hypotension (mean (SD), 17 (6) vs. 7 (2) mm Hg, P < 0.001).

CONCLUSIONS: A preoperative increase in blood pressure after position change may be a good variable to predict hypotension during spinal anesthesia for cesarean delivery.
The occurrence of perioperative seizures in patients with a preexisting seizure disorder is unclear. There are several factors unique to the perioperative period that may increase a patient's risk of perioperative seizures, including medications administered, timing of medication administration, missed doses of antiepileptic medications, and sleep deprivation. We designed this retrospective chart review to evaluate the frequency of perioperative seizures in patients with a preexisting seizure disorder.

METHODS: We retrospectively reviewed the medical records of all patients with a documented history of a seizure disorder who received an anesthetic between January 1, 2002 and December 31, 2007. Patients excluded from this study include those who had an outpatient procedure or intracranial procedure, ASA classification of V, pregnant women, and patients younger than 2 years of age. The first hospital admission of at least 24 hours during which an anesthetic was provided was identified for each patient. Patient demographics, character of the seizure disorder, details of the surgical procedure, and clinically apparent seizure activity in the perioperative period (within 3 days after the anesthetic) were recorded.

RESULTS: During the 6-year study period, 641 patients with a documented seizure disorder were admitted for at least 24 hours after an anesthetic. Twenty-two patients experienced perioperative seizure activity for an overall frequency of 3.4% (95% confidence interval, 2.2%–5.2%). The frequency of preoperative seizures ($P < 0.001$) and the timing of the most recent seizure ($P < 0.001$) were both found to be significantly related to the likelihood of experiencing a perioperative seizure. As the number of antiepileptic medications increased, so did the frequency of perioperative seizures ($P < 0.001$). Neither the type of surgery nor the type of anesthetic (general anesthesia, regional anesthesia, or monitored anesthesia care) affected the frequency of perioperative seizures in this patient population.

CONCLUSIONS: We conclude that the majority of perioperative seizures in patients with a preexisting seizure disorder are likely related to the patient's underlying condition. The frequency of seizures is not influenced by the type of anesthesia or procedure. Because patients with frequent seizures at baseline are likely to experience a seizure in the perioperative period, it is essential to be prepared to treat seizure activity regardless of the surgical procedure or anesthetic technique.
We present a new method of percutaneous radiofrequency mandibular nerve rhizotomy for pain relief in the mandibular region, in which needle placement is guided by high-speed real-time computed tomography (CT) fluoroscopy. Eleven patients (13 procedures) with idiopathic trigeminal neuralgia underwent the procedure. CT fluoroscopy simultaneously provided 3 slices (1-mm interval series, craniocaudally) in 1 fluoroscopic view, allowing for accurate needle placement. Trigeminal neuralgia improved in all patients without severe complications. The mean numerical rating scales of pain intensity (±SD) decreased from 6.5 (±1.8, pretreatment) to 1.8 (±1.7, 1 month after treatment) and to 0.9 (±1.0, 3 months after treatment). Our limited-case series suggests potential advantages for the new CT fluoroscopy guidance, but these findings await confirmation from randomized controlled trials and large-case series.
BACKGROUND: Pulsed radiofrequency (PRF) is a popular pain treatment modality. The effect of PRF current on neuropathic pain has not been examined in detail. We investigated the effect of PRF current on mechanical allodynia induced with resiniferatoxin (RTX) in rats, especially regarding the influence of the duration of allodynia before PRF procedures and that of exposure time to PRF.

METHODS: Adult male Sprague-Dawley rats (weighing 250–400 g) received a single intraperitoneal injection of RTX (200 μg/kg) under 2 to 3% sevoflurane anesthesia. Rats in group S₂ (n = 5) were assigned to receive PRF current to the right sciatic nerve for 2 minutes 1 week after RTX treatment; rats in group M₂ (n = 6), PRF current for 2 minutes 3 weeks after RTX treatment; rats in group L₂ (n = 7), PRF current for 2 minutes 5 weeks after RTX treatment; rats in group S₄ (n = 5), PRF current for 4 minutes 1 week after RTX treatment; rats in group S₆ (n = 5), PRF current for 6 minutes 1 week after RTX treatment.
RESULTS: The paw withdrawal thresholds of both hind paws 1 week after RTX treatment were significantly lower than the pre-RTX baseline in all groups. In groups S_2, S_4, S_6, and M_2, after PRF procedures, the ipsilateral paw withdrawal thresholds significantly increased. A statistically significant difference was detected between the PRF-treated and PRF-untreated hindpaws. The ipsilateral–contralateral paw withdrawal thresholds after PRF procedures in group S_2 were significantly higher than those in groups M_2 and L_2. Between groups M_2 and L_2, significant differences were found 1, 2, 4, and 5 weeks after PRF procedures. The ipsilateral–contralateral paw withdrawal thresholds in group S_6 were significantly higher than those in groups S_2 and S_4 5 weeks after PRF procedures. No significant difference was found between groups S_2 and S_4 at any time. After PRF procedures, no difference in the withdrawal latency after heat stimulation and no motor disturbance were observed at any time in all groups.

CONCLUSIONS: PRF treatment was more effective when applied in the early stages of mechanical allodynia (1 week) in rats. Increased exposure time to PRF current from 2 to 6 minutes showed a significant antiallodynic effect without motor impairment. We propose the application of PRF current for 6 minutes adjacent to the nerve as soon as possible when allodynia appears.

背景：在腰段交感神經節阻滯(LSGB)期間，局麻藥注入靜脈及肌肉可以導致診斷阻滯效果的假陽性和假陰性結果。在這項研究中，我們前瞻性評估了 LSGB 間局麻藥注入肌肉或血管的發生率及可能的因素。

方法：我們評估了 83 名患者行 216 次 LSGBs。一名作者通過 3 針技術完成了所有的 LSGBs。最終穿刺針的位置通過 x 透視顯像確定，進行了抽吸試驗，並注射了
BACKGROUND: Intravascular and intramuscular injection of local anesthetics during lumbar sympathetic ganglion block (LSGB) can cause false positive or negative results in a diagnostic block, and complications. In the present study, we prospectively evaluated the incidence and possible factors causing intravascular and IM injection during LSGB.

METHODS: We evaluated 216 LSGBs in 83 patients. All LSGBs were performed by 1 of the authors using a 3-needle technique. After final needle position was confirmed by biplanar fluoroscopy, an aspiration test was conducted, and 1 mL of contrast was injected sequentially. Incidences of psoas muscle injection, blood flashback, and the presence of intravascular contrast spread on static and real-time fluoroscopy were assessed.

RESULTS: The incidence of psoas muscle injection of contrast was 21.3% (46/216), and it was associated with the level of injection (L2) significantly ($\chi^2 = 14.773, \ P = 0.001$). The incidence of intravascular injection of contrast was 12.5% (27/216). Among 27 cases of documented intravascular injections, 5.1% (11/216) of patients showed contrast spread at the area where the sympathetic ganglion was presumed to be and to the vessels simultaneously, and 7.4% (16/216) of patients showed only intravascular injection of contrast. The sensitivity of the aspiration test and static radiography were 40.7% and 70.4%, respectively.

CONCLUSIONS: LSGB at the L2 level showed the lowest incidence of psoas muscle injection of contrast in comparison with LSGB at L3 and L4. The aspiration test and static radiography frequently missed the intravascular injection of contrast during LSGBs.
近年來機器人輔助遠端手術技術的開展使外科專家為地理位置偏遠的患者提供服務成爲可能。同樣遠端麻醉也可以爲偏遠患者提供圍手術期管理。儘管很多關於遠端麻醉的調查尚在進行中，但還沒有涉及麻醉相關進程的具體操作。因此，我們描述了通過 da Vinci 多功能機器人系統在超聲引導下神經阻滯定位。我們成功地進行了單次注射和外周神經置管的操作。

Abstract

Recent advances in robotically assisted telesurgery offer expert surgical care for the geographically remote patient. Similar advances in teleanesthesia will be necessary to bring comparable perioperative care to the geographically remote patient. Although many preliminary investigations into teleanesthesia are underway, none involve remote performance of anesthesia-related procedures. Herein, we describe the placement of ultrasound-guided nerve blocks into an ultrasound phantom using the da Vinci multipurpose surgical robotic system (Intuitive Surgical, Sunnyvale, CA). Both single-injection and perineural catheter techniques were successfully performed.

A Thrombus in the Venous Reservoir While Using Bivalirudin in a Patient with Heparin-Induced Thrombocytopenia Undergoing Heart Transplantation
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Anesth Analg 2011; 111(3): 609-612

在肝素誘發的血小板減少症患者的心肺轉流術中，直接凝血酶抑制劑具有替代肝素的抗凝作用。我們報導的病例是關於使用比伐盧定時在靜脈貯血器中形成了一個巨大血栓。本例提示術中血液淤滯和持續充滿的靜脈貯血器有關，導致在靜脈濾罐頂端形成了一個巨大血栓。此外，在使用直接凝血酶抑制劑時，活化凝血時間或許不能準確地反映抗凝的強度。

Direct thrombin inhibitors are heparin alternatives for anticoagulation during cardiopulmonary bypass in patients with heparin-induced thrombocytopenia. We report a case of a large thrombus forming in the venous reservoir while using bivalirudin. We suggest that blood stasis associated with the full venous reservoir maintained in this case...
led to formation of a large thrombus at the top of the venous canister. Furthermore, activated clotting times may not accurately reflect the magnitude of anticoagulation when using direct thrombin inhibitors.

**The Effects of Intravenous Gabapentin Administration on the Minimum Alveolar Concentration of Isoflurane in Cats**

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Anesth Analg 2011; 111(3): 633-637

**BACKGROUND:** Gabapentin is a structural analog of γ-aminobutyric acid, one of the inhibitory neurotransmitters of the mammalian central nervous system. It is increasingly being used preemptively to control postoperative pain. Therefore, its interaction with inhaled anesthetics is of clinical interest. In this study, we examined the effects of gabapentin on the minimum alveolar concentration (MAC) of isoflurane in cats. We hypothesized that gabapentin would decrease the MAC of isoflurane in a dose-dependent manner.

**METHODS:** Six cats were included in the study. Gabapentin was administered IV to achieve target plasma concentrations between 0 and 16 μg/mL and the MAC of isoflurane was determined at each gabapentin concentration. Gabapentin concentrations were quantitated by liquid chromatography–mass spectrometry analysis of extracted plasma samples. MAC values at the different gabapentin plasma concentrations were analyzed by a repeated-measures analysis of variance using the Huynh-Feldt correction for violation of the sphericity assumption.
RESULTS: Actual gabapentin concentrations were 0 ± 0, 1.18 ± 0.23, 2.25 ± 0.23, 4.96 ± 1.19, 10.63 ± 1.37, and 19.69 ± 3.97 μg/mL for the target concentrations of 0, 1, 2, 4, 8, and 16 μg/mL, respectively. The MAC of isoflurane in this study was 2.10% ± 0.13%, 2.10% ± 0.14%, 2.13% ± 0.12%, 2.06% ± 0.11%, 2.11% ± 0.15%, and 2.09% ± 0.25% at target plasma concentrations of 0, 1, 2, 4, 8, and 16 μg/mL, respectively.

CONCLUSIONS: We conclude that gabapentin did not have a detectable effect on the MAC of isoflurane in cats.

一瞥監測：在手術室對麻醉醫生的隱蔽觀察

At-a-Glance Monitoring: Covert Observations of Anesthesiologists in the Operating Room

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Anesth Analg 2011; 111(3): 653-658

BACKGROUND: Patient monitoring displays are designed to improve patient safety, and yet little is known about how anesthesiologists interact with these displays. Previous studies of clinician behavior used an observer in the operating room, which may have altered behavior. We describe a covert observation technique to determine how often and for how long anesthesiologists actually look at the monitoring display during different segments of the maintenance phase of anesthesia, and to determine whether this changed with more than 1 anesthesia provider or during concomitant activities such as reading.
METHODS: Five staff anesthesiologists, 2 anesthesia fellows, 3 anesthesia residents, and 2 medical students were covertly videotaped across 10 dual anesthesia provider cases and 10 solo cases. Videotapes were later segmented (5 minutes postinduction [early maintenance], mid-maintenance, and immediately before the drapes came down [late maintenance]) and coded for looking behavior at the patient monitor, anesthesia chart, and other reading material.

RESULTS: Anesthesiologists looked at the monitor in 1- to 2-second glances, performed frequently throughout the 3 segments of maintenance anesthesia. Overall, the patient monitor was looked at only 5% of the analyzed time, which is less than has previously been reported. Monitoring behavior was constant across the segments of maintenance anesthesia and was not significantly affected by the number of anesthesia providers or role (trainee vs. senior). In contrast, charting behavior and other reading material viewing changed significantly over the analyzed segments of maintenance anesthesia.

CONCLUSIONS: The presence of “at-a-glance monitoring” has implications for the design of patient monitoring displays. Displays should be developed to optimize the information obtained from brief glances at the monitor.

在美國退伍軍人事務醫院引入快速應答系統可減少心搏驟停
Introduction of a Rapid Response System at a United States Veterans Affairs Hospital Reduced Cardiac Arrests
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Anesth Analg 2011; 111(3): 679-686

背景：我們試圖確定快速應答系統對美國退伍老兵人群中心搏驟停發生率以及死亡率的影響。
方法：我們對快速應答系統建立之前9 月以及之後27 個月裏的心搏驟停病例進行前瞻性分析，並且回顧性分析了系統建立前3.5 年以及之後27 個月的死亡率。這項研究包括了一家大學附屬美國退伍軍人事務醫學中心在實行快速應答系統前後的所有病人，快速應答系統包括一個教學程式、病人呼叫標準以及一個內科醫生領導的醫療急救團隊。主要結果標準化到出院率的醫院廣泛的心搏驟停的發生率以及死亡率。運用方差分析比較在實施過程的不同時間段之間事件的發生率。
結果：在研究期間有378 例患者呼叫到醫療急救團隊。與系統運用之前的時間點比較，心搏驟停的發生率減少57%，相當於每1000 名出院患者減少了5.6 起心搏驟停的發生（P < 0.01）。干預期間的死亡率降低，但這是由於研究的所有階段都自然減少。
BACKGROUND: We sought to determine the impact of a rapid response system on cardiac arrest rates and mortality in a United States veteran population. METHODS: We describe a prospective analysis of cardiac arrests in 9 months before and 27 months after institution of a rapid response system, and retrospective analysis of mortality 3.5 years before the intervention and 27 months after the intervention. The study included all inpatients from a university-affiliated United States Veterans Affairs Medical Center, before and after implementation of a rapid response system, including an educational program, patient calling criteria, and a physician-led medical emergency team. Primary end points were hospital-wide cardiac arrests and mortality rates normalized to hospital discharges. Comparisons of event rates between various time points during the implementation process were made by analysis of variance. RESULTS: Three hundred seventy-eight calls were made to the medical emergency team in the time period studied. Compared with preintervention time points, cardiac arrests were reduced by 57%, amounting to a reduction of 5.6 cardiac arrests per 1000 hospital discharges (P < 0.01). Mortality was reduced during the intervention, but this was attributable to a natural decrease occurring over all phases of the study. CONCLUSIONS: A significant reduction in the rate of cardiac arrests was realized with this intervention, as well as a trend toward lower mortality. We estimate that 51 arrests were prevented in the timeframe studied. Our results suggest that further reductions in morbidity can be realized by expansion of rapid response systems throughout the Veterans Affairs network.
BACKGROUND: Supraglottic jet ventilation (JVₜ) with injectors above airway stenoses may result in inadvertent high lung pressures. We designed this study to investigate intrinsic positive end-expiratory pressure (PEEPᵢ) during jet ventilation via a distant injector in a model of dynamic upper airway obstruction.

METHODS: Respiratory pressure-time curves were recorded during JVₜ in a tracheal lung model using a pig's trachea and an embolectomy catheter's air-filled balloon to simulate 60% and 80% airway obstruction. JVₜ was performed at various jet frequencies (Fₖj 30 min⁻¹, 60 min⁻¹, and 100 min⁻¹) and driving pressures (1 bar and 2 bar).

RESULTS: JVₜ was associated with generation of PEEPᵢ, which depended on driving pressure, the degree of obstruction, and on ventilatory frequency.

CONCLUSIONS: In the presence of a dynamic upper airway obstruction, JVₜ via a distant injector may result in PEEPᵢ, which cannot be detected when airway pressure is measured in front of the obstruction.

將研究的風險及益處呈現給父母:形式有關係嗎?
Presenting Research Risks and Benefits to Parents: Does Format Matter?

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Anesth Analg 2011; 111(3): 718-723

背景:幾項研究提示許多父母和研究參與者對知情同意書的內容的理解較差，尤其是對於風險和益處。然而，一些資料提示研究風險和益處的格式和結構可能是受試者理解的重要的決定性因素。我們研究了將研究的風險和益處用列表和圖示的方式展示對於患兒父母理解一個調查性研究的影響。

方法：擇期行外科手術的患兒的父母 (n = 408) 隨機通過文字、表格或統計圖表，接受關於術後疼痛控制的一項假研究的風險和益處的資訊，然後完成一個調查問卷以判斷他們對於該項資訊的要點（基本的）和逐字（實際的）瞭解程度。並記錄患兒父母的人口統計學資料以及他們的讀寫能力和計算能力。

結果：通過隨機法經由表格和統計圖表接受資訊的患兒父母對於要點和逐字內容的理解明顯好於那些通過標準的文字接受資訊的父母 (P < 0.025)。在提高讀寫能力和計算能力較差的父母的理解力方面，表格和統計圖表也優於文字。

結論：許多父母和病人在同化以及解釋關於研究和處理的風險/益處資料方面均存在困難。這些部分是和風險和益處的傳達方式有關，部分和個體的讀寫以及計算能力有關。該項研究的結果提示，一種簡單而實際的方式可以提高具有不同讀寫能力和計算能力的父母對於風險/益處統計學的理解。

（黃麗娜 譯 馬皓琳 李士通 校）
BACKGROUND: Several studies suggest that many parents and research participants have poor understanding of the elements of consent, particularly the risks and benefits. However, some data suggest that the format and framing of research risks and benefits may be an important determinant of subject understanding. We examined the effect of tabular and graphical presentation of risks and benefits on parents' understanding of a research study.

METHODS: Parents of children scheduled to undergo an elective surgical procedure (n = 408) were randomized to receive information about the risks and benefits of a sham study of postoperative pain control using text, tables, or pictographs and then completed a questionnaire to examine their gist (essential) and verbatim (actual) understanding of the information. Parent demographics were recorded and their literacy and numeracy skills measured.

RESULTS: Parents randomized to receive information using tables or pictographs had significantly (P < 0.025) greater gist and verbatim understanding than did parents who received the information using standard text. Tables and pictographs were also superior to text in promoting understanding among parents with low numeracy and literacy skills.

CONCLUSIONS: Many parents and patients have difficulty in assimilating and interpreting risk/benefit information for both research and treatment. This is due, in part, to the manner in which risks and benefits are communicated and to the literacy and numeracy abilities of the individual. The results of this study suggest a simple and practical method for enhancing understanding of risk/benefit statistics for parents with varying numeracy and literacy skills.
Increased intracranial pressure occurring after severe traumatic brain injury is a common and potentially devastating phenomenon. It has been clearly demonstrated that increased intracranial pressure that is refractory to initial medical measures is a poor prognostic sign. Current optimal management is based on a sequential, target-driven approach combining both medical and surgical treatment strategies. The surgical measures in current common practice include external ventricular drain insertion and decompressive craniectomy. There is evidence that both of these measures reduce intracranial pressure but the effect on outcome, particularly in the long term, is equivocal. Current Brain Trauma Foundation guidelines recommend timely evacuation of mass lesions and there is clear guidance regarding the indications for intracranial pressure monitoring; however, decompressive craniectomy is only cautiously recommended as a possible option for selected patients. In this review, we highlight the ongoing debate about the use of decompressive craniectomy to control intracranial pressure after traumatic brain injury; included is a summary of review of the most recent literature on the effect of decompressive craniectomy on increased intracranial pressure after traumatic brain injury and associated long-term outcome. The RESCUEicp and DECRA studies are discussed in detail. It is hoped that these 2 randomized controlled trials, which are evaluating the short- and longer-term outcomes of decompressive craniectomy, will provide conclusive evidence regarding the role of decompressive craniectomy in managing increased intracranial pressure after trauma.

利多卡因减少培养的大鼠神经小胶质细胞内细胞外三磷酸腺苷诱导的前炎症细胞因数产物
Lidocaine Attenuates Proinflammatory Cytokine Production Induced by Extracellular Adenosine Triphosphate in Cultured Rat Microglia
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Anesth Analg 2011; 111(3): 768-774

背景：我們之前的研究所證實鞘內利多卡因治療能夠對慢性縮窄性損傷導致的痛覺過敏或痛覺異常產生持續的逆轉作用。實際上，鞘內利多卡因治療能明顯抑制功能亢進的神經小膠質細胞內 p38 細胞分裂素激酶（MAPK）的活性。在本實驗中，我們提出：利多卡因可能直接作用於神經小膠質細胞並且減少細胞因數的釋放。

方法：我們評估了利多卡因對培養的大鼠神經小膠質細胞內細胞外三磷酸腺苷（ATP）觸發的磷酸化 p38 MAPK、腫瘤壞子因數-α (TNF-α)、白介素-1beta (IL-1β)、IL-6 和細胞內鈣離子水準。我們實驗方法包括：免疫印跡法（Western blot）、即時逆轉錄—多聚酶鏈反應（real-time RT-PCR）、酶聯免疫吸附法（ELISA）和鈣離子成像。

結果：我們發現：利多卡因通過抑制三種細胞因數 mRNAs 的轉錄和減少它們各自蛋白濃度（TNF-α、IL-1β 和 IL-6，與 ATP 組比較，P < 0.05），顯著減少了 1 mM
ATP 触发的 p38 MAPK 活性。SB203580 (P38 拮抗剂) 减少了小胶质细胞内 ATP 啓動的 TNF-α, IL-1β 和 IL-6 的高蛋白水準。添加 10 mM 利多卡因也减少了 ATP 誘導的細胞內高鈣離子 ([Ca^{2+}]_i) 水準 (與 ATP 組比較, P < 0.05)。

结論：这些發現表明利多卡因能直接作用於小膠質細胞。利多卡因通過抑制細胞內鈣離子的增加抑制了p38 MAPK 活性並且減少了細胞外 ATP 触發的培養的大鼠小膠質細胞內前炎症細胞因數產物（包括 TNF-α, IL-1β 和 IL-6）。

（王海濤 譯，馬皓琳 李士通 校）

BACKGROUND: Our previous studies demonstrated that intrathecal lidocaine treatment could produce prolonged reversal of established hyperalgesia or allodynia, both induced by chronic constriction injury. Indeed, intrathecal lidocaine treatment remarkably suppressed the activation of p38 mitogen-activated protein kinase (MAPK) in hyperactive microglia. In the present study we suggest that lidocaine may act directly on the microglia and attenuate the release of cytokines.

METHODS: We assessed the influence of lidocaine on the levels of phospho-p38 MAPK, tumor necrosis factor-α (TNF-α), interleukin-1beta (IL-1β), IL-6, and intracellular calcium triggered by extracellular adenosine triphosphate (ATP) in cultured rat microglia. Our experimental methods included Western blot, real-time reverse transcription–polymerase chain reaction, enzyme-linked immunosorbent assay, and calcium imaging.

RESULTS: We found that lidocaine (in a dose-dependent manner) significantly attenuated p38 MAPK activation triggered by 1 mM ATP, by inhibiting the transcription of 3 cytokine messenger RNAs and causing a decrease in their respective protein concentrations (TNF-α, IL-1β, and IL-6, P < 0.05, vs. the ATP group). SB203580, an antagonist of P38, attenuated ATP-activated elevation in protein levels of TNF-α, IL-1β, and IL-6 in the microglia. The high level of intracellular calcium ([Ca^{2+}]_i) that is induced by ATP was decreased by the addition of 10 mM lidocaine (P < 0.05 vs. the ATP group).

CONCLUSIONS: These findings indicate that lidocaine can directly act on microglia. Lidocaine, by inhibiting the increase of intracellular calcium, also inhibited p38 MAPK activation and attenuated the production of proinflammatory cytokines (including TNF-α, IL-1β, and IL-6), which were triggered by extracellular ATP in cultured rat microglia.

Epinephrine Injection in Lipid-Based Resuscitation from Bupivacaine-Induced Cardiac Arrest: Transient Circulatory Return in Rabbits
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Anesth Analg 2011; 111(3): 791-796
BACKGROUND: IV lipid emulsion has demonstrated to be effective therapy for bupivacaine-induced cardiotoxicity. However, the role of epinephrine when coadministered with lipid emulsion in toxin-induced cardiac arrest is unclear. We postulated superior resuscitation outcome in the absence of epinephrine in a rabbit model of bupivacaine-induced cardiac arrest resuscitated with IV lipid emulsion.

METHODS: Twenty sedated, instrumented New Zealand White rabbits received 10 mg/kg IV bupivacaine producing asystole. Mechanical ventilation and external chest compressions were commenced at 30 seconds. At 1 minute, animals received 5 mL/kg 20\% lipid emulsion in addition to 1 of 4 additional IV treatments (n = 5 all groups): 0.9\% saline, 2.5 \mu g/kg epinephrine, 10 \mu g/kg epinephrine, 100 \mu g/kg epinephrine; all at 1 mL/kg. Lipid emulsion bolus was repeated at 4 minutes. Return of spontaneous circulation and hemodynamic metrics were obtained to 15 minutes. Saline group animals additionally received high-dose epinephrine (100 \mu g/kg) treatment at 15 minutes, and were monitored to 20 minutes.

RESULTS: High-dose epinephrine administration was associated with increased rate of return of spontaneous circulation compared with saline control (0 of 5 saline-treated animals; 0 of 5 animals in the 2.5 \mu g/kg epinephrine group; 3 of 5 in the 10 \mu g/kg group [P = 0.167]; and 4 of 5 in the 100 \mu g/kg group [P = 0.048]). Spontaneous but decreasing circulation was maintained at 15 minutes in 4 of 5 animals in the 100 \mu g/kg group alone...
mean arterial blood pressure at 15 minutes was 12.8 (SEM 2.8) mm Hg saline, 12.0 (2.5) mm Hg 2.5 μg/kg epinephrine, 20.6 (2.7) mm Hg 10 μg/kg epinephrine, and 26.4 (3.9) mm Hg 100 μg/kg epinephrine ($P = 0.008$). Four of five animals in the saline-treated group exhibited return of spontaneous circulation after delayed epinephrine treatment ($P = 0.048$). High-dose epinephrine administration was associated with a significant increase in coronary perfusion pressure before return of spontaneous circulation.

**CONCLUSIONS:** Epinephrine seemed to be necessary for return of spontaneous circulation, but was subsequently associated with declining hemodynamic variables in this rabbit model of bupivacaine-induced cardiac arrest. Further study is required to define the role of epinephrine in lipid-based resuscitation from local anesthetic-induced cardiac arrest.

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**A Clinical Evaluation of Block Characteristics Using One Milliliter 2% Lidocaine in Ultrasound-Guided Axillary Brachial Plexus Block**

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Anesth Analg 2011; 111(3): 808-810;

We report onset and duration of ultrasound-guided axillary brachial plexus block using 1 mL of 2% lidocaine with 1:200,000 epinephrine per nerve (total local anesthetic volume 4 mL). Block performance time, block onset time, duration of surgery, and block duration were measured. Seventeen consecutive patients were recruited. The mean (SD) block performance and onset times were 271 (67.9) seconds and 9.7 (3.7) minutes, respectively. Block duration was 160.8 (30.7) minutes. All operations were performed using regional anesthesia alone. The duration of anesthesia obtained is sufficient for most ambulatory hand surgery.
BACKGROUND: There is a lack of clinical registries to document efficacy and safety of ultrasound-guided regional anesthesia. Interscalene blocks are effective for shoulder arthroscopy, and ultrasound guidance may reduce risk. Furthermore, ultrasound-guided supraclavicular block is a novel approach for shoulder anesthesia that may have less risk for neurological symptoms than interscalene block.

METHODS: One thousand one hundred sixty-nine patients undergoing ultrasound-guided regional anesthesia for ambulatory shoulder arthroscopy were enrolled in our prospective registry. Standardized perioperative data were collected including a preoperative neurological screening tool. Either interscalene or supraclavicular block was performed at the discretion of the clinical team. Standardized follow-up was performed in the postanesthesia care unit and at 1 week. Postoperative neurological symptoms (PONS) were assessed at the 1-week follow-up with the same screening tool by a blinded neurologist.

RESULTS: Ultrasound-guided interscalene (n = 515) and supraclavicular (n = 654) blocks had excellent anesthetic success (99.8%; 95% confidence interval [CI], 99.4%–99.9%) with 0% (95% CI, 0%–0.3%) incidence of vascular puncture or intravascular injection. The incidence of hoarseness in the postanesthesia care unit was significantly less with supraclavicular (22% with 95% CI, 19%–26%) than interscalene block (31%
with 95% CI, 27%–35%). The incidence of dyspnea was similar (7% for supraclavicular vs 10% with interscalene). No patient had a clinically apparent pneumothorax. The incidence of PONS was very low (0.4% with 95% CI, 0.1%–1%), and there was a 0% (95% CI, 0%–0.3%) incidence of permanent nerve injury.

CONCLUSIONS: Ultrasound-guided interscalene and supraclavicular blocks are effective and safe for shoulder arthroscopy. Temporary and permanent PONS is uncommon.

**The Subtype-Specific Effects of Droperidol on Action Potential Duration in Cellular and Computational Models of Long QT Syndrome**

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Anesth Analg September 2010 111:638-646;

**BACKGROUND:** Droperidol is a highly potent butyrophenone used for the therapy of postoperative nausea and vomiting. Its cardiac safety in cardiovascular-healthy patients and those with long QT (LQT) syndrome is a matter of debate. In this study, we investigated whether droperidol has subtype-specific effects in cellular and computational models of LQT syndrome.

**METHODS:** Left ventricular cardiac myocytes were isolated from adult guinea pig hearts. LQT1-like behavior was pharmacologically induced by chromanol 293B (10
μmol/L) and LQT2-like states by E4031 (10 μmol/L). Computational analysis was performed using the Luo-Rudy dynamic model. Data are given as mean ± SEM.

**RESULTS:** In control myocytes, droperidol lengthened action potentials in a concentration-dependent manner with a maximal prolongation of 37%± 13% (n = 4) at a concentration of 0.6 μmol/L. In LQT1-like myocytes, droperidol (0.6 μmol/L) further prolonged action potentials by 31% ± 6% (n = 6) but shortened action potentials of LQT2-like myocytes by 11% ± 2% (n = 8). Computational modeling supported the concept that droperidol, in addition to the rapid component of the delayed K⁺ current, blocks depolarizing targets, such as the L-type Ca²⁺ current, the Na⁺-Ca²⁺ exchanger, and the Na⁺-K⁺ adenosine triphosphatase.

**CONCLUSIONS:** Droperidol has more detrimental effects on cardiac repolarization of LQT1-like than of LQT2-like myocytes suggesting subtype-specific cardiotoxic effects in patients with LQT syndrome. The subtype specificity of droperidol seems to be caused by a complex interaction of droperidol with several different molecular targets. This interaction deserves further investigation to establish the feasibility of a subtype-directed approach in the perioperative management of patients with LQT syndrome.

肝部分切除手術中心靜脈壓合適的參考零點是什麼？

What Is the Preferred Central Venous Pressure Zero Reference for Hepatic Resection?

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Anesth Analg September 2010 111:660-664;

背景：在肝部分切除手術中，維持中心靜脈壓（central venous pressure，CVP）低於5mmHg以減少失血量是一個麻醉慣例，但這同時可增加靜脈空氣栓塞（venous air embolism，VAE）的風險。當CVP為5mmHg時，流體靜壓大約為7cm H₂O（1 mm Hg = 1.36 cm H₂O），而我們發現，肝臟的前後徑可遠遠長於7cm。由此，作者著手此項研究，目的在於闡明肝臟前後徑長短的變化及對CVP感測器位置的影響，從而平衡出血與VAE的風險。

方法：100例成人患者中，通過靜脈注射造影劑，應用連續存檔的胸部CT攝片測量肝臟的前後徑，及它到其他解剖位置的距離。

結果：研究結果表明，肝臟前後徑及患者肝門處標準的解剖學標誌有著明顯的個體差異，其中肝門前後徑的範圍為12.0-28.5cm，均值為17.9±2.8cm。

結論：肝臟前後徑長以及肝臟手術部位的巨大差異，使我們重新考慮在肝臟手術中，應尋找合適的CVP採頭零點的水準。我們應更重視肝靜脈本身的壓力而不是CVP，這樣才能同時減小VAE和出血的風險。文中作者還列舉了2種感測器歸零的方法。

（周姝婧 譯 陳傑 校）
BACKGROUND: The common practice of maintaining central venous pressure (CVP) below 5 mm Hg to reduce blood loss during hepatic resection increases the risk of venous air embolism (VAE). We initiated this study after observing that the anteroposterior (AP) diameter of the liver can be much larger than 7 cm, which is the approximate hydrostatic pressure corresponding to a CVP of 5 mm Hg (1 mm Hg = 1.36 cm H2O). The purpose of this study was to characterize the liver AP diameter and thereby describe how this might affect the placement of the CVP transducer to balance the risks of bleeding and VAE.

METHODS: We measured the AP liver diameter and its distance from other anatomic sites using consecutive archived chest tomograms with IV contrast from 100 adults.

RESULTS: The results of our study demonstrate a large interindividual range in AP liver dimensions (17.9 ± 2.8 cm, range = 12.0–28.5 cm) and standardized anatomic landmarks relative to the portal triad.

CONCLUSIONS: The significant variability in AP liver diameter, along with the variability in the liver surgical site, suggests that we rethink the zero reference point for the CVP transducer during hepatic surgeries. By considering the actual hepatic venous pressure itself, rather than the CVP, we can minimize the risks of VAE and hemorrhage. Two methods for zeroing the reference transducer are suggested.
LINE SCANNING AND CTscans. As a secondary goal, we evaluated Balik's formula in PE estimation.

RESULTS: No significant differences were found between the 2 groups with regard to their demographics and ICU clinical course. Group S had a significant reduction in the total number of chest radiographs obtained (−26%; \(P < 0.001\)) and CT scans (−47%; \(P < 0.001\)) in comparison with the comparison group C. A 6-month follow-up analysis of the ICU LUS protocol revealed a time-dependent decrease in the number of radiological examinations requested for patients with PE. Lastly, PE volume estimation using the LUS and Balik's formula correlates well with the effective volume drained (\(r = 0.65; P < 0.0001\)).

CONCLUSIONS: Routine use of LUS in the ICU setting can be associated with a reduction in the number of chest radiographs and CT scans performed.

BACKGROUND: Chest radiography has been reported to have low diagnostic accuracy in critically ill intensive care unit (ICU) patients, and chest computed tomography (CT) scans require patients to be transported out of the ICU, putting them at risk of adverse events. In this study we assessed the efficacy of routine bedside lung ultrasound (LUS) in the evaluation of pleural effusions (PE) in the ICU.

METHODS: Three hundred seventy-six patients admitted to the ICU for major trauma (46.3%), medical pathology (41.5%), and postsurgical complications (12.2%) (May 2008 to April 2009) were included in this study. Patients were placed into either the control group (group C) or the study group (group S), on the basis of the introduction of routine LUS performed by a single group of intensivists in 1 tertiary care ICU. To reduce provider bias, the physicians conducting the LUS were not aware of the study. Collected data included patient demographics, clinical course, and number of chest radiographs and CT scans performed. As a secondary goal, we assessed the reliability of Balik's formula in PE estimation.

RESULTS: No significant differences were found between the 2 groups with regard to their demographics and ICU clinical course. Group S had a significant reduction in the total number of chest radiographs obtained (−26%; \(P < 0.001\)) and CT scans (−47%; \(P < 0.001\)) in comparison with the comparison group C. A 6-month follow-up analysis of the ICU LUS protocol revealed a time-dependent decrease in the number of radiological examinations requested for patients with PE. Lastly, PE volume estimation using the LUS and Balik's formula correlates well with the effective volume drained (\(r = 0.65; P < 0.0001\)).

CONCLUSIONS: Routine use of LUS in the ICU setting can be associated with a reduction in the number of chest radiographs and CT scans performed.

簡報：肝臟疾病患者肌內生成抑制蛋白水準增高可能引起骨骼肌萎縮

Brief-Reports: Elevated Myostatin Levels in Patients with Liver Disease: A Potential Contributor to Skeletal Muscle Wasting

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Anesth Analg September 2010 111:707-709;
Loss of skeletal muscle mass is a poorly understood complication of end-stage liver disease (ESLD). Based on recent stem cell literature, we hypothesized that the potent negative regulator of muscle mass, myostatin, could play a role in the muscle loss associated with ESLD. In this preliminary investigation, we measured myostatin levels in patients undergoing liver transplant evaluation, using a novel enzyme-linked immunosensitivity assay. Myostatin levels were significantly elevated in patients with ESLD compared with healthy controls. These data suggest that myostatin deserves further investigation as a target for therapies designed to preserve muscle mass in patients with ESLD.

住院醫師對心臟手術嬰幼兒患者行股靜脈穿刺置管：超聲引導與標記定位技術的比較

Femoral Vein Cannulation Performed by Residents: A Comparison Between Ultrasound-Guided and Landmark Technique in Infants and Children Undergoing Cardiac Surgery

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背景：對嬰幼兒患者行經皮股靜脈穿刺置管在技術上具有挑戰性，特別是由培訓階段的住院醫生進行操作時。在此項研究中，作者研究了實施心臟手術的嬰幼兒患者，應用超聲即時引導下行股靜脈穿刺置管是否優於傳統定位技術。

方法：所有患者事先隨機分為兩組。在 LM 組中，應用傳統方法觸摸動脈搏動行股靜脈穿刺置管。在 US 組中，應用具有即時掃描功能的超聲探頭行股靜脈穿刺置管。比較兩組在完成穿刺置管的時間（主要結果）、成功率、穿刺次數，第一針穿刺置管成功率及併發症發生率的差別。

結果：共 48 例嬰幼兒患者入組。在兩組完成穿刺置管時間上，US 組要顯著短於 LM 組(155 [46–690] vs 370 [45–1620] 秒; P = 0.02)。穿刺成功率上兩組相比基本相似(95.8%)。穿刺次數上 US 組要顯著少於 LM 組(1 [1–8] vs 3 [1–21]; P = 0.001)。穿刺置管成功率上，US 組要顯著高於 LM 組(18 vs 6; P = 0.001)。兩組患者在誤穿股動脈的發生率相似。
結論：當由高年資麻醉住院醫師對嬰幼兒患者實施超聲引導下行股靜脈穿刺置管，其在穿刺速度、穿刺次數等方面優於定位技術，並能顯著提高第一次穿刺成功率。
（趙嫣紅譯 陳傑校）

BACKGROUND: Percutaneous cannulation of the femoral vein, in the pediatric age group, can be technically challenging, especially when performed by residents in training. We examined whether the use of real-time ultrasound guidance is superior to a landmark technique for femoral vein catheterization in children undergoing heart surgery.

METHODS: Patients were prospectively randomized into 2 groups. In group LM, the femoral vein was cannulated using the traditional method of palpation of arterial pulse. In group US, cannulation was guided by real-time scanning with an ultrasound probe. The time to complete cannulation (primary outcome), success rate, number of needle passes, number of successful cannulations on first needle pass, and incidence of complications were compared between the 2 groups.

RESULTS: Forty-eight pediatric patients were studied. The time to complete cannulation was significantly shorter (155 [46–690] vs 370 [45–1620] seconds; \( P = 0.02 \)) in group US versus group LM. The success rate was similar in both groups (95.8%). The number of needle passes was smaller (1 [1–8] vs 3 [1–21]; \( P = 0.001 \)) and the number of successful cannulations on first needle pass higher (18 vs 6; \( P = 0.001 \)) in group US compared with group LM. The incidence of femoral artery puncture was comparable between the 2 groups.

CONCLUSIONS: Ultrasound-guided cannulation of the femoral vein, in pediatric patients, when performed by senior anesthesia residents, is superior to the landmark technique in terms of speed and number of needle passes, with remarkable improvement in first attempt success.
INTRODUCTION: Decompression illness (DCI) is caused by bubble formation in the blood or tissues after a reduction in ambient pressure. Clinically, DCI may range from a trivial illness to paralysis, loss of consciousness, cardiovascular collapse, and death. Recompression is the universally accepted standard for the treatment of DCI. When recompression is delayed, a number of strategies have been suggested to improve the outcome. We examined the effectiveness and safety of both recompression and adjunctive therapies in the treatment of DCI.

METHODS: We searched CENTRAL (Cochrane Central Register of Controlled Trials) (The Cochrane Library 2009, Issue 2); MEDLINE (Medical Literature Analysis and Retrieval System Online) (1966 to July 2009); CINAHL (Cumulative Index to Nursing and Allied Health Literature) (1982 to July 2009); EMBASE (Excerpta Medica Database) (1980 to July 2009); the Database of Randomized Controlled Trials (RCTs) in Hyperbaric Medicine (July 2009); and hand-searched journals and texts. We included RCTs that compared the effect of any recompression schedule or adjunctive therapy with a standard recompression schedule and applied no language restrictions. Three authors extracted the data independently. We assessed each trial for internal validity and resolved differences by discussion. Data were entered into RevMan 5.0 software (Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2008).

RESULTS: Two RCTs satisfied the inclusion criteria. Pooling of data was not possible. In one study, there was no evidence of improved effectiveness with the addition of a nonsteroidal antiinflammatory drug to routine recompression therapy (at 6 weeks: relative risk 1.04, 95% confidence interval [CI]: 0.90–1.20, P = 0.58), but there was a reduction in the number of recompression treatments required when tenoxicam was added (P = 0.01, 95% CI: 0–1). In the other study, the odds of multiple recompressions were lower with a...
DISCUSSION: Recompression therapy is the standard for treatment of DCI, but there is no RCT evidence. The addition of a nonsteroidal antiinflammatory drug (tenoxicam) or the use of heliox may reduce the number of recompressions required, but neither improves the odds of recovery. The application of either of these strategies may be justified. The modest number of patients studied demands a cautious interpretation. Benefits may be largely economic, and an economic analysis should be undertaken. There is a case for large randomized trials of high methodological rigor to define any benefit from the use of different breathing gases and pressure profiles during recompression.

局麻藥可通過細胞內鹼化使大鼠背根神經節神經元細胞線粒體膜電位去極化
Local Anesthetics Depolarize Mitochondrial Membrane Potential by Intracellular Alkalization in Rat Dorsal Root Ganglion Neurons
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Anesth Analg September 2010 111:775-783;

背景：儘管已經有報導：局部麻醉藥，特別是利多卡因，具有細胞毒性，但機制尚不清楚。線粒體膜電位的去極化(ΔΨm)，是線粒體功能障礙的標誌之一，受質子電化學梯度(Δ H+ )調節。因此，細胞內 ph 值([pH]in)和線粒體 ph([pH]m)是調整 ΔΨm 的重要因素。然而，局麻藥對於[pH]in 和 [pH]m 的影響尚不清楚。為了解細胞線粒體於局麻藥的反應，作者同時檢測了[pH]m、[pH]in 以及 ΔΨm。

方法：用比率計量螢光探針 JC-1 和 HPTS 同時測量大鼠背根神經節神經元的 ΔΨm 和 [pH]in。carboxy-SNARF-1 螢光探針用來測定 [pH]m。評估對象為利多卡因、甲呱卡因、布比卡因、普魯卡因、QX-314（利多卡因的一種帶電形式）以及氯化銨 (NH4Cl)。

結果：應用利多卡因、甲呱卡因、布比卡因和普魯卡因時，ΔΨm 去極化，而 [pH]in 呈現劑量相關的增加。在灌注利多卡因、甲呱卡因、布比卡因、普魯卡因和 NH4Cl 時，ΔΨm 和 [pH]in 之間存在明顯聯繫。相反，灌注 QX-314 時，沒有改變 ΔΨm 和 [pH]in。在低 ph 的溶液(ph6)，以及弱酸的環境中，利多卡因沒有增加 [pH]in 或者使 ΔΨm 去極化。灌注利多卡因、甲呱卡因、布比卡因、普魯卡因，以及氯化銨(NH4Cl)時也增加了 [pH]m。

結論：結果表明不帶電（原形）局麻藥導致 ΔΨm 去極化。原因之一是細胞內和線粒體的鹼化。

（懷曉蓉 譯 陳傑 校）

BACKGROUND: Although it has been reported that local anesthetics, especially lidocaine, are cytotoxic, the mechanism is unclear. Depolarization of the mitochondrial membrane potential (ΔΨm), one of the markers of mitochondrial failure, is regulated by the proton electrochemical gradient (Δ H+ ). Therefore, intracellular pH ([pH]in) and
Mitochondrial pH ([pH]m) are important factors for modifying ΔΨm. However, the effects of local anesthetics on [pH]in and [pH]m are unclear. To investigate mitochondrial responses to local anesthetics, we simultaneously measured [pH]m and [pH]in, along with ΔΨm.

**METHODS:** The ratiometric fluorescent probe JC-1 and HPTS were used for the simultaneous measurements of ΔΨm with [pH]in in rat dorsal root ganglion neurons. A carboxy-SNARF-1 fluorescent probe was used to measure [pH]m. Lidocaine, mepivacaine, bupivacaine, procaine, QX-314, a charged form of lidocaine, and ammonium chloride (NH₄Cl) were evaluated.

**RESULTS:** ΔΨm was depolarized and [pH]in was increased by lidocaine, mepivacaine, bupivacaine, and procaine in a dose-dependent manner. Significantly, a relationship between ΔΨm and [pH]in was observed for lidocaine, mepivacaine, bupivacaine, procaine, and NH₄Cl perfusion. In contrast, QX-314 did not change ΔΨm or [pH]in. In low-pH saline (pH6) and in the presence of a weak acid, lidocaine failed to increase [pH]in or depolarize ΔΨm. The [pH]m was also increased by lidocaine, mepivacaine, bupivacaine, procaine, and NH₄Cl.

**CONCLUSION:** These results demonstrate that uncharged (base) forms of local anesthetics induce ΔΨm depolarization. One of the causes is intracellular and mitochondrial alkalization.

Transversus Abdominis Plane Block Does Not Provide Additional Benefit to Multimodal Analgesia in Gynecological Cancer Surgery

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Anesth Analg September 2010 111:797-801;

**背景**：腹横肌平面阻滞是一种最新的被描述为在腹壁的腹内斜肌层和腹横肌层间注射局部麻醉药的新技术。它已被证实其在多种临床环境下在减少吗啡用量及改善术后疼痛的缓解方面有效。

**方法**：作者对明确或怀疑是妇科恶性肿瘤并行腹正中线剖腹探查的成年女性病例在超声定位下以注射2×20ml的0.5%罗呱卡因和0.9%生理盐水行双侧腹横肌阻滞来进行随机对照试验比较。两组试验物件均接受多模式静脉镇痛。本次研究的主要结果是通过确定是否有术后2小时用力呼吸的镇痛不足（通过视觉类比评分法数值＞50mm判定）及术后2小时及24小时的吗啡总消耗量来判定。

**结果**：本次研究共包括65名患者的资料。各组年龄、体重、手术时间及术中吗啡用量相匹配。在2小时镇痛不足患者比例上对照组和实验组无论是休息状态（39%：22%，P=0.13）还是咳嗽状态（61%：53%，P=0.54）无显著性差异。对照组和实验组在术后2小时吗啡总用量（13.5mg：11.87mg，P=0.54）和24小时吗
啡總用量（34mg：36.1mg，P=0.76）上也無顯著性差異。在阿片類藥物副反應及患者滿意度上兩組無顯著性差異。

結論：本次研究證明對於進行婦科癌症手術的女性患者，腹橫肌平面阻滯對於多模式鎮痛無附加益處。

（曹強 譯 陳傑 校）

BACKGROUND: The transversus abdominis plane (TAP) block is a recently described technique involving injecting local anesthetic between the internal oblique and transversus abdominis layers of the abdominal wall. It has been shown to be effective in reducing morphine consumption and improving postoperative pain relief in several clinical settings.

METHODS: We performed a randomized placebo-controlled trial comparing bilateral ultrasound-guided TAP blocks (2 × 20 mL 0.5% ropivacaine or 0.9% saline) in adult female patients undergoing midline laparotomy for known or presumed gynecological malignancy. Both groups received multimodal IV analgesia. The primary outcomes for the study were defined as the incidence of “inadequate” analgesia (defined as a score >50 mm on a visual analog scale) with forced expiration at 2 hours postoperatively and total postoperative morphine consumption at 2 hours and 24 hours.

RESULTS: Data from 65 patients were included in the study. The groups were comparable in terms of age, weight, surgical duration, and intraoperative morphine doses. There were no significant differences between the control and treatment groups in the proportion of patients with inadequate analgesia either at rest (39% vs. 22%, P = 0.13) or with coughing (61% vs. 53%, P = 0.54) at 2 hours. There was no significant difference in postoperative morphine consumption between the placebo and treatment groups at 2 hours (13.5 mg vs. 11.87 mg, P = 0.53) or 24 hours (34.0 mg vs. 36.1 mg, P = 0.76). There were no significant differences in the incidence of opioid side effects or patient satisfaction.

CONCLUSION: This study demonstrated that TAP blockade conferred no benefit in addition to multimodal analgesia in women undergoing major gynecological cancer surgery.

簡報：區域麻醉穿刺針會引導超聲凝膠進入組織

Brief Reports: Regional Anesthesia Needles Can Introduce Ultrasound Gel into Tissues

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Anesth Analg September 2010 111:811-812;

背景：麻醉醫生在超聲引導的區域麻醉中會將穿刺針穿透超聲凝膠。在本次研究中，作者擬明確穿刺針能否將凝膠導入組織中。

方法：被染成藍色的超聲凝膠在豬內薄皮上進行試驗。將 Tuohy 針和短錐穿刺針穿過凝膠和豬肉。然後證實穿刺針內有無超聲凝膠的存在。

結果：包括有管心針在內的所有穿刺針，針腔內都帶有凝膠和組織。
BACKGROUND: Anesthesiologists may insert needles through ultrasound gel when performing ultrasound-guided regional anesthesia. In this study, it was determined whether needles carry gel into tissues.

METHODS: Ultrasound gel dyed blue was applied to pork rashers. Tuohy and short-bevel needles were passed through the gel and pork. The needles were then assessed for the presence of ultrasound gel.

RESULTS: All needles, including those with stylets, carried gel and tissue within the lumen.

CONCLUSIONS: Ultrasound gel may be injected around (and perhaps in) nerves during regional anesthesia procedures. Studies are needed to determine the implications of this practice.