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使用醫學模擬探查麻醉機管道供氣交換中設備故障和人-機交互作用

Use of Medical Simulation to Explore Equipment Failures and Human-Machine Interactions in Anesthesia Machine Pipeline Supply Crossover

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背景：高保真度的醫學模擬可用於探查技術、設備的故障模式和人-機交互作用。我們使用一個設備故障類比方案、即氧氣(O_2)/氧化亞氮(N_2O)管道交換，來調查住院醫生的知識和他們在一個快速升高的危機中對麻醉設備的使用。
方法：在這個描述性研究中，20 個從業 3 年的麻醉科住院醫生兩兩配對分為 10 組。本研究使用 Ohmeda Modulus SE 7500 麻醉機和提供生命體征和氣體監護的 Datex AS/3 監護儀。實驗開始前，我們轉換了管道連接，即 N_2O 進入 O_2 管道而 O_2 進入 N_2O 管道。由於轉換了管道，輔助 O_2 流量計測的是 N_2O 而非 O_2 的流量。兩個專業、獨立的評估人員觀看實驗錄影並記錄參與者明確注意到的警告和通氣方法。
結果：9 組注意到了低吸入氧氣分數(FIO_2)警報。只有 3 組認識到高吸入氧化亞氮分數(FIN_2O)警報。1 組均未認識到低 FIO_2 警報和高 FIN_2O 警報。9 組用了 3 步或更多的步驟來確定氧合線路。7 組在管理步驟中的幾個點上使用了輔助 O_2 流量計。
結論：這麼多參與者使用了輔助 O_2 流量計這個事實顯露了設備危機中的機械因數和相關的人-機交互作用。作為 O_2 的假定外源，輔助 O_2 流量計的使用延遲了確定性治療。很多參與者也沒有注意到高 N_2O 的存在。這可部分歸因於回顧錄影時我們揭露的 2 個事實：(a)高 N_2O 警報的短暫性和(b)低 FIO_2 警報的顯性，這些都可選擇靜音。我們建議高保真度模擬的使用可能是一個有希望的途徑，可用來進一步檢查與設備故障模式和臨床醫生合理管理應答策略相關的假設。
（周潔 譯 馬皓琳 李士通 校）

BACKGROUND: High-fidelity medical simulation can be used to explore failure modes of technology and equipment and human-machine interactions. We present the use of an equipment malfunction simulation scenario, oxygen (O_2)/nitrous oxide (N_2O) pipeline crossover, to probe residents' knowledge and their use of anesthetic equipment in a rapidly escalating crisis.
METHODS: In this descriptive study, 20 third-year anesthesia residents were paired into 10 two-member teams. The scenario involved an Ohmeda Modulus SE 7500 anesthetic

machine with a Datex AS/3 monitor that provided vital signs and gas monitoring. Before the scenario started, we switched pipeline connections so that N_2O entered through the O_2 pipeline and vice versa. Because of the switched pipeline, the auxiliary O_2 flowmeter delivered N_2O instead of O_2. Two expert, independent raters reviewed videotaped scenarios and recorded the alarms explicitly noted by participants and methods of ventilation.
RESULTS: Nine pairs became aware of the low fraction of inspired O_2 (FIO_2) alarm. Only 3 pairs recognized the high fraction of inspired N_2O (FIN_2O) alarm. One group failed to recognize both the low FIO_2 and the high FIN_2O alarms. Nine groups took 3 or more steps before instigating a definitive route of oxygenation. Seven groups used the auxiliary O_2 flowmeter at some point during the management steps.
CONCLUSIONS: The fact that so many participants used the auxiliary O_2 flowmeter may expose machine factors and related human-machine interactions during an equipment crisis. Use of the auxiliary O_2 flowmeter as a presumed external source of O_2 contributed to delays in definitive treatment. Many participants also failed to notice the presence of high N_2O. This may have been, in part, attributable to 2 facts that we uncovered during our video review: (a) the transitory nature of the "high N_2O" alert, and (b) the dominance of the low FIO_2 alarm, which many chose to mute. We suggest that the use of high-fidelity simulations may be a promising avenue to further examine hypotheses related to failure modes of equipment and possible management response strategies of clinicians.

醫務工作者和高危病人間對天然橡膠膠乳敏感症的遺傳素質存在差異

Genetic Predisposition to Natural Rubber Latex Allergy Differs Between Health Care Workers and High-Risk Patients

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背景: 已有研究顯示在醫務工作者中，當與非過敏性對照相比時，天然橡膠膠乳(NRL)敏感症顯型與白介素 13 和 18（IL13 和 IL18）中的啟動子多態性有關。然而，高危人群（諸如出生時就有神經管缺陷或泌尿生殖系統異常）是否顯示出在醫務工作者中已經報導的同樣的遺傳學/免疫學的危險因素的增高傾向。本研究中，

我們驗證了編碼 IL13 和 IL18 的基因的單核苷酸多態性在有脊柱裂（SB）或膀胱外翻（BE）的 NRL 敏感症病人中發生率增高這一假說。
方法：對 120 名試驗對象（SB40，BE40 和對照組 40）應用臨床病史調查表及血中的 NRL 特異性免疫球蛋白 E（IgE）抗體測定結果來篩選。從外周血淋巴細胞中提取出基因組 DNA，分析關注的候選基因中單核苷酸的多態性。進行單變數和多變數分析，來判斷重要的參數是否具有顯著性差異（定義為 P<0.05）。
結果： 對 NRL 變應原的致敏作用（IgE 抗體陽性）與特應性病史和既往手術次數有關，並且可通過在出生時就避免接觸 NRL 來預防。然而，與醫務工作者不同的是，當將 NRL 敏感的 SB 和 BE 病人與非敏感的病人、特應性及非特應性的對照病人相比時，NRL 過敏症顯型並不與 IL13 或 IL18 中啟動子的多態性顯著有關。
結論：在出生時就患有 SB 或 BE 的病人，環境因素似乎在 NRL 致敏作用和明顯的敏感症狀的發展中比以前研究顯示的在醫務工作者中與 NRL 敏感症有關的 IL13 和 IL18 中 IL 多態性發揮著更重要的作用。
（黃麗娜 譯 馬皓琳 李士通 校）

BACKGROUND: In health care workers, the natural rubber latex (NRL) allergy phenotype has been shown to be associated with promoter polymorphisms in interleukins 13 and 18 (*IL13* and *IL18*) when compared with nonatopic controls. However, it is not known whether high-risk patient populations, such as those born with neural tube defects or genitourinary abnormalities, demonstrate a heightened propensity toward the same genetic/immunologic risk factors that have been reported for health care workers. In this study, we tested the hypothesis that single-nucleotide polymorphisms in genes encoding *IL13* and *IL18* occur at an increased frequency in NRL allergic patients with spina bifida (SB) or bladder exstrophy (BE).
METHODS: One hundred twenty subjects (40 SB, 40 BE, and 40 control) were screened using a clinical history questionnaire and NRL-specific immunoglobulin E (IgE) antibody measurements in the blood. Genomic DNA was extracted from peripheral blood lymphocytes and analyzed for single-nucleotide polymorphisms in candidate genes of interest. Univariate and multivariate analyses were performed to identify significant variables with significance defined as $P < 0.05$.
RESULTS: Sensitization (IgE antibody positivity) to NRL allergens was associated with atopic history and number of prior operations and was prevented by the avoidance of NRL beginning at birth. However, unlike health care workers, the NRL allergy phenotype was not significantly associated with promoter polymorphisms in *IL13* or *IL18* when comparing NRL allergic SB and BE patients with nonsensitized patients and with atopic and nonatopic controls.
CONCLUSIONS: In patients born with SB or BE, environmental factors seem to play a greater role in the development of NRL sensitization and overt allergic symptoms than the IL polymorphisms in *IL13* and *IL18* previously shown to be associated with NRL allergy in health care workers.

輕度低溫在氣栓導致急性肺損傷中的作用

The Role of Mild Hypothermia in Air Embolism–Induced Acute Lung Injury

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背景：輕度低溫已成為缺血性腦損傷的一個重要治療手段。然而，輕度低溫對氣栓導致肺損傷的作用還不清楚。在本研究中，我們探討：在空氣輸注前和空氣輸注同時兩個時間點，使用輕度低溫是否減少氣栓導致的急性肺損傷。
方法：在本次大鼠模型研究（Sprague-Dawley 大鼠）中，通過靜脈輸注空氣（25μL/min，40min）產生肺氣栓。對照大鼠不接受空氣輸注。大鼠隨機分為：兩個對照組（正常體溫組 37°C 和輕度低溫組 34°C）和三個空氣栓塞組（輸注空氣前輕度低溫；輸注空氣且正常體溫；輸注空氣同時輕度低溫）。在實驗結束時，評估肺損傷變數。
結果：輸注空氣引起了肺的濕/幹重量比例及支氣管肺泡灌洗液中蛋白質、乳酸脫氫酶和腫瘤壞死因數（TNF）-α 濃度的明顯增加。還明顯增加了髓過氧化物酶活性、中性粒細胞浸潤和間質水腫。另外，肺內核因數（NF）-κB 活性也明顯增加。在輸注空氣前用輕度低溫處理減少了以上變數的增加，然而輸注空氣同時進行輕度低溫治療則對它們無明顯效果。
結論：我們實驗表明：在輸注空氣前進行輕度低溫，減少了氣栓導致的急性肺損傷。這個保護機制可能是抑制了炎症反應。
（王海濤 譯 馬皓琳 李士通 校）

BACKGROUND: Mild hypothermia has become an important treatment for ischemic brain injury. However, the role of mild hypothermia in air embolism–induced lung injury has not been explored. In this study, we investigated whether treatment with mild hypothermia before and synchronous with air infusion can attenuate acute lung injury induced by air embolism.
METHODS: In this rat model study (Sprague-Dawley rats), pulmonary air embolism was induced by venous infusion of air at a rate of 25 μL/min for 40 minutes. Control animals received no air infusion. The rats were randomly assigned to 2 control groups of normothermia (37°C) and mild hypothermia (34°C) and 3 air embolism groups of mild hypothermia induced before air infusion, normothermia with air infusion, and mild hypothermia induced synchronous with air infusion. At the end of the experiment, the variables of lung injury were assessed.
RESULTS: Air infusion elicited a significant increase in lung wet/dry weight ratio and protein, lactate dehydrogenase, and tumor necrosis factor-α concentration of the bronchoalveolar lavage fluid. Myeloperoxidase activity, neutrophil infiltration, and

interstitial edema in lung tissue were also significantly increased. In addition, nuclear factor-κB activity was significantly increased in the lungs. Treatment with mild hypothermia before air infusion reduced increases in these variables, whereas mild hypothermia synchronous with air infusion had no significant effect on them.
CONCLUSIONS: Our study suggests that mild hypothermia before air infusion decreases air embolism–induced acute lung injury. The protective mechanism seems to be the inhibition of inflammation.

燒傷病人中煙鹼型乙醯膽鹼受體基因的表達發生改變

Nicotinic Acetylcholine Receptor Gene Expression Is Altered in Burn Patients

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簡介：人們已經發現燒傷病人對去極化肌松藥琥珀膽鹼引起的高鉀血症效應更加敏感。煙鹼型乙醯膽鹼受體（nAChR）亞單位組成的變化會造成受體電生理學、藥理學及代謝特性的改變，從而導致由乙醯膽鹼引起的高鉀血症。目前還沒有研究表明燒傷病人中 nAChR 亞單位組成發生上調和/或改變。對急性損傷的病人，在疾病的不同時間窗裏進行肌肉活檢，在技術上和倫理道德上均存在一定困難，這也是造成對人類的研究報告缺少的主要原因。nAChR 在口腔角質白細胞中表達，並且在吸煙者中上調或改變。然而，對於燒傷病人口腔粘膜中的 nAchRs 表達尚無研究。
方法：我們分別在 9 例燒傷病人和 6 例外科重症監護室病中對照非燒傷手術患者中收集了口腔黏膜削刮的碎屑。在兩組病人中，我們在病人呈現時（記錄為 0 小時）及 12 小時、24 小時、48 小時、一周和兩周的時間點上採集組織。我們通過即時逆轉錄聚合酶鏈反應進行 nAChR 亞單位 α1、α7、γ 和 ϵ 的基因表達。
結果：在燒傷病人中，nAChR 亞單位 α7 和 γ 基因的表達顯著上調，而 α1 和 ϵ nAChR 基因幾乎不受影響，顯示在整個研究過程中無顯著變化。
討論：經過 2 周的檢測發現，燒傷和對照病人的 α7 和 γ 基因發生上調，但燒傷病人中上調的 α7 和 γ 亞單位比例較對照的外科 ICU 病人顯著較高。這提示熱傷和基因表達的變化之間可能存在因果關係。我們發現這種作用是在非熱傷的部位並且非肌肉組織，由此強調了熱損傷產生影響的全身性。由於基因的表達是蛋白質產生的基礎，α7 和 γ 基因表達的上調可能轉化為更多 α7 和 γ 蛋白質亞單位，這些蛋白質也可以相互結合或是與其他類型的亞單位（如 α1、β、ϵ 等）結合來組成電生理學特性改變的 nAChR，從而導致了異常的臨床表現。
總結：由於 nAChR 基因表達的上調/改變發生在遠離損傷區域的非肌肉組織，熱損傷導致的可能是全身性變化。人們可以通過使用微創的方法（口腔黏膜刮屑）和高

敏感度的技術（即時逆轉錄聚合酶鏈反應）研究熱損傷對 nAChR 基因亞單位的影響，而避免使用創傷性更大的方法。
（劉伍 譯 馬皓琳 李士通 校）

INTRODUCTION: Burn patients have been observed to be more susceptible to the hyperkalemic effect of the depolarizing muscle relaxant succinylcholine. Changes in nicotinic acetylcholine receptor (nAChR) subunit composition may alter electrophysiologic, pharmacologic, and metabolic characteristics of the receptor inducing hyperkalemia on exposure to succinylcholine. No studies have been performed that show the upregulation and/or alteration of nAChR subunit composition in human burn patients. The scarcity of studies performed on humans with burn injury is mainly attributable to the technical and ethical difficulties in obtaining muscle biopsies at different time frames of illness in these acutely injured patients. nAChRs are expressed in oral keratinocytes and are upregulated or altered in smokers. However, no studies have addressed the expression of nAChRs in the oral mucosa of burn patients.
METHODS: Buccal mucosal scrapings were collected from 9 burn patients and 6 control nonburn surgical intensive care unit patients. For burn and control patients, tissues were collected upon presentation (time: 0 hour) and at time points 12, 24, and 48 hours, 1 week, and 2 weeks. Gene expression of the nAChR subunits α1, α7, γ, and ϵ were performed using real-time reverse transcriptase polymerase chain reaction.
RESULTS: α7 and γ nAChR genes were significantly upregulated in burn patients, whereas α1 and ϵ nAChR genes were minimally affected, showing no significant changes over time.
DISCUSSION: Over the 2 weeks of measurement, an upregulation of the α7 and γ genes occurred in both burn and control patients; however, the proportion of α7 and γ subunit increases was significantly higher in burn patients than in control surgical intensive care unit patients. The relationship between the thermal injury and the observed alteration in gene expression suggests a possible cause/effect relationship. This effect was observed at a site not affected by the burn injury and in nonmuscle tissues, thus emphasizing the systemic nature of the effect caused by the thermal injury. Because gene expression is the basis of protein production, the upregulation of α7 and γ genes might translate into more α7 and γ protein subunits. These proteins can also combine with each other or with other types of subunits (α1, β, ϵ . . .) to form nAChRs with altered electrophysiologic characteristics leading to the observed abnormal clinical outcomes.
CONCLUSION: Thermal injury may infer a systemic effect because upregulation/alteration of nAChRs occurs in nonmuscle tissues distant from the site of injury. The effect of thermal injury on nAChR gene subunits can be studied using a minimally invasive method (buccal mucosal scraping) and a highly sensitive technology (real-time reverse transcriptase polymerase chain reaction) obviating the need for more invasive methods.

心臟病患兒麻醉相關心臟停搏：來自兒科圍術期心臟停搏(POCA)登記處的資料

Anesthesia-Related Cardiac Arrest in Children with Heart Disease: Data from the Pediatric Perioperative Cardiac Arrest (POCA) Registry

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背景：1994 至 2005 年，兒科圍術期心臟停搏登記處收集了 373 例兒童的麻醉相關心臟停搏(CAs)，其中 34%患有先天性或後天性心臟病(HD)。
方法：近 80 個志願為兒童提供麻醉的北美機構加入了兒科圍術期心臟停搏登記處。用於 18 歲及以下兒童中的每一例圍術期心臟停搏的標準化資料表格以不記名方式交付。我們分析患和不患心臟病兒童的麻醉相關心臟停搏的原因和結果。
結果：和 245 例不患心臟病兒童相比，127 例患心臟病的停搏兒童病得更重（92%比 62% ASA 評分 III–V; $P < 0.01$），且更有可能由於心血管原因而停搏(50%比 38%; $P = 0.03$)，儘管停搏的確切的心血管原因通常很難確定。死亡率在心臟病患兒（33%）較非心臟病患兒高（23%, $P = 0.048$），但用 ASA 體格狀態分級修正後則無差異。超過半數（54%）的患有心臟病患者的心臟停搏的報導來自普通手術室，26%來自心臟手術室，17%來自導管實驗室。發生心臟停搏患者的最常見心臟病損害種類是單心室（$n = 24$）。在心臟停搏時，多數先天性心臟病患者尚未修補（59%）或病情減輕（26%）。患主動脈狹窄和心肌病患者的停搏和最高的死亡率相關（分別是 62%和 50%），雖然一些心臟病損害的小樣本量妨礙了統計學比較。
結論：心臟病患兒比非心臟病患兒在麻醉相關心臟停搏發生時病情更嚴重，且在停搏後死亡率更高。此類停搏在普通手術室報導的頻率最高且可能由心血管因素導致。麻醉相關心臟停搏的原因和相關因素的確認對其預防提示了可能的策略。
（唐李雋 譯 馬皓琳 李士通 校）
BACKGROUND: From 1994 to 2005, the Pediatric Perioperative Cardiac Arrest Registry collected data on 373 anesthesia-related cardiac arrests (CAs) in children, 34% of whom had congenital or acquired heart disease (HD).
METHODS: Nearly 80 North American institutions that provide anesthesia for children voluntarily enrolled in the Pediatric Perioperative Cardiac Arrest Registry. A standardized data form for each perioperative CA in children 18 years old or younger was submitted anonymously. We analyzed causes of and outcomes from anesthesia-related CA in children with and without HD.
RESULTS: Compared with the 245 children without HD, the 127 children with HD who arrested were sicker (92% vs 62% ASA physical status III–V; $P < 0.01$) and more likely to arrest from cardiovascular causes (50% vs 38%; $P = 0.03$), although often the exact cardiovascular cause of arrest could not be determined. Mortality was higher in patients with HD (33%) than those without HD (23%, $P = 0.048$) but did not differ when adjusted for ASA physical status classification. More than half (54%) of the CA in patients with HD were reported from the general operating room compared with 26% from the cardiac

operating room and 17% from the catheterization laboratory. The most common category of HD lesion in patients suffering CA was single ventricle (*n* = 24). At the time of CA, most patients with congenital HD were either unrepaired (59%) or palliated (26%). Arrests in patients with aortic stenosis and cardiomyopathy were associated with the highest mortality rates (62% and 50%, respectively), although statistical comparison was precluded by small sample size for some HD lesions.
CONCLUSIONS: Children with HD were sicker compared with those without HD at the time of anesthesia-related CA and had a higher mortality after arrest. These arrests were reported most frequently from the general operating room and were likely to be from cardiovascular causes. The identification of causes of and factors relating to anesthesia-related CA suggests possible strategies for prevention.

用於兒科醫療操作的氧化亞氮鎮靜水準

Level of Sedation with Nitrous Oxide for Pediatric Medical Procedures

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背景：濃度小於 50%的氧化亞氮（N_2O）作為一種輕度鎮靜藥被美國麻醉學家協會和美國兒科學會所接受。 N_2O 濃度大於 50%時的預期鎮靜水準不太明瞭。
方法：我們在明尼蘇達的兒童醫院和診所對所有接受 N_2O 用於操作鎮靜的患兒進行了回顧性的病歷檢查。記錄患兒年齡、最大 N_2O 濃度、N_2O 持續吸入時間、操作的完成以及不良事件。對鎮靜水準進行0-6分評分。
結果：給予年齡小於 18 歲的 1585 例患者吸入 1858 次 N_2O。大多數吸入（91.3%）的 N_2O 的濃度大於 50%，鎮靜水準評分如下：6 分（鎮靜不足）=1.3%，5 分（輕度鎮靜）=94.3%，4 分（嗜睡）=4.3%，沒有評分小於 4 分的患者。59 名患者（3.3%）出現不良事件，其中 6 例（0.3%）不典型。N_2O 濃度≤50%和>50%之間，在鎮靜水準和不良事件的數量上並沒有差異。兩歲以下的患兒（7.4%）較兩歲以上的患兒（4%）達到 4 分的比例要高，但不良事件的發生率相似。N_2O 吸入持續時間對鎮靜水準沒有影響。鎮靜不足的患者較其他組患者年齡要小。大多數操作（94.1%）在患者平靜且不動的情況下進行。
結論：當用一個設計來滴定 N_2O 濃度範圍為 0%-70%的系統經由鼻罩吸入 N_2O 濃度大於 50%時，大多數的患兒能夠維持輕度鎮靜。用這種方式吸入 N_2O 濃度大於 50%的患者不良事件的發生率與一些大型研究中報導的 50%N_2O 的不良事件發生率相似。
（徐妍君 譯　馬皓琳 李士通 校）

BACKGROUND: Nitrous oxide (N_2O) delivered at a concentration <50% is accepted as a minimal sedation drug by both the American Society of Anesthesiologists and the American Academy of Pediatrics. The expected level of sedation at an N_2O concentration >50% is less clear.
METHODS: We conducted a retrospective chart review for all children receiving N_2O for procedural sedation at Children's Hospitals and Clinics of Minnesota. Patient age,

maximal N_2O concentration, duration of N_2O administration, completion of procedure, and adverse events were recorded. Level of sedation was assessed on a 0 to 6 scale.
RESULTS: N_2O was administered on 1858 occasions to 1585 patients younger than 18 years. Most administrations (91.3%) were N_2O concentration >50%. Level of sedation scores were as follows: 6 (inadequate) = 1.3%; 5 (minimal) = 94.3%; and 4 (drowsy) = 4.3%; no patient reached a sedation score <4. Fifty-nine patients (3.3%) had adverse events of which 6 (0.3%) were atypical. There was no difference between N_2O ≤50% and N_2O >50% in the level of sedation or number of adverse events. More children ≤2 years (7.4%) achieved a sedation level of 4 than those older than 2 years (4%), but they experienced a similar rate of adverse events. There was no difference in the level of sedation by duration of N_2O administration. Inadequately sedated patients were younger than the remainder of the group. Most procedures (94.1%) were completed with the patient calm and still.
CONCLUSIONS: A significant number of children remain minimally sedated while receiving N_2O at concentrations >50% via nasal hood using a system designed to titrate N_2O concentration from 0% to 70%. Adverse event rates of patients receiving >50% N_2O in this manner are similar to rates reported in large studies of 50% N_2O administration.

腦內出血的緊急處理：一項臨床綜述

The Acute Management of Intracerebral Hemorrhage: A Clinical Review

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腦內出血（ICH）是一種具有高發病率和死亡率的毀壞性疾病。ICH 的主要高危因素包括：慢性動脈高血壓以及口服抗凝劑。首次出血後，血腫膨脹以及血腫周圍水腫導致了繼發性的腦損壞並惡化病情。急性的局部神經功能障礙並伴有顱內壓增高的臨床體征強烈提示了 ICH 的診斷，但是仍需頭顱影像學檢查與缺血性中風相鑒別。ICH 是醫療緊急情況並且早期的處理應該關注心肺參數的緊急穩定以及對顱內併發症的處理。超過 90%的患者有急性高血壓，而且現有一些證據說明緊急的降壓是安全的並且可減緩血腫擴張以及減少早期神經學上惡化的危險性。然而，對於早期使用重組因數 VIIa (rFVIIa)可能改善結果的樂觀論並未被大量三期臨床試驗所證實。ICH 是華法令抗凝的最可怕的併發症，並且阻止顱內出血的需要比所有的其他因素更為重要。逆轉華法令的治療選項包括維生素 K、新鮮冰凍血漿、凝血酶原複合物濃縮劑和 rFVIIa。並沒有證據來指導抗血小板治療相關 ICH 的特殊處理。除了對腦積水患者置入腦室引流和對大量後顱窩血腫引流以外，其他的神經外科介入治療的時間和性質仍具有爭議性。大量證據表明，ICH 患者在專業的監護和管理心肺參數和顱內壓並直接對症處理的神經專科重症監護室內可使愈後改善。液體以及血糖的管理、降低呼吸機獲得性肺炎的可能性、發熱控制、腸內營養供應以及預防血栓栓塞也必需注意。人們越來越多地體會到 ICH 急性期積極的處理可以改善 ICH 的愈後。

（龔寅 譯 馬皓琳 李士通 校）

Intracerebral hemorrhage (ICH) is a devastating disease with high rates of mortality and morbidity. The major risk factors for ICH include chronic arterial hypertension and oral anticoagulation. After the initial hemorrhage, hematoma expansion and perihematoma edema result in secondary brain damage and worsened outcome. A rapid onset of focal neurological deficit with clinical signs of increased intracranial pressure is strongly suggestive of a diagnosis of ICH, although cranial imaging is required to differentiate it from ischemic stroke. ICH is a medical emergency and initial management should focus on urgent stabilization of cardiorespiratory variables and treatment of intracranial complications. More than 90% of patients present with acute hypertension, and there is some evidence that acute arterial blood pressure reduction is safe and associated with slowed hematoma growth and reduced risk of early neurological deterioration. However, early optimism that outcome might be improved by the early administration of recombinant factor VIIa (rFVIIa) has not been substantiated by a large phase III study. ICH is the most feared complication of warfarin anticoagulation, and the need to arrest intracranial bleeding outweighs all other considerations. Treatment options for warfarin reversal include vitamin K, fresh frozen plasma, prothrombin complex concentrates, and rFVIIa. There is no evidence to guide the specific management of antiplatelet therapy–related ICH. With the exceptions of placement of a ventricular drain in patients with hydrocephalus and evacuation of a large posterior fossa hematoma, the timing and nature of other neurosurgical interventions is also controversial. There is substantial evidence that management of patients with ICH in a specialist neurointensive care unit, where treatment is directed toward monitoring and managing cardiorespiratory variables and intracranial pressure, is associated with improved outcomes. Attention must be given to fluid and glycemic management, minimizing the risk of ventilator-acquired pneumonia, fever control, provision of enteral nutrition, and thromboembolic prophylaxis. There is an increasing awareness that aggressive management in the acute phase can translate into improved outcomes after ICH.

在健康志願者中用定量感覺檢測來觀察雙側針刺鎮痛

Bilateral Acupuncture Analgesia Observed by Quantitative Sensory Testing in Healthy Volunteers

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背景：有證據表明針灸啟動不同的脊髓和棘上鎮痛系統，但對感覺系統的具體調節作用沒有得到系統的研究。在此研究中，我們評估了不同類型的針灸對溫度、機械和振動感覺閾值的瞬即影響。

方法：24 個健康志願者（12 例男性，12 例女性，平均年齡 33.1 歲）在一個單盲交叉試驗接受 3 種不同形式的針灸，包括手工針刺、帶低頻電針刺激或高頻電針刺激的針刺。干預之間的時間間隔為一個星期。所有類型的針灸用於單側下肢上的標準穴道：脾 6、脾 9、胃 36 和膽囊 39。在每次干預後立即用系統定量感覺測試（QST）評估針灸效果。QST 測試在雙下肢進行，包括熱和機械感覺、痛覺和振動覺的閾值。

結果：手動針刺後，在針刺側和非針刺側的熱痛閾與基礎相比升高。低頻率電刺激和高頻率電刺激使針刺側機械痛閾較基礎和手動針刺較高。壓力痛閾在所有類型的針灸中雙側皆升高，個體變化為基礎值的 25%至 52%。

結論：三種普通針灸刺激方法後 QST 有一致的變化，單側和雙側均有影響。

（滕凌雅 譯 馬皓琳 李士通 校）

BACKGROUND: There is evidence that acupuncture activates different spinal and supraspinal antinociceptive systems, but the specific modulatory effects on the sensory system have not been systematically investigated. In this study, we evaluated the immediate effects of different types of acupuncture on thermal, mechanical, and vibratory sensory thresholds.

METHODS: Twenty-four healthy volunteers (12 men and 12 women, mean age 33.1 years) received 3 different forms of acupuncture in a single-blinded crossover design; these included manual acupuncture, acupuncture with low-frequency electrical stimulation, and acupuncture with high-frequency electrical stimulation. The time between the interventions was 1 week. All forms of acupuncture were applied unilaterally in the leg at standard acupuncture points: spleen 6, spleen 9, stomach 36, and gallbladder 39. The effects of acupuncture were evaluated by systematic quantitative sensory testing (QST) immediately after each intervention. QST was performed on bilateral lower extremities, including thermal and mechanical perception and pain and vibratory thresholds.

RESULTS: The heat pain threshold was increased after manual acupuncture on the treated and untreated side compared with baseline. Low- and high-frequency electrostimulation led to a higher mechanical pain threshold on the treated side compared with baseline and manual acupuncture. The pressure pain threshold was increased by all forms of acupuncture on both sides, with individual changes from baseline ranging from 25% to 52%.

CONCLUSIONS: There were congruent changes on QST after 3 common acupuncture stimulation methods, with possible unilateral as well as bilateral effects.

成纖維細胞生長因數和胰島素樣生長因數挽救丁卡因所致損傷後的感覺神經元生長錐塌縮

Fibroblast Growth Factor and Insulin-Like Growth Factor Rescue Growth Cones of Sensory Neurites from Collapse After Tetracaine-Induced Injury

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背景：鹼性成纖維細胞生長因數(bFGF)和胰島素樣生長因數(IGF)-1 具有包括增殖、分化和生存在內的多種細胞作用。本離體研究中，我們觀察不同濃度的 IGF 和 bFGF 對丁卡因所致損傷後發育中的感覺神經元生長錐的形態學影響。
方法：分離胚胎期第 7 或 8 天的雞胚胎背根神經節並培養 24h。隨後，組織暴露于 100μmol/L 丁卡因 60min。用含有不同濃度 IGF、 bFGF 或者複合 IGF 50 ng/mL 和 bFGF 5 ng/mL 的無丁卡因培養基取代上述丁卡因培養基並額外孵育 24h。進行生長錐塌縮分析以評估神經再生情況。
結果：背根神經節暴露于 100μmol/L 丁卡因培養基 1h 後洗脫丁卡因 24h 後出現顯著的生長錐塌縮($P < 0.01$)。我們還發現，在置換的培養基中加入 bFGF (5、10、20、和 50 ng/mL) 或 IGF (50 和 100 ng/mL)能顯著降低洗脫丁卡因 24h 後的生長錐塌縮百分比($P < 0.01$)；然而，低濃度的 bFGF (2 ng/mL)或 IGF(25 ng/mL)不能引起明顯的塌縮變化。同時加入 5 ng/mL bFGF 和 50 ng/mL IGF 後生長錐塌縮分別在統計學上和在邊際上低於單獨加入 5 ng/mL bFGF ($P < 0.01$)和單獨給予 50 ng/mL IGF 後的值。
結論：bFGF 和 IGF 能減輕離體實驗中丁卡因所致損傷後的生長錐塌縮。
(江繼宏 譯 馬皓琳 李士通 校）

BACKGROUND: Basic fibroblast growth factor (bFGF) and insulin-like growth factor (IGF)-1 have multiple effects on cells, including proliferation, differentiation, and survival. In this study, we investigated the effects of different concentrations of IGF and bFGF on the morphology of growth cones of the developing sensory neurons after tetracaine-induced injury in vitro.
METHODS: Dorsal root ganglia were isolated from chick embryos on embryonic day 7 or 8 and cultured for 24 hours. Tissues were then exposed to 100 μmol/L tetracaine for 60 minutes. The media were replaced by tetracaine-free media containing different concentrations of IGF, bFGF, or combination of IGF 50 ng/mL and bFGF 5 ng/mL and incubated for a further 24 hours. Growth cone collapse assays were then performed to assess regeneration of neurons.
RESULTS: Exposure of dorsal root ganglia explants to tetracaine 100 μmol/L for 1 hour caused significant growth cone collapse 24 hours after washing out tetracaine ($P < 0.01$). It was found that adding bFGF (5, 10, 20, and 50 ng/mL) or IGF (50 and 100 ng/mL) to the replacement media significantly decreased growth cone collapse percentage at 24 hours after washout ($P < 0.01$); however, the low concentrations of bFGF (2 ng/mL) or IGF (25 ng/mL) did not cause significant change. Growth cone collapse after simultaneous addition of 5 ng/mL bFGF and 50 ng/mL IGF was statistically lower than the values after adding 5 ng/mL bFGF ($P < 0.01$), and it was marginally lower than 50 ng/mL IGF.
CONCLUSION: bFGF and bIGF decreased growth cone collapse after tetracaine-induced injury in vitro.

在足踝手術中 0.5%的左布比卡因在用 Labat 進路行坐骨神經阻滯後比相同劑量的羅呱卡因提供的鎮痛時間長

Levobupivacaine 0.5% Provides Longer Analgesia After Sciatic Nerve Block Using the Labat Approach Than the Same Dose of Ropivacaine in Foot and Ankle Surgery

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背景：由於臨床使用的安全性，左布比卡因和羅呱卡因是兩個經常用於外周神經阻滯的左旋對映體分子。與羅呱卡因相比較，左布比卡因更為親脂且在理論上更為有效，但是臨床研究顯示了在麻醉和鎮痛特性方面不一致的結果。我們假定純的布比卡因 S－對映體比羅呱卡因提供的鎮痛持續時間更長。
方法：我們比較 20ml 左布比卡因和 20ml0.5%的羅呱卡因在用於足踝手術的坐骨神經阻滯（Labat 進路）中的鎮痛特性。在雙盲、隨機、前瞻性研究中，80 名患者接受其中一種麻醉藥。我們評估藥物的起效、持續時間和阻滯成功率，以及 24 小時內額外鎮痛藥的需要和技術上的或神經系統的併發症。
結果：感覺阻滯起效時間和成功率左布比卡因和羅呱卡因兩組相似（起效, 15min[5–40 min]對 15 min [5–60 min]; 成功率, 90%對 92.5%）。20ml0.5%左布比卡因組第一次要求鎮痛藥的平均時間晚于羅呱卡因(1605min[575–2400min]對 1035min[590–1500min], P < 0.001)。術後額外鎮痛的需要，左布比卡因組高於羅呱卡因組(37/40 [92.5%]對 30/40 [75%], P < 0.034)。兩組 24 小時內都未出現併發症。
結論：在足踝手術之後，20ml0.5%的左布比卡因在後臀（Labat）坐骨神經阻滯中比相同劑量的羅呱卡因提供的鎮痛時間長。
（唐亮 譯 馬皓琳 李士通 校）

BACKGROUND: Levobupivacaine and ropivacaine are 2 left enantiomeric molecules frequently used for peripheral nerve blocks because of their safe clinical profile. Levobupivacaine is more lipophilic and theoretically more potent than ropivacaine, but clinical studies show conflicting results in terms of anesthetic and analgesic characteristics. We hypothesized that the pure S-enantiomer of bupivacaine provides longer-lasting analgesia than ropivacaine.
METHODS: We compared the analgesic characteristics of 20 mL levobupivacaine versus 20 mL ropivacaine 0.5% in a posterior sciatic nerve block (Labat approach) for foot and ankle surgery. In a double-blind, randomized, prospective design, 80 patients received either substance. We assessed the onset, duration, and success of the block, and the need for rescue analgesia and technical or neurologic complications over 24 hours.
RESULTS: The onset of sensory block (minutes) and the success rate were similar in levobupivacaine and ropivacaine groups (onset, 15 minutes [5–40 minutes] vs 15 minutes [5–60 minutes], respectively; success rate, 90% vs 92.5%). The average time for the first request of pain medication provided by 20 mL levobupivacaine 0.5% was significantly longer than with ropivacaine (1605 minutes [575–2400 minutes] vs 1035 minutes [590–1500 minutes], P < 0.001). The need for postoperative rescue analgesia was higher in the ropivacaine group (37 of 40 [92.5%] vs 30 of 40 [75%], P < 0.034). No complications were noted in either group at 24 hours.

CONCLUSION: Twenty milliliters levobupivacaine 0.5% in posterior gluteal (Labat) sciatic nerve block provided longer-lasting analgesia after foot and ankle surgery compared with the same dose of ropivacaine.

為腎上腺功能不全的外科患者圍術期補充類固醇類藥物

Supplemental Perioperative Steroids for Surgical Patients with Adrenal Insufficiency

Sin Leong Yong, Paul Marik, Marco Esposito and Paul Coulthard

Anesth Analg 2010;110(5):1506;

背景：腎上腺危像是腎上腺功能不全的患者因術中應激導致威脅生命的急症。這可以通過圍術期給予大劑量類固醇來預防。但圍術期補充類固醇是否必要、何時給、以及用藥劑量和次數都存在爭議。

目的：評估對因腎上腺皮質功能不全給予維持劑量的糖皮質激素的成年患者圍術期補充類固醇是否必要。

搜索策略：我們搜索了循證醫學中央寄存器中的對照試驗（重要的）(循證醫學 e 圖書庫 2009，第 1 期)；MEDLINE (1966～2009.1); EMBASE (1980～2009.1); LILACS (1982～2009.1)；以及正在進行的試驗的資料庫。我們手工搜索了臨床內分泌學和新陳代謝雜誌（1982～1997）、臨床內分泌學（1972～1997）、外科學（1948～1994）、外科學編年史（1948～1994）和麻醉（1948～2000）。

選擇標準：對於已給予維持劑量類固醇的成年病人比較圍術期補充類固醇與給予安慰劑的隨機、對照試驗。

資料收集和分析：兩名回顧作者獨立地評估試驗品質和萃取的資料。研究作者之間互通缺少的資訊。我們使用平均差和標準差來概括每組的資料。

主要結果：計入了包括 37 名患者的兩組試驗。這些研究報導了對腎上腺功能不全的患者在手術期間補充圍術期類固醇是沒有必要的。在干預組和對照組都沒有不良反應和併發症的報導。

作者結論：由於病人例數較少，結果可能不具有代表性。 鑒於目前可用的證據，我們不能支援或反對對腎上腺功能不全的患者在手術術期間補充圍術期類固醇。

（楊秀娟 譯 馬皓琳 李士通校）

BACKGROUND: Adrenal crisis is a life threatening condition which can be induced by stress during surgery in patients with adrenal insufficiency. This may be prevented by perioperative administration of high doses of steroids. There is disagreement on whether supplemental perioperative steroids are required and, when administered, on the amount and frequency of doses.

OBJECTIVES: To assess whether it is necessary to administer supplemental perioperative steroids in adult patients on maintenance doses of glucocorticoids because of adrenal insufficiency.

SEARCH STRATEGY: We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2009, Issue 1); MEDLINE (1966 to January 2009); EMBASE (1980 to January 2009); LILACS (1982 to January 2009); and the databases of ongoing trials. We handsearched the Journal of Clinical Endocrinology and

Metabolism (1982 to 1997), Clinical Endocrinology (1972 to 1997), Surgery (1948 to 1994), Annals of Surgery (1948 to 1994), and Anaesthesia (1948 to 2000).
SELECTION CRITERIA: Randomized, controlled trials that compared the use of supplemental perioperative steroids to placebo in adult patients on maintenance doses of steroids who required surgery.
DATA COLLECTION AND ANALYSIS: Two review authors independently assessed trial quality and extracted data. Study authors were contacted for missing information. We used mean differences and standard deviations to summarize the data for each group.
MAIN RESULTS: Two trials involving 37 patients were included. These studies reported that supplemental perioperative steroids were not required during surgery for patients with adrenal insufficiency. Neither study reported any adverse effects or complications in the intervention and control groups.
AUTHORS' CONCLUSIONS: Owing to the small number of patients, the results may not be representative. Based on current available evidence, we are unable to support or refute the use of supplemental perioperative steroids for patients with adrenal insufficiency during surgery.

異氟烷麻醉並不能滿足快動眼睡眠期內環境穩定的需求

Isoflurane Anesthesia Does Not Satisfy the Homeostatic Need for Rapid Eye Movement Sleep

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背景：睡眠和全身麻醉師完全不同的兩種意識狀態，但卻有許多相同的特點。早前的研究提示，丙泊酚麻醉有助於從快動眼睡眠（REM）中恢復過來，且不產生非快動眼睡眠，但是吸入麻醉這一方面的作用尚未被研究。我們旨在驗證這一假說，即異氟烷也有助於從快動眼睡眠剝奪中蘇醒。
方法：在六隻小鼠的淺表皮質層、深部海馬區以及背部肌肉植入電極。在剝奪小鼠快動眼睡眠 24 小時以後分兩組進行實驗干預，1 組 ad libitum 睡眠 8 小時，2 組則立即應用異氟烷麻醉 4 小時，然後 ad libitum 睡眠 4 小時。在相同的無睡眠剝奪的情況下，將兩組經干預後快動眼睡眠與非快動眼睡眠的比例進行比較。此外，還將異氟烷麻醉期間、快動眼睡眠期以及清醒活動期海馬（theta）區的活動情況進行比較。
結果：在第一個 2 小時，快動眼睡眠期的剝奪後蘇醒呈 5.7 倍增加（P=0.0005），在第二個 2 小時成 2.6 倍的增加（P=0.004）。而異氟烷麻醉組在第一個 2 小時，快動眼睡眠期的剝奪後蘇醒呈 3.6 倍增加（P=0.001），在第二個 2 小時成 2.2 倍的增加（P=0.003）。在睡眠剝奪後的前 4 個小時內，兩個實驗組之間快動眼睡眠的波動狀態並無顯著差異。異氟烷麻醉期間海馬（theta）區的活動並不受快動眼睡眠剝奪的影響，並且麻醉期間（theta）區活動可能的分佈情況與清醒狀態時更為相似，而非快動眼睡眠狀態。

結論：與丙泊酚不同，異氟烷並不能滿足快動眼睡眠期內環境穩定的需求。並且，麻醉期間海馬（theta）區的活動規律和組織結構表現並不同于正常的睡眠狀態。我們總結認為，不同的麻醉藥物是作用於不同的層面來產生睡眠狀態的。（單嘉琪譯 薛張綱校）

BACKGROUND: Sleep and general anesthesia are distinct states of consciousness that share many traits. Prior studies suggest that propofol anesthesia facilitates recovery from rapid eye movement (REM) and non-REM (NREM) sleep deprivation, but the effects of inhaled anesthetics have not yet been studied. We tested the hypothesis that isoflurane anesthesia would also facilitate recovery from REM sleep deprivation.
METHODS: Six rats were implanted with superficial cortical, deep hippocampal, and nuchal muscle electrodes. Animals were deprived of REM sleep for 24 hours and then (1) allowed to sleep ad libitum for 8 hours or (2) were immediately anesthetized with isoflurane for a 4-hour period followed by ad libitum sleep for 4 hours. The percentage of REM and NREM sleep after the protocols was compared with similar conditions without sleep deprivation. Hippocampal [theta] activity during isoflurane anesthesia was also compared with [theta] activity during REM sleep and active waking.
RESULTS: Recovery after deprivation was associated with a 5.7-fold increase (P = 0.0005) in REM sleep in the first 2 hours and a 2.6-fold increase (P = 0.004) in the following 2 hours. Animals that underwent isoflurane anesthesia after deprivation demonstrated a 3.6-fold increase (P = 0.001) in REM sleep in the first 2 hours of recovery and a 2.2-fold increase (P = 0.003) in the second 2 hours. There were no significant differences in REM sleep rebound between the first 4 hours after deprivation and the first 4 hours after both deprivation and isoflurane anesthesia. Hippocampal [theta] activity during isoflurane anesthesia was not affected by REM sleep deprivation, and the probability distribution of [theta] events during anesthesia was more similar to that of waking than to REM sleep.
CONCLUSION: Unlike propofol, isoflurane does not satisfy the homeostatic need for REM sleep. Furthermore, the regulation and organization of hippocampal [theta] events during anesthesia are unlike sleep. We conclude that different anesthetics have distinct interfaces with sleep.

心臟驟停後治療性低體溫時的麻醉與鎮痛方案：一個系統回顧

Anesthesia and Analgesia Protocol During Therapeutic Hypothermia After Cardiac Arrest: A Systematic Review

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背景：當代實踐指南推薦在心跳驟停後昏迷並治療性低體溫病人中給予鎮靜-鎮痛和神經肌肉阻滯。然而，無人建議最佳的給予方案。本研究中，我們評價了這方面重症監護室人員的選擇。

方法：首先進行系統文獻回顧尋找 1997 年至 2009 年 7 月之間進行的臨床研究。文獻需滿足以下標準：心跳驟停後治療性低體溫來改善神經系統預後，特別提到鎮靜方案的運用。我們查找應用的藥物和劑量。，使用的原因，及使用的神經系統和神經肌肉監測儀的種類。
結果：我們共收集了來自不同國家 68 個重症監護室報告應用方案的 44 個研究。咪達唑侖是最常用的鎮靜劑，在 39 個重症監護室中使用劑量在 5mg/h 至 0.3mg/kg/h 之間。異丙酚在 13 個重症監護室的使用劑量不超過 6mg/kg/h。18 個重症監護室沒有報導使用任何鎮痛藥。芬太尼是應用最多的鎮痛藥，在 33 個重症監護室的使用劑量在 0.5 至 10ug/kg/h，其次是 4 個重症監護室中應用的嗎啡。在 54 個重症監護室中常規使用神經肌肉阻滯藥預防痙攣，8 個重症監護室中常規治療痙攣；在 1 個重症監護室中，神經肌肉阻滯藥的應用不積極。潘庫溴銨的使用最多，有 24 個重症監護室選擇了它，其次是順式阿曲庫銨，14 個重症監護室選擇了它。4 個重症監護室應用四個成串刺激監測、三個重症監護室使用連續腦電活動監測來指導神經肌肉阻滯藥的應用。
結論：治療性低體溫期間鎮靜鎮痛方案有著顯著差別。很多時候應用的藥物和劑量並不十分合理。只有 3 個重症監護室在病人神經肌肉阻滯時常規使用腦電圖監測。在怎樣治療這一類重症人群上達到共識是很必要的。
（黃劍譯 薛張綱校）
BACKGROUND: Present practice guidelines recommend sedative-analgesic and neuromuscular blocking administration during therapeutic hypothermia in comatose patients after cardiac arrest. However, none suggests the best administration protocol. In this study, we evaluated intensivists' preferences regarding administration.
METHODS: A systematic literature review was conducted to identify clinical studies published between 1997 and July 2009. Selected articles had to meet the following criteria: use of hypothermia to improve neurologic outcome after cardiac arrest, and specific mention of the sedative protocol used. We checked drugs and dose used, the reason for their administration, and the specific type of neurologic and neuromuscular monitoring used.
RESULTS: We identified 44 studies reporting protocols used in 68 intensive care units (ICUs) from various countries. Midazolam, the sedative used most often, was used in 39 ICUs at doses between 5 mg/h and 0.3 mg/kg/h. Propofol was used in 13 ICUs at doses up to 6 mg/kg/h. Eighteen ICUs (26%) did not report using any analgesic. Fentanyl was the analgesic used the most, in 33 ICUs, at doses between 0.5 and 10 μg/kg/h, followed by morphine in 4 ICUs. Neuromuscular blocking drugs were routinely used to prevent shivering in 54 ICUs and to treat shivering in 8; in 1 ICU, their use was discouraged. Pancuronium was used the most, in 24 ICUs, followed by cisatracurium in 14. Four ICUs used neuromuscular blocking drug administration guided by train-of-four monitoring and 3 ICUs used continuous monitoring of cerebral activity.
CONCLUSIONS: There is great variability in the protocols used for anesthesia and analgesia during therapeutic hypothermia. Very often, the drug and the dose used do not seem the most appropriate. Only 3 ICUs routinely used electroencephalographic monitoring during paralysis. It is necessary to reach a consensus on how to treat this critical care population.

經 M 型超聲評價膈肌運動用於預測上腹部手術後肺功能障礙的發生

An Evaluation of Diaphragmatic Movement by M-Mode Sonography as a Predictor of Pulmonary Dysfunction After Upper Abdominal Surgery

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背景：膈肌功能不全是上腹部手術後出現肺部併發症的主要發病因素。M 型超聲是目前公認的定性檢查方法，用於測量正常及病理狀態下的膈肌呼吸運動。在這項研究中，我們評估了通過 M 型超聲測量膈肌吸氣運動幅度（DIA）在預測術後肺功能障礙發生中的價值。
方法：這項前瞻性的、單中心、單組的觀察性研究是在 35 名 ASA 體格分級為 I-II 級的非吸煙病人中進行的，所有研究物件均為接受開腹肝葉切除術的病人。應用 M 型超聲分別測量病人在術前常規肺功能檢查後、術後第 1 天、第 2 天和第 7 天的膈肌運動功能，測量指標為安靜、經鼻深呼吸時的膈肌吸氣運動幅度（cm）。
結果：肝葉切除術後的第 1 天和第 2 天，膈肌吸氣運動幅度（DIA）和肺活量值呈顯著下降，其下降值為術前測量值的 60%（$P < 0.001$）。至術後第 7 天，上述兩項變化指標與術前第 1 天和第 2 天相比恢復 30%（$P < 0.001$）。在深呼吸時，膈肌吸氣運動幅度與肺活量顯著相關（$r = 0.839$, $P < 0.0001$）。通過受試者工作特徵曲線（ROC）分析，以 DIA 為 3.61cm 和 2.42cm 分別作為診斷肺活量值較術前下降 30%和 50%時的最佳臨界值，其敏感度分別為 94%和 81%，特異度分別為 76%和 91%（$P = 0.0001$）。有 2 名病人術後出現膈神經麻痹但均無呼吸窘迫的症狀，轉至普通病房後亦不需要額外的氧氣治療。
結論：在術後觀察期間，經 M 型超聲測量的膈肌吸氣運動幅度與肺量計測定的肺活量值存在線形相關關係。我們認為臨床上應用 M 型超聲技術檢查術後膈肌功能不全是一種實用的方法，同時也可作為床旁篩查膈神經麻痹的有效方法。
（李瑩譯 薛張綱校）

BACKGROUND: Diaphragmatic dysfunction is a major factor in the etiology of postoperative pulmonary complications after upper abdominal surgery. M-mode ultrasonography is now an accepted qualitative method of assessing diaphragmatic motion in normal and pathological conditions. In this study, we evaluated whether diaphragmatic inspiratory amplitude (DIA) as measured by M-mode sonography can be a predictor of pulmonary dysfunction.
METHODS: A prospective, single-center, single-unit, observational study was performed in 35 ASA physical status I and II nonsmoking patients undergoing open liver lobectomy. Diaphragmatic movements were assessed by M-mode sonography after a pulmonary function test preoperatively and on postoperative days (PODs) 1, 2, and 7. We measured the DIA (cm) during quiet, deep, and sniff breathing.

RESULTS: After liver lobectomy, DIA during deep breathing and vital capacity (VC) showed significant reductions of 60% from their preoperative values on PODs 1 and 2 ($P < 0.001$). By POD 7, the variables recovered significantly, by 30% from the values on PODs 1 and 2 ($P < 0.001$). During deep breathing, DIA showed a significant correlation with VC ($r = 0.839$, $P < 0.0001$). The best cutoff values of DIA for detecting 30% and 50% decreases of VC from preoperative values, calculated by receiver operating characteristic analysis, were 3.61 and 2.41 cm, with sensitivity of 94% and 81% and specificity of 76% and 91%, respectively ($P = 0.0001$). Two patients showed postoperative diaphragmatic paralysis but did not complain of respiratory distress symptoms or need supplemental oxygen after being transferred to the general ward.
CONCLUSIONS: DIA using M-mode sonography showed a linear correlation with VC measured by spirometry throughout the postoperative period. We conclude that using the M-mode sonographic technique at the bedside can be a practical way to investigate postoperative diaphragmatic dysfunction, and may also be an effective bedside screening method for diaphragmatic paralysis.

全國大樣本產婦產後出血的流行病學

The Epidemiology of Postpartum Hemorrhage in a Large, Nationwide Sample of Deliveries

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背景：在這個研究中，我們試圖描述產後出血發生率的變化趨勢，同時描述針對發生產後出血的危險因素和這一分娩並發生的產婦轉歸的當代流行病學。
方法：在美國最大的出院資料庫，全國住院病人中找出入院分娩的病例。運用國際疾病分類法，臨床修訂版（第十版）的定義找出分娩後發生產後出血併發症的病例和可能為危險因素的伴發疾病。評估 1995 年至 2004 年產後出血發生率的變化趨勢。運用 logistic 回歸對產後出血最常見的病因子宮收縮乏力進行相關危險因素分析。
結果：2004 年，所有分娩者中產後出血的發生率為 2.9%；其中由於宮縮乏力造成的占了 79%。產後出血占了所有分娩後院內死亡病因的 19.1%。從 1995 年至 2004 年產後出血總體發生率上升了 27.5%，主要由於子宮收縮乏力的發生率上升；而其他造成宮縮乏力的原因如胎盤滯留、凝血系統疾病在這一期間基本保持穩定。經 Logistic 回歸分析得出年齡<20 歲或>=40 歲、剖宮產、妊娠高血壓疾病、羊水過多、絨毛膜羊膜炎、多胎妊娠、胎盤滯留和產前出血是造成宮縮乏力導致產後出血並輸血的獨立危險因素。除外產婦年齡和剖腹產，其他一個或多個原因在這些病例中僅占 38.8%。

結論：產後出血是分娩常見的併發症並且和產婦發病率和死亡率息息相關。在美國產後出血的發生率正在上升。由於宮縮乏力導致產後出血後的輸血通常發生於無已知相關危險因素的病人中。
（姚敏敏譯 薛張綱校）

BACKGROUND: In this study, we sought to (1) define trends in the incidence of postpartum hemorrhage (PPH), and (2) elucidate the contemporary epidemiology of PPH focusing on risk factors and maternal outcomes related to this delivery complication.
METHODS: Hospital admissions for delivery were extracted from the Nationwide Inpatient Sample, the largest discharge dataset in the United States. Using International Classification of Diseases, Clinical Modification (ninth revision) codes, deliveries complicated by PPH were identified, as were comorbid conditions that may be risk factors for PPH. Temporal trends in the incidence of PPH from 1995 to 2004 were assessed. Logistic regression was used to identify risk factors for the most common etiology of PPH—uterine atony.
RESULTS: In 2004, PPH complicated 2.9% of all deliveries; uterine atony accounted for 79% of the cases of PPH. PPH was associated with 19.1% of all in-hospital deaths after delivery. The overall rate of PPH increased 27.5% from 1995 to 2004, primarily because of an increase in the incidence of uterine atony; the rates of PPH from other causes including retained placenta and coagulopathy remained relatively stable during the study period. Logistic regression modeling identified age <20 or ≥40 years, cesarean delivery, hypertensive diseases of pregnancy, polyhydramnios, chorioamnionitis, multiple gestation, retained placenta, and antepartum hemorrhage as independent risk factors for PPH from uterine atony that resulted in transfusion. Excluding maternal age and cesarean delivery, one or more of these risk factors were present in only 38.8% of these patients.
CONCLUSION: PPH is a relatively common complication of delivery and is associated with substantial maternal morbidity and mortality. It is increasing in frequency in the United States. PPH caused by uterine atony resulting in transfusion often occurs in the absence of recognized risk factors.

加巴噴丁在兒科脊柱融合手術病人中的應用：一項隨機、雙盲、對照研究

Gabapentin Use in Pediatric Spinal Fusion Patients: A Randomized, Double-Blind, Controlled Trial

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背景：在成年手術病人中，加巴噴丁具有降低阿片類藥物使用量的效應，但尚未有涉及兒童和青少年病人的相關研究發表。在這項雙盲、隨機、對照研究中，我們分析了加巴噴丁能否減少患有特發性脊柱側凸的兒科病人在接受脊柱融合術後阿片類藥物的使用量。

方法：研究物件的年齡均在9至13歲之間，分為兩組病人，術前分別給予加巴噴丁（15mg/kg，治療組）或者安慰劑。術中採用標準的麻醉方法。術後所有病人均接受含阿片類藥物的自控式鎮痛裝置，隨後5天兩組病人繼續給予加巴噴丁（5mg/kg）或安慰劑，每天3次。阿片類藥物的使用量按mg/kg/時間間隔計算，同時記錄疼痛評分和阿片類藥物副作用。

結果：59例病人（安慰劑組30例，加巴噴丁組29例）在人口統計資料上無差異。嗎啡總消耗量（mg/kg/h ± SD）在加巴噴丁組要顯著低於安慰劑組，使用量分別為恢復室（0.044 ± 0.017 vs 0.064 ± 0.031, P = 0.003）、術後第一天（0.046 ± 0.016 vs 0.055 ± 0.017, P = 0.051）、術後第二天（0.036 ± 0.016 vs 0.047 ± 0.019, P = 0.018）。此外，加巴噴丁能顯著降低恢復室內第1次疼痛評分（2.5 ± 2.8 vs 6.0 ± 2.4, P < 0.001）及術後清晨疼痛評分（3.2 ± 2.6 vs 5.0 ± 2.2, P < 0.05），但在其他觀察點的疼痛評分無顯著性差異。研究期間，阿片類相關副作用在兩組病人之間無差別。

結論：圍手術期口服加巴噴丁可以減少脊柱融合術後用於鎮痛的嗎啡使用量，但並不相應地減少阿片類相關的副作用。治療組的初始疼痛評分較對照組低。在接受脊柱融合術的兒童和青少年病人，圍術期應用加巴噴丁似乎是改善恢復早期疼痛控制效果的有效輔助手段。

（俞佳譯 薛張綱校）

BACKGROUND: Gabapentin has opioid-sparing effects in adult surgical patients, but no reported studies have involved children and adolescents. In a double-blind, randomized, controlled trial, we examined whether gabapentin decreases postoperative opioid consumption for pediatric spinal fusion patients with idiopathic scoliosis.

METHODS: Patients, aged 9 to 18 years, received preoperative gabapentin (15 mg/kg, treatment) or placebo. Anesthesia was standardized. After surgery, all patients received standardized patient-controlled analgesia opioid and continued on either gabapentin (5 mg/kg) or placebo 3 times per day for 5 days. Opioid use was calculated in mg/kg/time intervals. Pain scores and opioid side effects were recorded.

RESULTS: Data from 59 patients (30 placebo and 29 gabapentin) did not differ in demographics. Total morphine consumption (mg/kg/h ± SD) was significantly lower in the gabapentin group in the recovery room (0.044 ± 0.017 vs 0.064 ± 0.031, P = 0.003), postoperative day 1 (0.046 ± 0.016 vs 0.055 ± 0.017, P = 0.051), and postoperative day 2 (0.036 ± 0.016 vs 0.047 ± 0.019, P = 0.018). In addition, gabapentin significantly reduced first pain scores in the recovery room (2.5 ± 2.8 vs 6.0 ± 2.4, P < 0.001) and the morning after surgery (3.2 ± 2.6 vs 5.0 ± 2.2, P < 0.05), but otherwise pain scores were not significantly different. There were no differences in opioid-related side effects over the course of the study.

CONCLUSION: Perioperative oral gabapentin reduced the amount of morphine used for postoperative pain after spinal fusion surgery, but not overall opioid-related side effects. Initial pain scores were lower in the treatment group. Perioperative use of gabapentin seems to be an effective adjunct to improve pain control in the early stages of recovery in children and adolescents undergoing spinal fusion.

在局灶性腦缺血大鼠中，異氟醚預處理對腦血流、毛細管滲透率和耗氧量的影響

The Effects of Isoflurane Pretreatment on Cerebral Blood Flow, Capillary Permeability, and Oxygen Consumption in Focal Cerebral Ischemia in Rats

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背景：在我們的實驗中，我們研究了局部腦缺血模型中異氟醚預處理對血管的影響，尤其小動脈和毛細血管對局部腦血流量（rCBF）、氧供和氧耗及毛細血管滲透性的影響。由於誘導型一氧化氮合酶（iNOS）與異氟醚預處理作用相關，我們同時研究了 iNOS 對 rCBF 抑制作用。

方法：大腦中動脈（MCA）阻塞前 24 小時，使用 2%的異氟醚通過氣管導管和機械通氣對大鼠預處理 30 分鐘（IsoPC 組）。為了抑制組中 iNOS，在異氟醚預處理前注射 30 分鐘氨基胍 200mg/kg。MCA 閉塞後一小時，使用 ^{14}C –碘安替比林測定 rCBF。 使用冷的顯微分光光度測定法測定小動脈和小靜脈的氧飽和度。通過測定 ^{14}C-α-氨基異丁酸的轉換係數（Ki）測定毛細血管滲透性。MCA 阻塞後 3 小時測定 rCBF。

結果：大腦中動脈阻塞後，rCBF 及 O_2 消耗均降低，對照組及 IsoPC 組的 Ki 在 MCA 阻塞後 1 小時均增加。在缺血皮質（IC），IsoPC 組的 rCBF 和氧消耗量高於對照組（分別增加 40%和 41%），但兩組在對側皮質間沒有差異。在缺血皮質或對側皮質，兩組的 Ki 沒有顯著差異。在 IsoPC 組 MCA 阻塞後 3 小時，在 IC 處 rCBF 增加 50%的。 隨著 iNOS 的抑制，異氟醚預處理所致的 IC 處 rCBF 增加作用減弱。

結論：我們的資料表明，異氟醚預處理可以改善局部腦血流量，並增加缺血局部氧供和氧耗，但是在局部缺血早期並不影響毛細血管滲透性。異氟醚誘導的缺血區域 rCBF 增加在 iNOS 的抑制作用下變得微不足道。

（陳珺珺譯 薛張綱校）

BACKGROUND: We performed experiments to test whether isoflurane pretreatment produces vascular effects, especially at the levels of arterioles and capillaries affecting regional cerebral blood flow (rCBF), O_2 supply and consumption, or capillary permeability in focal cerebral ischemia. Because inducible nitric oxide synthase (iNOS) was implicated as one of the mechanisms of isoflurane preconditioning, the effect of iNOS inhibition on rCBF was also studied.

METHODS: Twenty-four hours before middle cerebral artery (MCA) occlusion, rats were pretreated with 2% isoflurane for 30 minutes using an endotracheal tube and mechanical ventilation for the isoflurane preconditioned (IsoPC) group. For the group of iNOS inhibition, aminoguanidine 200 mg/kg was injected IP 30 minutes before isoflurane pretreatment. One hour after MCA occlusion, rCBF was measured using ^{14}C-iodoantipyrine autoradiography. Alternate slices of the tissue were used to determine arteriolar and venular O_2 saturation using cryo microspectrophotometry. Capillary permeability was determined by measuring the transfer coefficient (Ki) of ^{14}C-α-aminoisobutyric acid. Additional measurements of rCBF were performed at 3 hours after MCA occlusion.

RESULTS: MCA occlusion decreased rCBF and O_2 consumption and increased Ki in both the control and the IsoPC groups at 1 hour after MCA occlusion. In the ischemic cortex (IC), the rCBF and O_2 consumption were significantly greater in the IsoPC group than in the control group (+40% and +41%, respectively), but they were similar in the contralateral cortex between the 2 groups. There was no difference in Ki between the groups in the IC or in the contralateral cortex. The increase of rCBF in the IC (+50%) was sustained in the IsoPC group at 3 hours after MCA occlusion. With iNOS inhibition, the increase of rCBF in the IC with isoflurane pretreatment became insignificant.
CONCLUSIONS: Our data demonstrate that isoflurane pretreatment improved rCBF and increased the regional O_2 supply and consumption in the focal ischemic area but did not affect capillary permeability during the early stage of focal cerebral ischemia. The isoflurane-induced increase in rCBF in the ischemic area became insignificant with inhibition of iNOS.

腎移植術中輸注大量晶體液時機對早期移植腎功能的影響

The impact of timing of maximal crystalloid hydration on early graft function during kidney transplantation.

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背景：早期移植腎的功能是腎移植成功與否的關鍵所在。由於液體向血管外間隙的快速移動，適當液體的維持較為複雜。本研究的目的即檢驗移植腎缺血期輸注大量液體對早期腎功能的影響。
方法：選取 40 例準備行活體腎移植手術的慢性腎功能不全的成年患者，將其隨機分配至實驗組和對照組。對照組患者在手術開始至腎血管吻合後開放期間按 10 到 12 mL．kg(-1)．h(-1)的速度輸注 0.9%生理鹽水。實驗組（CVPT 組）患者調整 0.9%生理鹽水的輸注速度來維持中心靜脈壓水準在手術開始至阻斷腎的主要血管期間在 5mmHg，在阻斷至完成所有腎血管的吻合期間在 15mmHg。記錄每組患者圍術期的血流動力學、生理鹽水輸注量和輸注速度、利尿劑的使用量、移植腎的腫脹度、尿量和術後 5 天的腎功能。
結果：在腎缺血期兩組患者均接受了大約 3 L 的晶體液。CVPT 組患者的腎缺血期為 48 +/- 12 分鐘，擴容至最高平臺期間，平均每分鐘接受 48.3 mL 的液體。該組患者的腎功能較對照組好，需要較少的血管活性藥物和利尿劑，且術後組織水腫較對照組減輕。
結論：腎移植術中按適當中心靜脈壓水準來給於液體可使血流動力學更穩定且增加尿量。在約一個小時左右的腎缺血期以每分鐘 45 到 50ml 的速度給於液體可提高早期移植腎功能。對於在此類患者中輸注晶體液維持中心靜脈壓的臨床獲益則需要大樣本和長期腎功能隨訪來明確。
（張釗譯 薛張綱校）

BACKGROUND: Early graft function is crucial for successful kidney transplantation. Maintaining adequate hydration is complicated by rapid movement of water to the

extravascular space. We designed this study to test the effect of maximal hydration during graft ischemia time on early renal function.

METHODS: Forty adult patients with chronic renal failure underwent renal transplantation from related living donors. Study subjects were randomly assigned 1 of 2 regimens for intraoperative hydration. The constant infusion rate group received normal saline 0.9% at an infusion rate 10 to 12 mL . kg(-1) . h(-1) from the start of surgery until the renal vessels were unclamped after vascular anastomosis. The central venous pressure target (CVPT) group received normal saline 0.9% titrated to maintain a specific central venous pressure (CVP). The target CVP from the start of surgery until clamping of the donor renal vessels was5 mm Hg except for the interval from clamping of the renal vessels until the end of renal vascular anastomosis, when the target CVP was 15 mm Hg. Perioperative hemodynamics, infused saline volumes, rate of infusion, onset of diuresis, graft turgidity, urine volume, and renal function during the first 5 postoperative days were recorded.

RESULTS: At the end of renal ischemia time, both groups had received approximately 3 L crystalloid solution. The CVPT group achieved the highest peak of intravascular volume expansion with an average infusion rate of 48.3 mL . min(-1) during 48 +/- 12 minutes of renal ischemia. The CVPT group had better graft function, required fewer vasopressors and diuretics, and had less postoperative tissue edema than the constant infusion rate group.

CONCLUSIONS: Hydration directed toward maintaining a given CVP during kidney transplantation produced a more stable hemodynamic profile and promoted diuresis. The calculated infusion rate of approximately 45 to 50 mL . min(-1), within an hour ischemia time, seems feasible to enhance early graft function. A larger trial with long-term follow-up of renal function is warranted to confirm the clinical benefit of titrating IV crystalloid administration to maintain a given CVP in this population.

簡要報導：螢光透視引導下穿透椎板和椎板間腰部硬膜外注射類固醇時管內注射的發生率

Brief Reports: Incidence of Intradiscal Injection During Lumbar Fluoroscopically Guided Transforaminal and Interlaminar Epidural Steroid Injections

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穿透椎板硬膜外類固醇注射和椎板間腰部硬膜外注射類固醇時發生管內注射的報導極少。因此，該回顧性觀察報告首次試圖去定量這一併發症的全部發生率。對 3 年可得資料（2004-2007）的回顧性分析共獲得 2 個培訓機構（Loyola 大學醫學中心和西北大學 Feinberg 醫學學校）的 2412 例穿透椎板的硬膜外類固醇注射。有 6 例發生管內注射，對比率為 1：402。同時期內，實施的 4723 例椎板間腰部硬膜外類固醇注射，僅一例發生管內注射，比率為 1：4723。

（朱蘭芳譯，薛張綱校）
Intradiscal injections during transforaminal epidural steroid injections and interlaminar lumbar epidural steroid injections have been reported rarely. In that regard, this retrospective observational report is the first attempt to quantify the overall rate of this complication. A retrospective analysis of 3 years of accrued data (2004–2007) showed that 2412 transforaminal epidural steroid injections were performed at the 2 training institutions (Loyola University Medical Center and Northwestern University/Feinberg School of Medicine). There were 6 intradiscal (annular) injections of contrast, for a rate of 1:402. Over the same interval, 4723 lumbar epidural steroid injections were performed, with 1 intradiscal injection, for a rate of 1:4723.

使用超聲引導和神經刺激器行鎖骨下臂叢神經阻滯時穿刺位置的比較

Selective Local Anesthetic Placement Using Ultrasound Guidance and Neurostimulation for Infraclavicular Brachial Plexus Block

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背景：在我們的研究中，我們使用超聲引導及神經刺激器進行鎖骨下臂叢神經阻滯，我們比較了從中間或外周進路單次注射局麻藥後成功的概率。
方法：218 名患者參加了這項連續前瞻性研究。患者被隨機分為兩組，通過超聲引導及神經刺激器在中間（後束）或外周（中間或外側束）注射局麻藥。高年住院麻醉醫師或主治醫師進行操作。比較中間位置或外周位置進針的效果。
結果：總體而言，中間進路的成功率顯著高於外周進路（96% vs 85%, P = 0.004）。每個束的成功率分別為：後側束 99%，外側束 92%和中間束 84%(P = 0.001)。中間組更多需要主治醫師參與（27% vs 6%, P < 0.001）。術後中間組疼痛評分≤3 的患者更多（100% vs 94%, P = 0.012）。
結論：經中間進路單次注射局麻藥使經鎖骨下對臂叢神經後束阻滯有更高的成功率。
（陳珺珺譯 薛張綱校）
BACKGROUND: In this study, we performed the infraclavicular block with combined ultrasound guidance and neurostimulation to selectively target cords to compare the success rates of placing a single injection of local anesthetic either in a central or peripheral location.
METHODS: Two hundred eighteen patients were enrolled in a consecutive, prospective study. Patients were randomized to injection of local anesthetic either centrally (posterior cord) or peripherally (medial or lateral cord) using ultrasound guidance and neurostimulation. Supervised senior anesthesiology residents or attending anesthesiologists performed the blocks. Both intent-to-treat and treatment-received analyses were used to compare central and peripheral placement efficacy.

RESULTS: The overall success rate was significantly higher for the central placements than peripheral placements (96% vs 85%, P = 0.004). Individual cord success rates were as follows: posterior 99%, lateral 92%, and medial 84% (P = 0.001). The central group required attending physician intervention more frequently (27% vs 6%, P < 0.001). Postoperative pain scores of ≤3 were more likely with central placement (100% vs 94%, P = 0.012).
CONCLUSION: Central placement of a single injection of local anesthetic targeted at the posterior cord resulted in a higher success rate for infraclavicular block.

通過核磁共振研究胸段脊椎管解剖

The Anatomy of the Thoracic Spinal Canal Investigated with Magnetic Resonance Imaging

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背景：我們通過核磁共振研究了沒有脊髓疾病患者在胸 2、胸 5 及胸 10 節段硬腦膜到脊髓的距離。
方法：50 名患者行仰臥位核磁共振檢查。通過 1.5-T 超導系統（Gyroscan Intera, Philips Medical Systems, Best, 荷蘭）測量矢狀位中間位置在胸 2、胸 5 及胸 10 節段兩者間的相對距離。在 10 名患者中，測量了皮膚穿刺點到目標的相對角度。
結果：後路硬腦膜－脊髓的距離在中胸段、上胸段及下胸段有顯著差異：胸 5 為 5.8 ± 0.8 mm，胸 2 為 3.9 ± 0.8 mm，胸 10 為 4.1 ± 1.0 mm (P < 0.015)。胸 2 和胸 10 段的空隙沒有顯著差異。硬腦膜－脊髓的距離與年齡沒有差異。進針的角度在胸 2 為 9.0° ± 2.5°，胸 5 為 45.0° ± 7.4°，胸 10 為 9.5° ± 4.2°。
結論：這項研究證明了在胸 2、胸 5 及胸 10 後路到蛛網膜下腔較深。在胸 5 距離最大。
（陳珺珺譯 薛張綱校）

BACKGROUND: We investigated, with magnetic resonance imaging, the distance of the dura mater to the spinal cord in patients without spinal or medullar disease at the 2nd, 5th, and 10th thoracic segments.
METHODS: Fifty patients in the supine position underwent magnetic resonance imaging. Medial sagittal slices of the 2nd, 5th, and 10th thoracic segments were measured for the relative distances using the 1.5-T superconducting system (Gyroscan Intera, Philips Medical Systems, Best, the Netherlands). In 10 patients, the angles relative to the tangent at the insertion point on the skin were measured.
RESULTS: The posterior dural-spinal cord distance is significantly greater at the midthoracic region (5th thoracic = 5.8 ± 0.8 mm) than at the upper (2nd thoracic = 3.9 ± 0.8 mm) and lower thoracic levels (10th thoracic = 4.1 ± 1.0 mm) (P < 0.015). There were no differences between interspaces T2 and T10. There was no correlation between

age and the measured distance between the dura mater and the spinal cord. The entry angle of the needle at T2 was 9.0° ± 2.5°; at T5, 45.0° ± 7.4°; and at T10, 9.5° ± 4.2°. **CONCLUSIONS**: This study demonstrated that there is greater depth of the posterior subarachnoid space at the T2, T5, and T10 levels. The greater distance was found at T5.

Hereditary Angioedema: Current and Emerging Treatment Options
遺傳性血管性水腫：一般和緊急治療方法
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血管性水腫可由過敏、遺傳和獲得性因素引起。遺傳性血管性水腫（HAE）可在起病時就致殘，並可威脅患者生命，患者患病時常需入院治療，併入住加護病房（ICU）。儘管 HAE 有幾種亞型，但它們有著共同的最終通路：啟動多種激肽及諸如激肽釋放酶和緩激肽等介質。最終導致血管通透性增加，引起水腫——其命名即由此得來。以往在美國獲得許可的治療方法包括合成代謝類固醇和抗纖維蛋白溶解藥，它們均伴隨著難治的併發症，而且不能逆轉急性發作。在歐洲，自 1974 年起 C1 酯酶抑制劑（C1-INH）濃縮物已被用於預防和終止疾病發作。在美國，現在這兩種該藥物已被許可用於 HAE 患者，一種用於預防，另一種用於對抗 HAE 相關的急性腹部及面部症狀。最近，在美國，首個激肽通路的介質——ecallantide 已被許可用於治療 HAE。本文的目的是描述 HAE，並回顧現有的處理疾病的方法及目前正在研究中的不同的治療藥物，著重關注 HAE 患者的圍術期處理。
（周姝婧　譯　陳傑　校）
Angioedema can result from allergic, hereditary, and acquired conditions. Hereditary angioedema (HAE) attacks are disabling at the time of occurrence and can be life threatening; they often result in hospitalization and intensive care unit admission. Although there are several variants of HAE, they share a final common pathway: unopposed activation of multiple kinins and mediators including kallikrein and bradykinin. This leads to increased vascular permeability, which in turn produces the edema after which the condition is named. Older treatment options licensed in the United States, anabolic steroids and antifibrinolytics, have troublesome side effect profiles and may not reverse a severe acute attack. In Europe, C1 esterase inhibitor (C1-INH) concentrates have been used since 1974 for both preventing and terminating attacks. Two of these have now been licensed in the United States for use in HAE patients, one for prophylaxis and the other for treating acute abdominal and facial HAE attacks. The first kinin pathway modulator, ecallantide, has also been licensed recently in the United States for treating HAE attacks. The objective of this article is to describe HAE and review the available options for managing patients, as well as different drugs currently under investigation. Specific attention is given to the perioperative management of patients with HAE.

The Link Between Intravenous Multiple Pump Flow Errors and Infusion System Mechanical Compliance.
靜脈內多泵輸注誤差與輸注系統的機械順應性之間的關係
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在重症監護病房內，靜脈輸注藥物的普遍形式是不同的輸注裝置通過共同的或者各自獨立的輸液通道同時輸注。鑒於給予的藥物的效能和患者的敏感性，藥物通常需要被快速輸注。一些病例報導表明，當輸注系統的平衡被打破時，藥物輸注的精確性可出乎意料地發生劣化。作者描述了一種單一輸注系統的數學模型，並用它來驗證由一種簡單的實驗性多泵輸注系統會導致故障情況的發生。結果顯示，輸注精確性劣化是由輸注系統的體外容積——即順應性的細小變化所引起的。這一模型可進一步擴展用於確定其他多泵輸注系統中液體的真實輸注方式，在將來用於設計新的靜脈輸注系統，並解釋了為何小容積輸注系統需要更小的機械順應性。
(周姝婧　譯　陳傑　校)

IV drug delivery in intensive care often takes the form of simultaneous multiple infusions from separate infusion devices via either shared or individual fluid pathways. Because of the potency of the drugs administered and the acuity of the patients, accurate drug delivery is required. Instances of unexpected and unacceptable accuracy degradation have been reported when the equilibrium of the infusion system is disturbed. We describe a mathematical model of a simple infusion system used to investigate and verify results reported from a simple experimental multiple pump fault scenario. The results suggest that flow degradation is attributable to small changes in infusion system extracorporeal volume, referred to as “compliance.” The model may, by expansion, be used to determine the nature of fluid flow within other multiple pump systems, be applied to the design of future IV systems, and explain the need for small-volume infusion systems with small mechanical compliance.

Rapid Sequence Induction and Intubation: Current Controversy.
快速程式性誘導及插管：目前爭議

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對於快速程式性誘導及插管（RSII）的一些傳統內容見解不同,導致其實際操作具有廣泛差異，目前尚未建立一個 RSII 標準。本文總結了誘導藥物的選擇，用量及給藥方式的爭議。一些人喜歡快速地注入預定劑量，有些人喜歡滴定至意識喪失。兩種方法的神經肌肉阻斷藥（NMBD）給藥的時間不同。前者 NMBD 通常應在誘導藥物後立即給予，後者在滴定至意識喪失時給予。琥珀膽鹼推薦的最佳劑量為 1.0 至 1.5mg/kg，對於這個劑量支持和反對者雙方都有爭議。在 RSII 中傳統推薦的琥珀膽鹼給藥前去顫措施現在存在爭議。儘管贊成這種技術可加速非去極化肌松藥的起效時間，但由於它潛在的併發症以及羅庫溴銨的推出,它的使用大大減少。按照傳統，氣管插管前應避免手控通氣以防氣體進入胃部，但是目前手控通氣已被接受，甚至有些人建議應用手控通氣以避免低氧血症且可以“測試”面罩通氣。環狀軟骨按壓的爭論最

為激烈，有些人認為其能有效防止肺吸入的發生；然而另一些則認為由於有利性證據的不足及可能出現併發症，所以不應按壓環狀軟骨。飽胃患者麻醉誘導插管的最佳、最安全的位置，是頭高位，頭低位元，或平臥位仍存在爭議。這些爭議內容需要討論，研究，解決後才能確定標準的 RSII。
（陳毓雯　譯　陳傑　校）

The changing opinion regarding some of the traditional components of rapid sequence induction and intubation (RSII) creates wide practice variations that impede attempts to establish a standard RSII protocol. There is controversy regarding the choice of induction drug, the dose, and the method of administration. Whereas some prefer the traditional rapid injection of a predetermined dose, others use the titration to loss of consciousness technique. The timing of neuromuscular blocking drug (NMBD) administration is different in both techniques. Whereas the NMBD should immediately follow the induction drug in the traditional technique, it is only given after establishing loss of consciousness in the titration technique. The optimal dose of succinylcholine is controversial with advocates and opponents for both higher and lower doses than the currently recommended 1.0 to 1.5 mg/kg dose. Defasciculation before succinylcholine was traditionally recommended in RSII but is currently controversial. Although the priming technique was advocated to accelerate onset of nondepolarizing NMBDs, its use has decreased because of potential complications and the introduction of rocuronium. Avoidance of manual ventilation before tracheal intubation was traditionally recommended to avoid gastric insufflation, but its use is currently acceptable and even recommended by some to avoid hypoxemia and to “test” the ability to mask ventilate. Cricoid pressure remains the most heated controversy; some believe in its effectiveness in preventing pulmonary aspiration, whereas others believe it should be abandoned because of the lack of scientific evidence of benefit and possible complications. There is still controversy regarding the best position and whether the head-up, head-down, or supine position is the safest during induction of anesthesia in full-stomach patients. These controversial components need to be discussed, studied, and resolved before establishing a standard RSII protocol.

原發性肺癌術後肺部併發症的臨床預測規則

A Clinical Prediction Rule for Pulmonary Complications After Thoracic Surgery for Primary Lung Cancer.

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背景：胸外科術後肺的一氧化碳彌散能力（DLCOppo）與第一秒用力呼氣量對胸外科術後併發症的預測價值存在爭議。
方法：作者使用資料庫分析了 956 例在同一機構行肺癌切除術的患者。肺部併發症定義為：肺不張，肺炎，肺栓塞，呼吸衰竭和出院後需要吸氧。
結果：956 例患者中有 121 例出現肺部併發症（12.7%）。術前化療（相對危險度 1.64，95%可信區間為 1.06-2.55，P=0.02，得 2 分），肺的一氧化碳彌散能力低（彌

散力遞減 5%相對危險度遞增 1.13，95%可信區間為 1.06-1.19，P<0.0001，一氧化碳彌散能力每遞減 5%即得 1 分）為出現術後併發症的獨立危險因素。肺部併發症的危險因素分為 3 類：低於≤10 分，448 例中有 39 例（9%）;11-13 分，256 例中有 37 例（14%）；大於≥14 分，159 例中有 42 例（26 %）。發生肺部併發症患者的平均住院天數顯著高於無併發症患者：分別為 12 天（3-113）比 6 天（2-39），P <0.0001。同樣，發生肺部併發症患者 30 天內死亡率高於無併發症患者：121 例中 16 例（13.2 %），835 例中 6 例（0.7%），P<0.0001。

結論：以上資料表明，一氧化碳彌散能力和病人是否化療可較好地預測肺癌術後肺部併發症的發生。第一秒用力呼氣量不能預測肺部併發症的發生。

（陳毓雯　譯　陳傑　校）

BACKGROUND: There is controversy surrounding the value of the predicted postoperative diffusing capacity of lung for carbon monoxide (DLCOppo) in comparison to the forced expired volume in 1 s for prediction of pulmonary complications (PCs) after thoracic surgery.

METHODS: Using a prospective database, we performed an analysis of 956 patients who had resection for lung cancer at a single institution. PC was defined as the occurrence of any of the following: atelectasis, pneumonia, pulmonary embolism, respiratory failure, and need for supplemental oxygen at hospital discharge.

RESULTS: PCs occurred in 121 of 956 patients (12.7%). Preoperative chemotherapy (odds ratio 1.64, 95% confidence interval 1.06–2.55, *P* = 0.02, point score 2) and a lower DLCOppo (odds ratio per each 5% decrement 1.13, 95% confidence interval 1.06–1.19, *P* < 0.0001, point score 1 per each 5% decrement of DLCOppo less than 100%) were independent risk factors for PCs. We defined 3 overall risk categories for PCs: low ≤10 points, 39 of 448 patients (9%); intermediate 11–13 points, 37 of 256 patients (14%); and high ≥14 points, 42 of 159 patients (26%). The median (range) length of hospital stay was significantly greater for patients who developed PCs than for those who did not: 12 (3–113) days vs 6 (2–39) days, *P* < 0.0001, respectively. Similarly, 30-day mortality was significantly more frequent for patients who developed PCs than for those who did not: 16 of 121 (13.2%) vs 6 of 835 (0.7%), *P* < 0.0001.

CONCLUSIONS: These data show that PCs after thoracic surgery for lung cancer can be predicted with moderate accuracy based on DLCOppo and whether patients had chemotherapy. Forced expired volume in 1 s was not a predictor of PCs.

阻塞性睡眠呼吸障礙的病態肥胖病人行腔鏡下減肥手術拔管後即刻予以無創通氣可改善肺功能

Noninvasive Ventilation Immediately After Extubation Improves Lung Function in Morbidly Obese Patients with Obstructive Sleep Apnea Undergoing Laparoscopic Bariatric Surgery.

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背景：無創正壓通氣（NIPPV）可以改善腹部手術病人術後肺功能，同時減少術後併發症的發生。本研究的目的是確定術後 NIPPV 的時機是否會影響術後第一天的肺功能情況。
方法：在標準麻醉監護下，將 40 個已知有阻塞性睡眠呼吸障礙的肥胖病人隨機分成兩組，這些病人都進行了腹腔鏡下的減肥手術，拔管後，分別給予 NIPPV（干預組）或者吸氧（標準組）治療。在麻醉後監護室（PACU），病人拔管後 30 分鐘內，用同一個無創呼吸機給予病人持續氣道正壓通氣。由同一個非知情觀察者分別在入 PACU 一小時後以及術後第一天對這些病人做肺功能檢查。主要觀察結果是用力肺活量從基線到 24 小時內的變化程度。
結果：每組 20 例共 40 例入選本試驗。1 秒用力呼氣容量，用力肺活量，最高呼氣流速在這兩組中均有所下降。24 小時內干預組的用力肺活量僅下降 0.7L，而標準組則為 1.3L（P=0.0005）。協方差分析證實了以上這點，通過測定術後 1 小時和 24 小時的肺功能，發現術後即刻予以 NIPPV，可以更好地保護肺功能。具體來說，兩組間的主要結果是有統計學差異的。
結論：阻塞性睡眠呼吸障礙的肥胖病人行腔鏡下減肥手術，拔管後即刻給予 NIPPV 較 PACU 中給予持續氣道正壓通氣可以明顯改善術後 1 小時和術後第一天的肺功能情況。
（張婷　譯　陳傑　校）

BACKGROUND: Noninvasive positive pressure ventilation (NIPPV) may improve postoperative lung function and reduce postoperative complications in patients undergoing abdominal surgery. The purpose of our study was to determine whether the timing of postoperative NIPPV affects lung function 1 day postoperatively.
METHODS: Forty morbidly obese patients with known obstructive sleep apnea undergoing laparoscopic bariatric surgery with standardized anesthesia care were randomly assigned to receive NIPPV immediately after tracheal extubation (immediate group) or supplemental oxygen (standard group). All patients had continuous positive airway pressure initiated 30 minutes after extubation in the postanesthesia care unit (PACU) via identical noninvasive ventilators. Spirometry was performed by a blinded observer in the perioperative holding area 1 hour after admission to the PACU and 1 day postoperatively. The primary outcome was the change in forced vital capacity (FVC) from baseline to 24 hours (FVC baseline–FVC 24 hours).
RESULTS: Forty patients, 20 in each group, were enrolled in the study. Forced expiratory volume in 1 second, FVC, and peak expiratory flow rate were significantly reduced in both groups from perioperative values throughout the study. At 24 hours, the intervention group had lost only 0.7 L FVC, versus 1.3 L for the intervention group ($P = 0.0005$). An analysis of covariance confirmed this and indicated that the immediate postoperative NIPPV better preserved spirometric function at 1 and 24 hours postoperatively. Specifically, the differences in the primary outcome were statistically significant.
CONCLUSIONS: NIPPV given immediately after extubation significantly improves spirometric lung function at 1 hour and 1 day postoperatively, compared with continuous

positive airway pressure started in the PACU, in morbidly obese patients with obstructive sleep apnea undergoing laparoscopic bariatric surgery.

心內直視手術後，右旋美托咪定在嬰兒中的群體藥代動力學

Population Pharmacokinetics of Dexmedetomidine in Infants After Open Heart Surgery.

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背景：右旋美托咪定是一種高選擇性的α2受體激動劑，同時具有催眠、鎮痛及抗焦慮作用。在成人中，右旋美托咪定在鎮靜的同時不影響呼吸功能，又可減輕拔管時反應。但是該藥在小兒病人中的藥代動力學資料還相對缺乏。本試驗的主要目的是研究心內直視手術後右旋美托咪定在嬰兒中的藥代動力學改變。

方法：本試驗評估了 36 例心內直視手術後的嬰兒，其年齡在 1-24 個月。將所有心內直視手術後需機械通氣的嬰兒分成三組，每組 12 例，分別給予以下 3 種不同的初始負荷劑量-連續靜脈輸注劑量（CIVI）：0.35-0.25,0.7-0.5,or 1-0.75ug /kg/h。術後即刻給予初始負荷劑量大於 10 分鐘，然後再給予持續劑量不超過 24 小時。血漿右旋美托咪定濃度由高效液相色譜串聯質譜分析儀測定。本試驗使用群體非線性混合效應模型來說明右旋美托咪定的藥效動力學特點。

結果：本試驗用 2 房模型來評估右美托咪定的藥代動力學參數，分別研究體重對藥物清除率，兩房間清除率，中樞和外周的分佈容積的影響，總的轉流時間對清除率和中央分佈容積的影響，以及年齡和心室生理對清除率影響。嬰兒的清除率是 28.1ml/min/kg，兩房間清除率是 93.4ml/min/kg，中央分佈容積是 1.2 L /kg,外周分佈容積是 1.5L/kg。

討論：右旋美托咪定的清除率隨體重、年齡和單心室生理的增加而增加，而總轉流時間則與清除率下降有關，中央分佈容積隨著總轉流時間的增加而增加。與體重相關的清除率給現在臨床上按體重給右旋美托咪定劑量提供了依據，但是其他變數效應對臨床的影響還需更進一步的研究證實。在嬰兒這類群體中，初始負荷劑量範圍為 0.35-1ug/kg 大於 10 分鐘，維持靜脈輸注劑量為 0.25-0.75ug/kg/h 是比較適合的。（張婷　譯　陳傑　校）

BACKGROUND: Dexmedetomidine is a highly selective α_2-agonist with hypnotic, analgesic, and anxiolytic properties. In adults, it provides sedation while preserving respiratory function facilitating extubation. Only limited pharmacokinetic data are available for pediatric patients. The primary aim of this study was to determine the pharmacokinetics of dexmedetomidine in infants after open heart surgery.

METHODS: We evaluated 36 infants, aged 1 to 24 months, after open heart surgery. Cohorts of 12 infants requiring mechanical ventilation after open heart surgery were enrolled sequentially to 1 of the 3 initial loading dose—continuous IV infusion (CIVI) regimens: 0.35–0.25, 0.7–0.5, or 1–0.75 μg/kg-μg/kg/h. The initial loading dose was administered over 10 minutes immediately postoperatively followed by a CIVI of up to 24 hours. Plasma dexmedetomidine concentrations were determined using a validated high-performance liquid chromatography tandem mass spectrometry assay. A population nonlinear mixed effects modeling approach was used to characterize dexmedetomidine pharmacokinetics.
RESULTS: Pharmacokinetic parameters of dexmedetomidine were estimated using a 2-compartment disposition model with weight on drug clearance, intercompartmental clearance, central and peripheral volume of distributions, total bypass time as a covariate on clearance and central volume of distribution, and age and ventricular physiology as covariates on clearance. Infants demonstrated a clearance of 28.1 mL/min/kg$^{0.75}$, intercompartmental clearance of 93.4 mL/min/kg$^{0.75}$, central volume of distribution of 1.2 L/kg, and peripheral volume of distribution of 1.5 L/kg.
CONCLUSIONS: Dexmedetomidine clearance increased with weight, age, and single-ventricle physiology, whereas total bypass time was associated with a trend toward decreasing clearance, and central volume of distribution increased as a function of total bypass time. The dependence of clearance on body weight supports current practice of weight-based dexmedetomidine dosing, whereas the clinical impact of the remaining covariate effects requires further investigation. Initial loading doses in the range of 0.35 to 1 μg/kg over 10 minutes and CIVI of 0.25 to 0.75 μg/kg/h were well tolerated in this infant population.

腺苷誘導腦血流停止應用於顱內動脈瘤夾閉術：量效數據以及安全性

Adenosine-Induced Flow Arrest to Facilitate Intracranial Aneurysm Clip Ligation: Dose-Response Data and Safety Profile.

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背景：腺苷產生的短暫腦血流停止已經被用來協助顱內動脈瘤的夾閉。然而，其起始劑量, 即能產生並維持一段足夠時間低血壓的腺苷劑量為多少還不得而知。作者回顧了以往經驗來確定其量效關係以及腺苷對於顱內動脈瘤患者的圍手術期安全性。
方法：本文包括了 24 例行顱內動脈瘤夾閉術，麻醉採用瑞芬太尼，低劑量的揮發性麻醉藥，丙泊酚以及腺苷。報告側重於使用的劑量，收縮壓<60mmHg 的持續時間和圍手術期觀察到的心血管、神經以及呼吸系統的併發症。
結果：應用腺苷平均劑量 0.34 mg/kg（理想體重，範圍：0.29–0.44 mg/kg）可導致收縮壓<60mmHg 維持 57s（範圍：26–105 s），腺苷的對數變換劑量與收縮壓收縮壓<60mmHg 的時間之間存在線性關係（R^2 = 0.38）。2 例患者出現短暫的、血流動力

學穩定的房顫，2 例患者術後肌鈣蛋白水準>0.03 ng/mL，但沒有證據表明心功能不全，3 例患者術後出現神經功能變化。
結論：當無法或很難臨時阻斷顱內動脈瘤時，腺苷可以短暫降低血壓，並有較低的圍術期死亡率。在這些資料的基礎上，0.3-0.4 mg/kg 理想體重的劑量是一個推薦的起始劑量，在瑞芬太尼、低濃度吸入麻醉和異丙酚誘導的爆發性抑制麻醉狀態下可以產生大約 45s 的系統性較深的低血壓。
（黃丹　譯　陳傑　校）

BACKGROUND: Adenosine-induced transient flow arrest has been used to facilitate clip ligation of intracranial aneurysms. However, the starting dose that is most likely to produce an adequate duration of profound hypotension remains unclear. We reviewed our experience to determine the dose-response relationship and apparent perioperative safety profile of adenosine in intracranial aneurysm patients.
METHODS: This case series describes 24 aneurysm clip ligation procedures performed under an anesthetic consisting of remifentanil, low-dose volatile anesthetic, and propofol in which adenosine was used. The report focuses on the doses administered; duration of systolic blood pressure <60 mm Hg ($SBP_{<60\ mm\ Hg}$); and any cardiovascular, neurologic, or pulmonary complications observed in the perioperative period.
RESULTS: A median dose of 0.34 mg/kg ideal body weight (range: 0.29–0.44 mg/kg) resulted in a $SBP_{<60\ mm\ Hg}$ for a median of 57 seconds (range: 26–105 seconds). There was a linear relationship between the log-transformed dose of adenosine and the duration of a $SBP_{<60\ mm\ Hg}$ (R^2 = 0.38). Two patients developed transient, hemodynamically stable atrial fibrillation, 2 had postoperative troponin levels >0.03 ng/mL without any evidence of cardiac dysfunction, and 3 had postoperative neurologic changes.
CONCLUSIONS: For intracranial aneurysms in which temporary occlusion is impractical or difficult, adenosine is capable of providing brief periods of profound systemic hypotension with low perioperative morbidity. On the basis of these data, a dose of 0.3 to 0.4 mg/kg ideal body weight may be the recommended starting dose to achieve approximately 45 seconds of profound systemic hypotension during a remifentanil/low-dose volatile anesthetic with propofol induced burst suppression.

異氟醚和地氟醚、七氟醚麻醉拔管時間的平均值以及變異度對比：meta 分析

Meta-Analysis of Average and Variability of Time to Extubation Comparing Isoflurane with Desflurane or Isoflurane with Sevoflurane.

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背景:最近，作者在探索如何通過麻醉資訊管理系統資料來類比從手術結束到拔管的時間。運用此系統來比較地氟醚和七氟醚麻醉維持後的拔管時間差異的 meta 分析。

在這項研究中，作者應用 meta 分析分別對異氟醚與地氟醚、異氟醚與七氟醚進行比較。

方法：從 Medline 搜索 2009 年 12 月的研究,其特徵為 1) 隨機分為地氟醚和異氟醚組，組間沒有其他差異（例如誘導用的藥物），2) 報導拔管時間和/或能聽從命令時間的均值和標準差。再進行異氟醚和七氟醚的類似比較研究搜索。拔管時間>15 分鐘就被認為是拔管時間延長（在麻醉資訊管理系統資料中占 15%的病例）。

結果：地氟醚相對異氟醚，拔管的平均時間減少 34%，拔管平均時間的變異度減少 36%。拔管時間延長的發生率分別減少 95%和 97%。七氟醚相對異氟醚，拔管平均時間減少 13%，拔管平均時間的標準差減少 8.7%。拔管時間延長的發生率分別減少 51%和 35%。

結論：雖然測量的時間差異較小,但吸入麻醉藥的經濟學方面差異是巨大的。因此，手術機構在制定藥物採購和使用方法的管理決策時,應將這些數值和資料(如,平均拔管時間)進行比較。

（黃丹　譯　陳傑　校）

BACKGROUND: We recently determined how to use anesthesia information management system data to model the time from end of surgery to extubation. We applied that knowledge for meta-analyses of trials comparing extubation times after maintenance with desflurane and sevoflurane. In this study, we repeated the meta-analyses to compare isoflurane with desflurane and sevoflurane.

METHODS: A Medline search through December 2009 was used to identify studies with (1) humans randomly assigned to isoflurane or desflurane groups without other differences (e.g., induction drugs) between groups, and (2) mean and SD reported for extubation time and/or time to follow commands. The search was repeated for random assignment to isoflurane or sevoflurane groups. We considered extubation times >15 minutes (representing 15% of cases in the anesthesia information management system data) to be prolonged.

RESULTS: Desflurane reduced the mean extubation time by 34% and reduced the variability in extubation time by 36% relative to isoflurane. These reductions would reduce the incidence of prolonged extubation times by 95% and 97%, respectively. Sevoflurane reduced the mean extubation time by 13% and reduced the SD by 8.7% relative to isoflurane. These reductions would reduce the incidence of prolonged extubation times by 51% and 35%, respectively.

CONCLUSIONS: The pharmacoeconomics of volatile anesthetics are highly sensitive to measurement of relatively small time differences. Therefore, surgical facilities should use these values combined with their local data (e.g., mean baseline extubation times) when making evidence-based management decisions regarding pharmaceutical purchases and usage guidelines.

利多卡因滴眼液有助減少帶狀皰疹後眼部神經痛

Lidocaine Eye Drops Attenuate Pain Associated with Ophthalmic Postherpetic Neuralgia.

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背景：對於帶狀皰疹後神經痛（PHN）事先局部應用利多卡因（LDC）凝膠或貼片治療是有效的.然而無論是利多卡因凝膠或是貼片對於帶狀皰疹後眼部神經痛的患者都不適用。本文研究了 4%利多卡因（LDC）滴眼液對帶狀皰疹後眼部神經痛的有效性。
方法：24 例帶狀皰疹後眼部神經痛的患者隨機分為兩組：實驗組（LDC 組）患者患側眼部給予 0.4mL 的 4%利多卡因滴眼液，對照組（PBO 組）給予生理鹽水。在 7 天后，兩組患者交換使用對方的滴眼液繼續治療。在利多卡因滴眼液治療前及之後 15 分鐘使用視覺類比評分（VAS）評估眼部及前額的疼痛。患者通過一項描述性量表來評定疼痛等級並被要求記錄是否在治療後再次產生疼痛及治療後多久再次產生疼痛。
結果：應用利多卡因滴眼液（LDC）顯著減少患者眼部持續性疼痛的 VAS 評分（基線：5.9 ± 2.2 cm; 眼部滴入利多卡因後 15 分鐘: 0.9 ± 1.8 cm, 均數 ± 標準差[P < 0.01]），並顯著減少前額部的持續性疼痛評分(基線: 6.3 ± 2.0 cm; 眼部滴入利多卡因後 15 分鐘: 2.6 ± 2.7 cm [P < 0.01])。δ 變化顯示 LDC 組及 PBO 組的 VAS 評分差異顯著 (P < 0.01)。另外，23 例 LDC 組患者及 4 例對照組患者在接受治療後表示疼痛緩和或有所改善。利多卡因滴眼液（LDC）的治療有效時程平均為 36 小時（8-96 小時）。
結論：此次研究表明利多卡因（LDC）滴眼液對治療帶狀皰疹後眼部神經痛有顯著改善效果，且其鎮痛迅速、全身副作用少、應用方便。
（趙嫣紅　譯　陳傑　校）

BACKGROUND: Topical lidocaine (LDC) treatment using a gel or patch preparation is effective in the treatment of postherpetic neuralgia (PHN), but neither is suited for the eye in patients with ophthalmic PHN. Herein, we examined the effect of LDC 4% eye drops on ophthalmic PHN pain.
METHODS: Twenty-four patients with ophthalmic PHN were randomized to receive 0.4 mL eye drops of either LDC 4% or saline placebo (PBO) in the painful eye. After a 7-day period, the patients were crossed over to receive the alternative eye drops. The pain in the eye and the forehead was assessed with a visual analog scale (VAS) before and 15 minutes after treatment. Patients used a descriptive scale to grade pain outcome and were asked to note whether the pain returned and how long after therapy it recurred.
RESULTS: LDC significantly decreased the VAS score of persistent pain in the eye (baseline: 5.9 ± 2.2 cm; 15 minutes after eye drops: 0.9 ± 1.8 cm, mean ± SD [$P < 0.01$]) and in the forehead (baseline: 6.3 ± 2.0 cm; 15 minutes after eye drops: 2.6 ± 2.7 cm [$P < 0.01$]). The δ change in these VAS scores between LDC and PBO was significant ($P < 0.01$). Moreover, pain was described as moderate or better by 23 patients after they received LDC and 4 patients of the PBO group. The effect of LDC persisted for a median of 36 hours (range, 8–96 hours) after application.
CONCLUSIONS: This study suggests that LDC provides a significant improvement of ophthalmic PHN because of its prompt analgesia, lack of systemic side effects, and convenience of use.

麻醉下機械通氣的幼豬應用兩種不同脂肪乳劑逆轉布比卡因引起的心臟電生理變化

Reversal of Bupivacaine-Induced Cardiac Electrophysiologic Changes by Two Lipid Emulsions in Anesthetized and Mechanically Ventilated Piglets.

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背景：靜脈誤注布比卡因將作用於心血管功能導致致命的心律失常，而應用脂肪乳劑可緩解這種血流動力學改變。然而，對於脂肪乳劑的電生理作用仍然不甚明確。在此次研究中，作者對麻醉下機械通氣的幼豬應用兩種不同脂肪乳劑，並評估其是否對布比卡因引起的心臟電生理損害有逆轉作用。

方法：入組 26 只幼豬在 30 秒內靜脈注射布比卡因(4 mg · kg−1)。注射完畢 30 秒後對照組 1 分鐘內靜脈注射生理鹽水 1.5 mL · kg−1；實驗組 1 分鐘內靜脈注射長鏈甘油三酯乳劑（LCT 組）或長鏈/中鏈甘油三酯混合乳劑(LCT/MCT 組)。在注射後 30 分鐘內監測幼豬心臟傳導改變及心臟血流動力學改變。

結果：各組應用布比卡因靜脈注射對心臟電生理改變及血流動力學改變相似。在注射後 3 分鐘，對照組、LCT 組、LCT/MCT 組的心室-His 束間期（中位數和四分位數表示）分別為 100 (85–105)、45 (35–55)、 53 (48–73) 毫秒，三組均 P < 0.001。脂肪乳劑對 QRS 間期、心房-His 束間期及 PQ 間期（即 P 波起始至 QRS 波群中的 Q 波終止）的改變有所逆轉。LCT/MCT 乳劑對左心室最大射血分數的下降有恢復作用（注射後 3 分鐘，與對照組相比 P < 0.01）。

結論：靜脈注射 4 mg · kg−1 布比卡因後應用 LCT 及 LCT/MCT 脂肪乳劑，能有效逆轉心室-His 束間期、QRS 間期、心房-His 束間期及 PQ 間期的延長。

（趙嫣紅　譯　陳傑　校）

BACKGROUND: Accidental IV administration of bupivacaine can compromise cardiovascular function by inducing lethal arrhythmias whose hemodynamic consequences may be alleviated by lipid emulsions. However, little is known about the electrophysiologic effects of lipid emulsions. In this study, we assessed whether 2 different lipid emulsions can reverse cardiac electrophysiologic impairment induced by the IV administration of bupivacaine in anesthetized and mechanically ventilated piglets.

METHODS: Bupivacaine (4 mg · kg^{-1}) was injected over a 30-second period in 26 piglets. Thirty seconds after the end of bupivacaine injection, 1.5 mL · kg^{-1} saline solution for the control group, and long-chain triglyceride emulsion (LCT group) or a mixture of long-chain and medium-chain triglyceride emulsion (LCT/MCT group) were infused over 1 minute. Cardiac conduction variables and hemodynamic variables were monitored for 30 minutes after injection.

RESULTS: Bupivacaine induced similar electrophysiologic and hemodynamic changes. After 3 minutes, His ventricle intervals (median and interquartiles) were 100 (85–105), 45 (35–55), and 53 (48–73) milliseconds in the control, LCT, and LCT/MCT groups, respectively ($P < 0.001$ between control and both lipid emulsion groups). Lipid emulsions also reversed the effects on QRS duration, atrial-His, and PQ (the onset of the P wave to the Q wave of the QRS complex) intervals. LCT/MCT emulsion restored the decrease in maximal first derivative of left ventricular pressure ($P < 0.01$ after 3 minutes versus control group).
CONCLUSIONS: LCT and LCT/MCT emulsions reversed the lengthening of His ventricle, QRS, atrial-His, and PQ intervals induced by the IV injection of 4 mg · kg^{-1} bupivacaine.

肛腸手術中性別對於羅呱卡因骶管麻醉最小局麻濃度的影響

The Effect of Sex on the Minimum Local Analgesic Concentration of Ropivacaine for Caudal Anesthesia in Anorectal Surgery.

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背景：骶管麻醉常規應用於大部分日間肛腸手術（患者需要盡可能快的恢復）。局麻藥的劑量在男性和女性患者之間可能不同。作者設計這項研究以探討性別對於羅呱卡因骶管麻醉最小局麻濃度（MLAC）的影響。
方法：在這個雙盲、前瞻性的研究中，共收集 70 例 ASA I 的病人（男女各 35 例），進行骶管麻醉下肛腸手術，並根據他們的性別分為兩組。每位患者通過一個骶管單次給予羅呱卡因 20ml。使用 Dixon 序貫試驗法，第一位患者給予 0.2%的羅呱卡因，後面患者的濃度根據前一位元患者對於首次切皮刺激的止痛效果和肛門括約肌鬆弛程度來決定。濃度的變化單位為 0.025%。用 Dixon and Massey 分析藥物濃度的上下的順序，以量化患者的骶管麻醉阻滯效果的半數有效濃度。
結果：羅呱卡因鎮痛的 MLAC，男性患者為 0.296%（95%可信區間，0.286% - 0.307%），女性患者位 0.389%（95%可信區間，0.372%-0.407%）（P <0.01）。
結論：羅呱卡因骶管麻醉中的 MLAC 女性患者比男性患者大 31%。
（懷曉蓉　譯　陳傑　校）

BACKGROUND: Caudal anesthesia is routinely used in our hospital for most of ambulatory anorectal surgery; patients need to recover as quickly as possible. The dose of local anesthetic may be different for male and female patients. We designed this study to investigate the effect of sex on the minimum local anesthetic concentration (MLAC) of ropivacaine for caudal anesthesia.
METHODS: In this double-blind, prospective study, we enrolled 70 ASA physical status I patients (35 male and 35 female) who were scheduled for anorectal surgery under caudal anesthesia, and allocated them to 2 study groups according to their gender. Each participant received a single injection of 20 mL ropivacaine through a caudal catheter. Using Dixon's up-and-down sequential allocation, the first participant received 0.2% and subsequent concentrations were determined by the analgesic response of the previous patients to the

initial skin incision and laxity of the anal sphincter. The concentration change was 0.025%. The up-and-down sequences were analyzed using the Dixon and Massey method to quantify the caudal analgesic block effective concentrations in 50% of patients.
RESULTS: The MLAC of ropivacaine for caudal analgesia was 0.296% (95% confidence interval, 0.286%–0.307%) in male patients and 0.389% (95% confidence interval, 0.372%–0.407%) in female patients ($P < 0.01$).
CONCLUSIONS: We conclude that the ropivacaine MLAC for caudal anesthesia in female patients is 31% larger than in male patients.

圍術期液體管理中高滲鹽水的應用

Hypertonic Saline for Perioperative Fluid Management.
McAlister V, Burns KEA, Znajda T, Church B. Hypertonic saline for peri-operative fluid management. Cochrane Database of Systematic Reviews 2010, Issue 1. Art. No.: CD005576.
.Anesth Analg May 2010 110:1506;

背景：液體過量可能把接受手術的患者置於嚴重併發症的風險之中。高滲鹽水（HS）比等滲鹽水（IS）更好地在低靜脈液體量的基礎上維持血管容量，但可能會增加血清鈉。
目標：比較手術患者應用 HS 和 IS 的優缺點
搜索：搜索 The Cochrane Central Register of Controlled Trials (CENTRAL), (The Cochrane Library) Issue 1, 2009; MEDLINE (1966 to 2009); EMBASE (1980 to 2009); LILACS (to August 2009) and CINAHL (1982 to 2009)有關文獻，沒有語言限制。
選擇標準：納入隨機臨床試驗，手術患者， 作 HS 和 IS 比較研究。不考慮盲法，語言和出版情況。
資料收集和分析：評估給予 HS 對於死亡率、器官衰竭、液體平衡，血清鈉，血清滲透壓，利尿，心血管功能的生理測量的影響。分別應用比值比或平均差異（MD）匯總二進位和連續結果, 並採用隨機效應模型。
主要結果：本研究共納入了 15 個研究，614 例患者。每組有 1 人死亡，無其他嚴重不良事件的報告。當所有的病人術後處於正液體平衡時，HS 組患者中過量的患者明顯較少（標準平均差小於（SMD）- 1.43L，95％可信區間（CI）少 0.8 至 2.1L; P <0.00001）。HS 組患者比 IS 組患者接受的液體明顯較少（MD - 2.4 升，95％（CI），少 1.5 至 3.2L，P <0.00001），兩組間尿量無差異。術中心臟最大指數 HS 組明顯增加（SMD 高 0.6 L/min/M2，95％CI，0.1 至 1.0，P=0.02），但術中肺動脈楔壓保持不變。而最高血清鈉和研究結束時血清鈉在 HS 組患者明顯較高，但仍維持在正常範圍（136-146 meq/L）。
結論：HS 減少了維持進行手術患者所需的靜脈液體量，但短暫增加血清鈉。這是否影響患者的存活率和發病率尚未清楚，因此應該設計臨床隨機試驗以便有效地檢測這些結果。
（懷曉蓉　譯　陳傑　校）
BACKGROUND: Fluid excess may place patients undergoing surgery at risk for various complications. Hypertonic saline (HS) maintains intravascular volume with less intravenous fluid than isotonic salt (IS) solutions, but may increase serum sodium.

OBJECTIVES: To determine the benefits and harms of HS versus IS solutions administered to patients undergoing surgery.
SEARCH STRATEGY: We searched the Cochrane Central Register of Controlled Trials (CENTRAL), (*The Cochrane Library*) Issue 1, 2009; MEDLINE (1966 to 2009); EMBASE (1980 to 2009); LILACS (to August 2009) and CINAHL (1982 to 2009) without language restrictions.
SELECTION CRITERIA: We included randomized clinical trials where HS was compared to IS in patients undergoing surgery, irrespective of blinding, language, and publication status.
DATA COLLECTION AND ANALYSIS: We assessed the impact of HS administration on mortality, organ failure, fluid balance, serum sodium, serum osmolarity, diuresis and physiologic measures of cardiovascular function. We pooled data using odds ratio or mean difference (MD) for binary and continuous outcomes, respectively, using random-effects models.
MAIN RESULTS: We included 15 studies with 614 participants. One death in each group and no other serious adverse events were reported. While all patients were in a positive fluid balance postoperatively, the excess was significantly less in HS patients (standardized mean difference (SMD) −1.43L, 95% confidence interval (CI) 0.8 to 2.1 L less; $P < 0.00001$). Patients treated with HS received significantly less fluid than IS-treated patients (MD −2.4L 95% (CI) 1.5 to 3.2 L less; $P < 0.00001$) without differences in diuresis between the groups. Maximum intraoperative cardiac index was significantly increased with HS (SMD 0.6 L/min/M2 higher, 95% CI 0.1 to 1.0, $P = 0.02$) but Intraoperative pulmonary artery wedge pressure remained unchanged. While the maximum serum sodium and the serum sodium at the end of the study were significantly higher in HS patients, the level remained within normal limits (136 to 146 meq/L).
AUTHORS' CONCLUSIONS: HS reduces the volume of intravenous fluid required to maintain patients undergoing surgery but transiently increases serum sodium. It is not known if HS effects patient survival and morbidity but it should be tested in randomized clinical trials that are designed and powered to test these outcomes.