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老年血管外科手術患者身體品質指數與術後疾病結局間的相互關係：一反 J 曲線現象

The association of body mass index to postoperative outcomes in elderly vascular surgery patients: a reverse j-curve phenomenon.

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Anesth Analg January 2011 112:23-29

此項研究旨在測定接受血管外科手術的老年患者其身體品質指數（BMI）分級與術後早期疾病結局間是否存在相互關係。本研究假設超重或肥胖會增加手術風險。試驗資料來源於美國外科醫師學會全國外科品質改進計畫共用資料庫，共選取 2005 至 2007 年間年齡≥65 歲的血管外科手術患者 25337 例，分別測定其 BMI（kg/m^2）及術後 30 天的疾病結局。根據 BMI 計算值，患者被分爲 6 個 BMI 等級：（1）體重過輕（BMI≤18.5 kg/m^2），（2）體重正常（BMI=18.6-24.9 kg/m^2），（3）超重（BMI=25-29.9 kg/m^2），（4）Ⅰ度肥胖（BMI=30-34.9 kg/m^2），（5）Ⅱ度肥胖（BMI=35-39.9 kg/m^2），（6）Ⅲ度肥胖（BMI≥40 kg/m^2）。各個 BMI 級別其術後併發症的發病率與死亡率均需行單因素及多因素的 Logistic 回歸分析。不同 BMI 級別的死亡率均不相同：體重過輕組 9.4%，體重正常組 4.0%，超重及Ⅰ度肥胖組 3.0%，Ⅱ度肥胖組 3.3%，Ⅲ度肥胖組 4.6%（P＜0.001）。術後主要併發症的發病率與死亡風險相似。術前與死亡率相關的獨立風險因素包括糖尿病、慢性阻塞性肺病、充血性心衰活躍期、近期體重下降、轉移性癌及自立能力缺失。在判定手術風險時，上述因素中的每一項在統計學上均比單獨考慮 BMI 更爲重要。對這些接受血管外科手術的老年群體而言，僅僅 BMI 增加並不能成爲預測術後 30 天死亡的主要依據；BMI 的效應主要表現爲一非線性的反 J 曲線，即在體重過輕或正常患者中其疾病結局往往最差，而過度肥胖患者其死亡率卻僅輕度增加。
（范羽譯 薛張綱校）

The purpose of this investigation was to determine whether there is a relation between body mass index (BMI) classes and early postoperative outcomes in elderly patients undergoing vascular surgery. We hypothesized that being overweight or obese increases

the risks of surgery.Data from the American College of Surgeons' National Surgical Quality Improvement Program Participant Use Data File was used to identify the BMI (kg/m(2)) and 30-day outcomes of 25,337 patients aged ≥65 years undergoing vascular surgery from 2005 to 2007. Patients were stratified into 6 BMI classes: (1) underweight (BMI ≤18.5 kg/m(2)), (2) normal (BMI = 18.6-24.9 kg/m(2)), (3) overweight (BMI = 25-29.9 kg/m(2)), (4) obese class I (BMI = 30-34.9 kg/m(2)), (5) obese class II (BMI = 35-39.9 kg/m(2)), and (6) obese class III (BMI ≥40 kg/m(2)). Morbidity and mortality rates across all BMI classes were subjected to univariate and multiple logistic regression analyses.Mortality rates varied among the BMI classes: 9.4% underweight, 4.0% normal, 3.0 overweight and obese I, 3.3% obese II, and 4.6% obese III (P < 0.001). Major postoperative morbidity paralleled the risk of death. Independent preoperative factors associated with mortality included diabetes mellitus, chronic obstructive pulmonary disease, active congestive heart failure, recent weight loss, disseminated cancer, and an inability to function independently. Each of these factors was statistically more important than the BMI alone in defining an increased risk of surgery.Increased BMI alone was not a major factor predicting perioperative 30-day mortality in this cohort of elderly surgical patients; the effect was a nonlinear one with a reversed J-curve response documenting the poorest outcomes in underweight, normal, and a slight increase in excessively obese patients.

綜述：高凝的病因和評估以及從肝素介導的血小板減少症中學到的經驗教訓

Review article: etiology and assessment of hypercoagulability with lessons from heparin-induced thrombocytopenia.

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高凝或者血栓形成過快是指一種血液不正常地過度趨向於凝集反應的狀態。處於這種狀態的患者容易發生靜脈或者動脈血栓並且常需要預防血栓形成。高凝大體上可以分爲兩類：遺傳性和獲得性。遺傳性高凝患者的基因片斷有異常，使得與凝血有關的蛋白發生質或者量的異常。高凝也可以是獲得性的，並且由組織損傷後機體的正常生理反應發展爲過度反應，或者是對於多種致凝因數的不正常反應。對高凝應當進行細緻地評估，從而可以制定出有效的處理對策，通常需要進行抗凝治療。比如肝素介導的血小板減少症就是一種獲得性高凝狀態。對此人們已經進行了深入的研究並且能夠採取有效的治療措施。本文就血栓形成的病因、風險因素和血栓形成狀態的評估進行綜述，並且著重關注於從肝素介導的血小板減少症中學習到的臨床經驗和教訓。

（黃劍譯 薛張綱校）

Hypercoagulability, or thrombophilia, is a condition associated with an abnormally increased tendency toward blood clotting. Affected individuals are prone to developing venous or arterial thrombosis and often require thromboprophylaxis. Hypercoagulability can be generally classified as either an inherited or acquired condition. Patients with an

inherited thrombophilia have genetic variances that alter the quality or quantity of proteins involved with hemostasis. Hypercoagulability may also be acquired and develop as an exaggeration of normal physiologic responses to major tissue injury, or an abnormal response to various prothrombotic clinical factors. Careful assessment for hypercoagulability is important because effective management strategies, often involving anticoagulation, may be available. Heparin-induced thrombocytopenia is an example of an acquired hypercoagulable state that has been well studied and, when recognized, responds to appropriate therapy. In this article, we review the etiology, risks, and assessment of thrombophilia, with emphasis on the clinical lessons learned from heparin-induced thrombocytopenia.

呼吸變異與脈壓差及體積描記波形：北美研究中心術中應用

Respiratory Variation in Pulse Pressure and Plethysmographic Waveforms: Intraoperative
Applicability in a North American Academic Cente

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Anesth Analg January 2011 112:94-96

血流動力學變化是對全麻機械通氣病人液體負荷的最好預測；即呼吸變異對脈壓差及體積描記波形的影響。然而這些變異存在潛在局限。我們的目的是評估術中應用價值。我們從研究所 2009 年全麻病例中收集資料，確認病歷號，預先提出應用條件。在 12308 個病例中，39%符合體積描記無創監測標準，23%有動脈符合脈壓差有創監測標準。
（毛慧譯，薛張剛校）

Dynamic variables are the best predictors of fluid responsiveness in patients under general anesthesia and mechanical ventilation; namely, respiratory variations in pulse pressure and in the plethysmographic waveform. However, these variables have potential limitations. Our aim was to evaluate their intraoperative applicability. We extracted clinical data from all anesthesia procedures performed at our institution in 2009 and identified the number of cases that presented predetermined conditions of application. Among the 12,308 procedures, 39% met the criteria for the noninvasive monitoring of variations in the plethysmographic waveform of which 23% had arterial lines and met the criteria for the invasive monitoring of variations in pulse pressure. (Anesth Analg 2011;112:94–6)

睡眠呼吸暫停病人行非心臟手術後圍術期肺相關預後

Perioperative pulmonary outcomes in patients with sleep apnea after noncardiac surgery

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Anesth Analg January 2011 112:113-121

背景：儘管合併睡眠呼吸暫停的病人被認爲術後發生併發症風險增加，但圍術期肺部併發症發病率增加的證據有限。本試驗總結了合併睡眠呼吸暫停病人行矯形外科或普外科手術的總體病例，並基於此總體樣本分析了術後肺相關預後。我們假設睡眠呼吸暫停是圍術期肺部併發症的獨立危險因素，這使可利用的資源有所增加，其中包括了重症監護和處理這些相關併發症策略的發展。
方法：我們分析了 1998 年到 2007 年的全美住院病人資料。行矯形科和普外科手術，並在出院時有睡眠呼吸暫停診斷的病人被記錄。我們使用傾向分數方法，並基於人口統計變異值將有睡眠呼吸暫停診斷的病人與那些沒有此疾病的病人配對。主要的併發症包括吸入性肺炎、成人呼吸窘迫綜合症、肺栓塞和需要氣管插管和機械通氣。比值比和風險減少絕對值的 95%置信區間被報導。
結果：我們確認了在 1998 年到 2007 年間的 2610441 例矯形科手術和 3441262 例普外科手術。這其中分別有 2.52%和 1.40%的病人被診斷爲睡眠呼吸暫停。在矯形或普外科手術後，合併呼吸睡眠暫停的病人發生肺部併發症的幾率均比配對的對照組高(例如：吸入性肺炎 1.18% 比 0.84%，2.79%比 2.05%；成人呼吸窘迫綜合症 1.06%比 0.45%，3.79%比 2.44%；氣管插管/機械通氣 3.99%比 0.79%，10.8%比 5.94%，所有 P 值均小於 0.0001)。相對而言，合併呼吸睡眠暫停病人在矯形術後發生肺栓塞機會更高(0.51%比 0.42%，P=0.0038)，但在普外科術後則不然(0.45%比 0.49%，P=0.22)。除外肺栓塞，在矯形科和普外科術後，呼吸睡眠暫停在術後肺部併發症方面，與一個顯著增高的調整後比值比相關(比值比：吸入性肺炎 1.41[1.35，1.47]和 1.37 [1.33，1.41]；成人呼吸窘迫綜合症 2.39[2.28，2.51]和 1.58[1.54，1.62]；肺栓塞 1.22 [1.15，1.29]和 0.90[0.84，0.97]；氣管插管/機械通氣 5.20[5.05，5.37]和 1.95[1.91，1.98])。
結論：睡眠呼吸暫停是圍術期肺部併發症的獨立危險因素。在與這種病人群體相關促進圍術期預後的臨床研究中，我們的結果可以被用於假設生成。
（任雲譯 薛張綱校）

BACKGROUND: Although patients with sleep apnea (SA) are considered to be at increased risk for postoperative complications, evidence supporting increased risk of perioperative pulmonary morbidity is limited. The objective of this study, therefore, was to analyze perioperative demographics and pulmonary outcomes of patients with SA after orthopedic and general surgical procedures using a population-based sample. We hypothesized that SA is an independent risk factor for perioperative pulmonary complications, thus providing a basis for an increase in the utilization of resources, including intensive monitoring and development of strategies to prevent and treat these events.
METHODS: National Inpatient Sample data for each year between 1998 and 2007 were accessed. Orthopedic and general surgical procedures were included and discharges with a diagnosis code for SA were identified. Patients with the diagnosis of SA were matched to those without the disease based on demographic variables using the propensity scoring method. Aspiration pneumonia, adult respiratory distress syndrome (ARDS), pulmonary

embolism (PE), and the need for intubation and mechanical ventilation were the primary outcomes. Odds ratio (OR) and absolute risk reduction along with 95% confidence interval were reported.
RESULTS: We identified 2,610,441 entries for orthopedic and 3,441,262 for general surgical procedures performed between 1998 and 2007. Of those, 2.52% and 1.40%, respectively, carried a diagnosis of SA. Patients with SA developed pulmonary complications more frequently than their matched controls after both orthopedic and general surgical procedures, respectively (i.e., aspiration pneumonia: 1.18% vs 0.84% and 2.79% vs 2.05%; ARDS: 1.06% vs 0.45% and 3.79% vs 2.44%; intubation/mechanical ventilation: 3.99% vs 0.79% and 10.8% vs 5.94%, all P values <0.0001). Comparatively, PE was more frequent in SA patients after orthopedic procedures (0.51% vs 0.42%, P = 0.0038) but not after general surgical procedures (0.45% vs 0.49%, P = 0.22). SA was associated with a significantly higher adjusted OR of developing pulmonary complications after both orthopedic and general surgical procedures, respectively, with the exception of PE (OR for aspiration pneumonia: 1.41 [1.35, 1.47] and 1.37 [1.33, 1.41]; for ARDS: 2.39 [2.28, 2.51] and 1.58 [1.54, 1.62]; for PE: OR 1.22 [1.15, 1.29] and 0.90 [0.84, 0.97]; for intubation/mechanical ventilation: 5.20 [5.05, 5.37] and 1.95 [1.91, 1.98]).
CONCLUSION: SA is an independent risk factor for perioperative pulmonary complications. Our results may be used for hypothesis generation for clinical studies targeted to improve perioperative outcomes in this patient population.

心臟手術第一個 24 小時內常規拍攝胸片的臨床價值

The Clinical Value of Routine Chest Radiographs in the First 24 Hours After Cardiac Surgery

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背景：在重症監護室（ＩＣＵ）經常會拍攝胸片。但是應該常規拍攝胸片還是應該根據臨床病情來拍攝胸片，這是受到爭議的。本實驗的目的是研究心臟手術後常規胸片對發現異常情況的機率和臨床重要性，並研究如果嚴格地限制拍攝胸片是否會影響到這些重要情況的發現。
方法：我們的研究包括了所有在２個月內經歷過心臟手術的病人。在進入ＩＣＵ的第一個２４小時內會拍攝２－３張胸片。進入ＩＣＵ後和引流管拔除後，在拍攝胸片之前都會進行臨床評估。我們記錄了所有的胸片，並且記錄它是否帶來進一步的干預治療。對於進入ＩＣＵ後的胸片和引流管拔除後的胸片，我們比較了醫生有臨床指征拍的胸片和沒有臨床指征的胸片。
結果：總共有２４０名患者參加了我們的研究。其中６０％的患者接受了冠狀動脈搭橋手術，２１％的病人接受了心臟瓣膜手術，有１４％的病人同時進行了兩種手術。總共拍攝了５３４張胸片（平均每人２．５張）。１７９張胸片有異常問題

（占３３．５％），其中有１３張胸片導致了進一步的干預治療（占２．４％）。有臨床指征胸片與異常情況的發生率相關性比較低。在３２１張入ＩＣＵ的胸片和拔管後的胸片中有３２張是醫生認爲是有臨床指征的。如果胸片沒有被常規拍攝，可能會錯失６８次異常情況，其中只有５次有干預措施。

結論：對大多數病人來說心臟手術後第一個２４小時內部分取消胸片是可以的，但是同時也限制了在臨床評估中發現重要異常情況的敏感性，而這些異常情況本可以通過胸片發現。

（翁梅琳譯 薛張綱校）

BACKGROUND: Chest radiographs (CXRs) are obtained frequently in the intensive care unit (ICU). Whether these CXRs should be performed routinely or on clinical indication only is often debated. The aim of our study was to investigate the incidence and clinical significance of abnormalities found on routine postoperative CXRs in cardiac surgery patients and whether a restricted use of CXRs would influence the number of significant findings.

METHODS: We prospectively included all consecutive patients who underwent cardiac surgery during a 2-month period. Two or three CXRs were performed in the first 24 hours of ICU stay. After ICU admission and after drain removal, a clinical assessment was performed before a CXR was obtained. All CXR abnormalities were noted and it was also noted whether they led to an intervention. For the admission CXR and the drain removal CXR, a comparison was made between CXRs clinically indicated by the physician and those not clinically indicated.

RESULTS: Two hundred fourteen patients were included. The majority of patients underwent coronary arterial bypass grafting (60%), heart valve surgery (21%), or a combination of these (14%). In total, 534 CXRs were performed (2.5 per patient). Abnormalities were found on 179 CXRs (33.5%) and 13 CXR results led to an intervention (2.4%). The association between clinically indicated CXRs and the presence of CXR abnormalities was poor. For 32 (10%) of the 321 admission and drain removal CXRs, clinical indications were stated by the physician beforehand. If these CXRs would not have been performed routinely, 68 abnormalities would have been missed, of which 5 led to an intervention.

CONCLUSIONS: Partial elimination of routine CXRs in the first 24 hours after cardiac surgery seems possible for the majority of patients, but it is limited by the insensitivity of clinical assessment in predicting clinically important abnormalities detectable by CXRs.

危重患者膠體復蘇的有效性和安全性

The Efficacy and Safety of Colloid Resuscitation in the Critically Ill

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儘管有臨床研究和 Meta 分析表明晶體液和膠體液在危重患者的復蘇方面同樣有效，且高品質的臨床研究和 Meta 分析報告羥乙基（HES）液澱粉的腎毒性、出血風險和增加危重患者的死亡率趨勢，膠體液仍然被廣泛使用，且 HES 在全球範圍內使用越來越多。

我們研究了使用膠體液的主要依據：膠體液是比晶體液更爲有效的血漿擴容劑；合成膠體與白蛋白同樣安全；在所有合成膠體中，HES 具有最佳的風險/收益比；第三代膠體 HES130/0.4 副作用更少。
臨床試驗的證據表明，通常小於推薦劑量的 1/2 的膠體液就能達到相似的復蘇效果。
ICU 患者（閉合性顱腦損傷患者除外）使用白蛋白是安全的。所有的人工合成膠體（包括右旋糖苷、明膠和 HES）都具有劑量依賴性的副作用，包括凝血功能障礙、腎衰竭等。對於嚴重膿毒血症的患者，更高劑量的 HES 可能與死亡率增加有關。有關第三代 HES130/0.4 不良反應更少的說法並未獲得證實。HES130/0.4 的臨床試驗存在一些明顯的缺陷。其中，最重要的是，其並不是在 ICU 或急診科進行的，觀察時間僅有 24-48 小時，且累計劑量低於 1 天的限量（50ml/kg），並且對照組液體使用不當（如使用其他 HES 液體或明膠）。
總之，偏好使用膠體液對急性低血容量患者行液體復蘇的證據尚未被臨床試驗證實。人工合成膠體對於重症成人和兒童患者並不更優，並且由於其累計劑量應考慮其有害性。安全劑量閾值應該在高危患者的臨床研究中確定，其觀察時間應長達 90 天。儘管 HES130/0.4 的臨床應用日益增加，但其臨床試驗仍較匱乏。因爲有更安全和同等有效的晶體液替代品，除了臨床試驗的適應證，合成膠體液的使用應避免過濫。
（吳少勇譯 薛張綱校）
Despite evidence from clinical studies and meta-analyses that resuscitation with colloids or crystalloids is equally effective in critically ill patients, and despite reports from high-quality clinical trials and meta-analyses regarding nephrotoxic effects, increased risk of bleeding, and a trend toward higher mortality in these patients after the use of hydroxyethyl starch (HES) solutions, colloids remain popular and the use of HES solutions is increasing worldwide.
We investigated the major rationales for colloid use, namely that colloids are more effective plasma expanders than crystalloids, that synthetic colloids are as safe as albumin, that HES solutions have the best risk/benefit profile among the synthetic colloids, and that the third-generation HES 130/0.4 has fewer adverse effects than older starches.
Evidence from clinical studies shows that comparable resuscitation is achieved with considerably less crystalloid volumes than frequently suggested, namely, <2-fold the volume of colloids.
Albumin is safe in intensive care unit patients except in patients with closed head injury. All synthetic colloids, namely, dextran, gelatin, and HES have dose-related side effects, which are coagulopathy, renal failure, and tissue storage. In patients with severe sepsis, higher doses of HES may be associated with excess mortality. The assumption that third-generation HES 130/0.4 has fewer adverse effects is yet unproven. Clinical trials on HES 130/0.4 have notable shortcomings. Mostly, they were not performed in intensive care unit or emergency department patients, had short observation periods of 24 to 48 hours, used cumulative doses below 1 daily dose limit (50 mL/kg), and used unsuitable control fluids such as other HES solutions or gelatins.
In conclusion, the preferred use of colloidal solutions for resuscitation of patients with acute hypovolemia is based on rationales that are not supported by clinical evidence.

Synthetic colloids are not superior in critically ill adults and children but must be considered harmful depending on the cumulative dose administered. Safe threshold doses need to be determined in studies in high-risk patients and observation periods of 90 days. Such studies on HES 130/0.4 are still lacking despite its widespread and increasing use. Because there are safer and equally effective alternatives in the form of crystalloids, use of synthetic colloids should be avoided except in the context of clinical studies.

全麻氣體和地球環境

General Anesthetic Gases and the Global Environment

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美國每年約有 5 千萬人接受全身麻醉。麻醉氣體也廣泛用於牙科診所、獸醫門診和實驗室做動物實驗。今年常用的揮發性麻醉藥都是對臭氧層有破壞性的鹵族化合物。這些鹵族麻醉藥可能對全球變暖有潛在的巨大影響。廣泛使用的麻醉氣體一氧化二氮是眾所周知的溫室氣體且是重要的減少臭氧的氣體。這些麻醉氣體不被代謝分解而主要通過呼氣排出人體，而且大部分麻醉機直接將這些氣體當做廢氣以原形排入大氣層。對於麻醉氣體的生態毒理的關注很少。我們依據最近的資料來估算，顯示在美國麻醉用氧化亞氮構成了總排放量的 3.0%。研究提示隨著氯氟碳類的水準的降低鹵代麻醉藥對全球變暖的影響將變得相對重要了。除了麻醉時的這些不可忽略的污染效應，尚無這些氣體在其他公共場所的產生和排放的資料。這篇文章的主要目的是嚴謹地回顧最近的有關全麻藥對全球環境潛在影響的資料，同時描述出可能的選擇和新的可能防止這些氣體排入大氣的技術。
（張玥琪譯，薛張綱校）

General anesthetics are administered to approximately 50 million patients each year in the United States. Anesthetic vapors and gases are also widely used in dentists' offices, veterinary clinics, and laboratories for animal research. All the volatile anesthetics that are currently used are halogenated compounds destructive to the ozone layer. These halogenated anesthetics could have potential significant impact on global warming. The widely used anesthetic gas nitrous oxide is a known greenhouse gas as well as an important ozone-depleting gas. These anesthetic gases and vapors are primarily eliminated through exhalation without being metabolized in the body, and most anesthesia systems transfer these gases as waste directly and unchanged into the atmosphere. Little consideration has been given to the ecotoxicological properties of gaseous general anesthetics. Our estimation using the most recent consumption data indicates that the anesthetic use of nitrous oxide contributes 3.0% of the total emissions in the United States. Studies suggest that the influence of halogenated anesthetics on global warming will be of increasing relative importance given the decreasing level of chlorofluorocarbons globally. Despite these nonnegligible pollutant effects of the anesthetics, no data on the production or emission of these gases and vapors are publicly available. The primary goal of this article is to critically review the current data on the potential effects of general anesthetics on the global environment and to describe possible

alternatives and new technologies that may prevent these gases from being discharged into the atmosphere.

簡要報導：客觀結構化臨床考試爲基礎的區域麻醉技術評估：以色列麻醉學經驗國家考試委員會

Brief Report: Objective Structured Clinical Examination–Based Assessment of Regional Anesthesia Skills: The Israeli National Board Examination in Anesthesiology Experience

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仿真技術在麻醉訓練計畫中的應用逐漸增加，而在住院醫師的評估中應用程度相對較低。我們記錄了以色列麻醉學國家考試委員會 7 年來應用客觀結構化臨床考試爲基礎的區域麻醉技術評估的經驗。我們相信這是第一次使用這種類比場景對區域麻醉進行評估，以達到國家認證的重要目的。研究期間，308 名受試者分別用 8 種不同阻滯方法中的一種進行試驗。總的通過率爲 83%(308 名中的 257 名)，範圍爲 73%-91%。相互間相關總性、批判性、和全球化評分分別爲 0.84、0.88 和 0.75。技術和成本限制區域麻醉的排除性實際評估。然而，測試使得更接近地反應臨床實踐成爲傳統考試相關潛在價值格式化。
(朱蘭芳譯，薛張綱校）
Simulation techniques are increasingly being used in anesthesia training programs and to a lesser extent in evaluation of residents. We describe 7 years of experience with Objective Structured Clinical Examination–based regional anesthesia assessment in the Israeli National Board Examinations in Anesthesiology. We believe this is the first use of such mock scenarios for the assessment of regional anesthesia for the important purpose of national accreditation. During the study period, 308 candidates were examined in 1 of 8 different blocks. The total pass rate was 83%(257 of 308), ranging from 73% to 91%. The interrater correlation for total, critical, and global scores were 0.84, 0.88, and 0.75, respectively. Technological and cost constraints preclude actual assessment of regional anesthesia. However, testing formats that more closely reflect clinical practice are potentially valuable adjuncts to traditional examinations.

體外迴圈心臟手術後凝血酶產生升高

Enhanced Thrombin Generation After Cardiopulmonary Bypass Surgery

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背景：凝血酶的生成在止血的病理生理中起了很關鍵的作用。以往研究著重於術中凝血，而對術後的凝血啓動瞭解甚少。凝血酶生成的測定能對體外凝血酶生成的潛力進行定量，有利於發現高凝狀態。凝血酶動力試驗（TDT）評估凝血酶生成的初始動力學。我們假設在心臟手術後有凝血酶生成增加和功能的增加。
方法：有 220 例接受首次冠狀動脈旁路移植術或主動脈瓣置換術（AVR）的患者入組前瞻性研究。行 AVR 手術的患者術後第二天開始接受華法林治療。測定凝血酶原片段(F_{1+2})、TDT、D-二聚體以及肌鈣蛋白 T。在術前、手術結束、術後 4 小時及術後第 1、3 和 5 天（PODs）早晨採集血液樣本。主要觀察指標是術後第一天（POD1）的凝血酶的動態變化。
結果：所有患者中，凝血酶原片段(F_{1+2})高峰在手術結束時，並一直持續顯著升高至術後第五天（POD5）。TDT 一開始比基礎水準有所下降，但在術後第一天顯著升高。冠脈搭橋術後患者 TDT 持續顯著升高，而 AVR 術後行華法林治療患者 TDT 在術後第三和五天顯著降低。
結論：心臟手術後，凝血酶繼續產生，並伴有較高的凝血酶產生能力和纖維蛋白原水準的升高。本研究顯示術後處於顯著的預凝狀態，潛在增加了血栓栓塞併發症的風險。AVR 術後華法林治療明顯降低了凝血酶的產生能力。
（滕凌雅 譯 馬皓琳 李士通 校）

BACKGROUND: Thrombin generation has a key role in the pathophysiology of hemostasis. Research has focused on the intraoperative course of hemostasis, while little is known about postoperative hemostatic activation. Thrombin generation assays quantify the potential for thrombin generation ex vivo and may be useful for determining hypercoagulability. The thrombin dynamics test (TDT) assesses the initial kinetics of thrombin formation. We hypothesized that there would be an increase in thrombin generation as well as thrombin capacity after cardiac surgery.
METHODS: Two hundred twenty patients undergoing primary coronary artery bypass grafting or aortic valve replacement (AVR) surgery were prospectively enrolled. Patients undergoing AVR received warfarin beginning on the second postoperative day. In addition to prothrombin fragment (F_{1+2}), TDT, D-dimer, and troponin T were assessed. Blood samples were obtained preoperatively, at the end of the operation, 4 hours postoperatively, and the morning of postoperative days (PODs) 1, 3, and 5. The primary end point was the change of thrombin dynamics on POD 1.
RESULTS: In all patients, F_{1+2} peaked at the end of the operation and remained significantly elevated until POD 5. Compared with baseline and after an initial decrease, TDT was found to be significantly elevated on POD 1. After coronary artery bypass graft, TDT remained significantly elevated, whereas in AVR patients with warfarin treatment, TDT was significantly reduced on PODs 3 and 5.
CONCLUSIONS: After cardiac surgery, thrombin generation continues, accompanied by a high thrombin-generating capacity and elevated fibrinogen levels. This constellation suggests a marked procoagulopathic state in the postoperative period with the potential to aggravate the risk of thromboembolic complications. Warfarin treatment after AVR significantly reduced thrombin-generating capacity.

使用體外恒流實驗設備檢測肺動脈熱稀釋導管的精度誤差

Determination of the Precision Error of the Pulmonary Artery Thermodilution Catheter Using an In Vitro Continuous Flow Test Rig

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背景：使用肺動脈導管檢測心輸出量的熱稀釋法是判斷所有心輸出量測定新方法的參照方法。然而，熱稀釋法缺乏精度，且有±20%的引證精度誤差。目前，並不清楚它的真實精度，這也給驗證心輸出量測定新方法帶來了困難。我們在本研究中的目的是爲了確定熱稀釋法的當前精度誤差。
方法：安裝試驗台，水以不同的恒定流速迴圈通過此試驗台，並且有孔插入導管到一個流動室。通過外置的超聲流量探測器和量器檢測流速。使用同步填充的量筒校準量器。將“Arrow”和“Edwards” 7Fr 熱稀釋導管連接到 Siemens SC9000 心輸出量監測儀，對其進行測試。通過注射 5 mL 冰水來獲取熱稀釋法的讀數。精度誤差分爲隨機和系統誤差，兩者分別測定。通過獲取在不同的流速時的每組十個讀數確定每個導管的讀數間（隨機）變異性。計算每組的變異係數並計算均值。對每套導管繪製校準線，得出導管間的系統（系統）變異性。用斜率評估系統誤差的成分。比較以下三個心輸出量監護儀的性能：Siemens SC9000、Siemens Sirecust 1261 和 Philips MP50.。
結果：使用 Siemens SC9000 監護儀測試 5 根 Arrow 和 5 根 Edwards 導管。研究的流速在 0.7 到 7.0 L/min 間。Arrow 的變異係數（隨機誤差）爲 5.4%，Edwards 爲 4.8%。隨機精度誤差爲±10.0%（95%置信區間）。Arrow 和 Edwards 的變異係數（系統誤差）分別爲 5.8%和 6.0%。系統精度誤差爲±11.6%。單次熱稀釋法讀數的總精度誤差爲±15.3%，三次熱稀釋法讀數的總精度誤差爲±13.0%。使用 Sirecust 監護儀時，精度誤差增加 45%；使用 Philips 監護儀，精度誤差增加 100%。
結論：體外測試肺動脈導管使我們能檢測熱稀釋法測定心輸出量的隨機和系統誤差組分，並且因此能計算精度誤差。使用 Siemens 監護儀，我們評估單次和三次讀數的精度誤差分別爲±15.3%和±13.0%，這與以前的評估（±20%）接近。然而，使用 Sirecust 和 Philips 監護儀後，精度誤差明顯增加。臨床醫生應該意識到：心輸出量熱稀釋法的精度誤差依賴於導管和監測模型的選擇。
（王海濤 譯，馬皓琳，李士通校）

BACKGROUND: Thermodilution cardiac output using a pulmonary artery catheter is the reference method against which all new methods of cardiac output measurement are judged. However, thermodilution lacks precision and has a quoted precision error of ±20%. There is uncertainty about its true precision and this causes difficulty when validating new cardiac output technology. Our aim in this investigation was to determine the current precision error of thermodilution measurements.
METHODS: A test rig through which water circulated at different constant rates with ports to insert catheters into a flow chamber was assembled. Flow rate was measured by an externally placed transonic flowprobe and meter. The meter was calibrated by timed filling

of a cylinder. Arrow and Edwards 7Fr thermodilution catheters, connected to a Siemens SC9000 cardiac output monitor, were tested. Thermodilution readings were made by injecting 5 mL of ice-cold water. Precision error was divided into random and systematic components, which were determined separately. Between-readings (random) variability was determined for each catheter by taking sets of 10 readings at different flow rates. Coefficient of variation (CV) was calculated for each set and averaged. Between-catheter systems (systematic) variability was derived by plotting calibration lines for sets of catheters. Slopes were used to estimate the systematic component. Performances of 3 cardiac output monitors were compared: Siemens SC9000, Siemens Sirecust 1261, and Philips MP50.
RESULTS: Five Arrow and 5 Edwards catheters were tested using the Siemens SC9000 monitor. Flow rates between 0.7 and 7.0 L/min were studied. The CV (random error) for Arrow was 5.4% and for Edwards was 4.8%. The random precision error was ±10.0% (95% confidence limits). CV (systematic error) was 5.8% and 6.0%, respectively. The systematic precision error was ±11.6%. The total precision error of a single thermodilution reading was ±15.3% and ±13.0% for triplicate readings. Precision error increased by 45% when using the Sirecust monitor and 100% when using the Philips monitor.
CONCLUSION: In vitro testing of pulmonary artery catheters enabled us to measure both the random and systematic error components of thermodilution cardiac output measurement, and thus calculate the precision error. Using the Siemens monitor, we established a precision error of ±15.3% for single and ±13.0% for triplicate reading, which was similar to the previous estimate of ±20%. However, this precision error was significantly worsened by using the Sirecust and Philips monitors. Clinicians should recognize that the precision error of thermodilution cardiac output is dependent on the selection of catheter and monitor model.

設計、執行並評估一個用於圍術期與不能熟練掌握本國語言的病人進行交流的電腦系統

Design, Implementation, and Evaluation of a Computerized System to Communicate with Patients with Limited Native Language Proficiency in the Perioperative Period

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背景：在圍術期與不能熟練掌握麻醉實施者本國語言的患者進行有效交流常常具有挑戰性。我們描述了我們如何開發、執行並且評估一個電腦化系統，該系統把與圍術期麻醉監護相關的常用且事先錄音的短語用我們最常遇見的這些患者語種傳達給這些患者。
方法：在麻醉科醫生之間通過一個意見一致的程式選擇短語。這些短語包括常用于告知病人將要發生的事、我們將要進行的干預以及他們如何配合等日常對話。還鑒定了需要回答“是”或“否”的普通問題。我們用瞭解醫學知識並且熟悉病人的文化以提供精確翻譯的講本國語言的人將這些短語錄音。我們開發了一種應用軟體，將短語

明確分組，使麻醉實施者可以選擇短語並且給病人播放相關的音效檔案，並且在我們的觸摸螢幕式麻醉資訊管理系統工作站上展開該程式。我們對講一種中國方言的產科病人中的便利樣本運用了該語言程式，並要求填寫翻譯成中文的關於她們的感受的無記名調查表。計算 95%可信區間下限(LCLs)作爲應答率。
結果：我們研究了 25 名英文理解水準不同的產婦，她們都同意使用該語言程式。每一個病人在陣痛和分娩時，與麻醉監護實施者交流的全過程使用了該程式，每一個病人都完成了調查。該程式的接受程度很高，所有病人表示假如她們要回來進行需要麻醉的其他操作，她們會願意再一次使用該程式。88%（LCL = 73%）表明接受母語的指令使她們感到更放鬆，而其餘病人的感受是中立的。表現的短語理解力很高，有 96%（LCL = 83%）的患者表示她們理解所有的指令。96%(LCL = 83%)的病人表示基於該設備的有效性，她們願意介紹朋友或家人到我們機構。
結論：儘管病人的安全可能會因爲使用交流設備（比如我們開發的這個設備）而改善，但是我們的研究還不足以能夠做到度量這個潛在的改善程度。不論麻醉監護實施者在哪里，不能與病人用同樣的語言交流時，我們描述的這個程式應該有用。
（瞿亦楓 譯 馬皓琳 李士通校）
BACKGROUND: Effective communication with patients having limited proficiency in the native language of anesthesia care providers during the perioperative period is often challenging. We describe how we developed, implemented, and evaluated a computerized system to convey frequently used prerecorded phrases related to perioperative anesthesia care in the languages we most often encounter in such patients.
METHODS: Phrases were chosen through a consensus process among anesthesia department members. These included routine sayings used to inform patients about what they should anticipate, what interventions we are performing, and how they can participate. Common questions requiring a “yes” or “no” answer were also identified. We recorded these phrases using native speakers who were both knowledgeable medically and familiar with the culture of the patients to provide accurate translations. We developed a software application that categorically grouped the phrases and allowed care providers to select a phrase and play the associated sound file to the patient and deployed the program on our touchscreen-enabled anesthesia information management system workstations. A convenience sample of obstetrical patients speaking a Chinese dialect with whom the language program was used were asked to complete an anonymous questionnaire, translated into Chinese, about their experience. Ninety-five percent lower confidence limits (LCLs) were calculated for response proportions.
RESULTS: We approached 25 parturients with varying levels of English comprehension, and all agreed to use the language program. Each used it throughout her interaction with the anesthesia care providers during labor and delivery, and all patients completed the survey. Acceptance of the process was high, with all patients indicating that they would like to use it again were they to return for another procedure requiring anesthesia. Eighty-eight percent (LCL = 73%) indicated that having instructions in their native language made them feel more relaxed, whereas the experience was neutral in the remainder. Comprehension of the phrases presented was high, with 96% (LCL = 83%) indicating that they understood all instructions. Ninety-six percent (LCL = 83%) of patients indicated that they would be likely to refer friends and family to our institution based on the availability of this device.

CONCLUSIONS: Although patient safety likely could be improved by use of a communication device such as the one we developed, our study was insufficiently powered to be able to measure this potential improvement. The process we describe should be useful wherever anesthesia care providers are not able to communicate in the same language as their patients.

多培沙明對於在腹部大型手術中進行液體靶控治療的高危病人無額外益處

Dopexamine Has No Additional Benefit in High-Risk Patients Receiving Goal-Directed Fluid Therapy Undergoing Major Abdominal Surgery

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Anesth Analg 2011;112(1):130-138

背景：研究表明作爲圍術期提高攜氧能力的方法之一，多培沙明在大型外科手術中可減少病人的死亡率和併發症的發生率。歐洲一項多中心的研究驗訖了多培沙明在行腹部大型手術的患者中的應用，該研究表明在高危病人中小劑量（$0.5\mu g \cdot kg^{-1} \cdot min^{-1}$）應用多培沙明有提高病人的存活率並減少併發症的趨勢。已有研究顯示無氧閾（AT）中攜氧量的降低是影響腹部大型手術病人死亡率的顯著危險因素，它也是評定高危手術病人的客觀依據。在本次研究中，我們評估了小劑量應用多培沙明對於由於 AT 降低而增加了風險的腹部大型手術病人的併發症發生率的影響。
方法：我們招募了擇期進行大型結直腸或泌尿外科手術的病人，他們的 AT <11 $mL \cdot kg^{-1} \cdot min^{-1}$ 或者 AT 處於 11-14 $mL \cdot kg^{-1} \cdot min^{-1}$ 但有缺血性心臟病病史。術前我們進行橈動脈置管，將其與愛德華生命科學 FloTrac/Vigileo™系統連接以測定心輸出量。我們給病人單次注射 250 毫升萬汶（0.9%氯化鈉中含 6%羥乙基澱粉 130/0.4）直至每博量不再升高 10%，然後予以 24 小時多培沙明或者生理鹽水的輸注。術中如果出現每博量變異度>10%則予以萬汶輸注，術中不輸注晶體液。醫囑用含 Hartmann 溶液 $1.5\ mL \cdot kg^{-1} \cdot h^{-1}$ 的標準化術後液體方案持續 24 小時。我們主要的測定結果是由術後發病率調查測得的術後發病率。
結果：我們隨訪了 124 名病人術後 23 個月的情況。我們通過術後發病率調查表統計到術後第 5 天對照組的發病率爲 55%，而多培沙明組爲 47%（P=0.14）。在術後任意一個觀察天數均無發病率的顯著下降。兩組之間的併發症的程度、死亡率和住院天數是類似的；但是多培沙明組的病人可更早地恢復對腸內營養的耐受。
結論：通過液體靶向治療在擇期手術病人中的有效應用，常規應用多培沙明不能提供額外的臨床益處。
（毛祖旻 譯 馬皓琳 李士通 校）

BACKGROUND: Dopexamine has been shown to reduce both mortality and morbidity in major surgery when it is used as part of a protocol to increase oxygen delivery in the perioperative period. A European multicenter study has examined the use of dopexamine in patients undergoing major abdominal surgery, showing a trend toward improved survival and reduced complications in high-risk patients when receiving low-dose dopexamine (0.5

μg · kg^{-1} · min^{-1}). A reduced oxygen uptake at the anaerobic threshold (AT) has been shown to confer a significant risk of mortality in patients undergoing major abdominal surgery and allows objective identification of a high-risk operative group. In this study, we assessed the effects of low-dose dopexamine on morbidity after major abdominal surgery in patients who were at increased risk by virtue of a reduced AT.

METHODS: Patients undergoing elective major colorectal or urological surgery who had an AT of <11 mL · kg^{-1} · min^{-1} or an AT of 11 to 14 mL · kg^{-1} · min^{-1} with a history of ischemic heart disease were recruited. Before surgery, a radial arterial cannula was placed and attached to an Edwards Lifesciences FloTrac/Vigileo™ system for measuring cardiac output. Patients were given a 250-mL bolus of Voluven® (6% hydroxyethyl starch 130/0.4 in 0.9% sodium chloride) until the stroke volume no longer increased by 10%, then received either dopexamine (0.5 μg · kg^{-1} · min^{-1}) or saline 0.9% for 24 hours. During surgery, fluid boluses of Voluven were given if the stroke volume variation was >10%. No crystalloid was given during surgery. A standardized postoperative fluid regime with Hartmann solution was prescribed at 1.5 mL · kg^{-1} · h^{-1} for 24 hours. The primary outcome measure was postoperative morbidity measured by the Postoperative Morbidity Survey.

RESULTS: One hundred twenty-four patients were recruited over a 23-month period. The incidence of morbidity as measured by the Postoperative Morbidity Survey on day 5 was 55% in the control group versus 47% in the dopexamine group (P = 0.14). There was no significant reduction in morbidity on any measured postoperative day. Complication rates, mortality, and hospital length of stay were similar between the 2 groups; however, administration of dopexamine was associated with earlier return of tolerating an enteral diet.

CONCLUSION: With the effective use of goal-directed fluid therapy in elective surgical patients, the routine use of dopexamine does not confer an additional clinical benefit.

危重病人針刺治療可改善胃排空延遲：一項隨機對照試驗

Acupuncture in Critically Ill Patients Improves Delayed Gastric Emptying: A Randomized Controlled Trial

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背景：營養不良仍是影響危重病人恢復的嚴重問題，並可導致住院期間死亡率和住院天數的增加。即使已有研究顯示早期腸內營養可改善重症監護室（ICU）中總的病人的預後，給予管飼仍會伴隨胃排空延遲及胃食管反流的併發症。針刺治療已經成功用於防治術後噁心嘔吐。在本項研究中，我們在接受腸內營養的危重病人中，對針刺治療與標準促胃動力藥相比是否改善胃排空進行了研究。

方法：30 例機械通氣下神經外科 ICU 胃排空延遲的病人入選本研究。我們將胃排空延遲定義爲胃殘餘量（GRV）大於 500ml 持續超過 2 天，將此 30 例病人前瞻性地隨機分爲兩組：針刺穴位刺激組（ASG：雙向經皮穴位電刺激內關穴，PC-6）和服用常規促胃動力藥組（DTG：服用胃複安、西沙必利或紅黴素）持續 6 天。ASG 組不服用任何促胃動力藥。治療成功（腸內營養耐受）的定義爲 GRV 小於 200ml 每 24 小時。

結果：人口統計學和血流動力學資料兩組相似。治療 5 天后，ASG 組腸內營養耐受的病人爲 80%，而服用常規促胃動力藥組的病人爲 60%。在治療的第一天，ASG 組病人經穴位刺激後 GRV 從 970 ± 87 mL 下降至 346 ± 71 mL (P = 0.003)，而 DTG 組病人 GRV 從 903 ± 60 mL 顯著上升至 1040 ± 211 mL (P = 0.015)。此外 ASG 組中 GRV 下降且餵養平衡（定義爲腸飼量減去 GRV）增加的病人數量（15 人中有 14 人）大於 DTG 組（15 人中有 7 人）（P = 0.014）。在治療的第一天， ASG 組病人的平均餵養平衡（121 ± 128 mL）顯著大於 DTG 組 (−727 ± 259 mL) (P = 0.005)。總體來看，與 DTG 組相比，ASG 組病人的餵養平衡在治療全程中顯著改善。DTG 組病人的餵養平衡在治療第六天前沒有增加。

結論：我們將針刺作爲一種新的治療措施引入重症監護管理中，並證明了此項措施與標準的促胃動力藥相比，在治療危重病人胃排空延遲方面更加有效。對危重病人營養不良的防治，內關穴（PC-6）的針刺穴位刺激可能是一種方便且廉價（副作用少）的選擇。

（劉伍 譯 馬皓琳 李士通 校）

BACKGROUND: Malnutrition remains a severe problem in the recovery of critically ill patients and leads to increased in-hospital morbidity and in-hospital stay. Even though early enteral nutrition has been shown to improve overall patient outcomes in the intensive care unit (ICU), tubefeed administration is often complicated by delayed gastric emptying and gastroesophageal reflux. Acupuncture has been successfully used in the treatment and prevention of perioperative nausea and vomiting. In this study we evaluated whether acupuncture can improve gastric emptying in comparison with standard promotility drugs in critically ill patients receiving enteral feeding.

METHODS: Thirty mechanically ventilated neurosurgical ICU patients with delayed gastric emptying, defined as a gastric residual volume (GRV) >500 mL for ≥2 days, were prospectively and randomly assigned to either the acupoint stimulation group (ASG; bilateral transcutaneous electrical acupoint stimulation at Neiguan, PC-6) or the conventional promotility drug treatment group (DTG) over a period of 6 days (metoclopramide, cisapride, erythromycin). Patients in the ASG group did not receive any conventional promotility drugs. Successful treatment (feeding tolerance) was defined as GRV <200 mL per 24 hours.

RESULTS: Demographic and hemodynamic data were similar in both groups. After 5 days of treatment, 80% of patients in the ASG group successfully developed feeding tolerance versus 60% in the DTG group. On treatment day 1, GRV decreased from 970 ± 87 mL to 346 ± 71 mL with acupoint stimulation (P = 0.003), whereas patients in the DTG group showed a significant increase in GRV from 903 ± 60 mL to 1040 ± 211 mL (P = 0.015). In addition, GRV decreased and feeding balance (defined as enteral feeding volume minus GRV) increased in more patients in the ASG group (14 of 15) than in the DTG group (7 of 15; P = 0.014). On treatment day 1, the mean feeding balance was significantly higher in the

ASG group (121 ± 128 mL) than in the DTG group (−727 ± 259 mL) (P = 0.005). Overall, the feeding balance improved significantly on all days of treatment in comparison with the DTG group. Patients in the DTG group did not show an increase in feeding balance until day 6.
CONCLUSIONS: We introduce a new protocol for acupuncture administration in the critical care setting. We demonstrated that this protocol was more effective than standard promotility medication in the treatment of delayed gastric emptying in critically ill patients. Acupoint stimulation at Neiguan (PC-6) may be a convenient and inexpensive option (with few side effects) for the prevention and treatment of malnutrition in critically ill patients.

對插管型喉導氣管作爲兒童氣管導管插管的管道的臨床評價

A Clinical Evaluation of the Intubating Laryngeal Airway as a Conduit for Tracheal Intubation in Children

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背景：空氣- Q ™插管型喉導氣管（ILA）(Cookgas LLC，Mercury Medical, Clearwater, FL)是有小兒型號的聲門上通氣裝置，其設計特點是爲了在引導氣管插管時方便帶套囊的氣管導管通過。我們設計了這個 ILA 的前瞻性觀察研究，以評估其在癱瘓的兒科病人中放置是否更容易，確定其位置並用光學纖維支氣管鏡調整到喉部，評估它作爲用帶套囊氣管導管進行纖維光學插管的管道的有效性，以及在成功氣管插管後，評估移除 ILA 後不發生氣管導管移位的能力。
方法：100 例健康的年齡 6 個月至 8 歲，ASA I 至 II 級並需要在氣管內全身麻醉下行擇期手術的兒童入選本前瞻性研究。基於製造商的指導，每個患者根據體重使用 1.5 號或 2.0 號的 ILA。記錄成功插入的嘗試次數、漏氣壓力、視野的纖維光學分級、氣管插管的嘗試次數和時間、ILA 移除的時間以及併發症。
結果：ILA 的放置、纖維光學氣管插管和 ILA 的移除在所有患者中成功完成。儘管有足夠的通氣參數，但是 1.5 號 ILA 組較 2.0 號 ILA 年齡組有顯著較高的會厭塌陷的發生率（P < 0.001）。當比較纖維光學分級與體重的關係時，發現它們呈中等負相關(r = −0.41, P < 0.001)，說明較大的患者可能有更好的纖維光學視野分級。相比 2.0 號 ILA 組，1.5 號 ILA 組插管時間顯著較長（P = 0.04）。但是，這種差異可能不會有重大的臨床意義，因爲 1.5 號 ILA 平均時間（27.0 ± 13.0 秒）和 2.0 號 ILA 平均時間（22.7 ± 6.9 秒）的可信區間有一個較大的重疊。當比較體重和氣管插管時間的關係時，發現它們相關性較弱，並不具有統計學意義（r = -0.17，P＝0.09），顯示按體重分級時，儘管體重較小的患者有較高的鏡下分級，但是插管時間沒有明顯差異。
結論：ILA 很容易放置，爲在氣道正常的兒童用帶套囊的氣管導管進行氣管插管提供了一個有效的通道。此外，插管成功後移除 ILA 可以快速達到，並無氣管導管移

位。由於在較小的患者中會厭塌陷有較高的發生率，所以推薦使用光學纖維支氣管鏡以協助氣管插管通過該裝置。
（唐亮 譯 馬皓琳 李士通 校）

BACKGROUND: The air-Q™ Intubating Laryngeal Airway (ILA) (Cookgas LLC, Mercury Medical, Clearwater, FL) is a supraglottic airway device available in pediatric sizes, with design features to facilitate passage of cuffed tracheal tubes when used to guide tracheal intubation. We designed this prospective observational study of the ILA to assess the ease of its placement in paralyzed pediatric patients, determine its position and alignment to the larynx using a fiberoptic bronchoscope, gauge its efficacy as a conduit for fiberoptic intubation with cuffed tracheal tubes, and evaluate the ability to remove the ILA without dislodgement of the tracheal tube after successful tracheal intubation.
METHODS: One hundred healthy children, aged 6 months to 8 years, ASA physical status I to II, and scheduled for elective surgery requiring general endotracheal anesthesia were enrolled in this prospective study. Based on the manufacturer's guidelines, each patient received either a size 1.5 or 2.0 ILA according to their weight. The number of attempts for successful insertion, leak pressures, fiberoptic grade of view, number of attempts and time for tracheal intubation, time for ILA removal, and complications were recorded.
RESULTS: ILA placement, fiberoptic tracheal intubation, and ILA removal were successful in all patients. The size 1.5 ILA cohort had significantly higher rates of epiglottic downfolding compared with the size 2.0 ILA cohort ($P < 0.001$), despite adequate ventilation variables. When comparing fiberoptic grade of view to weight, a moderate negative correlation was found ($r = -0.41$, $P < 0.001$), indicating that larger patients tended to have better fiberoptic grades of view. The size 1.5 ILA cohort had a significantly longer time to intubation ($P = 0.04$) compared with the size 2.0 ILA cohort. However, this difference may not be clinically significant because there was a large overlap of confidence bounds in the average times of the size 1.5 ILA (27.0 ± 13.0 seconds) and size 2.0 ILA cohorts (22.7 ± 6.9 seconds). When comparing weight to time to tracheal intubation, a weak correlation that was not statistically significant was found ($r = -0.17$, $P = 0.09$), showing that time to intubation did not differ significantly according to weight, despite higher fiberoptic grades in smaller patients.
CONCLUSIONS: The ILA was easy to place and provided an effective conduit for tracheal intubation with cuffed tracheal tubes in children with normal airways. Additionally, removal of the ILA after successful intubation could be achieved quickly and without dislodgement of the tracheal tube. Because of the higher incidence of epiglottic downfolding in smaller patients, the use of fiberoptic bronchoscopy is recommended to assist with tracheal intubation through this device.

鞘內注射 A 型肉毒桿菌神經毒素減弱福馬林所致的小鼠感受性傷害反應

Intrathecal Administration of Botulinum Neurotoxin Type A Attenuates Formalin-Induced Nociceptive Responses in Mice

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背景：A 型肉毒桿菌神經毒素(BoNT/A)已作爲鎮痛劑用於肌筋膜疼痛綜合征、偏頭痛以及其他類型頭痛。儘管中樞或外周使用 BoNT/A 的鎮痛效果確切，但是其在脊柱水準的作用還不甚明朗。本研究中，我們評估了福馬林試驗中的 ICR 小鼠鞘內注射 BoNT/A 的鎮痛作用。
方法：每只 ICR 小鼠鞘內注射 0.01 單位 BoNT/A，且觀察注射後第 1、4、7、10、14、21 和 28 天福馬林所致炎症性疼痛行爲。同時，我們採用免疫印記或免疫組織化學分析方法檢測鞘內注射 BoNT/A 前後的降鈣素基因相關肽(CGRP)、磷酸化的細胞外信號調節激酶(p-ERK)以及磷酸化的 2 型鈣/鈣調蛋白依賴性蛋白激酶(p-CaMK-II)的水準。
結果：即使單次鞘內注射 BoNT/A 也能明顯減輕 1、4、7、10 和 14 天后福馬林試驗第一相（10 和 14 天后）和第二相中的感受性傷害反應($P < 0.05$)，且不伴有運動改變。有趣的是，與對照組相比，鞘內注射 BoNT/A 後第 10 天，第 4 和第 5 腰椎脊髓背側角中 CGRP、p-ERK 和 p-CaMK-II 的表達水準有所降低。
結論：我們的研究顯示，鞘內注射 BoNT/A 可能是通過中樞敏感化調節作用對炎症性疼痛產生中樞性鎮痛作用。具有長效鎮痛作用的 BoNT/A 或許是一種有效的炎性痛鎮痛劑。
(江繼宏 譯 馬皓琳 李士通 校）
BACKGROUND: Botulinum neurotoxin type A (BoNT/A) has been used as an analgesic for myofascial pain syndromes, migraine, and other types of headaches. Although an antinociceptive effect of central or peripheral administration of BoNT/A is suggested, the effect at the spinal level is still unclear. In this study, we evaluated the antinociceptive effect of intrathecally administered BoNT/A on the ICR mice during the formalin test.
METHODS: BoNT/A (0.01 U/mouse) was injected intrathecally in ICR mice, and we observed formalin-induced inflammatory pain behaviors at days 1, 4, 7, 10, 14, 21, and 28 after the injection. We also examined the level of calcitonin gene-related peptide (CGRP), phosphorylated extracellullar signal-regulated kinases (p-ERK), and phosphorylated Ca^{2+}/calmodulin-dependent protein kinase type 2 (p-CaMK-II) using immunoblot or immunohistochemical analyses before and after BoNT/A intrathecal injection.
RESULTS: Even a single intrathecal injection of BoNT/A significantly decreased the nociceptive responses in the first phase (10 and 14 days later) and in the second phase of the formalin test at 1, 4, 7, 10, and 14 days later ($P < 0.05$) without any locomotor changes. Interestingly, intrathecal BoNT/A attenuated the expression level of CGRP, p-ERK, and p-CaMK-II in the 4th and 5th lumbar spinal dorsal horn at 10 days after injection in comparison with control.
CONCLUSIONS: We showed that intrathecally administered BoNT/A may have a central analgesic effect on inflammatory pain through the modulation of central sensitization. BoNT/A, with its long-lasting antinociceptive effect, may be a useful analgesic in inflammatory pain.

電流-距離關係用於周圍神經刺激儀定位

Current-Distance Relationships for Peripheral Nerve Stimulation Localization

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背景：成功的外周神經阻滯需要在使用局麻藥前準確放置注射器針尖。此項研究中，我們使用動物體外和體內模型實驗性地重建了極性依賴（陽性和陰性）刺激圖。
方法：一種新型的體外裝置（神經-肌肉複合型）被首次用於探測陰極和陽極的刺激特性。記錄不同的刺激（單極電極）距離和強度下大鼠坐骨神經電生理（神經複合動作電位，CAP）。我們在更接近於臨床狀態下的開放的解剖大鼠模型上重複了此方法。將從電流掃描得到的合成資料繪製成一個 3 維的距離-刺激-CAP 圖。這些圖描繪了神經啓動所需的最小刺激電流，並描述了距離函數和輸入刺激強度的預期電生理結果。刺激圖提供臨床上操作（如區域麻醉中的神經定位）相關的位置資訊。
結果：陰極刺激產生了複雜的雙向電生理反應。CAP 的幅度（電流固定）在電極移近神經時增大，但在接近或與神經接觸後反而降低。這種現象依賴於刺激強度，並且在體內和體外模型中均被觀察到。陽極刺激產生了一個單一的關係，即電極-神經距離減小時 CAP 增大。研究發現外周神經對陰極和陽極的刺激最低啓動閾值被認爲分別是 0.34 ± 0.11 mA (均值±標準差)和 0.63 ± 0.12 mA。對陰極和陽極刺激的神經內閾值均明顯降低，分別爲 0.12 ± 0.03 mA 和 0.32 ± 0.09 mA。
結論：陰極刺激在針尖靠近神經時可能產生傳導阻滯。與此相反，陽極刺激引起的輸出特性是可預測性的，且更適合於神經定位。我們相信，在近神經距離陽極刺激是可行的選擇，儘管需要的電流增強。這是一個對以陰極爲基礎的傳統的神經刺激定位的轉變的假說。對該假說應該進行臨床驗證。
（楊秀娟 譯 馬皓琳 李士通 校）

BACKGROUND: Successful peripheral nerve blocks require accurate placement of the injection needle tip before local anesthetic application. In this investigation, we experimentally reconstructed polarity-dependent (anode and cathode) stimulation maps using ex vivo and in vivo animal models.
METHODS: A novel ex vivo configuration (muscle–nerve composite) was first used to probe both cathodic and anodic stimulation characteristics. The electrophysiology (compound nerve action potential, CAP) of rat sciatic nerve was recorded at varying stimulation (monopolar electrode) distances and intensities. We repeated this methodology with an open dissection rat model that was more analogous to the clinical setting. Resultant data from the current sweeps were plotted as a 3-dimensional distance–stimulus–CAP map. These plots depict the minimum stimulation currents required for nerve activation and describe the expected electrophysiological outcomes as a function of distance and input stimulus intensity. The stimulation maps provide positional information relevant to clinical procedures such as nerve localization during regional anesthesia.
RESULTS: Cathodic stimulation produced a complex biphasic electrophysiological response. The CAP amplitude (with fixed current) increased as the electrode moved closer

towards the nerve, but decreased upon close proximity or nerve contact. This phenomenon was dependent upon stimulation intensity and was observed in both ex vivo and in vivo models. Anodic stimulation produced a monotonic relationship, with the CAP increasing with closer electrode-to-nerve distances. Minimum extraneural activation thresholds were found to be 0.34 ± 0.11 mA (mean ± SD) and 0.63 ± 0.12 mA for cathode and anode stimulation, respectively. Intraneural thresholds were substantially lower, 0.12 ± 0.03 mA and 0.32 ± 0.09 mA, for cathode and anode, respectively.
CONCLUSION: Cathodic stimulation may produce conduction block at close tip-to-nerve distances. In contrast, anodic stimulation elicited output characteristics that were predictable and more suitable for nerve localization. We believe anodic stimulation is a viable option at near-nerve distances, despite the increased current requirements. This hypothesis is a paradigm shift in stimulation nerve localization, which conventionally has been cathode based. The hypothesis should be clinically validated.

小兒心臟手術應用血栓彈力圖可減少輸血

Intraoperative Thromboelastometry Is Associated with Reduced Transfusion Prevalence in Pediatric Cardiac Surgery

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背景：大多數小兒心臟手術患者術中需輸血。作者假設術中常規使用血栓彈力圖指導輸血將減少心臟手術患兒接受輸血的總比例。
方法：本研究包括 100 例心臟手術患兒。其中 50 例前瞻性入選爲研究組，另 50 例程式與年齡相匹配的患者作爲對照組。研究組在體外迴圈期間應用血栓彈力圖來指導術中輸血。比較兩組的術中和術後所輸的濃縮紅細胞，新鮮冰凍血漿，血小板和纖維蛋白原凝集物，並比較兩組的術後出血量和血紅蛋白水準。
結果：術中或術後接受任何血製品（包括濃縮紅細胞，新鮮冰凍血漿，血小板，纖維蛋白原凝集物）的輸注比例，研究組（32/50,64%）明顯低於對照組（46/50,92%），*P* 值< 0.001。研究組輸注濃縮紅細胞 (58% 比 78%, *P* = 0.032) 以及血小板(14% 比 78%, *P* < 0.001)的比例也明顯較低。然而，研究組輸注血小板 (38% 比 12%, *P* = 0.002) 和纖維蛋白原凝集物 (16% 比 2%, *P* = 0.015）的比例更高。無論研究組還是對照組，術後出血量與血紅蛋白水準沒有明顯差異。
結論：研究結果表明，小兒心臟手術中常規應用血栓彈力圖指導輸血可以減少輸血比例，並改變輸血模式。
(鄒巧群　譯　陳傑　校)

BACKGROUND: The majority of pediatric cardiac surgery patients receive blood transfusions. We hypothesized that the routine use of intraoperative thromboelastometry to guide transfusion decisions would reduce the overall proportion of patients receiving transfusions in pediatric cardiac surgery.
METHODS: One hundred pediatric cardiac surgery patients were included in the study. Fifty patients (study group) were prospectively included and compared with 50 procedure- and age-matched control patients (control group). In the study group, thromboelastometry, performed during cardiopulmonary bypass, guided intraoperative transfusions. Intraoperative and postoperative transfusions of packed red blood cells, fresh frozen plasma, platelets, and fibrinogen concentrates, and postoperative blood loss and hemoglobin levels were compared between the 2 groups.
RESULTS: The proportion of patients receiving any intraoperative or postoperative transfusion of packed red blood cells, fresh frozen plasma, platelets, or fibrinogen concentrates was significantly lower in the study group than in the control group (32 of 50 [64%] vs 46 of 50 [92%], respectively; $P < 0.001$). Significantly fewer patients in the study group received transfusions of packed red blood cells (58% vs 78%, $P = 0.032$) and plasma (14% vs 78%, $P < 0.001$), whereas more patients in the study group received transfusions of platelets (38% vs 12%, $P = 0.002$) and fibrinogen concentrates (16% vs 2%, $P = 0.015$). Neither postoperative blood loss nor postoperative hemoglobin levels differed significantly between the study group and the control group.
CONCLUSIONS: The results suggest that routine use of intraoperative thromboelastometry in pediatric cardiac surgery to guide transfusions is associated with a reduced proportion of patients receiving transfusions and an altered transfusion pattern.

四個成串刺激中可見兩個抽顫搐時給予新斯的明或 Sugammadex 後的肌松藥殘餘時間

The Duration of Residual Neuromuscular Block After Administration of Neostigmine or Sugammadex at Two Visible Twitches During Train-of-Four Monitoring

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背景：患者神經肌肉阻滯（NMB）的充分恢復對充分掌控咽部及呼吸肌功能是必要的。TOF 比率至少應恢復到 0.90，以排除臨床潛在的術後肌松藥殘餘。使用周圍神經刺激儀(PNS)時當 TOF 比率> 0.4 無法可靠地檢測出衰減。從使用 PNS 時觀察到的衰減消失到客觀的 TOF 比率恢復> 0.90 的這段間隔被認爲是“潛在不安全恢復期”。依此作者假設，使用 sugammadex 相比於新斯的明這一間隔將大大縮短。
方法：50 例患者接受吸入麻醉藥、阿片類藥物及羅庫溴銨誘導。使用 TOF-Watch® 非預載模式，麻醉醫師僅依靠視覺評價 TOF 刺激反應。手術結束時，最後一次給予羅庫溴銨後出現 TOF 中兩個顫搐刺激時，患者隨機接受新斯的明 50

μg/kg 或 sugammadex 2 mg/kg。根據 PNS 和臨床資料來決定氣管拔管時間。並對由新斯的明或 sugammadex 拮抗後的潛在不安全期進行了 Mann–Whitney U 核對總和 Pearsonχ2 檢驗的統計分析。

結果：觀察到衰減消失至 TOF 比> 0.90 間隔 [平均值±標準差（範圍）] 在新斯的明組和 sugammadex 組分別爲 10.3 ± 5.5（1.3～26.0）min 和 0.3 ± 0.3（0.0 到 1.0）min($P < 0.001$)。新斯的明或 sugammadex 拮抗至 TOF 比率> 0.90 的時間分別爲 13.3 ± 5.7（3.5 至 28.9）和 1.7 ± 0.7（0.7 至 3.5）min，（P<0.001）。當觀察到衰減消失時，新斯的明組和 sugammadex 組的 TOF 比率分別爲 0.34 ± 0.14（0.00～0.56）和 0.86 ± 0.11 (0.64 to 1.04) ($P < 0.001$)。

結論：用新斯的明拮抗羅庫溴銨後，主觀視覺評估神經肌肉功能的衰減消失與實際 TOF 比率> 0.90 之間有明顯差距。僅僅依賴主觀視覺評估 TOF 刺激反應時，運用 Sugammadex 相比於新斯的明更安全。

(陳毓雯　譯　陳傑　校)

BACKGROUND: Adequate recovery from neuromuscular block (NMB) is imperative for the patient to have full control of pharyngeal and respiratory muscles. The train-of-4 (TOF) ratio should return to at least 0.90 to exclude potentially clinically significant postoperative residual block. Fade cannot be detected reliably with a peripheral nerve stimulator (PNS) at a TOF ratio >0.4. The time gap between loss of visual fade by using a PNS until objective TOF ratio has returned to >0.90 can be considered "the potentially unsafe period of recovery." According to our hypothesis the duration of this period would be significantly shorter with sugammadex than with neostigmine.

METHODS: Fifty patients received volatile anesthetics, opioids, and a rocuronium-induced NMB. TOF-Watch® without a preload was used, but the anesthesiologist relied on visual evaluation of the TOF responses only. At end of operation, patients were randomized to receive either neostigmine 50 μg/kg or sugammadex 2 mg/kg, when 2 twitch responses were detected after the last dose of rocuronium. Timing of tracheal extubation was based on PNS and clinical data. Duration of the potentially unsafe period of recovery after reversal by either neostigmine or sugammadex was analyzed. Mann–Whitney *U* test and Pearson χ^2 test were used for statistical analysis.

RESULTS: The times [mean ± SD (range)] from loss of visual fade to TOF ratio >0.90 were 10.3 ± 5.5 (1.3 to 26.0) minutes and 0.3 ± 0.3 (0.0 to 1.0) minutes in the neostigmine and sugammadex groups, respectively ($P < 0.001$). The times from reversal by neostigmine or sugammadex to TOF ratio >0.90 were 13.3 ± 5.7 (3.5 to 28.9) and 1.7 ± 0.7 (0.7 to 3.5) minutes, respectively ($P < 0.001$). The values of TOF ratios at the time of loss of visual fade were 0.34 ± 0.14 (0.00 to 0.56) in patients given neostigmine and 0.86 ± 0.11 (0.64 to 1.04) in patients given sugammadex ($P < 0.001$).

CONCLUSIONS: There is a significant time gap between visual loss of fade and return of TOF ratio >0.90 after reversal of a rocuronium block by neostigmine. Sugammadex in comparison with neostigmine allows a safer reversal of a moderate NMB when relying on visual evaluation of the TOF response.

麻醉操作人員的手部污染是術中細菌傳播的重要危險因數

Hand Contamination of Anesthesia Providers Is an Important Risk Factor for Intraoperative Bacterial Transmission

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背景：作者近期瞭解到術中通過靜脈活塞裝置將細菌傳播給患者會增加患者的死亡率。本研究中作者假設麻醉操作人員在接觸病人之前的手部細菌污染將成爲一個直接術中細菌污染的風險因素。
方法：Dartmouth–Hitchcock 是三級綜合醫療和一級創傷治療中心，有 400 個床位和 28 個手術區。隨機選取 92 個手術室中的一類和二類手術進行分析。一共挑選了 82 對案例進行分析。有 10 對案例由於標本被破壞或丟失，或者違反草案而剔出研究。根據草案確定術中通過靜脈活塞裝置發生的細菌傳播及通過麻醉環境（可調節壓力控制閥和刻度盤）的細菌傳播。然後每個案例開始前我們對裝置及環境分離的污染微生物和每個麻醉實施者的雙手分離出的微生物的生物型進行分析比較。麻醉者來源的微生物傳播的定義是：麻醉實施者雙手分離出的傳染源病原體與患者靜脈裝置或麻醉環境分離出的病原體有相同的生物型。同時通過在方案開始時是否有潛在病原體來評估術中的清潔程度。術中清潔不良的定義爲：方案開始時麻醉環境中發現 1 個甚至更多病原體存在，列爲二類手術，而一類手術則在方案開始時未發現有病原體存在。將所有案例中符合臨床邏輯的案例收集起來分析污染的風險因素。
結果：共研究了 164 例（82 對）病案。11.5%（19/164）患者靜脈活塞裝置在術中感染細菌，其中 47%（9/19）由麻醉實施者傳播。89%（146/164）例術中細菌傳播到麻醉外環境中，其中 12%（17/146）是麻醉實施者傳播。主治麻醉醫生同時管理的房間數、患者年齡和患者從手術室出來至重症監護室都是細菌傳播事件獨立的預測因素，而麻醉實施者自身並非爲直接因素。
結論：在手術室中麻醉實施者雙手的細菌污染是患者周圍環境和靜脈裝置污染的重要原因。其他的手術細菌傳播來源，包括術後周圍環境的清潔，值得深入研究。
(楊秋娟　譯　陳傑　校)
BACKGROUND: We have recently shown that intraoperative bacterial transmission to patient IV stopcock sets is associated with increased patient mortality. In this study, we hypothesized that bacterial contamination of anesthesia provider hands before patient contact is a risk factor for direct intraoperative bacterial transmission.
METHODS: Dartmouth–Hitchcock Medical Center is a tertiary care and level 1 trauma center with 400 inpatient beds and 28 operating suites. The first and second operative cases in each of 92 operating rooms were randomly selected for analysis. Eighty-two paired samples were analyzed. Ten pairs of cases were excluded because of broken or missing sampling protocol and lost samples. We identified cases of intraoperative bacterial transmission to the patient IV stopcock set and the anesthesia environment (adjustable pressure-limiting valve and agent dial) in each operating room pair by using a previously validated protocol. We then used biotype analysis to compare these transmitted organisms to those organisms isolated from the hands of anesthesia providers obtained before the start of each case. Provider-origin transmission was defined as potential pathogens isolated in the patient stopcock set or environment that had an identical biotype to the same organism isolated from hands of providers. We also assessed the efficacy of the current intraoperative cleaning protocol by evaluating

isolated potential pathogens identified at the start of case 2. Poor intraoperative cleaning was defined as 1 or more potential pathogens found in the anesthesia environment at the start of case 2 that were not there at the beginning of case 1. We collected clinical and epidemiological data on all the cases to identify risk factors for contamination.
RESULTS: One hundred sixty-four cases (82 case pairs) were studied. We identified intraoperative bacterial transmission to the IV stopcock set in 11.5 % (19/164) of cases, 47% (9/19) of which were of provider origin. We identified intraoperative bacterial transmission to the anesthesia environment in 89% (146/164) of cases, 12% (17/146) of which were of provider origin. The number of rooms that an attending anesthesiologist supervised simultaneously, the age of the patient, and patient discharge from the operating room to an intensive care unit were independent predictors of bacterial transmission events not directly linked to providers.
CONCLUSION: The contaminated hands of anesthesia providers serve as a significant source of patient environmental and stopcock set contamination in the operating room. Additional sources of intraoperative bacterial transmission, including postoperative environmental cleaning practices, should be further studied.

初學者使用 Airtraq 喉鏡和 Macintosh 喉鏡進行氣管插管的學習曲線：一項臨床研究

Learning Curves of the Airtraq and the Macintosh Laryngoscopes for Tracheal Intubation by Novice Laryngoscopists: A Clinical Study

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背景：Macintosh 在 1943 年發明的弧形喉鏡片仍然是臨床上最廣泛使用的氣管插管設備。Airtraq 喉鏡是一種新的一次性使用的氣管插管設備。一些研究比較了 Airtraq 喉鏡和 Macintosh 喉鏡在人體模型上類比氣管插管的使用。作者在一項臨床隨機對照試驗中評估了初學者使用 Airtraq 喉鏡或 Macintosh 喉鏡進行氣管插管的學習曲線和表現。
方法：108 例手術過程中需要氣管插管的病人隨機分配接受使用 Macintosh 喉鏡（n=54）或 Airtraq 喉鏡（n=54）氣管插管。由第一年且沒有使用過任何一種喉鏡的住院醫師進行氣管插管。重點記錄使用這兩種喉鏡進行氣管插管的持續時間和插管困難評分。
結果：18 名住院醫生參加了這項研究，每組 9 名。每個參與者使用相同的設備至少進行 6 次氣管插管。作者觀察到使用 Airtraq 喉鏡比 Macintosh 喉鏡更快掌握技能且插管時間更短。t 檢驗的資料分析顯示兩組有顯著差異（$p<0.001$）。
結論：在新手進行臨床應用時，Airtraq 喉鏡相對於 Macintosh 喉鏡顯示了一個更快的學習曲線。Airtraq 喉鏡更易於初學者使用。
(唐穎　譯　陳傑　校)
BACKGROUND: The curved laryngoscope blade described by Macintosh in 1943 remains the most widely used device to facilitate tracheal intubation. The Airtraq

laryngoscope is a new, single-use device for tracheal intubation. Several studies compared the use of Airtraq and Macintosh laryngoscopes in simulated intubation scenarios on manikins. We evaluated learning and performance of tracheal intubation by novice laryngoscopists using the Airtraq or Macintosh laryngoscopes in a randomized controlled clinical trial.

METHODS: One hundred eight consecutive patients scheduled for surgical procedures requiring tracheal intubation were enrolled. Patients were randomly allocated to undergo tracheal intubation using a Macintosh (n = 54) or an Airtraq (n = 54) laryngoscope. Tracheal intubation was performed by first-year residents who had no prior experience with the use of either laryngoscope. Primary end points were duration of tracheal intubation and intubation difficulty scale score for both devices.

RESULTS: Eighteen residents participated in the protocol; 9 were allocated to each study group. Each participant performed at least 6 tracheal intubations with the same device. We observed a more rapid skill acquisition with the Airtraq than with the Macintosh laryngoscope, as demonstrated by the shorter duration of intubation with the Airtraq laryngoscope. Data analysis with the Student t test revealed a significant difference between the groups ($P < 0.001$).

CONCLUSION: The Airtraq laryngoscope facilitates a more rapid learning curve compared with the Macintosh laryngoscope when used in a clinical setting by novice laryngoscopists. The Airtraq laryngoscope was judged easier to use by novice users.

環氧合酶抑制劑在機械通氣肺損傷中的作用

Cyclooxygenase Inhibition in Ventilator-Induced Lung Injury

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背景：作者在一所大學附屬實驗室進行了一項前瞻性、隨機對照的動物研究來驗證環氧合酶（COX）抑制劑是否可以減少機械通氣肺損傷的發生率。成年雄性大鼠麻醉後行創傷性機械通氣（PEEP=0，吸氣壓峰值 21mmHg），隨機分成兩組：給予非選擇性 COX 抑制劑（布洛芬）組和不予 COX 抑制劑組。

方法：本試驗中收集了實驗組和空白對照組創傷性機械通氣的相關資料（呼吸力學，細胞因數，花生四烯酸類物質），環氧合酶的表達，細胞核因數（NF-κB）的活性等。創傷性的機械通氣會導致肺損傷（順應性下降，組織水腫，炎症因數、花生四烯酸和環氧合酶-2 表達增加）。

結果：布洛芬可以有效抑制花生四烯酸的合成和 COX-2 的活性，因而給予布洛芬預處理後能夠提高生存率、減少肺水腫。然而對於機械通氣引起的 NF-κB 和炎症因數（腫瘤壞死因數-α，白介素-1β，白介素-6，生長相關原癌基因/角化細胞化學引誘物）的啓動，布洛芬是無調節作用。在體大鼠研究中發現，機械通氣肺損傷的

發病機理中，COX 的活性是起著重要作用。抑制 COX 活性對機械通氣肺損傷有保護作用（包括生存率，肺功能等），但未影響到重要介質的濃度（腫瘤壞死因數-α，白介素-1β，白介素-6，生長相關原癌基因/角化細胞化學引誘物）或 NF-κB 的活性，

結論：以上資料表明非選擇性 COX 抑制劑對機械性通氣肺損傷有一定的保護作用，而 NF-kB 的信號通道並非是花生四烯酸完全依賴的。多模式靶向研究包括對炎症因數和 NF-kB 作用的綜合考慮對有關 COX 抑制劑在機械通氣肺損傷中作用的研究可能有益。

(張婷　譯　陳傑　校)

BACKGROUND: We tested the hypothesis that inhibition of cyclooxygenase (COX) attenuates in vivo ventilator-induced lung injury (VILI) in a prospective, randomized laboratory investigation in a university-affiliated laboratory. Adult male rats were anesthetized and randomized with or without nonselective COX inhibition (ibuprofen) and were subjected to injurious mechanical ventilation (positive end-expiratory pressure = 0; peak inspiratory pressure = 21 mm Hg).

METHODS: We investigated the profile of VILI (respiratory mechanics, cytokines, eicosanoids), expression of COX enzymes, and activation of nuclear factor (NF)-κB in ibuprofen- versus vehicle-treated animals. Injurious ventilation caused lung injury (i.e., decrement in compliance, tissue edema, and elevated inflammatory cytokines, eicosanoids, and COX-2).

RESULTS: Pretreatment with ibuprofen that effectively inhibited eicosanoid synthesis and COX-2 activity increased survival and attenuated lung edema and decrement in respiratory mechanics. Ibuprofen had no modulatory effect on ventilator-induced activation of NF-κB or inflammatory cytokines (tumor necrosis factor-α, interleukin [IL]-1β, IL-6, GRO/KC [growth-related oncogene/keratinocyte chemoattractant]). COX activity seems important in the pathogenesis of VILI in the in vivo rat. Inhibition of COX provides significant protection (i.e., survival, pulmonary function) in VILI, but without affecting levels of important mediators (tumor necrosis factor-α, IL-1β, IL-6, GRO/KC) or activation of NF-κB.

CONCLUSIONS: These data confirm that nonselective COX inhibition provides partial protection against VILI and that the NF-κB signaling pathway is not exclusively eicosanoid dependent. Studies of COX inhibition in ventilator-associated lung injury might benefit from multimodal targeting that includes a comprehensive focus on inflammatory cytokines and NF-κB.

加巴噴丁改善剖腹產術後疼痛管理：一個隨機，安慰劑對照試驗

Gabapentin Improves Postcesarean Delivery Pain Management: A Randomized, Placebo-Controlled Trial

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背景:加巴噴丁對預防和治療急性和慢性術後疼痛有效。但尚未用於剖腹產。作者假設術前應用加巴噴丁能減少剖腹產術後的疼痛。

方法：擇期剖腹產病人隨機分成術前應用加巴噴丁 600mg，或者安慰劑。用 0.75% 高比重布比卡因 12mg，芬太尼 10ug，嗎啡 100ug 施行腰麻。術後鎮痛處理包括在手術中即開始應用酮洛酸和對乙醯氨基酚，直到手術後應用雙氯酚酸，對乙醯氨基酚，嗎啡。通過在腰麻後 6, 12, 24, 和 48 小時分別在休息和活動情況下應用視覺類比量表(0 to 100 mm)、滿意度、鴉片類藥消耗量和副作用指標評估病人。同時評估的指標還有新生兒干預，Apgar 評分，臍動脈血氣，母乳餵養難度。在剖腹產術後 3 個月評估慢性疼痛程度。設立亞組監測母體和臍靜脈加巴噴丁血藥濃度。使用複合模型分析比較 24h 時主要預後（視覺類比疼痛評分分數）。

結果：隨機分配 46 名病人，2 個被排除分析。活動狀態下 24 小時(95% 可信區間, CI)加巴噴丁組平均疼痛評分是 21 mm (CI = 13–28) ，而安慰劑組(*P* = 0.001)是 41mm(CI = 31–50)。母親的滿意度在加巴噴丁組更高。鴉片類藥的消耗量沒有區別。在加巴噴丁組有更嚴重的母親鎮靜作用 19% vs. 0%, *P* = 0.04)。新生兒的 Apgar 評分，干預，或者臍動脈的 pH 值沒有區別。平均母體靜脈血和臍靜脈血漿加巴噴丁藥物濃度之比是 0.86 (0.12)。兩組產婦在術後 3 個月的疼痛發生率是相似的。

結論：和安慰劑比較，包括術前給予加巴噴丁 600mg 的多模式鎮痛可減少剖腹產術後疼痛並增加母親滿意率

(陳靈科　譯　陳傑　校)

BACKGROUND: Gabapentin is effective for preventing and treating acute and chronic postoperative pain; however, it has not been described for use in cesarean delivery. We hypothesized that preoperative gabapentin would reduce postcesarean delivery pain.

METHODS: Women undergoing scheduled cesarean delivery were randomized to receive preoperative gabapentin 600 mg, or placebo. Spinal anesthesia was achieved with 0.75% hyperbaric bupivacaine 12 mg, fentanyl 10 μg, and morphine 100 μg. Postoperative analgesia was initiated with intraoperative ketorolac and acetaminophen, and continued with postoperative diclofenac, acetaminophen, and morphine. Patients were assessed at 6, 12, 24, and 48 hours after spinal anesthesia for pain at rest and on movement using a visual analog scale (0 to 100 mm), satisfaction, opioid consumption, and side effects. Neonatal interventions, Apgar scores, umbilical artery blood gases, and breastfeeding difficulties were assessed. Chronic pain was assessed 3 months after delivery. Maternal and umbilical vein gabapentin plasma concentrations were measured in a subgroup of patients. Mixed-model analysis was used to compare the primary outcome of visual analog scale pain scores at 24 hours between groups.

RESULTS: Forty-six patients were randomized, and 2 were excluded from analysis. The mean (95% confidence interval, CI) pain scores on movement at 24 hours were 21 mm (CI = 13–28) in the gabapentin and 41 mm (CI = 31–50) in the placebo group (*P* = 0.001). Maternal satisfaction was higher in the gabapentin group. There was no difference in opioid consumption. Severe maternal sedation was more common in the gabapentin group (19% vs. 0%, *P* = 0.04). There was no difference in neonatal Apgar scores, interventions, or umbilical artery pH. The mean (SD) maternal vein:umbilical vein

plasma gabapentin ratio was 0.86 (0.12). The incidence of pain at 3 months was similar in both groups.
CONCLUSION: Preoperative gabapentin 600 mg in the setting of multimodal analgesia reduces postcesarean delivery pain and increases maternal satisfaction in comparison with placebo.

高位完全性脊髓損傷患者行經尿道碎石術中，瑞芬太尼可減少阻滯自主神經亢進的七氟醚的需要量，

Remifentanil Decreases Sevoflurane Requirements to Block Autonomic Hyperreflexia During Transurethral Litholapaxy in Patients with High Complete Spinal Cord Injury

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背景：在高位脊髓損傷患者中，應用吸入麻醉藥達到阻滯自主神經反射亢進的濃度會引起嚴重的低血壓。作者研究了瑞芬太尼對於七氟醚在脊髓損傷患者中達到阻滯高自主神經反射的濃度的影響。
方法：該研究包含 96 例慢性、完全性脊髓損傷患者計畫在全身麻醉下行經尿道碎石術。麻醉誘導使用硫噴妥鈉、50%笑氣混合七氟醚吸入，調整七氟醚濃度維持 BIS 值在 40-50。首先找出在用甘氨酸溶液擴充膀胱時發生了自主神經發射亢進的病人（收縮壓增加 20-40mmHg）（第一試驗）。接著這些病人被分配成三個組：不接受瑞芬太尼注射（對照組，n=31），靶控輸注血漿藥物濃度爲 1ng/mL（n=25）或者是 3ng/mL（n=24）。在血流動力學恢復至基線後，七氟醚和瑞芬太尼的目標濃度下至少維持 20 分鐘，並重複這個步驟（第二試驗）。根據收縮壓對於膀胱擴充的反應（增減幅度 15%以上）來設定七氟醚目標濃度的上下調整。在試驗中測量膀胱擴充之前和期間的收縮壓，心率，BIS 指數在，並且在第一試驗期間測量兒茶酚胺的血漿濃度。
結果：96 例患者中有 82 例（85.4%）在第一試驗中發生了自主神經反射亢進，其中有 2 例在靶控藥物輸注中因爲發生了低血壓（動脈血壓<50mmHg）而被排除。在第二試驗中，與對照組 3.1%(2.9% to 3.3%)相比，接受 1 和 3 ng/mL 瑞芬太尼組抑制自主神經亢進的呼氣末七氟醚濃度分別減少到 2.6%（95%置信區間爲 2.5%-2.8%，p<0.01）和 2.2%（2.1% t- 2.4%, *P* < 0.0001）。再分別綜合了最低麻醉濃度值和 50%笑氣（0.48MAC）的作用，合併後的 MAC 值分別爲 2.27（對照組）,1.98（1 ng/mL 瑞芬太尼組）和 1.75（3 ng/mL 瑞芬太尼組）。
結論：在脊髓損傷病人行經尿道碎石術中，爲了阻滯自主神經反射亢進， 瑞芬太尼靶控濃度 1 ng/mL 和 3 ng/mL 可以減少七氟醚的濃度（混合 50%笑氣）16%和 29%。

(張蕾　譯　陳傑　校)

BACKGROUND: An inhaled anesthetic concentration required to block autonomic hyperreflexia (AHR) is high enough to cause severe hypotension in patients with high spinal cord injury (SCI). We determined the effects of remifentanil on the sevoflurane requirement to block AHR in SCI.

METHODS: The study involved 96 patients with chronic, complete SCI scheduled to undergo transurethral litholapaxy during general anesthesia. Anesthesia was induced with thiopental, and sevoflurane concentrations in 50% nitrous oxide were adjusted to maintain a bispectral index of 40 to 50. Whether the patient develops an AHR [an increase of systolic blood pressure (SBP) >20 to 40 mm Hg] was first examined by distending the bladder with glycine solution (the first trial). Patients who developed AHR were then allocated to receive no remifentanil infusion (control, $n = 31$), a target-controlled plasma concentration of 1 ng/mL ($n = 25$), or 3 ng/mL remifentanil ($n = 24$). After baseline hemodynamics had recovered, the target sevoflurane and remifentanil concentrations were maintained for at least 20 minutes and the procedure was resumed (the second trial). Each target sevoflurane concentration was determined by the up-and-down method based on changes (15% increase or more) of SBP in response to the bladder distension. SBP, heart rate, and bispectral index were measured before and during the bladder distension during the trials, and plasma concentrations of catecholamines during the first trial.

RESULTS: Eighty-two (85.4%) of 96 patients developed AHR during the first trial, in which 2 were excluded because of hypotension (mean arterial blood pressure <50 mm Hg) developed during target-controlled drug administration. During the second trial, the end-tidal concentrations of sevoflurane to prevent AHR were reduced to 2.6% (95% confidence interval 2.5% to 2.8%, $P < 0.01$) and 2.2% (2.1% to 2.4%, $P < 0.0001$) in the groups receiving 1 and 3 ng/mL remifentanil, respectively, in comparison with 3.1% (2.9% to 3.3%) in the control. When considering minimum anesthetic concentration (MAC) values and the contribution of 50% nitrous oxide (0.48 MAC), the combined MAC values, expressed as multiples of MAC, were 2.27, 1.98, and 1.75 in the control, 1 ng/mL remifentanil, and 3 ng/mL remifentanil groups, respectively.

CONCLUSIONS: Target-controlled concentrations of 1 and 3 ng/mL remifentanil would reduce the requirement of sevoflurane combined with 50% nitrous oxide to block AHR by 16% and 29%, respectively, in SCI patients undergoing transurethral litholapaxy.

術中用美沙酮可改善複雜脊椎手術病人的術後鎮痛

Intraoperative Methadone Improves Postoperative Pain Control in Patients Undergoing Complex Spine Surgery

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背景：進行複雜脊椎手術的病人常會遭受嚴重術後疼痛。對這些病人而言，美沙酮作爲阿片受體激動劑與 N -甲基- D -天冬氨酸受體拮抗劑的結合，是一種較適用的藥物，因爲 N-甲基- D-天門冬氨酸系統參與阿片耐受與痛覺過敏機制。

方法：本前瞻性研究入選 29 例行器械植入及椎體融合的多節段胸椎手術患者，隨機分組，一組在劃皮前接受 0.2 mg/kg 的美沙酮，對照組則以 0.75 μg/kg 舒芬太尼爲負荷劑量，並以 0.25 μg/kg/h 的速度持續輸注。術後均採用靜脈用阿片類藥物進行病人自控鎮痛。同時對患者術後 24h，48h，72h 的疼痛評分（視覺類比評分從 0 到 10），累積阿片類藥物需求量以及副作用等方面進行評估。

結果： 兩組的人口資料，持續時間，手術類型都相似。用美沙酮可以減少術後 50%阿片類藥物需求量（資料對應爲美沙酮組比舒芬太尼組，各自的中位數 [25%/75%區間距]）。術後 48 h 爲 63 mg （27.3/86.1）比 25 mg （16.5/31.5 ）嗎啡等值量, $P = 0.023$; 術後 72 h: 34 mg（19.9/91.5）比 15 mg （8.8/27.8）嗎啡等值量, $P = 0.024$. 並且，術後 48h 美沙酮組術後疼痛評分約低 50% (其[均值 ± SD] ，舒芬太尼爲 4.8 ± 2.4 ，美沙酮爲 2.8 ± 2.0, $P = 0.026$)。不良反應兩組發生率相似。

結論：術中單次注射美沙酮可改善複雜脊椎手術患者的術後疼痛。

(舒慧剛　譯　陳傑　校)

BACKGROUND: Patients undergoing complex spine surgery frequently experience severe pain in the postoperative period. The combined opiate receptor agonist/*N*-methyl-D-aspartate receptor antagonist methadone may be an optimal drug for these patients given the probable involvement of *N*-methyl-D-aspartate systems in the mechanism of opioid tolerance and hyperalgesia.

METHODS: Twenty-nine patients undergoing multilevel thoracolumbar spine surgery with instrumentation and fusion were enrolled in this prospective study and randomized to receive either methadone (0.2 mg/kg) before surgical incision or a continuous sufentanil infusion of 0.25 μg/kg/h after a load of 0.75 μg/kg. Postoperative analgesia was provided using IV opioids by patient-controlled analgesia. Patients were assessed with respect to pain scores (visual analog scale from 0 to 10), cumulative opioid requirement, and side effects at 24, 48, and 72 hours after surgery.

RESULTS: Demographic data, duration, and type of surgery were comparable between the groups. Methadone reduced postoperative opioid requirement by approximately 50% at 48 hours (sufentanil versus methadone group, median [25%/75% interquartile range]: 63 mg [27.3/86.1] vs 25 mg [16.5/31.5] morphine equivalents, $P = 0.023$; and 72 hours: 34 mg [19.9/91.5] vs 15 mg [8.8/27.8] morphine equivalents, $P = 0.024$) after surgery. In addition, pain scores were lower by approximately 50% in the methadone group at 48 hours after surgery (sufentanil versus methadone group [mean ± SD] 4.8 ± 2.4 vs 2.8 ± 2.0, $P = 0.026$). The incidence of side effects was comparable in both groups.

CONCLUSION: Perioperative treatment with a single bolus of methadone improves postoperative pain control for patients undergoing complex spine surgery.