超聲引導下腰方肌神經阻滯對剖宮產術後患者的鎮痛作用：一項隨機對照實驗

The Analgesic Effect of Ultrasound-Guided Quadratus Lumborum Block After Cesarean Delivery：A Randomized Clinical Trial

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背景:超聲定位腹橫筋膜平面神經阻滯已被證實在剖宮產術後能減少阿片類藥物使用。腰方肌位置靠後，可能能使局麻藥物更好地滲透進胸腰筋膜及椎旁。本研究擬評估腰方肌阻滯在剖宮產術後的鎮痛作用。

方法：本實驗為隨機、雙盲、對照實驗，納入 40 名臨產患者，所有受試物件均接受腰方肌神經阻滯，實驗組予 2mg/ml 羅呱卡因，對照組予生理鹽水。所有實驗物件均蛛網膜下隙予布比卡因和舒芬太尼，術後均接受標準鎮痛流程，使用撲熱息痛、布洛芬和內有凱托米酮的自控鎮痛泵。凱托米酮的用量以及自控鎮痛的時間均被記錄下來。主要結局指標為術後 24 小時凱托米酮用量。次要指標為疼痛評分、噁心、乏力及能夠站立和行走 5 米以上的恢復時間的重複測量值、有鎮痛評分和時間之間關係。

結果：40 名實驗物件均完成實驗，每組 20 人。實驗組術後 24 小時凱托米酮使用量與對照組相比減少（P=.04;95%可信區間：0.37-0.97）。實驗組有效鎮痛評分在平靜狀態（p＜.01）和咳嗽(p＜.01）時均優於對照組。

結論：腰方肌羅呱卡因神經阻滯作為多模式鎮痛模式（不包含椎管內嗎啡使用）中的一部分能夠降低凱托米酮的使用及剖宮產術後疼痛的強度。

（曹雪 譯 薛張剛，潘豔校）

BACKGROUD:Landmark and ultradound transversus abdominis plane blocks have demonstrated an opioid-sparing effect postoperatively after

cesarean delivery.The more posterior quadratus lumborum(QL) might provide superior local anesthetic spread to the thoracolumbar fascia and paravertebral space .The aim of our study was to evaluate the efficacy of the QL block after cesarean delivery.
METHODS:A Randomized ,double-blind ,controlled trial was performed .Forty parturients undergoing cesarean delivery received bilateral ultrasound-guided OL blocks with either 2mg /mlropivacaine or saline postoperatively.All patients received spinal anesthesia with bupivacaine and sufentanil and a postoperative analgesic regimen of paracetamol,ibuprofen ,and ketobemidone administered by a patient-controlled analgesic pump.The ketomidone consumption during the first 24 hours postoperatively.Secondary and exploratory analyses compared repeated measures of pain scores ,nausea,and fatigue and total differences in time until patients were able to stand and able to walk 5m,and the interaction between the effective analgesic score and time.
RESULTS:All 40 patients completed the trial,20 in each group.The cumulative ketobemidone consumption in 24 hours was reduced in the active group compared with the control group(p=.04;ratio of means=0.60;95%confidence interval ,0.37-0.97).The effective analgesic scores were significantly better in the treatment group compared with the placebo group both at rest(p＜.01)and during coughing(p＜.01).

CONCLUSIONS:QL block with ropivacaine reduces the postoperative ketomidone consumption and pain intensity as a part of a multimodal analgesic regimen that exclude neuraxial morphine.

亨廷頓小鼠在炎症疼痛模型中表現出疼痛反應減少

Huntington Mice Demonstrate Diminished Pain Response in Inflammatory Pain Model

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背景：亨廷頓舞蹈病（HD）影響神經系統，可以導致精神及運動功能障礙。之前的研究顯示 HD 是由亨廷頓（HTT）基因的外顯子 1 片段中 CAG 三核苷酸廣泛重複引起。然而，很少有研究關注 HD 與疼痛之間的關係。本研究的目的就是要探究一下 HD 與疼痛反應之間的關係。

方法：我們使用臨床相似的轉基因 HD 小鼠來評估 HD 與疼痛的關係，這些小鼠攜帶包含 84 個 CAG 三核苷酸重複序列的 HTT 外顯子突變基因。通過福馬林或全弗氏佐劑注射到小鼠的後爪上誘發炎症疼痛模型。在炎症疼痛研究行為學研究後獲取小鼠的脊髓，背根神經節及後爪的皮膚組織。使用免疫螢光，蛋白質印跡法和酶聯免疫吸附法去測定細胞及細胞因數的變化。

結果：我們的資料證實在年幼及老年小鼠中預處理的 HD 小鼠都較野生型小鼠表現出更少的疼痛行為。蛋白質印跡法和免疫組織法檢測腰段脊髓組織和背根神經節顯示年幼小鼠中 HD 小鼠較野生型小鼠啟動的膠質細胞及星形膠質細胞更少。腫瘤壞死因數-α ，白細胞介素-1β 和 P 物質的產生水準也較低。

結論：我們的資料表明，與野生型小鼠相比，HD 小鼠脊髓水準的疼痛行為和疼痛相關細胞因數反應較少。還需要進一步的實驗去確定 HTT 突變造成疼痛行為及疼痛相關細胞因數反應改變的具體機制。

（胡翔翔 譯 薛張剛，潘豔校）

BACKGROUND: Huntington disease (HD) affects the nervous system and leads to mental and motor dysfunction. Previous studies have shown that HD is caused by the exon 1 region of the huntingtin (HTT) gene having expanded CAG trinucleotide repeats. However, few studies have focused on the relationship between HD and pain. The purpose of this study is to investigate the relationship between HD and pain response.
METHODS: We used clinical similar transgenic HD mice carrying a mutant HTT exon 1 containing 84 CAG trinucleotide repeats to evaluate the relationship between HD and pain. Inflammatory pain models were induced by either formalin or complete Freund adjuvant injection over the hind paw. Spinal cord, dorsal root ganglion, and paw skin tissues were harvested at the end of the behavioral inflammatory pain studies. Immunofluorescence assay, Western blotting, and enzyme-linked immunosorbent assay were used to identify changes in cells and cytokines.
RESULTS: Our data demonstrate that preonset HD mice exhibited less pain behavior than wild-type (WT) mice in both young (n = 11 [WT], 13 [HD]) and aged (n = 8 [WT], 9 [HD]) mice. Western blotting and immunohistological examination of lumbar spinal cord tissue and dorsal root ganglion indicate

less activation of glial cells and astrocytes in young HD mice (n = 6–7) compared to that in WT mice (n = 6–7). The production levels of tumor necrosis factor-α, interleukin-1β, and substance P were also lower in young HD mice (n = 6–7).
CONCLUSIONS: Our data demonstrate less pain behavior and pain-related cytokine response at the spinal cord level for HD mice compared to those for WT mice. Further studies are needed for determining the mechanism as to how mutant HTT leads to altered pain behavior and pain-related cytokine response.

顯著性、錯誤、功效和樣本量：統計區組和處理

Significance, Errors, Power, and Sample Size: The Blocking and Tackling of Statistics

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推斷統計主要依賴於中心極限和大資料定律。根據中心極限定理，當樣本足夠大時，無論來源人口的分佈如何，樣本估計的人口都將具有正態分佈。相關大數定律認為，當隨機樣本變足夠大時，中心極限定理是有效的，一般樣本量為n≥30。在研究相關的假設檢驗中，“統計顯著性”一詞用來描述觀察到的差異或關聯何時達到某個閾值。這個顯著性閾值或切點定義為為 α（α），通常設置為 0.05。當觀察到的 P 值小於 α 時，拒絕零假設（Ho）並接受替換假設。臨床意義比統計意義更重要，因此應定期報告治療效果估計值和置信區間。當 Ho 無差別或者無關聯時而被拒絕，就發生 I 類錯誤，而實際上 Ho 是真實的。當 Ho 沒有被拒絕，而事實上存在真實人口影響，則發生 II 型錯誤。統計功效是指真正存在的真正差異，效果或關聯的概率。合理的樣本量和功效分析是研究設計的關鍵要素。當研究計畫不周或功效不足時，就會出現倫理問題。當計算比較組的樣本量時，需要 4 個數量：α，II 類錯誤，利益差異或效應以及結果變數的估

計變異性。樣本量隨著變異性和功效的增加而增加，並且通過減少 α 和減少差異來檢測。給定比例相對減少的樣本量在很大程度上取決於對照組本身的比例，隨著比例的減小而增大。估計未知參數的單組研究的樣本量基於期望的估計精度。評估療效和/或無效的中期分析是節省時間和金錢的良好工具，也使得科學快速進步，但只有在決定停止或繼續試驗時才考慮到 1 個組成部分。

（吳俊梅 譯 薛張剛，潘豔校））

Inferential statistics relies heavily on the central limit theorem and the related law of large numbers.
According to the central limit theorem, regardless of the distribution of the source population, a sample estimate of that population will have a normal distribution, but only if the sample is large enough.The related law of large numbers holds that the central limit theorem is valid as random samples become large enough, usually defined as an n ≥ 30. In research-related hypothesis testing, the term ″statistically significant″ is used to describe when an observed difference or association has met a certain threshold.This significance threshold or cut-point is denoted as alpha (α) and is typically set at .05.When the observed P value is less than α, one rejects the null hypothesis (Ho) and accepts the alternative. Clinical significance is even more important than statistical significance, so treatment effect estimates and confidence intervals should be regularly reported. A type I error occurs when the Ho of no difference or no association is rejected, when in fact the Ho is true. A type II error occurs when the Ho is not rejected, when in fact there is a true population effect.Power is the probability of detecting a true difference, effect, or association if it truly exists. Sample size justification and power analysis are key elements of a study design. Ethical concerns arise when studies are poorly planned or underpowered.When calculating sample size for comparing groups, 4 quantities are needed: α, type II error, the difference or effect of interest, and the estimated variability of the outcome variable. Sample size increases for increasing variability and power, and for decreasing α and decreasing difference to detect.Sample size for a given relative reduction in proportions depends heavily on the proportion in the control group itself, and increases as the proportion decreases. Sample size for single-group studies estimating an unknown parameter is based on the desired precision of the estimate. Interim analyses assessing for efficacy and/or futility are great tools to save time and money, as well as allow science to progress faster, but are only 1 component considered

when a decision to stop or continue a trial is made.

右美托咪定對高血壓肥厚性心肌缺血/再灌注損傷具有直接的心肌保護作用

Dexmedetomidine Maintains Its Direct Cardioprotective Effect Against Ischemia/Reperfusion Injury in Hypertensive Hypertrophied Myocardium

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背景：右美托咪定（DEX）通過 α2-腎上腺素受體（α2-AR）通過內皮型一氧化氮合酶（eNOS）磷酸化對缺血/再灌注損傷具有直接的心臟保護作用。 採用自發性高血壓大鼠（SHR）和 Wistar-Kyoto（WKY）大鼠模型，觀察 DEX 對肥厚性心肌的保護作用及心臟 α2-AR 和 I1 咪唑啉受體（I1R）的差異性。

方法: Langendorff 灌注的大鼠心臟在缺血前存在或不存在 DEX 的情況下進行 40 分鐘的全心臟缺血，然後再灌注 120 分鐘。 測量梗塞面積，並通過 Western 蛋白印跡評估 eNOS 磷酸化。 通過免疫組織化學，即時逆轉錄酶聚合酶鏈式反應和 Western 蛋白印跡來評估受體的存在和表達。

結果:在 WKY 大鼠模型中，DEX 顯著降低了梗塞面積並增加了磷酸化的 eNOS / eNOS。這些作用被育亨賓（α2-AR 拮抗劑）和 efaroxan（α2-AR 和 I1R 拮抗劑）抵消。在 SHR 大鼠模型中，DEX 顯著降低梗塞面積，效果被 efaroxan 而不是育亨賓所抵消。 SHX 大鼠模型中 DEX 沒有改變磷酸化的 eNOS / eNOS。 在 WKY 和 SHR 大鼠模型心臟中觀察到 α2-AR 和 I1R。儘管在 SHR 大鼠模型中 α2A-AR 和 α2B-AR 信使 RNA 和蛋白質水準上調，但 I1R 表達在兩種物種之間相當。

結論：在肥厚性心臟病中，儘管 α2-AR 上調，但 DEX 通過 I1R 以非依賴 eNOS 的方式維持其對缺血/再灌注損傷的直接心臟保護作用。

（楊振 譯 薛張剛，潘豔校））

BACKGROUND: Dexmedetomidine (DEX)has direct cardioprotective effect against ischemia/reperfusion injury through endothelial nitric oxide synthase (eNOS) phosphorylation via α2-adrenoreceptor (α2-AR). By using spontaneously hypertensive rat (SHR) and Wistar-Kyoto (WKY) rat models, the cardioprotective effect of DEX in hypertrophied myocardium and the differential characteristics of cardiac α2-AR and the I1 imidazoline receptor (I1R) were examined.
METHODS: Langendorff-perfused rat hearts underwent 40 minutes of global ischemia followed by 120 minutes of reperfusion in the presence or absence of DEX before ischemia. Infarct size was measured, and eNOS phosphorylation was assessed by Western blotting. The presence and expression of the receptors were assessed by immunohistochemistry, real-time reverse transcriptase polymerase chain reaction, and Western blotting.
RESULTS: In WKY, DEX significantly decreased infarct size and increased phosphorylated-eNOS/eNOS. These effects were counteracted by yohimbine (α2-AR antagonist) and efaroxan (α2-AR and I1R antagonist). In SHR, DEX significantly decreased infarct size, and the effect was counteracted by efaroxan but not yohimbine. DEX did not alter phosphorylated-eNOS/eNOS in SHR. α2-AR and I1R were observed in WKY and SHR hearts. Although alpha2A-AR and alpha2B-AR messenger RNA and protein levels were upregulated in SHR, I1R expression was comparable between the 2 species.
CONCLUSIONS: In the hypertrophied heart, DEX maintains its direct cardioprotective effect against ischemia/reperfusion injury via I1R in an eNOS-nondependent manner despite upregulation of α2-AR.

硬膜外無痛分娩術中硬膜外間隙突破感的識別--使用空氣或鹽水進行比較的隨機對照研究--舊爭議的新論證。

Epidural Space Identification With Loss of Resistance Technique for Epidural Analgesia During Labor: A Randomized Controlled Study Using Air orSaline—New Arguments for an Old Controversy

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背景：儘管發表了各種隨機對照研究和 Meta 分析，但仍不清楚用在無痛分娩中硬膜外間隙識別的最佳技術。我們的目的是評估在阻滯效果方面鹽水阻力損失

(SLOR)技術優於空氣阻力損失(ALOR)技術。

方法：我們將順產或引產的產婦隨機分為硬膜外鎮痛的 SLOR 組和 ALOR 組。我們的主要結果是比較 SLOR 組和 ALOR 組技術對硬膜外阻滯 30 分鐘後疼痛評分的影響。我們的次要結果包括 30 分鐘時的運動阻滯的程度和鎮痛效果。採用 t 核對總和曼-惠特尼 U 檢驗對主要和次要結果進行比較。根據邦弗朗尼多重校正，在主要和次要結果中，p＜017 為有統計學意義，其他結果認為是探索性的。

結果：包括 400 名產婦，其中 24 名被排除在最後分析之外。30 分鐘後，疼痛評分減少(ALOR，4.7±2.9/10；SLOR，4.9±3.0/10；P=.49)，運動阻滯(ALOR，1.4±0.8；SLOR，1.3±0.8；P=.27)，鎮痛效果(ALOR，1.0±0.7；SLOR，1.0)，兩組間差異無顯著意義(P=.87)。

結論：硬膜外阻滯 30 分鐘後疼痛評分降低和阻滯開始不受硬膜外間隙定位技術的影響。

（葉志祥 譯 薛張剛，潘豔校)）

BACKGROUND: The best technique to identify the epidural space for labor analgesia is still unclear despite the publication of variousrandomized controlled studies and meta-analyses. Our aim was to assess the superiority of the saline loss of resistance (SLOR)technique over the air loss of resistance (ALOR) technique with respect to the quality of the block.

METHODS: Consenting parturients admitted to our obstetric suite for spontaneous or induced labor were randomized to receiveepidural analgesia using either the ALOR or technique. Our primary outcome was to compare the impact of the SLOR and ALOR technique on pain score improvement measured 30 minutes after administration of epidural block. Our secondary outcomes included the density of motor blockade and analgesic efficacy measured at 30 minutes. Primary and secondary outcomes were compared using the Student t test and Mann-Whitney U test. Statistical significance was set at P < .017 for primary and secondary outcomes, considering Bonferroni correction for multiple comparisons. Other comparisons were considered exploratory.

RESULTS:Four hundred parturients were included; 24 were excluded from the final analysis. After 30 minutes, pain score reduction (ALOR, 4.7 ± 2.9/10; SLOR, 4.9 ± 3.0/10; P = .49), motor block (ALOR, 1.4 ± 0.8; SLOR, 1.3 ± 0.8; P = .27), and efficacy of the block (ALOR, 1.0 ± 0.7; SLOR, 1.0 ± 0.6; P = .87) did not differ significantly between groups.
CONCLUSIONS:Pain score reduction after 30 minutes and onset of the block were not affected by the technique used to locate theepidural space.

老年患者非心臟手術術後的知情同意和認知功能障礙

Informed Consent and Cognitive Dysfunction After Noncardiac Surgery in the Elderly

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在行非心臟手術的老年患者中，術後 3 個月發生的認知功能障礙與 10%-15%患者的可預見知情同意閾值相匹配，並且與事先接受正常行為測試患者新發生的記憶和行為能力缺陷有關。目前，唯一能避免術後認知功能障礙發生的方法是放棄手術，因此需要充分權衡手術的得益，如解除創傷和炎症、正常營養、體力活動及睡眠的恢復。為了確保手術知情同意書被合理地告知，手術團隊在術前應該與患者充分溝通術後發生認知功能障礙的可能性和替代治療方案的選擇。

（趙明曄 譯 薛張剛，潘豔校））

Cognitive dysfunction 3 months after noncardiac surgery in the elderly satisfies informed consent thresholds of foreseeability in 10%-15% of patients, and materiality with new deficits observed in memory and executive function in patients with normal test performance beforehand. At present, the only safety step to avoid cognitive dysfunction after surgery is to forego surgery, thereby precluding the benefits of surgery with removal of pain and inflammation, and resumption of normal nutrition, physical activity, and sleep. To assure that consent for surgery is properly informed, risks of both cognitive dysfunction and alternative management strategies must be discussed with patients by the surgery team before a procedure is scheduled.

經顱多普勒和超聲標記近紅外光譜法比較人類受試者腦血流的相對變化。

Comparison of Transcranial Doppler and Ultrasound-Tagged Near Infrared Spectroscopy for Measuring Relative Changes in Cerebral Blood Flow in Human Subjects.

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背景:目前尚無可靠的方法來測量絕對腦血流(CBF)的連續、無創測量。我們試圖確定超聲標記近紅外光譜(UT-NIRS)測量的變化與在深度低碳酸血症和高碳酸血症期間健康志願者中經顱多普勒(TCD)測量的 CBF 變化。

方法:10 名健康的志願者通過 TCD, UT-NIRS (c-FLOW, Ornim Medical)，以及心率、血壓、末端潮汐 PCO2 (PEtCO2)、末潮 O2 和激發 O2 的組合進行監測。在 15-20、25-30、35-40、45-50 和 55-60 毫米汞柱的基礎上，控制二氧化碳和微小的通風，以達到 5 個穩定的目標。CBF 被評估為穩定狀態，TCD 被指定為參考標準。主要的分析是 TCD 和 UT-NIRS 流與 PEtCO2 的線性混合效應模型，該模型解釋了重複測量。為檢測 CBF 的變化，確定了接收機的工作特性曲線。

結果:換氣過度(最低點 PEtCO2 17.1±2.4)導致顯著降低大腦中動脈的平均流速基線(79%±22%)，但沒有一個一致的降低 UT-NIRS 腦流速指數(n = 10;基線的 101%±6%)。血碳酸過多症 PEtCO2 峰值(59.3±3.3)從基線導致顯著增加大腦中動脈的平均流速(153%±25%)和 UT-NIRS(119%±11%)。比較斜坡和 PEtCO2 作為 TCD 基線的百分比(1.7%[1.5%-2%])和 UT-NIRS(0.4%[0.3%-0.5%])表明，UT-NIRS 斜率明顯平坦，P < 0.0001。在 TCD 下，TCD 的面積顯著高於 UT-NIRS, 0.97(95%置信區間，0.92-0.99)和 0.75(95%置信區間，0.66-0.82)。

結論:我們的資料表明，UT-NIRS 腦血流速度指數僅在高碳酸血症的時候檢測到 CBF 的變化，而在健康的受試者中並不是低卡的，其敏感性遠低於 TCD。在廣泛的臨床應用 UT-NIRS 之前需要額外的改良和驗證。

（曹雨楓 譯 薛張剛，潘豔校））

BACKGROUND: Currently, no reliable method exists for continuous, noninvasive measurements of absolute cerebral blood flow (CBF). We sought to determine how changes measured by ultrasound-tagged near-infrared spectroscopy (UT-NIRS) compare with changes in CBF as measured by transcranial Doppler (TCD) in healthy volunteers during profound hypocapnia and hypercapnia.
METHODS: Ten healthy volunteers were monitored with a combination of TCD, UT-NIRS (c-FLOW, Ornim Medical), as well as heart rate, blood pressure, end-tidal PCO2 (PEtCO2), end-tidal O2, and inspired O2. Inspired CO2 and minute ventilation were controlled to achieve 5 stable plateau goals of EtCO2 at 15-20, 25-30, 35-40, 45-50, and 55-60 mm Hg, for a total of 7 measurements per subject. CBF was assessed at a steady state, with the TCD designated as the reference standard. The primary analysis was a linear mixed-effect model of TCD and UT-NIRS flow with PEtCO2, which accounts for repeated measures. Receiver operating characteristic curves were determined for detection of changes in CBF.
RESULTS: Hyperventilation (nadir PEtCO2 17.1 ± 2.4) resulted in significantly decreased mean flow velocity of the middle cerebral artery from baseline (to 79% ± 22%), but not a consistent decrease in UT-NIRS cerebral flow velocity index (n = 10; 101% ± 6% of baseline). Hypercapnia (peak PEtCO2 59.3 ± 3.3) resulted in a significant increase from baseline in both mean flow velocity of the middle cerebral artery (153% ± 25%) and UT-NIRS (119% ± 11%). Comparing slopes versus PEtCO2 as a percent of baseline for the TCD (1.7% [1.5%-2%]) and UT-NIRS (0.4% [0.3%-0.5%]) shows that the UT-NIRS slope is significantly flatter, P < .0001. Area under the receiver operating characteristic curve was significantly higher for the TCD than for UT-NIRS, 0.97 (95% confidence interval, 0.92-0.99) versus 0.75 (95% confidence interval, 0.66-0.82).
CONCLUSIONS: Our data indicate that UT-NIRS cerebral flow velocity index detects changes in CBF only during hypercarbia but not hypocarbia in healthy subjects and with much less sensitivity than TCD. Additional refinement and validation are needed before widespread clinical utilization of UT-NIRS.

根據國家品質程式報告要求（運用麻醉資訊管理系統資料庫）來探討圍術期體溫測量注意事項

Perioperative Temperature Measurement Considerations Relevant to Reporting Requirements for National Quality Programs Using Data From Anesthesia Information Management Systems

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背景：圍術期低溫可增加傷口感染、失血、輸血以及心血管事件的發生率。美國國家品質程式將圍術期正常體溫定義為於術前30分鐘至術後15分鐘這一段麻醉時間內至少高於35.5℃。通過採用4個學術性醫院的資料，我們根據當下需求，評估了檢測時間測體溫時的注意事項，以引導醫院報告圍術期體溫時使用電子資料來源。

方法:從4個學術性醫院的麻醉資訊管理系統資料庫中獲取圍術期體溫以及測量時間間隔（體溫監測停止時、手術結束時以及拔除氣管導管時）。入選標準為年齡>16歲；使用氣管導管或聲門上通氣道的患者；手術時間≥60min。麻醉結束前30min內測得的最大術中體溫作為事件末體溫（即用以研究報告的體溫）。測量時間間隔大於30min的那一部分（的事件末體溫）由最終術中體溫和麻醉結束時體溫決定（這句實在不會翻！！！）。

結果：在這些醫院的資料中，34.5%至59.5%的病例中的平均數存在麻醉結束前體溫監測事件中斷30分鐘以上的情況。雖然直至拔除氣管導管都在測量體溫，5.9%至20.8%的病例都超出了可接受的30min-窗。平均8.9%至21.3%病例中的事件末術中體溫<35.5℃（測量品質問題）

結論：考慮到有關檢測時間的一些注意事項，大部分病例使用的事件末術中體溫對於國家品質程式報告來說都是不合格的。因此，在復蘇室期間的溫度測量就顯得很有必要。大部分病例都存在事件末術中體溫低於35.5℃這個閾值，也表示術後體溫測量的必要性，從而判斷測量品質是否有保障。那些思考著圍術期體溫國家測量品質報告的機構，應該更多考慮技術和後勤問題，如此在規定管理語言

的基礎上才能達到一個較高水準的依從性。

（依明江 譯 薛張剛，潘豔校））

BACKGROUND: Perioperative hypothermia may increase the incidences of wound infection, blood loss, transfusion, and cardiac morbidity. US national quality programs for perioperative normothermia specify the presence of at least 1 "body temperature" ≥35.5° C during the interval from 30 minutes before to 15 minutes after the anesthesia end time. Using data from 4 academic hospitals, we evaluated timing and measurement considerations relevant to the current requirements to guide hospitals wishing to report perioperative temperature measures using electronic data sources.

METHODS: Anesthesia information management system databases from 4 hospitals were queried to obtain intraoperative temperatures and intervals to the anesthesia end time from discontinuation of temperature monitoring, end of surgery, and extubation. Inclusion criteria included age >16 years, use of a tracheal tube or supraglottic airway, and case duration ≥60 minutes. The end-of-case temperature was determined as the maximum intraoperative temperature recorded within 30 minutes before the anesthesia end time (ie, the temperature that would be used for reporting purposes). The fractions of cases with intervals >30 minutes between the last intraoperative temperature and the anesthesia end time were determined.

RESULTS: Among the hospitals, averages (binned by quarters) of 34.5% to 59.5% of cases had intraoperative temperature monitoring discontinued >30 minutes before the anesthesia end time. Even if temperature measurement had been continued until extubation, averages of 5.9% to 20.8% of cases would have exceeded the allowed 30-minute window. Averages of 8.9% to 21.3% of cases had end-of-case intraoperative temperatures <35.5° C (ie, a quality measure failure).

CONCLUSIONS: Because of timing considerations, a substantial fraction of cases would have been ineligible to use the end-of-case intraoperative temperature for national quality program reporting. Thus, retrieval of postanesthesia care unit temperatures would have been necessary. A substantive percentage of cases had end-of-case intraoperative temperatures below the 35.5° C threshold, also requiring postoperative measurement to determine whether the quality measure was satisfied. Institutions considering reporting national quality measures for perioperative normothermia should consider the technical and logistical issues identified to achieve a high level of compliance based on the specified regulatory language.

全麻中應用保護性機械通氣策略的多樣性

Variability in the Use of Protective Mechanical Ventilation During General Anesthesia.

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背景:本研究旨在探討不同麻醉醫生實施保護性肺通氣策略是否會有顯著不同，以及這些策略上的差異是否與患者、手術方式或麻醉醫生人口學特徵有關。

方法：本佇列研究納入三級醫院 262 位麻醉醫生與 2007 年至 2014 年共 57372 名患者作為研究物件。保護性肺通氣是指保持呼氣末正壓 5 cm H_2O 或以上，潮氣量小於 10 mL/kg（預計體重），氣道平臺壓小於 30 cm H_2O。傾向指數校正協變數後用多因素回歸分析來分析結果。在敏感性分析中使用的是改良的保護性肺通氣概念。

結果：在未校正的分析中，實施保護性通氣的平均概率為 53.8%（第 2.5 百分位為 19.9%，第 97.5 百分位為 80.8%）。經大量協變數校正後，實施保護性通氣的平均概率為 51.1%，變化並不大（第 2.5 百分位為 24.7%，第 97.5 百分位為 77.2%）。當保護性肺通氣的範疇發生改變，實施保護性肺通氣策略仍然有顯著的不同。

結論：不同麻醉醫生術中實施保護性機械通氣策略有顯著的不同。本研究表明這種差異性與個人傾向高度相關，而與患者、手術方式、麻醉醫生的人口學特徵無關。

（潘波 譯 薛張剛，潘豔校））

BACKGROUND: The purpose of this study was to determine whether significant variation exists in the use of protective ventilation across individual anesthesia providers and whether this difference can be explained by patient, procedure, and provider-related characteristics.

METHODS: The cohort consisted of 262 anesthesia providers treating 57,372 patients at a tertiary care hospital between 2007 and 2014. Protective ventilation was defined as a median positive end-expiratory pressure of 5 cm H20 or more, tidal volume of <10 mL/kg of predicted body weight and

plateau pressure of <30 cm H2O. Analysis was performed using mixed-effects logistic regression models with propensity scores to adjust for covariates. The definition of protective ventilation was modified in sensitivity analyses.
RESULTS:In unadjusted analysis, the mean probability of administering protective ventilation was 53.8% (2.5th percentile of provider 19.9%, 97.5th percentile 80.8%). After adjustment for a large number of covariates, there was little change in the results with a mean probability of 51.1% (2.5th percentile 24.7%, 97.5th percentile 77.2%). The variations persisted when the thresholds for protective ventilation were changed.
CONCLUSIONS:There was significant variability across individual anesthesia providers in the use of intraoperative protective mechanical ventilation. Our data suggest that this variability is highly driven by individual preference, rather than patient, procedure, or provider-related characteristics.

氨甲環酸不會影響缺血預處理及遠端缺血預處理的心肌保護作用

Tranexamic Acid Does Not Influence Cardioprotection by Ischemic Preconditioning and Remote Ischemic Preconditioning

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先前的研究表明，抗纖溶藥物抑酶肽（aprotinin）在缺血再灌注後會增加梗死面積，並減弱缺血預處理(IPC)的作用。在臨床中，抑酶肽被氨甲環酸（TXA）所取代。作者研究了氨甲環酸是否影響缺血再灌注損傷及由缺血預處理、遠程缺血預處理(RIPC)產生的心臟保護作用。將被麻醉的雄性Wistar大鼠隨機分為6組。對照組大鼠不做進一步的治療，治療組分別為只予氨甲環酸治療，只予缺血預處理，只予遠端缺血預處理，氨甲環酸聯合缺血預處理與氨甲環酸聯合遠程缺血預處理。預估治療效果為20%。與對照組相比(56%±11%)，IPC使梗死面積減少46%(30%±6%；平均差26%；95%可信區間19-33；P < 0.0001)，RIPC使梗死面積減少29%(40%±8%；平均差16%；95%可信區間9-24；P < 0.011)。使用氨甲環酸對缺血再灌注損傷以及由缺血預處理、遠端缺血預處理(RIPC)產生的心臟保護作用均無影響。氨甲環酸不會影響缺血預處理與遠端缺血預處理減少的梗死面積。

（張金源 譯　陳傑 校）

Prior studies have suggested that the antifibrinolytic drug aprotinin increases the infarct size after ischemia and reperfusion (I/R) and attenuates the effect of ischemic preconditioning (IPC). Aprotinin was replaced by tranexamic acid (TXA) in clinical practice. Here, we investigated whether TXA influences I/R injury and/or cardioprotection initiated by IPC and/or remote ischemic preconditioning (RIPC). Anesthetized Wistar male rats were randomized to 6 groups. Control animals were not further treated. Administration of TXA was combined with and without IPC and RIPC. Estimated treatment effect was 20%. Compared

to control group (56% ± 11%), IPC reduced infarct size by 46% (30% ± 6%; mean difference, 26%; 95% confidence interval, 19-33; P < .0001), and RIPC reduced infarct size by 29% (40% ± 8%; mean difference, 16%; 95% confidence interval, 9-24; P < .011). Additional application of TXA had no effect on I/R injury and cardioprotection by IPC or RIPC. TXA does not abolish infarct size reduction by IPC or RIPC.

圍術期神經肌肉監測

Neuromuscular Monitoring in the Perioperative Period

Murphy, Glenn S. MD

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神經肌肉監測裝置在 20 世紀 70 年代被引入臨床實踐。定性的神經肌肉監視器或周圍神經刺激器給予運動神經電刺激，並主觀地評估相應肌肉的回應。標準的周圍神經刺激器提供了幾種神經刺激模式，包括四個成串刺激（TOF），雙脈衝，強直和強直後計數。定性(和定量)監測裝置對於確定神經肌肉阻滯的起效，維持手術過程中所需的肌肉鬆弛深度，評估拮抗藥物的合適劑量是必需的。然而，用周圍神經刺激器測量到的(阻滯作用)消退不存在並不能夠排除神經肌肉阻滯殘餘; 當(阻滯作用)消退不能再觀察到時，TOF 比率可能低至 0.4-0.6。另外，監測部位也可能會影響神經肌肉恢復不完全的風險。拇內收肌對神經阻滯藥物的作用更敏感(相對于眼周肌肉)，在這個位點監測可以更準確地反映咽部肌肉(阻滯後的)恢復(神經肌肉阻斷劑作用後最後恢復的肌肉，其功能障礙甚至可能會持續到 TOF 比值為 1.0 時)。定量監測裝置是測量和量化肌肉無力程度並以數值方式顯示結果的裝置。已開發了幾種不同的技術，包括肌動圖、肌電圖、加速度法、運動描記法和肌音描記法。低劑量的阿替普酶可用於在 TOF 比值為 0.4-0.6 時，有效逆轉神經肌肉阻滯；需要定量監測來確定這種程度的神經肌肉恢復已經發生。作為肌肉力量的臨床測試，外周神經刺激器無法確定在手術結束時神經肌

肉功能完全恢復。使用定量監測裝置排除臨床上重要的肌無力（TOF 比值<0.到1.0），在拔除氣管導管時是必不可少的。

（姚雪雅 譯 陳傑 校）

Neuromuscular monitoring devices were introduced into clinical practice in the 1970s. Qualitative neuromuscular monitors, or peripheral nerve stimulators, provide an electrical stimulus to a motor nerve and the response of corresponding muscle subjectively evaluated. A standard peripheral nerve stimulator provides several patterns of nerve stimulation, including train-of-four (TOF), double-burst, tetanic, and post-tetanic count. Qualitative (and quantitative) monitors are needed to determine onset of neuromuscular blockade, maintain the required depth of muscle relaxation during the surgical procedure, and assess an appropriate dose of reversal agent. However, absence of fade measured with a peripheral nerve stimulator does not exclude residual neuromuscular block; TOF ratios as low as 0.4-0.6 may be present when fade is no longer observed. In addition, the risk of incomplete neuromuscular recovery may be influenced by monitoring site. The adductor pollicis is more sensitive to the effects of neuromuscular blocking agents (compared to the muscles surrounding the eye), and monitoring at this site may more accurately reflect recovery of pharyngeal muscles (the last muscles to recover from the effects of neuromuscular blocking agents, in which dysfunction may persist even at a TOF ratio of 1.0). Quantitative monitors are devices that measure and quantify the degree of muscle weakness and display the results numerically. Several different technologies have been developed, including mechanomyography, electromyography, acceleromyography, kineograph, and phonomyography. Lower doses of anticholinesterases may be used to effectively reverse neuromuscular blockade at TOF ratios of 0.4-0.6; quantitative monitoring is required to determine that this level of neuromuscular recovery has occurred. As clinical tests of muscle strength, peripheral nerve stimulators are unable to determine whether full recovery of neuromuscular function is present at the end of the surgical procedure. The use of quantitative monitors is essential in excluding clinically important muscle weakness (TOF ratios <0.9 to 1.0) at the time of tracheal extubation.

單肺通氣的管理-臨床實踐的變化和趨勢：一項多中心圍術期結局的報導

Management of 1-Lung Ventilation—Variation and Trends in Clinical Practice: A Report From the Multicenter Perioperative Outcomes Group

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背景：肺保護性通氣（LPV）已被證明可以改善手術患者的臨床預後。儘管證據表明單肺通氣（1LV）可能是 LPV 的一種極為重要的方式，但是對於進行 1LV 的患者來說，目前關於應用 LPV 的研究非常有限。在這項多中心研究中，作者報導了 1LV 患者的通氣策略變化趨勢。

方法：多中心圍手術期結局資料庫被用來識別接受 1LV 的患者。檢索並計算了佇列和高風險亞組（女性、肥胖[體重指數> 30 kg / m2]、身材矮小）的初始和總潮氣量（VT）的中位數，應用呼氣末正壓（PEEP）≥5cm H2O 的患者比例，1LV 時的 LPV（VT≤6 mL/kg 預測體重[PBW]、PEEP≥5 cm H2O）和呼吸機驅動壓力（ΔP;平臺氣道壓力 - PEEP）。

結果：本研究分析了 4 個機構共 5609 名患者的資料。計算每個病例的平均 VT，由於資料呈正態分佈，整個佇列和亞組均報告了平均值。1LV 時 VT 的平均值為 6.49±1.82 mL/kg PBW。高風險亞組的 VT（mL/kg PBW）顯著升高；體重指數≥30kg/m 時，VT 為 6.86±1.97，女性為 7.05±1.92，矮小患者為 7.33±2.01。在研究期間，中位 VT 的平均值顯著下降（6.88-5.72; P <0.001），接受 LPV 的患者比例在研究期間顯著增加（9.1%-54.6%; P <0.001）。這些變化與研究期間 ΔP 的顯著下降相吻合，從第 1 期的 19.4 cm H2O 到第 12 期的 17.3 cm H2O（P = 0.003）。

結論：儘管人們逐漸意識到肺保護性通氣的重要性，但接受 1LV 治療的患者中，大部分患者繼續接受超出推薦閾值的 VT PEEP 水準。此外在高風險亞組中，由於高 VT 和 LPV 應用較少，使得醫源性肺損傷的風險增高。

（翟小竹 譯 陳傑 校）

BACKGROUND：Lung-protective ventilation (LPV) has been demonstrated to improve clinical outcomes in surgical patients. There are very limited data on the current use of LPV for patients undergoing 1-lung ventilation (1LV) despite evidence that 1LV may be a particularly important setting for its use. In this multicenter study, we report trends in ventilation practice for patients undergoing 1LV.

METHODS：The Multicenter Perioperative Outcomes Group database was used to identify patients undergoing 1LV. We retrieved and calculated median initial and overall tidal volume (VT) for the cohort and for high-risk subgroups (female sex, obesity [body mass index >30 kg/m], and short stature), percentage of patients receiving positive end-expiratory pressure (PEEP) ≥5 cm H2O, LPV during 1LV (VT ≤ 6 mL/kg predicted body weight [PBW] and PEEP ≥5 cm H2O), and ventilator driving pressure (ΔP; plateau airway pressure - PEEP).

RESULTS：Data from 5609 patients across 4 institutions were included in the analysis. Median VT was calculated for each case and since the data were normally distributed, the mean is reported for the entire cohort and subgroups. Mean of median VT during 1LV for the cohort was 6.49 ± 1.82 mL/kg PBW. VT (mL/kg PBW) for high-risk subgroups was significantly higher; 6.86 ± 1.97 for body mass index ≥30 kg/m, 7.05 ± 1.92 for female patients, and 7.33 ± 2.01 for short stature patients. Mean of the median VT declined significantly over the study period (from 6.88 to 5.72; P < .001), and the proportion of patients receiving LPV increased significantly over the study period (from 9.1% to 54.6%; P < .001). These changes coincided with a significant decrease in ΔP during the study period, from 19.4 cm H2O during period 1 to 17.3 cm H2O in period 12 (P = .003).

CONCLUSIONS：Despite a growing awareness of the importance of protective ventilation, a large proportion of patients undergoing 1LV continue to receive VT PEEP levels outside of recommended thresholds. Moreover, VT remains higher and LPV less common in high-risk subgroups, potentially placing them at elevated risk for iatrogenic lung injury.

創傷患者入院前使用氨甲環酸對凝血功能的影響

The Impact of Prehospital Tranexamic Acid on Blood Coagulation in Trauma Patients

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背景：目前僅有有限的資料關於創傷患者入院前 TXA 的應用。本文將從受傷現場到入院後應用TXA的嚴重創傷患者與以往研究中未應用TXA的創傷患者進行對比，評估其凝血功能的變化。

方法：該研究方案已在 ClinicalTrials.gov (NCT02354885)上註冊。為一項前瞻的，多中心，觀察性研究。研究將 70 個受傷即刻應用 TXA（靜注 1g）的創傷患者與之前發表的研究中未用藥的38名創傷患者進行對比。為了闡明患者因素，創傷流行病學，晶膠體復蘇的差異，設立了傾向得分匹配的兩組（n=24/每組）。檢測受傷即刻和入急診室後的旋轉血栓彈力圖（ROTEM），出凝血，血氣分析。結果用平均數，標準差，均數差和 95%置信區間表示。

結果：兩組患者流行病學無明顯差異。兩組出凝血檢測有可比性。在 TXA 組全部的 4 名患者中入院前纖溶亢進表現減弱。血栓彈力圖 FIBTEM-MCF（MCF：最大血塊穩定性）代表纖維蛋白原功能水準，在 TXA 組受傷即刻到入急診室並無變化，而對照組 MCF 下降-3.7[1.8]mm。TXA 組的 EXTEM-MCF 明顯下降 9.2（7.2-11.2）mm（P<0.001）和 INTEM-MCF 明顯下降 6.8 (4.7-9.0) mm (P < .001)，與對照組相比，TXA 組纖維蛋白降解產物（用 D2 聚體代表）明顯下降。

結論：入院前早期 TXA 的應用可穩定凝血快，降低纖溶活性，從而減少纖維蛋白降解產物（D2 聚體）的生成。

（崔璀 譯　陳傑 校）

BACKGROUND: There is limited data on prehospital administration of tranexamic acid (TXA) in civilian trauma. The aim of this study was to evaluate changes in coagulation after severe trauma from on-scene to the hospital after TXA application in comparison to a previous study without TXA.
METHODS: The study protocol was registered at ClinicalTrials.gov (NCT02354885). A prospective, multicenter, observational study investigating coagulation status in 70 trauma patients receiving TXA (1 g intravenously) on-scene versus a control group of 38 patients previously published without TXA. To account for potential differences in patient and trauma epidemiology, crystalloid and colloidal resuscitation fluid, 2 propensity score matched groups (n = 24 per group) were created. Measurements included ROTEM, standard coagulation tests and blood gas analyses on-scene and emergency department admission. Presented values are mean and [standard deviation], and difference in means and 95% confidence intervals.
RESULTS: Patient epidemiology was not different between groups. Coagulation assays on-scene were comparable between the TXA and C. Prehospital hyperfibrinolysis was blunted in all 4 patients in the TXA group. Viscoelastic FIBTEM maximum clot firmness (MCF), representing functional fibrinogen levels, did not change from on-scene to the emergency department in the TXA group, whereas MCF decreased -3.7 [1.8] mm in the control group. Decrease of MCF was significantly reduced in the TXA group in EXTEM by 9.2 (7.2-11.2) mm ($P < .001$) and INTEM by 6.8 (4.7-9.0) mm ($P < .001$) in favor of the TXA group. Production of fibrinogen fragments (represented by D-dimers) was significantly lower in the TXA group compared to group C.
CONCLUSIONS: Early prehospital administration of TXA leads to clot stabilization and a reduction of fibrinolytic activity, causing a decrease in fibrin degradation products buildup (D-dimer).

使用 26G 的 Whitacre 針和 0.125% 布比卡因單次注射，硬膜穿破硬膜外麻醉技術與傳統硬膜外麻醉用於分娩鎮痛：一項隨機臨床試驗

Labor Analgesia Onset With Dural Puncture Epidural Versus Traditional Epidural Using a 26-Gauge Whitacre Needle and 0.125% Bupivacaine Bolus: A Randomized Clinical Trial

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腰硬膜外麻醉(LEs)能提供良好的鎮痛。腰硬膜外麻醉聯合硬膜穿破技術(DPE)是一種加速神經鎮痛的方法。在 DPE 中，硬膜被穿刺，但在腦脊液中沒有藥物治療。採用 DPE 法，用 0.25%的布比卡因進行快速鎮痛。然而，這種濃度可能會阻礙非輔助陰道分娩，目前還沒有確定的分娩鎮痛的誘導和維持方法。本研究的主要目的是比較 DPE 與 LE 單次硬膜外(0.125% bupivacaine)的患者中獲得適當的分娩鎮痛患者的百分比。適當的分娩鎮痛定義為硬膜外麻醉開始後 10 分鐘視覺類比量表測量≤10mm（100mm 範圍內）。隨機分配病人接受 LE 或 DPE。在硬膜外置入前，受試者在子宮收縮過程中測定 VAS 評分，而 VAS < 50 mm 的產婦除外。硬膜外間隙通過對生理鹽水(17G Tuohy 針[Arrow International, Inc, Redding, PA])的抵抗技術確定。在 DPE 組，dura 被一個 26G 的 Whitacre 針紮穿(Arrow International, Inc)。在所有的參與者中，置入 19G 的硬膜外導管(Arrow International, Inc)。單次硬膜外給予 0.125% 布比卡因 +50μg 芬太尼 12ml，3 分鐘後給予 0.1%布比卡因+2μg /ml 芬太尼液體。在硬膜外一次性給藥(時間為 0)開始後，每 2 分鐘測量 VAS，至給藥後 20 分鐘。採用 kaplanmeier 分析方法對治療組獲得適當鎮痛的中位時間進行評估。使用 Cox 回歸模型評估獲得足夠的鎮痛時間。所有分析均在 SAS 版本 9.4 中進行(SAS 研究所，Cary, NC)。結果:資料來自 80 個參與者(每組 40 人)。在 10 分鐘內不同技術鎮痛評分無差異(DPE = 55.3% vs = 44.7%;P = .256)。然而，接受 DPE 的產婦達到足夠鎮痛的中位時間較短(中值[95%置信區間]，8 分鐘[6-10]和 10 分鐘[8-14])，而相對於 LE(相對危險度= 1.67)，獲得充分鎮痛加快了 67%(95%置信區間,1.02－－2.64;P = .042)。

雖然產婦在硬膜外單次給藥後 10min 獲得足夠分娩鎮痛比例在兩種技術之間無差異，但 DPE 較 LE 達到 VAS ≤ 10 mm 更快。

（陳聰 譯　陳傑 校）

Lumbar epidurals (LEs) provide excellent analgesia. Combined spinal epidural and dural puncture epidural (DPE) are 2 techniques to expedite neuraxial analgesia onset. In DPE, dura is punctured but medication is not administered in the cerebrospinal fluid. Expedited analgesia onset has been demonstrated with DPE, using 0.25% bupivacaine; however, this concentration may impede an unassisted vaginal birth and is not currently used for induction and maintenance of labor analgesia. The primary goal of this study was to compare the percentage of patients who achieved adequate labor analgesia following DPE or LE with an epidural bolus of 0.125% bupivacaine. Adequate labor analgesia was defined as Visual Analog Scale (VAS) measurement ≤ 10 mm on a 100-mm scale during active contractions, measured 10 minutes after epidural bolus initiation.Laboring patients were randomly assigned to receive LE or DPE. Immediately before epidural placement, subjects marked a VAS score during an active contraction and parturients with VAS < 50 mm were excluded. The epidural space was identified by a loss of resistance technique to saline (17G Tuohy needle [Arrow International, Inc, Redding, PA]). In the DPE group, dura was punctured with a 26G Whitacre needle (Arrow International, Inc). In all participants, a 19G epidural catheter (Arrow International, Inc) was inserted. An epidural bolus was then administered over 3 minutes (12 mL, 0.125% bupivacaine, 50 μg fentanyl) followed by infusion (0.1% bupivacaine, 2 μg/mL fentanyl). After initiation of epidural bolus (time zero), VAS measurements were collected at 2-minute intervals for up to 20 minutes. Median time to achieve adequate analgesia by treatment group was assessed by Kaplan-Meier analysis. Time to achieving adequate analgesia was evaluated using a Cox regression model. All analyses were conducted in SAS version 9.4. (SAS Institute, Cary, NC) RESULTS:: Data were analyzed from 80 participants (40 per group). Adequate analgesia at 10 minutes did not differ by neuraxial technique (DPE = 55.3% vs LE = 44.7%; P= .256). However, parturients receiving DPE had shorter median times to adequate analgesia (median [95% confidence interval], 8 minutes [6-10] vs 10 minutes [8-14]) and a 67% increase in the relative risk of achieving adequate analgesia compared to LE (relative risk = 1.67; 95% confidence interval, 1.02-2.64; P= .042).Although the percentage of parturients achieving adequate labor analgesia at 10 minutes after epidural bolus did not differ by technique, DPE was associated with faster time to VAS ≤ 10 mm compared with LE.

一份關於從事兒科亞專科麻醉醫生的人力調查： 2015-2035 年需求和趨勢

The Pediatric Anesthesiology Workforce: Projecting Supply and Trends 2015 - 2035

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背景：實施人力調查用以預測未來從事兒科亞專科麻醉醫生的供應是否與兒科住院患者保持平衡。作者分析的具體目標是（1）預測未來（2035 年）從事兒科亞專科麻醉醫生的數目；（2）預測到 2035 年從事兒科亞專科麻醉醫生-兒科患者比例（0-17 歲）；（3）計算到 2035 年，每名從事兒科亞專科麻醉醫生需要診療兒科患者的平均人數；（4）評估到 2035 年替代個別變數對模型預測的影響。

方法：未來從事兒科亞專科麻醉醫生數量取決於當前的供應情況，人員的增加情況和離職人員情況。作者在 2015 年編制了美國兒科麻醉醫師資料庫。使用 2002 年到 2016 年 Accreditation Council for Graduate Medical Education Data 確定兒科麻醉醫生出現歷史性線性增長。考慮到兒科麻醉醫生以歷史性線性增長，預計將由 75%住院醫生畢業後選擇從事兒科麻醉工作，麻醉醫師的退休年齡以目前的平均退休年齡 64 歲為基準。在基線模型預測中，伴隨著年齡和性別調整的麻醉醫生的供應，以及關於職位增長，退休，兒科住院患者，住院手術和市場份額的敏感性分析評估單模型變數對基線模型的影響。使用 2012 年美國兒童人口普查預測兒科麻醉醫生與兒科患者的比率。依據 the Kids' Inpatient Database historical 資料確定每名兒科麻醉醫生需要照看多少住院患者，以及住院患者數量（包括門診手術數量）。

結果：2015 年，每 100000 名兒科患者中有 5.4 名兒科專科麻醉醫生，每名兒科專科醫師需要處理 262±8 名患者。依此趨勢，到 2035 年每 100000 名兒科患者

將有大約7.4名兒科專科麻醉醫師,每名兒科專科醫師需要診斷193±6名患者。如果兒科專科麻醉住院醫師在2015年達到穩定平臺期,那麼在2035年每100000名患者將有5.7名兒科專科麻醉醫師，每名醫師需要診斷248±7名兒童患者。

結論：如果照此趨勢發展下去，那麼在2015年到2035年20年間，兒科麻醉醫師供應的增長可能超過兒科住院患者和手術的增長。

（丁曦冰 譯　陳傑 校）

BACKGROUND: A workforce analysis was conducted to predict whether the projected future supply of pediatric anesthesiologists is balanced with the requirements of the inpatient pediatric population. The specific aims of our analysis were to (1) project the number of pediatric anesthesiologists in the future workforce; (2) project pediatric anesthesiologist-to-pediatric population ratios (0-17 years); (3) project the mean number of inpatient pediatric procedures per pediatric anesthesiologist; and (4) evaluate the effect of alternative projections of individual variables on the model projections through 2035.
METHODS: The future number of pediatric anesthesiologists is determined by the current supply, additions to the workforce, and departures from the workforce. We previously compiled a database of US pediatric anesthesiologists in the base year of 2015. The historical linear growth rate for pediatric anesthesiology fellowship positions was determined using the Accreditation Council for Graduate Medical Education Data Resource Books from 2002 to 2016. The future number of pediatric anesthesiologists in the workforce was projected given growth of pediatric anesthesiology fellowship positions at the historical linear growth rate, modeling that 75% of graduating fellows remain in the pediatric anesthesiology workforce, and anesthesiologists retire at the current mean retirement age of 64 years old. The baseline model projections were accompanied by age- and gender-adjusted anesthesiologist supply, and sensitivity analyses of potential variations in fellowship position growth, retirement, pediatric population, inpatient surgery, and market share to evaluate the effect of each model variable on the baseline model. The projected ratio of pediatric anesthesiologists to pediatric population was determined using the 2012 US Censuspediatric population projections. The projected number of inpatient pediatric procedures per pediatric anesthesiologist was determined using the Kids' Inpatient Database historical data to project

the future number of inpatient procedures (including out of operating room procedures).
RESULTS: In 2015, there were 5.4 pediatric anesthesiologists per 100,000 pediatric population and a mean (±standard deviation [SD]) of 262 ±8 inpatient procedures per pediatric anesthesiologist. If historical trends continue, there will be an estimated 7.4 pediatricanesthesiologists per 100,000 pediatric population and a mean (±SD) 193 ±6 inpatient procedures per pediatric anesthesiologist in 2035. If pediatric anesthesiology fellowship positions plateau at 2015 levels, there will be an estimated 5.7 pediatric anesthesiologists per 100,000pediatric population and a mean (±SD) 248 ±7 inpatient procedures per pediatric anesthesiologist in 2035.
CONCLUSIONS: If historical trends continue, the growth in pediatric anesthesiologist supply may exceed the growth in both the pediatric population and inpatient procedures in the 20-year period from 2015 to 2035.

一種新型影像處理裝置用以體外評估吸引器中的手術失血量

In Vitro Evaluation of a Novel Image Processing Device to Estimate Surgical Blood Loss in Suction Canisters

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背景：臨床醫師的任務之一是監測手術失血。不幸的是，沒有可靠的方法來確保結果的準確。手術過程中大部分丟失的血液最終是存在於手術海綿和吸引器內。先前已經描述了一種新型食品和藥物管理局批准的裝置（Triton 系統; Gauss Surgical，Inc，Los Altos，CA），它是利用電腦圖像分析來測量海綿上存在的血液量。本研究報告了補充食品和藥物管理局批准的設備（Triton Canister System；Gauss Surgical，Inc，Los Altos，CA）的性能，該設備使用類似的圖像分析來測量吸引器中的血液量。

方法：過期的捐獻全血，包裝的紅細胞和血漿以及不同量的生理鹽水被用於製造207個樣品，這些樣品代表了吸引器中常見的各種血液稀釋度。在3個手術室照明條件（明亮，中等和黑暗）下通過Triton設備測量每個樣品，以表示合理範圍，共進行621次測量。使用Bland-Altman方法，將每個樣品中測量的血紅蛋白（Hb）品質與使用標準實驗室測定獲得的結果作為參考值進行比較。在每種照明條件下測量的樣品分別進行分析。預計在每個獨立照明條件下，該設備將在預先規定的臨床顯著Hb品質範圍內（每個吸引器±30g）測量各種樣品。

結果：設備與參考方法之間的一致性限值，其中黑暗照明條件下（偏差：4.7 g [95%置信區間{CI}，3.8至5.6 g]；LOA：-8.1 g [95% CI, -9.7 至-6.6 g]至17.6 g [95% CI, 16.0至19.1 g]），中值（偏差：3.4g [95%CI，2.6至4.1g]；LOA：-7.4 g [95% CI, -8.7 至-6.1 g] 至 14.2 g [95% CI, 12.9至15.5 g]）；明亮光照條件下（偏差：4.1 g [95% CI, 3.2至4.9 g]；LOA: -7.6 g [95% CI, -9.0至-6.2 g] 至 15.7 g [95% CI, 14.3至17.1 g]）完全落入臨床預定的顯著差異限值±30g內。在不同照明條件下重複測量樣本與組內相關係數為0.995（95%CI，0.993-0.996; P <0.001）高度相關，表明照明條件對測量沒有顯著影響。Hb品質偏差與溶血水準（Spearman ρ 相關係數，-0.137; P = .001）和總容器體積（Spearman ρ 相關係數，0.135; P = .001）顯著相關，但與環境照度無關。

結論：Triton濾罐系統能夠可靠地測量血紅蛋白的品質，具有臨床可接受的準確性，可用于代表各種血紅蛋白濃度，稀釋度，溶血和環境照明。

（黃莉莉 譯　陳傑 校）

BACKGROUND: Clinicians are tasked with monitoring surgical blood loss. Unfortunately, there is no reliable method available to assure an accurate result. Most blood lost during surgery ends up on surgical sponges and within suction canisters. A novel Food and Drug Administration-cleared

device (Triton system; Gauss Surgical, Inc, Los Altos, CA) to measure the amount of blood present on sponges using computer image analysis has been previously described. This study reports on performance of a complementary Food and Drug Administration-cleared device (Triton Canister System; Gauss Surgical, Inc, Los Altos, CA) that uses similar image analysis to measure the amount of blood in suction canisters.
METHODS: Known quantities of expired donated whole blood, packed red blood cells, and plasma, in conjunction with various amounts of normal saline, were used to create 207 samples representing a wide range of blood dilutions commonly seen in suction canisters. Each sample was measured by the Triton device under 3 operating room lighting conditions (bright, medium, and dark) meant to represent a reasonable range, resulting in a total of 621 measurements. Using the Bland-Altman method, the measured hemoglobin (Hb) mass in each sample was compared to the results obtained using a standard laboratory assay as a reference value. The analysis was performed separately for samples measured under each lighting condition. It was expected that under each separate lighting condition, the device would measure the various samples within a prespecified clinically significant Hb mass range (±30 g per canister).
RESULTS: The limits of agreement (LOA) between the device and the reference method for dark (bias: 4.7 g [95% confidence interval {CI}, 3.8-5.6 g]; LOA: -8.1 g [95% CI, -9.7 to -6.6 g] to 17.6 g [95% CI, 16.0-19.1 g]), medium (bias: 3.4 g [95% CI, 2.6-4.1 g]; LOA: -7.4 g [95% CI, -8.7 to -6.1 g] to 14.2 g [95% CI, 12.9-15.5 g]), and bright lighting conditions (bias: 4.1 g [95% CI, 3.2-4.9 g]; LOA: -7.6 g [95% CI, -9.0 to -6.2 g] to 15.7 g [95% CI, 14.3-17.1 g]) fell well within the predetermined clinically significant limits of ±30 g. Repeated measurements of the samples under the various lighting conditions were highly correlated with intraclass correlation coefficient of 0.995 (95% CI, 0.993-0.996; P < .001), showing that lighting conditions did not have a significant impact on measurements. Hb mass bias was significantly associated with hemolysis level (Spearman ρ correlation coefficient, -0.137; P = .001) and total canister volume (Spearman ρ correlation coefficient, 0.135; P = .001), but not ambient illuminance.
CONCLUSIONS: The Triton Canister System was able to measure the Hb mass reliably with clinically acceptable accuracy in reconstituted blood samples representing a wide range of Hb concentrations, dilutions, hemolysis, and ambient lighting settings.

嗎啡消耗基線可能解釋輔助鎮痛藥薈萃分析的對照研究異質性，並提高功效評估的精度與准度

Baseline Morphine Consumption May Explain Between-Study Heterogeneity in Meta-analyses of Adjuvant Analgesics and Improve Precision and Accuracy of Effect Estimates

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背景：統計學異質性會增加結果的不確定性，並降低系統評價所得證據的品質。目前，還不確定是什麼主要因素導致了鎮痛藥物薈萃分析的異質性。因此，這次審查的目的是確定是否各種協變數可以解釋統計學異質性，並在報告鎮痛藥的功效時使用它來提高準確性。

方法：作者使用 MEDLINE，EMBASE，CINAHL，AMED 和 Cochrane 系統評價資料庫搜索評價。首先，作者確定存在相當大的統計學異質性（I> 75％）。其次，使用基線風險（對照組嗎啡消耗）和其他臨床學和方法學的協變數對 24 小時嗎啡消耗的結果進行薈萃回歸分析。最後，使用報告效應估計的新方法構建了輔助鎮痛藥的聯盟表，假設術後固定消耗 50mg 嗎啡。

結果：包括 344 個隨機對照試驗，28,130 名參與者。91%的分析顯示出相當大的統計學異質性。基線風險是對乙醯氨基酚，非類固醇類抗炎藥和環加氧酶-2 抑制劑，曲馬多，氯胺酮，α 2 受體激動劑，加巴噴丁，普瑞巴林，利多卡因，鎂和地塞米松之間對照研究異質性的重要原因（R = 21％-100 ％; P <.05）。有證據表明，試驗中的方法學限制解釋了一些殘餘的異質性。手術類型與鎮痛效果並不獨立相關。加巴噴丁，對乙醯氨基酚，α 2-激動劑，非甾體抗炎藥和環加氧酶-2 抑制劑，普瑞巴林，曲馬多，鎂和利多卡因的固定基線風險假設為 50mg（按功效順序），表現出中等的臨床顯著減少（> 10 毫克）。不能排除氯胺酮臨床上顯著的中度影響。地塞米松表現出小的臨床益處（> 5mg）。

結論：根據經驗將嗎啡消耗基線確定為所有手術干預中輔助鎮痛藥薈萃分析異質性的主要來源。通過控制基線嗎啡消耗，不管當地人群接受哪種手術，臨床醫生都可以使用審核資料來估計添加任何佐劑對他們的嗎啡使用減少的效果。此外，作者利用這些研究結果提出了一種新的報告方法和圖形顯示效果估計的修正方法，既減少了納入試驗中變數基線風險的混淆，又能夠調整其他臨床和方法混雜變數。作者建議在臨床實踐和對未來術後鎮痛藥的評價中使用這些方法。

（俞蘇洋 譯　陳傑 校）

BACKGROUND： Statistical heterogeneity can increase the uncertainty of results and reduce the quality of evidence derived from systematic reviews. At present, it is uncertain what the major factors are that account for heterogeneity in meta-analyses of analgesic adjuncts. Therefore, the aim of this review was to identify whether various covariates could explain statistical heterogeneity and use this to improve accuracy when reporting the efficacy of analgesics.

METHODS：We searched for reviews using MEDLINE, EMBASE, CINAHL, AMED, and the Cochrane Database of Systematic Reviews. First, we identified the existence of considerable statistical heterogeneity ($I > 75\%$). Second, we conducted meta-regression analysis for the outcome of 24-hour morphine consumption using baseline risk (control group morphine consumption) and other clinical and methodological covariates. Finally, we constructed a league table of adjuvant analgesics using a novel method of reporting effect estimates assuming a fixed consumption of 50 mg postoperative morphine.

RESULTS：We included 344 randomized controlled trials with 28,130 participants. Ninety-one percent of analyses showed considerable statistical heterogeneity. Baseline risk was a significant cause of between-study heterogeneity for acetaminophen, nonsteroidal anti-inflammatory drugs and cyclooxygenase-2 inhibitors, tramadol, ketamine, α2-agonists, gabapentin, pregabalin, lidocaine, magnesium, and dexamethasone ($R = 21\%-100\%$; $P < .05$). There was some evidence that the methodological limitations of the trials explained some of the residual heterogeneity. Type of surgery was not independently associated with analgesic efficacy. Assuming a fixed baseline risk of 50 mg (in order of efficacy), gabapentin, acetaminophen, α2-agonists, nonsteroidal

anti-inflammatory drugs and cyclooxygenase-2 inhibitors, pregabalin, tramadol, magnesium, and lidocaine demonstrated moderate clinically significant reductions (>10 mg). We could not exclude a moderate clinically significant effect with ketamine. Dexamethasone demonstrated a small clinical benefit (>5 mg).

CONCLUSIONS：We empirically identified baseline morphine consumption as the major source of heterogeneity in meta-analyses of adjuvant analgesics across all surgical interventions. Controlling for baseline morphine consumption, clinicians can use audit data to estimate the morphine-reducing effect of adding any adjuvant for their local population, regardless which surgery they undergo. Moreover, we have utilized these findings to present a novel method of reporting and an amended method of graphically displaying effect estimates, which both reduces confounding from variable baseline risk in included trials and is able to adjust for other clinical and methodological confounding variables. We recommend use of these methods in clinical practice and future reviews of analgesics for postoperative pain.

用於人口健康的圍手術期醫學模型:一種發展中臨床科學的綜合方法

A Perioperative Medicine Model for Population Health: An Integrated Approach for an Evolving Clinical Science

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美國的醫療保健服務在連接其從數量到價值的緊密繩索上繼續保持平衡。經濟術語中的價值可以被定義為超出其商品價格，由卓越的聲譽、品質和/或服務決定，而其破壞可能是管理不善、政策不佳、需求減少和/或競爭加劇的結果。今後，衛生保健服務的費用將越來越多地基於提高個人和/或群體健康價值的服務，而支付衛生保健服務的資金將越來越容易受到競爭性市場力量的影響。因此，可持續的人口健康戰略需要做到全面，因此包括圍手術期藥物作為以病人為中心

的護理的完整迴圈的一個重要組成部分。作者描述了一個多學科綜合計畫，以支援圍手術期藥物服務，這些服務是綜合人口健康戰略的組成部分。

（楊柳 譯　陳傑 校）

Health care delivery in the United States continues to balance on the tight rope that connects its transition from volume to value. Value in economic terms can be defined as the amount something exceeds its commodity price and is determined by extraordinary reputation, quality, and/or service, whereas its destruction can be a consequence of poor management, unfavorable policy, decreased demand, and/or increased competition. Going forward, payment for health care delivery will increasingly be based on services that contribute to improvements in individual and/or population health value, and funds to pay for health care delivery will become increasingly vulnerable to competitive market forces. Therefore, a sustainable population health strategy needs to be comprehensive and thus include perioperative medicine as an essential component of the complete cycle of patient-centered care. We describe a multidisciplinary integrated program to support perioperative medicine services that are integral to a comprehensive population health strategy.

體外迴圈術後急性心內血栓形成和肺血栓栓塞:系統回顧報告

Acute Intracardiac Thrombosis and Pulmonary Thromboembolism After Cardiopulmonary Bypass: A Systematic Review of Reported Cas

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心臟體外迴圈(CPB)後的心內血栓形成(ICT)和肺血栓栓塞(PE)是危及生命的嚴重事件，但病理機制尚未明確。本篇綜述的目的是提供一個有關體外迴圈後高凝狀態病例文獻的知識更新。在 48 例 ICT/PE 事件中，病例的共同特徵包括充血性心力衰竭(50%)、血小板輸注(37.5%)、CPB 持續時間大於 3 小時(37.5%)和主動脈損傷(27.1%)。術前存在血栓形成傾向少有報導,16.7%存在低啟動凝血時間（ACT）,CPB 期間≤400 秒。儘管進行了血栓取除術和支持性治療，死亡率仍然很高(85.4%)。溶栓治療不常使用(48 例病人中有 5 例使用)，但由於常用的抗纖溶療法(77.1%)使其療效存疑。急性 ICT/PE 事件似乎很少發生，但常見的特徵包括長時間的 CPB、心肌功能受抑制、大血管損傷和止血干預。進一步闡明體外迴圈中的病理機制和優化抗凝治療，並對 CPB 後進行止血干預是必要的。

（吳潔譯 李士通校）

Intracardiac thrombosis (ICT) and pulmonary thromboembolism (PE) after cardiopulmonary bypass (CPB) are life-threatening events, but pathological mechanisms are not yet well defined. The aim of this review is to provide an update of case literature of a postbypass hypercoagulable state. Case commonalities among 48 ICT/PE events included congestive heart failure (50%), platelet transfusion (37.5%), CPB duration greater than 3 hours (37.5%), and aortic injury (27.1%). Preexisting thrombophilia was rarely reported, and 16.7% had low activated clotting time, ≤400 seconds during CPB. Mortality rate was very high (85.4%), despite attempted thrombectomy and supportive therapy. Thrombolytic therapy was infrequently used (5 of 48 times), but its efficacy is questionable due to common use of antifibrinolytic therapy (77.1% of cases). Acute ICT/PE events appear to rarely occur, but common features

include prolonged CPB, depressed myocardial function, major vascular injury, and hemostatic interventions. Further efforts to elucidate pathomechanisms and optimize anticoagulation during CPB and hemostatic interventions after CPB are warranted.

基於**血管卸載技術(CNAP 系統)的連續無創動脈壓力監測在腹腔鏡減肥手術中應用**

Continuous Noninvasive Arterial Pressure Monitoring Using the Vascular Unloading Technique (CNAP System) in Obese Patients During Laparoscopic Bariatric Operations

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背景：肥胖發生率的增加為圍術期的血流動力學監測帶來了新的挑戰。因為存在心血管併發症的特定風險，持續監測動脈壓(AP)對極度肥胖患者極為重要。現在可以獲得持續的無創性 AP 監測的創新技術。在本研究中，我們的目的是比較使用血管卸載技術(CNAP 系統的連續無創性 AP 測量(CNAP systems, Graz，奧地利)與有創性 AP 測量(橈動脈導管)在極度肥胖患者腹腔鏡減肥手術治療中的應用。

方法：在 29 例重度肥胖患者(平均體重指數為 48.1 kg/ m2)中，我們在 45 分鐘內同時記錄了無創性和有創性的 AP 測量值，並每 10 秒取一平均值。我們比較了無創性(測試方法)和有創性(參考方法)AP 測量值，使用 Bland-Altman 分析和 4 象限圖/一致性分析(2 分鐘間隔)。

結果：我們觀察到通過 CNAP 系統獲得的 AP 測量值與有創性評估 AP 值之間的差異的平均值(±SD,95%可信區間)分別是，平均動脈壓

7.9mmHg(±9.6mmHg, －11.2 到 27.0mmHg),收縮壓 4.8mmHg(±15.8mmHg, －26.5 到 36.0mmHg),舒張壓 9.5mmHg （±10.3mmHg, －10.9 到 29.9mmHg)。一致率分別為平均 AP 97.5%，收縮壓 95.0%，舒張期 AP 96.7%。

結論：在腹腔鏡減肥手術中，使用 CNAP 系統進行連續的無創 AP 監測與通過橈動脈導管獲得的連續有創 AP 監測相比，具有良好的趨勢能力。然而，絕對的通過 CNAP 系統和通過動脈導管衍生獲得的 AP 值不能互換。

（吳潔譯 李士通校）

BACKGROUND: Increasing rates of obesity create new challenges for hemodynamic monitoring in the perioperative phase. Continuous monitoring of arterial pressure (AP) is important in severely obese patients who are at particular risk for cardiovascular complications. Innovative technologies for continuous noninvasive AP monitoring are now available. In this study, we aimed to compare continuous noninvasive AP measurements using the vascular unloading technique (CNAP system; CNSystems, Graz, Austria) compared with invasive AP measurements (radial arterial catheter) in severely obese patients during laparoscopic bariatric surgery。

METHODS: In 29 severely obese patients (mean body mass index 48.1 kg/m^2), we simultaneously recorded noninvasive and invasive AP measurements over a period of 45 minutes and averaged the measurements using 10-second episodes. We compared noninvasive (test method) and invasive (reference method) AP measurements using Bland-Altman analysis and 4-quadrant plot/concordance analysis (2-minute interval). **RESULTS:** We observed a mean of the differences (±SD, 95% limits of agreement) between the AP values obtained by the CNAP system and the invasively assessed AP values of 7.9 mm Hg (±9.6 mm Hg, −11.2 to 27.0 mm Hg) for mean AP, 4.8 mm Hg (±15.8 mm Hg, −26.5 to 36.0 mm Hg) for systolic AP, and 9.5 mm Hg (±10.3 mm Hg, −10.9 to 29.9 mm Hg) for diastolic AP, respectively. The concordance rate was 97.5% for mean AP, 95.0% for systolic AP, and 96.7% for diastolic AP, respectively.
CONCLUSIONS: In the setting of laparoscopic bariatric surgery, continuous noninvasive AP monitoring with the CNAP system showed good trending capabilities compared with continuous invasive AP measurements obtained with a radial arterial catheter. However, absolute CNAP- and arterial catheter–derived AP values were not interchangeable.

3. 普通外科術後機械通氣的發生率及手術因素

Incidence and Operative Factors Associated With Discretional Postoperative Mechanical Ventilation After General Surgery

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背景：普外術後的機械通氣會導致更糟的結果，延長住院時間，增加醫療費用。手術後，需接受重症監護病房(ICU)治療的患者可分為 3 組:拔管患者(EXT)，有客觀醫學指征需保持機械通氣的患者 (MED)，患者不符合這些標準，稱為“離散術後機械通氣”(DPMV)。本研究的目的是確定 DPMV 在普外科手術患者中的發生率，並確定相關的手術因素。

方法：在一個大型的三級醫療中心，我們回顧了從 2008 年 4 月 1 日至 2015 年 2 月 28 日在全身麻醉下進行的並在術後接受 ICU 治療的所有手術病例。患者被分為 3 組，包括:EXT 組, MED 組，和 DPMV 組。手術因素包括美國麻醉醫師協會定義的身體一般狀況(ASA PS)、手術持續時間、手術結束時間、困難氣道管理、術中血液和液體管理、血管收縮藥物的使用、術中動脈血氣、通氣參數等。此外，還檢查了麻醉記錄，說明術後通氣治療的原因或合理性。分類變數比較使用卡方 x 2 檢驗,連續變數使用方差分析或克魯斯卡爾-沃利斯 H 測試。分類變數表示為 n(%), 連續變數表示為均值±標準差或中位數(四分位範圍)。顯著性水準設定為 P≤0.05。

結果：3555 名患者中 16%被分入 DPMV 組， 12.2%分入 EXT 組。與 EXT 組患者相比,DPMV 組患者補液量明顯較少(2757±2728 毫升對 3868±1885 毫升;P <0.001), 術中失血量也較少(150ml(20 - 625)對 300ml[150 - 600]; P <0.001), 手術時間較短(199±215 分鐘對 276±143 分鐘;P <0.001), 但輸注了更多的血液製品, 900ml(600 - 1800)對 600ml(300 - 900ml)。DPMV 組比 EXT 組包含更多高 ASA

PS(ASA III-V) 的患者: 508 例(90.4%)對 1934 例(75.6%);P <0.001。急診手術(ASA E 級)在 DPMV 組較 EXT 組更常見:分別是 145 例(25.8%)和 306 例(12%)，P < 0.001。手術結束後常規工作時間 DPMV 組並沒有明顯高於 EXT 組。與 EXT 組和 MED 組相比，DPMV 組困難氣道發生例數更少。與 MED 組病人相比，DPMV 組患者補液量較少(2757±2728ml 對 4499±2830ml; P <0.001), 失血量也較少(150ml[20 - 625]對 500ml [200 - 1350]; P <0.001), 但在輸注血液製品和手術持續時間方面沒有差別。

結論：在我們的三級醫療中心，患者經常在沒有客觀醫學指征的情況下，進入 ICU 進行機械輔助通氣治療。與進入 ICU 拔管的患者相比，那些機械通氣但沒有客觀指征的患者 ASA PS 分級更高，更有可能轉為 ASA E 級。在常規操作或困難氣道管理後的手術結束時間與 DPMV 的高發生率無關。

(吳潔譯 李士通校)

BACKGROUND: Mechanical ventilation after general surgery is associated with worse outcomes, prolonged hospital stay, and increased health care cost. Postoperatively, patients admitted to the intensive care unit (ICU) may be categorized into 1 of 3 groups: extubated patients (EXT), patients with objective medical indications to remain ventilated (MED), and patients not meeting these criteria, called “discretional postoperative mechanical ventilation” (DPMV). The objectives of this study were to determine the incidence of DPMV in general surgery patients and identify the associated operative factors.

METHODS: At a large, tertiary medical center, we reviewed all surgical cases performed under general anesthesia from April 1, 2008 to February 28, 2015 and admitted to the ICU postoperatively. Patients were categorized into 1 of 3 cohorts: EXT, MED, or DPMV. Operative factors related to the American Society of Anesthesiologists Physical Status (ASA PS), duration of surgery, surgery end time, difficult airway management, intraoperative blood and fluid administration, vasopressor infusions, intraoperative arterial blood gasses, and ventilation data were collected. Additionally, anesthesia records were reviewed for notes indicating a reason or rationale for postoperative ventilation. Categorical variables were compared by x^2 test, and continuous variables by analysis of

variance or Kruskal-Wallis H test. Categorical variables are presented as n (%), and continuous variables as mean ± standard deviation or median (interquartile range) as appropriate. Significance level was set at $P \leqslant .05$

RESULTS: Sixteen percent of the 3555 patients were categorized as DPMV and 12.2% as MED. Compared to EXT patients, those classified as DPMV had received significantly less fluid (2757 ± 2728 mL vs 3868 ± 1885 mL; $P < .001$), lost less blood during surgery (150 [20 - 625] mL vs 300 [150 - 600] mL; $P < .001$), underwent a shorter surgery (199 ± 215 minutes vs 276 ± 143 minutes; $P < .001$), but received more blood products, 900 (600 - 1800) mL vs 600 (300 - 900) mL. The DPMV group had more patients with high ASA PS (ASA III - V) than the EXT group: 508 (90.4%) vs 1934 (75.6%); $P < .001$. Emergency surgery (ASA E modifier) was more common in the DPMV group than the EXT group: 145 (25.8%) vs 306 (12%), $P < .001$, respectively. Surgery end after regular working hours was not significantly higher with DPMV status compared to EXT. DPMV cohort had fewer cases with difficult airway when compared to EXT or MED. When compared to MED patients, those classified as DPMV received less fluid (2757 ± 2728 mL vs 4499 ± 2830 mL; $P < .001$), lost less blood (150 [20 - 625] mL vs 500 [200 - 1350] mL; $P < .001$), but did not differ in blood products transfused or duration of surgery.

CONCLUSIONS: In our tertiary medical center, patients often admitted to the ICU on mechanical ventilation without an objective medical indication. When compared to patients admitted to the ICU extubated, those mechanically ventilated but without an objective indication had a higher ASA PS class and were more likely to have an ASA E modifier. A surgery end time after regular working hours or difficult airway management was not associated with higher incidence of DPMV.

低或高氯含量靜脈注射液用於危重及圍術期成年患者的系統回顧和薈萃分析

Low- Versus High-Chloride Content Intravenous Solutions for Critically Ill and Perioperative Adult Patients: A Systematic Review and Meta-analysis

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背景:評估對比在非選擇危重病人或圍術期的成年患者中使用低氯或高氯溶液是否能降低死亡率和腎臟替代療法(RRT)的比率。

方法：系統回顧和 meta 分析隨機效應的逆方差模型。搜索至 2016 年 10 月來自

PubMed、Cochrane 圖書館、EMBASE、LILACS 和科學網的文獻。任何語言涉及危重病人和/或圍手術期成人患者的發表和未發表的隨機對照研究，比較低或高含氯化物溶液用於容量維持或液體復蘇。主要的結果是死亡率和 RRT 的使用。我們進行了逐次分析，並評估了個體試驗的偏差風險和證據的整體品質。對涉及 4067 例患者的 15 個研究進行了分析，多數為低偏倚風險。其中，只有 11 項和 10 項試驗分別有關於死亡率和 RRT 使用的資料。在 RRT 分析中，共有 3710 名患者參與了死亡率分析，3724 名患者參與了 RRT 使用分析。

結果：死亡率(優勢比，0.90; 95%可信區間為 0.69-1.17;P = .44; I^2= 0%)或 RRT 使用(優勢比，1.12; 95%可信區間，0.80-1.58;P =0.52; I^2= 0%)均無統計學顯著性差異。總的來說，針對主要結果的證據品質都很低。試驗順序分析強調，所需的樣本量遠遠大於用於適當的結果評估的可獲得的樣本量。

結論：目前的證據表明，對於未選擇的重症患者或圍手術期的成人患者，低氯和高氯化物的液體均無任何好處，但卻存在相當大的不準確性。我們注意到，用於液體研究的涉及容量有限，每個研究人群的風險相對較低。這些資料和相對較小的混合樣本容量一起，讓我們無力去發現潛在的重要差異。從良好的，充分的隨機對照試驗研究足夠大的液體使用獲得結果是必要的。

（吳潔譯 李士通校）

BACKGROUND: To assess whether use of low-chloride solutions in unselected critically ill or perioperative adult patients for maintenance or resuscitation reduces mortality and renal replacement therapy (RRT) use when compared to high-chloride fluids.

METHODS: Systematic review and meta-analysis with random-effects inverse variance model. PubMed, Cochrane library, EMBASE, LILACS, and Web of Science were searched from inception to October 2016. Published and unpublished randomized controlled trials in any language that enrolled critically ill and/or perioperative adult patients and compared a low- to a highchloride solution for volume maintenance or resuscitation. The

primary outcomes were mortality and RRT use. We conducted trial sequential analyses and assessed risk of bias of individual trials and the overall quality of evidence. Fifteen trials with 4067 patients, most at low risk of bias, were identified. Of those, only 11 and 10 trials had data on mortality and RRT use, respectively. A total of 3710 patients were included in the mortality analysis and 3724 in the RRT analysis.
RESULTS: No statistically significant impact on mortality (odds ratio, 0.90; 95% confidence interval, 0.69–1.17; P = .44; I^2 = 0%) or RRT use (odds ratio, 1.12; 95% confidence interval, 0.80–1.58; P = .52; I^2 = 0%) was found. Overall quality of evidence was low for both primary outcomes. Trial sequential analyses highlighted that the sample size needed was much larger than that available for properly powered outcome assessment.
CONCLUSIONS: The current evidence on low- versus high-chloride solutions for unselected critically ill or perioperative adult patients demonstrates no benefit, but suffers from considerable imprecision. We noted a limited exposure volume for study fluids and a relatively low risk of the populations in each study. Together with the relatively small pooled sample size, these data leave us underpowered to detect potentially important differences. Results from well-conducted, adequately powered randomized controlled trials examining sufficiently large fluid exposure are necessary

多腔和單腔彈簧導管用於硬膜外分娩鎮痛臨床療效的隨機對照試驗 Randomized Controlled Trial of the Clinical Efficacy of Multiport Versus Uniport Wire-Reinforced Flexible Catheters for Labor Epidural Analgesia

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背景:這個前瞻性隨機對照研究的目的是明確使用多腔彈簧管進行硬膜外分娩鎮痛（LEA）是否會改善鎮痛效果。

方法：650 名產婦隨機分為兩組：分別使用多腔彈簧管接受硬膜外鎮痛和使用單腔彈簧管進行硬膜外鎮痛。主要結果是成功鎮痛，評估給予初始劑量開始實施硬膜外鎮痛後充分鎮痛的發生率。次要結果包括硬膜外鎮痛維持過程中需要臨床干預的病人數；麻醉成功定義為給予初始劑量後到建立可以實施剖宮產手術麻醉的適當麻醉的發生率；以及整個硬膜外分娩鎮痛過程中產婦的滿意度。

結果:使用多腔和單腔彈簧管在硬膜外分娩鎮痛的初始階段成功鎮痛的發生率沒有顯著性差異（分別為93.6%和89.5%，差異為4.1% [95%的可信區間為-0.4%-8.5%]；P=0.077）。這兩種類型的導管在硬膜外分娩鎮痛維持過程中需要臨床干預的病人數及實施剖宮產手術的麻醉成功率方面沒有顯著差異。

結論：多腔設計並不能改善鋼絲彈簧管用於硬膜外分娩鎮痛的鎮痛效果。

（周宇譯 李士通校）

BACKGROUND: The purpose of this prospective, randomized, controlled trial was to determine whether multiple ports improve the analgesic efficacy of wire-reinforced flexible catheters used for labor epidural analgesia (LEA).
METHODS: Six hundred fifty laboring patients were randomized to receive epidural analgesia using either a multiport or uniport wire-reinforced flexible catheter. The primary outcome was analgesic success, defined as the incidence of adequate analgesia following the initial bolus given to initiate LEA. Secondary outcomes included the number of patients requiring clinician interventions during maintenance of LEA; anesthetic success, defined as the incidence of adequate anesthesia following the initial bolus given to establish surgical anesthesia for cesarean delivery; and maternal satisfaction with the overall quality of LEA.
RESULTS: There was no significant difference in analgesic success at initiation of LEA between the uniport and the multiport wire-reinforced flexible catheter (93.6% vs 89.5%, respectively; difference of 4.1% [95% confidence interval, −0.4% to 8.5%]; P = .077). There was also no difference in the number of patients requiring clinician interventions during maintenance of LEA and in anesthetic success at the establishment of surgical anesthesia for cesarean delivery between the 2 catheter types.
CONCLUSIONS: Multiple ports do not appear to improve the analgesic efficacy of wire-reinforced flexible catheters used for LEA.

剖宮產手術椎管內麻醉過程中格隆溴銨對低血壓發生率及血管收縮藥需求影響的Meta分析

The Effect of Glycopyrrolate on the Incidence of Hypotension and Vasopressor Requirement During Spinal Anesthesia for Cesarean Delivery: A Meta-analysis

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背景：這項 meta 分析的目標是確定格隆溴銨減少剖宮產手術腰麻過程中低血壓的療效。

方法：收集研究格隆溴銨對剖宮產手術腰麻所致低血壓療效方面的隨機對照試驗相關文獻。主要結果是手術過程中的低血壓和對血管加壓藥的需求量（去氧腎上腺素類似物）。次要結果包含心率，噁心嘔吐，口幹及新生兒 Apgar 評分。用隨機效應模型來計算風險比（RRs）和平均差（MDs），95%置信區間為主要結果，99%置信區間為次要結果。

結果：5 個隨機對照試驗符合我們的納入標準。共納入 311 名患者：153 名為格隆溴銨組，158 名為對照組。預防性應用格隆溴銨與對照組相比並沒有降低椎管內麻醉過程中低血壓的發生率（RR, 0.93 [0.71－1.21]; P =0 .59），但是格隆溴銨組顯著減少了去氧腎上腺素的總需求量（MD, －62.64 μg [－107.61 到－17.66 μg]; P =0 .006）。格隆溴銨組最高心率顯著高於對照組（MD, 15.85 bpm [5.40－26.31]; P ＜ .0001）；但是心動過緩的發生率並沒有顯著差異。兩組患者術中噁心嘔吐的發生率沒有顯著差異；但是格隆溴銨增加口腔乾燥的風險（RR, 5.15 [1.82－14.57]; P ＜ .0001）。新生兒 Apger 評分在 1 分鐘和 5 分鐘時兩組沒有差異。

結論：預防性應用格隆溴銨並不能降低腰麻所致的低血壓，但是在加快母親心率的同時一定程度上減少了血管收縮藥的需求量。

（周宇譯　李士通校）

BACKGROUND: The objective of this meta-analysis was to determine the efficacy of glycopyrrolate at reducing spinal hypotension during cesarean

delivery.
METHODS: A literature search was performed to identify randomized controlled trials investigating the effect of glycopyrrolate on spinal-induced hypotension during cesarean delivery. Primary outcomes were intraoperative hypotension and vasopressor requirement (phenylephrine equivalents). Secondary outcomes included heart rate (HR), nausea and vomiting, dry mouth, and Apgar scores. Risk ratios (RRs), and mean differences (MDs) were calculated using random-effects modeling with 95% confidence intervals for primary outcomes and 99% confidence intervals for secondary outcomes.
RESULTS: Five randomized controlled trials met our inclusion criteria. A total of 311 patients were included: 153 received glycopyrrolate and 158 placebo. The incidence of spinal-induced hypotension was no different with prophylactic glycopyrrolate compared to control (RR, 0.93 [0.71 - 1.21]; P = .59), but the total phenylephrine dose required was significantly reduced with glycopyrrolate (MD, −62.64 μg [−107.61 to −17.66 μg]; P = .006). The maximal HR achieved in the glycopyrrolate group was significantly higher compared to controls (MD, 15.85 bpm [5.40 - 26.31]; P <0.0001); however, the incidence of bradycardia was not statistically different. The incidence of intraoperative nausea and vomiting was not different between groups; however, glycopyrrolate increased the risk of dry mouth (RR, 5.15 [1.82 - 14.57]; P < .0001). Apgar scores at 1 and 5 minutes did not differ between groups.
CONCLUSIONS: Prophylactic glycopyrrolate does not reduce the incidence of spinal-induced hypotension but results in a modest reduction in vasopressor requirements while increasing maternal HR.

鹼化利多卡因預充氣管導管套囊減少短小手術後出現的嗆咳反應的前瞻性隨機對照試驗

Alkalinized Lidocaine Preloaded Endotracheal Tube Cuffs Reduce Emergence Cough After Brief Surgery: A Prospective Randomized Trial

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背景:氣管導管套囊中注射鹼化利多卡因可減少時間超過 2 小時的手術出現的咳嗽和咽喉疼痛的發生率。 然而，鹼化利多卡因需要 60-120 分鐘穿透氣管導管套

囊；因此，它在短小手術中的作用是未知的。 此前瞻性隨機對照雙盲試驗測試了鹼化利多卡因可減少時間<120 分鐘的手術出現咳嗽的發生率的這一假設。

方法:經當地倫理委員會批准後，ASA I-III 級患者隨機分為兩組，分別應用鹼化利多卡因（AL 組）或生理鹽水（S 組）注入套囊。氣管插管之前用 2%利多卡因 2ml 和 8.4%碳酸氫鹽 8ml（AL 組）或生理鹽水 10ml（S 組）將套囊預填充> 90 分鐘。氣管插管前立即抽空套囊。氣管插管後，將 2%利多卡因 2ml（AL）或生理鹽水 2ml（S）注入套囊。額外的 8.4%碳酸氫鹽（AL）或生理鹽水（S）注入套囊，直至無空氣洩漏。使用地氟醚，羅庫溴銨以及芬太尼或舒芬太尼維持麻醉，保證患者在麻醉狀態下生命體征變化在其基礎值 20%以內。禁止應用阿片類藥物預防拔管嗆咳。採用標準化的“無接觸”技術。一位元不知情的評估者記錄蘇醒期患者地氟醚最低肺泡濃度（MAC）>0.2 出現的嗆咳。在 MAC 為 0.2 時，每 30 秒一次，指示患者睜開眼睛，一旦有定向反應即可拔管。

結果:共計 213 名患者進行隨機分組，每組 100 名患者完成了實驗方案。 AL 組拔管嗆咳發生率為 12%，顯著低於 S 組 22%的發生率（單側 P = 0.045）。AL 組嗆咳的單尾風險比為 0.55（0-0.94， P = 0.045）。各組間阿片類藥物總量（P = 0.194），氣管導管套囊預充時間（P = 0.259）和拔管時間（P = 0.331）無顯著差異。平均手術時間 AL 組為 59±28 分鐘，S 組為 52±29 分鐘（P = 0.057）。

結論:氣管導管套囊注入鹼化利多卡因顯著降低平均持續時間略短於 1 小時的手術全麻出現的嗆咳反應。

（張霄迪譯 李士通校）

BACKGROUND: Alkalinized lidocaine in the endotracheal tube (ETT) cuff decreases the incidence of cough and throat pain on emergence after surgery lasting more than 2 hours. However, alkalinized lidocaine needs 60 – 120 minutes to cross the ETT cuff membrane; therefore, its usefulness

in shorter duration surgery is unknown. This prospective double-blind randomized controlled trial tested the hypothesis that alkalinized lidocaine would reduce the incidence of emergence cough after surgeries lasting <120 minutes.
METHODS: After local ethics board approval, American Society of Anesthesiologists I–III patients consented to be randomized into 1 of 2 groups receiving either alkalinized lidocaine (group AL) or saline (group S) to inflate the ETT cuff. Cuffs were prefilled >90 minutes before intubation with either 2 mL of 2% lidocaine and 8 mL of 8.4% bicarbonate (group AL) or 10 mL of normal saline (group S). Cuffs were emptied immediately before intubation. After intubation, either 2 mL of 2% lidocaine (AL) or 2 mL of saline (S) were injected into the cuff. Additional 8.4% bicarbonate (AL) or saline (S) was injected into the cuff until there was no air leak. Anesthesia was maintained using desflurane, rocuronium, and either fentanyl or sufentanil to maintain vital signs within 20% of baseline values. Opioids administered in prophylaxis of extubation cough were proscribed. A standardized "no touch" emergence technique was used. A blinded assessor noted any cough above 0.2 minimum alveolar concentration (MAC) of expired desflurane. At 0.2 MAC, once every 30 seconds, the patient was instructed to open his eyes and extubation occurred once a directed response was noted.
RESULTS: A total of 213 patients were randomized and 100 patients in each group completed the experimental protocol. The incidence of extubation cough in group AL was 12%, significantly lower (1-sided $P = .045$) than the 22% incidence in group S. The 1-tailed risk ratio for cough in group AL was 0.55 (0–0.94, $P = .045$). Total amount of opioids administered ($P = .194$), ETT cuff preloading times ($P = .259$), and extubation times ($P = .331$) were not significantly different between groups. The average duration of surgery was 59 ± 28 minutes in group AL and 52 ± 29 minutes in group S ($P = .057$).
CONCLUSIONS: Alkalinized lidocaine in the ETT cuff significantly decreased general anesthesia emergence cough after surgeries with an average duration of slightly <1 hour.

通過監測周圍神經阻滯的成功率來提高性能

Improving Performance by Monitoring the Success Rate of Peripheral Nerve Blocks

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我們引入了一個系統來測量臂叢和腘神經阻滯的集體和個體效能，目的是為了提高其作為監測和改善工具的透明度。最初，個體的結果是匿名的，但是在 1 年之

後，麻醉師團隊中的匿名性被提升並且進行季度性結果討論。隨著時間的推移，肌間溝、鎖骨上和腘窩阻滯的集體表現顯著改善。分享和討論集體和個人的表現實現了批判性的自我評價，並增加了相互學習的意願，增強了團隊進一步改進的雄心。

（王子鈺譯 李士通校）

In our hospital, we introduced a system to measure the collective and individual efficacy of brachial plexus and popliteal nerve blocks with the objective to create transparency as an instrument for monitoring and improvement. Initially, individual results were anonymous, but after 1 year anonymity was lifted within the team of anesthesiologists and results are now discussed quarterly. Collective performance of interscalene, supraclavicular, and popliteal blocks improved significantly over time. Sharing and discussing collective and individual performance has resulted in critical self-appraisal and increased willingness to learn from each other and strengthened the team’s ambition for further improvement.

MicroRNAs 作為圍手術期醫學的臨床生物標誌物和治療手段

MicroRNAs as Clinical Biomarkers and Therapeutic Tools in Perioperative Medicine

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在過去的十年裡，進化保守的、不編碼的小 RNA 即所謂的 microRNAs (miRNAs)－已經成為幾乎所有細胞過程的重要調節者。microRNA 通過綁定 3′ 非編碼區的 RNA 來影響基因表達,導致其降解和轉錄後抑制。在醫學上，miRNAs 被揭示為新穎的、極具潛力的生物標誌物，是極具吸引力的新穎治療方法的工具和靶點。miRNAs 目前正在進入圍手術期醫學領域，他們可能在麻醉、重症監護和止痛藥方面開闢新的前景。在這篇綜述中，我們概述了 miRNAs 的生物學特性及其在人類疾病中的潛在作用。我們重點介紹 miRNA 介導的圍手術期藥物作用的當前模式，並對目前已知的 miRNA 生物標誌物進行了調查。最後,我們提供了一個基於 miRNA

的治療機會和視角。

(王子鈺譯 李士通校)

Over the past decade, evolutionarily conserved, noncoding small RNAs—so-called microRNAs (miRNAs)—have emerged as important regulators of virtually all cellular processes. miRNAs influence gene expression by binding to the 3′ -untranslated region of protein-coding RNA, leading to its degradation and translational repression. In medicine, miRNAs have been revealed as novel, highly promising biomarkers and as attractive tools and targets for novel therapeutic approaches. miRNAs are currently entering the field of perioperative medicine, and they may open up new perspectives in anesthesia, critical care, and pain medicine. In this review, we provide an overview of the biology of miRNAs and their potential role in human disease. We highlight current paradigms of miRNA-mediated effects in perioperative medicine and provide a survey of miRNA biomarkers in the field known so far. Finally, we provide a perspective on miRNA-based therapeutic opportunities and perspectives.