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一次性穴位按壓設備作爲一個多模式止吐策略的一部分用於減少術後噁心和嘔吐的應用

Use of a Disposable Acupressure Device as Part of a Multimodal Antiemetic Strategy for Reducing Postoperative Nausea and Vomiting

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背景：關於在高危手術患者中處理術後噁心和嘔吐（PONV）的最佳策略尚有爭議。儘管已有研究證實在 P6 穴位刺激能有效預防 PONV，然而以前沒有研究評估過這個非藥物治療作爲一個多模式止吐方案的一部分時，對患者日常生活的正常活動恢復的影響。因此，我們設計了這個隨機、假對照、雙盲的研究，以評估一次性穴位按壓設備（Pressure Right® ; Pressure Point 公司., Grand Rapids, MI）聯合應用昂丹司瓊和地塞米松用於止吐預防時，對嘔吐發作的發病率和恢復品質的有效性。
方法：100 例進行較大的腹腔鏡手術的 ASA I 級和 II 級患者被隨機分配到對照組（*n* = 50）或穴位按壓組（*n* = 50），在麻醉誘導前 30 至 60 分鐘對照組接受一個“假”穴位刺激設備，穴位按壓組接受一次性 Pressure Right 設備，置於雙側 P6 穴位。所有患者都接受了標準化的全身麻醉。兩個研究組均在手術期間聯合給予昂丹司瓊 4mg IV 和地塞米松 4 mg IV 用於止吐預防。在手術後 72 小時的特定時間間隔，評價噁心和嘔吐的發生率和“解救”止吐藥的需要。在術後 48 小時和 72 小時評估恢復情況和恢復品質的問卷。在 72 小時的研究階段結束時，評估了病人對其 PONV 管理的滿意度。
結果：兩個研究組在他們的人口學特徵和 PONV 的危險因素方面沒有差異。穴位按壓組在 24 小時時的嘔吐發病率顯著下降（10%比 26%，*P*= 0.04，絕對風險降低的 95%置信區

間 1%–31%）。穴位按壓組從術後 0 到 72 小時，嘔吐的總體發病率也顯著從 30%下降至 12%的（*P*=0.03，95%置信區間 2%-33%）。此外，穴位按壓設備的輔助使用似乎提高了患者對 PONV 管理的滿意度和術後 48 小時時的恢復品質。然而，達到出院、恢復正常生理活動及恢復工作的恢復時間在兩組之間無顯著差異。

結論：聯合使用 Pressure Right 穴位按壓設備和止吐藥物能降低從術後 0 到 72 小時的嘔吐發生率，並且改善病人對 PONV 管理的滿意度。然而，恢復和預後參數無法證實穴位設備的增加有任何改善作用。

（馬皓琳 譯 李士通 校）

BACKGROUND: There is still controversy regarding the optimal strategy for managing postoperative nausea and vomiting (PONV) in high-risk surgical populations. Although acustimulation at the P6 acupoint has been demonstrated to be effective in preventing PONV, the effect of this nonpharmacologic therapy on the patient's recovery with respect to resumption of normal activities of daily living has not been previously assessed when it is used as part of a multimodal antiemetic regimen. Therefore, we designed this randomized, sham-controlled, and double-blind study to assess the efficacy of a disposable acupressure device (Pressure Right® ; Pressure Point Inc., Grand Rapids, MI) on the incidence of emetic episodes and quality of recovery when used in combination with ondansetron and dexamethasone for antiemetic prophylaxis.

METHODS: One hundred ASA physical status I and II patients undergoing major laparoscopic procedures were randomly assigned to either a control group ($n = 50$) receiving a "sham" acustimulation device or an acupressure group ($n = 50$) receiving a disposable Pressure Right device placed bilaterally at the P6 point 30 to 60 minutes before induction of anesthesia. All patients received a standardized general anesthetic. A combination of ondansetron, 4 mg IV, and dexamethasone, 4 mg IV, was administered during surgery for antiemetic prophylaxis in both study groups. The incidence of nausea and vomiting and the need for "rescue" antiemetic therapy were assessed at specific time intervals for up to 72 hours after surgery. The recovery profiles and quality of recovery questionnaires were evaluated at 48 hours and 72 hours after surgery. Patient satisfaction with the management of their PONV was assessed at the end of the 72-hour study period.

RESULTS: The 2 study groups did not differ in their demographic characteristics or risk factors for PONV. The incidence of vomiting at 24 hours was significantly decreased in the acupressure group (10% vs 26%, $P = 0.04$, 95% confidence interval for absolute risk reduction 1%–31%). The overall incidence of vomiting from 0 to 72 hours after surgery was also significantly decreased from 30% to 12% in the acupressure group ($P = 0.03$, 95% confidence interval 2%–33%). Furthermore, adjunctive use of the acupressure device seemed to enhance patient satisfaction with their PONV management and quality of recovery at 48 hours after surgery. However, the recovery times to hospital discharge, resumption of normal physical activities, and return to work did not differ significantly between the 2 study groups.

CONCLUSION: Use of the Pressure Right acupressure device in combination with antiemetic drugs provided a reduction in the incidence of vomiting from 0 to 72 hours after surgery with an associated improvement in patient satisfaction with their PONV management. However, recovery and outcome variables failed to demonstrate any improvement with the addition of the acupressure device.

異氟醚麻醉下大鼠胰高血糖素樣肽-1 的生物物理學及藥理學特性

Biophysical and Pharmacological Properties of Glucagon-Like Peptide-1 in Rats Under Isoflurane Anesthesia

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背景：胰高血糖素樣肽 1（CLP-1）可促進胰島素分泌，對維持血糖穩態具有重要作用。本研究從在體和離體實驗兩方面評估 GLP-1 的生物物理學及藥理學特性，從而明確 GLP-1 在大鼠異氟醚麻醉下血糖調控中的可應用性。

方法：研究分爲兩組：對照組吸入氧濃度爲 30%的空氣，實驗組吸入 1.4%濃度的異氟醚，測定兩組吸入前、吸入中和吸入後禁食和經胃給予葡萄糖負荷後門靜脈 GLP-1、胰島素、血糖和二肽肽酶-4 的活性。在人腸內分泌細胞 NCL-H716 細胞株測定異氟醚對 GLP-1 分泌的直接作用。用放射免疫法測定分離的胰島組織胰島素的釋放。用 β-七葉素穿孔的全細胞電流膜片鉗測定單個胰臟 β 細胞的膜電位。

結果：禁食大鼠吸入異氟醚可導致 GLP-1 基礎值的下降，但不影響胰島素和血糖水準。對照組給予葡萄糖後，GLP-1、胰島素和血糖水準升高。而異氟醚可減輕葡萄糖引起的 GLP-1、胰島素和血糖水準的升高。相反，異氟醚並不影響經胃給予葡萄糖負荷前和給予後的二肽肽酶-4 的活性。0.35 mM 的異氟醚可抑制 NCI-H716 細胞中 GLP-1 的釋放；該結果與以往報導的在體研究的結果相一致。在表面灌流實驗中，0.35 mM 的異氟醚可抑制糖誘導的胰島素的釋放，而給予外源性 10 nM 的 GLP-1 可促進胰島素的釋放。重要的是，聯合給予七氟醚和 GLP-1 延長了葡萄糖誘發島素的釋放的兩個時相到與單獨給與 GLP-1 相似的程度。全細胞膜片鉗結果表明： 0.35 mM 異氟醚可抑制糖刺激的去極化，而 10 nM 的 GLP-1 幾乎可完全使之恢復。

結論：以往研究顯示異氟醚麻醉下 GLP-1 分泌功能受損。而本研究證實異氟醚並不影響 GLP-1 的促胰島素樣作用，而且給予 GLP-1 可增加胰臟 β 細胞的膜活性，預防異氟醚引起的葡萄糖誘導的胰島素分泌的受損。這些結果支持基於 GLP-1 的治療可有效維持術中血糖調控的假說。

（邱鬱薇 譯 馬皓琳 李士通 校）

BACKGROUND: Glucagon-like peptide-1 (GLP-1) increases insulin secretion and has an important role in maintaining glucose homeostasis. In this study, we evaluated the biophysical and pharmacological properties of GLP-1 by performing in vivo and in vitro experiments to determine the applicability of GLP-1 in glycemic control in rats under isoflurane anesthesia.

METHODS: Levels of portal GLP-1, insulin, and glucose and dipeptidyl peptidase-4 activity were measured in the basal fasting state and after gastric glucose load before, during, and after exposure to 30% O_2 in air (control) or 1.4% isoflurane in a mixture of 30% O_2 and air. The direct effects of isoflurane on GLP-1 secretion were assessed in human enteroendocrine NCI-H716 cells. Insulin release from isolated pancreatic islets was measured using a radioimmunoassay.

Single pancreatic β-cell membrane potentials were recorded using whole-cell current-clamp patches perforated by β-escin.
RESULTS: In fasting rats, inhalation of isoflurane led to a decrease in the basal levels of GLP-1 but did not affect insulin and glucose levels. Levels of GLP-1, insulin, and glucose increased after gastric administration of glucose in control rats. However, isoflurane attenuated the glucose-induced increase in GLP-1 and insulin levels and increased plasma glucose levels. In contrast, isoflurane did not affect dipeptidyl peptidase-4 activity before or after gastric glucose loading. Isoflurane (0.35 mM) inhibited GLP-1 release in NCI-H716 cells; this finding was similar to that observed in in vivo studies. In perifusion experiments, isoflurane (0.35 mM) inhibited glucose-induced insulin release, whereas exogenous GLP-1 (10 nM) enhanced insulin release. Importantly, combined administration of isoflurane and GLP-1 enhanced both phases of glucose-induced insulin release to an extent similar to that achieved with GLP-1 alone. Whole-cell patches showed that exposure to GLP-1 (10 nM) led to nearly complete restoration of glucose-stimulated depolarization that had been suppressed by isoflurane (0.35 mM).
CONCLUSIONS: GLP-1 secretion is impaired during isoflurane anesthesia. However, our study showed that the insulinotropic action of GLP-1 was not affected by isoflurane. Furthermore, exposure to GLP-1 increased the membrane activity of pancreatic β-cells, preventing isoflurane-induced impairment of glucose-induced insulin secretion. These results support the hypothesis that GLP-1–based therapy may be a useful approach for achieving intraoperative glycemic control.

驗證應用脈搏波通過時間無創測定連續心輸出量的方法的多中心研究：與間斷推注熱稀釋法心輸出量比較

Multicenter Study Verifying a Method of Noninvasive Continuous Cardiac Output Measurement Using Pulse Wave Transit Time: A Comparison with Intermittent Bolus Thermodilution Cardiac Output

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背景：許多技術已經爲心輸出量的微創監測而開發。應用脈搏波通過時間的連續預估心輸出量（esCCO）測量法是一個無創的方法。在爲任何病人包括低風險的病人進行常規臨床迴圈監測中，esCCO 測量法是潛在有用的。因爲除了那些用於實施 3 種基本類型監測的方法（如心電圖、脈搏氧飽和度和無創或有創的動脈血壓測量法）所需的感測器以外，它不需要任何額外的感測器。在本多中心研究中，我們評估了應用脈搏波通過時間的無創 esCCO 的功效。
方法：在 7 個參與機構中，我們選取 213 名病人比較 esCCO 和間斷推注熱稀釋法心輸出量（TDCO），其中重症監護病房（ICUs）139 名，手術室（ORs）74 名。在 ICUs 和 ORs，我們對在 ICU 和 OR 裡的病人做了心電圖、脈搏氧飽和度、TDCO 和動脈血壓的監測。施行一個單一標定一連續測量 esCCO。在 ICU 和 OR 病人移除肺動脈導管之前，爲 ICU 病人每日一次以及 OR 病人每小時進行 TDCO 測量。我們評估了 esCCO 相對於

TDCO 的相關性分析和 Bland-Altman 分析，同時也評估了偏差隨時間的變化。此外，我們觀察了全身血管阻力（SVR）改變對偏差變化的影響，因爲異常的 SVR 被假定爲促使這種偏差變化的一個因素。

結果：在 588 個 esCCO 和 TDCO 資料集中（除了標定點），分析了 213 名病人的 587 個資料集。分析結果顯示相關係數爲 0.79（*P*<0.0001，95%可信區間爲 0.756–0.819），偏差（指 esCCO 和 TDCO 之間的平均差）爲 0.13 L/min（偏差的 95%可信區間爲 0.04–0.22 L/min），以及精度（1 個標準差）爲 1.15 L/min（95%可信區間爲−2.13 至 2.39 L/min）。在 ICU，定標後超過 48 小時的 3 個確定的時間區間之間沒有顯著的差異（重複測量方差分析 *P* = 0.781）。SVR 對 esCCO 分析的影響顯示 SVR 和誤差之間的相關係數爲 0.37（*P*<0.0001，95%可信區間爲 0.298–0.438）。

結論：在 213 例病例中比較了無創 esCCO 技術和 TDCO 的功效。587 個資料集顯示 esCCO 和 TDCO 之間相關密切、偏差較小且精確，可與當前的動脈波形分析技術相媲美。

（唐瑩 譯 馬皓琳 李士通 校）

BACKGROUND: Many technologies have been developed for minimally invasive monitoring of cardiac output. Estimated continuous cardiac output (esCCO) measurement using pulse wave transit time is one noninvasive method. Because it does not require any additional sensors other than those for conducting 3 basic forms of monitoring (electrocardiogram, pulse oximeter wave, and noninvasive (or invasive) arterial blood pressure measurement), esCCO measurement is potentially useful in routine clinical circulatory monitoring for any patient including low-risk patients. We evaluated the efficacy of noninvasive esCCO using pulse wave transit time in this multicenter study.

METHODS: We compared esCCO and intermittent bolus thermodilution cardiac output (TDCO) in 213 patients, 139 intensive care units (ICUs), and 74 operating rooms (ORs), at 7 participating institutions. We performed electrocardiogram, pulse oximetry, TDCO, and arterial blood pressure measurements in patients in ICUs and ORs; a single calibration was performed to measure esCCO continuously. TDCO measurement was performed once daily for ICU patients and every hour for OR patients, and just before the removal of the pulmonary arterial catheter from patients in both the ICU and OR. We evaluated esCCO against TDCO with correlation analysis and Bland and Altman analysis and also assessed the change of bias over time. Furthermore, we inspected the impact of change in systemic vascular resistance (SVR) on change in bias because abnormal SVR was assumed to be a factor contributing to the change of the bias.

RESULTS: From among 588 esCCO and TDCO datasets (excluding calibration points), 587 datasets were analyzed for 213 patients. The analysis results show a correlation coefficient of 0.79 (*P* < 0.0001, 95% confidence limits of 0.756–0.819), a bias (mean difference between esCCO and TDCO) of 0.13 L/min (95% confidence interval of bias 0.04–0.22 L/min), and a precision (1 SD) of 1.15 L/min (95% prediction interval was −2.13 to 2.39 L/min). There were no significant differences among 3 defined time intervals over 48 hours after calibration (repeated-measures analysis of variance *P* = 0.781) in the ICU. The influence of SVR on esCCO analysis showed a correlation coefficient between SVR and an error of 0.37 (*P* < 0.0001, 95% confidence interval 0.298–0.438).

CONCLUSION: The efficacy of noninvasive esCCO technology was compared with TDCO in 213 cases. Five hundred eighty-seven datasets comparing esCCO and TDCO showed close

correlation and small bias and precision, which were comparable to current arterial waveform analysis technologies.

我們能使術後患者的交接班更安全嗎？一篇相關文獻資料的系統綜述

Can We Make Postoperative Patient Handovers Safer? A Systematic Review of the Literature

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術後患者交接班經常會出現技術上的失誤和溝通上的誤差，不利於患者的安全。我們系統性地回顧了有關從手術室至麻醉後蘇醒室或重症監護室的護理交接班的文獻資料，並歸納總結了基於這些結果的程式和溝通建議。在超過 500 篇文章中，我們找到 31 篇處理術後交接班問題的文章。其中 24 篇文章含有組織交接班程式或者資訊傳遞的建議。其中一些建議得到了廣泛支持，包括：(1)標準化程式（例如通過使用清單和協定交接班）；(2)在資訊傳遞之前完成緊急臨床工作；(3) 在進行口頭交接班時只允許討論患者特殊病情；(4)要求所有相關團體成員到場；(5)給團體成員提供技巧和溝通培訓。只有 4 項研究形成了干預措施，且正式地評估了其對不同程式方法的影響。這 4 種干預措施均改善了效力和效率指標及團隊的協作。大多數文章爲橫向研究，找出對安全有效術後交接班的障礙，包括未完整的資訊傳遞和其他交流問題、意見不一或隊伍不完整的團隊、臨床工作的缺失或者無效執行以及標準化較差。還證實了低品質的交接班品質和不良事件之間的關係。需要進行更多創新研究以明確最佳的患者交接班方案並確定交接班品質對患者預後的影響。
（方斌譯 馬皓琳 李士通 校）

Postoperative patient handovers are fraught with technical and communication errors and may negatively impact patient safety. We systematically reviewed the literature on handover of care from the operating room to postanesthesia or intensive care units and summarized process and communication recommendations based on these findings. From >500 papers, we identified 31 dealing with postoperative handovers. Twenty-four included recommendations for structuring the handover process or information transfer. Several recommendations were broadly supported, including (1) standardize processes (e.g., through the use of checklists and protocols); (2) complete urgent clinical tasks before the information transfer; (3) allow only patient-specific discussions during verbal handovers; (4) require that all relevant team members be present; and (5) provide training in team skills and communication. Only 4 of the studies developed an intervention and formally assessed its impact on different process measures. All 4 interventions improved metrics of effectiveness, efficiency, and perceived teamwork. Most of the papers were cross-sectional studies that identified barriers to safe, effective postoperative handovers including the incomplete transfer of information and other communication issues, inconsistent or

incomplete teams, absent or inefficient execution of clinical tasks, and poor standardization. An association between poor-quality handovers and adverse events was also demonstrated. More innovative research is needed to define optimal patient handovers and to determine the effect of handover quality on patient outcomes.

產婦硬膜意外穿破後預防性硬膜外血補片用於防止硬膜穿破後頭痛

Prophylactic Epidural Blood Patch After Unintentional Dural Puncture for the Prevention of Postdural Puncture Headache in Parturients

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硬膜意外穿破是產科患者行椎管內麻醉主要發病率的一個原因。本焦點綜述中，我們探討了預防性硬膜外血補片預防硬膜穿破後頭痛，尤其在產科人群。儘管硬膜外血補片一直被認爲是一種有效治療硬膜穿破後頭痛的方法，目前並無充足證據支持其作爲一個預防性操作的應用。
(許辛譯 馬皓琳 李士通 校)
Unintentional dural puncture is a source of significant morbidity in obstetric patients undergoing neuraxial anesthesia. In this focused review, we discuss the use of a prophylactic epidural blood patch to prevent postdural puncture headache, particularly as it relates to the obstetric population. Although epidural blood patch is thought to be an effective treatment for postdural puncture headache, there is insufficient evidence to support its use as a prophylactic procedure.

兒童顱面重建術中低血壓期間沒有心動過速

Absence of Tachycardia During Hypotension in Children Undergoing Craniofacial Reconstruction Surgery

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背景：心動過速是一種壓力感受器介導的對低血壓的反應。麻醉期間兒童在發生低血壓時的心率（HR）表現的特徵不是很明顯。我們進行了這項研究來評估經歷大量失血的麻醉兒童人群中 HR 與低血壓之間的關係。我們主要的假設是在低血容量引起低血壓時心率會較無低血壓時增快。
方法：我們對於行顱頂重建術的兩歲以內兒童，查詢了預期顱面手術圍術期登記。提取人口統計學和圍術期資料，計算術中失血量。從電腦化的麻醉記錄提取生命體征並分析。低血壓的定義爲平均動脈壓小於 40mmHg 持續至少三個電腦化麻醉記錄（每 15 秒捕獲一次）。比較術前 HR、整個手術期間的平均 HR、低血壓開始發生時的 HR 及低血壓前後五分鐘的 HR。

結果：病歷查詢產生的資料來自 57 例手術。在 10 個病例中有 29 次低血壓發生。低血壓（平均動脈壓低于 40mmHg 時）開始發生時的 HR 與術前 HR、術中平均 HR 以及低血壓前後五分鐘時的 HR 無明顯差異。
結論：在這項針對術中出現大量失血的麻醉期間 2 歲以內兒童的研究中，低血壓未引起心率增快。在這類人群中，心率對於低血容量似乎不是有用的指標。
（張怡 譯 馬皓琳 李士通校）

BACKGROUND: Tachycardia is a baroreceptor-mediated response to hypotension. Heart rate (HR) behavior in the setting of hypotension in anesthetized children is not well characterized. We conducted this study to assess the relationship between HR and hypotension in a population of anesthetized children experiencing massive blood loss. Our primary hypothesis was that HR would be increased with the onset of hypotension associated with hypovolemia in comparison with time points without hypotension.
METHODS: We performed a query of our prospective craniofacial perioperative registry for children younger than 24 months who underwent cranial vault reconstruction surgery. Demographic and perioperative data were extracted, and the intraoperative blood loss was calculated. Vital signs were extracted from our computerized anesthesia record and analyzed. Hypotension was defined as a mean arterial blood pressure <40 mm Hg for at least 3 computerized anesthesia record entries (captured every 15 seconds). The preoperative HR, the average HR over the entire intraoperative period, the HR at the onset of hypotension, and the HR 5 minutes before and 5 minutes after the hypotensive episode were compared.
RESULTS: The registry query yielded data from 57 procedures. There were 29 episodes of hypotension occurring in 10 subjects. There was no significant difference in HR at the onset of hypotension (when mean arterial blood pressure decreased below 40 mm Hg) in comparison with the preoperative HR, the average intraoperative HR, or in comparison with 5 minutes before and 5 minutes after the episode of hypotension.
CONCLUSIONS: In this study of anesthetized children younger than 24 months undergoing surgery with massive blood loss, hypotension was not associated with an increased HR. HR does not appear to be a useful indicator of hypovolemia in this population.

肥胖在兒童和青少年患者中對丙泊酚引起意識喪失 ED_{95} 的影響

The Effect of Obesity on the ED_{95} of Propofol for Loss of Consciousness in Children and Adolescents

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介紹：麻醉醫師在決定肥胖兒童的麻醉藥適宜用量時，經常面臨兩難的局面。本研究在肥胖與非肥胖患兒中，通過睫毛反射的消失，測定了丙泊酚引起 95%患兒意識喪失的劑量（ED_{95}）。

方法：40 名肥胖的（體重指數[BMI]＞同齡同性別兒童的第 95 百分位數）和 40 名正常體重的（BMI 在第 25~第 84 百分位數之間）、ASA 1~2 級、年齡 3~17 歲行外科手術的的健康兒童參與了本項偏倚硬幣設計研究。主要觀察指標是丙泊酚注射後 20 秒睫毛反射消失。每組第一名患兒接受 1.0mg/kg 丙泊酚靜脈注射，此後的患兒根據之前一名患兒的睫毛反射效果，接受預設的丙泊酚劑量。如果睫毛反射存在，則下一名患兒的劑量增加 0.25mg/kg。如果睫毛反射消失，則下一名患兒隨機接受相同劑量（幾率 95%）或劑量減少 0.25mg/kg（幾率 5%）。ED_{95}和 95%可信區間（CI）分別通過保序回歸和引導法計算。

結果：丙泊酚引起睫毛反射消失的 ED_{95}在肥胖患兒中（2.0mg/kg，近似 95%可信區間 1.8~2.2mg/kg）顯著低於非肥胖患兒（3.2mg/kg，近似 95%可信區間 2.7~3.2mg/kg），$P \leq 0.05$。

討論：決定丙泊酚對 3~17 歲患兒進行麻醉誘導必須用多少劑量的一個簡單方法是爲了首先確定該患兒的 BMI 在性別特異分佈圖的位置。肥胖兒童（BMI＞同齡同性別兒童的第 95 百分位數）進行麻醉誘導所需單位體重丙泊酚的劑量低於非肥胖兒童。

（陳彬彬譯 馬皓琳 李士通校）

INTRODUCTION: Anesthesiologists face a dilemma in determining appropriate dosing of anesthetic drugs in obese children. In this study we determined the dose of propofol that caused loss of consciousness in 95% (ED_{95}) of obese and nonobese children as determined by loss of eye lash reflex.

METHODS: Forty obese (body mass index [BMI] > 95th percentile for age and gender) and 40 normal weight (BMI 25th to 84th percentile) healthy ASA 1 to 2 children ages 3 to 17 years presenting for surgical procedures were studied using a biased coin design. The primary endpoint was loss of lash reflex at 20 seconds after propofol administration. The first patient in each group received 1.0 mg/kg of IV propofol, and subsequent patients received predetermined propofol doses based on the lash reflex response in the previous patient. If the lash reflex was present, the next patient received a dose increment of 0.25 mg/kg. If the lash reflex was absent, the next patient was randomized to receive either the same dose (95% probability) or a dose decrement of 0.25 mg/kg (5% probability). The ED_{95} and 95% confidence intervals (CI) were calculated using isotonic regression and bootstrapping methods respectively.

RESULTS: The ED_{95} of propofol for loss of lash reflex was significantly lower in obese pediatric patients (2.0 mg/kg, approximate 95% CI, 1.8 to 2.2 mg/kg) in comparison with nonobese patients (3.2 mg/kg, approximate 95% CI, 2.7 to 3.2 mg/kg), $P \leq 0.05$.

DISCUSSION: A simple approach to deciding what dose of propofol should be used for induction of anesthesia in children ages 3 to 17 years is to first establish the child's BMI on readily available gender-specific charts. Obese children (BMI >95th percentile for age and gender) require a lower weight–based dose of propofol for induction of anesthesia, than do normal-weight children.

右美托咪啶在大鼠中對手術腦損傷的腦水腫及神經病學轉歸的影響

Effect of Dexmedetomidine on Brain Edema and Neurological Outcomes in Surgical Brain Injury in Rats

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背景:手術腦損傷(SBI)是神經外科操作（比如銳性剝離、電灼、吸引、直接施加的壓迫）對功能性腦組織所造成的損害。腦水腫是促成炎症、壞死、氧化性應激這些損害發生的主要因素，而對細胞凋亡起的作用可能較小。針對 SBI 的有效治療可以改善神經病學預後並減少神經外科手術相關的術後併發症的發生。以往的研究表明血腦屏障的控制與腎上腺素有相關性。已有研究顯示 α-2 受體激動劑右美托咪定（DEX）可以改善中風模型的神經病學轉歸。我們假設在 SBI 大鼠模型中，DEX 可以減少腦水腫並改善神經病學預後。
方法：將體重 280-350g 的雄性 SD 大鼠（*n*=63）隨機分爲 4 個 IP 處置組：假手術 IP 組、溶劑 IP 組、DEX 10mg/kg 組和 DEX 30mg/kg 組。在 SBI 前 30 分鐘給予相應的處置。反復觀察 DEX 對首次發生 SBI 動物的平均動脈壓（MAP）、心率（HR）和血糖的生理影響。大鼠還被隨機分爲 4 個損傷後 IV 處置組: 假手術 IV 組、溶劑 IV 組、DEX 10/5 組和 DEX 30/15 組（DEX 治療組劑量分別爲 10 和 30 mg/kg/hr，初始負荷劑量分別爲 5 和 15 mg/kg/hr）。初始負荷劑量的給予開始於 SBI 後 20 分鐘，之後持續輸注 2 小時。SBI 動物在腦損傷後 24 小時將由不知分組情況的觀察員進行神經病學檢測，它們被立即致死，通過幹/濕測重法測量腦組織含水量。
結果：各治療組與假手術組動物相比，在同側額葉腦組織含水量和神經系統的評分方面表現出顯著差異。然而，DEX 治療組和溶劑組之間沒有區別。生理監測表明不論是高或低劑量 DEX 治療相對於無任何處置的動物或者安慰劑組動物，都顯著降低 MAP 和 HR，並且造成短暫的血糖升高。
結論：在本研究中，DEX 的使用並未能在 SBI 後減輕腦水腫或改善神經功能。在假手術組與安慰劑組、DEX 治療組之間腦組織含水量以及神經學評分的統計學差異在此模型的一致再現性。使用 DEX 後的 MAP、HR 以及血糖相較於溶劑組和假手術組有顯著變化，提示給藥恰當。
（余亦南 譯 馬皓琳 李士通 校）

BACKGROUND: Surgical brain injury (SBI) is damage to functional brain tissue resulting from neurosurgical manipulations such as sharp dissection, electrocautery, retraction, and direct applied pressure. Brain edema is the major contributor to morbidity with inflammation, necrosis, oxidative stress, and apoptosis likely playing smaller roles. Effective therapies for SBI may improve neurological outcomes and postoperative morbidities associated with brain surgery. Previous studies show an adrenergic correlation to blood-brain barrier control. The α-2 receptor agonist dexmedetomidine (DEX) has been shown to improve neurological outcomes in stroke models. We hypothesized that DEX may reduce brain edema and improve neurological outcomes in a rat model of SBI.
METHODS: Male Sprague-Dawley rats (*n* = 63) weighing 280 to 350 g were randomly assigned to 1 of 4 IP treatment groups: sham IP, vehicle IP, DEX 10 mg/kg, and DEX 30 mg/kg.

Treatments were given 30 min before SBI. These treatment groups were repeated to observe the physiologic impact of DEX on mean arterial blood pressure (MAP), heart rate (HR), and blood glucose on SBI naïve animals. Rats were also assigned to 4 postinjury IV treatment groups: sham IV, vehicle IV, DEX 10/5, and DEX 30/15 (DEX group doses were 10 and 30 mg/kg/hr, with 5 and 15 mg/kg initial loading doses, respectively). Initial loading doses began 20 min after SBI, followed by 2 h of infusion. SBI animals were subjected to neurological testing 24 h after brain injury by a blinded observer, promptly killed, and brain water content measured via the dry/wet weight method.
RESULTS: All treatment groups showed a significant difference in ipsilateral frontal brain water content and neurological scores when compared with sham animals. However, there was no difference between DEX-treated and vehicle animals. Physiologic monitoring showed treatment with low or high doses of DEX significantly decreased MAP and HR, and briefly increased blood glucose compared with naïve or vehicle-treated animals.
CONCLUSIONS: DEX administration did not reduce brain edema or improve neurological function after SBI in this study. The statistical difference in brain water content and neurological scores when comparing sham treatment to vehicle and DEX treatments shows consistent reproduction of this model. Significant changes in MAP, HR, and blood glucose after DEX as compared to vehicle and sham treatments suggest appropriate delivery of drug.

通過旋轉血栓彈力測定方法評價紅細胞比容對纖維凝塊形成的影響

The impact of hematocrit on fibrin clot formation assessed by rotational thromboelastometry.

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背景：以 FIBTEM 爲基礎的旋轉血栓彈力測定法用來評估圍術期全血細胞的纖維聚合程度。在 TIBETEM 中，松胞素 D 降低血小板的凝血作用，但松胞素 D 也改變纖維蛋白的水準，而且紅細胞也會對血凝塊形成起不同的作用。因爲血漿纖維蛋白原測定不會反映紅細胞比容的動態變化，假設分離血漿測定中沒有紅細胞，這將影響心外科手術期間的凝血酶法和以血液爲基礎的 FIBTEM 法的相關性。因此，現在研究圍術期血細胞比容改變對 FIBTEM 和纖維蛋白原測定的影響。
方法：從六名健康志願者取血樣本，FIBTEM 實驗組分爲：全血不稀釋組，全血用鹽水稀釋組，和分別用自體血漿（濃度 5:1, 2:1,和 1:1）稀釋組，然後評估 FIBTEM 的最大凝固程度（MCF）與凝血酶原測定法的相關性，判斷心臟手術前後紅細胞比容的價值。皮爾斯相關係數在實驗資料和 ROTEM 參數之間起決定性作用。
結果：由於離體後紅細胞減少，FIBTEM-MCF 隨鹽水濃度降低逐漸減少，而在 1:1 的自體血漿中 MCF 增加 31%（P《0.05）。在來自心臟病患者（在 50 人身上完成 150 次測試）的樣本中，所有 MCF 和血漿纖維蛋白原間的相關參數爲 0.8（P《0.001）；在稀釋的血液樣本組（術中和監護室），MCF10mm 相當於血漿纖維蛋白原 200 mg/dL。 小樣本分

析的紅細胞比容分別爲<25%, ≥25% to 30%, ≥30%, 200 mg/dL 的血漿纖維蛋白原分別相當於 11 mm/10 mm/8mm 的 MCF。紅細胞比容越低，MCF 與血漿纖維蛋白原相關性越高。**結論**：圍術期改變紅細胞比容影響血漿纖維蛋白原和 MCF 的相關性。低紅細胞比容時（<25%）,MCF 與血漿纖維蛋白原相關性較高，提示 FIBTEM 適用於決定是否需要對術中貧血的出血病人進行血漿纖維蛋白原置換。
（韓旭譯 薛張綱校）

BACKGROUND: Rotational thromboelastometry (ROTEM®)-based FIBTEM is used perioperatively to assess the extent of fibrin polymerization in whole blood. In FIBTEM, cytochalasin D eliminates the contribution of platelets to whole blood clotting, but changing levels in fibrin(ogen) and erythrocytes may differently affect clot formation. Because dynamic changes of hematocrit are not reflected in plasma fibrinogen measurements, we hypothesized that the lack of erythrocytes in isolated plasma measurements would affect the relationship between the Clauss method and whole blood-based FIBTEM during cardiac surgery. Therefore, in the current study we investigated the influence of perioperative hematocrit changes on FIBTEM and fibrinogen measurements.
METHODS: Blood samples were collected from 6 consenting healthy volunteers. FIBTEM tests were run before and after serial in vitro dilutions of whole blood with saline or autologous plasma (5:1, 2:1, and 1:1 v/v). We then evaluated the relationship between FIBTEM-maximal clot firmness (MCF) and the Clauss fibrinogen method in relation to hematocrit values before and after cardiac surgery. Pearson correlation coefficients were determined between laboratory test results and ROTEM variables.
RESULTS: Upon in vitro hematocrit reduction, FIBTEM-MCF was progressively decreased depending on the extent of saline dilution, but it was increased by 31% after 1:1 volume replacement with autologous plasma ($P < 0.05$). In samples from cardiac patients (150 measurements in 50 patients), the overall correlation coefficient between FIBTEM-MCF and plasma fibrinogen was 0.80 ($P < 0.001$). In hemodiluted blood samples (during surgery or at intensive care unit), FIBTEM-MCF 10 mm corresponded to plasma fibrinogen levels of 200 mg/dL. In the subgroup analysis (n = 50 each), according to hematocrit levels (<25%, ≥25% to 30%, ≥30%), plasma fibrinogen levels of 200 mg/dL corresponded to 11 mm, 10 mm, and 8 mm of FIBTEM-MCF, respectively. The correlation between FIBTEM-MCF and plasma fibrinogen was higher at lower hematocrit (<25%) than at higher hematocrit (>30%) ($r = 0.88$ and 0.67, respectively).
CONCLUSIONS: Perioperative changes in hematocrit affect the correlation between plasma fibrinogen levels and FIBTEM-MCF values. The higher correlation between FIBTEM-MCF and plasma fibrinogen with lower hematocrit (<25%) indicates that FIBTEM is a practical method to determine the need for fibrinogen replacement in bleeding patients who typically develop perioperative anemia.

在一種新型的大鼠模型中，右美托咪啶防止外科手術應激和疼痛引起的腸道微循環改變

Dexmedetomidine prevents alterations of intestinal microcirculation that are induced by surgical stress and pain in a novel rat model.

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背景：麻醉可以在不經意間產生不足或在手術過程中出現誤判，手術應激和疼痛刺激沒有得到適當的治療會增加。明顯的刺激可以啓動交感神經系統，增加血液兒茶酚胺水準，並引起內臟動脈血管收縮。
方法：我們將 30 只雄性大白鼠分爲以下三組：控制組，手術應激和疼痛組（SSP）及手術應激和疼痛+右美托咪定組（SSP+ Dex）。我們將大鼠沿中線剖腹，取出末端回腸一部分，通過一個全視野鐳射灌注成像和側流暗場視頻顯微鏡對大白鼠的黏膜、肌肉和集合淋巴小結進行微循環檢查。SSP 組和 SSP+Dex 組異氟醚吸入濃度從 1.2%下降到 0.7%。在 SSP + Dex 組，大鼠接受右美托咪定的初始負荷劑量（0.5μg/kg）和維持輸注劑量(0.5 μg · kg(-1) ·h(-1))。
結果：右美托咪啶可以防止手術應激和疼痛相關性心動過速和高血壓，並且可以減弱腸黏膜(1100 ± 185 perfusion units [PU] vs 800 ± 105 PU, P = 0.001)和肌肉(993 ± 208 PU vs 713 ± 92 PU, P < 0.001)微循環血流量降低的強度。右美托咪啶修復腸黏膜和肌肉中的小血管灌注。
結論：我們建立了一個有效的大鼠模型，研究在淺麻醉時手術應激和疼痛刺激對腸道微循環的影響。利用此大鼠模型，我們發現，右美托咪定能使全身血流動力學趨於穩定，防止腸道微循環的改變。
（賀盼譯 薛張綱校）

BACKGROUND: Anesthesia can become inadequate inadvertently or by misjudgment during surgery or emergence, and the surgical stress and pain stimulation will increase without adequate treatment. Overt stimulation may activate the sympathetic nervous system, increase the blood level of catecholamines, and lead to splanchnic arterial vasoconstriction.
METHODS: We divided 30 male Wistar rats into the following 3 groups: control, surgical stress and pain (SSP), and surgical stress and pain + dexmedetomidine (SSP + Dex). The rats received midline laparotomy to exteriorize a segment of terminal ileum for microcirculation examination by a full-field laser perfusion imager and sidestream dark-field video microscope on mucosa, muscle, and Peyer patch. The inspired concentration of isoflurane was decreased from 1.2% to 0.7% in SSP and SSP + Dex groups. In the SSP + Dex group, the rats received an initial loading dose of dexmedetomidine (0.5 μg/kg) and a maintenance infusion (0.5 μg · kg(-1) ·h(-1)).
RESULTS: Dexmedetomidine prevented surgical stress and pain-related tachycardia and hypertension, and it attenuated the reduction of the microcirculatory blood flow intensity in intestinal mucosa (1100 ± 185 perfusion units [PU] vs 800 ± 105 PU, P = 0.001) and muscle (993 ± 208 PU vs 713 ± 92 PU, P < 0.001). Dexmedetomidine restored perfused small vessel density in intestinal mucosa and muscle.
CONCLUSIONS: We established a promising rat model to investigate the effect of surgical stress and pain stimulation on the intestinal microcirculation during light anesthesia. Using this rat model, we found that dexmedetomidine can normalize global hemodynamics and prevent the alteration of intestinal microcirculation.

泰嘉依託咪酯抑制 alph4/beta2 神經元乙醯膽鹼受體濃度對動物的影響

Brief report: carboetomidate inhibits alpha4/beta2 neuronal nicotinic acetylcholine receptors at concentrations affecting animals.

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背景：泰嘉依託咪酯是一種依託咪酯的衍生物，產生催眠作用並且不抑制腎上腺皮質類固醇激素的合成。和依託咪酯相似，泰嘉依託咪酯作用於 γ-氨基丁酸 A 受體，但其對全身麻醉中其他離子通道的影響尚未知。
方法：我們比較了依託咪酯和泰嘉依託咪酯影響人類 N-甲基-D-天冬氨酸受體及在卵母細胞中表達的神經元煙鹼型乙醯膽鹼受體，通過利用 2-微電極電生理技術。
結果：依託咪酯在臨床相關濃度中對這兩種類型的受體沒有影響，然而泰嘉依託咪酯將近 50%有效濃度在麻醉中對神經元煙鹼型乙醯膽鹼受體有顯著的抑制。
結論：與依託咪酯相比較，泰嘉依託咪酯的高疏水性使其對神經元煙鹼型乙醯膽鹼受體有更大的抑制作用。
（胡曉清譯 薛張綱校）

BACKGROUND: Carboetomidate is an etomidate derivative that produces hypnosis without inhibiting adrenal corticosteroid synthesis. Similar to etomidate, carboetomidate modulates γ-aminobutyric acid type A receptors, but its effects on other ion channel targets of general anesthetics are unknown.
METHODS: We compared etomidate and carboetomidate effects on human N-methyl-d-aspartate receptors or neuronal nicotinic acetylcholine receptors (nnAChRs) expressed in Xenopus oocytes, using 2-microelectrode voltage clamp electrophysiology.
RESULTS: Etomidate did not affect either type of receptor at clinically relevant concentrations, whereas carboetomidate concentrations near 50% effective concentration for anesthesia significantly inhibited nnAChRs.
CONCLUSIONS: Compared with etomidate, carboetomidate's higher hydrophobicity is associated with greater inhibition of nnAChRs.

對於進行重大外科手術病人預期無計畫插管的評分系統

A scoring system to predict unplanned intubation in patients having undergone major surgical procedures.

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背景：手術後無計畫的氣管插管一直伴隨著高死亡率。很少有研究探討此併發症的危險因素。

方法：美國外科醫師學會國家外科品質改進計畫(NSQIP)是一個關於施行重大外科手術病人的多中心的，有前瞻性的，以結果爲導向的資料庫。我們使用 NSQIP 資料庫中 2005 年至 2007 年組的資料（n =231548）和 Cox 比例風險模型，分析了風險因素，並用他們得出一個評分系統來分層病人的意外插管結果的風險。2008（N=176031）NSQIP 資料用來驗證此評分系統。
結果:對於無計畫插管最有預測性的變數因素是: 患者年齡（0-4 分），ASA 評分（0-7 分），術前敗血症的存在（3 分），總手術時間（0-4 分）。根據這些變數調整後的危險比從 0（最低風險）至 18（最高風險），無計畫插管的風險指數在區分病人是否需要無計畫插管上具有 79%的準確性，（接受操作特性曲線下面積 0.79，95％可信區間 0.79-0.80）。當記分系統應用到驗證佇列資料，其識別性能大致維持不變（接受操作特性曲線下面積 0.79，95％可信區間 0.79-0.80）。
結論：根據臨床危險因素而建立的評分系統能夠準確地預測手術後意外插管。計畫外插管風險指數在通過改良的危險分層和圍手術期護理管理而減少意外插管的發生率的有效性方面需要進一步的研究。
（李麗紅譯 薛張綱校）
BACKGROUND:Unplanned tracheal intubation after surgery has been associated with high mortality. Few studies have examined the risk factors for this complication.
METHODS:The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) is a multicenter, prospective, outcome-oriented database for patients having undergone major surgical procedures. Using the NSQIP data for the years 2005 to 2007 (n = 231,548) and Cox proportional hazards modeling, we identified risk factors and used them to derive a scoring system to stratify patients' risk of having an unplanned intubation outcome. NSQIP data for the year 2008 (n = 176,031) were then used to validate the scoring system.
RESULTS:The variables most predictive of unplanned intubation were patient age (0-4 points), ASA physical status (0-7 points), the presence of preoperative sepsis (3 points), and total operative time (0-4 points). The Unplanned Intubation Risk Index based on the adjusted hazard ratios for these variables, ranging from 0 (lowest risk) to 18 (highest risk), had a 79% accuracy in distinguishing patients requiring unplanned intubation from those not requiring it (area under the receiver operating characteristic curve 0.79, 95% confidence interval 0.79-0.80). When the scoring system was applied to the validation cohort data, its discriminative performance remained virtually unchanged (area under the receiver operating characteristic curve 0.79, 95% confidence interval 0.79-0.80).
CONCLUSIONS:A scoring system based on clinical risk factors was able to accurately predict unplanned intubation after surgery. Further investigation is needed to assess the utility of the Unplanned Intubation Risk Index in reducing the incidence of unplanned intubation through improved risk stratification and management in perioperative care.

青少年後路脊柱融合術中鞘內注射嗎啡對經顱電刺激動作誘發電位的影響。

Effects of intrathecal morphine on transcranial electric motor-evoked potentials in adolescents undergoing posterior spinal fusion.
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背景：鞘內注射嗎啡（ITM）能爲後路脊柱融合術（PSF）後提供有效的鎮痛。雖然大多數麻醉藥對誘發電位有特徵的影響，但很少有 ITM 對經顱電刺激動作誘發電位（tceMEPs）的影響的資料。我們的這項研究用來評估在 ITM 給藥後 30 分鐘內對 tceMEPs 的影響。我們假設，與未接受藥物的對照組相比，在我們機構目前使用的 ITM 劑量下，ITM 組不會顯著影響平均 tceMEP 振幅和潛伏期。
方法：研究物件爲 14 位元 11 歲到 18 歲接受 PSF 的患者，在 ITM 注射前及注射後 5、10、20、30 分鐘進行 tceMEPs 記錄。將這些記錄與行 PSF 的同齡人但未注射 ITM 的對照組進行比較，比較 2 組之間 ITM 對 tceMEP 幅度和潛伏期的影響。
結果：ITM 組裡有 14 名研究物件，對照組裡有 16 名研究物件。經過對 8 組肌肉的研究後，兩組在基線階段的平均反應振幅沒有顯著差異。在 30 分鐘的治療後階段中，與對照組相比，ITM 組的平均反應幅度並沒有顯著改變。在基線階段，所有肌肉的平均反應幅度的下降程度在每個研究物件上沒有顯著改變 (95% CI = -38% to 45%; P = 0.783)，同時，在治療後階段也沒有顯著改變(95% CI = -30% to 78%; P = 0.640)。此外，在基線和治療後階段，兩組的平均反應潛伏期也沒有顯著差異。在每個研究物件的所有肌肉的平均反應潛伏期的下降程度方面，基線階段 ITM 組比對照組大 4%(95% CI = -5% to 13%; P = 0.377)，而在治療後階段大了 3% (95% CI = -4% to 12%; P = 0.359)。
結論：在我們機構目前使用的 ITM 劑量下，與對照組相比，ITM 組在注射後 30 分鐘內並不能減少平均 tceMEP 幅度或潛伏期 70%以上。需要進一步研究在這個初始階段後是否存在延遲效應。
（周玲譯 薛張綱校））

BACKGROUND: Intrathecal morphine (ITM) provides effective analgesia after posterior spinal fusion (PSF). Although most anesthetic drugs have well-characterized effects on evoked potentials, there is little data on the effects of ITM on transcranial electric motor-evoked potentials (tceMEPs). We performed this study to assess the effects of ITM on tceMEPs in the first 30 minutes after administration. We hypothesized that administration of ITM in doses currently used at our institution would not significantly affect mean tceMEP amplitudes and latencies of an ITM study group relative to control patients who did not receive the drug.
METHODS: tceMEPs were recorded before ITM injection and 5, 10, 20, and 30 minutes after injection in 14 subjects ages 11 through 18 years undergoing PSF. These recordings were compared to an age-matched control group undergoing PSF in which ITM was not injected. The effects of ITM on tceMEP amplitude and latency were compared between the 2 groups.

RESULTS: Fourteen subjects were enrolled in the ITM group and 16 served as controls. There were no significant differences in the baseline mean response amplitudes of the 2 groups for any of the 8 muscles studied. Mean response amplitudes over the 30-minute posttreatment period in the ITM group did not differ significantly from those of the control subjects. Average response amplitudes collapsed across all muscles for each subject were not significantly different during the baseline period (95% CI = -38% to 45%; P = 0.783), nor were they significantly different between the 2 groups during the posttreatment period(95% CI = -30% to 78%; P = 0.640). There also were no significant differences in the mean response latencies of the 2 groups in either the baseline or posttreatment periods. Average response latencies collapsed across all muscles for each subject were 4% larger for the ITM group than for controls during the baseline period (95% CI = -5% to 13%; P = 0.377), and 3% larger for the ITM group than for controls during the posttreatment period (95% CI = -4% to 12%; P = 0.359).
CONCLUSIONS: Administration of ITM in doses currently used at our institution did not cause more than a 70% attenuation of mean tceMEP amplitudes or latency changes of an ITM study group relative to control subjects during the 30-minute period after injection. Further studies are required to determine if there are delayed effects after this initial time period.

使用 **Tuohy** 針行無定向硬膜外穿刺增加慢性頭痛的風險

Unintentional dural puncture with a tuohy needle increases risk of chronic headache.
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背景：在美國約半數的孕婦選擇椎管內鎮痛。硬脊膜意外穿破是這項鎮痛技術最常見的併發症。在這些發生併發症的產婦中，70%至 80%的病人會發生嚴重的位置相關的頭痛。急性硬膜穿刺後頭痛已被廣泛知曉，但少有研究探討長期預後。我們以被 17 號 Tuohy 針無意穿破硬脊膜的產婦爲研究物件，研究其術後慢性頭痛及慢性背痛的發生率和危險因素
方法：病例對照實驗中，40 名孕產時間大於 18 個月且被 17 號 Tuohy 針刺破硬脊膜的產婦通過電話隨訪，根據年齡、體重及分娩時長分組，回答 2 項有效問卷並評估產後 12 至 24 個月的頭痛及背痛。
結果：研究組慢性頭痛的發生率（28%）明顯高於對照組（5%）(OR = 7, P = 0.0129)。硬膜被穿破的研究物件相比對照組更易發生慢性背痛(OR = 4, P = 0.0250)。但是血補丁治療並不是增加慢性背痛發生的危險因素。
結論：硬膜被大號穿刺針無意穿破的患者令人驚訝的易發生術後慢性頭痛。治療使用硬膜外血補丁並不會增加慢性背痛的發生率。其病理生理以解釋這項症狀以及最佳的治療方法尚未知。
（楊琰譯 薛張綱校）

BACKGROUND: Neuraxial analgesia is chosen by almost half of women who give birth in the United States. Unintentional dural puncture is the most common complication of this pain management technique, occurring in 0.4% to 6% of parturients. Severe positional headaches develop acutely in 70% to 80% of these parturients. Acute postdural puncture headaches are well known, but few studies have investigated long-term sequelae. We investigated the incidence of

and risk factors for chronic headache and chronic back pain in parturients who experienced unintentional dural puncture with a 17-gauge Tuohy needle compared with matched controls.
METHODS: In a case control design, 40 parturients who sustained unintentional dural puncture with a 17-gauge Tuohy needle over an 18-month period and 40 controls matched for age, weight, and time of delivery were recruited by telephone and 2 validated questionnaires were administered assessing headache and back pain symptoms 12 to 24 months after delivery.
RESULTS: The incidence of chronic headaches in the study group (28%) was significantly higher than in the matched controls (5%) (OR = 7, P = 0.0129). Subjects who experienced dural punctures were more likely than controls to report chronic back pain (OR = 4, P = 0.0250), but treatment with an epidural blood patch was not a risk factor for chronic back pain.
CONCLUSIONS: Patients who incur unintentional dural punctures with large-gauge needles are surprisingly likely to continue to suffer chronic headaches. Treatment with an epidural blood patch does not enhance the risk of chronic back pain. The pathophysiology underlying these symptoms and the best treatment for this syndrome are not known.

加巴噴丁對七氟醚麻醉下大鼠的瑞芬太尼急性阿片藥物耐受的影響

The Effects of Gabapentin on Acute Opioid Tolerance to Remifentanil Under Sevoflurane Anesthesia in Rats

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背景：在七氟醚麻醉過程中出現瑞芬太尼耐受可能會降低其減少麻醉藥使用量的能力。加巴噴丁被證實能有效降低術後麻醉藥物使用量，這種作用可能與降低阿片類藥物耐受及痛覺過敏有關。本試驗研究加巴噴丁是否能在七氟醚最低肺泡有效濃度下（MAC）預防由瑞芬太尼引起明顯的急性阿片類藥物耐受（AOT）
方法：用七氟醚麻醉 Wistar 大鼠，給予加巴噴丁 150mg/kg 或 300mg/kg，觀察其對七氟醚 MAC 的單獨效應。第二個實驗：在使用瑞芬太尼前（120μg · kg^{-1} ·h^{-1}和 240μg · kg^{-1} · h^{-1}）給予加巴噴丁 300mg/kg。在給予加巴噴丁前測定 MAC，並在給予後每 1.5 小時測定 MAC 共 3 次，以評估 AOT。從氣道採樣並使用測流氣體分析儀來測定 MAC；使用鼠尾夾來給予閾上刺激。統計分析採用單因素方差分析。
結果：瑞芬太尼 120μg · kg^{-1} ·h^{-1}和 240μg · kg^{-1} ·h^{-1}分別降低七氟醚 MAC（2.5±0.2%）16%±5%和 36%±6%，在同時應用加巴噴丁（300mg/kg）時七氟醚 MAC 進一步降低分別達 39%±12%和 62%±14% (與單獨使用瑞芬太尼相比，$P < 0.01$)。單獨使用加巴噴丁時（150mg/kg 和 300mg/kg）降低七氟醚 MAC 26%（兩組，$P < 0.01$）。1.5 小時以後，通過觀察 MAC 降低程度的減少來確定發生了瑞芬太尼 AOT。當瑞芬太尼與加巴噴丁同時使用時，未觀察到瑞芬太尼的 AOT ($P > 0.05$)。

結論：加巴噴丁降低七氟醚的 MAC，與瑞芬太尼合用時降低七氟醚 MAC 有增強作用。此增強作用可能限制大鼠 AOT 的產生。
（範逸臣　譯　陳傑　校）

BACKGROUND: Tolerance to remifentanil during sevoflurane anesthesia may blunt the ability of this drug to reduce anesthetic requirements. Gabapentin has been shown to be effective in reducing postoperative narcotic usage, a reduction that may be associated with a reduction in opioid-induced tolerance and hyperalgesia. We sought to determine whether gabapentin might prevent the observed acute opioid tolerance (AOT) produced by remifentanil in sevoflurane minimum alveolar concentration (MAC).
METHODS: Wistar rats were anesthetized with sevoflurane and the effects of gabapentin alone on sevoflurane MAC were determined at doses of 150 and 300 mg $\cdot kg^{-1}$. In a second experiment, gabapentin 300 mg $\cdot kg^{-1}$ was administered before remifentanil (120 and 240 $\mu g \cdot kg^{-1} \cdot h^{-1}$). The MAC was determined before gabapentin administration and 3 more times at 1.5-hour intervals after drug administration to assess AOT. MAC was determined from intratracheal gas samples using a sidestream gas analyzer; tail clamping was used as a supramaximal stimulus. Statistical analysis was performed with the 1-way analysis of variance test.
RESULTS: Remifentanil reduced MAC (2.5 ± 0.2%) by 16% ± 5% and 36% ± 6% (120 and 240 $\mu g \cdot kg^{-1} \cdot h^{-1}$, respectively, $P < 0.01$) with a further reduction produced by coadministration with gabapentin 300 mg $\cdot kg^{-1}$ to 39% ± 12% and 62% ± 14%, respectively ($P < 0.01$ versus remifentanil alone). Gabapentin given alone at 150 and 300 mg $\cdot kg^{-1}$ reduced MAC by 26% (both doses, $P < 0.01$). AOT was observed with remifentanil and characterized by a lower degree of MAC reduction, approximately 1.5 hours later ($P < 0.05$). However, when remifentanil was administered with gabapentin, the AOT to remifentanil was not observed ($P > 0.05$).
CONCLUSIONS: Gabapentin reduced the sevoflurane MAC and enhanced the MAC reduction produced by remifentanil. This enhancement may limit AOT in rats.

異氟醚預處理可維持暴露于高血糖引起的氧化應激狀態下人體動脈的三磷酸腺苷敏感的鉀離子通道的功能

Isoflurane Pretreatment Preserves Adenosine Triphosphate–Sensitive K^+ Channel Function in the Human Artery Exposed to Oxidative Stress Caused by High Glucose Levels

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背景：在生理和病理情況下，三磷酸腺苷（ATP）敏感的鉀通道在器官血流調節機制中發揮著重要的作用。高血糖時通過過氧化物的產生導致動脈內 ATP 敏感型鉀通道活性的損傷，但至今仍缺乏相關研究評價麻醉藥對人體內這一病理過程的作用。本試驗探究揮發性

麻醉藥異氟醚對暴露于高血糖引起的氧化應激狀態下的人體動脈能否維持其三磷酸腺苷敏感型鉀離子通道的功能。

方法：實驗中使用了 D-葡萄糖(5.5 mmol/L)處理的去內皮化人網膜動脈，使用異氟醚(1.15% or 2.3%) 及 D-葡萄糖或 L-葡萄糖(20 mmol/L)處理其中一部分動脈共 60min，後僅停用異氟醚，分別用等長張力記錄儀及電生理研究評估動脈段在 ATP 敏感型鉀通道開放劑——左色滿卡林作用下，其舒張和超極化情況。使用氫化乙啡啶螢光檢測超氧化物，用免疫組化分析濃縮化煙醯胺腺嘌呤二核苷酸磷酸（NADPH）氧化酶 p47phox 的亞基。最後對資料進行 Scheffé 檢驗後根據情況選擇重複測量方差分析或多因素方差分析進行資料的分析。

結果：累積量的左克羅卡林(10^{-8} 到 10^{-5} mol/L)對經 L-葡萄糖 (20 mmol/L)處理動脈的舒張作用可被 ATP 敏感型鉀通道拮抗劑格列本脲(10^{-6}mol/L)消除。而 D-葡萄糖(20 mmol/L)的培養作用可破壞左克羅卡林引起的血管舒張，使用選擇性 NADPH 氧化酶 NOX2 抑制劑 gp91ds-tat (10^{-6} mol/L)和異氟醚(1.15% 及 2.3%)預處理可恢復左克羅卡林對經 D-葡萄糖(20 mmol/L)處理動脈的舒張反應。在 20 mmol/L 的 D-葡萄糖溶液中，單獨使用異氟醚(2.3%)、 gp91ds-tat (10^{-6} mol/L),或兩者合用恢復左克羅卡林(3×10^{-6} mol/L)對經 D-葡萄糖(20 mmol/L)處理動脈的超極化能力相似。與此同時， 2.3%的異氟醚可減少經 20 mmol/L D-葡萄糖溶液處理的動脈中過氧化物的產生及減少細胞內胞質 NOX2 亞基 p47phox 向平滑肌細胞膜的移動。

結論：本試驗首次證明使用異氟醚預處理對離體人體動脈的保護作用，異氟醚預處理可保護暴露于高血糖引起的氧化應激中的人網膜動脈 ATP 敏感型鉀通道的活性，而這一作用似乎由 NADPH 氧化酶的抑制所介導。因此，揮發性麻醉藥可能對氧化應激造成的人體內臟動脈功能障礙具有保護作用。

（夏蘇雲　譯　陳傑　校）

BACKGROUND: Adenosine triphosphate (ATP)-sensitive K^+ channels contribute to significant regulatory mechanisms related to organ blood flow in both physiological and pathological conditions. High glucose impairs arterial ATP-sensitive K^+ channel activity via superoxide production. However, the effects of anesthetics on this pathological process have not been evaluated in humans. In the present study, we investigated whether pretreatment with the volatile anesthetic isoflurane preserves ATP-sensitive K^+ channel activity in the human artery exposed to oxidative stress caused by high glucose.

METHODS: All experiments were performed using human omental arteries without endothelium in the presence of d-glucose (5.5 mmol/L). Some arteries were treated with isoflurane (1.15% or 2.3%) in combination with d- or l-glucose (20 mmol/L) for 60 minutes, and then only isoflurane was discontinued. Relaxation and hyperpolarization of arterial segments in response to an ATP-sensitive K^+ channel opener levcromakalim were evaluated using the isometric force recording or electrophysiological study, respectively. Superoxide production was determined by dihydroethidium fluorescence. Immunohistochemical analysis for a subunit of reduced nicotinamide adenine dinucleotide phosphate (NADPH) oxidase p47phox was performed. Data were evaluated using repeated-measures analysis of variance or a factorial analysis of variance as appropriate, followed by Scheffé test.

RESULTS: The ATP-sensitive K^+ channel antagonist glibenclamide (10^{-6} mol/L) abolished relaxation induced by cumulative addition of levcromakalim (10^{-8} to 10^{-5} mol/L) in arteries treated with l-glucose (20 mmol/L). Incubation with d-glucose (20 mmol/L) impaired the

vasorelaxation induced by levcromakalim. The selective NADPH oxidase NOX2 inhibitor gp91ds-tat (10^{-6} mol/L) and pretreatment with isoflurane (1.15% and 2.3%) restored relaxation in response to levcromakalim in arteries treated with d-glucose (20 mmol/L). Isoflurane (2.3%), gp91ds-tat (10^{-6} mol/L), and their combination similarly restored hyperpolarization in response to levcromakalim (3×10^{-6} mol/L) in arteries treated with d-glucose (20 mmol/L). Along with these results, isoflurane (2.3%) reduced superoxide production and the intracellular mobilization of the cytosolic NOX2 subunit p47phox toward smooth muscle cell membrane in arteries treated with d-glucose (20 mmol/L).
CONCLUSIONS: We have demonstrated for the first time a beneficial effect from the pretreatment with isoflurane on the isolated human artery. Pretreatment with isoflurane preserves ATP-sensitive K^+ channel activity in the human omental artery exposed to oxidative stress induced by high glucose, whereas the effect seems to be mediated by NADPH oxidase inhibition. Volatile anesthetics may protect human visceral arteries from malfunction caused by oxidative stress.

使用光體積描記術波形的時頻分析探究抽取 900 毫升血液期間變化

Using Time-Frequency Analysis of the Photoplethysmographic Waveform to Detect the Withdrawal of 900 mL of Blood

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背景：此研究目的爲確定健康志願者自主呼吸下抽取 900 毫升血液期間在心率或動脈血壓顯著變化前，是否可通過檢查光體積描記圖（PPG）波形的心率頻譜帶和/或呼吸頻譜帶隨時間變化頻譜幅度檢測其變化。本研究還探討耳朵、手指和前額，哪個是用於早期檢測血容量損失時 PPG 探頭放置的最佳部位。
方法：八位受試者被抽取 900 毫升血液後再回輸。生理監測包括耳朵、手指和前額部位的 PPG 的波形、標準心電圖、標準血壓袖帶測量。從心率頻段和呼吸頻率段在 PPG 波形隨時間變化的振幅序列中提取高解析度時頻譜。這些振幅用於作爲失血檢測參數。
結果：處理期間受試者心率和血壓沒有顯著變化。使用從耳朵、手指和前額探測部位收集的 PPG 波形的時頻分析，當抽出 900ml 血液時，發現相對於基線，提取的相對心率的頻率振幅信號顯著下降（P <0.05）；在耳部，僅 300 毫升血液被抽出時相應的信號下降就出現下降。
在耳朵、手指和額頭三個部位分別進行監測，損失 900 毫升血液時相對基線的心率分量的振幅分別平均下降 45.2%（38.2%），42.0%（29.2%）和 42.3%（30.5%），括弧中顯示 95%的置信區間。 900 毫升血回輸後，顯示心率的振幅信號向基線恢復。基線和 900 毫升的血液抽出後之間心率振幅值有一個明顯的分離。將心率頻率優化分離 2 簇心率振幅值（基線和失血）而得到的選定耳 PPG 信號的閾值，其特異性和敏感性都爲 87.5%，95%

置信區間是（47.4%，99.7%）。同時，發現在相應的呼吸頻率波段的光譜幅度沒有顯著變化。

結論：時頻光譜法可監測自主呼吸下血壓心率顯著變化前的血液丟失。發現自住呼吸患者失血時，心率頻率帶的光譜振幅顯著減少，然而呼吸頻率帶的無顯著變化。這項技術可作爲手術中和創傷期有價值監測出血的監測方法。

（孫曉瓊　譯　陳傑　校）

BACKGROUND: We designed this study to determine if 900 mL of blood withdrawal during spontaneous breathing in healthy volunteers could be detected by examining the time-varying spectral amplitude of the photoplethysmographic (PPG) waveform in the heart rate frequency band and/or in the breathing rate frequency band before significant changes occurred in heart rate or arterial blood pressure. We also identified the best PPG probe site for early detection of blood volume loss by testing ear, finger, and forehead sites.

METHODS: Eight subjects had 900 mL of blood withdrawn followed by reinfusion of 900 mL of blood. Physiological monitoring included PPG waveforms from ear, finger, and forehead probe sites, standard electrocardiogram, and standard blood pressure cuff measurements. The time-varying amplitude sequences in the heart rate frequency band and breathing rate frequency band present in the PPG waveform were extracted from high-resolution time-frequency spectra. These amplitudes were used as a parameter for blood loss detection.

RESULTS: Heart rate and arterial blood pressure did not significantly change during the protocol. Using time-frequency analysis of the PPG waveform from ear, finger, and forehead probe sites, the amplitude signal extracted at the frequency corresponding to the heart rate significantly decreased when 900 mL of blood was withdrawn, relative to baseline (all $P < 0.05$); for the ear, the corresponding signal decreased when only 300 mL of blood was withdrawn. The mean percent decrease in the amplitude of the heart rate component at 900 mL blood loss relative to baseline was 45.2% (38.2%), 42.0% (29.2%), and 42.3% (30.5%) for ear, finger, and forehead probe sites, respectively, with the lower 95% confidence limit shown in parentheses. After 900 mL blood reinfusion, the amplitude signal at the heart rate frequency showed a recovery towards baseline. There was a clear separation of amplitude values at the heart rate frequency between baseline and 900 mL blood withdrawal. Specificity and sensitivity were both found to be 87.5% with 95% confidence intervals (47.4%, 99.7%) for ear PPG signals for a chosen threshold value that was optimized to separate the 2 clusters of amplitude values (baseline and blood loss) at the heart rate frequency. Meanwhile, no significant changes in the spectral amplitude in the frequency band corresponding to respiration were found.

CONCLUSION: A time-frequency spectral method detected blood loss in spontaneously breathing subjects before the onset of significant changes in heart rate or blood pressure. Spectral amplitudes at the heart rate frequency band were found to significantly decrease during blood loss in spontaneously breathing subjects, whereas those at the breathing rate frequency band did not significantly change. This technique may serve as a valuable tool in intraoperative and trauma settings to detect and monitor hemorrhage.

改良快速順序誘導和插管: 美國最新臨床調查

Modified Rapid Sequence Induction and Intubation: A Survey of United States Current Practice

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背景: 快速順序誘導插管 (RSII) 是一種廣泛用於防止胃內容物返流和保護氣道的技術。改良的 RSII 在一些特定臨床條件下應用。然而改良 RSII 沒有明確定義。因此，本研究調查了全美各地的學術中心的臨床醫生，以建立改良 RSII 的確切定義及其目前的使用情況。
方法: 本調查意在對改良 RSII 的定義和具體使用提出問題，並且由測試者證實。給全美 131 家麻醉住院醫師培訓機構發送了電子郵件。設計 logistic 回歸模型來評估在接受改良 RSII 的測試者中有肯定回應及連續回答調查各項問題的百分比。醫師狀態也同樣被計算在內（住院和主治）。
結果: 從 58 個機構中得到了 490 份調查(44%的機構回應率);93%測試者使用改良 RSII,他們中的 85% 持續完成了調查研究。大多數測試者(71%, 置信區間: 63%–77%) 報告在麻醉誘導前予以吸氧，進行環狀軟骨壓迫，以及在保障氣道通氣前嘗試面罩通氣。測試者記錄到，當病人中度或病態肥胖(59%, 53%–64%)，有胃食管返流病史但當前無症狀(52%, 46%–57%)，食道裂孔疝(42%, 36%–48%)或者外傷病人禁食 8 小時以上(39%, 33%–45%)時，他們會使用改良 RSII。同樣的結果在那些沒有持續完成的調查中也有所體現。
結論: 在調查基礎上，本研究確定了 3 個改良 RSII 的特徵: (1) 誘導前吸氧; (2) 環狀軟骨壓迫; (3) 氣道保障前嘗試病人肺部通氣。這一定義很顯而易見，儘管如此被公眾接受，但之前卻沒有相關試驗資料。
（俞劼晶　譯　陳傑　校）
BACKGROUND: Rapid sequence induction and intubation (RSII) is a technique commonly used to resist regurgitation of gastric contents and protect the airway. A modification of this technique is implemented in certain clinical circumstances. However, there is currently no standard definition for a modified RSII. Therefore, we surveyed clinicians at academic centers across the United States to establish a working definition of a modified RSII as well as the clinical scenarios in which it is being used.
METHODS: A survey was created that queried the use and definition of modified RSII, and validated with test respondents. We then mailed the survey to all 131 anesthesia residency training programs across the United States. Logistic regression models were created to estimate the percentage of affirmative responses among respondents that performed modified RSII procedures and answered survey items in a consistent manner. Similar quantities were calculated by physician status (resident and attending).
RESULTS: Four hundred ninety surveys were received from 58 institutions (44% institution response rate); 93% of respondents reported using a modified RSII, and of those 85% consistently completed the survey instrument. A majority of respondents (71%, CI: 63%–77%) reported administering oxygen before anesthesia induction, applying cricoid pressure, and attempting to ventilate the lungs via a facemask before securing the airway. Respondents noted that they would use a modified RSII procedure if the patient were either moderately or morbidly obese (each ~59%, 53%–64%), had a history but no current symptoms of gastroesophageal reflux disease (52%, 46%–57%), had a hiatal hernia (42%, 36%–48%) or were a trauma patient who had been NPO for at least 8 h (39%, 33%–45%). Similar RSII results were obtained when repeating the analysis on the subset that did not enforce the consistency requirements.

CONCLUSIONS: Based on our survey we have established three defining features of a modified RSII: (1) oxygen administration before induction; (2) the use of cricoid pressure; and (3) an attempt to ventilate the patient's lungs before securing the airway. Although this definition seems intuitively obvious, no previous work has tested whether it is commonly accepted.

簡報：全身炎性反應與正常肺機械通氣策略相關性急性肺損傷無關

Brief Report: Systemic Inflammatory Response Does Not Correlate with Acute Lung Injury Associated with Mechanical Ventilation Strategies in Normal Lungs

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背景：機械通氣（MV）可引起繼發於創傷的通氣誘導肺損傷，且與肺炎症因數增加相關。關於肺損傷與全身炎性反應的關係尚存爭議。本報告闡明了機械通氣對全身炎症的影響。
方法：本報告是先前已發表的一篇研究的部分內容（Hong et al. Anesth Analg 2010;110:1652–60）。雌豬隨機分爲三組。H-Vt/3 組根據預計體重（PBW）給予潮氣量（VT）15ml/kg 機械通氣/呼氣末正壓（PEEP）爲 3cm H2O；L-Vt/3 組根據預計體重給予 6ml/kg 潮氣量/PEEP 爲 3cm H2O 機械通氣；L-VT/10 根據預計體重給予 6ml/kg 潮氣量/PEEP 爲 10cm H2O 機械通氣，共機械通氣 8 小時。每組 6 個樣本（n=6）。 抽取機械通氣前後的血清進行炎性標誌檢測。同時監測血流動力學，氣道力學及動脈血氣。
結果：組間的全身炎症因數沒有顯著差異。所有樣本的血清炎性標誌物的變化趨勢相似。此結果與先前發表的支氣管肺泡灌洗物中炎性介質升高的結果矛盾。
結論：全身炎性標誌物和機械通氣相關性肺損傷不相關。
（陸秉瑋　譯　陳傑　校）

BACKGROUND: Mechanical ventilation (MV) can lead to ventilator-induced lung injury secondary to trauma and associated increases in pulmonary inflammatory cytokines. There is controversy regarding the associated systemic inflammatory response. In this report, we demonstrate the effects of MV on systemic inflammation.
METHODS: This report is part of a previously published study (Hong et al. Anesth Analg 2010;110:1652–60). Female pigs were randomized into 3 groups. Group H-Vt/3 was ventilated with a tidal volume (Vt) of 15 mL/kg predicted body weight (PBW)/positive end-expiratory pressure (PEEP) of 3 cm H_2O; group L-Vt/3 with a Vt of 6 mL/kg PBW/PEEP of 3 cm H2O; and group L-Vt/10 with a Vt of 6 mL/kg PBW/PEEP of 10 cm H_2O, for 8 hours. Each group had 6 subjects (n = 6). Prelung and postlung sera were analyzed for inflammatory markers. Hemodynamics, airway mechanics, and arterial blood gases were monitored.
RESULTS: There were no significant differences in systemic cytokines among groups. There were similar trends of serum inflammatory markers in all subjects. This is in contrast to findings

previously published demonstrating increases in inflammatory mediators in bronchoalveolar lavage.
CONCLUSION: Systemic inflammatory markers did not correlate with lung injury associated with MV.

嗎啡、普瑞巴林、加巴噴丁和度洛西丁在大鼠病理性疼痛模型中對機械痛敏和神經瘤疼痛的不同作用

The Efficacy of Morphine, Pregabalin, Gabapentin, and Duloxetine on Mechanical Allodynia Is Different from That on Neuroma Pain in the Rat Neuropathic Pain Model

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背景：據報導，<50%的神經痛患者對藥物治療滿意。由於開具藥物處方時忽略了疼痛的原因，故神經病理性疼痛藥物缺乏有效性是有可能的。本文比較了口服嗎啡、普瑞巴林、加巴噴丁和度洛西丁在脛骨神經瘤換位元模型（TNT）中對機械痛敏和神經瘤疼痛的療效。
方法：在 TNT 模型中，橫切脛神經，將脛神經殘端嫁接至後肢外側。TNT 模型建立後，觀察到機械痛敏和神經瘤痛。給予嗎啡、普瑞巴林、加巴噴丁和度洛西丁口服並檢查其抗機械痛敏和神經瘤痛療效。
結果：嗎啡、普瑞巴林、加巴噴丁和度洛西丁對機械痛敏有劑量依賴性的治療作用。嗎啡可以減輕神經瘤疼痛，而普瑞巴林、加巴噴丁和度洛西丁無效。嗎啡對神經瘤痛的療效小於其對機械痛敏的療效。在兩種藥物合用的研究中（嗎啡+普瑞巴林，嗎啡+度洛西丁，普瑞巴林+度洛西丁），所有藥物合用產生了對治療機械痛敏的協同效應，但對神經瘤的疼痛治療無此效應。
結論：這些資料表明與治療神經瘤性疼痛不同，嗎啡及普瑞巴林、加巴噴丁、度洛西丁對治療機械痛敏更有效，且聯合療法是另一種治療神經病理性疼痛的方法。
（滕淩雅　譯　陳傑　校）

BACKGROUND: It has been reported that <50% of neuropathic pain patients are satisfactorily treated with drugs. It is possible that this lack of efficacy of drugs on neuropathic pain might be due to the drugs prescribed, regardless of the origin of pain. We compared the efficacy of orally administered morphine, pregabalin, gabapentin, and duloxetine on mechanical allodynia with that on neuroma pain using the tibial neuroma transposition (TNT) model.
METHODS: In the TNT model, the tibial nerve is transected, and the tibial nerve stump is transpositioned to the lateral aspect of the hindlimb. After TNT injury, mechanical allodynia and neuroma pain are observed. Morphine, pregabalin, gabapentin, and duloxetine were administered orally and were examined for the antiallodynic and antineuroma pain effects.
RESULTS: Morphine, pregabalin, gabapentin, and duloxetine attenuated the level of mechanical allodynia in a dose-dependent manner. Morphine—but not pregabalin, gabapentin, and duloxetine—attenuated the neuroma pain. Morphine was less potent in neuroma pain than in mechanical allodynia. In the 2-drug-combination studies (morphine + pregabalin, morphine + duloxetine, and pregabalin + duloxetine), all drug combinations produced a synergistic effect on mechanical allodynia, but not on neuroma pain.

CONCLUSIONS: These data indicate that the potency of morphine and the efficacy of pregabalin, gabapentin, and duloxetine on mechanical allodynia are different from those on neuroma pain and that combination therapy is one of different therapeutic choices for the treatment of neuropathic pain.

在大鼠術後疼痛模型中加巴噴丁通過脊髓作用加強雙氯芬酸鈉的抗痛覺過敏效果

Gabapentin Augments the Antihyperalgesic Effects of Diclofenac Sodium Through Spinal Action in a Rat Postoperative Pain Model

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背景：加巴噴丁及非甾體類抗炎藥物(NSAIDs) 緩解人術後疼痛和神經病理性疼痛。加巴噴丁和非甾體抗炎藥的組合對治療術後疼痛和增強手術後功能恢復是有效的。鞘內注射加巴噴丁或 NSAIDs 在大鼠術後疼痛模型中可抑制痛覺過敏。然而,沒有資料提示在鞘內混合注射加巴噴丁和非甾體抗炎藥有何效果。因此,本試驗研究鞘內注射加巴噴丁和非甾體抗炎藥物在老鼠術後疼痛模型中的作用。
方法：大鼠在氟烷麻醉下行鞘內置管。置管後兩天,分組並鞘內注射加巴噴丁(4,40,或 400μg 每 20μL 鹽水)，雙氯芬酸鈉－一非選擇性環氧合酶抑制劑 (2、20 或 200ug 每 20μL6%葡萄糖溶液),20μL 生理鹽水,20μL 6%葡萄糖,加巴噴丁和雙氯芬酸混合液(40μg 加巴噴丁+ 20μg 雙氯芬酸和 4μg 加巴噴丁+ 2μg 雙氯芬酸每 20μL 6%葡萄糖)。注射後 30 分鐘行後爪切開。每個小組由 6 只大鼠組成。分別在鞘內置管前和後 2 小時,和後爪切開後 1、3、5 和 7 天通過使用 von Frey 纖維檢測機械閾值來評估繼發性痛敏
結果：與對照組相比，加巴噴丁 400μg 組持續 7 天減輕了機械性痛敏。200μg 雙氯芬酸與對照組相比抑制痛敏長達 5 天。與單獨使用加巴噴丁 40μg 或雙氯芬酸 20μg 相比，加巴噴丁 40μg +雙氯芬酸組 20μg 在術後 2 小時、1 天顯著降低繼發性痛敏。與雙氯芬酸 2μg 組相比，加巴噴丁 4μg +雙氯芬酸顯著 2μg 減輕了術後 2 小時、1 天的痛敏。與切開前閾值相比，對側爪的縮足反射閾值並未改變。
結論：鞘內混合注射加巴噴丁和雙氯芬酸可減輕繼發性痛敏，單獨應用時並無作用。此研究結果表明, 在脊髓水準減少術後疼痛中加巴噴丁和雙氯芬酸起到重要作用,加巴噴丁通過脊髓作用增強雙氯芬酸的抗痛敏效果。
（龔寅　譯　陳傑　校）

BACKGROUND: Gabapentin and nonsteroidal antiinflammatory drugs (NSAIDs) attenuate postoperative pain and neuropathic pain in humans. The combination of gabapentin and NSAIDs is effective for postoperative pain and enhances functional recovery after surgery. Intrathecal administration of gabapentin or NSAIDs inhibits hyperalgesia in a rat postoperative pain model. However, there is no information on the effects of intrathecal administration of a combination of gabapentin and NSAIDs. We therefore investigated the effects of intrathecal administration of gabapentin and NSAIDs in a rat model of postoperative pain.
METHODS: Rats were prepared for intrathecal catheters under halothane anesthesia. Two days after catheterization, gabapentin (4, 40, or 400 μg per 20 μL of saline), diclofenac sodium, a nonselective cyclooxygenase inhibitor (2, 20, or 200 μg per 20 μL of 6% glucose), 20 μL saline, 20 μL 6% glucose, and a combination of gabapentin and diclofenac (40 μg gabapentin + 20 μg diclofenac and 4 μg gabapentin + 2 μg diclofenac per 20 μL 6% glucose) were injected

intrathecally. We performed a hindpaw incision 30 minutes after injection. Each group consisted of 6 rats. The mechanical threshold was measured to evaluate secondary hyperalgesia using von Frey filaments before intrathecal catheterization and at 2 hours, and 1, 3, 5, and 7 days after paw incision.
RESULTS: Gabapentin 400 μg attenuated mechanical hyperalgesia for 7 days compared with the control group. Diclofenac 200 μg inhibited hyperalgesia for 5 days compared with the control group. The 40 μg gabapentin + 20 μg diclofenac group had a significantly reduced secondary hyperalgesic response in 2 hours and 1 day compared with 40 μg gabapentin and 20 μg diclofenac, respectively. The 4 μg gabapentin + 2 μg diclofenac group had a significantly reduced secondary hyperalgesic response in 2 hours and 1 day compared with 2 μg diclofenac. The withdrawal threshold on the contralateral paw did not change compared with the preincision threshold.
CONCLUSION: Intrathecal administration of gabapentin and diclofenac in combination reduced secondary hyperalgesia at doses having no antihyperalgesic effects when given individually. Our results suggest that gabapentin and diclofenac have an important role in postoperative pain reduction at the spinal level, and that gabapentin augments the antihyperalgesic effects of diclofenac through action in the spinal cord.

超聲引導下眼部阻滯是否損傷眼睛？家兔模型下使用兩種超聲設備評估眶內熱量和結構變化的比較研究

Are Ultrasound-Guided Ophthalmic Blocks Injurious to the Eye? A Comparative Rabbit Model Study of Two Ultrasound Devices Evaluating Intraorbital Thermal and Structural Changes

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背景：自 1936 年 Atkinson's 描述球後阻滯，以針刺給藥爲基礎的麻醉技術已成爲眼科麻醉的主要方法。但是，這項技術有罕見，但嚴重的併發症，如眼球穿孔。超聲技術在外周神經阻滯已廣泛運用，但其在眼部麻醉的應用因爲顧慮超聲可能對脆弱眼組織產生熱敏或生物力學傷害而受阻。美國食品和藥物管理局（FDA）已制定超聲眼科檢查指南，但大多數麻醉醫師使用的眼部超聲設備沒有通過 FDA 批准， 因爲此類設備產生過多能量。國家監管機構指出，只要不超過組織生理溫度水準 1.5℃，即可安全進行超聲檢查。
方法：利用家兔模型，調查長時間使用眼眶超聲及非眼眶超聲對眼部的溫度及機械效應。此雙階段研究旨在檢測是否會導致眼外傷，對 8 只家兔的眼睛進行 2 種設備連續 10 分鐘的超聲檢查：(1) the Sonosite Micromaxx（非特定眼眶型） (2) the Sonomed VuMax（特定眼眶型）。第一階段，通過植入熱電偶，在特定的眼部結構連續監測溫度（N =4）。 第二階段，無手術治療情況下進行超聲暴露（n =4）。對所有眼睛行光學顯微鏡檢查，並由眼科病理學家進行不定時組織學評價。

結果：4 只家兔的眼睛被檢測到溫度變化。三隻家兔的晶狀體（分別在 5.0, 5.5, 及 1.5min）及兩隻家兔的角膜（均在 1.5min）在非特定眼眶型超聲下下，眼部組織溫度超過安全上限（增加>1.5℃）。 繼而進行時間溫度分析，發現在 3.5min 時角膜處，在 2.5min 時晶狀體處，在 4.0min 時玻璃體處，特定眼眶型及非特定眼眶型組存在明顯的統計學差異(Bonferroni 校正法 P < 0.05)。兩組光學顯微鏡和組織學檢查均未發現眼外傷。
結論：非特定眼眶型超聲(Sonosite Micromaxx) 會增加眼部組織的溫度。需進行更大更多的調查研究來證實其安全性。目前，眼科超聲引導阻滯應僅在特定眼眶型設備下進行。
（陳毓雯　譯　陳傑　校）

BACKGROUND: Since Atkinson's original description of retrobulbar block in 1936, needle-based anesthetic techniques have become integral to ophthalmic anesthesia. These techniques are unfortunately associated with rare, grave complications such as globe perforation. Ultrasound has gained widespread acceptance for peripheral nerve blockade, but its translation to ocular anesthesia has been hampered because sonic energy, in the guise of thermal or biomechanical insult, is potentially injurious to vulnerable eye tissue. The US Food and Drug Administration (FDA) has defined guidelines for safe use of ultrasound for ophthalmic examination, but most ultrasound devices used by anesthesiologists are not FDA-approved for ocular application because they generate excessive energy. Regulating agencies state that ultrasound examinations can be safely undertaken as long as tissue temperatures do not increase >1.5℃ above physiological levels.
METHODS: Using a rabbit model, we investigated the thermal and mechanical ocular effects after prolonged ultrasonic exposure to single orbital- and nonorbital-rated devices. In a dual-phase study, aimed at detecting ocular injury, the eyes of 8 rabbits were exposed to continuous 10-minute ultrasound examinations from 2 devices: (1) the Sonosite Micromaxx (nonorbital rated) and (2) the Sonomed VuMax (orbital rated) machines. In phase I, temperatures were continuously monitored via thermocouples implanted within specific eye structures (n = 4). In phase II the eyes were subjected to ultrasonic exposure without surgical intervention (n = 4). All eyes underwent light microscopy examinations, followed at different intervals by histology evaluations conducted by an ophthalmic pathologist.
RESULTS: Temperature changes were monitored in the eyes of 4 rabbits. The nonorbital-rated transducer produced increases in ocular tissue temperature that surpassed the safe limit (increases >1.5℃) in the lens of 3 rabbits (at 5.0, 5.5, and 1.5 minutes) and cornea of 2 rabbits (both at 1.5 minutes). A secondary analysis of temporal temperature differences between the orbital-rated and nonorbital transducers revealed statistically significant differences (Bonferroni-adjusted P < 0.05) in the cornea at 3.5 minutes, the lens at 2.5 minutes, and the vitreous at 4.0 minutes. Light microscopy and histology failed to elicit ocular injury in either group
CONCLUSIONS: The nonorbital-rated ultrasound machine (Sonosite Micromaxx) increases the ocular tissue temperature. A larger study is needed to establish safety. Until then, ophthalmic ultrasound-guided blocks should only be performed with ocular-rated devices.

股神經阻滯聯合選擇性脛神經阻滯可提供有效的全膝關節置換術後鎮痛，同時避免足下垂發生：一項前瞻性，隨機，觀察者盲法研究

Femoral Nerve Block With Selective Tibial Nerve Block Provides Effective Analgesia Without Foot Drop After Total Knee Arthroplasty: A Prospective, Randomized, Observer-Blinded Study

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背景：坐骨神經阻滯聯合股神經阻滯對於全膝關節置換術，可提供優越的鎮痛效果，但會產生足下垂的併發症，這可能掩蓋了手術引起的腓總神經損傷。這項前瞻性，隨機，觀察者盲法的研究目的是評估在腘窩行選擇性脛神經阻滯是否能避免完全的腓運動神經阻滯。
方法：擇期行膝關節置換術的患者 80 例，隨機接受腘窩處的脛神經阻滯或坐骨神經分叉處阻滯，並聯合股神經阻滯，作爲多模式鎮痛的一部分。爲了阻滯目標神經需要足夠的局部麻醉劑量，最多 20 毫升。手術中使用全身麻醉。麻醉蘇醒後，在恢復室需評價腓神經感覺阻滯和運動阻滯是否存在。同時記錄術後 24 小時疼痛評分和阿片類的用量。
結果：脛神經阻滯和坐骨神經阻滯分別在腘橫紋近端 1.7cm 處（99％置信區間爲 1.3～2.1）和 9.4cm 處（99％CI，8.3 到 10.5）進行，（均數間差異的 99％CI 爲 6.4 至 9.0，P<0.001）。低劑量的 0.5％羅呱卡因用於脛神經阻滯，分別爲 8.7ml（99％CI，7.9～9.4）與 15.2ml（99％CI，14.9 至 15.5），（均數間差異的 99％CI 爲 5.6 7.3; P<0.001）。接受脛神經阻滯的病人中無人發生完全性腓運動神經阻滯，而行坐骨神經阻滯的病人中則有 82.5％發生這種併發症（P <0.01）。疼痛評分和阿片類藥物用量在兩組之間沒有顯著差異。
結論：對於接受全膝關節置換術的患者聯合股神經阻滯情況下，在腘窩靠近腘橫紋處行脛神經阻滯可以避免完全的腓運動神經阻滯，又能提供與坐骨神經阻滯類似的鎮痛效果。
（張婷　譯　陳傑　校）

BACKGROUND: Sciatic nerve block when combined with femoral nerve block for total knee arthroplasty may provide superior analgesia but can produce footdrop, which may mask surgically induced peroneal nerve injury. In this prospective, randomized, observer-blinded study, we evaluated whether performing a selective tibial nerve block in the popliteal fossa would avoid complete peroneal motor block.
METHODS: Eighty patients scheduled for primary total knee arthroplasty were randomized to receive either a tibial nerve block in the popliteal fossa or a sciatic nerve block proximal to its bifurcation in combination with femoral nerve block as part of a multimodal analgesia regimen. Local anesthetic solution of sufficient volume to encircle the target nerve was administered for the block, up to a maximum of 20 mL. General anesthesia was administered for surgery. After emergence from anesthesia, in the recovery room, the presence or absence of peroneal sensory and motor block was noted. Pain scores and opioid consumption were recorded for 24 hours after surgery.
RESULTS: The tibial nerve block and sciatic nerve block were performed 1.7 cm (99% CI, 1.3 to 2.1) and 9.4 cm (99% CI, 8.3 to 10.5) proximal to the popliteal crease, respectively (99% CI for difference between means: 6.4 to 9.0; $P < 0.001$). A lower volume of ropivacaine 0.5% was used for the tibial nerve block, 8.7 mL (99% CI, 7.9 to 9.4) versus 15.2 mL (99% CI, 14.9 to 15.5), respectively (99% CI for difference between means, 5.6 to 7.3; $P < 0.001$). No patient receiving a tibial nerve block developed complete peroneal motor block compared to 82.5% of

patients with sciatic nerve block ($P < 0.001$). There were no significant differences in the pain scores and opioid consumption between the groups.
CONCLUSIONS: Tibial nerve block performed in the popliteal fossa in close proximity to the popliteal crease avoided complete peroneal motor block and provided similar postoperative analgesia compared to sciatic nerve block when combined with femoral nerve block for patients undergoing total knee arthroplasty.