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CARDIOVASCULAR ANESTHESIOLOGY:

術後認知功能障礙對絕經婦女心臟手術後 6 月生活品質的影

The Role of Postoperative Neurocognitive Dysfunction on Quality of Life for Postmenopausal Women 6 Months After Cardiac Surgery

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背景：婦女心臟手術後易於產生神經系統併發症。作者以前報導過術前用神經保護劑類固醇 17β-雌二醇,術後 4-6 周仍不能改善老年婦女認知功能。在此項研究中，作者評估了絕經婦女心臟手術早期術後認知功能障礙對術後 6 月生活品質的影響，並評估術前給予 17β-雌二醇是否具有治療作用。
方法：174 名絕經婦女從手術前一天開始到術後第 5 天隨機、雙盲給予 17β-雌二醇或安慰劑。分別於術前、4-6 周、術後 6 個月對患者進行一組標準的心理測試。用 SF-36 問卷法和 Lawton 日常生活能力量表評價基線水準和術後 6 月的生活品質。
結果：108 名婦女獲取有用資料，其中 13%患者發生術後認知功能障礙。依據多因素回歸分析，術後 4-6 周認知缺陷預示 SF-36 部分評分較低($P = 0.004$)，並且術後 6 月 Lawton 日常生活能力量表評分較低($P = 0.015$)。用 17β-雌二醇治療($P = 0.003$) 和吸煙($P = 0.015$)者 SF-36 精神健康部分更差。術前評分較低與各種方式測量的術後生活品質差非常相關。

結論：術後認知功能障礙與婦女心臟手術後生活品質受損有關。術前用 17β-雌二醇治療對術後生活品質的改善沒有益處。術前自評的健康狀態低和術後自評的健康狀態也低的關係表明，絕經婦女生活品質沒有隨心臟手術而改善。
（趙燕星 譯 陳傑 校）

BACKGROUND: Women are prone to neurological complications after cardiac surgery. We have previously reported that treatment perioperatively with the neuroprotectant steroid 17β-estradiol did not improve neurocognitive end-points 4 to 6 wk after surgery for elderly women. In this study, we evaluated the influence of early postoperative neurocognitive dysfunction on quality of life in postmenopausal women undergoing cardiac surgery and whether it is impacted by perioperative 17β-estradiol treatment.
METHODS: One hundred seventy-four postmenopausal women randomly received 17β-estradiol or placebo in a double-blind manner beginning the day before surgery and continued until the fifth postoperative day. The patients underwent psychometric testing using a standard battery before surgery and again 4 to 6 wk and 6 mo postoperatively. Quality of life was assessed at baseline and 6 mo after surgery with the SF-36 questionnaire and the Lawton instrumental activities of daily living scale.
RESULTS: Complete data were available from 108 women of whom 13% demonstrated postoperative neurocognitive dysfunction. Based on multiple logistic regression analysis, a neurocognitive deficit 4 to 6 wk after surgery was an independent predictor of a lower SF-36 physical component score ($P = 0.004$) and lower Lawton instrumental activities of daily living scale 6 mo postoperatively ($P = 0.026$). Treatment with 17β-estradiol ($P = 0.003$) and smoking status ($P = 0.015$) were predictors of worse SF-36 mental health component rating. Preoperative lower scores were independently associated with low quality of life postoperatively for all measurements.
CONCLUSIONS: Postoperative neurocognitive dysfunction is associated with impaired quality of life in women after cardiac surgery. Perioperative treatment with 17β-estradiol provides no benefits to postoperative quality of life. The relationship between low preoperative and postoperative self-rated health status suggests that some aspects of quality of life in postmenopausal women are not amenable to improvements with cardiac surgery.

對女性缺血性心臟病病理生理學的最新認識導致在圍術期管理上發生變化：一個核心綜述

Newly Appreciated Pathophysiology of Ischemic Heart Disease in Women Mandates Changes in Perioperative Management: A Core Review (Review Article)

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Anesth Analg 2008; 107:37-50

男性和女性在病理生理學上相似的假設使得女性患者在臨床上常常根據男性患者的標準來評估和治療。然而文獻中有越來越多的證據表明，除生殖系統外，男性和女性還存在其他基本的生理上的差異。這些差異在青春期以後很快體現出來並隨年齡增長而變得更顯著。體重、容量和肝腎代謝上的差異成爲常用心血管藥物療效和副作用不同的原因。女性冠狀動脈更細，心臟舒張功能障礙更常發生，冠脈疾病症狀

不典型，血管重建術後效果不及男性。另外女性心動週期較男性短，更容易出現心律失常並且對抗心律失常藥的反應存在個體差異。評估了非心臟手術後藥理學心肌保護的作用或結果的大多數流行病學研究不是僅對男性患者研究，就是沒有將女性患者單獨分組做研究。最近研究表明冠脈痙攣可能是女性急性心肌缺血的主要原因。這也正解釋了女性患者對常規心肌灌注試驗敏感性和特異性不佳的原因。考慮到所有的這些證據，已很有必要基於性別來考慮手術風險分層。而這個探討也會引起當前患者管理日常規範的調整。

（邱鬱薇 譯 馬皓琳 李士通 校）

The assumption that males and females are physiologically similar has led to females being clinically evaluated and treated as males. However, there is growing evidence in the literature that, other than the reproductive system, there are other fundamental physiological differences between the two genders. The manifestation of these differences starts soon after puberty and becomes more pronounced with age. The differences in body mass and volume and renal and liver metabolism account for the difference in therapeutic efficacy and side effects of commonly used cardiovascular drugs. Women have smaller coronary arteries, more frequent diastolic dysfunction, present with vague symptoms of coronary artery disease and do worse than men after revascularization procedures. Women also have a shorter cardiac cycle and are more prone to develop arrhythmias and react differently to antiarrhythmic drugs. Most epidemiological trials that have assessed the utility of pharmacological myocardial protection or outcomes after noncardiac surgery have either been performed on men only or women were not identified as a separate group. Recent evidence is suggestive that coronary vasospasm may be the dominant etiology of acute myocardial ischemia in women. This may explain the poor sensitivity and specificity of the routine myocardial perfusion tests. Having considered all this evidence, it has become very essential to view the operative risk stratification as being gender-based. This approach may involve a shift in our present day paradigm of patient management.

動態監測和控制血糖在心臟手術中是有效的，可行的，安全的

Dynamic Tight Glycemic Control During and After Cardiac Surgery Is Effective, Feasible, and Safe

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Anesth Analg 2008 107: 51-58.

背景：嚴密的血糖監測有助於減少危重病人的發病率和死亡率，但是，心臟手術當中的血糖監測經常很困難，且有低血糖的危險。在本項研究中，我們就一份胰島素治療的運算法則（Aalst 血糖胰島素運算法則)評估在心臟手術中及在 ICU 中，將目標血糖控制在 80－110 mg/dL 的安全性和有效性。
方法：我們收集了進行體外迴圈的心臟手術的 483 例非糖尿病病人及 168 例糖尿病病人的資料。對手術期間的胰島素需要和敏感性進行快速預測，我們用表格表現

血糖和胰島素用量的關係，用排來表示血糖範圍，用列來表示根據患者的胰島素敏感性得出的胰島素劑量。根據血糖的水準和胰島素的敏感度調整胰島素的劑量（例如，在體外迴圈時降低敏感性，術後正常化）。

結果：總共測量了 18893 個術中及術後血糖。手術中，非糖尿病病人的平均血糖在目標血糖範圍中，除了體外迴圈時（112 ± 17 mg/dL）及複溫時(113 ± 19 mg/dL)。在糖尿病病人，血糖由麻醉誘導時的 121 ± 40 mg/dL，降至手術結束時的 112 ± 26 mg/dL（P < 0.05)，52.9%的病人達到目標血糖。在 ICU，平均血糖水平均在目標血糖範圍，除了糖尿病病人剛進入 ICU 時(113 ± 24 mg/dL)。在所有的血糖監測中（術中及 ICU 中）68.0%的病人在目標血糖範圍，0.12% 的非糖尿病病人和 0.18% 糖尿病病人低於 60 mg/dL. 血糖低於 50 mg/dL 在所有病人中被避免，但還是有四個病人(0.6%)發生低血糖(40 mg/dL 時觀測到的最低值).

結論：Aalst 血糖胰島素運算法則對於嚴密監測心臟手術期間的血糖是有效的，而且可以將低血糖的危險性降到最低。

（胡豔譯　薛張剛校）

BACKGROUND: Tight blood glucose control reduces mortality and morbidity in critically ill patients, but intraoperative glucose control during cardiac surgery is often difficult, and risks hypoglycemia. In this study, we evaluated the safety and efficacy of a nurse-driven insulin protocol (the Aalst Glycemia Insulin Protocol) for achieving a target glucose level of 80–110 mg/dL during cardiac surgery and in the intensive care unit (ICU).

METHODS: We included 483 nondiabetics and 168 diabetics scheduled for cardiac surgery with cardiopulmonary bypass. To anticipate rapid perioperative changes in insulin requirement and/or sensitivity during surgery, we developed a dynamic algorithm presented in tabular form, with rows representing blood glucose ranges and columns representing insulin dosages based on the patients' insulin sensitivity. The algorithm adjusts insulin dosage based on blood glucose level and the projected insulin sensitivity (e.g., reduced sensitivity during cardiopulmonary bypass and normalizing sensitivity after surgery).

RESULTS: A total of 18,893 blood glucose measurements were made during and after surgery. During surgery, the mean glucose level in nondiabetic patients was within targeted levels except during (112 ± 17 mg/dL) and after rewarming (113 ± 19 mg/dL) on cardiopulmonary bypass. In diabetics, blood glucose was decreased from 121 ± 40 mg/dL at anesthesia induction to 112 ± 26 mg/dL at the end of surgery (P < 0.05), with 52.9% of patients achieving the target. In the ICU, the mean glucose level was within targeted range at all time points, except for diabetics upon ICU arrival (113 ± 24 mg/dL). Of all blood glucose measurements (operating room and ICU), 68.0% were within the target, with 0.12% of measurements in nondiabetics and 0.18% in diabetics below 60 mg/dL. Hypoglycemia < 50 mg/dL was avoided in all but four (0.6%) patients (40 mg/dL was the lowest observed value).

CONCLUSIONS: The Aalst Glycemia Insulin Protocol is effective for maintaining tight perioperative blood glucose control during cardiac surgery with minimal risk of hypoglycemia.

心臟手術後急性高血壓的治療：氯維地平的治療效應-2（ESCAPE-2），一項隨機雙盲安慰劑對照研究

Treatment of Acute Postoperative Hypertension in Cardiac Surgery Patients: An Efficacy Study of Clevidipine Assessing Its Postoperative Antihypertensive Effect in Cardiac Surgery-2 (ESCAPE-2), a Randomized, Double-Blind, Placebo-Controlled Trial.

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Anesth Analg 2008 107: 59-67.

背景：術後急性高血壓是心臟手術後常見的併發症，且與術後其他併發症的發生密切相關。氯維地平，一超短效第三代二氫吡啶類鈣離子拮抗劑具有血管選擇性，特異性擴張動脈，從而降低動脈壓且無負性肌力作用。在此項隨機、雙盲、安慰劑對照的試驗中作者研究了氯維地平治療心臟手術術後高血壓的效能和安全性。

方法：206 名進行心臟手術的患者隨機分組。其中 110 名符合研究標準（術後 4hSBP□140mmHg，且血壓需要下降 15%以上）。給予患者注射氯維地平（0.4-0.8ug.kg-1.min-1）或 20%乳劑（安慰劑）30min-1h，除非治療無效。試驗的終點時治療失敗。治療失敗定義爲 SBP 無法從基線下降 15%或用藥開始後 30min 內無法繼續研究。

結果：氯維地平與安慰劑相比治療失敗的發生率顯著較低 [8.2% vs79.6%，P<0.001]。氯維地平治療組治療的成功率達 91.8%。達到目標 SBP 的中位元時間爲 5.3min(95%可信區間爲 4-7min)。心率沒有顯著增快。兩組的不良事件發生率相似。

結論：氯維地平能快速有效安全地治療心臟手術後急性高血壓。

（潘方立 譯 陳傑 校）

BACKGROUND: Acute postoperative hypertension is a well-known complication of cardiac surgery and is associated with postoperative morbidity. Clevidipine, an ultrashort-acting, third-generation dihydropyridine calcium channel blocker, exerts vascular-selective, arterial-specific vasodilation to decrease arterial blood pressure without negatively impacting cardiac function. In this double-blind, placebo-controlled trial, we examined the efficacy and safety of clevidipine in treating postoperative hypertension in cardiac surgery patients.

METHODS: Two hundred six patients undergoing cardiac surgery were randomized preoperatively. Of these, 110 met postrandomization inclusion criteria for the study

[systolic blood pressure (SBP) ≥140 mm Hg within 4 h of admission to a postoperative setting, and clinically assessed as needing SBP reduction by ≥15% from baseline]. Patients received an infusion of either clevidipine (0.4–8.0 μg kg^{-1} min^{-1}) or 20% lipid emulsion (placebo) for 30 min to a maximum of 1 h unless treatment failure occurred sooner. The primary end point was the incidence of treatment failure, defined as the inability to decrease SBP by ≥15% from baseline, or the discontinuation of study treatment for any reason within the 30-min period after study drug initiation.
RESULTS: Clevidipine-treated patients had a significantly lower incidence of treatment failure than placebo patients [8.2% (5 of 61) vs 79.6% (39 of 49), $P < 0.0001$]. Treatment success was achieved in 91.8% of clevidipine-treated patients. Median time to target SBP with clevidipine was 5.3 min (95% confidence interval, 4–7 min). No clinically significant increase in heart rate from baseline was observed. Adverse event rates were similar for both treatment groups.
CONCLUSIONS: Clevidipine is effective and safe in the rapid treatment of acute postoperative hypertension after cardiac surgery.

PEDIATRIC ANESTHESIOLOGY:

術後接受由代理人進行的病人自控鎮痛或者病人自控鎮痛的兒童的不良事件的發生率和危險因素

The Prevalence of and Risk Factors for Adverse Events in Children Receiving Patient-Controlled Analgesia by Proxy or Patient-Controlled Analgesia After Surgery

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Anesth Analg 2008; 107:70-75

背景：最近的報導強調與由代理人進行的病人自控鎮痛(PCA-P)相關的危險，然而在兒童中關於這些危險的資料仍然很少。我們比較了接受 PCA-P 和 PCA 的兒童有臨床意義的不良事件的發生率，並且找出使兒童處於高風險的因素。
方法：回顧術後接受 PCA 或者 PCA-P 的未使用過阿片類藥物的兒童（年齡在剛出生到 18 歲之間）的記錄。資料包括一般情況、合併症、圍手術期情況、疼痛、鎮靜和呼吸系統評價、氧飽和度、鎮痛藥、不良後果和干預措施。
結果：本研究中的 145 名兒童接受 PCA－P，另外 157 名兒童接受 PCA。PCA-P 組年齡更小且存在更多的合併症($P < 0.05$)。阿片類藥物的醫囑是相似的，但在 PCA-P 組疼痛評分和阿片類藥物的劑量較低，且較少的兒童接受地西泮($P < 0.05$)。有臨床意義的不良事件（即需要干預措施的不良事件）在 PCA-P 組和 PCA 組的發生率分別爲 22%和 24%；然而在 PCA 組有較多的兒童發生“臨界事件”（需要較小的干預），在 PCA-P 組有較多的兒童發生“解救事件”（阿片類藥物逆轉或者提高監護級別）。呼吸系統不良事件在 PCA-P 組較早發生($P < 0.05$)。與不良事件相關的因

素包括骨科手術、認識障礙、呼吸系統合併症、連續背景阿片類藥物輸注、地西泮的使用以及在第 1、2、3 天給予較大劑量的阿片類藥物。然而，只有認知障礙和第 1 天的阿片類藥物使用劑量是獨立預測這些事件的因素。

結論：本研究發現，雖然有較多的接受 PCA 或者 PCA-P 的兒童發生不良事件，但兩組的發生率卻沒有差別。PCA-P 組有發生需要解救干預的不良事件的較高風險，其原因可能是其潛在的合併症。這些發現強調了仔細監護的需要，以便早期識別和及時干預呼吸抑制。

（吳進 譯　馬皓琳 李士通 校）

BACKGROUND: Recent reports emphasize the risks associated with patient-controlled analgesia by proxy (PCA-P), yet data regarding such risks in children remain sparse. We compared the prevalence of clinically significant adverse events in children receiving PCA-P versus PCA, and examined factors that place children at increased risk.

METHODS: The records were reviewed of opioid-naïve children, ages birth to 18 yr, who received PCA or PCA-P after surgery. Data included demographics, comorbidities, perioperative information, pain, sedation, and respiratory assessments, oxygen saturation, analgesics, adverse outcomes, and interventions.

RESULTS: This study included 145 children who received PCA-P and 157 PCA. The PCA-P group was younger and had more comorbidities ($P < 0.05$). Opioid orders were similar, but pain scores and opioid dosages were lower, and fewer children received diazepam in the PCA-P group ($P < 0.05$). Clinically significant adverse events (i.e., those requiring intervention) occurred in 22% and 24% of patients in the PCA-P and PCA groups, respectively; however, more children in the PCA group had "threshold events" (minor intervention) and more in the PCA-P group had "rescue events" (opioid reversal or escalation of level of care). Respiratory events occurred earlier in the PCA-P group ($P < 0.05$). Factors associated with adverse events included orthopedic surgery, cognitive impairment, respiratory comorbidity, use of continuous basal opioid infusion, use of diazepam, and larger opioid doses on days 1, 2, and 3. Yet, cognitive impairment and opioid dose on day 1 were the only factors independently predictive of these events.

CONCLUSIONS: This study found that although a significant number of children receiving PCA and PCA-P experienced adverse events, there was no difference in the prevalence between groups. The PCA-P group was at greater risk for events requiring rescue interventions, perhaps due to the prevalence of underlying comorbidities. These findings emphasize the need for vigilant monitoring to facilitate early recognition and timely intervention of respiratory depression.

AMBULATORY ANESTHESIOLOGY:

麻醉過程中聽音樂不能減低獲得特定腦電雙頻譜指數所需的七氟烷濃度

Listening to Music During Anesthesia Does Not Reduce the Sevoflurane Concentration Needed to Maintain a Constant Bispectral Index

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Anesth Analg 2008 107: 77-80.

背景：音樂可減低清醒受試者的應激反應。但治療性應用音樂在全麻和術後蘇醒中的角色仍有爭議。因此我們測試了如下假設：腹腔鏡手術中暴露于平和音樂能減低維持 50 左右的腦電雙頻譜指數(BIS)所需的呼末七氟烷濃度(ETSevo)。
方法：選取 40 名年齡在 40－60 歲間，ASA Ⅰ－Ⅱ級,擬行全麻下腹腔鏡疝修補或膽囊切除術的患者。所有患者均行 BIS 檢測。以芬太尼 2 μg/kg，七氟烷混合於氧氣中，羅庫溴銨(0.6 mg/kg)誘導；以七氟烷混合於氧氣和 50%氧化亞氮中，持續輸注芬太尼(1 μg • kg－1 • h－1)維持麻醉。整個過程中通過維持 50 左右的 BIS 滴定七氟烷。患者被隨機指定是否聽音樂。
結果：維持 50 左右的 BIS 所需的 ETSevo 在聽音樂組(1.29 ± 0.33%)和不聽音樂組(1.27 ± 0.33%, P = 0.84)實際相同。聽音樂組患者訴痛感稍輕，但差異在統計學上無意義。聽音樂組(101 ± 11 mm Hg)較不聽音樂組(94 ± 10 mm Hg, P = 0.040)平均動脈壓略高。
結論：行腹腔鏡膽囊切除術維持 50 左右的 BIS 所需的 ETSevo 在暴露和非暴露于音樂的患者間實際相同。儘管先前的研究表明音樂能減輕術前應激且有助於鎮靜，但本試驗結果並不支援術中使用音樂。
（黃凝譯　薛張綱校）

BACKGROUND: Music reduces stress responses in awake subjects. However, there remains controversy about the role of music or therapeutic suggestions during general anesthesia and postoperative recovery. We thus tested the hypothesis that intraoperative exposure to soothing music reduces the end-tidal concentration of sevoflurane (ETSevo) necessary to maintain bispectral index (BIS) near 50 during laparoscopic surgery.
METHODS: Forty patients, aged 40–60 yrs, ASA I and II, undergoing laparoscopic hernias or cholecystectomy under general anesthesia were studied. All patients were connected to a BIS monitor. Anesthesia was induced with fentanyl 2 μg/kg, sevoflurane in oxygen, rocuronium (0.6 mg/kg), and maintained with sevoflurane in oxygen and 50% nitrous oxide, with an infusion of fentanyl (1 μg • kg–1 • h–1). Sevoflurane was titrated to maintain BIS near 50 throughout the procedure. Patients were randomly assigned to either listen to music or not.
RESULTS: The ETSevo necessary to maintain a BIS near 50 was virtually identical in patients who listened to music (1.29 ± 0.33%) and those who did not (1.27 ± 0.33%, P = 0.84). Patients who listened to music reported slightly less pain, but the difference was not statistically significant. Mean arterial blood pressure was slightly higher in patients who listened to music (101 ± 11 mm Hg) than in those who did not (94 ± 10 mm Hg, P = 0.040).
CONCLUSIONS: The end-tidal concentration of sevoflurane required to maintain BIS near 50 during laparoscopic cholecystectomy was virtually identical in patients exposed to music or not. Although previous work suggests that music reduces preoperative stress

and may be useful during sedation, our results do not support the use of music during surgery.

ANESTHETIC PHARMACOLOGY:

阿片類藥物性別特異性反應：動物和人體研究綜述

Sex-Specific Responses to Opiates: Animal and Human Studies (Review Article)

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Anesth Analg 2008 107: 83-95.

摘要：很多研究報導顯示作用於μ，κ，δ阿片受體的鎮痛藥物在雄性和雌性動物的效應有量和質的差異。這種性別差異不僅局限于阿片類藥物的鎮痛和抗傷害特性方面，而且也表現在負反應方面。如對呼吸、運動能力、學習記憶和成癮的影響以及對心血管系統的作用。儘管性別與阿片藥物鎮痛作用有關，但是越來越多用於直接測定此方面影響的動物和人體對照研究表明性別差異的特異和強度依賴於多種相互作用的因素。包括藥物本身的特異性，比如劑量、藥理活性、給藥途徑和時間和個體的差異，比如種群、疼痛類型、基因遺傳、年齡及激素水準。本文將系統列舉這些具體研究並探討其相互影響因素。雖已觀察到阿片藥物的性別差異，但尚缺乏其他因素參與阿片類藥物鎮痛敏感性差異方面的知識，這就需要臨床從業人員根據個體需要實行個體化的劑量方案。
（蔣宗明譯 薛張綱校）

It is widely reported that analgesic drugs acting at μ, [kappa], and [delta] opioid-receptors display quantitative and qualitative differences in effect in males and females. These sex-related differences are not restricted to the analgesic/antinociceptive properties of opioids, but are also present in opioid-induced side effects, such as changes in respiration, locomotor activity, learning/memory, addiction, and changes in the cardiovascular system. An increasing number of well-controlled animal and human studies directly examining the issue of sex in the potency of opioids show that, although sex may affect opioid analgesia, the direction and magnitude of sex differences depend on many interacting variables. These include those specific to the drug itself, such as dose, pharmacology, and route and time of administration, and those particular to the subject, such as species, type of pain, genetics, age, and gonadal/hormonal status. In the current review, we systematically present these animal and human studies and discuss the data in relation to the depending variables. Although the observed sex differences in opioid effect may be clinically relevant, lack of knowledge on other factors involved in the large variability in patient opioid analgesic sensitivity should compel practitioners to customize their dosing regimens based on individual requirements.

右美托咪啶通過α-2A 腎上腺素受體來增強利多卡因局麻作用

Dexmedetomidine Enhances the Local Anesthetic Action of Lidocaine via an α-2A Adrenoceptor (Review Article)

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Anesth Analg 2008; 107:96-101

背景：可樂定爲α-2 腎上腺素受體激動劑，是中樞和外周阻滯的常用輔助藥物。右美托咪啶是高選擇性α-2 腎上腺素受體激動劑，也能夠增強中樞神經阻滯作用。但是它的外周作用還不能完全闡明。因此，我們研究了右美托咪啶和其他α-2 腎上腺素受體激動劑對外周利多卡因局麻作用的影響，並探討相關的機制。

方法：α-2 腎上腺素受體激動劑包括右美托咪啶、可樂定和羥甲唑啉，分別與利多卡因一起在雄性豚鼠背部進行皮內注射。每隔 5 分鐘進行 6 下針刺試驗直到注射後 60 分鐘。將在 60 分鐘的時間內對針刺無反應的次數相加，總和就當作表明局麻程度的麻醉得分。每組中與對照值的差別，先用方差分析再用由此的 Dennett's 檢驗來分析。此外，我們評估了育亨賓（一種α-2A、2B 和 2C 腎上腺素受體拮抗劑）或哌唑嗪（一種α-1、α-2B 和 2C 腎上腺素受體拮抗劑）對右旋美托咪啶效應的拮抗作用，用雙因素方差分析進行分析。

結果：所有的α-2 腎上腺素受體激動劑都以劑量依賴性的方式增強利多卡因的局麻作用的程度。此外，育亨賓抑制右旋美托咪啶的效應，而哌唑嗪不抑制。

結論：我們證明了α-2 腎上腺素受體激動劑能夠增強利多卡因的局麻作用，且提示右旋美托咪啶通過α-2A 腎上腺素受體起作用。

（唐亮 譯　馬皓琳 李士通 校）

BACKGROUND: Clonidine, an α-2 adrenoceptor agonist, is a common adjunct in both central and peripheral blocks. Dexmedetomidine, a more selective α-2 adrenoceptor agonist, is also known to enhance central neural blockades. Its peripheral effect, however, has not been fully elucidated. Thus, we evaluated the effect of dexmedetomidine and other α-2 adrenoceptor agonists on the local anesthetic action of lidocaine at the periphery and explored the mechanism involved.

METHODS: α-2 Adrenoceptor agonists, including dexmedetomidine, clonidine, and oxymetazoline, combined with lidocaine were intracutaneously injected into the back of male guinea pigs. The test of six pinpricks was applied every 5 min until 60 min after the injection. The number of times which the prick failed to elicit a response during the 60-min period was added and the sum served as an anesthetic score indicating the degree of local anesthesia. Differences from the control value within the group were analyzed using an analysis of variance followed by a post hoc Dunnett's test. Furthermore, we evaluated the antagonism of the effect of dexmedetomidine by yohimbine, an α-2A, 2B, and 2C adrenoceptor antagonist, or prazosin, an α-1, α-2B, and 2C adrenoceptor antagonist, analyzed using a two-way analysis of variance.

RESULTS: All α-2 adrenoceptor agonists enhanced the degree of local anesthesia of lidocaine in a dose-dependent manner. Furthermore, yohimbine inhibited the effect of dexmedetomidine, whereas prazosin did not.
CONCLUSION: We demonstrated that α-2 adrenoceptor agonists enhanced the local anesthetic action of lidocaine, and suggest that dexmedetomidine acts via α-2A adrenoceptors.

9-四氫大麻醇對小鼠異丙酚麻醉效果的減弱作用

Propofol Sedation Is Reduced by 9-Tetrahydrocannabinol in Mice

(Review Article)

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Anesth Analg 2008 107: 102-106.

背景：9-四氫大麻醇(9-THC)可產生鎮痛作用並改變警覺性。有報導顯示異丙酚可增加腦內的內源性大麻醇的含量，但 9-THC 對異丙酚麻醉效果的影響作用還屬未知。因此我們的研究目標即是探究出 9-THC 和異丙酚之間，在鎮靜及鎮痛效果上的相互作用。
方法：我們用轉棒儀來監測麻醉的鎮靜效果，再用甩尾潛伏期法來監測鎮痛效果。在制定好各種藥物的基準值後，我們對以 20 只小鼠爲一組，各組分別經腹腔注射 50 mg/kg 的 9-THC 和 50、75 及 100 mg/kg 的異丙酚。而對照組的小鼠則予注射 9-THC 和戊硫代巴比妥或英特利匹特。
結果：根據轉棒儀，腹腔注射 50 mg/kg 異丙酚的小鼠很快即進入麻醉鎮靜狀態，其所需最短時間爲 24s。單獨注射 50 mg/kg 的 9-THC 並沒有麻醉鎮靜作用。但 9-THC 卻顯著減小了異丙酚的麻醉鎮靜作用，將其轉棒儀至少延長到了 60s($P < 0.001$)。而在合用 9-THC 的情況下，將異丙酚的用量增加至 100 mg/kg，根據轉棒儀，其誘導時間又恢復至 27s。同樣，在合用 9-THC 的情況下，戊硫代巴比妥的麻醉鎮靜作用也有著顯著的減弱($P < 0.01$)。
結論：以上結果顯示，在 9-THC 和異丙酚之間存在著劑量依賴性的拮抗作用，而在 9-THC 和戊硫代巴比妥之間同樣如此。
（劉沁譯 薛張綱校）

BACKGROUND: Δ9-Tetrahydrocannabinol (Δ9-THC) induces analgesic effects and alterations of alertness. It has been reported that propofol increases endocannabinoid levels in the brain, but the effects of Δ9-THC on propofol sedation remain unclear. Our aim was to characterize the interaction between Δ9-THC and propofol in terms of sedation and analgesia.
METHODS: Sedation was monitored by a rota-rod and analgesia by tail-flick latencies. Twenty mice received intraperitoneal injections of 50 mg/kg Δ9-THC with 50, 75 and

100 mg/kg propofol after baseline values were established for each drug. Control experiments were performed with Δ9-THC and thiopental or Intralipid.
RESULTS: Injection of 50 mg/kg propofol caused a rapid onset of sedation with a minimum of 24 s on the rota-rod. Fifty mg/kg Δ9-THC alone had no sedative effects. Administration of Δ9-THC significantly reduced the sedative effect of propofol to at least 60 s on the rota-rod ($P < 0.001$). After increasing the propofol dose to 100 mg/kg in the presence of Δ9-THC, sedation was re-established with 27 s on the rota-rod. Thiopental sedation was significantly reduced ($P < 0.01$) in the presence of Δ9-THC.
CONCLUSION: The results indicate a dose-dependent antagonistic interaction between Δ9-THC and propofol, and also between Δ9-THC and thiopental.

芬太尼樣阿片類藥物與氫化嗎啡酮對人類 5-HT_{3A} 受體的作用

The Effects of Fentanyl-Like Opioids and Hydromorphone on Human 5-HT_{3A} Receptors (Review Article)

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Anesth Analg 2008 107: 107-112.

背景: 5-HT_{3A} 受體有多重生理作用，如調製嘔吐。5-HT_{3A} 拮抗劑在臨床上廣泛用於強力止吐。嘔吐是阿片類鎮痛藥的不良反應之一。然而,有趣的是,天然的阿片類藥物嗎啡在臨床使用濃度下就能與人類 5-HT_{3A} 受體相互作用。在本項試驗中,作者研究了結構不一的阿片類藥物是否具有共同效應。研究的藥物包括:嗎啡衍生物(菲型)氫化嗎啡酮,芬太尼及其衍生物(4-甲氧羰基型).
方法: 人胚腎 293 細胞配型的全細胞,導入人類 5-HT_{3A} 受體 cDNA,通過膜片鉗(電壓鉗)技術來檢測阿片類藥物對 5-HT(3 μM)誘導電流的影響.
結果: 阿片類衍生物在臨床使用的納米摩爾濃度範圍內(IC_{50} 值 >30 μM)對通過 5-HT_{3A} 受體的電流沒有顯著影響。與此相反,氫化嗎啡酮對其影響相對較顯著(IC_{50} = 5.3 μM)。與嗎啡相似，它顯著削弱了電流的活化和脫敏動力學.在高於臨床使用濃度,但在 Meyer-Overton 相關性爲非特異性相互作用推薦的濃度範圍內, 芬太尼衍生物都會產生對電流振幅的抑制作用,但是對人類 5-HT_{3A} 受體的活化和脫敏動力學卻有相反的作用效果.
結論: 只有嗎啡和氫化嗎啡酮,在接近臨床使用濃度時,可以減小 5-HT-誘導電流的振幅,削弱電流的動力學,而芬太尼衍生物沒有這種作用效果。高效能的嗎啡和氫化嗎啡酮,相比親脂性的衍生物,與 5-HT_{3A} 受體有特異性的相互作用。而芬太尼樣阿片類藥物與之相互作用卻是非特異性的。因爲阿片類藥物作用於人類 5-HT_{3A} 受體的效能序列與作用于阿片受體的效能序列是相反,作用位點與阿片受體結合位元點的結構不同。最近對於各種酚類的研究也支持:酚類的-OH 基團(嗎啡和氫化嗎啡酮都有)可能參與了嗎啡和氫化嗎啡酮與人類 5-HT_{3A} 受體的特異性作用。將來需要更多的臨床研究探究不同類阿片類藥物引起的嘔吐是否具有相關性.
（杜唯佳 譯 陳傑 校）

BACKGROUND: 5-HT_3 receptors are involved in various physiologic functions, including the modulation of emesis. 5-HT_3 antagonists are clinically widely used as potent antiemetics. Emesis is also a side effect of opioid analgesics. Intriguingly, the natural opioid morphine shows specific interactions with human 5-HT_3 receptors at clinically relevant concentrations. In the present study, we investigated whether this is a general effect of opioids, even when they are structurally diverse. Therefore, another morphine (phenanthrene-type) derivative, hydromorphone, and fentanyl including its (4-anilinopiperidine-type) derivatives were tested.
METHODS: Whole-cell patches from human embryonic kidney-293 cells, stably transfected with the human 5-HT_{3A} receptor cDNA, were used to determine the opioid effects on the 5-HT (3 μM)-induced currents using the patch clamp technique (voltage-clamp).
RESULTS: None of the fentanyl derivatives affected currents through the 5-HT_{3A} receptor (3 μM 5-HT) significantly in the clinically relevant nanomolar concentration range (IC_{50} values >30 μM). In contrast, hydromorphone was considerably more potent (IC_{50} = 5.3 μM), slowing the current activation- and desensitization-kinetics significantly (at 3 μM by a factor of 1.9 and 2.4, respectively), similar to morphine. At concentrations much higher than clinically relevant, but within the range predicted from Meyer-Overton correlations for nonspecific interactions, the fentanyl derivatives all showed at least a tendency to suppress current amplitudes, but they had diverse effects on the activation- and desensitization-kinetics of 5-HT_{3A} receptors.
CONCLUSIONS: Only morphine and hydromorphone, but not the fentanyl derivatives, reduced 5-HT-induced current amplitudes and slowed current kinetics near clinically relevant concentrations. The high potencies of morphine and hydromorphone, when compared to their lipophilicities, suggest a specific interaction with 5-HT_{3A} receptors. In contrast, the effects of fentanyl-type opioids appear to be of unspecific nature. Because the rank order of opioid potencies for human 5-HT_{3A} receptors is opposite of that for opioid receptors, the site involved is structurally different from opioid receptor binding sites. In agreement with recent data on different phenols, a phenolic OH-group (which morphine and hydromorphone possess) may contribute to specific interactions of morphine and hydromorphone with the 5-HT_{3A} receptor. Future clinical studies could test whether corresponding differences in emetogenicity between different classes of opioids will be found.

鐮狀細胞病患者阿曲庫銨起效時間延遲

The Onset Time of Atracurium Is Prolonged in Patients with Sickle Cell Disease

(Brief Report)

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Anesth Analg 2008 107: 113-116.

背景：鐮狀細胞病患者在人生中常經歷手術。一般認爲，這些病人的圍術期併發症的風險要比其他健康病人高並需要精細的麻醉處理。這些患者因微循環異常和貧血的緣故，麻醉藥的藥代動力學可能改變。
方法：在這個研究中，作者利用肌電圖評估了 13 名鐮狀細胞病患者和 17 名對照病人給予單次劑量阿曲庫銨（0.5mg/kg）的藥代動力學。
結果：阿曲庫銨的給藥和 90%肌顫搐抑制（起效時間）之間的時間在鐮狀細胞病的病人更長 324±124s,而對照組爲 165±36s（P<0.01）。在給予阿曲庫銨後 3min 5/13 的鐮狀細胞病的病人和 1/17 的對照組病人存在不滿意插管（P<0.05）。阿曲庫銨的作用時間兩組相似。TOFR 恢復到 0.9 的時間組建無顯著差別（對照組是 101±24min,鐮狀細胞病人組 93±24min）。
結論：可能因爲鐮狀細胞病人阿曲庫銨分佈容積增加導致起效時間延遲，但神經肌阻滯時間無差別。結果提示鐮狀細胞病人應監測神經肌肉阻滯作用而指導氣管插管時機。
(胡瀟 譯 陳傑 校)
BACKGROUND: Patients with sickle cell disease (SCD) frequently undergo surgery during their lifetime. Patients with SCD are considered at greater risk of perioperative complications than otherwise healthy patients and require meticulous anesthetic management. The pharmacodynamics of anesthetics may be altered in patients with SCD due to microcirculatory abnormalities or anemia.
METHODS: In this study, we assessed the pharmacodynamics of a single dose of atracurium (0.5 mg/kg) by mechanomyography in 13 patients with SCD and in 17 control patients.
RESULTS: The time between atracurium administration and 90% twitch height depression (onset time) was longer in SCD patients (mean ± sd) 323 ± 124 s than in controls 165 ± 36 s ($P < 0.01$). Unsatisfactory intubation conditions at 3 min after atracurium administration were observed in 5/13 patients with SCD and 1/17 control patients ($P < 0.05$). The duration of action of atracurium in patients with SCD was similar to that of control patients. The time to spontaneous return of the train-of-four ratio to 0.9 was 101 ± 24 min in control patients and did not differ 93 ± 24 min in patients with SCD.
CONCLUSION: Delayed onset time, together with unchanged duration of the neuromuscular blocking effect of atracurium, may be explained by an increased distribution volume of atracurium in patients with SCD. Our results suggest that monitoring of neuromuscular block may guide the time of tracheal intubation in patients with SCD.

TECHNOLOGY, COMPUTING, AND STIMULATION:

異丙酚－芬太尼麻醉下複合聽覺誘發電位指數和腦電雙頻指數的變異性比較

Variability Comparison of the Composite Auditory Evoked Potential Index and the Bispectral Index During Propofol-Fentanyl Anesthesia

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Anesth Analg 2008; 107:117-124

背景：催眠深度的監測有助於麻醉醫生指導麻醉用藥。不同監測的施行依賴於一些因素，催眠深度穩態時的指數變異性是其中一種因素。我們比較了最近介紹的AAI1.6 和既定的雙譜指數（BIS）在異丙酚穩定效應濃度下的指數變異性。
方法：得到倫理委員會同意及患者書面知情同意後，40 位病人用異丙酚靶控輸注和芬太尼實施麻醉。在預計的異丙酚恒定效應室濃度和恒定手術刺激水準期間計算BIS 和 AAI1.6 的變異性，記作中位數和中位數絕對偏差（MAD）。變異性指數記作1.48×MAD/（閾值－中位數），其中閾值指蘇醒和睡眠之間的分界線。用閾值交叉時間來評價預測病人意識恢復的能力。
結果：雖然用 MAD 計算的絕對變異性基本相似，但是 AAI1.6 的變異性指數顯著較大。用 BIS 監測時，恢復前需要較早地減淺麻醉，儘管 AAI1.6 監測時蘇醒期的 Pk 值要顯著大於 BIS。
結論：與 BIS 相比，AAI1.6 監測時與麻醉期指數中位數和高敏感地發現知曉所需閾值間差異有關的變異性較大。這個與 AAI1.6 較劇烈的濃度－反應功能一樣，使得 AAI1.6 在異丙酚濃度逐漸減少時不能很好地預測到意識即將恢復。然而，當真正蘇醒時，這也使得 AAI1.6 就很能很適合地發現意識恢復。
（黃佳佳譯，馬皓琳，李士通校）

BACKGROUND: Monitors of hypnotic depth help anesthesiologists to guide the anesthetic. The performance of different monitors depends on several factors, index variability at a steady state of hypnotic depth being one. We compared the recently introduced AAI1.6 with the established bispectral index (BIS), regarding index variability during stable values of propofol effect-site concentration.
METHODS: After ethics committee approval and written informed consent, anesthesia was performed in 40 patients with propofol as the target controlled infusion and fentanyl. Variability of BIS and AAI1.6 was calculated during periods of constant predicted propofol effect compartment concentration and constant levels of surgical stimulation as the median absolute deviation (MAD) from the median value. A variability index was calculated as 1.48*MAD/(threshold – median value), with threshold being the division line between awake and asleep. Threshold crossing time was used to evaluate the performance in predicting return of consciousness.
RESULTS: Variability index, however, was significantly larger for the AAI1.6, despite similar absolute variability measured as MAD. Lightening of anesthesia before recovery could be noticed earlier using the BIS than the AAI1.6, although consciousness was detected with a significantly higher Pk-value by the AAI1.6.
CONCLUSION: Variability in relation to the difference between the median index value during anesthesia and the threshold necessary to detect consciousness with high sensitivity is higher for the AAI1.6 than for the BIS. This, as well as the steeper concentration–response function found for AAI1.6, impairs the performance of the AAI1.6 in predicting imminent return of consciousness during decreasing propofol concentrations. However, it makes AAI1.6 well suited to detect consciousness when it has occurred.

對極低體重兒血氧飽和度（SpO2）/經皮二氧化碳分壓(PtcCO2)聯合監測新技術的評估

An Evaluation of a New Combined $Spo_2/PtcCO_2$ Sensor in Very Low Birth Weight Infants (Technical Communication)

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Anesth Analg 2008 107: 125-129.Abstract

背景：最近一款同時檢測血氧飽和度（SpO2）和經皮二氧化碳分壓(PtcCO2) 的感測器（TOSCA 500Radiometer America Inc）推出市場。而筆者設計這一實驗來檢測 TOSCA 在極低體重的新生兒（<=1500g）上使用時的有效性及可靠性。
方法：選擇 22 名新生兒，將 TOSCA 放置於耳廓進行監測。同時採用目前臨床使用的脈搏血氧飽和度儀（HP ;Ohmeda 3740）及經皮二氧化碳分壓儀（TINA TCM3 Radiometer,Copenhagen）監測 60min。在第 1min 及第 60min 分別比較 TOSCA（$PtcCO_{2TOSCA}$）、TINA（$PtcCO_2$）與抽取血標本的 Pco_{2EAB}。研究中分別比較 $PtcCO_{2TOSCA}$、$PtcCO_2$以及 TOSCA 與血氧飽和度儀獲得的 SatO2。相應資料採用 Bland-Altman 分析。
結果：第 1min 與第 60min$PtcCO_2$與 Pco_{2EAB}偏差（精確度）分別爲 3.5（12.4）mmHg、2.8（10.2）mmHg，而 Pco_{2EAB}與 $PtcCO_{2TOSCA}$分別爲 18.3（30.4）mmHg、1.8（25）mmHg。Bland-Altman 分析結果顯示 $PtcCO_2$與 $PtcCO_{2TOSCA}$之間有良好的的相關性在 7-15 分鐘之間。SpO2 與 SpO_{2TOSCA}間無顯著差異。
結論：TOSCA 檢測儀可以應用於極低體重新生兒，使用安全簡易。脈搏血氧飽和度儀對於逐步氧療十分有效。用 TOSCA 作爲 Pco_2趨勢監測最有用，如果需要精確值還需動脈 Pco_2檢測。
（陶穎瑩 譯 陳傑 校）

BACKGROUND: Recently, a new sensor for combined assessment of pulse oximetry oxygen saturation (Spo_2) and transcutaneous monitoring of carbon dioxide partial pressure ($PtcCO_2$) has been introduced (TOSCA 500, Radiometer America Inc.). We designed this study to evaluate the usability and reliability of TOSCA in neonates with birth weight ≤1500 g (very low birth weight).
METHODS: In a prospective study of 22 newborns, TOSCA was tested, positioning the sensor on the ear pinna with an adhesive attachment clip. Simultaneous monitoring with TOSCA, conventional pulse oximeter (HP; Datex Ohmeda 3740), and a transcutaneous device (TINA TCM3, Radiometer, Copenhagen) was performed for 60 min. $PtcCO_2$ measurement from TOSCA ($PtcCO_{2TOSCA}$) and TINA ($PtcCO_2$) were compared with Pco_2 from blood samples (PCO_{2EAB}) at 1 and 60 min. During the monitoring period, values of $PtcCO_{2TOSCA}$ were compared with $PtcCO_2$, and $SatO_2$ values from TOSCA with those from a pulse oximeter. Corresponding data were compared using Bland–Altman analysis.
RESULTS: Bias (precision) at 1 min and at 60 min between PCO_{2EAB} and $PtcCO_2$ values were 3.5 (12.4) mm Hg and 2.8 (10.2), respectively, whereas between PCO_{2EAB} and

$PtcCO_{2TOSCA}$ values were 18.3 (30.4) mm Hg and 1.8 (25) mm Hg. Bland–Altman analysis shows a better correspondence $PtcCO_2/PtcCO_{2TOSCA}$ between 7 and 15 min. No significant differences were found between Spo_2 and SpO_{2TOSCA}.
CONCLUSIONS: The TOSCA monitor is safe and easy to apply in very low birth weight newborns. The pulse oximeter measurements may be useful for titrating oxygen therapy. Pco_2 measurement with TOSCA is most useful as a trend and independent confirmation of arterial Pco_2 is required if an accurate value is needed.

PATIENT SAFETY:

麻醉後恢復室內的殘餘神經肌肉阻滯和危險的呼吸事件

Residual Neuromuscular Blockade and Critical Respiratory Events in the Postanesthesia Care Unit

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背景：神經肌肉功能的不完全恢復可能會可能會損害肺和上呼吸道的功能，並且導致在麻醉後恢復室內（PACU）發生不良的呼吸事件。本研究的目的是評價和量化 PACU 內有危險的呼吸事件（CREs）體征或症狀的病人的神經肌肉阻滯的嚴重性。
方法：我們收集了一年的資料。PACU 內的護士在病人進入 PACU 後的 15min 內判定其是否有預先定義的 CRE 的表現。應用加速度法肌松監測儀立即得出這些病人的 4 個成串刺激（TOF）的比值。同時也收集了對照組病人的 TOF 的資料，對照組由進行全身麻醉的年齡、性別和手術過程相匹配的處於同一階段的病人組成。
結果：一年間共有 7459 名接受了全身麻醉，其中 61 名發生了 CRE。這些病人中共有 42 個病例與對照組相匹配，組成了用於統計分析的研究組。在相匹配的病例中，最常見的 CREs 爲嚴重的低氧血症（42 名患者中有 22 名發生，占 52.4%）以及上呼吸道梗阻（42 名中有 15 名發生，占 35.7%）。病例組和匹配對照組在術前和術中的任何測得的資料無明顯差異。病例組中 TOFR 的均數（±標準差）爲 0.62（±0.20），73.8%的病例的 TOFR 值小於 0.70。相反，對照組中的 TOFR 的值爲 0.98（±0.07）（差異爲－0.36，而 95%可信區間的差異爲－0.43 至 －0.30，P < 0.0001），對照組中沒有病人 TOFR 的值小於 0.70（95%可信區間爲 59%－85%，P < 0.0001）。
討論：我們發現在有 CREs 的病人中，嚴重殘餘肌松的發生率很高，而在沒有 CREs 的對照組病人中沒有一例發生。這些發現提示不全的神經肌肉恢復是 PACU 內發生不良呼吸事件的一個重要的起作用的因素。
（黃麗娜 譯 馬皓琳 李士通 校）
BACKGROUND: Incomplete recovery of neuromuscular function may impair pulmonary and upper airway function and contribute to adverse respiratory events in the

postanesthesia care unit (PACU). The aim of this investigation was to assess and quantify the severity of neuromuscular blockade in patients with signs or symptoms of critical respiratory events (CREs) in the PACU.
METHODS: We collected data over a 1-yr period. PACU nurses identified patients with evidence of a predefined CRE during the first 15 min of PACU admission. Train-of-four (TOF) ratios were immediately quantified in these patients using acceleromyography (cases). TOF data were also collected in a control group that consisted of patients undergoing a general anesthetic during the same period who were matched with the cases by age, sex, and surgical procedure.
RESULTS: A total of 7459 patients received a general anesthetic during the 1-yr period, of whom 61 developed a CRE. Forty-two of these cases were matched with controls and constituted the study group for statistical analysis. The most common CREs among matched cases were severe hypoxemia (22 of 42 patients; 52.4%) and upper airway obstruction (15 of 42 patients; 35.7%). There were no significant differences between the cases and matched controls in any measured preoperative or intraoperative variables. Mean (±sd) TOF ratios were 0.62 (±0.20) in the cases, with 73.8% of the cases having TOF ratios <0.70. In contrast, TOF values in the controls were 0.98 (±0.07) (a difference of –0.36 with a 95% confidence interval of –0.43 to –0.30, $P < 0.0001$), and no control patients were observed to have TOF values <0.70 (the 95% confidence interval of the difference was 59%–85%, $P < 0.0001$).
CONCLUSIONS: A high incidence of severe residual blockade was observed in patients with CREs, which was absent in control patients without CREs. These findings suggest that incomplete neuromuscular recovery is an important contributing factor in the development of adverse respiratory events in the PACU.

存在呼吸睡眠暫停綜合征的肥胖病人與不存在呼吸睡眠暫停綜合征的肥胖病人在腹腔鏡術後低氧血症發生率比較

Postoperative Hypoxemia in Morbidly Obese Patients With and Without Obstructive Sleep Apnea Undergoing Laparoscopic Bariatric Surgery

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背景:病態肥胖發生率的增加導致肥胖病人手術的增加.呼吸睡眠暫停綜合征在肥胖患者中多見鎮靜,鎮痛等麻醉藥會改變通氣,使通氣受阻,有報導顯示即使微量的鎮靜麻醉藥品都會引起其死亡.並且大多人並非很重視這些患者.此項研究將觀察由多導睡眠圖診斷的呼吸睡眠暫停綜合的征肥胖病人與不存在呼吸睡眠暫停綜合症的肥胖病人在腹腔鏡術後 24 小時內低氧血症發生率比較.
方法:物件爲成年人(體重指數 35-75 kg/m2)預定進行腹腔鏡手術的患者.術前患者即給予指尖脈氧連續監測.所有物件術前 4 周均進行多導睡眠圖測試.應用標準化麻醉管理,用丙泊芬誘導,丙泊芬與瑞芬術中維持,術後疼痛管理應用患者自控嗎啡鎮痛每十分鐘 1mg.低氧血症的發生以 Spo2 低於多導睡眠圖基線>4%且長於 10 分鐘.

結果:8 男 32 女入組,一個離組資料.40 名對象中 31 人被診斷爲呼吸睡眠暫停綜合征.八人夜晚需應用被動正壓通氣裝置,六人術後繼續應用.術前呼吸睡眠暫停綜合征患者由多導睡眠圖分析結果 Spo2 最低及多數窒息指數>10 與無呼吸睡眠暫停綜合征患者比較術後 24 小時內氧飽和度在有無氧療的存在呼吸睡眠暫停綜合的征肥胖病人與不存在呼吸睡眠暫停綜合征的肥胖病人中無明顯區別,低氧血症的發生 Spo2 低於多導睡眠圖基線>4%者也無明顯區別.

結論:在病態肥胖對象中,在腹腔鏡手術後 24 小時記憶體在呼吸睡眠暫停綜合征的肥胖病人術後發生低氧血症的風險並無明顯增加。我們的資料顯示,儘管進行氧療肥胖患者無論是否具有呼吸睡眠暫停綜合征術後經常平凡發生缺氧,所以建議腹腔鏡手術肥胖病人術前評估應包括估計術後低氧血症的發生。

（劉婷潔譯 薛張綱校）

INTRODUCTION: The increased incidence of morbid obesity has resulted in an increase of bariatric surgical procedures. Obstructive sleep apnea (OSA) is a commonly encountered comorbidity in morbidly obese patients. Sedatives, analgesics, and anesthetics alter airway tone, and airway obstruction and death have been reported in patients with OSA after minimal doses of sedatives and anesthetics, yet there is a lack of consensus regarding the care of these patients. In this study, we sought to determine whether obese patients with polysomnography-confirmed diagnosis of OSA were at significantly greater risk for postoperative hypoxemic episodes in the first 24 h after laparoscopic bariatric surgery than morbidly obese patients without a diagnosis of OSA.

METHODS: Adult subjects (Body Mass Index, 35–75 kg/m2) scheduled to undergo laparoscopic bariatric surgery were studied. A finger pulse oximetry probe was placed preoperatively and oxygen saturation (Spo2) was recorded continuously. All subjects underwent preoperative polysomnography testing within 4 wk of surgery. Anesthetic management was standardized, using propofol for induction and desflurane and remifentanil for maintenance of anesthesia. Patient-controlled analgesia programmed to deliver morphine, 1 mg. every 10 minutes, was used for pain management postoperatively. Hypoxemic episodes were scored as Spo2 >4% below the polysomnography study baseline and lasting for more than 10 s.

RESULTS: Eight men and 32 women were enrolled and 1 subject had incomplete data. Thirty-one of the 40 subjects had polysomnography-confirmed OSA. Eight subjects used home continuous positive airway pressure devices nightly, and six of these used their device postoperatively. Preoperatively, subjects with OSA had lower nadir Spo2 during the polysomnography study and a larger number had an apnea/hypopnea index >10 episodes per hour compared with the non-OSA group. In the first 24 h postoperatively, there was no difference in the median Spo2 with and without oxygen therapy, between OSA and non-OSA groups.The number of episodes of oxygen desaturation >4% below the polysomnography study baseline value and the mean number of desaturation episodes per hour did not differ between the groups.

CONCLUSIONS: In morbidly obese subjects, in the first 24 h after laparoscopic bariatric surgery, OSA does not seem to increase the risk of postoperative hypoxemia. Our data confirm that morbidly obese subjects, with or without OSA, experience frequent oxygen desaturation episodes postoperatively, despite supplemental oxygen therapy suggesting that perioperative management strategies in morbidly obese patients undergoing

laparoscopic bariatric surgery should include measures to prevent postoperative hypoxemia.

經鼻氣管內插管：GlideScope®視頻喉鏡與直接喉鏡的比較

A Comparison of GlideScope® Videolaryngoscopy to Direct Laryngoscopy for Nasotracheal Intubation

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背 景：在這項研究中，作者比較了經鼻氣管插管中，以插管時間（TTI）和插管難易性評定直接喉鏡(DL)和 glidescope ®視頻喉鏡(GVL)的效果，。
方 法： 選擇 70 名需要經鼻氣管插管的患者隨機分配進行 DL 或 GVL。 TTI 盲法評估。喉鏡操作者事前不知。視覺類比評分法評定插管難易性。記錄插管嘗試次數，失敗次數，聲門等級，出血量，Magill 的使用，術後咽喉痛的嚴重程度等。
結 果：使用 GVL 的插管時間(43.5 s,[IQR]: 39.8－67.3)比使用 DL 的插管時間(66.7 s, IQR: 53.8－89.9)短了 23.2 秒 ，P=0.0023。使用 GVL 經鼻氣管插管難易評分要比 DL 低（VAS 10 mm, IQR: 5.5－18, vs 20 mm, IQR: 10－32, P = 0.0041)。術後中度或嚴重咽喉痛的發病率在 GVL 組明顯減少(9% 對 34%, P = 0.018)。使用 GVL 組聲門暴露較好 。GVL 組未使用 Magill 鉗。DL 組的 49 %患者使用 Magill 鉗（ P < 0.0001） 。併發症發生率和嚴重出血 2 組中相似。
結 論：與直接喉鏡相比，GVL 具有顯著的優勢並大大減少術後咽喉痛的發生。GVL 在常規經鼻氣管插管中具有明確的作用。
（張燕 譯 陳傑 校）

BACKGROUND: In this study, we compared the effectiveness of direct laryngoscopy (DL) and the GlideScope® videolaryngoscope (GVL) for nasotracheal intubation, as judged by the time to intubation (TTI—the primary outcome) and the ease of intubation.
METHODS: Seventy patients requiring nasotracheal intubation for elective surgery were randomly allocated to intubation with the GVL or DL. TTI was assessed by a blinded observer. Operators were blinded until the start of laryngoscopy. A Visual Analog Scale assessed the ease of intubation. The number of intubation attempts, number of failures, glottic grades, amount of bleeding, usage of Magill forceps, and the severity of postoperative sore throat were recorded.
RESULTS: The median TTI was 23.2 s faster with the GVL (43.5 s, interquartile range [IQR]: 39.8–67.3) than with DL (66.7 s, IQR: 53.8–89.9), P = 0.0023. Nasotracheal intubation was easier with the GVL than with DL (Visual Analog Scale 10 mm, IQR: 5.5–18, vs 20 mm, IQR: 10–32, P = 0.0041). The incidence of postoperative moderate or severe sore throat was significantly reduced in the GVL group (9% vs 34%, P = 0.018). Glottic exposure was significantly better with the GVL. Magill forceps were not used in the GVL group, but were used 49% of the time in the DL group, P < 0.0001. The incidence and severity of bleeding were similar between groups.

CONCLUSIONS: Compared with DL, the GVL has superior performance characteristics when used for nasotracheal intubation and demonstrates an important reduction of postoperative sore throat. The GVL has a clear role in routine nasotracheal intubation.

踝肱血壓指數預測非心臟手術後的心臟併發症的風險

The Ankle-to-Arm Blood Pressure Index Predicts Risk of Cardiac Complications After Noncardiac Surgery

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研究背景：已有研究顯示通過踝肱血壓指數(AAI)下降發現的外周動脈疾病，可預測心臟事件。然而，關於監測 AAI 來預測患者非心臟手術後的心臟併發症的實用性尚不清楚。
方法：在大學附屬醫院的院前診室內我們前瞻性、連續性地研究了 242 位□50 歲的擇期行非心臟手術的患者。我們對病人施行標準的臨床評估，包括：計算校正心臟危險指數(rCRI)及使用觸診及多普勒技術監測 AAI。不知道對術前評估及 AAI 結果的獨立的觀察者在術後 7 天內查明心臟併發症。 我們使用似然比(LR)、ROC 曲線下面積(AUC)及多引數的對數回歸分析來調整 rCRI 結果，評估用異常的 AAI（≤ 0.9 或 4 個足部搏動均未觸及）來預測術後心臟併發症的能力。
結果：研究物件的年齡中位數爲 67 歲，60%爲男性，19%患有糖尿病，14%患有缺血性心臟病，35%行腹腔內或胸腔內手術。術後 242 中的 14 位（6%）病人罹患了心臟併發症，但無病人死亡。44 位患者表現出異常的 AAI，其中的 10 位（23%）有術後心臟併發症：正 LR 4.79 (95% 可信區間：3.04－7.54)，負 LR0.34（95%可信區間：0.15－0.77），AUC = 0.80。AAI 與 rCRI 可比性很好，其正 LR4.22（95%可信區間：2.24－7.95），負 LR 0.57 (95%可信區間：0.34－0.96)，AUC = 0.74。在多變數分析中，對於那些 AAI 異常的患者，甚至在調整 rCRI 結果後，其心臟併發症的經調整的比值比爲 10.16(95%可信區間： 2.90－36.02)。
結論：異常低的 AAI 表明患有外周動脈疾病，是術後心臟併發症的一個獨立危險因素。AAI 的精確性與 rCRI 相似，它爲術前心臟危險分層提供了額外的獨立預見值。
（裘毅敏譯，馬皓琳 李士通校）

BACKGROUND: Peripheral arterial disease, as detected by a reduced ankle-to-arm blood pressure index (AAI), has been shown to predict future cardiac events. However, the utility of measuring the AAI to predict postoperative cardiac complications in patients undergoing noncardiac surgery is unknown.
METHODS: We prospectively studied 242 consecutive patients aged 50 yr or older presenting to a university hospital preadmission clinic before elective noncardiac surgery.

We performed a standardized clinical evaluation that included calculation of the revised cardiac risk index (rCRI) and measurement of the AAI using both palpation and Doppler techniques. Independent observers, blinded to preoperative assessment and AAI results, ascertained cardiac complications in the first 7 days after surgery. We assessed the ability of an abnormal AAI (≤0.9 or absence of all four pedal pulses) to predict postoperative cardiac complications using likelihood ratios (LR), area under the ROC curves (AUC), and multivariable logistic regression in which we adjusted for the rCRI result.
RESULTS: The cohort had a median age of 67 yr, 60% were male, 19% had diabetes, 14% had ischemic heart disease, and 35% underwent intraperitoneal or intrathoracic surgery. Postoperatively, 14 of 242 (6%) patients suffered cardiac complications, but no patients died. An abnormal AAI was present in 44 patients, 10 (23%) of whom had postoperative cardiac complications: positive LR 4.79 (95% CI: 3.04–7.54), negative LR 0.34 (95% CI: 0.15–0.77), AUC = 0.80. The AAI compared favorably with the rCRI, which had positive LR 4.22 (95% CI: 2.24–7.95), negative LR 0.57 (95% CI: 0.34–0.96), and AUC = 0.74. In multivariate analysis, the adjusted odds ratio for having a cardiac complication was 10.16 (95% CI: 2.90–36.02) for those patients with an abnormal AAI, even after adjusting for rCRI results.
CONCLUSIONS: An abnormally low AAI, indicative of underlying peripheral arterial disease, is an independent risk factor for postoperative cardiac complications. The accuracy of the AAI is similar to the rCRI, and it provides additional independent predictive value for preoperative cardiac risk stratification.

兩種安全型周圍靜脈留置針的前瞻性隨機臨床對比試驗

A Prospective Randomized Trial of Two Safety Peripheral Intravenous Catheters

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Anesth Analg 2008 107: 155-158

背景：爲了降低意外針刺傷的危險程度，在被動型安全性周圍靜脈留置針的基礎上，發展出了第一代主動型安全型靜脈留置針。然而，這些裝置是否容易應用，是否真正能夠減少意外針刺傷的危險，還未被試驗證實過。
方法：在這個前瞻性隨機臨床對比試驗中，比較被動安全型，主動安全型，以及傳統的非安全型周圍靜脈留置針。主要目的是爲了評估插入留置針的困難度，這主要通過插入留置針的失敗次數比較而得出；和置入留置針軟管和拔出針芯的困難程度；以及在遞藥系統中血液返流情況。第二個目的是評估操作人員暴露于病人血液中以及血液進入周圍環境的情況，並對此進行分級。
結果：本次試驗共收集到 759 個評估卡片。三組的失效例數相似，並無統計學意義。在導入軟管方面，主動型安全留置針更困難，拔出針芯方面，被動型安全留置針更困難。血液回流在安全型的留置針中不正常的更多。操作人員的暴露在使用主動型安全性靜脈留置針時更常見。使用安全型留置針時血液污染環境更常見。

結論：安全型周圍靜脈留置針在置管上並沒有優勢。操作者發現安全型周圍靜脈留置針的保護性更好，但是使用更難，並且會給周圍環境帶來更多的血液污染。比較主動型安全型靜脈留置針和被動型安全性靜脈留置針，被動型安全性留置針在穿周圍靜脈時更容易。操作人員暴露于血液的危險性更小。
（秦敏菊譯 薛張綱校）

BACKGROUND: To reduce the risk of accidental needlestick injuries, first active then passive safety devices were developed on IV catheters. However, whether these catheters are easy to implement and really protect personnel from accidental needlestick is untested.
METHODS: In this prospective randomized survey, we compared a passive safety catheter with an active safety catheter and a nonsafety classic catheter. The main objective was to evaluate the difficulty of inserting the catheters in terms of the number of insertion failures, difficulties introducing the catheter and withdrawing the needle, and the normality of the blood reflux in the delivery system. The second objective was to determine the degree of exposure to patients' blood evaluated as the number of exposures of the staff and blood splashes of the environment, and the staff's sense of protection.
RESULTS: Seven hundred fifty-nine assessment cards were collected. The number of failures for the three catheter groups was similar and not statistically different. Introduction of the catheter was more difficult with the active safety catheter. Needle withdrawal was more difficult with the passive safety catheter. The blood reflux was abnormal more often with the safety catheters. The staff's exposure was more frequent with the active safety catheter. The number of blood splashes was more common with the safety catheters.
CONCLUSIONS: Safety catheters are not superior with regard to failure rate in the catheter's placement. Users feel better protected, but find the use of safety catheters more difficult, and their handling generates more splashing of blood into the environment. The passive safety catheter is more efficient than the active safety catheter with regard to ease of introduction of the catheter into the vein and the staff's exposure to the patient's blood.

CRITICAL CARE AND TRAUMA:

性激素及其受體拮抗劑：一種改善失血性創傷後免疫、心血管應答和減少膿毒症繼發死亡率的輔助用藥

Sex Steroids/Receptor Antagonist: Their Use as Adjuncts After Trauma-Hemorrhage for Improving Immune/Cardiovascular Responses and for Decreasing Mortality from Subsequent Sepsis (Review Article)

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Anesth Analg 2008 107: 159-166.

動物實驗和臨床研究均標明：雌性個體在動情前期（即維持高水準雌激素）比雄性個體能更好地耐受出血性創傷和膿毒症。雌激素是這種預後存在性別差異的關鍵因素。關於一些結果爲陰性的研究，可能原因是在損傷當時的激素水準存在群體多相

性。一些實驗性研究顯示：雄激素可引起出血性創傷後的免疫和心血管抑制。因此，在出血性創傷後使用雄激素受體拮抗劑對免疫和心血管功能有正向作用。同樣，雌激素在出血性創傷後在免疫和心血管方面產生有益的作用，且顯著地減少膿毒症繼發的死亡率。雌激素的這種作用機制同時涉及基因和非基因的調控。出血性創傷後使用雌激素或雄激素受體拮抗劑是一種修復免疫和心血管功能的安全新方法，且可以降低膿毒症繼發的死亡率。
（於章傑 譯 陳傑 校）

Studies in human as well as animal models demonstrate that females in the proestrus cycle (i.e., with high estrogen) tolerate trauma-hemorrhage and sepsis far better than males. The female sex steroid, estrogen, is the significant factor contributing to this observed gender difference in outcome. One reason for the lack of significant gender association in some clinical studies is the possibility of heterogeneity of the population in terms of their hormonal status at the time of injury. Several experimental investigations have revealed that androgens produce immune and cardiovascular depression after trauma-hemorrhage. However, the use of an androgen receptor antagonist after trauma-hemorrhage has salutary effects of immune and cardiovascular function. Likewise, estrogen produces beneficial effects on immune and cardiovascular function after trauma-hemorrhage and significantly decreases mortality rates from subsequent sepsis. The salutary effects of estrogen after trauma-hemorrhage have been shown to be due to both genomic and nongenomic effects. Thus, the use of an estrogen or androgen receptor antagonist as an adjunct after trauma-hemorrhage is a safe and novel approach for restoring immune and cardiovascular function after trauma-hemorrhage and for decreasing the mortality from subsequent sepsis.

右美托咪啶對非插管通氣病人的效用的初步研究

The Efficacy of Dexmedetomidine in Patients with Noninvasive Ventilation: A Preliminary Study (Brief Report)

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Anesth Analg 2008; 107:167-170

背景：激動會導致非插管通氣(NIV)的失敗。我們研究右美托咪啶在非插管通氣病人中的作用。
方法：這是一個在重症監護病房中進行的前瞻性臨床研究。對 10 個由於激動而無法進行 NIV 的病人輸注右美托咪啶。
結果：Ramsay 和 Richmond 激動-鎮靜評分，分別維持在 2.94 ± 0.94 和－1.23 ± 1.30。所有的病人成功擺脫 NIV，且呼吸狀態沒有惡化。
結論：此研究顯示右美托咪啶是一個有效的用於 NIV 病人鎮靜的藥物。
（張曦 譯，馬皓琳 李士通 校）

BACKGROUND: Agitation is associated with failure of noninvasive ventilation (NIV). We investigated the effect of dexmedetomidine in patients with NIV.
METHODS: This was a prospective clinical investigation in an intensive care unit. Dexmedetomidine was infused in 10 patients in whom NIV was difficult because of agitation.
RESULTS: Ramsay and Richmond Agitation-Sedation Scale scores were maintained at 2.94 ± 0.94 and –1.23 ± 1.30, respectively. All patients were successfully weaned from NIV, and the respiratory state was not worsened.
CONCLUSION: This study shows that dexmedetomidine is an effective sedative drug for patients with NIV.

OBSTETRIC ANESTHESIOLOGY:

七氟烷與胎兒胎盤脈管系統：一氧化氮及類花生酸類的作用

Sevoflurane and the Feto-Placental Vasculature: The Role of Nitric Oxide and Vasoactive Eicosanoids

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Anesth Analg 2008; 107:171-177

背景：揮發性麻醉劑對胎兒胎盤的作用及其原理尚不爲人知。我們的目標是量化七氟烷對血管活性的影響，並測定一氧化氮及類花生酸類在離體人絨毛膜板動脈環對這些影響的調節作用。
方法：我們將研究用的離體人絨毛膜板動脈環分爲四組。在第一組中，應用血栓素類似物 U46619 使動脈環收縮，測定量化七氟烷的血管舒張作用。第二組的 A-C 例驗證一氧化氮對七氟烷血管舒張作用的影響。在每次實驗中，我們分別驗證非特異性一氧化氮抑制因素：L-NAME，L-nMMA，及靜止性 D-NAME，對七氟烷介導的血管舒張的調節作用。第二組的 D 例用於測定七氟烷是否影響血管平滑肌對外源性一氧化氮的敏感性。第三組的 A-D 例驗證類花生酸類對七氟烷血管舒張作用的影響。在每次實驗中，我們分別驗證非特異性環加氧酶抑制劑、引哚美辛、5-脂氧合酶及去甲二氫愈創木酸對七氟烷介導的血管舒張的調節作用。
結果：七氟烷可使離體人絨毛膜板動脈環產生劑量依賴性血管舒張，當七氟醚的劑量爲 2%-8%時，動脈環舒張平均增加 15 ± 7%到 67 ± 17%。阻斷一氧化氮合成酶不能減弱七氟烷的血管舒張作用。七氟烷不改變血管平滑肌對一氧化氮的敏感性。引哚美辛可增加七氟烷的血管舒張作用，血管舒張增加 10-5 米，而非 10-6 米。去甲二氫愈創木酸則可使血管舒張增加 3 x 10－6 米，而非 3 x 10－7 米。

結論：在本次體外研究模型中，七氟烷是一種胎兒胎盤脈管系統舒張劑。七氟烷介導的這種血管舒張作用不受一氧化氮及環加氧酶影響，並表現爲脂氧合酶介導的血管舒張作用的一部分。
（施穎譯 薛張綱校）

BACKGROUND: The effects and mechanisms of action of volatile anesthetics on the feto-placental vasculature are not known. We aimed to quantify the vasoactive effects of sevoflurane and determine the role of nitric oxide (NO) and of vasoactive eicosanoids in mediating these effects in isolated human chorionic plate arterial rings.
METHODS: Quadruplicate ex vivo human chorionic plate arterial rings were used in all studies. Series 1 quantified the vasodilation produced by sevoflurane in rings preconstricted with the thromboxane analog U46619. Series 2A–C examined the role of NO in sevoflurane-mediated vasodilation. In separate experiments, we examined the potential for the nonspecific NO inhibitors, L-NAME, L-nMMA, and the inactive D-NAME, to modulate the vasodilation produced by sevoflurane. Series 2D determined whether sevoflurane altered vascular smooth muscle sensitivity to exogenous NO. Series 3A–D examined the role of vasoactive eicosanoids in sevoflurane-mediated vasodilation. In separate experimental series, we examined whether the nonspecific cyclooxygenase inhibitor, indomethacin, or the 5-lipoxygenase inhibitor, nordihydroguaiaretic acid, modulated sevoflurane-mediated vasodilation.
RESULTS: Sevoflurane produced dose-dependent vasodilation of preconstricted chorionic plate arterial rings, with mean ring vasodilation increasing from 15 ± 7% at 2% sevoflurane to 67 ± 17% (mean ± sd) at 8% sevoflurane. Blockade of NO synthase did not attenuate the vasodilator effects of sevoflurane. Sevoflurane did not alter smooth muscle sensitivity to NO. Indomethacin augmented sevoflurane vasodilation at 10–5 M, but not at 10–6 M. Conversely, nordihydroguaiaretic acid attenuated sevoflurane-mediated vasodilation at 3 x 10–6 M but not at 3 x 10–7 M.
CONCLUSIONS: Sevoflurane was a vasodilator in the feto-placental vasculature in this in vitro model. Sevoflurane-mediated vasodilation is NO and cyclooxygenase-independent and appears to be mediated in part via a lipoxygenase generated vasodilator eicosanoid.

NEUROSURGICAL ANESTHESIOLOGY：

妊娠婦女的神經麻醉

Neuroanesthesia for the Pregnant Woman (Review Article)

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Anesth Analg 2008 107: 193-200.

妊娠病人需要神經麻醉的情況比較少見，且神經麻醉管理相關的循證醫學證據較少。作者制定了一個對妊娠病人合併蛛網膜下或腦內出血、顱內腫瘤、顱腦外傷、

脊髓腫瘤或脊髓外傷施行麻醉的框架，合理的處理方法。麻醉醫師會在面對產前、剖宮產時或產後等不同情況下如何實施行神經外科手術麻醉。作者還討論了這些方案的安全性和神經放射學介入時的麻醉考慮。
（於章傑 譯 陳傑 校）
Neuroanesthesia for the pregnant patient is required infrequently, and evidence-based recommendations for neuroanesthetic management are sparse. We present a framework for a practical approach to anesthesia of the pregnant patient with subarachnoid or intracerebral hemorrhage, intracranial tumor, traumatic brain injury, spinal tumor, or spinal injury. The importance of a team-approach is emphasized. The anesthesiologist may have to anesthetize the pregnant patient for neurosurgery well before delivery, for cesarean delivery at the time of the neurosurgical procedure, or for delivery after neurosurgery. These scenarios are discussed along with fetal safety and anesthetic considerations for interventional neuroradiology.

性別和腦損傷的關係
Gender and the Injured Brain **(Review Article)**

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Anesth Analg 2008; 107:201-214

麻醉醫師經常會遇到由於圍術期中風或先前的外傷性腦損傷而造成有神經系統合併症風險的病人。在這篇綜述中我們回顧了越來越多且吸引人的病例資料，我們在本文中回顧了腦缺血、預後外。這些資料都提示性別和性甾體影響這些病人損傷的病理生理學和傷性腦損傷和癲癇這幾種疾病中性別差異對腦損傷的發病機制和預後的可能影響，以及雌激素、黃體酮和雄激素在決定這些發病過程中起的作用。最後我們也確定了對目前和未來圍術期以及重症監護的建議。
（薑旭暉 譯 馬皓琳 李士通 校）
Anesthesiologists are frequently confronted with patients who are at risk for neurological complications due to perioperative stroke or prior traumatic brain injury. In this review, we address the growing and fascinating body of data that suggests gender and sex steroids influence the pathophysiology of injury and outcome for these patients. Cerebral ischemia, traumatic brain injury, and epilepsy are reviewed in the context of potential sex differences in mechanisms and outcomes of brain injury and the role of estrogen, progesterone, and androgens in shaping these processes. Lastly, implications for current and future perioperative and intensive care are identified.

經顱刺激前強直刺激單側脛神經能增加來自雙側上下肢的 MEP 幅度
The Application of Tetanic Stimulation of the Unilateral Tibial Nerve Before Transcranial Stimulation Can Augment the Amplitudes of Myogenic Motor-Evoked Potentials from the Muscles in the Bilateral Upper and Lower Limbs **(Review Article)**

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Anesth Analg 2008 107: 215-220.

背景：最近，我們報導了在全麻下增加動作誘發電位（MEP）的新技術，利用該技術在經顱刺激之前強直刺激外周神經能增加來自受強直刺激影響的神經支配的肌肉的 MEP。在最近的研究中，我們測試了強直刺激左脛神經能否增加由不受強直刺激影響的神經支配的肌肉的 MEP。
方法：30 名在丙泊酚-芬太尼麻醉下，部分神經阻滯麻醉下接受脊柱手術的病人接受測試。作爲常規 MEP（c-MEP）紀錄，五個成串經顱刺激傳遞到頸 3-4，來自拇短展肌，足拇展肌，脛骨前肌，魚際肌的動作電位被雙向紀錄。爲了記錄強直後動作誘發電位（p-MEP），在經顱刺激前 1 秒對左側踝部的脛神經每隔 5 秒進行一次強直刺激（50 Hz, 50 mA 的刺激強度）。經顱刺激和混合肌肉動作電位紀錄方式和 c-MEP 一樣。c-MEP 和 p-MEP 強度比較採用 Wilcoxon 等級測試。
結果：強直刺激影響的脛神經支配的左足拇展肌的 p-MEP 明顯高於 c-MEP。不受左脛神經支配的雙側拇短展肌，右脛骨前肌，右魚際肌的 p-MEP 也顯著高於 c-MEP。
結論：對於丙泊酚-芬太尼麻醉下，部分神經阻滯麻醉下接受脊柱手術的病人，強直刺激左脛神經能增加來自肌肉的 MEP 強度-不管該肌肉由不由受強直刺激影響的神經支配。
（孫鵬飛譯 薛張綱校）
BACKGROUND: Recently, we reported a new technique to augment motor-evoked potentials (MEPs) under general anesthesia, posttetanic MEP (p-MEP), in which tetanic stimulation of the peripheral nerve before transcranial stimulation enlarged amplitudes of MEPs from the muscle innervated by the nerve subjected to tetanic stimulation. In the present study, we tested whether tetanic stimulation of the left tibial nerve can also augment amplitudes of MEPs from the muscles which are not innervated by the nerve subjected to tetanic stimulation.
METHODS: Thirty patients undergoing spinal surgery under propofol-fentanyl anesthesia with partial neuromuscular blockade were examined. For conventional MEP (c-MEP) recording, transcranial stimulation with train-of-five pulses was delivered to C3-4, and the compound muscle action potentials were bilaterally recorded from the abductor pollicis brevis, abductor hallucis (AH), tibialis anterior, and soleus muscles. For p-MEP recording, tetanic stimulation (50 Hz, 50 mA of stimulus intensity) with a duration of 5 s was applied to the left tibial nerve at the ankle 1 s before transcranial stimulation. Transcranial stimulation and recording of compound muscle action potentials were performed in the same manner as c-MEP recording. Amplitudes of c-MEP and p-MEP were compared using Wilcoxon's signed rank test.
RESULTS: Amplitudes of p-MEPs from the left AH muscle innervated by the left tibial nerve with tetanic stimulation were significantly larger compared with those of c-MEPs. Amplitudes of p-MEPs from the bilateral abductor pollicis brevis and soleus muscles and

right AH and tibialis anterior muscles, which were not innervated by the left tibial nerve with tetanic stimulation, were also significantly larger compared with those of c-MEPs. CONCLUSION: In patients under propofol and fentanyl anesthesia with partial neuromuscular blockade, the application of tetanic stimulation to the left tibial nerve augmented the amplitudes of MEPs from the muscles without tetanic nerve stimulation and those with stimulation.

髖關節固定術中腦微栓塞：一項前瞻性的研究

Cerebral Microemboli During Hip Fracture Fixation: A Prospective Study **(Review Article)**

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Anesth Analg 2008 107: 221-225.

背景：最近的研究顯示大腦脂肪栓塞經常發生在髖關節手術或膝關節置換術中。在這個研究中，作者研究了髖關節固定術中固體或氣體的腦栓塞的發生率。
方法：這項前瞻性研究中患者行急診的髓內釘髖關節骨折固定術。術中通過經顱多普勒超聲檢測左右大腦中動脈的栓子。
結果：22 名患者入選，年齡中位數爲 82 歲（範圍從 51 歲——97 歲）。有 9 名患者（41%）在大腦中動脈中記錄高強度信號的微栓子。均有固體和氣體塞子的信號。其中一名術後發生了腦血管意外。
結論：在急診行髖部骨折內固定手術中腦微栓子的發生率相當可觀。這種現象並不局限於髖關節或膝關節置換手術。這一發現對臨床意義還需要進一步調查。
（王騰 譯 陳傑 校）

BACKGROUND: Recent studies have shown that cerebral fat microembolism takes place during surgery for hip or knee replacement. In this study, we examined the occurrence of cerebral microembolism, solid or gas, during a standard procedure of hip fracture fixation.
METHODS: This was a prospective study of patients who underwent urgent surgery with a dynamic hip screw for hip fracture fixation. During surgery, patients were monitored with transcranial Doppler for detection of microemboli from right and left middle cerebral arteries.
RESULTS: Twenty-two patients were included in the study; their median age was 82 yr (range, 51–97 yr). In nine (41%) patients, high intensity transient signals were recorded, indicating microemboli passage in the middle cerebral arteries. All nine patients had signals of both solid and gas emboli. One of these nine patients had a postoperative cerebrovascular accident.
CONCLUSIONS: The incidence of cerebral microemboli during urgent surgery for hip fracture fixation is considerable. This phenomenon is not confined to hip or knee replacement surgery. The clinical implications of this finding require further investigation.

GENERAL ARTICLES:

移植中的性別問題
Gender Issues in Transplantation (Special Article)

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Anesth Analg 2008; 107:232-238

半個世紀前人們已認識到臨床移植中性別錯配的作用。但臨床移植中的性別問題影響了包括免疫學關注的問題及以外的許多層面的結果。許多導致移植的疾病都主要在一種性別中表達。器官捐獻模式一向以女性活體捐獻者爲主要趨勢。誰有權得到移植可能受移植人員與男性或女性等待移植者之間微妙的相互作用影響。在幹細胞移植這個新的領域中，男性與女性之間成人幹細胞功能上的差別可能使固體器官移植預後中的性別差異清楚地顯示出來。本綜述突出討論了與移植相關的性別問題，目的是使所有移植患者得到最好的治療。
（朱 慧譯 馬皓琳 李士通校）
The effects of gender mismatch in clinical transplantation have been recognized for half a century. But gender issues in clinical transplantation affect outcomes at many levels beyond immunologic concerns. Many diseases leading to transplantation are predominantly expressed in one gender. Organ donation patterns have consistently been defined by a greater tendency of women to be live donors. Access to transplantation may be affected by subtleties in the interactions of transplant personnel with women versus men candidates. In the new field of stem-cell transplantation, functional differences in male versus female adult stem cells may shed light on gender differences in outcomes for solid organ transplantation. This review highlights gender issues related to transplantation with a goal of optimizing the care of all transplant patients.

腎缺血：與性別相關？
Renal Ischemia: Does Sex Matter? (Review Article)

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Anesth Analg 2008 107: 239-249.

腎缺血是圍手術期常見的併發症之一，具有高發病率和死亡率。與其他缺血情況（例如：心、腦）相比，腎缺血的發病和結局有顯著的性別特異性。腎損傷的性別差異已經被關注多年，現在成爲臨床和實驗室研究的課題。從臨床方面講，除外心臟手術，女性圍手術期急性腎衰的發生率更低。實驗科學發現，性激素影響腎臟對缺血的反應。這篇報導中，我們評價了圍手術期腎功能衰竭及腎缺血再灌注病理生理學的性別差異。且有很多研究指出與生物學機制相關，有足夠資料支援性別及使用影響性激素水準的藥物影響圍手術期治療計畫的有效性。

（夏俊明譯，薛張綱校）
Renal ischemia is a common complication in the perioperative period that leads to a high rate of morbidity and mortality. As in other forms of ischemia (i.e., cardiac, neurologic), the incidence and outcome of renal ischemia is strikingly sex-specific. Sexual dimorphism in response to renal injury has been noted for many years, but is now the subject of both clinical and experimental research. Clinically, women experience a lower incidence of perioperative acute renal failure, with the exception of cardiac surgery. Experimental science is now producing tantalizing clues that sex steroids, both male and female, play a role in the kidney's response to ischemia. In this review, we evaluated sex differences in perioperative renal failure and in the pathophysiology of renal ischemia/reperfusion injury. Although much work remains to characterize the biological mechanisms involved, the data are sufficient to support consideration of gender and the use of medications that impact steroid availability in the perioperative plan of care.

不同晶體液對腎移植患者酸城平衡和術後早期腎功能影響

The Effect of Different Crystalloid Solutions on Acid-Base Balance and Early **Kidney Function After Kidney Transplantation**

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Anesth Analg 2008 107: 264-269.

背景：本實驗旨在研究腎移植中給予不同的晶體液所引起的酸城平衡，鉀和乳酸水準的變化，從而爲這類病人選擇理想的晶體液。
方法：在這項雙盲對照研究中，將患者隨機分爲三組（每組 n = 30），分別給予生理鹽水，乳酸林格液，或 plasmalyte，用量均爲 20-30ml·kg/h 。麻醉誘導前和術中每隔 30min 作一次動脈血分析，並記錄靜脈滴注的晶體液總量。記錄術後第 1 ， 2 ， 3 ， 7 天的尿量，血肌酐，尿素氮和肌酐清除率。
結果：術中接受生理鹽水的病人在 pH 值（ 7.44 ± 0.50 與 7.36 ±0.05 ）和城剩餘（ 0.4 ± 3.1 比-4.3 ± 2.1 ）方面有顯著降低，而血清氯化物（ 104 ± 2 比 125 ± 3 毫米/ l ）顯著增加。接受乳酸林格液的病人乳酸水準（ 0.48 ± 0.29 與 1.95 ± 0.48 ）顯著增加。接受 plasmalyte 的病人乳酸水準和酸城平衡均無明顯變化。在任何一組中，鉀水平均無顯著變化。
結論：所有三種晶體液均可以安全地使用在簡單，短時的腎移植術中。Plasmalyte 較爲理想。
（陳偉 譯 陳傑 校）
BACKGROUND: This study aimed to quantify changes in acid-base balance, potassium and lactate levels as a function of administration of different crystalloid solutions during kidney transplantation, and to determine the ideal fluid for such patients.

METHODS: In this double-blind study, patients were randomized to three groups (n = 30 each) to receive either normal saline, lactated Ringer's, or Plasmalyte, all at 20–30 $mL \cdot kg^{-1} \cdot h^{-1}$. Arterial blood analyses were performed before induction of anesthesia, and at 30-min intervals during surgery, and total IV fluids recorded. Urine volume, serum creatinine and BUN, and creatinine clearance were recorded on postoperative days 1, 2, 3, and 7.
RESULTS: There was a statistically significant decrease in pH (7.44 ± 0.50 vs 7.36 ± 0.05), base excess (0.4 ± 3.1 vs –4.3 ± 2.1), and a significant increase in serum chloride (104 ± 2 vs 125 ± 3 mM/L) in patients receiving saline during surgery. Lactate levels increased significantly in patients who received Ringer's lactate (0.48 ± 0.29 vs 1.95 ± 0.48). No significant changes in acid-base measures or lactate levels occurred in patients who received Plasmalyte. Potassium levels were not significantly changed in any group.
CONCLUSIONS: All three crystalloid solutions can be safely used during uncomplicated, short-duration renal transplants; however, the best metabolic profile is maintained in patients who receive Plasmalyte.

PAIN MEDICINE:

辣椒素受體誘導的傳導鎮痛：具選擇性、劑量依賴、長效且潛在神經毒性低。
Vanilloid-Induced Conduction Analgesia: Selective, Dose-Dependent, Long-Lasting, with a Low Level of Potential Neurotoxicity **(Special Article)**

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Anesth Analg 2008; 107:271-281

辣椒素受體激動劑（辣椒辣素，周樹脂毒，[RTX]）應用于外周神經可造成傳導阻滯。與局麻藥引起的傳導麻醉中鎮痛成分不同，辣椒素受體激動劑引起的傳導鎮痛不抑制與疼痛無關的感覺運動功能。辣椒素受體激動劑可提供選擇性的傳導鎮痛是因爲其對於神經幹的作用局限於 C- 和 Aδ-纖維。RTX 效能強於辣椒辣素，且治療窗更寬。大鼠實驗中，神經周圍的 RTX 在相當大的有效濃度範圍（0.00003% 到 0.001%）內可長時間地減輕機械和溫度刺激所致的痛覺，此效應可持續數小時至數周。RTX 引起的神經阻滯可預防溫度和機械刺激所致痛覺過敏的發展以及在切口痛模型中的疼痛行爲。RTX 誘導的傳導阻滯具有 TRPV1 受體激動劑固有的一個缺點即初始興奮（疼痛）；故必須注射局麻藥預防。提供傳導鎮痛所需劑量的 RTX 用於大鼠坐骨神經時，無髓鞘神經纖維退化的頻率比治療濃度的利多卡因低一個數量級以上。這些有價值的結果必須在齧齒類以外的種屬（豬、羊）中實驗來證實。綜上所述，上述資料提示辣椒素受體誘導的傳導鎮痛可能有臨床適用性。
（周雅春 譯 馬皓琳 李士通 校）

Vanilloid agonists (capsaicin, resiniferatoxin, [RTX]) applied to the peripheral nerves provide conduction blockade. In contrast to the analgesic component of conduction anesthesia produced by local anesthetics, vanilloid agonists provide conduction analgesia not associated with suppression of motor or sensory functions not related to pain.

Vanilloid agonists provide conduction analgesia selectively because their effect on the nerve trunks is limited to C- and Aδ-fibers. RTX is much more potent than capsaicin and has a wider therapeutic window. In rat experiments, perineural RTX produced a long-lasting thermal and mechanical hypoalgesia with a very wide separation between effective concentrations (from 0.00003% to 0.001%) providing an effect lasting from several hours to several weeks. A nerve block with RTX prevented the development of thermal and mechanical hyperalgesia as well as pain behavior in a model of incisional pain. RTX-induced conduction blockade has an inherent drawback of TRPV1 agonists, the initial excitation (pain); therefore, a local anesthetic should be injected to prevent it. When RTX was applied to the rat's sciatic nerve in doses necessary to provide conduction analgesia, the frequency of unmyelinated fiber degeneration was more than an order of magnitude lower than that with the therapeutic concentration of lidocaine. These promising results should be confirmed by experiments in species other than rodents (pigs, sheep). Taken together, the data indicate possible clinical applicability of vanilloid-induced conduction analgesia.

在傷口上滴注一種新提純的辣椒堿成分對疝切開手術後疼痛的效果：一個雙盲、隨機、對照試驗

The Effect of Wound Instillation of a Novel Purified Capsaicin Formulation on Postherniotomy Pain: A Double-Blind, Randomized, Placebo-Controlled Study

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Anesth Analg 2008 107: 282-291

背景：急性術後疼痛在大多數手術操作後很常見。即使用了許多止痛劑，處理術後疼痛的效果也通常不令人滿意。在體外、臨床前以及臨床試驗中，純化辣椒堿（ALGRX4975 純度 98%）被證實能夠延長對 C 纖維的阻滯作用，也許對治療術後疼痛是一種有效的輔助物。
方法：我們完成了一個單中心、隨機、雙盲、對照試驗：在 41 個成年男性行腹股溝疝修補術後病人的傷口滴入超純化的辣椒堿（ALGRX4975）的止痛效果。術後第一周的基礎的滴定終點是由平均每日疼痛評分的直觀類比標度（VAS）估計爲曲線下面積（AUC）。疼痛被記錄在疼痛日記中，一天兩次，共四周。在術前和術後一周進行體格檢查和實驗室檢查，記錄不良事件直至 28 天。不良事件已被記錄。用非線性混合效應模型分析資料。
結果：VAS 的 AUC 分析在術後三天顯著較低（$P<0.05$），而不是在術後整個一周或四周。非線性混合效應模型顯示辣椒堿組疼痛評分在前四天顯著較低（$P<0.05$）。

非辣椒堿組被觀察到出現嚴重不良事件，而在用辣椒堿治療組中肝酶一過性輕度升高更常見。

結論：在有一個明確的鎮痛記錄標準的前提下，VAS 的 AUC 分析和混合效應分析表明，辣椒堿組在腹股溝疝修補術後 3-4 天的鎮痛效果優於安慰劑組。

（宣麗真譯 薛張綱校）

BACKGROUND: Acute postoperative pain is common after most surgical procedures. Despite the availability of many analgesic options, postoperative pain management is often unsatisfactory. Purified capsaicin (ALGRX 4975 98% pure) has demonstrated prolong inhibition of C-fiber function in in vitro, preclinical, and clinical studies, and may be an effective adjunct to postoperative pain management.

METHODS: We performed a single-center, randomized, double-blind, placebo-controlled study of the analgesic efficacy of a single intraoperative wound instillation of 1000 μg ultrapurified capsaicin (ALGRX 4975) after open mesh groin hernia repair in 41 adult male patients. The primary end-point was average daily visual analog scale (VAS) pain scores during the first week after surgery assessed as area under the curve (AUC). Pain was recorded twice daily in a pain diary for 4 wk. Physical examination and laboratory tests were done before and 1 wk after surgery, together with recordings of adverse events up to 28 days. Adverse events were recorded. Data were also analyzed using a mixed-effects analysis with NONMEM.

RESULTS: VAS AUC was significantly lower during the first 3 days postoperatively ($P < 0.05$), but not for the whole 1 or 4 wk postoperatively. Mixed-effects analysis with NONMEM revealed that pain scores were significantly lower ($P < 0.05$) in the capsaicin group during the first 4 days. No clinically significant serious adverse events were observed, although a mild transient increase in liver enzymes was seen more often in the capsaicin-treated group.

CONCLUSION: In the setting of a well-defined analgesic protocol standard, VAS AUC analysis and a mixed-effect analysis showed superior analgesia of capsaicin relative to placebo during the first 3–4 days after inguinal hernia repair.

在門診行膝關節鏡手術病人的關節內聯合使用曲馬多和布比卡因可延長藥物的術後鎮痛時間

Intraarticular Tramadol-Bupivacaine Combination Prolongs the Duration of Postoperative Analgesia After Outpatient Arthroscopic Knee Surgery

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Anesth Analg 2008 107: 292-299.

背景：關節腔內局部麻醉常用於處理和治療膝關節鏡術後疼痛。近來，關節腔內常使用曲馬多來處理這些病人。然而，關節內聯合使用局麻和曲馬多使用效果還未

在關節鏡門診病人得到證實。本研究目的是在行膝關節鏡病人通過視覺類比疼痛評分來研究關節內聯合使用局麻和曲馬多與分別使用局麻和曲馬多的效果差別。
方法：90 名 ASA Ⅰ級和 II 級病人在全身麻醉下由外科醫生行關節鏡下部分半月板切除術，這些病人隨機、雙盲分爲三組： B 組（30 名）術後接受 0.25%的布比卡因，T 組（30 名）接受 100mg 的曲馬多，BT 組（30 名）接受 0.25%的布比卡因和 100mg 的曲馬多稀釋到 20ml。通過 VAS 法評定術後疼痛，分別在術後 0.5、1、2、4、6、8、12 及 24 小時時間點安靜及活動時的疼痛程度。並記錄麻醉持續時間，麻醉復蘇後 24 小時的鎮痛藥消耗量，離床活動的時間和出院的時間。同時記錄關節內注射藥物引起的全身性反應。
結果： BT 組的 VAS 評分明顯低於 T 組和 B 組。BT 組的術後疼痛開始時間晚於 B 組和 T 組，且恢復時間長與 B 組和 T 組。BT 組的 24 小時麻醉劑消耗量明顯少於 B 組和 T 組。另外，BT 組出院的時間和可以獨立行走的時間明顯短於 B 組和 T 組，且沒有伴隨任何系統反應。
結論：在日間行膝關節鏡手術的病人的關節內給予 100mg 曲馬多和 0.25%布比卡因比單獨給其中一種藥可以顯著的延長止痛的時間。
（王鵬 譯 陳傑 校）

BACKGROUND: Intraarticular (IA) local anesthetics are often used for the management and prevention of pain after arthroscopic knee surgery. Recently, IA tramadol was also used for the management of these patients. However, the IA combination of local anesthetic and tramadol has not been evaluated in arthroscopic outpatients. Our primary aim in this study was to evaluate the analgesic effect of an IA combination of bupivacaine and tramadol when compared with each drug alone using visual analog scale (VAS) pain scores in patients undergoing day-care arthroscopic knee surgery. Additionally, we assessed analgesic demand.
METHODS: Ninety ASA I/II patients undergoing arthroscopic partial meniscectomy, performed by a single surgeon under general anesthesia, were assigned in a randomized, double-blind manner into three groups: group B (n = 30) received 0.25% bupivacaine, group T (n = 30) received 100 mg tramadol, and group BT (n = 30) received 0.25% bupivacaine and 100 mg tramadol to a total volume of 20 mL by the IA route after surgery. Postoperative pain scores were measured on a VAS, at rest and on mobilization at 0.5, 1, 2, 4, 6, 8, 12, and 24 h. Duration of analgesia, the subsequent 24 h consumption of rescue analgesia, time to ambulation, and time to discharge were evaluated. In addition, the systemic side effects of the IA injected drugs were also assessed.
RESULTS: The results showed significantly lower VAS pain scores in group BT ($P << 0.1$) when compared with groups T and B. Group BT had a later onset of postsurgical pain and longer time to first rescue analgesic than groups B and T. The 24 h consumption of analgesic was significantly less in group BT when compared with the other two groups (26.7% of the patients required rescue analgesia in group BT, whereas this number was 90% in group B and 86.7% in group T). In addition, time in hours to discharge and time to unassisted ambulation were significantly shorter in group BT when compared with groups T and B, and this was not associated with any detectable systemic effects.
CONCLUSION: The IA admixture of tramadol 100 mg with bupivacaine 0.25% provides a pronounced prolongation of analgesia compared with either drug alone in patients undergoing day care arthroscopic knee surgery.

一種新的用於評估術後疼痛的功能性措施的大鼠膝部手術模型

A New Knee Surgery Model in Rats to Evaluate Functional Measures of Postoperative Pain

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背景：隨著全膝手術數量的增加，術後鎮痛處理依舊是一個挑戰。我們使用了一種新的動物膝部手術模型來表現大鼠疼痛相關行爲以及全身或鞘內用藥的治療調整的特點。
方法：用異氟醚麻醉大鼠，切開大鼠左膝皮膚暴露髕骨肌腱。將肌腱牽開，在膝關節上下 2 mm 處的股骨和脛骨上個各鑽一個直徑 1.4mm、深 0.5 mm 的洞。在洞內充入骨水泥，並縫合傷口。僞手術動物僅切開和縫合皮膚。術前部分動物在腰段鞘內置管用來給藥。術後 24 小時時，動物全身給予如下藥物：經腹腔給予硫酸嗎啡 0.3－1 mg/kg、腹腔注射酮咯酸 2.5－20 mg/kg、口服塞來考昔 10－50 mg/kg、腹腔注射鹽酸氯胺酮 2.5－10 mg/kg、腹腔注射鹽酸可樂定 25 μg/kg、口服 pregabablin 10－20 mg/kg 或藥物賦形劑；或者鞘內給予：硫酸嗎啡 0.3－1 μg、酮咯酸 4－80 μg、L-745,337 80 μg、pregabalin 15 μg、新斯的明 0.5 μg 或生理鹽水賦形劑。然後通過記錄探測的自發活動來評估疼痛相關行爲，其中自動記錄水準和垂直光束的中斷，以測定 60 分鐘裏大鼠的覓食行爲和活動。用方差分析和 Tukey-B post hoc 檢驗比較資料。
結果：與僞皮膚切開對照組相比，術後 1－3 天模型動物覓食和活動都有障礙。全身和鞘內給予嗎啡可以改善大鼠的覓食和活動，膝部手術/嗎啡大鼠的活動與僞皮膚切開/賦形劑動物的活動一樣多，但膝部手術/賦形劑大鼠的活動。鞘內給予減少。全身給予酮咯酸 20 mg/kg 可以改善大鼠的覓食和活動，膝部手術/酮咯酸 4－40 μg 大鼠的活動比膝部手術/賦形劑動物多，並沒有增多大鼠的覓食或活動，但給予 80 μg 酮咯酸則有效。其他實驗藥物，無論是全身還是鞘內給藥，均不能使活動恢復到正常水準。
結論：這個研究呈現了一個新穎、簡單、可重現的大鼠模型，可以用來評估膝部手術後的功能和不適，以及對治療措施的反應。在這個膝部手術模型中，全身和鞘內給予嗎啡或酮咯酸可以逆轉大鼠術後 24 小時時的覓食和活動功能障礙。
（張瑩譯　馬皓琳 李士通校）

INTRODUCTION: With the increase in the number of total knee surgeries being performed, postoperative analgesic management remains a challenge. We used a new animal knee surgery model to characterize pain-related behavior in the rat, and its therapeutic modulation with systemic and intrathecal drug treatment.
METHODS: Rats were anesthetized with isoflurane and an incision was made over the left knee to expose the patella tendon. The tendon was reflected aside and a 1.4-mm diameter, 0.5 mm deep hole was drilled in both the femur and tibia at 2 mm above and below the knee joint, respectively. The holes were filled with dental cement and the wound was closed. Sham surgery animals only had a skin incision. Some animals had

previously been implanted with a lumbar intrathecal catheter for drug injection. At 24 h after surgery, animals received the following drugs systemically: i.p. morphine sulfate 0.3–1 mg/kg, i.p. ketorolac 2.5–20 mg/kg, p.o. celecoxib 10–50 mg/kg, i.p. ketamine hydrochloride 2.5–10 mg/kg, i.p. clonidine hydrochloride 25 μg/kg, p.o. pregabablin 10–20 mg/kg, or drug vehicle; or intrathecally: morphine sulfate 0.3–1 μg, ketorolac 4–80 μg, L-745,337 80 μg, pregabalin 15 μg, neostigmine 0.5 μg, or saline vehicle. Pain-related behavior was then assessed by recording exploratory spontaneous activity, in which vertical and horizontal light beam interruptions were automatically recorded to measure rearing activity and ambulation for 60 min. Data were compared using analysis of variance with the Tukey-B post hoc test.
RESULTS: The model demonstrated deficits in rearing and ambulation compared with sham skin incision control animals on postsurgery days 1–3. Systemic and intrathecal morphine improved rearing and ambulation, with knee surgery/ morphine rats displaying as much activity as sham skin incision/vehicle animals, whereas knee surgery/vehicle rats showed decreased activity. Systemic ketorolac 20 mg/kg improved rearing and ambulation, with knee surgery/ketorolac rats showing increased activity compared with knee surgery/vehicle animals. Intrathecal ketorolac 4–40 μg did not increase rearing or ambulation, but the 80 μg dose was effective. Other drugs tested, systemically or intrathecally, did not restore activity to normal levels.
CONCLUSION: This study presents a new simple, reproducible rat model to assess function and discomfort after knee surgery, and one that responds to therapeutic interventions. In this knee surgery model, both systemic and intrathecal administration of either morphine or ketorolac caused reversal of the deficits in rearing and ambulatory behavior at 24 h postsurgery.

PAIN MECHANISMS:

性、性別和疼痛： 一個複雜領域的總的看法

Sex, Gender, and Pain: An Overview of a Complex Field **(Review Article)**

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Anesth Analg 2008 107: 309-317.

傳統上，在雄性動物和男性患者開展了疼痛領域的生物醫學研究。 在過去 20－30 年，越來越被認可這種狹窄的方法錯過了重要可變物： 性。 研究的一個持續增長的數字建立了性區別以回應疼痛和鎮痛藥。 這些研究顯示出，性之間的區別看上去有一個生物和心理依據。 我們提供流行病學、嚙齒目動物和人的實驗性研究結果的簡要的回顧。 在學術上的爭論和普遍分歧突出需要一種進步方法針對在基本和臨床生物醫學以及在流行病學和社會科學努力合作問題。 爲了使遭受急性和/或慢性疼痛的患者受益于這工作，方法必須涉及使用或發展臨床疼痛或疼痛相關的模型回答基本而複雜問題。學術的現狀不允許轉變我們制定的臨床決策。
（章一靜譯 薛張綱校）

Traditionally, biomedical research in the field of pain has been conducted with male animals and subjects. Over the past 20–30 yr, it has been increasingly recognized that this narrow approach has missed an important variable: sex. An ever-increasing number of studies have established sex differences in response to pain and analgesics. These studies have demonstrated that the differences between the sexes appear to have a biological and psychological basis. We will provide brief review of the epidemiology, rodent, and human experimental findings. The controversies and widespread disagreement in the literature highlight the need for a progressive approach to the questions involving collaborative efforts between those trained in the basic and clinical biomedical sciences and those in the epidemiological and social sciences. In order for patients suffering from acute and/or chronic pain to benefit from this work, the approach has to involve the use or development of clinically relevant models of nociception or pain to answer the basic, but complex, question. The present state of the literature allows no translation of the work to our clinical decision-making.

高濃度樹脂毒素抑制克隆神經內分泌細胞的離子通道功能

A High Concentration of Resiniferatoxin Inhibits Ion Channel Function in Clonal Neuroendocrine Cells

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Anesth Analg 2008 107: 318-324.Abstract

背景：樹脂毒素（RTX）是外周傷害性感受器跨膜受體 TRPV1 通道的強力激動劑。RTX 首先引起細胞興奮，接著是長時間的不應期，從而起到鎮痛作用。RTX 的效應可能是直接作用於 TRPV1 通道引起的，也可能是先前報導的 TRPV1 通道非依賴性效應。本實驗檢驗 RTX 是否通過 TRPV1 通道非依賴性的方式作用於離子通道。
方法：克隆鼠垂體前葉細胞(GH$_3$)，置於 Ca^{2+}敏感的螢光染料中，用 Na^+通道激動劑藜蘆定（VTD）刺激或直接用 60 mM K^+溶液去極化。以細胞內 Ca^{2+}濃度升高引起的螢光增強來評估暴露于 RTX 的生理效應。
結果：在 10 M RTX 時，VTD 與 60 mM K^+迅速使螢光改變分別降低到對照組的 45%與 50%(*P* 值分別爲 0.018 與 0.043)。細胞長時間（24h）暴露於 10 M RTX 中，洗脫 2h，VTD 與 60 mM K^+分別使螢光改變降低到對照組 5.6%與 42%(*P*值分別爲 0.027 與 0.011)。細胞在 RTX 陰性的培養基中培養 24h,其對 VTD 的反應部分恢復到對照組的 42%。
結論：10 M RTX 能直接迅速地以 TRPV1 非依賴的方式抑制電壓門控 Ca^{2+}通道。長時間（24h）暴露於 10 M RTX 則以至少部分可逆性的方式抑制電壓門控 Na^+ 與 Ca^{2+}通道。
（張江玲譯 陳傑 校）

BACKGROUND: Resiniferatoxin (RTX) is a potent agonist of the transient receptor potential vanilloid 1 channel (TRPV1) found in peripheral nociceptors. RTX causes cellular excitation first, followed by a long-lasting refractory state, which has suggested its therapeutic use for pain control. RTX's effect could result from specific actions on

TRPV1 channels, but might also arise from previously reported TRPV1-independent effects. We have tested whether exposure to RTX compromises ion channels in a TRPV1-independent manner.
METHODS: Clonal rat anterior pituitary (GH_3) cells, loaded with the Ca^{+2}-sensitive fluorescent dye (fluo-4), were stimulated with the Na^+ channel activator veratridine (VTD) or directly depolarized by 60 mM K^+ solution. The physiological effects of exposure to RTX were evaluated by stimulated increases of fluorescence from raised intracellular $[Ca^{2+}]$.
RESULTS: The presence of 10 μM RTX acutely reduced the median fluorescence changes by VTD and 60 mM K^+ to 45% and 50%, respectively ($P = 0.018$ and 0.043). Prolonged exposure (24 h) of cells to 10 μM RTX, followed by a 2 h washout, reduced the median fluorescence changes by VTD and 60 mM K^+ to 5.6% and 42% of control changes, respectively ($P = 0.027$ and 0.011). Cell responses to VTD partially recovered, to 42% of control, after incubation in RTX-free medium for 24 h.
CONCLUSION: RTX at 10 μM directly and acutely inhibited voltage-dependent Ca^{2+} channels, in a TRPV1-independent manner. Prolonged exposure (24 h) to 10 μM RTX inhibited voltage-dependent Na^+ channels in addition to the Ca^{2+} channels, in at least a partially reversible manner.

REGIONAL ANESTHESIA:

硬膜外腔容量增大與鞘內麻醉劑量的需求：普通與重比重布比卡因的比較

Epidural Volume Extension and Intrathecal Dose Requirement: Plain Versus Hyperbaric Bupivacaine

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背景：硬膜外腔麻醉藥容積增大可以使局麻藥引起的知覺消失平面提高。但是在腰硬聯合麻醉（CSE）中，劑量需要減少的情況下這種現象是否會存在還未闡明。同樣，鞘內藥物所產生的壓力是否會影響硬膜外麻醉藥的擴散也未研究。本研究通過比較普通與重比重布比卡因的 ED_{50} 伴或不伴硬膜外容量變化來研究小量硬膜外容積變化的效應及其與鞘內藥物壓力的關係。
方法：88 名在 CSE 下接受下肢整形外科手術的男性成年病人隨機分成四組（每組 n=22）；鞘內注射分爲普通布比卡因組及重比重布比卡因組；其中普通布比卡因組又分爲普通布比卡因組（PB）和伴有硬膜外容積變化的普通布比卡因組（PBE），重比重布比卡因組又分爲重比重布比卡因組（HB）和伴有硬膜外容積變化的重比重布比卡因組（PHB）。每組患者均鞘內注射芬太尼 25ug。PBE 及 HBE 兩組硬膜外給予 10ml 生理鹽水以改變硬膜外腔容積。鞘內布比卡因用藥劑量通過序貫法給予。每組的第一個病人給予 10mg 布比卡因。一個成功的椎管阻滯定義爲在鞘內給藥

20min 後知覺平面的消失至少達到 T_{10} 同時伴有完全的運動阻滯。根據前一病人是否獲得失敗或成功的椎管內阻滯，布比卡因的劑量依次增加或減少 1mg。
結果：普通布比卡因配合採用硬膜外容積擴散時，PBE 組與 PB 相比較，ED_{50} 明顯減少（相對功效評估：1.2，95%CI：1.04-1.64），且產生了最高的知覺阻滯平面（分別爲 T_6 vs T_8，p〈0.05）。重比重布比卡因組（HB vs HBE）無此現象。在沒有硬膜外容液擴散的影響下，與重比重布比卡因組相比普通布比卡因組的 ED_{50} 明顯要低（PB 組 vs HB 組的相對功效評估：0.78，95%CI：0.54-0.93；PBE 組 vs HBE 組的相對功效評估：0.68，95%CI：0.37-0.87）。
結論：使用或不使用硬膜外容積增大，普通的布比卡因腰麻所受影響更爲顯著。與重比重布比卡因相比只需一個較小的劑量卻在更早期產生了一個更高的知覺阻滯平面。當硬膜外容積增大應用於重比重布比卡因時，不能使之劑量減少或平面增高。
（潘錢玲 譯 陳傑 校）
BACKGROUND: Epidural volume extension leads to an increase in sensory spread of local anesthetic, but whether this translates into lower dose requirements during combined spinal epidural (CSE) remains undetermined. Likewise, the influence of intrathecal drug baricity on the dose-sparing effect of epidural volume extension has not been investigated. We studied the dose-sparing effect of epidural volume extension and its relation to intrathecal drug baricity by comparing the ED_{50} of plain and hyperbaric bupivacaine with and without epidural volume extension.
METHODS: Eighty-eight adult male patients scheduled for lower limb orthopedic surgery under CSE in the sitting position were randomized to four groups (n = 22 each); intrathecal injection was made with plain bupivacaine in groups plain bupivacaine (PB) and plain bupivacaine with epidural volume extension (PBE), and hyperbaric bupivacaine in groups hyperbaric bupivacaine (HB) and hyperbaric bupivacaine with epidural volume extension (HBE). Fentanyl, 25 μg, was added to the intrathecal drug in all groups. Among these four groups, epidural volume extension was performed with 10 mL normal saline only for groups PBE and HBE. The dose of spinal bupivacaine was varied using the up-and-down sequential allocation method. The first patient of each group received 10 mg bupivacaine. A successful spinal block was defined as attainment of sensory level of at least T10 along with complete motor blockade within 20 min of the intrathecal injection. The dose of bupivacaine was sequentially increased or decreased by 1 mg depending on whether spinal block was a failure or success in the previous patient.
RESULTS: The addition of epidural volume extension to plain bupivacaine, i.e., group PBE versus group PB, resulted in a significant decrease in ED_{50} (relative potency estimate: 1.2, 95% CI: 1.04–1.64) and increase in maximum sensory level (T6 vs T8, respectively, $P < 0.05$). These differences were not seen with hyperbaric bupivacaine (group HB vs HBE). Independent of the effect of epidural volume extension, the ED_{50} of plain bupivacaine when compared with hyperbaric bupivacaine was significantly lower (relative potency estimate of group PB vs group HB: 0.78, 95% CI: 0.54–0.93; and for group PBE vs group HBE: 0.68, 95% CI: 0.37–0.87).
CONCLUSIONS: Administered with or without epidural volume extension, plain bupivacaine appears to be more effective, requiring a smaller dose and producing a higher sensory block with an earlier onset in comparison to hyperbaric bupivacaine. Epidural

volume extension, when applied to intrathecal hyperbaric bupivacaine, fails to decrease the dose or raise the level of block.

經肋間放置椎旁導管：一種可供選擇的連續椎旁阻滯的進路方法

Intercostally Placed Paravertebral Catheterization: An Alternative Approach to Continuous Paravertebral Blockade (Brief Report)

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背景：連續椎旁神經阻滯能在腹部和胸部手術後提供有效的術後鎮痛。儘管椎旁阻滯與胸段硬膜外鎮痛相比具有很多優點，用經典進路方法並不總能輕易和/或可能到達椎旁間隙。因此，通過經皮肋間入路的連續椎旁神經阻滯在理論上可作爲到達椎旁間隙的一個可供選擇的進路方法。
方法：110 位接受腹部、胸部或腹膜後大手術的病人在術前經肋間入路放置單側或雙側椎旁導管。在中線旁 8cm，以 5cm 長 18G Tuohy 針向頭端 45 度，向正中矢狀面 60 度進針，直至碰到肋骨下 1/3。針頭保持原方向滑過肋骨下緣在肋骨下繼續進 5-6mm 進入肋溝。在注射 0.5%羅呱卡因 5ml 後，向中線方向按照估計的距離放置椎旁導管。術後每根導管以 10ml/h 速度連續輸注 0.2%羅呱卡因，在疼痛爆發時 1 小時內可追加 5ml。
結果：在術後第一個 24 小時內，病人中位疼痛評分（0-10）平均爲 2，病人自控鎮痛氫嗎啡酮用量平均僅 1.69mg。該技術未發生明顯臨床併發症。
結論：經肋間放置椎旁導管可爲胸部、腹部和腹膜後大手術提供術後鎮痛。
（顏濤 譯，馬皓琳 李士通 校）

BACKGROUND: Continuous paravertebral nerve blocks can provide effective postoperative analgesia after abdominal and thoracic surgery. While offering a number of advantages compared with thoracic epidural analgesia, access to the paravertebral space using a classic approach is not always easily accomplished and/or possible. In this regard, continuous paravertebral blockade via a percutaneous intercostal approach may theoretically serve as an alternative approach to the paravertebral space.
METHODS: One hundred ten patients undergoing major abdominal, thoracic, or retroperitoneal procedures had preoperative placement of unilateral or bilateral paravertebral catheter(s) via an intercostal approach. At a point 8 cm lateral to the midline

a 5 cm, 18 G Tuohy needle was advanced with the needle tip angled 45 degrees cephalad and 60 degrees medial to the sagittal plane to come in contact with the lower third of the rib. The needle was "walked-off" the inferior border of the rib while maintaining its orientation and advanced a further 5 to 6 mm under the rib to lie in the subcostal groove. After injection of 5 mL ropivacaine 0.5%, a catheter was advanced medially the estimated distance to the paravertebral space. Postoperatively 0.2% ropivacaine was continuously infused at 10 mL/h in each catheter with hourly boluses of 5 mL available for breakthrough pain.

RESULTS: Median pain scores averaged 2 on a scale of 0–10 and patient-controlled analgesia hydromorphone consumption averaged only 1.69 mg for the first 24 h postoperatively. There were no clinically significant complications of the technique.

CONCLUSION: The intercostally placed paravertebral catheter provides postoperative analgesia after major surgery of the chest, abdomen, or retroperitoneum.