Table of Contents
October 2011

Cardiovascular Anesthesiology

Ambulatory Anesthesiology

- Marie-Eve Bergeron,
- Pascale Ouellet,
- Emmanuel Bujold,
- Maxime Cote,
- Caroline Rhéaume,
- Daniel Lapointe,
- Christine Beaudet,
- Madeleine Lemyre,
- and Philippe Laberge

Anesth Analg October 2011 113:723-728; published ahead of print July 25, 2011

Anesthetic Pharmacology

研究有外科感染風險的肥胖患者應用頭孢西丁的藥代動力學及組織滲透性

(侯文婷譯 薛張綱校)

Pharmacokinetics and Tissue Penetration of Cefoxitin in Obesity: Implications for Risk of Surgical Site Infection

- Octavian Toma,
- Patty Suntrup,
- Andrei Stefanescu,
- Amy London,
- Matthew Mutch,
- and Evan Kharasch

Anesth Analg October 2011 113:730-737; published ahead of print June 3, 2011

改良環糊精劑型丙泊酚：首次重點關注注射痛量效關係的人體研究

(龔寅譯　陳傑校)

Propofol in a Modified Cyclodextrin Formulation: First Human Study of Dose–Response with Emphasis on Injection Pain

- Crystal B. Wallentine,
- Noriko Shimode,
- Talmage D. Egan,
- and Nathan L. Pace

Anesth Analg October 2011 113:738-741; published ahead of print September 2, 2011

七氟醚對豬自體肺移植模型預處理的效應

(劉伍 譯 馬皓琳 李士通 校)

The Effects of Anesthetic Preconditioning with Sevoflurane in an Experimental Lung Autotransplant Model in Pigs

- Javier Casanova,
- Ignacio Garutti,
- Carlos Simon,
- Ana Giraldez,
- Beatriz Martin,
- Guillermo Gonzalez,
- Leire Azcarate,
- Cruz Garcia,
- and Elena Vara

Anesth Analg October 2011 113:742–748; published ahead of print September 2, 2011

Technology, Computing, and Simulation

苯腎上腺素、麻黃堿和前負荷增加對於第三代Vigileo-FloTrac 與經食道多普勒在監測時心輸出量變化時的影響

(黃劍譯 薛張綱校)

The Impact of Phenylephrine, Ephedrine, and Increased Preload on Third-Generation Vigileo-FloTrac and Esophageal Doppler Cardiac Output Measurements

- Lingzhong Meng,
- Nam Phuong Tran,
- Brenton S. Alexander,
- Kathleen Laning,
- Guo Chen,
- Zeev N. Kain,
- and Maxime Cannesson

Anesth Analg October 2011 113:751–757; published ahead of print August 4, 2011

N2O 反常調節腦電圖慢波振盪: 麻醉監測的意義

(俞劼晶譯　陳傑校)

Nitrous Oxide Paradoxically Modulates Slow Electroencephalogram Oscillations: Implications for Anesthesia Monitoring

- Brett L. Foster and
- David T. J. Liley

Anesth Analg October 2011 113:758–765; published ahead of print July 25, 2011

麻醉醫生關於動脈波形分析過去、現在、將來的概念

(毛祖旻 譯 馬皓琳 李士通 校)

Review Article: Arterial Waveform Analysis for the Anesthesiologist: Past, Present, and Future Concepts

- Robert H. Thiele and
- Marcel E. Durieux

Anesth Analg October 2011 113:766–776; published ahead of print September 2, 2011

Patient Safety

術後 5 年出現惡性疾病與使用七氟醚麻醉的時間和腦電雙頻指數小於 45 的時間的相關性

(劉玨瑩譯 薛張綱校)

Malignant Disease Within 5 Years After Surgery in Relation to Duration of Sevoflurane Anesthesia and Time with Bispectral Index Under 45

- Maj-Lis Lindholm,
- Fredrik Granath,
- Lars I. Eriksson,
- and Rolf Sandin

Anesth Analg October 2011 113:778–783; published ahead of print May 19, 2011

雙側全膝關節置換術：主要併發症發病率和死亡率的危險因素

(丁佳譯　陳傑校)

Bilateral Total Knee Arthroplasty: Risk Factors for Major Morbidity and Mortality

- Stavros G. Memtsoudis,
- Yan Ma,
- Ya-Lin Chiu,
- Lazaros Poultsides,
- Alejandro Gonzalez Della Valle,

- and Madhu Mazumdar

Anesth Analg October 2011 113:784–790; published ahead of print July 13, 2011

應用 **AP Advance、GlideScope Ranger** 可視喉鏡和 **Macintosh** 喉鏡在人體模型插管的研究

(瞿亦楓 譯 馬皓琳 李士通 校)

A Mannequin Study of Intubation with the AP Advance and GlideScope Ranger Videolaryngoscopes and the Macintosh Laryngoscope

- Jack A. R. Hodd,
- D. John Doyle,
- Shipra Gupta,
- Jarrod E. Dalton,
- Juan P. Cata,
- Edward J. Brewer,
- Monyulona James,
- and Daniel I. Sessler

Anesth Analg October 2011 113:791–800; published ahead of print September 2, 2011

Obstetric Anesthesiology

擇期剖宮產產婦行腰麻後使用晶體或膠體對心輸出量的影響

(陸麗虹譯 薛張綱校)

Maternal Cardiac Output Changes After Crystalloid or Colloid Coload Following Spinal Anesthesia for Elective Cesarean Delivery: A Randomized Controlled Trial

- Sarah McDonald,
- Roshan Fernando,
- Keri Ashpole,
- and Malachy Columb

Anesth Analg October 2011 113:803–810; published ahead of print September 2, 2011

布比卡因的比重是否會影響在擇期剖腹產術前長時保持坐位時藥物的鞘內擴散？一項前瞻性、隨機、對照研究

(范逸辰譯　陳傑校)

Does the Baricity of Bupivacaine Influence Intrathecal Spread in the Prolonged Sitting Position Before Elective Cesarean Delivery? A Prospective Randomized Controlled Study

- Christian Loubert,
- Stephen Hallworth,
- Roshan Fernando,
- Malachy Columb,
- Nisa Patel,
- Kavita Sarang,
- and Vinnie Sodhi

Anesth Analg October 2011 113:811–817; published ahead of print September 2, 2011

對比瑞芬太尼和呱替啶應用於分娩鎮痛的一項系統綜述

(劉朝輝譯，馬皓琳，李士通校)

A Comparison Between Remifentanil and Meperidine for Labor Analgesia: A Systematic Review

- Wan Ling Leong,
- Ban Leong Sng,
- and Alex Tiong Heng Sia

Anesth Analg October 2011 113:818–825; published ahead of print September 2, 2011

程式性硬膜外間斷給藥對比持續給藥用於分娩鎮痛對母體運動功能和分娩結局的影響：一項對初產婦的隨機雙盲研究

(任雲譯 薛張綱校)

Programmed Intermittent Epidural Bolus Versus Continuous Epidural Infusion for Labor Analgesia: The Effects on Maternal Motor Function and Labor Outcome. A Randomized Double-Blind Study in Nulliparous Women

- Giorgio Capogna,
- Michela Camorcia,
- Silvia Stirparo,
- and Alessio Farcomeni

Anesth Analg October 2011 113:826–831; published ahead of print July 25, 2011

Pediatric Anesthesiology

預防性靜脈給予納洛酮來改善因中重度疼痛而接受嗎啡靜脈自控鎮痛的兒童發生阿片類藥物副作用的最佳劑量：一項探索劑量的研究

(滕凌雅譯　陳傑校)

The Optimal Dose of Prophylactic Intravenous Naloxone in Ameliorating Opioid-Induced Side Effects in Children Receiving Intravenous Patient-Controlled Analgesia Morphine for Moderate to Severe Pain: A Dose Finding Study

- Constance L. Monitto,
- Sabine Kost-Byerly,
- Elizabeth White,
- Carlton K. K. Lee,
- Michelle A. Rudek,
- Carol Thompson,
- and Myron Yaster

Anesth Analg October 2011 113:834-842; published ahead of print September 2, 2011

青少年的氧化亞氮麻醉和血漿高半胱氨酸

(安光惠譯 馬皓琳 李士通校)

Nitrous Oxide Anesthesia and Plasma Homocysteine in Adolescents

- Peter Nagele,
- Danielle Tallchief,
- Jane Blood,
- Anshuman Sharma,
- and Evan D. Kharasch

Anesth Analg October 2011 113:843-848; published ahead of print June 16, 2011

Neuroscience in Anesthesiology and Perioperative Medicine

近紅外線分光鏡測量腦血管的反應性的局限性：低頻振盪所扮演的角色。

(翁梅琳譯 薛張綱校)

The Limitations of Near-Infrared Spectroscopy to Assess Cerebrovascular Reactivity: The Role of Slow Frequency Oscillations

- Jennifer Diedler,
- Christian Zweifel,
- Karol P. Budohoski,

- Magdalena Kasprowicz,
- Enrico Sorrentino,
- Christina Haubrich,
- Kenneth M. Brady,
- Marek Czosnyka,
- John D. Pickard,
- and Peter Smielewski

Anesth Analg October 2011 113:849–857; published ahead of print August 4, 2011

Analgesia

Pain Medicine

比較連續股神經與後路腰叢神經阻滯在髖關節術後的鎮痛效果：一項隨機對照研究

(陸秉瑋譯　陳傑校)

一項隨機對照研究：連續股神經阻滯與腰後叢阻滯用於髖關節成形術後鎮痛的比較

(黃麗娜 譯 李士通 馬皓琳 校)

Continuous Femoral Versus Posterior Lumbar Plexus Nerve Blocks for Analgesia After Hip Arthroplasty: A Randomized, Controlled Study

- Brian M. Ilfeld,
- Edward R. Mariano,
- Sarah J. Madison,
- Vanessa J. Loland,
- NavParkash S. Sandhu,
- Preetham J. Suresh,
- Michael L. Bishop,
- T. Edward Kim,
- Michael C. Donohue,
- Anna A. Kulidjian,
- and Scott T. Ball

Anesth Analg October 2011 113:897–903; published ahead of print April 5, 2011

連續外周神經阻滯:一項基於發表證據的綜述

(姚敏敏譯 薛張綱校)

Review Article: Continuous Peripheral Nerve Blocks: A Review of the Published Evidence

- Brian M. Ilfeld

Anesth Analg October 2011 113:904–925; published ahead of print August 4, 2011

鞘內注射嗎啡與局部浸潤鎮痛作爲全膝關節置換術後疼痛管理的隨機對照試驗

(孫曉瓊譯　陳傑校)

Local Infiltration Analgesia Versus Intrathecal Morphine for Postoperative Pain Management After Total Knee Arthroplasty: A Randomized Controlled Trial

- Per Essving,
- Kjell Axelsson,
- Elisabeth Åberg,
- Henrik Spännar,
- Anil Gupta,
- and Anders Lundin

Anesth Analg October 2011 113:926–933; published ahead of print August 4, 2011

Pain Mechanisms

鞘內注射 **Kappa-2** 阿片受體激動劑 **GR89696** 和白介素**-10** 以協同的相互作用方式減輕骨癌痛

(江繼宏 譯 馬皓琳 李士通 校）

The Intrathecally Administered Kappa-2 Opioid Agonist GR89696 and Interleukin-10 Attenuate Bone Cancer–Induced Pain Through Synergistic Interaction

- Woong Mo Kim,
- Cheol Won Jeong,
- Seong Heon Lee,
- Yeo Ok Kim,
- Jin Hua Cui,
- and Myung Ha Yoon

Anesth Analg October 2011 113:934–940; published ahead of print July 25, 2011

利多卡因通過抑制小膠質細胞活化來減少糖尿病誘導觸覺性疼痛過敏

(張玥琪譯，薛張綱校)

Lidocaine Attenuates the Development of Diabetic-Induced Tactile Allodynia by Inhibiting Microglial Activation

- Naoko Suzuki,
- Maiko Hasegawa-Moriyama,
- Yoshika Takahashi,
- Yuji Kamikubo,
- Takashi Sakurai,
- and Eiichi Inada

Anesth Analg October 2011 113:941-946; published ahead of print July 25, 2011

簡報：對於用紫杉醇治療的 C57B16 雌性大鼠，大麻二酚可以防止冷和機械刺激性痛覺超敏的發生

(張婷譯　陳傑校)

Brief Report: Cannabidiol Prevents the Development of Cold and Mechanical Allodynia in Paclitaxel-Treated Female C57Bl6 Mice

- Sara Jane Ward,
- Michael David Ramirez,
- Harshini Neelakantan,
- and Ellen Ann Walker

Anesth Analg October 2011 113:947-950; published ahead of print July 7, 2011

Regional Anesthesia

在超聲引導下的斜角肌間溝臂叢神經阻滯中 0.75%羅呱卡因的最小有效麻醉容量

(陳彬彬譯 馬皓琳 李士通校)

The Minimum Effective Anesthetic Volume of 0.75% Ropivacaine in Ultrasound-Guided Interscalene Brachial Plexus Block

- Philippe Gautier,
- Catherine Vandepitte,
- Caroline Ramquet,
- Mieke DeCoopman,
- Daquan Xu,
- and Admir Hadzic

Anesth Analg October 2011 113:951-955; published ahead of print August 4, 2011

改良環糊精劑型丙泊酚：首次重點關注注射痛量效關係的人體研究

Propofol in a Modified Cyclodextrin Formulation: First Human Study of Dose–Response with Emphasis on Injection Pain

Crystal B. Wallentine, MD*, Noriko Shimode, MD†, Talmage D. Egan, MD* and Nathan L. Pace, MD, MStat*
From the *Department of Anesthesiology, University of Utah, Salt Lake City; and †Department of Anesthesiology, Hyogo College of Medicine Hyogo, Japan.
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背景：已經開發出一種新型的丙泊酚非脂制劑型，其中含有磺丁基-β-環糊精以及水。本研究的主要目的是比較脂制劑型以及新型環糊精劑型的丙泊酚注射時引起的疼痛差異。本研究假設環糊精劑型的丙泊酚可比脂劑丙泊酚引起更少的注射痛。
方法：本研究是一項運用完全交叉平衡設計的方法，針對健康志願者的單中心，雙盲，2-週期，隨機，劑量階梯式增加的研究。通過主觀及客觀的評估方法比較脂肪製劑以及環糊精結構的丙泊酚在多個不同的時間點的注射痛情況。記錄分析了關於疼痛的五個反應變數。
結果：環糊精劑型的丙泊酚在所有五個疼痛變數中均顯著升高。其他結果包括鎮靜作用等無差異。
結論：環糊精劑型的丙泊酚並不能減少於丙泊酚相關的注射時疼痛。
（龔寅　譯　陳傑　校）

BACKGROUND: A new lipid-free preparation of propofol has been developed containing the drug, sulfobutylether ß-cyclodextrin and water. The primary objective of this study was to compare the effects of propofol in the lipid formulation with those of the new cyclodextrin formulation, particularly with regard to pain on injection. We hypothesized that the propofol in cyclodextrin would be associated with less pain on injection than propofol in lipid.
METHODS: The study was a single-center, double-blind, 2-period, randomized, dose-escalating study using a completely balanced cross-over design in healthy volunteers. Pain on injection was compared between propofol in cyclodextrin and propofol in lipid using subject and observer assessments of pain rated at several different time points. Five response variables to pain were analyzed.
RESULTS: Propofol in cyclodextrin had significantly higher pain scores for all 5 variables. Other endpoints, including sedation, showed no difference.
CONCLUSION: The propofol in cyclodextrin formulation failed to reduce the pain on injection associated with propofol.

N2O 反常調節腦電圖慢波振盪: 麻醉監測的意義

Nitrous Oxide Paradoxically Modulates Slow Electroencephalogram Oscillations: Implications for Anesthesia Monitoring

Brett L. Foster, PhD and David T. J. Liley, MBChB, PhD
From Faculty of Life and Social Sciences, the Brain and Psychological Sciences Research Centre, Swinburne University of Technology, Melbourne, Australia.
Brett L. Foster, PhD, is currently affiliated with the Department of Neurology & Neurological Sciences, School of Medicine, Stanford University, Stanford, CA.
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背景：氧化亞氮 (N_2O) 是最傳統的鎮痛藥/輔助鎮痛藥之一，並一直沿用至今。然而，其對於腦電圖（EEG）的影響卻至今未明。有人提出，N_2O 可能增加術中高頻的 EEG 活動(經常提示患者警戒狀態和認知的改變) 這一可能的反常效果解釋了爲什麼許多 EEG 監視器並不能捕捉到麻醉期間 N_2O 對於患者整體狀態的影響。爲了更好地瞭解爲何使用現行 EEG 監測 N_2O 的波動會如此低效，本研究力求在最小噪音的實驗環境中，對健康的志願者使用多頻道的 EEG 記錄儀定量研究他們在靜息狀態的 EEG 變化。

方法：健康男性志願者在隔絕噪音的 EEG 記錄環境中，分別吸入氧氣混合 20% (*n* = 10), 40% (*n* = 10),或者 60% (*n* = 5)的 N_2O。吸入 N_2O20 分鐘，其中包括 5 分鐘平衡期和 5 分鐘消退期。選擇 EEG 的頻譜邊緣頻率(SEF)(95%), 中位元頻率（MF）, 總功率和帶限頻率(δ, θ, α, β 和 γ) 作爲定量的參數，在 N_2O 吸入期間可對這些參數的變化進行定量並對給藥前，藥物效應峰值和消除期不同時段進行比較。

結果：N_2O 吸入期間，頻譜頻率的定量變化僅僅顯示了 SEF 和 MF 的微小變化，但額部的總功率在藥物高峰期卻顯著降低(*P* = 0.001; 平均降低[95% 置信區間]: 41.90 μV^2 [18.19–65.61 μV^2]) ，在消除期反彈。總功率的這一系列變化是由於低頻功率(δ/θ)的轉換,而低頻功率在額部最高。

結論： N_2O 只是維持靜息狀態 EEG 的清醒特徵(α 譜帶)，並且抑制了那些功率升高與鎮靜/催眠(δ 和 θ)密切相關的功率，而不是直接提高 EEG 的高頻功率(β 或 γ 譜帶),。這些資料顯示，N_2O 對低頻率 EEG 的抑制可能會幫助解釋之前在 N_2O 麻醉期間使用 EEG 監測患者狀態的困難原因。因爲低頻功率的升高代表性地提示了麻醉深度加深，N_2O 對這些活動的抑制及其消除期的反彈都反常地影響著 EEG 的監護參數。因此，對於這些影響的修正，有望在未來提升監測方法。

（俞劼晶　譯　陳傑　校）

BACKGROUND: Nitrous oxide (N_2O) is one of the oldest analgesics/adjuvant agents still in use today; however, its effects on the human electroencephalogram (EEG) remain unclear. It has been proposed that N_2O may enhance higher-frequency EEG activity (often indicative of alert states and cognition) duration sedation. This possibly paradoxical effect has been used to explain the failure of many EEG monitors to capture the effects of N_2O on patient state during anesthesia. To better understand the poor efficacy of current EEG approaches to monitoring N_2O action, we quantitatively studied the sole effect of N_2O on the resting EEG in healthy volunteers using multichannel EEG recordings under noise-minimized laboratory conditions.

METHODS: Healthy male volunteers were administered 20% (*n* = 10), 40% (*n* = 10), or 60% (*n* = 5) inspired N_2O mixed with oxygen during noise-shielded EEG recordings. N_2O was administered over a 20-minute period involving a 5-minute equilibration period and 5-minute washout. EEG spectral edge frequency (95%), median power frequency, total power, and band-limited power (δ, θ, α, β, and γ) were used as quantitative EEG parameters. The changes in these EEG parameters were quantified throughout N_2O inhalation and compared between predrug baseline, peak drug effect, and washout.

RESULTS: Quantification of changes in spectral power during N_2O inhalation showed only minor changes in estimates of spectral edge and median power frequency, whereas significant reductions in total power were observed at frontal sites during peak gas effect

(P = 0.001; mean reduction [95% confidence interval]: 41.90 μV^2 [18.19–65.61 μV^2]) that rebounded during N_2O washout. Such changes in total power were driven by shifts in low-frequency power (δ/θ), which were most elevated at frontal sites.
CONCLUSION: Rather than directly enhancing high-frequency EEG power (β or γ bands), N_2O seems to preserve the awake features of resting EEG (α band) and suppress power in those bands in which increases are typically associated with sedation/hypnosis (δ and θ). These data suggest that N_2O's suppression of low-frequency EEG power may help to explain previously reported difficulties in attempting to monitor patient state with the EEG during anesthesia involving N_2O. Because increases in low-frequency power typically indicate increasing anesthesia, N_2O's suppression of such activity and its rebound during washout would paradoxically influence EEG monitoring parameters. Therefore, correcting for such effects is expected to improve future monitoring methods.

雙側全膝關節置換術：主要併發症發病率和死亡率的危險因素

Bilateral Total Knee Arthroplasty: Risk Factors for Major Morbidity and Mortality

Stavros G. Memtsoudis, MD, PhD*, Yan Ma, PhD†, Ya-Lin Chiu, MS†, Lazaros Poultsides, MD, PhD‡, Alejandro Gonzalez Della Valle, MD‡ and Madhu Mazumdar, PhD†
From the *Department of Anesthesiology; †Division of Biostatistics and Epidemiology, Public Health; and ‡Department of Orthopaedic Surgery, Hospital for Special Surgery, Weill Cornell Medical College, New York, New York.
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背景：相同的住院時間，雙側全膝關節置換（Bilateral total knee arthroplasty ，BTKA）較單側膝關節置換相比發病率及死亡率較高。然而，目前沒有層化分析的證據顯示哪些患者具有發病和死亡的高風險。本研究目的是分析 BTKA 患者中主要發病率和死亡率的危險因素。
方法：收集 1998-2007 年全國住院病人的資料，從中隨機選擇 BTKA 的病人。統計分析其死亡率及主要併發症。然後進行多因素分析找出主要併發症發病率及死亡率的獨立危險因素。
結果：從 42,003 個資料庫條目中收集了 206,573 例 BTKA 病例。主要院內併發症及死亡的發生率是 9.5%。不良結局的危險因素包括高齡（與 45-65 歲組相比，65-74 歲組和>75 歲組的比值比分別爲 1.88[CI:1.72,2.05]和 2.66[CI:2.42,2.92]），男性 (OR: 1.54 [CI: 1.44, 1.66])，以及合併症。充血性心衰(OR: 5.55 [CI: 4.81, 6.39])和肺動脈高壓 (OR: 4.10 [CI: 2.72, 6.10])是不良結局最主要的危險因素。
結論：研究證實了影響 BTKA 患者主要併發症發病率和死亡率的危險因素。本研究資料有助於該類患者的手術選擇。
（丁佳　譯　陳傑　校）
BACKGROUND: Bilateral total knee arthroplasty (BTKA) performed during the same hospitalization carries increased risk for morbidity and mortality compared with the unilateral approach. However, no evidence-based stratifications to identify patients at risk for major morbidity and mortality are available. Our objective was to determine the incidence and patient-related risk factors for major morbidity and mortality among patients undergoing BTKA.

METHODS: Nationwide Inpatient Survey data collected for the years 1998 to 2007 were analyzed and cases of elective BTKA procedures were included. Patient demographics, including comorbidities, were analyzed and frequencies of mortality and major complications were computed. Subsequently, a multivariate analysis was conducted to determine independent risk factors for major morbidity and mortality.
RESULTS: Included were 42,003 database entries, representing an estimated 206,573 elective BTKAs. The incidence of major in-hospital complications and mortality was 9.5%. Risk factors for adverse outcome included advanced age (odds ratios [ORs] for age groups 65–74 and >75 years were 1.88 [confidence interval, CI: 1.72, 2.05] and 2.66 [CI: 2.42, 2.92], respectively, compared with the 45–65 years group), male gender (OR: 1.54 [CI: 1.44, 1.66]), and a number of comorbidities. The presence of congestive heart failure (OR: 5.55 [CI: 4.81, 6.39]) and pulmonary hypertension (OR: 4.10 [CI: 2.72, 6.10]) were the most significant risk factors associated with increased odds for adverse outcome.
CONCLUSIONS: We identified patient-related risk factors for major morbidity and mortality in patients undergoing BTKA. Our data can be used to aid in the selection of patients for this procedure.

布比卡因的比重是否會影響在擇期剖腹產術前長時保持坐位時藥物的鞘內擴散？一項前瞻性、隨機、對照研究

Does the Baricity of Bupivacaine Influence Intrathecal Spread in the Prolonged Sitting Position Before Elective Cesarean Delivery? A Prospective Randomized Controlled Study

Christian Loubert, FRCPC*, Stephen Hallworth, FRCA†, Roshan Fernando, FRCA*, Malachy Columb, FRCA‡, Nisa Patel, FRCA*, Kavita Sarang, FRCA§ and Vinnie Sodhi, FRCA ‖
From the *Department of Anesthetics, University College London Hospital; †Department of Anesthetics, Royal London Hospital, London; ‡Department of Anesthesia, University Hospital of South Manchester NHS Foundation Trust, Wythenshawe, Manchester; §Department of Anesthetics, The Lister Hospital; and ‖Department of Anaesthetics, Queen Charlotte's and Chelsea Hospital, Imperial College Healthcare NHS Trust, London, United Kingdom.
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背景：在剖腹產腰硬聯合麻醉時出現硬膜外置管困難可能會過分延長從混合局麻藥注入到放置仰臥傾斜位的時間。本研究假定這種延遲可能會影響不同比重局麻藥鞘內注射的分佈，如低比重的藥物會出現更高的感覺阻滯平面。
方法：選擇在腰硬聯合麻醉下行擇期剖腹產的無妊娠合併症的健康臨產婦納入這項前瞻性、隨機、雙盲試驗中。研究物件分別接受鞘內重比重（重比重組）、等比重（等比重組）和低比重（低比重組）布比卡因 10mg。鞘內注藥後，研究物件在放置仰臥傾斜位元前要保持坐位 5 分鐘（模擬困難硬膜外置管）。主要觀察指標是腰麻後 25 分鐘內感覺阻滯平面。其他包括運動阻滯評分，母體低血壓，升壓藥使用情況。
結果：分析了 89 位元病人的資料。組間病人的特徵無差異。腰麻後感覺阻滯水準隨著藥物比重的降低有明顯的升高：重比重組 T10[T11-8](T10-9) 中位數[四分位數

間距]（95%可靠區間）,等比重組 T9[T10-7](T9-7),和低比重組 T6[T8-4](T8-5) (Cuzick 趨勢檢驗：$P < 0.001$).低比重組中所有的病人在腰麻後 25 分鐘其感覺阻滯平面都到達了 T4，而在等比重和重比重組中都只有 80%的病人到達 T4（P=0.04，差異 20%，差異的 95%可靠區間 4%-33%）。在低比重組中病人下肢的運動阻滯更加完全（Bromage 評分=4）（重比重 43%,等比重 63%，低比重 90%，P<0.001）。儘管母體出現低血壓，噁心，嘔吐的情況在各組中無差異，但等比重和低比重組中麻黃素使用量較重比重分別高 1.83 和 3.0 倍 (Cuzick 趨勢檢驗：$P < 0.001$)。
結論：本研究顯示當接受剖腹產術的臨產婦行腰麻注入局麻藥，保持坐位 5 分鐘後，低比重的布比卡因所到達的感覺阻滯平面要比等比重和重比重更高。
(範逸辰　譯　陳傑　校)

BACKGROUND: Difficulties in inserting an epidural catheter while performing combined spinal-epidural anesthesia for cesarean delivery may lead to undue delays between the spinal injection of the local anesthetic mixture and the adoption of the supine position with lateral tilt. We hypothesized that this delay may affect the intrathecal distribution of local anesthetic of different baricities such that hypobaric local anesthetic would lead to a higher sensory block level.
METHODS: Healthy parturients with uncomplicated pregnancies undergoing elective cesarean delivery under combined spinal-epidural anesthesia were enrolled in this prospective double-blind randomized controlled trial. The subjects were allocated to receive hyperbaric (hyperbaric group), isobaric (isobaric group), or hypobaric (hypobaric group) spinal bupivacaine 10 mg. After the spinal injection, the subjects remained in the sitting position for 5 minutes (to simulate difficulty in inserting the epidural catheter) before being helped into the supine lateral tilt position. The primary outcome was the sensory block level during the 25 minutes after the spinal injection. Other end points included motor block score, maternal hypotension, and vasopressor requirements.
RESULTS: Data from 89 patients were analyzed. Patient characteristics were similar in all groups. The median [interquartile range] (95% confidence interval) sensory levels after spinal injection were significantly higher with decreasing baricity: hyperbaric T10 [T11-8] (T10-9), isobaric T9 [T10-7] (T9-7), and hypobaric T6 [T8-4] (T8-5) ($P < 0.001$, Cuzick trend). All patients in the hypobaric group reached a sensory block level of T4 at 25 minutes after spinal injection compared with 80% of the patients in both the isobaric and hyperbaric groups ($P = 0.04$; difference 20%, 95% confidence interval of difference 4%–33%). Significantly more patients in the hypobaric group had complete lower limb motor block (Bromage score = 4) (hyperbaric 43%, isobaric 63%, and hypobaric 90%; $P < 0.001$). The incidences of maternal hypotension and nausea and vomiting were similar among groups, although the ephedrine requirements were significantly increased in the isobaric and hypobaric groups by factors of 1.83 and 3.0, respectively, compared with the hyperbaric group ($P < 0.001$, Cuzick trend).
CONCLUSIONS: We demonstrated that when parturients undergoing cesarean delivery were maintained in the sitting position for 5 minutes after spinal injection of the local anesthetic, hypobaric bupivacaine resulted in sensory block levels that were higher compared with isobaric and hyperbaric bupivacaine, respectively, during the study period.

預防性靜脈給予納洛酮來改善因中重度疼痛而接受嗎啡靜脈自控鎮痛的兒童發生阿片類藥物副作用的最佳劑量：一項探索劑量的研究

The Optimal Dose of Prophylactic Intravenous Naloxone in Ameliorating Opioid-Induced Side Effects in Children Receiving Intravenous Patient-Controlled Analgesia Morphine for Moderate to Severe Pain: A Dose Finding Study

Constance L. Monitto, MD*, Sabine Kost-Byerly, MD*, Elizabeth White, RN*, Carlton K. K. Lee, PharmD†‡, Michelle A. Rudek, PharmD, PhD§, Carol Thompson, MS, MBA ‖ and Myron Yaster, MD*‡

From the *Department of Anesthesiology and Critical Care Medicine, Division of Pediatric Anesthesiology and Critical Care Medicine; †Department of Pharmacy; ‡Department of Pediatrics; and §Department of Oncology, Division of Chemical Therapeutics, The Johns Hopkins University School of Medicine, Baltimore; and ‖Department of Biostatistics, The Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland.

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背景：阿片類藥物引起的副作用，如皮膚瘙癢、噁心、嘔吐，是常見的現象，可能比疼痛本身傷害更大。持續低劑量的納洛酮輸注（0.25 μg/kg/h）能改善很多而非全部患者如上的這些副作用，同時不影響鎮痛效果。本研究目的在於確定使得阿片類藥物副作用降到最低的納洛酮最佳劑量，並採用劑量遞增法測量相關的血漿嗎啡和納洛酮的濃度。

方法：59 位中重度術後疼痛的患兒（24 名男性/35 名女性；平均年齡 14.2 ± 2.2 歲）給予嗎啡靜脈自控鎮痛（基礎劑量 20 μg/kg/h，追加劑量 20 μg/kg，每小時最多 5 次），同時給予小劑量納洛酮靜脈持續輸注（最初劑量 0.05 μg/kg/h，隨後佇列劑量依次爲 0.10, 0.15, 0.25, 0.40, 0.65, 1, and 1.65 μg/kg/h）。如果有 2 例患者出現難以忍受的噁心、嘔吐或皮膚瘙癢，隨後患者的納洛酮的劑量則增加。劑量/治療成功被定義爲 10 例患者在此納洛酮劑量下副反應降到最小。使用電噴霧串聯質譜法處理、儲存並檢測納洛酮輸注開始後收集到的血液樣本，用於測定血漿嗎啡和納洛酮水準。

結果：成功治療病人並將副作用/失敗比降至 10%以下的最低納洛酮劑量爲 1 μg/kg/h；每個佇列的大小爲 4-11 名患者不等。納洛酮對預防皮膚瘙癢的有效性優於噁心嘔吐。在所有納洛酮輸注劑量中，都需要有額外的藥物來補充治療阿片類藥物的副作用。當納洛酮輸注速度≤0.15 μg/kg/h 時，血漿納洛酮濃度低於試驗測定下限 0.1 ng/ml。當輸注速度>0.25 μg/kg/h 時，血漿濃度呈線性增加。在各個劑量的佇列中，非成功治療的患者的血漿納洛酮濃度相當或高於成功治療的患者的水準。血漿嗎啡濃度介於 3.52 和 172 ng/ml 之間，其中>90%的濃度介於 10.2 和 61.6 ng/ml 之間。成功治療和非成功治療患者血漿中的嗎啡濃度相當。

結論：納洛酮輸注速度≥1 μg/kg/h 時可顯著降低但不能消除術後接受嗎啡靜脈自控鎮痛的患兒阿片類藥物的副反應。非成功治療患者血漿中納洛酮和嗎啡的濃度都與成功治療患者的水準相近，這表明改善阿片類藥物副作用的成敗與血漿濃度無關。(滕淩雅 譯　陳傑　校)

BACKGROUND: Opioid-induced side effects, such as pruritus, nausea, and vomiting are common and may be more debilitating than pain itself. A continuous low-dose naloxone infusion (0.25 μg/kg/h) ameliorates some of these side effects in many but not all patients without adversely affecting analgesia. We sought to determine the optimal

dose of naloxone required to minimize opioid-induced side effects and to measure plasma morphine and naloxone levels in a dose escalation study.
METHODS: Fifty-nine pediatric patients (24 male/35 female; average age 14.2 ± 2.2 years) experiencing moderate to severe postoperative pain were started on IV patient-controlled analgesia morphine (basal infusion 20 μg/kg/h, demand dose 20 μg/kg, 5 doses/h) and a low-dose naloxone infusion (initial cohort: 0.05 μg/kg/h; subsequent cohorts: 0.10, 0.15, 0.25, 0.40, 0.65, 1, and 1.65 μg/kg/h). If 2 patients developed intolerable nausea, vomiting, or pruritus, the naloxone infusion was increased for subsequent patients. Dose/treatment success occurred when 10 patients had minimal side effects at a naloxone dose. Blood samples were obtained for measurement of plasma morphine and naloxone levels after initiation of the naloxone infusion, processed, stored, and measured by tandem mass spectrometry with electrospray positive ionization.
RESULTS: The minimum naloxone dose at which patients were successfully treated with a <10% side effect/failure rate was 1 μg/kg/h; cohort size varied between 4 and 11 patients. Naloxone was more effective in preventing pruritus than nausea and vomiting. Concomitant use of supplemental medicines to treat opioid-induced side effects was required at all naloxone infusion rates. Plasma naloxone levels were below the level of assay quantification (0.1 ng/mL) for infusion rates ≤0.15 μg/kg/h. At rates >0.25 μg/kg/h, plasma levels increased linearly with increasing infusion rate. In each dose cohort, patients who failed therapy had comparable or higher plasma naloxone levels than those levels measured in patients who did not fail treatment. Plasma morphine levels ranged between 3.52 and 172 ng/mL, and >90% of levels ranged between 10.2 and 61.6 ng/mL. Plasma morphine levels were comparable between patients who failed therapy and those patients who achieved symptom control.
CONCLUSIONS: Naloxone infusion rates ≥1 μg/kg/h significantly reduced, but did not eliminate, the incidence of opioid-induced side effects in postoperative pediatric patients receiving IV patient-controlled analgesia morphine. Patients who failed therapy generally had plasma naloxone and morphine levels that were comparable to those who had good symptom relief suggesting that success or failure to ameliorate opioid-induced side effects was unrelated to plasma levels.

比較連續股神經與後路腰叢神經阻滯在髖關節術後的鎮痛效果：一項隨機對照研究

Continuous Femoral Versus Posterior Lumbar Plexus Nerve Blocks for Analgesia After Hip Arthroplasty: A Randomized, Controlled Study

Brian M. Ilfeld, MD, MS*, Edward R. Mariano, MD, MAS*, Sarah J. Madison, MD*, Vanessa J. Loland, MD*, NavParkash S. Sandhu, MD*, Preetham J. Suresh, MD*, Michael L. Bishop, MD*, T. Edward Kim, MD*, Michael C. Donohue, PhD†, Anna A. Kulidjian, MD‡ and Scott T. Ball, MD‡
From the *Department of Anesthesiology, †Division of Biostatistics and Bioinformatics and ‡Department of Orthopedic Surgery, University of California San Diego, La Jolla, California.
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背景：髖關節成形術常需要有效的術後鎮痛，通常採取硬膜外或者後路腰叢局部麻醉輸注的方法。但是，美國區域麻醉學會指南現在不推薦對需要術後注射各種抗

凝藥物的髖關節成形術患者採取硬膜外或者連續後路腰叢阻滯。連續股神經阻滯可能是一種鎮痛選擇，但是它是否能提供連續後路腰叢一樣的鎮痛效果尚不清楚。因此，本研究通過髖關節成形術後從不同位置置入導管（股神經和後路腰叢）驗證此兩種方法在術後鎮痛上沒有影響的假說。

方法：接受髖關節成形術的患者術前隨機分爲接受股神經阻滯（神經刺激導管頭超過針尖 5-15cm）或者接受後路腰叢阻滯（神經刺激導管頭超過針尖 0-1cm）。患者術後接受至少 2 天的 0.2%的羅呱卡因鎮痛（背景流量 6ml/hr，解救劑量 4ml，鎖定時間 30min）。主要終點爲以疼痛數位評價量表記錄的 24 小時平均疼痛評分，時間從術後首日晨 7:30 開始記錄，排除每天兩次的理療部分。次要終點包括在同一個 24 小時內的理療時的疼痛評分，可行走距離，需要補充鎮痛藥的劑量以及住院期間對鎮痛的滿意程度。

結果 接受股神經浸潤阻滯的患者（n=25）平均（標準差）疼痛評分爲 3.6（1.8），而接受後路腰叢浸潤阻滯的患者（n=22）評分爲 3.5 (1.8)，組間差異 0.1（95%可信區間−0.9 ~ 1.2；P=0.78）。因爲可信區間特異度預設在−1.6~ 1.6 寬度範圍內，得出兩種技術在術後鎮痛上等效。同樣，除了接受股神經導管的患者在術後首晨行走訓練的中位數爲 2 米（10-90 百分位數爲 0-17 米），而接受後路腰叢導管的患者的中位數爲 11 米（10-90 百分位數爲 0-31 米）（非參數資料，P=0.02）外，兩種方法在次要終點上也沒有差異。

結論 在髖關節成型術後，使用神經刺激導管引導技術時，可以選擇採取連續股神經來代替連續後路腰叢鎮痛。但是，股神經鎮痛在早期進行行走鍛煉時，鎮痛效果欠佳。

(陸秉瑋　譯　陳傑　校)

BACKGROUND: Hip arthroplasty frequently requires potent postoperative analgesia, often provided with an epidural or posterior lumbar plexus local anesthetic infusion. However, American Society of Regional Anesthesia guidelines now recommend against epidural and continuous posterior lumbar plexus blocks during administration of various perioperative anticoagulants often administered after hip arthroplasty. A continuous femoral nerve block is a possible analgesic alternative, but whether it provides comparable analgesia to a continuous posterior lumbar plexus block after hip arthroplasty remains unclear. We therefore tested the hypothesis that differing the catheter insertion site (femoral versus posterior lumbar plexus) after hip arthroplasty has no impact on postoperative analgesia.

METHODS: Preoperatively, subjects undergoing hip arthroplasty were randomly assigned to receive either a femoral or a posterior lumbar plexus stimulating catheter inserted 5 to 15 cm or 0 to 1 cm past the needle tip, respectively. Postoperatively, patients received perineural ropivacaine, 0.2% (basal 6 mL/hr, bolus 4 mL, 30-minute lockout) for at least 2 days. The primary end point was the average daily pain scores as measured with a numeric rating scale (0–10) recorded in the 24-hour period beginning at 07:30 the morning after surgery, excluding twice-daily physical therapy sessions. Secondary end points included pain during physical therapy, ambulatory distance, and supplemental analgesic requirements during the same 24-hour period, as well as satisfaction with analgesia during hospitalization.

RESULTS: The mean (SD) pain scores for subjects receiving a femoral infusion (n = 25) were 3.6 (1.8) versus 3.5 (1.8) for patients receiving a posterior lumbar plexus infusion (n

= 22), resulting in a group difference of 0.1 (95% confidence interval −0.9 to 1.2; *P* = 0.78). Because the confidence interval was within a prespecified −1.6 to 1.6 range, we conclude that the effect of the 2 analgesic techniques on postoperative pain was equivalent. Similarly, we detected no differences between the 2 treatments with respect to the secondary end points, with one exception: subjects with a femoral catheter ambulated a median (10th–90th percentiles) 2 (0–17) m the morning after surgery, in comparison with 11 (0–31) m for subjects with a posterior lumbar plexus catheter (data nonparametric; *P* = 0.02).
CONCLUSIONS: After hip arthroplasty, a continuous femoral nerve block is an acceptable analgesic alternative to a continuous posterior lumbar plexus block when using a stimulating perineural catheter. However, early ambulatory ability suffers with a femoral infusion.

鞘內注射嗎啡與局部浸潤鎮痛作爲全膝關節置換術後疼痛管理的隨機對照試驗

Local Infiltration Analgesia Versus Intrathecal Morphine for Postoperative Pain Management After Total Knee Arthroplasty: A Randomized Controlled Trial

Per Essving, MD*†, Kjell Axelsson, MD, PhD†‡, Elisabeth Å berg, BSc‡, Henrik Spännar, BSc§, Anil Gupta, MD, PhD†‡¶ and Anders Lundin, MD, PhD*†
From the *Department of Orthopedic Surgery, †Division of Clinical Medicine, ‡Department of Anesthesiology and Intensive Care, and §Department of Physiotherapy, University Hospital, Ö rebro, Sweden, and ¶University of Linköping, Linköping, Sweden.
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背景：局部浸潤鎮痛（LIA），即手術期間在關節周圍複合注射局部麻醉藥、非甾體抗炎藥和腎上腺素，LIA 已經在全膝關節置換術（TKA）術後疼痛管理中成了常規。本研究比較了 TKA 術後鞘內注射嗎啡和 LIA 的效應。
方法：在這項雙盲研究中，50 例椎管內麻醉下行 TKA 的患者隨機分爲 2 組：M 組，脊麻時鞘內注入 0.1mg 嗎啡和脊麻藥物；而 L 組，手術期間在膝關節處給予羅呱卡因、酮咯酸和腎上腺素行局部浸潤鎮痛，並術後兩次通過關節內導管注入上述的的混合物。記錄術後疼痛，解救鎮痛需要，活動度和出院時間。3 個月隨訪期間使用牛津膝關節評分和 EQ - 5D 評估病人的健康品質。主要終點是術後第 48 小時內的靜脈嗎啡用量。
結果：L 組術後第 48 小時平均嗎啡消耗量顯著低於 M 組：26 ± 15 比 54 ± 29mg，即每 24 小時平均相差 14.2mg（95％可信區間爲 7.6-20.9）。L 組在 48 小時內休息和運動時疼痛評分低於 M 組（P <0.01）。L 組在術後 24h 和 48h 行走時疼痛評分也比 M 組低（P <0.001）。L 組中，有更多患者在 24 小時內能夠爬樓梯：50％（11/22）比 4％（1/23），即 46％的差異（95％可信區間 23.5％-68.5％），而在 48 小時內：70％（16/23）比 22％（5/23），即 48％的差異（95％可信區間爲 23％-73％）。L 組的達到出院標準的中值（範圍）時間比 M 組更短，分別爲 51（24-166）h 比 72（51-170）h。時間差異 23h（95％可信區間爲 18％-42％）（P = 0.001）。L 組的住院時間也短於 M 組：中位數分別爲 3（2-17）天和 4（2-14）天（P = 0.029）。 L 組病人的滿意度高於 M 組（P = 0.001），但在膝關節功能、副作用、病人相關預後、牛津膝關節評分及 EQ - 5D 沒有差異。

結論：TKA 術後，LIA 比鞘內注射嗎啡提供了更好的術後鎮痛及早期活動，並縮短住院時間。
(孫曉瓊　譯　陳傑　校)
BACKGROUND: Local infiltration analgesia (LIA)—using a combination of local anesthetics, nonsteroidal anti-inflammatory drugs, and epinephrine, injected periarticularly during surgery—has become popular in postoperative pain management after total knee arthroplasty (TKA). We compared intrathecal morphine with LIA after TKA.
METHODS: In this double-blind study, 50 patients scheduled to undergo TKA under spinal anesthesia were randomized into 2 groups: group M, 0.1 mg morphine was injected intrathecally together with the spinal anesthetic and in group L, LIA using ropivacaine, ketorolac, and epinephrine was infiltrated in the knee during the operation, and 2 bolus injections of the same mixture were given via an intraarticular catheter postoperatively. Postoperative pain, rescue analgesic requirements, mobilization, and home readiness were recorded. Patient-assessed health quality was recorded using the Oxford Knee Score and EQ-5D during 3 months follow-up. The primary endpoint was IV morphine consumption the first 48 postoperative hours.
RESULTS: Mean morphine consumption was significantly lower in group L than in group M during the first 48 postoperative hours: 26 ± 15 vs 54 ± 29 mg, i.e., a mean difference for each 24-hour period of 14.2 (95% confidence interval [CI] 7.6 to 20.9) mg. Pain scores at rest and on movement were lower during the first 48 hours in group L than in group M ($P < 0.001$). Pain score was also lower when walking in group L than in group M at 24 hours and 48 hours postoperatively ($P < 0.001$). In group L, more patients were able to climb stairs at 24 hours: 50% (11 of 22) versus 4% (1 of 23), i.e., a difference of 46% (95% CI 23.5 to 68.5) and at 48 hours: 70% (16 of 23) versus 22% (5 of 23), i.e., a difference of 48% (95% CI 23 to 73). Median (range) time to fulfillment of discharge criteria was shorter in group L than in group M, 51 (24–166) hours versus 72 (51–170) hours. The difference was 23 (95% CI 18 to 42) hours ($P = 0.001$). Length of hospital stay was also shorter in group L than in group M: median (range) 3 (2–17) versus 4 (2–14) days ($P = 0.029$). Patient satisfaction was greater in group L than in group M ($P = 0.001$), but no differences were found in knee function, side effects, or in patient-related outcomes, Oxford Knee score, or EQ-5D.
CONCLUSIONS: LIA technique provided better postoperative analgesia and earlier mobilization, resulting in shorter hospital stay, than did intrathecal morphine after TKA.

簡報：對於用紫杉醇治療的 C57B16 雌性大鼠，大麻二酚可以防止冷和機械刺激性痛覺超敏的發生

Brief Report: Cannabidiol Prevents the Development of Cold and Mechanical Allodynia in Paclitaxel-Treated Female C57Bl6 Mice

Sara Jane Ward, PhD, Michael David Ramirez, BS, Harshini Neelakantan, MS and Ellen Ann Walker, PhD
From the Department of Pharmaceutical Sciences, Temple University School of Pharmacy, Philadelphia, Pennsylvania.
Anesth Analg October 2011 113:947-950;

給人行紫杉醇化療通常會致周圍性神經病變。對於研究周圍性神經病變的機制和治療方法的齧齒動物模型僅限於雄性大鼠，而雌性大鼠的研究還很有限。本實驗研究了不同劑量的紫杉醇對於引起雌雄性 C57Bl/6 大鼠的冷刺激和機械性痛覺超敏的影響。由於無精神活性藥物植物大麻素大麻二酚可以減少其他種類的神經性疼痛，作者評估了其對紫杉醇引起的痛覺超敏有無效果。紫杉醇會劑量依賴性地引起痛覺超敏，並對雌性大鼠影響更爲明顯。但是大麻二酚防止這種紫杉醇引起的痛覺超敏。本實驗的結果表明：在大鼠中，大麻二酚可以阻止紫杉醇引起的痛覺過敏的發生。因此，大麻二酚可能預防人類由於使用有限劑量下的紫杉醇引起的神經性病變。
(張婷　譯　陳傑　校)

The taxane chemotherapeutic paclitaxel frequently produces peripheral neuropathy in humans. Rodent models to investigate mechanisms and treatments are largely restricted to male rats, whereas female mouse studies are lacking. We characterized a range of paclitaxel doses on cold and mechanical allodynia in male and female C57Bl/6 mice. Because the nonpsychoactive phytocannabinoid cannabidiol attenuates other forms of neuropathic pain, we assessed its effect on paclitaxel-induced allodynia. Paclitaxel produced allodynia that was largely dose independent and more robust in female mice, and this effect was prevented by treatment with cannabidiol. Our preliminary findings therefore indicate that cannabidiol may prevent the development of paclitaxel-induced allodynia in mice and therefore be effective at preventing dose-limiting paclitaxel-induced peripheral neuropathy in humans.

在健康個體，rFVIIa 逆轉氯吡格雷引起的出血作用：一項隨機、安慰劑對照、雙盲、探索性研究

Reversal of Clopidogrel-Induced Bleeding with rFVIIa in Healthy Subjects: A Randomized, Placebo-Controlled, Double-Blind, Exploratory Study

Brett E. Skolnick, PhD, Magdy Shenouda, MD, Naum M. Khutoryansky, PhD, Anthony E. Pusateri, PhD, Don Gabriel, MD, PhD and Marcus E. Carr, MD, PhD, FACP
From [*]Novo Nordisk Inc., Princeton, New Jersey; [†]MDS Pharma Services, Neptune, New Jersey; [‡]Novo Nordisk Research Facility US, New Brunswick, New Jersey; and [§]Department of Medicine, Division of Hematology and Oncology, University of North Carolina, Chapel Hill, North Carolina.
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背景：氯吡格雷(Plavix®)可以有效降低血栓性事件的發生，但同時也會增加出血的風險。在因自身抗體所致血友病患者，重組的 FVII 啓動劑(rFVIIa, NovoSeven®)可用於治療其出血現象，因此人們提出用該藥物可以減輕氯吡格雷導致的出血副作用。

方法：在這項單中心、隨機、安慰劑對照、雙盲、劑量遞增的 I 期探索試驗，我們試驗性地從健康個體穿刺活檢，評估了 FVIIa 應用於逆轉氯吡格雷引起出血增加效應的安全性及有效性。有效性評估包括逆轉出血參數（出血持續時間[BD]，中止出血及穿刺活檢導致的出血量[BV]，血栓彈力圖參數），在氯吡格雷治療後 rFVIIa 組及安慰劑組分別測定。

結果：一定比例的個體（56%）對氯吡格雷的反應有限（定義爲≤30%血小板聚集受抑制）而中止了試驗。餘下的進一步進行試驗，並做了 4 項活檢。在 40 個體中，隨機選擇 37 個進行有效性評估。相比於基線的活檢結果，氯吡格雷可以增加 BD 和 BV。重組 FVIIa (10 和 20 μg/kg)可以顯著減輕氯吡格雷導致的 BD 延長效應 (P = 0.007 和 P = 0.001, 分別)。早期中止試驗限制進一步評估大劑量 rFVIIa 的效果。同一醫生對組織活檢結果提示，20 μg/kg 的 rFVIIa 可以顯著減少氯吡格雷導致的 BD 延長(P = 0.048)。體外試驗通過血液凝固的動力學參數：凝血開始時間 (TEG® -R)及凝血三角(TEG® -A)進一步證明了 rFVIIa 的作用 (P < 0.005)。
結論：在我們的臨床試驗中，rFVIIa (10 和 20 μg/kg)可以逆轉氯吡格雷的出血效應。
（范羽譯 薛張綱校）

BACKGROUND: Clopidogrel (Plavix®) therapy, although effective for minimizing risk of thrombotic events, is also associated with potential bleeding risk. Recombinant activated FVII (rFVIIa, NovoSeven®) induces hemostasis in hemophilia patients with inhibitors (alloantibodies) and has been proposed as potential treatment for mitigating clopidogrel therapy–mediated bleeding.
METHODS: In this single-center, randomized, placebo-controlled, double-blind, dose-escalation, exploratory phase I trial, we assessed the safety and effects of rFVIIa in reversing clopidogrel-enhanced bleeding in an experimentally induced punch biopsy in healthy subjects. Efficacy assessments included the reversal of bleeding characteristics (bleed duration [BD], the primary end point and blood loss volume [BV] induced by punch biopsy, and thromboelastograph [TEG®] parameters) with rFVIIa or placebo after clopidogrel treatment.
RESULTS: A significant number of subjects (56%) had limited response to clopidogrel (defined as ≤30% platelet aggregation inhibition) and were discontinued from study. The remaining subjects continued and had 4 biopsies. Of 40 subjects randomized, 37 were evaluated for efficacy. Clopidogrel treatment increased BD and BV compared with the baseline biopsy. Recombinant FVIIa (10 and 20 μg/kg) significantly mitigated the clopidogrel-induced effects on BV (P = 0.007 and P = 0.001, respectively). Early trial termination limited the evaluation of effects of higher rFVIIa doses. Subgroup analyses of subjects biopsied by the same physician demonstrated significant reduction of clopidogrel-induced BD with 20 μg/kg rFVIIa (P = 0.048). Ex vivo analysis of rFVIIa demonstrated clotting dynamics presented by parameters time to clot onset (TEG® -R) and clot angle (TEG® -A) (P < 0.005).
CONCLUSIONS: In this clinical study, rFVIIa (10 and 20 μg/kg) reversed the effect of clopidogrel on blood loss.

研究有外科感染風險的肥胖患者應用頭孢西丁的藥代動力學及組織滲透性

Pharmacokinetics and tissue penetration of cefoxitin in obesity: implications for risk of surgical site infection

Octavian Toma, MD, Patty Suntrup, CRRT, Andrei Stefanescu, PhD, Amy London, BS, Matthew Mutch, MD and Evan Kharasch, MD, PhD
From the Department of Anesthesiology, Division of Clinical and Translational Research, and Department of Surgery, Washington University in St. Louis, St. Louis, Missouri.

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背景：肥胖是外科感染的重要危險因素之一，這個理由很不充分。SSIs 是發病的主要原因，延長住院時間，增加醫療費用。藥物治療常被作爲肥胖患者的治療手段。術前應用抗生素同時使切口獲得足夠的藥物濃度，是預防手術部位感染的重要策略。雖然如此，關於肥胖患者手術的抗生素濃度的資訊仍很少。這項研究檢驗預防性使用抗生素頭孢西丁可能會延遲和或降低肥胖患者的組織滲透力的假設。
方法：對腹部及骨盆手術的肥胖患者（BMI43 ± 10 kg/m(2), n = 14, 2 g 頭孢西丁）、正常體重患者及健康志願者（BMI20 ± 2 kg/m(2), n = 13, 1 g 頭孢西丁）的血漿及組織中頭孢西丁的濃度進行檢測。使用微量探測儀來檢測腹部皮層及離體脂肪組織（同時測切口及癒合組織）的組織濃度。
結果：由於肥胖患者的劑量是兩倍多，所以肥胖患者的血漿濃度及濃度—時間曲線下面積大約是兩倍高。規範劑量的濃度會更高，雖然濃度-時間曲線下面積並沒有顯著的不同。檢測的及規範劑量的皮下頭孢西丁的濃度及濃度-時間曲線下面積肥胖患者遠比正常體重患者低。頭孢西丁組織滲透力和體重指數呈反比關係。肥胖者的組織滲透力更加低(0.08 ± 0.07 vs 0.37 ± 0.26, P < 0.05)。肥胖者脂肪組織的頭孢西丁的切口及癒合組織的濃度分別僅有7.8 ± 7.3 及 2.7 ± 1.4 μg/g，低於最低抑菌濃度需氧微生物是 8μg/mL 和 厭氧微生物是16 μg/mL。
結論：肥胖手術患者預防性使用抗生素頭孢西丁的組織滲透力弱，足夠的組織濃度儘管增加臨床劑量（2g),足夠的組織抗生素濃度可能是肥胖手術患者 ssis 風險增加的因素之一。需要進一步研究達到足夠的組織濃度所需的確切的劑量。
（侯文婷譯 薛張綱校）

BACKGROUND:Obesity is a significant risk factor for surgical site infections (SSIs), for poorly understood reasons. SSIs are a major cause of morbidity, prolonged hospitalization, and increased health care cost. Drug disposition in general is frequently altered in the obese. Preoperative antibiotic administration, achieving adequate tissue concentrations at the time of incision, is an essential strategy to prevent SSIs. Nonetheless, there is little information regarding antibiotic concentrations in obese surgical patients. This investigation tested the hypothesis that the prophylactic antibiotic cefoxitin may have delayed and/or diminished tissue penetration in the obese.
METHODS:Plasma and tissue concentrations of cefoxitin were determined in obese patients undergoing abdominal and pelvic surgery (body mass index 43 ± 10 kg/m(2), n = 14, 2 g cefoxitin) and in normal-weight patients and healthy volunteers (body mass index 20 ± 2 kg/m(2), n = 13, 1 g cefoxitin). Tissue concentrations were measured using a microdialysis probe in the subcutaneous layer of the abdomen, and in adipose tissue excised at the time of incision and wound closure.
RESULTS:Plasma concentrations and area under the concentration-time curve (AUC) were approximately 2-fold higher in the obese patients because of the 2-fold-higher dose. Dose-normalized concentrations were higher, although AUCs were not significantly different. Measured and dose-normalized subcutaneous cefoxitin concentrations and AUCs in the obese patients were significantly lower than in the normal-weight subjects. There was an inverse relationship between cefoxitin tissue penetration (AUC(tissue)/AUC(plasma) ratio) and body mass index. Tissue penetration was substantially lower in the obese patients (0.08 ± 0.07 vs 0.37 ± 0.26, P < 0.05). Adipose

tissue cefoxitin concentrations in obese patients were only 7.8 ± 7.3 and 2.7 ± 1.4 μg/g, respectively, at incision and closure, below the minimum inhibitory concentration of 8 and 16 μg/mL, respectively, for aerobic and anaerobic microorganisms.
CONCLUSION：Obese surgical patients have impaired tissue penetration of the prophylactic antibiotic cefoxitin, and inadequate tissue concentrations despite increased clinical dose (2 g). Inadequate tissue antibiotic concentrations may be a factor in the increased risk of SSIs in obese surgical patients. Additional studies are needed to define doses achieving adequate tissue concentrations.

苯腎上腺素、麻黃堿和前負荷增加對於第三代Vigileo-FloTrac 與經食道多普勒在監測時心輸出量變化時的影響

The Impact of Phenylephrine, Ephedrine, and Increased Preload on Third-Generation Vigileo-FloTrac and Esophageal Doppler Cardiac Output Measurements.

Lingzhong Meng, MD, Nam Phuong Tran, BS, Brenton S. Alexander, BS, Kathleen Laning, BS, Guo Chen, MD, Zeev N. Kain, MD, MBA and Maxime Cannesson, MD, PhD
From the Department of Anesthesiology and Perioperative Care, University of California, Irvine, Irvine, California.
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背景：心輸出量監測對於圍手術期的目標導向性液體治療具有潛在的指導意義。而Vigileo-FloTrac正是一種對脈搏波型進行分析從而監測心輸出量的儀器。然而有些因素會影響Vigileo-FloTrac在監測心輸出量變化時的可信度，如使用了血管加壓素等。我們使用了血管加壓素，測試第三代Vigileo-FloTrac系統是否可能精確測量出心輸出量和前負荷的變化，並且與相同情況下的經食道超聲多普勒測量情況進行比較。
方法：對33名麻醉後的病人，同時使用第三代Vigileo-FloTrac和經食道超聲多普勒測量心輸出量。引起血流動力學改變的措施包括：使用苯腎上腺素增加血管張力，使用麻黃堿增加心肌收縮力和心率以及放置頭低腳高體位元增加前負荷。每一項措施進行之前和之後分別用兩種方法測量心輸出量。
結果：總計得到了176對心輸出量的測量結果。脈搏波形和多普勒法測量心輸出量的配對差值爲0.14 ± 2.13 L/min，百分比誤差爲66%(2倍的標準差除以其方法所測得心輸出量的平均值)。關於脈搏波形和多普勒在預測趨勢變化時的能力，使用苯腎上腺素後兩者的一致性爲23%，使用麻黃堿後的一致性爲69%，改變體位後的一致性爲96%。
結論：當前負荷發生變化時，第三代Vigileo-FloTrac儀器所使用的根據脈搏波形分析法可以精確地監測和反應出心輸出量的變化。但是脈搏波形分析法對於苯腎上腺素和麻黃堿引起的心輸出量變化的監測不夠精確。
（黃劍譯 薛張綱校）
BACKGROUND:Cardiac output (CO) monitoring based on pulse contour analysis (Vigileo-FloTrac) has the potential to be used for goal-directed fluid therapy in the perioperative setting. However, factors such as vasopressor usage may impact Vigileo-

FloTrac's reliability in tracking CO changes. We tested third-generation Vigileo-FloTrac system's ability to accurately measure the changes in CO induced by vasopressor administration and increased preload in comparison with esophageal Doppler measurements.
METHODS:In 33 anesthetized patients, CO was monitored simultaneously by the third-generation Vigileo-FloTrac and esophageal Doppler. Hemodynamic challenges included phenylephrine (to increase vasomotor tone), ephedrine (to increase myocardial contractility and heart rate), and whole-body tilting (to increase preload). Measurements were performed before and after each intervention.
RESULTS:Overall, 176 pairs of CO measurements were obtained. The difference between paired pulse contour and Doppler measurements of CO was 0.14 ± 2.13 L/min (mean ± SD), and the percentage error (2 SD of the difference divided by the mean CO of the reference method) was 66%. The trending ability of pulse contour versus Doppler was 23% (concordance, the percentage of the total number of data points that are in 1 of the 2 quadrants of agreement) after phenylephrine treatment, 69% (concordance) after ephedrine treatment, and 96% (concordance) after whole-body tilting.
CONCLUSIONS:The pulse contour method of measuring CO, as implemented in the third-generation Vigileo-FloTrac device, accurately tracks changes in CO when preload changes. However, the pulse contour method does not accurately track changes in CO induced with phenylephrine and ephedrine.

術後 5 年出現惡性疾病與使用七氟醚麻醉的時間和腦電雙頻指數小於 45 的時間的相關性

Malignant Disease Within 5 Years After Surgery in Relation to Duration of Sevoflurane Anesthesia and Time with Bispectral Index Under 45

Octavian Toma, MD, Patty Suntrup, CRRT, Andrei Stefanescu, PhD, Amy London, BS, Matthew Mutch, MD and Evan Kharasch, MD, PhD
From the*Department of Anesthesiology, Division of Clinical and Translational Research, and †Department of Surgery, Washington University in St. Louis, St. Louis, Missouri.
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背景：手術、麻醉以及相關的事件已經被認爲與促進癌細胞的增殖相關聯。我們調查了術後 5 年之內的癌症的發生率與麻醉持續時間及作爲麻醉深度檢測指標——腦電雙頻指數小於 45 的時間之間的相關性。
方法：這是一項前瞻性佇列研究，2972 例術前未發現任何惡性疾病的患者使用七氟醚麻醉，並監測 BIS 值，術後隨訪其是否新發惡性腫瘤。使用 COX 回歸評估麻醉時間和 BIS<45 的時間與術後發生癌症風險的相關性。用標準比計算手術人群中癌症發生率與一般人群中發生率的比值。
結果：術後 5 年，129 位病人（4.3%）被診斷 136 個新的惡性腫瘤。沒有證據顯示 T_{ANESTH} or $T_{BIS<45}$ 或使用 BIS 其他閾值時（即分別<30，<40，<50）與新診斷的惡性疾病相關聯。新的惡性疾病的標準發病比是 1.37。
結論：用七氟醚進行麻醉，麻醉持續時間與增加深麻醉累積時間都被證實都不會增加術前沒有腫瘤而術後 5 年出現的新的惡性疾病的風險。
（劉玨瑩譯 薛張綱校）

Background: Surgery, general anesthesia, and related events have been implicated to promote cancer proliferation. We investigated the incidence of cancer within 5 years after surgery in relation to duration of anesthesia (T_{ANESTH}) and also by time with bispectral index (BIS) under 45 ($T_{BIS<45}$) serving as a proxy for more profound anesthesia exposure.
Methods: New malignant diagnoses after surgery under sevoflurane anesthesia were obtained in a prospective cohort of 2972 BIS-monitored patients without any clinically diagnosed malignant disease at the time of index surgery. The risk of cancer during follow-up in relation to T_{ANESTH} and $T_{BIS<45}$ was assessed by Cox regression. The cancer incidence in this surgical population was compared with the incidence in a standardized general population by calculation of standard incidence ratio.
Results: One hundred twenty-nine patients (4.3%) were assigned 136 new malignant diagnoses within 5 years after surgery. No relation between T_{ANESTH} or $T_{BIS<45}$ and new malignant disease was found, nor were any significant relations obtained when other thresholds for BIS (i.e., <30, <40, and <50, respectively) were used in the calculations. The standard incidence ratio for new malignant disease was 1.37 (confidence interval, 1.15–1.62).
Conclusion: Neither duration of anesthesia nor increased cumulative time with profound sevoflurane anesthesia was associated with an increased risk for new malignant disease within 5 years after surgery in previously cancer-free patients.

擇期剖宮產產婦行腰麻後使用晶體或膠體對心輸出量的影響

Maternal Cardiac Output Changes After Crystalloid or Colloid Coload Following Spinal Anesthesia for Elective Cesarean Delivery: A Randomized Controlled Trial

Sarah McDonald, FRCA, Roshan Fernando, FRCA, Keri Ashpole, FRCA and Malachy Columb, FRCA
From the Department of Anesthesia, Royal Free Hospital NHS Trust, London; and Department of Anesthesia, University Hospital of South Manchester NHS Foundation Trust, Wythenshawe, Manchester, United Kingdom.
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背景：行剖宮產產婦腰麻後會出現低血壓，通過靜脈輸液或使用升壓藥以減少胎兒和產婦低血壓的發病率。大多數研究都集中在無創收縮壓（SBP）的測量，以評估這種療法的效果。我們使用經胸多普勒技術，分別測量使用新福林結合輸注晶體或在麻醉開始即使用膠體溶擴容時產婦的心輸出量（CO）。我們假設與晶體相比，膠體會增加心輸出量從而減少對升壓藥的需求量。
方法：我們招募了 60 名健康的擇期在椎管內麻醉下行剖宮產手術的產婦作爲這項隨機雙盲對照研究婦女。在左傾位置測定基線心率、基線收縮壓和 CO 變數，包括每搏輸出量、糾正流動時間和收縮力。在腰麻後，受試者分別給予快速輸注 1L w/v 6%羥乙基澱粉溶液（HES）或哈特曼晶體液（HS）。滴定新福林保證產婦的收縮壓維持在基準水準。腰麻後 20 分鐘每隔 5 分鐘測量 CO。主要比較兩組間 CO 變數，次要比較新福林用量和產婦血流動力學及胎兒的結果資料。
結果：產婦的人口統計資料，手術時間，胎兒的結果資料兩組相似。CO 變數的差異，兩組間無顯著差異。HS 組 5 分鐘時 CO 值及 HES 組 5 分鐘及 10 分鐘時的 CO 值暫時高於基準值（範圍 0.13-1.74L/分鐘），晶體組和膠體組間的 CO 在研究期間

的整體平均差異爲 0.06L/分鐘（95%置信區間：-0.46 至 0.58）。兩組每搏輸出量均高於基線。只有 HES 組流速峰值始終高於基線，兩組的糾正流動時間均增加，上述效應在 HS 組時暫時的，但在 HES 組持續存在。任何時間心率在組內或兩組之間是沒有差異的，但隨著時間延長下降。兩組使用新福林劑量是相似的。

結論：我們發現腰麻後使用晶體或膠體液對 CO 沒有明顯差異。此外，在升壓藥求或血流動力學穩定方面也無差異性。我們的結論是：在擇期腰麻下行剖宮產產婦使用膠體或晶體結合新福林沒有顯著差異。

（陸麗虹譯 薛張綱校）

BACKGROUND: Minimizing hypotension associated with spinal anesthesia for cesarean delivery by administration of IV fluids and vasopressors reduces fetal and maternal morbidity. Most studies have concentrated on noninvasive systolic blood pressure (SBP) measurements to evaluate the effect of such regimens. We used a suprasternal Doppler flow technique to measure maternal cardiac output (CO) variables in parturients receiving a phenylephrine infusion combined with the rapid administration of crystalloid or colloid solution at the time of initiation of anesthesia (coload). We hypothesized that a colloid coload compared with a crystalloid coload would produce a larger sustained increase in CO and therefore reduce vasopressor requirements. 、

METHODS: We recruited 60 healthy term women scheduled for elective cesarean delivery under spinal anesthesia for this randomized double-blind study. Baseline heart rate, baseline SBP, and CO variables including stroke volume, corrected flow time, and contractility were recorded in the left lateral tilt position. At the time of spinal injection, subjects were allocated to receive a rapid 1-L coload of either 6% w/v hydroxyethyl starch solution (HES) or Hartmann (crystalloid) solution (HS). A phenylephrine infusion was titrated to maintain maternal baseline SBP. CO was measured at 5-minute intervals for 20 minutes after initiation of spinal anesthesia. The primary outcome, CO, was compared between groups, as were secondary outcomes: phenylephrine dose and maternal hemodynamic and fetal outcome data.

RESULTS: Maternal demographics, surgical times, and fetal outcome data were similar between groups. There were no significant differences between groups in any measured CO variable at any time point. CO was transiently higher than baseline at 5 minutes in the HS group and at 5 and 10 minutes in the HES group (range, 0.13–1.74 L/min); the overall mean difference in CO between crystalloid and colloid over the study period was 0.06 L/min (95% confidence interval: −0.46 to 0.58). Stroke volume was higher than baseline in both groups throughout; peak velocity was consistently higher than baseline only in the HES group; and corrected flow time increased in both groups; the effect was transient in the HS but sustained in the HES group. Heart rate was not different at any time point within or between groups but did decrease over time. The total phenylephrine dose from time of spinal anesthesia to delivery was similar between groups.

CONCLUSION: We found no difference in CO in women randomized to colloid or crystalloid coload. In addition, there were no differences in vasopressor requirements or hemodynamic stability. We conclude that there is no advantage in using colloid over crystalloid when used in combination with a phenylephrine infusion during spinal anesthesia for elective cesarean delivery.

程式性硬膜外間斷給藥對比持續給藥用於分娩鎮痛對母體運動功能和分娩結局的影響：一項對初產婦的隨機雙盲研究

Programmed intermittent epidural bolus versus continuous epidural infusion for laboranalgesia: the effects on maternal motor function and labor outcome：
A randomized double-blind study in nulliparous women.

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Giorgio Capogna, MD, Michela Camorcia, MD, Silvia Stirparo, MD and Alessio Farcomeni, PhD
From the Department of Anesthesia, Città di Roma Hospital, Rome, Italy.

背景：與持續硬膜外給藥(CEI)相比，程式性的硬膜外間斷給藥(PIEB)可減少局麻藥使用總量和手控給藥次數，病人滿意度更高。在此隨機雙盲研究中，我們比較了 PIEB 和 CEI 用於維持分娩鎮痛對運動阻滯的發生率和分娩結局的影響。研究初期結果變數爲母體運動功能，第二結果變數爲分娩方式。
方法：本研究入選標準爲：初產婦、順產、宮口擴大<4cm。硬膜外鎮痛負荷劑量和維持均使用 0.0625%左旋布比卡因和 0.5 μg/mL 的舒芬太尼。硬膜外使用負荷劑量 20ml 後，產婦被隨機分配接受 PIEB(負荷劑量 1 小時後每小時單次推注 10ml)或者 CEI(負荷劑量後即刻開始持續推注每小時 10ml)來維持鎮痛。病人自控硬膜外鎮痛(PCEA)由第二個輸注泵實施來控制突發痛，藥物爲 0.125%的左旋布比卡因。分娩期間規律使用 Bromage 評分來評估雙下肢運動阻滯程度，任意側下肢出現任何程度運動阻滯時評估結束。我們同樣評估了病人自控硬膜外鎮痛的單次注藥量和總的鎮痛藥液使用量。
結果：研究樣本量爲 145 (PIEB = 75; CEI = 70)。運動阻滯在 CEI 組爲 37%，在 PIEB 爲 2.7%(P < 0.001; 比值比爲 21.2; 95%置信區間爲 4.9-129.3)；運動阻滯在 CEI 組中發生時間更早(P = 0.008) (危害比爲 7.8; 95%置信區間爲 1.9-30.8; P = 0.003)且在宮口開全後發生更加頻繁(P < 0.001)。在 CEI 組中器械助產發生率爲 20%，而在 PIEB 組中爲 7% (P = 0.03)。PIEB 組在總左旋布比卡因使用量、需要額外 PCEA 手控注藥的病人數，每個病人 PCEA 手控注藥平均次數方面均低於對照組(P < 0.001)。在疼痛評分和產程鎮痛方面組間無差異。
結論：與 CEI 相比，PIEB 維持的分娩鎮痛母體運動阻滯和器械陰道助產發生率較低。
（任雲譯 薛張綱校）

BACKGROUND: Programmed intermittent epidural anesthetic bolus (PIEB) technique may result in reduced total local anesthetic consumption, fewer manual boluses, and greater patient satisfaction compared with continuous epidural infusion(CEI). In this randomized, double-blind study, we compared the incidence of motor block and labor outcome in women who received PIEB or CEI for maintenance of labor analgesia. The primary outcome variable was maternal motor function and the secondary outcome was mode of delivery.
METHODS: Nulliparous, term women with spontaneous labor and cervical dilation <4 cm were eligible to participate in thestudy. Epidural analgesia was initiated and maintained with a solution of levobupivacaine 0.0625% with sufentanil 0.5 μg/mL. After

an initial epidural loading dose of 20 mL, patients were randomly assigned to receive PIEB (10 mL every hour beginning 60 minutes after the initial dose) or CEI (10 mL/h, beginning immediately after the initial dose) for the maintenance ofanalgesia. Patient-controlled epidural analgesia (PCEA) using a second infusion pump with levobupivacaine 0.125% was used to treat breakthrough pain. The degree of motor block was assessed in both lower extremities using the modified Bromage score at regular intervals throughout labor; the end point was any motor block in either limb. We also evaluated PCEA bolus doses and total analgesic solution consumption.
RESULTS: We studied 145 subjects (PIEB = 75; CEI = 70). Motor block was reported in 37% in the CEI group and in 2.7% in the PIEB group (P < 0.001; odds ratio = 21.2; 95% CI: 4.9-129.3); it occurred earlier (P = 0.008) (hazard ratio = 7.8; 95% CI: 1.9-30.8; P = 0.003) and was more frequent at full cervical dilation in the CEI group (P < 0.001). The incidence of instrumental delivery was 20% for the CEI group and 7% for the PIEB group (P = 0.03). Total levobupivacaine consumption, number of patients requiring additional PCEA boluses, and mean number of PCEA boluses per patient were lower in the PIEB group (P < 0.001). No differences in pain scores and duration of labor analgesia were observed.
CONCLUSION: Maintenance of epidural analgesia with PIEB compared with CEI resulted in a lower incidence of maternalmotor block and instrumental vaginal delivery.

近紅外線分光鏡測量腦血管的反應性的局限性：低頻振盪所扮演的角色。

The Limitations of Near-Infrared Spectroscopy to Assess Cerebrovascular Reactivity: The Role of Slow Frequency Oscillations

Jennifer Diedler, MD*†, Christian Zweifel, MD*, Karol P. Budohoski, MD*, Magdalena Kasprowicz, PhD*, Enrico Sorrentino, MD*, Christina Haubrich, MD*,
Kenneth M. Brady, MD*‡, Marek Czosnyka, PhD*, John D. Pickard, FMedSci* and Peter Smielewski, PhD*
From the *Academic Neurosurgical Unit, University of Cambridge Clinical School, Cambridge, United Kingdom; †Department of Neurology, University of Heidelberg, Germany; and ‡Department of Anesthesiology and Pediatrics, Texas Children's Hospital, Baylor College of Medicine, Houston, Texas.
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背景：使用近紅外線分光鏡檢查得到的總的血紅蛋白反應指數已經被用於無創評估腦血管的反應性。與壓力反應指數相似，總血紅蛋白反應指數是由相關係數計算而來的，與動脈血壓有關。然而，總血紅蛋白指數在腦外傷病人中的可靠性仍不確定。雖然慢振盪可以被近紅外線分光鏡描述成信號，但是評估自動調節的重要性仍然不確定。在最近的研究中，我們研究了總血紅蛋白低振盪在於腦血管反應性監測中的角色。
方法：這項研究是基於一項回顧性研究分析，這項研究曾經以不同的方案記載發表多次。在 2008 年 6 月-2009 年 6 月之間有 37 名腦外傷患者被收治于 Addenbrooke's 神經外監護室。在人工假體摘除後，我們使用光譜分析來研究組織的血紅蛋白指數（THI，即測量結合氧的血紅蛋白和未結合氧的血紅蛋白）和顱內壓信號。壓力反應指數和總血紅蛋白反應指數都與顱內壓，動脈血壓，組織血紅蛋

白指數等動態相關。另外，我們也研究了來自左右大腦的總血紅蛋白指數的相關性。

結果：壓力反應指數和總血紅蛋白反應指數的一致性依賴於輸入信號的低振盪能力。對於標準慢波活動度>0.4，組間比較顯示總血紅蛋白指數與壓力反應指數有很大的相關性。（r=0.80,95%可信區間是 0.53-0.92,P<0.01）。另外，組內比較提示只有當左右腦的總血紅蛋白指數至少有中等程度的一致時，才能用總血紅蛋白指數來代替壓力反應指數。

結論：我們的研究提示腦血管反應指數總血紅蛋白指數可以用於無創替代壓力反應指數，但是只有在輸入信號有足夠的慢波能量時。另外，左右大腦的總血紅蛋白指數的一致性是比較總壓力反應指數和局部總血紅蛋白指數的先決條件。最後，無創監測腦血管的反應性可以在患者無顱內壓監測的條件下，理想地指導這些患者的動脈血壓的管理。

（翁梅琳譯 薛張綱校）

BACKGROUND: A total hemoglobin reactivity index (THx) derived from near-infrared spectroscopy (NIRS) has recently been introduced to assess cerebrovascular reactivity noninvasively. Analogously to the pressure reactivity index (PRx), THx is calculated as correlation coefficient with arterial blood pressure (ABP). However, the reliability of THx in the injured brain is uncertain. Although slow oscillations have been described in NIRS signals, their significance for assessment of autoregulation remains unclear. In the current study, we investigated the role of slow oscillations of total hemoglobin for NIRS-based cerebrovascular reactivity monitoring.

METHODS: This study was based on a retrospective analysis of data that were consecutively recorded for a different project published previously. Thirty-seven patients with traumatic brain injury and admitted to Addenbrooke's Neurosciences Critical Care Unit between June 2008 and June 2009 were included. After artifact removal, we performed spectral analysis of the tissue hemoglobin index (THI, a measure of oxy- and deoxygenated hemoglobin) and intracranial pressure (ICP) signal. PRx and THx were calculated as moving correlations between ICP and ABP, and THI and ABP, respectively. The agreement between PRx and THx as a function of normalized power of slow oscillations (0.015–0.055 Hz) contained in the input signals was assessed performing between-subject and within-subject correlation analyses. Furthermore, the correlation between the THx values derived from the right and left sides was analyzed.

RESULTS: The agreement between PRx and THx depended on the power of slow oscillations in the input signals. Between-subject comparisons revealed a significant correlation between THx and PRx (r = 0.80, 95% confidence interval 0.53–0.92, P < 0.01) for patients with normalized slow wave activity >0.4 in the THI signal, compared with r = 0.07 (95% confidence interval −0.40 to 0.51, P = 0.79) in the remaining files. Furthermore, within-subject comparisons suggested that THx may be used as a substitute for PRx only when there is an at least moderate agreement (r = 0.36) between the THx values derived from the right and left sides.

CONCLUSIONS: Our results suggest that the NIRS-based cerebrovascular reactivity index THx can be used as a noninvasive substitute for PRx, but only during phases with sufficient slow wave power in the input signal. Furthermore, a good agreement between the THx measures on both sides seems to be a prerequisite for comparison of a global (PRx) versus the more local (THx) index. Nevertheless, noninvasive assessment of

cerebrovascular reactivity may be desirable in patients without ICP monitoring and help to guide ABP management in these patients.

連續外周神經阻滯:一項基於發表證據的綜述

Continuous Peripheral Nerve Blocks: A Review of the Published Evidence

Brian M. Ilfeld, MD, MS
From Clinical Investigation, Department of Anesthesiology, University of California San Diego, San Diego, California.
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摘要：連續外周神經阻滯,又稱爲神經周圍局麻藥輸注包括了經皮在外周神經周圍置管,然後通過這根導管給予局麻藥從而提供多天甚至數月的麻醉或鎮痛。連續外周神經阻滯可以在醫院內進行，但輕便的可攜式泵使得病人可以下床活動 同時進行輸注。這一技術最主要用於術後鎮痛。同時，也可用於頑固性呃逆，血管意外後誘導交感神經切除和血管擴張來增加血流，斷肢再植，或四肢的手術，緩解雷諾病的血管痙攣；治療外周血管栓塞和慢性疼痛如複雜區域疼痛綜合症、幻肢痛、三叉神經痛和癌性疼痛。創傷後連續外周神經阻滯能在病人轉運至醫療中心前或者等待手術修復前給予鎮痛。放置導管可以通過很多方法進行，包括神經刺激、超聲引導、誘導異感，螢光影像或者簡單的觸覺進行。簡單的硬膜外導管可以用於置管，或者能傳輸電流至其尖端的“可刺激的導管”也可用。輸注的藥物包括了稀釋的長效局麻藥，可通過僅給予單次劑量、背景劑量或者兩者結合的方式進行。記錄的益處有賴於成功緩解疼痛，包括減少安靜痛、暴發痛和運動痛，減少輔助鎮痛藥和阿片類相關副作用和睡眠障礙。在一些病例中，病人的滿意度增加，下床活動、功能均改善；被動關節運動功能恢復加速，同時病人達到出院標準或者實際出院時間均加快。最後，術後關節炎症和炎性指標均減少。輸注本身帶來了很多益處，但是在幾個隨機臨床試驗中得出導管拔除後仍具有延長的益處。一些小的併發症有時經常發生，但是大的風險例如臨床相關的感染和神經損傷很少見。本文是關於連續周圍神經阻滯的循證綜述。
（姚敏敏譯 薛張綱校）

Abstract：A continuous peripheral nerve block, also termed “perineural local anesthetic infusion,” involves the percutaneous insertion of a catheter adjacent to a peripheral nerve, followed by local anesthetic administration via the catheter, providing anesthesia/analgesia for multiple days or even months. Continuous peripheral nerve blocks may be provided in the hospital setting, but the use of lightweight, portable pumps permits ambulatory infusion as well. This technique's most common application is providing analgesia after surgical procedures. However, additional indications include treating intractable hiccups; inducing a sympathectomy and vasodilation to increase blood flow after a vascular accident, digit transfer/replantation, or limb salvage; alleviating vasospasm of Raynaud disease; and treating peripheral embolism and chronic pain such as complex regional pain syndrome, phantom limb pain, trigeminal neuralgia, and cancer-induced pain. After trauma, perineural infusion can provide analgesia during transportation to a distant treatment center, or while simply awaiting surgical repair. Catheter insertion may be accomplished using many possible modalities, including nerve

stimulation, ultrasound guidance, paresthesia induction, fluoroscopic imaging, and simple tactile perceptions (“facial click”). Either a nonstimulating epidural-type catheter may be used, or a “stimulating catheter” that delivers electrical current to its tip. Administered infusate generally includes exclusively long-acting, dilute, local anesthetic delivered as a bolus only, basal only, or basal-bolus combination. Documented benefits appear to be dependent on successfully improving analgesia, and include decreasing baseline/breakthrough/dynamic pain, supplemental analgesic requirements, opioid-related side effects, and sleep disturbances.In some cases, patient satisfaction and ambulation/functioning may be improved; an accelerated resumption of passive joint range-of-motion realized; and the time until discharge readiness as well as actual discharge from the hospital or rehabilitation center achieved. Lastly, postoperative joint inflammation and inflammatory markers may be decreased. Nearly all benefits occur during the infusion itself, but several randomized controlled trials suggest that in some situations there are prolonged benefits after catheter removal as well. Easily rectified minor complications occur somewhat frequently, but major risks including clinically relevant infection and nerve injury are relatively rare. This article is an evidence-based review of the published literature involving continuous peripheral nerve blocks.

利多卡因通過抑制小膠質細胞活化來減少糖尿病誘導觸覺性疼痛過敏

Lidocaine Attenuates the Development of Diabetic-Induced Tactile Allodynia by Inhibiting Microglial Activation

Naoko Suzuki, MD, Maiko Hasegawa-Moriyama, MD, PhD, Yoshika Takahashi, MD, Yuji Kamikubo, PhD, Takashi Sakurai, MD, PhD and Eiichi Inada, MD, PhD
From the [*]Departments of Anesthesiology and Pain Medicine, and [†]Pharmacology, Juntendo University School of Medicine, Tokyo, Japan
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背景：利多卡因在臨床上用來治療與糖尿病神經病變相關的觸覺性疼痛過敏。儘管利多卡因通過抑制小膠質細胞活化的鎮痛效應與創傷誘導的神經性疼痛有相似之處，但他減少糖尿病誘導的觸覺性疼痛過敏的機制還未完全闡明。
方法：爲了評估利多卡因在糖尿病神經病變中對小膠質細胞的效應，小鼠在接受注射鏈脲黴毒後 14 天到 21 天間持續注射利多卡因。在第 21 天，評估脊髓背角內小膠質細胞的積聚及 p38 分裂活化蛋白激酶的活化。在體外，利多卡因對細胞存活，單核細胞趨化蛋白-1 的趨化作用和促炎症反應的影響通過干擾素-γ–啓動的原始小膠質細胞來檢測。
結果：STZ-小鼠中，在觸覺性疼痛過敏的早期進程中持續全身應用利多卡因產生長時間的鎮痛效果。利多卡因顯著減少脊髓背角中小膠質細胞的積聚和 p38 磷酸化。在體外，利多卡因負調節干擾素-γ–誘導基因誘導氧化合酶和 interleukin-1β。利多卡因預處理顯著減少干擾素-γ–活化小膠質細胞中單核細胞趨化蛋白-1 的趨化作用。
結論：利多卡因可能通過調節脊髓小膠質細胞的 P38 途徑來緩解 STZ-誘導的觸覺性痛覺過敏。在糖尿病神經病變早期通過利多卡因的治療來抑制小膠質細胞活性顯示了一種潛在可行的治療觸覺性痛覺過敏的策略。

（張玥琪譯，薛張綱校）

BACKGROUND: Lidocaine is used clinically for tactile allodynia associated with diabetes-induced neuropathy. Although the analgesic effect of lidocaine through suppression of microglial activation has been implicated in the development of injury-induced neuropathic pain, its mechanism of action in diabetes-induced tactile allodynia has not yet been completely elucidated.
METHODS: To evaluate the effects of lidocaine on microglial response in diabetic neuropathy, streptozotocin (STZ)-injected mice received a continuous infusion of lidocaine (vehicle, 2, or 10%) from day 14 to day 21 after STZ injection. On day 21, microglial accumulation and p38 mitogen-activated protein kinase activation in the dorsal horn were evaluated. In vitro, the effects of lidocaine on cell viability, chemotactic response to monocyte chemotactic protein-1, and induction of proinflammatory mediators were examined in interferon (IFN)-γ–stimulated primary microglial cells.
RESULTS: Continuous systemic administration of lidocaine in the early progression of tactile allodynia produced long-lasting analgesic effects in STZ-treated mice. Lidocaine significantly reduced accumulation and p38 phosphorylation of microglial cells in the dorsal horn. In vitro, lidocaine down-regulated IFN-γ–induced gene induction of inducible oxide synthase and interleukin-1β. Pretreatment with lidocaine significantly reduced chemotactic response to monocyte chemotactic protein-1 of IFN-γ–activated microglial cells.
CONCLUSION: Lidocaine alleviates STZ-induced tactile allodynia, possibly by modulating the p38 pathway in spinal microglial cells. Inhibiting microglial activation by lidocaine treatment early in the course of diabetes-induced neuropathy represents a potential therapeutic strategy for tactile allodynia.

結合臨床和實驗室方法對心胸外科重症監護病房內患者進行肝素誘導血小板減少症的診斷

A Diagnosis of Heparin-Induced Thrombocytopenia with Combined Clinical and Laboratory Methods in Cardiothoracic Surgical Intensive Care Unit Patients

Linda J. Demma, MD, PhD*, Anne M. Winkler, MD† and Jerrold H. Levy, MD, FAHA*‡
From the *Department of Anesthesiology, †Transfusion Medicine, and ‡Department of Critical Care Medicine, Emory University, Atlanta, Georgia.
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背景：由於大量血小板減少症的發生與體外迴圈（CPB）有關，所以在心胸外科手術患者中診斷術後肝素誘導血小板減少症（HIT）是比較複雜的。體外迴圈使患者發展成爲直接針對血小板因數 4(PF4)/肝素複合物的抗體和 HIT 的發生率較高。這種比較容易形成的免疫抗體的敏感性高，但特異性十分低。同時使用臨床概率評分和快速實驗室免疫分析法已顯示特異性有所增加，這在體外迴圈的情況下尤其重要。及時的診斷是關鍵，因爲停止肝素和替代性抗凝藥物治療可以減少血栓栓塞事件的風險。
方法：我們回顧性地研究了從 2007 年 1 月至 2010 年 12 月用血清素釋放分析法（SRA）和 PF4/肝素免疫分析血清的心胸外科手術患者的記錄。我們指定一個高

級、中級或低級臨床“4Ts”概率評分來量化每一個病人的血小板減少症、血小板減少的時間和血栓性併發症。然後我們將臨床評分和 PF4/肝素免疫分析與“金標準”的診斷測試——SRA 相比較。

結果：PF4/肝素光學密度>0.40 的敏感性和特異性分別爲 100%和 26%。結合 PF4/肝素光學密度>0.40 和高/中級 4Ts 評分診斷 HIT 的敏感性和特異性分別爲 100%和 70%。低級 4Ts 評分陰性預測值爲 100%。

結論：我們證明了結合 4Ts 臨床評分和 PF4/肝素免疫分析用於診斷 HIT 與單獨使用 PF4/肝素免疫分析相比較增加了診斷 HIT 的敏感性和特異性。此外，一個中級 4Ts 評分和陽性的 PF4/肝素抗體測試結果，確認性的血小板活化檢測如 SRA 是必要的。醫生治療心胸外科手術後的患者時應該認識到，甚至 HIT 中級臨床可能性的患者也需要抗體測試，並用血小板活化檢測進行確認。

（唐亮 譯 馬皓琳 李士通 校）

BACKGROUND: Diagnosing postoperative heparin-induced thrombocytopenia (HIT) in cardiothoracic surgical patients is complicated because of the profound thrombocytopenia that occurs with cardiopulmonary bypass (CPB). CPB predisposes patients to develop a frequent incidence of antibodies directed against platelet factor 4 (PF4)/heparin complexes and HIT. The sensitivity of readily available antibody immunoassays is high, but specificity is quite low. The use of both a clinical probability score and rapid laboratory immunoassay has been shown to increase specificity, which is of particular importance in the CPB setting. Prompt diagnosis is crucial because cessation of heparin and treatment with alternative anticoagulation can reduce the risk of thromboembolic events.

METHODS: We retrospectively reviewed records from cardiothoracic surgical patients whose serum was tested with both the serotonin release assay (SRA) and the PF4/heparin immunoassay from January 2007 through December 2010. We assigned a high, intermediate, or low clinical “4Ts” probability score that quantifies thrombocytopenia, timing of platelet decrease, and thrombotic complications in each patient. We then compared the clinical score and the PF4/heparin immunoassay against the “gold standard” diagnostic test, the SRA.

RESULTS: The sensitivity and specificity for PF4/heparin optical density >0.40 were 100% and 26%, respectively. Sensitivity and specificity for the diagnosis of HIT with a combination of PF4/heparin optical density >0.40 and high/intermediate 4Ts score were 100% and 70%, respectively. The negative predictive value was 100% for low 4Ts score.

CONCLUSIONS: We demonstrated that the use of the 4Ts clinical score combined with the PF4/heparin immunoassay for HIT diagnosis increases the sensitivity and specificity of HIT testing compared with the PF4/heparin immunoassay alone. Furthermore, with an intermediate 4Ts score and positive PF4/heparin antibody test, a confirmatory platelet activation assay such as the SRA is necessary. Physicians treating patients after cardiothoracic surgery should recognize the need for an antibody test and confirmation with a platelet activation assay with even moderate clinical probability of HIT.

麻醉方式對於宮腔鏡手術中甘氨酸吸收的影響：一項隨機對照試驗

The Impact of Anesthesia on Glycine Absorption in Operative Hysteroscopy: A Randomized Controlled Trial

Marie-Eve Bergeron, MD*, Pascale Ouellet, MD†, Emmanuel Bujold, MD, MSc*, Maxime Cote, MD†, Caroline Rhéaume, MD*, Daniel Lapointe, MD†, Christine Beaudet, MD*, Madeleine Lemyre, MD* and Philippe Laberge, MD*
From the Departments of *Obstetrics and Gynecology and †Anesthesiology, Centre Hospitalier Universitaire de Québec, Faculty of Medicine, Universite Laval, Québec, Québec, Canada.
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背景：宮腔鏡手術需要使用膨脹性介質，它的吸收可能導致嚴重的併發症如血容量過多和水中毒。我們比較了兩種麻醉方式（全身麻醉和局部麻醉聯合鎮靜）對於宮腔鏡手術中甘氨酸吸收的影響。
方法：這是一項爲期超過 17 個月時間的隨機對照試驗。因異常子宮出血進行宮腔鏡手術的符合條件的病人被隨機分爲兩組：全身麻醉組和局部麻醉聯合鎮靜組。主要觀察指標是用自動化串聯濾罐系統測量的甘氨酸溶液吸收中位數（第 10--第 90 百分位數）。次要觀察指標包括吸收大於 1000ml 的發生率、因過度吸收中斷手術、血清鈉改變中位數、術後低鈉血症和病人術後 24 小時時的生活品質（8 項短條目健康調查問卷）。應用非參數檢驗（曼-惠特尼 U 檢驗、χ^2 核對總和費舍爾確切檢驗）。
結果：在 142 個符合條件的病人中，95 人同意參與試驗並被隨機分組。全身麻醉組病人甘氨酸溶液的吸收中位數（第 10-第 90 百分位元數）較局部麻醉聯合鎮靜組高（480 mL [76–1300 mL]比 253 mL [70–728 mL]; $P = 0.005$）。全身麻醉組甘氨酸溶液吸收大於 1000ml 的發生率較局部麻醉聯合鎮靜組高(>1000 mL [20%比 4%; $P = 0.009$])，血清鈉降低速度也較快(≥10 mEq/L [8%比 0%; $P = 0.005$])。患者分級的術後生活品質兩組相比較差異不大。
結論：相對於全身麻醉，局部麻醉聯合鎮靜時的甘氨酸溶液吸收較少，應作爲宮腔鏡手術優先考慮的麻醉方式。
（張怡譯 馬皓琳 李士通校）

BACKGROUND: Operative hysteroscopy requires the use of a distension medium and its absorption can lead to serious consequences from intravascular volume overload and water intoxication. We compared the impact of 2 types of anesthesia (general anesthesia and local anesthesia with sedation) on the absorption of glycine solution in operative hysteroscopy.
METHODS: A randomized controlled trial was conducted over a 17-month period. Eligible patients undergoing operative hysteroscopy for abnormal uterine bleeding were randomized in 2 groups: a general anesthesia group and a local anesthesia with sedation group. The primary outcome was the median absorption of the glycine solution (10th–90th percentile) measured with an automated tandem canister system. Secondary outcomes included incidence of absorption >1000 mL, discontinued surgery because of excessive absorption, median change in serum sodium, postoperative hyponatremia, and patients' postoperative quality of life at 24 hours (8-item Short Form Health Survey questionnaire). Nonparametric analyses (Mann-Whitney U test, χ^2 test, and Fisher exact test) were used.
RESULTS: Of 142 eligible patients, 95 agreed to participate and were randomized. Women who underwent general anesthesia had a higher median absorption of the glycine

solution (10th–90th percentile) compared with women who underwent local anesthesia with sedation (480 mL [76–1300 mL] vs 253 mL [70–728 mL]; *P* = 0.005). General anesthesia was also associated with a higher rate of glycine solution absorption (>1000 mL [20% vs 4%; *P* = 0.009]) and a more rapid rate of decrease in serum sodium (≥10 mEq/L [8% vs 0%; *P* = 0.005]) than local anesthesia with sedation. Postoperative quality of life measures as rated by the patients were comparable between the 2 groups.
CONCLUSION: Compared with general anesthesia, local anesthesia with sedation is associated with less glycine absorption and should be considered the preferred method of anesthesia for operative hysteroscopy.

七氟醚對豬自體肺移植模型預處理的效應

The Effects of Anesthetic Preconditioning with Sevoflurane in an Experimental Lung Autotransplant Model in Pigs

Javier Casanova, MD*, Ignacio Garutti, PhD, MD*, Carlos Simon, PhD, MD†, Ana Giraldez, MD*, Beatriz Martin, MD*, Guillermo Gonzalez, MD†, Leire Azcarate, MD†, Cruz Garcia, PhD, MD‡ and Elena Vara, PhD, MD‡
From the *Department of Anesthesiology and †Department of Thoracic Surgery, Gregorio Maranon University General Hospital, Madrid, Spain; and ‡Department of Biochemistry and Molecular Biology III, Faculty of Medicine, Complutense University of Madrid, Madrid, Spain.
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背景：由於胸外科手術對一側肺的通氣損害，缺血再灌注肺損傷在胸外科手術中成倍的重要。我們在本項研究中評估了七氟醚對豬自體肺移植模型的細胞保護作用。
方法：我們根據使用的麻醉藥物不同（七氟醚或丙泊酚）將 20 只行肺切除術加自體肺移植術的大白豬分爲 2 組，每組 10 只。每 5 分鐘測量一次促炎症反應介質、氧化應激、氧化亞氮代謝及血流動力學和血液數據。
結果：丙泊酚組氧化應激指標和促炎症反應介質升高，但兩組血流動力學無顯著差異。
結論：我們證明了在活體缺血再灌注肺損傷的模型中，七氟醚降低了炎症反應和氧化應激。
（劉伍 譯 馬皓琳 李士通 校）

BACKGROUND: Ischemia–reperfusion lung injury is doubly important in thoracic surgery because of the associated ventilation damage to 1 lung. In this study we evaluated the cytoprotective effects of sevoflurane in a pulmonary autotransplant model in pigs.
METHODS: Twenty Large White pigs undergoing pneumonectomy plus lung autotransplant were divided into 2 10-member groups on the basis of the anesthetic received (propofol or sevoflurane). Proinflammatory mediators, oxidative stress, nitric oxide metabolism, and hemodynamic and blood variables were measured at 5 different time points.
RESULTS: There was an increase of oxidative stress markers and proinflammatory mediators in the propofol group, whereas the hemodynamic variables were similar in both groups.

CONCLUSIONS: We demonstrated that sevoflurane decreased the inflammatory response and oxidative stress in a live ischemia–reperfusion lung model.

麻醉醫生關於動脈波形分析過去、現在、將來的概念

Arterial Waveform Analysis for the Anesthesiologist: Past, Present, and Future Concepts

Robert H. Thiele, MD and Marcel E. Durieux, MD, PhD
From the Department of Anesthesiology, University of Virginia Health Sciences Center, Charlottesville, Virginia.
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定性的動脈波形分析已有千年歷史，而可追溯到 18 世紀的歐拉的著作中的定量動脈波形分析技術卻未被麻醉醫生和其他臨床工作者廣泛應用。這可能部分歸因於血壓計的普及，它使得實際操作者評估動脈血壓可不必開發一種監測裝置來測定更高級的動脈波形的特性。測量這些特性的裝置的開發延遲了 20 年正說明了我們對此資訊的原始構想的正確。外周動脈血壓波形的形狀可能確實包含了對麻醉醫生和重症監護醫生的有用資訊。外周動脈血壓描記圖的最大斜率似與左心室收縮性有關，雖然這種關係可能被其他血流動力學變數混雜。當負荷情況穩定時，外周動脈血壓描記圖的線下面積與每搏量有關，這個發現已被應用於一些連續心輸出量監測的開發中。脈搏波傳導速度可能與血管阻抗有關，並可能潛在提高基於波形的心搏量估計的精確性。通過廣義傳遞函數可根據外周動脈（例如肱、橈）的描記圖估計中心動脈壓（例如主動脈），並融入一些連續心輸出量監測儀的演算法。
（毛祖旻 譯 馬皓琳 李士通 校）

Qualitative arterial waveform analysis has been in existence for millennia; quantitative arterial waveform analysis techniques, which can be traced back to Euler's work in the 18th century, have not been widely used by anesthesiologists and other clinicians. This is likely attributable, in part, to the widespread use of the sphygmomanometer, which allows the practitioner to assess arterial blood pressure without having to develop a sense for the higher-order characteristics of the arterial waveform. The 20-year delay in the development of devices that measure these traits is a testament to the primitiveness of our appreciation for this information. The shape of the peripheral arterial pressure waveform may indeed contain information useful to the anesthesiologist and intensivist. The maximal slope of the peripheral arterial pressure tracing seems to be related to left ventricular contractility, although the relationship may be confounded by other hemodynamic variables. The area under the peripheral arterial pressure tracing is related to stroke volume when loading conditions are stable; this finding has been used in the development of several continuous cardiac output monitors. Pulse wave velocity may be related to vascular impedance and could potentially improve the accuracy of waveform-based stroke volume estimates. Estimates of central arterial pressures (e.g., aortic) can be produced from peripheral (e.g., brachial, radial) tracings using a Generalized Transfer Function, and are incorporated into the algorithms of several continuous cardiac output monitors.

應用 AP Advance、GlideScope Ranger 可視喉鏡和 Macintosh 喉鏡在人體模型插管的研究

A Mannequin Study of Intubation with the AP Advance and GlideScope Ranger Videolaryngoscopes and the Macintosh Laryngoscope

Jack A. R. Hodd, MA, MB, Bchir*, D. John Doyle, MD, PhD†, Shipra Gupta, BS*, Jarrod E. Dalton, MA*‡, Juan P. Cata, MD*, Edward J. Brewer, BS, MA, EMSI§, Monyulona James, BS§ and Daniel I. Sessler, MD*
From the Departments of *Outcomes Research, †General Anesthesiology, and ‡Quantitative Health Sciences, Cleveland Clinic; §CPR Department, Nursing Education, Cleveland Clinic, Cleveland, Ohio.
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背景：AP Advance (APA)是一種可以互換鏡片的可視喉鏡：插管者可選用標準 Macintosh 鏡片或增加了曲率和一條通道以引導導管進入喉部的困難氣道鏡片。因此 APA 可能在處理正常氣道和困難氣道時有著同等的有效性。我們驗證了 APA 在正常氣道模型插管不慢於 Macintosh 喉鏡，在困難氣道模型插管中不慢於 GlideScope Ranger 可視喉鏡的假設。
方法：可能有氣管插管職責的醫學專業人員接受了每一種喉鏡使用的培訓。參加者用 APA、GlideScope 和傳統的 Macintosh 喉鏡對模擬的（Laerdal SimMan）正常和困難氣道進行插管。應用 Cox 相對危險回歸法來比較插管速度，當危害比>0.8 時認爲速度不慢。我們同時還比較了喉部顯影、失敗數以及參與者的偏好。
結果：未經校準的 APA 和 Macintosh 喉鏡插管時間事實上是相等的（中位數 22 比 23 秒）；在對經驗、次序、階段的影響進行校準後，APA 比 Macintosh 喉鏡的危害比（95%可信區間）爲 0.87 (0.65, 1.17),並不明顯高於我們預先定義的非劣效性邊界值 0.8 (P = 0.26)。APA 在困難氣道的插管速度比 GlideScope 喉鏡更快（危害比 =0.76，[5.0, 11.3], P < 0.001，中位數：20 比 59 秒）。所有的受試者都用 APA 完成了困難氣道模型的插管，而用 GlideScope 和 Macintosh 者分別有 33%和 37%插管失敗。在困難氣道中，99%受試者應用 APA 暴露聲門達到了 Cormack and Lehane 評級 I 到 II 級，而應用 GlideScope 和 Macintosh 者分別爲 85%和 33%。請受試者選用其中一種喉鏡時，82%選擇 APA。
結論：在正常氣道模型，APA 和 Macintosh 喉鏡的插管時間相似。然而在困難氣道模型中，APA 插管速度顯著快於 GlideScope 喉鏡。
（瞿亦楓 譯 馬皓琳 李士通 校）

BACKGROUND: The AP Advance (APA) is a videolaryngoscope with interchangeable blades: intubators can choose standard Macintosh blades or a difficult-airway blade with increased curvature and a channel to guide the tube to the larynx. The APA may therefore be comparably effective in both normal and difficult airways. We tested the hypotheses that intubation with the APA is no slower than Macintosh laryngoscopy for normal mannequin airways, and that it is no slower than videolaryngoscopy using a GlideScope Ranger in difficult mannequin airways.
METHODS: Medical professionals whose roles potentially include tracheal intubation were trained with each device. Participants intubated simulated (Laerdal SimMan) normal and difficult airways with the APA, GlideScope, and a conventional Macintosh

blade. Speed of intubation was compared using Cox proportional hazards regression, with a hazard ratio >0.8 considered noninferior. We also compared laryngeal visualization, failures, and participant preferences.
RESULTS: Unadjusted intubation times in the normal airway with the APA and Macintosh were virtually identical (median, 22 vs 23 seconds); after adjustment for effects of experience, order, and period, the hazard ratio (95% confidence interval) comparing APA with Macintosh laryngoscopy was 0.87 (0.65, 1.17), which was not significantly more than our predefined noninferiority boundary of 0.8 ($P = 0.26$). Intubation with the APA was faster than with the GlideScope in difficult airways (hazard ratio = 7.6 [5.0, 11.3], $P < 0.001$; median, 20 vs 59 seconds). All participants intubated the difficult airway mannequin with the APA, whereas 33% and 37% failed with the GlideScope and Macintosh, respectively. In the difficult airway, 99% of participants achieved a Cormack and Lehane grade I to II view with the APA, versus 85% and 33% with the GlideScope and Macintosh, respectively. When asked to choose 1 device overall, 82% chose the APA.
CONCLUSIONS: Intubation times were similar with the APA and Macintosh laryngoscopes in mannequins with normal airways. However, intubation with the APA was significantly faster than with the GlideScope in the difficult mannequin simulation.

對比瑞芬太尼和呱替啶應用於分娩鎮痛的一項系統綜述

A Comparison Between Remifentanil and Meperidine for Labor Analgesia: A Systematic Review

Wan Ling Leong, MBBS, FANZCA, Ban Leong Sng, MBBS, MMed(Anaes), FANZCA, FFPMANZCA and Alex Tiong Heng Sia, MBBS, MMed(Anaes)
From the Department of Anaesthesia, KK Women's and Children's Hospital, Singapore.
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背景：瑞芬太尼是一超短效阿片類藥物，具有良好的藥代動力學特性使它非常適合分娩鎮痛。儘管瑞芬太尼自由通過胎盤，但由於在新生兒體內快速代謝和重新分佈使它快速消除。我們研究的目的是瑞芬太尼和呱替啶相比在降低分娩產婦疼痛評分是否有效。還觀察了瑞芬太尼對母親、產程和新生兒的影響。
方法：用多個關鍵字（如產科鎮痛，瑞芬太尼，呱替啶）沒有語言限制搜索 MEDLINE、CINAHL、Embase、Cochrane CENTRAL 及母嬰保健資料庫。檢查了來自於 5 個重要研究會議出版的摘要和來自檢索文獻的參考文獻用來搜索額外的研究。選擇了瑞芬太尼和呱替啶在分娩產婦做對比的隨機對照試驗。按照*用於干預的系統回顧的循證醫學手冊*中列出的標準來進行評估偏倚風險。我們評估序列產生是否合適、分配隱藏、盲法和隨訪的完整性。用標準化資料收集表從每一項研究提取資料。主要觀察指標是疼痛評分的降低（視覺類比評分[VAS]，0-100mm）。我們也評估了產婦副作用（鎮靜、血氧飽和度下降和呼吸減緩）和對新生兒的影響（Apgar 評分、臍帶 pH 及神經病學和適應能力評分）
結果：7 個研究（349 個患者）確認入組；僅有 3 個研究適合在薈萃分析中用於定量合成（233 例患者）。我們發現瑞芬太尼在 1 小時時降低平均 VAS 評分比呱替

啶多 25mm（95%置信區間 19-31mm）($P < 0.001$)。由於資料不充分導致關於瑞芬太尼副作用方面做出的結論有限。
結論：瑞芬太尼在降低 1 小時後的分娩疼痛平均視覺類比評分方面優於呱替啶。（劉朝輝譯，馬皓琳，李士通校）

BACKGROUND: Remifentanil is an ultrashort-acting opioid with favorable pharmacokinetic properties that make it suitable as a labor analgesic. Although it crosses the placenta freely, it is eliminated quickly in the neonate by rapid metabolism and redistribution. We aimed to determine whether remifentanil compared with meperidine is effective in reducing pain scores in laboring parturients. Other effects on the mother, the labor process, and the neonate were also examined.
METHODS: MEDLINE, CINAHL, Embase, Cochrane CENTRAL, and Maternity and Infant Care databases were searched without language restriction using multiple keywords for labor analgesia, remifentanil, and meperidine. Published abstracts from 5 key research meetings and references from retrieved articles were examined for additional studies. Randomized controlled trials in laboring parturients comparing remifentanil with meperidine were selected. Risk of bias was assessed using criteria outlined in the *Cochrane Handbook for Systematic Reviews of Interventions*. We assessed for adequacy of sequence generation, allocation concealment, blinding, and completeness of follow-up. Data were extracted from each study using a standardized data collection form. The primary outcome was reduction in pain scores (visual analog scale [VAS], 0–100 mm). We also evaluated maternal side effects (sedation, oxygen desaturation, and bradypnea) and effects on the neonate (Apgar scores, umbilical cord pH, and Neurologic and Adaptive Capacity Scores).
RESULTS: Seven studies (349 patients) were identified for inclusion; only 3 studies were suitable for quantitative synthesis in a meta-analysis (233 patients). We found that remifentanil reduces the mean VAS score at 1 hour by 25 mm more than meperidine ($P < 0.001$) (95% confidence interval = 19–31 mm). Limited conclusions can be made regarding the side-effect profile of remifentanil because of insufficient data.
CONCLUSION: Compared with meperidine, remifentanil is superior in reducing mean VAS scores for labor pain after 1 hour.

青少年的氧化亞氮麻醉和血漿高半胱氨酸

Nitrous Oxide Anesthesia and Plasma Homocysteine in Adolescents

Peter Nagele, MD, MSc, Danielle Tallchief, BS, RN, Jane Blood, BS, RN, Anshuman Sharma, MD and Evan D. Kharasch, MD, PhD
From the Department of Anesthesiology, Washington University, St. Louis, Missouri.
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背景：氧化亞氮可以使維生素 B_{12} 滅活，抑制蛋氨酸合酶，從而升高血漿總高半胱氨酸量（tHcy）。兒童長時間暴露於氧化亞氮可導致神經病變、脊髓變性，甚至導致死亡。我們對氧化亞氮麻醉導致兒童血漿 tHcy 明顯增加的假設進行了研究。
方法：27 名（年齡 10-18 歲）擇期行脊柱大手術的兒童入組，採取患者誘導後 0-96 h 一系列血漿樣本。麻醉方案，包括氧化亞氮的使用，由麻醉師自由決定。使用標準酶法測定血漿 tHcy。

結果：血漿 tHcy 濃度中位數基線值爲 5.1 μmol/L（3.9-8.0 μmol/L，四分位距），並且所有暴露於氧化亞氮的病人（n=26）血漿 tHcy 量均升高，平均升高 9.4 μmol/L（幾何平均數;95％置信區間 7.1-12.5 μmol/L）或 228％（均值；95％置信區間，178％-279％）。 血漿 tHcy 量在麻醉誘導後 6-8 小時出現峰值。一名沒有接受氧化亞氮的病人血漿 tHcy 量未升高。一些患者血漿 tHcy 成倍增加（最高+567％）。血漿 tHcy 的增加與氧化亞氮麻醉的持續時間和平均濃度密切相關（r =0.80，P <0.001）。
結論：小兒患者接受氧化亞氮麻醉顯著增加血漿 tHcy 濃度。這種影響程度似乎比成人要大，但臨床意義不明。
（安光惠譯 馬皓琳 李士通校）

BACKGROUND: Nitrous oxide inactivates vitamin B_{12}, inhibits methionine synthase, and consequently increases plasma total homocysteine (tHcy). Prolonged exposure to nitrous oxide can lead to neuropathy, spinal cord degeneration, and even death in children. We tested the hypothesis that nitrous oxide anesthesia causes a significant increase in plasma tHcy in children.
METHODS: Twenty-seven children (aged 10–18 years) undergoing elective major spine surgery were enrolled, and serial plasma samples from 0 to 96 hours after induction were obtained. The anesthetic regimen, including the use of nitrous oxide, was at the discretion of the anesthesiologist. Plasma tHcy was measured using standard enzymatic assays.
RESULTS: The median baseline plasma tHcy concentration was 5.1 μmol/L (3.9–8.0 μmol/L, interquartile range) and increased in all patients exposed to nitrous oxide (n = 26) by an average of +9.4 μmol/L (geometric mean; 95% confidence interval, 7.1–12.5 μmol/L) or +228% (mean; 95% confidence interval, 178%–279%). Plasma tHcy peaked between 6 and 8 hours after induction of anesthesia. One patient who did not receive nitrous oxide had no increase in plasma tHcy. Several patients experienced a severalfold increase in plasma tHcy (maximum +567%). The increase in plasma tHcy was strongly correlated with the duration and average concentration of nitrous oxide anesthesia (r = 0.80; P < 0.001).
CONCLUSIONS: Pediatric patients undergoing nitrous oxide anesthesia develop significantly increased plasma tHcy concentrations. The magnitude of this effect seems to be greater compared with adults; however, the clinical relevance is unknown.

一項隨機對照研究：連續股神經阻滯與腰後叢阻滯用於髖關節成形術後鎮痛的比較

Continuous Femoral Versus Posterior Lumbar Plexus Nerve Blocks for Analgesia After Hip Arthroplasty: A Randomized, Controlled Study

Brian M. Ilfeld, MD, MS*, Edward R. Mariano, MD, MAS*, Sarah J. Madison, MD*, Vanessa J. Loland, MD*, NavParkash S. Sandhu, MD*, Preetham J. Suresh, MD*, Michael L. Bishop, MD*, T. Edward Kim, MD*, Michael C. Donohue, PhD†, Anna A. Kulidjian, MD‡ and Scott T. Ball, MD‡
From the *Department of Anesthesiology, †Division of Biostatistics and Bioinformatics and ‡Department of Orthopedic Surgery, University of California San Diego, La Jolla, California.
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背景：髖關節成形術通常需要術後有效的鎮痛，經常由椎管內或腰後叢局麻藥輸注提供。然而，現在美國區域麻醉學會指南推薦在髖關節成形術後經常給予的各種抗凝藥圍術期給藥期間，取消椎管內或腰後叢阻滯。連續股神經阻滯是一種可能的鎮痛選擇，而這種方式是否能在髖關節成形術後提供與連續腰後叢阻滯同等的鎮痛效果仍不明確。因此，我們驗證了髖關節成形術後改變導管置入位置（股神經或腰後叢）對於術後鎮痛沒有影響的假說。

方法：行髖關節成形術的患者術前隨機分組，接受股神經或者是腰後叢刺激導管，導管深度分別是通過針尖 5-15cm 或 0-1cm。術後，病人神經周圍注射 0.2%羅呱卡因至少 2 天（背景劑量爲 6mL/hr，每次推注爲 4mL，鎖定時間 30min）。主要研究指標爲平均每天的疼痛評分，用數位等級評分量表（0-10）測定，從手術後早晨 07:30 開始記錄，記錄 24 小時，排除每天兩次的物理治療時間。次要研究指標是包括在物理治療期間的疼痛評分、走動距離、在同樣的 24 小時內鎮痛藥的追加量以及在住院期間對鎮痛的滿意度。

結果：接受股神經輸注阻滯的患者（n=25）與接受腰後叢輸注阻滯的患者(n=22)的疼痛評分平均值（SD）分別爲 3.6（1.8）和 3.5(1.8)，組間差異爲 0.1（95%可信區間爲-0.9 至 1.2，*P*=0.78）。因爲可信區間在-1.6 至 1.6 的範圍之內，我們推論兩種鎮痛方法的效應是相等的。類似地，我們發現次要研究指標在兩種處理方式之間無差異，但有一個例外：股神經置管的患者手術後早晨步行距離的平均值（第 10-第 90 百分位數）爲 2(0-17) m，而腰後叢神經置管的患者爲 11（0-31）m（非參數資料，*P*=0.02）。

結論：在髖關節成形術後，應用刺激性神經周圍導管行連續股神經阻滯是一種可以接受的替代連續腰後叢神經阻滯的鎮痛方式。然而，股神經輸注時早期的下床活動能力受影響。

（黃麗娜 譯 李士通 馬皓琳 校）

BACKGROUND: Hip arthroplasty frequently requires potent postoperative analgesia, often provided with an epidural or posterior lumbar plexus local anesthetic infusion. However, American Society of Regional Anesthesia guidelines now recommend against epidural and continuous posterior lumbar plexus blocks during administration of various perioperative anticoagulants often administered after hip arthroplasty. A continuous femoral nerve block is a possible analgesic alternative, but whether it provides comparable analgesia to a continuous posterior lumbar plexus block after hip arthroplasty remains unclear. We therefore tested the hypothesis that differing the catheter insertion site (femoral versus posterior lumbar plexus) after hip arthroplasty has no impact on postoperative analgesia.

METHODS: Preoperatively, subjects undergoing hip arthroplasty were randomly assigned to receive either a femoral or a posterior lumbar plexus stimulating catheter inserted 5 to 15 cm or 0 to 1 cm past the needle tip, respectively. Postoperatively, patients received perineural ropivacaine, 0.2% (basal 6 mL/hr, bolus 4 mL, 30-minute lockout) for at least 2 days. The primary end point was the average daily pain scores as measured with a numeric rating scale (0–10) recorded in the 24-hour period beginning at 07:30 the morning after surgery, excluding twice-daily physical therapy sessions. Secondary end points included pain during physical therapy, ambulatory distance, and supplemental

analgesic requirements during the same 24-hour period, as well as satisfaction with analgesia during hospitalization.
RESULTS: The mean (SD) pain scores for subjects receiving a femoral infusion (n = 25) were 3.6 (1.8) versus 3.5 (1.8) for patients receiving a posterior lumbar plexus infusion (n = 22), resulting in a group difference of 0.1 (95% confidence interval −0.9 to 1.2; P = 0.78). Because the confidence interval was within a prespecified −1.6 to 1.6 range, we conclude that the effect of the 2 analgesic techniques on postoperative pain was equivalent. Similarly, we detected no differences between the 2 treatments with respect to the secondary end points, with one exception: subjects with a femoral catheter ambulated a median (10th–90th percentiles) 2 (0–17) m the morning after surgery, in comparison with 11 (0–31) m for subjects with a posterior lumbar plexus catheter (data nonparametric; P = 0.02).
CONCLUSIONS: After hip arthroplasty, a continuous femoral nerve block is an acceptable analgesic alternative to a continuous posterior lumbar plexus block when using a stimulating perineural catheter. However, early ambulatory ability suffers with a femoral infusion.

鞘內注射 Kappa-2 阿片受體激動劑 GR89696 和白介素-10 以協同的相互作用方式減輕骨癌痛

The Intrathecally Administered Kappa-2 Opioid Agonist GR89696 and Interleukin-10 Attenuate Bone Cancer–Induced Pain Through Synergistic Interaction

Woong Mo Kim, MD*, Cheol Won Jeong, MD*, Seong Heon Lee, MD*, Yeo Ok Kim, MD, PhD*, Jin Hua Cui, MD*† and Myung Ha Yoon, MD, PhD*†
From the *Department of Anesthesiology and Pain Medicine, Chonnam National University, Medical School; and †Brain Korea 21 Project, Center for Biomedical Human Resources, Chonnam National University, Medical School, Gwangju, Korea.
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背景：雖然骨癌痛是晚期癌症患者中最具破壞性的症狀之一，但是患者用藥物治療常常無效；因此，需要更加有效的治療措施用於骨癌痛。我們在骨癌痛大鼠模型中評估鞘內注射 GR89696（一種 κ_2 阿片受體激動劑）和白介素（IL）-10 的鎮痛效能及其相互作用。
方法：採用右側脛骨髓內注射大鼠乳腺癌細胞法建立大鼠骨癌痛模型，同時行鞘內置管。模型建立後第十天，鞘內注射 GR89696 和 IL-10 後，用以上-下法測定大鼠對 von Frey 纖維絲引起的機械性刺激的縮足閾值。以等輻射分析法評估這 2 種藥物間的相互作用。
結果：鞘內注射 GR89696 和 IL-10 以劑量依賴性方式，明顯增加癌細胞植入大鼠的縮足閾值，其 50%有效劑量值（95%可信區間）分別爲 50.78 μg (31.80–80.07μg) 和 0.83 μg (0.59–1.15 μg)。等輻射分析法顯示 GR89696 和 IL-10 之間存在協同作用。
結論：鞘內注射 GR89696 和 IL-10 減輕骨癌痛，這 2 種藥物在脊髓中存在協同作用。這些結果提示 κ_2 阿片受體激動劑和 IL-10 非常可能成爲治療骨癌相關疼痛的一種新方法。

(江繼宏 譯 馬皓琳 李士通 校）

BACKGROUND: Although bone cancer–related pain is one of the most disruptive symptoms in patients with advanced cancer, patients are often refractory to pharmacological treatments; thus, more effective treatments for bone cancer pain are needed. We evaluated the analgesic efficacy of and interaction between intrathecal GR89696, a κ_2-opioid receptor agonist, and interleukin (IL)-10 in a rat model of bone cancer pain.

METHODS: The rat model of bone cancer pain was produced by right tibia intramedullary injection of rat breast cancer cells, and an intrathecal catheterization was performed. Ten days later, a paw-withdrawal threshold to mechanical stimulus by von Frey hairs was measured using the up-down method, after intrathecal administration of GR89696 and IL-10. The interaction between the 2 drugs was also evaluated using an isobolographic analysis.

RESULTS: Intrathecal GR89696 and IL-10 significantly increased the paw withdrawal threshold of the cancer cell–implanted rat, in a dose-dependent manner, with 50% effective dose values (95% confidence interval) of 50.78 μg (31.80–80.07μg) and 0.83 μg (0.59–1.15 μg), respectively. Isobolographic analysis revealed a synergistic interaction between intrathecal GR89696 and IL-10.

CONCLUSIONS: Intrathecally administered GR89696 and IL-10 attenuated bone cancer–induced pain, and the 2 drugs interacted synergistically in the spinal cord. These results raise the intriguing possibility of κ_2-opioid receptor agonists and IL-10 as a new therapeutic approach for the management of bone cancer–associated pain.

在超聲引導下的斜角肌間溝臂叢神經阻滯中 0.75%羅呱卡因的最小有效麻醉容量

The Minimum Effective Anesthetic Volume of 0.75% Ropivacaine in Ultrasound-Guided Interscalene Brachial Plexus Block

Philippe Gautier, MD*, Catherine Vandepitte, MD*, Caroline Ramquet, MD*, Mieke DeCoopman, MD*, Daquan Xu, MD† and Admir Hadzic, MD†

From the *Department of Anesthesiology, Clinique Ste Anne-St, Remi, Brussels, Belgium; and †Department of Anesthesiology, St. Luke's–Roosevelt Hospital Center, University Hospital of Columbia University, College of Physicians and Surgeons, New York, New York.

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背景：應用超聲監測進針部位和局麻藥的擴散，可減少麻醉周圍神經阻滯所需的局麻藥容量。本研究旨在研究用斜角肌間溝臂叢神經阻滯完成的手術麻醉所需的最小容量。

方法：入選 ASA 分級 I–III 級的患者 20 名，年齡 18 到 75 歲，擇期在斜角肌間溝臂叢神經阻滯下行肩部手術。用以前已驗證的遞增/遞減法，我們根據先前的阻滯結果決定相鄰患者 0.75%羅呱卡因的注射容量。起始容量爲 15mL（分 3 次注射，每個神經幹各 5mL）；如果阻滯失敗，則容量增加 1mL；如果阻滯成功，劑量減少 1mL。當達到次要終止規則時，即連續 10 次以 5ml 的 0.75%羅呱卡因阻滯成功，則試驗終止。臂叢神經阻滯達到的成功的手術麻醉定義爲出現足夠的運動阻滯

（運動評分≤2，總計 0 到 4 分），注射 30 分鐘內溫覺及針刺覺消失，且完成手術無須全麻。由通過詢問患者以記錄痛覺首次出現的時間評估感覺阻滯的持續時間。

結果：在我們的研究驗條件下，用 0.75%羅呱卡因 5mL 或臂叢的三個神經幹（上、中、下）各約 1.7mL 均可成功完成肩關節鏡手術的麻醉。研究在連續 10 次以 5mL 局麻藥成功阻滯後終止（100%，95%可信區間[CI] 74.1%–100%）。整組的感覺阻滯起效時間中位數（範圍）爲 5（5-20）分鐘，二頭肌時間中位數（範圍）爲 7.5（5-15）分鐘，外展運動阻滯的起效時間中位數（範圍）爲 10（5-15）分鐘。阻滯持續時間中位數（範圍）爲 9.9（5-19）小時，平均（標準差）阻滯實施時間爲 8.0 ± 3.2 分鐘。平均鎮痛持續時間爲 9.9 ± 3.7 小時。鎮痛持續時間與局麻藥的容量無關（$r = 0.05$, $P = 0.83$）。

結論：本研究中所有患者均成功以 5mL 局麻藥實施了手術阻滯。然而，可信區間的下限（據一例失敗假設計算而得）包含 25%失敗率的可能性；故使用類似的用於劑量大於 5mL 的終止規則的研究，也是正當的。

（陳彬彬譯 馬皓琳 李士通校）

BACKGROUND: The use of ultrasound to monitor needle placement and spread of local anesthetics (LA) has allowed reductions in the volume of LA required to anesthetize peripheral nerves. In the current study we investigated the minimal volume necessary to accomplish surgical anesthesia with interscalene brachial plexus block.

METHODS: Twenty ASA physical status I–III patients, ages 18 to 75 years and scheduled for shoulder surgery under interscalene brachial plexus block, were enrolled. Using a previously validated step-up/step-down method, we determined the injection volume of 0.75% ropivacaine used for consecutive patients by the outcome of the preceding block. The starting volume was 15 mL (3 injections of 5 mL per each trunk); in the case of block failure, the volume was increased by 1 mL, whereas after successful block, the volume was reduced by 1 mL. The study was stopped upon achieving the secondary stopping rule of 10 consecutive successful interscalane blocks using 5 mL of ropivacaine 0.75%. Successful surgical anesthesia with the brachial plexus block was defined as presence of adequate motor block (motor score of ≤2 on 0 to 4 scale), absent sensation to cold and pinprick sensation within 30 minutes of injection, and absence of the need for general anesthesia for completion of surgery. Duration of sensory blockade was assessed by asking the patient to record the time of first pain sensation.

RESULTS: Under our study conditions, successful surgical anesthesia for arthroscopic shoulder surgery can be achieved with 5 mL of 0.75% ropivacaine, or approximately 1.7 mL per each of the 3 trunks of the brachial plexus (superior, middle, and inferior). The study was stopped after 10 consecutive successful blocks with 5 mL of LA (100%, 95% confidence interval [CI]: 74.1%–100%). For the group as a whole, the median (range) sensory block onset time was 5 (5–20) minutes, the median (range) motor block for the biceps was 7.5 (5–15) minutes, and for abduction 10 (5–15) minutes. The median (range) block duration was 9.9 (5–19) hours, and the mean (SD) block performance time was 8.0 ± 3.2 minutes. Mean duration of analgesia was 9.9 ± 3.7 hours. Duration of analgesia was not associated with volume of LA ($r = 0.05$, $P = 0.83$).

CONCLUSIONS: All patients in our study had successful surgical blocks with 5 mL of LA. However, the lower limit of the CI (calculated on the assumption of a single failure) does include the possibility of a 25% failure rate; thus studies using similar stopping rules for doses higher than 5 mL are nonetheless warranted.