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全麻復蘇期間靜脈注射葡萄糖與術後噁心嘔吐的關係：一項隨機對照試驗
The Relationship of Intravenous Dextrose Administration During Emergence from Anesthesia to Postoperative Nausea and Vomiting: A Randomized Controlled Trial

後背景：儘管預防性使用止吐藥，術後噁心嘔吐(PONV)仍有可能發生，並且與意外入院、費用增加以及患者不滿相關。以往的研究發現靜脈注射(IV)葡萄糖對PONV有不同影響。本研究試圖確定全麻復蘇期間靜脈注射葡萄糖與PONV的關係。

方法：這是一項前瞻性、隨機、雙盲、對照試驗。預定接受婦科、泌尿科或乳腺日間手術，ASA分級為I級和II級的非糖尿病成年女性患者，隨機分配接受250ml乳酸林格氏液(P組: n=75)或加入5%葡萄糖的乳酸林格氏液輸注(D組, n=87)，她們在手術結束時開始輸液，持續2h。在進入手術室前，在手術室內接受試驗液體輸注的前一刻及在麻醉恢復室內輸液完成時分別用快速血糖儀測量血糖。在抵達恢復室前不給予止吐藥。記錄抵達恢復室0min, 30min, 60min, 120min以及24h的PONV評分，並記錄其他用藥。

結果：分析來源於162名有正常基線血糖患者的資料。這兩組患者的人口統計學、PONV史或吸煙史沒有明顯差異。在麻醉結束後的第一個2h內，兩組患者的PONV發生率沒有明顯差異(D組為52.9%，P組為46.7%；差值6.2%；95%CI值為-9.2%到21.6%；P=0.43)。在D組與P組中，麻醉後2h內發生PONV的患者在恢復期間嚴重度評分>1分的程度相似(分別為1.5分、1.0分；差值為0；95%CI值為0%到0%；P=0.93)；兩組在抵達恢復室30min內PONV的發生率相似(分別為65.2%，57.1%；差值8.1%；95%CI值為-13.1%到28.8%；P=0.46)；兩組超過1個劑量的止吐藥使用率相
似（分別為：56.5%，62.9%；差值 6.3%；95%CI 值為-26.9%到 15.1%；P=0.65）；兩組使用超過一種止吐藥的比例相似（分別為：50.0%，54.3%；差值 4.3%；95%CI 值為-25.5%到 17.4%；P=0.82）。

結論：在麻醉復蘇期間靜脈給予葡萄糖與麻醉結束後2h 內 PONV 發生率的差異（超過20%）或嚴重程度與 PONV 並不相關。PONV 與靜脈注射葡萄糖的藥物差異以及注射時間之間的關係尚不清楚，可能需要進一步的研究。

（王苑譯 陳傑校）

BACKGROUND: Postoperative nausea and vomiting (PONV) may occur despite antiemetic prophylaxis and is associated with unanticipated hospital admission, financial impact, and patient dissatisfaction. Previous studies have shown variable impact of IV dextrose on PONV. We sought to determine the relationship of IV dextrose administered during emergence from anesthesia to PONV.

METHODS: This was a prospective, double-blind randomized placebo-controlled trial. Adult female ASA physical status I and II nondiabetic patients scheduled for outpatient gynecologic, urologic, or breast surgery were randomly assigned to infusion of 250 mL lactated Ringer’s solution (group P; n = 75) or dextrose 5% in lactated Ringer’s solution (group D; n = 87) over 2 hours beginning with surgical closing. Blood glucose was determined using a point-of-care device before transfer to the operating room, in the operating room immediately before study fluid infusion, and in the recovery room after study fluid infusion. No antiemetics were given before arrival in the recovery room. PONV scores were recorded at 0, 30, 60, and 120 minutes and 24 hours after arrival in the recovery room. Medication administration was recorded.

RESULTS: Data from 162 patients with normal baseline blood glucose were analyzed. There were no significant intergroup differences in demographics, history of PONV, or tobacco use. There was no significant intergroup difference in PONV during the first 2 hours after anesthesia (group D 52.9% vs group P 46.7%; difference, 6.2%; 95% confidence interval [CI], −9.2% to 21.6%; P = 0.43). Patients in groups D or P who developed PONV within 2 hours of anesthesia had similar number of severity scores ≥1 during recovery stay (1.5 vs 1.0; difference, 0; 95% CI, 0%–0%; P = 0.93); and similar proportions of: PONV onset within 30 minutes of recovery room arrival (65.2% vs 57.1%; difference, 8.1%; 95% CI, −13.1% to 28.8%; P = 0.46); more than 1 dose of antiemetic medication (56.5% vs 62.9%; difference, 6.3%; 95% CI, −26.9% to 15.1%; P= 0.65); or more than 1 class of antiemetic medication (50.0% vs 54.3%; difference, 4.3%; 95% CI, −25.5% to 17.4%; P = 0.82).

CONCLUSIONS: The administration of dextrose during emergence from anesthesia was not associated with a difference in the incidence of PONV exceeding 20% or in the severity of PONV in the first 2 hours after anesthesia. The relationship between PONV and the optimal dose and timing of IV dextrose administration remains unclear and may warrant further study.

技術交流：異丙酚在聚苯乙烯統胞培養皿中的穩定性

Technical Communication: Stability of Propofol in Polystyrene-Based Tissue Culture Plates

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據報導，異丙酚在玻璃中有高穩定性並且在聚氯乙烯醫學塑膠製品中有長達 24h 的相對高的穩定性。近期一些發表的文章觀察了異丙酚對培養皿中細胞和組織的影響。許多細胞培養皿由聚丙烯乙烯構成的，但很難找到有關暴露於聚丙烯乙烯中異丙酚穩定性的相關資訊。發現暴露於盛有細胞培養基的玻璃制器皿的異丙酚長達 24h 基本沒有變化，而暴露於 96 孔聚丙烯乙烯細胞培養皿中時出現了大量的藥物損失。於第一個小時藥物減少最快且一直持續 24h。用於與異丙酚一起進行試驗的細胞和組織培養的器皿類型可通過增加達到效應所需的劑量來改變結果。

Propofol has been reported to have high stability in glass and relatively high stability up to 24 hours in polyvinyl chloride-based medical plastics. Recent publications have observed the effects of propofol on cells and tissues grown in culture. Many cell culture plastics are formulated from polystyrene but we could find little information on the stability of propofol exposed to these products. We observed very little change in the concentration of propofol diluted in cell culture medium over 24 hours when exposed to glass, but substantial loss of the drug when exposed to 96-well polystyrene cell culture plates. This decrease was most rapid in the first hour but continued until 24 hours. The type of plastic used in cell and tissue culture experiments with propofol may influence the results by increasing the apparent dose required to see an effect.

單肺通氣時全心舒張末容量和血管外肺水指數的評價：經肺熱稀釋技術是否可用？
An Assessment of Global End-Diastolic Volume and Extravascular Lung Water Index During One-Lung Ventilation: Is Transpulmonary Thermodilution Usable?

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背景：使用經肺熱稀釋技術得到的熱稀釋曲線是計算全心舒張末容量指數（GEDI）和血管外肺水指數（EVLWI）的基礎。此方法是否受單肺通氣的影響，直至現今尚未明確。因此，本研究目的為評估單肺通氣對熱稀釋曲線和對 GEDI 及 EVLWI 評估的影響。

方法：23 頭豬使用經肺熱稀釋技術來評估平均通過時間、下坡時間和血溫差（ΔTb）。通過肺動脈血流探頭（PAFP）測得“金標準”的心輸出量並用於 GEDIPAFP 和 EVLWIPAFP 的計算。分別測量正常血容量狀態下雙肺通氣時（M1），單肺通氣 15min 後（M2）和低血容量狀態（放血 20ml/kg）下雙肺通氣時（M3）和單肺通氣 15 分鐘後（M4）的參數。

結果：正常血容量和低血容量狀態下，ΔTb 的增加和平均通過時間及下坡時間的減少（所有 P<0.04）證明了熱稀釋曲線的形態明顯受單肺通氣影響。正常血容量（M1: 459.9 ± 67.5 mL/m2; M2: 397.0 ± 54.8 mL/m2; P = 0.001）和低血容量狀態下（M3: 300.6 ± 40.9 mL/m2; M4: 275.2 ± 37.6 mL/m2; P = 0.03）GEDIPAFP 在單肺通氣後有明顯降低。同樣正常血容量（M1: 9.0 [7.3, 10.1] mL/kg; M2: 7.4 [5.8, 8.3] mL/kg; P = 0.01）和低血容量狀態下（M3: 7.4 [6.3, 9.7] mL/kg; M4: 5.8 [5.2, 7.4] mL/kg; P = 0.0009）EVLWIPAFP 在單肺通氣後也有明顯降低。

結論：熱稀釋曲線形態和 GEDI 及 EVLWI 的評估明顯受到單肺通氣的影響。
BACKGROUND: The thermodilution curve assessed by transpulmonary thermodilution is the basis for calculation of global end-diastolic volume index (GEDI) and extravascular lung water index (EVLWI). Until now, it was unclear whether the method is affected by 1-lung ventilation. Therefore, aim of our study was to evaluate the impact of 1-lung ventilation on the thermodilution curve and assessment of GEDI and EVLWI.

METHODS: In 23 pigs, mean transit time, down slope time, and difference in blood temperature (ΔTb) were assessed by transpulmonary thermodilution. “Gold standard” cardiac output was measured by pulmonary artery flowprobe (PAFP) and used for GEDIPAFP and EVLWIPAFP calculations. Measurements were performed during normovolemia during double-lung ventilation (M1), 15 minutes after 1-lung ventilation (M2) and during hypovolemia (blood withdrawal 20 mL/kg) during double-lung ventilation (M3) and again 15 minutes after 1-lung ventilation (M4).

RESULTS: Configuration of the thermodilution curve was significantly affected by 1-lung ventilation demonstrated by an increase in ΔTb and a decrease in mean transit time and down slope time (all P < 0.04) during normovolemia and hypovolemia. GEDIPAFP was lower after 1-lung ventilation during normovolemia (M1: 459.9 ± 67.5 mL/m²; M2: 397.0 ± 54.8 mL/m²; P = 0.001) and hypovolemia (M3: 300.6 ± 40.9 mL/m²; M4: 275.2 ± 37.6 mL/m²; P = 0.03). EVLWIPAFP also decreased after 1-lung ventilation in normovolemia (M1: 9.0 [7.3, 10.1] mL/kg; M2: 7.4 [5.8, 8.3] mL/kg; P = 0.01) and hypovolemia (M3: 7.4 [6.3, 9.7] mL/kg; M4: 5.8 [5.2, 7.4]) mL/kg; P = 0.0009).

CONCLUSION: Configuration of the thermodilution curve and therefore assessment of GEDI and EVLWI are significantly affected by 1-lung ventilation.
BACKGROUND: If full expiration during subclavian venous cannulation increases the distance between the subclavian vein (SCV) and the pleura or increases the diameter of the vein, it might decrease the incidence of pneumothorax and/or increase the success rate of venous cannulation. In this study, we evaluated the effect of full expiration on the distance from the SCV to the pleura and on the cross-sectional area (CSA) of the SCV in spontaneously breathing adults.

METHODS: The distance from the inferior border of the right SCV and the pleura (SCVinfin-Pleura distance), the distance from the center of the vein to the pleura (SCVcen-Pleura distance), and the CSA of the vein were measured using ultrasound at the end of inspiration and at the end of full expiration in 20 adults placed in the horizontal position. The subjects were then placed in 15° Trendelenburg tilt, and the distances and the CSA were measured again.

RESULTS: The SCVcen-Pleura distances were changed minimally in the horizontal position (0.005 cm, 95% confidence interval [CI] −0.04 to 0.05) and in the Trendelenburg position (0.02 cm, 95% CI −0.005 to 0.05). The SCVinfin-Pleura distances decreased at the end of full expiration in the horizontal position, but the change was only 0.07 cm (95% CI 0.03–0.11; P = 0.003). In the Trendelenburg position, those distances remained unchanged (0.02 cm, 95% CI −0.01 to 0.06). Compared with endinspiration, the SCV CSA after full expiration increased by at least 14% in both the horizontal position and the Trendelenburg position.

CONCLUSIONS: The distance from the SCV to the pleura did not change after full expiration. However, this simple technique can still be considered during placement of subclavian catheters in spontaneously breathing patients, because it significantly enlarges the CSA of the SCV.

術後殘餘肌松與不良臨床預後的相關性
Postoperative Residual Neuromuscular Blockade Is Associated with Impaired Clinical Recovery
Glenn S. Murphy, MD, Joseph W. Szokol, MD, Michael J. Avram, PhD, Steven B. Greenberg, MD, Torin Shear, MD, Jeffery S. Vender, MD, Jayla Gray, BA and Elizabeth Landry, BA
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背景：此項調查試圖確定在麻醉後監護室中，神經肌肉阻滯殘餘作用的客觀證據（四個成串刺激[TOF]比值<0.9）與主觀肌無力症狀的類型、發生率和嚴重程度之間的聯繫。

方法：在進入PACU時，使用肌肉加速度描計法將149例患者的TOF比值進行量化。患者被分為兩組：TOF<0.9組(n=48)和TOF≥0.9（對照）組(n=101)。使用一項標準化測試來確定從進入PACU時和之後20min, 40min, 60min是否存在肌無力的16種症狀和11種跡象。

結果：從進入PACU (TOF <0.9 組 vs 對照組的肌無力症狀中位數[區間]：7 [3-6] vs 2 [0–11]；差值=5，99%可信區間差值=4-6)到之後60min (TOF <0.9 組 vs 對照組：2 [0–12] vs
BACKGROUND: In this investigation, we sought to determine the association between objective evidence of residual neuromuscular blockade (train-of-four [TOF] ratio <0.9) and the type, incidence, and severity of subjective symptoms of muscle weakness in the postanesthesia care unit (PACU).

METHODS: TOF ratios of 149 patients were quantified with acceleromyography on arrival to the PACU. Patients were stratified into 2 cohorts: a TOF <0.9 group (n = 48) or a TOF ≥0.9 (control) group (n = 101). A standardized examination determined the presence or absence of 16 symptoms and 11 signs of muscle weakness on arrival to the PACU and 20, 40, and 60 minutes after admission.

RESULTS: The incidence of symptoms of muscle weakness was significantly higher in the TOF <0.9 group at all times (P < 0.001), as was the median (range) number of symptoms from PACU arrival (7 [3–6] TOF <0.9 group vs 2 [0–11] control group; difference 5, 99% confidence interval of the difference 4–6) until 60 minutes after admission (2 [0–12] TOF <0.9 group vs 0 [0–11] control group; difference 2, 99% confidence interval of the difference 1–2) (all P < 0.0001).

CONCLUSION: The incidence and severity of symptoms of muscle weakness were increased in the PACU in patients with a TOF <0.9.

A Retrospective Identification of Gastroesophageal Reflux Disease as a New Risk Factor for Surgical Site Infection in Cerebral Palsy Patients After Spine Surgery

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Anesth Analg July 2013 117:162-168

背景：神經肌肉性脊柱側彎是造成脊柱融合術後手術部位感染（SSI）的一項已知危險因素，據報導感染率高達11.2%。儘管某些感染因素如抗生素使用時間掌握之前也被提及，而本研究目的為驗證合併神經肌肉性脊柱側彎的腦癱（CP）患者發生SSI的內在危險因素。本研究假設脊柱融合術後出現SSI的CP患者與那些發生院內感染的患者有著類似的風險特徵。
BACKGROUND: Neuromuscular scoliosis is a known risk factor for surgical site infection (SSI) after spinal fusion, with reported infection rates as high as 11.2%. Although risk factors such as antibiotic timing have been previously addressed, our objective was to identify intrinsic risk factors for SSI in cerebral palsy (CP) patients with neuromuscular scoliosis. We hypothesized that CP patients who develop SSI after spine fusion would have a risk profile similar to those who develop nosocomial infection.

METHODS: We retrospectively analyzed records from patients with CP who developed infections after spinal fusion from January 1998 until July 2008, who were identified by our Infection Control Officer using National Nosocomial Infection Surveillance System criteria (N = 34). Demographically and procedurally matched controls without infection were identified from our spine database (N = 37). We compared these groups for gastroesophageal reflux disease (GERD), use of gastric acid inhibitors, presence of preoperative decubitus ulcer, previous infection, and postoperative ventilation. Multivariable logistic regression was then performed to assess the relative contributions of the predictors to “deep infection” and “any infection.”

RESULTS: Of 30 evaluable infected patients, 70% had incisional SSI. Although many of the infections were polymicrobial, the most common pathogens identified were Gram-negative bacilli. Many significant predictors were identified by univariable logistic regression for any infection and deep infection. Multivariable logistic regression found a significant effect only for GERD (odds ratio, 6.4; 95% confidence interval, 1.9–21.3; P = 0.002) for any infection, whereas the effect of therapy with gastric acid inhibitors did not reach statistical significance (odds ratio, 6.1 [95% confidence interval, 0.84–44.6]; P = 0.07). No significant interaction between the 2 factors was detected. Among our controls and infected patients altogether, 46.3% had GERD.

CONCLUSIONS: We show that GERD increases the risk for infection in CP patients after spine fusion. Prospective multicenter studies are necessary to further validate the predictive value of this risk factor.

特約撰稿：口頭oman重建手術的氣道管理
Special Article: Airway Management in Reconstructive Surgery for Noma (Cancrum Oris)
Wound (Noma) is a disease of poverty and malnutrition, which predominantly affects children younger than 10 years in developing countries. Although the majority of sufferers die of sepsis at the time of the initial infection, or of subsequent starvation due to severe trismus and an inability to eat, a small minority of patients survive and require reconstructive surgery for severe facial scarring and deformity. These patients present significant problems to the anesthesiologist with regard to airway management. We present a series of 26 patients undergoing primary and subsequent reconstructive surgery, with particular focus on airway management. We show that airway management, while challenging, can be performed safely and successfully by using individualized airway plans but may require advanced techniques and equipment. Traditional tests focusing on the anterior/superior airway are helpful in assessing patients with facial deformity due to noma.

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Anesth Analg July 2013 117:236-251

Background: Modern ultrasound (US) is a technique used to provide anatomical guidance during interventional procedures for chronic pain. This study evaluated the utility of US in interventional pain procedures, focusing on the anterior/superior airway. The study included 26 patients undergoing primary and subsequent reconstructive surgery, with particular focus on airway management.

Methods: The study included 26 patients undergoing primary and subsequent reconstructive surgery, with particular focus on airway management. The study aimed to assess the utility of US in interventional pain procedures, focusing on the anterior/superior airway.

Results: The study showed that airway management, while challenging, can be performed safely and successfully by using individualized airway plans but may require advanced techniques and equipment. Traditional tests focusing on the anterior/superior airway are helpful in assessing patients with facial deformity due to noma.

Conclusion: Ultrasound guidance is advantageous for interventional pain management, particularly in the context of reconstructive surgery for facial deformity due to noma.
結果：研究結果表明超聲引導技術和神經刺激法及解剖標誌法相比，通過超聲引導法治療慢性疼痛，有著非劣或更優的可操作性和安全相關預後。

結論：目前缺乏足夠的資料來支持超聲引導治療短期和長期慢性疼痛的有效性。

（孫曉瓊 譯 陳傑 校）

BACKGROUND: Modern ultrasound (US) is an attractive alternative to anatomical landmark-, nerve stimulation-, and fluoroscopic-guided techniques for interventional procedures performed to treat chronic pain syndromes.

METHODS: In this review, we evaluated the effects of US guidance compared with traditional guidance techniques on performance, efficacy, and safety outcomes for interventional chronic pain procedures. We identified 46 studies, including 41 case series and 5 randomized trials of intermediate-to-good quality that investigated the use of US guidance for a diverse variety of chronic pain procedures.

RESULTS: Our results suggest that US guidance can match or improve performance- and safety-related outcomes compared with many anatomic landmark-, nerve stimulation-, and fluoroscopic-guided techniques for treating chronic pain.

CONCLUSIONS: There are presently insufficient data to support improved efficacy with procedures performed with US guidance for relieving both short- and long-term chronic pain.

超聲引導技術和解剖定位技術行隱神經阻滯的比較：一項前瞻、對照、雙盲、交叉試驗
A Comparison of Ultrasound-Guided and Landmark-Based Approaches to Saphenous Nerve Blockade: A Prospective, Controlled, Blinded, Crossover Trial
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背景：隱神經阻滯通常用於膝蓋以下的手術。採用不同的方法，成功率的變化可以在33%至88%之間。此項前瞻性研究對2種超聲引導技術，即改進的股內側隱神經阻滯和股骨周圍隱神經阻滯，與膝部以下區域阻滯技術進行比較。

方法：在此項單盲，交叉，前瞻性試驗中，20名成年志願者接受用3種不同的隱神經阻滯方法。阻滯成功的主要終點為在隱神經分佈的遠端三分之二區域產生感覺消失。次要終點包括阻滯時間，感覺消失時間，阻滯過程中的疼痛，以及運動無力。

結果：和膝以下區域阻滯30%的成功率相比，改良的股內側阻滯和股骨周圍阻滯技術兩者的成功率更高（80%，分別50%的置信區間[C]的差異，23%—77%，P = 0.009，和100%，70%的置信區間的差異，41%–91%，P < 0.001）。但超聲引導的股骨周圍神經阻滯技術和改良股內側神經阻滯技術之間並沒有顯著的差異（置信區間的差異為20%，-7%到49%，p=0.125）。除了與膝部以下區域阻滯相比，股骨周圍技術的操作時間更短（P=0.07）；其他測量參數也無統計學差異。

結論：此項前瞻性研究證明超聲引導下膝部以上隱神經神經阻滯與膝部以下區域阻滯相比，有更高的成功率且操作時間更短。

（馬霄雯 譯 陳傑 校）
BACKGROUND: Blockade of the saphenous nerve is often used for surgeries below the knee. Depending on the approach, success rates vary widely ranging from 33% to 88%. In this prospective volunteer study, we compared 2 ultrasound-guided techniques, the modified vastus medialis and perifemoral saphenous nerve block with a below the knee field block.

METHODS: Twenty volunteer adults, in a single-blinded, crossover, prospective trial underwent 3 different saphenous nerve blocks. The primary end point of block success was loss of sensation in the distal two-thirds distribution of the saphenous nerve. Secondary variables included time to perform the block, time to sensory loss, pain during block, and motor weakness.

RESULTS: Compared with the below the knee field block success rate (30%), both the modified vastus medialis and perifemoral techniques had significantly higher success rates (80%, difference 50% with confidence interval [CI], 23%–77%, P = 0.009, and 100%, difference 70% with CI, 41%–91%, P < 0.001, respectively). However, the difference when comparing the perifemoral ultrasound technique against the modified vastus medialis ultrasound technique did not show significance (difference 20% with CI, −7% to 49%, P = 0.125). Also, no statistical differences were found with the other variables measured, except the perifemoral technique showed faster block performance times than below the knee field block (P = 0.007).

CONCLUSION: In our prospective study, we have demonstrated that ultrasound-guided above the knee saphenous nerve blocks have higher success rates than a below the knee field block and are easily performed in a short amount of time.

使用旋轉式血栓彈力儀分析無血小板血漿的最大血凝塊穩定性受不同實驗方法影響
Thromboelastometric Maximum Clot Firmness in Platelet-Free Plasma Is Influenced by the Assay Used
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Anesth Analg July 2013 117:23-29

背景：粘彈性測試是測定外源性活化途徑的凝血塊在血小板抑制情況下的彈性，如血栓彈力圖(TEG)或旋轉式血栓彈力儀(ROTEM)對功能性纖維蛋白原聚合分析(FFPAs)。尚沒有研究顯示除了受血小板抑制的影響外，FFPAs的組成對纖維蛋白聚合是否有影響。

方法：我們使用多種不含血小板的血漿製品，並比較了外源性活化途徑 ROTEM 分析 (EXTEM) 和 3 種 FFPAs：細胞鬆弛素 D 修正的血栓彈力測定(FIBTEM)，FIBTEM+和功能性纖維蛋白原測試(FFTEG)。我們使用了校準血漿(LL 公司和西門子)、混合新鮮冰凍血漿 (octaplas)和取自一名健康志願者的鮮新製備的不含血小板的血漿。EXTEM 和所有 FFPAs 均在 ROTEM 儀器上平行測定。

結果：所有血漿製品的最大血凝塊穩定性(MCF)值中位數(四分位距)為：EXTEM 組 20.5mm (17.25-22.0mm)；FIBTEM 組 23.0mm(18.5-24.0mm)；FIBTEM+組 23.0mm(18.25-24.75mm)；FFTEG 組 18.0mm(16.0-19.0mm)。與 EXTEM 組相比，FIBTEM 組和 FIBTEM+組 MCF 值升高而 FFTEG 組 MCF 值降低(p<0.001)。進一步使用不含血小板的血漿實驗結果顯示，FFPAs 組中含有的血小板抑制劑(細胞鬆弛素 D 或血小板糖蛋白 IIb/IIa...
BACKGROUND: Viscoelastic tests such as functional fibrinogen polymerization assays (FFPAs) in thrombelastography (TEG®) or thromboelastometry (ROTEM®) measure the elasticity of extrinsically activated clotting under conditions of platelet inhibition. There are no reports on whether components of the FFPAs have any effects on fibrin polymerization, aside from the effects of platelet inhibition.

METHODS: Using various platelet-free plasma (PFP) preparations, we compared the extrinsically activated EXTEM thromboelastometric assay with 3 FFPAs: FIBTEM, FIBTEM PLUS, and the Functional Fibrinogen Test® (FFTEG). These FFPAs activate coagulation extrinsically but additionally inhibit platelet function. We used calibration plasma (Instrumentation Laboratory and Siemens), pooled fresh-frozen plasma (Octaplas) and freshly prepared PFP from a healthy volunteer. EXTEM and all FFPAs were run in parallel on a ROTEM device.

RESULTS: Median (interquartile range) maximum clot firmness (MCF) values for all plasma preparations were: 20.5 mm (17.25–22.0 mm) in EXTEM, 23.0 mm (18.5–24.0 mm) in FIBTEM, 23.0 mm (18.25–24.75 mm) in FIBTEM PLUS, and 18.0 mm (16.0–19.0 mm) in FFTEG. Compared with EXTEM, FIBTEM and FIBTEM PLUS (P< 0.01) showed increased MCF values whereas FFTEG (P < 0.001) showed decreased MCF values. Further experiments in PFP showed that the platelet inhibitors used in the FFPAs (cytochalasin D or the glycoprotein-IIb/IIIa inhibitor abciximab) were not causing these alterations in MCF. However, reducing the activating tissue factor concentration (by diluting the extrinsic assay) decreased the MCF.

CONCLUSIONS: We speculate that FIBTEM and FIBTEM PLUS may contain stabilizing agents that enhance fibrin polymerization whereas FFTEG might contain less tissue factor than the ROTEM assays.

Mechanism of autoinduction of methadone N-demethylation in human hepatocytes.
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Anesth Analg July 2013 117:52-60

背景: 美沙酮的代謝和清除機制在個體與個體間以及個體內都有相當大的差異。由於美沙酮隨著時間的期前的代謝確落入受相當大的挑戰。減管美沙酮的 N 脫甲基化在體外由細胞色素酶 P4502B6(CYP2B6)以及 CYP3A4 誘導，並由 CYP2B6 活化清除，它的自身誘導機制並未完全明確。在本研究中，研究者利 用人類肝細胞明確美沙酮自身誘導的機制。
方法：將新鮮的人體肝細胞暴露於 0.1 至 10μM 濃度的美沙酮 72 小時後，進行細胞清洗並評估美沙酮的 N 脫甲基化。同時測量 CYP2B6，CYP3A4，以及 CYP3A5 信使 RNA
BACKGROUND: There is considerable interindividual and intraindividual variability in methadone metabolism and clearance. Methadone dosing is particularly challenging during initiation of therapy, because of time-dependent increases in hepatic clearance (autoinduction). Although methadone N-demethylation is catalyzed in vitro by cytochrome P4502B6 (CYP2B6) and CYP3A4, and clearance in vivo depends on CYP2B6, mechanism(s) of autoinduction are incompletely understood. In this investigation, we determined mechanism(s) of methadone autoinduction using human hepatocytes.

METHODS: Fresh human hepatocytes were exposed to 0.1 to 10 µM methadone for 72 hours. Cells were washed and methadone N-demethylation assessed. CYP2B6, CYP3A4, and CYP3A5 messenger RNA (mRNA), protein expression (by gel-free high-performance liquid chromatography mass spectrometry) and catalytic activity (bupropion hydroxylation and alfentanil dealkylation for CYP2B6 and CYP3A4/5, respectively) were measured. Mechanisms of CYP induction were characterized using pregnane X receptor and constitutive androstane receptor reporter gene assays.

RESULTS: Methadone (10 µM) increased methadone N-demethylation 2-fold, CYP2B6 and CYP3A4 mRNA 3-fold, and protein expression 2-fold. CYP3A5 mRNA was unchanged. CYP2B6 and CYP3A4/5 activities increased 2-fold. Induction by methadone enantiomers (R-methadone versus S-methadone) did not differ. Induction was relatively weak compared with maximum induction by phenobarbital and rifampin. Lower methadone concentrations had smaller effects. Methadone was an agonist for the pregnane X receptor but not the constitutive androstane receptor.

CONCLUSIONS: Methadone caused concentration-dependent autoinduction of methadone N-demethylation in human hepatocytes, related to induction of CYP2B6 and CYP3A4 mRNA expression, protein expression, and catalytic activity. Induction was related to pregnane X receptor but not constitutive androstane receptor activation. These in vitro findings provide mechanistic insights into clinical autoinduction of methadone metabolism and clearance.

連續無創動脈血壓在經導管主動脈瓣置換術中快速心室起搏時的準確度和靈敏度

The accuracy and responsiveness of continuous noninvasive arterial pressure during rapid ventricular pacing for transcatheter aortic valve replacement.

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BACKGROUND: The accuracy of measurement of the continuous noninvasive arterial blood pressure (CNAP) technique is unknown during sudden cardiocirculatory arrest.

METHODS: In 33 patients undergoing elective transfemoral aortic valve implantation procedures under analgesic sedation, invasive arterial blood pressure (IAP) was compared with a CNAP device during episodes of severe hypotension (functional cardiocirculatory arrests by rapid pacing) and the remaining time without severe hypotension. Systolic, diastolic, and mean pairs of blood pressure measurements were extracted for both groups and were analyzed by Bland-Altman plots. The responsiveness of the CNAP technique was assessed in the various phases of severe hypotension concerning time and amplitude of changes.

RESULTS: Overall CNAP accuracy (bias), calculated by subtracting IAP from CNAP, was -6.3 ± 18.9, 7.4 ± 10.5, and 4.0 ± 11.3 mm Hg (mean ± SD, systolic, diastolic, and mean). Bias increased during episodes of severe hypotension to 11.8 ± 14.5, 13.8 ± 12.4, and 12.9 ± 12.4 mm Hg. The percentage of agreements (95% confidence interval) between the blood pressure pairs with a difference ≤15 mm Hg was 58.5% (57.9-58.6), 75.8% (75.5-76.0), and 82.2% (81.9-82.4); during rapid pacing, 56.4% (54.2-58.9; P = 0.71), 53.2%* (51.1-56.0), and 57.4%* (56.3-59.1; *P < 0.001). The responsiveness of mean CNAP and mean IAP did not differ significantly during the various phases of rapid pacing.

CONCLUSIONS: The stand-alone CNAP monitor (model 500at, software V3.5) accurately and rapidly measures the changes of blood pressure that occur during sudden development of cardiocirculatory arrest and recovery to baseline blood pressures. CNAP monitors the duration of the arrest.

Special article: retained guidewires after intraoperative placement of central venous catheters.
Guidewire retention is a rare complication of central venous catheter placement, and has been related to operator fatigue, inexperience, and inattention, and inadequate supervision of trainees. The true incidence of guidewire loss after intraoperative placement of central venous catheters is unknown. We report 4 cases of guidewire loss after central venous access procedures performed by anesthesia providers in the operating room. Worsening of patients' clinical condition during catheter placement and complex procedures necessitating more than one guidewire insertion are recurring scenarios in cases involving guidewire loss. Over 6 years at our institution, intraoperative wire loss occurred at a rate of 1:3291 procedures (95% confidence interval of 1/10,000 to 8/10,000).

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Anesth Analg July 2013 117:126-132

Background: The effects of advanced airway devices on cervical spinal alignment are not well defined.

Methods: A prospective, randomized, within-subjects study was performed. Spinal models were created using cadavers. Models were divided into four groups: a) Airtraq laryngoscope; b) fiberoptic bronchoscope; c) Intubating laryngeal mask; and d) Macintosh blade. The models were then subjected to cervical spine flexion and extension movements. The angle of cervical spine alignment was measured using electronic goniometers.

Results: In all groups, the Airtraq laryngoscope significantly decreased the degree of cervical spine flexion and extension movements compared to the other devices (P < 0.05). The fiberoptic bronchoscope also significantly decreased the degree of cervical spine flexion and extension movements compared to the Macintosh blade (P < 0.05).

Conclusion: The Airtraq laryngoscope and fiberoptic bronchoscope significantly decrease the degree of cervical spine flexion and extension movements compared to the Macintosh blade.
**BACKGROUND:** The effects of advanced airway management on cervical spine alignment in patients with upper cervical spine instability are uncertain.

**METHODS:** To examine the potential for mechanical disruption during endotracheal intubation in cadavers with unstable cervical spines, we performed a prospective observational cohort study with 3 cadaver subjects. We created an unstable, type II odontoid fracture with global ligamentous instability at C1-2 in lightly embalmed cadavers, followed by repetitive intubations with 4 different airway devices (Airtraq laryngoscope, Lightwand, intubating laryngeal mask airway [LMA], and Macintosh laryngoscope) while manual in-line stabilization was applied. Motion analysis data were collected using an electromagnetic device to assess the degree of angular movement in 3 axes (flexion-extension, axial rotation, and lateral bending) during the intubation trials with each device. Intubation was performed by either an emergency medical technician or attending anesthesiologist.

**RESULTS:** Overall, 153 intubations were recorded with the 4 devices. The Lightwand technique resulted in significantly less flexion-extension and axial rotation at C1-2 than with the intubating LMA (mean difference in flexion-extension 3.2° [95% confidence interval {CI}, 0.9°–5.5°], P = 0.003; mean difference in axial rotation 1.6° [95% CI, 0.3°–2.8°], P = 0.01) and Macintosh laryngoscope (mean difference in flexion-extension3.1° [95% CI, 0.8°–5.4°], P = 0.005; mean difference in axial rotation 1.4° [95% CI 0.1°–2.6°], P = 0.03).

**CONCLUSIONS:** In cadavers with instability at C1-2, the Lightwand technique produced less motion than the Macintosh and intubating LMA. (Anesth Analg 2013;117:126–32)

**使用椎管內麻醉術的胎頭外倒轉術促進分娩時胎兒臀部先出術的總費用分析。**

Brief report: cost analysis of neuraxial anesthesia to facilitate external cephalic version for breech fetal presentation.

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Anesth Analg July 2013 117:155-159

**背景：** 在本次研究中，探索使用椎管內麻醉術的胎頭外倒轉術促進胎兒臀部先出術的總費用分析。

**方法:** 我們使用可以同時可以分析結果和不確定性概率的電腦成本分析模型。通過在試驗中使用椎管內麻醉術的胎頭外倒轉術與不使用椎管內麻醉術的胎頭外倒轉術的對比，估計胎兒臀部先出術的總預期成本。

**結果:** 研究發現，使用椎管內麻醉術的胎頭外倒轉術的成功平均概率為 60%（單獨研究從 44%到 87%），而不使用椎管內麻醉術的胎頭外倒轉術的成功平均概率為 38%（單獨研究從 31%到 58%）。使用椎管內麻醉術的胎頭外倒轉術的成功或者失敗的預計費用
BACKGROUND: In this study, we sought to determine whether neuraxial anesthesia to facilitate external cephalic version (ECV) increased delivery costs for breech fetal presentation.

METHODS: Using a computer cost model, which considers possible outcomes and probability uncertainties at the same time, we estimated total expected delivery costs for breech presentation managed by a trial of ECV with and without neuraxial anesthesia.

RESULTS: From published studies, the average probability of successful ECV with neuraxial anesthesia was 60% (with individual studies ranging from 44% to 87%) compared with 38% (with individual studies ranging from 31% to 58%) without neuraxial anesthesia.

The mean expected total delivery costs, including the cost of attempting/performing ECV with anesthesia, equaled $8931 (2.5th-97.5th percentile prediction interval $8541-$9252). The cost was $9207 (2.5th-97.5th percentile prediction interval $8896-$9419) if ECV was attempted/performed without anesthesia. The expected mean incremental difference between the total cost of delivery that includes ECV with anesthesia and ECV without anesthesia was $-276 (2.5th-97.5th percentile prediction interval $-720 to $112).

CONCLUSION: The total cost of delivery in women with breech presentation may be decreased (up to $720) or increased (up to $112) if ECV is attempted/performed with neuraxial anesthesia compared with ECV without neuraxial anesthesia. Increased ECV success with neuraxial anesthesia and the subsequent reduction in breech cesarean delivery rate offset the costs of providing anesthesia to facilitate ECV.

GlideScope® 可視喉鏡和直接喉鏡在兒童困難氣道的比較試驗，以及對鏡片型號作用的評估

A Comparative Trial of the GlideScope® Video Laryngoscope to Direct Laryngoscope in Children with Difficult Direct Laryngoscopy and an Evaluation of the Effect of Blade Size

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背景：GlideScope® 可視喉鏡 (GVL) 有助於氣道管理，但在兒科患者的困難氣道管理中尚未明確其有效性。在這項試驗中，我們入選了在直接喉鏡下 Cormack 和 Lehane 評分 (C&L grade) ≥3 分的兒科患者，評估了 GVL 改善咽喉暴露的有效性。我們同時評估了不同型號鏡片的作用。
METHODS: This randomized open trial was conducted in a tertiary pediatric center. Patients whose previous C&L grade was ≥3, or who were anticipated to have a difficult airway, were enrolled. The initial modified C&L grade was scored using a direct laryngoscope (DL). If the patient’s C&L grade was ≥3, the laryngoscopic view was scored again using GVLw (selected based on weight) and GVLs (1 size smaller than GVLw) in random order by a single experienced anesthesiologist. All laryngoscopic views were graded both with and without the backward, upward, and right lateral displacement of the thyroid cartilage (BURP) maneuver. The primary outcome was the difference in the C&L grade between DL and GVLw, and the secondary outcome was that between GVLw and GVLs. For statistical analysis, the modified C&L grade was converted to an ordinal scale.

RESULTS: Data from 23 pediatric patients were analyzed. When compared with DL, improvement of laryngoscopic view with the GVLw was not obvious (98.3% confidence interval [CI] for differences of ordinal scale, 0–1 without BURP, P = 0.15 and 0–1 with BURP, P = 0.11). However, GVLs improved the laryngoscopic view in comparison with both DL (98.3% CI for differences, 3.5–5.0 without BURP, P = 0.00007 and 3.5–4.5 with BURP, P = 0.0001) and GVLw (98.3% CI for differences, 3.0–4.5 without BURP, P = 0.00007 and 2.5–4.0 with BURP, P = 0.0001). There was no adverse outcome during this study.

CONCLUSIONS: In patients with C&L grade ≥3 under direct laryngoscopy, GVLs significantly improved the laryngoscopic view when compared with DL or GVLw. The GVLs is recommended for improving the laryngoscopic view in patients with a difficult airway.

BACKGROUND: GlideScope® video laryngoscope (GVL) has been proposed to be useful for airway management, but its efficacy for difficult airways has not been confirmed in pediatric patients. In this study, we evaluated the usefulness of the GVL for improving the laryngoscopic view in patients whose Cormack and Lehane grade (C&L grade) was ≥3 under direct laryngoscopy. We also assessed the effect of GVL blade size on the laryngoscopic view.

METHODS: This randomized open trial was conducted in a tertiary pediatric center. Patients whose previous C&L grade was ≥3, or who were anticipated to have a difficult airway, were enrolled. The initial modified C&L grade was scored using a direct laryngoscope (DL). If the patient’s C&L grade was ≥3, the laryngoscopic view was scored again using GVLw (selected based on weight) and GVLs (1 size smaller than GVLw) in random order by a single experienced anesthesiologist. All laryngoscopic views were graded both with and without the backward, upward, and right lateral displacement of the thyroid cartilage (BURP) maneuver. The primary outcome was the difference in the C&L grade between DL and GVLw, and the secondary outcome was that between GVLw and GVLs. For statistical analysis, the modified C&L grade was converted to an ordinal scale.

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CONCLUSIONS: In patients with C&L grade ≥3 under direct laryngoscopy, GVLs significantly improved the laryngoscopic view when compared with DL or GVLw. The GVLs is recommended for improving the laryngoscopic view in patients with a difficult airway.
A comparison of intraarticular lumbar facet joint steroid injections and lumbar facet joint radiofrequency denervation in the treatment of low back pain: a randomized, controlled, double-blind trial.

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BACKGROUND: 15% to 45% of the patients with low back pain have been described in the literature, including intraarticular lumbar facet joint steroid injections and radiofrequency denervation. In this study, we compared the effectiveness of intraarticular facet joint steroid injections and radiofrequency denervation.

METHODS: Our randomized, double-blind, controlled study included patients who received intraarticular steroid infiltrations in the lumbar facet joints (L3/L4-L5/S1) and patients who underwent radiofrequency denervation of L3/L4-L5/S1 segments. The inclusion criteria were based on magnetic resonance imaging findings showing hypertrophy of the facet joints L3/L4-L5/S1 and a positive response to an intraarticular test infiltration of the facet joints L3/L4-L5/S1 with local anesthetics. The primary end point was the Roland-Morris Questionnaire. Secondary end points were the visual analog scale and the Oswestry Disability Index. All outcome assessments were performed at baseline and at 6 months.

RESULTS: Fifty-six patients were randomized; 24 of 29 patients in the steroid injection group and 26 of 27 patients in the denervation group completed the 6-month follow-up. Pain relief and functional improvement were observed in both groups. There were no significant differences between the 2 groups for the primary end point (95% confidence interval [CI], -3 to 4) and for
both secondary end points (95% CI for visual analog scale, -2 to 1; 95% CI for Oswestry Disability Index, -18 to 0).

CONCLUSIONS: Intraarticular steroid infiltration or radiofrequency denervation appear to be a managing option for chronic function-limiting low back pain of facet origin with favorable short- and midterm results in terms of pain relief and function improvement, but improvements were similar in both groups.

Hypobaric spinal anesthesia with ropivacaine plus sufentanil for traumatic femoral neck surgery in the elderly: a dose-response study.
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BACKGROUND: In this randomized, prospective trial, we sought to determine the effective dose of hypobaric ropivacaine with sufentanil providing 95% success (ED95) in spinal anesthesia for traumatic femoral neck surgery in the elderly.

METHODS: Sixty-eight elderly patients with unilateral hip fracture randomly received 6, 8, 10, or 12 mg spinal hypobaric ropivacaine combined with 5 µg sufentanil. Patients remained in a
lateral position for 15 minutes after spinal injection. The dose was considered successful if a unilateral sensory block >T12 was achieved, and there was no need for additional analgesia or conversion to general anesthesia. The ED95 was determined using logit analysis. The incidence of severe and very severe hypotension (systolic blood pressure decrease by >30% and >40% baseline, respectively) and the use of remifentanil were compared among groups using χ² test for trend.

RESULTS: Three patients were excluded because of failure to reach the subarachnoid space. No differences in baseline demographic data were observed among groups. The ED95 for hypobaric ropivacaine was determined to be 9 mg (95% confidence interval, 8-14). Increasing doses of ropivacaine (6, 8, 10, and 12 mg) demonstrated a positive trend with respect to incidence of hypotension (53%, 47%, 87%, and 81%, \( P = 0.0004 \)) and a negative trend with respect to the use of remifentanil (41%, 12%, 0%, and 0%, \( P = 0.0004 \)). A significant difference in the level of sensory block (\( P < 0.0001 \)) was observed among operative and nonoperative sides but not among ropivacaine dosing groups (\( P = 0.16 \)). No difference in motor blockade, incidence of very severe hypotension, total dose of ephedrine, duration of surgery, patient satisfaction, operating conditions, or surgeon satisfaction scores was observed among groups. No cases of bradycardia were observed. No patient had a preoperative sensory level <T12 after 15 minutes in the lateral decubitus position, and no cases were converted to general anesthesia. There was no difference in undesirable outcomes or postoperative troponin values among groups.

CONCLUSIONS: The effective dose of hypobaric ropivacaine combined with sufentanil 5 µg providing 95% success in spinal anesthesia for traumatic femoral neck surgery in the elderly is \( \text{ED95} = 9 \text{ mg} \) (95% confidence interval, 8-14). Using doses exceeding the ED95 may increase the incidence of hypotension. If doses less than the ED95 are chosen, the use of additional analgesia may be necessary.
BACKGROUND: Coagulopathy leading to excessive blood loss and large volume red cell transfusion is a frequent complication of cardiac surgery with cardiopulmonary bypass (CPB) that may be caused by low perioperative fibrinogen levels. We explored the relationship between post-CPB fibrinogen levels and large volume red cell transfusion.

METHODS: Patients who underwent cardiac surgery with CPB from 2005 to 2011 at a single institution and had a fibrinogen level measured after CPB were included in this retrospective observational study. The relationship between post-CPB fibrinogen levels and large volume red cell transfusion (defined as ≥5 units transfused on the day of or the day after surgery) was assessed by cubic spline function and receiver operating characteristic analyses. The independent relationship between fibrinogen levels and large volume transfusion was assessed by multivariable logistic regression and propensity score analyses.

RESULTS: In the 4606 patients included, the probability of large volume transfusion increased when fibrinogen levels decreased below approximately 2.0 g/L. Using <2.0 g/L as the threshold for low fibrinogen, 1918 (42%) were categorized into the low fibrinogen group, of whom 363 (18.9%) had large volume transfusion compared with 164 (13.5%) of the 2688 patients whose fibrinogen level was ≥2.0 g/L (P < 0.0001). In the low fibrinogen group, the unadjusted odds ratio (95% confidence interval) for large volume transfusion was 1.5 (1.3–1.7). The risk-adjusted odds ratio obtained by logistic regression was 1.8 (1.4–2.2) and by propensity score methods was 1.5 (1.2–2.0).

CONCLUSIONS: While this study was not equipped to detect the critical fibrinogen level in bleeding patients, its results suggest that current recommendations that fibrinogen replacement not be initiated in bleeding patients unless fibrinogen levels decrease below 0.8 to 1.0 g/L may be too conservative. Randomized trials are needed to determine whether maintaining higher fibrinogen levels in bleeding patients can reduce blood loss and transfusions and by that means improve clinical outcomes in cardiac surgery.
The Effect of the Double Mask on Anesthetic Waste Gas Levels During Pediatric Mask Inductions in Dental Offices
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小兒患者使用吸入麻醉藥進行面罩誘導，接受全身麻醉有一大部分發生在牙科診所，這可能導致廢氣污染。我們評估了牙科診所內小兒全麻期間麻醉藥物的職業性暴露和應用“雙面罩”誘導的有效性。9家獨立性牙科診所分別在雙面罩系統應用之前和之後即刻進行麻醉廢氣濃度的測定。應用雙面罩時9家診所中笑氣水準的中位數從40.0兆北率（ppm；四分位區間=23.0—46.0 ppm，n=9）下降到3.0 ppm，（四分位區間=2.3—4.7 ppm，n=9，P=0.0055）；沒有一家診所中笑氣水準超出25 ppm（95%可信區間上限34%）。使用雙面罩時七氟烷水準的中位數從4.60 ppm（四分位區間=3.10—7.00 ppm，n=9）下降到0 ppm（四分位區間=0—0.39 ppm，n=9，P=0.0024）；沒有一家診所中超出2 ppm（95%可信區間上限34%）。在這一研究中我們展示了在獨立性牙科診所中小兒面罩麻醉誘導期間，應用雙面罩系統協同牙科“高容量”吸引器（抽空裝置產生約12 m3/h的高容量）與傳統面罩誘導相比較，足以降低至少三分之二診所對麻醉廢氣的暴露。

彩虹聲學監測和二氧化碳監測測定呼吸頻率及發現呼吸暫停的準確性、精確性以及可靠性
The Accuracy, Precision and Reliability of Measuring Ventilatory Rate and Detecting Ventilatory Pause by Rainbow Acoustic Monitoring and Capnometry
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BACKGROUND: Current methods for monitoring ventilatory rate have limitations including poor accuracy and precision and low patient tolerance. In this study, we evaluated a new acoustic ventilatory rate monitoring technology for accuracy, precision, reliability, and the ability to detect pauses in ventilation, relative to capnometry and a reference method in postsurgical patients.

METHODS: Adult patients presenting to the postanesthesia care unit were connected to a Pulse CO-Oximeter with acoustic monitoring technology (Rad-87, version 7804, Masimo, Irvine, CA) through an adhesive bioacoustic sensor (RAS-125, rev C) applied to the neck. Each subject also wore a nasal cannula connected to a bedside capnometer (Capnostream20, version 4.5, Oridion, Needham, MA). The acoustic monitor and capnometer were connected to a computer for...
continuous acoustic and expiratory carbon dioxide waveform recordings. Recordings were retrospectively analyzed by a trained technician in a setting that allowed for the simultaneous viewing of both waveforms while listening to the breathing sounds from the acoustic signal to determine inspiration and expiration reference markers within the ventilatory cycle without using the acoustic monitor- or capnometer-calculated ventilatory rate. This allowed the automatic calculation of a reference ventilatory rate for each device through a software program (TagEditor, Masimo). Accuracy (relative to the respective reference) and precision of each device were estimated and compared with each other. Sensitivity for detection of pauses in ventilation, defined as no inspiration or expiration activity in the reference ventilatory cycle for ≥30 seconds, was also determined. The devices were also evaluated for their reliability, i.e., the percentage of the time when each displayed a value and did not drop a measurement.

RESULTS: Thirty-three adults (73% female) with age of 45 ± 14 years and weight 117 ± 42 kg were enrolled. A total of 3712 minutes of monitoring time (average 112 minutes per subject) were analyzed across the 2 devices, reference ventilatory rates ranged from 1.9 to 49.1 bpm. Acoustic monitoring showed significantly greater accuracy (P = 0.0056) and precision (P = 0.0024) for respiratory rate as compared with capnometry. On average, both devices displayed data over 97% of the monitored time. The (0.95, 0.95) lower tolerance limits for the acoustic monitor and capnometer were 94% and 84%, respectively. Acoustic monitoring was marginally more sensitive (P = 0.0461) to pauses in ventilation (81% vs 62%) in 21 apneic events.

CONCLUSIONS: In this study of a population of postsurgical patients, the acoustic monitor and capnometer both reliably monitored ventilatory rate. The acoustic monitor was statistically more accurate and more precise than the capnometer, but differences in performance were modest. It is not known whether the observed differences are clinically significant. The acoustic monitor was more sensitive to detecting pauses in ventilation. Acoustic monitoring may provide an effective and convenient means of monitoring ventilatory rate in postsurgical patients.
結果：資料表明對較廣範圍的非臥床受試者來說，RVM 和肺活量計監測到的 MV 和 TV 相當，其中平均誤差<10% (準確性的 95% 可信區間<16%, 精度性 <12%, 偏倚 <11%)。再次進行差異分析發現 RVM 和肺活量計在監測 MV、TV 和 RR 上無顯著差異（P > 0.7）。然而，成對差異等效檢驗表明來自於兩種儀器的 MV 和 TV 監測值相等，差異都是在±15％範圍內。

結論：本研究說明 RVM 可在臨床上相當準確且精確地在 24 小時裡各種呼吸模式期間監測 MV、TV 和 RR。

（王慧娟 譯 馬皓琳 李士通 校）

BACKGROUND: Currently there is no technology that noninvasively measures the adequacy of ventilation in nonintubated patients. A novel, noninvasive Respiratory Volume Monitor (RVM) has been developed to continuously measure and display minute ventilation (MV), tidal volume (TV), and respiratory rate (RR) in a variety of clinical settings. We demonstrate the RVM’s accuracy and precision as compared with a standard spirometer under a variety of clinically relevant breathing patterns in nonintubated subjects.

METHODS: Thirty-one voluntary subjects completed the primary study. MV, TV, and RR measurements were collected from the RVM and spirometer simultaneously for each participant on day 1 and day 2 and analyzed to determine accuracy, precision, and bias for normal, fast, slow, irregular, and closed-glottis breathing.

RESULTS: Data demonstrated that RVM and spirometer measurements of MV and TV are equivalent in a wide range of ambulatory subjects with an average error <10% (95% confidence interval for accuracy <16%, precision <12%, and bias <11%). Repeated measures analysis of variance found no significant difference between spirometry and RVM individual measurements of MV, TV, and RR (P > 0.7), whereas a paired-difference equivalent test demonstrated, with 99% power, that both MV and TV measurements from the 2 devices are equivalent within ±15%.

CONCLUSIONS: This study demonstrates RVM’s clinically relevant accuracy and precision in measuring MV, TV, and RR over a 24-hour period and during various breathing patterns.
鎖骨下静脉的横截面積及锁骨下静脉至胸膜距离（DSCV-pleura）。除了 P<0.05 爲有統計學差異以外，將 CSA 和 DSCV-pleura 差異≥15%定義為有臨床意義的變化。

結果: 在 S-20、T-0 和 T-20 的 CSA（均數[95%可信區間]）（分別為 1.02 [0.95–1.14] cm²、1.04 [0.95–1.15] cm² 和 1.14 [1.04–1.24] cm²），都顯著大於在 S-0 的 CSA（0.93 [0.86–1.00] cm²，所有的 P<0.001）。然而只有 T-20 比 S-0 的 CSA 增大（0.21 cm²，23.2%）有臨床意義≥15%。從 S-10 到 T-20 的 CSA 增加≥15%的病人數（57%）比從 S-0 到 S-20 （23%）及從 S-0 到 T-0 （27%）的病人數多。S-20 和 T-20 的 DSCV-pleura 均數（0.61 和 0.60 cm）明顯短於 S-0 (0.70 cm, 所有的 P < 0.001)，但這種縮短沒有臨床意義≥15%。

結論: 聯合應用保持胸內壓和頭低足高位可提供一個更大且更相關程度的 CSA 增大，而不會縮短 DSCV-pleura，這可能有利於 SCV 穿刺。需要進一步研究來明確這些結果是否會影響穿刺的成功率和操作損傷的風險。

（邢怡安 譯 馬皓琳 李士通 校）

BACKGROUND: The effects of maneuvers to increase intrathoracic pressure and of Trendelenburg position on the cross-sectional area (CSA) of the subclavian vein (SCV) and the relationship between the SCV and adjacent structures have not been investigated.

METHODS: In ultrasonography-guided SCV catheterization (N = 30), the CSA of the SCV and the distance between the SCV and pleura (DSCV-pleura) were determined during 10-second airway opening, and 10-second positive inspiratory hold with 20 cm H2O in the supine position (S-0, and S-20) and the 10° Trendelenburg position (T-0, and T-20). In addition to a statistical significance of P < 0.05, CSA and DSCV-pleura differences of ≥15% were defined as clinically relevant changes.

RESULTS: CSA (mean [95% confidence interval]) in S-20, T-0, and T-20 (1.02 [0.95–1.14] cm², 1.04 [0.95–1.15] cm², and 1.14 [1.04–1.24] cm², respectively) was significantly larger than a CSA in S-0 (0.93 [0.86–1.00] cm², all P < 0.001). However, only the increase of CSA in T-20 vs S-0 (0.21 cm², 23.2%) was clinically meaningful (≥15%). The number of patients who showed CSA increase ≥15% was more in S-0 to T-20 (57%) compared with those in S-0 to S-20 (23%) and S-0 to T-0 (27%). DSCV-pleura measurements (mean) in S-20 and T-20 (0.61 and 0.60 cm) were significantly shorter than those in S-0 (0.70 cm, all P < 0.001), but the reductions of DSCV-pleura were not clinically meaningful (≥15%).

CONCLUSIONS: The combined application of inspiratory hold and Trendelenburg position provided a greater and more relevant degree of CSA increase without compromising DSCV-pleura, which may facilitate SCV catheterization. Further investigations are needed to determine whether these results affect the success rate of catheterization and the risk of procedural injury.
BACKGROUND: The video laryngoscope (VL) has been shown to improve laryngoscopic views and first-attempt success rates in elective operating room and simulated tracheal intubations compared with the direct laryngoscope (DL). However, there are limited data on the effectiveness of the VL compared with the DL in urgent endotracheal intubations (UEIs) in the critically ill. We assessed the effectiveness of using a VL as the primary intubating device during UEI in critically ill patients when performed by less experienced operators.

METHODS: We compared success rates of UEIs performed by Pulmonary and Critical Care Medicine (PCCM) fellows in the medical intensive care unit and medical or surgical wards. A cohort of PCCM fellows using GlideScope VL as the primary intubating device was compared with a historical cohort of PCCM fellows using a traditional Macintosh or Miller blade DL. The primary measured outcome was first-attempt intubation success rate. Secondary outcomes included total number of attempts required for successful tracheal intubation, rate of esophageal intubation, need for supervising attending intervention, duration of intubation sequence, and incidence of hypoxemia and hypotension.

RESULTS: There were 138 UEIs, with 78 using a VL and 50 using a DL as the primary intubating device. The rate of first-attempt success was superior with the VL as compared with the DL (91% vs 68%, P < 0.01). The rate of intubations requiring ≥3 attempts (4% vs 20%, P < 0.01), unintended esophageal intubations (0% vs 14%, P < 0.01), and the average number of
attempts required for successful tracheal intubation (1.2 ± 0.56 vs 1.7 ± 1.1, P < 0.01) all improved significantly with use of the VL compared with the DL.

**CONCLUSIONS:** UEI using a VL as the primary device improved intubation success and decreased complications compared with a DL when PCCM fellows were the primary operators. These data suggest that the VL should be used as the primary device when urgent intubations are performed by less experienced operators.

**小兒圍手術期低氧血症的發生率和年齡的相關性**

Incidence of Intraoperative Hypoxemia in Children in Relation to Age

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**背景：** 儘管到目前為止，呼吸道問題是小兒麻醉最常見的併發症，但當前仍沒有關於圍手術期小兒低氧血症發生率的可信資料。大部分觀察小兒呼吸道併發症發生率的研究都是基於一些自己的個案報導。

**方法：** 我們前瞻性地研究了一所大學附屬三級兒科醫院的 575 名年齡介於 0 到 16 歲之間的小兒非心臟手術患者的手術中低氧血症的發生率及脈搏氧飽和度依偽像的發生率。隨後，我們對登記在同一所醫院的麻醉資訊管理系統（AIMS）中的 8277 名患者回顧性分析術中低氧血症的發生率。

**結果：** 在前瞻性組，576 名患者中有 69 名至少出現一次氧飽和度（Spo2）≤ 90% 持續至少一分鐘（12%；95%的可信區間【CI】，9%-15%）。此外，576 名患者中有 35 名（6%；95%CI，4%-8%）出現至少一次真正的低氧事件。在前瞻性研究組，總共有 117 起 Spo2 ≤ 90%，其中有 3 起不能詳細說明，114 例中有 67 起（54%；95%CI，42%-65%）可歸類於真正的低氧事件。假陽性低 Spo2 值主要由脈搏氧飽和度儀的誤動所致。在回顧性分析中，AIMS 中登記的 Spo2 ≤ 90% 和 Spo2 ≤ 80% 持續至少 1 分鐘的發生率分別為 18%（95%CI，17%-19%）和 7.5%（95%CI，7%-8%）；每 100 例中分別為 31 起和 10 起。低氧血症的發生率隨年齡的降低而增加：Spo2 ≤ 90% 持續至少 1 分鐘在新生兒中的發生率為 56%（95%CI，49%-63%）（170 起每 100 例）。

**結論：** 術中低氧血症的發生率隨年齡的降低而增加，新生兒的發生率最高。由於較高的偽像發生率，應該謹慎解讀 AIMS 中未經證實的脈搏氧資料，因爲小兒麻醉中記錄到的低氧血症事件中只有最多 65% 是由真正的低氧所導致。

（楊禮 譯 馬皓琳 李士通 校）

**BACKGROUND:** Although respiratory problems are by far the most frequent complications of pediatric anesthesia, there are currently no reliable data on the incidence of perioperative hypoxemia in children. Most studies investigating the incidence of pediatric respiratory complications were based on self-report.
METHODS: We studied the incidence of intraoperative hypoxemia as well as that of pulse oximeter artifacts prospectively in 575 pediatric noncardiac surgery patients aged between 0 and 16 years operated in a tertiary pediatric university hospital. Subsequently, the incidence of intraoperative hypoxemia was determined retrospectively in 8277 patients registered in an anesthesia information management system (AIMS) of the same hospital.

RESULTS: In the prospective cohort, at least 1 episode of oxygen saturation (Spo2) ≤ 90% for at least 1 minute occurred in 69 of 575 cases (12%; 95% confidence interval [CI], 9%–15%). Furthermore, in 35 of 575 (6%; 95% CI, 4%–8%) cases at least 1 true hypoxemic event was observed. In total, 117 episodes of Spo2 ≤ 90% were observed in the prospective study, of which 3 of 117 could not be specified and 67 of 114 (54%; 95% CI, 42%–65%) episodes were classified as true hypoxemia. False-positive low Spo2 values were mainly caused by dislodgment of the pulse oximeter. In the retrospective analysis, Spo2 ≤ 90% and Spo2 ≤ 80% for at least 1 minute were documented in the AIMS in 18% (95% CI, 17%–19%) and 7.5% (95% CI, 7%–8%) of the cases, respectively; 31 and 10 episodes per 100 cases, respectively. The incidence of hypoxemia increased in younger age groups: Spo2 ≤ 90% for at least 1 minute occurred in 56% (95% CI, 49%–63%) of neonates (170 episodes per 100 cases).

CONCLUSIONS: The incidence of intraoperative hypoxemia increased with younger age, with the highest incidence in neonates. Because of the high artifact rate, unvalidated pulse oximeter data in AIMS should be interpreted with caution because only up to 65% of all hypoxemic episodes recorded during pediatric anesthesia were caused by true hypoxia.

背：硬膜外類固醇注射通常用於治療伴有腰骶部神經根痛的腰痛，可經椎板間途徑或椎間孔途徑兩種方法實施。根據報導，椎間孔途徑可使腹側硬膜外隙有更多藥物分佈，故比椎板間途徑更有效。但椎間孔途徑可導致脊髓損傷和永久性癱瘓等嚴重併發症。因此，需要尋找一種技術上更好且併發症更少的進針途徑以達到腹側硬膜外隙藥物分佈。近來有報導稱，經椎板間（PIL）途徑行硬膜外造影劑注射可達100%腹側硬膜外隙擴散。然而，該進針途徑的療效尚未被研究過。本研究旨在比較PIL途徑和正中椎板間（MIL）途徑的療效。我們提出如下假說：與MIL途徑相比，PIL途徑因藥物更好的腹側硬膜外隙擴散，可能產生更好的預後。

方法：37名患者被隨機分為兩組，分別在透視導向下接受經PIL（PIL組，n=19）或MIL（MIL組，n=18）途徑注射80mg甲潑尼龍。在治療後15天、1、2、3和6個月，對患者通過直觀類比標度評估有效的疼痛緩解情況（比基線改善≥50%），並通過改良Oswestry殘疾問卷法評估功能障礙的改善情況。疼痛改善與基線相比<50%的患者再次接受相同藥
物、劑量和給藥途徑的硬膜外注射，最多接受三次注射，至少間隔 15 天。本研究主要觀察指標是第 6 個月時的有效疼痛緩解率。

結果：PIL 組患者第 6 個月末時的有效疼痛緩解率（13/19 [68.4%]）高於 MIL 組（3/18 [16.7%]）。6 個月隨訪結束時，PIL 組有效疼痛緩解的相對成功率明顯更高（相對風險度 4.10; 95% 可信區間 1.40–12.05; P = 0.001），所需總注射量更少（29 比 41 MIL 組，P = 0.043）。治療後所有時點的直觀類比標度和改良 Oswestry 殘疾問卷評分，PIL 組均顯著低於 MIL 組。PIL 組造影劑的腹側硬膜外隙分佈（89.7%）比 MIL 組更多（31.7%）。無併發症硬膜外類固醇注射的確切 95% Clopper-Pearson 可信區間在 PIL 組為 0.0%–17.6%，在 MIL 組為 0.0%–18.5%。

結論：在治療由腰骶部神經根痛引起的腰痛中，與經 MIL 途徑相比，經 PIL 途徑的硬膜外類固醇注射在 6 個月中對疼痛的緩解和功能障礙的改善更有效。

（陳彬彬 譯，馬皓琳、李士通 审校）

BACKGROUND: Epidural steroid injections are commonly used for management of low back pain with lumbosacral radicular pain and can be administered by either interlaminar or transforaminal routes. The transforaminal route is reported to be more effective than the interlaminar route due to higher delivery of drug at the ventral epidural space. However, the transforaminal route has been associated with serious complications including spinal cord injury and permanent paralysis. Hence, there is a search for a technically better route with fewer complications for drug delivery into the ventral epidural space. Recently, a parasagittal interlaminar (PIL) approach of epidural contrast injection was reported to have 100% ventral epidural spread. However, the therapeutic efficacy of this route has never been investigated. We compared the therapeutic efficacy of the PIL approach and midline interlaminar (MIL) approach. We hypothesized that the PIL approach may produce a better clinical outcome because of better ventral epidural spread of the drug compared with MIL approach.

METHODS: Thirty-seven patients were randomized to receive injection of 80 mg methylprednisolone either by the PIL (PIL group, n = 19) or MIL (MIL group, n = 18) approach under fluoroscopic guidance. Patients were evaluated for effective pain relief (≥50% from baseline) by visual analog scale and improvement in disability by the modified Oswestry Disability Questionnaire at intervals of 15 days, 1, 2, 3, and 6 months. Patients having <50% pain relief from baseline received additional epidural injection of the same drug, dosage, and route, a maximum of 3 injections at least 15 days apart. The primary outcome of our study was the incidence of effective pain relief at 6 months.

RESULTS: The incidence of patients having effective pain relief was higher with the PIL approach (13/19 [68.4%]) vs MIL (3/18 [16.7%]) at the end of 6 months. A significantly higher relative success of effective pain relief was noted in the PIL group (relative risk, 4.10; 95% confidence interval, 1.40–12.05; P = 0.001) at the end of the 6-month follow up with the requirement of fewer total injections (29 vs 41 in MIL, P = 0.043). Visual analog scale and modified Oswestry Disability Questionnaire scores were significantly lower in the PIL group compared with the MIL group at all time intervals after the procedure. Ventral epidural spread of contrast was significantly higher in the PIL 89.7% vs 31.7% in the MIL group. The administration of epidural steroid injection was without any complications with an exact 95% Clopper-Pearson confidence interval of 0.0% to 17.6% in the PIL group and 0.0% to 18.5% in the MIL group.
CONCLUSIONS: Epidural steroid injection administered with the PIL approach was significantly more effective for pain relief and improvement in disability than the MIL approach for 6 months in the management of low back pain with lumbosacral radicular pain.

Guided Paravertebral Blocks With Versus Without Clonidine for Women Undergoing Breast Surgery: A Prospective Double-Blinded Randomized Study
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BACKGROUND: Paravertebral blocks (PVBs) have been introduced as an alternative to general anesthesia for breast cancer surgeries. The addition of clonidine as an adjuvant in PVBs may enhance quality and duration of analgesia and significantly reduce the consumption of analgesics after breast surgery. In this prospective randomized double-blind study, we assessed the significance of adding clonidine to the anesthetic mixture for women undergoing mastectomy.

METHODS: Sixty patients were randomized equally into 2 groups, both of which received PVB block, either with or without clonidine. Analgesic consumption was noted up to 2 weeks after the operation. A visual analog scale was used to assess pain postoperatively during the hospital stay, and a numeric rating scale was used when patients were discharged.

RESULTS: Analgesic consumption was significantly lower in the clonidine group 48 hours postoperatively with 95% confidence interval (CI) for the difference (−69.5% to −6.6%). Pain scores at rest showed significant reduction in the clonidine group during the period from 24 to 72 hours postoperatively with 95% CI for the ratios of 2 means (1.09–3.61), (2.04–9.04), and (2.54–
16.55), respectively, with shoulder movement at 24, 48, and 72 hours postoperatively 95% CI for the ratio of 2 means (1.10–3.15), (1.32–6.38), and (1.33–8.42), respectively. The time needed to resume daily activity was shorter in the clonidine group compared with the control group with 95% CI for the ratio of 2 means (1.14–1.62).

CONCLUSION: The addition of clonidine enhanced the analgesic efficacy of PVB up to 3 days postoperatively for patients undergoing breast surgery.

静脈內右美托咪定對脊麻持續時間的易化作用: 系統回顧和薈萃分析

The Facilitatory Effects of Intravenous Dexmedetomidine on the Duration of Spinal Anesthesia: A Systematic Review and Meta-Analysis

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背景: 已有人提出中樞機制來解釋報導的藥品核准標示外使用右美托咪定作爲佐劑加入局麻藥混合液中延長作用時間。我們評價了靜脈推注美托咪定是否可延長脊麻的感覺阻滯持續時間。

方法: 作者在 MEDLINE、Embase、Cochrane 系統回顧資料庫及 Cochrane 對照試驗資料庫的中央寄存器，搜索了觀察靜脈內給予右美托咪定（右美托咪定組）與安慰劑（對照組）相比較對基於單劑量注射局部麻醉藥的脊麻易化作用的隨機對照試驗。評估感覺及運動阻滯的持續時間、感覺及運動阻滯的起效時間、術後疼痛評分、第一次請求使用止痛藥的時間、止痛藥的使用量及右美托咪定相關的副作用。在需要時運用隨機效應模型綜合分析結果。

結果: 分析了來自於中-高品質的隨機對照試驗的共 364 例患者。脊麻複合靜脈使用右美托咪定時，感覺阻滯持續時間延長至少 34%（點估計：38%），P < 0.00001；運動阻滯持續時間延長至少 17%（點估計：21%），P < 0.00001；首次請求止痛藥的時間延後至少53%（點估計 60%），P < 0.00001。右美托咪定的使用可能使短期、可逆性的心動過緩增加 3.7 倍 (95%可信區間，1.53-8.82，P=0.004)。在低血壓及術後鎮靜的發生率上，兩組沒有差別；沒有患者出現呼吸抑制。

結論: 靜脈使用右美托咪定可以延長脊麻的感覺及運動阻滯的持續時間及首次要求鎮痛的時間。

（王賢譯 馬皓琳、李士通校）

BACKGROUND: Central mechanisms have been proposed to explain the prolongation of effect reported with the off-label use of dexmedetomidine as an adjuvant in local anesthetic admixtures. We evaluated whether IV dexmedetomidine can prolong the duration of sensory block associated with spinal anesthesia.

METHODS: The authors searched MEDLINE, Embase, Cochrane Database of Systematic Reviews, and Cochrane Central Register of Controlled Trials databases for randomized controlled trials investigating the facilitatory effects of IV administration of dexmedetomidine (dexmedetomidine group) compared with placebo (control group) on single-injection local anesthetic-based spinal anesthesia. Durations of sensory and motor block, sensory and motor
block onset times, postoperative pain scores, time to first analgesic request, analgesic consumption, and dexmedetomidine-related side effects were evaluated. Results were combined using random effects modeling when appropriate.

RESULTS: A total of 364 patients were analyzed from 7 intermediate to high-quality randomized controlled trials. When IV dexmedetomidine accompanied spinal anesthesia, sensory block duration was prolonged by at least 34% (point estimate: 38%), P < 0.00001, motor block duration was prolonged by at least 17% (point estimate: 21%), P < 0.00001, and time to first analgesic request was increased by at least 53% (point estimate: 60%), P < 0.00001. The use of dexmedetomidine was associated with a 3.7-fold increase (95% confidence interval, 1.53–8.82, P = 0.004) in transient reversible bradycardia. There was no difference in the incidence of hypotension or postoperative sedation, and none of the patients experienced respiratory depression.

CONCLUSION: IV dexmedetomidine can prolong the duration of sensory block, motor block, and time to first analgesic request associated with spinal anesthesia.