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### **全麻复苏期间静脉注射葡萄糖与术后恶心呕吐的关系：一项随机对照试验**

#### **The Relationship of Intravenous Dextrose Administration During Emergence from Anesthesia to Postoperative Nausea and Vomiting: A Randomized Controlled Trial**

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**背景：**尽管预防性使用止吐药，术后恶心呕吐(PONV)仍有可能发生；并与意外入院、费用增加以及患者不满相关。以往的研究表明静脉注射（IV）葡萄糖对PONV有不同影响。本研究试图确定全麻复苏期间静脉注射葡萄糖与PONV的关系。

**方法：**这是一项前瞻性、随机、双盲、对照试验。预定接受妇科、泌尿科或乳腺日间手术，ASA分级为I

级和II级的非糖尿病成年女性患者，随机分配接受250ml乳酸林格氏液（P组；n=75）或加入5%葡萄糖的乳酸林格氏液输注（D组，n=87），她们在手术结束时开始输液，持续2h。在进入手术室前，在手术室内接受试验液体输注的前一刻及在麻醉恢复室内输液完成时分别用快速血糖仪测量血糖。在抵达恢复室前不给予止吐药。记录抵达恢复室0min，30min，60min，120min以及24h的PONV评分，并记录其他用药。

**结果：**分析来源于162名有正常基线血糖患者的数据。这两组患者的人口统计学、PONV史或吸烟史没有明显差异。在麻醉结束后的第一个2h内，两组患者的PONV发生率没有明显差异（D组为52.9%，P组为46.7%；差值6.2%；95%置信区间〔CI〕为-9.2%到21.6%；P=0.43）。在D组与P组中，麻醉后2h内发生PONV的患者在恢复期间严重程度评分>1分的程度相似（分别为1.5分、1.0分；差值为0；95%CI值为0%—0%；P=0.93）；两组在到达恢复室30min内PONV的发生率相似（分别为：65.2%，57.1%；差值

8.1%；95%CI值为-

13.1%到28.8%；P=0.46）；两组超过1个剂量的止吐药使用率相似（分别为：56.5%，62.9%；差值6.3%；95%CI值为-

26.9%到15.1%；P=0.65）；两组使用超过一种止吐药的比例相似（分别为：50.0%，54.3%；差值4.3%；95%CI值为-25.5%到17.4%；P=0.82）。

**结论：**在麻醉复苏期间静脉给予葡萄糖与麻醉结束后2h内PONV发生率的差异（超过20%）或严重程度与PONV并不相关。PONV与静脉注射葡萄糖的最佳剂量以及注射时间之间的关系尚不清楚，可能需要进一步的研究。

（王苑 译 陈杰 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  $\geq 1$  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.

**技术交流：异丙酚在聚苯乙烯细胞培养皿中的稳定性**

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

Jeffrey W. Sall, MD, PhD and Jason Leong

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据报道，异丙酚在玻璃中有高稳定性并且在聚氯乙烯医学塑料制品中有长达24h的相对高的稳定性。近期一些发表的文章观察了异丙酚对培养皿中细胞和组织的影响。许多细胞培养皿由聚苯乙烯构成的，但很难找到有关暴露于聚苯乙烯中异丙酚稳定性的相关信息。发现暴露于盛有细胞培养基的玻璃制器皿的异丙酚长达24h基本没有变化，而暴露于96-孔聚苯乙烯细胞培养皿中时出现了大量的药物损失。于第一个小时药物减少最快且一直持续24h。用于与异丙酚一起进行试验的细胞和组织培类的器皿类型可通过增加达到效应的所需剂量来改变结果。

(郑华容 译 陈杰 校)

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.

#### 单肺通气时全心舒张末容量和血管外肺水指数的评价：经肺热稀释技术是否可用？

#### 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：**使用经肺热稀释技术得到的热稀释曲线是计算全心舒张末容量指数（GEDV）和血管外肺水指数（EVLWI）的基础。此方法是否受单肺通气的影响，直至现今尚未明确。因此，本研究目的为评估单肺通气对热稀释曲线和对GEDV及EVLWI评估的影响。

**方法：**23头猪使用经肺热稀释技术来评估平均通过时间、下坡时间和血温差（ $\Delta T_b$ ）。通过肺动脉血流探头（PAFP）测得“金标准”的心输出量并用于GEDVPAFP和EVLWIPAFP的计算。分别测量正常血容量状态下双肺通气时（M1），单肺通气15min后（M2）和低血容量状态（放血20ml/kg）下双肺通气时（M3）和单肺通气15分钟后（M4）的参数。

**结果：**正常血容量和低血容量状态下， $\Delta T_b$ 的增加和平均通过时间及下坡时间的减少（所有 $P < 0.04$ ）证明了热稀释曲线的形态明显受单肺通气影响。正常血容量（M1:  $459.9 \pm 67.5$  mL/m<sup>2</sup>; M2:  $397.0 \pm 54.8$  mL/m<sup>2</sup>;  $P = 0.001$ ）和低血容量状态下（M3:  $300.6 \pm 40.9$  mL/m<sup>2</sup>; M4:  $275.2 \pm 37.6$  mL/m<sup>2</sup>;  $P = 0.03$ ）GEDVPAFP在单肺通气后有明显降低。同样正常血容量（M1: 9.0 [7.3, 10.1] mL/kg;

M2: 7.4 [5.8, 8.3] mL/kg; P = 0.01) 和低血容量状态下 (M3: 7.4 [6.3, 9.7] mL/kg; M4: 5.8 [5.2, 7.4] mL/kg; P = 0.0009) EVLWIPAFP在单肺通气后也有明显降低。

**结论：**热稀释曲线形态和GEDI及EVLWI的评估明显受到单肺通气的影响。

(孙莉荔 译 陈杰 校)

**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 ( $\Delta T_b$ ) 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  $\Delta T_b$  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:  $459.9 \pm 67.5$  mL/m<sup>2</sup>; M2:  $397.0 \pm 54.8$  mL/m<sup>2</sup>;  $P = 0.001$ ) and hypovolemia (M3:  $300.6 \pm 40.9$  mL/m<sup>2</sup>; M4:  $275.2 \pm 37.6$  mL/m<sup>2</sup>;  $P = 0.03$ ). 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.

### 自主呼吸状态下成人完全呼气对于锁骨下静脉位置和大小影响

#### The Effect of Full Expiration on the Position and Size of the Subclavian Vein in Spontaneously Breathing Adults

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**背景：**如果锁骨下静脉穿刺时进行完全呼气可增加锁骨下静脉和胸膜间的距离或增加静脉直径，它有可能减少气胸发生率和/或增加静脉穿刺成功率。此项研究评估自主呼吸状态下的成年人进行完全呼气对锁骨下静脉到胸膜的距离和对锁骨下静脉横断面面积的影响。

**方法：**分别用超声测量20名成年人平卧位时在吸气末和呼气末右锁骨下静脉的下缘与胸膜的距离 (SCVinP-Pleura distance)，静脉中心与胸膜的距离(SCVcen-Pleura distance)和静脉的横断面面积。然后在15°头低脚高位时再次测量这些数据。

**结果：**静脉中心与胸膜的距离在平卧位 (0.005 cm, 95%可信区间 -0.04 到 0.05) 和头低脚高位(0.02 cm, 95%可信区间-0.005 to 0.05)时变化均较小。SCV下缘与胸膜的距离在平卧位呼气末时减小,但改变仅有 0.07 cm (95%可信区间 0.03-0.11; P = 0.003)。在头低脚高位时,这些距离未有变化(0.02 cm, 95%可信区间 -0.01 to 0.06)。不论在平卧位还是头低脚高位,与吸气末相比,完全呼气状态下锁骨下静脉的横断面至少增加14%。

**结论：**锁骨下静脉与胸膜的距离在完全呼气状态下未有改变。然而在自主呼吸病人的锁骨下导管放置时此种最简单技术仍能考虑使用,因为它显著增加锁骨下静脉的横断面面积。

(詹恺诞 译 陈杰 校)

**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 (SCVinf-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 SCVinfPleura 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.

### 术后残余肌松与不良临床预后的相关性

#### Postoperative Residual Neuromuscular Blockade Is Associated with Impaired Clinical Recovery

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**背景：**此项调查试图确定在麻醉后监护室中,神经肌肉阻滞残余作用的客观证据(四个成串刺激 [TOF]比值<0.9)与主观肌无力症状的类型、发生率和严重程度之间的联系。

**方法：**在进入PACU时，使用肌肉加速度描计法将149例患者的TOF比值进行量化。患者被分为两组：TOF <0.9组 (n = 48)和TOF ≥0.9 (对照) 组(n = 101)。使用一项标准化测试来确定从进入PACU时和之后20min，40min，60min是否存在肌无力的16种症状和11种迹象。

**结果：**从进入PACU (TOF <0.9组 vs对照组的肌无力症状中位数[区间]：7 [3–6] vs 2 [0–11]；差值=5，99%可信区间差值=4-6)到之后60min (TOF <0.9组 vs对照组：(2 [0–12] vs 0 [0–11] 对照组；差值=2，99%可信区间差值=1-2) (所有P < 0.0001)，TOF <0.9组在各时间点上肌无力的发生率要显著高于对照组 (P < 0.001)，。

**结论：**在麻醉后监护室中，TOF<0.9的病人会增加肌无力症状的发生率和严重程度。  
(诸琳婕 译 陈杰 校)

**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.

### 一项关于验证胃食管反流疾病作为脑瘫患者脊椎术后手术部位感染的一个新危险因素的回溯性研究

#### 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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**背景：**神经肌肉性脊柱侧弯是造成脊柱融合术术后手术部位感染（SSI）的一项已知危险因素，据报道感染率高达11.2%。尽管某些感染因素如抗生素使用时间掌握之前也被提及，而本研究目的为验证合并神经肌肉性脊柱侧弯的脑瘫（CP）患者发生SSI的内在危险因素。本研究假设脊柱融合术后出现SSI的CP患者与那些发生院内感染的患者有着类似的风险特征。

**方法：**本文回顾分析了从1998年1月到2008年6月接受脊柱融合术后出现手术部位感染的脑瘫患者的数据，这些患者由作者单位所属感染控制办公室使用国家院内感染监测系统标准（N=34）来确认。从作者单位的脊柱数据库中寻找人口统计学及程序相关匹配的非感染对照患者（N=37）。本研究比较了两组的胃食管返流疾病（GERD），胃酸抑制药物使用，术前褥疮发生率，先前感染和术后机械通气几个方面。使用多因素logistic回归来评估各预测因素对于“深度感染”和“任意感染”的相对影响。

**结果：**在30例可评价的感染患者中，70%发生了切口SSI。尽管许多感染是多种微生物引起，但最常见的病原体是格兰氏阴性菌。许多重要的预测因素通过单因素logistic回归分析确认与任意感染和深度感染相关。多因素logistic回归仅发现了一项重要影响即GERD（比值比6.1；95%可信区间1.9-

21.3；P=0.002）与任意感染相关；反之，使用胃酸抑制药物进行治疗所产生的影响没有达到统计学意义（比值比6.1，95%可信区间0.84-

44.6；P=0.07）。未发现两两因素间有相互作用。在所有入组对象中，GERD发生率为46.3%。

**结论：**GERD增加了脑瘫患者脊柱融合术后感染的风险，还需要前瞻性多中心研究来证实此危险因素的预测价值。

（瞿亦枫 译 陈杰 校）

**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.

### 特约撰稿：口颊坏疽重建手术的气道管理

#### **Special Article: Airway Management in Reconstructive Surgery for Noma (Cancrum Oris)**

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Anesth Analg July 2013 117:211-218;

走马疳（口颊坏疽）是一种贫穷和营养不良性疾病，主要发病于发展中国家10岁以下的儿童。尽管大部分儿童在最初感染时因败血症、或继发于因严重牙关紧闭或不能进食造成的饥饿而死亡，仍有小部分患者存活，并需要对严重的面部瘢痕和畸形进行重建手术。这些患者给麻醉医师带来气道管理方面的问题。对26例接受I期和II期重建手术的患者进行报道，重点关注于如何行气道管理。结果显示通过先进的技术和工具制定个性化的计划，可以安全和成功地进行气道管理。侧重于前/上气道的传统性测试有助于评估患者因口颊坏疽导致的面部畸形。

（黄萍 译 陈杰 校）

Noma (cancrum oris) 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.

### 综述:超声引导是否有利于疼痛介入治疗?一项慢性疼痛预后的系统性综述

#### **Review Article: Is Ultrasound Guidance Advantageous for Interventional Pain Management? A Systematic Review of Chronic Pain Outcomes**

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**背景:**现代超声(US)是一种替代解剖标志物、神经刺激及荧光介导的治疗慢性疼痛综合征的热门技术。

**方法:**此综述比较了传统引导技术和超声引导技术对介入治疗慢性疼痛的操作、有效性及安全性的影响。本文确定了46项关于超声引导应用于不同慢性疼痛介入治疗的研究,包括质量较高的41项系列病例报道和5项随机试验。

**结果:**研究结果表明较解剖标志法、神经刺激法及荧光介导法,通过超声引导法来治疗慢性疼痛,有着非劣或更优的可操作性和安全相关预后。

**结论:**目前缺乏足够的数据来支持超声引导治疗短期和长期慢性疼痛的有效性。

(孙晓琼 译 陈杰 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.

**超声引导技术和解剖定位技术行隐神经阻滞的比较：一项前瞻、对照、双盲、交叉试验**

**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:**隐神经阻滞通常用于膝盖以下的手术。采用不同的方法,成功率的变化可以在33%至88%之间。此项前瞻性志愿者实验对2种超声引导技术,即改进的股内侧隐神经阻滞和股骨周围隐神经阻滞,与膝部下区域阻滞技术进行比较。

**方法:**在此项单盲,交叉,前瞻性的试验中,20名成年志愿者接受用3种不同的隐神经阻滞方法。阻滞成功的主要终点为在隐神经分布的远端三分之二区域产生感觉消失。次要终点包括阻滞时间,感觉消失时间,阻滞过程中的疼痛,以及运动无力。

**结果:**和膝以下区域阻滞30%的成功率相比,改良的股内侧阻滞和股骨周围阻滞技术两者的成功率更高(80%,分别50%的置信区间[CI]的差异,23%-77%, $P = 0.009$ ,和100%,

70%的置信区间的差异，41%–91%， $P < 0.001$

)。但超声引导的股骨周围神经阻滞技术和改良股内侧神经阻滞技术之间并没有显著的差异(置信区间的差异为20%，-7%到49%， $p=0.125$ )。除了与膝部以下区域阻滞相比，股骨周围技术的操作时间更短( $P=0.07$ )；其他测量参数也无统计学差异。

**结论：**此项前瞻性研究证明超声引导下膝部以上隐神经阻滞与膝部以下区域阻滞相比，有更高的成功率且操作时间更短。

(马霄雯 译 陈杰 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.

### 使用旋转式血栓弹力仪分析无血小板血浆的最大血凝块稳定性受不同实验方法影响

#### Thromboelastometric Maximum Clot Firmness in Platelet-Free Plasma Is Influenced by the Assay Used

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**背景：**粘弹性测试是测定外源性活化途径的血凝块在血小板抑制情况下的弹性，如血栓弹力图(TEG)或旋转式血栓弹力仪(ROTEM)对功能性纤维蛋白原聚合分析(FFPAs)。尚没有研究显示除了受血小板抑制的影响外，FFPAs的组成对纤维蛋白聚合是否有影响。

**方法：**我们使用多种不含血小板的血浆制品，并比较了外源性活化途径ROTEM分析(EXT-EM)和3种FFPAs：细胞松弛素D修正的血栓弹力测定(FIBTEM)，FIBTEM+和功能性纤维蛋白原测试(FFTEG)。我们使用了校准血浆(LL公司和西门子)、混合新鲜冰冻血浆(octapla

s)和取自一名健康志愿者的新鲜制备的不含血小板的血浆。EXTEM和所有的FFPAs均在ROTEM仪器上平行测定。

**结果：**所有血浆制品的最大血凝块稳定性(MCF)值中位数(四分位距)为：EXTEM组20.5mm(17.25-22.0mm)；FIBTEM组23.0mm(18.5-24.0mm)；FIBTEM+组23.0mm(18.25-24.75mm)；FFTEG组18.0mm(16.0-

19.0mm)。与EXTEM组相比，FIBTEM组和FIBTEM+组MCF值升高而FFTEG组MCF值降低( $p < 0.001$ )。进一步使用不含血小板的血浆实验结果显示，FFPAs组中含有的血小板抑制剂(细胞松弛素D或血小板糖蛋白IIb/IIIa受体抑制剂阿昔单抗)并不引起MCF值的变化。然而降低活化组织因子的浓度(稀释EXTEM)会降低MCF值。

**结论：**我们推测FIBTEM和FIBTEM+可能含有促进纤维蛋白聚合的稳定剂，而与ROTEM分析相比FFTEG中组织因子含量较少。

(朱怡琦译 薛张纲校)

**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.

### 美沙酮在人体肝细胞内自身诱导N脱甲基化的机制

#### Mechanism of autoinduction of methadone N-demethylation in human hepatocytes.

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**背景：**美沙酮的代谢和清除机制在个体与个体间以及个体内都有相当大的差异。由于美沙酮随时间增长的肝内清除（自身诱导），使其在治疗的初期的剂量确定受到相当大的挑战。尽管

美沙酮的N脱甲基化在体外由细胞色素酶P4502B6(CYP2B6)以及CYP3A4诱导，并由CYP2B6活化清除，它的自身诱导机制并未完全明确。在本研究中，研究者利用人类肝细胞明确美沙酮自身诱导的机制。

**方法：**将新鲜的人体肝细胞暴露于0.1至10 $\mu$ M浓度的美沙酮72小时后，进行细胞清洗并评估美沙酮的N脱甲基化。同时测量CYP2B6，CYP3A4，以及CYP3A5信使RNA（mRNA），蛋白质表达（通过无凝胶高效液相色谱质谱分析）以及其催化活性（CYP2B6对安非他酮的羟基化以及CYP3A4/5对阿芬太尼的脱烷基化的作用）。通过研究孕烷

X受体构造雄甾烷的受体的基因检测研究CYP的诱导机制

**结果：**美沙酮（10  $\mu$ M）可以提高美沙酮的N脱甲基化2倍，CYP2B6和CYP3A4 mRNA三倍，以及蛋白质表达2倍。CYP3A5

mRNA无改变。CYP2B6和CYP3A4/5活性提高两倍。美沙酮对映异构体的诱导作用（R-美沙酮 对比S-

美沙酮）无显著差异。与最大剂量的苯巴比妥以及利福平的诱导相比其诱导作用相对较弱。低浓度美沙酮剂量影响较小。美沙酮是孕烷X受体激动剂，但不是构造雄甾烷受体激动剂。

**结论：**由美沙酮引起的浓度依赖的在人体肝细胞内的美沙酮自身诱导N去甲基化与其诱导CYP2B6和CYP3A4 mRNA

表达，蛋白表达以及催化活性相关。其诱导作用去孕烷X受体有关，但与结构雄甾烷受体激活无关。这些体外研究的结果可以给予临床上美沙酮的自身诱导的代谢与清除机制提供一定的见解。

（陈婉南译 薛张纲校）

**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  $\mu$ M 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  $\mu$ M) 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.

### 连续无创动脉血压在经导管主动脉瓣置换术中快速心室起搏时的准确度和灵敏度

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

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**背景：**连续无创动脉血压监测(CNAP)技术在心跳骤停时的准确度尚不明确。

**方法：**选取33例择期行经股动脉介入主动脉瓣置换术,镇痛镇静中的病人。比较严重低血压暴露下(快速心室起搏所致的功能性心跳骤停)的功能性有创动脉血压(IAP)和CNAP,其余时间无严重低血压。两组均记录收缩压、舒张压和平均动脉压并使用Bland-Altman

plots法进行统计分析。CNAP技术的灵敏度通过严重低血压相关的时间和变化幅度各个方面来评估。

**结果：**CNAP相较IAP总的准确度(偏倚)为收缩压 $-6.3 \pm 18.9$ ,舒张压 $7.4 \pm 10.5$ ,平均压 $4.0 \pm 11.3$  mm Hg(mean  $\pm$  SD)。严重低血压时偏倚增加为收缩压 $11.8 \pm 14.5$ ,舒张压 $13.8 \pm 12.4$ ,平均压 $12.9 \pm 12.4$  mm

Hg.CNAP对应的IAP两组血压差值小于15mmHg定义为一致性(95%可信限),总的一致性为舒张压58.5% (57.9-58.6),舒张压75.8% (75.5-76.0),平均压82.2% (81.9-

82.4);快速起搏时一致性为收缩压 56.4% (54.2-58.9; P = 0.71),舒张压53.2%\* (51.1-56.0),平均压57.4%\* (56.3-59.1; \*P < 0.001)。

CNAP和IAP平均值的相关性较好,在快速起搏各时相差别不显著。

**结论：**快速起搏中突然发生心跳骤停和血压恢复基础水平时,CNAP监护仪(model 500at, software V3.5)可以准确快速的测量血压变化。CNAP可以检测停搏时程。

(李春译 薛张纲校)

**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  $-6.3 \pm 18.9$ ,  $7.4 \pm 10.5$ , and  $4.0 \pm 11.3$  mm Hg (mean  $\pm$  SD, systolic, diastolic, and mean). Bias

increased during episodes of severe hypotension to  $11.8 \pm 14.5$ ,  $13.8 \pm 12.4$ , and  $12.9 \pm 12.4$  mm Hg. The percentage of agreements (95% confidence interval) between the blood pressure pairs with a difference  $\leq 15$  mm Hg was 58.5% (57.9-58.6), 75.8% (75.5-76.0), 82.2% (81.9-82.4; systolic, diastolic, mean) for all data and 56.4% (54.2-58.9;  $P = 0.71$ ), 53.2%\* (51.1-56.0), and 57.4%\* (56.3-59.1; \* $P < 0.001$ ) during rapid pacing. 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.

### 专论：术中放置中心静脉导管后导丝误留体内

#### **Special article: retained guidewires after intraoperative placement of central venous catheters.**

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**摘要：**导引钢丝误留体内是中心静脉导管放置过程中少见的并发症，与操作者的疲劳、经验不足、注意力不集中以及缺乏适当的监督有关。术中放置中心静脉导管后导丝误留的真实发生率是未知的。我们报道了4例手术室麻醉人员在中心静脉穿刺操作时误留导丝的病例。在涉及的病例中，往往出现了导管放置过程中患者临床状况恶化及进行了需要插入多根导丝的复杂操作。6年以来在我们的机构中，术中误留导丝的发生率为1/3291（95%可信区间为1/10000到8/10000）。

（凌晓敏译 薛张纲校）

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).

### 关于4种寰枢椎颈椎病人的气道设备在尸体模型上的比较

#### **A Comparison of 4 Airway Devices on Cervical Spine Alignment in Cadaver Models of Global Ligamentous Instability at C1-2.**

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**背景：**先进的气道管理的效果对于高位颈椎病人的效果是不确定的。

**方法：**研究对不稳定型颈椎尸体气管插管时机械中断的可能性，我们进行了一项对于3具尸体前瞻性观察性的群组研究的项目。我们先在略微做了防腐处理的尸体上建立了一个不稳定的2型寰枢椎齿状突骨折和薄弱的global

ligamentous，然后进行重复插管并与4个不同的气道设备（Airtraq喉镜，光棒，插管型喉罩，和Macintosh喉镜）以帮助建立稳定的人工气道轴。通过使用电磁设备收集动作分析数据来评估在困难插管时每种设备3个轴的角度运动的程度（屈伸，轴向旋转，侧弯）。插管由急诊技术人员或主治麻醉师来操作。

**结果：**总体而言，4种设备共插管153次并进行记录。在寰枢椎病人，光棒设备可以显著减少屈伸和自旋的角度。对比插管型喉罩（屈伸角度的平均差在 $3.2^{\circ}$  [95% CI,  $0.9^{\circ}$ – $5.5^{\circ}$ ],  $P = 0.003$ ; 自旋角度的平均差在 $1.6^{\circ}$  [95% CI,  $0.3^{\circ}$ – $2.8^{\circ}$ ],  $P = 0.01$ )。对比Macintosh喉镜（屈伸角度的平均差在 $3.1^{\circ}$  [95% CI,  $0.8^{\circ}$ – $5.4^{\circ}$ ],  $P = 0.005$ ; 自旋角度的平均差在 $1.4^{\circ}$  [95% CI  $0.1^{\circ}$ – $2.6^{\circ}$ ],  $P = 0.03$ .)

**结论：**在不稳定型寰枢椎尸体模型上，光棒技术使用的动作幅度可以比Macintosh喉镜和插管型喉罩更小。

（徐峥译 薛张纲校）

**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  $3.2^{\circ}$  [95% confidence interval {CI},  $0.9^{\circ}$ – $5.5^{\circ}$ ],  $P = 0.003$ ; mean difference in axial rotation  $1.6^{\circ}$  [95% CI,  $0.3^{\circ}$ – $2.8^{\circ}$ ],  $P = 0.01$ ) and Macintosh laryngoscope (mean difference in flexion-extension  $3.1^{\circ}$  [95% CI,  $0.8^{\circ}$ – $5.4^{\circ}$ ],  $P = 0.005$ ; mean difference in axial rotation  $1.4^{\circ}$  [95% CI  $0.1^{\circ}$ – $2.6^{\circ}$ ],  $P = 0.03$ ).

**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)

使用椎管内麻醉术的胎头外倒转术促进分娩时胎儿臀部先出术的总费用分析。

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

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**背景：**在本次研究中，探索使用椎管内麻醉术的胎头外倒转术促进胎儿臀部先出术的总费用分析。

**方法：**我们使用可以同时分析结果和不确定性概率的电脑成本分析模型。通过在试验中使用椎管内麻醉术的胎头外倒转术与不使用椎管内麻醉术的胎头外倒转术的对比，估计胎儿臀部先出术的总预期成本。

**结果：**研究发现，使用椎管内麻醉术的胎头外倒转术的成功平均概率为60%（单独研究从44%到87%），而不使用椎管内麻醉术的胎头外倒转术的成功平均概率为38%（单独研究从31%到58%）。

使用椎管内麻醉术的胎头外倒转术的成功或者失败的预计费用平均为\$8931（95%的可信区间为\$8541-\$9252）。的不使用椎管内麻醉术的胎头外倒转术的成功或者失败的费用平均为\$9207（95%的可信区间为\$8896-\$9419）。使用椎管内麻醉术的胎头外倒转术的平均预计费用比不使用椎管内麻醉术的胎头外倒转术的平均预计费用少\$-276（95%的可信区间为\$-720-\$112）。

**结论：**对于使用椎管内麻醉术的胎头外倒转术的胎儿臀部先出术的总成本可能比不使用轴椎管内麻醉术减少最多720美元或增加最多112美元。使用椎管内麻醉术可以增加胎头外倒转术的成功率，同时，随后减少的臀部剖宫产率可以抵消麻醉促进胎头外倒转术的费用。

（徐升译 薛张纲校）

**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® 可视喉镜和直接喉镜在儿童困难气道的比较试验，以及对镜片型号作用的评估**

### **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® 可视喉镜(GVL)有助于气道管理，但在儿科患者的困难气道管理中尚未明确其有效性。在这项试验中，我们入选了在直接喉镜下Cormack和Lehane评分(C&L grade)

≥3分的儿科患者，评估了GVL改善咽喉暴露的有效性。我们同时评估了不同型号镜片的作用。

**方法：**这个随机开放试验在第三方儿科中心进行。入选了C&L评分≥3分，或者之前就是困难气道的患者。由直接喉镜(DL)评估初始C&L评分。如果患者C&L评分≥3分，再随机地用可视喉镜GVLw(根据体重选择镜片型号)和GVLs(比GVLw小一个型号)评估。以上都由同一位有经验的麻醉科医生完成。所有咽喉部显示图像的评分都需有或无各个方向上甲状软骨按压(BURP手法)。试验的主要结果是用DL和GVLw时C&L评分的差异，次要结果是GVLw和GVLs间C&L评分的差异。为了统计分析，C&L评分做了数据转化。

**结果：**共有23个患者入组。DL和GVLw在暴露咽喉视野上没有显著差异(98.3%的置信区间[CI]，0-1无BURP，P= 0.15；0-1有BURP，P=

0.11)。然而，GVLs和DL，GVLs和GVLw在暴露咽喉视野上有显著差异。前者(98.3%的置信区间[CI]，3.5-5.0无BURP，P= 0.00007；3.5-4.5有BURP，P=

0.0001)，后者(98.3%的置信区间[CI]，3.0-4.5无BURP，P= 0.00007；2.5-4.0有BURP，P= 0.0001)。试验中无不良事件发生。

**结论：**直接喉镜下C&L评分≥3分的患者，与DL或GVLw相比，GVLs能显著改善咽喉部暴露。GVLs更推荐用于困难气道的儿科患者。(陈实玉译 薛张纲校)

**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.

**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  $\geq 3$  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.

一组对比腰椎关节腔内注射类固醇类激素治疗背部疼痛和腰椎内射频去神经根治疗背部疼痛的随机，控制，双盲临床试验。

**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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**背景：**15%到45%的腰背部疼痛的病人是由腰椎关节退行性变而引起慢性腰背部疼痛。文献报道了多种针对腰椎关节平面相关性疼痛的治疗方法，例如腰椎关节腔内注射类固醇激素及腰椎内射频去神经根。在这项研究中，我们对比了这两种方法的效果。

**方法：**本研究是以随机，双盲，控制的研究方法选取在腰椎平面（L3/L4-

L5/S1）注射类固醇激素的病人及在（L3/L4-

L5/S1）节段接受射频去神经根治疗的病人入组。入组标准首先基于核磁共振成像显示L3/L4-L5/S1关节平面的肿大及L3/L4-

L5/S1关节腔内注射局麻药的阳性反应。第一终点评价是Roland-

Morris调查问卷，第二个终点评价是视觉模拟测量和Osewsky功能障碍指数。所有结果的评估都是6月之内根据相同基线执行的。

**结果：**入组56个随机病人，其中29个类固醇药物注射组病人中有24个在6个月中完成随访，27个去神经根组病人中有26个在6个月中完成随访。两个组中都观察到了疼痛的缓解和功能的改善。用第一终点评估方法（95%可靠区间，-

3到4）及第二终点评估方法（视觉模拟测量法 95%可靠区间，-

2到1；Osewsky功能障碍指数95%可靠区间，-

18到0）评估两组病人的疗效并未见显著差别。

**结论：**关节腔内注射类固醇药物，射频去神经根法已成为治疗慢性功能限制性腰背部疼痛的可选方法，并可取得中短期内疼痛缓解及功能恢复等效果，但两种方法的疗效是相似的。

（蒋鑫梅译 薛张纲校）

**BACKGROUND：** Lumbar facet joint degeneration is a source of chronic low back pain, with an incidence of 15% to 45% among patients with low back pain. Various therapeutic techniques in the treatment of facet-related 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 first 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.

### 联合应用罗哌卡因和舒芬太尼在老年人创伤性股骨颈手术中进行椎管内减压麻醉的剂量反应研究

#### **Hypobaric spinal anesthesia with ropivacaine plus sufentanil for traumatic femoral neck surgery in the elderly: a dose-response study.**

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**背景:**在这项针对老年人创伤性股骨颈手术中进行的随机性前瞻试验中，我们试图确定在提供95%有效药物剂量(ED95)舒芬太尼的条件下轻比重罗哌卡因的有效剂量。

**方法:**68

位单侧髌部骨折老年患者随机接受6、8、10和12mg轻比重罗哌卡因脊髓内注射，同时联合进行5μg舒芬太尼的注射。患者接受脊髓注射后保持侧卧位15分钟。如果能实现单侧第

12胸椎以上的感觉阻断，则判定该剂量为有效。通过logit回归分析确定ED95。应用卡方趋势检验对严重和极严重的低血压(分别指收缩压减少大于标准的30%和40%)以及瑞芬太尼的使用在各组间进行比较。

**结果:**三名病人由于药物未能达到蛛网膜下腔被排除。各组间标准人口统计数据无差异。

轻比重罗哌卡因ED95确定为9mg(95%可信区间为8-

14mg)。轻比重罗哌卡因剂量的逐步增加

(6、8、10和12mg)和低血压的发生率呈正相关(53%、47%、87%和81%， $P=0.0004$ )，而和

瑞芬太尼的使用则呈负相关(41%、12%、0%和0%， $P=0.0004$ )。手术组和非手术组的感觉

阻滞效应存在显著统计学差异( $P<0.0001$ )，但在使用罗哌卡因的各组中无明显差异( $P=0.16$ )。

各组间在运动阻滞、极严重低血压、麻黄碱总剂量、手术时间、病人满意度、手术状

况以及外科医生满意度得分等指标上均无显著差异。试验过程中没有出现心动过缓的病例

，没有病人第12胸椎以下部位在术前保持侧卧位15分钟后出现感觉，也没有一例转变为全

身麻醉状态。各组间病例术后不良后果和肌钙蛋白值均无显著差异。

**结论:**联合应用舒芬太尼5 $\mu$ g条件下，轻比重罗哌卡因在老年创伤性股骨颈手术患者进行脊髓麻醉中的ED95为9mg(95%可信区间为8-

14mg)。轻比重罗哌卡因使用剂量一旦超过ED95可使低血压的发生率增高，如果使用剂量小于ED95，则必须使用额外的镇痛量。

(刘毅译 薛张纲校)

**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  $\mu$ g 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 remifentanyl were compared among groups using  $\chi^2$  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 remifentanyl (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  $\mu$ g providing 95% success in spinal anesthesia for traumatic femoral neck surgery in the elderly is

ED95 = 9 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.

## 心肺转流术后纤维蛋白原水平与心脏手术中大量红细胞输注之间的关系：一项观察性研究

### The Relationship Between Fibrinogen Levels After Cardiopulmonary Bypass and Large Volume Red Cell Transfusion in Cardiac Surgery: An Observational Study

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**背景：**凝血障碍导致的过多失血和大量红细胞输注是心肺转流的心脏手术中由于围术期纤维蛋白原水平降低而发生的一个常见并发症。我们探索了心肺转流术后纤维蛋白原水平与大量红细胞输注之间的关系。

**方法：**在这项回顾性观察性研究中，收集了某一个机构中从2005年到2011年行心脏手术且在心肺转流术后测定了纤维蛋白原水平的患者。用三次样条函数和接受者运行特性分析来评估心肺转流术后纤维蛋白原水平和大量红细胞输注之间的关系（大量红细胞输注的定义为：手术当天或者术后一天大于或等于5个单位的输血量）。用多变量logistic回归分析和倾向评分分析以评估纤维蛋白原水平和大量输血之间的独立关系。

**结果：**在纳入的4605例患者中，当纤维蛋白原水平降低到低于大约2.0 g/L，大量输血的概率会增加。以低于2.0

g/L作为纤维蛋白原临界值，1918（42%）名患者被划分为低纤维蛋白原组群，其有363（18.9%）人需要大量输血，而纤维蛋白原水平 $\geq 2.0$

g/L的2688名患者中有164（13.5%）人需要大量输血( $P <$

0.0001)。在低纤维蛋白原组中，大量输血的未经调整比值比（95%置信区间）为1.5（1.3–1.7）。通过Logistic回归和倾向评分方法得到的风险调整后比值比分别为1.8（1.4–2.2）和1.5（1.2–2.0）。

**结论：**虽然在本研究的目的不是来检测出血病人的临界纤维蛋白原水平，但是其结果表明“在出血患者中不能开始补充纤维蛋白原，除非纤维蛋白原水平降低到0.8至1.0 g/L”的目前建议太过于保守。需要随机试验来确定在出血患者中是否需要维持高的纤维蛋白原水平以便能减少失血和输血，从而达到提高改善心脏外科手术的临床预后。

（赵晓 译 马皓琳 李世通 校）

**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  $\geq 5$  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  $\geq 2.0$  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.

### 牙科诊所中小儿面罩麻醉诱导期间双面罩对麻醉废气水平的影响

#### The Effect of the Double Mask on Anesthetic Waste Gas Levels During Pediatric Mask Inductions in Dental Offices

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小儿患者使用吸入麻醉药进行面罩诱导，接受全身麻醉有一大部分发生在牙科诊所，这可能导致废气污染。我们评估了牙科诊所内小儿全麻期间麻醉药物的职业性暴露和应用“双面罩”诱导的有效性。9家独立性牙科诊所分别在双面罩系统应用之前和之后即刻进行麻醉废气浓度的测定。应用双面罩时9家诊所中笑气水平的中位数从40.0兆北率（ppm；四分位区间=23.0—46.0 ppm，n=9）下降到3.0 ppm，（四分位区间=2.3—4.7 ppm，n=9， $P=0.0055$ ），没有一家诊所中笑气水平超出25 ppm（95%可信区间上限34%）。使用双面罩时七氟烷水平的中位数从4.60 ppm（四分位区间=3.10—7.00 ppm，n=9）下降到0 ppm（四分位区间=0—0.39 ppm，n=9， $P=0.0024$ ），没有一家诊所中超出2 ppm（95%可信区间上限34%）。在这一研究中我们展示了在独立性牙科诊所中小儿面罩麻醉诱导期间，应用双面罩系统协同牙科“高容量”吸引器（抽空装置产生约12



m<sup>3</sup>/h的高容量)与传统面罩诱导相比较,足以降低至少三分之二诊所对麻醉废气的暴露。

(盛嘉君译 马皓琳 李士通校)

A significant portion of office-based general anesthesia for pediatric patients is performed in dental offices and involves mask inductions with inhaled drugs. This can lead to significant pollution with waste gases. We assessed occupational exposure to anesthetic drugs during pediatric general anesthesia in dental offices and assessed the effectiveness of the “double mask.” Nine freestanding dental offices had measurements of anesthetic waste gas levels taken before and immediately after implementation of a double-mask system. Levels of nitrous oxide decreased from a median of 40.0 parts per million (ppm; interquartile range [IQR] = 23.0–46.0 ppm, n = 9) to 3.0 ppm, (IQR = 2.3–4.7 ppm, n = 9, P = 0.0055) and exceeded 25 ppm in 0% of the 9 offices (upper 95% confidence limit 34%) when using the double mask. Levels of sevoflurane decreased from a median of 4.60 ppm (IQR = 3.10–7.00 ppm, n = 9) to 0 ppm (IQR = 0–0.39 ppm, n = 9, P = 0.0024) and exceeded 2 ppm in 0% of the 9 offices (upper 95% confidence limit 34%) when using the double mask. We demonstrated in our study that the double-mask system, when used with dental “high-volumes” suctions (high-volume evacuators producing approximately 12 m<sup>3</sup>/h) in freestanding dental offices, was sufficient to decrease the exposure to anesthetic waste gas during pediatric mask induction in at least two thirds of offices when compared with the traditional mask.

### 彩虹声学监测和二氧化碳监测测定呼吸频率及发现呼吸暂停的准确性、精确性以及可靠性

#### The Accuracy, Precision and Reliability of Measuring Ventilatory Rate and Detecting Ventilatory Pause by Rainbow Acoustic Monitoring and Capnometry

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**背景:** 目前用于监测呼吸频率方法的限制性包括准确性和精确性较差以及患者耐受性差。这项研究中,我们在术后患者评估了一种新的声学呼吸频率监测技术相对于二氧化碳监测仪和一种参照方法的准确性、精确性、可靠性以及发现通气中呼吸暂停的能力。

**方法:** 送到麻醉后监护室中的成年患者通过一个粘在颈部的生物声学传感器(RAS-125, rev C)与带有声学监测技术的脉搏CO-血氧监测仪(Rad-87, 版本号7804, Masimo, Irvine, 加利福尼亚州)连接。同时每位患者带有一个鼻腔插管与一台床旁二氧化碳监测仪(Capnostream20, 版本号4.5, Oridion, Needham,

马萨诸塞州)相连接。声学监测仪和二氧化碳监测仪与电脑连接进行连续声学和呼末二氧化碳波形记录。记录结果由一位经过培训的技术员进行回顾性分析,通过观察两种波形同时倾听声学信号记录的呼吸声音来辨别并标记呼吸周期中吸气相和呼气相,不使用声学监测仪或二氧化碳监测仪来计算呼吸频率。每台设备通过一个软件程序(TagEditor,

Masimo) 来自动计算参照呼吸频率。评估每台设备的准确性(与各自参照值相比)和精确性并相互比较。同时也测定发现呼吸暂停的敏感性(呼吸暂停定义为在通气周期中无吸气或呼气活动 $\geq 30$ 秒)。还评估了设备的可靠性,即每个设备显示一个数值且没有落下一个测定值的发生率。

**结果:** 33例成年患者(73%女性)被纳入研究,年龄为 $45 \pm 14$ 岁,体重为 $117 \pm 42$ 千克。2台设备共分析了总时长为3712分钟(平均每位患者112分钟)的监护记录,参照呼吸频率范围从1.9到49.1次/分。声学监测仪与二氧化碳监测仪相比,其呼吸频率准确性( $P = 0.0056$ )和精确性( $P = 0.0024$ )明显较好。两种监护仪平均超过97%的监护时间显示了监护数据。声学监测仪和二氧化碳监测仪的(0.95, 0.95)较低耐受限度分别为94%和84%。在21次呼吸暂停事件中,声学监测仪发现呼吸暂停的敏感性稍好(81%比62%,  $P = 0.0461$ )。

**结论:** 这项针对术后患者人群的研究中,声学监测仪和二氧化碳监测仪均能可靠地监测呼吸频率。统计学显示,声学监测仪较二氧化碳监测仪有更好的准确性和精确性,但表现出的差别并不明显。观察到的差别是否有临床意义尚未得知。声学监测仪在发现呼吸暂停方面较二氧化碳监测仪更敏感。声学监测仪可以为术后患者提供一个有效而方便的呼吸频率监测手段。

(张怡译 马皓琳 李士通 校)

**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  $\geq 30$  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  $45 \pm 14$  years and weight  $117 \pm 42$  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.

### 评估对各种临床情况中的非卧床病人提供分钟通气量持续监测的一种新型无创呼吸监测仪

#### **Evaluation of a Novel Noninvasive Respiration Monitor Providing Continuous Measurement of Minute Ventilation in Ambulatory Subjects in a Variety of Clinical Scenarios**

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**背景：**目前还没有一种技术可以对未插管的病人进行通气量是否充足的无创监测。现在发明了一种新型的无创通气量检测仪(RVM)，对各种临床病人可以持续监测和显示分钟通气量(MV)、潮气量(TV)和呼吸频率(RR)

。我们探讨未插管的病人在不同的临床相关的呼吸模式下，RVM相较于标准的肺活量计的准确性和精准度。

**方法：**31个自愿者完成了这次基础研究。我们分别在第一天和第二天从RVM和肺活量计上同时收集和分析每个受试者的MV、TV和RR的测定值，来测定呼吸正常、快、慢、无规律及声门闭合时的准确性、精准性和偏倚。

**结果：**数据表明对较广范围的非卧床受试者来说，RVM和肺活量计监测到的MV和TV相当，其中平均误差<10% (准确性的95% 可信区间<16%, 精度性 <12%, 偏倚 <11%)。再次进行差异分析发现RVM和肺活量计在监测MV、TV和RR上无显著差异 ( $P > 0.7$ )。然而，成对差异等效检验表明来自于两种仪器的MV和TV监测值相等，差异都是在±15%范围内。

**结论：**本研究说明RVM可以在临床上相当准确且精确地在24小时里各种呼吸模式期间监测MV、TV和RR。

(王慧娟 译 马皓琳 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  $\pm 15\%$ .

**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.

### 头低足高位和胸内压对麻醉患者锁骨下横截面积及锁骨下静脉到胸膜距离的影响

#### The Effects of the Trendelenburg Position and Intrathoracic Pressure on the Subclavian Cross-Sectional Area and Distance from the Subclavian Vein to Pleura in Anesthetized Patients

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#### 背景:

增加胸内压和处于头低足高位对于锁骨下静脉 (SCV) 的横截面积 (CSA) 的影响以及锁骨下静脉和毗邻组织之间的关系尚未被研究过。

**方法:**在超声引导下进行锁骨下静脉穿刺(例数=10)时,在开放气道10秒及保持10秒的正压通气于20cm水柱压力期间,分别于仰卧(S-0和S-20)和10°头低足高位(T-0和T-20)测定锁骨下静脉的横截面积及锁骨下静脉到胸膜距离(DSCV-pleura)

。除了 $P < 0.05$ 为有统计学差异以外,将CSA和DSCV-pleura差异 $\geq 15\%$ 定义为有临床意义的变化。

**结果:**在S-20、T-0和T-20的CSA (均数[95%可信区间]) (分别为1.02 [0.95–1.14]  $\text{cm}^2$ 、1.04 [0.95–1.15]  $\text{cm}^2$ 和1.14 [1.04–1.24]  $\text{cm}^2$ ) ,都显著大于在S-0的CSA (0.93 [0.86–1.00]  $\text{cm}^2$ ,所有的 $P < 0.001$ )。然而只有T-20比S-0的CSA增大(0.21  $\text{cm}^2$ , 23.2%)有临床意义( $\geq 15\%$ )。从S-10到T-20的CSA增加 $\geq 15\%$ 的病人数(57%)比从S-0到S-20(23%)及从S-0到T-0(27%)的病人数多。S-20和T-20的DSCV-pleura均数(0.61和0.60 cm)明显短于S-0(0.70 cm,所有的 $P < 0.001$ ),但这种缩短没有临床意义( $\geq 15\%$ )。

**结论:**联合应用保持胸内压和头低足高位可提供一个更大且更相关程度的CSA增大,而不会缩短DSCV-

pleura，这可能有利于SCV穿刺。需要进一步研究来明确这些结果是否会影响穿刺的成功率和操作损伤的风险。

（邢怡安 译 马皓琳 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 H<sub>2</sub>O 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  $\geq 15\%$  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] cm<sup>2</sup>, 1.04 [0.95–1.15] cm<sup>2</sup>, and 1.14 [1.04–1.24] cm<sup>2</sup>, respectively) was significantly larger than a CSA in S-0 (0.93 [0.86–1.00] cm<sup>2</sup>, all  $P < 0.001$ ). However, only the increase of CSA in T-20 vs S-0 (0.21 cm<sup>2</sup>, 23.2%) was clinically meaningful ( $\geq 15\%$ ). The number of patients who showed CSA increase  $\geq 15\%$  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 ( $\geq 15\%$ ).

**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.

### 视频喉镜在危重病人紧急气管插管过程中应用的影响

#### The Impact of Video Laryngoscopy Use During Urgent Endotracheal Intubation in the Critically Ill

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**背景：**已有研究显示，与直接喉镜（DL）相比，在择期手术室中视频喉镜（VL）改善喉镜视野和首次尝试成功率，并且能模拟气管插管。然而，关于在危重病人紧急气管内插管过程中视频喉镜与直接喉镜比较的有效性数据有限。我们评估了缺乏经验的操作者在危重病人紧急气管插管中将视频喉镜作为主要的气管插管装置的有效率。

**方法：**我们比较了在内科监护病房和内科或外科病房中，由肺科和重症医学（PCCM）的专科被培训人员操作进行的紧急气管插管的成功率。一组PCCM专科被培训人员使用GlideScope

视频喉镜作为主要的气管插管装置，另一组使用传统麦金托什机或米勒喉镜片的直接喉镜。主要的观测指标为首次尝试气管插管的成功率。次要观测指标包括成功的气管插管需要的尝试总次数、食管插入的频率、是否需要上级主治医生的干预、插管的持续时间及低氧血症和低血压的发生率。

**结果：**在138例紧急气管插管的病例中，78例和50例分别应用视频喉镜和直接喉镜作为主要的气管插管装置。视频喉镜的首次尝试成功率优于直接喉镜（91%比68%, $P<0.01$ ）。需要 $\geq 3$ 次尝试的插管概率（4%比20%， $P<0.01$ ）、误入食管的概率（0%比14%， $P<0.01$ ）、成功气管插管所需要的平均尝试次数（ $1.2\pm 0.56$ 比 $1.7\pm 1.1$ ， $P<0.01$ ）在使用视频喉镜时均比直接喉镜显著改善。

**结论：**当PCCM专科被培训人员为主要操作者时，应用视频喉镜作为紧急气管插管的主要装置与使用直接喉镜相比，能改善气管插管的成功率，减少并发症。这些数据表明，缺乏经验的操作者实施紧急气管插管时，应当选用视频喉镜作为主要装置。

（董静译 马皓琳 李士通校）

**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  $\geq 3$  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 ( $1.2 \pm 0.56$  vs  $1.7 \pm 1.1$ ,  $P < 0.01$ ) 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.

## 小儿围手术期低氧血症的发生率和年龄的相关性

### Incidence of Intraoperative Hypoxemia in Children in Relation to Age

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**背景：**尽管到目前为止，呼吸道问题是小儿麻醉最常见的并发症，但当前仍没有关于围手术期小儿低氧血症发生率的可靠数据。大部分观察小儿呼吸道并发症发生率的研究都是基于一些自己的个案报道。

**方法：**我们前瞻性地研究了一所大学附属三级儿科医院的575名年龄介于0到16岁之间的小儿非心脏手术患者的术中低氧血症的发生率及脉搏氧饱和度依伪像的发生率。随后，我们对登记在同一家医院的麻醉信息管理系统（AIMS）中的8277名患者回顾性分析术中低氧血症的发生率。

**结果：**在前瞻性组，576名患者中有69名至少出现一次氧饱和度（Spo2） $\leq$  90%持续至少一分钟（12%；95%的可信区间【CI】，9%-15%）。此外，576名患者中有35名（6%；95%CI，4%-8%）出现至少一次真正的血氧过低事件。在前瞻性研究组，总共有117起Spo2  $\leq$  90%，其中有3起不能详细说明，114例中有67起（54%；95%CI，42%-65%）可归类于真正的血氧过低。假阳性低Spo2值主要由脉搏氧饱和度仪的移动所致。在回顾性分析中，AIMS中登记的Spo2  $\leq$  90%和Spo2  $\leq$  80%持续至少1分钟的发生率分别为18%（95%CI，17%-19%）和7.5%（95%CI，7%-8%）；每100例中分别为31起和10起。低氧血症的发生率随年龄的降低而增加：Spo2  $\leq$  90%持续至少1分钟在新生儿中的发生率为56%（95%CI，49%-63%）（170起每100例）。

**结论：**术中低氧血症的发生率随年龄的降低而增加，新生儿的发生率最高。由于较高的伪像发生率，应该谨慎解读AIMS中未经证实的脉搏氧数据，因为小儿麻醉中记录到的低氧血症事件中只有最多65%是由真正的低氧所导致。

（杨礼译 马皓琳 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)  $\leq$  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  $\leq$  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  $\leq$  90% and Spo2  $\leq$  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  $\leq$  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.

### 经侧旁途径与正中椎板间途径腰段硬膜外类固醇注射治疗伴有腰骶神经根痛的腰痛的比较：一项双盲随机研究

#### Lateral Parasagittal Versus Midline Interlaminar Lumbar Epidural Steroid Injection for Management of Low Back Pain with Lumbosacral Radicular Pain: A Double-Blind, Randomized Study

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**背景：**硬膜外类固醇注射通常用于治疗伴有腰骶部神经根痛的腰痛，可经椎板间途径或椎间孔途径两种方法实施。根据报道，椎间孔途径可使腹侧硬膜外隙有更多药物分布，故比椎板间途径更有效。但椎间孔途径可导致脊髓损伤和永久性瘫痪等严重并发症。因此，需要寻找一种技术上更好且并发症更少的进针途径以达到腹侧硬膜外隙药物分布。近来有报道称，经椎板旁（PIL）途径行硬膜外造影剂注射可达100%腹侧硬膜外隙扩散。然而，该进针途径的疗效尚未被研究过。本研究旨在比较PIL途径和正中椎板间（MIL）途径的疗效。我们提出如下假说：与MIL途径相比，PIL途径因药物更好的腹侧硬膜外隙扩散，可能产生更好的预后。

**方法：**37名患者被随机分为两组，分别在透视导向下接受经PIL（PIL组，n=19）或MIL（MIL组，n=18）途径注射80mg甲泼尼龙。在治疗后15天、1、2、3和6个月，对患者通过直观类比标度评估有效的疼痛缓解情况（比基线改善 $\geq$ 50%），并通过改良Oswestry残疾问卷法评估功能障碍的改善情况。疼痛改善与基线相比 $<$ 50%的患者再次接受相同药物、剂量和给药途径的硬膜外注射，最多接受三次注射，至少间隔15天。本研究主要观察指标是第6个月时的有效疼痛缓解率。

**结果：**PIL组患者第6个月末时的有效疼痛缓解率(13/19 [68.4%])高于MIL组(3/18 [16.7%])。6个月随访结束时，PIL组有效疼痛缓解的相对成功率明显更高(相对危险度4.10; 95%可信区间1.40–12.05; P = 0.001)，所需总注射量更少(29比41 MIL组, P = 0.043)。治疗后所有时点的直观类比标度和改良Oswestry残疾问卷评分，PIL组均显著低于MIL组。PIL组造影剂的腹侧硬膜外隙分布(89.7%)比MIL组更多(31.7%)。无并发症硬膜外类固醇注射的确切95% Clopper-Pearson可信区间在PIL组为0.0%~17.6%，在MIL组为0.0%~18.5%。



**结论：**在治疗由腰骶部神经根痛引起的腰痛中，与经MIL途径相比，经PIL途径的硬膜外类固醇注射在6个月中对疼痛的缓解和功能障碍的改善更有效。

（陈彬彬 译，马皓琳、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 ( $\geq 50\%$  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.

对施行乳房手术的女性引导下的椎旁阻滞有和没有可宁定进行对比：一项前瞻性双盲对照研究

### **Guided Paravertebral Blocks With Versus Without Clonidine for Women Undergoing Breast Surgery: A Prospective Double-Blinded Randomized Study**

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**背景：**椎旁阻滞已经作为乳腺癌手术全麻的一项选择。增加可乐定作为椎旁阻滞的辅助用药可能增强镇痛的质量及持续时间，并且明显减少乳房手术后止痛剂的消耗量。在这项前瞻性随机双盲研究中，我们评估了用于女性患者切除乳房手术的麻醉合计中添加可乐定的意义。

**方法：**60个病人随机平均分为两组，两组都接受椎旁阻滞，一组有可乐定，另一组没有可乐定。止痛药的使用记录到术后两周。用直观类比标度来评定住院期间的术后疼痛，当患者出院后用数字等级量表。

**结果：**在可乐定组中术后48小时里止痛药的消耗量明显减少，差异的95%可信区间为(-69.5%~-6.6%)。术后24到72小时这段时间可乐定组的静息疼痛评分明显降低，术后24、48和72小时时的2种方法比率的95%可信区间分别为(1.09-3.61)、(2.04-9.04)和(2.54-16.55)，肩膀活动时则分别为(1.10-3.15)、(1.32-6.38)和(1.33-8.42)。可乐定组恢复日常活动所需时间比对照组短，2种方法比率的95%可信区间为(1.14-1.62)。

**结论：**对于施行乳腺手术的病人，在椎旁阻滞中加入可乐定可增强术后镇痛效应达3天。  
(王晓莉译 马皓琳 李士通校)

**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.

静脉内右美托咪定对脊麻持续时间的易化作用：系统回顾和荟萃分析

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

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**背景：**已有人提出中枢机制来解释报道的药品核准标示外使用右美托咪定作为佐剂加入到局麻药混合液中延长作用时间。我们评价了静脉推注美托咪定是否可延长脊麻的感觉阻滞持续时间。

**方法：**作者在MEDLINE、Embase、Cochrane系统回顾数据库及Cochrane对照试验数据库的中央寄存器，搜索了观察静脉内给予右美托咪定（右美托咪定组）与安慰剂（对照组）相比较对基于单剂量注射局部麻醉药的脊麻易化作用的随机对照试验。评估感觉及运动阻滞的持续时间、感觉及运动阻滞的起效时间、术后疼痛评分、第一次请求使用止痛药的时间、止痛药的使用量及右美托咪定相关的副作用。在需要时运用随机效应模型综合分析结果。

**结果：**分析了来自于中-

高质量的随机对照试验的共364例患者。脊麻复合静脉使用右美托咪定时，感觉阻滞持续时间延长至少34%（点估计：38%）， $P < 0.00001$ ；运动阻滞持续时间延长至少17%（点估计：21%）， $P < 0.00001$ ；首次请求止痛药的时间延后至少53%（点估计60%）， $P < 0.00001$ 。右美托咪定的使用可能使短暂、可逆性的心动过缓增加3.7倍（95%可信区间，1.53-8.82， $P = 0.004$ ）。在低血压及术后镇静的发生率上，两组没有差别；没有患者出现呼吸抑制。

**结论：**静脉使用右美托咪定可以延长脊麻的感觉及运动阻滞的持续时间及首次要求镇痛的时间。

（王赞译 马皓琳、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.