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The Open Mind
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術前心力衰竭惡化而非心肌梗死與非心臟手術後死亡率和非心臟併發症有關:一項回顧性佇列研究

Worsening Preoperative Heart Failure Is Associated with Mortality and Noncardiac Complications, But Not Myocardial Infarction After Noncardiac Surgery: A Retrospective Cohort Study

Maile, Michael D. MD, MS; Engoren, Milo C. MD; Tremper, Kevin K. MD, PhD; Jewell, Elizabeth MS; Kheterpal, Sachin MD, MBA

Anesthesia & Analgesia 2014 119 522–532

背景:心力衰竭(HF)是圍手術期併發症發生率和死亡率的一個重要危險因素。雖然這些患者的心臟不良事件的風險高，很少有資料描述這一人群中非心臟併發症發生情況。

方法:作者對接受2005年到2010年間美國醫學學會全國外科品質改進計畫的非心臟手術的患者進行了一項多中心佇列研究。將HF(術後30天內新發或惡化 的HF)佇列與其他外科手術的危險因素相關的對照組進行比較。

結果:5094例術前惡化的HF患者與術前沒有HF惡化的相似的患者佇列比較，術前HF惡化與30天全因死亡率增加(相對危險[RR] 2.08; 95%置信區間[CI], 1.75–2.46; P<0.001)以及發病風險增加有關(任何有記錄的術後併發症)(RR 1.54; 95% CI, 1.40–1.69; P<0.001)。HF患者發生腎衰竭(RR 1.85; 95% CI, 1.37–2.49; P<0.001)，機械通氣的需要>48小時(RR 1.81; 95% CI, 1.52–2.15; P<0.001)，肺炎(RR 1.73; 95% CI, 1.44–2.08; P<0.001)，心肌梗死(RR 1.69; 95% CI, 1.29–2.21; P<0.001)，計畫外插管(RR 1.68; 95% CI, 1.41–1.99; P<0.001)，腎功能不全(RR 1.64; 95% CI, 1.10–2.44; P=0.014)，腎功能(95% CI, 1.24–1.64; P<0.001)，以及尿路感染(RR 1.29; 95% CI, 1.06–1.58; P=0.011)的風險增加。

結論:在控制其他併發症的條件下，術前HF惡化與術後併發症發病率和死亡率顯著增加有關。雖然這似乎有多種病因，患者相對心臟併發症更有可能發生呼吸系統、腎臟和感染性併發症。

（柳韶華譯 陳傑校）

BACKGROUND: Heart failure (HF) is an important risk factor for perioperative morbidity and mortality. While these patients are at high risk for cardiac adverse events, there are few current data describing the types of noncardiac complications that occur in this population.

METHODS: We performed a multicenter cohort study of patients undergoing noncardiac surgery from 2005 to 2010 as part of the American College of Surgeons National Surgical Quality Improvement Program. A HF cohort (HF that is new or worsening within 30 days of surgery) was compared with a control cohort that was matched regarding other surgical risk factors.

RESULTS: Five thousand ninety-four patients with worsening preoperative HF were compared with an otherwise similar cohort of patients without worsening preoperative HF. Worsening preoperative HF was associated with increased risk of 30-day all-cause mortality (relative risk [RR] 2.08; 95% confidence interval [CI], 1.75–2.46; P<0.001) and increased risk of morbidity (any recorded postoperative complication) (RR 1.54; 95% CI, 1.40–1.69; P<0.001). HF patients had increased risk of developing renal failure (RR 1.85; 95% CI, 1.37–2.49; P<0.001), need for mechanical ventilation longer than 48 hours (RR 1.81; 95% CI, 1.52–2.15; P<0.001), pneumonia (RR 1.73; 95% CI, 1.44–2.08; P<0.001), cardiac arrest (RR 1.69; 95% CI,
1.29–2.21; P < 0.001), unplanned intubation (RR 1.68; 95% CI, 1.41–1.99; P < 0.001), renal insufficiency (RR 1.64; 95% CI, 1.10–2.44; P = 0.014), sepsis (RR 1.43, 95% CI, 1.24–1.64; P < 0.001), and urinary tract infection (RR 1.29; 95% CI, 1.06–1.58; P = 0.011). The incidence of myocardial infarction in the sample was similar between the 2 groups (RR 1.07; 95% CI, 0.75–1.52; P = 0.719).

CONCLUSIONS: Worsening preoperative HF is associated with a significant increase in postoperative morbidity and mortality when controlling for other comorbidities. Although these likely have a multifactorial etiology, patients are much more likely to suffer from respiratory, renal, and infectious complications than cardiac complications.

Attenuation of Regional Cerebral Blood Flow During Memory Processing After Coronary Artery Bypass Surgery

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Anesthesia & Analgesia 2014 119 550–553

Reports of memory impairment after cardiac surgery are controversial. To address this controversy, we used positron emission tomography to examine changes in regional cerebral blood flow (rCBF) during memory processing before and after elective coronary artery bypass grafting surgery. In postoperative scans, we observed significantly reduced rCBF in 2 of the most important memory processing areas: the medial temporal lobe (P = 0.023) and the prefrontal cortex (P = 0.002). The results suggest postoperative attenuation of rCBF in brain areas involved in memory processing. These reductions could be used to evaluate severity of memory impairment after coronary artery bypass grafting surgery in patients at risk.

Perioperative Goal-Directed Hemodynamic Optimization Using Noninvasive Cardiac Output Monitoring in Major Abdominal Surgery: A Prospective, Randomized, Multicenter, Pragmatic Trial: POEMAS Study (PeriOperative goal-directed thErapy in Major Abdominal Surgery)

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Anesthesia & Analgesia 2014 119 579–587

Background: In this study, the primary goal was to determine if perioperative goal-directed hemodynamic optimization, using noninvasive cardiac output monitoring, can reduce perioperative complications and length of stay in major abdominal surgery.
BACKGROUND: In this study, our objective was to determine whether a perioperative hemodynamic protocol based on noninvasive cardiac output monitoring decreases the incidence of postoperative complications and hospital length of stay in major abdominal surgery patients requiring intensive care unit admission. Secondary objectives were the time to peristalsis recovery and the incidence of wound infection, anastomotic leaks, and mortality.

METHODS: A randomized clinical trial was conducted in 6 tertiary hospitals. One hundred forty-two adult patients scheduled for open colorectal surgery, gastrectomy, or small bowel resection were enrolled. A hemodynamic protocol including fluid administration and vasoactive drugs based on arterial blood pressure, cardiac index, and stroke volume response was compared with standard practice. Patients were followed until hospital discharge (determined by a surgeon blinded to the study) or death. In contrast to previous studies, we designed a pragmatic trial (as opposed to explanatory trials) to mimic real practice and obtain maximal external validity for the study.

RESULTS: Fluid administration was similar except for the number of colloid boluses (2.4 ± 1.8 [treated] vs 1.3 ± 1.4 [control]; P < 0.001) and packed red blood cell units (0.6 ± 1.3 [treated] vs 0.2 ± 0.6 [control]; P = 0.019). Dobutamine was used in 25% (intraoperatively) and 19.4% (postoperatively) of the treated patients versus 1.4% and 0% in the control group (P < 0.001). We have observed a reduction in reoperations in the treated group (5.6% vs 15.7%; P = 0.049). However, no significant differences were observed in overall complications (40% vs 41%; relative risk 0.99 [0.67–1.44]; P = 0.397), length of stay (11.5 [8–15] vs 10.5 [8–16]; P = 0.874), time to first flatus (62 hours [40–76] vs 72 hours [48–96]; P = 0.180), wound infection (7 vs 14; P = 0.085), anastomotic leaks (2 vs 5; P = 0.23) and mortality (4.2% vs 5.7%; P = 0.67).

CONCLUSIONS: The results of our pragmatic study indicate that a perioperative hemodynamic protocol guided by a noninvasive cardiac output monitor was not associated with a decrease in the incidence of overall complications or length of stay in major abdominal surgery.

The Association of Serum Vitamin D Concentration with Serious Complications After Noncardiac Surgery

血清維生素 D 濃度與非心臟手術後的嚴重併發症關係

The Association of Serum Vitamin D Concentration with Serious Complications After Noncardiac Surgery
BACKGROUND: Vitamin D deficiency is a global health problem. Epidemiological studies demonstrate that vitamin D is both cardioprotective and neuroprotective. Vitamin D also plays a substantial role in innate and acquired immunity. Our goal was to evaluate the association of serum vitamin D concentration on serious postoperative complications and death in noncardiac surgical patients.

METHODS: We retrospectively analyzed the data of 3509 patients who had noncardiac surgery at the Cleveland Clinic Main Campus and had a serum vitamin D measurement. The relationship between serum vitamin D concentration and all-cause in-hospital mortality, in-hospital cardiovascular morbidity, and serious in-hospital infections was assessed as a common effect odds ratio (OR) by using a multivariate generalized estimating equation model with adjustment for demographic, medical history variables, and type and duration of surgery.

RESULTS: Higher vitamin D concentrations were associated with decreased odds of in-hospital mortality/morbidity (P = 0.003). There was a linear reduction of the corresponding common effect odds ratio (OR 0.93, 95% confidence interval, 0.88–0.97) for severe in-hospital outcomes for each 5 ng/mL increase in vitamin D concentration over the range from 4 to 44 ng/mL. In addition, we found that the odds versus patients with vitamin D <13 ng/mL (i.e., 1st quintile) were significantly lower in patients with vitamin D 13–20, 20–27, 27–36, and >36 ng/mL (i.e., 2nd–5th quintiles); the corresponding estimated ORs were 0.65 (99% confidence interval, 0.43–0.98), 0.53 (0.35–0.80), 0.44 (0.28–0.70), and 0.49 (0.31–0.78), respectively. However, there was no statistically significant difference among individual quintiles >13 ng/mL.

CONCLUSIONS: Vitamin D concentrations were associated with a composite of in-hospital death, serious infections, and serious cardiovascular events in patients recovering from noncardiac surgery. While causality cannot be determined from our retrospective analysis, the association suggests that a large randomized trial of preoperative vitamin D supplementation and postoperative outcomes is warranted.
**C-Reactive Protein Kinetics After Major Surgery**

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Anesthesia & Analgesia 2014 119 624–629

**BACKGROUND:** Diagnosis of sepsis in the postoperative period is a challenge. Measurements of inflammatory markers, such as C-reactive protein (CRP), have been proposed in medical patients, but the interpretation of these values in surgical patients is more difficult. We evaluated the changes in blood CRP levels and white blood cell count in postoperative patients with and without infection.

**METHODS:** All patients admitted to our 34-bed Department of Intensive Care after major (elective or emergency) cardiac, neuro-, vascular, thoracic, or abdominal surgery during a 4-month period were prospectively included. Patients were screened daily and characterized as infected or noninfected. CRP levels and white blood cell counts were recorded daily in all patients for up to 7 days after the surgical intervention.

**RESULTS:** Of the 151 patients enrolled, 115 underwent elective surgery and 36 emergency surgery; cardiac surgery was performed in 49 patients, neurosurgery in 65, abdominal surgery in 25, vascular surgery in 7, and thoracic surgery in 5. In noninfected patients (n = 117), mean CRP values increased from baseline to postoperative day (POD) 3 (P < 0.0001, estimated mean difference [EMD] = 99.7 mg/L [95% confidence interval, 85.6–113.8]) and then decreased until POD 7 but remained higher than the level at baseline (P < 0.0001, EMD = 49.2 mg/L [95% confidence interval, 27.1–71.2]). Postoperative infection occurred in 20 patients (13.2%). In these patients, CRP values were already higher on POD 1 than in noninfected patients (P = 0.0054).

**CONCLUSIONS:** CRP levels increase in the first week after major surgery but to a much larger extent in infected than in noninfected patients. Persistently high CRP levels after POD 4, especially when >100 mg/L, suggest the presence of a postoperative infection.
背景：小兒麻醉的神經毒性研究無法區分手術相關因素中全麻（GA）的長期影響和。最近的一項在一群大學的，他們在生命的第 1 年接受過－次全身麻醉的孩子們的身上做的研究，證實了小兒麻醉的持續時間和測試成績之間的關係，也揭示了其中有一小部分群體有著“非常少的學術成就的孩子”（VPAA），即在標準化測試的得分都低於百分之五。在對一個類似的兒童的全身麻醉替代組術後認知功能進行的分析，可能有助於區分麻醉的影響與其他混雜因素。

方法：使用一種新的方法來構建一個聯合醫療和教育資料庫，用來搜索這些在一個類似的接受脊麻的進行同樣手術的兒童群體中的影響。作者將之前的一些病人和一個控制人數的有著相匹配的年級，性別，測試的年齡和社會經濟地位的學生群體進行了比較。

結果：對佛蒙特州的教育部的記錄進行分析，其中 265 個學生在其嬰兒時期均在單次脊髓麻醉下進行了包皮環切術，幽門環肌切開術，或者腹股溝疝修補術。接觸脊髓麻醉和手術治療對有 VPAA 的兒童的比值無顯著影響。 (數學: P = 0.18；比值比為 1.50，置信區間 (CI)，0.83–2.68；閱讀: P = 0.55；比值比 = 1.19，置信區間 CI，0.67–2.1)。脊髓麻醉和手術的持續時間與在數學標準化測試 (P = 0.73) 或者閱讀的標準化測試中 (P = 0.57) 的表現沒有相關性。在實驗組裡有一個小的但是在統計學上有顯著數學和閱讀分數減少的差異。 (P = 0.03；數學：閱讀: P = 0.02)。

結論：作者並沒有發現小兒期進行脊髓麻醉的手術持續時間與小學裡學校考試分數之間的任何關係。也沒有發現小兒期的脊髓麻醉和手術治療與小學測試的 VPAA 之間有任何關聯，儘管置信區間很廣。

（李慧 譯 陳傑 校）

BACKGROUND: Observational studies on pediatric anesthesia neurotoxicity have been unable to distinguish long-term effects of general anesthesia (GA) from factors associated with the need for surgery. A recent study on elementary school children who had received a single GA during the first year of life demonstrated an association in otherwise healthy children between the duration of anesthesia and diminished test scores and also revealed a subgroup of children with “very poor academic achievement” (VPAA), scoring below the fifth percentile on standardized testing. Analysis of postoperative cognitive function in a similar cohort of children anesthetized with an alternative to GA may help to begin to separate the effects of anesthesia from other confounders.

METHODS: We used a novel methodology to construct a combined medical and educational database to search for these effects in a similar cohort of children receiving spinal anesthesia (SA) for the same procedures. We compared former patients with a control population of students matched by grade, gender, year of testing, and socioeconomic status.

RESULTS: Vermont Department of Education records were analyzed for 265 students who had a single exposure to SA during infancy for circumcision, pyloromyotomy, or inguinal hernia repair. Exposure to SA and surgery had no significant effect on the odds of children having VPAA. (mathematics: P = 0.18; odds ratio 1.50, confidence interval (CI), 0.83–2.68; reading: P = 0.55; odds ratio = 1.19,
There was no relationship between duration of exposure to SA and surgery and performance on mathematics \((P = 0.73)\) or reading \((P = 0.57)\) standardized testing. There was a small but statistically significant decrease in reading and math scores in the exposed group \((\text{mathematics}: P = 0.03; \text{reading}: P = 0.02)\).

**CONCLUSIONS:** We found no link between duration of surgery with infant SA and scores on academic achievement testing in elementary school. We also found no relationship between infant SA and surgery with VPAA on elementary school testing, although the CIs were wide.

**由單純皰疹病毒載體介導的白細胞介素10在大鼠模型中能阻止由人免疫缺陷病毒gp120導致的神經性疼痛**

Interleukin 10 Mediated by Herpes Simplex Virus Vectors Suppresses Neuropathic Pain Induced by Human Immunodeficiency Virus gp120 in Rats

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Anesthesia & Analgesia 2014 119 693–701

**BACKGROUND:** Human immunodeficiency virus (HIV)–associated sensory neuropathy is a common neurological complication of HIV infection affecting up to 30% of HIV-positive individuals. However, the exact neuropathological mechanisms remain unknown, which hinders our ability to develop effective treatments for HIV-related neuropathic pain (NP). In this study, we tested the hypothesis that inhibition of proinflammatory factors with overexpression of interleukin (IL)-10 reduces HIV-related NP in a rat model.

**METHODS:** NP was induced by the application of recombinant HIV-1 envelope protein gp120 into the sciatic nerve. The hindpaws of rats were inoculated with nonreplicating herpes simplex virus (HSV) vectors expressing anti-inflammatory cytokine IL-10 or control vector. Mechanical threshold was tested using von Frey...
filaments before and after treatments with the vectors. The mechanical threshold response was assessed over time using the area under curves. The expression of phosphorylated p38 mitogen-activated kinase, tumor necrosis factor-α, stromal cell–derived factor-1α, and C-X-C chemokine receptor type 4 in both the lumbar spinal cord and the L4/5 dorsal root ganglia (DRG), was examined at 14 and 28 days after vector inoculation using Western blots.

RESULTS: We found that in the gp120-induced NP model, IL-10 overexpression mediated by the HSV vector resulted in a significant elevation of the mechanical threshold that was apparent on day 3 after vector inoculation compared with the control vector (P < 0.001). The antiallodynic effect of the single HSV vector inoculation expressing IL-10 lasted >28 days. The area under curve in the HSV vector expressing IL-10 was increased compared with that in the control vector (P < 0.0001). HSV vectors expressing IL-10 reversed the upregulation of phosphorylated p38 mitogen-activated kinase, tumor necrosis factor-α, stromal cell–derived factor-1α, and C-X-C chemokine receptor type 4 expression at 14 and/or 28 days in the DRG and/or the spinal dorsal horn.

CONCLUSIONS: Our studies demonstrate that blocking the signaling of these proinflammatory molecules in the DRG and/or the spinal cord using the HSV vector expressing IL-10 is able to reduce HIV-related NP. These results provide new insights on the potential mechanisms of HIV-associated NP and a proof of concept for treating painful HIV sensory neuropathy with this type of gene therapy.

超聲引導下齶大神經阻滯: 一系列病例的解剖描述和臨床評價

Ultrasound-Guided Greater Palatine Nerve Block: A Case Series of Anatomical Descriptions and Clinical Evaluations

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Anesthesia & Analgesia 2014 119 726–730

BACKGROUND: Greater palatine nerve (GPN) block is commonly performed for maxillary and palatal anesthesia by using bony landmarks. Ultrasound (US) can be used to consistently identify greater palatine foramen (GPF) as a defect in the bony palate enabling US-guided injections near the foramen.

METHODS: We scanned and injected 16 undissected well-embalmed hemisectioned cadaveric heads after excluding major anatomical malformations. A linear high-frequency hockey stick probe (7–13 MHz) positioned in long axis to the hard
palate visualized GPF as a discontinuity in the hard palate. US-guided injections of 0.1 mL India ink were made in an oblique plane. Specimens were dissected immediately after injection, and dye distribution was noted. The success rate of identification of GPF, number of attempts, and number of successful injections were recorded. The technique was evaluated clinically in 7 patients undergoing dental procedures. Five patients had US-guided injections, and 2 patients received US-assisted greater palatine canal blocks.

RESULTS: GPF was successfully identified in 16 hemisectioned heads (n = 16). In 7 of 16 hemisectioned cadaveric specimens (n = 7/16), needle pass was seen on the US and traces of India ink were found within the greater palatine canal and pterygopalatine fossa. In the remaining heads (n = 9/16), the dye was observed in the mucosal tissue of the hard palate anterior to the GPF or in the soft palate. Clinical evaluation reconfirmed successful identification of GPF by US in 6 of 7 patients (n = 6/7). US-guided injections were successful in 6 of the 8 attempted blocks (n = 6/8) with median number (range) of attempts being 2 (1–4). US-assisted injections were successful in 2 patients (n = 2/2).

CONCLUSIONS: US has the potential to successfully locate and characterize GPF in normal and edentulous maxilla. US-guided GPN blocks can be technically challenging. The clinical applicability of US guidance or assistance for GPN block needs further evaluation in a larger sample of patients.
BACKGROUND: Although thromboelastometry (ROTEM®) and thrombelastography can be used for bedside diagnosis of fibrinolysis, the time needed for detection is often prolonged. Since untreated fibrinolysis can result in consumption of coagulation factors and bleeding, early diagnosis and decision making are desirable. Accordingly, we assessed ROTEM variables from extrinsically activated assays with (APTEM) and without (EXTEM) addition of aprotinin for their ability to rapidly identify fibrinolysis. Specifically, we tested the hypotheses that prolonged clotting time, clot formation time, low clot firmness (at 5, 10, 15, and 20 minutes, designated A5, A10, A15, and A20, respectively), low maximum clot firmness (MCF) in EXTEM assays, and differences in these variables from parallel APTEM and EXTEM assays (designated as Δvariables) predict fibrinolysis.

METHODS: Data from 411 thromboelastometric measurements (obtained from 352 patients) with fibrinolysis and from 2537 measurements without fibrinolysis (obtained from 1605 patients) were assessed and analyzed using receiver operating characteristics. Data were analyzed as a pooled fibrinolysis cohort, and subanalyses were performed from sets assigned to categories of fibrinolysis related to the timing of thrombus lysis (i.e., a decrease of clot firmness to <15% of MCF within 30, 45, and 60 minutes, respectively). A lower 95% confidence limit of the area under the receiver operating characteristic curve (AUC [SE] <0.6) was considered a failure to substantially improve detection of increased fibrinolysis. AUCs were compared to identify the variable providing the best predictive association with fibrinolysis. As a secondary end point, optimum cutoff values at the point estimate corresponding to the greatest Youden index were calculated along with the respective sensitivities and specificities.

RESULTS: In the pooled cohort, clot formation time (AUC: 0.652 [0.016]), α-angle (AUC: 0.675 [0.015]), A5 (AUC: 0.718 [0.013]), A10 (AUC: 0.734 [0.013]), A15 (AUC: 0.752 [0.013]), A20 (AUC: 0.771 [0.013]), and MCF (AUC: 0.799 [0.012]) predicted fibrinolysis. Fibrinolysis was also predicted by ΔA15 (AUC: 0.675 [0.016]), ΔA20 (AUC: 0.719 [0.015]), and ΔMCF (AUC: 0.812 [0.013]). AUCs increased in a time-related fashion. The ability to predict subsequent fibrinolysis based on thromboelastometry was higher when it occurred early rather than later during testing. However, for prediction of late fibrinolysis, only MCF (AUC: 0.655 [0.025]) appears to be potentially clinically useful.

CONCLUSIONS: Low early values of clot firmness in extrinsically activated thromboelastometric assays are associated with fibrinolysis and improve its early detection. Additional assays with aprotinin fail to improve the early diagnosis of fibrinolysis compared with assays without aprotinin.
BACKGROUND: Anesthetics enhance γ-aminobutyric acid (GABA)-mediated inhibition in the central nervous system. Different agents have been shown to act on tonic versus synaptic GABA receptors to different degrees, but it remains unknown whether different forms of synaptic inhibition are also differentially engaged. With this in mind, we tested the hypothesis that different types of GABA-mediated synapses exhibit different anesthetic sensitivities. The present study compared effects produced by isoflurane, halothane, pentobarbital, thiopental, and propofol on paired-pulse GABAA receptor-mediated synaptic inhibition. Effects on glutamate-mediated facilitation were also studied.

METHODS: Synaptic responses were measured in rat hippocampal brain slices. Orthodromic paired-pulse stimulation was used to assess anesthetic effects on either glutamate-mediated excitatory inputs or GABA-mediated inhibitory inputs to CA1 neurons. Antidromic stimulation was used to assess anesthetic effects on CA1 background excitability. Agents were studied at equieffective concentrations for population spike depression to compare their relative degree of effect on synaptic inhibition.

RESULTS: Differing degrees of anesthetic effect on paired-pulse facilitation at excitatory glutamate synapses were evident, and blocking GABA inhibition revealed a previously unseen presynaptic action for pentobarbital. Although all 5 anesthetics depressed synaptically evoked excitation of CA1 neurons, the involvement of enhanced GABA-mediated inhibition differed considerably among agents. Single-pulse inhibition was enhanced by propofol, thiopental, and pentobarbital, but only marginally by halothane and isoflurane. In contrast, isoflurane enhanced paired-pulse inhibition strongly, as did thiopental, but propofol, pentobarbital, and halothane were less effective.

CONCLUSIONS: These observations support the idea that different GABA synapses use receptors with differing subunit compositions and that anesthetics exhibit differing degrees of selectivity for these receptors. The differing anesthetic sensitivities seen in the present study, at glutamate and GABA synapses, help explain the unique behavioral/clinical profiles produced by different classes of anesthetics and indicate that there are selective targets for new agent development.
背景：術中失血量的精確測量對於補液管理及避免血液製品不必要的輸注具有重要價值。在這項研究中利用外科開腹手術中使用的紗布來計算血液丟失，使用了面部識別技術建模程式設計的平板電腦進行了一個獨特的演算法來測量。在本研究中，我們評估了該系統在外科手術的精確度和性能。

方法：在這項前瞻性、多中心的研究中，入選了46例接受剖腹手術並預期有顯著失血的研究物件，使用Triton系統的特徵提取技術來測量止血紗布中的血紅蛋白(Hb)損耗量。本研究將新系統所測量的Hb損耗量與手工漂洗紗布測定法進行了比較。採用線性回歸和Bland-Altman分析進行準確性評價。此外，本研究還比較了新系統與止血紗布稱重法估計血液丟失量的準確性。

結果：新系統測量的Hb值與沖洗所得的Hb品質之間呈現顯著線性正相關(r=0.93, P<0.0001)。Bland-Altman分析顯示，結果偏移為9.0g，新方法與沖洗血紅蛋白品質之間的差異區間為(-7.5g—25.5g)。這種差異是在臨床差異允許範圍內(±30克)，這大約是一半單位的同種異基因的全血的血紅蛋白含量。Bland-Altman分析表明，止血紗布稱重法估計失血量具有466ml的偏移(高估)，差異區間為(-171ml—1103ml)，可能原因是剖腹手術止血紗布中除了血液還有污染物的存在。

結論：與手工漂洗測量法相比，這種新穎的移動監視系統可以更準確測量手術止血紗布中Hb的品質，並且顯著比止血紗布稱重法精確。當然，還需要進一步的研究來評估臨床使用的價值。

(江凌慧譯 薛張綱校)
Hypovitaminosis D in Hospitalized Patients: A Marker of Frailty or a Disease Requiring Treatment?

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Anesthesia & Analgesia 2014 119 613–618

In this issue of Anesthesia & Analgesia, Turan et al. report on vitamin D levels in adult patients undergoing noncardiac surgery and relate these levels to postoperative complications and death. Despite the methodological issues with retrospective cohort analysis, this study draws attentions to the high prevalence of hypovitaminosis D in hospitalized patients and the association of hypocitaminosis D with nonskeletal complications and mortality. These findings raise a number of questions: Is vitamin D deficiency an underappreciated condition responsible for poor outcomes in surgical patients? Is vitamin D deficiency in surgical patients a cause or just a consequence of poor outcomes? Is surveillance for vitamin D deficiency useful in patients undergoing surgery, and should these patients receive vitamin D supplementation? Unfortunately, there are no simple answers to these questions, but the scientific literature of the last 15 years offers some suggestions about how to conceptualize perioperative vitamin D deficiency. We conducted a narrative review of English-language papers indexed in PubMed from 1999 to 2014 to explore the role of vitamin D in surgical outcomes.
方法：本前瞻性、观察性研究的研究物件为39名进行引产术或成功经阴道分娩的辛格尔顿足月产婦或过月产婦。在产前进行四種有效的心理學問卷（焦虑敏感指数量表[ASI]、懼痛量表[FPQIII]、疼痛災難性感覺量表[PCS]）以及簡式艾森克人格問卷），以對焦慮、自信和鎮痛期望的分級調查。主要觀察指標有開始需要進行硬膜外鎮痛的時間長短、需要進行硬膜外鎮痛時的疼痛程度、疼痛-時間曲線下面積、每小時硬膜外局麻藥用量以及對產後鎮痛的滿意程度。心理學預測與臨床反應之間的關係用雙變數相關與回歸模型描述。

結果：臨床上產後疼痛的曲線下面積（R = 0.45, P = 0.006）、硬膜外局麻藥的應用（R = 0.45, P = 0.019）以及開始需要進行硬膜外鎮痛的時間長短（R = 0.36, P = 0.015）與心理學預測結果相一致。ASI、PCS、人格特徵（撒謊、外向、精神質）以及對焦慮、自信和鎮痛期望的分級均對結果預計有幫助。在應用多變數線性回歸模型進行篩選以後，懼痛量表[FPQIII]和疼痛災難性感覺量表[PCS]均不適合應用於疼痛曲線下面積的預測，而疼痛災難性感覺量表[PCS]則可以（P=0.022）。ASI 和自我報告的焦慮無明顯相關性（r = 0.03, P = 0.91）。

總結：人格特徵（撒謊、外向、精神質）以及對焦慮、自信和鎮痛期望的分級對產痛、硬膜外局麻藥的應用以及開始需要進行硬膜外鎮痛的時間長短的預計有幫助。儘管ASI 包含在預計產後疼痛的曲線下面積的最終模型中（懼痛量表[FPQIII]和疼痛災難性感覺量表[PCS]沒有），ASI 在對疼痛的預計方面是否優於懼痛量表[FPQIII]和疼痛災難性感覺量表[PCS]尚需要進一步研究證實。

（郝光偉譯 薛張綱校）

BACKGROUND: Psychological characteristics may affect interpretation and expression of pain. In this study, we sought to determine whether validated psychological tests predict the labor pain experience.

METHODS: Thirty-nine women with singleton term or post-term pregnancies undergoing induction of labor and successful vaginal delivery comprised the study population for this prospective observational study. Four validated psychological questionnaires (Anxiety Sensitivity Index [ASI], Fear of Pain [FPQIII], Pain Catastrophizing Scale [PCS]), and Eysenck Personality Questionnaire-Short Scale) and 3-scaled ratings of anxiety, confidence, and analgesic expectations were completed before onset of labor. Outcome measures included time to epidural analgesia request, pain at request for epidural analgesia, area under the pain × time curve (AUC), epidural local anesthetic use per hour, and maternal satisfaction with analgesia. The relationship between psychological predictors and clinical responses was assessed using bivariate correlations and regression modeling.

RESULTS: Labor pain AUC (R = 0.45, P = 0.006), epidural local anesthetic use (R = 0.45, P = 0.019), and time to epidural analgesia request (R = 0.36, P = 0.015) were predicted with models incorporating some of the prelabor predictors. ASI, PCS, personality traits (lying, extroversion, psychoticism), and scaled ratings of anxiety, confidence, and analgesic expectations were completed before onset of labor. Outcome measures included time to epidural analgesia request, pain at request for epidural analgesia, area under the pain × time curve (AUC), epidural local anesthetic use per hour, and maternal satisfaction with analgesia. The relationship between psychological predictors and clinical responses was assessed using bivariate correlations and regression modeling.

CONCLUSIONS: Personality traits (psychoticism, extroversion, and lying), as well as scaled ratings of anxiety, confidence, and analgesia expectations, show some potential to predict labor pain, epidural local anesthetic use, and time to epidural analgesia request. Although ASI was included in the final model for labor pain AUC, and FPQ and PCS were not, further study is required to determine whether ASI is a better predictor than FPQ or PCS.
Preclinical studies have established that anesthesia is toxic to the brain in neonatal animals, but scant research investigates the neurodevelopmental effects of exposure to anesthesia. In this article, we discuss the issue of outcome measurement of children after anesthesia administered between infancy and approximately 4 years of age. Recent studies are reviewed with the goal of understanding the contributions and limitations of the extant literature with respect to neurodevelopmental outcome. A review of school-based information (academic achievement and learning disability characterization), which are most frequently applied to measure cognitive outcome in cohort studies, is provided. The strengths and limitations of this literature is reviewed, followed by a discussion of how future trials investigating neurodevelopmental outcome after anesthesia might be improved by procedures designed specifically to assess the status of the central nervous system. Neuropsychological assessment is described and proposed as a way to increase the validity and sensitivity of forthcoming studies that intend to evaluate the short- and long-term effects of exposure to anesthesia during infancy and early childhood.

**Acute Resistance Exercise Induces Antinociception by Activation of the Endocannabinoid System in Rats**

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Anesthesia & Analgesia 2014 119 702–715
BACKGROUND: Resistance exercise (RE) is also known as strength training, and it is performed to increase the strength and mass of muscles, bone strength, and metabolism. RE has been increasingly prescribed for pain relief. However, the endogenous mechanisms underlying this antinociceptive effect are still largely unexplored. Thus, we investigated the involvement of the endocannabinoid system in RE-induced antinociception.

METHODS: Male Wistar rats were submitted to acute RE in a weight-lifting model. The nociceptive threshold was measured by a mechanical nociceptive test (paw pressure) before and after exercise. To investigate the involvement of cannabinoid receptors and endocannabinoids in RE-induced antinociception, cannabinoid receptor inverse agonists, endocannabinoid metabolizing enzyme inhibitors, and an anandamide reuptake inhibitor were injected before RE. After RE, CB1 cannabinoid receptors were quantified in rat brain tissue by Western blot and immunofluorescence. In addition, endocannabinoid plasma levels were measured by isotope dilution-liquid chromatography mass spectrometry.

RESULTS: RE-induced antinociception was prevented by preinjection with CB1 and CB2 cannabinoid receptor inverse agonists. By contrast, preadministration of metabolizing enzyme inhibitors and the anandamide reuptake inhibitor prolonged and enhanced this effect. RE also produced an increase in the expression and activation of CB1 cannabinoid receptors in rat brain tissue and in the dorsolateral and ventrolateral periaqueductal regions and an increase in endocannabinoid plasma levels.

CONCLUSIONS: The present study suggests that a single session of RE activates the endocannabinoid system to induce antinociception.

一項關於心臓外科手術患者的零熱通量皮膚溫度計的研究

An Evaluation of a Zero-Heat-Flux Cutaneous Thermometer in Cardiac Surgical Patients

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Anesthesia & Analgesia 2014 119 543–549

背景：儘管人體的中心溫度可以被測量，但是目前沒有廣泛、可靠、用於體表的溫度計可用，因此我們在測量肺動脈導管的溫度時把標準的零熱通量的溫度計和即時測溫的溫度計進行了比較。特別的，我們假設零熱通量的溫度計具足夠準確的用於常規臨床患者。

方法：在 105 個非急診的心臓手術患者身上，我們用標準的零熱通量深部組織溫度計和熱敏電阻分別測肺動脈導管的溫度，零熱通量的溫度探頭放置於前額的兩
Results: The mean duration in the operating room was 279 ± 75 minutes, and the mean cross-clamp time was 118 ± 50 minutes. All subjects were monitored for an additional 4 hours in the intensive care unit. The average overall difference between forehead zero-heat-flux and pulmonary artery temperatures (i.e., forehead minus pulmonary artery) was −0.23°C (95% limits of agreement of ±0.82); 78% of the differences were ≤0.5°C. The average intraoperative temperature difference was −0.08°C (95% limits of agreement of ±0.88); 84% of the differences were ≤0.5°C. The average postoperative difference was −0.32°C (95% limits of agreement of ±0.75); 84% of the differences were ≤0.5°C. Bias and precision values for neck site were similar to the forehead values. Uncorrected forehead skin temperature showed an increasing negative bias as core temperature decreased.

Conclusions: Core temperature can be noninvasively measured using the zero-heat-flux method. Bias was small, but precision was slightly worse than our designated 0.5°C limits compared with measurements from a pulmonary artery catheter.
BACKGROUND: Recently, clinical trials revealed renal impairment induced by hydroxyethyl starch (HES) in septic patients. In prior studies, we managed to demonstrate that HES accumulated in renal proximal tubule cells (PTCs). The related pathomechanism has not yet been discovered. To validate our hypothesis that the HES molecule itself is harmful, regardless of its molecule size or origin, we conducted a comprehensive study to elucidate the influences of different HES preparations on PTC viability in vitro.

METHODS: Cell viability of human PTC was measured with a cytotoxicity assay, quantifying the reduction of tetrazolium salt to colored formazan. Experiments were performed by assessing the influence of different carrier solutions of HES (balanced, nonbalanced, culture medium), different average molecular weights (70, 130, 200 kDa), different origins (potato or corn derived), and various durations of incubation (2–21 hours). Furthermore, HES 130/0.4 was fractionated by ultrafiltration, and the impact on cell viability of average single-size fractions with <3, 3 to 10, 10 to 30, 30 to 50, 50 to 100, and >100 kDa was investigated. We also tested the possible synergistic effects of inflammation induced by tumor necrosis factor-α.

RESULTS: All tested HES solutions, regardless of origin or carrier matrix, decreased cell viability in an equivalent, dose-dependent manner. Coincubation with tumor necrosis factor-α did not reduce HES-induced reduction of cell viability. Minor differences were detected comparing 70, 130, and 200 kDa preparations. Analysis of fractionated HES revealed that each fraction decreased cell viability. Even small HES molecules (10–30 kDa) were significantly deleterious.

CONCLUSIONS: For the first time, we were able to show that only the total mass of HES molecules applied is responsible for the harmful impact on renal PTC in vitro. Neither molecular size nor their origin showed any relevance.

In Vitro Evaluation of a Novel System for Monitoring Surgical Hemoglobin Loss
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BACKGROUND: Accurate measurement of intraoperative blood loss is an important clinical variable in managing fluid resuscitation and avoiding unnecessary transfusion of blood products. In this study, we measured surgical blood loss using a tablet computer programmed with a unique algorithm modeled after facial recognition technology. The aim of the study was to assess the accuracy and performance of the system on surgical laparotomy sponges in vitro.

METHODS: Whole blood samples of premeasured hemoglobin (Hb) and volume were reconstituted from units of human packed red blood cells and plasma and distributed across surgical laparotomy sponges. Normal saline was added to simulate the presence of varying levels of hemodilution and/or irrigation use. Soaked sponges from 4 different manufacturers were scanned using the Triton System with Feature Extraction Technology (Gauss Surgical, Inc., Palo Alto, CA) under 3 different ambient light conditions in an operating room. Accuracy of Hb loss measurement was evaluated relative to the premeasured values using linear regression and Bland-Altman analysis. Correlations between studied variables and measurement bias were analyzed using nonparametric tests.

RESULTS: The overall mean percent error for measure of Hb loss for the Triton System was 12.3% (95% confidence interval [CI], 8.2%-16.4%). A strong positive linear correlation between the premeasured and actual Hb masses was noted across the full range of intraoperative lighting conditions, including (A) high ($r = 0.95$ [95% CI, 0.93-0.96]), (B) medium ($r = 0.94$ [95% CI, 0.93-0.96]), and (C) low ($r = 0.90$ [95% CI, 0.87-0.93]) mean ambient light intensity. Bland-Altman analysis revealed a bias of 0.01 g [95% CI, -0.03 to 0.06 g] of Hb per sponge between the 2 measures. The corresponding lower and upper limits of agreement were -1.16 g (95% CI, -1.21 to -1.12 g) per sponge and 1.19 g (95% CI, 1.15-1.24 g) per sponge, respectively. Measurement bias of estimated blood loss and Hb mass using the new system were not associated with the volume of saline used to reconstitute the samples ($P = 0.506$).
and P = 0.469, respectively), suggesting that the system is robust under a wide range of sponge saturation conditions.

CONCLUSIONS: Mobile blood loss monitoring using the Triton system is accurate in assessing Hb mass on surgical sponges across a range of ambient light conditions, sponge saturation, saline contamination, and initial blood Hb. Utilization of this tool could significantly improve the accuracy of blood loss estimates.

Positive End-Expiratory Pressure to Increase Internal Jugular Vein Size Is Poorly Tolerated in Obese Anesthetized Adults

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Anesthesia & Analgesia 2014 119 619–621

BACKGROUND: Central venous cannulation is technically challenging in obese patients. We hypothesized that positive end-expiratory pressure (PEEP) increases the size of the internal jugular vein (IJV) in obese adults.

METHODS: The circumference and cross-sectional area of the IJV were measured in obese patients under general anesthesia at PEEP 0, 5, and 10 cm H2O. Results are reported as means ± SE.

RESULTS: PEEP at 10 cm H2O was tolerated by 18 of 24 obese patients. Each 5 cm H2O of PEEP increased the cross-sectional area by 0.16 ± 0.02 cm (P < 0.0001) and the circumference by 0.23 ± 0.03 cm (P < 0.0001).

CONCLUSIONS: PEEP modestly increases the size of the IJV in obese adults but was poorly tolerated because of hypotension.

Development of a Short Version of the Modified Yale Preoperative Anxiety Scale

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Anesthesia & Analgesia 2014 119 643–650

BACKGROUND: The modified Yale preoperative anxiety scale (mYPAS) has been used extensively to evaluate children’s perioperative anxiety. This observation procedure has 5 items, usually evaluated at 4 time points during the preoperative period. However, this complex procedure can be challenging in a busy operating room setting. In this investigation, we examined whether this tool can be simplified and tailored for use in the operating room environment.

METHODS: We used qualitative methods, principal component analysis, Cronbach’s alpha, and effect size to create a short version of the mYPAS.

RESULTS: A short version of the mYPAS, with 2 items, was developed. This version had good internal consistency (α = 0.84) and moderate test-retest reliability (intraclass correlation coefficient = 0.73).

CONCLUSIONS: A short version of the modified Yale preoperative anxiety scale is a reliable and valid tool for use in the operating room setting.
BACKGROUND: The modified Yale Preoperative Anxiety Scale (mYPAS) is the current "criterion standard" for assessing child anxiety during induction of anesthesia and has been used in >100 studies. This observational instrument covers 5 items and is typically administered at 4 perioperative time points. Application of this complex instrument in busy operating room (OR) settings, however, presents a challenge. In this investigation, we examined whether the instrument could be modified and made easier to use in OR settings.

METHODS: This study used qualitative methods, principal component analyses, Cronbach αs, and effect sizes to create the mYPAS-Short Form (mYPAS-SF) and reduce time points of assessment. Data were obtained from multiple patients (N = 3798; Mage = 5.63) who were recruited in previous investigations using the mYPAS over the past 15 years.

RESULTS: After qualitative analysis, the "use of parent" item was eliminated due to content overlap with other items. The reduced item set accounted for 82% or more of the variance in child anxiety and produced the Cronbach α of at least 0.92. To reduce the number of time points of assessment, a minimum Cohen d effect size criterion of 0.48 change in mYPAS score across time points was used. This led to eliminating the walk to the OR and entrance to the OR time points.

CONCLUSIONS: Reducing the mYPAS to 4 items, creating the mYPAS-SF that can be administered at 2 time points, retained the accuracy of the measure while allowing the instrument to be more easily used in clinical research settings.
发作时间（6.1±3.4 vs 28.1±9.2 天；P < 0.001），并且 VAS 评分在第 1 周也比对照组明显减少（40% vs 4.7%）（P < 0.001）。所测量的干预组中所有变量和对照组大部分变量都显示在基线的显著改善（P < 0.05）。组间比较表明，干预组存在更大的改善，在所有时间点的 VAS 评分，肩部疼痛和残疾指数评分（P < 0.05），与大多数的 PROM（P < 0.05）都存在增益。两组都没有严重的不良反应或并发症。

结论：本研究表明，超声引导在采用 PRF 毁损 SSN 与理疗结合应用治疗 AC 较之单纯理疗能够更好更快的缓解疼痛、减少残疾，效果至少持续 12 周。

（许红霞 谭，李士通 审校）

BACKGROUND: The treatment of adhesive capsulitis (AC) is a well-known, complicated, and long process. Recent studies have shown that pulsed radiofrequency (PRF) lesioning of the suprascapular nerve (SSN) using a fluoroscopy- or computed tomography-guided technique can alleviate shoulder pain. However, there are no studies of PRF lesioning of the SSN in patients with AC using ultrasound-guided (UG) techniques, except for 2 case reports. In this study, we compared the effect of physical therapy alone with physical therapy and PRF lesioning of the SSN using a UG technique.

METHODS: Sixty patients with AC were included in the study. Patients were randomized into the following 2 groups: the intervention group containing patients who received 12 weeks of physical therapy after 1 treatment of PRF lesioning of the SSN, and the control group containing patients who received 12 weeks of physical therapy alone. All outcome measurements including visual analog scale (VAS), shoulder pain and disability index, and passive range of motion (PROM) were performed at 1, 4, 8, and 12 weeks after treatment.

RESULTS: Forty-two patients (21 patients in each group) completed the study. The intervention group had a notably shorter time to onset of significant pain relief (6.1 ± 3.4 vs 28.1 ± 9.2 days; P < 0.001) and noticeable reduction of VAS score at week 1 (40% vs 4.7%) than the control group (P < 0.001). All measured variables in the intervention group and most variables in the control group showed significant improvement from the baseline (P < 0.05). A comparison of the 2 groups indicated significantly greater improvement in the intervention group at all times in VAS and shoulder pain and disability index scores (all P < 0.05), and for most gain of PROM (P < 0.05). There were no serious adverse effects or complications in either group.

CONCLUSIONS: This study indicates that the application of PRF lesioning of the SSN using a UG technique combined with physical therapy provided better and faster relief from pain, reduced disability, and improved PROM when compared with physical therapy alone in patients with AC, an effect that persisted for at least 12 weeks.
內麻醉與單獨全身麻醉進行對比; 將椎管內聯合全身麻醉與單獨全身麻醉進行對比, 總結死亡、胸部感染、心肌梗死、和/或嚴重不良事件的結果。本總數採用相同納入標準納入所選研究。

結果: Cochrane 系統評估資料庫中, 9 份概述被納入。其概述品質評估問卷從 4 變化到 6 的, 最大評分為 7 分。從 20 份研究中的 3006 名患者來看, 相比全身麻醉, 椎管內麻醉減少了 0 至 30 天的死亡率（風險比（RR）0.71, 95%置信區間 [CI], 0.53-0.94; I = 0 %）。椎管內麻醉也降低了肺炎的風險（RR 0.45; 95% CI, 0.26-0.79; I = 0%）(基於 5 項研究 400 人)。而兩者心肌梗死發生率無顯著性差異（RR 1.17; 95% CI, 0.57-2.37; I= 0%）(基於 6 項研究 849 名患者)。與單獨全身麻醉相比, 椎管內聯合麻醉對其 0 至 30 天死亡率並沒有影響（RR 1.07; 95% CI, 0.76-1.51; I=0%）(18 項研究 3228 人)。椎管內聯合全身麻醉的心肌梗死風險無顯著差異（RR 0.69; 95% CI, 0.49-0.98; I = 9%）(9 項研究 2433 人)。所有 6 個併發症都被評為中度的, 與椎管內阻滯的相關評分為 9 分（4 至 12 [中位數 {range}]），最高得分為 14。

結論: 對於存在中-高度心臟風險的患者, 椎管內麻醉相對全身麻醉可能降低 0 至 30 天的死亡率。在此, 對比全身麻醉與椎管內麻醉的死亡與其他主要後果, 需要大型隨機對照試驗進一步證明。

（許紅嬌 譯，李士通 審校）

BACKGROUND: This analysis summarized Cochrane reviews that assess the effects of neuraxial anesthesia on perioperative rates of death, chest infections, and myocardial infarction.

METHODS: A search was performed in the Cochrane Database of Systematic Reviews on July 13, 2012. We have included all Cochrane systematic reviews that examined subjects of any age undergoing any type of surgical (open or endoscopic) procedure, compared neuraxial anesthesia to general anesthesia alone for the surgical anesthesia, or neuraxial anesthesia plus general anesthesia to general anesthesia alone for the surgical anesthesia, and included death, chest infections, myocardial infarction, and/or serious adverse events as outcomes. Studies included in these reviews were selected on the same criteria.

RESULTS: Nine Cochrane reviews were selected for this overview. Their scores on the Overview Quality Assessment Questionnaire varied from 4 to 6 of a maximal possible score of 7. Compared with general anesthesia, neuraxial anesthesia reduced the 0- to 30-day mortality (risk ratio [RR] 0.71; 95% confidence interval [CI], 0.53-0.94; I = 0%) based on 20 studies that included 3006 participants. Neuraxial anesthesia also decreased the risk of pneumonia (RR 0.45; 95% CI, 0.26-0.79; I = 0%) based on 5 studies that included 400 participants. No difference was detected in the risk of myocardial infarction between the 2 techniques (RR 1.17; 95% CI, 0.57-2.37; I = 0%) based on 6 studies with 849 participants. Compared with general anesthesia alone, adding neuraxial anesthesia to general anesthesia did not affect the 0- to 30-day mortality (RR 1.07; 95% CI, 0.76-1.51; I = 0%) based on 18 studies with 3228 participants. No difference was detected in the risk of myocardial infarction between combined neuraxial anesthesia-general anesthesia and general anesthesia alone (RR 0.69; 95% CI, 0.44-1.09; I = 0%) based on 8 studies that included 1580 participants. Adding a neuraxial anesthesia to general anesthesia reduced the risk of pneumonia (RR 0.69; 95% CI, 0.49-0.98; I = 9%) after adjustment for publication bias and based on 9 studies that included 2433 participants. The quality of the evidence was judged as moderate for all 6 comparisons. The quality of the reporting score of complications related to neuraxial blocks was 9 (4 to 12 [median {range}]) for a possible maximum score of 14.

CONCLUSIONS: Compared with general anesthesia, neuraxial anesthesia may reduce the 0- to 30-day mortality for patients undergoing a surgery with an intermediate-to-high cardiac risk (level of evidence moderate). Large randomized
controlled trials on the difference in death and major outcomes between regional and general anesthesia are required.