兒童中比伐蘆定的抗凝過程

Bivalirudin for Pediatric Procedural Anticoagulation

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Anesthesia & Analgesia: 2019 128 43–55

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比伐蘆定（新澤西州帕西帕尼，Angiomax）是凝血酶的直接抑制劑，由於兒童中存在肝素誘導的繼發性血小板減少症，比伐蘆定越來越多應用於替代肝素。肝素誘導的血小板減少症相對罕見，而且食品和藥物管理局尚未批准其對兒童的使用，因此關於比伐盧定在兒童中的藥代動力學和藥效學多是由成人資料推算出來。通過回顧既往發表的相關文獻，本篇敘述性綜述將給出兒童中使用比伐蘆定抗凝的建議。

（楊雨迎 譯 潘豔、薛張綱校）

Bivalirudin (Angiomax; The Medicines Company, Parsippany, NJ), a direct thrombin inhibitor, has found increasing utilization as a heparin alternative in the pediatric population, most com- monly for the treatment of thrombosis secondary to heparin-induced thrombocytopenia. Due to the relative rarity of heparin-induced thrombocytopenia as well as the lack of Food and Drug Administration–approved indications in this age group, much of what is known regarding the pharmacokinetics and pharmacodynamics of bivalirudin in this population has been extrapo- lated from adult data. This narrative review will present recommendations regarding the use of bivalirudin for procedural anticoagulation in the pediatric population based on the published literature. (Anesth Analg 2019;128:43–55)

重複應用嗎啡延長雄鼠術後疼痛

Repeated Morphine Prolongs Postoperative Pain in Male Rats

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Anesthesia & Analgesia: 2019 128 161–167

背景:阿片類藥物是有效的術後鎮痛藥。然而，我們曾經報導過嗎啡一類的阿片類藥物會加劇炎性疼痛以及外周和中樞的神經性疼痛。這一不良的效應是由能促

進脊髓背角的神經高興奮性的炎症介質引起的。由此，我們檢驗了圍術期嗎啡的應用在雄鼠中是否能類似的延長術後疼痛。

方法：剖腹手術後，老鼠立即被嗎啡處理了七天，其中第二組嗎啡的用量遞減。脊髓背角表達炎性介質的基因被量化。在最終實驗中，剖腹手術前老鼠應用了七天的嗎啡。

結果:我們發現剖腹手術後應用嗎啡延長了術後三周的疼痛。（時間*用量：p 小於 0.001；時間：p 小於 0.001；用量：p 小於 0.5）術後疼痛延長和嗎啡撤量無關，所以它不會由劑量遞減而預防。（時間*用量：p=0.8；時間：p 小於 0.001；用量：p=0.9）。延長的術後疼痛和炎症基因的表達增加相關，包括表達 toll 樣受體 4，NLRP3，NFkB，caspase-1，干擾素 1，腫瘤壞死因數（p 小於 0.05）。最後我們展示了術前應用嗎啡，包括剖腹術前立刻應用嗎啡，相似的延長了疼痛。（時間*用量：p 小於 0.001；時間：p 小於 0.001；用量：p 小於 0.001）嗎啡潛在引起疼痛有效應窗，在術前一周應用七天嗎啡不會延長術後疼痛。

結論：這些研究表明嗎啡對術後疼痛有一定不良效應。這些研究提示臨床應進一步研究阿片類藥物是否延長術後疼痛。

（劉璐萍 譯 潘豔、薛張綱校）

BACKGROUND: Opioids are effective postoperative analgesics. Disturbingly, we have previously reported that opioids such as morphine can worsen inflammatory pain and peripheral and central neuropathic pain. These deleterious effects are mediated by immune mediators that promote neuronal hyperexcitability in the spinal dorsal horn. Herein, we tested whether perioperative morphine could similarly prolong postoperative pain in male rats.
METHODS: Rats were treated with morphine for 7 days, beginning immediately after laparotomy, while the morphine was tapered in a second group. Expression of genes for inflammatory mediators was quantified in the spinal dorsal horn. In the final experiment, morphine was administered before laparotomy for 7 days.
RESULTS: We found that morphine treatment after laparotomy extended postoperative pain by more than 3 weeks (time × treatment: $P < .001$; time: $P < .001$;

treatment: P < .05). Extension of postoperative pain was not related to morphine withdrawal, as it was not prevented by dose tapering (time × treatment: P = .8; time: P < .001; treatment: P = .9). Prolonged postsurgical pain was associated with increased expression of inflammatory genes, including those encoding Toll-like receptor 4, NOD like receptor protein 3 (NLRP3), nuclear factor kappa B (NFκB), caspase-1, interleukin-1β, and tumor necrosis factor (P < .05). Finally, we showed that of preoperative morphine, concluding immediately before laparotomy, similarly prolonged postoperative pain (time × treatment: P < .001; time: P < .001; treatment: P < .001). There is a critical window for morphine potentiation of pain, as a 7-day course of morphine that concluded 1 week before laparotomy did not prolong postsurgical pain.
CONCLUSIONS: These studies indicate the morphine can have a deleterious effect on postoperative pain. These studies further suggest that longitudinal studies could be performed to test whether opioids similarly prolong postoperative pain in the clinic.

認識到中國神經軸突分娩鎮痛的先驅張廣博博士和她半個多世紀前未發表的手稿

Recognizing the Chinese Pioneer of Neuraxial Labor Analgesia Dr Guang-Bo Zhang and Her Unpublished Manuscript From More Than a Half-Century Ago

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Anesthesia & Analgesia: 2019 128 119–122

張廣博醫生是中國第一個管理和研究分娩硬膜外鎮痛效果的麻醉醫生。1963 年 9 月至 1964 年 3 月，她進行了一項觀察性研究，評估神經軸系鎮痛對分娩婦女的影響。她展示了她的研究並準備了一篇文章;然而，由於 1966 年開始的無產階級文化大革命，她的作品沒有出版。文革期間，她成功地將未發表的文章、筆記和幻燈片保存在北京附近的一個鄉村。這些 54 歲以前未發表的文獻是中國已知的第一例神經軸突分娩鎮痛臨床試驗。

(高華原 譯 潘豔、薛張綱校)

Dr Guang-Bo Zhang was the first anesthesiologist to administer and study the effects of labor epidural analgesiain China. Between September 1963 and March 1964, she conducted an observational study evaluating the effects of neuraxial analgesia for laboring women. She presented her research and prepared an article; however, due to the Great Proletarian Cultural Revolution (Cultural Revolution), which began in 1966, her work went unpublished. She successfully preserved her unpublished article, notes, and slides throughout the Cultural Revolution by hiding them in a countryside location near Beijing. These 54-year-old, previously unpublished documents represent the first known clinical trial of neuraxial labor analgesia conducted in China.

胃超聲檢測“滿胃”的準確性

Diagnostic Accuracy of Point-of-Care Gastric Ultrasound

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Anesthesia & Analgesia: 2019 128 89–95

背景: 肺吸入式胃內容物與術後發病率和死亡率有著顯著的聯繫。 先前的研究已經調查了胃超聲評估床邊胃內容物的有效性、可靠性和可能存在的臨床影響。在本研究中，我們檢查了護理胃超聲檢測“滿胃”的準確性(作為敏感性、特異性和似然比的評估)。

方法: 40 名健康志願者在禁食至少 8 小時後，按 1：1 的比例隨機被分為兩組，一組保持禁食另一組志願者攝入標準數量的透明液體或固體食物。 每個受試者被隨機分為兩組，每組 24 小時內至少進行兩次獨立的研究。胃超聲檢查是由一位失明的超聲檢查人員按照標準掃描方案進行的。採用定性和定量相結合的方法，將結果歸納為陽性(任何固體或>1.5ml/kg 清液)或陰性(無固體和≤1.5ml/kg 清液)。

結果: 本研究對 80 個研究階段的資料進行了分析。 在這個預先測試概率為 50%的模擬臨床場景中，注意點胃超聲的敏感性為 1.0(95%可信區間[CI]，0.925~1.0)，特異性為 0.975(95%CI，0.95-1.0)。陽性似然比為 40.0(95%CI，10.33-∞)，負似

然比為 0(95%CI，0~0.072)，陽性預測值為 0.976(95%CI，0.878~1.0)，陰性預測值為 1.0(95%CI，0.92-1.0)。

結論: 結果表明，床邊胃超聲是高度敏感和特異的，在不確定是否存在胃內容物的臨床案例中，專門用於檢測或排除飽胃。

（符奕青 譯 潘豔、薛張綱校）

Background: Pulmonary aspiration of gastric contents is associated with significant perioperative morbidity and mortality. Previous studies have investigated the validity, reliability, and possible clinical impact of gastric ultrasound for the assessment of gastric content at the bedside. In the present study, we examined the accuracy (evaluated as sensitivity, specificity, and likelihood ratios) of point-of-care gastric ultrasound to detect a "full stomach" in a simulated scenario of clinical equipoise.
Methods: After a minimum fasting period of 8 hours, 40 healthy volunteers were randomized in a 1:1 ratio to either remain fasted or ingest a standardized quantity of clear fluid or solid. Each subject was randomized twice on 2 independent study sessions at least 24 hours apart. A gastric ultrasound examination was performed by a blinded sonographer following a standardized scanning protocol. Using a combination of qualitative and quantitative findings, the result was summarized in a dichotomous manner as positive (any solid or >1.5 mL/kg of clear fluid) or negative (no solid and ≤1.5 mL/kg of clear fluid) for full stomach.
Results: Data from 80 study sessions were analyzed. In this simulated clinical scenario with a pretest probability of 50%, point-of-care gastric ultrasound had a sensitivity of 1.0 (95% confidence interval [CI], 0.925-1.0), a specificity of 0.975 (95% CI, 0.95-1.0), a positive likelihood ratio of 40.0 (95% CI, 10.33-∞), a negative likelihood ratio of 0 (95% CI, 0-0.072), a positive predictive value of 0.976 (95% CI, 0.878-1.0), and a negative predictive value of 1.0 (95% CI, 0.92-1.0). **Conclusions:** Our results suggest that bedside gastric ultrasound is highly sensitive and specific to detect or rule out a full stomach in clinical scenarios in which the presence of gastric content is uncertain.

女性在麻醉學術界的地位：最近 10 年

Status of Women in Academic Anesthesiology: A 10-Year Update
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背景：性別不平等在當今的醫療行業中仍然普遍存在。 過去的研究已調查了女性在麻醉學術界的地位。本研究的目的則是提供有關女性麻醉醫師在麻醉學術界

地位的最新資訊。 過去 10 年中女性麻醉醫師的人數雖然有所增加，但性別差異仍然存在，尤其是在領導階層方面。

方法：醫學生，住院醫師和醫務人員的資料來自美國醫學院協會。 在 2006 年至 2016 年期間，比較了在麻醉科住院醫師和醫務人員這個級別的女性人數，以及麻醉部門女性主席的數量。在其他的領導角色中，麻醉學期刊編輯委員會成員的性別分佈和麻醉研究獲獎者的資料，主要來自互聯網，並與 2005 年和 2006 年的資料進行比較。

結果：在 2006 年，女性麻醉科住院醫師/醫務人員的數量從 1570（32％）/ 1783（29％）增加到 2145（35％）/ 2945（36％）（P = .004 和 P <.001）。 自 2006 年以來，女性麻醉科醫師每年增加的幾率約 2％，比值比約為 1.02（95％置信區間，1.014-1.025; P <.001）。 2015 年，麻醉科女性正教授的比例（7.4％）低於男性正教授（17.3％）（差值，-9.9％; 95％的置信區間差異，-8.5％—-11.3％; P <.001）。 從 2006 年到 2016 年，麻醉科女性主席的比例保持不變（12.7％對 14.0％）（P = 0.75）。 到目前為止，無論是《麻醉和鎮痛》還是《麻醉學》雜誌都沒有一位女主編。 麻醉科女性研究獲獎者人數百分比從 1997-2007 年的 21.1％顯著增加到 2007-2016 年的 31.5％（P = .02）。

結論：麻醉學術界領導層及以上的階層仍然存在性別差異，主要是正教授，部門主任和期刊編輯。 然而，有一些跡象表明，女性可能正在走向領導平等的道路，最值得注意的是，女性在麻醉住院醫師和其他醫務人員中的數量在增長以及獲得研究獎項的女性數量在增長。

（潘豔 譯 薛張綱校）

BACKGROUND: Gender inequity is still prevalent in today's medical workforce. Previous studies have investigated the status of women in academic anesthesiology.

The objective of this study is to provide a current update on the status of women in academic anesthesiology. We hypothesized that while the number of women in academic anesthesiology has increased in the past 10 years, major gender disparities continue to persist, most notably in leadership roles.
METHODS: Medical student, resident, and faculty data were obtained from the Association of American Medical Colleges. The number of women in anesthesiology at the resident and faculty level, the distribution of faculty academic rank, and the number of women chairpersons were compared across the period from 2006 to 2016. The gender distribution of major anesthesiology journal editorial boards and data on anesthesiology research grant awards, among other leadership roles, were collected from websites and compared to data from 2005 and 2006.
RESULTS: The number (%) of women anesthesiology residents/faculty has increased from 1570 (32%)/1783 (29%) in 2006 to 2145 (35%)/2945 (36%) in 2016 (P = .004 and P < .001, respectively). Since 2006, the odds that an anesthesiology faculty member was a woman increased approximately 2% per year, with an estimated odds ratio of 1.02 (95% confidence interval, 1.014-1.025; P < .001). In 2015, the percentage of women anesthesiology full professors (7.4%) was less than men full professors (17.3%) (difference, -9.9%; 95% confidence interval of the difference, -8.5% to -11.3%; P < .001). The percentage of women anesthesiology department chairs remained unchanged from 2006 to 2016 (12.7% vs 14.0%) (P = .75). To date, neither Anesthesia & Analgesia nor Anesthesiology has had a woman Editor-in-Chief. The percentage of major research grant awards to women has increased significantly from 21.1% in 1997-2007 to 31.5% in 2007-2016 (P = .02).
CONCLUSIONS: Gender disparities continue to exist at the upper levels of leadership in academic anesthesiology, most importantly in the roles of full professor, department chair, and journal editors. However, there are some indications that women may be on the path to leadership parity, most notably, the growth of women in anesthesiology residencies and faculty positions and increases in major research grants awarded to women.

麻醉相關的專案依從性對於住院時間的影響：結果來自一項結直腸手術開展 ERAS 的佇列研究

The Impact of Anesthesia-Influenced Process Measure Compliance on Length of Stay：Results From an Enhanced Recovery After Surgery for Colorectal Surgery Cohort

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Anesthesia & Analgesia: 2019 128 68-74

背景：在加速康復外科（ERAS）中，患者的項目依從性與 ERAS 的結局改善相關。由此，我們試圖在一項關於結直腸手術開展 ERAS 專案的佇列研究中，評估與麻醉直接相關的項目依從性的影響。

方法：從 2013 年 1 月到 2015 年 4 月，我們收集了 1140 名連續的患者的資料，包括實施 ERAS 之前的和 ERAS 開展之後的。我們分析了直接受麻醉師或急性疼痛服務影響的 9 項特定項目措施的依從性，以評估其對住院時間(LOS)的影響。

結果：專案措施依從性與住院時間的逐步減少相關。能夠接受多於 4 項專案措施(高依從性)患者與低依從性(0-2 項項目措施)的患者相比，住院時間顯著縮短(發病率比值[IRR]，0.77; 95%可信區間[CI],0.70 -0.85;P < 0.001)。多變數回歸表明，多模式噁心嘔吐預防措施的使用(IRR, 0.78;95%CI,0.68 -0.89;P < 0.001)、術後非甾體類鎮痛藥的定時使用(IRR, 0.76;95%CI,0.67 -0.85;P < 0.001)以及對於爆發痛嚴格遵守術後阿片類藥物的給藥方案(IRR, 0.58；95%CI, 0.51-0.67; P < 0.001)都與住院時間降低獨立相關。

結論：我們的研究結果表明，在麻醉師的直接作用下以及在一個正式的麻醉方案的配合下，患者專案依從性的增加與住院時間降低有關。麻醉同事在整個手術過程中的參與增加了圍術期監管的整體價值。

(李艾倫 譯 潘豔、薛張綱校)

BACKGROUND: Process measure compliance has been associated with improved outcomes in enhanced recovery after surgery (ERAS) programs. Herein, we sought to assess the impact of compliance with measures directly influenced by anesthesiology in an ERAS for colorectal surgery cohort.

METHODS: From January 2013 to April 2015, data from 1140 consecutive patients were collected for all patients before (pre-ERAS) and after (ERAS) implementation of

an ERAS program. Compliance with 9 specific process measures directly influenced by the anesthesiologist or acute pain service was analyzed to determine the impact on hospital length of stay (LOS).
RESULTS: Process measure compliance was associated with a stepwise reduction in LOS. Patients who received >4 process measures (high compliance) had a significantly shorter LOS (incident rate ratio [IRR], 0.77; 95% CI, 0.70–0.85); P < .001) compared to low compliance (0–2 process measures) counterparts. Multivariable regression suggests that utilization of multimodal nausea and vomiting prophylaxis (IRR, 0.78; 95% CI, 0.68–0.89; P < .001), scheduled postoperative nonsteroidal pain medication use (IRR, 0.76; 95% CI, 0.67–0.85; P < .001), and strict adherence to a postoperative opioid administration (IRR, 0.58; 95% CI, 0.51–0.67; P < .001) protocol for breakthrough pain were independently associated with reduced LOS.
CONCLUSIONS: Our findings suggest that increased compliance with process measures directly influenced by the anesthesiologists and in concert with a formal anesthesia protocol is associated with reduced LOS. Engaging anesthesiology colleagues throughout the surgical encounter increases the overall value of perioperative care.

終末期腎病患者的七氟醚最低肺泡蘇醒濃度降低

Minimum Alveolar Concentration-Awake of Sevoflurane Is Decreased in Patients With End-Stage Renal Disease.
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Anesthesia & Analgesia: 2019 128:77-82

背景：終末期腎病(ESRD)已被證實與神經功能異常有關。臨床上使用的吸入麻醉藥通常通過中樞神經系統中的多個靶受體發揮作用。大腦的病理性變化可能改變機體對吸入麻醉藥的敏感性。本研究旨在比較 ESRD 患者與腎功能正常的患者的七氟醚的最低肺泡蘇醒濃度(MAC-awake)。

方法：根據改進的 Dixon 序貫法，患者以預先選擇的七氟醚濃度進行吸入誘導，起始濃度為 1.0%，間隔 0.2%。在接下來的每一個病人中，七氟醚的濃度將根據前一病人是否對口頭指令做出積極反應而增加或減少。我們還檢測了血清神經元

特異性烯醇化酶濃度，它是神經元受損的的生物標誌物。

結果：本研究共納入患者 41 例：其中 ESRD 患者 20 例，對照組 21 例。在 ESRD 患者中，七氟醚的 MAC-awake 明顯低於對照組(0.56%[標準差{SD} = 0.10%] vs 0.67% [SD = 0.08%];P = .031)。ESRD 患者的血清神經元特異性烯醇化酶濃度高於對照組(16.4 ng/mL [SD = 5.0] vs 8.7 ng/mL [SD = 2.9]);P <0.01)。

結論：與腎功能正常的患者相比，ESRD 患者的七氟醚 MAC-awake 較腎功能正常的患者低。腦功能受損可能是導致其降低的部分原因。

（陳瑩 譯 潘豔、薛張綱校）

BACKGROUND : End-stage renal disease (ESRD) has been shown to be associated with abnormal neural function. Clinically used inhaled anesthetic agents typically exert their effect through multiple target receptors in the central nervous system. Pathological changes in the brain may alter sensitivity to inhaled anesthetic agents. This study aimed to determine the minimum alveolar concentration-awake (MACawake) of sevoflurane in patients with ESRD compared to patients with normal renal function.
METHODS: Patients underwent inhalational induction of anesthesia and received sevoflurane at a preselected concentration according to a modified Dixon "up-and-down" method starting at 1.0% with a step size of 0.2%. The concentration of sevoflurane used for each consecutive patient was increased or decreased based on a positive or negative response to verbal command in the previous patient. Serum neuron-specific enolase, a biomarker of impaired neurons, was also measured.
RESULTS: Forty-one patients were enrolled: 20 with ESRD and 21 as controls. The MACawake of sevoflurane in patients with ESRD was significantly lower than that observed in the control group (0.56% [standard deviation {SD} = 0.10%] vs 0.67% [SD = 0.08%]; P = .031). Patients with ESRD exhibited higher serum neuron-specific enolase levels compared to the control group (16.4 ng/mL [SD = 5.0] vs 8.7 ng/mL [SD = 2.9]; P < .001).
CONCLUSIONS: MACawake of sevoflurane is somewhat lower in patients with ESRD compared to those with normal renal function. Impaired cerebral function may partly contribute to the reduction in anesthetic requirement.

術中血流動力學和超聲心動圖監測左心室輔助裝置植入後併發的嚴重右室衰竭

Intraoperative Hemodynamic and Echocardiographic Measurements Associated with Severe Right Ventricular Failure After Left Ventricular Assist Device Implantation

Gudejko MD, Gebhardt BR, Zahedi F, Jain A, Breeze JL, Lawrence MR, Shernan SK, Kapur NK, Kiernan MS, Couper G, Cobey FC.
Anesthesia & Analgesia: 2019 128 25–32

背景：左心室輔助裝置（LVAD）植入後發生的嚴重右室衰竭（RVF）可導致併發症發生率和死亡率增高。作者研究術中右心血流動力學資料、超聲心動圖參數與是否發生嚴重右室衰竭的關係。

方法：此綜述回顧了 2013 年 5 月至 2016 年 5 月接受 LVAD 植入的患者。嚴重 RVF 定義為需要右室機械支援裝置、強心藥物、和/或吸入性肺血管擴張劑持續應用大於 14 天。根據病例回顧計算右室心衰危險度評分及收集右心血流動力學資料。在兩個時期測量肺動脈搏動指數(PAPi)[（肺動脈收縮壓－肺動脈舒張壓）/中心靜脈壓]（1）體外迴圈(CPB)開始前 30 分鐘；以及（2）關胸後。在體外迴圈前後由不知情人員測量超聲心動圖資料。採用單變數回歸模型測量血流動力學和超聲心動圖情況。

結果：共收集 110 位 LVAD 植入患者。其中 25 位不符合右心衰標準。剩下 85 位患者，28 名（33%）符合嚴重 RVF 診斷。嚴重 RVF 相關的血流動力學資料表現為：除了 CPB 開始前(18 ± 9 vs 13 ± 5 mm Hg; P = .0008)和關胸後(0.9 ± 0.5 vs 1.5 ± 0.8; P = .0008) PAPi 更低以外，關胸時中心靜脈壓更高(18 ± 9 vs 13 ± 5 mm Hg; P = .0008)。CPB 開始後嚴重 RVF 相關的超聲心動圖資料包括：右房長軸直徑更長(0.9 ± 0.2 vs 1.1 ± 0.3 cm; P = .008)，右室收縮末面積更大(22.6 ± 8.4 vs 18.5 ± 7.9 cm; P = .03)，面積變化分數更低(20.2 ± 10.8 vs 25.9 ± 12.6; P = .04)，三尖瓣環收縮期移位更小(0.9 ± 0.2 vs 1.1 ± 0.3 cm; P = .008)。右室心衰危險度評分並並非嚴重 RVF 的顯著預測因數。關胸後中心靜脈壓和關胸後 PAPi 較其它的變數能更好地區分是否發生嚴重 RVF，其曲線下面積均為 0.75(95% CI, 0.64-0.86)。

結論：關胸後中心靜脈壓和肺動脈搏動指數與嚴重右心衰竭顯著相關。體外迴圈後使用超聲心動圖評估右室功能的參數與嚴重右室衰竭的相關性較弱。

（黃思銘 譯　陳傑 校）

BACKGROUND: Severe right ventricular failure (RVF) after left ventricular assist device (LVAD) implantation increases morbidity and mortality. We investigated the association between intraoperative right heart hemodynamic data, echocardiographic parameters, and severe versus nonsevere RVF.
METHODS: A review of LVAD patients between March 2013 and March 2016 was performed. Severe RVF was defined by the need for a rightventricular mechanical support device, inotropic, and/or inhaled pulmonary vasodilator requirements for >14 days. From a chart review, the right ventricular failure risk score was calculated and right heart hemodynamic data were collected. Pulmonary artery pulsatility index (PAPi) [(pulmonary artery systolic pressure - pulmonary artery diastolic pressure)/central venous pressure (CVP)] was calculated for 2 periods: (1) 30 minutes before cardiopulmonary bypass (CPB) and (2) after chest closure. Echocardiographic data were recorded pre-CPB and post-CPB by a blinded reviewer. Univariate logistic regression models were used to examine the performance of hemodynamic and echocardiographicmetrics.
RESULTS: A total of 110 LVAD patients were identified. Twenty-five did not meet criteria for RVF. Of the remaining 85 patients, 28 (33%) met criteria for severe RVF. Hemodynamic factors associated with severe RVF included: higher CVP values after chest closure (18 ± 9 vs 13 ± 5 mm Hg; P = .0008) in addition to lower PAPi pre-CPB (1.2 ± 0.6 vs 1.7 ± 1.0; P = .04) and after chest closure (0.9 ± 0.5 vs 1.5 ± 0.8; P = .0008). Post-CPB echocardiographic findings associated with severe RVF included: larger right atrial diameter major axis (5.4 ± 0.9 vs 4.9 ± 1.0 cm; P = .03), larger right ventricle end-systolic area (22.6 ± 8.4 vs 18.5 ± 7.9 cm; P = .03), lower fractional area of change (20.2 ± 10.8 vs 25.9 ± 12.6; P = .04), and lower tricuspid annular plane systolic excursion (0.9 ± 0.2 vs 1.1 ± 0.3 cm; P = .008). Right ventricular failure risk score was not a significant predictor of severe RVF. Post-chest closure CVP and post-chest closure PAPi discriminated severe from nonsevere RVF better than other variables measured, each with an area under the curve of 0.75 (95% CI, 0.64-0.86).
CONCLUSIONS: Post-chest closure values of CVP and PAPi were significantly associated with severe RVF. Echocardiographic assessment of RV function post-CPB was weakly associated with severe RVF.

門診前交叉韌帶重建術中區域阻滯的循證

第一部分 股神經阻滯

Evidence Basis for Regional Anesthesia in Ambulatory Anterior Cruciate Ligament Reconstruction

Part I—Femoral Nerve Block
Vorobeichik L, Brull R, Joshi GP, Abdallah FW.
Anesthesia & Analgesia: 2019 128 58–65

目前門診前交叉韌帶重建術（ACLR）後最佳的疼痛治療方法尚未明確。股神經阻滯（FNB）被認為能增強術後鎮痛，但其作用在現代多模式鎮痛中的地位尚不清楚。本文系統綜述探討了無論使用的鎮痛方案是否包括局部滴注鎮痛（LIA），在多模式鎮痛中添加 FNB 對 ACLR 術後鎮痛效果的影響。作者檢索了與單獨使用多模式鎮痛（對照）相比，評估多模式鎮痛中添加 FNB 對 ACLR 術後鎮痛效果影響的隨機對照試驗。作者將術後 24 小時阿片類藥物使用量作為主要預後指標。次要預後指標包括術後 24-48 小時的阿片類藥物使用量、0-48 小時的靜息和動態疼痛評分、疼痛解救時間、PACU 停留和住院時間、患者滿意度、術後噁心嘔吐、功能性預後和長期（>1 個月）股四頭肌強度。納入了 8 項隨機對照試驗（716 例患者）。5 項試驗比較了 FNB 和對照，另外 3 項試驗比較了聯合 FNB 和 LIA 和單獨 LIA。與對照組相比，在 3 個試驗中有 2 個試驗顯示加用 FNB 可適度減少 24 小時阿片類藥物使用量，1 個試驗中 1 小時內及另一試驗中長達 24 小時的靜息痛有所改善。然而，與單獨 LIA 相比，聯合 FNB 和 LIA 在任何試驗中都沒顯示其能減少阿片類藥物使用量，僅在 1 個試驗中確實在 20 分鐘內改善了疼痛評分。回顧性試驗中，沒有 FNB 對 ACLR 術後長期股四頭肌力量或功能影響的評估。當前證據表明，將 FNB 添加到 ACLR 的多模式鎮痛中的收益較弱且存在爭議。但如果多式鎮痛方案包括 LIA，則加入 FNB 沒有益處。作者研究結果不支持 ACLR 患者常規使用 FNB 進行鎮痛

（蔣長青　譯　陳傑 校）

The optimal management of pain after ambulatory anterior cruciate ligament reconstruction (ACLR) is unclear. Femoral nerve block (FNB) is purported to

enhance postoperative analgesia, but its effectiveness in the setting of modern multimodal analgesia is unclear. This systematic review examines the effect of adding FNB to multimodal analgesia on analgesic outcomes after ACLR, whether or not the analgesic regimen used included local instillation analgesia (LIA). We retrieved randomized controlled trials evaluating the effects of adding FNB to multimodal analgesia on analgesic outcomes after ACLR, compared to multimodal analgesia alone (control). We designated postoperative opioid consumption at 24 hours as our primary outcome. Secondary outcomes included postoperative opioid consumption at 24-48 hours, rest, and dynamic pain severity between 0 and 48 hours, time to analgesic request, postanesthesia care unit and hospital stay durations, patient satisfaction, postoperative nausea and vomiting, functional outcomes, and long-term (>1 month) quadriceps strength. Eight randomized controlled trials (716 patients) were identified. Five trials compared FNB administration to control, and another 3 compared the combination of FNB and LIA to LIA alone. Compared to control, adding FNB resulted in modest reductions in 24-hour opioid consumption in 2 of 3 trials, and improvements in rest pain at 1 hour in 1 trial and up to 24 hours in another.。

In contrast, the combination of FNB and LIA, compared to LIA alone, did not reduce opioid consumption in any of the trials, but it did improve pain scores at 20 minutes only in 1 trial. The effect of FNB on long-term quadriceps strength or function after ACLR was not evaluated in the reviewed trials. Contemporary evidence suggests that the benefits of adding FNB to multimodal analgesia for ACLR are modest and conflicting, but there is no incremental analgesic benefit if the multimodal analgesic regimen included LIA. Our findings do not support the routine use of FNB for analgesia in patients having ACLR.

麻醉影響的過程監測依從性對住院時間的影響：一項結直腸手術加速康復外科佇列研究的結果

The Impact of Anesthesia-Influenced Process Measure Compliance on Length of Stay：Results From an Enhanced Recovery After Surgery for Colorectal Surgery Cohort

Grant MC1, Pio Roda CM1, Canner JK1, Sommer P1, Galante D1, Hobson D1, Gearhart S1, Wu CL1, Wick E2.
Anesthesia & Analgesia: 2019 128 68–74

背景：過程測量的依從性與改善加速康復外科（ERAS）預後相關。在此作者試圖評估在結直腸手術中麻醉直接影響的監測指標的依從性對患者預後的影響。

方法：資料納入了自 2013 年 1 月至 2015 年 4 月參與並完成 ERAS 專案的 1140 名患者，連續記錄了 ERAS 實施前後的資料。分析了直接接受麻醉醫生或急性疼痛服務的 9 項特定專案過程測量的依從性，確定其對住院時間（LOS）的影響。

結果：過程測量的依從性與 LOS 逐步減少有關。與依從性低的患者（接受 0-2 項過程測量）相比，接受 4 項以上過程測量的患者（依從性高），LOS 明顯減少（IRR 0.77；95% Cl，0.70-0.85，p＜0.01）；多變數回歸統計結果表明，多模式噁心嘔吐預防的應用（IRR，0.78；95% Cl，0.68-0.89；p＜0.001）、有計劃的術後非甾體類鎮痛藥物的應用（IRR, 0.76; 95% Cl,0.51-0.67；p＜0.001）、減少術後爆發痛時阿片類藥物的使用（IRR, 0.58;95% Cl，0.51-0.67；p＜0.001），分別可減少 LOS。

結論：作者研究表明，在麻醉醫師的直接影響下，並配合正式的麻醉方案，依從性的增加與降低 LOS 有關。整個手術過程中，麻醉醫師的參與增加了圍手術期監護的整體價值。

（張驍 譯　陳傑 校）

BACKGROUND: Process measure compliance has been associated with improved outcomes in enhanced recovery after surgery (ERAS) programs. Herein, we sought to assess the impact of compliance with measures directly influenced by anesthesiology in an ERAS for colorectal surgery cohort.
METHODS: From January 2013 to April 2015, data from 1140 consecutive patients were collected for all patients before (pre-ERAS) and after (ERAS) implementation of an ERAS program. Compliance with 9 specific process measures directly influenced by the anesthesiologist or acute pain service was analyzed to determine the impact on hospital length of stay (LOS).
RESULTS: Process measure compliance was associated with a stepwise reduction in LOS. Patients who received >4 process measures (high compliance) had a significantly shorter LOS (incident rate ratio [IRR], 0.77; 95% CI, 0.70-0.85); P < .001) compared to low compliance (0-2 process measures) counterparts. Multivariable regression suggests that utilization of multimodal nausea and vomiting prophylaxis (IRR, 0.78; 95% CI, 0.68-0.89; P < .001), scheduled postoperative nonsteroidal pain medication use (IRR, 0.76; 95% CI, 0.67-0.85; P < .001), and strict

adherence to a postoperative opioid administration (IRR, 0.58; 95% CI, 0.51-0.67; P < .001) protocol for breakthrough pain were independently associated with reduced LOS.
CONCLUSIONS: Our findings suggest that increased compliance with process measures directly influenced by the anesthesiologists and in concert with a formal anesthesia protocol is associated with reduced LOS. Engaging anesthesiology colleagues throughout the surgical encounter increases the overall value of perioperative care.

終末期腎病患者七氟烷最小蘇醒肺泡有效濃度降低

Minimum Alveolar Concentration-Awake of Sevoflurane Is Decreased in Patients With End-Stage Renal Disease

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Wu Y1, Jin S1, Zhang L2, Cheng J3, Hu X1, Chen H1, Zhang Y1.
Anesthesia & Analgesia: 2019 128 77–82

背景：終末期腎病（ESRD）已被證明與神經功能異常密切相關。臨床上使用的吸入麻醉藥通常通過中樞神經系統中的多個靶受體發揮其作用。大腦中的病理變化可能改變其對吸入性麻醉藥的敏感性。本研究旨在確定 ESRD 患者七氟烷最小蘇醒肺泡有效濃度（MACawake）與腎功能正常患者相比的差異。

方法：患者接受吸入麻醉誘導，根據改進的 Dixon 序貫法（起始濃度為 1.0%，每次增加 0.2%）設置誘導時七氟烷的濃度。基於先前患者對口頭命令的積極或消極反應增減後續患者的七氟烷濃度。與此同時，測量患者血清中神經元特異性烯醇化酶、神經元受損的生物標誌物的水準。

結果：本研究招募了 41 名患者，其中 ESRD 組 20 名，對照組 21 名。 ESRD 患者的七氟醚 MACawake 顯著低於對照組（0.56％[標準差 0.10％]vs0.67％[標準差 0.08％]; P=0.031）。與對照組相比，ESRD 患者血清中神經元特異性烯醇酶水準更高（16.4ng/mL[標準差 5.0]vs8.7ng/mL[標準差 2.9];P<0.001）。

結論：與腎功能正常者相比，ESRD 患者的七氟醚 MACawake 略低，腦功能受損在其中可能起了部分作用。

（周江平 譯　陳傑 校）

BACKGROUND: End-stage renal disease (ESRD) has been shown to be associated with abnormal neural function. Clinically used inhaled anesthetic agents typically exert their effect through multiple target receptors in the central nervous system. Pathological changes in the brain may alter sensitivity to inhaled anesthetic agents. This study aimed to determine the minimum alveolar concentration-awake (MACawake) of sevoflurane in patients with ESRD compared to patients with normal renal function.
METHODS: Patients underwent inhalational induction of anesthesia and received sevoflurane at a preselected concentration according to a modified Dixon "up-and-down" method starting at 1.0% with a step size of 0.2%. The concentration of sevofluraneused for each consecutive patient was increased or decreased based on a positive or negative response to verbal command in the previous patient. Serum neuron-specific enolase, a biomarker of impaired neurons, was also measured.
RESULTS: Forty-one patients were enrolled: 20 with ESRD and 21 as controls. The MACawake of sevoflurane in patients with ESRD was significantly lower than that observed in the control group (0.56% [standard deviation {SD} = 0.10%] vs 0.67% [SD = 0.08%]; P = .031). Patients with ESRD exhibited higher serum neuron-specific enolase levels compared to the control group (16.4 ng/mL [SD = 5.0] vs 8.7 ng/mL [SD = 2.9]; P < .001).
CONCLUSIONS: MACawake of sevoflurane is somewhat lower in patients with ESRD compared to those with normal renal function. Impaired cerebral function may partly contribute to the reduction in anesthetic requirement.

比較右美托咪定或瑞芬太尼在監護性麻醉下的超聲引導下經支氣管針吸活檢術中的應用

Dexmedetomidine Versus Remifentanil for Monitored Anesthesia Care During Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration
A Randomized Controlled Trial

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Anesthesia & Analgesia: 2019 128 98–106

背景：作者假設：與瑞芬太尼相比，接受右美托咪定的監護性麻醉（MAC）下進行超聲引導下經支氣管針吸活檢術(EBUS-TBNA)的非插管患者不良事件發生率更低，但對圍術期條件的滿意度並無差異。

方法：60 名擇期行 MAC 下 EBUS-TBNA 的患者（ASA I-III 級）隨機被分為以下兩組：接受瑞芬太尼 0.5μg/ kg 靜脈推注持續 10 分鐘，然後 0.05-0.25μg/ kg / min 維持；或接受右美托咪定 0.4μg/ kg 靜脈推注 10 分鐘，然後 0.5-1.0μg/ kg / h 維持。主要預後指標是嚴重呼吸道不良事件的數量（呼吸過慢、窒息、低氧）。次要預後指標包括血流動力學參數、出 PACU 時間、氣管內利多卡因使用量、使用觀察者評估警覺/鎮靜量表評估的鎮靜深度、手術條件、操作者和患者滿意度、疼痛、咳嗽、聲帶動度、術中知曉、噁心嘔吐情況。

結果：與瑞芬太尼相比，右美托咪定組的嚴重呼吸不良事件（呼吸過慢、窒息、低氧）發生次數顯著減少（P =0 .001）：兩組呼吸抑制或呼吸暫停次數分別為 0 [0-0]vs 0 [0-0.5]; P = 0.031），兩組低氧次數分別為 0 [0-0.5] vs 1 [0-4]; P = .039。右美托咪定組（10 [3-37.5]分鐘）EBUS-TBNA 術後患者達到離開 PACU 標準（Aldrete 評分：9）的時間，與瑞芬太尼組（3 [3-5]分鐘）相比，所需時間更長（P <.001）。兩組在鎮靜深度（觀察者評估警覺/鎮靜量表）、氣管內利多卡因使用量、手術條件、操作者和患者滿意度、疼痛度、咳嗽、聲帶懂度、噁心嘔吐方面沒有差異。

結論：與瑞芬太尼相比，使用右美托咪定行監護性麻醉下的超聲引導下經支氣管針吸活檢術的不良事件更少，但是整體手術條件無差異。 然而，使用右美托咪定可導致出院延遲。

（宋英才 譯　陳傑 校）

BACKGROUND: We hypothesized that, compared to remifentanil, dexmedetomidine used for endobronchial ultrasound-guidedtransbronchial needle aspiration (EBUS-TBNA) performed under monitored anesthesia care (MAC) in nonintubated patients would result in fewer episodes of major respiratory adverse events (number of episodes of bradypnea, apnea or desaturation) but no difference in satisfaction with perioperative conditions.
METHODS: Sixty (American Society of Anesthesiologists physical status I-III) patients scheduled to undergo EBUS-TBNA under MAC were randomized to receive either remifentanil (0.5 μg/kg IV bolus) in 10 minutes, followed by 0.05-0.25 μg/kg/min, or dexmedetomidine (0.4 μg/kg IV bolus) in 10 minutes, followed by 0.5-1.0 μg/kg/h. The primary outcome was the number of major respiratory adverse events (bradypnea, apnea, or hypoxia). The secondary outcomes included hemodynamic variables, discharge time from the postanesthesia care unit, endotracheal lidocaine use, patient's sedation using the Observer Assessment of Alertness/Sedation Scale, operative conditions, operator and patient satisfaction, pain, coughing, vocal cord mobility, recall, and nausea/vomiting.
RESULTS: Dexmedetomidine produced significantly fewer episodes of major respiratory events (bradypnea, apnea, or desaturation), with 0 [0-0.5] episodes versus 2 [0-5] (median [interquartile range]) (P = .001), than did remifentanil. Fewer episodes of bradypnea or apnea (dexmedetomidine: 0 [0-0] versus remifentanil: 0 [0-0.5]; P = .031), and fewer episodes of desaturation (dexmedetomidine: 0 [0-0.5] versus remifentanil: 1 [0-4]; P = .039) were recorded in the dexmedetomidine group. The time needed for patients to meet postanesthesia care unit discharge criteria (Aldrete score: 9) after EBUS-TBNA was longer in the dexmedetomidine group (10 [3-37.5] minutes) versus the remifentanil group (3 [3-5] minutes) (P < .001). No differences were observed in the 2 groups for sedation depth (Observer Assessment of Alertness/Sedation Scale), endotracheal lidocaine use, operative conditions, operator and patient satisfaction, pain, coughing, vocal cord mobility, recall, and nausea/vomiting episodes.
CONCLUSIONS: Dexmedetomidine resulted in fewer respiratory adverse events during EBUS-TBNA under MAC, when compared to remifentanil, with no difference in overall operative conditions. However, dexmedetomidine use was associated with delayed postoperative discharge

產科麻醉新進展 2017 年 Gerard W. Ostheimer 演講

What Is New in Obstetric Anesthesia The 2017 Gerard W. Ostheimer Lecture
Bateman, Brian T., MD, MSc Bateman BT
Anesthesia & Analgesia: 2019 128 123–127

每年 Gerard W. Ostheimer 都會在關於產科麻醉與圍產期學年度會議上進行演講，旨在總結對產科麻醉醫師臨床操作有指導意義的重要新進展。本次回顧著眼

於此次演講中的一些最具總結性的文獻資料。此次對於一些可能改變婦產科麻醉操作的具有里程碑意義的臨床試驗進行了探討。同時對一些以如何優化椎管內麻醉和術後疼痛管理的幾篇文章進行總結。最後，還回顧了以識別系統干預改善產科結局的多項研究。作者陳列了一套“待辦事項”清單，重點是可以在妊娠和分娩單位實施品質改進計畫。

（金夏　譯　陳傑 校）

The Gerard W. Ostheimer lecture is given each year at the Society for Obstetric Anesthesia and Perinatology annual meeting and is intended to summarize important new scientific literature relevant to practicing obstetric anesthesiologists. This review highlights some of the most consequential papers covered in this lecture. It discusses landmark clinical trials that are likely to change the practice of obstetrics and obstetric anesthesia. It summarizes several articles that focus on how to optimize the provision of neuraxial anesthesia and postoperative pain control. Finally, it reviews studies aimed at identifying systems-based interventions that can improve obstetrical outcomes. A proposed "to-do" list focused on quality improvement initiatives that can be implemented on labor and delivery units is provided.

手術患者的管理困境——當輸血不是一種選擇 2017 年血液管理進展年會

Proceedings from the Society for Advancement of Blood Management Annual Meeting 2017 Management Dilemmas of the Surgical Patient—When Blood Is Not an Option

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Tan GM1, Guinn NR2, Frank SM3, Shander A4.
Anesthesia & Analgesia: 2019 128 144–151

圍術期的特殊情況預警是很必要的。當輸血不再是圍術期的一種選擇，尤其是對於存在高輸血風險的患者中，我們對圍術期患者的管理變得更加複雜。近年來的技術和資訊使得避免輸血成為一項現實可行的圍術期管理選項，但這需要圍術期管理團隊以病人為中心進行相互協調和努力。本文分享了一些關於安全成功避免患者圍術期輸血的建議。主要方法包括圍術期最優化管理，以及一些在術中和術後減少血液丟失的技巧，並介紹了現今對於輸血的一些新型替代療法。同時，

本文還有助於通過法律和道德的層面進行考慮和操作，以尊重患者的信仰並確保其安全。

（謝婷婷 譯　陳傑 校）

Vigilance is essential in the perioperative period. When blood is not an option for the patient, especially in a procedure/surgery that normally holds a risk for blood transfusion, complexity is added to the management. Current technology and knowledge has made avoidance of blood transfusion a realistic option but it does require a concerted patient-centered effort from the perioperative team. In this article, we provide suggestions for a successful, safe, and bloodless journey for patients. The approaches include preoperative optimization as well as intraoperative and postoperative techniques to reduce blood loss, and also introduces current innovative substitutes for transfusions. This article also assists in considering and maneuvering through the legal and ethical systems to respect patients' beliefs and ensuring their safety.

在豬實驗性肺切除術模型中，術中輸注艾司洛爾對其全身和肺部炎症的影響

Effects of Intraoperative Infusion of Esmolol on Systemic and Pulmonary Inflammation in a Porcine Experimental Model of Lung Resection Surgery

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Anesthesia & Analgesia: 2019 128 168–175

背景：肺切除術(LRS)與全身和肺部炎症有關，後者可影響術後預後。β-腎上腺素受體的啟動增加了促炎和抗炎介質的表達,而阻斷 β-腎上腺素受體可減輕全身炎症反應。本實驗目的是在需單肺通氣(OLV)的 LRS 實驗模型中，研究圍術期持續靜脈注射艾司洛爾對術後肺水腫的影響。

方法：將 24 頭大白豬隨機分為 3 組:對照組(CON)，艾司洛爾組(ESM)，假手術組(sham)。ESM 組在整個手術過程中先予以靜脈注射艾司洛爾 (0.5 mg/kg)，然後持續輸注(0.05 mg·kg·min)。CON 組予以與 ESM 組相同體積的 0.9%生理鹽水，並持續輸注生理鹽水。假手術組在沒有 LRS 或 OLV 行左胸切開術。LRS 結束後，

復蘇動物，24 小時後，再次接受全身麻醉。取肺活檢及血漿標本，分析炎症介質的水準及其表達，並收集支氣管肺泡灌洗液。

結果：術後 24 小時，與 CON 組相比，ESM 組兩側肺水腫程度較輕，促炎生物標誌物腫瘤壞死因數(TNF)和白細胞介素(IL)-1 表達也更低。對於經縱隔肺葉活檢，各組肺水腫程度、TNF、IL-1 的均數值及 95%置信區間(CI)分別為 14.3 (95% CI, 5.6-23.1)， P = 0.002; 0.19 (95% CI, 0.07-0.32)， P = 0.002; 0.13 (95% CI, 0.04-0.22)， P = 0.006。左上葉各組的肺水腫程度、TNF、IL-1 的均數值及 95%置信區間(CI)分別為 12.4 (95% CI, 4.2-20.6)，P =0.003; 0.25 (95% CI, 0.12-0.37)，P < 0.001; 0.3 (95% CI, 0.08-0.53) P =0.009。

結論：本研究結果表明，在術中行單肺通氣的豬實驗性肺切除術模型中，艾司洛爾可減輕術中和術後肺水腫程度及其炎症反應。

（陳冠楠 譯　陳傑 校）

BACKGROUND: Lung resection surgery (LRS) is associated with systemic and pulmonary inflammation, which can affect postoperative outcomes. Activation of β-adrenergic receptors increases the expression of proinflammatory and anti-inflammatory mediators, and their blockade may attenuate the systemic inflammatory response. The aim of this study was to analyze the effect of a continuous perioperative intravenous perfusion of esmolol on postoperative pulmonary edema in an experimental model of LRS requiring periods of one-lung ventilation (OLV).

METHODS: Twenty-four large white pigs were randomly assigned to 3 groups: control (CON), esmolol (ESM), and sham. The ESM group received an intravenous esmolol bolus (0.5 mg/kg) and then an esmolol infusion (0.05 mg·kg·minute) throughout the procedure. The CON group received the same volume of 0.9% saline solution as the ESM group plus a continual infusion of saline. The sham group underwent a left thoracotomy without LRS or OLV. At the end of the LRS, the animals were awakened, and after 24 hours, they underwent general anesthesia again. Lung biopsies and plasma samples were obtained to analyze the levels and expression of inflammatory mediators, and the animals also received a bronchoalveolar lavage.

RESULTS: At 24 hours after the operation, the ESM group had less lung edema and lower expression of the proinflammatory biomarkers tumor necrosis factor (TNF) and interleukin (IL)-1 compared to the CON group for both lung lobes. For the

mediastinal lobe biopsies, the mean difference and 95% confidence interval (CI) between the groups for edema, TNF, and IL-1 were 14.3 (95% CI, 5.6-23.1), P = .002; 0.19 (95% CI, 0.07-0.32), P = .002; and 0.13 (95% CI, 0.04-0.22), P = .006, respectively. In the left upper lobe, the mean differences for edema, TNF, and IL-1 were 12.4 (95% CI, 4.2-20.6), P = .003; 0.25 (95% CI, 0.12-0.37), P < .001; and 0.3 (95% CI, 0.08-0.53), P = .009.
CONCLUSIONS: Our results suggest that esmolol reduces lung edema and inflammatory responses in the intraoperative and postoperative periods in animals that underwent LRS with OLV.

心血管麻醉醫師學會/歐洲心胸麻醉醫師協會對房顫患者心臟手術圍術期管理的實踐諮詢

Society of Cardiovascular Anesthesiologists/European Association of Cardiothoracic Anaesthetists Practice Advisory for the Management of Perioperative Atrial Fibrillation in Patients Undergoing Cardiac Surgery

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Anesthesia & Analgesia: 2019 128 33–42

即便對於心臟手術，術後房顫（POAF）也是術後最常見的不良事件，其與發病率、死亡率、住院時間和重症監護病房停留時間相關。儘管心臟外科手術總死亡率和術後發病率得到逐步改善，但 POAF 的發病率仍保持在 30%-50%之間。近年來，一些主要心血管學會已發佈了一些關於心房顫動（AF）圍手術期管理的循證建議；然而，醫生們對這些指南的遵照執行程度尚不清楚。此外，許多學會建議根據患者房顫情況分為"正常風險組"和"提高風險組"，但分級標準尚未明確界定。為了改善房顫的圍手術期管理，心血管麻醉醫師學會（SCA）臨床實踐改進委員會開發了一個多學科房顫工作組，該工作組根據相關專業協會的最新指南總結出包括心臟外科病人的管理在內的當前最佳實踐原則。然後發佈了一組循證調查問卷來描述當前的圍手術期房顫治療情況。通過與歐洲心胸麻醉師協會

（EACTA）的合作，該調查問卷被分發給 SCA 和 EACTA 的聯合會員，收到 641 份回饋，使人們對北美、歐洲和其他地區的圍手術期房顫管理有了最全面的瞭解。調查資料表明，用於預防和治療 POAF 的治療方法範圍廣泛，並符合已發表的指南。為了提高依從性，創建了一個圖形化的諮詢工具，其格式易於訪問，可用於床旁管理。最後，鑒於目前還沒有基於證據的閾值來區分正常風險患者與高風險患者，SCA/EACTA 房顫工作組使用專家意見並基於已公佈的房顫風險評分模型創建了一份房顫風險因素列表。該方法可以用於區分患者風險分組，並有助於遵守圖形諮詢工具中總結的循證建議。我們希望這些新增加的用於圍手術期房顫管理的臨床工具可以改善全世界心臟外科患者的循證醫學管理及預後。

（吳潔譯 李士通校）

Postoperative atrial fibrillation (poAF) is the most common adverse event after cardiac surgery and is associated with increased morbidity, mortality, and hospital and intensive care unit length of stay. Despite progressive improvements in overall cardiac surgical operative mortality and postoperative morbidity, the incidence of poAF has remained unchanged at 30%–50%. A number of evidence-based recommendations regarding the perioperative management of atrial fibrillation (AF) have been released from leading cardiovascular societies in recent years; however, it is unknown how closely these guidelines are being followed by medical practitioners. In addition, many of these society recommendations are based on patient stratification into “normal” and “elevated” risk groups for AF, but criteria for that stratification have not been clearly defined. In an effort to improve the perioperative management of AF, the Society of Cardiovascular Anesthesiologists (SCA) Clinical Practice Improvement Committee developed a multidisciplinary Atrial Fibrillation Working Group that created a summary of current best practice based on a distillation of recent guidelines from professional societies involved in the care of cardiac surgical patients. An evidence-based set of survey questions was then generated to describe the current practice of perioperative AF management. Through collaboration with the European Association of Cardiothoracic Anaesthetists (EACTA), that survey was distributed to the combined memberships of both the SCA and EACTA, yielding 641 responses and resulting in the most comprehensive understanding to date of perioperative AF management in North America, Europe, and beyond. The survey data demonstrated the broad range of therapies utilized for the prevention and treatment of poAF, as well as a spectrum of adherence to published guidelines. With the goal of improving adherence, a graphical advisory tool was created with an easily accessible format that could be utilized for bedside management. Finally, given that no evidence-based threshold currently exists to differentiate patients at normal risk to develop poAF from those at elevated risk, the SCA/EACTA AF working group created a list of poAF risk factors using expert opinion and

based on published risk score models for poAF. This approach allows stratification of patients into risk groups and facilitates adherence to the evidence-based recommendations summarized in the graphical advisory tool. It is our hope that these new additions to the clinical toolkit for the management of perioperative AF will improve the evidence-based care and outcomes of cardiac surgical patients worldwide.

麻醉干擾的過程測量依從性對住院時長的影響來自結直腸手術佇列術後恢復增強結果

The Impact of Anesthesia-Influenced Process Measure Compliance on Length of Stay Results From an Enhanced Recovery After Surgery for Colorectal Surgery Cohort

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Anesthesia & Analgesia: 2019 128 68–74

背景：過程測量依從性與改善加速康復外科（ERAS）結果有關。在此，我們試圖評估直接受麻醉影響措施的依從性對結直腸手術 ERAS 佇列影響。

方法：收集了 2013 年 1 月至 2015 年 4 月所有 1140 名患者實施 ERAS 策略之前（ERAS 前）和之後（ERAS 後）的資料。分析受麻醉醫師或急性疼痛治療直接影響的 9 項具體措施的遵從情況，以確定其對住院時長（LOS）的影響。

結果：過程測量的依從性與住院時長的逐漸延長有關。接受 4 個以上具體措施（高依從性）的患者與低依從性（0-2 個具體措施）的患者相比，其 LOS（事件率比[IRR]：0.77；95%可信區間：0.70-0.85）；P<0.001）明顯較短。多變數回歸分析表明，多模式噁心和嘔吐的預防（IRR：0.78；95%CI：0.68–0.89；P<0.001）、計畫內術後非甾體類藥物使用（IRR：0.76；95%CI：0.67–0.85；P<0.001）和嚴格遵守術後阿片類藥物治療疼痛方案（IRR：0.58；95%CI：0.51–0.67；P<0.001）是降低 LOS 的獨立相關因素。

結論：我們的研究結果表明，在麻醉醫師的直接影響下，與標準麻醉方案相一致，

提高對過程測量的依從性與降低 LOS 有關。讓麻醉醫師參與進整個手術過程中會提高圍手術期管理的整體品質。

（吳潔譯 李士通校）

BACKGROUND: Process measure compliance has been associated with improved outcomes in enhanced recovery after surgery (ERAS) programs. Herein, we sought to assess the impact of compliance with measures directly influenced by anesthesiology in an ERAS for colorectal surgery cohort.

METHODS: From January 2013 to April 2015, data from 1140 consecutive patients were collected for all patients before (pre-ERAS) and after (ERAS) implementation of an ERAS program. Compliance with 9 specific process measures directly influenced by the anesthesiologist or acute pain service was analyzed to determine the impact on hospital length of stay (LOS).

RESULTS: Process measure compliance was associated with a stepwise reduction in LOS. Patients who received >4 process measures (high compliance) had a significantly shorter LOS (incident rate ratio [IRR], 0.77; 95% CI, 0.70–0.85); $P < .001$) compared to low compliance (0–2 process measures) counterparts. Multivariable regression suggests that utilization of multimodal nausea and vomiting prophylaxis (IRR, 0.78; 95% CI, 0.68–0.89; $P < .001$), scheduled postoperative use (IRR, 0.76; 95% CI, 0.67–0.85; $P< .001$), and strict adherence to a postoperative opioid administration (IRR, 0.58; 95% CI, 0.51–0.67; $P < .001$) protocol for breakthrough pain were independently associated with reduced LOS.

CONCLUSIONS: Our findings suggest that increased compliance with process measures directly influenced by the anesthesiologists and in concert with a formal anesthesia protocol is associated with reduced LOS. Engaging anesthesiology colleagues throughout the surgical encounter increases the overall value of perioperative care.

環狀軟骨壓迫法作用的可訓練性：基於模擬的研究

Trainability of Cricoid Pressure Force Application：A Simulation-Based Study

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Anesthesia & Analgesia: 2019 128 109–116

背景：吸入胃內容物是導致麻醉期間氣道管理相關死亡率的主要原因。環狀軟骨壓迫法（CP）在快速誘導過程中被廣泛應用，以防止誤吸發生。國際 CP 指南建議失去意識前和失去意識後的實施壓力分別為 10 牛頓和 30 牛頓。然而，很少有研究能嚴格評估臨床醫師是否接受過如何持續給予這些所需壓力的訓練。我們假

設臨床醫師接受過訓練可以在實施 CP 時有效地持續保持 10-30 N 的壓力。

方法：臨床醫生（主治麻醉醫師、麻醉科住院醫師、註冊護士、或手術室護士）在游標測力板上類比實施 CP，在超過 60 秒的時間段選取 4 個時間點進行測量，在失去知覺之前進行 2 次測量，在失去知覺之後進行 2 次測量。所有 4 個時間點壓力均在目標範圍內（分別為 10±5 和 30±5 N）視為成功。基線評估後（n=100 名臨床醫生），40 名自願接受達到推薦目標壓力的訓練，自我調節練習後，進行 30 個持續 1 分鐘的高頻模擬迴圈練習，通過累積和分析來評估他們的實施壓力錶現變化。

結果：訓練前，400 個訓練迴圈中有 5 個週期（1.3%【置信區間置信區間：0.3% – 2.50%】）成功。教育和自我調節練習後的表現有所改善（成功週期占 16% [CI：7.8% – 25%]，30 個週期中的最後 4 個週期的成功率為 45%（CI：33% – 58%）。成功的幾率隨著練習時間的延長而增加（比值比：1.1；p<0.001）。然而，通過累積和分析，沒有志願者越過 h0 線，表明沒有志願者達到預定目標壓力的訓練程度。

結論：訓練前按照國際指南的規定實施目標壓力方面表現不佳。模擬訓練提高了成功率，但仍無志願者達到預先設定的熟練程度閾值。

（吳潔譯 李士通校）

BACKGROUND: Aspiration of gastric contents is a leading cause of airway management–related mortality during anesthesia practice. Cricoid pressure (CP) is widely used during rapid sequence induction to prevent aspiration. National guidelines for CP suggest a target force of 10 N before and 30 N after loss of consciousness. However, few studies have rigorously assessed whether clinicians can be trained to consistently achieve these levels of force. We hypothesized that clinicians can be trained effectively to deliver 10–30 N during application of CP.

METHODS: Clinicians (attending anesthesiologist, anesthesiology residents, certified registered nurse anesthetists, or operating room nurses) applied CP on a Vernier force plate simulator with measurements taken at 4 time points over 60 seconds, 2 measurements before and 2 measurements after loss of consciousness. A successful cycle required all 4 time points to be within the target range (10 ± 5 and 30 ± 5 N, respectively). After baseline assessment (n = 100 clinicians), a subset of 40 participants volunteered for education on recommended force targets, underwent

self-regulated practice, and then performed 30 1-minute cycles of high-frequency simulation analyzed by cumulative sum analysis to assess their change in performance.
RESULTS: At baseline, 5 cycles (1.3% [confidence interval {CI}, 0.3%–2.50%]) out of 400 were successful. Performance improved after education and self-regulated practice (16% successful cycles [CI, 7.8%–25%]), and performance during the last 4 of 30 cycles was 45% (CI, 33%–58%). The odds of success increased over time (odds ratio, 1.1; $P < .001$). By cumulative sum analysis, however, no subject crossed the h0 line, indicating that no one achieved proficiency of the predefined target forces.
CONCLUSIONS: At baseline, performance was poor at achieving target forces specified by national guidelines. Simulation-based training improved the success rate, but no participant achieved the predefined threshold for proficiency.

全麻加區域阻滯鎮痛與全麻加靜脈鎮痛在小兒心臟手術中的比較: 隨機臨床試驗的系統回顧與薈萃分析

Regional Analgesia Added to General Anesthesia Compared With General Anesthesia Plus Systemic Analgesia for Cardiac Surgery in Children: A Systematic Review and Meta-analysis of Randomized Clinical Trials

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Anesthesia & Analgesia: 2019 128 130–136

背景：本綜述目的是比較區域性阻滯鎮痛（RA）技術與靜脈鎮痛對心臟手術患兒術後疼痛、噁心嘔吐、資源利用、二次手術、死亡和併發症的影響。

方法：2018 年 5 月，搜索了 PubMed、Embase 和 Cochrane 中心對照試驗登記註冊中比較區域阻滯鎮痛技術和全身鎮痛的隨機對照試驗。使用 Cochrane 工具評估所包括試驗的偏倚風險。資料分析採用固定（i 2<25%）或隨機效應模型（i 2 ≥25%）。根據建議評分、發展評分和評估工作組評分表對資料品質進行評分。

結果：我們納入了 14 個隨機對照試驗，605 名參與患者（312 名實施 RA，293 名為對照組）。RA 可在術後 24 小時內減輕疼痛。術後 6-8 小時，標準化平均差為−0.81（95%置信區間[CI]：-1.22 至−0.40；低品質證據）。我們沒有發現噁心和嘔吐發生（風險比[RR]：0.89；95%可信區間：0.61–1.31；非常低品質的證據）、氣管插管時間（標準化平均差：−0.18；95%可信區間：−0.40 至 0.05；低品質證

據）、重症監護病房住院時間（平均差：−0.10 小時；95%可信區間：−1.31 至 1.12 小時；低-品質證據）、住院時間（平均差異：−0.02 天；95%可信區間：−1.16 至 1.12 天；低品質證據）、二次手術（RR：0.76；95%可信區間：0.17–3.28；低品質證據）、死亡（RR：0.50；95%可信區間：0.05–4.94；低品質證據）和呼吸抑制（RR：2.06；95%可信區間：0.20–21.68；非常低品質證據）。沒有試驗報告局部麻醉藥毒性或與 RA 技術相關的持續性神經性或感染性併發症的跡象。一項試驗報告了 1 例胸膜內鎮痛引起的同側膈肌麻痹短暫發作，隨著局部麻醉藥物停止使用而消失。

結論：與靜脈鎮痛相比，RA 技術可使接受心臟手術患兒術後 24 小時的疼痛減輕。目前，尚無證據表明小兒心臟外科手術的 RA 對總發病率和死亡率有任何影響。這些結果應該謹慎地解釋，因為它們代表了一個小型和異質性研究的薈萃分析。有待進一步研究。

（吳潔譯 李士通校）

BACKGROUND: The aim of this systematic review was to compare the effects of regional analgesic (RA) techniques with systemic analgesia on postoperative pain, nausea and vomiting, resources utilization, reoperation, death, and complications of the analgesic techniques in children undergoing cardiac surgery.

METHODS: A search was done in May 2018 in PubMed, Embase, and the Cochrane Central Register of Controlled Trials for randomized controlled trials comparing RA techniques with systemic analgesia. Risks of bias of included trials were judged with the Cochrane tool. Data were analyzed with fixed- ($I^2 < 25\%$) or random-effects models ($I^2 \geq 25\%$). The quality of evidence was graded according to the Grading of Recommendations Assessment, Development, and Evaluation working group scale.

RESULTS: We included 14 randomized controlled trials with 605 participants (312 to RA and 293 to the comparator). RA reduces pain up to 24 hours after surgery. At 6–8 hours after surgery, the standardized mean difference was −0.81 (95% confidence interval [CI], −1.22 to −0.40; low-quality evidence). We did not find a difference for nausea and vomiting (risk ratio [RR], 0.89; 95% CI, 0.61–1.31; very low-quality evidence), duration of tracheal intubation (standardized mean difference, −0.18; 95% CI, −0.40 to 0.05; low-quality evidence), intensive care unit length of stay (mean difference, −0.10 hours; 95% CI, −1.31 to 1.12 hours; low-quality evidence), hospital length of stay (mean difference, −0.02 days; 95% CI, −1.16 to 1.12 days; low-quality

evidence), reoperation (RR, 0.76; 95% CI, 0.17–3.28; low-quality evidence), death (RR, 0.50; 95% CI, 0.05–4.94; low-quality evidence), and respiratory depression (RR, 2.06; 95% CI, 0.20–21.68; very low-quality evidence). No trial reported signs of local anesthetic toxicity or lasting neurological or infectious complications related to the RA techniques. One trial reported 1 transient ipsilateral episode of diaphragmatic paralysis with intrapleural analgesia that resolved with cessation of local anesthetic administration。

CONCLUSIONS: Compared to systemic analgesia, RA techniques reduce postoperative pain up to 24 hours in children undergoing cardiac surgery. Currently, there is no evidence that RA for pediatric cardiac surgery has any impact on major morbidity and mortality. These results should be interpreted cautiously because they represent a meta-analysis of small and heterogeneous studies. Further studies are needed.

成年患者阿片類藥物過量住院死亡率的國家趨勢及相關因素

National Trends and Factors Associated With Inpatient Mortality in Adult Patients With Opioid Overdose

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Anesthesia & Analgesia: 2019 128 152–160

背景：阿片類藥物濫用和阿片類藥物相關死亡率在過去十年中急劇上升。在住院患者中，與阿片類藥物過量導致死亡的相關因素證據有限。主要目的是報告阿片類藥物過量和死亡率的全國趨勢。次要目標是探討與住院患者死亡率相關的因素，並報告處方阿片類藥物過量（POD）與非法阿片類藥物過量（IOD）佇列的差異。

方法：利用 2010-2014 年全國住院病人樣本，我們進行了橫斷面分析，並確定了 570987 名符合國際疾病分類、第九次修訂或 POD 或 IOD 外源性原因的成年患者進行加權評估。我們進行了多變數邏輯回歸分析，以確定住院患者死亡率的預測因素。報告了比值比（OR）及其相關的 95%置信區間（CI）。

結果:在 570987 例阿片類藥物過量使用患者中，13.8%的患者被診斷為碘缺乏症，其餘患者被診斷為 POD。在所有的阿片類藥物過量入院患者中，調整後的 IOD 入院率每年增加 31%（OR：1.31；95%CI：1.29–1.31；P<0.001）；然而，調整後的 IOD 入院率每年減少 24%（OR：0.76；95%CI：0.75–0.77；P<0.001）。IOD

和 POD 患者的死亡率分別為 4.7%和 2.3%。住院患者死亡率在住院期間每年增加 8%（OR，1.08；95%CI，1.02–1.14；P<.007）。所有 POD 入院患者的住院死亡率每年增加 6%（OR：1.06；95%CI：1.03–1.09；P<0.001）。與 POD 相比，IOD 組的死亡率更高（OR：2.03；95%CI：1.79–2.29；P<0.001）。年齡大於或等於 80 歲且診斷為實體惡性腫瘤患者的死亡率較高。非裔美國人和白人患者以及接受酒癮康復治療的患者住院死亡率較低。

結論：死亡率的增加為進一步的降低風險策略和干預方案的實施提供了強有力的基礎支援。對阿片類藥物過量及其合併症的醫療管理是需要涉及決策者和醫療保健團隊的多學科方法。

（吳潔譯 李士通校）

BACKGROUND: The prevalence of opioid misuse and opioid-related mortality has increased dramatically over the past decade. There is limited evidence on factors associated with mortality from opioid overdose in the inpatient setting. The primary objective was to report national trends in opioid overdose and mortality. The secondary objectives were to explore factors associated with inpatient mortality and report differences in prescription opioid overdose (POD) versus illicit opioid overdose (IOD) cohorts.

METHODS: Using the 2010–2014 Nationwide Inpatient Sample, we performed a cross-sectional analysis and identified a weighted estimate of 570,987 adult patients with an International Classification of Disease, Ninth Revision, or External Cause of Injury code of POD or IOD. We performed multivariable logistic regression to identify predictors of inpatient mortality. The odds ratio (OR) and their associated 95% confidence interval (CI) are reported.

RESULTS: Of the 570,987 patients with opioid overdose, 13.8% had an admissions diagnosis of IOD, and the remaining had POD. Among all opioid overdose admissions, the adjusted odds of IOD admissions increased by 31% per year (OR, 1.31; 95% CI, 1.29–1.31; $P < .001$); however, the adjusted odds POD admissions decreased by 24% per year (OR, 0.76; 95% CI, 0.75–0.77; $P < .001$). The mortality was 4.7% and 2.3% among IOD and POD admissions, respectively. The odds of inpatient mortality increased by 8% per year among IOD admissions (OR, 1.08; 95% CI, 1.02–1.14; $P < .007$). The odds of inpatient mortality increased by 6% per year among all POD admissions (OR, 1.06; 95% CI, 1.03–1.09; $P < .001$). Those with IOD compared to POD had higher odds of mortality (OR, 2.03; 95% CI, 1.79–2.29; $P < .001$). Patients with age ≥80 years of age and those with a diagnosis of a solid tumor malignancy had higher odds of mortality. Odds of inpatient mortality were decreased in African American versus Caucasian patients and in patients undergoing alcohol rehabilitation therapy.

CONCLUSIONS: The increase in mortality provides a strong basis for further risk reduction

strategies and intervention program implementation. Medical management of not only the opioid overdose but also the comorbidities calls for a multidisciplinary approach that involves policy makers and health care teams.