主動脈瓣置換術後左右心室的早期反應

Early Left and Right Ventricular Response to Aortic Valve Replacement

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背景：在主動脈縮窄對 主動脈瓣置換（AVR）圍手術期心肌功能的即時影響尚不清楚。左心室（LV）功能可能因心臟停搏液和缺血再灌注受損，尤其是左心室肥厚患者。另外，左心室功能可以在主動脈瓣置換術後提高，但是右心室功能卻沒有提高。主動脈瓣置換在主動脈縮中對圍手術期心肌功能的影響尚未深入探討。我們的首要目標是使用超聲心動圖描述主動脈瓣置換術中左室功能的影響。其次，我們評估右心室功能。

方法：在這個 100 例患者的臨床試驗中（NCT01187329），97 例是做過主動脈瓣置換術的主動脈狹窄患者。這些患者中，95 例在切皮前和關胸前使用經食管超聲心動圖檢查收縮和舒張功能。採用二維追蹤超聲心動圖分析心肌縱向應變和應變率。使用配對 t 檢驗分析比較手術開始時與手術結束時的心肌變形。

結果：手術結束時左室容積、動脈血壓下降而心率增加。超聲心動圖用來分析其中 72 例左室應變、67 例的左室應變率，54 例的右室應變和應變率。72 例左心室應變心動圖中，9 例患者需要腎上腺素，22 例需要去甲腎上腺素，2 例兩者都需要。手術結束時與手術開始時左心室應變沒有改變（差異：0.7[97.6%可信區間，-0.2-1.5] %，P = 0.07），而左心室收縮應變率提高（變為陰性）（-0.3 [-0.4 --0.2] s；P＜0.001）。相反，右心室收縮期應變惡化（變為陽性）（差異：4.6[3.1-6]%；P＜0.001），雖然右室收縮期應變率不變（0.00 [97.6%置信區間，-0.1-0.1]；P = 0.83）。

結論：左心室功能在主動脈瓣置換術後提高。相反，通過縱向應變的評估，右心室功能下降。

(高洋洋 譯 李士通 校)

BACKGROUND: The immediate effect of aortic valve replacement (AVR) for aortic stenosis on perioperative myocardial function is unclear. Left ventricular (LV) function may be impaired by cardioplegia-induced myocardial arrest and ischemia-reperfusion injury, especially in patients with LV hypertrophy. Alternatively, LV function may improve when afterload is reduced after AVR. The rightventricle (RV), however, experiences cardioplegic arrest without benefiting from improved loading conditions. Which of these effects on myocardial function dominate in patients undergoing AVR for aortic stenosis has not been thoroughly explored. Our primary objective is thus to characterize the effect of intraoperative events on LV function during AVR using echocardiographic measures of myocardial deformation. Second, we evaluated RV function.
METHODS: In this supplementary analysis of 100 patients enrolled in a clinical trial (NCT01187329), 97 patients underwent AVR foraortic stenosis. Of these patients, 95 had a standardized intraoperative transesophageal echocardiographic examination of systolic and diastolic function performed before surgical incision and repeated after chest closure. Echocardiographic images were analyzed off-line for global longitudinal myocardial strain and strain rate using 2D speckle-tracking echocardiography. Myocardial deformation assessed at the beginning of surgery was compared with the end of surgery using paired t tests corrected for multiple comparisons.
RESULTS: LV volumes and arterial blood pressure decreased, and heart rate increased at the end of surgery. Echocardiographic images were acceptable for analysis in 72 patients for LV strain, 67 for LV strain rate, and 54 for RV strain and strain rate. In 72 patients with LV strain images, 9 patients required epinephrine, 22 required norepinephrine, and 2 required both at the end of surgery. LV strain did not change at the end of surgery compared with the beginning of surgery (difference: 0.7 [97.6% confidence interval, -0.2 to 1.5]%; P = 0.07), whereas LV systolic strain rate improved (became more negative) (-0.3 [-0.4 to -0.2] s; P < 0.001). In contrast, RV systolic strain worsened (became less negative) at the end of surgery (difference: 4.6 [3.1 to 6.0]%; P < 0.001) although RV systolic strain rate was unchanged (0.0 [97.6% confidence interval, -0.1 to 0.1]; P = 0.83).
CONCLUSIONS: LV function improved after replacement of a stenotic aortic valve demonstrated by improved longitudinal strain rate. In contrast, RV function, assessed by longitudinal strain, was reduced.

氟呱啶醇與昂丹司瓊對全麻手術既定的噁心和嘔吐治療效果的對比：一項隨機臨床試驗

Haloperidol Versus Ondansetron for Treatment of Established Nausea and Vomiting Following General Anesthesia: A Randomized Clinical Trial

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背景：氟呱啶醇是一種抗精神病藥。在低劑量時，它是預防手術後的噁心和嘔吐（PONV）的有效藥物。然而，它治療既定的 PONV 的作用還沒有被很好的研究。

方法：這項隨機雙盲試驗，測試氟呱啶醇在治療成人全麻術後噁心嘔吐的早期治療中是否不劣于昂丹司瓊。主要結果是患者是否在第一個 4 小時內未發生噁心嘔吐。結果的非劣效率為 15%。120 例在術後發生噁心嘔吐的病人靜脈注射氟呱啶醇 1 mg（n = 60）或昂丹司瓊 4 mg（n = 60）。

結果：分析從 112 例病人（氟呱啶醇組 59 例和昂丹司瓊組 53 例）中得到的資料。氟呱啶醇組的 35 例病人（52%）接受了 1 或 2 預防性止吐藥，對比昂丹司瓊組為 42 例（79%）。在術後階段的早期（0-4 小時）和 0- 24 小時，通過合方案集分析和意向治療分析，氟呱啶醇在治療完全反應的終點是不劣于昂丹司瓊（定義為術後未噁心嘔吐的患者率）的。在合方案集分析中，氟呱啶醇組和昂丹司瓊組在早期階段被記錄的的完全反應分別（差異性 5%；95%可信區間[CI：-13%—22 %）為在 59 位病人中有 35 例（59%）和在 53 位病人有 29 例（55%），在 0-24 小時階段被記錄的的完全反應分別（差異性 4%；95%可信區間[CI：-15%—21 %）為在 59 位病人中有 31 例（59%）和在 53 位病人有 26 例（55%）。在意向治療分析中，氟呱啶醇組和昂丹司瓊組在早期階段被記錄的的完全反應分別（差異性 10%；95%可信區間[CI：-8%—27%）為在 60 位病人中有 35 例（58%）和在 60 位病人有 29 例（48%），在 0-24 小時階段被記錄的的完全反應分別（差異性 8%；95%可信區間[CI：-9%—25%）為在 60 位病人中有 31 例（52%）和在 60 位病

人有 26 例（43%）。所有其他的 PONV 次要結果是可比的，在氟呱啶醇組中 25% 的病人被鎮靜，對比昂丹司瓊組為 2%(P < .001; 差異性 23%; 95%差異性可信區間: 11%-36%)。而疼痛、滿意度得分、對止痛藥的需求和 QTc 區間的變化在 2 組之間無明顯差異。

結論：通過意向性治療分析和完成治療分析方法，氟呱啶醇在最壞的情況下效果分別低於昂丹司瓊 13%和 8%。因此，氟呱啶醇在既定的噁心嘔吐的早期治療中不劣于昂丹司瓊，但是它和鎮靜密切相關。

（馮亞飛 譯 李士通 校）

BACKGROUND: Haloperidol is an antipsychotic. At low doses, it is a useful agent for the prophylaxis of postoperative nausea and vomiting (PONV). However, its use for treating established PONV has not been well studied.
METHODS: This randomized double-blinded trial tested whether haloperidol is noninferior to ondansetron for the early treatment of established PONV in adult patients undergoing general anesthesia. The primary outcome is whether patients were PONV free during the first 4 hours. The noninferiority margin was set at 15%. One hundred twenty patients with PONV received either haloperidol 1 mg intravenously (n = 60) or ondansetron 4 mg intravenously (n = 60).
RESULTS: Data from 112 patients (59 in the haloperidol group and 53 in the ondansetron group) were analyzed. Thirty-five patients (52%) in the haloperidol group received 1 or 2 prophylactic antiemetics compared with 42 (79%) in the ondansetron group. Haloperidol was noninferior to ondansetron for the end point of complete response to treatment (defined as the rate of PONV-free patients) for the early (0-4 hour) and the 0- to 24-hour postoperative periods by both the per-protocol and intention-to-treat analyses. In the per-protocol analysis, complete responses in the early period were noted in 35 of 59 patients (59%) and 29 of 53 patients (55%) for the haloperidol and ondansetron groups, respectively (difference 5%; 95% confidence interval [CI]: -13% to 22 %), and in the 0- to 24-hour period in 31 of 59 patients (53%) and 26 of 53 patients (49%) for the haloperidol and ondansetron groups, respectively (difference 4%; 95% CI of the difference: -15% to 21%). In the intention-to-treat analysis, complete responses in the early period were noted in 35 of 60 patients (58%) and 29 of 60 patients (48%) for the haloperidol and ondansetron groups, respectively (difference 10%; 95% CI of difference: -8% to 27%) and in the 0- to 24-hour period in 31 of 60 patients (52%) and 26 of 60 patients (43%) for the haloperidol and ondansetron groups, respectively (difference 8%; 95% CI of the difference: -9% to 25%). All other PONV secondary outcomes were comparable. Twenty-five percent of patients in the haloperidol group were sedated versus 2% in the ondansetron group (P

< .001; difference 23%; 95% CI of the difference: 11%-36%). Pain, satisfaction scores, need for analgesics, and changes in QTc intervals were not different between the 2 groups.
CONCLUSIONS: Haloperidol is at worst 13% and 8% less effective than ondansetron by per-protocol analysis and by intention-to-treat analysis, respectively. Thus, it is noninferior to ondansetron for the early treatment of established PONV, but is associated with sedation.

地氟烷在敏感性氣道中的時間和劑量依賴性作用

Time- and Dose-Dependent Effects of Desflurane in Sensitized Airways
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背景：儘管揮發性麻醉劑如氟烷，異氟烷和七氟醚的支氣管擴張作用在以前的研究中已被充分記載，但地氟醚的相關性質仍然有爭議。本研究的目的是調查不同濃度和持續時間的地氟醚在卵白蛋白致敏的氣道高反應性豚鼠模型中的影響。

方法：根據接受的地氟烷的最小肺泡濃度（MAC），176 只卵清蛋白敏化的豚鼠被隨機分為 5 組，分別為：0.0、0.5、1.0、1.5 和 2.0MAC。測量體內總肺阻力、體外氣道平滑肌張力和細胞內環腺苷酸（AMP）水準以評價地氟烷的作用。

結果：在 5 個致敏組中，在吸入地氟烷過程中，總肺阻力在約 8 分鐘時從基線增加到峰值，然後緩慢降低，總過程約 17 分鐘。無論有無增加乙醯膽鹼的劑量，地氟烷都會增加總肺阻力，但隨著乙醯膽鹼濃度的增加可以減少的肌肉張力。地氟烷會引起環磷醯胺水準的增加：在 60 分鐘時間點，具有 0.5MAC（1.96±0.40）和 1.0MAC（2.11±0.50）地氟烷的 cAMP 濃度（平均值±SD）高於 8 分鐘時間點（1.11±0.23 和 1.32±0.32）。

結論：地氟烷具有時間和劑量依賴性效應，並且在 0.5 和 1.0MAC 濃度下使用，對於卵清蛋白敏化的豚鼠沒有顯著的支氣管收縮。cAMP 介導的氣道平滑肌鬆弛可能是地氟醚誘導支氣管擴張的一種機制。

（顧明露 譯 李士通 校）

BACKGROUND: Although the bronchodilatory actions of volatile anesthetics, such as halothane, isoflurane, and sevoflurane, have been well documented in previous studies, the properties of desflurane remain controversial. The aim of this study was to investigate the effects of desflurane at different concentrations and durations in an ovalbumin-sensitized guinea pig model of airway hyper-responsiveness.
METHODS: Ovalbumin-sensitized animals (n = 176) were randomly assigned to 5 groups according to the minimum alveolar concentration (MAC) of desflurane they received: 0.0, 0.5, 1.0, 1.5, and 2.0 MAC. Total lung resistance in vivo, airway smooth muscle tension in vitro, and intracellular cyclic adenosine monophosphate (AMP) levels were measured to evaluate the effects of desflurane.
RESULTS: In 5 sensitized groups, total lung resistance increased from baseline to peak at approximately 8 minutes and then decreased slowly until about 17 minutes with extended administration of desflurane. Desflurane dose-dependently increased total lung resistance with or without incremental doses of acetylcholine and reduced muscle tension with increasing concentrations of carbacholine. Cyclic AMP levels were increased by desflurane: at the 60-minute time point, cyclic AMP concentrations (means ± SD) with 0.5 MAC (1.96 ± 0.40) and 1.0 MAC (2.11 ± 0.50) desflurane were higher than those at the 8-minute time point (1.11 ± 0.23 and 1.32 ± 0.32).
CONCLUSIONS: Desflurane exerted time- and dose-dependent effects and could be used at 0.5 and 1.0 MAC concentrations without significant bronchoconstriction in ovalbumin-sensitized guinea pigs. Cyclic AMP-mediated airway smooth muscle relaxation might be one mechanism by which desflurane induces bronchodilation.

全身血管阻力對 **Pulsioflex** 監測設備準確性的影響

Impact of Systemic Vascular Resistance on the Accuracy of the Pulsioflex Device
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背景：現有使用脈搏曲線分析的設備，沒有心臟指數(CI)測定的外部校準，其準確性受到高動力迴圈狀態、低系統血管阻力(SVR)和 SVR 突然變化的負面影響。本研究的目的是在接受肝移植的患者中評估新設備 Pulsioflex（心排量監測系統）的準確性。

方法：肝移植計畫表上按序的 30 名患者被包括在內。CI 監測使用肺動脈導管(CI-PAC)和 Pulsioflex(CI-Pulsio)。在術中 9 個不同階段進行同時的 CI 測量。

結果：對 270 對測量結果進行了分析。CI-Pulsio 的中位數值(3.3；四分位範圍 2.8-3.8 L·min·m)明顯不同於 CI-PAC 的中位數值(4.1；四分位範圍 3.1-5.0 L·min·m) (P < .0001)。Bland-Altman 分析顯示,平均偏差為 0.8 L·min·m(95%置信區間 -2.5-4.1 L·min·m)。百分比誤差為 65%(95%置信區間 60% -71%)。考慮到 CI 兩階段之間的差異，對比 CI-PAC 的變化與 CI-Pulsio 的變化顯示平均偏差為 0.1 L·min·m(95%置信區間-2.1-2.2 L·min·m)。當排除 CI 變化< 0.5 L·min·m (154 組配對分析)時，一致率為 62%(95%的置信區間，54%-70%)。CI-PAC 與 CI-Pulsio 之間的偏差與 SVR 呈負相關(r = -0.67，P < .0001)。CI-PAC 的變化與 CI-Pulsio 的變化之間的偏差與 SVR 也呈負相關(r = -0.52，P < .0001)。

結論：接受肝移植的患者中，Pulsioflex 不能準確估計 CI。其準確性受到 SVR 高度影響， SVR 發生大變化時的不能追蹤 CI 的變化。

（黃堯卿 譯 李士通 校）

BACKGROUND: The accuracy of currently available devices using pulse contour analysis without external calibration for cardiac index (CI) estimation is negatively impacted by hyperdynamic states, low systemic vascular resistance (SVR), and abrupt changes in SVR. The aim of this study was to evaluate the accuracy of a new device, the Pulsioflex (Pulsion Medical System), in patients undergoing liver transplantation.
METHODS: Thirty consecutive patients scheduled for liver transplantation were included. CI was monitored using pulmonary arterial catheter (CI-PAC) and Pulsioflex (CI-Pulsio). Simultaneous CI measurements were made intraoperatively at 9 different stages of the procedure.
RESULTS: Two hundred seventy pairs of measurements were analyzed. The median CI-Pulsio values (3.3; interquartile range, 2.8-3.8 L·min·m) were significantly different from the median CI-PAC (4.1; interquartile range, 3.1-5.0 L·min·m; P < .0001). Bland and Altman analysis showed a mean bias of 0.8 L·min·m and 95% limit of agreement from -2.5 to 4.1 L·min·m. Percentage error was 65% (95% confidence interval, 60%-71%). Considering the variations in CI between 2 stages, the comparison between changes in CI-PAC and changes in CI-Pulsio showed a mean bias of 0.1 L·min·m and 95% limit of agreement of -2.1 to 2.2 L·min·m. When excluding changes in CI <0.5 L·min·m (154 paired analyzed), the concordance rate was 62% (95% confidence interval, 54%-70%). The bias between CI-PAC and CI-Pulsio was negatively correlated with SVR (r = -0.67, P < .0001). The bias

between changes in CI-PAC and changes in CI-Pulsio was also negatively correlated with changes in SVR ($r = -0.52$, $P < .0001$).
CONCLUSIONS: In patients undergoing liver transplantation, Pulsioflex does not accurately estimate CI. Its accuracy is highly impacted by SVR, and it is not able to track changes in CI when large variations in SVR occur.

最佳的俯臥位下心肺復蘇術：通過電腦斷層掃描確定與最大的左心室橫截面積相關聯的椎體節段位置

Optimizing Prone Cardiopulmonary Resuscitation: Identifying the Vertebral Level Correlating With the Largest Left Ventricle Cross-Sectional Area via Computed Tomography Scan

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背景：臨床工作中，一些外科手術要求我們將病人擺放于俯臥位。如果術中病人出現心臟驟停，則不能安全的將病人轉為俯臥位，心肺復蘇可能就需要我們在病人處於俯臥位元的情況下實施。雖然仰臥位元心肺復蘇已經有清晰的認識，但俯臥位元實施心肺復蘇的最佳手法還沒有明確的規定。本研究的目的是確定在俯臥位元情況下，如何從解剖學上確定心肺復蘇的最佳手法。

方法：我們回顧性分析了在俯臥位姿勢下 100 例患者的胸部電腦斷層掃描圖像。我們確定了跨越肩胛骨內側角,肩胛骨下角椎體水準以及棘突椎體與最下面肋骨連接的位置,我們選擇的圖像水準是處在左心室橫截面積最大的平面上。這一水準被認為是最優壓縮水準以及相關表面解剖標誌。我們計算的距離的比值從第七頸椎棘突水準到最大的左心室橫截面積水平除以從第七頸椎棘突到最下端的肋骨之間的距離。

結果：在俯臥位下，45%的病人的最大的左心室橫截面是低於肩胛下角 1 個椎體節段位置，95%的病人是低於肩胛下角的 0-2 個節段。從第七頸椎棘突水準到最

大的左心室横截面積水平除以從第七頸椎棘突到胸 12 椎體棘突之間距離的均值(SD)為 67%±7%(99% CI, 65-69).

結論：當病人被擺放在俯臥位下，86%的病人的最大的左心室横截面積是低於肩胛下角 0-2 個椎體節段的位置。在俯臥位下，低於肩胛下角 0~2 個椎體節段的位置是不是最合適的胸部擠壓的位置需要我們進一步的研究確定。

（解建 譯 李士通 校）

BACKGROUND: Placing the patient in the prone position frequently is required for some surgical procedures. If cardiac arrest occurs and the patient cannot be safely turned supine, cardiopulmonary resuscitation (CPR) may need to be performed with the patient in the prone position. Although clear landmarks have been defined for supine CPR, the optimal hand position for CPR in the prone position has not been clearly determined. The purpose of this study was to determine anatomically the optimal hand position for CPR in the prone position.
METHODS: We reviewed retrospectively the chest computed tomography images of 100 patients taken in the prone position. The vertebral body levels crossing the medial angle of the scapula, the inferior angle of the scapula, and the spinous process of the vertebral body connected to the most inferior rib were identified, and we selected the image level at which the left ventricular (LV)cross-sectional area was the largest. This level was defined as the optimal compression level and correlated to surface anatomical landmarks. We calculated the ratio of the distance from the C7 spinous process to the level of the largest LV cross-sectional area divided by the distance from the C7 spinous process to the spinous process of the vertebral body connected with the most inferior rib.
RESULTS: The level of the largest LV cross-sectional area in the prone position was 1 vertebral segment below the inferior angle of the scapula in 45% (99% confidence interval [CI], 33-58) of patients and 0 to 2 vertebral segments below that in 95% (99% CI, 86-98) of patients. The mean (SD) ratio of the distance from the C7 spinous process to the level of the largest LV cross-sectional areadivided by the distance from the C7 spinous process to T12 spinous process was 67% ± 7% (99% CI, 65-69).
CONCLUSIONS: When the patient is positioned prone, the largest LV cross-sectional area is 0 to 2 vertebral segments below the inferior angle of the scapula in at least 86% of patients. Further studies are needed to determine whether this position is optimal for chest compressions in the prone position.

程式化間斷硬膜外輸注在第一產程分娩鎮痛中的應用：一項隨機的連續分配實驗以確定輸注 0.0625%布比卡因與 2μg/mL 芬太尼混合液 10mL 的最佳間隔時間

Programmed Intermittent Epidural Bolus for Labor Analgesia During First Stage of Labor: A Biased-Coin Up-and-Down Sequential Allocation Trial to Determine the Optimum Interval Time Between Boluses of a Fixed Volume of 10 mL of Bupivacaine 0.0625% With Fentanyl 2 μg/mL

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背景：許多研究已經將間斷硬膜外輸注 (PIEB)與連續硬膜外輸注進行比較，比如患者自控硬膜外鎮痛與疼痛加重時的單次手動按壓鎮痛。因此，PIEB 的最佳間隔時間還待研究。我們設計了一項實驗來確立 PIEB 的最佳間隔時間，其組成為 0.0625%布比卡因與 2 μg/mL 芬太尼混合液，以期待能使 90%的產婦在第一產程能產生有效鎮痛。

方法：我們進行了一項雙盲連續分配實驗，以隨機設計來獲得 PIEB 90%的有效間隔時間。我們收集的病人為 ASA2-3 級未生育過的女性，在硬膜外鎮痛下進行自然分娩或人工引產。在超聲引導下將硬膜外導管置入 L2/3 或 L3/4。試驗劑量為 3mL0.125%的布比卡因與 3.3 μg/mL 芬太尼的混合液，隨後再給予 12 毫升的負荷量。在負荷劑量給完之後，若 20 分鐘內患者視覺類比評分≤1/10 ，則患者將進行 PIEB 鎮痛方案。在所有研究的產婦當中，PIEB 單次給藥劑量均為 10 mL 0.0625% 的布比卡因與 2 μg/mL 芬太尼的混合液。第一次程式性間斷給藥是在負荷劑量給藥 1 小時之後。共隨機分為四組，第一組產婦的間隔時間為 60 分鐘，接下來依次為間隔 50、40、30 分鐘。主要結果為有效鎮痛，即硬膜外鎮痛後 6 小時或者在宮頸完全擴張之前，產婦不需要進行患者自控鎮痛或單次手動按壓鎮痛。每小時對疼痛評分、冷感覺阻斷平面、運動阻滯程度和血壓進行測量。

結果：我們收集了 40 名女性。採用 DM 評估方法則估計 90%的有效間隔時間為 42.6 分鐘（95%的可信區間為 38.9-46.4）。採用等張回歸分析則為 36.8 分鐘 (95%

的可信區間為 31.0-49.0)。在 30 分鐘組有 70%的產婦感覺阻滯平面達到了 T6 以上，而 40、50、60 分鐘組分別為 44%、22%、11%。只有 30 分鐘組能對運動進行阻滯。所有組低血壓發生率均較低且不需處理。

結論：PIEB 給藥方法輸注 10 毫升 0.0625%布比卡因與 2 μg/mL 芬太尼混合液的最佳間隔時間大約為 40 分鐘。仍需要進一步的實驗來確定在整個分娩過程中該方法的有效性。

（廖汝婷 譯 李士通 校）

BACKGROUND: Most studies that have compared programmed intermittent epidural bolus (PIEB) with continuous epidural infusion regimens have included patient-controlled epidural analgesia and/or manual bolus as rescue analgesia for breakthrough pain. Consequently, the optimal time interval between PIEB is yet to be determined. We designed a study to establish the optimal timeinterval between PIEB of 10 mL of bupivacaine 0.0625% with fentanyl 2 μg/mL to produce effective analgesia in 90% of women duringfirst stage of labor without breakthrough pain.

METHODS: We conducted a double-blind sequential allocation trial with a biased-coin up-down design to obtain the effective interval90% for the PIEB regimen. We included American Society of Anesthesiologists physical status 2-3 nulliparous women at term undergoing spontaneous or induced labor requesting epidural analgesia. An ultrasound-assisted epidural catheter placement was performed at L2/3 or L3/4. A test dose of 3 mL of bupivacaine 0.125% plus fentanyl 3.3 μg/mL was followed by a loading dose of 12 mL of the same solution. PIEB was then started in women whose pain scores achieved Verbal Numerical Rating Score ≤1/10 within 20 minutes after the end of the loading dose. In all subjects, the programmed bolus dose was fixed at 10 mL of bupivacaine 0.0625% withfentanyl 2 μg/mL. The first bolus was delivered 1 hour after the loading dose. The PIEB interval was set at 60 minutes for the firstpatient and at varying time intervals (60, 50, 40, and 30 minutes; groups 60, 50, 40 and 30, respectively) for the subsequent patients, according to a biased-coin design. The primary outcome was effective analgesia, defined as no requirement for a patient-controlled epidural analgesia or a manual bolus for 6 hours after the initiation of the epidural analgesia or until the patient presented with full cervical dilatation, whichever event occurred first. Pain scores, sensory block levels to ice, degree of motor block, and blood pressure were assessed hourly.

RESULTS: We studied 40 women. The estimated effective interval 90% was 42.6 minutes (95% confidence interval 38.9-46.4) using the truncated Dixon and Mood

method and 36.8 minutes (95% confidence interval 31.0-49.0) using the Isotonic Regression analysis. Almost 70% of the patients in group 30 presented with sensory block above T6, compared with 44%, 22%, and 11% in groups 40, 50, and 60, respectively. Only patients in group 30 presented with motor blockade. The incidence of hypotension was low in all groups with no treatment required.
DISCUSSION: The optimal time interval between PIEB of 10 mL of bupivacaine 0.0625% with fentanyl 2 μg/mL is approximately 40 minutes. Further studies to determine the efficacy of this regimen throughout the entire duration of labor are warranted.

腹腔內滴注利多卡因有利於改善剖宮產術後鎮痛

Intraperitoneal Instillation of Lidocaine Improves Postoperative Analgesia at Cesarean Delivery: A Randomized, Double-Blind, Placebo-Controlled Trial
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背景: 剖宮產是一種常見的手術。儘管多模式鎮痛得到了發展，但仍有一部分女性術後鎮痛不完善、病人滿意度低。腹腔內滴注局麻藥已證實能有效緩解腹部手術術後疼痛。我們旨在研究腹腔內滴注利多卡因作為多模式鎮痛的一部分，對剖宮產術後鎮痛的有效性。

方法：我們選擇了擇期行剖宮產腰麻的產婦。以 0.75%布比卡因、芬太尼和嗎啡配成重比重進行腰麻。在剖宮產快要結束時，腹膜壁層或筋膜關閉之前，產婦隨機給予利多卡因（2%利多卡因加腎上腺素共 20 毫升）或安慰劑（20 毫升生理鹽水）滴注入腹腔內。主要觀察結果是 24 小時運動疼痛評分。次要觀察結果是 2、24、48 小時靜止疼痛評分和運動疼痛評分；產婦滿意度評分；鎮痛藥消耗量；噁心嘔吐瘙癢發生率和胃腸道功能恢復情況。

結果：共收集了 204 位產婦。利多卡因組跟安慰劑組基本特徵相似。術後 24 小時運動疼痛評分（參數估計 0.02，[95% 可信區間{CI} -0.14 到 0.18]；P = .823)），靜止時 (參數估計 0.00 [95% CI -0.32 到 0.33]；P = .986)，兩組是相同的。術後

2 小時運動疼痛評分(參數估計-0.58 [95% CI -0.90 到 -0.26]；P = .001) ，靜止時(參數估計-1.00 [95% CI -1.57 到 -0.43]；P = .001) ，利多卡因組相對較低。次要觀察結果中，腹膜關閉的產婦利多卡因組 24 小時運動疼痛評分有顯著的降低(參數估計-0.33 [95% CI -0.64 到 -0.03]；P = .032)。利多卡因組術後對阿片類鎮痛藥的需求也比對照組顯著減少(40 [40%] 比 61 [65%], 相對風險 0.59 [95% CI 0.43-0.81]； P = 0.001)。

結論：腹腔內滴注利多卡因有利於緩解剖宮產術後早期術後疼痛。而且能減少產婦術後對阿片類藥物鎮痛的需求。產婦在關腹過程中進行此項干預能從中獲益。

（廖汝婷 譯 李士通 校）

BACKGROUND: Cesarean delivery is a commonly procedure worldwide. Despite improvements in balanced multimodal analgesia, there remains a proportion of women for whom postoperative pain relief and patient satisfaction are still inadequate. Intraperitoneal instillation of local anesthetic has been shown to be effective in reducing postoperative pain after abdominal surgery. We sought to investigate the effect of intraperitoneal instillation of lidocaine on postcesarean delivery pain as part of a multimodal analgesia regimen.

METHODS: We studied women scheduled for elective cesarean delivery under spinal anesthesia. Spinal anesthesia was performed with 0.75% hyperbaric bupivacaine, fentanyl, and morphine. At the end of the cesarean delivery, immediately before parietal peritoneum or fascia closure, patients were randomized to receive either lidocaine (20 mL 2% lidocaine with epinephrine) or placebo (20 mL normal saline) instilled into the peritoneal cavity. The primary outcome was pain score on movement at 24 hours. Secondary outcomes were pain score at rest and on movement at 2, 24, and 48 hours; maternal satisfaction score; analgesic consumption; incidence of nausea, vomiting, and itching; and return of bowel function.

RESULTS: Two hundred four women were recruited. Baseline characteristics were similar between the lidocaine and placebo groups. Pain scores at 24 hours postcesarean delivery on movement (parameter estimate 0.02 [95% confidence interval {CI} -0.14 to 0.18]; P = .823) and at rest (parameter estimate 0.00 [95% CI -0.32 to 0.33]; P = .986) were similar in both groups. Pain scores at 2 hours postcesarean delivery on movement (parameter estimate -0.58 [95% CI -0.90 to -0.26]; P = .001) and at rest (parameter estimate -1.00 [95% CI -1.57 to -0.43]; P = .001) were lower in the lidocaine group. Subgroup analysis of patients with peritoneum closure revealed significantly lower pain scores at 24 hours on movement (parameter estimate -0.33 [95% CI -0.64 to -0.03]; P = .032) in the lidocaine group. The number

of women requesting postoperative opioids for breakthrough pain was significantly lower in the lidocaine group compared with that of the placebo (40 [40%] vs 61 [65%], respectively, relative risk 0.59 [95% CI 0.43-0.81]; P = 0.001).
CONCLUSIONS: The use of intraperitoneal instillation of lidocaine improves early postoperative pain management after cesarean delivery. Furthermore, it reduces the number of women requesting systemic opioids in the immediate postpartum period. Women undergoing peritoneal closure may particularly benefit from this intervention.

大鼠海馬腦片的長時程增強中異氟醚，腫瘤壞死因數（TNF-α）和 β-澱粉樣肽的相互作用

Interaction of Isoflurane, Tumor Necrosis Factor-α and β-Amyloid on Long-term Potentiation in Rat Hippocampal Slices
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背景：吸入麻醉藥如異氟醚和老年認知功能障礙之間的關係一直存在爭議。與阿爾茨海默病的相關的 β-澱粉樣肽（Aβ），和促炎症反應應激肽，即腫瘤壞死因數（TNF-α），均可損害突觸功能。我們推測，短暫暴露於異氟醚和這些肽會損害突觸功能，大鼠海馬將表現為抑鬱的長時程增強（LTP）和雙脈衝易化（PPF）。

方法：準備 3-4 周齡 Wistar 雄性大鼠的海馬腦片 。初步實驗確定 Aβ1–42 肽和 TNF-α 對 LTP 產生抑制影響的最低濃度（600 nM Aβ1–42 和 5 ng/mL TNF-α）。將這些濃度的肽分別與 1.5%異氟醚應用於海馬切片 ，或將兩者組合 1 小時後洗脫應用。通過 Schaffer-Collateral 側支通路的高頻刺激（100 Hz，1 秒），測量海馬 CA1 區神經元的 LTP（興奮性突觸後電位[fEPSPs]）。使用多重比較校正的方差分析來比較在穩態下的 LTP 和 LTP 誘導後的 40 到 60 分鐘。

結果：LTP 誘導後 EPSP 幅度在基線的 155%±9%，若沒有異氟醚暴露和洗脫影響為（基線的 150%±4%，P = .47）。與對照組相比，Aβ1–42 和 TNF-α 均可使 LTP 減少約 15%（基線的 129%±7%和 131%±11%，均數±標準差，P 均＜.001）。當異氟醚與 Aβ1–42 聯合時，LTP 沒有受損（對照的 151%±9%，P = .85），但異

氟醚聯合 TNF-α 或同時聯合 Aβ 和 TNF-α 時，LTP 的降低未受到影響。

結論：異氟醚的短暫暴露可抑制而非損害大鼠海馬 LTP 的降低，這主要與 Aβ1–42 有關。與此相反，異氟醚不通過 TNF-α 或 Aβ 和 TNF-α 聯合體，對突觸造成損害。雖然這是一項體外研究，將其轉換為臨床醫學還需額外的工作，但這意味著異氟醚，Aβ 和 TNF-α 的相互作用可能對阿爾茨海默病患者或圍手術期的炎症反應患者有一定的影響。

（陸曉斐 譯 李士通 校）

BACKGROUND: The relationship between inhalational anesthetics such as isoflurane and cognitive impairment in the elderly is controversial. Both β-amyloid peptide (Aβ), associated with Alzheimer disease, and tumor necrosis factor-α (TNF-α), a proinflammatory stress-related peptide, impair the synaptic function. We hypothesized that transient exposure to isoflurane and these peptides would impair synaptic function, manifest as a depression of long-term potentiation (LTP) and paired pulse facilitation (PPF), in the rat hippocampus.
METHODS: Hippocampal slices were prepared from 3- to 4-week-old male Wistar rats. Preliminary experiments identified minimal concentrations of Aβ1–42 peptide and TNF-α that produced statistically detectable suppressing effects on LTP (600 nM Aβ1–42 and 5 ng/mL TNF-α). These concentrations of peptides were applied to slices alone, with 1.5% isoflurane, or in combination for 1 hour and then washed out. Measurements of LTP (field excitatory postsynaptic potentials [fEPSPs]) from neurons in the CA1 area by stimulation of the Schaffer-Collateral pathway were made after high-frequency stimulation (100 Hz, 1 second). Analysis of variance with correction for multiple comparisons was used to compare LTP under steady-state conditions and averaged for the 40- to 60-minute period after LTP induction.
RESULTS: EPSP amplitude after LTP induction was 155% ± 9% of baseline and was not affected by isoflurane exposure and washout (150% ± 4% of baseline, P = .47). Both Aβ1–42 and TNF-α reduced LTP by approximately 15% compared with control (129% ± 7% and 131% ± 11% of baseline respectively, means ± SD, both P < .001). When Aβ1–42 was combined with isoflurane, LTP was not impaired (151% ± 9% of control, P = .85), but isoflurane had no effect on LTP depression caused by TNF-α or a combination of Aβ and TNF-α.
CONCLUSIONS: Brief exposure to isoflurane prevents rather than impairs the decrease in LTP caused by Aβ1–42 in rat hippocampus. In contrast, isoflurane had no effect on synaptic impairment caused by TNF-α or a combination of TNF-α and Aβ. Although this is an in vitro study and translation to clinical medicine requires additional work, the interactions of isoflurane, Aβ, and TNF-α revealed here could have implications for patients with Alzheimer disease or perioperative

neuroinflammation.

鎖骨上和鎖骨下臂叢神經阻滯的比較：一項隨機對照試驗的系統綜述

Comparison of Supraclavicular and Infraclavicular Brachial Plexus Block: A Systemic Review of Randomized Controlled Trials

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背景：鎖骨上臂叢神經阻滯和鎖骨下臂叢神經阻滯通常被廣泛用於上肢手術。近期有許多的臨床研究比較了鎖骨上臂叢神經阻滯和鎖骨下臂叢神經阻滯的影響，但是這兩者在臂叢四個周圍神經分支的感覺阻滯方面的影響還存在爭議。

方法：本研究是一個系統綜述，使用的是 2016.03 之前的 MEDLINE 和 EMBASE 資料庫。選擇的是比較鎖骨上臂叢神經阻滯和鎖骨下臂叢神經阻滯的隨機對照試驗。本次研究的主要結果是比較兩者在臂叢四個神經分支的不完全阻滯發生率。次要結果包括兩者成功阻滯的發生率，阻滯的時間，感覺阻滯的發生，鎮痛的持續時間，和併發症的發生率。

結果：本次研究共納入十個隨機對照試驗，共計 676 例患者。匯總分析顯示 30 分鐘時鎖骨下臂叢神經阻滯的橈神經不完全阻滯的發生率顯著高於鎖骨上臂叢神經阻滯（風險比 0.39；95%置信區間[0.17-0.88]，P = .02，I = 0%）。而根據鎖骨下臂叢神經阻滯注射數量的亞組分析顯示，雙次注射或三次注射對於橈神經不完全阻滯的發生沒有差異。此外，當鎖骨下臂叢神經阻滯進行雙次注射或三次注射時， 30 分鐘時尺神經不完全阻滯的發生率顯著降低。鎖骨上臂叢神經阻滯局部麻醉注射時感覺異常和疼痛的發生，膈神經麻痹，Horner 綜合征均顯著高於鎖骨下組，其餘的次要結果兩者之間沒有差異。

結論：這項薈萃分析結果表明，鎖骨下臂叢神經阻滯 30 分鐘時橈神經不全阻滯

的發生率較高，這可能可以通過雙次或三次注射避免。此外，鎖骨下臂叢神經阻滯的多次注射技術使其在尺神經不完全阻滯的發生率顯著低於鎖骨上組。在神經阻滯的成功率，阻滯起效時間，鎮痛持續時間方面，鎖骨上和鎖骨下臂叢神經阻滯無差異。但鎖骨上臂叢神經阻滯在感覺異常、疼痛和周圍神經相關併發症方面的發生率更頻繁。然而，由於樣本量小，發表偏倚仍然值得關注。進一步的研究還需足夠的樣本量和大量的試驗結果。

（陸曉斐 譯 李士通 校）

Background: Supraclavicular (SC) and infraclavicular (IC) brachial plexus block (BPB) are commonly used for upper extremity surgery. Recent clinical studies have compared the effect of SC- and IC-BPB, but there have been controversies over spread of sensory blockade in each of the 4 peripheral nerve branches of brachial plexus.
Methods: This study included a systemic review, using the Medline and EMBASE database from their inceptions through March 2016. Randomized controlled trials (RCTs) comparing SC- and IC-BPB were included. The prespecified primary outcome was the incidences of incomplete sensory blockade in each of the 4 terminal nerve branches of brachial plexus. Secondary outcome included the incidence of successful blockade, performance time, onset of sensory block, duration of analgesia, and complication rates.
Results: Ten RCTs involving 676 patients were included. Pooled analyses showed the incidence of incomplete block at 30 minutes in radial nerve territory was significantly higher in IC-BPB, favoring SC-BPB (risk ratio 0.39; 95% confidence interval [0.17-0.88], P = .02, I = 0%). However, subgroup analysis according to the number of injections of IC-BPB showed that double or triple injections IC-BPB yielded no difference in the incomplete radial block. Furthermore, the incidence of incomplete ulnar block at 30 minutes was significantly lower in IC-BPB when using double or triple injection IC-BPB. There was no difference in the secondary outcomes between SC- and IC-BPB groups, with the exception of complication rates. The incidence of paresthesia/pain on local anesthetic injection, phrenic nerve palsy, and Horner syndrome was significantly higher in the SC group, favoring IC-BPB.
Conclusions: This meta-analysis demonstrated that IC-BPB showed a significantly high incidence of incomplete radial nerve sensory block at 30 minutes, which may be avoided by double or triple injection. Furthermore, IC-BPB with multiple injection technique showed significantly lower incidence of incomplete ulnar block than SC-BPB. There were no differences in the incidence of successful blockade, block onset, and duration of analgesia between SC- and IC-BPB. Procedure-related paresthesia/pain and adjacent nerve-related complications were more frequent in

SC-BPB. However, because of the small sample size, publication bias remains a concern when interpreting our results. Further studies with sufficient sample size and reporting large number of outcomes are required.

一個新穎控制炎症性疼痛的方法:前列腺素 E2 絡合 β-Cyclodextrins 通過隨機的甲基化

A Novel Approach for the Control of Inflammatory Pain: Prostaglandin E2 Complexation by Randomly Methylated β-Cyclodextrins

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背景：環氧酶抑制劑阻斷前列腺素(PG)E2 的形成，是治療炎症性疼痛的標準藥物。然而，這些藥物有嚴重的胃腸道、腎和心血管副作用限制其臨床應用。環糊精葡萄糖是中性的寡聚物，形成外部親水結構，內部疏水腔用於攜帶親水性物質。甲基化的 β 環糊精目前使用在一些藥物作為增強劑，還提供動力。因此，我們假設隨機甲基化 β 環糊精(RAMEB)可以用於疼痛治療。

方法：矽片篩選重要的炎症介質(如 PGE2、P 物質、緩激肽和降鈣素相關基因肽)被用來進行預測這些分子與甲基化 β 環糊精 RAMEB 相綁定的可能性。之後，一個全面的體外研究在 RAMEB 或其 RAMEB FL 之間使用毛細管電泳調查了絡合親和力的最佳目標。Wistar 鼠是足底注射完全弗氏佐劑(CFA)96 小時誘導炎性痛覺過敏。隨後，老鼠足底注射或靜脈注射治療 RAMEB 或 RAMEB FL 並給予相應的治療。帕瑞昔布作為積極的治療手段。機械(爪壓痛閾值，PPT)和熱(縮足反應潛伏期)疼痛的閾值確定之前注入和在指定的時間點。將爪組織收集後，測量 PGE2 和 PGD2。方差分析是用於資料分析並採取適當的事後比較。

結果：在矽片篩選表明，PGE2 擁有最高的親和力是最好的人選與 RAMEB 綁定。同樣，在毛細管電泳實驗，RAMEB 有高親和力的形式包含複合物與 PGE2(穩定

常數(K)，360 1/M；95%置信區間[C]：347.58-372.42M)。局部應用 RAMEB 緩解 CFA 誘導的機械(PPT：76.25g；95%置信區間：76.25-56.24g)和熱痛覺過敏(PPT：8.50 秒；95%置信區間：8.50-6.76 秒)。此外，全身性應用 RAMEB 減少 CFA-誘導的機械痛(PPT：126.66g；95%置信區間：126.66-114.54 g)和熱痛覺過敏(縮足反應潛伏期：11.47 秒；95%置信區間：9.26-13.68 秒)。體外應用 RAMEB FL 導致更大的 PGE-2 的結合容量並且降低 PG 含量，與體內痛覺過敏相似的程度。大鼠的運動活動並不由 RAMEB 或 RAMEB FL 改變的。

結論：通過環糊精結合 PGs 可以是一個新奇的和創新的工具用於治療炎症性疼痛並且可以繞過一些不必要的環氧酶抑制劑的副作用。

（吳昕菀 譯 李士通 校）

BACKGROUND: Inhibitors of cyclooxygenase, which block the formation of prostaglandin (PG) E2, are the standard treatment of inflammatory pain. These drugs, however, have serious gastrointestinal, renal, and cardiovascular side effects that limit their clinical use. Cyclodextrins are neutral glucose oligomers that form a hydrophilic outer and a hydrophobic interior cavity used to carry hydrophilic substances. Methyl-β-cyclodextrins are used currently in several drugs as enhancers and also to deliver PGs. We therefore hypothesized that randomly methylated β-cyclodextrins (RAMEB) could be used for pain treatment.
METHODS: An in silico screening for important inflammatory mediators (eg, PGE2, substance P, bradykinin, and calcitonin gene-related peptide) was performed to predict the probability of these molecules binding to RAMEB. Thereafter, a comprehensive in vitro study investigated the complexation affinity of the best target toward RAMEB or its RAMEB-fraction L (FL) using capillary electrophoresis. Wistar rats were injected intraplantarly with complete Freund's adjuvant (CFA) for 96 hours to induce inflammatory hyperalgesia. Subsequently, rats were treated intraplantarly or intravenously either with RAMEB or RAMEB FL and compared with the respective controls. Parecoxib was used as positive control. Mechanical (paw pressure threshold, PPT) and thermal (paw withdrawal latency) nociceptive thresholds were determined before injection and at the indicated time points thereafter. Paw tissue was collected after treatments, and PGE2 and PGD2 contents were measured. Analysis of variance was used for data analysis followed by appropriate post hoc comparisons.
RESULTS: In silico screening indicated that PGE2, with the highest affinity, was the best candidate for RAMEB binding. Likewise, in capillary electrophoresis experiments, RAMEB had a high affinity to form inclusion complexes with the PGE2

(stability constant [K], 360 1/M; 95% confidence interval [C]: 347.58-372.42 M). Local treatment with RAMEB alleviated CFA-induced mechanical (PPT: 76.25 g; 95% CI: 56.24-96.25 g) and thermal hyperalgesia (PPT: 8.50 seconds; 95% CI: 6.76-10.23 seconds). Moreover, a systemic administration of RAMEB decreased CFA-induced mechanical (PPT: 126.66 g; 95% CI: 114.54-138.77 g) and thermal hyperalgesia (paw withdrawal latency: 11.47 seconds; 95% CI: 9.26-13.68 seconds). RAMEB FL resulted in greater in vitro PGE2-binding capacity and decreased PG content as well as hyperalgesia in vivo to a similar extent. Motor activity of the rats was not altered by RAMEB or RAMEB FL.
CONCLUSIONS: Capture of PGs by cyclodextrins could be a novel and innovative tool for the treatment of inflammatory pain and bypassing some unwanted side effects of cyclooxygenase inhibitors.

術前應用三維超聲應變成像技術評估心臟手術後左室功能減退和預測臨床預後

Preoperative Three-Dimensional Strain Imaging Identifies Reduction in Left Ventricular Function and Predicts Outcomes After Cardiac Surgery
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背景：基於心動超聲圖的斑點追蹤應變成像技術是一項評估左心室功能的最新技術。本次研究旨在運用三維（3D）斑點追蹤應變成像技術評估心臟術後左心室收縮功能的變化，並分析術前運用該項技術能否獨立預測主動脈瓣膜手術、二尖瓣手術和冠脈搭橋術的短期和長期預後。

方法：前瞻性納入共 163 名接受主動脈瓣手術、二尖瓣手術和冠脈搭橋術的患者，並詳細記錄臨床資料。並收集患者的一般資料、手術記錄和結果資料。在患者術前和術後 2-4 天進行經胸超聲心動圖檢查。盲法離線分析患者左室二維和三維射血分數（EF2D 和 EF3D），左心室整體收縮期峰值面積，縱向、圓周和徑向應變。

結果：三維整體應變與三維射血分數結果關聯性好。應變成像技術發現在各種心臟手術術後左心室功能均顯著降低。通過結合術前 EF3D，繪製 ROC 曲線計算

得出了對應左心室功能正常、輕度降低和嚴重降低的 3D 整體應變參考值。左心室功能正常（(EF3D ≥ 50%)對應 3D 整體面積應變-25%，曲線下面積 0.86(0.81-0.89)。術前整體面積應變減少的患者預後較差，包括 ICU 時間延長（4 vs 3 days, P = .001），存在更多嚴重不良事件(27% vs 11%, P = .03)和較低的 1 年無事件生存率(69% vs 88%, P = .005)。通過校正基線時其他危險因素（包括歐洲心臟手術風險評估評分和手術類型），發現術前應變是一項短期和長期預後（包括 ICU 住院時間，術後正性肌力藥物評分和 1 年無事件生存率）的獨立預測因數。

結論：本次研究發現通過 3D 應變成像技術評估，在各種心臟手術術後左心室功能均顯著降低。同時術前三維應變是一項短期和長期預後的獨立預測因數。心臟手術術前使用這項無創三維經胸超聲心動圖應變成像檢查能夠為高危患者的圍術期危險因素分層和管理提供更多的有益資訊。

（吳瑋譯　陳傑校）

BACKGROUND: Echocardiography-based speckle-tracking strain imaging is an emerging modality to assess left ventricular function. The aim of this study was to investigate the change in left ventricular systolic function after cardiac surgery with 3-dimensional (3D) speckle-tracking strain imaging and to determine whether preoperative 3D strain is an independent predictor of acute and long-term clinical outcomes after aortic valve, mitral valve, and coronary artery bypass grafting operations.
METHODS: In total, 163 adult patients undergoing aortic valve, mitral valve, and coronary artery bypass surgeries were enrolled prospectively and had complete data sets. Demographic, operative, and outcome data were collected. 3D transthoracic echocardiograms were preformed preoperatively and on second to fourth postoperative day. Blinded off-line analysis was performed for left ventricular 2-dimensional (2D) ejection fraction (EF2D) and 3D ejection fraction (EF3D) and global peak systolic area, longitudinal, circumferential, and radial strain.
RESULTS: 3D global strain correlated well with EF3D. Ventricular function as measured by strain imaging decreased significantly after all types of cardiac surgery. When preoperative EF3D was used, receiver operating characteristic curves identified reference values for 3D global strain corresponding to normal, mildly reduced, and

severely reduced ventricular function. Normal ventricular function (EF3D ≥ 50%) corresponded to 3D global area strain -25%, with area under curve = 0.86 (0.81-0.89). Patients with reduced preoperative 3D global area strain had worse postoperative outcomes, including length of intensive care unit stay (4 vs 3 days, P = .001), major adverse events (27% vs 11%, P = .03), and decreased 1-year event-free survival (69% vs 88%, P = .005). After we controlled for baseline preoperative risk models including European System for Cardiac Operative Risk Evaluation score and surgery type, preoperative strain was an independent predictor of both short- and long-term outcomes, including length of intensive care unit stay, postoperative inotrope score, and 1-year event-free survival.
CONCLUSIONS: This study shows that cardiac surgery was associated with an acute reduction in postoperative left ventricular function, when evaluated with 3D strain imaging. In addition, preoperative 3D strain was demonstrated to be an independent predictor of acute and long-term clinical outcomes after cardiac surgery. The use of noninvasive 3D transthoracic echocardiogram strain imaging before cardiac surgery may provide added information to aid in perioperative risk stratification and management for these high-risk patients.

2.閉環系統的臨床性能和安全性：一項對隨機對照試驗的系統綜述與薈萃分析

Clinical Performance and Safety of Closed-Loop Systems: A Systematic Review and Meta-analysis of Randomized Controlled Trials
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自動化系統可以提高受控變數的穩定性，減少臨床實踐中的工作量，而不增加患者的風險。因此進行這項系統性綜述與薈萃分析來比較閉環系統與手動控制系統的臨床性能表現。主要指標是評價閉環系統與手動控制系統相比較下將給定變數保持在期望目標範圍內的精准程度。次要指標是發生過沖和下沖次數。檢索閉環系統與手動控制系統準確性與安全性的隨機對照試驗。主要指標是系統能夠在期望範圍內維持給定變數（例如，雙譜指數或氧飽和度）或在目標測量比例在所需範圍內的百分比。次要指標是受控變數高於或低於目標範圍的百分比或發生次數。連續變數計算標準化平均差和 95％置信區間（CI），而對二分變數計算優勢比和 95％CI。共納入 36 項臨床研究。與手動控制體統相比，自動化系統能夠

在麻醉藥物輸注裝置（95％CI，11.7％-23.1％；時間百分比，P <0.0001，研究數目：n = 15），糖尿病病人（95％CI，11.5％-30.9％；P = 0.001，n = 8）與機械通氣患者（95％CI，1.5％-23.1％，n = 8）中更好地維持受控變數。研究中的異質性較高（> 75％）。當使用閉環系統時，觀察到過沖和下沖的發生顯著減少。自動化系統的使用可以對所選範圍內對給定目標具有更好控制。閉環系統中給定目標過沖或下沖減少。

（謝律譯　陳傑校）

Automated systems can improve the stability of controlled variables and reduce the workload in clinical practice without increasing the risks to patients. We conducted this review and meta-analysis to assess
the clinical performance of closed-loop systems compared with manual control. Our primary outcome was the accuracy of closed-loop systems in comparison with manual control to maintain a given variable in a desired target range. The occurrence of overshoot and undershoot episodes was the secondary outcome.We
retrieved randomizedcontrolled trials on accuracy
and safety of closed-loop systems versus manual control. Our primary outcome was the percentage of time during which the system was able to maintain a given variable (eg, bispectral index or oxygen saturation) in a desired range or the proportion of the target measurements that was within the required range. Our secondary outcome was the percentage of time or the number of episodes that the controlled variable was above or below the target range. The standardized mean difference and 95% confidence interval (CI) were calculated for continuous outcomes, whereas the odds ratio and 95% CI were estimated for dichotomous outcomes.Thirty-six trialswere included. Compared with manual control, automated systems allowed better maintenance of the controlled variable in the anesthesia drug delivery setting (95% CI, 11.7%-23.1%; percentage of time, P < 0.0001, number of studies: n = 15), in patients with diabetes mellitus (95% CI, 11.5%-30.9%; percentage of time, P = 0.001, n = 8), and in patients mechanically ventilated (95% CI, 1.5%-23.1%; percentage of time, P = 0.03, n = 8). Heterogeneity among the studies was high (>75%). We observed a significant reduction of episodes of overshooting and undershooting
when closed-loop systems were used. The use of automated systems can result in better control of a given target within a selected range. There was a decrease of overshooting or undershooting of a given target with closed-loop systems.

在低於 0℃及使用一種新型麻醉輸送裝置情況下各麻醉藥物蒸氣壓的變化

Vapor Pressures of Anesthetic Agents at Temperatures Below 0°C and a Novel

Anesthetic Delivery Device

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在室溫下，地氟烷、異氟烷和七氟烷的蒸氣壓在臨床有效範圍以上，假設在室溫低於 0℃時這些麻醉劑的治療濃度可達成，但此時蒸氣壓-溫度關係曲線是未知的。其次假設這個關係能夠被運用入輸送治療範圍濃度的麻醉氣。因此著手確定每種麻醉劑的低溫-蒸氣壓關係曲線，以及確定每種麻醉劑在 0℃以下任意溫度的飽和蒸氣濃度。為了驗證以上假設，測量在一個大氣壓下溫度-60℃到 0℃的飽和蒸氣濃度，由此描繪每種麻醉劑的經驗關係曲線。所有三種麻醉劑的重複實驗具有一致性。為了驗證這組經驗性資料，構建了一個有此特徵的數控熱電麻醉蒸發器，用於給實驗室大鼠輸送麻醉氣體，研究首次發現在 0℃以下地氟烷，異氟烷，七氟烷的蒸氣壓-溫度關係曲線以及蒸氣壓等於最低肺泡有效濃度時的溫度（TMAC）。研究顯示一定程度上驗證了此麻醉蒸發器的原理。揮發性麻醉劑也能夠在低溫下達到的臨床治療相關濃度。

（袁天傑譯　陳傑校）

At room temperature, the vapor pressures of desflurane, isoflurane, and sevoflurane are well above the clinically useful range. We hypothesized that therapeutic concentrations of these agents could be achieved at temperatures below 0°C, but the vapor pressure-temperature relationship is unknown below 0. Second, we hypothesized that this relationship could be exploited to deliver therapeutic-range concentrations of anesthetic vapor. We therefore set out to determine the low temperature-vapor pressure relationships of each anesthetic agent, thereby identifying the saturated vapor concentration of each agent at any temperature below 0°C. To test our hypothesis, we measured the saturated vapor concentration at 1 atm of pressure for temperatures between -60 and 0°C, thus developing an empiric relationship for each agent. There was consistency in repeated experiments for all 3 agents. To test the empiric data, we constructed a digitally controlled thermoelectric anesthetic vaporizer, characterized the device, and used it to deliver anesthetic vapor to laboratory mice. We report, for the first time, the temperature-vapor pressure relationship at

temperatures below 0°C for desflurane, isoflurane, and sevoflurane as well as the TMAC of these agents: the temperature at which the vapor pressure is equal to the minimum alveolar concentration. We describe the construction and limited validation of an anesthetic vaporizer prototype on the basis of this principle. We conclude that clinically relevant concentrations of volatile anesthetics may be achieved at low temperatures.

肺超聲用於圍術期肺不張的評估：一項初步可行性研究

Lung Ultrasonography for the Assessment of Perioperative Atelectasis: A Pilot Feasibility Study

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背景：當面對術中低氧血症時，麻醉醫生可使用的診斷工具有限。肺超聲是一種安全和準確的床邊成像模式。本項研究的目的是評估肺超聲在圍術期的可行性，並評估其檢測術中呼吸道併發症和圍手術期肺不張引起氧合變化的能力。

方法：在這項前瞻性觀察性初步研究中，連續招募了 30 名腹腔鏡手術患者。使用標準化的機械通氣。在 5 個預定的時間點進行肺部超聲檢查：全麻誘導之前，全麻誘導之後，氣腹建立之後，到達恢復室之後和離開恢復室之前。每個超聲的圖像檢測中，形成 12 個肺部區域成像。由此計算肺超聲評分（LUS）---一項半定量評分，來評估每個時間點的肺通氣情況。

結果：對所有患者均進行了肺部超聲檢查。誘導之後和到達恢復室的 LUS 評分變化與氧合變化一致(Spearman r=-0.43, P=.018)。全麻的誘導與 LUS 評分增加相關，在之後時間點逐漸惡化直到出恢復室。這種惡化在基地段和依賴性肺區更顯著。肺超聲幫助觀察到兩例二氧化碳氣胸、一例支氣管內插管和一例亞臨床肺水腫。

結論：肺超聲在圍術期的應用是可行的，可用於追蹤圍術期肺不張，並協助呼吸道併發症的診斷。通氣損失的演變與氧合的變化中度相關。

（殷智宇譯 陳傑校）

BACKGROUND: Few diagnostic tools are available to anesthesiologists when confronted with intraoperative hypoxemia. Lungultrasonography is a safe and accurate bedside imaging modality. The aim of this study was to evaluate the feasibility of lungultrasonography during the perioperative period and assess its ability to detect intraoperative respiratory complications and oxygenation changes resulting from perioperative atelectasis.
METHODS: In this prospective observational pilot study, 30 consecutive patients scheduled for laparoscopic surgery were recruited. Mechanical ventilation was standardized. Lung ultrasonography was performed at 5 predefined time points: before induction of general anesthesia (GA), after induction of GA, after pneumoperitoneum insufflation, on arrival in the recovery room, and before recovery room discharge. For each echographic examination, 12 pulmonary quadrants were imaged. From these, a semiquantitative score, the lungultrasound (LUS) score, was calculated to assess lung aeration at each time point.
RESULTS: Lung ultrasonography was possible in all patients. Changes in the LUS score between the postinduction period and arrival in the recovery room were correlated with changes in oxygenation (Spearman r = -0.43, P = .018). Induction of GA was associated with an increase in the LUS score, which gradually worsened at all time points until recovery room discharge. This increase was significantly worse in the basal and dependent lung zones. Lung ultrasonography helped in the detection of 2 capnothoraces, 1 endobronchial intubation, and 1 episode of subclinical pulmonary edema.
CONCLUSIONS: Lung ultrasonography in the perioperative period is feasible, allows tracking of perioperative atelectasis, and facilitates the diagnosis of respiratory complications. The evolution of aeration loss correlates moderately with changes in oxygenation.

呼氣流量受限是腹部大型手術後肺部併發症的一項危險因素

Expiratory Flow Limitation as a Risk Factor for Pulmonary Complications After Major Abdominal Surgery

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背景：術後肺部併發症是增加術後發病率和死亡率的主要因素。雖然術後肺部併發症的發生與多種危險因素相關，但各項研究之間結果並非一致，即使在某些確

定因素的研究中，其預測能力也較低。此研究假定術後肺併發症與術中呼氣流速受限存在相關性。

方法：這項前瞻性觀察性研究的候選人是接受全身麻醉進行腹部大型手術的患者。術前資料獲取包括年齡、體重指數、ASA 分級、吸煙及呼吸困難病史和室內空氣氧分壓。使用呼氣末正壓試驗在術中評估呼氣流速受限情況。術後資料收集包括術後肺併發症的發生率。

結果：在招募的 330 名患者中，31％發生了呼氣流速受限。單因素分析顯示，發生呼氣流速受限的患者更易患術後肺炎（5％vs 0％，P <0.001）和急性呼吸衰竭（11％vs 1％，P <0.001），且住院時間更長（7 天 vs 9 天，P <0.01）。多變數分析確定呼氣流速受限增加術後肺併發症的發生風險> 50％（風險比，2.7; 95％置信區間，1.7-4.2）。年齡和 MRC 呼吸困難量表也是肺併發症的顯著多變數危險因素。

結論：此研究結果表明，術中呼氣流速受限與腹部大型手術後的肺併發症相關。需要進一步研究來更好地瞭解呼氣流速受限與術後肺部情況的相關性。

（陳依譯 陳傑校）

BACKGROUND: Postoperative pulmonary complications are major causes of postoperative morbidity and mortality. Although several risk factors have been associated with postoperative pulmonary complications, they are not consistent between studies and, even in those studies in which these factors were identified, the predictive power is low. We hypothesized that postoperative pulmonary complications would correlate with the presence of intraoperative expiratory flow limitation.
METHODS: Candidates for this prospective observational study were patients undergoing general anesthesia for major abdominal surgery. Preoperative data collection included age, body mass index, American Society of Anesthesiologists class, smoking and dyspnea history, and room air PO2. Expiratory flow limitation was assessed intraoperatively using the positive end-expiratory pressure test. Postoperative data collection included the incidence of postoperative pulmonary complications.
RESULTS: Of the 330 patients we enrolled, 31% exhibited expiratory flow limitation. On univariate analysis, patients with expiratory flow limitation were more likely to

have postoperative pneumonia (5% vs 0%, P < .001) and acute respiratory failure (11% vs 1%, P < .001) and a longer length of hospital stay (7 vs 9 days, P < .01). Multivariate analysis identified that expiratory flow limitation increased the risk of developing postoperative pulmonary complications by >50% (risk ratio, 2.7; 95% confidence interval, 1.7-4.2). Age and Medical Research Council dyspnea score were also significant multivariate risk factors for pulmonary complications.
CONCLUSIONS: Our results show that intraoperative expiratory flow limitation correlates with that of postoperative pulmonary complication after major abdominal surgery. Further work is needed to better understand the relevance of expiratory flow limitation on postoperative pulmonary outcomes.

硬膜外導管放置期間使用音樂對分娩產婦焦慮、疼痛和滿意度影響的一項隨機對照試驗

A Randomized Controlled Trial of Music Use During Epidural Catheter Placement on Laboring Parturient Anxiety, Pain, and Satisfaction
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背景：雖然音樂常用來營造舒適輕鬆的分娩環境,但其在硬膜外導管放置期間使用的效果是未知的。本研究試圖證明音樂在分娩產婦硬膜外導管放置期間的作用，並提出以下假設：音樂使用會減少焦慮,降低疼痛,增加病人滿意度。

方法：進行了此項分娩產婦在音樂有無兩種情況下接受硬膜外導管放置的前瞻、隨機、對照試驗。音樂組患者通過外部放大揚聲器接聽潘朵拉® 電臺廣播的受個人喜愛的音樂; 對照組沒有聽音樂。對所有女性使用標準化的硬膜外技術和局部麻醉劑量。主要結果是焦慮相關的 3 次測評。次要結果包括疼痛、病人滿意度、血流動力學參數、產科參數、新生兒預後和麻醉醫生的焦慮程度。Bonferroni 校正用於主要結果分析。對於次要結果, P 值<001 被認為是具有統計學意義。

結果：共有 100 名產婦被隨機分配，99 位患者納入意向治療分析。兩組病人特徵相似;音樂組,音樂使用的持續時間為 31.1±7.7min(平均數±標準差)。音樂組在硬膜外導管放置當時使用數位評定量表分數測量後具有更高的焦慮程度(2.9±3.3 vs

1.4±1.7,平均差 1.5(95%置信區間 CI) { 0.2 - -2.7},P = 02), 在硬膜外導管放置 1 小時後感到“非常舒適”的產婦更少(51% vs 78%,優勢比{或} 0.3(95% CI 0.1 - -0.9),P = 02)。據觀察兩組在硬膜外導管放置前後患者的疼痛評分和整個期間病人滿意度沒有差異。然而,音樂組對未來硬膜外穿刺時使用音樂的意願更高(84% vs 45%,或 6.4(95% CI 2.5 - -16.5),P <.0001。)。據觀察兩組硬膜外導管放置的難度或剖腹產率並沒有差異。

結論:分娩產婦在硬膜外導管放置期間聽音樂可能導致更多的術後焦慮而且疼痛或滿意度並沒有得到改善;然而,對未來硬膜外穿刺時使用音樂的意願更高，需要進一步研究以確定音樂對使用硬膜外分娩鎮痛且有音樂需求臨產婦的作用。

（董璐譯　陳傑校）

BACKGROUND: Although music is frequently used to promote a relaxing environment during labor and delivery, the effect of its use during the placement of neuraxial techniques is unknown. Our study sought to determine the effects of music use on laboring parturients during epidural catheter placement, with the hypothesis that music use would result in lower anxiety, lower pain, and greater patient satisfaction.

METHODS: We conducted a prospective, randomized, controlled trial of laboring parturients undergoing epidural catheter placement with or without music. The music group listened to the patient's preferred music on a Pandora® station broadcast through an external amplified speaker; the control group listened to no music. All women received a standardized epidural technique and local anesthetic dose. The primary outcomes were 3 measures of anxiety. Secondary outcomes included pain, patient satisfaction, hemodynamic parameters, obstetric parameters, neonatal outcomes, and anesthesia provider anxiety. Intention-to-treat analysis with Bonferroni correction was used for the primary outcomes. For secondary outcomes, a P value of <.001 was considered statistically significant.

RESULTS: A total of 100 parturients were randomly assigned, with 99 included in the intention-to-treat analysis. Patient characteristics were similar in both groups; in the music group, the duration of music use was 31.1 ± 7.7 minutes (mean ± SD). The music group experienced higher anxiety as measured by Numeric Rating Scale scores immediately after epidural catheter placement (2.9 ± 3.3 vs 1.4 ± 1.7, mean difference 1.5 [95% confidence interval {CI} 0.2-2.7], P = .02), and as measured by fewer parturients being "very much relaxed" 1 hour after epidural catheter placement (51% vs 78%, odds ratio {OR} 0.3 [95% CI 0.1-0.9], P = .02). No differences in mean pain

scores immediately after placement or patient satisfaction with the overall epidural placement experience were observed; however, the desire for music use with future epidural catheter placements was higher in the music group (84% vs 45%, OR 6.4 [95% CI 2.5-16.5], P < .0001). No differences in the difficulty with the epidural catheter placement or in the rate of cesarean delivery were observed.
CONCLUSIONS: Music use during epidural catheter placement in laboring parturients is associated with higher postprocedure anxiety and no improvement in pain or satisfaction; however, a stronger desire for music with future epidural catheter placements was observed. Further investigation is needed to determine the effect of music use in parturients requesting and using epidural labor analgesia.

硬膜穿破硬膜外麻醉技術與硬膜外麻醉聯合脊椎麻醉技術相比改善產婦麻醉效果、減小副反應：一項隨機臨床試驗

Dural Puncture Epidural Technique Improves Labor Analgesia Quality With Fewer Side Effects Compared With Epidural and Combined Spinal Epidural Techniques: A Randomized Clinical Trial
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背景：硬膜穿破硬膜外麻醉技術是在腰硬聯合技術基礎上的改進，用腰麻針穿透硬膜但不向鞘內注麻醉藥。硬膜穿破硬膜外麻醉技術（DPE）與硬膜外麻醉技術（EPL）相比，改善了尾部麻醉藥的擴散，與腰硬聯合技術（CSE）相比，減少了麻醉副反應。作者假設產婦麻醉的起效時間：CSE>DPE>EPL。

方法：120 例產婦在分娩早期隨機分成 EPL、DPE、CSE 組。EPL 和 DPE 組的起始給藥劑量為硬膜外 20ml 0.125%布比卡因和 2ug/ml 芬太尼，超過 5min 給完，CSE 組鞘內注射 0.125%布比卡因 1.7mg 和芬太尼 17ug。阻滯完全後由不知道分組的合作研究者評估麻醉效果。雙盲研究中由產科醫生回顧性評估椎管阻滯前後 1h 產婦的子宮收縮力和胎兒胎心率情況。第一研究結果通過 Kaplan-Meier 曲線和比例風險模型分析麻醉後達到 NPRS≤ 1 的時間。第二個研究結果通過 χ 檢驗 Yates 連續性校正分析包括阻滯效果，產婦麻醉副反應，子宮收縮情況及胎兒情

況。

結果： DPE 組和 EPL 組達到 NPRS ≤ 1 的時間無明顯差異（RR 1.4；95%置信區間[CI] 0.83-2.4, P = .21）。DPE 組達到 NPRS ≤ 1 的時間明顯慢於 CSE 組（RR 0.36；95%置信區間 0.22-0.59, P = .0001）。時間中位數（四分位數法）CSE 達到 NPRS ≤ 1 為 2(0.5-6)min。而 DPE 組為 11(4-120)min；EPL 組為 18 (10-120)min。與 EPL 組相比，DPE 組雙側 S2 阻滯的發生率明顯增高。10min：（[RR] 2.13; 95% CI 1.39-3.28; P < .001）；20min：(RR 1.60; 95% CI 1.26-2.03; P < .001)；30min(RR 1.18; 95% CI 1.01-1.30; P < .034)。同時 30min 後不對稱阻滯的發生率更低：(RR 0.19; 95% CI 0.07-0.51; P < .001)；醫師補加麻藥干預的發生率更低(RR 0.45; 95% CI 0.23-0.86; P = .011)。與 CSE 組相比，DPE 組瘙癢(RR 0.15; 95% CI 0.06-0.38; P < .001)，低血壓(RR 0.38; 95% CI 0.15-0.98; P = .032)，子宮強直收縮(RR 0.22; 95% CI 0.08-0.60; P < .001)，醫師加藥干預(RR 0.45; 95% CI 0.23-0.86; p = .011)的發生率均顯著降低。

結論：對於分娩早期椎管麻醉的產婦來說：CSE 的麻醉起效最快，而 DPE 和 EPL 組無差異。DPE 技術與 EPL 技術相比阻滯效果更好，與 CSE 技術相比產婦和胎兒副反應更少。

（戴依利譯　陳傑校）

BACKGROUND: The dural puncture epidural (DPE) technique is a modification of the combined spinal epidural(CSE) technique, where a dural perforation is created from a spinal needle but intrathecal medication administration is withheld. The DPE technique has been shown to improve caudal spread of analgesia compared with epidural (EPL) technique without the side effects observed with the CSE technique. We hypothesized that the onset of labor analgesia would follow this order: CSE > DPE > EPL techniques.

METHODS: A total of 120 parturients in early labor were randomly assigned to EPL, DPE, or CSE groups. Initial dosing for EPL and DPE consisted of epidural 20 mL of 0.125% bupivacaine plus fentanyl 2 μg/mL over 5 minutes, and for CSE, intrathecal

0.25% bupivacaine 1.7 mg and fentanyl 17 μg. Upon block completion, a blinded coinvestigator assessed the outcomes. Two blinded obstetricians retrospectively interpreted uterine contractions and fetal heart rate tracings 1 hour before and after the neuraxialtechnique. The primary outcome was time to numeric pain rating scale (NPRS) ≤ 1 analyzed by using Kaplan-Meier curves and Cox proportional hazard model. Secondary outcomes included block quality, maternal adverse effects, uterine contraction patterns, and fetal outcomes analyzed by using the χ test with Yates continuity correction.
RESULTS: There was no significant difference in the time to NPRS ≤ 1 between DPE and EPL (hazard ratio 1.4; 95% confidence interval [CI] 0.83-2.4, P = .21). DPE achieved NPRS ≤ 1 significantly slower than CSE (hazard ratio 0.36; 95% CI 0.22-0.59, P = .0001). The median times (interquartile range) to NPRS ≤ 1 were 2 (0.5-6) minutes for CSE, 11 (4-120) minutes for DPE, and 18 (10-120) minutes for EPL. Compared with EPL, DPE had significantly greater incidence of bilateral S2 blockade at 10 minutes (risk ratio [RR] 2.13; 95% CI 1.39-3.28; P < .001), 20 minutes (RR 1.60; 95% CI 1.26-2.03; P < .001), and 30 minutes (RR 1.18; 95% CI 1.01-1.30; P < .034), a lower incidence of asymmetric block after 30 minutes (RR 0.19; 95% CI 0.07-0.51; P < .001) and physician top-up intervention (RR 0.45; 95% CI 0.23-0.86; P = .011). Compared with CSE, DPE had a significantly lower incidence of pruritus (RR 0.15; 95% CI 0.06-0.38; P < .001), hypotension (RR 0.38; 95% CI 0.15-0.98; P = .032), combined uterine tachysystole and hypertonus (RR 0.22; 95% CI 0.08-0.60; P < .001), and physician top-up intervention (RR 0.45; 95% CI 0.23-0.86; p = .011).
CONCLUSIONS: Analgesia onset was most rapid with CSE with no difference between DPE and EPLtechniques. The DPEtechniquehas improved block quality over the EPL technique with fewer maternal and fetal side effects than the CSE technique for parturients requesting early labor analgesia.

神經影像學中意識障礙患者的鎮靜：對靜息狀態腦功能連接的影響

Sedation of Patients With Disorders of Consciousness During Neuroimaging: Effects on Resting State Functional Brain Connectivity

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背景：為了減少靜息狀態功能性磁共振成像時的頭部動作，臨床上對意識障礙（DOC）患者經常用異丙酚鎮靜。然而，基於不同的鑒別診斷時鎮靜對於受損的大腦連接模式有何影響知之甚少。這項研究旨在評估這些影響。

方法：在過去幾年內，以診斷和研究為目的，通過基於靜息狀態功能性磁共振成像掃描病人獲得 3T 資料。在 20 例健康非鎮靜對照患者，8 例非鎮靜的意識障礙患者，8 例異丙酚鎮靜的意識障礙患者中，採用種子相關分析法檢查高階（預設模式，雙側外部控制，特徵）靜息狀態的連線性和低階（聽覺、感覺運動和視覺）靜息狀態連線性，及與丘腦的連線性。根據發病年齡、病因、意識障礙時間、標準化行為評估分數、運動強度和腦損傷結構模式（如評估以 T1 為基礎的圖元形態分析方法）對 DOC 組患者進行匹配。

結果：除了視覺網路，意識障礙和其餘所有的靜息狀態大腦網路功能連接的嚴重受損有關。丘腦和高階網路區域連接也減少。患者接受異丙酚注射，導致丘腦和腦島的連線性進一步減少。

結論：本研究表明大腦，包括丘腦和腦島，功能連線性降低與異丙酚鎮靜相關，但與那些已經由於意識障礙引起的相關結構腦損傷相比較小。儘管如此，考慮到丘腦在腦興奮的重要性，其破壞很可能反映了這些患者運動減少。然而，在這個問題上還需要更多的研究去完全解釋這種現象。

（傅丹雲譯　陳傑校）

BACKGROUND: To reduce head movement during resting state functional magnetic resonance imaging, post-coma patients with disorders of consciousness (DOC) are frequently sedated with propofol. However, little is known about the effects of this sedation on the brain connectivity patterns in the damaged brain essential for differential diagnosis. In this study, we aimed to assess these effects.
METHODS: Using resting state functional magnetic resonance imaging 3T data obtained over several years of scanning patients for diagnostic and research purposes, we employed a seed-based approach to examine resting state connectivity in higher-order (default mode, bilateral external control, and salience) and lower-order (auditory, sensorimotor, and visual) resting state networks and connectivity with the thalamus, in 20 healthy unsedated controls, 8 unsedated patients with DOC, and 8 patients with DOC sedated with propofol. The DOC groups were matched for age at onset, etiology, time spent in DOC, diagnosis, standardized behavioral assessment scores, movement intensities, and pattern of structural brain injury (as assessed with

T1-based voxel-based morphometry).
RESULTS: DOC were associated with severely impaired resting state network connectivity in all but the visual network. Thalamic connectivity to higher-order network regions was also reduced. Propofol administration to patients was associated with minor further decreases in thalamic and insular connectivity.
CONCLUSIONS: Our findings indicate that connectivity decreases associated with propofol sedation, involving the thalamus and insula, are relatively small compared with those already caused by DOC-associated structural brain injury. Nonetheless, given the known importance of the thalamus in brain arousal, its disruption could well reflect the diminished movement obtained in these patients. However, more research is needed on this topic to fully address the research question.

周圍神經阻滯後與神經系統併發症的相關風險因素：一項系統回顧

Factors Associated With Risk of Neurologic Complications After Peripheral Nerve Blocks: A Systematic Review
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局部麻醉後神經併發症的發生是一個複雜的過程，可能是由病人機體，藥和環境相關危險因素的相互作用結果。這個系統綜述的目的是為了評估定性的證據：與周圍神經阻滯(PNB)後神經功能障礙有關的各種危險因素。MEDLINE, OVID 和 EMBASE 資料庫是文獻的主要來源。Cochrane、 LILACS、 DARE、IndMed、 ERIC、NHS 和 HTA 通過進入英文綜述和傳播中心資料庫 (CRD；約克大學)資料庫被用來尋找額外的獨特的研究結果。隨機對照研究、病例對照研究、佇列研究、回顧性調查和周圍神經阻滯後神經系統的症狀的案例報告或者病例系列報告都被包括在內。相關的、高品質的系統評價也符合要求。人類和動物研究中的危險因素對於神經阻滯研究結果是重要的，它們被分別進行評估。關於研究的設計、結果、品質資訊由 2 位元作者獨立提取和評論審查。整體評級品質的證據被分配使用 GRADE (分級的建議評估、開發和評價)標準。有關全文的分類基於類型(前瞻性、回顧性和非臨床的研究)。依據協會研究的品質和方向，研究異質性的等級被定義為高、中等、不確定或者不充分的。77 項臨床研究的證據用來審

查評估各種人體機體、藥和環境因素有相關的可能風險。大部分關於 3 種主要藥品的損傷機制、壓力、神經毒性的有害作用的證據是通過動物實驗研究提取的(42項研究)。在人類的危險因素調查中，神經的阻滯類型和神經系統併發症有著強烈的因果關係。神經內注射，這似乎通常發生在周圍神經阻滯中，薈萃的結果顯示為不一致性。為了提高神經阻滯精確度和減少併發症的發生的措施，如目前引導技術，結果顯示相關措施的開展與神經併發症的發生率影響不大。預先存在風險因素的患者神經損傷後恢復似乎更糟糕。從不同的研究來分類和定義的神經系統併發症，綜合證據變成難題。同時，一部分關於周圍神經損傷與周圍神經阻滯有意義的證據來自動物或實驗室的研究，結果導致很難轉化為臨床現象。很少有預先設計為了驗證某種特定的風險暴露因素和導致的神經系統後遺症之間關聯的臨床研究。在臨床研究中僅有一些相關聯的危險因素被確定，但證據的總體品質很低。大部分風險因素的證據來自於動物模型和案例報告。最後神經系統的併發症似乎表現的是機體、藥和環境相關因素複雜的相互作用結果。

（方洪偉譯　陳傑校）

The onset of neurologic complications after regional anesthesia is a complex process and may result from an interaction of host, agent, and environmental risk factors. The purpose of this systematic review was examine the qualitative evidence relating to various risk factors implicated in neurologic dysfunction after peripheral nerve block (PNB). The MEDLINE, OVID, and EMBASE databases were primary sources for literature. Cochrane, LILACS, DARE, IndMed, ERIC, NHS, and HTA via Centre for Reviews and Dissemination (CRD; York University) databases were searched for additional unique results. Randomized controlled studies, case-control studies, cohort studies, retrospective reviews, and case reports/case series reporting neurologic outcomes after PNB were included. Relevant, good-quality systematic reviews were also eligible. Human and animal studies evaluating factors important for neurologic outcomes were assessed separately. Information on study design, outcomes, and quality was extracted and reviewed independently by the 2 review authors. An overall rating of the quality of evidence was assigned using GRADE (Grading of Recommendations Assessment, Development and Evaluation) criteria. Relevant full-text articles were separated based on type (prospective, retrospective, and

nonhuman studies). Strengths of association were defined as high, moderate, inconclusive, or inadequate based on study quality and direction of association. The evidence from 77 human studies was reviewed to assess various host, agent, and environmental factors that have been implicated as possible risks. Most of the available evidence regarding the injurious effects of the 3 cardinal agents of mechanical insult, pressure, and neurotoxicity was extracted from animal studies (42 studies). Among the risk factors investigated in humans, block type had a strong association with neurologic outcome. Intraneural injection, which seems to occur commonly with PNBs, showed an inconsistent direction of association. Measures meant to increase precision and ostensibly reduce the occurrence of complications such as currently available guidance techniques showed little effect on the incidence of neurologic complications. Recovery from neurologic injury appears to be worse in patients with pre-existing risk factors. Categorization and definition of neurologic complication varied among studies, making synthesis of evidence difficult. Also, a significant portion of the evidence surrounding neurologic injury associated with PNB comes from animal or laboratory studies, the results of which are difficult to translate to clinical scenarios. Of the human studies, few had an a priori design to test associations between a specific risk factor exposure and resultant neurologic sequelae. A few risk factor associations were identified in human studies, but overall quality of evidence was low. Much of the evidence for risk factors comes from animal models and case reports. The final neurologic outcome seems to represent the complex interaction of the host, agent, and the environment.