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吸入一氧化碳对猪肺体外循环的后处理作用

Postconditioning of the Lungs with Inhaled Carbon Monoxide After Cardiopulmonary Bypass in Pigs

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背景：动物模型中已经证实，在器官缺血损伤前吸入一氧化碳对器官有保护作用。但是尚未证实缺血损伤发生后吸入一氧化碳是否同样有效。本试验的目的是研究在猪模型中，体外循环后吸入一氧化碳是否会减少肺损伤。

方法：所有动物被随机分到假手术组（n=5）,假手术+吸入一氧化碳组（n=5）,标准 CPB 组（n=10）,CPB+吸入一氧化碳组（n=10）。在 CPB 结束后给予 1 小时的一氧化碳（250ppm）。CPB 开始前，CPB 结束即刻，CPB 结束后 5 小时分别进行肺组织活检，检测肺热休克蛋白 70 和 90 的表达，细胞因子，肺泡巨噬细胞渗透以及 caspase-3 的活性。

结果：CPB 结束后 5 小时，给予吸入一氧化碳明显减少炎性细胞因子肿瘤坏死因子（CPB+CO 521±77 vs CPB 821±97pg/ml, P<0.001）和白细胞介素-6 的表达（304±81 vs 860±153pg/ml, P<0.001）, 增加了热休克蛋白 70（CPB+CO 79±14 vs CPB 36±9ng/ml, P<0.001）和抗炎因子白介素-10 的表达（CPB+CO 278±40 vs CPB 63±20pg/ml, P<0.001）, 同时减弱了肺凋亡蛋白 caspase-3 的活性(CPB + CO 0.73 ± 0.11 vs CPB 0.99 ± 0.1 RFU, P < 0.05)。给予一氧化碳可以减少肺组织损伤和肺泡巨噬细胞渗透（78 ± 39 vs 145 ± 34 counts per field of vision, P < 0.001)。
结论：本试验证实在 CPB 后给予低浓度的一氧化碳有减少 CPB 相关肺损伤的作用。
(张婷　译　陈杰　校)

BACKGROUND: Administration of inhaled carbon monoxide before organ ischemic injury exerts protective effects in animal models. Because there are no data showing that this also works after an ischemic insult, our objective in this study was to investigate whether inhaled carbon monoxide attenuates cardiopulmonary bypass (CPB)-induced lung injury in a pig model.
METHODS: Animals were randomized to a SHAM group (n = 5), a SHAM group plus inhaled carbon monoxide (n = 5), standard CPB (n = 10), and to CPB plus inhaled carbon monoxide (n = 10). Carbon monoxide (250 ppm) was given for 1 hour after termination of CPB. Lung biopsies were obtained before CPB, immediately after separation from CPB, and for 5 hours after termination of CPB to determine expression of pulmonary heat shock proteins 70 and 90, cytokines, alveolar macrophage infiltration, and fluorogenic caspase-3 activity.
RESULTS: At 5 hours after CPB, administration of inhaled carbon monoxide was associated with reduced pulmonary expression of the inflammatory cytokines tumor necrosis factor (CPB + CO 521 ± 77 vs CPB 821 ± 97 pg $\cdot mL^{-1}$, P < 0.001) and interleukin-6 (304 ± 81 vs 860 ± 153 pg $\cdot mL^{-1}$, P < 0.001), increased pulmonary expression of the cytoprotective heat shock protein 70 (CPB + CO 79 ± 14 vs CPB 36 ± 9 ng $\cdot mL^{-1}$, P < 0.001) and the antiinflammatory cytokine interleukin-10 (CPB + CO 278 ± 40 vs CPB 63 ± 20 pg $\cdot mL^{-1}$, P < 0.001), and with reduced pulmonary apoptotic protein caspase-3 activity (CPB + CO 0.73 ± 0.11 vs CPB 0.99 ± 0.1 RFU, P < 0.05). Carbon monoxide administration was associated with reduced histological evidence of lung injury and alveolar macrophage infiltration (78 ± 39 vs 145 ± 34 counts per field of vision, P < 0.001).
CONCLUSIONS: These results suggest that administration of low concentrations of carbon monoxide after CPB ("postconditioning") protects the lung from CPB-related lung injury.

使用自适应神经模糊推理系统（ANFIS）建立内镜检查时具有镇静-镇痛效果的异丙酚、瑞芬太尼组合模型

Modeling the Effect of Propofol and Remifentanil Combinations for Sedation-Analgesia in Endoscopic Procedures Using an Adaptive Neuro Fuzzy Inference System (ANFIS)

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背景：消化道内镜检查的需求日益增加，但目前没有提供并控制患者的镇静和镇痛效果方案。这项研究中，作者通过靶控输注系统评估不同组合的异丙酚和瑞芬太尼，得出提供接受超声内镜患者的镇痛效果的诱导药物组合的最佳浓度，。
方法：120 例接受超声内镜检查患者，随机分配至异丙酚或瑞芬太尼的 8 种不同浓度组合靶控输注系统， 固定异丙酚或瑞芬太尼的某一浓度，允许调整另一种药物的浓度。预测异丙酚（$C_e$pro）和瑞芬太尼（$C_e$remi）效应室浓度，收集、记录，并通过自适应神经模糊推理系统分析听觉诱发电位参数，听觉诱发电位指数（AAI/2）和脑电图信号（双频指数[BIS]和意识指数[IoC]），以及明确有或无疼痛刺激的情况下（Ramsay 镇静评分[RSS]分数）。这个模型通过使用执行误差绝对值中位数(MDAPE)、平均均方根误差（MDRMSE）和执行误差中位数（MDPE）的模糊理论描述了 $C_e$pro 及 $C_e$remi 相对 AAI/ 2，BIS 及 IoC 之间的关系。68 名患者运用此模型接受异丙酚和瑞芬太尼不同组合进行前瞻性的验证。就预测峰值（P_k）AAI/ 2，BIS 及 IoC 镇静水平，RSS 评分进行了探讨。
结果：对 110 例患者数据进行了分组分析。由此产生模型的 MDAPE 为 32.87, 12.89 及 8.77；MDRMSE 为 17.01, 12.81 及 9.40 ；AAI/2, BIS 及 IoC 的 MDPE 分别为−1.86, 3.97 及 2.21。在无刺激和相似刺激下 AAI/2, BIS,及 IoC,的 P_k 值分别为 0.82，0.81 和 0.85。用该模型预测的 MDAPE 34.81，14.78 及 10.25; MDRMSE 为 16.81，15.91 和 11.81；MDPE 为 -8.37，5.65 及-1.43 和 AAI/2, BIS 及 IoCP_k 值分别 0.81, 0.8,及 0.8。
结论：本文制定并前瞻性验证 $C_e$pro and $C_e$remi 的 AAI/2, BIS 及 IoC 的模型。根据模型，符合 RSS 评分为 4 分的（$C_e$pro and $C_e$remi）浓度组合范围从（1.8 $\mu g \cdot mL^{-1}$, 1.5 $ng \cdot mL^{-1}$）至（(2.7 $\mu g \cdot mL^{-1}$, 0 $ng \cdot mL^{-1}$）。这些浓度对应的 AAI/ 2 为 25 至 30，BIS 71 至 75，IoC 为 72 至 76。当有疼痛刺激时，如达到相同程度的镇静作用需增加 $C_e$pro 和 $C_e$remi。
(陈毓雯　译　陈杰　校)
BACKGROUND: The increasing demand for anesthetic procedures in the gastrointestinal endoscopy area has not been followed by a similar increase in the methods to provide and control sedation and analgesia for
these patients. In this study, we evaluated different combinations of propofol and remifentanil, administered through a target-controlled infusion system, to estimate the optimal concentrations as well as the best way to control the sedative effects induced by the combinations of drugs in patients undergoing ultrasonographic endoscopy.
METHODS: One hundred twenty patients undergoing ultrasonographic endoscopy were randomized to receive, by means of a target-controlled infusion system, a fixed effect-site concentration of either propofol or remifentanil of 8 different possible concentrations, allowing adjustment of the concentrations of the other drug. Predicted effect-site propofol ($C_e$pro) and remifentanil ($C_e$remi) concentrations, parameters derived from auditory

evoked potential, autoregressive auditory evoked potential index (AAI/2) and electroencephalogram (bispectral index [BIS] and index of consciousness [IoC]) signals, as well as categorical scores of sedation (Ramsay Sedation Scale [RSS] score) in the presence or absence of nociceptive stimulation, were collected, recorded, and analyzed using an Adaptive Neuro Fuzzy Inference System. The models described for the relationship between $C_e$pro and $C_e$remi versus AAI/2, BIS, and IoC were diagnosed for inaccuracy using median absolute performance error (MDAPE) and median root mean squared error (MDRMSE), and for bias using median performance error (MDPE). The models were validated in a prospective group of 68 new patients receiving different combinations of propofol and remifentanil. The predictive ability (P_k) of AAI/2, BIS, and IoC with respect to the sedation level, RSS score, was also explored.

RESULTS: Data from 110 patients were analyzed in the training group. The resulting estimated models had an MDAPE of 32.87, 12.89, and 8.77; an MDRMSE of 17.01, 12.81, and 9.40; and an MDPE of −1.86, 3.97, and 2.21 for AAI/2, BIS, and IoC, respectively, in the absence of stimulation and similar values under stimulation. P_k values were 0.82, 0.81, and 0.85 for AAI/2, BIS, and IoC, respectively. The model predicted the prospective validation data with an MDAPE of 34.81, 14.78, and 10.25; an MDRMSE of 16.81, 15.91, and 11.81; an MDPE of −8.37, 5.65, and −1.43; and P_k values of 0.81, 0.8, and 0.8 for AAI/2, BIS, and IoC, respectively.

CONCLUSION: A model relating $C_e$pro and $C_e$remi to AAI/2, BIS, and IoC has been developed and prospectively validated. Based on these models, the ($C_e$pro, $C_e$remi) concentration pairs that provide an RSS score of 4 range from (1.8 $\mu g \cdot mL^{-1}$, 1.5 $ng \cdot mL^{-1}$) to (2.7 $\mu g \cdot mL^{-1}$, 0 $ng \cdot mL^{-1}$). These concentrations are associated with AAI/2 values of 25 to 30, BIS of 71 to 75, and IoC of 72 to 76. The presence of noxious stimulation increases the requirements of $C_e$pro and $C_e$remi to achieve the same degree of sedative effects.

在标准麻醉设备下行全身麻醉受试者的通气死腔的测定

Measurement of Dead Space in Subjects Under General Anesthesia Using Standard Anesthesia Equipment

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Anesth Analg February 2011 112:375-377;

背景：肺部通气死腔是指被送入肺部但不参加气体交换的气体容积。了解全身麻醉患者的肺部通气死腔在临床上是非常有用的，因为它可以帮助检测例如肺栓塞、低心输出量状态等疾病的进程。死腔可以简单地运用波尔公式计算出来，然而使用标准麻醉机却很难测定混合呼末二氧化碳。以往研究表明标准麻醉机风箱内二氧化碳浓度与呼末二氧化碳非常接近。本研究作者应用风箱呼气末 C02 和 PaCO2 计算肺死腔并通过麻醉期间加一已知死腔容积的设备加以验证。

方法：受试者采用气管内全身麻醉。采样线被定位在呼吸机风箱内并连接到二氧化碳检测仪。分别在基础状态、加入 100ml 及 200ml 死腔时呼末二氧化碳值，同时通过动脉导管测量血二氧化碳分压。运用波尔公式（肺泡死腔/潮气量=[血二氧化碳分压-呼末二氧化碳]/血二氧化碳分压）来分别计算基础、加入 100ml 及 200ml 机械死腔后的死腔容积。

结果：10 位受试者基础死腔值为 265 ± 47 mL。加入 100ml 死腔后受试者死腔测量值增加 110 ± 46 mL.。加入 200ml 死腔后受试者死腔测量值增加 158 ± 39 mL。
结论：全身麻醉下基础死腔测定值在预期范围内。当机械死腔增加时，可以计算到死腔值的增加。加入 100ml 机械死腔获得的计算值比加入 200ml 机械死腔获得的计算值更精确。作者介绍了一种简单的方法检测应用 Narkomed GS 麻醉机(Dräger Medical, Lübeck, Germany)机械通气时通气死腔的变化趋势。
(曹强　译　陈杰　校)

BACKGROUND: Pulmonary dead space is the volume of gas that is delivered to the lungs but does not participate in gas exchange. Knowing pulmonary dead space in patients under general anesthesia is clinically useful because it can aid in detecting disease processes such as pulmonary emboli or low cardiac output states. Dead space can be simply calculated by using the Bohr equation; however, it is difficult to measure mixed exhaled carbon dioxide ($PECO_2$) with a standard anesthesia machine. Previously, a study at our institution demonstrated the carbon dioxide (CO_2) concentration in the bellows of a standard anesthesia machine is an accurate approximation of $PECO_2$. In this study, we used the bellows $PECO_2$ measurement and arterial CO_2 ($PaCO_2$) to calculate pulmonary dead space. We verified the technique by adding known apparatus dead space volumes during anesthesia.
METHODS: Subjects were under general endotracheal anesthesia. A sampling line was positioned inside the ventilator bellows and connected to a capnometer. Measurements of $PECO_2$ and $PaCO_2$ from an arterial catheter were taken at baseline and after adding 100 mL and 200 mL of dead space to the endotracheal tube. Dead space was calculated using the Bohr equation (alveolar dead space/tidal volume = $[PaCO_2 - PECO_2]/PaCO_2$) at baseline and after adding 100 mL and 200 mL of apparatus dead space.
RESULTS: The dead space at baseline was 265 ± 47 mL (mean ± SD) in 10 study subjects. After adding 100 mL of dead space to the endotracheal tube, the measured dead space increased by 110 ± 46 mL. The measured dead space increased by 158 ± 39 mL after adding 200 mL.
CONCLUSIONS: Our baseline dead space measurements were in the expected range under general anesthesia. When dead space was added, we were able to calculate that an increase in dead space occurred. Our calculation was more accurate after adding a 100-mL volume than after adding 200 mL. We present a simple way to detect trends in dead space in ventilated patients using a Narkomed GS anesthesia machine (Dräger Medical, Lübeck, Germany).

狗出血性休克复苏中输注 6%羟乙基淀粉-高张力氯化钠液体的疗效

The Effects of 6% Hydroxyethyl Starch–Hypertonic Saline in Resuscitation of Dogs with Hemorrhagic Shock

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背景：血流动力学参数及全身携氧能力参数很难很好地反应出机体内脏灌注不足，从而导致延误对失血性休克及时的处理。液体复苏后容量扩充对增加失血性休克患者机体全身及局部氧含量颇为有效。此次实验中，作者假设相对于传统血浆扩容液体，对失血性休克患者输注 7.5 氯化钠/6%羟乙基淀粉（HHES）会使携氧能力下降并降少胃血流灌注。应用失血性休克的狗模型来比较几种不同静脉扩容液体快速输注后其早期系统氧合以及胃肠道血流灌注。扩容液体包括临床上广泛应用于严重失血性休克病人的液体：7.5 氯化钠/6%羟乙基淀粉（HHES）、乳酸钠林格氏液（LR）、以及 6%羟乙基淀粉液体（HES）。

方法：实验入组 30 只失血量为 30 mL ·kg^{-1}的成年狗，维持其平均动脉压在 40-50mmHg 持续 45 分钟，并按照液体复苏的方式分为不同的三组：LR 组（n=10），以 3 比 1 补充丢失容量；HES 组（液体平均相对分子量 130kDa）（n=10），以 1 比 1 补充丢失容量；HHES 组（n=10），以 4 mL · kg−1 补充丢失容量。实验记录数据包括血管内容量扩张（伊文氏蓝法及血红蛋白稀释法）、血流动力、携氧能力、动静脉二氧化碳压差（Pv-aco2），胃黏膜内动脉二氧化碳分压差(Pco2 gap)，数据记录时间包括各个基数值、失血后 45 分钟、输注液体后 5 分钟、45 分钟及 90 分钟。

结果：实验结果显示 7.5 氯化钠/6%羟乙基淀粉（HHES）由于其高效的扩容能力大大提高了血容量，但其血管内容量扩张相比其他液体较小(P < 0.05)。三种液体对机体血流动力学改变相似，但 HHES 相对其他两种液体其输注后混合静脉血氧分压较低、其组织氧摄取能力、Pv-aCO2 及 PCO2 有所升高。(P < 0.05)

结论：在此次对成年狗实施失血性休克后容量复苏的实验中，可以看到：HHES 虽然其扩容效果最好，但其对系统携氧及胃肠道灌注方面的恢复与 LR 及 HES 相比较差。

(赵嫣红　译　陈杰　校)

BACKGROUND: Hemodynamic and global oxygen transport variables have failed to reflect splanchnic hypoperfusion, resulting in a failure to recognize inadequately treated hemorrhagic shock. Volemic expansion after fluid resuscitation is essential to improve global and regional oxygen in hemorrhagic shock. We hypothesized that, in contrast to conventional plasma expanders, the smaller volemic expansion from 7.5 NaCl/6% hydroxyethyl starch (HHES) solution administration in hemorrhagic shock may provide lesser systemic oxygen delivery and gastric perfusion. We used hemorrhaged dogs to compare intravascular volume expansion and the early systemic oxygenation and gastric perfusion effects of fixed fluid bolus administration, which are usually used in clinical situations with severe hemorrhage, of HHES, lactated Ringer (LR), and 6% hydroxyethyl starch (HES) solutions.

METHODS: Thirty dogs were bled (30 mL ·kg^{-1}) to hold mean arterial blood pressure at 40 to 50 mm Hg over 45 minutes and were resuscitated in 3 groups: LR (n = 10) at 3:1 ratio to shed blood; HES (mean molecular weight 130 kDa, degree of substitution 0.4) (n = 10) at 1:1 to shed blood; and HHES (n = 10), 4 mL ·kg^{-1}. Intravascular volume expansion (Evans blue and hemoglobin dilution), hemodynamic, systemic oxygenation, venous-to-arterial CO_2 gradient ($P\bar{v}$-aCO_2), and gastric intramucosal-arterial PCO_2

gradient (PCO_2 gap) variables were measured at baseline, after 45 minutes of hemorrhage, and 5, 45, and 90 minutes after fluid resuscitation.
RESULTS: HHES increased blood volume because of the high volume expansion efficiency, but intravascular volume expansion with this solution was the smallest of the solutions ($P < 0.05$). All 3 solutions induced a similar hemodynamic performance but HHES showed lower mixed venous PO_2 and higher systemic oxygenation extraction, $P\bar{v}$-aCO_2, and PCO_2 gap than LR and HES ($P < 0.05$).
CONCLUSIONS: In dogs submitted to pressure-guided hemorrhagic shock and fixed-volume resuscitation, the smaller intravascular volume expansion from HHES solutions provides worse recovery of systemic oxygenation and gastric perfusion compared with LR and HES solutions despite its high volume expansion efficiency, which was limited by low infused volume.

长期灌注吗啡后药物在猪脊髓内的分布

Morphine Distribution in the Spinal Cord After Chronic Infusion in Pigs

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背景: 连续鞘内给药提供了一种长期脊髓靶向给药的新方法，其疗效差异很大。应用一种猪的急性模型，作者先前已经证实连续鞘内给药疗效可能差异巨大，其原因与药物在脑脊液和脊髓中分布相关。 作者设计本研究以确定长期给药是否存在急性研究中所观察到的药物分布。
方法:四个农场饲养的猪，植入鞘内注射泵，给予吗啡（1 mg/mL），每小时 20μL。 由于程序性错误，1 只猪接受吗啡鞘内注射每小时 2μL。 药物输注持续 14 天，在此期间，动物的活动不受限制。 在 2 周后动物接受麻醉和安乐死，并分离脊髓。 脊髓按照 1cm 为单位进行分割，分别测量吗啡浓度。
结果:与既往急性动物实验相同，药物分布极为有限。 吗啡浓度从导管尖端开始，按照距离呈指数下降，导致仅仅 5-10cm 之内出现 5 - 10 倍的降低，。
结论:在活动的猪中鞘内注射吗啡的药物分布非常有限，并且从注射位置开始，按照距离呈现一个明显的脊髓药物浓度梯度。 因此，导管尖端位置可能至关重要，尤其是当注入等比重溶液时。 这些数据也支持一个假说，长期鞘内注射阿片类药物会产生导管尖端位置炎症肿块的并发症，是由于药物有限分布引起注射位置极高的药物浓度。
(怀晓蓉　译　陈杰　校)

Abstract
BACKGROUND: Continuous intrathecal drug delivery provides new options for chronic delivery of drugs that target the spinal cord, but therapeutic efficacy is highly variable. Using an acute porcine model, we have previously demonstrated that continuous intrathecal drug delivery efficacy may be highly variable because of severely limited drug distribution in the cerebrospinal fluid and spinal cord. We designed this study to determine whether the limited drug distribution observed in our acute studies occurs with chronic administration as well.

METHODS: Four farm-bred pigs were implanted with intrathecal infusion pumps delivering morphine (1 mg/mL) at 20 μL per hour. Because of a programming error, 1 additional pig received intrathecal morphine at 2 μL per hour. Drug infusion continued for 14 days, during which time animal activity was unrestricted. At the end of 2 weeks the animals were anesthetized and euthanized and their spinal cords removed. The spinal cords were divided into 1-cm sections and morphine concentrations measured.
RESULTS: As with previous acute animal studies, drug distribution was extremely limited. Morphine concentration decreased exponentially as a function of distance from the catheter tip, resulting in a 5- to 10-fold decrease over a distance of only 5 to 10 cm.
CONCLUSION: Morphine distribution is very limited during chronic intrathecal delivery in ambulatory pigs, and there are significant spinal cord drug concentration gradients as a function of distance from the infusion point. Consequently, catheter tip position may be critical, particularly when infusing isobaric solutions. These data also support the hypothesis that inflammatory masses complicating chronic intrathecal opioid delivery occur at the catheter tip because limited drug distribution results in extremely high drug concentrations at that point.

以铅笔尖式或 Touph 针尖行外周神经穿刺后的组织学分析

Histological Analysis After Peripheral Nerve Puncture with Pencil-Point or Tuohy Needletip

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背景：典型的持续性外周神经阻滞通常是通过一种“通过穿刺针技术”实施的，要求穿刺针的内径能通过留置导管。目前认为，当穿刺针与神经直接接触时，铅笔尖式针尖比其它模式的穿刺针的创伤性更小。本次研究中，作者将铅笔尖式穿刺针与 Touph 穿刺针作比较，以观察是否前者比后者更少地引起神经损伤。
方法：6 只猪接受麻醉后，暴露其双侧臂丛神经。用铅笔尖式穿刺针或 Touph 穿刺针对总共 8 支神经进行刺激。48 小时后，在麻醉下切除这些神经。样本被进一步送检，包括目视检查、检测炎性细胞、髓鞘损伤和神经内血肿。神经损伤的程度是通过一项客观评分确认，其中 0 分为无损伤，4 分为严重损伤。
结果：包括对照组在内共有 58 支神经接受了检测。根据损伤评分，铅笔尖式穿刺针组【中位数（四分位数间距）为 3（3-4）】和 Touph 穿刺针组【3（3-4），P=0.97】之间没有明显的统计学差异。两组神经组织的创伤后局部炎症反应、髓鞘损伤和神经内血肿的程度均较之前有所增高。

结论：无论采用何种针尖式样的穿刺针，铅笔尖样和 Tuohy 样针尖均会导致神经组织发生相同程度的创伤后炎症反应和相似的组织学改变，两种穿刺针之间没有明显的差异。
(周姝婧　译　陈杰　校)

BACKGROUND: Continuous peripheral nerve blocks typically are performed with a "through-the-needle technique" and require needles with an inner diameter allowing catheter placement. In case of direct needle–nerve contact, the pencil-point needletip is currently considered less traumatic than are other needle configurations. In this study we determined whether nerve puncture with pencil-point needles is associated with fewer nerve injuries in comparison with Tuohy needles.
METHODS: In 6 anesthetized pigs the brachial plexus were exposed bilaterally. Up to 8 nerves underwent nerve puncture with a pencil-point or a Tuohy needle. After 48 hours, the nerves were resected during anesthesia. The specimens were processed for visual examination and the detection of inflammatory cells, myelin damage, and intraneural hematoma. The grade of nerve injury was assessed using an objective score ranging from 0 (no injury) to 4 (severe injury).
RESULTS: Fifty-eight nerves, including controls, were examined. According to the applied injury score, there was no significant difference between the pencil-point needle group [median (interquartile range) 3 (3–4)] and the Tuohy needle group [3 (3–4) P = 0.97]. The occurrence of posttraumatic regional inflammation, myelin damage, and intraneural hematoma was similarly high in both groups.
CONCLUSIONS: Regardless of the needletip configuration applied for nerve puncture, pencil-point and Tuohy needletips may both lead to comparable magnitude of posttraumatic inflammation and considerable structural changes within the nerve. No significant differences were found comparing pencil-point with Tuohy tip–configured needles.

围术期应用艾司洛尔的安全性：随机对照试验的系统回顾和荟萃分析

The Safety of Perioperative Esmolol: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

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背景：虽然已发现 β 受体阻滞剂能减少围术期心肌梗死（MI）的发生率，但是其引起的低血压与术后中风及术后死亡率密切相关。在这个系统性回顾中，我们将对选择性 β1 肾上腺素受体阻滞剂艾司洛尔在非心脏手术中的安全性和有效性作一评估。安全性的评估是通过分析术后低血压和心动过缓的发生率，而有效性的评估则是通过分析心肌缺血的发生率。
方法：我们通过电子数据库检索非心脏手术围术期应用艾司洛尔的随机安慰剂对照试验。按照实验设计、人口统计学资料、血流动力学改变（预料或非预料中的）、心肌缺血和 MI 等获取相关数据。运用 meta 回归分析来评估其不均一性。

结果：本研究纳入了 67 项临床试验，均符合本研究的纳入标准。研究的质量受到小样本和盲法贯彻不力的限制。总的来说，本研究显示，艾司洛尔的应用导致了意料之外的低血压发生率的升高（OR=2.13，95%置信区间为 1.48~3.04），并呈剂量相关（R^2 = 0.408）。而心动过缓的发生率并没有明显上升（OR=1.18，95%置信区间为 0.69~2.02）。同时发现艾司洛尔的剂量滴定对动脉血压和心率的变化均有影响。7 个对照研究表明，与安慰剂组相比，艾司洛尔能减少心肌缺血的发生率（OR=0.17，95%置信区间为 0.02~0.45）。我们并没有评估艾司洛尔对 MI 或中风发生率的影响，因为在我们检索的研究中，这些事件的发生率太低。
结论：本综述提示，根据血流动力学指示滴定艾司洛尔剂量是安全有效的。需要从高危患者中研究得到的安全性数据来建立艾司洛尔的围术期治疗的安全性和有效性情况。
（徐妍君 译， 马皓琳 李士通 校）

BACKGROUND: Although β blockers have been found to decrease perioperative myocardial infarction (MI), β-blocker-mediated hypotension is associated with postoperative stroke and mortality. In this systematic review we assessed the safety and efficacy of the β1-specific, adrenergic receptor antagonist esmolol in noncardiac surgery. Safety was assessed by analyzing the incidence of postoperative hypotension and bradycardia, and efficacy was assessed by analyzing the incidence of myocardial ischemia.
METHODS: We searched electronic databases for randomized placebo-controlled trials of the perioperative use of esmolol in noncardiac surgery. We abstracted data on design, demographics, hemodynamic changes (planned or unplanned), myocardial ischemia, and MI. Heterogeneity was assessed via meta-regression.
RESULTS: Our search identified 67 trials, which were well matched for study characteristics. The quality of the studies was limited by small sample size and poorly defined allocation concealment. Overall, the analysis demonstrates an increased incidence of unplanned hypotension (OR 2.13; 95% confidence interval [CI], 1.48 to 3.04), which was found to be dose related (R^2 = 0.408). An increased incidence of significant bradycardia was not demonstrated (OR 1.18; 95% CI, 0.69 to 2.02). Dose titration was shown to influence both the change in arterial blood pressure and heart rate. In comparison with placebo, esmolol decreased the frequency of myocardial ischemia in the 7 evaluating studies (OR 0.17; 95% CI, 0.02 to 0.45). We did not assess the effects of esmolol on the incidence of MI or stroke because the incidence of these events was too infrequent in the retrieved studies.
CONCLUSION: This review suggests that titration of esmolol to a hemodynamic end point can be safe and effective. Safety data from studies in higher-risk patients are needed to establish a perioperative safety and efficacy profile of esmolol.

口服布洛芬和塞来考昔对预防门诊手术后病人疼痛、改善恢复转归和病人满意度的影响

The Effects of Oral Ibuprofen and Celecoxib in Preventing Pain, Improving Recovery Outcomes and Patient Satisfaction After Ambulatory Surgery

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背景：非甾体类抗炎药已日益广泛成为用于门诊手术室病人疼痛处理的多模式镇痛方式的一部分。我们设计了这个随机、双盲、安慰剂对照研究，以评估非选择性非甾体抗炎药（布洛芬）或选择性 COX-2 抑制剂（给予塞来考昔作为多模式镇痛的一部分）对门诊手术后患者的疼痛分级、对补救性镇痛药的需要和患者临床相关转归的影响。首要的观察指标是恢复到日常生活活动正常的时间。
方法：180 名接受门诊手术的患者被随机分成 3 组：组 1（对照组）患者在恢复室接受了 2 颗安慰剂胶囊（与塞来考昔匹配）或 1 颗安慰剂片（与布洛芬匹配），于术日晚睡前口服 1 片安慰剂，出院后 3 天每次 1 颗胶囊或片剂安慰剂，1 日 3 次；组 2 (塞来考昔)患者在恢复室口服 400mg 塞来考昔（2 颗胶囊），术日晚睡前 1 颗安慰剂胶囊和片剂，术后 3 天每日 2 次每次 200mg 塞来考昔(1 颗胶囊)加睡前 1 颗安慰剂胶囊；组 3（布洛芬）患者在恢复室口服 400mg 布洛芬（1 片），术日晚睡前加服一片，术后 3 日 1 天 3 次每次 400mg 口服。出院前记录恢复时间、术后疼痛评分和补充镇痛药需要量。在术后 24h、48h、72h、7d 和 30d 进行随访评价以评定疼痛分级、镇痛药需要量、正常活动的恢复、阿片相关副作用、恢复质量以及用 5 点口头评定量表评定的患者对术后疼痛处理的满意度。
结果：3 组患者人口统计学均无差异。相比于安慰剂组，塞来考昔和布洛芬显著减少出院后补充镇痛药的需要（$P < 0.05$）。效用比（塞来考昔和布洛芬比对照组）分别为 0.73 比 1 和 0.3 比 0.8。塞来考昔和布洛芬组恢复质量评分和病人对术后镇痛满意度均比对照组高（$P < 0.05$, 效用比[比对照组] = 0.67）。术后便秘的发生率在对照组（28%）明显高于塞来考昔(5%)和布洛芬（7%）组（$P < 0.05$）。服用药物的两组患者出院后耐受性均良好。然而，3 组患者恢复到日常生活活动正常的时间相似。
结论：在出院后阶段早期布洛芬（1200 mg/d）和塞来考昔(400 mg/d)显著减少补充镇痛药的需要，这导致门诊手术后病人恢复质量和镇痛满意度提高。
（杨秀娟 译 马皓琳 李士通 校）
BACKGROUND: Nonsteroidal antiinflammatory drugs have become increasingly popular as part of multimodal analgesic regimens for pain management in the ambulatory setting. We designed this randomized, double-blind, placebo-controlled study to evaluate the effect of postoperative administration of either a nonselective nonsteroidal antiinflammatory drug (ibuprofen) or the cyclooxygenase-2 selective inhibitor (celecoxib when administered as part of a multimodal analgesic regimen) on the severity of pain, the need for rescue analgesics, and clinically relevant patient outcomes after ambulatory surgery. The primary end point was the time to resumption of normal activities of daily living.
METHODS: One hundred eighty patients undergoing outpatient surgery were randomly assigned to 1 of 3 treatment groups: group 1 (control) received either 2 placebo capsules (matching celecoxib) or 1 placebo tablet (matching ibuprofen) in the recovery room and 1

placebo tablet at bedtime on the day of surgery, followed by 1 placebo capsule or tablet 3 times a day for 3 days after discharge; group 2 (celecoxib) received celecoxib 400 mg (2 capsules) orally in the recovery room and 1 placebo capsule and tablet at bedtime on the day of surgery, followed by celecoxib 200 mg (1 capsule) twice a day + placebo capsule every day at bedtime for 3 days after surgery; or group 3 (ibuprofen) received ibuprofen 400 mg (1 tablet) orally in the recovery room and 400 mg orally at bedtime on the day of surgery, followed by 400 mg orally 3 times a day for 3 days after surgery. Recovery times, postoperative pain scores, and the need for rescue analgesics were recorded before discharge. Follow-up evaluations were performed at 24 hours, 48 hours, 72 hours, 7 days, and 30 days after surgery to assess postdischarge pain, analgesic requirements, resumption of normal activities, opioid-related side effects, as well as quality of recovery and patient satisfaction with their postoperative pain management using a 5-point verbal rating scale.
RESULTS: The 3 groups did not differ with respect to their demographic characteristics. Compared with the placebo treatment, both celecoxib and ibuprofen significantly decreased the need for rescue analgesic medication after discharge ($P < 0.05$). The effect sizes (celecoxib and ibuprofen versus control group) were 0.73 to 1 and 0.3 to 0.8, respectively. Quality of recovery scores and patient satisfaction with their postoperative pain management were also improved in the celecoxib and ibuprofen groups compared with the control group ($P < 0.05$, effect size [vs control group] = 0.67). The incidence of postoperative constipation was significantly higher in the control group (28%) compared with the celecoxib (5%) and ibuprofen (7%) groups, respectively ($P < 0.05$). Both active treatments were well tolerated in the postdischarge period. However, the time to resumption of normal activities of daily living was similar among the 3 groups.
CONCLUSIONS: Both ibuprofen (1200 mg/d) and celecoxib (400 mg/d) significantly decreased the need for rescue analgesic medication in the early postdischarge period, leading to an improvement in the quality of recovery and patient satisfaction with their pain management after outpatient surgery.

清醒的有自主呼吸的低血容量志愿者的脉搏氧饱和度仪体积描记的波形变化

Pulse Oximeter Plethysmographic Waveform Changes in Awake, Spontaneously Breathing, Hypovolemic Volunteers

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Anesth Analg 2011; 112(2): 368-374

背景：本研究的主要目的是为了确定脉搏氧饱和度仪波形特点的变化是否可追踪中枢血容量的进行性减少。我们也评估了脉搏氧饱和度仪波形的变化是否可以在标准生命体征改变前提供出血患者血液流失的提示。
方法：从 18 例通过下体负压（LBNP）诱导中枢血容量进行性减少的健康受试者中收集来自于手指、额头以及耳朵的脉搏氧饱和度仪感受器的脉搏氧饱和度仪数据。同时运用心阻抗图记录心搏量。本研究在不受干预的研究工作实验室里进行。从每个脉搏波形记录计算脉搏的波幅、宽度以及曲线下面积（AUC）特征。计算

合并相关系数来确定脉搏氧饱和度仪波形特征的变化与 LBNP 时的心搏量之间的关系。

结果：对于在耳朵、额头的脉搏氧饱和度仪感受器，脉搏波幅、宽度以及曲线下面积的减少与 LBNP 期间心搏量的进行性减少明显相关 (所有特征均 $R^2 \geq 0.59$)。脉搏氧饱和度波形特点的改变在动脉血压降低前即可观察到。从额头感受器的曲线下面积得到了脉搏特点与心搏量之间的最佳关系 ($R^2 = 0.97$)。当中枢血容量恢复时脉搏氧饱和度仪波形特征恢复到基线水平。

结论：这些结果支持脉搏氧饱和度仪波形分析作为一种潜在的诊断工具用于自主呼吸的患者，在心血管失代偿出现前发现显著的低血容量。

（龚寅 译 马皓琳 李士通 校）

BACKGROUND: The primary objective of this study was to determine whether alterations in the pulse oximeter waveform characteristics would track progressive reductions in central blood volume. We also assessed whether changes in the pulse oximeter waveform provide an indication of blood loss in the hemorrhaging patient before changes in standard vital signs.

METHODS: Pulse oximeter data from finger, forehead, and ear pulse oximeter sensors were collected from 18 healthy subjects undergoing progressive reduction in central blood volume induced by lower body negative pressure (LBNP). Stroke volume measurements were simultaneously recorded using impedance cardiography. The study was conducted in a research laboratory setting where no interventions were performed. Pulse amplitude, width, and area under the curve (AUC) features were calculated from each pulse wave recording. Amalgamated correlation coefficients were calculated to determine the relationship between the changes in pulse oximeter waveform features and changes in stroke volume with LBNP.

RESULTS: For pulse oximeter sensors on the ear and forehead, reductions in pulse amplitude, width, and area were strongly correlated with progressive reductions in stroke volume during LBNP ($R^2 \geq 0.59$ for all features). Changes in pulse oximeter waveform features were observed before profound decreases in arterial blood pressure. The best correlations between pulse features and stroke volume were obtained from the forehead sensor area ($R^2 = 0.97$). Pulse oximeter waveform features returned to baseline levels when central blood volume was restored.

CONCLUSIONS: These results support the use of pulse oximeter waveform analysis as a potential diagnostic tool to detect clinically significant hypovolemia before the onset of cardiovascular decompensation in spontaneously breathing patients.

探索性试验中氧化亚氮和远期发病率和死亡率的关系

Nitrous Oxide and Long-Term Morbidity and Mortality in the ENIGMA Trial

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背景：患者接触大量氧化亚氮后，其更远期的心血管发病率和死亡率升高可能存在有病理生理的基础理论。然而这种关系临床上并未确定。探索试验随机选取2050例行非心脏手术的患者，包括接触2小时以上氧化亚氮和不接触氧化亚氮的麻醉。我们进行随访研究以评估长期心血管事件的风险。
方法：回顾所有研究患者的病例报告表和医疗记录进行审查。记录死亡日期和原因以及心肌梗死或中风的发生。然后电话采访所有幸存的患者。该研究主要终点是生存。
结果：该研究随访时间中位数是3.5年（0-5.7年）。在整个随访期间，有380例（19%）手术后死亡，91例（4.5%）发生心肌梗死，有44例（2.2%）发生中风。氧化亚氮并没有显著增加死亡风险（危险比=0.98，95%可信区间：0.80-1.20，P=0.82）。接受氧化亚氮的患者发生心肌梗死的比值比为1.59（95%可信区间：1.01-2.51，P=0.04），发生中风的比值比为1.01（95%可信区间：0.55-1.87，P=0.97）。
结论：在探索性试验中，氧化亚氮的使用增加了远期发生心肌梗死的风险，但与死亡率和中风发生无关。给予氧化亚氮与严重长期不良转归之间的确切关系尚需要通过一个合理设计的大样本随机对照试验来确定。
（滕凌雅 译 马皓琳 李士通 校）

BACKGROUND: There is a plausible pathophysiologic rationale for increased long-term cardiovascular morbidity and mortality in patients receiving significant exposure to nitrous oxide. However, this relationship has not been established clinically. The ENIGMA trial randomized 2050 patients having noncardiac surgery lasting more than 2 hours to nitrous oxide–based or nitrous oxide–free anesthesia. We conducted a follow-up study of the ENIGMA patients to evaluate the risk of cardiovascular events in the longer term.
METHODS: The trial case report forms and medical records of all study patients were reviewed. The date and cause of death and occurrence of myocardial infarction or stroke were recorded. A telephone interview was then conducted with all surviving patients. The primary endpoint of the study was survival.
RESULTS: The median follow-up time was 3.5 (range: 0 to 5.7) years. Three hundred eighty patients (19%) had died since the index surgery, 91 (4.5%) were recorded as having myocardial infarction, and 44 (2.2%) had a stroke during the entire follow-up period. Nitrous oxide did not significantly increase the risk of death [hazard ratio = 0.98 (95% confidence interval, CI: 0.80 to 1.20; P = 0.82)]. The adjusted odds ratio for myocardial infarction in patients administered nitrous oxide was 1.59 (95% CI: 1.01 to 2.51; P = 0.04) and for stroke was 1.01 (95% CI: 0.55 to 1.87; P = 0.97).
CONCLUSIONS: The administration of nitrous oxide was associated with increased long-term risk of myocardial infarction, but not of death or stroke in patients enrolled in the ENIGMA trial. The exact relationship between nitrous oxide administration and serious long-term adverse outcomes will require confirmation by an appropriately designed large randomized controlled trial.

0-10数字评分量表能作为临床有意义的疼痛测量方法用于儿童吗？

Do 0–10 Numeric Rating Scores Translate into Clinically Meaningful Pain Measures for Children?

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Anesth Analg 2011; 112(2): 415-421;

背景：自我报告的疼痛评分已被广泛地应用于临床和研究工作中，但是对它们在儿童中的解释能力尚知之甚少。在这个前瞻性、观察性研究中我们评估了在术后儿童中 0-10 数字量表（NRS）疼痛评分与其他自我报告的，临床有意义的结果之间的关联。这些结果包括感到需要治疗（PNM）、疼痛减轻（PR）和对治疗感到满意度（PS）。
方法：该研究选择 7-16 岁经过手术并伴有术后疼痛的儿童。在术后第一个 24 小时中对每个儿童记录 1 到 4 个观察项目。在每次评估中，儿童根据 NRS 确定他们的疼痛度，并同时确定他们的 PNM 和他们对疼痛治疗的满意度。在 1-2 小时内重复一次评估，并进一步评定他们的 PR 与前次评估结果相比较是相同、更好还是更差。用受试者操作特征曲线来检查用于 PNM、PS 的潜在的 NRS 切割点，同时计算在疼痛评分中与 PR 有关的最小临床显著差异（MCSD）。
结果：在 113 个儿童中记录 397 个观察项目（包括 189 对）。与 PNM 有关的 NRS 评分显著高于“不需要者”（中位数 6 比 3;P < 0.001）。NRS 评分>4 用于鉴别 PNM 有很好的灵敏度(0.81)和特异性(0.70)，但是有大量的假阳性和阴性（例如：评分>4 的儿童有 42%没有要求镇痛）。在 NRS 评分中与感觉“好一点”或“差一点”有关（P<0.001 比相同）的 MCSD 分别是-1(95% 可信区间[CI] −0.5~1) 或+1 (CI 0.5~2.7)。NRS>6 用于鉴别对治疗不满意的敏感性为 0.82，特异性为 0.76，但是评分>6 的儿童中分别有 46%和 24%对他们的镇痛非常满意。
结论：该研究对有关 NRS 疼痛评分在儿童中的临床解释提供了重要的信息。数据进一步支持了 NRS 评分作为有效的疼痛强度测量方法在儿童急性术后状态下与 PNM、PR 和 PS 有关。然而，该评分与其它临床有意义的结果相关的变异性表明切点的应用对于个体治疗的决定是不合适的。
（周洁 译 马皓琳 李士通 校）
BACKGROUND: Self-reported pain scores are used widely in clinical and research settings, yet little is known about their interpretability in children. In this prospective, observational study we evaluated the relationship between 0 to 10 numerical rating scale (NRS) pain scores and other self-reported, clinically meaningful outcomes, including perceived need for medicine (PNM), pain relief (PR), and perceived satisfaction (PS) with treatment in children postoperatively.
METHODS: This study included children ages 7 to 16 years undergoing surgery associated with postoperative pain. One to 4 observations were recorded in each child within the first 24 hours postoperatively. At each assessment, children rated their pain with the NRS, stated their PNM, and rated their satisfaction with pain management. Assessments were repeated within 1 to 2 hours, and children additionally rated their PR as the same, better, or worse in comparison with the earlier assessment. Receiver operator characteristic curves were developed to examine potential NRS cut-points for PNM and PS, and the minimum clinically significant difference (MCSD) in pain score associated with PR was calculated.

RESULTS: Three hundred ninety-seven observations (including 189 pairs) were recorded in 113 children. NRS scores associated with PNM were significantly higher than "no need" (median 6 vs. 3; P < 0.001). NRS scores >4 had good sensitivity (0.81) and specificity (0.70) to discriminate PNM, but with a large number of false positives and negatives (e.g., 42% of children with scores >4 did not need analgesia). The MCSD in NRS scores was −1 (95% confidence interval [CI] −0.5 to 1) or +1 (CI 0.5 to 2.7) in relation to feel "a little better" or "worse," respectively (P < 0.001 vs. the same). NRS scores >6 had a sensitivity of 0.82 and specificity of 0.76 in discriminating dissatisfaction with treatment, yet 46% and 24% of children with scores >6, respectively, were somewhat to very satisfied with their analgesia.
CONCLUSIONS: This study provides important information regarding the clinical interpretation of NRS pain scores in children. Data further support the NRS as a valid measure of pain intensity in relation to the child's PNM, PR, and PS in the acute postoperative setting. However, the variability in scores in relation to other clinically meaningful outcomes suggests that application of cut-points for individual treatment decisions is inappropriate.

依那西普恢复吗啡耐受大鼠中吗啡的镇痛作用并抑制脊髓神经炎症

Etanercept Restores the Antinociceptive Effect of Morphine and Suppresses Spinal Neuroinflammation in Morphine-Tolerant Rats

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背景：在本实验中，我们观察在吗啡耐受大鼠中，肿瘤坏死因子（TNF）-α 拮抗剂依那西普对吗啡镇痛作用的影响。
方法：雄性 Wistar 大鼠鞘内埋入两根导管，一根与迷你渗透泵连接，输注吗啡（15 μg/h）或生理盐水（1 μL/h）五天。第五天，停止输注吗啡后，通过另一根导管注射依那西普（5 μg、25 μg 或 50 μg/10 μL）或生理盐水（10 μL）。三小时后，鞘内给予吗啡(15 μg/10 μL)，并测量摆尾潜伏期来评估吗啡的镇痛作用。处死大鼠并取出脊髓，对其进行定量实时聚合酶链反应和免疫组织化学来检测前炎症细胞因子表达。
结果：我们发现急性依那西普（50 μg）治疗能维持吗啡耐受大鼠中吗啡的镇痛作用。另外，在吗啡耐受大鼠脊髓背侧中，TNFα mRNA 的表达增加了 2.5 倍,白介素（IL）-1β mRNA 增加了 13 倍，IL-6 mRNA 增加了 111 倍。50 μg 依那西普阻断了 TNFα、IL-1β 和 IL-6 mRNA 的表达增加。免疫组织化学分析表明：50 μg 依那西普抑制了小胶质细胞内前炎症细胞因子的表达和神经炎症

结论：本实验表明：依那西普通过抑制前炎症细胞因子 TNF-α、IL-1β 和 IL-6 的表达和脊髓的神经炎症，恢复了对吗啡耐受大鼠中吗啡的镇痛作用。结果说明依那西普也能作为吗啡耐受的辅助治疗，这也拓展了阿片类镇痛药在临床疼痛管理中的作用。

（王海涛 译 马皓琳 李士通 校）

BACKGROUND: In the present study we examined the effect of the tumor necrosis factor (TNF)-α antagonist etanercept on the antinociceptive effect of morphine in morphine-tolerant rats.

METHODS: Male Wistar rats were implanted with 2 intrathecal catheters, and 1 was connected to a mini-osmotic pump for either morphine (15 μg/h) or saline (1 μL/h) infusion for 5 days. On day 5, either etanercept (5 μg, 25 μg, and 50 μg/10 μL) or saline (10 μL) was injected via the other catheter after morphine infusion was discontinued. Three hours later, morphine (15 μg/10 μL, intrathecally) was given and tail-flick latency was measured to evaluate the antinociceptive effect of morphine. Rats were then killed and their spinal cords were removed for quantitative real-time polymerase chain reaction and immunohistochemistry to measure proinflammatory cytokines expression.

RESULTS: We found that acute etanercept (50 μg) treatment preserved a significant antinociceptive effect of morphine in morphine-tolerant rats. In addition, the expression of TNFα mRNA was increased by 2.5-fold, interleukin (IL)-1β mRNA increased by 13-fold and IL-6 mRNA by 111-fold in the dorsal spinal cord of morphine-tolerant rats. The increase in TNFα, IL-1β, and IL-6 mRNA expression was blocked by 50 μg etanercept pretreatment. The immunohistochemistry analysis revealed that 50 μg etanercept suppressed proinflammatory cytokines expression and neuroinflammation in the microglia.

CONCLUSIONS: The present study demonstrates that etanercept restores the antinoceptive effect of morphine in morphine-tolerant rats by inhibition of proinflammatory cytokine TNF-α, IL-1β, and IL-6 expression and spinal neuroinflammation. The results suggest that etanercept could also be an adjuvant therapy for morphine tolerance, which extends the effectiveness of opioids in clinical pain management.

低剂量、低浓度左旋布比卡因加上芬太尼的选择性脊髓麻醉用于膝关节镜检查：一个剂量探索的研究

Low-Dose, Low-Concentration Levobupivacaine Plus Fentanyl Selective Spinal Anesthesia for Knee Arthroscopy: A Dose Finding Study

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背景：选择性感觉脊髓麻醉保有下肢运动功能，因此便于免去 PACU 并减少离床行走恢复所需的时间。

方法：在一个由 90 名（ASA 体格状态 I 级和 II 级）择期行膝关节镜检查的患者构

成的双盲研究中，我们比较了在 3 种低剂量、低浓度左旋布比卡因－芬太尼混合溶液（5、4、3mg+10μg）脊髓麻醉后离床行走时间和不用去 PACU 的比率。
结果：由于大量阻滞不全（50%），3mg 剂量被停止了。23%的 5mg 研究组和 80%的 4mg 研究组的患者不用去 PACU(P = 0001)。5mg 组在 70 分钟（30－130 分钟）（中位数[范围]）后能够下地行走，4mg 组在 45 分钟（23－120 分钟）后能够下地行走(P = 0006)。
结论：4mg 左旋利多卡因加上 10μg 芬太尼能够提供足够的外科手术麻醉，最短的下地行走的时间和最高的免去 PACU 比率。
（唐亮 译 马皓琳 李士通 校）
BACKGROUND: Selective sensory spinal anesthesia preserves lower limb motor function and thus facilitates postanesthesia care unit (PACU) bypass and reduces ambulation recovery time.
METHODS: We compared the ambulation time and PACU bypass rate after using 3 low-dose, low-concentration levobupivacaine-fentanyl spinal solutions (5, 4, and 3 mg + 10 μg) in a double-blind study consisting of 90 patients (ASA physical status I and II) scheduled to undergo knee arthroscopy.
RESULTS: The 3-mg dose was halted because of a large number of inadequate blocks (50%). Twenty-three percent and 80% of patients from groups 5 mg and 4 mg, respectively, bypassed the PACU (P = 0001). Ambulation took place after 70 minutes (30–130 minutes) (median [range]) in group 5 mg and 45 minutes (23–120 minutes) in group 4 mg (P = 0006).
CONCLUSION: Four milligrams levobupivacaine plus 10 μg fentanyl produced adequate surgical anesthesia with the shortest time to ambulation and the highest PACU bypass rate.

综述：抗血小板药物药理学与围手术期管理的文献回顾

Review article: antiplatelet drugs: a review of their pharmacology and management in the perioperative period.
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在日常麻醉监护过程中，麻醉医师经常会遇到许多正在使用影响血小板功能药物的患者。这些药物通常作为处理原发或继发动脉粥样硬化血栓疾病的基本组成部分。其中，一些抗血小板药物正在临床使用，而另有个别药物尚处在试验研究阶段。作为被最为广泛研究的抗血小板药物，阿司匹林与氯吡格雷（单独或联合应用）于当前在用药物中具有最出色的风险收益状况。普拉格雷最近被批准用于接受经皮介入的急性冠状动脉综合症患者。其它药物，例如双嘧达莫与西洛他唑，目前尚未开展大规模的临床研究。此外，还有诸如坎格雷洛与替卡格雷等新近临床试验药物，但其是否具有显著的额外收益仍有待进一步评估。在对接受抗血小板药物患者进行围

手术期管理时，要求临床医师充分掌握其基本病理学、给药原理、药理学与药代动力学和药物相互作用等相关知识。此外，在评估停止或继续使用抗血小板药物的风险收益状况时，应始终牢记手术方式、不可避免的出血并发症与选择适当的全麻或区域麻醉方式间的利弊关系。一般而言，防止血栓形成最安全的方法是在整个围手术期持续使用抗血小板药物，除非临床医师认为围手术期出血的风险相对血栓阻塞的发展更为重要。抗血小板药物药效与药代动力学的相关知识可以让临床医师更早地预期包括潜在药物相互作用在内的围手术期停药或继续使用抗血小板药物的风险与困难。

（范羽译 薛张纲校）

In the normal course of the delivery of care, anesthesiologists encounter many patients who are receiving drugs that affect platelet function as a fundamental part of primary and secondary management of atherosclerotic thrombotic disease. There are several antiplatelet drugs available for use in clinical practice and several under investigation. Aspirin and clopidogrel (alone and in combination) have been the most studied and have the most favorable risk-benefit profiles of drugs currently available. Prasugrel was recently approved for patients with acute coronary syndrome undergoing percutaneous interventions. Other drugs such as dipyridamole and cilostazol have not been as extensively investigated. There are several newer investigational drugs such as cangrelor and ticagrelor, but whether they confer significant additional benefits remains to be established. Management of patients who are receiving antiplatelet drugs during the perioperative period requires an understanding of the underlying pathology and rationale for their administration, pharmacology and pharmacokinetics, and drug interactions. Furthermore, the risk and benefit assessment of discontinuing or continuing these drugs should be made bearing in mind the proposed surgery and its inherent risk for bleeding complications as well as decisions relating to appropriate use of general or some form of regional anesthesia. In general, the safest approach to prevent thrombosis seems to be continuation of these drugs throughout the perioperative period except where concerns about perioperative bleeding outweigh those associated with the development of thrombotic occlusion. Knowledge of the pharmacodynamics and pharmacokinetics of antiplatelet drugs may allow practitioners to anticipate difficulties associated with drug withdrawal and administration in the perioperative period including the potential for drug interactions.

丙泊酚及其类似物2,6-二异丙基-4-(1 -羟基-2,2,2三氟)苯酚在6Hz部分惊厥发作模型中的抗惊厥作用

The anticonvulsant effects of propofol and a propofol analog, 2,6-diisopropyl-4-(1-hydroxy-2,2,2-trifluoroethyl)phenol, in a 6 Hz partial seizure model.

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背景：丙泊酚是一种具有良好抗惊厥作用的全麻药。但是其潜在的麻醉镇静作用限制了它用于惊厥发作的治疗。有研究发现重组丙泊酚分子的某些靶位可以改变2，6-二异丙基苯酚的结构，产生的新物质具有更低的毒性作用以及更好的抗惊厥

作用。本文的报道是关于丙泊酚取代合成的类似物，2,6-二异丙基-4-(1 -羟基-2,2,2三氟)苯酚(MB003)和2,6- 二仲丁基苯酚(MB050)以及它们在国家神经疾病与中风研究所筛选的模型中抗惊厥作用的比较。

方法：丙泊酚或2,6-二秒丁基苯酚在碳酸钾的催化下分别与三氟乙醛乙基半缩醛发生化学反应合成MB003和MB050。将产物纯化至98%的纯度。依据国家神经疾病与中风研究所抗惊厥筛查计划，研究丙泊酚，MB003，2,6-二仲丁基苯酚和MB050在小鼠最大电休克，皮下冲击 6Hz(32mA) 部分惊厥模型中的保护作用。所有化合物均给予腹腔注射。通过给药后小鼠在转棒取样器上的驻留能力来评价药物的毒性作用。

结果：丙泊酚，MB003和MB050对于6Hz模型的保护作用最好，但是对于小鼠最大电休克和皮下冲击法模型的保护作用欠佳。在6Hz模型中，要具有50%的保护作用，丙泊酚所需剂量为32.8mg/kg；MB003所需剂量为38.4mg/kg；MB050则需要74.0mg/kg。丙泊酚具有明显的毒性作用，并且2,6-二仲丁基苯酚的毒性作用更甚。相应的2,6-二甲基酚类似物为MB003和MB050，2,6二甲基- 4 -（1 -羟基-2,2,2三氟）苯酚，在6Hz模型中不具有保护作用，在测试的剂量范围内也不具有毒性作用。

结论：这些结果表明，麻醉剂异丙酚和2,6-二仲丁基苯酚可以用1-羟基-2,2,2三氟基取代一个对位，由此产生的新的物质在6Hz模型中具有更好的抗惊厥活性同时具有更低的致共济失调的副作用。在6Hz模型中丙泊酚，MB003，2,6-二秒丁基苯酚和MB050的有效性以及2,6-二甲基- 4-（1 -羟基-2,2,2三氟）苯酚的无效性表明2,6-异丙基和2,6-二仲丁基酚的结构对于抗惊厥作用更为重要，而对位有没有酚醛取代基则无关紧要。这些结果表明1 -羟基-2,2,2三氟基团取代的2,6-二烷基酚可能具有良好的抗惊厥活性并且具有良好的使用价值。

（黄剑译 薛张纲校）

BACKGROUND: Propofol is a general anesthetic having good anticonvulsant properties, but is limited in antiseizure use because of its potent anesthetic/sedative properties. It is proposed that substitution of the propofol molecule in the para position may yield compounds having less toxicity, yet possessing anticonvulsant properties because of retention of the 2,6-diisopropylphenol configuration. Reported herein is the synthesis of a para-substituted analog of propofol, 2,6-diisopropyl-4-(1-hydroxy-2,2,2-trifluoroethyl)phenol (MB003), and a similar analog of 2,6-di-sec-butylphenol (MB050), and their comparative anticonvulsant effects in National Institute of Neurological Disorders and Stroke screening models.

METHODS: MB003 and MB050 were synthesized by the reaction of propofol or 2,6-di-sec-butylphenol, respectively, with trifluoroacetaldehyde ethyl hemiacetal in the presence of catalytic amounts of K(2)CO(3). Compounds were purified to >98% purity. Propofol, MB003, 2,6-di-sec-butylphenol, and MB050 were screened for protective effects by the National Institute of Neurological Disorders and Stroke Anticonvulsant Screening Program in the mouse maximal electroshock, subcutaneous metrazol, and 6 Hz (32 mA) partial seizure models. All compounds were administered by IP injection. The toxicity of each compound was assessed by the ability of the animals to stay on a Rotorod after dosing.

RESULTS: Propofol, MB003, and MB050 were found to be most protective in the 6 Hz model with lesser protective effects in the mouse maximal electroshock and subcutaneous metrazol models. In the 6 Hz model, propofol yielded a 50% effective dose of 32.8 mg/kg; MB003, 38.4 mg/kg; and MB050, 74.0 mg/kg. Propofol, and to a greater degree, 2,6-di-sec-butylphenol, exhibited high toxicity. The corresponding 2,6-dimethylphenol analog to MB003 and MB050, 2,6-dimethyl-4-(1-hydroxy-2,2,2-trifluoroethyl)phenol, was not protective in the 6 Hz model and exhibited no toxicity at any dose tested.
CONCLUSION: These results show that the anesthetics propofol and 2,6-di-sec-butylphenol may be substituted in the para position with a 1-hydroxy-2,2,2-trifluoroethyl moiety and the resulting molecules have anticonvulsant activity in the 6 Hz model while exhibiting less toxicity (ataxia) than the parent 2,6-dialkylphenols. The effectiveness of propofol, MB003, 2,6-di-sec-butylphenol, and MB050 and the ineffectiveness of 2,6-dimethyl-4-(1-hydroxy-2,2,2-trifluoroethyl)phenol, in the 6 Hz model shows that the 2,6-diisopropyl or 2,6-di-sec-butyl phenolic configuration is more important to anticonvulsant activity than having the phenolic para position free of substituents. These results suggest that 1-hydroxy-2,2,2-trifluoroethyl substituted 2,6-di-alkylphenols may have useful anticonvulsant activities.

C-MAC D 型镜片可视喉镜在常规气管插管和困难气道处理的首个临床评价

First Clinical Evaluation of the C-MAC D-Blade Videolaryngoscope During Routine and Difficult Intubation.

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摘要：在本次初步研究中，我们在常规气管插管和困难气道处理中评估了 C-MAC D 型镜片(Karl Storz, Tuttlingen, Germany)，这是一种用于困难气道的新型 C-MAC 可视喉镜片。首先，我们在连续 15 个正常气道病人的常规诱导中分别使用传统直接喉镜和 D 型喉镜片进行声门暴露。之后，在连续 300 个病人中的 20 个病人(6.7%)中，当传统直接喉镜插管失败后，我们使用 D 型喉镜片作为困难气道急救设备。在 15 个病人的常规诱导插管中，使用直接喉镜可在 7-8 个病人中分别见到 Cormack-Lehane 分级 1 或 2a。而置入 D 型喉镜片可在所有病人中一次性的在视频中看到声门；使用 D 型喉镜片，所有 15 个病人 Cormack-Lehane 分级均为 1 级。使用 D 型喉镜片成功插管所用平均时间为 15 秒(范围 5-26 秒)。在使用传统直接喉镜发现未预计困难气道 20 个病人中，Cormack-Lehane 分级 3 或 4 的分别有 15 和 5 和病人。使用 D 型喉镜片后，通过视频的 Cormack-Lehane 分级改进到了 1 级 15 个病人，2a 级 5 个病人。从拿起喉镜到获得最佳暴露的时间平均为 11 秒(范围 5-45

秒)，成功插管时间平均 17 秒(范围 3-80 秒)。在所有的 35 个病人中，使用 D 型喉镜片没有对声门的直接暴露，接下来的气管插管需要可半弯曲的管芯。
（任云译 薛张纲校）

In the present preliminary study we evaluated the C-MAC® D-Blade (Karl Storz, Tuttlingen, Germany), a new videolaryngoscopic C-MAC blade for difficult intubation, during both routine and difficult intubations. First, both the conventional direct laryngoscopy and the D-Blade were used in 15 consecutive patients with normal airways during routine induction of anesthesia. Second, the D-Blade was used as a rescue device in 20 of 300 (6.7%) consecutive patients, when conventional direct laryngoscopy failed. In the 15 patients during routine induction of anesthesia, with direct laryngoscopy, a Cormack-Lehane (C/L) grade 1 and grade 2a view was seen in 7 and 8 patients, respectively. It was possible to insert the D-Blade and to get a video view of the glottis on the first attempt in all patients; with the D-Blade, all 15 patients had a C/L 1 view. The time to successful intubation with the D-Blade was 15 (8-26) seconds (median (range)). In the 20 patients, in whom unexpected difficulty with direct laryngoscopy was observed, C/L grades 3 and 4 were present in 15 and 5 patients, respectively. With the use of the D-Blade, indirect C/L video view improved to C/L class 1 in 15 patients, and to 2a in 5 patients, respectively. The time from touching the laryngoscope to optimal laryngoscopic view was 11 (5-45) seconds and for successful intubation 17 (3-80) seconds. In all 35 patients, with the D-Blade no direct view of the glottis was possible and subsequently a semiflexible tube guide was required.

在早期婴儿中行内镜下剥离颅骨切除术：最早五年来的麻醉经验

Endoscopic Strip Craniectomy in Early Infancy: The Initial Five Years of Anesthesia Experience

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背景：微创的内镜下剥离颅骨切除术是治疗婴儿颅缝早闭的一种相对较新的外科技术。在这项研究中我们回顾了我们对这类手术的麻醉经验。假设婴儿有低体重或者其它的合并症，很有可能需要术中输血，如果婴儿有肺部并发症就很有可能进入重症监护室。

方法：我们回顾了从 2008 年 3 月到 2009 年 12 月最早实行内镜下剥离颅骨切除术的 100 名婴儿的病历和麻醉记录。研究结果包括术中输血，静脉栓塞，进入 ICU，颅面重建的第二次手术。我们使用多变量的统计回归方法来决定对患者愈合的重要影响因素。

结果：所有患儿年龄从 4 周到 34 周（体重从 3.2-10.1 公斤），其中 87 例行单纯的内镜下剥离颅骨切除术和 13 例行复杂的内镜下剥离颅骨切除术。有 4 例患儿有颅面综合症。平均手术时间是 48 分钟（从 26-86 分钟）。92 名患儿有中度的失血，

平均约 23 毫升（四分位差 IQR：15-30 毫升）。8 名患儿接受了输血，平均约 17.2 毫升/公斤（四分位差 IQR：10.1-21.2 毫升/公斤）。如果患儿的体重小于 5 公斤($P = 0.04$)，矢状位行内镜下剥离颅骨切除术($P < 0.01$)，有症状的颅缝早闭($P < 0.01$),过早的实行手术($P < 0.01$)，大都需要术中输血。有 2 名患儿出现静脉栓塞但是对临床愈合没有影响。8 名患儿进入重症监护室，患儿进入 ICU 的因素多为术中输血($P < 0.001$)和肺部并发症($P < 0.001$)。82 名患儿在术后第一天就出院（从第一天到第三天）。6 名患儿进一步做了额眶部重建，1 名患儿做了颅顶重建。若患儿行多次颅缝早闭手术($P < 0.01$)，有并发症($P = 0.03$)，术后进入 ICU($P = 0.04$),大都预示着要再次手术。

结论：20%经历内镜下剥离颅骨切除术的患儿有以下一种或几种情况：需要输血，静脉栓塞，肺部并发症，需进入 ICU。多变量的分析证实患儿的体重小于 5 公斤，矢状位行内镜下剥离颅骨切除术，有症状的颅缝早闭,过早的实行手术，有很高的机率需要输血。患儿进入 ICU 的因素多为术中输血和肺部并发症。多次进行颅缝早闭手术的患儿很可能需要再进行颅面重建手术。

（翁梅琳译 薛张纲校）

BACKGROUND: Minimally invasive endoscopic strip craniectomy (ESC) is a relatively new surgical technique for treating craniosynostosis in early infancy. In this study we reviewed our anesthesia experience with ESC. The hypothesis was that infants with low body weight and syndromes would have a higher risk of perioperative blood transfusion and that those with respiratory complications are more likely to be admitted to the intensive care unit (ICU).

METHODS: We retrospectively reviewed patient charts and anesthesia records of the first 100 consecutive infants who underwent ESC between May 2004 and December 2008 and follow-up evaluations until December 2009. Outcomes included (a) perioperative blood transfusion, (b) venous air embolism (VAE), (c) ICU admission, and (d) reoperation with craniofacial reconstruction procedures. Multivariable logistic regression was used to determine significant factors of patient outcomes.

RESULTS: Infants ranging from 4 to 34 weeks of age (weight: 3.2 to 10.1 kg), presented for 87 single and 13 multiple ESC. Four infants had a craniofacial syndrome. The mean surgical time was 48 minutes (range: 26 to 86 minutes). Ninety-two infants had a median estimated blood loss of 23 mL (interquartile ranges [IQR]: 15 to 30 mL). Eight infants who required blood transfusion received a median amount of 17.2 mL/kg (IQR: 10.1 to 21.2 mL/kg). Body weight ≤5 kg ($P = 0.04$), sagittal ESC ($P < 0.01$), syndromic craniosynostosis ($P < 0.01$), and earlier date of surgery in the series ($P < 0.01$) were factors associated with blood transfusion. VAE was detected in 2 infants with no changes in clinical outcome. Eight infants were admitted to the ICU. Factors associated with ICU admission were blood transfusion ($P < 0.001$) and respiratory complications ($P < 0.001$). Eighty-two infants were discharged on postoperative day 1 (range: 1 to 3 days). Six infants underwent subsequent fronto-orbital advancement and 1 cranial vault reconstruction. Multiple-suture craniosynostosis ($P < 0.01$), associated syndromes ($P = 0.03$), and ICU admission after ESC ($P = 0.04$) were predictive of reoperation.

CONCLUSIONS: Twenty percent of infants undergoing ESC had 1 or more of the following: need for blood transfusion, VAE, respiratory complications, and ICU admission. Multivariable analysis confirmed that patients with lower body weight, those

with earlier date of surgery in the series, those undergoing sagittal ESC, and those with syndromic craniosynostosis had a higher rate of blood transfusion. ICU admissions often occurred in infants requiring transfusion and those with respiratory complications. Infants with multiple-suture craniosynostosis were more likely to require subsequent craniofacial reconstruction procedures.

儿茶酚-O-甲基转移酶和阿片类μ受体基因多态性影响吗啡术后镇痛和中枢副作用

Combined Catechol-O-Methyltransferase and μ-Opioid Receptor Gene Polymorphisms Affect Morphine Postoperative Analgesia and Central Side Effects

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背景：之前关于阿片类μ受体的基因多态性对吗啡镇痛和阿片类相关副作用的影响研究有不同的结论.但是评价两种以上基因多态性对于吗啡影响的研究很少.本研究中探讨了儿茶酚-O-甲基转移酶和阿片类μ受体基因多态性是否影响吗啡的术后镇痛
方法：102 名手术病人入组了本前瞻性、观察性研究。所有病人接受了全麻并运用血标本的 DNA 筛查μ受体多态性 A118G (Asn40Asp) 和儿茶酚-O-甲基转移酶 多态性 G1947A (Val158Met)。术后给予病人自控镇痛并保存使用记录。量化表记录病人的静息痛和副作用。
结果：同μ受体 A118 纯合子相比，阿片类μ受体 A118G 和儿茶酚-O-甲基转移酶 G1947A 突变杂合子病人在苏醒室和术后 48 小时使用的吗啡量显著减少。杂合子病人在术后观察期内恶心和镇静评分显著减少，且只有 2 个病人接受了镇吐治疗。
结论：本项研究显示了在理解吗啡在下腹部手术的不同反应时基因与基因之间的重要性。需要在多基因、人口学和临床特征上进行研究来预测正确的吗啡剂量和相关的阿片类副作用。
（姚敏敏译 薛张纲校）
BACKGROUND: Previous studies have generated controversial results regarding the influence of the genetic variations of μ-opioid receptors on morphine analgesia and opioid-related side effects in the postoperative period. Few studies have been conducted attempting to assess the combined effects of variation within ≥2 genes in relation to morphine response. In this study, we investigated whether combined catechol-O-methyltransferase and μ-opioid receptor polymorphisms contribute to the morphine response in postoperative analgesia.
METHODS: One hundred two surgical patients were enrolled in this prospective, observational study. All patients received general anesthesia and were screened for μ-opioid receptor polymorphism A118G (Asn40Asp) and catechol-O-methyltransferase G1947A (Val158Met) polymorphism using a blood sample of DNA. Patient-controlled

analgesia was provided postoperatively and morphine consumption was observed. Any pain at rest or side effects were measured with rating scales.
RESULTS: The heterozygous patients with μ-opioid receptor A118G and catechol-O-methyltransferase G1947A mutation consumed significantly less morphine in the postanesthetic recovery room and 48 hours after surgery compared with homozygous patients of the A118 variant. Nausea and sedation scores were also significantly lower during all observed postoperative periods for heterozygous patients and only 2 patients (18%) from this group received antinausea treatment.
CONCLUSION: This study has demonstrated the importance of the gene-gene approach in understanding the morphine response in patients after lower abdominal surgery. More studies are needed to characterize the combined effects of multiple genes and demographic as well as clinical variables in predicting the correct morphine dosage and corresponding opioid-related side effects.

1.5%甲哌卡因与 0.5%布比卡因混合液在超声引导下肌间沟阻滞中对镇痛的时效与阻滞起效延迟的影响。

The effect of mixing 1.5% mepivacaine and 0.5% bupivacaine on duration of analgesia and latency of block onset in ultrasound-guided interscalene block.
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背景：为了在神经阻滞中获得快速起效和长时效的结果，短效与长效的局麻药常常混合使用。然而，这样的组合真的集合了上述两大优点么。我们假设甲哌卡因与布比卡因的混合液可以带来比布比卡因更快起效速度和比甲哌卡因更长的阻滞时间。
方法：64 个接受肩关节镜手术（18 到 65 岁；ASA1-2 级）在超声引导下进行肌间沟臂丛阻滞作为唯一的麻醉。研究对象随机接受 3 种研究液体之一：30mL1.5%甲哌卡因，30mL0.5%布比卡因，或 15mL0.5%布比卡因和 1.5%甲哌卡因的混合液。记录阻滞起效时间和运动感觉的阻滞时效。
结果：腋神经感觉（前干）阻滞的起效三组相似（甲哌卡因 8.7 ± 4.3 分钟，布比卡因 10.0 ± 5.1 分钟，混合液 11.3 ± 5.3 分钟，P=0.21）。运动阻滞时效混合液组（11.5 ± 4.7 小时）处于布比卡因组（16.4 ± 9.4 小时）和甲哌卡因组（6.0 ± 4.2 小时）当中（布比卡因组和混合液组 P = 0.03; 甲哌卡因组和混合液组 P = 0.01）。镇痛时效甲哌卡因组最短（4.9 ± 2.4 小时），布比卡因组最长（14.0 ± 6.2 小时），混合液组居中（10.3 ± 4.9 小时）(甲哌卡因组和混合液组 P < 0.001 ; 布比卡因组和混合液组 P = 0.01).
结论：超声引导下肌间沟阻滞中，0.5%布比卡因和 1.5%甲哌卡因混合液起效时间与任一局麻药单用的起效时间相似。平均阻滞时效甲哌卡因-布比卡因混合液要显著长于 1.5%甲哌卡因单用，但显著短于 0.5%布比卡因单用。
（张玥琪译，薛张纲校）

BACKGROUND: Short- and long-acting local anesthetics are commonly mixed to achieve nerve blocks with short onset and long duration. However, there is a paucity of data on advantages of such mixtures. We hypothesized that a mixture of mepivacaine and bupivacaine results in a faster onset than does bupivacaine and in a longer duration of blockade than does mepivacaine.
METHODS: Sixty-four patients undergoing arthroscopic shoulder surgery (ages 18 to 65 years; ASA physical status I-II) with ultrasound-guided interscalene brachial plexus block as the sole anesthetic were studied. The subjects were randomized to receive 1 of 3 study solutions: 30 mL of mepivacaine 1.5%, 30 mL of bupivacaine 0.5%, or a mixture of 15 mL each of bupivacaine 0.5% and mepivacaine 1.5%. The block onset time and duration of motor and sensory block were assessed.
RESULTS: Onset of sensory block in the axillary nerve distribution (superior trunk) was similar among the 3 groups (8.7 ± 4.3 minutes for mepivacaine, 10.0 ± 5.1 minutes for bupivacaine, and 11.3 ± 5.3 minutes for the combination group; $P = 0.21$ between all groups). The duration of motor block for the combination group (11.5 ± 4.7 hours) was between that of the bupivacaine (16.4 ± 9.4 hours) and mepivacaine (6.0 ± 4.2 hours) groups ($P = 0.03$ between bupivacaine and combination groups; $P = 0.01$ between mepivacaine and combination groups). Duration of analgesia was the shortest with mepivacaine (4.9 ± 2.4 hours), longest with bupivacaine (14.0 ± 6.2 hours), and intermediate with the combination group (10.3 ± 4.9 hours) ($P < 0.001$ for mepivacaine vs. combination group; $P = 0.01$ for bupivacaine vs. combination group).
CONCLUSIONS: For ultrasound-guided interscalene block, a combination of mepivacaine 1.5% and bupivacaine 0.5% results in a block onset similar to either local anesthetic alone. The mean duration of blockade with a mepivacaine-bupivacaine mixture was significantly longer than block with mepivacaine 1.5% alone but significantly shorter than the block with bupivacaine 0.5% alone.