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### **使用简化超声膀胱测量诊断术后尿潴留**

## **Diagnosis of Postoperative Urinary Retention Using a Simplified Ultrasound Bladder Measurement**

Daurat, Aurélien MD\*; Choquet, Olivier MD\*; Bringuier, Sophie PharmD, PhD†; Charbit, Jonathan MD\*; Egan, Michael MD\*; Capdevila, Xavier MD, PhD\*

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**背景：**在本研究中，我们试图确定使用标准超声设备通过简化超声测量膀胱最大的横径的方法，是否可以用来诊断术后尿潴留（POUR）。这个方法可以替代昂贵的膀胱容量测定设备或者复杂的超声测量步骤（包括测量3条膀胱的直径）。

**方法：**骨科术后的患者如果不能排空膀胱有术后尿潴留的风险，在离开苏醒室之前，对这些患者进行评估。首先使用便携式超声设备测量膀胱的直径(Vscan®; GE Healthcare, Wauwatosa, WI)。随后自动测定膀胱的容量(Bladderscan® BVI 3000; Diagnostic Ultrasound, Redmond, WA)。最后，插入导尿管后测定实际的尿量。主要结果是使用自动超声扫描(Bladderscan BVI 3000)或导尿管测定的膀胱容量 $\geq 600$ ml。研究膀胱容量和直径之间的相关性，并绘制受试者工作曲线来确定预测膀胱容量 $\geq 600$ ml 的表现。由于单个的界值并不总是具有临床意义，我们使用了“灰色地带”的方法。

**结果：**研究纳入 100 名患者，均进行了膀胱扫描测量。49 名患者获得了导尿管置入后的尿量。膀胱最大横径和通过两种方法（膀胱扫描及导尿）获得的尿量之间有显著的相关性。Pearson 相关系数分别是  $r = 0.80$  (95% 可信区间 [CI], 0.72-0.86;  $P < 0.001$ ) and  $r = 0.79$  (95% CI, 0.65-0.88;  $P < 0.001$ )，膀胱扫描以及导尿预测膀胱容量 $\geq 600$ ml 的 ROC 曲线下面积分别是 0.94 (95% CI, 0.88-0.98) and 0.91 (95% CI, 0.79-0.97)。对于两种方法，最佳的界值是 9.7 cm。灰色地带狭窄，从 9.7cm 到 10.7cm，因此限制了无效的测量。

**结论：**简化超声测量膀胱最大横径的方法似乎可以帮助确定或排除术后尿潴留 (POUR)。

(杜芳译 薛张纲校)

**BACKGROUND:** In this study, we sought to determine whether a simplified ultrasound measurement of the largest transverse diameter, using a standard ultrasound machine, could be used to diagnose postoperative urinary retention (POUR). This method may replace expensive bladder volume measuring devices or a more complex ultrasound procedure (involving the measurement of 3 bladder diameters).

**METHODS:** Patients at risk of POUR if unable to void after orthopedic surgery were evaluated in the postanesthesia care unit before discharge. Bladder diameter was first measured using a portable ultrasound device (Vscan®; GE Healthcare, Wauwatosa, WI). An automated evaluation of bladder volume was then performed (Bladderscan® BVI 3000; Diagnostic Ultrasound, Redmond, WA). Finally, when a bladder catheterization was performed, the actual urinary volume was measured. The main outcome was a bladder volume  $\geq 600$  mL as measured using the automated ultrasound scanner (Bladderscan BVI 3000) or by catheterization. Correlations between bladder volumes and diameter were studied and receiver operating characteristic curves were constructed to determine the performance in predicting a bladder volume  $\geq 600$  mL. A "gray zone" approach was developed because a single cutoff value may not always be clinically significant.

**RESULTS:** One hundred patients were included and underwent a Bladderscan measurement. Urinary volume after catheterization was obtained in 49 patients. A significant correlation was found between the largest transverse diameter and urinary volumes assessed by the 2 methods (Bladderscan and catheterization). Pearson correlation coefficients were  $r = 0.80$  (95% confidence interval [CI], 0.72-0.86;  $P < 0.001$ ) and  $r = 0.79$  (95% CI, 0.65-0.88;  $P < 0.001$ ), respectively. The area under the receiver operating characteristic curves for the prediction of a bladder volume  $\geq 600$  mL were 0.94 (95% CI, 0.88-0.98) and 0.91 (95% CI, 0.79-0.97), respectively, for urinary volumes assessed by Bladderscan and catheterization. The optimal cutoff value was 9.7 cm for both methods. The gray zone was narrow, ranging from 9.7 to 10.7 cm thus limiting inconclusive measurements.

**CONCLUSIONS:** A simple ultrasound measurement of the largest transverse bladder diameter seemed to be helpful to exclude or confirm POUR.

在体外培养的人初级羊膜和绒毛膜细胞中孕激素对肿瘤坏死因子  $\alpha$  诱导的基质金属蛋白酶-9 活性和基因表达的影响

**The Effect of Progestins on Tumor Necrosis Factor  $\alpha$ -Induced Matrix Metalloproteinase-9 Activity and Gene Expression in Human Primary Amnion and Chorion Cells In Vitro**

Allen, Terrence K. MBBS, FRCA\*; Feng, Liping MD†; Nazzari, Matthew BS\*; Grotegut, Chad A. MD, MHS†; Buhimschi, Irina A. MD‡§; Murtha, Amy P. MD†

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**背景：**目前用于防止早产儿胎膜早破的治疗方式非常有限，但孕激素可能会起到一定作用。肿瘤坏死因子  $\alpha$  (TNF $\alpha$ ) 可以增强胎膜内基质金属蛋白酶 9 (MMP-9) 基因的表达和活性，从而导致胎膜弱化和破裂。曾有研究表明，在细胞滋养层细胞系中孕激素可以减弱 TNF $\alpha$  诱导的 MMP-9 活性。然而，在胎膜初级羊膜绒毛膜细胞中是否存在相似的作用尚未知。在这项研究中，我们从足月剖宫产患者的胎膜中采集初级绒毛膜和羊膜细胞，评估了孕激素对基础水平和 TNF $\alpha$  诱导的 MMP-9 活性和基因表达的作用。

**方法：**我们从足月剖宫产患者 (N = 11) 胎膜中分离提取初级羊膜和绒毛膜细胞。初级羊膜和绒毛膜细胞混合培养液分别给予浓度为 10 $\mu$ M 的载体 (对照)、孕酮 (P4)、17 $\alpha$ -己酸羟孕酮 (17P) 或醋酸甲羟孕酮 (MPA) 预处理 6 小时，随后给予 10ng/ml TNF $\alpha$  刺激 24 小时。对照组按照是否使用 TNF $\alpha$  刺激分为未刺激对照组与刺激对照组。两个对照组的量化值均为 100 个单位。然后我们使用明胶酶谱的方法来定量细胞培养基中 MMP-9 的酶活性，并提取总 RNA，使用实时定量 PCR 来定量 MMP-9 的基因表达。基础水平的 MMP-9 活性和基因表达水平作为标准化未刺激对照。TNF $\alpha$  刺激的 MMP-9 的活性和基因表达水平作为标准化的刺激对照。本研究主要结果是在体外初级羊膜和绒毛膜细胞中孕激素对 TNF $\alpha$  诱导 MMP-9 酶活性的影响。次要结果包括在体外初级羊膜和绒毛膜细胞中孕激素治疗对 TNF $\alpha$  诱导的 MMP-9 基因的表达和基础水平 MMP-9 的活性和基因表达的影响。

**结果：**本研究中原代细胞是从 11 例患者胎膜中提取的。与未刺激的对照相比，TNF $\alpha$  可增加 MMP-9 的活性 (初级羊膜细胞 P = 0.005，绒毛膜细胞 P <0.001) 和 MMP-9 的基因表达 (初级羊膜细胞 P = 0.030，绒毛膜细胞 P <0.001)。与未刺激的对照相比，MPA 可以减少基础水平 MMP-9 活性 [平均差 (95%CI) -49.6 (-81.9, -17.3)，P = 0.001] 和基因表达 [平均差 (在初级羊膜细胞 95%CI) -53.4 (-105.9, -0.9)，P = 0.045]，但 P4 或 17P 没有这种作用。与刺激对照相比，MPA 也可以降低初级羊膜细胞 TNF $\alpha$  诱导的 MMP-9 的活性 [平均差 (95%CI) -69.0 (-91.8, -46.3)，P <0.001] 和基因表达 [平均差 (95%CI) -86.0 (-120.7, -51.3)，P <0.001]。孕激素预处理对绒毛膜细胞基础水平或 TNF $\alpha$  诱导的 MMP-9 活性和基因表达无显著影响。

**结论：**初级羊膜细胞中 MPA 对基础水平和 TNF $\alpha$  诱导的 MMP-9 活性和基因表达有抑制作用，阐明了孕激素可以防止胎膜薄弱导致的胎膜早破的可能机制。

(江凌慧译 薛张纲校)

**BACKGROUND:** Current treatment modalities for preventing preterm premature rupture of membranes are limited, but progestins may play a role. Tumor necrosis factor  $\alpha$  (TNF $\alpha$ ) enhances matrix metalloproteinase-9 (MMP-9) gene expression and activity in fetal membranes, contributing to membrane weakening and rupture. We previously demonstrated that progestins attenuate TNF $\alpha$ -induced MMP-9 activity in a cytotrophoblast cell line. However, whether they have a similar effect in primary amnion and chorion cells of fetal membranes is unknown. In this study, we evaluated the effect of progestins on basal and TNF $\alpha$ -induced MMP-9 activity and gene expression in primary chorion and amnion cells harvested from the fetal membranes of term nonlaboring patients.

**METHODS:** Primary amnion and chorion cells were isolated from fetal membranes obtained from term uncomplicated nonlaboring patients following elective cesarean delivery (n = 11). Confluent primary amnion and chorion cell cultures were both pretreated with vehicle (control), progesterone (P4), 17 $\alpha$ -hydroxyprogesterone caproate (17P), or medroxyprogesterone acetate (MPA) at 10 M concentration for 6 hours followed by stimulation with TNF $\alpha$  at 10 ng/mL for an additional 24 hours. Cell cultures pretreated with the vehicle only served as the unstimulated control and the vehicle stimulated with TNF $\alpha$  served as the stimulated control. Both controls

were assigned a value of 100 units. Cell culture medium was harvested for MMP-9 enzymatic activity quantification using gelatin zymography. Total RNA was extracted for quantifying MMP-9 gene expression using real-time quantitative PCR. Basal MMP-9 activity and gene expression data were normalized to the unstimulated control. TNF $\alpha$ -stimulated MMP-9 activity and gene expression were normalized to the stimulated control. The primary outcome was the effect of progestins on TNF $\alpha$ -induced MMP-9 enzymatic activity in term human primary amnion and chorion cells in vitro. Secondary outcomes included the effect of progestin therapy on TNF $\alpha$ -induced MMP-9 gene expression and on basal MMP-9 activity and gene expression in primary amnion and chorion cells in vitro.

**RESULTS:** Primary cells were harvested from 11 patients. Compared with the unstimulated control, TNF $\alpha$  increased MMP-9 activity (P = 0.005 versus control in primary amnion cells and P < 0.001 versus control in primary chorion cells) and MMP-9 gene expression (P = 0.030 versus control in primary amnion cells, P < 0.001 versus control in primary chorion cells). Compared with the unstimulated controls, MPA, but not P4 or 17P, reduced basal MMP-9 activity [mean difference (95% CI) -49.6 (-81.9, -17.3) units, P = 0.001] and gene expression [mean difference (95% CI) -53.4 (-105.9, -0.9) units, P = 0.045] in primary amnion cells. Compared with the stimulated control, MPA also reduced TNF $\alpha$ -induced MMP-9 activity [mean difference (95% CI) -69.0 (-91.8, -46.3) units, P < 0.001] and gene expression [mean difference (95% CI) -86.0 (-120.7, -51.3) units, P < 0.001] in primary amnion cells. Progestin pretreatment had no significant effect on basal or TNF $\alpha$ -induced MMP-9 activity and gene expression in primary chorion cells.

**CONCLUSIONS:** The inhibitory effect of MPA on both basal and TNF $\alpha$ -induced MMP-9 activity and gene expression in primary amnion cells demonstrate a possible mechanism by which progestins may prevent fetal membrane weakening leading to preterm premature rupture of membranes.

## 关于单次肌间沟注射阻滞实质优势的系统回顾性 meta-分析

### Will the Real Benefits of Single-Shot Interscalene Block Please Stand Up? A Systematic Review and Meta-Analysis

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Anesthesia & Analgesia 2015 120 1114–1129

**背景：**肌间沟阻滞可以提供肩部手术的术后镇痛，但目前仍缺乏描述其镇痛好处的可靠量化评估。本 meta-分析调查了单次肌间沟注射阻滞在肩部手术术后第一个 48 小时内的镇痛作用。

**方法：**我们回顾了比较了使用肌间沟阻滞和无肌间沟阻滞的镇痛的肩部手术的随机对照和类随机对照试验。利用视觉模拟评分评估术后 24 小时静息痛的程度（10cm 长度，0 代表完全无痛，10 代表最严重疼痛），并将其作为主要结局。次要结局包括术后 2,4,6,8,12,16,32,36,40 及 48 小时的静息痛和活动痛的疼痛程度。阿片类药物用量，术后恶心呕吐的严重程度，病人对术后镇痛的满意程度以及 PACU 时间和住院时间也将列入评估范畴。

**结果：**本研究共分析了 23 个随机对照试验，包括 1090 位病人。与非肌间沟阻滞组相比，术后 24 小时内，肌间沟阻滞组具有更严重的静息痛，加权平均差为 0.96cm（95%的置信区间为 0.08-1.83；P=0.03），但是超过 24 小时，二者疼痛程度无差别。肌间沟阻滞组中，静息痛和运动痛的镇痛时间分别为 8 小时和 6 小时，相对应的静息痛评估的加权平均差为 -1.59cm（95%的可信区间为 -2.60—-0.58cm），运动痛评估的加权平均差为 -2.20cm（-4.34—-0.06cm），且超过这两个时间点后疼痛无进一步缓解。肌间沟阻滞减少术后 12



小时内阿片类药物用量，减少术后 24 小时内恶心呕吐的发生以及减少术后 PACU 时间和住院时间。区域阻滞的类型、药物剂量及注射容量并不影响研究结果。

**结论：**肌间沟阻滞能够提供有效的术后镇痛，包括术后 6 小时内的运动痛和 8 小时内的静息痛，而此后无显著优势。接受肌间沟阻滞的病人会在术后 24 小时内感受到反跳痛，但是 24 小时后和未接受肌间沟阻滞的病人的疼痛体验无明显差别。肌间沟阻滞可分别在术后 12 小时和 24 小时内减少阿片类药物用量和阿片类药物相关的副作用。这些研究结果有助于肩部手术实施肌间沟阻滞的术前风险讨论。

（潘艳译 薛张纲校）

**BACKGROUND:** Interscalene block (ISB) can provide pain relief after shoulder surgery, but a reliable quantification of its analgesic benefits is lacking. This meta-analysis examines the effect of single-shot ISB on analgesic outcomes during the first 48 hours after shoulder surgery.

**METHODS:** We retrieved randomized and quasirandomized controlled trials examining the analgesic benefits of ISB compared with none in shoulder surgery. Severity of postoperative pain measured on a visual analog scale (10 cm scale, 0 = no pain, 10 = worst pain) at rest at 24 hours was the designated primary outcome. Secondary outcomes included pain severity at rest and with motion at 2, 4, 6, 8, 12, 16, 32, 36, 40, and 48 hours postoperatively. Opioid consumption, postoperative nausea and vomiting, patient satisfaction with pain relief, and postanesthesia care unit and hospital discharge time were also assessed.

**RESULTS:** A total of 23 randomized controlled trials, including 1090 patients, were analyzed. Patients in the ISB group had more severe postoperative pain at rest by a weighed mean difference (95% confidence interval) of 0.96 cm (0.08–1.83;  $P = 0.03$ ) at 24 hours compared with no ISB, but there was no difference in pain severity beyond that point. The duration of pain relief at rest and with motion after ISB were 8 and 6 hours, respectively, with a corresponding weighed mean difference in visual analog scale pain scores (99% confidence interval) of  $-1.59$  cm ( $-2.60$  to  $-0.58$ ) and  $-2.20$  cm ( $-4.34$  to  $-0.06$ ), respectively, with no additional pain relief benefits beyond these points. ISB reduced postoperative opioid consumption up to 12 hours, decreased postoperative nausea and vomiting at 24 hours, and expedited postanesthesia care unit and hospital discharge. The type, dose, and volume of local anesthetic used did not affect the results.

**CONCLUSIONS:** ISB can provide effective analgesia up to 6 hours with motion and 8 hours at rest after shoulder surgery, with no demonstrable benefits thereafter. Patients who receive an ISB can suffer rebound pain at 24 hours but later experience similar pain severity compared with those who do not receive an ISB. ISB can also provide an opioid-sparing effect and reduce opioid-related side effects in the first 12 and 24 hours postoperatively, respectively. These findings are useful to inform preoperative risk-benefit discussions regarding ISB for shoulder surgery.

## 持续气道正压对阻塞性睡眠呼吸暂停患者接受手术治疗术后结果的影响：系统性回顾和 Meta-分析

### The Effects of Continuous Positive Airway Pressure on Postoperative Outcomes in Obstructive Sleep Apnea Patients Undergoing Surgery: A Systematic Review and Meta-Analysis

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**背景：**阻塞性睡眠呼吸暂停（OSA）是接受手术治疗患者的一个常见的合并症，并且是术后不良事件发生的一个很大的危险因素。在这篇文章中我们的目标是调查持续正压通气（CPAP）在减少接受手术治疗的 OSA 患者术后不良事件发生的危险因素的效果，围手术期呼吸紊乱的指数（AHI）以及住院时间（LOS）。

**方法：**我们对文献数据库进行了一个系统调查。我们回顾这个研究包括以下部分：（1）确诊 OSA 的成人手术患者（>18 岁）；（2）无论是采用术前和/或术后 CPAP 或无 CPAP 的患者；（3）可获得术后不良事件，术前或术后 AHI 以及 LOS 的报告；（4）所有用英文发表的研究，包括病例。

**结果：**包括 904 位病人的 6 项研究可用来做 meta-分析。我们用 904 位患者做了关于术后不良事件的 meta-分析（CPAP: n = 471 vs no-CPAP: n = 433; 不良事件: 134 vs 133; P = 0.19）。这 2 组间术后不良事件的发生率没有明显差异。没有 CPAP 患者的术前基线 AHI 相对于使用 CPAP 患者显著下降（术前 AHI vs 术后 AHI,  $37 \pm 19$  vs  $12 \pm 16$  个事件每小时,  $P < 0.001$ ）。

**结论：**我们的研究表明在有 CPAP 和无 CPAP 治疗的患者术后不良事件的发生率没有明显差异。使用 CPAP 的患者有一个明显的更低的术后 AHI 和更短的 LOS。这可能是围手术期使用 CPAP 的一个潜在优势。

（张秋丽 译，李士通 审校）

**BACKGROUND:** Obstructive sleep apnea (OSA) is a commonly encountered comorbid condition in patients undergoing surgery and is associated with a greater risk of postoperative adverse events. Our objective in this review was to investigate the effectiveness of continuous positive airway pressure (CPAP) in reducing the risk of postoperative adverse events in patients with OSA undergoing surgery, the perioperative Apnea-Hypopnea Index (AHI), and the hospital length of stay (LOS).

**METHODS:** We performed a systematic search of the literature databases. We reviewed the studies that included the following: (1) adult surgical patients (>18 years old) with information available on OSA; (2) patients using either preoperative and/or postoperative CPAP or no-CPAP; (3) available reports on postoperative adverse events, preoperative and postoperative AHI, and LOS; and (4) all published studies in English including case series.

**RESULTS:** Six studies that included 904 patients were eligible for the meta-analysis. The meta-analysis for postoperative adverse events was performed in 904 patients (CPAP: n = 471 vs no-CPAP: n = 433; adverse events: 134 vs 133; P = 0.19). There was no significant difference in the postoperative adverse events between the 2 groups. The preoperative baseline AHI without CPAP was reduced significantly with postoperative use of CPAP (preoperative AHI versus postoperative AHI,  $37 \pm 19$  vs  $12 \pm 16$  events per hour,  $P < 0.001$ ). LOS showed a trend toward significance in the CPAP group versus the no-CPAP group ( $4.0 \pm 4$  vs  $4.4 \pm 8$  days,  $P = 0.05$ ).

### **CONCLUSIONS:**

Our review suggests that there was no significant difference in the postoperative adverse events between CPAP and no-CPAP treatment. Patients using CPAP had significantly lower postoperative AHI and a trend toward shorter LOS. There may be potential benefits in the use of CPAP during the perioperative period.

### **美国麻醉重症监护训练者的重症监护基础超声学习目标：专家小组的意见**

#### **Critical Care Basic Ultrasound Learning Goals for American Anesthesiology Critical Care Trainees: Recommendations from an Expert Group**

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**目的**在这篇文章中，我们定义学习目标并推荐有关重症监护专家的基本重症监护超声（CCUS）的能力。

**设计**叙事审查，并包含在本文的建议是，由重症监护麻醉医师学会主办。我们的建议是由麻醉科和重症心脏病与超声正规培训的专家小组基于结构化的文献综述。鉴定并考虑麻醉重症护理等专业的学习和训练程序的发布说明。部分是由专门小组撰写，不同意的也列入正文。

**结果**学习的目的和目标，是为了获得专科水平的使用 CCUS 的能力（重症监护奖学金培训），这个能力可以使我们在重症监护环境诊断和监测的重要器官功能障碍。超声检查分为血管、腹部、胸部和心脏部分。对于每个部分都有一个学习目标和特殊技能，并会描述教学建议和学习方法。

**讨论**超声资源的及时床边可用性极大地提高了重症监护医师照顾危重病患者的能力。麻醉-危重病医学培训需要有麻醉科解释基础 CCUS 的明确的期望和业绩标准—重症监护专家。这篇文章的学习目标反应了目前多专科重症监护环境的趋势，即以超声为基础的诊断策略已被频繁应用。这些能力需要作为既定的麻醉-重症监护医学研究医学教育项目的一部分被传授。

（张秋丽 译，李士通 审校）

#### **OBJECTIVE:**

In this review, we define learning goals and recommend competencies concerning focused basic critical care ultrasound (CCUS) for critical care specialists in training.

#### **DESIGN:**

The narrative review is, and the recommendations contained herein are, sponsored by the Society of Critical Care Anesthesiologists. Our recommendations are based on a structured literature review by an expert panel of anesthesiology intensivists and cardiologists with formal training in ultrasound. Published descriptions of learning and training routines from anesthesia-critical care and other specialties were identified and considered. Sections were written by groups with special expertise, with dissent included in the text.

**RESULTS** Learning goals and objectives were identified for achieving competence in the use of CCUS at a specialist level (critical care fellowship training) for diagnosis and monitoring of vital organ dysfunction in the critical care environment. The ultrasound examination was divided into vascular, abdominal, thoracic, and cardiac components. For each component, learning goals and specific skills were presented. Suggestions for teaching and training methods were described.

**DISCUSSION** Immediate bedside availability of ultrasound resources can dramatically improve the ability of critical care physicians to care for critically ill patients. Anesthesia--critical care medicine training should have definitive expectations and performance standards for basic CCUS interpretation by anesthesiology--critical care specialists. The learning goals in this review reflect current trends in the multispecialty critical care environment where ultrasound-based diagnostic strategies are already frequently applied. These competencies should be formally taught as part of an established anesthesiology-critical care medicine graduate medical education programs.

#### **关于夜班呼叫系统对非目的性硬膜穿刺发生率影响的回顾性研究**

**The Influence of a Night-Float Call System on the Incidence of Unintentional Dural Puncture: A Retrospective Impact Study**

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**背景** 住院医生的夜班制度已经引起了不良的后果。现在我们假设住院医生夜班做产科麻醉会增加非目的性硬膜穿刺的发生率。

**方法** 我们回顾性的比较 7 月至 12 月间在非夜班期间（对照组）及夜班期间（实验组）非目的性硬膜穿刺的发生率。我们将对穿刺伤发生在一周的周几及麻醉医生的工作水平进行评估。

**结果** 非目的性硬膜穿刺在对照组中的发生率为 0.73% (20 of 2758)，而实验组的发生率为 1.49% (39 of 2612) (P=0.08；相对危险度=2.06；95%置信区间=1.23—3.74)。由于急诊麻醉引起非目的性硬膜穿刺的比例-1，住院医生在实验组及对照组中的比例分别为 28.2% (11 of 39) 和 5.0% (1 of 20) (相关危险度=5.64；95%置信区间=1.07-152；；P = 0.044)

**结论** 实行夜班呼叫制度会增加非目的性硬膜穿刺的发生率。

(徐典译，李士通 审校)

**BACKGROUND:** Resident night-float systems have been associated with adverse outcomes. We hypothesized that an obstetric anesthesia night float would increase the incidence of unintentional dural punctures.

**METHODS:** The July to December incidence of unintentional dural puncture before (control group) and with night float (night-float group) was compared retrospectively. The incidence of unintentional dural puncture by day of week and trainee level was evaluated.

**RESULTS:** The unintentional dural puncture rate of control group was 0.73% (20 of 2758) vs 1.49% (39 of 2612) in the night-float group (P = 0.008; relative risk = 2.06; 95% confidence interval = 1.23-3.74). The proportion of unintentional dural punctures attributed to clinical anesthesia-1 residents in the night-float and control groups was 28.2% (11 of 39) and 5.0% (1 of 20), respectively (relative risk = 5.64; 95% confidence interval = 1.07-152; P = 0.044).

**CONCLUSIONS:** Implementation of night float increased the incidence of unintentional dural puncture.

关于不同浓度美托咪啉在成年老鼠海马组织切片中对基底兴奋性突触传递和突触塑形作用的研究

**The Effects of Different Concentrations of the  $\alpha$ 2-Adrenoceptor Agonist Medetomidine on Basal Excitatory Synaptic Transmission and Synaptic Plasticity in Hippocampal Slices of Adult Mice**

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**背景**  $\alpha$ 2 受体激动剂作为镇静或止痛药被频繁的应用于人类和动物的麻醉中。然而， $\alpha$ 2 受体激动剂会损伤认知功能。人们对不同浓度  $\alpha$ 2 受体激动剂作用于学习及记忆的神经生理学基础--突触塑形的影响所知甚少。因此，我们研究了不同浓度的美托咪啉（ $\alpha$ 2 受体激动剂）对基底兴奋性突触传递及突触塑形两种形式---双脉冲异化(PPF)和长时程增强(LTP)的影响。

**方法** 在老鼠海马切片的谢弗纤维 CA1 锥形细胞突触上记录诱发的节段兴奋性突触后电位，测量其最初兴奋性突触后电位的斜率。将逐渐增高浓度的美托咪定(1-200  $\mu\text{M}$ )应用于每一个切片上，记录其基底兴奋性突触传递和双脉冲易化的突触塑形。测试浓度的美托咪定 (0.1-0.4  $\mu\text{M}$ )应用于额外的切片中，记录其 LTP 的诱导及维持。

**结果** 低浓度的测试美托咪定在降低 LTP 的作用中呈浓度依赖关系，而若要降低纤维凌空振幅及基底兴奋性突触传递则需要更大的药物浓度。PPF 只能被高浓度(200  $\mu\text{M}$ )的药物影响。

**结论** 美托咪定降低老鼠海马组织的长时程增强突触塑形与药物诱导记忆缺失的能力有关。

(徐典译，李士通 审校)

**BACKGROUND:**  $\alpha_2$ -Adrenoceptor agonists are used frequently in human and veterinary anesthesia as sedative/analgesic drugs. However, they can impair cognition. Little is known about the concentration-dependent effects of  $\alpha_2$ -adrenoceptor agonists on synaptic plasticity, the neurophysiological basis of learning and memory. Therefore, we investigated the effects of different concentrations of medetomidine, an  $\alpha_2$ -adrenoceptor agonist, on basal excitatory synaptic transmission and on 2 forms of synaptic plasticity: paired-pulse facilitation (PPF) and long-term potentiation (LTP).

**METHODS:** Evoked field excitatory postsynaptic potentials were recorded in Schaffer fibers-CA1 pyramidal cell synapses of mouse hippocampal slices, and the initial field excitatory postsynaptic potentials slope was measured. For basal synaptic transmission and PPF, increasing concentrations of medetomidine (1-200  $\mu\text{M}$ ) were applied to each slice. For LTP experiments, individual slices were used for each tested concentration of medetomidine (0.1-0.4  $\mu\text{M}$ ), where LTP induction and LTP maintenance were measured.

**RESULTS:** The lower tested concentrations of medetomidine decreased LTP in a concentration-dependent manner, whereas greater concentrations were required to decrease fiber volley amplitude and basal excitatory synaptic transmission. PPF was only affected by the greatest concentration (200  $\mu\text{M}$ ).

**CONCLUSIONS:** Medetomidine decreased LTP in the mouse hippocampus, in accordance with the ability of medetomidine to induce memory deficits

**阿法沙龙新型制剂：一种以磺丁基醚- $\beta$ -环糊精为辅料的水溶性静脉麻醉药**

**Alphaxalone Reformulated: A Water-Soluble Intravenous Anesthetic Preparation in Sulfobutyl-Ether- $\beta$ -Cyclodextrin**

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**背景：**阿法沙龙是一种不溶于水的神经活性类固醇类麻醉药。它于 1972 年上市，商品名为安泰酮®，它使用一种名为聚氧乙烯蓖麻油 EL 的非离子型表面活性剂作为辅料。它自 1972 年至 1984 年在许多国家作为一种多用途短效静脉麻醉药使用于临床。但由于聚氧乙烯蓖麻油 EL 的致敏性，它退出了临床使用。在本项研究中，研究者比较了三种麻醉药的性能：一种溶于磺丁基醚- $\beta$ -环糊精 (SBECD，一种水溶性分子，其内部有一个脂溶性空腔使药物能溶解于水) 的新型阿法沙龙水溶液，以聚氧乙烯蓖麻油 EL 为辅料的阿法沙龙和丙泊酚制剂。

**方法：**两种阿法沙龙溶液 (10mg/ml) 如下配置：一种使用加入 13% w/v SBECD 溶液的生理盐水 (PHAX)，另一种如文献中描述的使用 20% 聚氧乙烯蓖麻油 EL (ALTH)。溶

于 10% v/v 大豆油乳剂的丙泊酚 (10mg/ml; PROP) 作为对比麻醉药。雄性 Wistar 小鼠 (180-220g) 在氟烷麻醉下行颈静脉置管。每组各 10 只小鼠通过静脉分别给予从 1.2mg/kg 至致死剂量的 PHAX, ALTH 或 PROP。每种药物产生麻醉效果的剂量 (翻正反射和招尾反应消失) 和小鼠的 50% 致死量由概率分析得出。同时比较了每种药物对动脉血压和心率的影响。

**结果:** 静脉注射 PHAX, ALTH 和 PROP 可产生剂量依赖的镇静和麻醉效果, 各药物的翻正反射消失的半数有效剂量 (ED50) 分别为 2.8, 3.0 和 4.6mg/kg。PROP 致 10 只小鼠全部死亡的剂量大于 30 mg/kg (半数致死剂量 (LD50) = 27.7 mg/kg)。ALTH 致 10 只小鼠全部死亡的阿法沙龙剂量为 53mg/kg (LD50 = 43.6mg/kg)。然而当给予相同剂量溶于 SBECD 的阿法沙龙, 却没有小鼠死亡。PHAX 在 84mg/kg 的最大测试量时发生 20% 死亡。PHAX 比 PROP 产生更少的心血管抑制。使用这三种药物的载体进行的对照实验没有表现出任何反应。

**结论:** 阿法沙龙的两种剂型 (PHAX 和 ALTH) 在相同剂量下都迅速产生了麻醉效果。使用 SBECD 作为药物助溶辅料并没有改变阿法沙龙的麻醉效果, 但提高了其治疗指数。PHAX 比丙泊酚脂剂和阿法沙龙的聚氧乙烯蓖麻油 EL 剂型拥有更大的安全边际。

(张帆译 陈杰校)

**BACKGROUND:** Alphaxalone is a neuroactive steroid anesthetic that is poorly water soluble. It was formulated in 1972 as Althesin® using Cremophor® EL, a nonionic surfactant additive. The product was a versatile short-acting IV anesthetic used in clinical practice in many countries from 1972 to 1984. It was withdrawn from clinical practice because of hypersensitivity to Cremophor EL. In the investigations reported here, we compared the properties of 3 anesthetics: a new aqueous solution of alphaxalone dissolved in 7-sulfobutyl-ether- $\beta$ -cyclodextrin (SBECD, a water-soluble molecule with a lipophilic cavity that enables drug solubilization in water); a Cremophor EL preparation of alphaxalone; and propofol.

**METHODS:** Two solutions of alphaxalone (10 mg/mL) were prepared: one using 13% w/v solution of SBECD in 0.9% saline (PHAX) and the other a solution of alphaxalone prepared as described in the literature using 20% Cremophor EL (ALTH). A solution of propofol (10 mg/

mL; PROP) in 10% v/v soya bean oil emulsion was used as a comparator anesthetic. Jugular IV catheters were implanted in male Wistar rats (180–220 g) under halothane anesthesia. Separate groups of 10 implanted rats each were given IV injections of PHAX, ALTH, or PROP from 1.2 mg/kg to lethal doses. Doses of each drug that caused anesthesia (loss of righting reflex and response to tail pinch) and lethality in 50% of rats were calculated by probit analysis. The drugs were also compared for effects on arterial blood pressure and heart rate.

**RESULTS:** IV PHAX, ALTH, and PROP caused dose-related sedation and anesthesia, with 50% effective dose (ED50) values for loss of righting reflex being 2.8, 3.0, and 4.6 mg/kg, respectively. PROP led to death in 10 of 10 rats at doses >30 mg/kg (50% lethal dose (LD50) = 27.7 mg/kg). A dose of alphaxalone 53 mg/kg as ALTH caused 10 of 10 rats to die (LD50 = 43.6 mg/kg), whereas none died when given the same doses of alphaxalone formulated in SBECD. PHAX caused 20% lethality at the maximal dose tested of 84 mg/kg. PHAX caused less cardiovascular depression than PROP. Control experiments with the 3 drug-free vehicles showed no effects.

**CONCLUSIONS:** Alphaxalone caused fast-onset anesthesia at the same dose for both formulations (PHAX and ALTH). The use of SBECD as a drug-solubilizing excipient did not alter the anesthetic effect of alphaxalone, but it did increase the therapeutic index of alphaxalone in PHAX compared with ALTH. PHAX has a higher safety margin than the propofol lipid formulation and also the alphaxalone formulation in Cremophor EL (ALTH).

关于缩宫素、麦角新碱、卡前列素及上述混合药物对于人子宫肌层收缩影响的一项体外研究

## The Contractile Effects of Oxytocin, Ergonovine, and Carboprost and Their Combinations: An In Vitro Study on Human Myometrial Strips

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**背景：**该研究目的是在体外实验中比较缩宫素（低剂量与高剂量）与麦角新碱或卡前列素联合应用对剖宫产（CD）产妇子宫肌层收缩的影响，以及给予缩宫素预处理后对于上述各组子宫肌层收缩的影响。假设缩宫素联合应用麦角新碱或卡前列素与单独应用缩宫素相比可改善子宫肌层的收缩性。

**方法：**子宫肌层的样本来自于择期行剖宫产手术的女性。将上述样本置于器官浴室，实验组给予缩宫素 10-5M，对照组给予生理盐水，各预处理 2 小时。2 小时后将样本洗净后进行单独给予缩宫素、麦角新碱或卡前列素（10-10~10-5M）或联合应用固定低剂量（10-10M）（LDOx）或高剂量（10-6M）（HDOx）缩宫素的剂量反应实验。利用线性回归模型分析并比较剂量反应实验中的收缩幅度、频率、曲线下面积以及动力指数（振幅\*频率），主要结果是比较各组的动力指数。

**结果：**对来自 56 名女性的样本进行 169 次实验。其中对照组缩宫素的动力指数均方根(标准误) (3.40 [0.24])显著高于实验组(2.02 [0.15]) ( $P < 0.001$ )。比较所有对照组，缩宫素组的动力指数(3.21 [0.25])显著高于麦角新碱组(2.13 [0.30],  $P < 0.001$ [多重比较校正  $P$  值,  $P < 0.001$ )、卡前列素组(1.88 [0.10],  $P < 0.001$  [ $P < 0.001$ ])、麦角新碱+ LDOx 组(2.07 [0.15],  $P < 0.001$  [ $P < 0.001$ ])及卡前列素+ LDOx (1.82 [0.15],  $P < 0.001$  [ $P < 0.001$ ])，而前者与麦角新碱+ HDOx 组(3.39 [0.32],  $P = 0.68$  [ $P = 0.99$ ])、卡前列素+ HDOx 组 (3.39 [0.32],  $P = 0.68$  [ $P = 0.99$ ])则无显著差异。然而对于缩宫素预处理的各组，卡前列素+ LDOx 组 (2.53 [0.08],  $P = 0.001$ [多重比较校正  $P$  值,  $P = 0.002$ ])以及麦角新碱+ HDOx 组 (2.82 [0.15],  $P < 0.001$  [ $P < 0.001$ ])与单独给予缩宫素相比显著改善收缩性。但麦角新碱+ LDOx 组(2.47 [0.13],  $P = 0.01$  [ $P = 0.08$ ])和卡前列素 + HDOx 组 (2.51 [0.20],  $P = 0.05$  [ $P = 0.24$ ])与单独给予缩宫素相比有更高的平均收缩性，但无统计学差异。

**结论：**在缩宫素预处理的子宫肌层，缩宫素诱导的收缩衰减与既定的缩宫素受体脱敏现象相关。如果子宫肌层未行缩宫素预处理，缩宫素是最强的子宫收缩剂。然而，对于经缩宫素预处理的子宫肌层，协同作用较明显，缩宫素联合应用麦角新碱或卡前列素与单独给予缩宫素相比，具有更显著的收缩效应。尚需进行体内试验以明确体外实验的差异是否具有临床意义。

（隋永恒 译 陈杰 校）

**BACKGROUND:** The objective of this study was to compare the in vitro contractile effects of the combination of oxytocin (low dose and high dose) with either ergonovine or carboprost in myometrial strips from women undergoing cesarean delivery (CD), and to study the effect of oxytocin pretreatment on these contractions. We hypothesized that the use of ergonovine or carboprost in combination with oxytocin would improve contractility compared with oxytocin alone.

**METHODS:** Myometrial samples obtained from women undergoing elective CD were pretreated in organ bath chambers with either oxytocin 10–5 M (experimental) or physiological salt solution (control) for 2 hours. They were then washed and subjected to dose-response testing with oxytocin, ergonovine, or carboprost (10–10 to 10–5 M), either alone or in combination with a fixed low-dose (10–10 M) (LDOx) or high-dose (10–6 M) (HDOx) oxytocin. The amplitude, frequency, area under the curve, and motility index (amplitude  $\times$  frequency) of contractions during the dose-response period were analyzed with linear regression models, and compared among the groups. The primary outcome was the motility index across the study groups.

**RESULTS:** One hundred sixty-nine experiments were done in samples obtained from 56 women. The mean square root of the motility index [standard error] ( $\sqrt{g \cdot \text{contractions}/10 \text{ min}}$ ) of oxytocin was significantly higher in the control (3.40 [0.24]) versus experimental group (2.02 [0.15]) ( $P < 0.001$ ). When all control groups were compared, the motility index of oxytocin (3.21 [0.25]) was higher than that of ergonovine (2.13 [0.30],  $P < 0.001$  [multiple comparisons adjusted  $P$  value,  $P < 0.001$ ]), carboprost (1.88 [0.10],  $P < 0.001$  [ $P < 0.001$ ]), ergonovine + LDOx (2.07 [0.15],  $P < 0.001$  [ $P < 0.001$ ]), and carboprost + LDOx (1.82 [0.15],  $P < 0.001$  [ $P < 0.001$ ]) and was not different than that of ergonovine + HDOx (3.39 [0.32],  $P = 0.68$  [ $P = 0.99$ ]) and carboprost + HDOx (2.68 [0.30],  $P = 0.20$  [ $P = 0.60$ ]). However, in oxytocin-pretreated groups, carboprost + LDOx (motility index: 2.53 [0.08],  $P = 0.001$  [multiple comparisons adjusted  $P$  value,  $P = 0.002$ ]) and ergonovine + HDOx (2.82 [0.15],  $P < 0.001$  [ $P < 0.001$ ]) exhibited significantly superior contractility response compared with oxytocin alone, while ergonovine + LDOx (2.47 [0.13],  $P = 0.01$  [ $P = 0.08$ ]) and carboprost + HDOx (2.51 [0.20],  $P = 0.05$  [ $P = 0.24$ ]) showed higher mean contractility response compared with oxytocin alone but failed to reach statistical significance in adjusted analyses.

**CONCLUSIONS:** The attenuation of oxytocin-induced contractility in oxytocin-pretreated myometrial strips is in keeping with the previously established oxytocin-receptor desensitization phenomenon. Oxytocin is the most effective of the uterotonics tested if the myometrium is not preexposed to oxytocin. However, in the oxytocin-pretreated myometrium, a synergistic response is evident, and the combination of oxytocin with either ergonovine or carboprost produces superior response compared with oxytocin alone. Further in vivo studies in humans are necessary to determine whether these differences identified in vitro are clinically significant.

### 小儿腹腔镜胆囊切除术中双侧椎旁神经阻滞 (T7-10) 与切口局部麻醉比较：一项前瞻性随机临床研究

#### Bilateral Paravertebral Blockade (T7-10) Versus Incisional Local Anesthetic Administration for Pediatric Laparoscopic Cholecystectomy: A Prospective, Randomized Clinical Study

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**背景：**单次椎旁神经阻滞 (paravertebral nerve blocks, PVBs) 为接受腹腔镜胆囊切除术 (laparoscopic cholecystectomy, LC) 的成年患者提供了有效的术后镇痛。本研究试图比较小兒腹腔镜手术中 PVBs 与切口局部麻醉药注射作用的差异。

**方法：**将 83 名 (8–17 岁) 择期 LC 患者随机分为 2 个治疗组：PVB 组于椎旁间隙和切口处分别注入 0.5% 罗哌卡因和生理盐水，切口浸润组则于椎旁间隙和切口处分别注入生理盐水和 0.5% 罗哌卡因。术后镇痛选择氢吗啡酮自控镇痛至术后 12 小时，之后给予羟考酮和氢吗啡酮。记录 24 小时内镇痛药的总用量、疼痛的连续视觉模拟评分、主观疼痛控制满意度、疼痛的类型和特征、并发症等内容。

**结果：**PVB 组的术中芬太尼用量 (ng/kg/min) 比切口浸润组更少 (12.81 vs 16.57,  $P = 0.007$ )。两组的术后镇痛药消耗总量和平均视觉模拟评分无显著差异。仅在切口浸润组中，术前记录的基线疼痛与术后自述疼痛评分呈相关性。两组的并发症类似且发生率低。两组患者主诉的切口痛、内脏痛、胀气痛的发生率没有区别。然而切口浸润组的肩部疼痛发生率减少 49% (95% 置信区间, 0.269–0.893)。

**结论：**PVBs 并没有减少小儿腹腔镜术后疼痛, 却降低了术中芬太尼的用量。

(柳韶华 译 陈杰 校)



**BACKGROUND:** Single-injection paravertebral nerve blocks (PVBs) provide effective postoperative analgesia after adult laparoscopic cholecystectomy (LC). We sought to compare PVBs with local anesthetic injections at laparoscopic port sites in a pediatric population.

**METHODS:** Eighty-three patients (8–17 years old) scheduled for LC were randomized prospectively to 2 treatment groups: the PVB group received ropivacaine 0.5% injected in the paravertebral space and normal saline injections at laparoscopic instrument sites, and the port infiltration group received normal saline in the paravertebral space and ropivacaine 0.5% at instrument sites. Postoperative analgesia was provided with hydromorphone via patient-controlled analgesia for up to 12 hours, followed by oxycodone and hydromorphone. The total amount of analgesic, serial visual analog scale scores for pain and subject pain control satisfaction, type and characteristics of pain, and complications were recorded for 24 hours.

**RESULTS:** The intraoperative fentanyl requirement (ng/kg/min) was lower in the PVB group than in the port infiltration group (12.81 vs 16.57,  $P = 0.007$ ). Total postoperative analgesic consumption and mean visual analog scale scores were not different between the groups. Baseline pain recorded before surgery correlated with self-reported postoperative pain scores only in the port infiltration group. The rate of complications was low and similar between groups. There was no difference in incidence of patient-reported incisional, visceral, or gas pain. Shoulder pain, however, was 49% less (95% confidence interval, 0.269–0.893) in the port infiltration group.

**CONCLUSIONS:** PVBs did not reduce postoperative pain associated with pediatric LC but decreased intraoperative fentanyl requirements.

### 健康志愿者中肌间沟造影剂的分布

#### The Disposition of Radiocontrast in the Interscalene Space in Healthy Volunteers

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**背景:** 本研究测量了肌间沟内高压力（大于 15 磅）和低压（小于 15 磅）下注射造影剂的扩散差异。

**方法:** 对 9 名健康志愿者行超声引导下双侧肌间沟内各注射 10ml 不透 X 线的 0.9%NaCl。通过计算机断层扫描来评估造影剂的扩散，记录注射时不适感。

**结果:** 两种压力情况下注药，药物均接触到三个臂丛神经根，并在颈筋膜下达到前斜角肌和/或中斜角肌表面。

**结论:** 无论注射压力如何，肌间沟都被 10ml 不透 X 线的造影剂填满。

(林雨轩 译 陈杰 校)

**BACKGROUND:** We measured the spread of radiocontrast in the interscalene space after injection under low (<15 psi) and high (>20 psi) pressures.

**METHODS:** Nine healthy volunteers received ultrasound-guided injections of 10 mL radioopaque NaCl 0.9% in both interscalene spaces. Spread of injectate as assessed by computed tomography scan and discomfort on injection were recorded.

**RESULTS:** Under both opening pressure conditions, injectate contacted 3 brachial plexus roots and spilled over the surface of the anterior and/or middle scalene muscles underneath the cervical fascia.

**CONCLUSIONS:** Regardless of injection pressure, the interscalene space was filled with 10 mL of radiocontrast injectate.