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医院间和医院内骶尾部单次注射局部麻醉药的变化：儿科区域麻醉网络的报告  
Variation Between and Within Hospitals in Single Injection Caudal Local Anesthetic Dose: A Report From the Pediatric Regional Anesthesia Network  
Taenzer, Andreas H. MD, MS<sup>\*</sup>; Hoyt, Matthew MD<sup>\*</sup>; Krane, Elliot J. MD, FAAP<sup>†,‡</sup>; Walker, Benjamin J. MD<sup>§</sup>; Flack, Sean MBChB, FCA(SA)<sup>||</sup>; Bosenberg, Adrian MBChB, FFA(SA)<sup>||</sup>; Sethna, Navil F. MD, MA (Hon.), FAAP<sup>¶</sup>; Franklin, Andrew D. MD, MBA, FASA<sup>#</sup>; Polaner, David M. MD, FAAP<sup>||</sup>; for the PRAN investigators  
Anesthesia & Analgesia: 2020 130 1693-1701

**背景：**由于医疗利用率，支出和临床实践之间存在差异，但在麻醉实践中尚缺乏有关变量差异的数据。儿科区域麻醉网络（PRAN）的数据有助于探索是否存在不同的医疗实践模式，以及神经阻滞局部麻醉药剂量是否存在较大差异。本研究的主要目的是量化单次骶尾部阻滞注射剂量的变化，次要目的是探讨引起变化的可能原因（例如，阻滞的数量与阻滞部位的关系）。

**方法：**我们查询了1岁以下儿童的骶尾部阻滞单次注射局麻药的PRAN数据库。分析数据中局麻药剂量，机构内和跨机构的差异以及可能存在的原因。

**结果：**各部位布比卡因的平均剂量为每千克（BE • kg）在1.39~2.22，十分位区间（IDR）占有剂量的80%的中位数，在0.21~1.48之间。平均剂量（BE • kg）与阻滞部位，年龄，体重和局麻药有关（ $P < 0.001$ ）。阻滞部位的Cohen的F效应大小估计值（0.65）比年龄（0.05）或体重（0.02）高10倍。每公斤平均体积为 $0.9 \pm 0.2$ （平均值 $\pm$ 标准偏差），并且与年龄（0.04）或体重（0.07）相比，与阻滞部位（Cohen's F 0.3）的相关性更强。

**结论：**骶尾部局麻药剂量和给药量存在很大差异。这种差异与每个中心的病例数无关，而是与各不同研究中心有关（即，中心之间的差异）。研究中心内的差异较大，这表明差异主要取决于每位执业医师。尽管有合理的理由来改变统一剂量，但目前的方法尚不一致，也无关于给予标准剂量的有力证据的支持。

（刘洋洋译 潘艳、薛张纲校）

**BACKGROUND:** Given that variation exists in health care utilization, expenditure, and medical practice, there is a paucity of data on variation within the practice of anesthesia. The Pediatric Regional Anesthesia Network (PRAN) data lend itself to explore whether different medical practice patterns exist and if there are nerve blocks with more local anesthetic dosing variation than others. The primary aim of this study was to quantify variation in single injection caudal block dosing, and the secondary aim was to explore possible causes for variation (eg, number of blocks performed versus geographic location).

**METHODS:** We queried the PRAN database for single injection caudal blocks in children <1 year of age. Data were analyzed for local anesthetic dose, variation within and across institutions, and possible causes.

**RESULTS:** Mean dose of bupivacaine equivalents per kilogram (BE • kg) among sites ranged from 1.39 to 2.22 with an interdecile range (IDR) containing the mid 80% of all doses ranging from 0.21 to 1.48. Mean dose (BE • kg) was associated with site, age, weight, and local anesthetic used (all  $P$

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<.0001). Cohen's F effect size estimate was 10 times higher for site (0.65) than for age (0.05) or weight (0.02). Variation (IDR) was not related to number of blocks done at each site (P = .23). Mean volume per kilogram was  $0.9 \pm 0.2$  (mean  $\pm$  standard deviation) and was more strongly associated with site (Cohen's F 0.3) than age (0.04) or weight (0.07). **CONCLUSIONS:** Wide variation in caudal local anesthetic dosing and administered volume exists. This variation is independent of the number of cases performed at each center but rather is determined by study site (ie, variation between centers) with considerable additional variation within study centers, suggesting additional variability dependent on individual practitioners. While there are legitimate reasons to vary dosing, the current approach is inconsistent and not supported by strong evidence over giving a standardized dose.

### 凝血的快速检测在小儿心脏外科抗凝和出血管理中的应用:系统综述

#### Use of Coagulation Point-of-Care Tests in the Management of Anticoagulation and Bleeding in Pediatric Cardiac Surgery: A Systematic Review

Bianchi, Paolo MD<sup>\*</sup>; Beccaris, Camilla MD<sup>†</sup>; Norbert, Martina BSc<sup>‡</sup>; Dunlop, Bradley BSc<sup>‡</sup>; Ranucci, Marco MD, FESC<sup>§</sup>

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出血和凝血处理是新生儿和儿童心脏手术管理中至关重要。在小儿中使用快速检测(POCTs)不如在成人中使用广泛。本系统综述旨在总结文献中关于POCTs在儿童心脏手术中应用的证据。我们纳入了所有在接受心脏手术的儿童人群(<18岁)中,利用POCTs评估凝血水平的研究。检索了三个电子数据库(PubMed、Embase和Cochrane对照临床试验注册资料)。所涉及的测试包括肝素效应测试、粘弹性测试和血小板功能测试。由于所研究的患者和测试存在广泛的异质性,因此无法进行正式的荟萃分析,因此研究结果将通过系统综述来呈现。共查询80篇文章,其中47篇在本综述中介绍。目前,文献资料还不够完善,无法将POCTs作为小儿心脏外科围手术期出血治疗的金标准。尽管如此,在术后检测中引入POCTs可以改善出血管理、患者预后和成本效率。

ACT = 活化凝血时间; APPEAR = 白蛋白和血浆在儿科的应用; CCT = 控制临床试验; CFT = 血栓形成时间; CHD = 先天性心脏病; CPA = 锥形体和血小板分析仪; CPB = 心肺转流术; CT = 凝血时间; FFP = 新鲜冰冻血浆; HMS = 肝素监控系统; ICU = 重症监护病房; MA = 最大振幅; MCF = 最大血凝块硬度; PICU = 儿科重症监护病房; POCT = 快速测试; PRISMA = 系统审查和荟萃分析的首选报告项目; RCT = 随机对照试验; Sao2 = 动脉血氧饱和度; TEG = 血栓弹性描记法(刘宏津译 潘艳、薛张纲校)

Bleeding and coagulation management are essential aspects in the management of neonates and children undergoing cardiac surgery. The use of point-of-care tests (POCTs) in a pediatric setting is not as widely used as in the adult setting. This systematic review aims to summarize the evidence showed by the literature regarding the use of POCTs in

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children undergoing cardiac surgery. We included all studies examining the pediatric population (<18 years old) undergoing cardiac surgery in which the coagulation profile was assessed with POCTs. Three electronic databases (PubMed, Embase, and the Cochrane Controlled Clinical Trials register) were searched. Tests involved were heparin effect tests, viscoelastic tests, and platelet function tests. Due to the wide heterogeneity of the patients and tests studied, a formal meta-analysis was impossible, and the results are therefore presented through a systematic review. Eighty articles were found, of which 47 are presented in this review. At present, literature data are too weak to define POCTs as a “gold standard” for the treatment of perioperative bleeding in pediatric cardiac surgery. Nevertheless, introduction of POCTs into postoperative algorithms has shown to improve bleeding management, patient outcome, and cost efficiency. (*Anesth Analg* 2020;130:1594 - 604)

#### GLOSSARY

ACT = activated clotting time; APPEAR = Albumin vs Plasma for PaEdiAtric pRiming; CCT = controlled clinical trial; CFT = clot formation time; CHD = congenital heart disease; CPA = cone and platelet analyzer; CPB = cardiopulmonary bypass; CT = clotting time; FFP = fresh-frozen plasma; HMS = heparin monitoring system; ICU = intensive care unit; MA = maximum amplitude; MCF = maximum clot firmness; PICU = pediatric intensive care unit; POCT = point-of-care test; PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-analyses; RCT = randomized controlled trial; Sao2 = arterial oxygen saturation; TEG = thromboelastography

#### **分娩过程中口服碳水化合物对器械阴道分娩率的影响：多中心随机对照试验** **Effect of Oral Carbohydrate Intake During Labor on the Rate of Instrumental Vaginal Delivery: A Multicenter, Randomized Controlled Trial**

Vaginal Delivery: A Multicenter, Randomized Controlled Trial

Simonet, Thérèse MD<sup>\*</sup>; Gakuba, Clément MD, PhD<sup>\*</sup>; Desmeulles, Isabelle MD<sup>†</sup>; Corouge, Julien MD<sup>‡</sup>; Beucher, Gael MD<sup>§</sup>; Morello, Rémi MD<sup>‡</sup>; Gérard, Jean-Louis MD, PhD<sup>¶</sup>; Ducloy-Bouthors, Anne Sophie MD<sup>‡</sup>; Dreyfus, Michel MD, PhD<sup>§</sup>; Hanouz, Jean-Luc MD, PhD<sup>#</sup>

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**背景：** 体育锻炼期间摄入碳水化合物可改善肌肉性能并减少疲劳。我们假设在分娩期间（这是一个重要的体力活动时期）摄入碳水化合物，可以降低器械阴道分娩率。

**方法：** 在一项多中心的前瞻性随机对照试验中，可自然分娩的健康成年孕妇被分为“碳水化合物”组（建议每3小时喝200ml不含果肉的苹果汁或葡萄汁）以及“禁食”组（仅给予水）。主要结果是器械阴道分娩率。次要结果包括分娩持续时间、剖宫产率、呕吐发生率和住院时间，并通过数字评分量表（0分最差，

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10分为最佳评分)评估产妇分娩时的总体感觉、饥饿、口渴、压力、疲劳。在意向性治疗的基础上进行统计分析。主要结果以“禁食”组作为参考组进行比较。调整了次要结果的P值以进行多组比较。两组之间的差异以99%置信区间(CI)报告。

**结果:** 总共3984名女性纳入了统计分析(碳水化合物组2014人,禁食组1970人)。器械分娩率上碳水化合物组(21.0%)和禁食组(22.4%)之间没有差异(差异-1.4%; 99%CI=-4.9~2.2)。两组之间在分娩持续时间(差异,-7分钟; 99%CI=-25~11)、剖宫产率(差异-0.3%; 99%CI=-2.4~3.0)、呕吐率(差异2.8%; 99%CI=0.2~5.7)、自我描述的疲劳程度(差异1; 99%CI=0~2)、自我报告的饥饿感(差异0; 99%CI=-1~1)、口渴(差异0; 99%CI=-1~1)、压力(差异0; 99%CI, -1~1)、总体感觉(差异0; 99%CI=0~0)和住院时间(差异0; 99%CI=-1~1)上均没有差异。

**结论:** 分娩期间摄入碳水化合物不会影响器械阴道分娩率。  
(鞠惠惠译 潘艳、薛张纲校)

**Background:** Carbohydrate intake during physical exercise improves muscle performance and decreases fatigue. We hypothesized that carbohydrate intake during labor, which is a period of significant physical activity, can decrease the instrumental vaginal delivery rate.

**Methods:** In a multicenter, prospective, randomized, controlled trial, healthy adult pregnant women presenting with spontaneous labor were assigned to a "Carbohydrate" group (advised to drink 200 mL of apple or grape juice without pulp every 3 hours) or a "Fasting" group (water only). The primary outcome was the instrumental vaginal delivery rate. Secondary outcomes included duration of labor, rate of cesarean delivery, evaluation of maternal hunger, thirst, stress, fatigue, and overall feeling during labor by numeric rating scale (0 worst rating to 10 best rating), rate of vomiting, and hospital length of stay. Statistical analysis was performed on an intention-to-treat basis. The primary outcome was tested with the "Fasting" group as the reference group. The P values for secondary outcomes were adjusted for multiple comparisons. The differences between groups are reported with 99% confidence interval (CI).

**Results:** A total of 3984 women were analyzed (2014 in the Carbohydrate group and 1970 in the Fasting group). There was no difference in the rate of instrumental delivery between the Carbohydrate (21.0%) and the Fasting (22.4%) groups (difference, -1.4%; 99% CI, -4.9 to 2.2). No differences were found between the Carbohydrate and the Fasting groups for the duration of labor (difference, -7 minutes; 99% CI, -25 to 11), the rate of cesarean delivery (difference, -0.3%; 99% CI, -2.4 to 3.0), the rate of vomiting (difference, 2.8%; 99% CI, 0.2-5.7), the degree of self-reported fatigue (difference, 1; 99% CI, 0-2), self-reported hunger (difference, 0; 99% CI, -1 to 1), thirst (difference, 0; 99% CI, -1 to 1), stress (difference, 0; 99% CI, -1 to 1), overall feeling (difference, 0; 99% CI, 0-0), and the length of hospitalization (difference, 0; 99%

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CI, -1 to 0).

**Conclusions:** Carbohydrate intake during labor did not modify the rate of instrumental vaginal delivery.

### 衰弱患者的术前评估

#### Preoperative Evaluation of the Frail Patient

Nidadavolu, Lolita S. MD, PhD<sup>\*</sup>; Ehrlich, April L. MD<sup>\*</sup>; Sieber, Frederick E. MD<sup>†</sup>; Oh, Esther S. MD, PhD<sup>\*,‡,§,¶</sup>

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老年患者的围手术期管理是一个复杂的领域，严重受到老年人临床异质性的影响。衰弱是一种老年综合症，由于身体机能和储备的减少患者更易遭受应激源的伤害，这也是造成术后不良结果的可能原因。目前已经研究出许多方法以评估老年病人的衰弱，包括身体和认知功能，合并症，自我报告健康状况和临床判断。大部分衰弱评估方法都能识别出可能发生术后不良后果的一部分患者，包括术后并发症，较长的住院时间，需较高水平的医疗护理和较高死亡率。在外科手术干预前，衰弱评估还可以指导患者及其家人，麻醉医生和外科医生为患者量身定制手术计划，从而降低老年病人衰弱引起的高风险。目前研究仍在进行中，以明确可改善患者预后的干预措施，但尚缺乏随机对照试验的高质量数据。

(陈悦译 潘艳、薛张纲校)

Perioperative management of older adults is a complex field that is heavily influenced by the clinical heterogeneity of older adults. Frailty—a geriatric syndrome in which a patient is more vulnerable to stressors due to decreases in physical function and reserve—has been indicative of adverse postoperative outcomes. Many tools have been developed to measure frailty that incorporate a variety of factors including physical and cognitive function, comorbidities, self-reported measures of health, and clinical judgment. Most of these frailty assessment tools are able to identify a subset of patients at risk of adverse outcomes including postoperative complications, longer hospital length of stay, discharge to a higher level of care, and mortality. Frailty assessment before surgical interventions can also guide discussions among patients, their families, anesthesiologists, and surgeons to tailor operative plans for patients to mitigate this increased risk. Studies are ongoing to identify interventions in frail patients that can improve postoperative outcomes, but high-quality data in the form of randomized controlled trials are lacking at this time.

### 微小 RNA 在术后疼痛中的作用:动物和人类研究的系统综述

#### Role of Micro-RNA for Pain After Surgery: Narrative Review of Animal and Human Studies

Cata, Juan P. MD<sup>\*</sup>; Gorur, Aysegul PhD<sup>\*</sup>; Yuan, Xiaoyi PhD<sup>†</sup>; Berg, Nathaniel K. MS<sup>†</sup>; Sood, Anil K. MD<sup>‡</sup>; Eltzschig, Holger K. MD, PhD<sup>†</sup>

大手术后疼痛是普遍存在的。如果术后疼痛治疗不够理想，则可能导致患者术后恢复不良，生活质量降低，医疗费用增加等情况。当前使用的镇痛药物，无论是单一用药或者是联合用药，由于药效低下，作用时间短，毒性与成瘾性等使其疗效受限，由于缺乏非成瘾性的强效镇痛药和阿片类药物处方过量导致阿片类药物在美国流行。所以，迫切需要开发新型的镇痛药物。微核糖核酸(miRNAs)是一种小的非编码 RNA 分子，能够调节神经元和支持细胞（胶质细胞，白细胞和施旺细胞）的蛋白质合成。文献表明 miRNA 在伤害性感受中具有重要的调节作用。因此，我们总结了目前 miRNA 在切口痛、炎性痛、神经病理痛和癌痛中发挥作用的相关证据。我们还讨论了 miRNA 在作为调节镇痛和阿片耐受中潜在治疗靶点的作用。最后，我们提出如何将 miRNA 类似物(mimic-miRNAs or antago-miRNAs)用于临床实践，在围术期发挥镇痛作用。

（胡月译 潘艳、薛张纲校）

One of the most prevalent symptoms after major surgery is pain. When postoperative pain treatment is unsatisfactory, it can lead to poor surgical recovery, decreased quality of life, and increased health care costs. Current analgesics, single or in combination, have limited efficacy due to low potency, limited duration of action, toxicities, and risk of addiction. The lack of nonaddictive strong analgesics along with the over prescription of opioids has led to an opioid epidemic in the United States. Therefore, there is an urgent need for the development of newer analgesics. Microribonucleic acids (miRNAs) are small noncoding RNA molecules that modulate protein synthesis in neurons and supporting cells (glia, leukocytes, and Schwann cells). The literature indicates that miRNA regulation is important in nociception. Here, we summarize the current evidence on the role of miRNAs on mechanisms involved in incisional, inflammatory, neuropathic, and cancer pain. We also discuss the role of modulating miRNA functions as potential therapeutic targets for analgesic use and opioid tolerance. Finally, we propose how the delivery of analog miRNAs (mimic-miRNAs or antago-miRNAs) could be introduced into clinical practice to provide analgesia in the perioperative period.

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## 衰弱综合征的预康复：改善最脆弱患者的预后

### Prehabilitation for the Frailty Syndrome: Improving Outcomes for Our Most Vulnerable Patients

Norris, Christina M. MBBS<sup>\*†</sup>; Close, Jacqueline C. T. MD<sup>\*†</sup>

From the <sup>\*</sup>Falls, Balance and Injury Research Centre, Neuroscience Research Australia, Randwick, Sydney, New South Wales, Australia.

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麻醉医师日益面临着为衰弱的老年人提供围手术期护理的挑战。衰弱的患者接受手术治疗，其围手术期并发症、死亡和延长住院时间的风险显著增加。此外，衰弱往往与多种发病率和一系列老年综合征有关，包括功能依赖、认知障碍和营养不良，这进一步增加了医疗护理的风险和复杂性。越来越多的证据表明，术前康复干预以改善整体健康和功能，可改善手术患者的术后结局。然而，尚不清楚这一衰弱老年群体能否从预康复中获益。我们回顾了对衰弱患者进行预康复的证据，其中包括是否可以通过全面的老年医学评估以改变手术相关的风险和结果。

(冯真译 潘艳、薛张纲校)

Anesthetists are increasingly faced with the challenge of delivering perioperative care to frail older people. Patients with frailty undergoing surgical intervention are at a significantly increased risk of perioperative complications, mortality, and longer length of stay. Moreover, frailty is often associated with multimorbidity and a range of geriatric syndromes including functional dependency, cognitive impairment, and malnutrition which further increases risk and complexity of care. There is a growing body of evidence that prehabilitation—intervention delivered during the preoperative period to improve overall health and function—can improve postoperative outcomes for patients undergoing surgery. However, whether this vulnerable population stand to benefit from prehabilitation is less clear. We review the evidence for prehabilitation for patients with frailty including whether the risks associated with and outcomes from surgery can be modified through comprehensive geriatric assessment.

## 老年非心脏手术患者的衰弱与术后谵妄有关但与术后认知功能减退无关

### Frailty Is Associated With Postoperative Delirium But Not With Postoperative Cognitive Decline in Older Noncardiac Surgery Patients

Mahanna-Gabrielli, Elizabeth MD<sup>\*</sup>; Zhang, Kathy BA<sup>†</sup>; Sieber, Frederick E. MD<sup>‡</sup>; Lin, Hung Mo ScD, MS <sup>§</sup>; Liu, Xiaoyu MS <sup>§</sup>; Sewell, Margaret PhD <sup>||</sup>; Deiner, Stacie G. MD<sup>¶</sup>; Boockvar, Kenneth S. MD<sup>#</sup>

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**背景：**术后认知功能障碍（POCD）和谵妄是老年患者围手术期最常见的认知功能并发症。近来一项针对心脏外科手术患者的研究表明，身体衰弱是上述两种并发症的危险因素。我们试图阐明在非心脏大手术后，术前衰弱和术后谵妄和 POCD 之间的关系。

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**方法:** 我们开展了一项前瞻性队列研究, 研究对象为: 大于 65 岁的全身麻醉下择期行非心脏大手术患者。排除标准为: 术前即存的痴呆状态; 无法完成知情同意; 接受心脏、颅内或急诊手术。术前衰弱使用 FRAIL 量表确定, 通过一种简单的问卷将患者分为无衰弱、衰弱前期及衰弱三组。自转入苏醒室至出院, 使用意识模糊评估法 (CAM-ICU) 对患者的谵妄状态每日评估两次。所有患者于手术前和术后 3 个月均接受了神经心理学测试 (加利福尼亚语言学习测验 II、循迹连线测验 (TMT)、韦氏成人智力测验的子测验、逻辑记忆故事 A 测验、即刻和延迟回忆、动植物语言流利度、波士顿命名测验以及简易精神状态测试量表 (MMSE))。

**结果:** 共 178 例患者符合入选标准; 其中 167 例接受大型手术, 150 例完成了术后 3 个月的持续随访。中位年龄值为 70 岁。术前有 31 例 (18.6%) 患者被评定为衰弱, 72 例 (43.1%) 患者被评定为衰弱前期。在调整了基线认知评分、年龄、教育程度、手术时间、ASA 等级、手术类型和性别之后, 术前被评定为衰弱及衰弱前期的患者术后谵妄的发生率是无衰弱组的 2.7 倍 (97.5% 可信区间 [CI]=1.0-7.3)。在测试为衰弱、衰弱前期和无衰弱患者组间 POCD 的发生率没有显著差异。

**结论:** 调整基线认知评分后, 通过 FRAIL 量表评定的衰弱或衰弱前期与术后谵妄的发生率增加有关, 但与非心脏手术后的 POCD 发生率无关。

(关昱 译 潘艳、薛张纲校)

**Background:** Postoperative cognitive dysfunction (POCD) and delirium are the most common perioperative cognitive complications in older adults undergoing surgery. A recent study of cardiac surgery patients suggests that physical frailty is a risk factor for both complications. We sought to examine the relationship between preoperative frailty and postoperative delirium and preoperative frailty and POCD after major noncardiac surgery.

**Methods:** We performed a prospective cohort study of patients >65 years old having major elective noncardiac surgery with general anesthesia. Exclusion criteria were preexisting dementia, inability to consent, cardiac, intracranial, or emergency surgery. Preoperative frailty was determined using the FRAIL scale, a simple questionnaire that categorizes patients as robust, prefrail, or frail. Delirium was assessed with the Confusion Assessment Method for the intensive care unit (CAM-ICU) twice daily, starting in the recovery room until hospital discharge. All patients were assessed with neuropsychological tests (California Verbal Learning Test II, Trail Making Test, subtests from the Wechsler Adult Intelligence Scale, Logical Memory Story A, Immediate and Delayed Recall, Animal and Vegetable verbal fluency, Boston Naming Test, and the Mini-Mental Status Examination) before surgery and at 3 months afterward.

**Results:** A total of 178 patients met inclusion criteria; 167 underwent major surgery and 150 were available for follow-up 3 months after surgery. The median age was 70 years old. Thirty-one patients (18.6%) tested as frail, and 72 (43.1%) prefrail before surgery. After adjustment for baseline cognitive score, age, education, surgery duration, American Society of Anesthesiologists (ASA) physical status, type of surgery, and



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sex, patients who tested frail or prefrail had an estimated 2.7 times the odds of delirium (97.5% confidence interval, 1.0-7.3) when compared to patients who were robust. There was no significant difference between the proportion of POCD between patients who tested as frail, prefrail, or robust.

**Conclusions:** After adjustment for baseline cognition, testing as frail or prefrail with the FRAIL scale is associated with increased odds of postoperative delirium, but not POCD after noncardiac surgery.

### 衰弱综合征患者的知情同意

#### Informed Consent in Patients With Frailty Syndrome

Silbert, Brendan S. MB, BS, FANZCA; Scott, David A. MB, BS, PhD, FANZCA, FFPMANZCA

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年龄在 65 岁以上的人中，有 30% 以上的人在进行麻醉和手术时存在衰弱现象，这在知情同意程序中构成了许多独特的问题。已有很多人关注到这类人群不良结局的发生率增加，包括术后死亡率，并发症和住院时间延长。这些重大风险通常不会纳入常规风险预测因素中，因此，衰弱患者可能永远不会完全了解在医院中进行手术的真实风险。虽然“衰弱”一词提出的是警惕风险并允许适当的护理和干预，但该词不利于在社会上客观地对待老年主义。这可能会鼓励照顾者和家庭成员侵犯自决权，甚至在极端情况下表现为胁迫和损害自主权的家长式行为。衰弱的老年患者中认知功能障碍的发生率很高，必须注意识别无能力提供知情同意的患者。同样重要的是，不能排除有能力的人提供的知情同意。为了研究而获得的知情同意给临床上的知情同意增加了额外的负担。衰弱的老年人的知情同意程序给工作繁忙的临床麻醉医生提出了独特的挑战。医生至少应认识到需要增加时间投入，还应该承认知情同意理论上的目标与实际做法之间的差距。

(刘婕译 潘艳、薛张纲校)

Frailty is present in more than 30% of individuals older than 65 years of age presenting for anesthesia and surgery, and poses a number of unique issues in the informed consent process. Much attention has been directed at the increased incidence of poor outcomes in these individuals, including postoperative mortality, complications, and prolonged length of stay. These material risks are not generally factored into conventional risk predictors, so it is likely that individuals with frailty are never fully informed of the true risk for procedures undertaken in the hospital setting. While the term "frailty" has the advantage of alerting to risk and allowing appropriate care and interventions, the term has the social disadvantage of encouraging objectivity to ageism. This may encourage paternalistic behavior from carers and family encroaching on self-determination and, in extreme cases, manifesting as coercion and compromising autonomy. There is a high prevalence of neurocognitive

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disorder in frail elderly patients, and care must be taken to identify those without capacity to provide informed consent; equally important is to not exclude those with capacity from providing consent. Obtaining consent for research adds an extra onus to that of clinical consent. The informed consent process in the frail elderly poses unique challenges to the busy clinical anesthesiologist. At the very least, an increased time commitment should be recognized. The gap between theoretical goals and actual practice of informed consent should be acknowledged.

### 围术期临床医生需要面对的虚弱问题：一项叙述性综述

#### **Frailty for Perioperative Clinicians: A Narrative Review**

McIsaac, Daniel I. MD, MPH, FRCPC<sup>\*,†,‡</sup>; MacDonald, David B. MD, FRCPC<sup>§</sup>;  
Aucoin, Sylvie D. MD, MSc, FRCPC<sup>\*</sup>

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虚弱是以对应激的储备和抵抗力降低为特征的多维综合征。虚弱患者较易受到应激影响，特别是面对手术应激后会增加不良预后和医疗费用的风险。随着西方人口的迅速老龄化，越来越多虚弱的老年人需要接受手术治疗。这意味着麻醉医生以及其他围术期临床医生需要熟悉虚弱的评估、临床表现及优化策略。因而作者针对围术期临床医生对虚弱进行叙述性综述。本文将使读者熟悉虚弱的概念，讨论虚弱程度术前评估的常见与可行方法，并描述了与虚弱相对和绝对相关的不良预后，包括发病率和死亡率、以及以患者为中心，报道的与功能、残疾和生活质量相关预后。据此提出了一种在术前进行优化的建议方法，该方法包括进行虚弱评估，然后提出识别潜在残疾、营养不良、认知功能障碍和心理健康诊断的建议。总之接受大型手术的老年患者约 30%-50% 具有虚弱表现，这会导致发病率、死亡率及新发残疾风险增加 2 倍以上。临床虚弱量表似乎是术前评估虚弱程度最可行的工具，而有证据表明，在诸如 Fried 表型、Edmonton 虚弱量表和虚弱指数之类的评估虚弱程度的工具之间，预测的准确性并没有显著差异。识别出的功能障碍可通过术前运动康复来优化，而营养不良可考虑进行相关的营养补充。住院长者生命计划可预防术后谵妄的发生，而有精神方面和/或其他心理压力应激的患者可能会从多学科监护和入院前出院计划中受益。如今在术中和术后阶段，可指导治疗的临床数据有限，将来仍需要进行更多的试验，以提供支持这些干预措施的确切证据。改善老年虚弱患者的监护及预后是麻醉医生和围术期临床医生的重要机遇。

(陈思涵 译 陈杰 校)

Frailty is a multidimensional syndrome characterized by decreased reserve and diminished resistance to stressors. People with frailty are vulnerable to stressors, and exposure to the stress of surgery is associated with increased risk of adverse outcomes and higher levels of resource use. As Western populations age rapidly, older people with frailty are presenting for surgery with increasing frequency. This means that anesthesiologists and other perioperative clinicians need to be familiar with frailty, its assessment, manifestations, and strategies for optimization. We present a narrative review of frailty aimed at perioperative clinicians. The review will familiarize readers

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with the concept of frailty, will discuss common and feasible approaches to frailty assessment before surgery, and will describe the relative and absolute associations of frailty with commonly measured adverse outcomes, including morbidity and mortality, as well as patient-centered and reported outcomes related to function, disability, and quality of life. A proposed approach to optimization before surgery is presented, which includes frailty assessment followed by recommendations for identification of underlying physical disability, malnutrition, cognitive dysfunction, and mental health diagnoses. Overall, 30%-50% of older patients presenting for major surgery will be living with frailty, which results in a more than 2-fold increase in risk of morbidity, mortality, and development of new patient-reported disability.

The Clinical Frailty Scale appears to be the most feasible frailty instrument for use before surgery; however, evidence suggests that predictive accuracy does not differ significantly between frailty instruments such as the Fried Phenotype, Edmonton Frail Scale, and Frailty Index. Identification of physical dysfunction may allow for optimization via exercise prehabilitation, while nutritional supplementation could be considered with a positive screen for malnutrition. The Hospital Elder Life Program shows promise for delirium prevention, while individuals with mental health and/or other psychosocial stressors may derive particular benefit from multidisciplinary care and preadmission discharge planning. Robust trials are still required to provide definitive evidence supporting these interventions and minimal data are available to guide management during the intra- and postoperative phases. Improving the care and outcomes of older people with frailty represents a key opportunity for anesthesiologists and perioperative scientists.

### 危重病与虚弱综合征：其机制与潜在治疗目标

### **Critical Illness and the Frailty Syndrome: Mechanisms and Potential Therapeutic Targets**

Paul, Jonathan A. DO<sup>\*</sup>; Whittington, Robert A. MD<sup>\*</sup>; Baldwin, Matthew R. MD, MS<sup>†</sup>  
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虚弱综合征其特征是因多个生理系统的储备减少,从而导致功能受限及对新应激的易感性。社区居住的老年人本身就存在持续多年的虚弱状态,重症监护病房(ICU)住院数日内会出现进一步恶化,因为危重病会加剧导致年龄相关身体虚弱的机制。虚弱的标志是肌肉重量、力量和耐力的综合下降。约 1/3 的 ICU 患者在住院前就存在虚弱状态,其可增加他们短期和长期致残和死亡风险。虽然有几种有效的方法可以评估入 ICU 前后患者的临床虚弱状况,但尚未有研究揭示重症患者、ICU 康复患者者虚弱的机制基础。此外,在 ICU 住院期间及出院后对患者虚弱的治疗性干预措施仍存在缺失。在这篇叙述性综述中,作者调查了与衰老和危重疾病(例如炎症、线粒体肌病和神经内分泌疾病等)相关的虚弱发展与扩展的潜在生物学机制的研究。作者讨论了老年人、危重患者和 ICU 康复患者中存在的虚弱机制的具体方面,以期找到治疗目标。与虚弱背后的复杂性相一致,这种综合征不太可能是由单一有害介质的过量或单一保护介质的缺乏引起的,而是由于尚未完全了解的多系统功能失调所致的。作者进一步描述了在虚弱与重症监护中进行临床转化研究的知识鸿沟,其总体目标是为重症患者和 ICU 康复患

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者寻求对虚弱的有效治疗方法。

(陈思涵 译 陈杰 校)

Frailty is a syndrome characterized by decreased reserves across multiple physiologic systems resulting in functional limitations and vulnerability to new stressors. Physical frailty develops over years in community-dwelling older adults but presents or worsens within days in the intensive care unit (ICU) because common mechanisms governing age-related physical frailty are often exacerbated by critical illness. The hallmark of physical frailty is a combined loss of muscle mass, force, and endurance. About one-third of ICU patients have frailty before hospitalization, which increases their risk for both short- and long-term disability and mortality. While there are several valid ways to measure clinical frailty in patients before or after an ICU admission, the mechanistic underpinnings of frailty in critically ill patients and ICU survivors have not been thoroughly investigated. Furthermore, therapeutic interventions to treat frailty during and after time in the ICU are lacking. In this narrative review, we examine studies that identify potential biological mechanisms underlying the development and propagation of physical frailty in both aging and critical illness (eg, inflammation, mitochondrial myopathy, and neuroendocrinopathy). We discuss specific aspects of these frailty mechanisms in older adults, critically ill patients, and ICU survivors that may represent therapeutic targets. Consistent with complexity underlying frailty, this syndrome is unlikely to result from an excess of a single harmful mediator or deficit of a single protective mediator. Rather, frailty occurs in the presence of an incompletely understood state of multisystem dysregulation. We further describe knowledge gaps that warrant clinical and translational research in frailty and critical care with an overall goal of developing effective frailty treatments in critically ill patients and ICU survivors.

### 9000 例倾向评分配对的手术患者应用 6%羟乙基淀粉 130/0.4 后肾脏损伤发病率的研究

#### Renal Morbidity of 6% Hydroxyethyl Starch 130/0.4 in 9000 Propensity Score Matched Pairs of Surgical Patients

Miyao, Hideki MD, PhD<sup>\*</sup>; Kotake, Yoshifumi MD, PhD<sup>†</sup>

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**背景:** 几项关于重症患者的研究报告中表明, 使用羟乙基淀粉 (HES) 溶液进行液体复苏会损伤肾脏, 但对于其是否能用于外科手术患者的说法尚有争议。由于不同的 HES 制剂具有不同的安全性, 因此作者试图确定用于外科手术患者的第三代 6% 的 HES 130 / 0.4 是否与肾脏损伤的发病率相关。

**方法:** 研究对象为在日本全国医学数据库中 2014 年至 2016 年之间接受了 HES 130 / 0.4 或未接受 HES (对照) 液体管理的成年手术患者, 这些人群的倾向得分匹配比例为 1: 1, 但未使用 36 个协变量进行多变量 logistic 回归替代, 包括人口统计学特征、术前合并症以及麻醉/手术方式。主要结果是术中接受 HES 和对照液体输注患者急性肾损伤 (AKI) 的发生率。次要结果是评估 HES 是否与 AKI 分级的恶化、肾脏替代疗法 (RRT) 的发生率、住院时间的长短以及住院 30 天死亡率相关。三级结果包括手术当天使用血管活性药物与液体需求的多少。本研

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究采用  $\chi$  检验、Mann-Whitney U 检验或有序逻辑回归分析进行比较分析。

**结果:** 从数据库中的 76,048 名患者中, 筛选出 58,425 名符合条件的患者: 其中 9542 名患者、48,883 名患者分别接受了 HES 及对照液体输注。倾向得分匹配确定了 8823 对患者。HES 组、对照组的 AKI 的发生率分别为 6.2% (548/8823), 5.6% (492/8823) (比值比[OR]为 1.12; 95% 置信区间[CI]为 0.99-1.27;  $P = .07$ )。与对照组相比, HES 与 AKI 分级的恶化无关(OR 为 0.89; 95%CI 为 0.79-1.01;  $P = .08$ )。HES 组的 RRT 发生率低于对照组(分别为 0.2% 和 0.4%; OR 为 0.51; 95%CI 为 0.29-0.91;  $P = .02$ )。HES 组中位[四分位数间距]住院时间较对照组延长 1 天 (12 [8-21] vs 11 [7-20]天;  $P < .001$ ), 但两组间的院内 30 天死亡率无显著差异(分别为 0.5% 和 0.6%; OR, 0.83; 95%CI, 0.56-1.24;  $P = .36$ )。另外, HES 组血管活性药物的使用率和手术当天的平均净液体需求量与对照组相比更高(分别为 80.5% vs 70.0%;  $P < .001$ 、88.1 vs 73.6 mL/kg;  $P < .001$ )。

**结论:** 本研究并未证明 6% HES 130 / 0.4 会增加术后 AKI 的发生率和严重程度。当其用于外科手术患者时, RRT 发生率更低。

(陈思涵 译 陈杰 校)

**Background:** Several studies of critically ill patients reported that fluid resuscitation with hydroxyethyl starch (HES) solutions damages the kidneys, but their use for surgical patients is debated. Because different HES preparations have different safety profiles, we sought to determine whether 6% third-generation HES 130/0.4 was associated with renal morbidity when used for surgical patients.

**Methods:** We identified adults enrolled in a Japanese nationwide medical database who underwent surgery between 2014 and 2016, with HES 130/0.4 or without it (controls). These groups were balanced with propensity score matching in a 1:1 ratio without replacement by multivariable logistic regression with 36 covariates, including demographic characteristics, preoperative comorbidities, and anesthetic/surgical procedures. The primary outcome was the incidence of acute kidney injury (AKI) in patients receiving intraoperative HES and controls. Secondary outcomes were assessing whether HES was associated with worsening AKI stage, the incidence of renal-replacement therapy (RRT), hospital length-of-stay, and in-hospital 30-day mortality. Tertiary outcomes include the use of vasoactive agents and the fluid requirement on the day of surgery. Comparative analysis was made with  $\chi$ , Mann-Whitney U test, or the ordinal logistic regression analysis.

**Results:** Of 76,048 patients in the database, 58,425 were eligible: 9542 received HES and 48,883 controls. Propensity score matching identified 8823 matched pairs. The incidence of AKI was 6.2% (548/8823) in the HES group and 5.6% (492/8823) in controls (odds ratio [OR], 1.12; 95% confidence interval [CI], 0.99-1.27;  $P = .07$ ). Compared to controls, HES was not associated with worsening AKI stage (OR, 0.89; 95% CI, 0.79-1.01;  $P = .08$ ). The incidence of RRT was lower in the HES group than that in controls (0.2% vs 0.4%, respectively; OR, 0.51; 95% CI, 0.29-0.91;  $P = .02$ ). Median [interquartile range] hospital stay was 1 day longer in the HES group (12 [8-21] vs 11 [7-20] days;  $P < .001$ ), but in-hospital 30-day mortality did not differ between groups (0.5% vs 0.6%, respectively; OR, 0.83; 95% CI, 0.56-1.24;  $P = .36$ ). The use rate of vasoactive agents and the median net fluid requirement on the day of surgery were higher in the HES group (80.5% vs 70.0%;  $P < .001$ , 88.1 vs 73.6 mL/kg;

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P < .001, respectively) compared to controls.

**Conclusions:** The present study did not demonstrate that 6% HES 130/0.4 increased the incidence and the severity of postoperative AKI. It was associated with a lower incidence of RRT when used for surgical patients.

为评估心脏外科手术患者信号复杂性和手术风险进行有创和无创血压监测结果的比较研究

**Comparison of Invasive and Noninvasive Blood Pressure Measurements for Assessing Signal Complexity and Surgical Risk in Cardiac Surgical Patients**

Gibson, Lauren E. MD<sup>\*</sup>; Henriques, Teresa S. PhD<sup>\*,†</sup>; Costa, Madalena D. PhD<sup>†</sup>; Davis, Roger B. ScD<sup>‡</sup>; Mittleman, Murray A. MD, DrPH<sup>§</sup>; Mathur, Pooja BA<sup>\*</sup>; Subramaniam, Balachundhar MD, MPH<sup>\*</sup>

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**背景:** 连续动脉血压 (ABP) 通常是通过放置动脉内导管来记录的。最近, 无创 ABP 监测器已显示出与有创测量相当的准确性。先前的研究表明逐搏 ABP 测量值的波动不是随机变化的, 而是具有复杂的动力学结构, 并且 ABP 动态复杂性与胸外科医师协会指数 (STS) 估算的手术风险成反比。动态复杂性是一种数学构造, 并可反映生理系统对刺激的适应能力。 本研究的目的是: (1) 确定无创逐搏 ABP 测量是否也表现出复杂的时间结构; (2) 比较无创与有创 ABP 监测的时间序列的复杂性; (3) 量化无创 ABP 时间序列的复杂性与 STS 风险评分之间的关系。

**方法:** 该观察研究纳入了 15 名接受冠状动脉搭桥、瓣膜置换或冠状动脉搭桥/瓣膜置换联合手术的成年患者。术前使用桡动脉导管 (有创) 和连续无创动脉压监测仪同时记录 ABP 波形≥15 分钟。从连续波形中提取出逐搏的收缩压 (SBP)、舒张压 (DBP)、脉压 (PP) 和平均动脉压 (MAP) 时间序列, 并使用多尺度熵方法评估其复杂性。使用 Wilcoxon 符号秩和检验比较有创与无创 ABP 时间序列衍生指数的平均秩次, Spearman 相关系数用于量化有创和无创指标之间的关系, 线性回归分析用于量化每个复杂性指标和 STS 风险评分之间的关系。

**结果:** 无创 ABP 监测中的逐搏波动并非随机而具有复杂性, 但其复杂程度低于有创 ABP 信号的波动程度 (SBP: 7.05 vs 8.66, P < .001; DBP: 7.40 vs 8.41, P < .001; PP: 6.83 vs 8.82, P < .001; 以及 MAP: 7.17 vs 8.68, P < .005)。在 MSE $\Sigma$ ·斜率方面, 有创指数和无创指数显示出良好的相关性 (rs) (SBP 为 0.53, DBP 为 0.79, PP 为 0.42, MAP 为 0.60)。无创 ABP 时间序列的复杂度 (-0.70 [-1.28 至 -0.11]; 对于 DBP 为 P = .023), 类似于有创 ABP 时间序列的复杂度 (-0.94 [-1.52 至 -0.35]; 对于 DBP 为 P = .004), 与接受心血管手术患者评估的手术风险呈负相关。

**结论:** 本研究结果支持在计算与评估手术风险相关的基于复杂性的指标中使用无创 ABP 监测。

(陈思涵 译 陈杰 校)

**Background:** Continuous arterial blood pressure (ABP) is typically recorded by placement of an intraarterial catheter. Recently, noninvasive ABP monitors have been shown to be comparable in accuracy to invasive measurements. In a previous study, we showed that the fluctuations in beat-to-beat ABP measurements were not random

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variations but had a complex dynamical structure, and that ABP dynamical complexity was inversely associated with surgical risk estimated using the Society of Thoracic Surgeons (STS) index. Dynamical complexity is a mathematical construct that reflects the capacity of a physiological system to adapt to stimuli. The objectives of present study were to: (1) determine whether noninvasive beat-to-beat ABP measurements also exhibit a complex temporal structure; (2) compare the complexity of noninvasive versus invasive ABP time series; and (3) quantify the relationship between the complexity of noninvasive ABP time series and the STS risk scores.

**Methods:** Fifteen adult patients undergoing coronary artery bypass graft, valve, or combined coronary artery bypass graft/valve surgery were enrolled in this observational study. Preoperative ABP waveforms were simultaneously recorded for  $\geq 15$  minutes using a radial artery catheter (invasive) and a continuous noninvasive arterial pressure monitor. Beat-to-beat systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse pressure (PP), and mean arterial pressure (MAP) time series were extracted from the continuous waveforms. Complexity was assessed using the multiscale entropy method. The Wilcoxon signed-rank test was used to compare the mean ranks of indices derived from invasive versus noninvasive ABP time series. Spearman correlation coefficients were used to quantify the relationship between invasive and noninvasive indices. Linear regression analysis was used to quantify the association between each of the complexity indices and the STS risk scores.

**Results:** Beat-to-beat fluctuations in noninvasive ABP measurements were not random but complex; however, their degree of complexity was lower than that of fluctuations in invasively obtained ABP signals (SBP: 7.05 vs 8.66,  $P < .001$ ; DBP: 7.40 vs 8.41,  $P < .001$ ; PP: 6.83 vs 8.82,  $P < .001$ ; and MAP: 7.17 vs 8.68,  $P < .005$ ). Invasive and noninvasive indices for MSE $\cdot$ slope showed good correlation ( $r_s$ ) (0.53 for SBP, 0.79 for DBP, 0.42 for PP, 0.60 for MAP). The complexity of noninvasive ABP time series (-0.70 [-1.28 to -0.11];  $P = .023$  for DBP), like that of invasive time series (-0.94 [-1.52 to -0.35];  $P = .004$  for DBP), was inversely associated with estimated surgical risk in patients undergoing cardiovascular operations.

**Conclusions:** Our results support the use of noninvasive ABP monitoring in computations of complexity-based indices that correlate with estimated surgical risk.

基于循证监护新算法：三级儿科教学医院对黏多糖贮积病患儿非脊柱手术围术期神经监测的经验

### Tertiary Pediatric Academic Institution's Experience With Intraoperative Neuromonitoring for Nonspinal Surgery in Children With Mucopolysaccharidosis, Based on a Novel Evidence-Based Care Algorithm

Kandil, Ali I. DO, MPH<sup>\*</sup>; Pettit, Cindy S. DNP<sup>\*</sup>; Berry, Lisa N. LGC<sup>‡</sup>; Busso, Veronica O. MD<sup>\*</sup>; Careskey, Matthew MD<sup>\*</sup>; Chesnut, Emily BS<sup>†</sup>; Buck, David W. MD, MBA<sup>\*</sup>; Leslie, Nancy D. MD<sup>‡</sup>; Tamai, Junichi MD<sup>§</sup>; McAuliffe, John J. MD, MBA<sup>\*</sup>; Chidambaran, Vidya MD, MS<sup>\*</sup>

Anesthesia & Analgesia: 2020 130 1678-1684

**背景:** 肌肉骨骼畸形的黏多糖贮积病 (MPSs) 患者在手术, 尤其是非脊柱手术

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中会遇到很大的挑战。MPS 患者在非脊柱手术后表现出术后神经功能损害。然而麻醉状态下神经功能障碍的发生率不可得知,越来越多的证据推动着技术变革,也促进了神经监测在这类患者中的应用。体感诱发电位 (SSEPs) 和经颅运动诱发电位 (TcMEPs) 术中神经生理监测 (IONM) 已在选定机构开展,并取得了不同程度的成功。此篇文章描述在辛辛那提儿童医学中心使用多学科循证监护新算法的背景下进行 IONM 的经验。

**方法:** 进行电子病历回顾并收集 2016 年 9 月至 2018 年 3 月在作者医院所有行非脊柱手术的 MPS 患者数据。通过 IONM 记录,包括手术方式和患者合并症,来确认患者。提取以下数据:人口统计学资料、发病率、脊柱侧凸程度、术中用药及生命体征、手术类型、IONM 数据、手术时长和失血量。对收集的所有变量和数据进行了描述性分析。另外,术中任何的 IONM 监测变化都被识别、记录下来,并且对造成这种变化的影响因素进行了描述。

**结果:** 有 38 位诊断为 MPS 的患者进行了非脊柱手术,其中 21 位根据监护算法得到的术前决策接受了 IONM。根据这 21 位患者数据得到所有患者的可靠基线电压。这 21 位患者中 3 人出现了明显的神经生理改变,需要手术/麻醉干预。所有变化都持续了几分钟,实时 IONM 能够实现在变化出现时即刻捕捉。没有患者残留长期的神经功能缺陷。因此,根据本算法,不符合 IONM 使用标准的儿童(n=13)术后出现神经功能缺陷的概率为 0%(97.5%置信区间[CI], 00%-25.5%),而满足使用标准且进行 IONM 的儿童,14%(95% CI, 11.5%-30.1%)出现了明显的 IONM 改变。

**结论:** 通过这一系列病例,研究者描述了使用 IONM 的经验和指导 MPS 患者非脊柱手术麻醉管理的新算法。作者推断,这是一项为高风险人群提供安全麻醉管理的有用工具。

(邹沅芜 译 陈杰 校)

**Background:** Musculoskeletal deformities in mucopolysaccharidoses (MPSs) patients pose unique challenges when patients present for surgery, especially nonspinal surgery. MPS patients have developed postsurgical neurological deficits after nonspinal surgery. While the incidence of neurological deficits after nonspinal surgery under anesthesia is unknown, accumulating evidence provides impetus to change current practice and increased neurological monitoring in these patients. Intraoperative neurophysiologic monitoring (IONM) with somatosensory evoked potentials (SSEPs) and transcranial motor evoked potentials (TcMEPs) has been implemented at select institutions with varying degree of success. This report describes our experience with IONM in the context of a multidisciplinary evidence-based care algorithm we developed at Cincinnati Children's Hospital Medical Center.

**Methods:** We conducted a retrospective chart review of the electronic medical record (EPIC), for data from all MPS patients at our institution undergoing nonspinal surgery between September 2016 and March 2018. Patients were identified from IONM logs, which include procedure and patient comorbidities. Data concerning demographics, morbidities, degree of kyphoscoliosis, intraoperative administered medications and vital signs, surgical procedure, the IONM data, duration of surgery, and blood loss were extracted. Descriptive analyses were generated for all variables in the data collected. In addition, any IONM changes noted during the surgeries were identified



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and factors contributing to the changes described.

**Results:** Thirty-eight patients with a diagnosis of MPS underwent nonspinal surgery, and of those 38, 21 received IONM based on preoperative decision-making according to our care algorithm. Of the 21 patients who received IONM, we were able to get reliable baseline potentials on all patients. Of the 21 patients, 3 had significant neurophysiologic changes necessitating surgical/anesthetic intervention. All of these changes lasted several minutes, and the real-time IONM monitoring was able to capture them as they arose. None of the patients sustained residual neurological deficits. Thus, children who did not fit the criteria for IONM (n = 13) based on our algorithm had 0% incidence of any untoward neurological deficits after surgery (97.5% confidence interval [CI], 00%-25.5%), while 14% (95% CI, 11.5%-30.1%) of children who did fit criteria for IONM and had IONM had significant IONM changes.

**Conclusions:** Through this case series, we describe our experience with the use of IONM and a novel care algorithm for guiding the anesthetic management of MPS patients undergoing nonspinal surgery. We conclude that they can be useful tools for provision of safe anesthetic care in this high-risk cohort.

### 衰弱与多系统创伤后不良结局的关系：一项系统回顾和荟萃分析

#### The Association of Frailty With Adverse Outcomes After Multisystem Trauma: A Systematic Review and Meta-analysis

Poulton, Alexander MD<sup>\*</sup>; Shaw, Julia F. BSc<sup>†</sup>; Nguyen, Frederic MD<sup>\*</sup>; Wong, Camilla MD, FRCPC<sup>‡</sup>; Lampron, Jacinthe MD, FRCSC<sup>§,¶</sup>; Tran, Alexandre MD, MSc<sup>†,§</sup>; Lalu, Manoj M. MD, PhD, FRCPC<sup>\*,†,¶,###</sup>; McIsaac, Daniel I. MD, MPH, FRCPC<sup>\*,†,¶,#</sup>

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**背景:** 在众多临床情况下, 衰弱强烈预示着不良结局, 然而, 缺乏对衰弱相关的创伤结局进行系统回顾和定量分析。研究者目标是对衰弱和多系统创伤后不良结局(主要结局-死亡原因、并发症、卫生资源花费和次要结局-病人体验)的关系进行系统性回顾和荟萃分析。

**方法:** 注册(CRD42018104116)成功后, 研究者使用一种同行评议的搜索策略, 搜索平台包括 MEDLINE、EMBASE 和护理和专职医疗数据库(CINAHL), 截止日期 2019 年 3 月 22 日, 纳入标准包括:(1) 多系统创伤;(2) 患者年龄≥18 岁;(3) 应用明确的衰弱评估量表;(4) 有相关结局。排除研究的标准包括:(1) 缺乏对照组;(2) 孤立伤; 以及 (3) 混淆创伤和非创伤群体。入排标准独立实施, 标题/摘要和正文均有, 一式两份。偏倚风险通过非随机干预研究中的偏倚风险(ROBINS-I)工具来评估。采用随机效应模型对预先根据混杂因素调整的效应测量进行混合, 否则只能采取叙述性综合的方法。

**结果:** 共纳入 16 项研究、参与者 5198 人; 衰弱患者死亡率为 9.9%, 与之相比, 非衰弱患者死亡率为 4.2%。衰弱与死亡率升高(校正后的比值比[OR], 1.53; 95%置信区间[CI], 1.37-1.71), 并发症增加(校正后的 OR, 2.32; 95% CI, 1.72-3.15)和出院结局不良(校正后的 OR, 1.78; 95% CI, 1.29-2.45)相关。患者功能、体验和卫生资源花费等结局少有报道。

**结论:** 衰弱患者多系统创伤后死亡率、并发症和出院不良结局显著增加。这与

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患者和家属讨论提供了重要的预后信息，并且强调了优化创伤系统，以满足老年病人的复杂需求。

（邹沅芜 译 陈杰 校）

**Background:** Frailty strongly predicts adverse outcomes in a variety of clinical settings; however, frailty-related trauma outcomes have not been systematically reviewed and quantitatively synthesized. Our objective was to systematically review and meta-analyze the association between frailty and outcomes (mortality-primary; complications, health resource use, and patient experience-secondary) after multisystem trauma.

**Methods:** After registration (CRD42018104116), we applied a peer-reviewed search strategy to MEDLINE, EMBASE, and Comprehensive Index to Nursing and Allied Health Literature (CINAHL) from inception to May 22, 2019, to identify studies that described: (1) multisystem trauma; (2) participants  $\geq 18$  years of age; (3) explicit frailty instrument application; and (4) relevant outcomes. Excluded studies included those that: (1) lacked a comparator group; (2) reported isolated injuries; and (3) reported mixed trauma and nontrauma populations. Criteria were applied independently, in duplicate to title/abstract and full-text articles. Risk of bias was assessed using the Risk of Bias in Nonrandomized Studies-of Interventions (ROBINS-I) tool. Effect measures (adjusted for prespecified confounders) were pooled using random-effects models; otherwise, narrative synthesis was used.

**Results:** Sixteen studies were included that represented 5198 participants; 9.9% of people with frailty died compared to 4.2% of people without frailty. Frailty was associated with increased mortality (adjusted odds ratio [OR], 1.53; 95% confidence interval [CI], 1.37-1.71), complications (adjusted OR, 2.32; 95% CI, 1.72-3.15), and adverse discharge (adjusted OR, 1.78; 95% CI, 1.29-2.45). Patient function, experience, and resource use outcomes were rarely reported.

**Conclusions:** The presence of frailty is significantly associated with mortality, complications, and adverse discharge disposition after multisystem trauma. This provides important prognostic information to inform discussions with patients and families and highlights the need for trauma system optimization to meet the complex needs of older patients.

## 对衰弱患者的姑息性治疗和临终关怀

### **Palliative Care and End-of-Life Considerations for the Frail Patient**

Crooms, Rita C. MD\* ; Gelfman, Laura P. MD, MPH<sup>†</sup>

Anesthesia & Analgesia: 2020 130 1504-1515

衰弱患者经历环境相关的身心痛苦，且与非衰弱同龄人相比，有更高的发病率和死亡率。姑息性治疗是一项跨学科的医学领域，旨在提升疾病期间危重患者的生活质量，包括衰弱患者。麻醉医生在围术期和重症监护室（ICU）经常会接触到衰弱，在临终关怀过程中，他们能够提升患者的生活质量。作者强调在首诊医师进行包括基础症状治疗、指定目标讨论时加入姑息性治疗的可能性，必要时，如遇到复杂症状治疗、团队或患者家人对于治疗意见产生分歧时，及时咨询专业的姑息性治疗团队以求帮助。这篇综述列举了衰弱患者姑息性治疗的原则，而且

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综合了将姑息性治疗整合入围术期和 ICU 的方法。

(邹沅莞 译 陈杰 校)

Patients with frailty experience substantial physical and emotional distress related to their condition and face increased morbidity and mortality compared with their nonfrail peers. Palliative care is an interdisciplinary medical specialty focused on improving quality of life for patients with serious illness, including those with frailty, throughout their disease course. Anesthesiology providers will frequently encounter frail patients in the perioperative period and in the intensive care unit (ICU) and can contribute to improving the quality of life for these patients through the provision of palliative care. We highlight the opportunities to incorporate primary palliative care, including basic symptom management and straightforward goals-of-care discussions, provided by the primary clinicians, and when necessary, timely consultation by a specialty palliative care team to assist with complex symptom management and goals-of-care discussions in the face of team and/or family conflict. In this review, we apply the principles of palliative care to patients with frailty and synthesize the evidence regarding methods to integrate palliative care into the perioperative and ICU settings.

### 体弱者在重症监护的医疗：综述

#### **Frailty in Critical Care Medicine: A Review**

De Biasio, Justin C. MD<sup>\*</sup>; Mittel, Aaron M. MD<sup>†</sup>; Mueller, Ariel L. MA<sup>\*</sup>; Ferrante, Lauren E. MD<sup>‡</sup>; Kim, Dae H. MD<sup>§</sup>; Shaefi, Shahzad MD, MPH<sup>\*</sup>

Anesthesia & Analgesia: 2020 130 1462-1473

传统的临床风险评估方法利用年龄作为压力易感性的标志。衰老研究的相对较新的发展提出了衰弱综合症的概念，它代表了生理和社会心理储备枯竭和临床易感性的多维状态，该状态与年龄的增长有关，但变化不定。衰弱综合症现在是一个完善的临床实体，既可以作为临床干预的指南，又可以作为初级和急诊护理下不良预后的预测指标。该综合症的生物学方面广泛地体现了相互关联的网络，包括与年龄相关的分子、细胞和组织层面的损伤积累，从而导致多系统失调，功能下降，以及对生理压力的反应异常差。考虑到生物学过程的复杂性，已经开发了几种有效的临床定义脆弱性的方法，每种方法都有独特而合理的考虑。从这种背景出发，过去几年中，在重症监护室进行了许多观察性研究，这些研究已经确定，在重症监护中，衰弱综合症的确定既可行又可预测。具体而言，由几种不同的衰弱测量工具确定的体弱似乎与死亡率、医疗利用增加和残疾程度相关，并且具有改善重症监护患者风险分层的潜力。尽管衰弱测量方法实施过程中的巨大差异可能会限制特定结果的普遍性，但总体预后趋势可能会为指导患者及其家人的管理决策提供一些帮助。尽管尚无试验取得相应干预措施以改善重症的体弱的老年人的结局，但该人群的特殊易感性为将来的干预提供了有希望的目标。

(许芳霞译 李金宝校)

Traditional approaches to clinical risk assessment utilize age as a marker of increased vulnerability to stress. Relatively recent advancements in the study of aging have led to the concept of the frailty syndrome, which represents a multidimensional state of depleted physiologic and psychosocial reserve and clinical vulnerability that is related

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to but variably present with advancing age. The frailty syndrome is now a well-established clinical entity that serves as both a guide for clinical intervention and a predictor of poor outcomes in the primary and acute care settings. The biological aspects of the syndrome broadly represent a network of interrelated perturbations involving the age-related accumulation of molecular, cellular, and tissue damage that leads to multisystem dysregulation, functional decline, and disproportionately poor response to physiologic stress. Given the complexity of the underlying biologic processes, several well-validated approaches to define frailty clinically have been developed, each with distinct and reasonable considerations. Stemming from this background, the past several years have seen a number of observational studies conducted in intensive care units that have established that the determination of frailty is both feasible and prognostically useful in the critical care setting. Specifically, frailty as determined by several different frailty measurement tools appears associated with mortality, increased health care utilization, and disability, and has the potential to improve risk stratification of intensive care patients. While substantial variability in the implementation of frailty measurement likely limits the generalizability of specific findings, the overall prognostic trends may offer some assistance in guiding management decisions with patients and their families. Although no trials have assessed interventions to improve the outcomes of critically ill older people living with frailty, the particular vulnerability of this population offers a promising target for intervention in the future.

#### 美国促进康复和围手术期质量协会关于术后谵妄预防的共识声明

#### **American Society for Enhanced Recovery and Perioperative Quality Initiative Joint Consensus Statement on Postoperative Delirium Prevention**

Hughes, Christopher G. MD, MS<sup>\*</sup>; Boneyk, Christina S. MD<sup>\*</sup>; Culley, Deborah J. MD<sup>†</sup>; Fleisher, Lee A. MD<sup>‡</sup>; Leung, Jacqueline M. MD, MPH<sup>§</sup>; McDonagh, David L. MD<sup>‡</sup>; Gan, Tong J. MD, MHS, FRCA<sup>¶</sup>; McEvoy, Matthew D. MD<sup>#</sup>; Miller, Timothy E. MB, ChB, FRCA<sup>\*\*</sup>; for the Perioperative Quality Initiative (POQI) 6 Workgroup  
*Anesthesia & Analgesia*: 2020 130 1572-1590

术后谵妄是一种老年人综合症，表现为手术后认知，注意力和意识水平的变化。大手术后高达 50% 的患者会发生此病，并伴有不良预后，包括住院时间增加，护理费用增加，出院后去收容所的比例更高和再入院率更高。此外，它与手术后的功能减退和认知障碍有关。随着我们外科手术人群的年龄和医疗复杂性的增加，从业者需要识别和预防谵妄的高危人群。由于谵妄是术后常见的并发症，因此最近有大量由各种专业的临床医生进行的针对谵妄的研究。也有一些综述和建议声明；但是，这些并不是基于可靠的证据。第六届围手术期质量协会（POQI-6）共识会议召集了一个由多学科专家组成的团队，正式调查和评估有关术后谵妄预防的文献，并使用重复的 Delphi 流程和用来评估生物医学文献的证据推荐分级的评价、制定与评估（GRADE）标准来提供基于证据的建议指南。

（许芳霞译 李金宝校）

Postoperative delirium is a geriatric syndrome that manifests as changes in cognition, attention, and levels of consciousness after surgery. It occurs in up to 50% of patients

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after major surgery and is associated with adverse outcomes, including increased hospital length of stay, higher cost of care, higher rates of institutionalization after discharge, and higher rates of readmission. Furthermore, it is associated with functional decline and cognitive impairments after surgery. As the age and medical complexity of our surgical population increases, practitioners need the skills to identify and prevent delirium in this high-risk population. Because delirium is a common and consequential postoperative complication, there has been an abundance of recent research focused on delirium, conducted by clinicians from a variety of specialties. There have also been several reviews and recommendation statements; however, these have not been based on robust evidence. The Sixth Perioperative Quality Initiative (POQI-6) consensus conference brought together a team of multidisciplinary experts to formally survey and evaluate the literature on postoperative delirium prevention and provide evidence-based recommendations using an iterative Delphi process and Grading of Recommendations Assessment, Development and Evaluation (GRADE) Criteria for evaluating biomedical literature.

**舒更葡糖钠在孕妇和生育期妇女中的应用：叙述性综述。**

**Sugammadex Administration in Pregnant Women and in Women of Reproductive Potential: A Narrative Review**

Richardson, Michael G. MD; Raymond, Britany L. MD

Anesthesia & Analgesia: 2020 130 1628-1637

自 2008 年开始临床应用以来，与新斯的明相比，舒更葡糖钠具有更高的安全性和优越的疗效，可用于拮抗类固醇非去极化神经肌肉阻滞剂产生的肌肉松弛。包括在特殊人群中使用，例如老年人，2 岁以上的儿童以及患有肾，肝或肺疾病的患者。相反，指导该药在怀孕期，生育期和哺乳期妇女中使用的临床证据很少。但在接受全麻（GA）进行剖宫产（CD）的产妇中，关于在手术结束时给药的的有效性和安全性的证据正在迅速增加。我们对以下证据进行了回顾性研究：在给予大剂量罗库溴铵后发生无法插管/无法通气（CICV）时立即给予舒更葡糖钠抢救逆转的情况，母体给予的舒更葡糖钠后的胎盘转移程度，胎儿暴露于舒更葡糖钠下的不良影响，维持早孕的潜在影响，以及转移至母乳的程度。最后，许多麻醉学家似乎会注意制造商的警告，告知妇女在接受舒更葡糖钠暴露后激素避孕失败的风险。我们提供了在舒更葡糖钠给药后通常报告的事后咨询的医学伦理分析，这有助于术前讨论和共同决策，或者由医生决定使用新斯的明。这篇综述着重指出了在女性不同的生殖健康情况下使用舒更葡糖钠的证据存在差异，包括当前的研究空白，使得该人群无法共享大多数围手术期患者享有的舒更葡糖钠的好处。（许芳霞译 李金宝校）

Since its clinical introduction in 2008, sugammadex has demonstrated a high degree of safety and superior effectiveness compared to neostigmine when used to antagonize muscle relaxation produced by steroid nondepolarizing neuromuscular blockers. This includes its use in special populations, such as the elderly, children over 2 years old, and patients with renal, hepatic, or lung disease. In contrast, clinical evidence guiding its use during pregnancy, in women of childbearing potential, and in lactating women, is sparse. An exception is administration at the end of surgery in

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parturients undergoing cesarean delivery (CD) with general anesthesia (GA), for whom effectiveness and safety evidence is rapidly accumulating. We review evidence regarding sugammadex rescue reversal shortly after high-dose rocuronium in cases of cannot intubate/cannot ventilate (CICV), the extent of placental transfer of maternally administered sugammadex, adverse fetal effects of sugammadex exposure, potential effects on maintenance of early pregnancy, and the extent of transfer to breast milk. Finally, many anesthesiologists appear to heed the manufacturer's warning regarding informing women of childbearing potential regarding the risk of hormone contraceptive failure after sugammadex exposure. We provide a medical ethics analysis of the ex post facto counseling commonly reported after sugammadex administration, which favors either preoperative discussion and shared decision making, or the decision by the physician to use neostigmine. This review highlights the disparity in evidence regarding sugammadex use in various contexts of female reproductive health, including current research gaps that prevent this population from sharing in the benefits of sugammadex enjoyed by most perioperative patients.

### 心脏手术患者有创血压和无创血压测量对信号复杂性和手术风险的比较

#### Comparison of Invasive and Noninvasive Blood Pressure Measurements for Assessing Signal Complexity and Surgical Risk in Cardiac Surgical Patients

Gibson, Lauren E. MD<sup>\*</sup>; Henriques, Teresa S. PhD<sup>\*,†</sup>; Costa, Madalena D. PhD<sup>†</sup>; Davis, Roger B. ScD<sup>‡</sup>; Mittleman, Murray A. MD, DrPH<sup>§</sup>; Mathur, Pooja BA<sup>\*</sup>; Subramaniam, Balachundhar MD, MPH<sup>\*</sup>

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**背景:** 连续动脉血压 (ABP) 通常通过放置动脉内导管来记录。最近, 非侵入式 ABP 监测器已显示出与侵入式测量相当的准确性。在先前的研究中, 我们显示逐搏 ABP 测量值的波动不是随机变化, 而是具有复杂的动力学结构, 并且 ABP 动力学复杂性与使用胸外科医师协会 (STS) 指数估算的手术风险成反比。动力学复杂性是一种数学结构, 反映了生理系统适应刺激的能力。本研究的目的是: (1) 确定无创性逐搏 ABP 测量是否也表现出复杂的时间结构; (2) 比较无创与有创 ABP 时间序列的复杂性; (3) 量化无创 ABP 时间序列的复杂度与 STS 风险评分之间的关系。

**方法:** 本研究纳入了 15 例接受冠状动脉搭桥、瓣膜置换或冠脉搭桥/瓣膜置换联合手术的成年患者。使用动脉导管 (有创) 和连续无创动脉压监测仪同时记录术前 ABP 波形  $\geq 15$  分钟。从连续波形中提取逐搏收缩压 (SBP), 舒张压 (DBP), 脉压 (PP) 和平均动脉压 (MAP) 的时间序列。使用多尺度熵方法评估复杂性。Wilcoxon 符号秩检验用于比较有创 ABP 时间序列与无创 ABP 时间序列得出的指数的平均等级。Spearman 相关系数用于量化有创和无创指数之间的关系。线性回归分析用于量化每个复杂性指标和 STS 风险评分之间的关联。

**结果:** 无创 ABP 测量中的逐次波动不是随机的而是复杂的。但其复杂性低于有创方式获得的 ABP 信号的波动程度 (SBP: 7.05 vs 8.66,  $P < .001$ ; DBP: 7.40 vs 8.41,  $P < .001$ ; PP: 6.83 vs 8.82,  $P < .001$ ; 以及 MAP: 7.17 vs 8.68,  $P < .005$ )。MSE  $\Sigma$  · 斜率的有创指数和无创指数显示出良好的相关性 ( $r_s$ ) (SBP 为 0.53, DBP 为 0.79, PP 为 0.42, MAP 为 0.60)。无创 ABP 时间序列的复杂性 (-0.70 [-1.28

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至-0.11]; 对于 DBP 为  $P = .023$ ), 类似于有创时间序列的复杂性 (-0.94 [-1.52 至-0.35]; 对于 DBP 为  $P = .004$ ) 与接受心血管手术的患者估计的手术风险呈负相关。

**结论:** 我们的研究表明, 在计算基于复杂性的指数和预计手术相关风险的相关性时, 可使用无创 ABP 监测。

(许芳霞译 李金宝校)

**Background:** Continuous arterial blood pressure (ABP) is typically recorded by placement of an intraarterial catheter. Recently, noninvasive ABP monitors have been shown to be comparable in accuracy to invasive measurements. In a previous study, we showed that the fluctuations in beat-to-beat ABP measurements were not random variations but had a complex dynamical structure, and that ABP dynamical complexity was inversely associated with surgical risk estimated using the Society of Thoracic Surgeons (STS) index. Dynamical complexity is a mathematical construct that reflects the capacity of a physiological system to adapt to stimuli. The objectives of present study were to: (1) determine whether noninvasive beat-to-beat ABP measurements also exhibit a complex temporal structure; (2) compare the complexity of noninvasive versus invasive ABP time series; and (3) quantify the relationship between the complexity of noninvasive ABP time series and the STS risk scores.

**Methods:** Fifteen adult patients undergoing coronary artery bypass graft, valve, or combined coronary artery bypass graft/valve surgery were enrolled in this observational study. Preoperative ABP waveforms were simultaneously recorded for  $\geq 15$  minutes using a radial artery catheter (invasive) and a continuous noninvasive arterial pressure monitor. Beat-to-beat systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse pressure (PP), and mean arterial pressure (MAP) time series were extracted from the continuous waveforms. Complexity was assessed using the multiscale entropy method. The Wilcoxon signed-rank test was used to compare the mean ranks of indices derived from invasive versus noninvasive ABP time series. Spearman correlation coefficients were used to quantify the relationship between invasive and noninvasive indices. Linear regression analysis was used to quantify the association between each of the complexity indices and the STS risk scores.

**Results:** Beat-to-beat fluctuations in noninvasive ABP measurements were not random but complex; however, their degree of complexity was lower than that of fluctuations in invasively obtained ABP signals (SBP: 7.05 vs 8.66,  $P < .001$ ; DBP: 7.40 vs 8.41,  $P < .001$ ; PP: 6.83 vs 8.82,  $P < .001$ ; and MAP: 7.17 vs 8.68,  $P < .005$ ). Invasive and noninvasive indices for  $MSE\Sigma$ -slope showed good correlation ( $r_s$ ) (0.53 for SBP, 0.79 for DBP, 0.42 for PP, 0.60 for MAP). The complexity of noninvasive ABP time series (-0.70 [-1.28 to -0.11];  $P = .023$  for DBP), like that of invasive time series (-0.94 [-1.52 to -0.35];  $P = .004$  for DBP), was inversely associated with estimated surgical risk in patients undergoing cardiovascular operations.

**Conclusions:** Our results support the use of noninvasive ABP monitoring in computations of complexity-based indices that correlate with estimated surgical risk.

一种形式并不适合所有人: 针对美国麻醉医师学会对小儿患者身体状况进行分类划分的观点

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## One Size Does Not Fit All: A Perspective on the American Society of Anesthesiologists Physical Status Classification for Pediatric Patients

Ferrari, Lynne R. MD<sup>\*</sup>; Leahy, Izabela MS<sup>\*</sup>; Staffa, Steven J. MS<sup>\*</sup>; Johnson, Connor BS<sup>\*</sup>; Crofton, Charis BA<sup>†</sup>; Methot, Craig BS<sup>\*</sup>; Berry, Jay G. MD<sup>†</sup>

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**背景:** 美国麻醉医师协会身体状况 (ASA-PS) 分类系统主要依据合并症对患者进行分类, 被广泛应用于全身麻醉前的患者。尽管它很受欢迎, 但由于 ASA-PS 分类系统的主观定义, 尤其是在应用于儿科人群时, 可靠性较差。我们假设澄清 ASA-PS 定义以更好地反映儿科疾病, 将提高 ASA-PS 应用于该人群的准确性。

**方法:** 从三级儿科医院收集了 120 例儿科手术病例的分层随机样本。一组高年资麻醉医师使用建议的儿科专用 ASA-PS 定义, 对该样本中患者的 ASA-PS 进行了重新分类。使用组内相关系数 (ICC) 和 Fleiss  $\kappa$  统计量来评估其可靠性。此外, 由高年资麻醉医师讨论进行的一项定性研究确定了 ASA-PS 的歧义区域。

**结果:** 在 ASA-PS 组内的 90 个重新分类中, 42.2% ( $n = 38$ ) 的 ASA-PS I 升级为 ASA-PS II, 36.7% ( $n = 33$ ) 的 ASA-PS II 升级为 ASA-PS III。此外, 28.9% ( $n = 26$ ) 的 ASA-PS III 升级到 ASA-PS IV, 24.4% ( $n = 22$ ) 的 ASA-PS IV 降级到 III。重新分类的 ASA-PS 分类的可靠性为 0.77 (95% 置信区间 [CI] 为 0.71-0.83;  $P < .001$ ), 表明一致性良好。ASA-PS II 和 III 患者的 Fleiss  $\kappa$  统计最低 (分别为  $\kappa = 0.41$  和  $\kappa = 0.30$ ), 表明在这些亚组中除了偶然性外, 一致性也较低。讨论组揭示了一些共同的主题, 例如疾病的后遗症, 合并症的活动性与可控性以及可能存在的功能局限性作为重要考虑因素。

**结论:** ASA-PS 分类系统具有多个优点, 包括易于使用, 简单和灵活。但是, 修改 ASA-PS 系统为小儿患者提供更好的指导可能很有价值。尽管本研究通过 ASA-PS 的儿科定义证明了其良好的可靠性, 但仍需要进一步的工作来阐明 ASA-PS 在中档分类 (ASA-PS II 和 III) 中的准确分配, 并探索在其他机构中的执行情况。

(许芳霞译 李金宝校)

**Background:** The American Society of Anesthesiologists physical status (ASA-PS) classification system is used worldwide to classify patients based on comorbid conditions before general anesthesia. Despite its popularity, the ASA-PS classification system has been shown to have poor interrater reliability due to its subjective definitions, especially when applied to the pediatric population. We hypothesized that the clarification of ASA-PS definitions to better reflect pediatric conditions would improve the accuracy of ASA-PS applied to this population.

**Methods:** A stratified, randomized sample of 120 pediatric surgical cases was collected from a tertiary-care pediatric hospital. A team of senior anesthesiologists reclassified ASA-PS within this patient sample using the suggested pediatric-specific ASA-PS definitions. Interrater reliability was measured using intraclass correlation (ICC) and Fleiss  $\kappa$  statistic. In addition, a qualitative study component using small focus groups of senior anesthesiologists identified areas of ambiguity within the ASA-PS system.

**Results:** Among the 90 reclassifications within each ASA-PS group, 42.2% ( $n = 38$ ) of ASA-PS I were upgraded to ASA-PS II, and 36.7% ( $n = 33$ ) of ASA-PS II were



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upgraded to ASA-PS III. In addition, 28.9% (n = 26) of ASA-PS III were upgraded to ASA-PS IV, and 24.4% (n = 22) of ASA-PS IV were downgraded to III. ICC across the reclassified ASA-PS categories was 0.77 (95% confidence interval [CI], 0.71-0.83;  $P < .001$ ) demonstrating strong overall agreement. Fleiss  $\kappa$  statistic was lowest in ASA-PS II and III patients ( $\kappa = 0.41$  and  $\kappa = 0.30$ , respectively) indicating lower agreement beyond chance within these subgroups. Focus groups revealed common themes such as active sequelae of disease, active versus well-controlled presence of comorbidities, and the possible inclusion of functional limitations as important considerations.

**Conclusions:** The ASA-PS classification system has several benefits including ease-of-use, simplicity, and flexibility. However, revising the ASA-PS system to provide better guidance for pediatric patients could be valuable. While this study demonstrates good interrater reliability with the included ASA-PS pediatric definitions, further work is needed to clarify accurate assignment of ASA-PS within the midrange of the scale (ASA-PS II and III) and explore its implementation in other institutions.

多中心围术期预后小组针对术后疼痛状况，止痛药使用，慢性疼痛转化以及阿片类药物过量和延长使用模式的观察研究

**Multicenter Perioperative Outcomes Group Enhanced Observation Study Postoperative Pain Profiles, Analgesic Use, and Transition to Chronic Pain and Excessive and Prolonged Opioid Use Patterns Methodology**

Stuart, Ami R. PhD<sup>\*</sup>; Kuck, Kai PhD<sup>\*</sup>; Naik, Bhiken I. MD<sup>†</sup>; Saager, Leif MD, MMM, FACHE, FCCM, FCCP<sup>‡</sup>; Pace, Nathan L. MD, MStat<sup>\*</sup>; Domino, Karen B. MD<sup>§</sup>; Posner, Karen L. PhD<sup>§</sup>; Alpert, Salome B. PhD<sup>†</sup>; Kheterpal, Sachin MD, MBA<sup>||</sup>; Sinha, Anik K. MS<sup>||</sup>; Brummett, Chad M. MD<sup>||</sup>; Durieux, Marcel E. MD, PhD<sup>†</sup>; and the MPOG EOS Investigator Group

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为研究麻醉中阿片类药物相关结局与急性和慢性术后疼痛的影响，我们开展了一项多中心研究，将来自多个机构的详细围手术期数据进行了综合分析。通过将术前和术后患者自诉的结果与通过多中心围手术期结果组（MPOG）自动提取的高分辨率的术中数据相结合，作者试图描述患者特征，术前心理因素，手术过程，麻醉过程，术后疼痛管理，以及根据出院后疼痛状况制定的出院后疼痛管理和阿片类药物使用模式。这项研究的独特之处在于，它利用与 MPOG 框架和数据库集成的数字病例报告表来收集多中心前瞻性数据。因此，该研究可以作为使用该创新方法的未来研究的模型。完整的结果将在以后的文章中进行报告；本文的目的是描述本研究的方法。

（许芳霞译 李金宝校）

To study the impact of anesthesia opioid-related outcomes and acute and chronic postsurgical pain, we organized a multicenter study that comprehensively combined detailed perioperative data elements from multiple institutions. By combining pre- and postoperative patient-reported outcomes with automatically extracted high-resolution intraoperative data obtained through the Multicenter Perioperative

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Outcomes Group (MPOG), the authors sought to describe the impact of patient characteristics, preoperative psychological factors, surgical procedure, anesthetic course, postoperative pain management, and postdischarge pain management on postdischarge pain profiles and opioid consumption patterns. This study is unique in that it utilized multicenter prospective data collection using a digital case report form integrated with the MPOG framework and database. Therefore, the study serves as a model for future studies using this innovative method. Full results will be reported in future articles; the purpose of this article is to describe the methods of this study.

**乳房手术后恢复的质量：比较了伤口局部浸润与胸神经筋膜间平面（胸 II）神经阻滞的一项多中心随机临床试验**

**Quality of Recovery After Breast Surgery: A Multicenter Randomized Clinical Trial Comparing Pectoral Nerves Interfascial Plane (Pectoral Nerves II) Block With Surgical Infiltration**

Barrington, Michael J. PhD<sup>\*,†</sup>; Seah, Gloria J. FANZCA<sup>\*,‡</sup>; Gotmaker, Robert MBiostat<sup>\*</sup>; Lim, Daniel MPharmPrac<sup>§</sup>; Byrne, Kelly FANZCA<sup>†</sup>

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**背景：**胸神经（PECS II）阻滞是一种常见的乳腺癌手术区域镇痛技术。外科医生的伤口局部浸润或 PECS II 阻滞可能可改善包括恢复质量（QoR）在内的预后。

**方法：**在这项多中心随机临床试验中，接受乳房手术的 104 名女性患者被分为以下两组：（1）胸神经局麻药神经阻滞和 0.9% 盐水伤口浸润（PECS 组）或（2）胸神经 0.9% 生理盐水阻滞和局麻药伤口浸润。患者，麻醉师，外科医生，护理人员和研究助手对分组都不知情。患者均接受标准化的全身麻醉和多模式镇痛。主要结果是术后 24 小时测量的多维（疼痛，舒适度，独立性，心理，情感）QoR-15 问卷的总分（最高分 150 分；良好康复 118 分）。次要结果是疼痛及其干扰，在术后 24 小时和 3 个月使用简明疼痛评估量表（BPI）简短形式进行评估（0，最佳；120，最坏）。使用 Wilcoxon 秩和检验比较随机分配的两组的结果，结果显示为中位数差异（95% 置信区间）。

**结果：**从 2016 年 8 月 17 日至 2018 年 6 月 8 日招募了 108 名患者，其中 4 名患者退出。104 名患者中有 12 名患者进行了乳房切除术，其余患者为微创性手术。

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基础的 QoR-15 总分用中位数[四分位数]显示, 在 PECS 组中为 135 [129, 143], 在伤口浸润组中为 139 [127, 143]。24 小时 QoR-15 总分中位数, 在 PECS 组为[四分位数]为 131 [116, 140], 渗透组为 123 [117, 143] (P = .60), 中位数差异 (95% 置信区间) 为-2 (-9 至 5)。伤口浸润组减去 PECS 组的 QoR-15 总分的中位数差异为疼痛 0 (-2 至 1), 身体舒适度-1 (-3 至 2), 身体独立性 0 (-2 至 1), 心理支持 0 (0- 0) 和情绪 0 (-1 至 2) (P> .28)。24 小时的 BPI 疼痛分量表 (0-40, 得分越低表示疼痛越少) 也用中位数表示[四分位数], PECS 组为 7 [2, 13], 浸润组为 10 [5, 17] (P = .15)。PECS 组在 24 小时的 BPI 总分 (中位数[四分位数]) 为 20 [7, 36], 渗透组为 23 [10, 43] (P = 0.34), 而 3 个月时分别为 0 [0, 14] 和 0 [0, 11] (P = .85)。

**结论:** 大部分乳腺癌的微创手术的预后中, PECS II 阻滞并不优于外科医生的伤口局部浸润。

(许芳霞译 李金宝校)

**Background:** Pectoral nerves (PECS II) block is a popular regional analgesia technique for breast surgery. PECS II block or local infiltration by surgeon may improve outcomes including quality of recovery (QoR).

**Methods:** In this multicenter randomized clinical trial, 104 female patients undergoing breast surgery received: (1) PECS II block with local anesthetic and surgical infiltration with 0.9% saline (PECS group) or (2) PECS II block with 0.9% saline and surgical infiltration with local anesthetic (infiltration group). Patients, anesthetists, surgeons, nursing staff, and research assistants were blinded to group allocation. Patients received standardized general anesthesia and multimodal analgesia. The primary outcome was the global score (maximum score, 150; good recovery, 118) of the multidimensional (pain, comfort, independence, psychological, emotional) QoR-15 questionnaire measured 24 hours postoperatively. Secondary outcomes were pain, and its functional interference measured 24 hours and 3 months postoperatively using the Brief Pain Inventory (BPI) short form (0, optimal; 120, worst possible). Randomly assigned groups were compared on outcomes using the Wilcoxon rank-sum test, and the results were reported as median difference with 95% confidence interval.

**Results:** One hundred eight patients were recruited from August 17, 2016 to June 8,

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2018, and 4 patients were withdrawn. Twelve patients from 104 had mastectomy, with the remainder having less invasive surgery. Baseline QoR-15 global scores reported as median [quartiles] were 135 [129, 143] in the PECS group and 139 [127, 143] in the infiltration group. The 24-hour QoR-15 global score reported as median [quartiles] was 131 [116, 140] in the PECS group and 123 [117, 143] in the infiltration group ( $P = .60$ ), with median difference (95% confidence interval) of -2 (-9 to 5). The median difference reported as infiltration minus PECS for QoR-15 domains was pain 0 (-2 to 1), physical comfort -1 (-3 to 2), physical independence 0 (-2 to 1), psychological support 0 (0-0), and emotions 0 (-1 to 2) ( $P > .28$ ). The BPI pain subscale at 24 hours (0-40, lower score indicates less pain), reported as median [quartiles], was 7 [2, 13] in the PECS group and 10 [5, 17] in the infiltration group ( $P = .15$ ). The BPI global score at 24 hours, reported as median [quartiles], was 20 [7, 36] in the PECS group and 23 [10, 43] in the infiltration group ( $P = .34$ ) and at 3 months was 0 [0, 14] and 0 [0, 11] ( $P = .85$ ).

**Conclusions:** After mostly minor surgery for breast cancer, PECS II block was not superior to local infiltration by the surgeon.