醫院間和醫院內骶尾部單次注射局部麻醉藥的變化：兒科區域麻醉網路的報告

Variation Between and Within Hospitals in Single Injection Caudal Local Anesthetic Dose: A Report From the Pediatric Regional Anesthesia Network

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背景：由於醫療利用率，支出和臨床實踐之間存在差異，但在麻醉實踐中尚缺乏有關變數差異的資料。 兒科區域麻醉網路（PRAN）的資料有助於探索是否存在不同的醫療實踐模式，以及神經阻滯局部麻醉藥劑量是否存在較大差異。 本研究的主要目的是量化單次骶尾部阻滯注射劑量的變化，次要目的是探討引起變化的可能原因（例如，阻滯的數量與阻滯部位的關係）。

方法:我們查詢了1歲以下兒童的骶尾部阻滯單次注射局麻藥的PRAN資料庫。 分析資料中局麻藥劑量，機構內和跨機構的差異以及可能存在的原因。

結果：各部位布比卡因的平均劑量為每千克（BE•kg）在1.39～2.22，十分位區間(IDR)占所有劑量的80%的中位數，在0.21～1.48之間。平均劑量(BE•kg)與阻滯部位，年齡，體重和局麻藥有關（P <0001）。阻滯部位的Cohen的F效應大小估計值（0.65）比年齡（0.05）或體重（0.02）高10倍。每公斤平均體積為0.9±±0.2(平均值±±標準差)，並且與年齡(0.04)或體重(0.07)相比，與阻滯部位（Cohen’s F 0.3）的相關性更強。

結論：骶尾部局麻藥劑量和給藥量存在很大差異。 這種差異與每個中心的病例數無關，而是與各不同研究中心有關（即，中心之間的差異）。研究中心內的差異較大，這表明差異主要取決於每位執業醫生。 儘管有合理的理由來改變統一

劑量，但目前的方法尚不一致，也無關於給予標準劑量的有力證據的支持。

(劉洋洋譯 潘豔、薛張綱校)

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 < .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± ± 0.2 (mean ± ±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.

凝血的快速檢測在小兒心臟外科抗凝和出血管理中的應用:系統綜述

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

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出血和凝血處理是新生兒和兒童心臟手術管理中至關重要。在小兒中使用快速檢測(POCTs)不如在成人中使用廣泛。本系統綜述旨在總結文獻中關於 POCTs 在兒童心臟手術中應用的證據。我們納入了所有在接受心臟手術的兒童人群(<18 歲)中，利用 POCTs 評估凝血水平的研究。檢索了三個電子資料庫(PubMed、Embase 和 Cochrane 對照臨床試驗註冊資料)。所涉及的測試包括肝素效應測試、粘彈性測試和血小板功能測試。由於所研究的患者和測試存在廣泛的異質性，因此無法進行正式的薈萃分析，因此研究結果將通過系統綜述來呈現。共查詢 80 篇文章，其中 47 篇在本綜述中介紹。目前，文獻資料還不夠完善，無法將 POCTs 作為小兒心臟外科圍手術期出血治療的金標準。儘管如此，在術後檢測中引入 POCTs 可以改善出血管理、患者預後和成本效率。

ACT = 活化凝血時間；APPEAR = 白蛋白和血漿在兒科的應用；CCT = 控制臨床試驗；CFT = 血栓形成時間；CHD = 先天性心臟病；CPA = 錐形體和血小板分析儀；CPB = 心肺轉流術；CT = 凝血時間；FFP = 新鮮冰凍血漿；HMS = 肝素監控系統;ICU = 重症監護病房；MA = 最大振幅；MCF = 最大血凝塊硬度；PICU = 兒科重症監護病房；POCT = 快速測試;PRISMA=系統審查和薈萃分析的首選報告專案;RCT = 隨機對照試驗；Sao2 =動脈血氧飽和度；TEG = 血栓彈性描記法

（劉宏津譯 潘豔、薛張綱校）

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 children undergoing cardiac surgery. We included all studies examining the pediatric population (<18 years old) undergoing cardiac surgery in which the coagulation profle 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 defne 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 effciency. (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 frmness; 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

分娩過程中口服碳水化合物對器械陰道分娩率的影響：多中心隨機對照試驗

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

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背景： 體育鍛煉期間攝入碳水化合物可改善肌肉性能並減少疲勞。我們假設在分娩期間（這是一個重要的體力活動時期）攝入碳水化合物，可以降低器械陰道分娩率。

方法： 在一項多中心的前瞻性隨機對照試驗中，可自然分娩的健康成年孕婦被分為“碳水化合物”組（建議每 3 小時喝 200ml 不含果肉的蘋果汁或葡萄汁）以

及“禁食”組（僅給予水）。主要結果是器械陰道分娩率。次要結果包括分娩持續時間、剖宮產率、嘔吐發生率和住院時間，並通過數位評分量表（0 分最差，10 分為最佳評分）評估產婦分娩時的總體感覺、饑餓、口渴、壓力、疲勞。在意向性治療的基礎上進行統計分析。主要結果以“禁食”組作為參考組進行比較。調整了次要結果的 P 值以進行多組比較。兩組之間的差異以 99%置信區間(CI）報告。

結果： 總共 3984 名女性納入了統計分析（碳水化合物組 2014 人，禁食組 1970 人）。器械分娩率上碳水化合物組（21.0%）和禁食組（22.4%）之間沒有差異（差異-1.4%；99%CI =-4.9～2.2）。兩組之間在分娩持續時間（差異，-7 分鐘； 99%CI=-25～11）、剖宮產率（差異-0.3%； 99%CI=- 2.4～3.0）、嘔吐率（差異 2.8%； 99%CI=0.2-5.7）、自我描述的疲勞程度（差異 1； 99%CI=0～2）、自我報告的饑餓感（差異 0; 99%CI=-1～1）、口渴（差異 0; 99%CI=-1～1）、壓力（差異 0; 99%CI，-1～1）、總體感覺（差異 0； 99%CI=0～0）和住院時間（差異 0；99%CI=-1～1）上均沒有差異。

結論： 分娩期間攝入碳水化合物不會影響器械陰道分娩率。

(鞠惠惠譯 潘豔、薛張綱校)

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% CI, -1 to 0).

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

衰弱患者的術前評估

Preoperative Evaluation of the Frail Patient

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老年患者的圍手術期管理是一個複雜的領域，嚴重受到老年人臨床異質性的影響。衰弱是一種老年綜合症，由於身體機能和儲備的減少患者更易遭受應激源的傷害，這也是造成術後不良結果的可能原因。目前已經研究出許多方法以評估老年病人的衰弱，包括身體和認知功能，合併症，自我報告健康狀況和臨床判斷。大部分衰弱評估方法都能識別出可能發生術後不良後果的一部分患者，包括術後併發症，較長的住院時間，需較高水準的醫療護理和較高死亡率。在外科手術干預前，衰弱評估還可以指導患者及其家人，麻醉醫生和外科醫生為患者量身定制手術計畫，

從而降低老年病人衰弱引起的高風險。目前研究仍在進行中，以明確可改善患者預後的干預措施，但尚缺乏隨機對照試驗的高品質資料。

(陳悅譯 潘豔、薛張綱校)

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 在術後疼痛中的作用:動物和人類研究的系統綜述

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

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大手術後疼痛是普遍存在的。如果術後疼痛治療不夠理想，則可能導致患者術後恢復不良，生活品質降低，醫療費用增加等情況。當前使用的鎮痛藥物，無論是單一用藥或者是聯合用藥，由於藥效低下，作用時間短，毒性與成癮性等使其療效受限,由於缺乏非成癮性的強效鎮痛藥和阿片類藥物處方過量導致阿片類藥物在美國流行。所以，迫切需要開發新型的鎮痛藥物。微核糖核酸(miRNAs)是一種小的非編碼 RNA 分子，能夠調節神經元和支持細胞（膠質細胞,白細胞和施旺細

胞)的蛋白質合成。文獻表明 miRNA 在傷害性感受中具有重要的調節作用。因此，我們總結了目前 miRNA 在切口痛、炎性痛、神經病理痛和癌痛中發揮作用的相關證據。我們還討論了 miRNA 在作為調節鎮痛和阿片耐受中潛在治療靶點的作用。最後，我們提出如何將 miRNA 類似物(mimic-miRNAs or antago-miRNAs)用於臨床實踐，在圍術期發揮鎮痛作用。

（胡月譯 潘豔、薛張綱校）

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.

衰弱綜合征的預康復：改善最脆弱患者的預後

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

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麻醉醫師日益面臨著為衰弱的老年人提供圍手術期護理的挑戰。衰弱的患者接受手術治療，其圍手術期併發症、死亡和延長住院時間的風險顯著增加。此外，衰弱往往與多種發病率和一系列老年綜合征有關，包括功能依賴、認知障礙和營養不良，這進一步增加了醫療護理的風險和複雜性。越來越多的證據表明，術前康復干預以改善整體健康和功能，可改善手術患者的術後結局。然而，尚不清楚這一衰弱老年群體能否從預康復中獲益。我們回顧了對衰弱患者進行預康復的證據，其中包括是否可以通過全面的老年醫學評估以改變手術相關的風險和結果。

（馮真 譯 潘豔、薛張綱校）

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.

老年非心臟手術患者的衰弱與術後譫妄有關但與術後認知功能減退無關

Frailty Is Associated With Postoperative Delirium But Not With

Postoperative Cognitive Decline in Older Noncardiac Surgery Patients

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背景：術後認知功能障礙（POCD）和譫妄是老年患者圍手術期最常見的認知功能併發症。近來一項針對心臟外科手術患者的研究表明，身體衰弱是上述兩種併發症的危險因素。我們試圖闡明在非心臟大手術後，術前衰弱和術後譫妄和 POCD 之間的關係。

方法：我們開展了一項前瞻性佇列研究，研究物件為：大於 65 歲的全身麻醉下擇期行非心臟大手術患者。排除標準為：術前即存的癡呆狀態；無法完成知情同意；接受心臟、顱內或急診手術。術前衰弱使用 FRAIL 量表確定，通過一種簡單的問卷將患者分為無衰弱、衰弱前期及衰弱三組。自轉入蘇醒室至出院，使用意識模糊評估法（CAM-ICU）對患者的譫妄狀態每日評估兩次。所有患者于手術前和術後 3 個月均接受了神經心理學測試（加利福尼亞語言學習測驗 II、循跡連線測驗（TMT）、韋氏成人智力測驗的子測驗、邏輯記憶故事 A 測驗、即刻和延遲回憶、動植物語言流利度、波士頓命名測驗以及簡易精神狀態測試量表（MMSE））。

結果：共 178 例患者符合入選標準；其中 167 例接受大型手術，150 例完成了術後 3 個月的持續隨訪。中位年齡值為 70 歲。術前有 31 例（18.6%）患者被評定為衰弱，72 例（43.1%）患者被評定為衰弱前期。在調整了基線認知評分、年齡、教育程度、手術時間、ASA 等級、手術類型和性別之後，術前被評定為衰弱及衰弱前期的患者術後譫妄的發生率是無衰弱組的 2.7 倍（97.5%可信區間

[CI]=1.0-7.3）。在測試為衰弱、衰弱前期和無衰弱患者組間 POCD 的發生率沒有顯著差異。

結論：調整基線認知評分後，通過 FRAIL 量表評定的衰弱或衰弱前期與術後譫妄的發生率增加有關，但與非心臟手術後的 POCD 發生率無關。

（關昱 譯 潘豔、薛張綱校）

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 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.

衰弱綜合征患者的知情同意

Informed Consent in Patients With Frailty Syndrome

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年齡在 65 歲以上的人中，有 30%以上的人在進行麻醉和手術時存在衰弱現象，這在知情同意程式中構成了許多獨特的問題。已有很多人關注到這類人群不良結局的發生率增加，包括術後死亡率，併發症和住院時間延長。這些重大風險通常不會納入常規風險預測因素中，因此，衰弱患者可能永遠不會完全瞭解在醫院中進行手術的真實風險。雖然“衰弱”一詞提出的是警惕風險並允許適當的護理和干預，但該詞不利於在社會上客觀地對待老年主義。這可能會鼓勵照顧者和家庭成員侵犯自決權，甚至在極端情況下表現為脅迫和損害自主權的家長式行為。衰弱的老年患者中認知功能障礙的發生率很高，必須注意識別無能力提供知情同意的患者。同樣重要的是，不能排除有能力的人提供的知情同意。為了研究而獲得的知情同意給臨床上的知情同意增加了額外的負擔。衰弱的老年人的知情同意程式給工作繁忙的臨床麻醉醫生提出了獨特的挑戰。醫生至少應認識到需要增加時間投入，還應該承認知情同意理論上的目標與實際做法之間的差距。

（劉婕譯 潘豔、薛張綱校）

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 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.

圍術期臨床醫生需要面對的虛弱問題：一項敘述性綜述

Frailty for Perioperative Clinicians: A Narrative Review

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虛弱是以對應激的儲備和抵抗力降低為特徵的多維綜合征。虛弱患者較易受到應激影響，特別是面對手術應激後會增加不良預後和醫療費用的風險。隨著西方人口的迅速老齡化，越來越多虛弱的老年人需要接受手術治療。這意味著麻醉醫生以及其他圍術期臨床醫生需要熟悉虛弱的評估、臨床表現及優化策略。因而作者針對圍術期臨床醫生對虛弱進行敘述性綜述。本文將使讀者熟悉虛弱的概念，討論虛弱程度術前評估的常見與可行方法，並描述了與虛弱相對和絕對相關的不良預後，包括發病率和死亡率、以及以患者為中心，報導的與功能、殘疾和生活品質相關預後。據此提出了一種在術前進行優化的建議方法，該方法包括進行虛弱評估，然後提出識別潛在殘疾、營養不良、認知功能障礙和心理健康診斷的建議。總之接受大型手術的老年患者約 30%-50%具有虛弱表現，這會導致發病率、死亡率及新發殘疾風險增加 2 倍以上。臨床虛弱量表似乎是術前評估虛弱程度最

可行的工具，而有證據表明，在諸如 Fried 表型、Edmonton 虛弱量表和虛弱指數之類的評估虛弱程度的工具之間，預測的準確性並沒有顯著差異。識別出的功能障礙可通過術前運動康復來優化，而營養不良可考慮進行相關的營養補充。住院長者生命計畫可預防術後譫妄的發生，而有精神方面和/或其他心理壓力應激的患者可能會從多學科監護和入院前出院計畫中受益。如今在術中和術後階段，可指導治療的臨床資料有限，將來仍需要進行更多的試驗，以提供支持這些干預措施的確切證據。改善老年虛弱患者的監護及預後是麻醉醫生和圍術期臨床醫生的重要機遇。

（陳思涵 譯 陳傑 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 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.

危重病與虛弱綜合征：其機制與潛在治療目標

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

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虛弱綜合征其特徵是因多個生理系統的儲備減少，從而導致功能受限及對新應激的易感性。社區居住的老年人本身就存在持續多年的虛弱狀態，重症監護病房（ICU）住院數日內會出現進一步惡化，因為危重病會加劇導致年齡相關身體虛弱的機制。虛弱的標誌是肌肉重量、力量和耐力的綜合下降。約 1/3 的 ICU 患者在住院前就存在虛弱狀態，其可增加他們短期和長期致殘和死亡風險。雖然有幾種有效的方法可以評估入 ICU 前後患者的臨床虛弱狀況，但尚未有研究揭示重症患者、ICU 康復患者者虛弱的機制基礎。此外，在 ICU 住院期間及出院後對患者虛弱的治療性干預措施仍存在缺失。在這篇敘述性綜述中，作者調查了與衰老和危重疾病（例如炎症、線粒體肌病和神經內分泌疾病等）相關的虛弱發展與擴展的潛在生物學機制的研究。作者討論了老年人、危重患者和 ICU 康復患者中存在的虛弱機制的具體方面，以期找到治療目標。與虛弱背後的複雜性相一致，這種綜合征不太可能是由單一有害介質的過量或單一保護介質的缺乏引起的，而是由於尚未完全瞭解的多系統功能失調所致的。作者進一步描述了在虛弱與重症監護中進行臨床轉化研究的知識鴻溝，其總體目標是為重症患者和 ICU 康復患者尋求對虛弱的有效治療方法。

（陳思涵 譯 陳傑 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 例傾向評分配對的手術患者應用 6%羥乙基澱粉 130/0.4 後腎臟損傷發病率的研究

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

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背景：幾項關於重症患者的研究報告中表明，使用羥乙基澱粉（HES）溶液進行液體復蘇會損傷腎臟，但對於其是否能用於外科手術患者的說法尚有爭議。由於不同的 HES 製劑具有不同的安全性，因此作者試圖確定用於外科手術患者的第三代 6%的 HES 130 / 0.4 是否與腎臟損傷的發病率相關。

方法：研究物件為在日本全國醫學資料庫中 2014 年至 2016 年之間接受了 HES 130 / 0.4 或未接受 HES（對照）液體管理的成年手術患者，這些人群的傾向得分

匹配比例為 1：1，但未使用 36 個協變數進行多變數 logistic 回歸替代，包括人口統計學特徵、術前合併症以及麻醉/手術方式。主要結果是術中接受 HES 和對照液體輸注患者急性腎損傷（AKI）的發生率。次要結果是評估 HES 是否與 AKI 分級的惡化、腎臟替代療法（RRT）的發生率、住院時間的長短以及住院 30 天死亡率相關。三級結果包括手術當天使用血管活性藥物與液體需求的多少。本研究採用 χ 檢驗、Mann-Whitney U 檢驗或有序邏輯回歸分析進行比較分析。

結果：從資料庫中的 76,048 名患者中，篩選出 58,425 名符合條件的患者：其中 9542 名患者、48,883 名患者分別接受了 HES 及對照液體輸注。傾向得分匹配確定了 8823 對患者。HES 組、對照組的 AKI 的發生率分別為 6.2％（548/8823），5.6％（492/8823）（比值比[OR]為 1.12； 95％置信區間[CI]為 0.99-1.27；P =.07）。與對照組相比，HES 與 AKI 分級的惡化無關（OR 為 0.89； 95％CI 為 0.79-1.01； P = .08）。HES 組的 RRT 發生率低於對照組（分別為 0.2％和 0.4％； OR 為 0.51； 95％CI 為 0.29-0.91；P = .02）。HES 組中位[四分位數間距]住院時間較對照組延長 1 天（12 [8-21] vs 11 [7-20]天； P <.001），但兩組間的院內 30 天死亡率無顯著差異（分別為 0.5％和 0.6％：OR，0.83；95％CI，0.56-1.24；P = .36）。另外，HES 組血管活性藥物的使用率和手術當天的平均淨液體需求量與對照組相比更高（分別為 80.5％vs 70.0％：P <.001、88.1 vs 73.6 mL / kg；P <.001）。

結論：本研究並未證明 6％HES 130 / 0.4 會增加術後 AKI 的發生率和嚴重程度。當其用於外科手術患者時， RRT 發生率更低。

（陳思涵 譯 陳傑 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 χ, 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; 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.

為評估心臟外科手術患者信號複雜性和手術風險進行有創和無創血壓監測結果的比較研究

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

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背景：連續動脈血壓（ABP）通常是通過放置動脈內導管來記錄的。最近，無創 ABP 監測器已顯示出與有創測量相當的準確性。先前的研究表明逐搏 ABP 測量

值的波動不是隨機變化的，而是具有複雜的動力學結構，並且 ABP 動態複雜性與胸外科醫師協會指數（STS）估算的手術風險成反比。動態複雜性是一種數學構造，並可反映生理系統對刺激的適應能力。 本研究的目的是：（1）確定無創逐搏 ABP 測量是否也表現出複雜的時間結構；（2）比較無創與有創 ABP 監測的時間序列的複雜性；（3）量化無創 ABP 時間序列的複雜性與 STS 風險評分之間的關係。

方法：該觀察研究納入了 15 名接受冠狀動脈搭橋、瓣膜置換或冠狀動脈搭橋/瓣膜置換聯合手術的成年患者。術前使用橈動脈導管（有創）和連續無創動脈壓監測儀同時記錄 ABP 波形≥15 分鐘。從連續波形中提取出逐搏的收縮壓（SBP）、舒張壓（DBP）、脈壓（PP）和平均動脈壓（MAP）時間序列，並使用多尺度熵方法評估其複雜性。使用 Wilcoxon 符號秩和檢驗比較有創與無創 ABP 時間序列衍生指數的平均秩次，Spearman 相關係數用於量化有創和無創指標之間的關係，線性回歸分析用於量化每個複雜性指標和 STS 風險評分之間的關係。

結果：無創 ABP 監測中的逐搏波動並非隨機而具有複雜性，但其複雜程度低於有創 ABP 信號的波動程度（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 MSEΣ·斜率方面，有創指數和無創指數顯示出良好的相關性（rs）（SBP 為 0.53，DBP 為 0.79，PP 為 0.42，MAP 為 0.60）。無創 ABP 時間序列的複雜度（-0.70 [-1.28 至-0.11]；對於 DBP 為 P = .023），類似於有創 ABP 時間序列的複雜度（-0.94 [-1.52 至-0.35]；對於 DBP 為 P = .004），與接受心血管手術患者評估的手術風險呈負相關。

結論：本研究結果支持在計算與評估手術風險相關的基於複雜性的指標中使用無

創 ABP 監測。

（陳思涵 譯 陳傑 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 ≥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 MSEΣ·slope showed good correlation (rs) (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.

基於循證監護新演算法：三級兒科教學醫院對黏多糖貯積病患兒非脊柱手術圍術期神經監測的經驗

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

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背景：肌肉骨骼畸形的黏多糖貯積病（MPSs）患者在手術，尤其是非脊柱手術中會遇到很大的挑戰。MPS 患者在非脊柱手術後表現出術後神經功能損害。然而麻醉狀態下神經功能障礙的發生率不可得知，越來越多的證據推動著技術變革，也促進了神經監測在這類患者中的應用。體感誘發電位（SSEPs）和經顱運動誘發電位（TcMEPs）式術中神經生理監測（IONM）已在選定機構開展，並取得了不同程度的成功。此篇文章描述在辛辛那提兒童醫學中心使用多學科循證監護新演算法的背景下進行 IONM 的經驗。

方法：進行電子病歷回顧並收集 2016 年 9 月至 2018 年 3 月在作者醫院所有行非脊柱手術的 MPS 患者資料。通過 IONM 記錄，包括手術方式和患者合併症，來確認患者。提取以下資料：人口統計學資料、發病率、脊柱側凸程度、術中用藥及生命體征、手術類型、IONM 資料、手術時長和失血量。對收集的所有變數和資料進行了描述性分析。另外，術中任何的 IONM 監測變化都被識別、記錄下來，並且對造成這種變化的影響因素進行了描述。

結果：有 38 位診斷為 MPS 的患者進行了非脊柱手術，其中 21 位元根據監護演算法得到的術前決策接受了 IONM。根據這 21 位元患者資料得到所有患者的可靠基線電壓。這 21 位患者中 3 人出現了明顯的神經生理改變，需要手術/麻醉干預。所有變化都持續了幾分鐘，即時 IONM 能夠實現在變化出現時即刻捕捉。沒有患者殘留長期的神經功能缺陷。因此，根據本演算法，不符合 IONM 使用

標準的兒童（n=13）術後出現神經功能缺陷的概率為 0%（97.5%置信區間[CI], 00%-25.5%），而滿足使用標準且進行 IONM 的兒童，14%（95% CI, 11.5%-30.1%）出現了明顯的 IONM 改變。

結論：通過這一系列病例，研究者描述了使用 IONM 的經驗和指導 MPS 患者非脊柱手術麻醉管理的新演算法。作者推斷，這是一項為高風險人群提供安全麻醉管理的有用工具。

（鄒沅芫 譯 陳傑 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 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.

衰弱與多系統創傷後不良結局的關係：一項系統回顧和薈萃分析

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

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背景：在眾多臨床情況下，衰弱強烈預示著不良結局，然而，缺乏對衰弱相關的創傷結局進行系統回顧和定量分析。研究者目標是對衰弱和多系統創傷後不良結局（主要結局-死亡原因、併發症、衛生資源花費和次要結局-病人體驗）的關係進行系統性回顧和薈萃分析。

方法：註冊（CRD42018104116）成功後，研究者使用一種同行評議的搜索策略，搜索平臺包括 MEDLINE、EMBASE 和護理和專職醫療資料庫（CINAHL），截止日期 2019 年 3 月 22 日，納入標準包括：（1）多系統創傷；（2）患者年齡≥18 歲；（3）應用明確的衰弱評估量表；（4）有相關結局。排除研究的標準包括：（1）缺乏對照組；（2）孤立傷；以及（3）混淆創傷和非創傷群體。入排標準獨立實施，標題/摘要和正文均有，一式兩份。偏倚風險通過非隨機干預研究中的偏倚風險（ROBINS-I）工具來評估。採用隨機效應模型對預先根據混雜因素調整的效應測量進行混合，否則只能採取敘述性綜合的方法。

結果：共納入 16 項研究、參與者 5198 人；衰弱患者死亡率為 9.9%，與之相比，

非衰弱患者死亡率為 4.2%。衰弱與死亡率升高（校正後的比值比[OR]，1.53；95%置信區間[CI]，1.37-1.71），併發症增加（校正後的 OR，2.32；95% CI，1.72-3.15）和出院結局不良（校正後的 OR，1.78；95% CI，1.29-2.45）相關。患者功能、體驗和衛生資源花費等結局少有報導。

結論：衰弱患者多系統創傷後死亡率、併發症和出院不良結局顯著增加。這為與患者和家屬討論提供了重要的預後資訊，並且強調了優化創傷系統，以滿足老年病人的複雜需求。

（鄒沅芫 譯 陳傑 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 ≥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.

對衰弱患者的姑息性治療和臨終關懷

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

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衰弱患者經歷環境相關的身心痛苦，且與非衰弱同齡人相比，有更高的發病率和死亡率。姑息性治療是一項跨學科的醫學領域，旨在提升疾病期間危重患者的生活品質，包括衰弱患者。麻醉醫生在圍術期和重症監護室（ICU）經常會接觸到衰弱，在臨終關懷過程中，他們能夠提升患者的生活品質。作者強調在首診醫師進行包括基礎症狀治療、指定目標討論時加入姑息性治療的可能性，必要時，如遇到複雜症狀治療、團隊或患者家人對於治療意見產生分歧時，及時諮詢專業的姑息性治療團隊以求幫助。這篇綜述列舉了衰弱患者姑息性治療的原則，而且綜合了將姑息性治療整合入圍術期和 ICU 的方法。

（鄒沅芫 譯 陳傑 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.

體弱者在重症監護的醫療：綜述

Frailty in Critical Care Medicine: A Review

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傳統的臨床風險評估方法利用年齡作為壓力易感性的標誌。衰老研究的相對較新的發展提出了衰弱綜合症的概念，它代表了生理和社會心理儲備枯竭和臨床易感性的多維狀態，該狀態與年齡的增長有關，但變化不定。衰弱綜合症現在是一個完善的臨床實體，既可以作為臨床干預的指南，又可以作為初級和急診護理下不良預後的預測指標。該綜合征的生物學方面廣泛地體現了相互關聯的網路，包括與年齡相關的分子、細胞和組織層面的損傷積累，從而導致多系統失調，功能下降，以及對生理壓力的反應異常差。考慮到生物學過程的複雜性，已經開發了幾種有效的臨床定義脆弱性的方法，每種方法都有獨特而合理的考慮。從這種背景出發，過去幾年中，在重症監護室進行了許多觀察性研究，這些研究已經確定，在重症監護中，衰弱綜合征的確定既可行又可預測。具體而言，由幾種不同的衰弱測量工具確定的體弱似乎與死亡率、醫療利用增加和殘疾程度相關，並且具有改善重症監護患者風險分層的潛力。儘管衰弱測量方法實施過程中的巨大差異可能會限制特定結果的普遍性，但總體預後趨勢可能會為指導患者及其家人的管理決策提供一些幫助。儘管尚無試驗取得相應干預措施以改善重症的體弱的老年人的結局，但該人群的特殊易感性為將來的干預提供了有希望的目標。

（許芳霞譯 李金寶校）

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 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.

美國促進康復和圍手術期品質協會關於術後譫妄預防的共識聲明

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

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術後譫妄是一種老年人綜合症，表現為手術後認知，注意力和意識水準的變化。大手術後高達 50%的患者會發生此病，並伴有不良預後，包括住院時間增加，護理費用增加，出院後去收容所的比例更高和再入院率更高。此外，它與手術後的功能減退和認知障礙有關。隨著我們外科手術人群的年齡和醫療複雜性的增加，從業者需要識別和預防譫妄的高危人群。由於譫妄是術後常見的併發症，因此最近有大量由各種專業的臨床醫生進行的針對譫妄的研究。也有一些綜述和建議聲明；但是，這些並不是基於可靠的證據。第六屆圍手術期品質協會（POQI-6）共識會議召集了一個由多學科專家組成的團隊，正式調查和評估有關術後譫妄預

防的文獻，並使用重複的 Delphi 流程和用來評估生物醫學文獻的證據推薦分級的評價、制定與評估（GRADE）標準來提供基於證據的建議指南。

（許芳霞譯 李金寶校）

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 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.

舒更葡糖鈉在孕婦和生育期婦女中的應用：敘述性綜述。

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

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自 2008 年開始臨床應用以來，與新斯的明相比，舒更葡糖鈉具有更高的安全性和優越的療效，可用於拮抗類固醇非去極化神經肌肉阻滯劑產生的肌肉鬆弛。包括在特殊人群中使用，例如老年人，2 歲以上的兒童以及患有腎，肝或肺疾病的患者。相反，指導該藥在懷孕期，生育期和哺乳期婦女中使用的臨床證據很少。但在接受全麻（GA）進行剖宮產（CD）的產婦中，關於在手術結束時給藥的有效性和安全性的證據正在迅速增加。我們對以下證據進行了回顧性研究：在給予大劑量羅庫溴銨後發生無法插管/無法通氣（CICV）時立即給予舒更葡糖鈉搶救

逆轉的情況，母體給予的舒更葡糖鈉後的胎盤轉移程度，胎兒暴露于舒更葡糖鈉下的不良影響，維持早孕的潛在影響，以及轉移至母乳的程度。最後，許多麻醉學家似乎會注意製造商的警告，告知婦女在接受舒更葡糖鈉暴露後激素避孕失敗的風險。我們提供了在舒更葡糖鈉給藥後通常報告的事後諮詢的醫學倫理分析，這有助於術前討論和共同決策，或者由醫生決定使用新斯的明。這篇綜述著重指出了在女性不同的生殖健康情況下使用舒更葡糖鈉的證據存在差異，包括當前的研究空白，使得該人群無法共用大多數圍手術期患者享有的舒更葡糖鈉的好處。

（許芳霞譯 李金寶校）

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 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.

心臟手術患者有創血壓和無創血壓測量對信號複雜性和手術風險的比較

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

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背景：連續動脈血壓（ABP）通常通過放置動脈內導管來記錄。最近，非侵入式 ABP 監測器已顯示出與侵入式測量相當的準確性。在先前的研究中，我們顯示逐搏 ABP 測量值的波動不是隨機變化，而是具有複雜的動力學結構，並且 ABP 動力學複雜性與使用胸外科醫師協會（STS）指數估算的手術風險成反比。動力學複雜性是一種數學結構，反映了生理系統適應刺激的能力。本研究的目的是：（1）確定無創性逐搏 ABP 測量是否也表現出複雜的時間結構；（2）比較無創與有創 ABP 時間序列的複雜性；（3）量化無創 ABP 時間序列的複雜度與 STS 風險評分之間的關係。

方法：本研究納入了 15 例接受冠狀動脈搭橋、瓣膜置換或冠脈搭橋/瓣膜置換聯合手術的成年患者。使用動脈導管（有創）和連續無創動脈壓監測儀同時記錄術前 ABP 波形≥15 分鐘。從連續波形中提取逐搏收縮壓（SBP），舒張壓（DBP），脈壓（PP）和平均動脈壓（MAP）的時間序列。使用多尺度熵方法評估複雜性。Wilcoxon 符號秩檢驗用於比較有創 ABP 時間序列與無創 ABP 時間序列得出的指數的平均等級。Spearman 相關係數用於量化有創和無創指數之間的關係。線性回歸分析用於量化每個複雜性指標和 STS 風險評分之間的關聯。

結果：無創 ABP 測量中的逐次波動不是隨機的而是複雜的。但其複雜性低於有創方式獲得的 ABP 信號的波動程度（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 Σ·斜率的有創指數和無創指數顯示出良好的相關性（rs）（SBP 為 0.53，DBP 為 0.79，PP 為 0.42，MAP 為 0.60）。無創 ABP 時間序列的複雜性（-0.70 [-1.28

至-0.11]；對於 DBP 為 P = .023），類似於有創時間序列的複雜性（-0.94 [-1.52 至-0.35]；對於 DBP 為 P = .004）與接受心血管手術的患者估計的手術風險呈負相關。

結論：我們的研究結果表明，在計算基於複雜性的指數和預計手術相關風險的相關性時，可使用無創 ABP 監測。

（許芳霞譯 李金寶校）

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 ≥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 MSEΣ·slope showed good correlation (rs) (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.

一種形式並不適合所有人：針對美國麻醉醫師學會對小兒患者身體狀況進行分類劃分的觀點

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

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背景：美國麻醉醫師協會身體狀況（ASA-PS）分類系統主要依據合併症對患者進行分類，被廣泛應用於全身麻醉前的患者。儘管它很受歡迎，但由於 ASA-PS 分類系統的主觀定義，尤其是在應用于兒科人群時，可靠性較差。我們假設澄清 ASA-PS 定義以更好地反映兒科疾病，將提高 ASA-PS 應用于該人群的準確性。

方法：從三級兒科醫院收集了 120 例兒科手術病例的分層隨機樣本。一組高年資麻醉醫師使用建議的兒科專用 ASA-PS 定義，對該樣本中患者的 ASA-PS 進行了重新分類。使用組內相關係數（ICC）和 Fleiss κ 統計量來評估其可靠性。此外，由高年資麻醉醫師討論進行的一項定性研究確定了 ASA-PS 的歧義區域。

結果：在 ASA-PS 組內的 90 個重新分類中，42.2%（n = 38）的 ASA-PS I 升級為 ASA-PS II，36.7%（n = 33）的 ASA-PS II 升級為 ASA-PS III。此外，28.9%（n = 26）的 ASA-PS III 升級到 ASA-PS IV，24.4%（n = 22）的 ASA-PS IV 降級到 III。重新分類的 ASA-PS 分類的可靠性為 0.77（95%置信區間[CI]為 0.71-0.83；P <.001），表明一致性良好。ASA-PS II 和 III 患者的 Fleiss κ 統計最低（分別為 κ= 0.41 和 κ= 0.30），表明在這些亞組中除了偶然性外，一致性也較低。討論群組揭示了一些共同的主題，例如疾病的後遺症，合併症的活動性與可控性以及可

能存在的功能局限性作為重要考慮因素。

結論：ASA-PS 分類系統具有多個優點，包括易於使用，簡單和靈活。但是，修改 ASA-PS 系統為小兒患者提供更好的指導可能很有價值。儘管本研究通過 ASA-PS 的兒科定義證明了其良好的可靠性，但仍需要進一步的工作來闡明 ASA-PS 在中檔分類（ASA-PS II 和 III）中的準確分配，並探索在其他機構中的執行情況。

（許芳霞譯 李金寶校）

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 κ 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 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 κ 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.

多中心圍術期預後小組針對術後疼痛狀況，止痛藥使用，慢性疼痛轉化以及阿片類藥物過量和延長使用模式的觀察研究

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

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為研究麻醉中阿片類藥物相關結局與急性和慢性術後疼痛的影響，我們開展了一項多中心研究，將來自多個機構的詳細圍手術期資料進行了綜合分析。通過將術前和術後患者自訴的結果與通過多中心圍手術期結果組（MPOG）自動提取的高解析度的術中資料相結合，作者試圖描述患者特徵，術前心理因素，手術過程，麻醉過程，術後疼痛管理，以及根據出院後疼痛狀況制定的出院後疼痛管理和阿片類藥物使用模式。這項研究的獨特之處在于，它利用與 MPOG 框架和資料庫集成的數位病例報告表來收集多中心前瞻性資料。因此，該研究可以作為使用該創新方法的未來研究的模型。完整的結果將在以後的文章中進行報告；本文的目的是描述本研究的方法。

（許芳霞譯 李金寶校）

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

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.

乳房手術後恢復的品質：比較了傷口局部浸潤與胸神經筋膜間平面（胸 II）神經阻滯的一項多中心隨機臨床試驗

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

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背景：胸神經（PECS II）阻滯是一種常見的乳腺癌手術區域鎮痛技術。外科醫生的傷口局部浸潤或 PECS II 阻滯可能可改善包括恢復品質（QoR）在內的預後。

方法：在這項多中心隨機臨床試驗中，接受乳房手術的 104 名女性患者被分為以下兩組：（1）胸神經局麻藥神經阻滯和 0.9％鹽水傷口浸潤（PECS 組）或（2）胸神經 0.9％生理鹽水阻滯和局麻藥傷口浸潤。患者，麻醉師，外科醫生，護理人員和研究助手對分組都不知情。患者均接受標準化的全身麻醉和多模式鎮痛。主要結果是術後 24 小時測量的多維（疼痛，舒適度，獨立性，心理，情感）QoR-15 問卷的總分（最高分 150 分；良好康復 118 分）。次要結果是疼痛及其干擾，在術後 24 小時和 3 個月使用簡明疼痛評估量表（BPI）簡短形式進行評估（0，最佳；120，最壞）。使用 Wilcoxon 秩和檢驗比較隨機分配的兩組的結果，結果顯示為中位數差異（95％置信區間）。

結果：從 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 名患者進行了乳房切除術，其餘患者為微創性手術。基礎的 QoR-15 總分用中位數[四分位元數]顯示，在 PECS 組中為 135 [129，143]，在傷口浸潤組中為 139 [127，143]。24 小時 QoR-15 總分中位數，在 PECS 組為[四分位數]為 131 [116，140]，滲透組為 123 [117，143]（P = .60），中位數差異（95％置信區間）為-2（-9 至 5）。傷口浸潤組減去 PECS 組的 QoR-15 總分的中位數差異為疼痛 0（-2 至 1），身體舒適度-1（-3 至 2），身體獨立性 0（-2 至 1），心理支持 0（0- 0）和情緒 0（-1 至 2）（P> .28）。24 小時的 BPI 疼痛分量表（0-40，得分越低表示疼痛越少）也用中位數表示[四分位數]，PECS 組為 7 [2，13]，浸潤組為 10 [5，17]（P = .15）。PECS 組在 24 小時的 BPI 總分（中位數[四分位數]）為 20 [7，36]，滲透組為 23 [10，43]（P = 0.34），而 3 個月時分別為 0 [0，14] 和 0 [0，11]（P = .85）。

結論：大部分乳腺癌的微創手術的預後中，PECS II 阻滯並不優於外科醫生的傷口局部浸潤。

（許芳霞譯 李金寶校）

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, 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.