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# ANESTHESIOLOGY

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## Editorial

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## Perioperative Medicine

### CLINICAL SCIENCE

  **Quality of Labor Analgesia with Dural Puncture Epidural *versus* Standard Epidural Technique in Obese Parturients: A Double-blind Randomized Controlled Study**

*H. S. Tan, S. E. Reed, J. E. Mehdiratta, O. I. Diomedes, R. Landreth, L. A. Gatta, D. Weikel, A. S. Habib* .....678

A total of 132 term parturients with a body mass index of 35 kg · m<sup>-2</sup> or greater were randomized to either a dural puncture epidural using a 25-gauge Whitacre needle or a standardized epidural technique. This was followed, in both groups, by maintenance with programmed intermittent boluses and patient-controlled epidural analgesia. The primary outcome


was a composite of five outcomes indicating lower quality of labor analgesia. There was no meaningful difference between the two groups (52 vs. 49%; absolute risk difference, 3.0%; 95% CI, -14.0 to 20.1%) in the primary outcome or the secondary outcomes assessed. The study excludes a large benefit for dural puncture epidural in improving labor analgesia in obese parturients, although CI ranges for the primary outcome were wide and do not fully exclude the potential for a clinically meaningful effect.

SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT

  **Self-reported Race/Ethnicity and Intraoperative Occult Hypoxemia: A Retrospective Cohort Study**

*G. W. Burnett, B. Stannard, D. B. Wax, H.-M. Lin, C. Pyram-Vincent, S. DeMaria, Jr., M. A. Levin* .....688

Among 46,523 patients with 151,070 paired arterial oxygen saturation (Sao<sub>2</sub>)—oxygen saturation measured by pulse oximetry (SpO<sub>2</sub>) intraoperative readings at a single center, the prevalence of occult hypoxemia (Sao<sub>2</sub> less than 88% despite concurrent SpO<sub>2</sub> greater than 92%) was significantly increased in patients self-reporting Black (2.1%) and Hispanic (1.8%) race/ethnicity compared with patients self-reporting White (1.1%) race/ethnicity. After adjusting for other clinical factors, Black or Hispanic race/ethnicity was independently associated with occult hypoxemia. SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT

 **Frequency and Risk Factors for Difficult Intubation in Women Undergoing General Anesthesia for Cesarean Delivery: A Multicenter Retrospective Cohort Analysis**

*S. C. Reale, M. E. Bauer, T. T. Klumpner, M. F. Aziz, K. G. Fields, R. Hurwitz, M. Saad, S. Kheterpal, B. T. Bateman, Multicenter Perioperative Outcomes Group Collaborators* .....697

In a cohort of more than 14,000 women receiving general anesthetics for cesarean delivery, the risk of difficult intubation was 1 in 49, and the risk of failed intubation was 1 in 808. Risk factors for difficult intubation included increased

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**ON THE COVER:** The dural puncture epidural technique may improve analgesia quality by confirming midline placement and increasing intrathecal translocation of epidural medications. This would be advantageous in obese parturients with increased risk of block failure. In this issue of ANESTHESIOLOGY, Tan *et al.* test the hypothesis that quality of labor analgesia will be improved with dural puncture epidural compared to standard epidural technique in obese parturients. In an accompanying editorial, Segal and Pan describe the evolution of the dural puncture epidural technique and conclude that the overall impact of this technique on the quality of labor analgesia is modest at best. Cover Illustration: A. Johnson, Vivo Visuals Studio.

- Tan *et al.*: Quality of Labor Analgesia with Dural Puncture Epidural *versus* Standard Epidural Technique in Obese Parturients: A Double-blind Randomized Controlled Study, p. 678
- Segal and Pan: Dural Puncture Epidural for Labor Analgesia: Is It Really an Improvement over Conventional Labor Epidural Analgesia? p. 667

body mass index, Mallampati score III or IV, small hyoid-to-mentum distance, limited jaw protrusion, limited mouth opening, and cervical spine limitations.

## BASIC SCIENCE

### A Neural Circuit from the Paraventricular Thalamus to the Bed Nucleus of the Stria Terminalis for the Regulation of States of Consciousness during Sevoflurane Anesthesia in Mice

J.-Y. Li, S.-J. Gao, R.-R. Li, W. Wang, J. Sun, L.-Q. Zhang, J.-Y. Wu, D.-Q. Liu, P. Zhang, B. Tian, W. Mei .....709

Chemogenetic inhibition of paraventricular glutamatergic neurons in the mouse thalamus projecting to the bed nucleus of the stria terminalis reduced induction time and prolonged emergence from sevoflurane anesthesia, while activation of this pathway had opposite effects. These observations suggest that glutamatergic neurons of the paraventricular thalamus contribute to the mechanisms of actions of sevoflurane anesthesia *via* their projections to the bed nucleus of the stria terminalis. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

## Critical Care Medicine

### CLINICAL SCIENCE

#### Extracorporeal Membrane Oxygenation for Respiratory Failure Related to COVID-19: A Nationwide Cohort Study

N. Nessler, G. Fadel, A. Mansour, M. Para, P.-E. Falcoz, N. Mongardon, A. Porto, A. Bertier, B. Levy, C. Cadoz, P.-G. Guinot, O. Fouquet, J.-L. Fellahi, A. Ouattara, J. Guihaire, V.-G. Ruggieri, P. Gaudard, F. Labaste, T. Clavier, K. Brini, N. Allou, C. Lacroix, J. Chommeloux, G. Lebreton, M. A. Matthay, S. Provenchere, E. Flécher, A. Vincentelli, for the ECMOSARS Investigators.....732

In this investigation, most patients were cannulated by a mobile extracorporeal membrane oxygenation unit without a negative impact on mortality. Based on this report, venovenous extracorporeal membrane oxygenation support should be considered within the first week of mechanical ventilation initiation for optimal outcomes. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

## BASIC SCIENCE

### Early Restrictive Fluid Strategy Impairs the Diaphragm Force in Lambs with Acute Respiratory Distress Syndrome

M. M. Ijland, S. A. Ingelse, L. M. van Loon, M. van Erp, B. Kusters, C. A. C. Ottenheim, M. Kox, J. G. van der Hoeven, L. M. A. Heunks, J. Lemson .....749

Using an ovine model of pediatric acute respiratory distress syndrome with lung-protective ventilation, the authors compared a strict restrictive fluid strategy with norepinephrine to a liberal fluid strategy over a 6-h period evaluating transdiaphragmatic pressure over a wide range of positive end-expiratory pressure levels along with evaluation of diaphragm microcirculation, histology, and biomarkers reflective of inflammation

and oxidative stress. Baseline measurements of transdiaphragmatic pressures before lung injury showed an inverse relationship with increasing positive end-expiratory pressure. Fluid restriction significantly reduced transdiaphragmatic pressures at positive end-expiratory pressure levels of 5 and 10 cm H<sub>2</sub>O but not at 15 or 20 cm H<sub>2</sub>O. Microvessel density was significantly reduced, although the histology and markers of inflammation and oxidative stress were not affected. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

### Phrenic Nerve Block and Respiratory Effort in Pigs and Critically Ill Patients with Acute Lung Injury

S. M. Pereira, B. E. Sinedino, E. L. V. Costa, C. C. A. Morais, M. C. Sklar, C. Adkson Sales Lima, M. A. M. Nakamura, O. T. Ranzani, E. C. Goligher, M. R. Tucci, Y.-L. Ho, L. U. Taniguchi, J. E. Vieira, L. Brochard, M. B. P. Amato .....763

The authors evaluated the effects of phrenic nerve block in a porcine model of acute respiratory distress syndrome and in nine patients with excessive inspiratory effort with acute respiratory distress syndrome on mechanical ventilation evaluating transdiaphragmatic pressures and electrical activity, as well as distribution of ventilation by electrical impedance tomography. In both groups, tidal volume, driving pressure, peak transpulmonary pressure, and electrical activity of the diaphragm decreased significantly with phrenic nerve block, with a slight decrease in dependent ventilation, while the respiratory rate was unchanged. Duration of the block was approximately 12 h. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

### Prone Position Minimizes the Exacerbation of Effort-dependent Lung Injury: Exploring the Mechanism in Pigs and Evaluating Injury in Rabbits

T. Yoshida, D. Engelberts, H. Chen, X. Li, B. H. Katira, G. Otulakowski, Y. Fujino.....779

The authors utilized porcine and rabbit models of lung injury to evaluate pulmonary mechanics, distribution of ventilation, and biochemical and histologic effects on lung injury with varying positive end-expiratory pressure levels. Independent of positive end-expiratory pressure levels, prone positioning reduced maldistribution of lung stress and reduced effort-dependent evidence of lung injury. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

## Pain Medicine

### CLINICAL SCIENCE

#### Ketamine Psychedelic and Antinociceptive Effects Are Connected

E. Olofson, J. Kamp, T. K. Henthorn, M. van Velzen, M. Niesters, E. Sarton, A. Dahan .....792

In a planned secondary analysis, a population pharmacokinetic–pharmacodynamic model of ketamine and its metabolite norketamine was developed to describe the relationship between effect site concentrations of *S*- and *R*-ketamine and their metabolites and pressure pain threshold

and the change in external perception as a measure of ketamine psychotropic effect. The pharmacodynamics of *S*-ketamine did not differ for antinociception and external perception, which had the same potency parameter ( $C_{50}$ ) and plasma-effect site equilibration half-time whether administered as racemic ketamine or *S*-ketamine. *R*-ketamine did not contribute to either endpoint, while *S*-norketamine had a small antagonistic effect for both endpoints.

## BASIC SCIENCE



### Slick Potassium Channels Control Pain and Itch in Distinct Populations of Sensory and Spinal Neurons in Mice

*C. Flauaus, P. Engel, F. Zhou, J. Petersen, P. Ruth, R. Lukowski, A. Schmidtke, R. Lu*.....802

Using male and female mouse models, it was observed that Slick reduces responses to noxious thermal and chemical stimulation. Conversely, Slick expressed on spinal interneurons facilitates somatostatin-induced itch. Analgesics targeting Slick channels may decrease pain but could increase itching if they reach the central nervous system. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

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#### Mechanical Circulatory Support with the Transvalvular Heart Pump

*I. Y. Wu, J. A. Wyrobek, Y. Naka, M. L. Dickstein, L. G. Glance*.....829

Use of the transvalvular heart pump to provide short-term circulatory support in the perioperative setting is growing. The considerations for the perioperative management of patients receiving transvalvular heart pump support are reviewed for the anesthesiologist.

### REVIEW ARTICLE

#### ◇ Immune Modulatory Effects of Nonsteroidal Anti-inflammatory Drugs in the Perioperative Period and Their Consequence on Postoperative Outcome

*D. J. Bosch, G. J. Nieuwenhuijs-Moeke, M. van Meurs, W. H. Abdulahad, M. M. R. F. Struys*.....843

Nonsteroidal anti-inflammatory drugs have immune modulatory effects in animal models and significantly affect outcome. In clinical studies, however, the immune-modulating effects of these drugs on perioperative outcome are much less evident.

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