Ultrasound-guided Internal Jugular Venous Cannulation Compared with Traditional Palpation Method in Infants. Verghese et al. (page 71)

Internal jugular venous cannulation is routinely performed in infants undergoing open heart surgery to monitor central venous pressure and to infuse vasoactive drugs. The incidence of carotid artery (CA) puncture varies from 8.5-23% and is higher in infants than in adults because of the proximity of the CA to the internal jugular vein and to infants' smaller caliber vessels. In 95 infants (all aged < 12 months), Verghese et al. prospectively compared two-dimensional real-time ultrasound with the traditional method of palpating the CA and identifying anatomic landmarks as guides for cannulation.

After induction of general anesthesia and placement of routine monitors and peripheral intravascular catheters, the infants were randomized to one of two approaches for guiding internal jugular venous cannulation: landmarks or ultrasound. All procedures were performed by pediatric anesthesia fellows who had been trained specifically in both methods, and who were supervised by attending specialists in cardiac anesthesia. The cannulation time, number of attempts, success rate, and incidence of complications were compared between the two groups. In the ultrasound group, the success rate was 100%, with no CA punctures, whereas in the landmarks group, the success rate was 77%, with a 25% incidence of punctures. The larger number of CA punctures in the landmarks group may have been partially attributable to the high approach that was chosen by the researchers to avoid the increased incidence of pneumothorax associated with the low approach. In addition, all infants in the study weighed less than 10 kg. Using real-time two-dimensional ultrasound guidance, the impact of anatomic variations of the internal jugular vein and CA in the infant neck was minimized.

Do Obstetricians’ Use Rates of Epidural Analgesia Predict Rates of Cesarean Section for Dystocia? Segal et al. (page 90)

Does the use of epidural analgesia affect the progress and outcome of labor and increase the incidence of cesarean section for dystocia? In an attempt to address the ongoing controversy and shed light on the possible relationship between type of analgesia and delivery outcome, Segal et al. analyzed data from 110 obstetricians caring for low-risk patients who were admitted for intended vaginal deliveries. Providers with 50 or more deliveries were included in the study, which spanned a 5-yr period. Type of delivery (spontaneous vaginal, vacuum extraction, forceps, or cesarean section), reasons for cesarean section, type of anesthesia, and patient data (e.g., maternal age, frequency of nulliparity, preterm or postdate infants) were included in the data summaries.

For analysis, the researchers listed the number of each type of delivery and number of patients that received each type of anesthesia for every obstetrician in the study. The total number of patients who received an epidural block divided by the total included patient volume yielded the epidural use rate. Cesarean section rates for dystocia and for all indications were also calculated. Stepwise linear regression modeling was used in an attempt to predict a given obstetrician’s cesarean section rate for dystocia from the characteristics of the practitioner’s patient population. Associations between mode of delivery and epidural analgesia, maternal age, nulliparity, birth weight, induction of labor, nonterm gestational age, insurance type, and low Apgar scores were also analyzed.

More than 50% of the patients included in the investigation received epidural analgesia for intended labor and vaginal delivery. However, the researchers found no relationship between the frequency of epidural analgesia and rate of cesarean section for dystocia across practitioners. The only four factors significantly related to a practitioner’s cesarean section rate for dystocia were nonterm gestation, frequency of low or high birth weight, frequency of induced labor, and low 1-min Apgar scores for the infant. There are individual practitioners with low cesarean section rates and high epidural analgesia rates, and those who have opposite or intermediate patterns. More studies are necessary to illuminate the mechanisms of the former pattern, which might foster reductions in cesarean section rates while retaining the ability to offer epidural analgesia to women who desire it.

Porcine Model Used To Study Impact of Hemorrhagic Shock on Opioid Pharmacokinetics. Egan et al. (page 156)

Reducing the dose of intravenous anesthetic agents in patients suffering from hemorrhagic shock is common in
clinical practice. Although clinicians intuitively accept
the notion that hemorrhagic shock alters pharmacokinetics, there is scant scientific foundation for this as-
sumption. Accordingly, Egan et al. fasted 18 Hampshire-
Yorkshire crossbred pigs and then randomly assigned
them to one of two groups to investigate whether the
distribution and clearance of fentanyl would be de-
creased in a porcine hemorrhage model. After induction
of anesthesia and appropriate instrumentation, the
researchers recorded baseline values of heart rate, mean
arterial pressure, central venous pressure, pulmonary
capillary wedge pressure, cardiac output, pH, tempera-
ture, hematocrit, lactate, and arterial and venous blood
gases. Pigs assigned to the “shock” group were subjected
to hemorrhagic shock after intravenous administration
of 5,000–6,000 U of heparin. The animals were bled
until the mean arterial pressure was reduced to 40–45
mmHg; it was maintained at that level throughout the
study. Fentanyl (50 µg/kg) was infused intravenously
over a 5-min period in both groups of animals. Those in
the shock group received fentanyl after the target mean
arterial pressure of 40 mmHg had been maintained for
1 hr. Blood samples were collected from aortic catheters
before drug administration and at regular intervals up to
370 min after drug infusion was begun.

Each animal’s pharmacokinetic parameters were esti-
mated by fitting a three-compartment model to the con-
centration versus time data. Nonlinear mixed-effects
population PK models examining the influence of mean
arterial pressure and cardiac index were also con-
structed. A computer simulation examined the concentra-
tion versus time profiles that result from a typical
dosage scheme in shock versus control subjects. Results
of that simulation suggested that, compared with con-
trols, shock subjects receive a relative overdose. The
50% and 80% decrement time simulations demonstrated
that fentanyl was longer-acting in the shock animals,
even when dosing adjustments were made.

Pigs in the shock cohort had higher fentanyl concen-
trations than those in the control group. Central clear-
ance and central and second compartment distribution
volumes were significantly reduced for those in the
shock group. However, the study did not address the
impact of pharmacodynamic changes on the overall
pharmacologic behavior of fentanyl, and extrapolating
these results to a human population may be difficult.

### Surfactant Replacement Therapy after Acute Lung Injury in Rabbits. Nishina et al. (page 240)

In a four-part study in rabbits, Nishina et al. determined
the effects of exogenous surfactant administered after
acute lung injury induced by intratracheal instillation of
acidified milk products. After induction of anesthesia,
intubation, and muscle relaxation, all animals were me-
chanically ventilated using an infant ventilator. Baseline
values of lung compliance and hemodynamics were mea-
sured, and arterial blood samples were obtained for
determination of PaO₂, PaCO₂, and peripheral leukocyte
counts. In study 1, 28 rabbits were assigned randomly to
one of four groups: three received acidified infant for-
matula (titrated to a pH of 1.8 by adding 6 N HCl), and the
fourth received acidified saline. Two of the first three
groups received intratracheal surfactant (100 and 200
mg/kg, respectively) 30 min after instillation of the aci-
dified infant formula. In study 2, three groups of rabbits
received acidified breast milk, and the control group
received acidified saline. Two groups received surfactant
in doses of 100 mg/kg or 200 mg/kg 30 min after instil-
alization of the acidified breast milk. The third group re-
ceived no postinjury surfactant.

The animals were observed for 4 hr in studies 1 and 2.
In studies 3 and 4, experiments were conducted in the
same manner, but the animals were observed for 12 hr.
After each study was completed, the animals were killed,
and their lungs were excised for bronchoalveolar lavage,
lung wet-to-dry-weight ratios, and histologic examina-
tions.

Both types of acidified milk products caused physio-
logic and histologic lung damage, confirming results
of other observations of this model of acute lung injury.
The alveolar to arterial oxygen gradient increased, as did
other observations of this model of acute lung injury.
Both types of acidified milk products caused physiologic
and histologic lung damage, confirming results of
other observations of this model of acute lung injury.

### Gretchen Henkel

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