A Guide to Pediatric Anesthesia

Craig Sims
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Second Edition

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Ten Current Issues in Pediatric Anesthesia and Where to Find Them

1. **Emergence Delirium**
   Young children sometimes wake from anesthesia crying and unhappy. There are many reasons for this, although sevoflurane dysphoria is commonly blamed. See Chap. 2.
2. **The Uncooperative Child**
   Many children become anxious during induction of anesthesia, and their anxiety may cause them to become uncooperative. There are many ways to reduce children's anxiety. See Chap. 3.
3. **Videolaryngoscopes**
   Many types of videolaryngoscopes are now available in sizes suitable for children. Their use is being informed by new studies, including the PediRegistry study of difficult airway management in children. See Chap. 4.
4. **Reducing Perioperative Respiratory Complications**
   Respiratory complications are the leading cause of morbidity in pediatric anesthesia, and there has been a surge in studies looking at the risk factors for them and how to modify the risk. See Chap. 11.
5. **Shorter Fasting Times for Clear Fluids**
   It is now realized clear fluids leave the stomach quickly, and allowing them up to 1 h or less before anesthesia has become common. See Chap. 5.
6. **Neurotoxicity of Anesthetic Agents**
   There is laboratory evidence that many anesthetic agents, including volatiles, affect the developing brain of neonates. See Chap. 2.
7. **The Airway**
   Many anesthetists do not like caring for children because of difficulties managing the pediatric airway. See Chap. 4 for many practical tips.
8. **RSI and Cricoid Pressure**
   The adult technique of rapid sequence induction is dangerous if directly applied to young children. There are calls to abandon the technique and cricoid pressure altogether. See Chap. 1.

9. **Reducing Pain and Distress During Procedures**
   Holding a child down to perform a procedure is becoming less and less acceptable. Many techniques and drugs are now used to make procedures more comfortable and less distressing for the child, parents, and staff. See Chap. 27.
10. **Hypotonic IV Fluids for Children**
    Hypotonic, dextrose-containing solutions have been traditionally used for IV fluids in children. The risk of hyponatremia from these fluids is so high that salt-rich fluids are recommended nowadays. See Chap. 5.

Useful Formulae in Pediatric Anesthesia

Weight

Body weight for infants = (age in months/2) + 4 kg (APLS)

Body weight for children 1–10 years = (age + 4) × 2 kg (UK Resuscitation Council)

Body weight for children older than 10 years = age × 3.3 kg (large variation in normal adolescent weight however) (APLS)

Blood Pressure

Expected systolic blood pressure for children older than 1 year = 80 + (age in years × 2) mmHg.

Fluids

Maintenance fluid rate in mL/h: (4:2:1 rule)

4 mL/kg first 10 kg weight + 2 mL/kg next 10 kg weight + 1 mL/kg for rest of weight (e.g., for a 19 kg child: (10 × 4) + (9 × 2) = 58 mL/h).

Minimum 10% dextrose infusion for neonate day one (4 mg/kg/min) in mL/h = 2.5 × weight in kg (e.g., 3 kg neonate needs at least 7.5 mL/h 10% dextrose)

ETT Size

Uncuffed ETT size for a child over 2 years: Age/4 + 4 = ETT size (inside diameter, mm) (modified Cole formula)

Cuffed ETT size for a child over 2 years: Age/4 + 3.5 = ETT size (ID, mm) (Motoyama formula)

ETT Depth

Position at vocal cords = ID size of ETT (e.g., 4.5 ETT should be 4.5 cm at vocal cords)

Oral ETT length (at lips in cm) = age/2 + 12

Nasal ETT length (at nostril in cm) = age/2 + 15 (and diameter of correct-size nasal ETT same as oral ETT for children)

Neonates: Oral ETT length (at lips in cm) = weight(kg) + 6

Neonates: Nasal ETT length (at lips in cm) = (weight(kg) × 1.5) + 7

Suction Catheter for ETT

Size of suction catheter for ETT (in French Gauge) = 2 × size of ETT (ID)

Urinary Catheter

Urinary catheter size (FG) = 2 × size of ETT (ID)

CVC

Depth for central line placement in right IJV = 10% of height (e.g., 8 cm in an 80 cm long child)

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