Preoperative Evaluation and Considerations of the Pediatric Patient

Megan Brockel, MD
Department of Anesthesiology
Children's Hospital Colorado

The ideal pediatric anesthetic strikes the perfect balance between psychological and clinical considerations and care.

Psychological Evaluation and Preparation

- Significant preoperative anxiety is associated with a stormy induction
- Frequently, the immediate postoperative course is a mirror of the induction experience

Part I: Psychological Considerations

Psychological evaluation and preparation
History
Medications
Physical examination
Diagnostic testing
Fasting
Risks
Anesthetic Prescription and Informed Consent
Premedication and Parental Presence
Emergence agitation

Part II: Clinical Considerations

- Special considerations in pediatric anesthesia
- Significant problems encountered
- Severe problems found
- Anesthetic management issues
- Other patient-specific issues

Pediatric Preoperative Evaluation

Anxiety in Children

- The level of maturity affects the child's understanding and response
- Infants fear separation
  - Stranger anxiety
  - Maintain parental involvement
- Toddlers fear loss of control
  - Allow child to make choices
- Preschool-aged children fear injury
  - Thinking is concrete and literal
- School-aged children fear they may not be able to meet expectations of adults
- Adolescent patients fear death

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Preoperative Anxiety

- Children aged 1 to 6 years are most vulnerable
- Children who are anxious preoperatively have greater distress postoperatively
- The risk of postoperative negative behavior is 3.5 fold greater in children with preoperative anxiety
  - Nightmares
  - Waking up crying
  - Separation anxiety
  - Temper tantrums
  - New-onset enuresis

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The entire family is undergoing the procedure.

Anxiety felt by the parents is transmitted to the child.

Anxiety in Parents:
- Many parents experience more anxiety around anesthesia for their child than they do for surgery.
- More concerned with risks for their child than they would be for themselves.
- Highest anxiety:
  - Child under one year of age.
  - First surgical experience.

Pre-anesthetic Interview:
- Behavioral intervention administered to all patients.
- Direct the focus of attention on the child.
  - Desired: Non-procedural, distracting talk.
  - Non-Procedural, Distracting Talk.
  - Actual control.
  - Undesired: Reassuring/empathetic/apologetic statements.
  - Description of medical equipment/procedures outside the OR.

Preoperative Preparation:
- In the USA, approximately 80% of pediatric surgical procedures are outpatient or same-day admission.
- Development of coping skills is considered the most effective preoperative preparation followed by:
  - Modeling.
  - Play therapy.
  - OR tour.
  - Printed material.

Pre-anesthetic Interview:
- Behavioral intervention administered to all parents.
- Ethical and legal obligation to disclose risk.
- Providers worry that detailed risk information may increase anxiety.
- Studies report conflicting results.

Pre-anesthetic Interview:
- Early adult studies showed that patients given detailed information were more tense and uncomfortable.
- Later studies have shown that patients and parents who receive extensive risk information are no more anxious than those who receive minimal information.
- Parents have expressed desire to have as much information as possible.
Anesthesia providers should note the coping strategies of parents and patients and information should be tailored to the individual.

### History
- Review of all organ systems
- Medications and allergies
- Previous surgical and hospital experiences
  - Response to premedication
  - Difficulties with I.V. access
  - Problems with airway management
- Time of last oral intake, urination, vomiting/diarrhea
- Recent illness
- Secondhand smoke exposure
- Maternal history as well as gestational and birth history

### Medications and Allergies
- Must obtain full medication history
  - Include nonprescription and alternative therapies
- Allergies
  - All medications, food allergies, latex
- All regular medications should be taken morning of surgery (consider holding ACE-inhibitors)
Physical Examination
• Exam of opportunity
• Loose, chipped, or missing teeth, permanent oral appliances

Diagnostic Testing
• Based on the condition of the patient and the planned procedure
• Hematocrit, blood chemistry, and urinalysis are rarely indicated in healthy children
• Pregnancy testing is controversial and guidelines vary from center to center
  • At CHCO, all females over 12 years old and those who have started menstruating require pregnancy tests before anesthesia

Fasting
ASA Fasting Guidelines
<table>
<thead>
<tr>
<th>Reason to fast</th>
<th>Acceptable food to eat while fasting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspiration 9%</td>
<td>Chips (French fries) 4.1%</td>
</tr>
<tr>
<td>Nausea or vomiting 51%</td>
<td>Toast/crackers 22.1%</td>
</tr>
<tr>
<td>Efficacy of anesthesia altered 12.5%</td>
<td>Cereal 17.3%</td>
</tr>
<tr>
<td>Other 17%</td>
<td>Sweets 14.4%</td>
</tr>
<tr>
<td></td>
<td>Gum 14.4%</td>
</tr>
<tr>
<td></td>
<td>Tea with milk 12.5%</td>
</tr>
</tbody>
</table>

Modern guidelines
• Minimize aspiration risk
  • Preserve intravascular volume
  • Maintain plasma glucose levels
• Maximize patient and parent satisfaction

Fasting
• Minimize aspiration risk
• Preserve intravascular volume
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Risks

- A discussion about risk can give them perspective
- Fear among parents stems largely from a lack of information rather than a high risk

Anesthetic prescription and informed consent

- Primary rationale of informed consent is to support and respect the autonomy of the patient, not to decrease anxiety and not to meet legal obligations
- Should strike a balance between providing a detailed description of significant risks while considering the individual needs of the patient
- Comorbidities that increase risk should be described, measures to optimize safety should be explained

Risks

- For a healthy child undergoing simple surgery, the risk of an adverse event is 1:200,000
- The risk of death for all patients is 1:10,000
- The incidence of anesthetic-related death is highest during the first year of life (43:10,000)
- This decreases to 5:10,000 during the second year
- Anesthetic risks increase by a factor of 6 during emergency procedures in all age groups

Anesthetic prescription and informed consent

After meeting the patient and parents, completing a history and physical exam, discussing the risks, benefits, and alternatives, we may proceed with the anesthetic...

Should we give the child premedication? Should the parent accompany the child to the operating room? Both? Neither?

Preoperative Anxiety and Premedication

In health care, informed consent refers to the process whereby the patient and the health care practitioner engage in a dialogue about a proposed medical treatment’s nature, consequences, harms, benefits, risks, and alternatives.

California Appellate Court, decided on Oct 22, 1957. Salgo v Leland Stanford Jr University Board of Trustees.

Midazolam

- Short-acting, water-soluble benzodiazepine with elimination half-life of two hours
- Most widely used premedication for children
- Major advantage is rapid uptake and elimination
- Can be administered IV, IM, nasally, orally, and rectally
- Peak plasma concentrations 10 minutes after IV, 16 minutes after rectal, 53 minutes after oral administration
Preoperative Anxiety and Premedication

**Alpha agonists**
- Cause dose-related sedation by effect in the locus ceruleus through inhibition of adenylate cyclase
- Plasma concentration of clonidine and dexmedetomidine peaks 60-90 minutes after oral administration and plasma concentration of intranasal dexmedetomidine peaks 40-45 minutes after intranasal administration

**Ketamine**
- Phencyclidine derivative produces dissociation of the cortex from the limbic system
- Produces reliable sedation and analgesia while preserving upper airway muscular tone and respiratory drive
- Can be administered IV, IM, nasally, orally, and rectally
- Disadvantages include increased oral secretions, nystagmus, hallucinations, nightmares, delirium (consider concomitant administration of midazolam and/or glycopyrrolate)

Parental Presence at Induction
- Eliminates separation
- Child often does not need premedication
- Parents must understand what to expect
- Entire OR team must have a clear understanding of their roles

Parental Presence versus Sedative Premedication
- 93 children ages 2-8 yr, ASA 1 or 2, GA, elective outpatient surgery
- Three groups:
  1. Parental presence group
  2. Midazolam group
  3. Control group
- Outcome measures:
  1. Anxiety of the child during the perioperative period
  2. Anxiety of the parent, compliance of the child, various recovery measures, parental satisfaction

Parental Presence during Induction of Anesthesia versus Sedative Premedication: Which Intervention Is More Effective?
Zeev N. Kain, MD; Lida C. Meyers, MD; Shu-Ming Wang, MD; Lisa A. Caramico, MD; Maura B. Hofstadter, PhD
**Parental Presence versus Sedative Premedication**

- Parents and children prefer to stay together
- Literature suggests this may not be effective treatment for anxiety of the child
- Allowing a parent into an operating room without significant preparation may be counterproductive

**Preoperative Anxiety and Preparation**

- ADVANCE family-centered behavioral preparation program
  - Anxiety reduction
  - Distraction
  - Video modeling and education
  - Adding parents
  - No excessive reassurance
  - Coaching
  - Exposure/shaping

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**Family-centered Preparation for Surgery Improves Preoperative Outcomes in Children: A Randomized Controlled Trial.**

Kain, Zeev; Caldwell-Andrews, Alison; Mayes, Linda; Weinberg, Megan; Wang, Shu-Ming; MacLaren, Jill; Blount, Ronald


- Family-centered behavioral preparation program
  - Reduced children's anxiety before surgery
  - Reduced incidence of postoperative delirium
  - Shortened discharge time after surgery
  - Reduced analgesic consumption after surgery
**Emergence Agitation**

- Characterized by nonpurposeful restlessness and inconsolability
- Thrashing, screaming, prolonged crying, inconsolability
- Reported incidence 10-50% in children less than 10 years of age
- Usually short lived but can last 45 minutes or longer
- Can lead to injury and prolong PACU stay

**Factors that increase the risk of postoperative emergence delirium**

<table>
<thead>
<tr>
<th>Patient factors</th>
<th>Anesthesia technique</th>
<th>Surgery type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 2-9</td>
<td>Volatile anesthetics</td>
<td>ENT surgery</td>
</tr>
<tr>
<td>Male gender</td>
<td>Time to awakening</td>
<td>Ophthalmologic procedures</td>
</tr>
<tr>
<td>Preoperative anxiety</td>
<td>Pain</td>
<td></td>
</tr>
<tr>
<td>Maladaptive behaviors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of emergence agitation</td>
<td></td>
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</tbody>
</table>

**Prophylaxis of emergence agitation**

<table>
<thead>
<tr>
<th>Medication</th>
<th>Efficacy</th>
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</thead>
<tbody>
<tr>
<td>Midazolam</td>
<td>Effective</td>
</tr>
<tr>
<td>Propofol</td>
<td>Effective</td>
</tr>
<tr>
<td>Opioids</td>
<td>Effective</td>
</tr>
<tr>
<td>NSAIDS</td>
<td>Effective, but less so than opioids</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>Not effective</td>
</tr>
<tr>
<td>Ketamine</td>
<td>Effective</td>
</tr>
<tr>
<td>Alpha agonists</td>
<td>Effective</td>
</tr>
<tr>
<td>Volatile anesthetics</td>
<td>Increase the risk of EA</td>
</tr>
<tr>
<td>Nonpharmacologic treatments</td>
<td>Parental presence not effective, strategies to decrease pre-op anxiety effective</td>
</tr>
</tbody>
</table>

**Treatment of emergence agitation**

- First must rule out cardiorespiratory problems and pain
- Nonpharmacologic treatment
  - Swaddling, reassurance, parental presence
- Pharmacologic treatment
  - Agents useful for prevention are often useful for treatment
    - Propofol, opioids, midazolam, flumazenil, recently dexmedetomidine

**In Summary**

- Preoperative anxiety is associated with postoperative behavioral complications
- The anxiety of the parents influences the anxiety of the child
- Parental presence and/or premedication may help alleviate anxiety in both patients and parents
- Explain what to expect to both patients and parents
- Preoperative intervention can influence postoperative outcomes

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Before anything else, preparation is the key to success.

Alexander Graham Bell
References


