Preventing the Preventable?
Complications of Adenotonsillectomy

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Topics

- Airway Fire
- Burns
- Informed Consent
- Codeine
- Local anesthesia
- Dental Injury

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Airway Fire – Basic Principles

“Fire triad”:

– **Oxidizer** - O2, Nitrous oxide
  - Particularly an oxidizer-enriched environment (closed or semiclosed breathing system)
    - ET tube and trachea (endoscopic airway surgery, tracheotomy), mouth (tonsillectomy), tenting of drapes with nasal cannula (excision of facial lesions), mask ventilation (i.e lingual frenulectomy)

– **Fuel source** – ET tube, gauze, sponge, drapes, hair, gown, soft tissue, etc

– **Ignition source** – Electrocautery, laser
Airway Fire – Basic Principles

- Ensure that drapes are configured so that accumulation of oxidizers does not occur.
- Use nonflammable skin preps (Betadine or Hibiclens) or make sure that a flammable skin prep is completely dry before proceeding.
- Moisten sponges or gauze when used near an ignition source.
Airway Fire

- Incidence in tonsillectomy? – unknown
  - Kaddoum 2006 – 2 case reports
    • Case 1 – uncuffed ET tube, 100% O2
    • Case 2 – uncuffed ET tube, O2 (% not specified), nitrous oxide, positive pressure ventilation
  - 2/154 claims (1.3%) from review of malpractice claims from 1985-2006 (Simonsen 2010)
Airway Fire - Treatment

- **When fire occurs:**
  - Remove ET tube and ignition source
  - Stop flow of gases
  - Remove any flammable material from the airway (i.e. sponges, etc)
  - Pour saline into airway
    - If fire persists, CO2 fire extinguisher

- **When fire is out:**
  - Re-establish ventilation, increase O2 if indicated
  - Examine ET tube to see if fragments are left in airway
  - Consider bronchoscopy
Airway Fire - Prevention

- Use of a cuffed endotracheal tube
  - Historically, uncuffed tubes were used in children <6-8 years old
  - There is significant oropharyngeal O2 contamination when an uncuffed tube is used
    - 71% with positive pressure ventilation, 65% with spontaneous ventilation (FiO2 100%)
    - Oropharyngeal O2 never went above 21% when a cuffed tube was used

Raman 2012
Airway Fire - Prevention

- Decrease FiO2 (ideally <30%)
  - Consider “oxygen timeout” prior to beginning surgery
  - Roy 2011 – no ignition or sustained flame was observed at an O2 concentration of 45% or less

- Avoid nitrous oxide
  - If used, turn it off prior to beginning the procedure and wait 1-3 minutes (Anesthesia Practice Advisory 2013)
Perioral Burns

- **Underreported complication**
  - Nuara 2008
    - 7 cases / 4327 procedures at their institution
    - 61/101 survey respondents reported having a patient with a perioral burn
    - Occurred with many techniques (Bovie > coblator > suction cautery and bipolar)

- **Significant medical liability**
  - Potentially cosmetically devastating and may require further procedures or splinting
  - 18% of T&A malpractice claims (highest percentage of single-cause claims)
Perioral Burns

- Multiple reasons/sources reported
  - Defective electrocautery tip
  - Operator error
  - Conduction through a metal instrument
  - Lack of insulation / faulty insulation
    - Monopolar and bipolar cautery
  - Often listed as “unknown”
Perioral Burns

- Could thermal injury from suction cautery technique in adenoidectomy be a risk?
  - Suction cautery wand provides electrical, but not thermal insulation
Thermal Injury

- Richter 2008
  - Tested cautery settings (20W vs 40W), mode (spray vs fulgurate), and with and without suction
  - Measured how far and how quickly up the shaft of the device heat traveled (specifically 60 deg Celsius)
  - Higher temps consistently with higher wattage and fulgurate mode and with no suction
Thermal Injury

(A) Distance from tip to 60°C

(B) Distance from adenoid to velum and oral commissure

- Soft palate
- Commissure

Distance (in) vs. Time (s)

Distance in cm vs. Age in Years

- Fulg 40W no suction
- Fulg 40W with suction
- Spray 40W no suction
- Spray 20W no suction
- Fulg 20W no suction

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Thermal Injury - Prevention

- Multiple techniques have been reported
  - Do not continue using the suction cautery when it is clogged (particularly with trainees)
  - Frequent irrigation with saline
  - Wet sponge at the right oral commissure
    - May move or fall out of the mouth and not be recognized
  - Use of a gloved finger to retract the commissure
Thermal injury - Prevention

- Use of a plastic cheek retractor (Nuara 2008)
Informed Consent

- Mistry 2004 – discrepancies between what is discussed and what potentially is impactful to patients
Informed Consent

- **Controversies/questions**
  - What exactly should be included in the informed consent?
  - Should it be based on severity of complication, incidence, incidence of lawsuit, etc?
  - How strong is an informed consent anyway?
  - How much is too much information for the patient to absorb?
Informed Consent - Incidence

- **Bleeding – 1-3%**
  - Could it be higher? – depends on how it is defined
    - Parental report
    - ER visit
    - Admission
    - Return to OR – 0.5%
  - Reports as high as 10-14% (Ikoma 2014, Tolska 2013)
  - Risk of transfusion 1/1500 (Windfuhr 2003)
  - Risk of death
Informed Consent

- ‘A patient may make an unbalanced judgement because he is deprived of adequate information. A patient may also make an unbalanced judgement if he is provided with too much information and is made aware of possibilities which he is not capable of assessing because of his lack of medical training, his prejudices or his personality.’

- **British dept of health guidelines:**
  - Should warn the patient of anything that poses a substantial risk of grave adverse consequences
  - Should mention significant risk that would affect the decision of a reasonable patient

Anderson 2007
Informed Consent

- **Conclusions:**
  - Wise to discuss/document bleeding
    - Reoperation
    - Blood transfusion
    - Death
  - Consider including
    - Pneumonia – maybe more important from patient perspective than we know
    - Burns – represent a high proportion of lawsuits
Pain Management

- Avoid codeine! – ultra-rapid metabolizers
  - Boxed warning, the FDA’s strongest warning, and contraindication in patients undergoing tonsillectomy and/or adenoidectomy (www.fda.gov)
  - Conflicting and inconclusive evidence as to whether metabolizer status affects analgesia or toxicity in oxycodone and hydrocodone
  - Consider avoiding narcotics in younger children, significant sleep apnea, asthma, obesity, prematurity
  - Evidence suggests that ibuprofen is safe, without increased risk of bleeding (Cochrane Database)
Local Anesthetic Injection

- **Cochrane Database 1999**
  - “There is no evidence that the use of perioperative local anaesthetic in patients undergoing tonsillectomy improves post-operative pain”

- **Risk/benefit analysis?**
  - Case reports and major malpractice settlements from epinephrine toxicity (Morris 2008)
  - If using local anesthetic, consider avoiding using it with epinephrine
Dental Injury

- May be secondary to intubation or mouth gag
- Ask about loose teeth, particularly around ages 5-7
- Be cognizant of trainees, both anesthesia and ENT
- Extract very loose teeth prior to intubation
  - Communicate this with parents
- Reassess the teeth prior to extubation
- Postoperative chest x-ray if missing or broken tooth is not recovered
Conclusions

- By paying close attention, some complications of adenotonsillectomy can be prevented or minimized
  - Cuffed ET tube
  - Decrease O2 level and don’t use nitrous oxide
  - Pay attention to the oral commissure, particularly in adenoidectomy
  - Have a strong informed consent
  - Avoid codeine, use alternatives
  - Be cognizant of the teeth!
Thank you – Questions?

“Wait, this one’s a lawyer. We’d better wash our hands.”