

# Airway Fire

# Oral Burn

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# Definitions

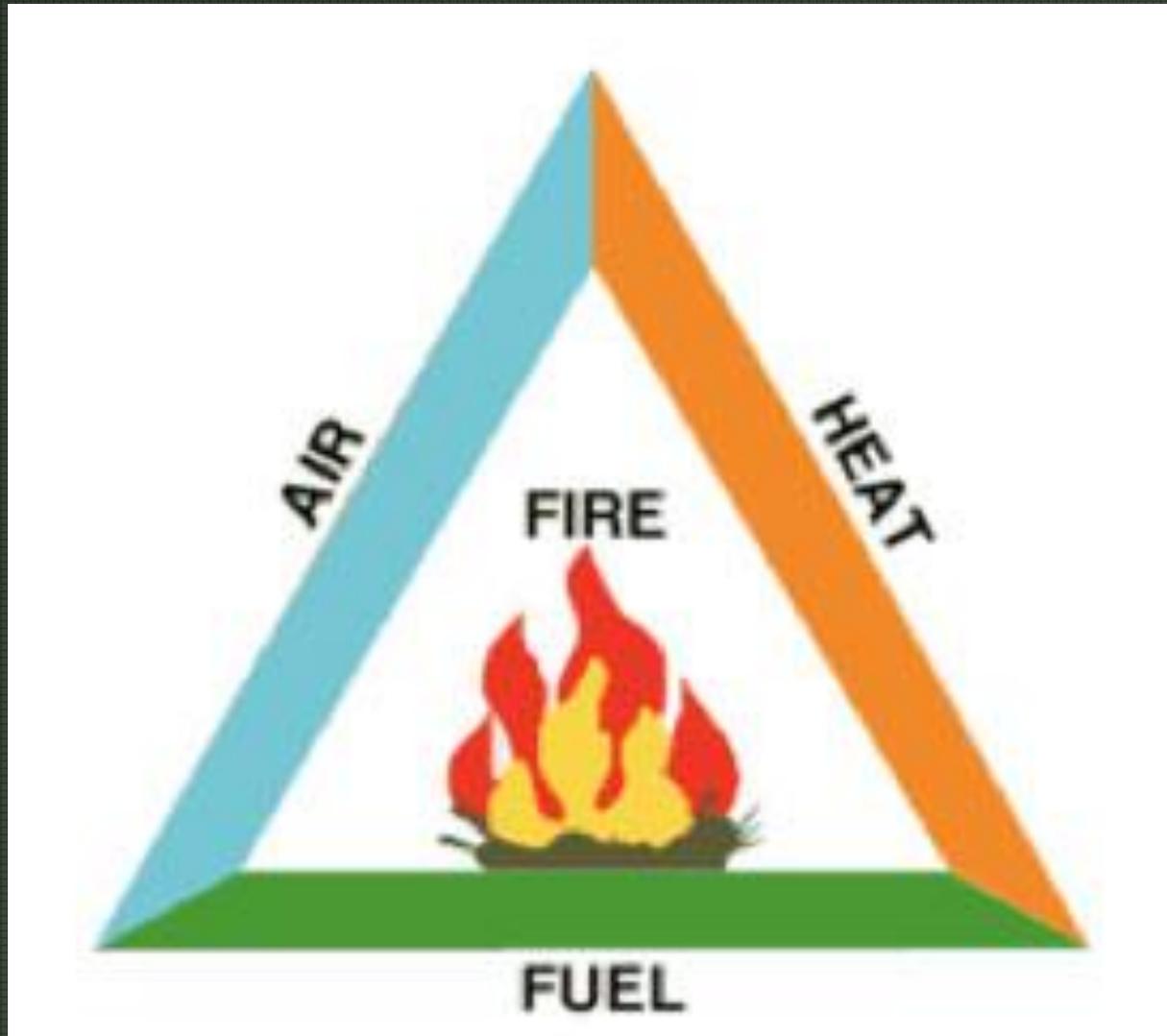
## Surgical fire

- A fire that occurs on or in a patient

## Airway fire

- A specific type of surgical fire that occurs in a patient's airway
- It may or may not include fire in the attached breathing circuit

# Fire Triad



# Ignition Sources

- Electrocautery
- Lasers
- Heated probes
- Drills
- Fiberoptic light cables
- Defibrillator paddles

# Oxidizers in OR

- Oxygen
- $N_2O$

They Increase likelihood & intensity of combustion

# Fuel

- ETT
- Masks
- Sponges, drapes, gauze, dressings
- Alcohol-containing solutions
- Patient's hair
- Ointments
- Packaging materials

# High-risk Procedure

= Ignition source in proximity to + an oxidizer-enriched atmosphere

- Tonsillectomy
- Tracheostomy
- Removal of laryngeal papillomas
- Cataract or other eye surgery
- Burr hole surgery
- Removal of head, neck, or face lesions

# Operating Room Fires

## *A Closed Claims Analysis*

Sonya P. Mehta, M.D., M.H.S.,\* Sanjay M. Bhananker, M.D., F.R.C.A.,† Karen L. Posner, Ph.D.,‡  
Karen B. Domino, M.D., M.P.H.§

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Williams & Wilkins. Anesthesiology 2013; 118:1133-9*

# 103 OR fire claims

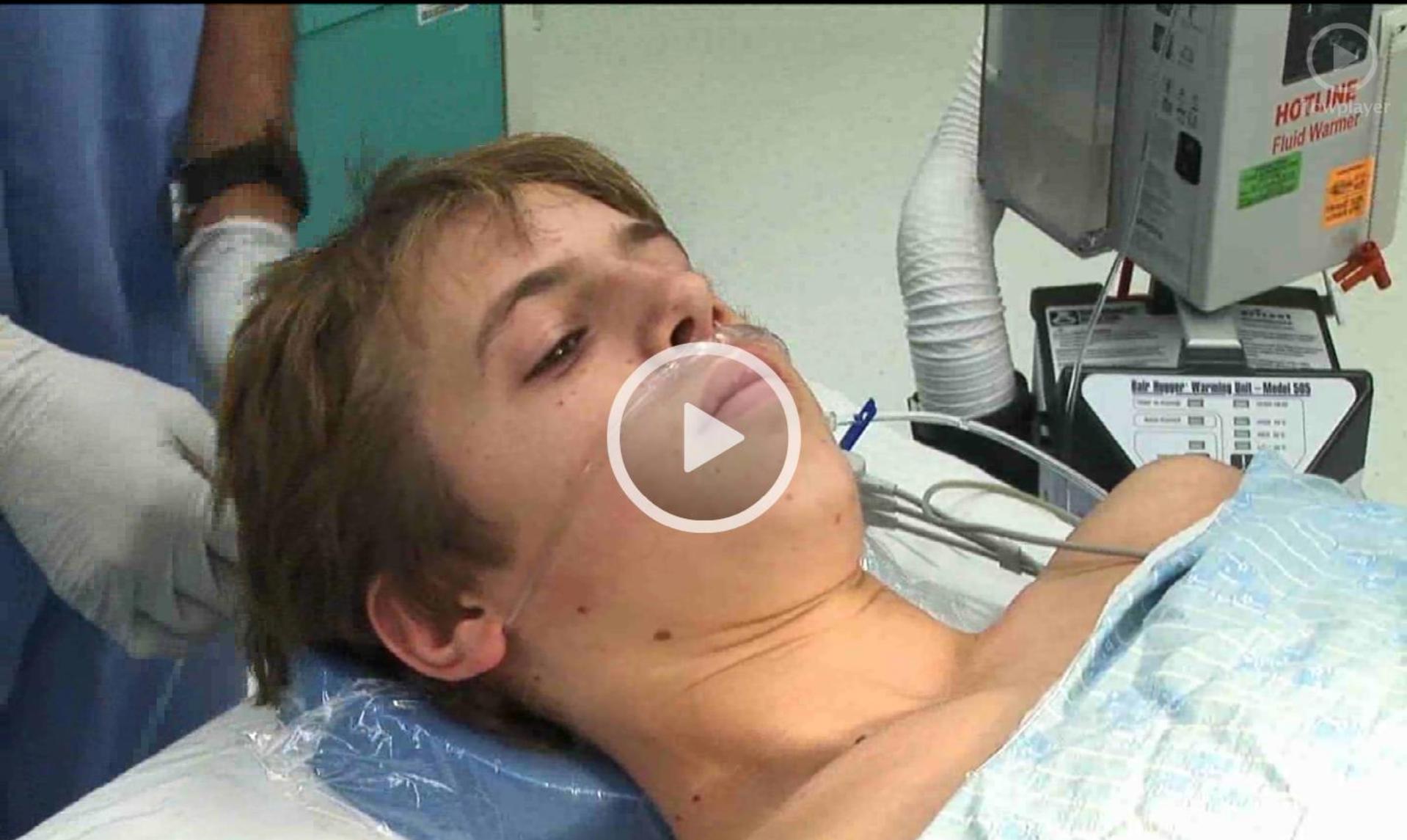
- Electrocautery in **93** of them



- **77** during MAC and sedation for RA
- **16** occurred during GA
  - 4** during tonsillectomy
  - 6** during tracheostomy  
(ETT cuff leaks or ruptures)

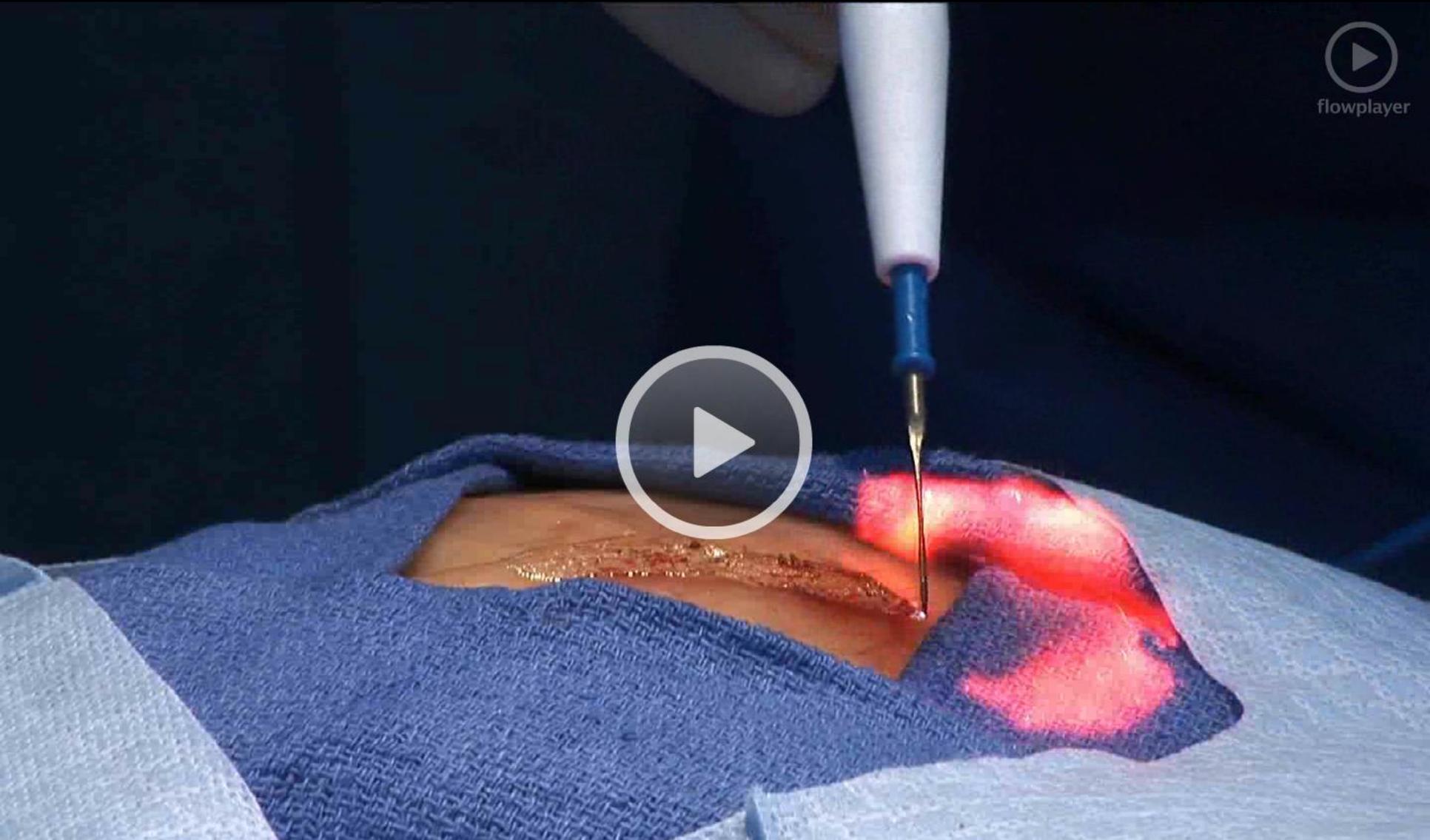
❖ 99% of electrocautery-induced fires during MAC/RA involved the use of supplemental oxygen (nasal prongs and face masks)





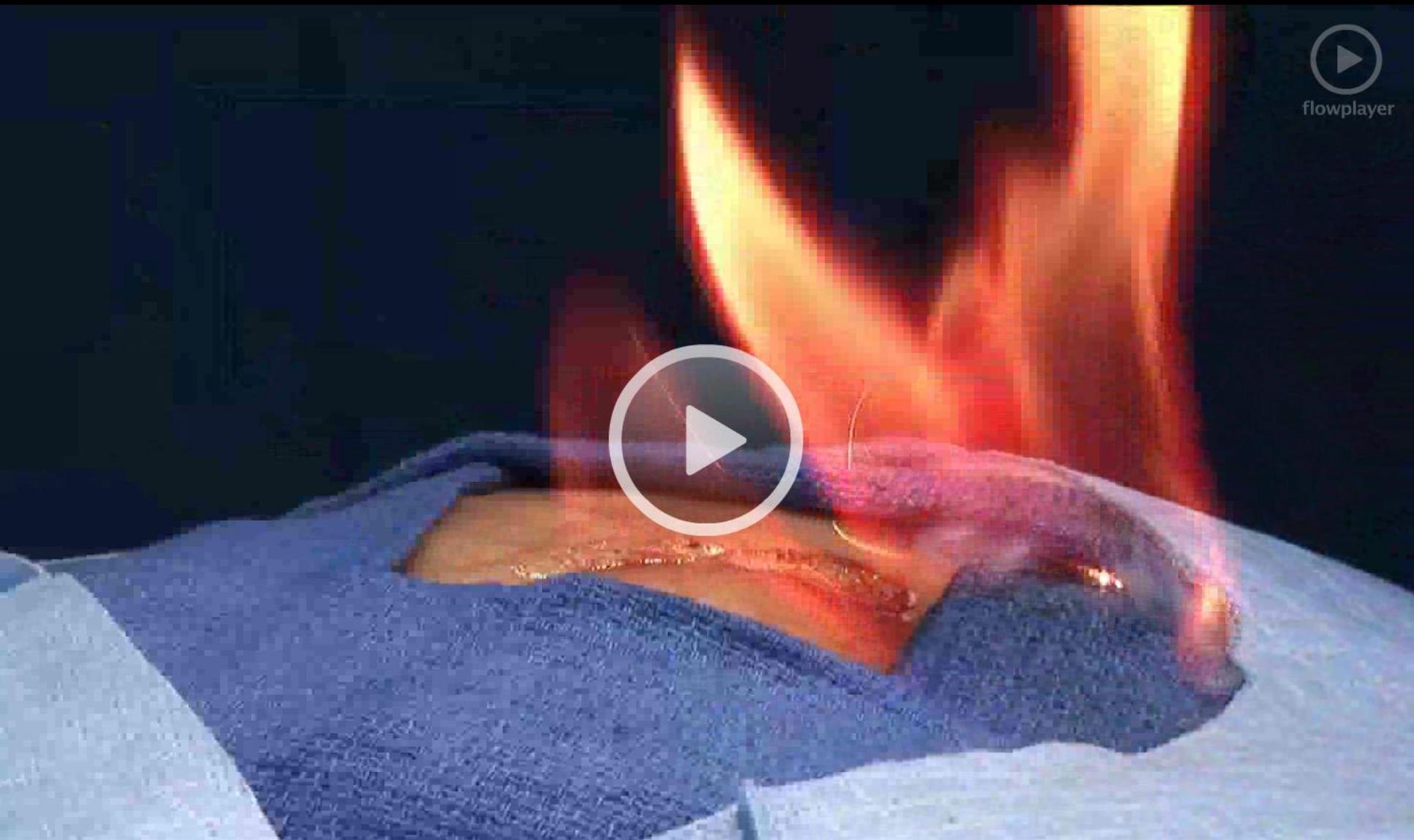


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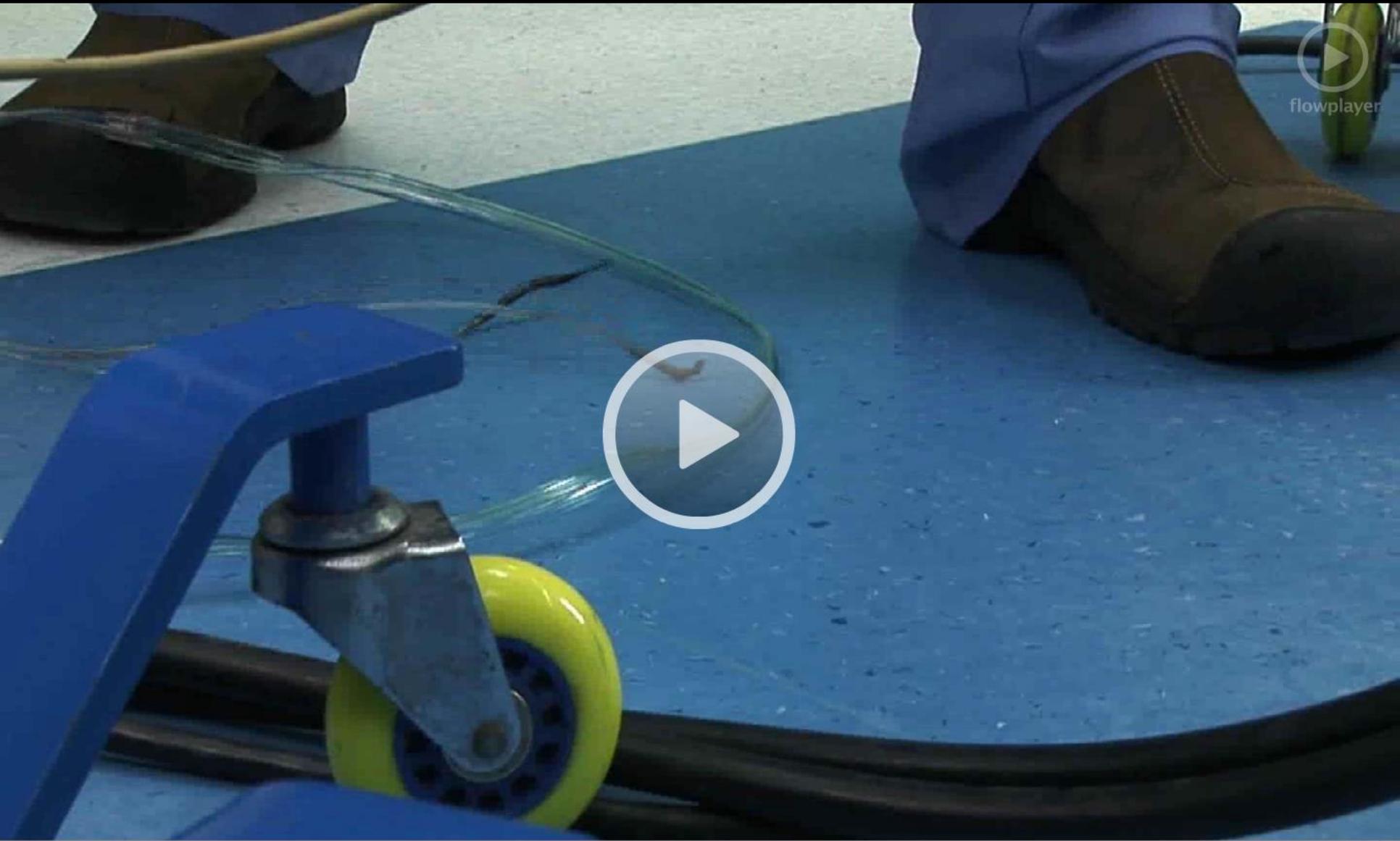


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# **Practice Advisory** for the Prevention and Management of Operating Room Fires

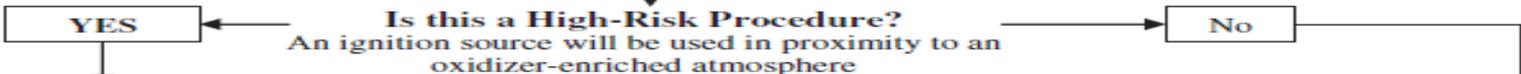
*An Updated Report by the American Society of Anesthesiologists Task Force on Operating Room Fires*

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**OPERATING ROOM FIRES ALGORITHM**

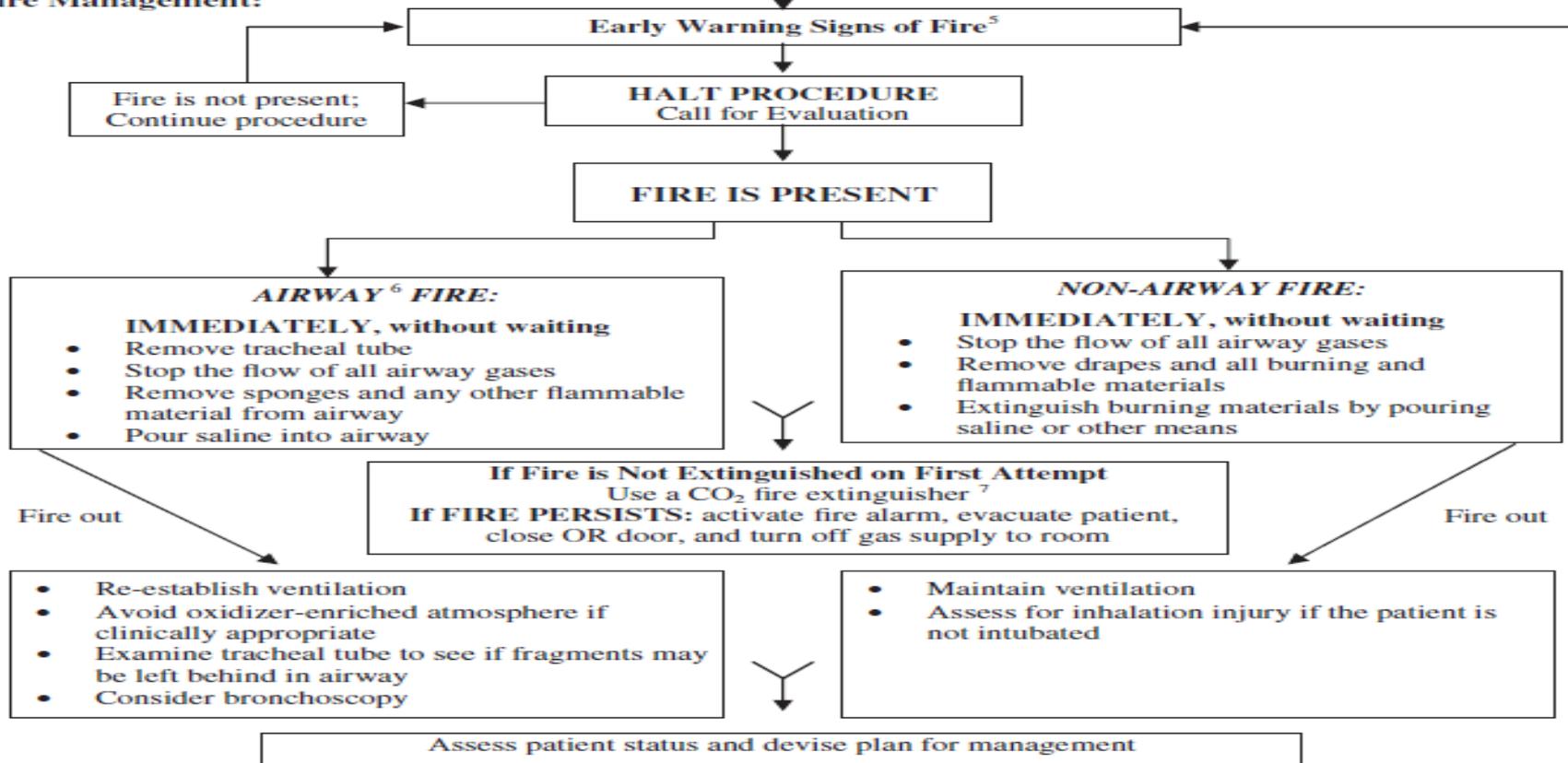
**Fire Prevention:**

- Avoid using ignition sources<sup>1</sup> in proximity to an oxidizer-enriched atmosphere<sup>2</sup>
- Configure surgical drapes to minimize the accumulation of oxidizers
- Allow sufficient drying time for flammable skin prepping solutions
- Moisten sponges and gauze when used in proximity to ignition sources



- Agree upon a team plan and team roles for preventing and managing a fire
- Notify the surgeon of the presence of, or an increase in, an oxidizer-enriched atmosphere
- Use cuffed tracheal tubes for surgery in the airway; appropriately prepare laser-resistant tracheal tubes
- Consider a tracheal tube or laryngeal mask for monitored anesthesia care (MAC) with moderate to deep sedation and/or oxygen-dependent patients who undergo surgery of the head, neck, or face.
- *Before* an ignition source is activated:
  - *Announce* the intent to use an ignition source
  - *Reduce* the oxygen concentration to the minimum required to avoid hypoxia<sup>3</sup>
  - *Stop* the use of nitrous oxide<sup>4</sup>

**Fire Management:**





For a fire in the airway or breathing circuit, the consultants and ASA members strongly agree that:

- As quickly as possible ETT and all flammable and burning materials should be removed from the airway
- Delivery of all airway gases should stop
- Saline should be poured into the patient's airway to extinguish any residual embers and cool the tissues

## For a fire elsewhere on or in the patient

- Consultants agree and ASA members are equivocal regarding stopping airway gases
- All burning and flammable materials (including all drapes) should be removed from the patient
- All burning materials in, on, or around the patient should be extinguished (*e.g., with saline, water, or a fire extinguisher*)

# Reducing the Likelihood of Airway Fires during Electrosurgery

- ❖ Do not use electrosurgical units to cut tracheal rings and enter the airway
- ❖ Packing should be applied wet and kept wet throughout the procedure
- ❖ Use Bipolar electrosurgical cautery or long, insulated probes

# Airway Fire during Tonsillectomy

## Case Presentation

- 9 years old boy undergoing Tonsillectomy
- Oral ETT
- Surgeon used unipolar electrocautery to control bleeding at the tonsillar beds
- By the end of the procedure, patient was spontaneously breathing
- Suddenly, strong flame came out of the mouth

# Airway Fire during Tonsillectomy

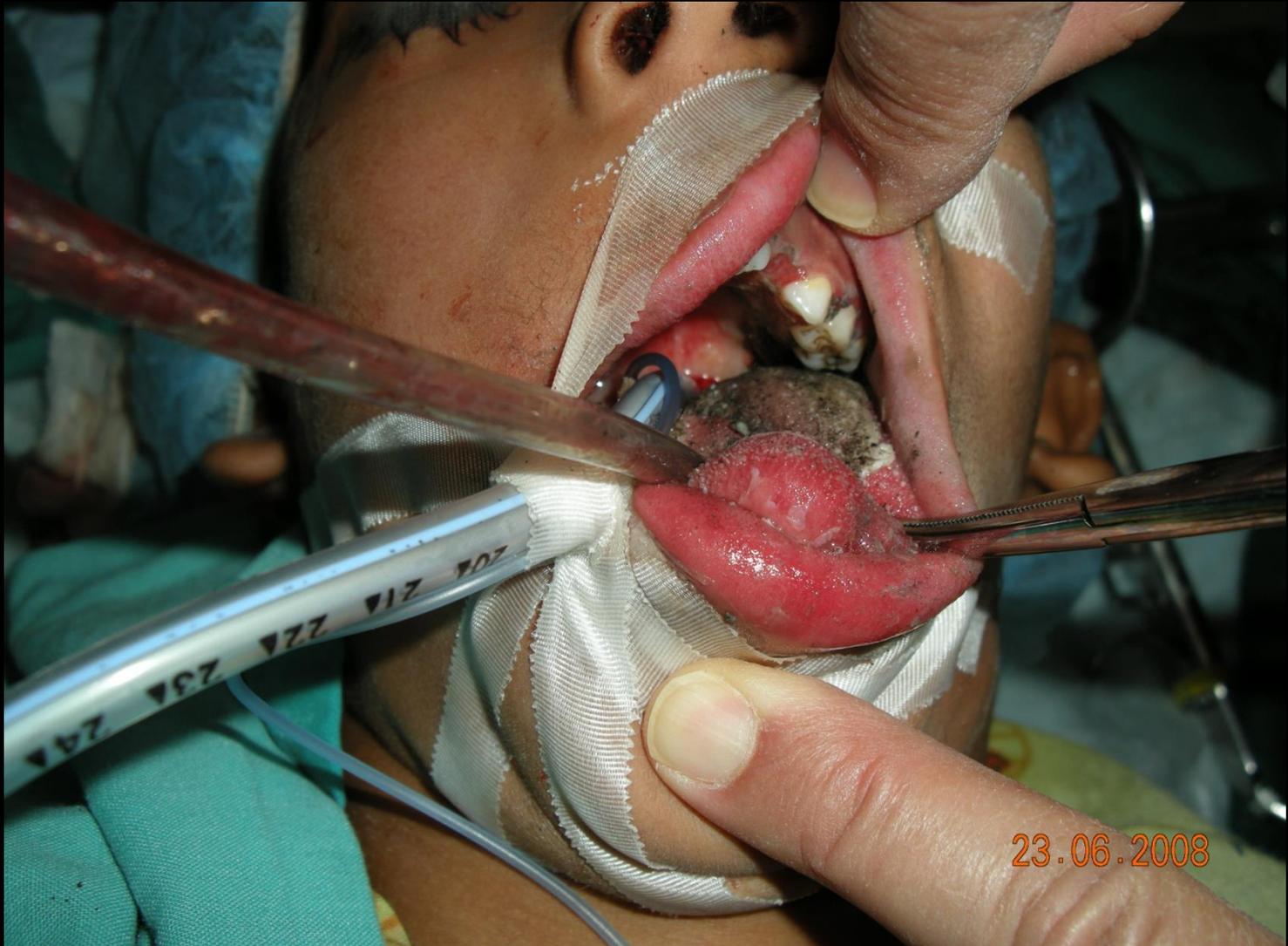
## Case Presentation

- I immediately turned off the gases
- The scrub nurse immediately poured saline into the patient's mouth
- The fire was extinguished
- I then removed the ETT and inserted a new one, the laryngeal opening was free from any burn

# After Reintubation



# Mouth Exposure by Plastic Surgeon



# Mouth Exposure by Plastic Surgeon



# Mouth Exposure by Plastic Surgeon



# ETT



23.06.2008

# ETT



# ETT



23.06.2008

# Airway Fire during Tonsillectomy

## Case Presentation

Fiberoptic bronchoscopy was performed in the operating room and revealed:

- Generalized upper-airway edema
- Some redness in the airway
- No distal airway burn injury
- No carbonaceous material in the trachea
- Glottis was normal

# Airway Fire during Tonsillectomy

## Case Presentation

- The oral ETT was changed with a nasal armored ETT, for the fear of severe airway edema
- Patient was transferred to ICU
- He was kept sedated on mechanical ventilation



24.06.2008



24.06.2008



24.06.2008

# Airway Fire during Tonsillectomy

## Case Presentation

- Repeated debridement & Hydrogel application by the plastic surgeon to create a moist environment to enhance healing

23.06.2008





28.06.2008



01.07.2008



01.07.2008

- Patient was successfully weaned from the ventilator on the seventh postoperative day
- 2<sup>nd</sup> debridement under GA on day 13 and 3<sup>rd</sup> debridement on day 17



06.07.2008



06.07.2008

- Near total healing after 3 weeks and patient discharged for follow up at outpatient clinic



14.07.2008

MED FORCES



14.07.2008

**Complete healing  
in 4 weeks**



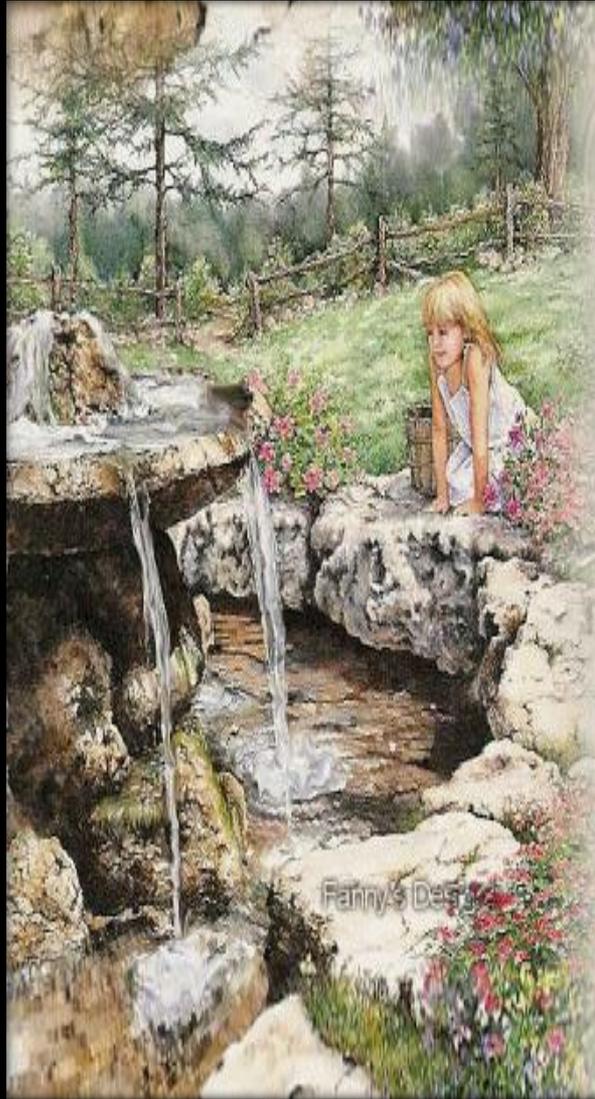
18.10.2008



18.10.2008



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**Thank You**

Fanny's Design