AIRWAY FIRE

LARRY F. CHU, MD, MS AND KYLE HARRISON, MD

1. **Fire on the patient or elsewhere** in the operating room.
   
   GO TO FIRE IN OR TAB #25

2. Sight of **smoke** or **flames** from the airway, breathing circuit or endotracheal tube. Smell of smoke.

3. **IMMEDIATELY REMOVE ENDOTRACHEAL TUBE**

4. **1. CALL FOR HELP**
   
   **2. CALL FOR FIRE EXTINGUISHER**
   
   **3. INFORM THE TEAM**

5. **TREAT**
   
   1. STOP the flow of gasses to the airway.
   2. Remove flammable and burning material from the airway.
   3. Pour saline into the airway.

6. **IF FIRE IS NOT EXTINGUISHED**
   
   1. Spray carbon dioxide fire extinguisher in or around patient.
   2. If fire persists, activate fire alarm.
   3. Evacuate the patient, if possible.
   4. Close the door to the room. Do not reopen the door or attempt to reenter.
   5. Turn off medical gas supply to the room.

**IF FIRE NOT OUT**

1. **STOP GAS**
   
   **REMOVE BURNING MATERIAL**
   
   **POUR SALINE**

2. **USE CO2 FIRE EXTINGUISHER**
   
   **ACTIVATE FIRE ALARM**
   
   **CLOSE DOOR DO NOT REOPEN DO NOT REENTER**
1. Once fire is extinguished, reestablish mask ventilation.
2. Ventilate patient on room air. Avoid oxygen or nitrous oxide if possible.

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1. Examine endotracheal tube to determine if fragments were left in the airway.
2. Consider bronchoscopy (rigid if possible) to assess lung injury, remove debris and endotracheal tube fragments from airway.
3. Assess patient airway and consider intubation before swelling or edema of airway ensues.

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ASPIRATION
LARRY F. CHU, MD, MS AND KYLE HARRISON, MD

Bronchospasm - Tab #7
Pulmonary Edema
ARDS

DDX
- Visible gastric contents in oropharynx
- Hypoxia despite proper ETT placement and ventilation
- ↑ inspiratory pressure during mechanical ventilation
- Dyspnea, apnea or hyperventilation
- Bronchospasm, laryngospasm, wheezing, crackles

IMMEDIATE
1. Place patient head down, lateral position if possible.
2. Suction airway to remove debris.
3. Apply cricoid pressure, ventilate with 100% O2.
4. Immediate rapid-sequence induction and intubation.
5. Controlled ventilation with 100% O2.
6. Consider PEEP 5-7 cmH2O.
7. Consider sedation and analgesia as needed.

1. CALL FOR HELP
2. CALL FOR BRONCHOSCOPE
3. INFORM THE TEAM

Continued on Next Page
1. **Perform bronchoscopy** if aspiration of particulate matter is suspected.
2. Remove **particulate matter**. Large particles must be removed to prevent airway obstruction.
3. **Bronchodilators** as necessary to treat bronchospasm. Refer to bronchospasm tab #7 for additional treatment information.
4. Administer fluids to maintain **normovolemia**.
5. Antibiotics are not indicated in the acute phase.
6. Corticosteroids should not be given prophylactically during the acute phase.

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**FOLLOWUP**

1. **Chest X-ray**. If normal and patient is not hypoxemic, consider extubation.
2. If unsymptomatic for 2 hours after extubation, **discharge from recovery**.
3. If unstable or hypoxemic, consider admission to **high dependency setting**.

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IN THE INTUBATED INTRAOPERATIVE PATIENT

**BRONCHOSPASM**

LARRY F. CHU, MD, MS AND KYLE HARRISON, MD

1. Administer bronchodilator β₁ agonist delivered through inspiratory limb of circuit using metered dose inhaler (e.g., Albuterol). Consider ipratropium.

2. If severe bronchospasm, consider Epinephrine 10–20 mcg IV bolus. Consider infusion if repeated dosing is necessary.

3. Consider neuromuscular blockade if there is significant patient-ventilator dyssynchrony.

4. Consider intravenous steroid (methylprednisolone 125 mg IV bolus).

5. Consider magnesium 2 gm IV infusion over 10–15 minutes.

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**BRONCHOSPASM DDX**

1. Anaphylaxis - Tab #21
2. ARDS
3. Aspiration - Tab #6

**DX**

- Rapid increased peak airway pressure
- Wheezing on lung auscultation
- Slowly increasing slope on capnogram
- Decreasing exhaled tidal volumes

**IMMEDIATE**

1. Switch to 100% Oxygen
2. Increase volatile anesthetic concentration (sevoflurane preferred).
3. Change ventilator I:E ratio to provide adequate exhalation time.

**4**

1. CALL FOR HELP
2. CALL FOR BRONCHOSCOPE
3. INFORM THE TEAM

**5**

IF SUDDEN

↓BP

CONSIDER AIR TRAPPING
DISCONNECT CIRCUIT & ALLOW FOR ADEQUATE EXHALATION

CONSIDER PNEUMOTHORAX
SEE TAB #12 FOR TREATMENT ALGORITHM

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Continued on Next Page
TREATMENT

1. **Administer bronchodilator** β₁ agonist delivered through inspiratory limb of circuit using **metered dose inhaler** (e.g. **Albuterol**). Consider ipratropium.

2. If severe bronchospasm, consider **Epinephrine 10-20 mcg IV bolus**. Consider infusion if repeated dosing is necessary.

3. Consider **neuromuscular blockade** if there is significant patient-ventilator dyssynchrony.

4. Consider intravenous steroid (methylprednisolone 125 mg IV bolus).

5. Consider **magnesium 2 gm IV infusion** over 10-15 minutes.

RULE OUT

1. **Anaphylaxis** - check for rash in the setting of hemodynamic collapse. **See tab #21**.

2. **Endobronchial intubation** - confirm bilateral breath sounds.

3. **Kinked endotracheal tube** - suction endotracheal tube with catheter.

Reference:
DIFFICULT AIRWAY

LARRY F. CHU, MD, MS, JEREMY COLLINS, MD AND KYLE HARRISON, MD

1 UNABLE TO SEE VOCAL CORDS OR PASS ETT

2 LIMIT TOTAL # AIRWAY ATTEMPTS TO 3
BEFORE FURTHER ATTEMPTS, CONSIDER THE FOLLOWING:

- CONSIDER RELEASING CRICOID PRESSURE (CP)
  - Try to improve view with ELM*
  - Reapply cricoid pressure if view does not improve

*EXTERNAL LARYNGEAL MANIPULATION. SEE ILLUSTRATION.

3 CALL FOR DIFFICULT AIRWAY CART
- Optimize “sniffing” position
- Mask ventilate with 100% O₂, 30N cricoid pressure
- Consider changing laryngoscope blade
- Consider using bougie/introducer
- Consider using video laryngoscopy device

4 IF SECOND INTUBATION ATTEMPT FAILS
ATTEMPT MASK VENTILATION

DIFFICULT AIRWAY
LARRY F. CHU, MD, MS, JEREMY COLLINS, MD AND KYLE HARRISON, MD

IF YOU CANNOT VENTILATE THE PATIENT

5

ORAL AIRWAY + NASAL AIRWAY + 2 HAND VENTILATION

6

CALL FOR HELP

7

IF YOU CANNOT VENTILATE, RELEASE CP, PLACE SGA

CONSIDER LMA, ILMA, LARYNGEAL TUBE

SGA = Supraglottic Airway (e.g. laryngeal mask airway (LMA), intubating laryngeal mask airway (ILMA), laryngeal tube).

8

IF YOU CANNOT VENTILATE THE PATIENT

• CALL FOR SURGEON, PREP NECK, CODE AIRWAY
• Attempt percutaneous cricothyrotomy (tab#37), transtracheal jet ventilation, surgical cricothyrotomy (tab #36) or tracheostomy.

9

IF AT ANY POINT VENTILATION IS SUCCESSFUL

CONSIDER OPTIONS BELOW:

1. Awaken the patient.
2. Complete case with LMA or face mask.
3. Video Assisted Laryngoscopy.
5. LMA as conduit for intubation or intubating LMA.
6. Retrograde wire intubation.

IF VENTILATION BECOMES INADEQUATE, RESUME STEPS 5-8 ABOVE