BLS and Advanced Airway Management

Vermont EMS Districts 3 and 4
Vermont EMS
UVM/IREMS
Winter, 2009

Schedule

- Basic Airway Review Practice
- Large Group Presentation – Airway A&P and Introduction to King KLTSD and Pediatric Airway
- King Airway Practice
- Scenario Practice
- Questions/Answer, Wrap Up

Airway Management Anatomy and Physiology Review

Objectives

- Explain the importance of ventilation, perfusion and diffusion
- Identify the major structures of the upper and lower airways
- Explain why hyperventilation is dangerous to patient outcome
- Identify how the use of an advanced airway impacts ventilations and compression with of CPR

Ventilation

- The process in which oxygen is \textit{inhaled} and carbon dioxide is \textit{exhaled}.
- \textbf{Ventilation} – how is ventilation regulated in the body?
  - The \textit{medulla} (brain stem)
  - \textit{Stretch} receptors (in lung tissue and chest wall) monitor
  - Changes in \textit{PCO}_2
  - \textit{COPD} patients

Ventilation Physiology

- How can ventilation be impacted negatively?
  - Upper airway \textit{obstruction} (trauma/medical)
  - Lower airway \textit{obstruction} (trauma/medical)
  - Impairment of chest \textit{wall} movement
  - Problems in \textit{neurological} control
Perfusion

The process in which oxygenated blood is pumped to the tissues and waste products are returned to the lungs.

Perfusion Physiology

Perfusion – what is required for adequate perfusion to occur?

- Adequate blood volume
- Intact vascular system
- Intact pulmonary capillaries
- Efficient pumping action by the heart
- Sufficient hemoglobin supply

Perfusion – so, what can disrupt perfusion?

- Alteration in Blood Flow
- Pulmonary Shunting
- Poor Cardiac Output
- Changes in Hemoglobin

Diffusion

The movement of a substance from a higher concentration to a lower concentration across a semi permeable membrane.

in this case, diffusion of gases across the alveoli / capillary membrane.

Diffusion Physiology

Diffusion – what can interfere with the diffusion of gases in the lungs?

- Hypoxia (lack of oxygen)
- Trauma to lung (damaged alveoli)
- Fluid accumulation in alveoli or interstitial spaces
- Thickening of the endothelial lining (lining of blood vessels)

Upper Airway

(Anatomy)
Nasal Cavity
Soft Palate
Nasopharynx

Tongue
Oropharynx
Epiglottis

Larynx
Trachea

Medulla Cavity
Esophagus
Spinal Column

Lower Airway
(Anatomy)

Trachea
Carina
Right Main Stem Bronchi
Left Main Stem Bronchi
Airway Management Thoughts (1 of 2)

- BLS is CRITICAL before ALS
- Pre-oxygenation is NOT hyperventilation (rescue breathing rates for adult, child, infant?)
- Avoid hyperventilation - why?
  - Can lead to poor cerebral circulation (reduces pCO₂ and pH which leads to vasoconstriction)

Airway Management Thoughts (2 of 2)

- Integration of an advanced airway with CPR
  - Minimize interruptions with compressions
  - Once advanced airway established, do NOT stop compressions to ventilate
  - May allow another provider to ventilate so EMT-I can provide update and establish venous access

Questions

- A patient is breathing 32 times a minute and they are cyanotic, why?
- An oropharyngeal airway is measured too short, what impact will this have on the patient’s anatomy?
**King Airway**

(Model KLTSD)

Vermont Emergency Medical Services Demonstration Project

**Pathway to the King Airway**

**Step 1**
Document Existing Combitube Use
December - March

**Step 2**
King Airway Training
January - March

Any time a Combitube is attempted, a data form must be completed.

All EMT-I’s must complete transition training to use the King Airway.

**Pathway to the King Airway**

**Step 3**
King Airway Begins April 1
Collect Data on 1st 100 Tubes

**Step 4**
PEAKS STUDY
Pre-Hospital Emergency Adjunct King-LT(s)D Study
Success Rates – Changing over bougie

Complete a data form for every King Airway attempted.

Thank you all for your help with this project.

**What is the King Airway?**

- A supralaryngeal airway
- Single lumen device
- Blind insertion device
- Positive pressure ventilation airway
- 100% latex free
- KLTSD model allows for the insertion of a gastric tube.

**Anatomy of the King KLTSD Airway** (1 of 3)

- Single Pilot Balloon
- CM Depth Markings
- Proximal Cuff
- Distal Cuff
Anatomy of the King KLTSD Airway (2 of 3)

- Orientation Line
- Proximal Opening Of Gastric Access Lumen
- Bilateral Eyelets (additional supplemental ventilation)
- Two Ventilation Outlets (allows for bronchoscope or tube Exchange catheter)

Anatomy of the King KLTSD Airway (3 of 3)

- Distal Tip/Cuff flattened for more anatomical fit behind larynx
- Multiple ventilation outlets
- Ramp directs tube exchanger

Placement Diagram

King Airway Design Features (1 of 2)

- Ease of insertion (single ventilation port)
- Low incidences of throat trauma
- Minimizes gastric inflation
- KLTSD model allows for passing of gastric tube...

King Airway Design Features (2 of 2)

- King Airway is designed with a straightened, beveled tip directing the device posterior to the larynx into the esophagus
- Minimal risk of entering the trachea

Indications for Use

- Patient is apneic

Contraindications

- Patient is breathing
- Gag reflex present
- Known esophageal disease
- Ingestion of caustic substance
- Patient is too small
**King Airway Sizes- Adult**

- **Number 3**
  - Yellow
  - Patient is 4 - 5 feet

- **Number 4**
  - Red
  - Patient is 5 - 6 feet

- **Number 5**
  - Purple
  - Patient is 6+ feet

**King Airway Sizes Pediatric (1 of 2)**

- **Number 2**
  - Green
  - Patient is 3 – 4 feet

- **Number 2.5**
  - Orange
  - Patient is 3.5 – 4.5 feet

Unlike adult KLTSD, pediatric distal end is closed, no gastric tube port ...

**King Airway EMS Kit**

Each kit contains:
- KLTSD airway
- Syringe
- Lubricant
- Instructions for use.

**Insertion Steps (1 of 10)**

- Assess patient, begin BLS management
- Choose correct device size
- Open kits, test and lubricate cuffs ...

**Insertion Steps (2 of 10)**

- Position yourself at head of patient or next to patient’s shoulder

**Insertion Steps (3 of 10)**

- Hold airway at the connector in dominant hand
- With non-dominant hand open mouth with chin lift (non trauma)
- Approach mouth from side, insert tip
**Insertion Steps (4 of 10)**

- Advance tip **behind** base of tongue
- **Rotate** tube back to midline
- Orientation line should face the patient’s chin

**Insertion Steps (5 of 10)**

- Without exerting excessive force, advance tube until base of connector is aligned with **teeth** or gums.

**Insertion Steps (6 of 10)**

Two stage inflation

**First Inflation for:**

- **Adult** (sizes 3, 4, and 5) = 60 cc
- **Pediatric** (sizes 2 and 2.5) = 30 cc

**Insertion Steps (7 of 10)**

- Attach BVM to connector
- To seat King Airway, gently bag patient while withdrawing tube until ventilations are **free** flowing (large tidal volume with minimum airway resistance).

**Insertion Steps (8 of 10)**

Two stage inflation

**Second Inflation:**

- Size 2 = 5 cc
- Size 2.5 = 5 cc
- Size 3 = 5 cc
- Size 4 = 10 cc
- Size 5 = 15 cc

**Insertion Steps (9 of 10)**

- **Confirm** placement with stethoscope (gastric and lung sounds).

- Positive breath sounds left and right
- No gastric sounds
Insertion Steps (10 of 10)

- Secure airway with tape or tube holder.

Removing the King Airway

- Turn patient to their side, have suction ready (suction oral cavity if necessary)
- Deflate the cuff. Depending on the volume of cuff inflation the deflation might take more than one evacuation (assess pilot balloon)
- Remove airway.

Documentation (1 of 2)

- Click HERE to view the Data Collection Form for the King Airway
- Stress where the copies of each form are to be filed...

Documentation (2 of 2)

- All attempts should be documented (successful or unsuccessful)
- An “attempt” is defined as any time the tube is inserted past the patient’s lips.

EKG – District 3 Protocol (1 of 4)

EKG – District 3 Protocol (2 of 4)

VTEMSD 3 and 4, VTEMS Office,
UVM/IREMS
EKG – District 3 Protocol (3 of 4)

En route:
- Obtain 12 lead ECG first. And if automated read ‘ACUTE MI’, call radio room to activate STEMI. Transmit ECG while en route as soon as possible.
- Aspirin 325mg,
- IV access
- Nitroglycerin
- Expedited Transfer

EKG – District 3 Protocol (4 of 4)

In ED Hallway:
- Rapid assessment by ED MD and disposition either directly to cathlab or ED.

Questions

1. When is the King Airway indicated for use? When is it contraindicated?
2. What size King Airway would be used for a 5’ 6” patient?
3. How do you know when you have inserted the King Airway far enough?
4. How much air is used to inflate a size 4 King Airway (first stage and second stage)?