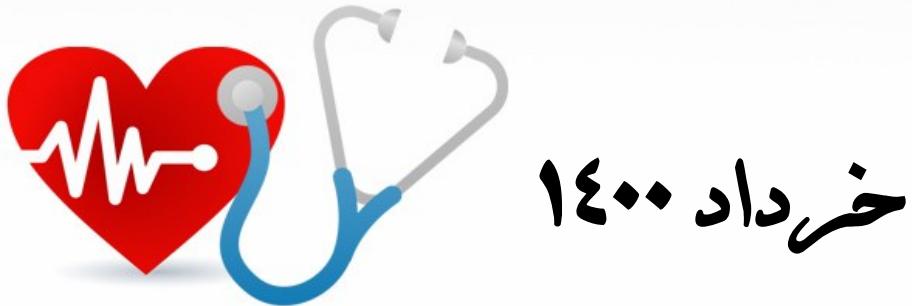


# دکتر مهرزاد آرتنگ



۱۴۰۰ خرداد

# Circulation

JOURNAL OF THE AMERICAN HEART ASSOCIATION



Learn and Live<sup>SM</sup>

2020

*Advanced Cardiovascular Life Support*

*American Heart Association Guidelines for  
Cardiopulmonary Resuscitation  
and Emergency Cardiovascular Care*



هنگام ارائه مراقبت به یک بیمار قلبی به نکات زیر دقت کنیم:



1. تخفیف اضطراب و کاهش درد
2. جلوگیری از هیپوکسی
3. جلوگیری از آریتمی کشنده
4. نگهداری خون رسانی کافی



# SUDDEN CARDIAC ARREST

- عدم مس نبض حتی با وجود شنیدن صدای قلب

A medical emergency with absent or inadequate contraction of the left ventricle of the heart that immediately causes bodywide circulatory failure

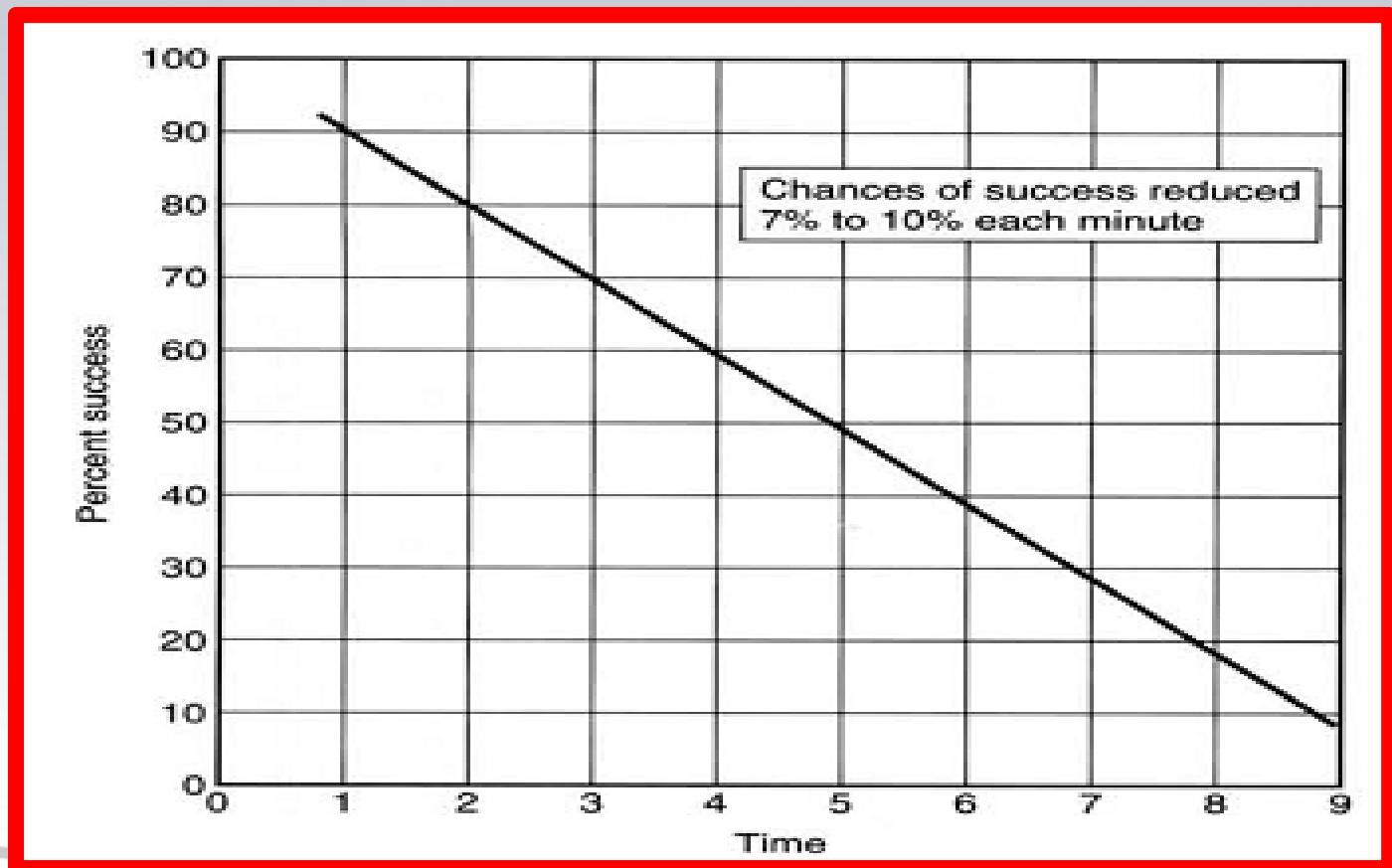


## نکته

- شایعترین آریتمی در یک SCA فیبریلاسیون بطنی (VF) می باشد. (85%)
- دفیبره کردن زود هنگام (کمتر از 4 دقیقه) بهمراه CPR شانس بقا 30% بدون %20 CPR
- دفیبره کردن تاخیری (10 دقیقه) بهمراه CPR شانس بقا 8% بدون % 0



# نقش زمان و مدیریت زمان



# CPR

## 1) Basic cardiac life support

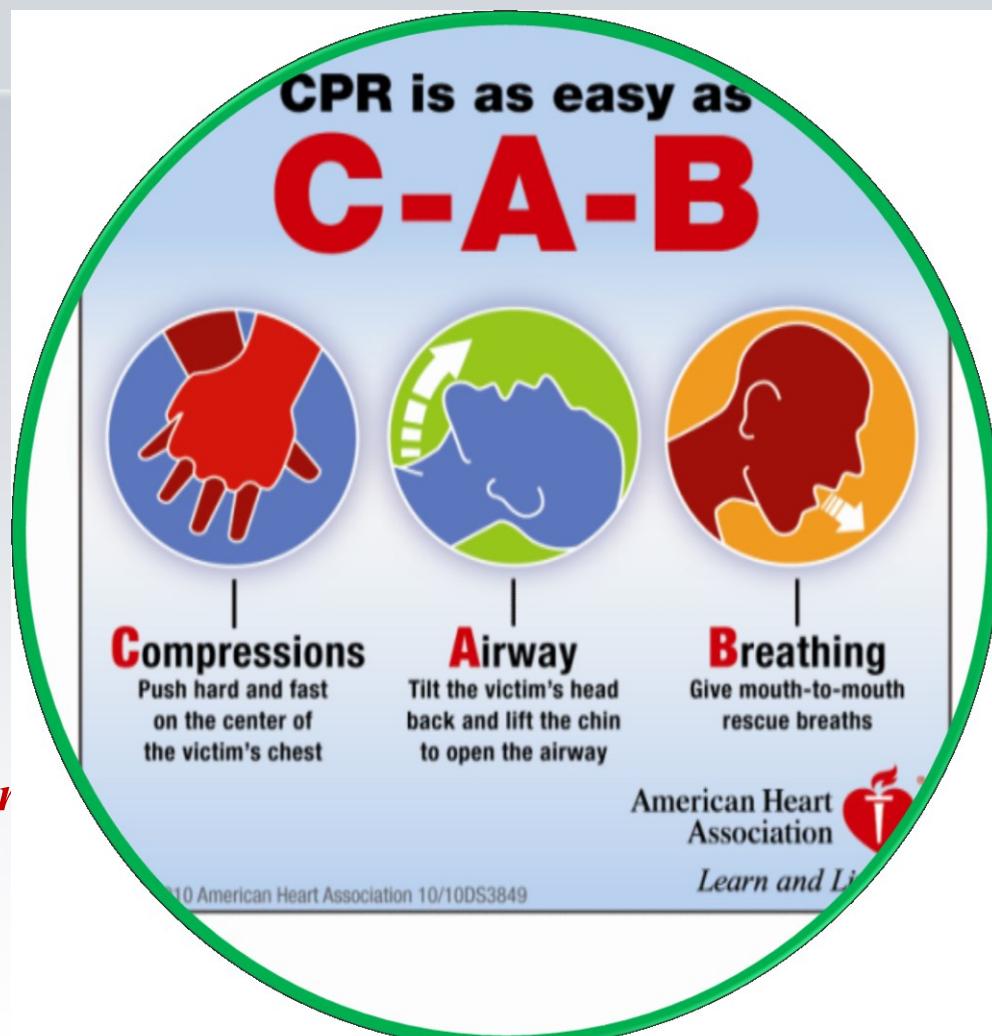
- compressions
- Airway control
- Breathing

## 2) Advance cardiac life support

- Drug and fluids
- Electrocardiography
- Fibrillation treatment

## 3) Prolonged cardiac life support

- Human mentation
- Intensive care



# Fully Recoil

do not leaning on chest



# هیپوکسی و ساکشن

\*برای جلوگیری از این مشکل ، ساکشن کردن را به 15 ثانیه در بالغین و 5 ثانیه در اطفال محدود کنید .



کاهش ضربان قلب ← ساکشن



# *Rhythm*

*Shockable*

*Nonshockable*



*VF*

*Asystole*

*Pulseless VT*

*PEA*



# *Pulseless electrical activity (PEA)*

- Previously called electromechanical dissociation
- PEA is often associated with specific clinical states that can be reversed when identified early and effectively treated.
- Survival is poor when the electrical activity is wide and/or slow.
- These rhythms may be associated with hyperkalemia, hypothermia, hypoxia, preexisting acidosis, or a variety of drug overdoses (eg, tricyclic antidepressants, beta blockers, calcium channel blockers, digoxin)

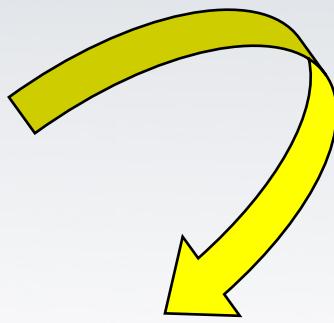


# *Check rhythm*

*VT*



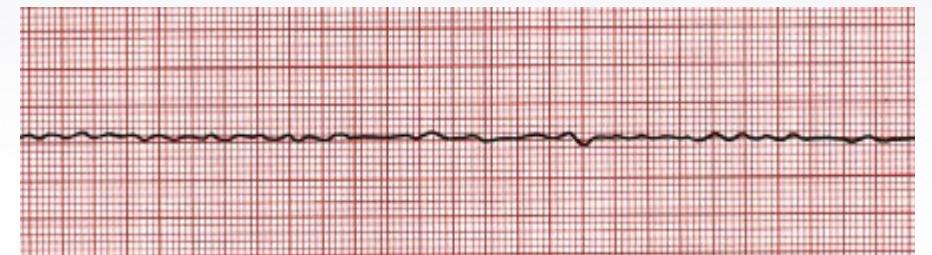
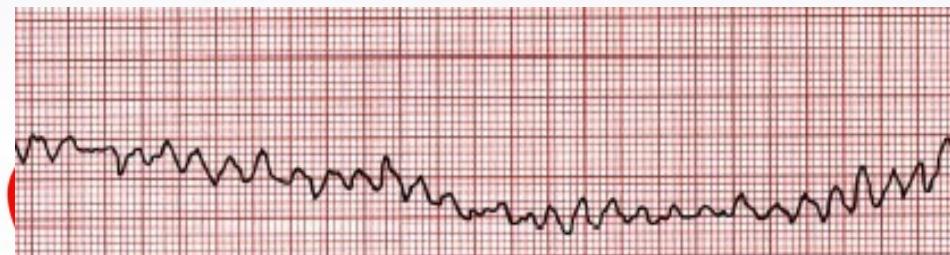
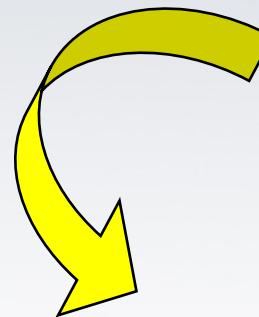
*VF*



*PEA*



*Asystole*



# *Shock ?*

*unsynchronized cardioversion (defibrillation)*

*Monophasic*



*360 J / at beginning*

*Biphasic*



*120 J / 200 J*

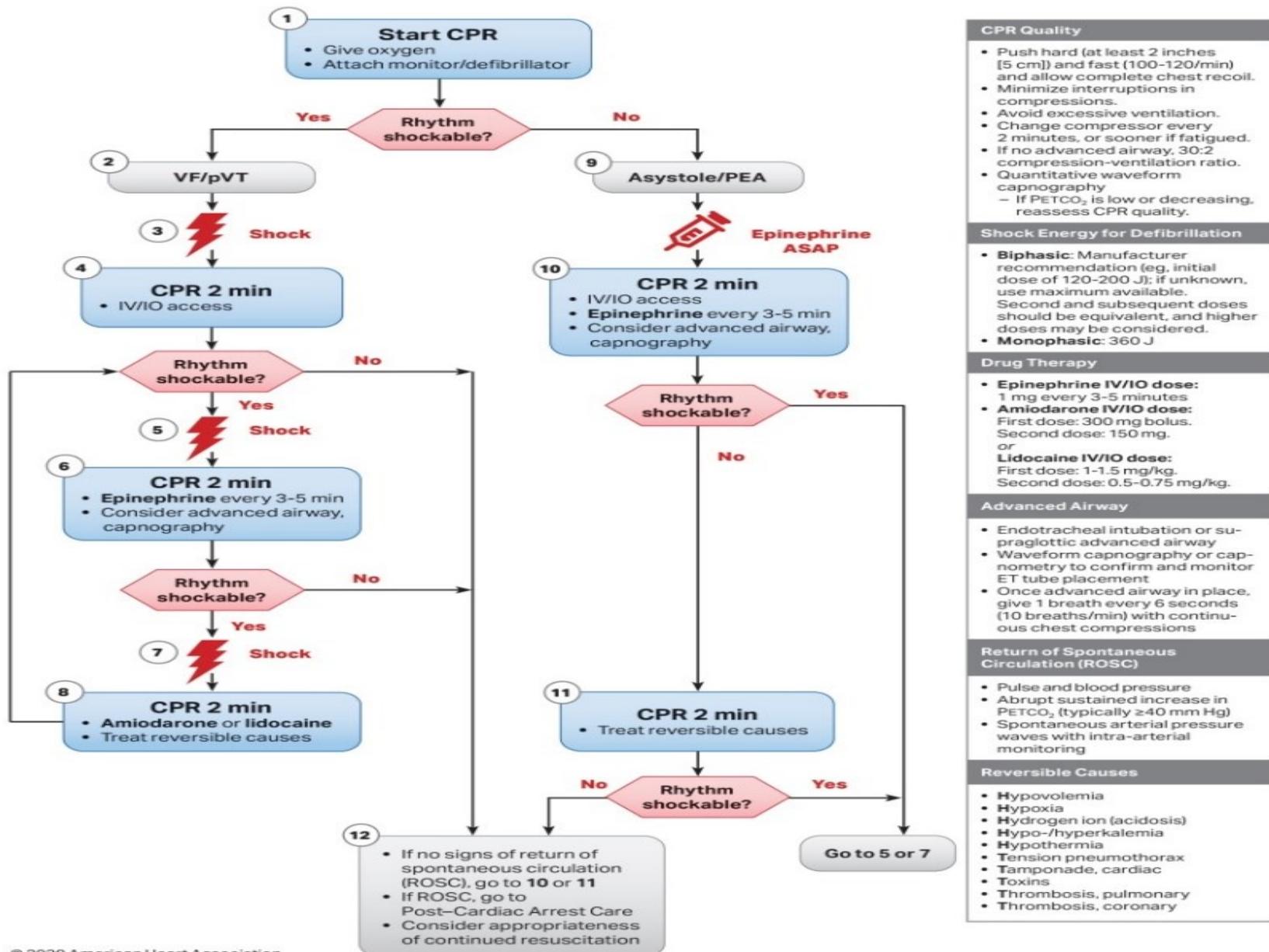
*Children*



*first 2 J/kg then 4 J/kg*



**Figure 4. Adult Cardiac Arrest Algorithm. AHA 2020**



## Prone CPR

### 2010 AHA Guidelines (Class IIb, LOE C)

- Advanced airway in place, hospitalized, cannot be placed in supine position
- E.g. patient undergoing brain surgery in prone position
- Not recommended for public layperson CPR

#### Steps

- Adhere to standard ACLS algorithms
- Patient intubated or had LMA in place
- Provide sternal support (sand bag or a bag of saline)
- Location of defibrillator pads:
  - Posterior-apical position
  - Posterior-anterior position
- Location of compression:
  - Two hands together: over T7 at the level of the inferior border of scapula
  - Two hands apart: one hand on either side of the spine, same level as above

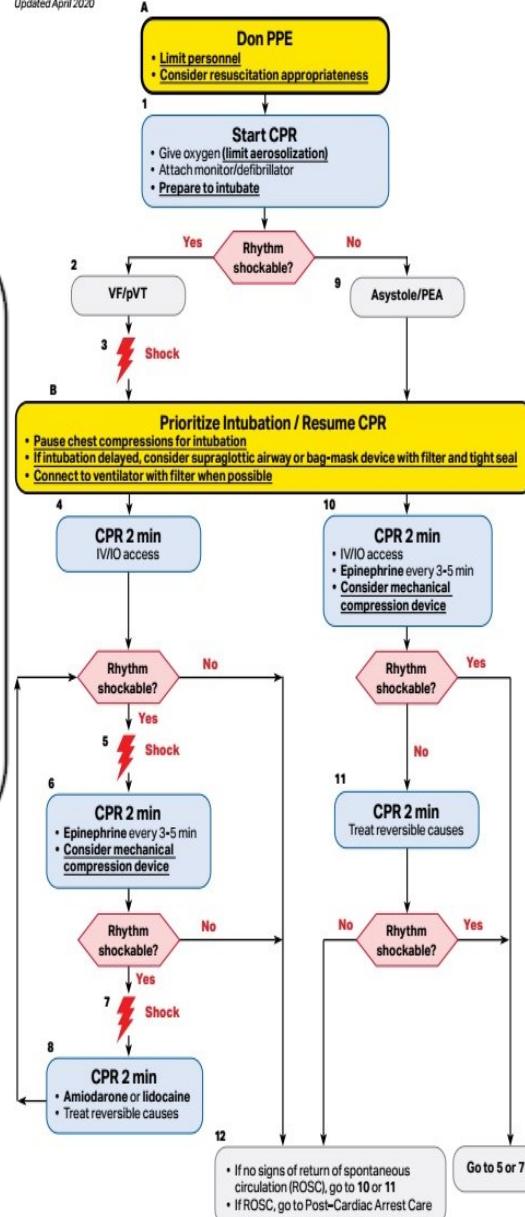


@jackcfchong



### ACLS Cardiac Arrest Algorithm for Suspected or Confirmed COVID-19 Patients

Updated April 2020



© 2020 American Heart Association

CPR Quality
<ul style="list-style-type: none"> <li>Push hard (at least 2 inches [5 cm] and fast [100-120/min]) and allow complete chest recoil.</li> <li>Minimize interruptions in compressions.</li> <li>Avoid excessive ventilation.</li> <li>Change compressor every 2 minutes, or sooner if fatigued.</li> <li>If no advanced airway, 30:2 compression-ventilation ratio.</li> <li>Quantitative waveform capnography                     <ul style="list-style-type: none"> <li>- If <math>\text{EtCO}_2 &lt; 10 \text{ mm Hg}</math>, attempt to improve CPR quality.</li> <li>- If relaxation phase (diastolic) pressure <math>&gt; 20 \text{ mm Hg}</math>, attempt to improve CPR quality.</li> </ul> </li> </ul>
Shock Energy for Defibrillation
<ul style="list-style-type: none"> <li>Biphasic: Manufacturer recommendation (e.g. initial dose of 120-200 J; if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered).</li> <li>Monophasic: 360 J</li> </ul>
Advanced Airway
<ul style="list-style-type: none"> <li>Minimize closed-circuit disconnection</li> <li>Use intubator with highest likelihood of first pass success</li> <li>Consider video laryngoscopy</li> <li>Endotracheal intubation or supraglottic advanced airway</li> <li>Waveform capnography or capnometry to confirm and monitor ET tube placement</li> <li>Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions</li> </ul>
Drug Therapy
<ul style="list-style-type: none"> <li>Epinephrine IV/IO dose: 1 mg every 3-5 minutes</li> <li>Amiodarone IV/IO dose: First dose: 300 mg bolus. Second dose: 150 mg. or Lidocaine IV/IO dose: First dose: 1.5-5 mg/kg. Second dose: 0.5-0.75 mg/kg.</li> </ul>
Return of Spontaneous Circulation (ROSC)
<ul style="list-style-type: none"> <li>Pulse and blood pressure</li> <li>Abrupt sustained increase in <math>\text{EtCO}_2</math> (typically <math>&gt; 40 \text{ mm Hg}</math>)</li> <li>Spontaneous arterial pressure waves with intra-arterial monitoring</li> </ul>
Reversible Causes
<ul style="list-style-type: none"> <li>Hypovolemia</li> <li>Hypoxia</li> <li>Hydrogen ion (acidosis)</li> <li>Hypo-/hyperkalemia</li> <li>Hypothermia</li> <li>Tension pneumothorax</li> <li>Tamponade, cardiac</li> <li>Toxins</li> <li>Thrombosis, pulmonary</li> <li>Thrombosis, coronary</li> </ul>

*Do not check  
pulse until  
The rhythm  
changed*



# Tachycardia With a Pulse Algorithm

Assess appropriateness for clinical condition.  
Heart rate typically  $\geq 150$ /min if tachyarrhythmia.

## Identify and Treat Underlying Cause

- Maintain patient airway; assist breathing as necessary
- Oxygen (if O<sub>2</sub> sat < 94%) or short of breath
- Cardiac monitor to identify rhythm; monitor blood pressure and oximetry

## Persistent Tachyarrhythmia Causing:

- Hypotension?
- Acutely altered mental status?
- Signs of shock?
- Ischemic chest discomfort?
- Acute heart failure?

## Synchronized Cardioversion\*

- Consider sedation
- If regular narrow complex, consider adenosine

Wide QRS?  
0.12 second

N

Y

- IV access and 12-lead ECG if available
- Consider adenosine only if regular and monomorphic
- Consider antiarrhythmic infusion
- Consider expert consultation

- IV access and 12-lead ECG if available
- Vagal maneuvers
- Adenosine (if regular)
- $\beta$ -Blocker or calcium channel blocker
- Consider expert consultation

## Doses/Details

### Synchronized Cardioversion\*\*

Initial recommended doses:

- Narrow regular: 50–100 J
- Narrow irregular: 120–200 J biphasic or 200 J monophasic
- Wide regular: 100 J
- Wide irregular: Defibrillation dose (not synchronized)

### Adenosine IV Dose:

First dose: 6 mg rapid IV push;  
follow with NS flush.  
Second dose: 12 mg if required

### Antiarrhythmic Infusions for Stable Wide-QRS Tachycardia Procainamide IV Dose:

20–50 mg/min until arrhythmia suppressed, hypotension ensues, QRS duration increases > 50% or maximum dose 17 mg/kg given.  
Maintenance infusion: 1–4 mg/min.  
Avoid if prolonged QT or CHF.

### Amiodarone IV Dose:

First dose: 150 mg over 10 minutes.  
Repeat as needed if VT recurs. Follow by maintenance infusion of 1 mg/min for first 6 hours.

### Sotalol IV Dose:

100 mg (1.5 mg/kg) over 5 minutes.  
Avoid if prolonged QT.

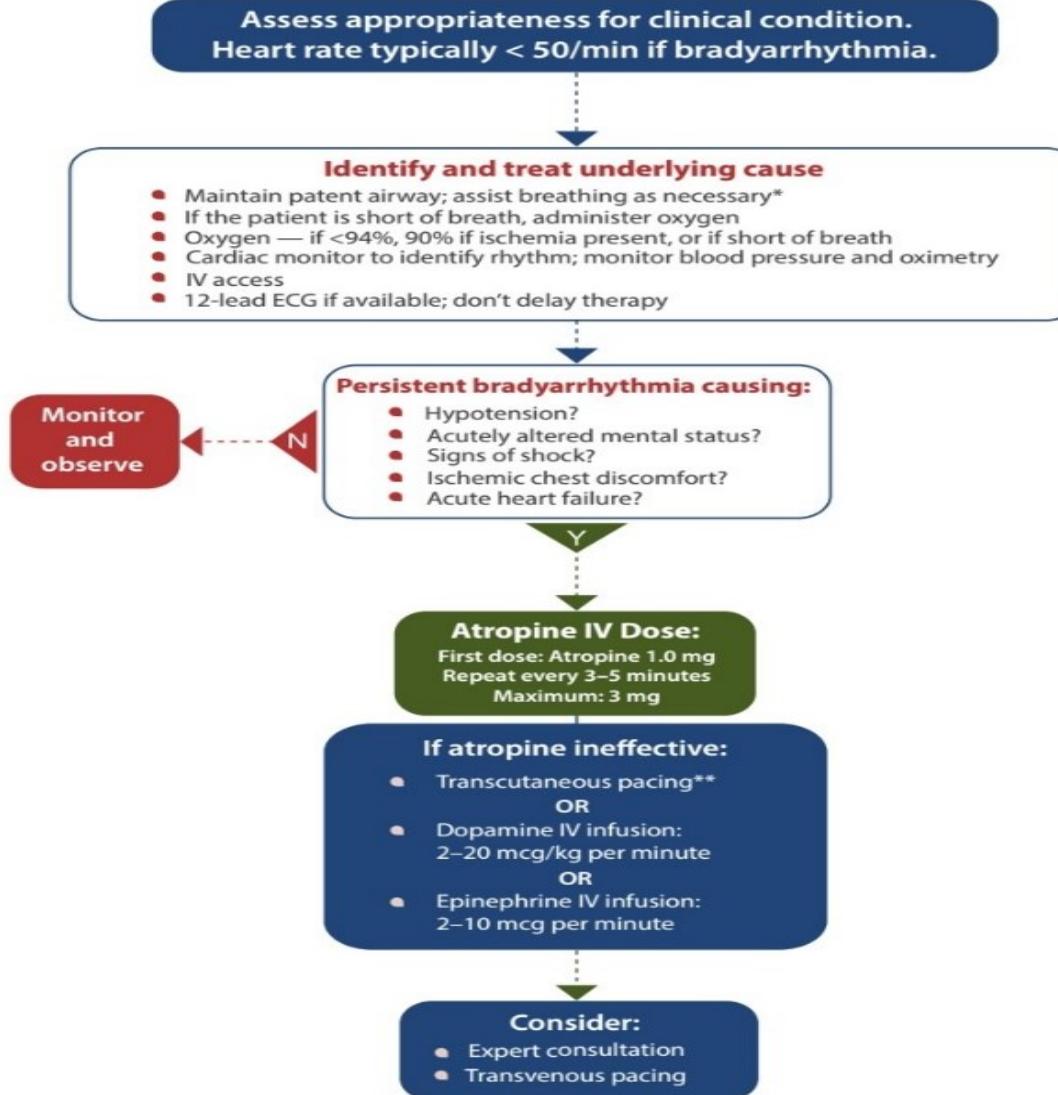
\*Link MS, Arkins DL, Passman RS, Halperin HR, Samson RA, White RD, Cudnik MT, Berg MD, Kudenchuk PJ, Kerebenchuk PJ, Kerber RE. "Part 6: electrical therapies: automated external defibrillators, defibrillation, cardioversion, and pacing." 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2010;122(suppl 3):S706-S719. [http://circ.ahajournals.org/content/122/18\\_suppl\\_3/S706](http://circ.ahajournals.org/content/122/18_suppl_3/S706)

\*\* Scholten M, Szili-Torok I, Kloosterveld P, Jordaens I. Comparison of monophasic and biphasic shocks for transthoracic cardioversion of atrial fibrillation. Heart 2003;89:1032-1034

Version control: This document follows 2020 American Heart Association® guidelines for CPR and ECC. American Heart Association® guidelines are updated every five years.  
If you are reading this page after December 2025, please contact support@acls.net for an update. Version 2021.01.c

# Bradycardia With a Pulse Algorithm

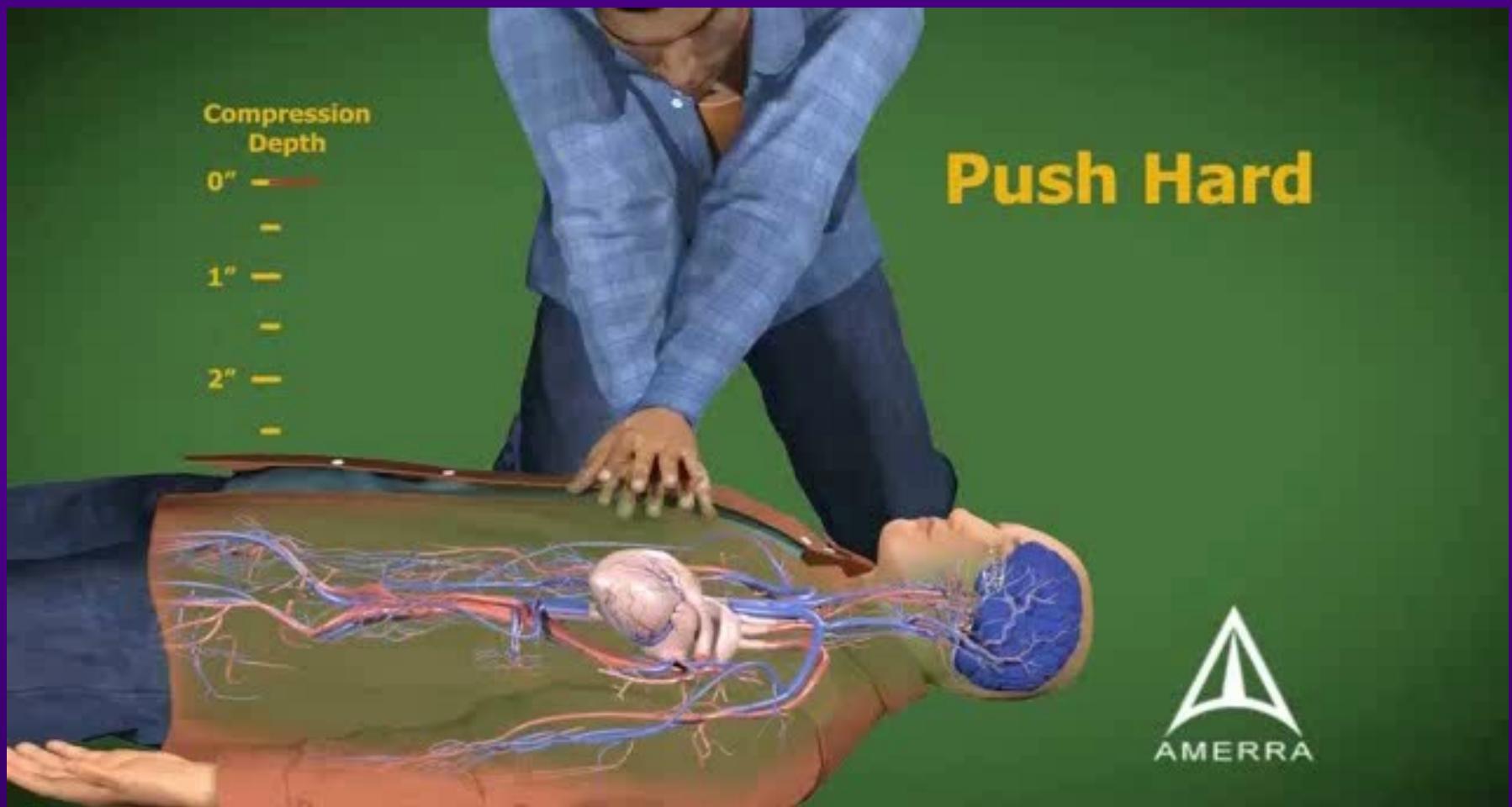
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\* Dargatz V, Wenzel V, Knacke P, Gerlach K. Comparison of different airway management strategies to ventilate apneic, nonpreoxygenated patients. Crit Care Med. 2003;31:800-804

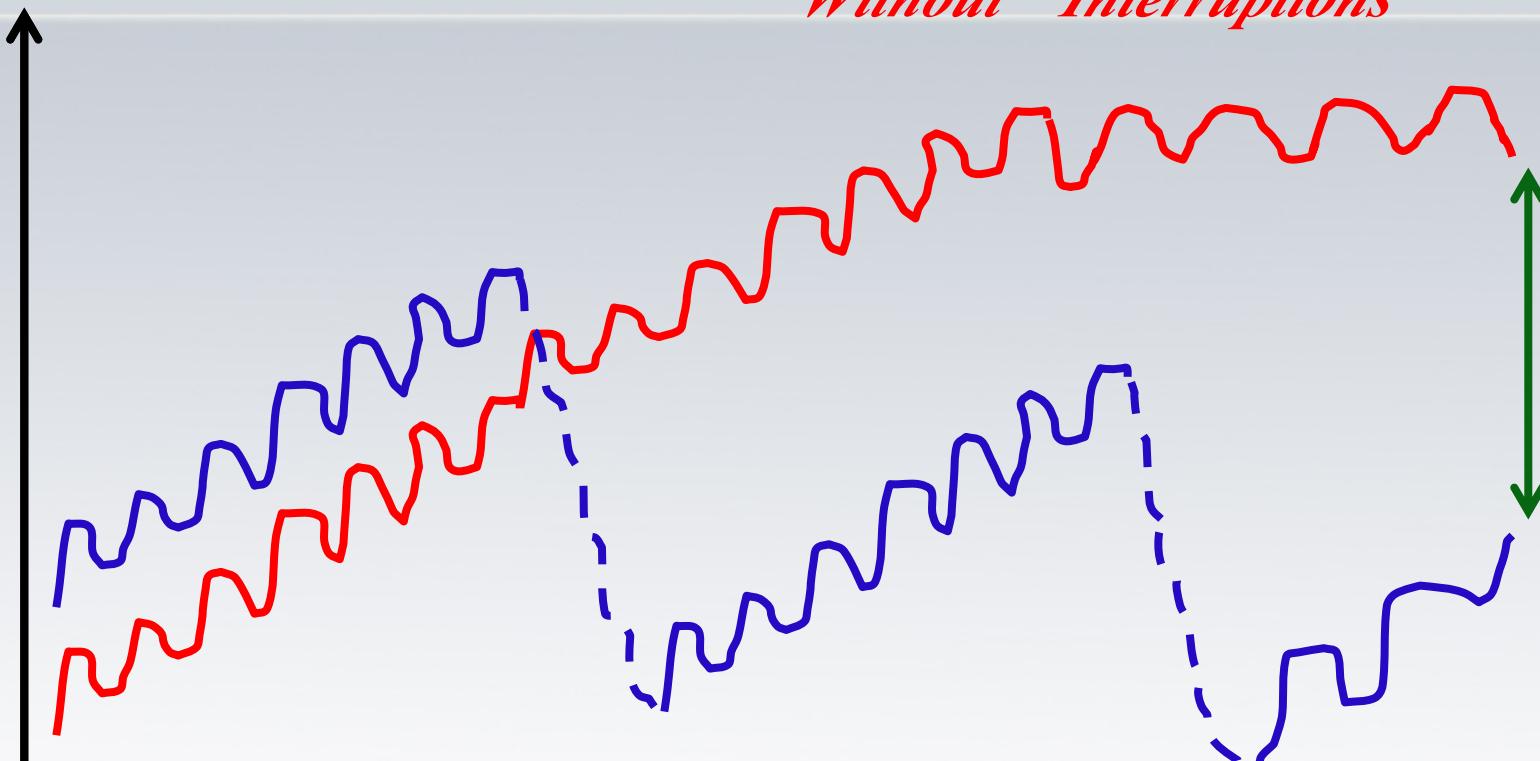
\*\* Link MS, Atkins DL, Possmann RS, Halperin HR, Samson RA, White RD, Cudnik MT, Berg MD, Kudenchuk PJ, Kerber RE. "Part 6: electrical therapies: automated external defibrillators, defibrillation, cardioversion, and pacing." 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2010; 122(suppl 3):S706-S719. [http://circ.ahajournals.org/content/122/18\\_suppl\\_3/S706](http://circ.ahajournals.org/content/122/18_suppl_3/S706)



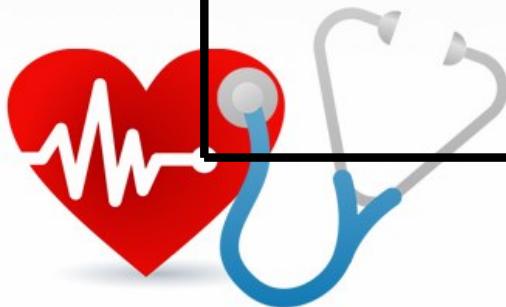


Cardiac Output

*Without Interruptions*



*With Interruptions*



Time 2 min



# داروهای احیای قلبی - ریوی



# *Amiodarone*

- *antiarrhythmic agent – used in ventricular fibrillation and ventricular tachycardia.*
- *An initial dose of 300 mg IV/IO can be followed by one dose of 150 mg IV/IO (Given 5 mg/kg over 20 minutes).*



(به شوک های متعدد پاسخ ندهد)

# *Epinephrine*

- *Epinephrine (1 mg intravenous push) should be given as soon as intravenous access is established and repeated every 3 to 5 minutes thereafter until return of spontaneous circulation is achieved.*

(0.01mg/kg 1:10/000)



اکشن همیشین دارود در مرابتت های قلبی است



# Oxygen Therapy

- “*Generally speaking*”, a patient who is breathing less than **12** and more than **24** times a minute needs **oxygen**



# Lidocaine



- *Lidocaine is administered at a dose of 1 mg/kg as an intravenous push and can be repeated every 3 to 5 minutes; it should not exceed a total dose of 3 mg/kg during the first hour.*

• عمدهاً روی بطن‌ها موثر است. آستانه فیبریلاسیون در قلب را بالا می‌برد بنابراین از تکرار دوره‌های VF جلوگیری می‌کند. ولی در خود VF اثر نمی‌کند.





**P.E.A**



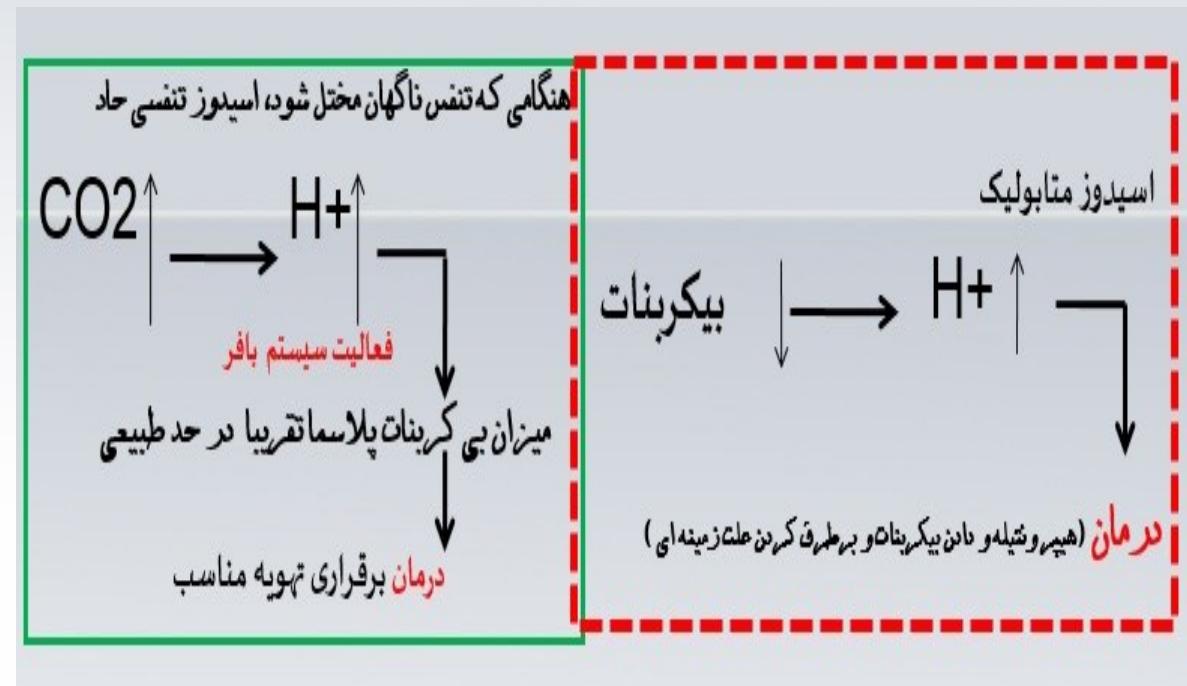
# *Sodium bicarbonate*

- *Sodium bicarbonate (1 meq/kg) has a role in the treatment of PEA (or) due to specific causes:*
- *preexisting hyperkalemia*
- *preexisting bicarbonate-responsive acidosis*
- *treatment of tricyclic antidepressant overdose*
- *alkalinize the urine in aspirin or other drug overdoses.*



## *Sodium bicarbonate*

- *It is **not** routinely used for **acute lactic** acidosis associated with CPR, but may be considered if the initial interventions (defibrillation, ventilation, cardiac compression) have been ineffective.*
  - *???? The use of bicarbonate is acceptable in intubated and ventilated patients with a long arrest interval or upon return of circulation after a long arrest interval; however, there is only fair evidence for its efficacy in these settings.*
  - *The use of bicarbonate is **harmful** and not indicated for respiratory acidosis (hypercapnic).*





# آدنوزین

(ریتم سریع را طبیعی میکند. گاهی بعدت ۱۲ ثانیه قلب را به فاز asystole میبرد.)



# *Drug*

*E Troute:*

*As a law:*

*Drugs injections in CPR must be:*

**PUSH**

*ETT administration:*

*2 - 2.5 times as IV doses*

*plus*

*5-10 ml distilled water*

- Lidocaine*
- Epinephrine*
- Atropine*
- Naloxone*
- Vasopressin*

*VALEN*



## *peripheral venous route:*

- 1.** *Follow with a 20 ml bolus of IV fluid.*
  
- 2.** *Elevate the extremity for 10 to 20 seconds to facilitate drug delivery to the central circulation.*



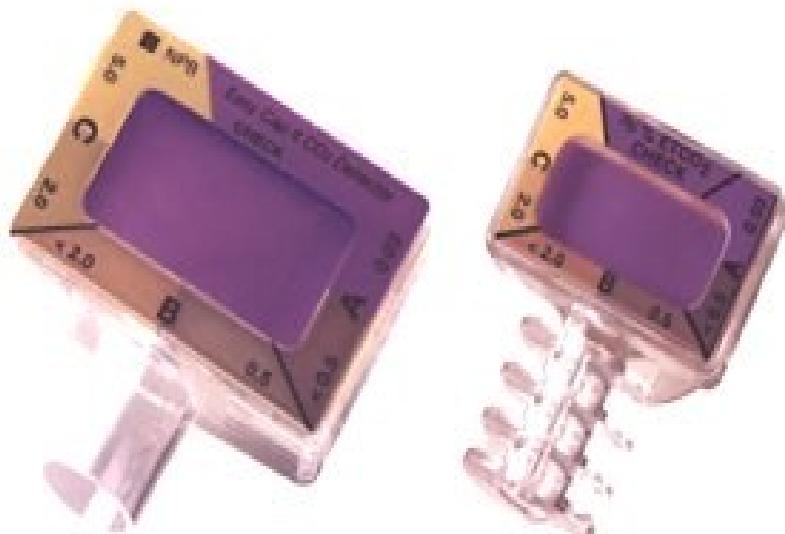
کاپنوگرافی برای بیماران اینتوهه در دوره ارست قلبی از طریق بررسی سطح دی اکسید کربن انتهای بازدمی

به منظور اطمینان از جایگذاری صحیح لوله تراشه و بررسی کیفیت **CPR (PETCO2)** توصیه شده است

هایپرونیله  $\downarrow \text{CO}_2 \leftarrow 25\text{mmHg}$

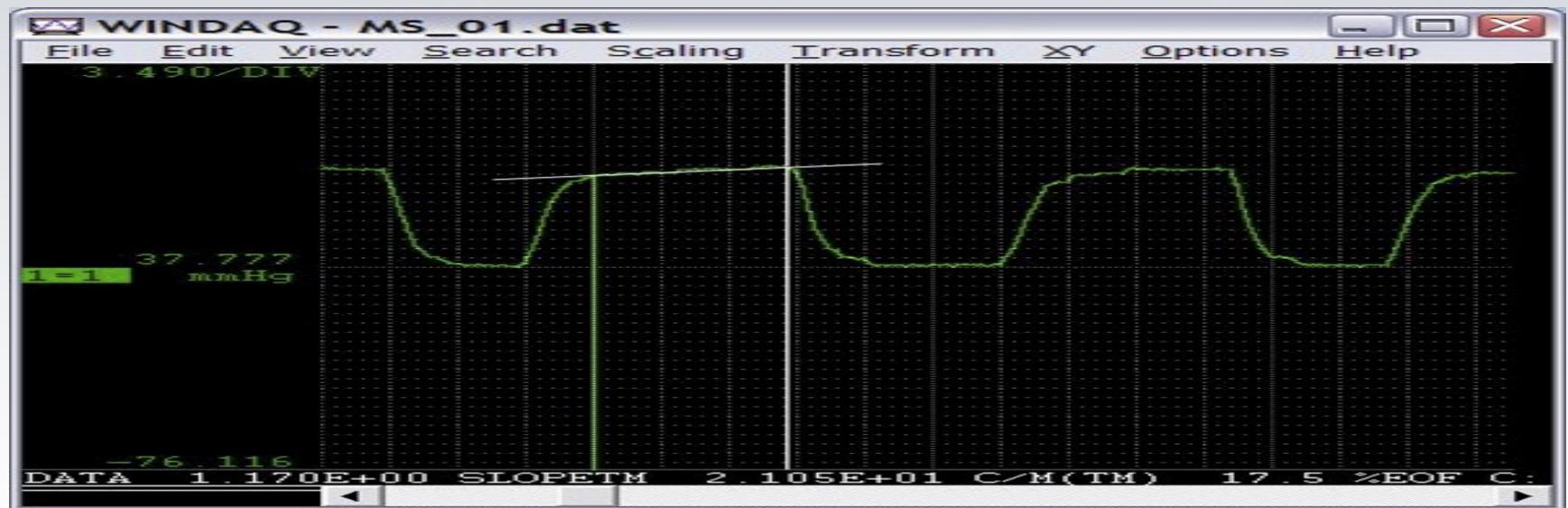
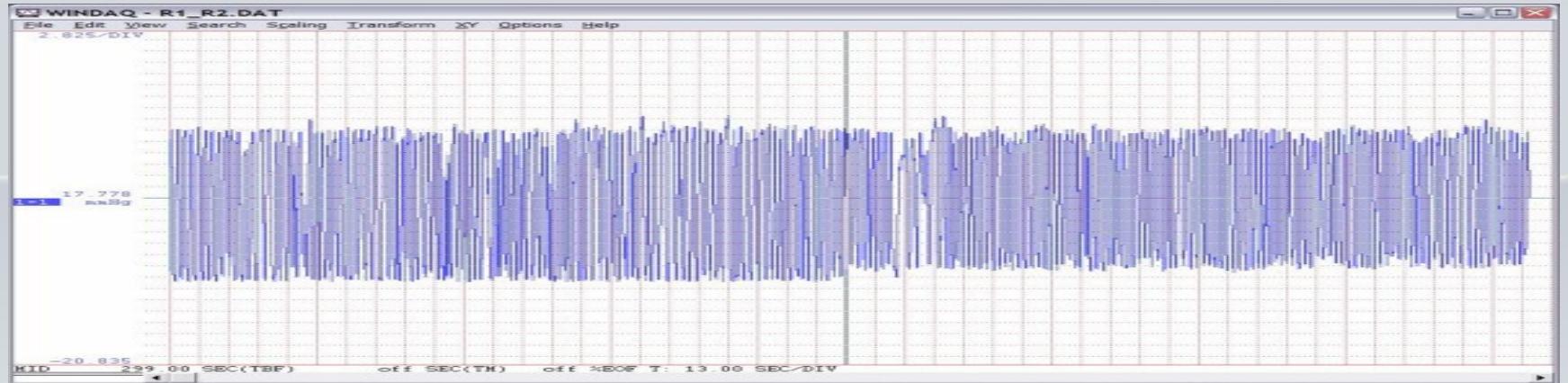


هیپوکسی مغزی در اثر انتباخت عروق مغزی



*Cannography*





# *Resuscitation of the Pregnant Patient*

## *Key Points*

- *During resuscitation there are two patients, mother & fetus*
- *The best hope of fetal survival is maternal survival*
- *Consider the physiologic changes due to pregnancy*



*Manual left uterine displacement by the 1-handed technique from the right of the patient during adult resuscitation.*

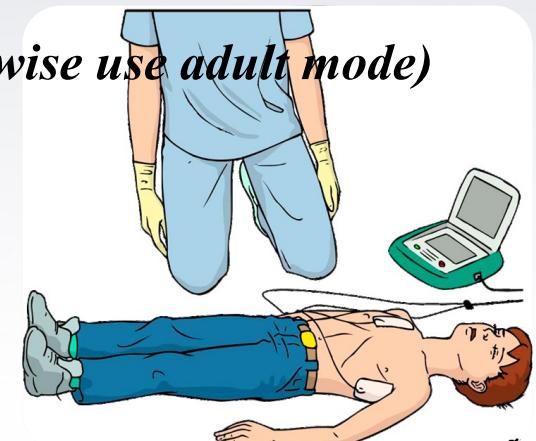


# *automated external defibrillator*

## *AED*



- *AHA recommends that AED (automatic external defibrillation) be used in children with sudden collapse or presumed cardiac arrest who are older than 8 years of age or more than 25 kg and are 50 inches long.*
- *Electrical energy is delivered by a fixed amount range 150 to 200. (4J/kg)*
- **Age 1-8 years**
  - *use paediatric pads / settings if available (otherwise use adult mode)*
- **Age < 1 year**
  - *use only if manufacturer instructions indicate it is safe*



کی مجازیم که **CPR** را انجام ندهیم ؟

▶ کبودی نعشی

▶ جمود نعشی

▶ فساد اعضای بدن

▶ جدا شدن سرازبد ن

▶ متلاشی شدن مغز



# کبودی نعشی

پس از وقوع مرگ به علت از بین رفتن خواص حیاتی جداره عروق خونی و قابل نفوذ شدن آن‌ها، گلبوک‌های قرمن خون از جداره این عروق که به واسطه وقوع مرگ از حالت طبیعی خود خارج شده اند و استحکام آن‌ها مختل و نفوذ پذیری شان افزایش یافته است، عبور می‌کنند. خونی که از جداره عروق می‌گذرد بر اثر قوه جاذبه به طرف نواحی تحتانی بدن و سطوح اتکای جسدگرایش می‌یابد. مناطق تجمع این گلبوک‌های قرمن و خونابه به رنگ صورتی مایل به بنفش به نظر می‌رسد. به این کبودی که در اثر شرایط خاص خون و رگ‌های بدن بعد از مرگ ایجاد می‌شود، کبودی نعشی یا می‌گویند. **کبودی نعشی در سطوح اتکای جسد به زمین تشکیل نمی‌شود، زیرا به دلیل تماس بدن با سطح زیرین و فشاری که به بافت‌ها وارد می‌آید این مناطق فاقد کبودی نعشی خواهند بود.**

**زمان ایجاد کبودی نعشی بسیار متغیر است معمولاً بعد از گذشت ۲ ساعت از وقوع مرگ شروع و در عرض ۸-۱۲ ساعت به حداقل وسعت خود می‌رسد و تا ۱۸ ساعت قابل جا به جایی است و در مدت ۲۴ ساعت کامل می‌گردد.**

بنابراین، با توجه به چگونگی تشکیل آن، هم می‌توان در مورد زمان تقریبی وقوع مرگ اظهار نظر کرد و هم با توجه به اینکه در صورت جا به جایی جسد محل کبودی نعشی تا ۱۸ ساعت بعد از مرگ امکان **جا به جایی** دارد، از این امر جهت تشخیص موارد احتمالی جا به جایی جسد استفاده کرد. برای مثال، در صورتی که فردی به دنبال فوت در حالت خوابیده به پشت (طاقباز) قرار گیرد، کبودی نعشی در پشت بدن وی تشکیل می‌گردد. حال اگر برای مثال ۱۰ ساعت بعد از مرگ جسد وی را جا به جا کنند یا به محل دیگری انتقال دهند، به صورتی که به حالت خوابیده به شکم قرار گیرد، در حالت دوم علاوه بر آثار کبودی نعشی در پشت بدن وی در جلوی بدن او نیز کبودی نعشی تشکیل می‌گردد که این امر می‌تواند در تحقیقات قضایی مورد استفاده قرار گیرد.



## جمود نعشی (Rigor mortis)

- حالتی است که پس از مرگ بافت‌های ماهیچه‌ای سفت و سخت می‌شود.
- ۳ ساعت پس از زمان مرگ آغاز می‌شود و ۱۲ ساعت پس از آن به اوج می‌رسد و شاید تا ۳۶ ساعت پس از مرگ نیز این حالت ادامه داشته باشد.
- ریگور مورتیس پس از گذشت ۱۸ تا ۳۶ ساعت پس از مرگ به آرامی آغاز به از میان رفتن می‌کند؛ و ۷۲ ساعت (سه روز) پس از مرگ این حالت یکسره از میان می‌رود.



# Factors affecting Rigor Mortis

Factors affecting Rigor mortis	Event	Effect	Circumstances
Temperature	Warm	Accelerate	Slower onset
	Cold	Slows	Faster onset
Activity Before Death	Anaerobic Exercise	Accelerate	Buildup of lactic acid and heat; accelerates rigor
	Sleep	Slows	Fully oxygenated muscles slow down rigor
Body fat	Obese	Slows	Fat stores oxygen
	Thin	Accelerate	Body loses more oxygen



# معیارهای CPR موفق

- .1 CPR موفق در کوتاه مدت، بازگشت جریان خون خودبخودی بیمار (ROSC: Return of Spontaneous Circulation) است.
- .2 اندازه گیری سطح  $\text{CO}_2$  End tidal به میزان بیش از 40 mmHg
- .3 CPR ای موفق است که پس از آن بیمار گردش خون خودبخودی پیدا کند و حداقل ۲۰ دقیقه نیاز به احیای مجدد نداشته باشد.

## معیارهای ROSC

- ✓ شواهدی از نبض قابل لمس (فمورال - برآکیار - کاروتید) بیش از ۳۰ ثانیه
- ✓ فشارخون قابل اندازه گیری



# *Targeted temperature management (T·T·M)*

- *All comatose adult pt with ROSC after cardiac arrest should have TTM, with a target temperature between 32-36°C selected and achieved, then maintained constantly for at least 24 hr*



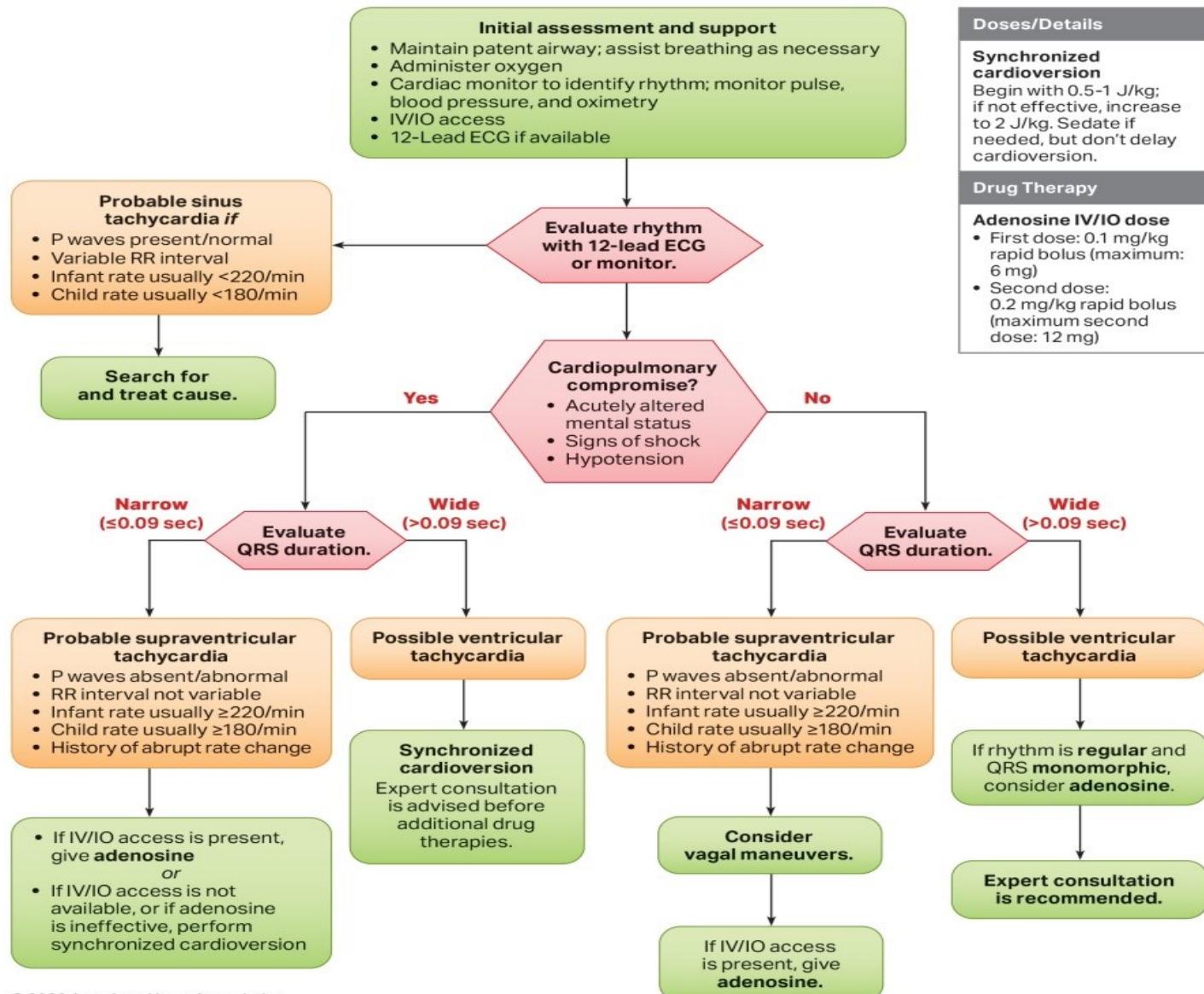
# *Pediatric CPR*

- \* *child(1-8y) CPR*
- \* *Infant(<1y) CPR*



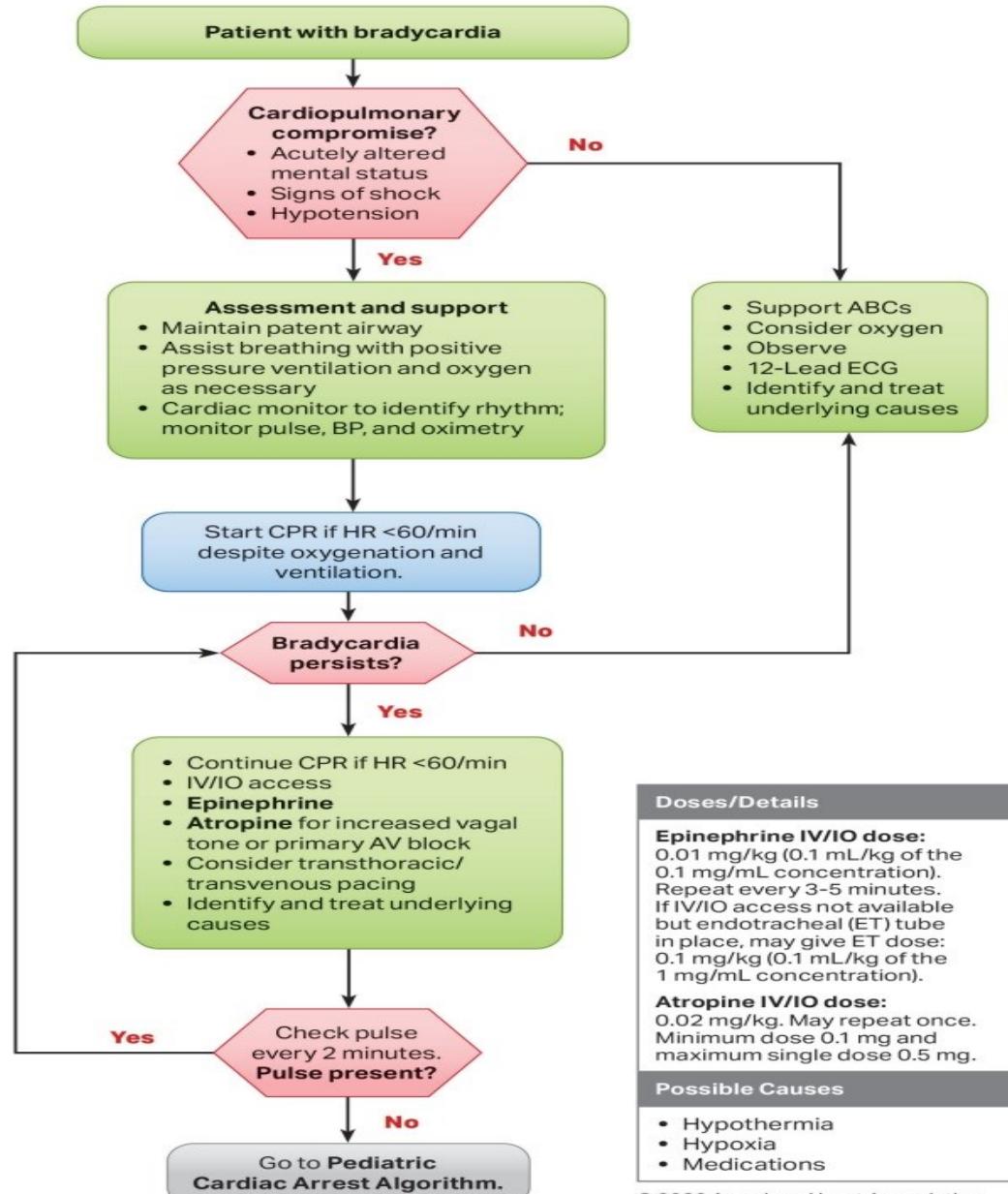


**Figure 13. Pediatric Tachycardia With a Pulse Algorithm.**



© 2020 American Heart Association

**Figure 12. Pediatric Bradycardia With a Pulse Algorithm.**



© 2020 American Heart Association

# *Cardiac Arrest*

- *Pediatric cardiac arrest is:*
  - *Uncommon*
  - *Rarely sudden cardiac arrest caused by primary cardiac arrhythmias.*
  - *Most often asphyxial, resulting from the progression of respiratory failure or shock or both.*



# *Impending Respiratory Failure*

- **RR**    *<10 or >60 is an ominous sign of impending respiratory failure.*

*Pearrest. s*



# *Circulatory Assessment*

- **HR** is the most sensitive parameter for determining perfusion and oxygenation in children.(<3Y)
  - Heart rate needs to be **at least 60 beats per minute** to provide adequate perfusion.  
*NEONATE*
  - **HR > 140 beats per minute at rest** needs to be evaluated.



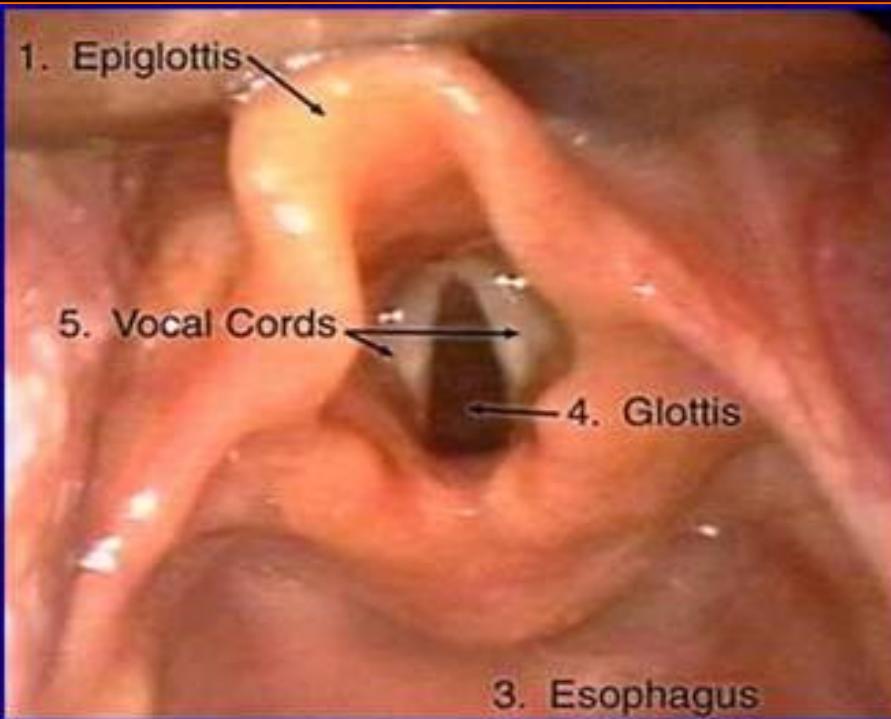
# *Vascular Access – New Guidelines*

- in children who are six years or younger after 90 seconds or 3 attempts at peripheral intravenous access – Intraosseous access recommended.*



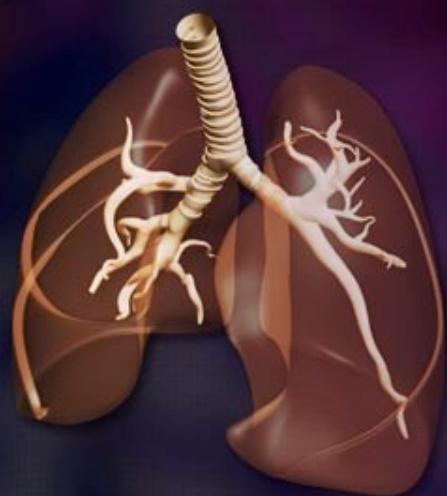
# *Airway Management*





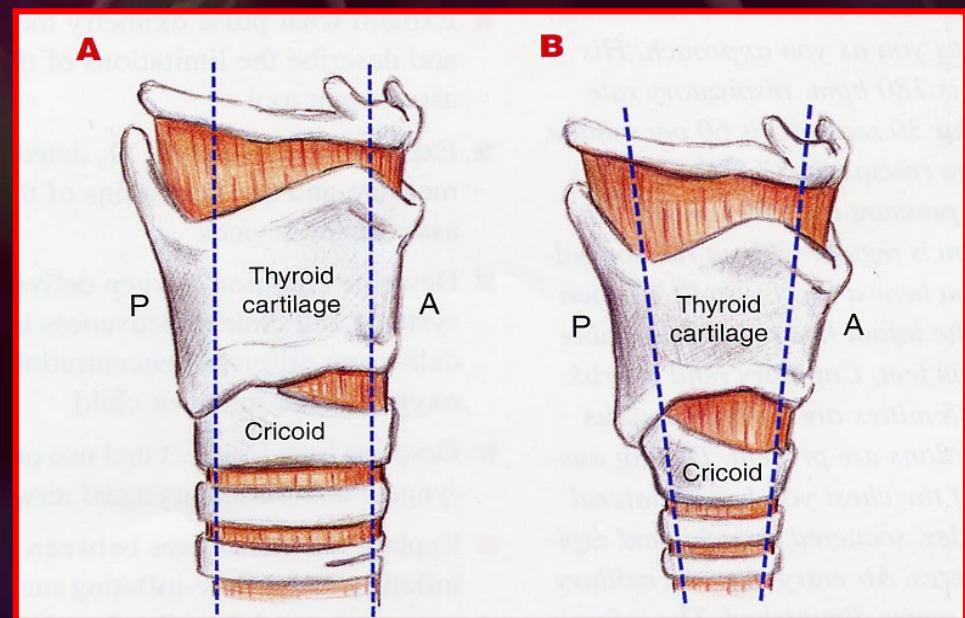
## Epiglottis

- Relatively large and U-shaped
- More susceptible to trauma
- Forms more acute angle with vocal cords

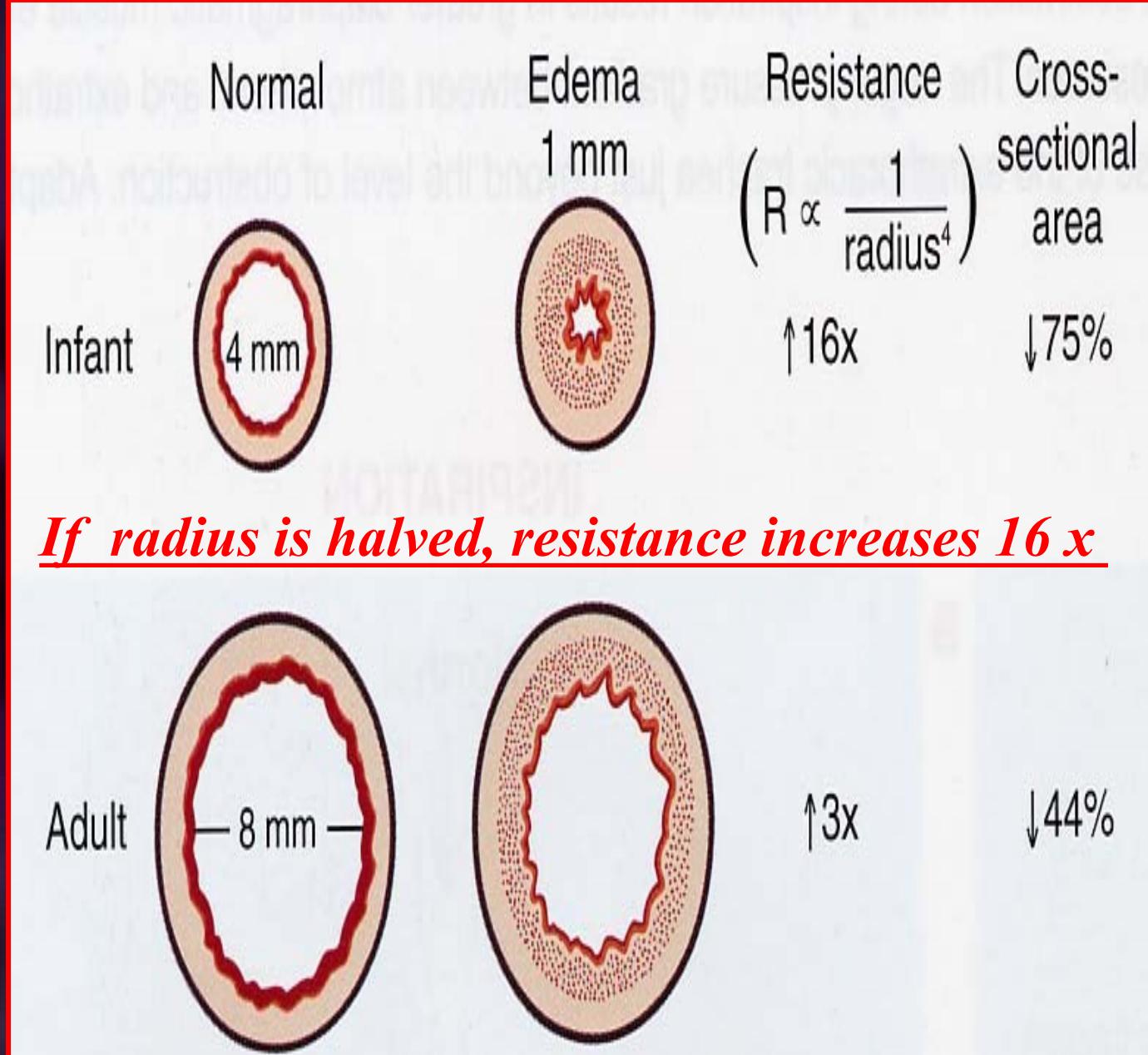


# Cricoid

- *Narrowest portion of airway*
- *↑ resistance with airway edema or infection*
- *Acts as “cuff” during tracheal intubation*

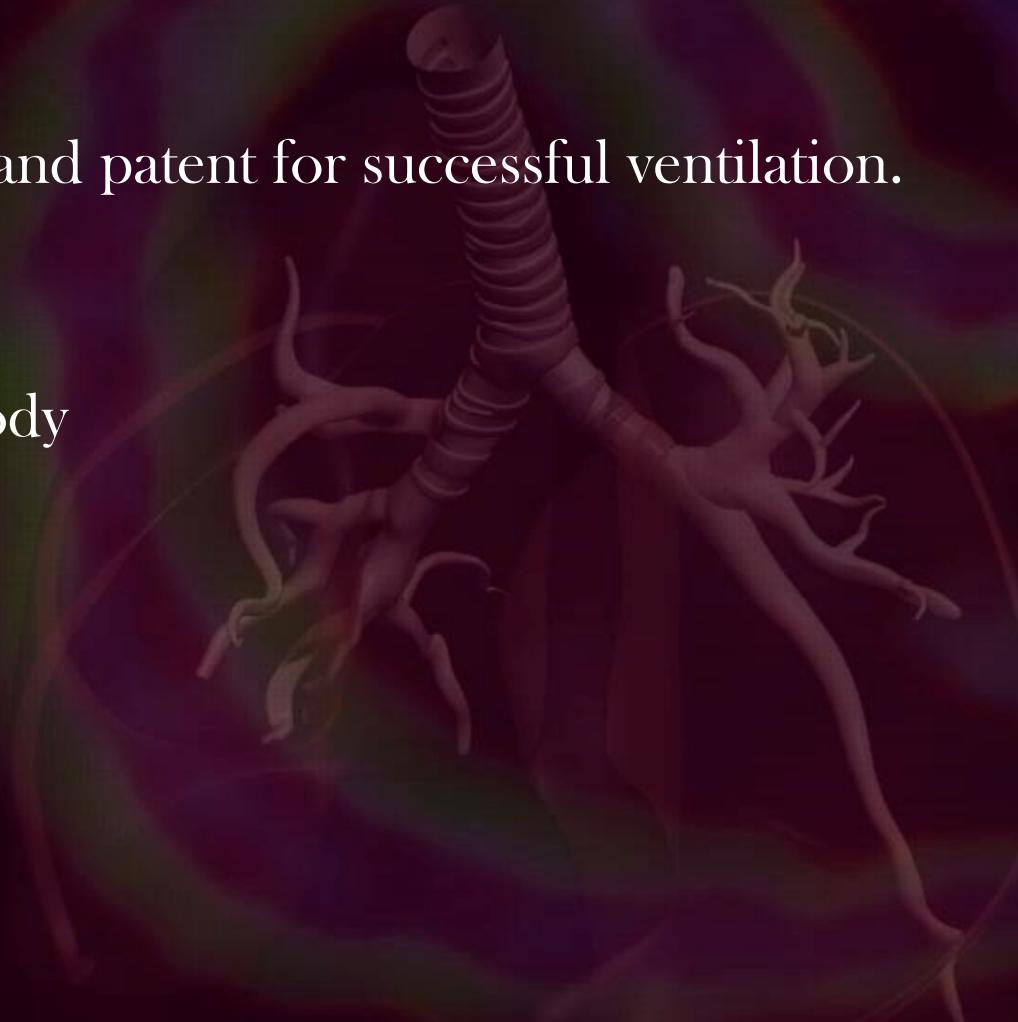
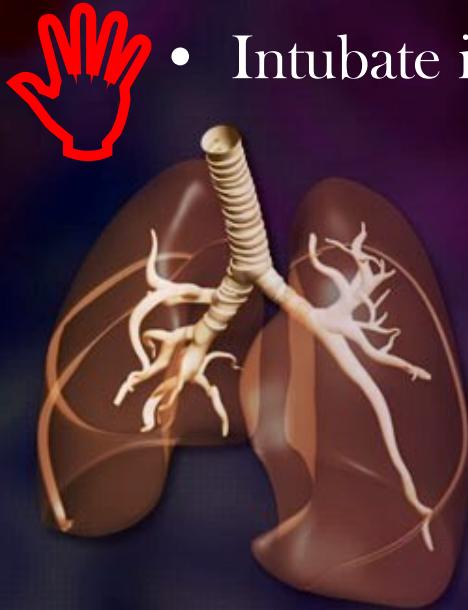


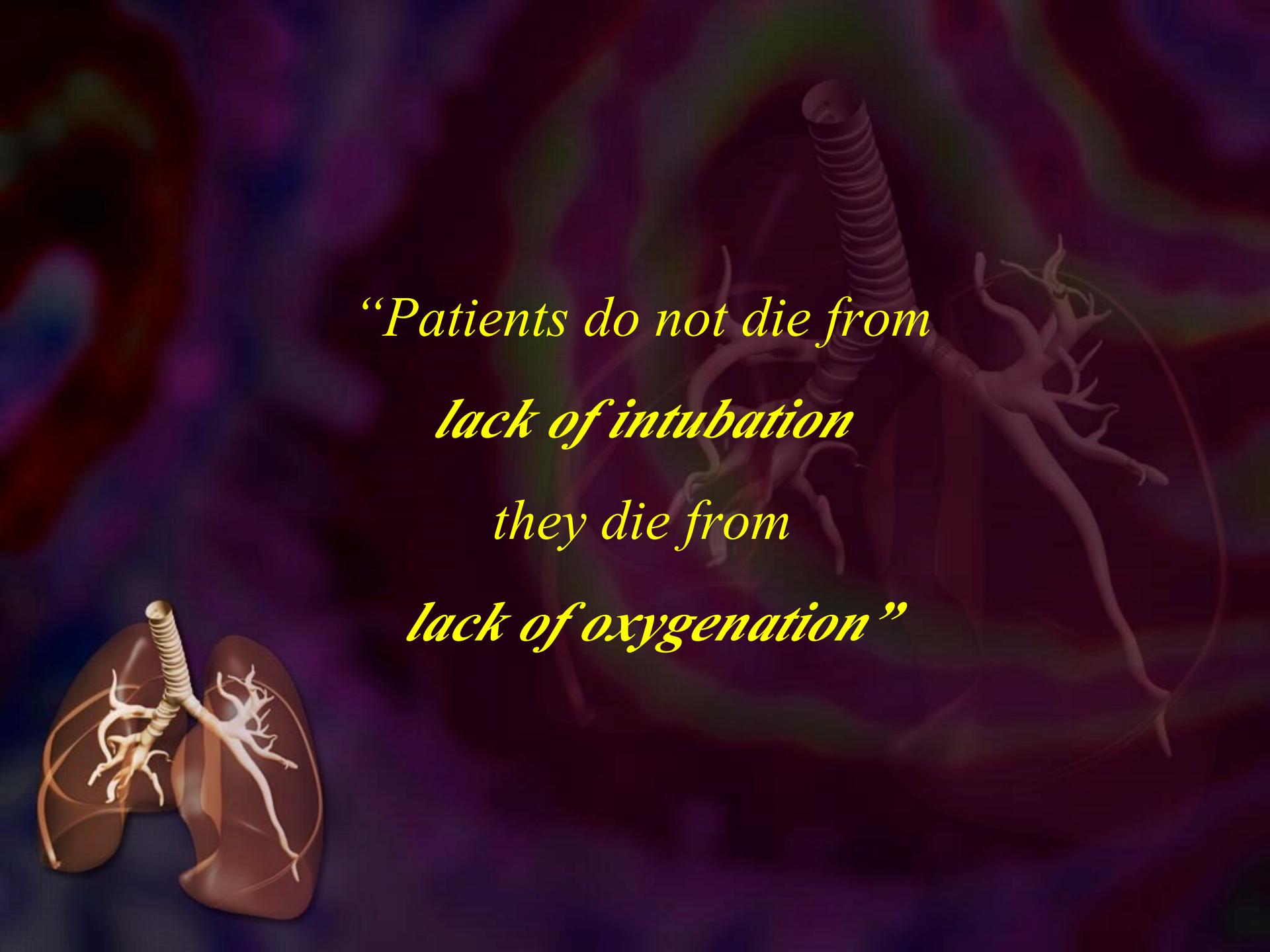
## Effect Of Edema



# *Airway*

- Airway must be clear and patent for successful ventilation.
  - Position
  - Clear of foreign body
  - Free from injury
- Intubate if needed





*“Patients do not die from*

*lack of intubation*

*they die from*

*lack of oxygenation”*



# *Signs of Respiratory Distress*

- *Tachypnea*
- *Tachycardia*
- *Grunting*
- *Stridor*
- *Head bobbing*
- *Nasal Flaring*
- *Agitation*
- *Retractions*
- *Access muscles*
- *Wheezing*
- *Sweating*
- *Prolonged expiration*
- *Apnea*
- *Cyanosis*



## *How much is Oxygen Delivered?*

*1-Delivery oxygen by pure ambo bag :*



## *2- Ambo bag plus Oxygen :*

*40-60%*



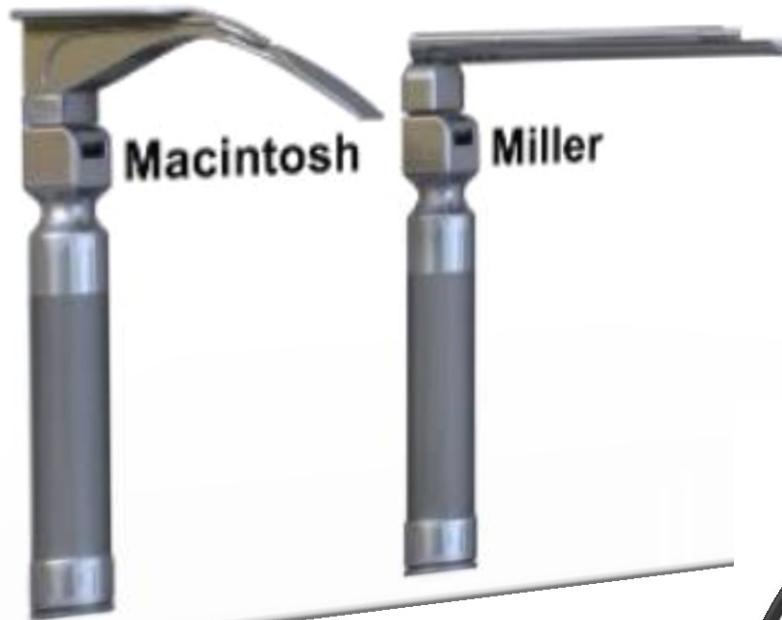
### *3- Ambo bag with reservoir bag plus*

*oxygen > 90%*

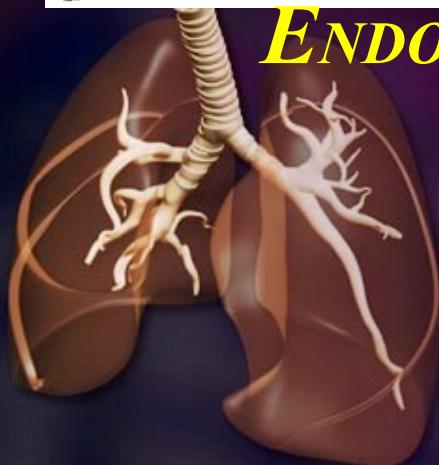


# *Advanced Airway Management*

## Equipment



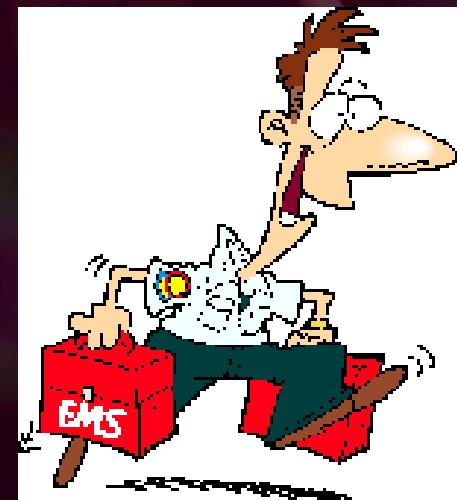
## *ENDOTRACHEAL INTUBATION*



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## *1. Preparation*

- *A two-part process:*
  - *Assess the risks*
  - *Prepare the equipment*



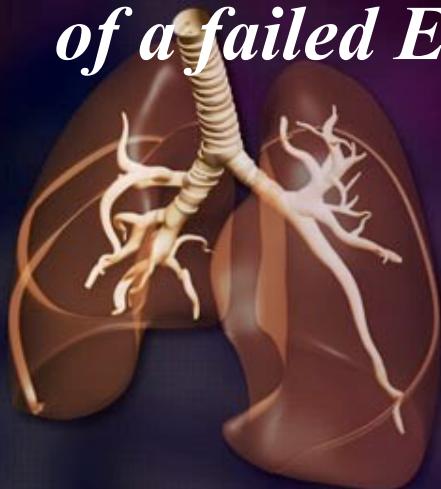
*Assess the Risks*

# *Difficult Airways*

**INFANT & CHILDREN**

*“The difficult airway is something one anticipates; the failed airway is something one experiences.”*

*Identifying a potentially difficult airway is essential to preparing and developing a strategy for successful ETI and also preparing an alternate plan of a failed ETI.*



# *Some Predictors of a Difficult Airway*

- *C-spine immobilized trauma patient*
- *Protruding tongue*
- *Short, thick neck*
- *Prominent upper incisors (“buckteeth”)*
- *Receding mandible*
- *High, arched palate*
- *Beard or facial hair*
- *Combative patient*
- *Dentures*
- *Limited jaw opening*
- *Limited cervical mobility*
- *Upper airway conditions*
- *Face, neck, or oral trauma*
- *Laryngeal trauma*
- *Airway edema or obstruction*
- ***Morbidly obese***



## Mallampati Classification



Class I: soft palate, tonsilar fauces and pillars, uvula visible



Class II: soft palate, partial tonsilar fauces and uvula visible



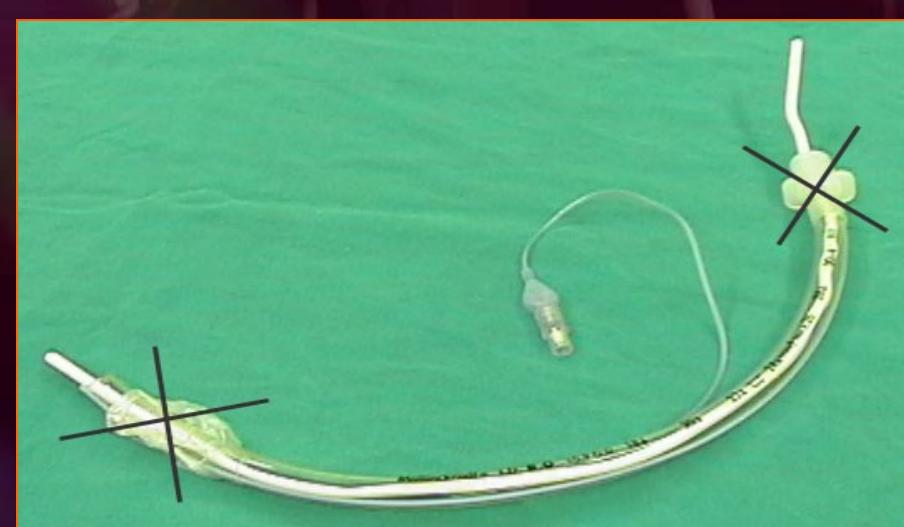
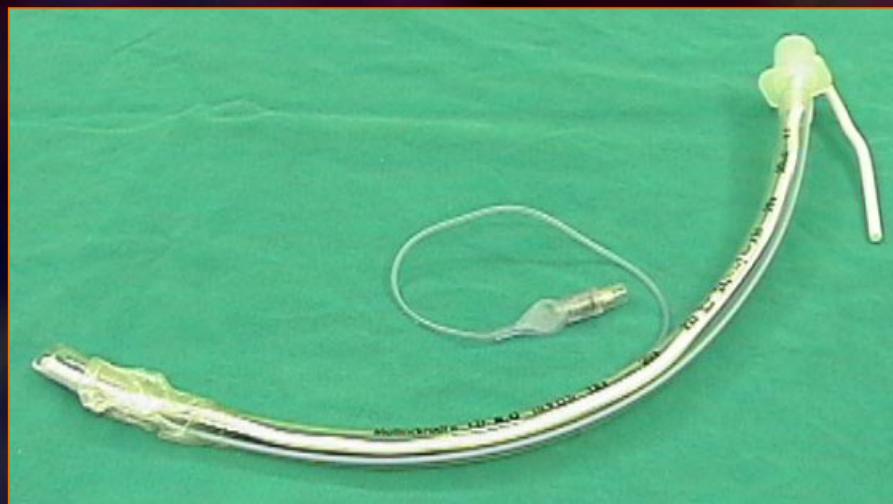
Class III: soft palate, base of uvula visible



Class IV: hard palate visible



# Stylet



# Magill forceps



## *Pre-oxygenation*

- *Pre-oxygenation helps prevent hypoxia during intubation.*
- *Manual ventilation with oxygen before intubation may maintain the PaO<sub>2</sub> above normal levels for at least 2 to 3 minutes in most adults*

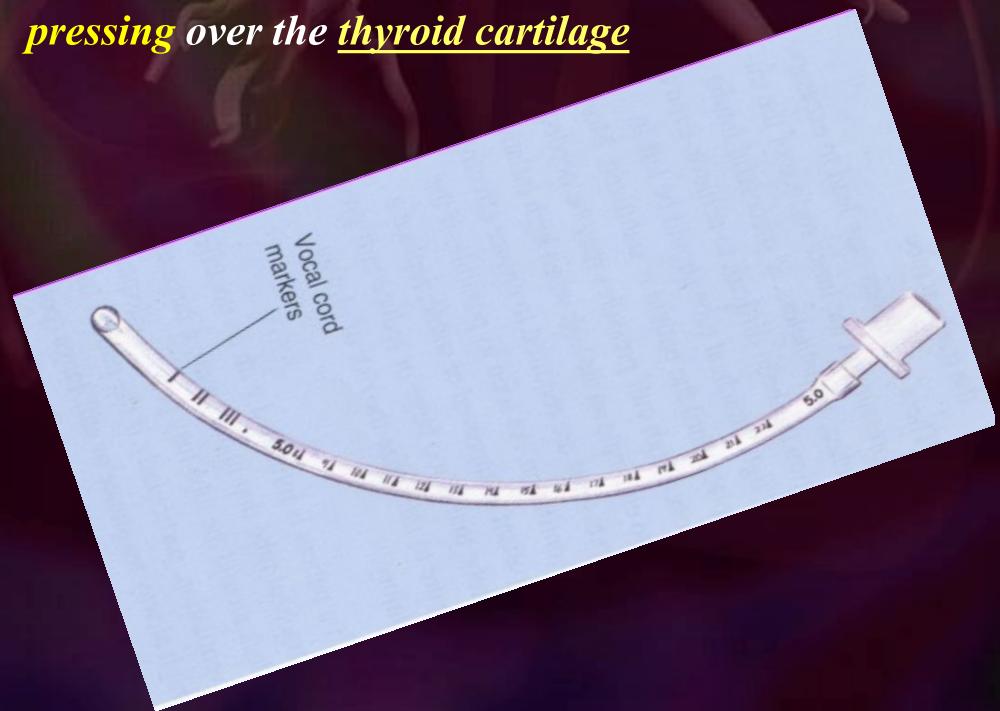


“BURP”

“External Laryngeal Manipulation”

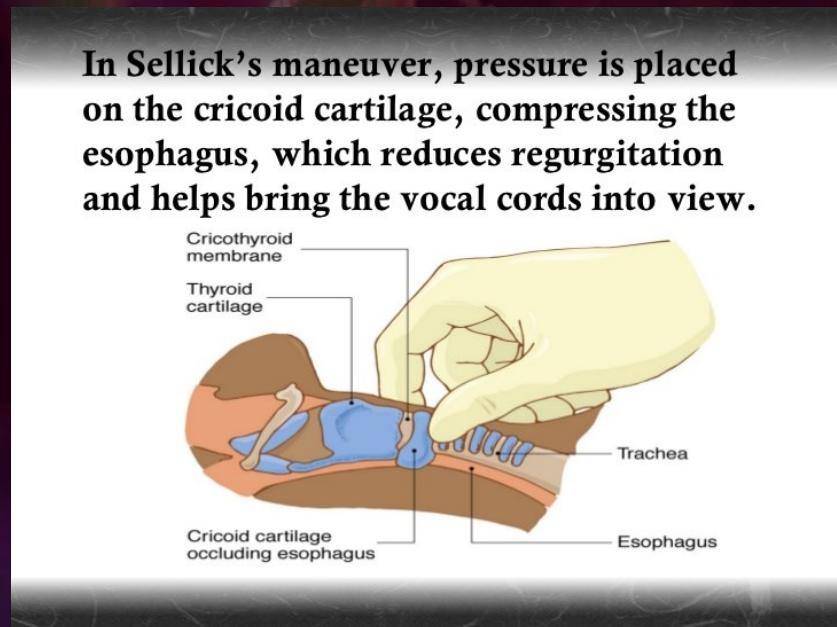


- Backward, Upward,
- Rightward Pressure:  
*manipulation of the trachea*
- *90% of the time the best view will be obtained by pressing over the thyroid cartilage*



# Cricoid Pressure (Sellick's Maneuver)

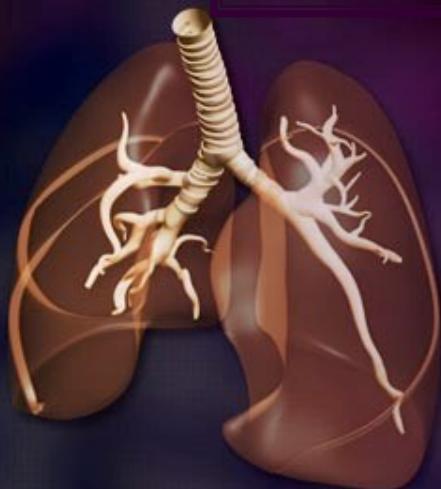
- *Cricoid pressure is indicated in the intubation of those who are deeply unconscious and in those who have been paralyzed for intubation.*



*Total time between ventilations*

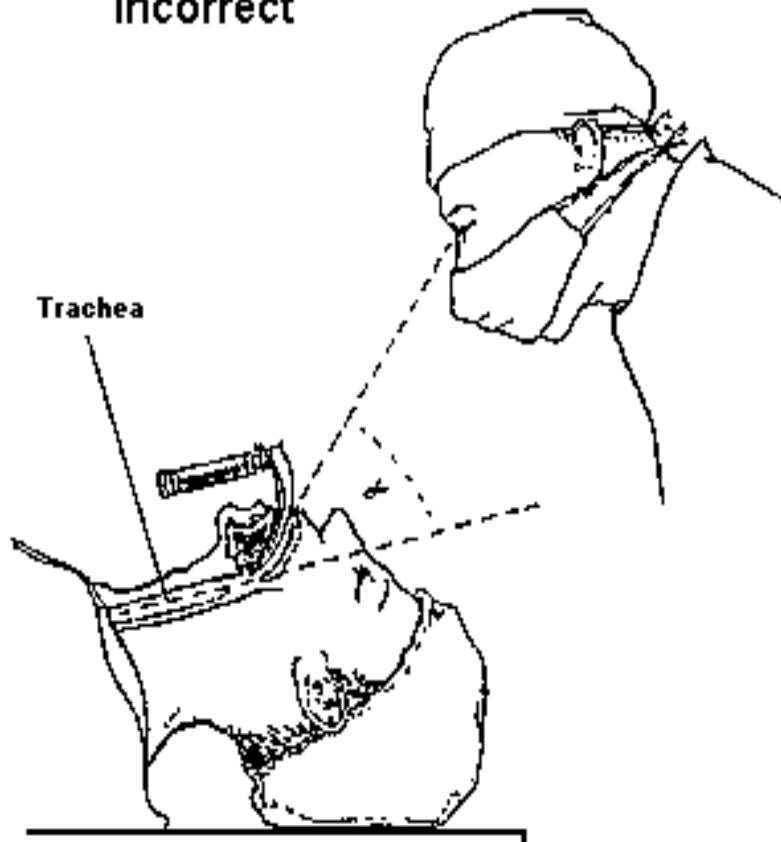
*should not exceed*

*30 seconds!*



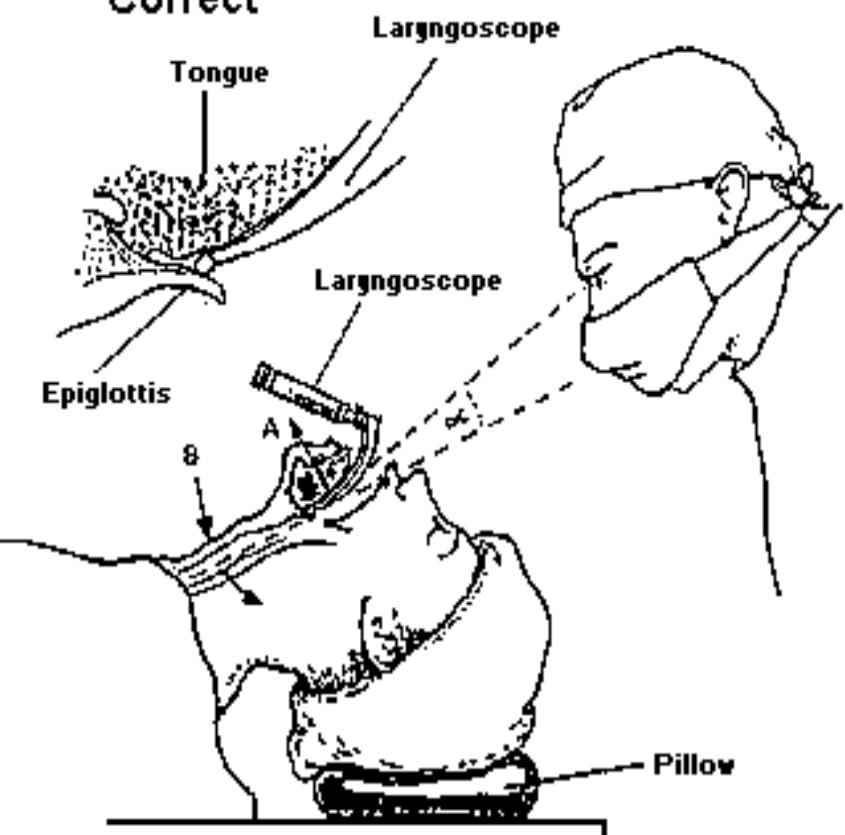
## *Correct Placement for intubation (b)*

Incorrect



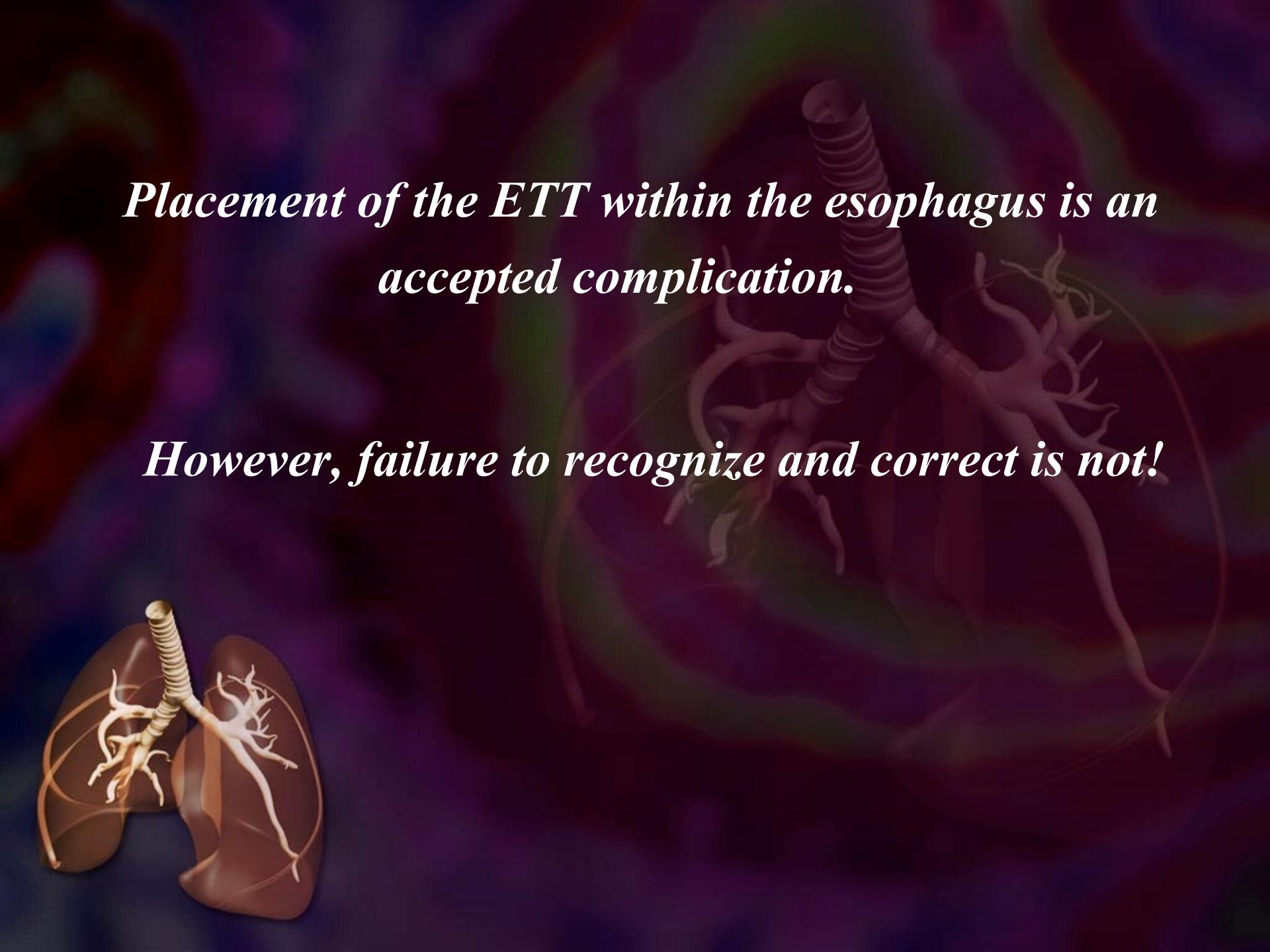
(a)

Correct



(b)





*Placement of the ETT within the esophagus is an accepted complication.*

*However, failure to recognize and correct is not!*

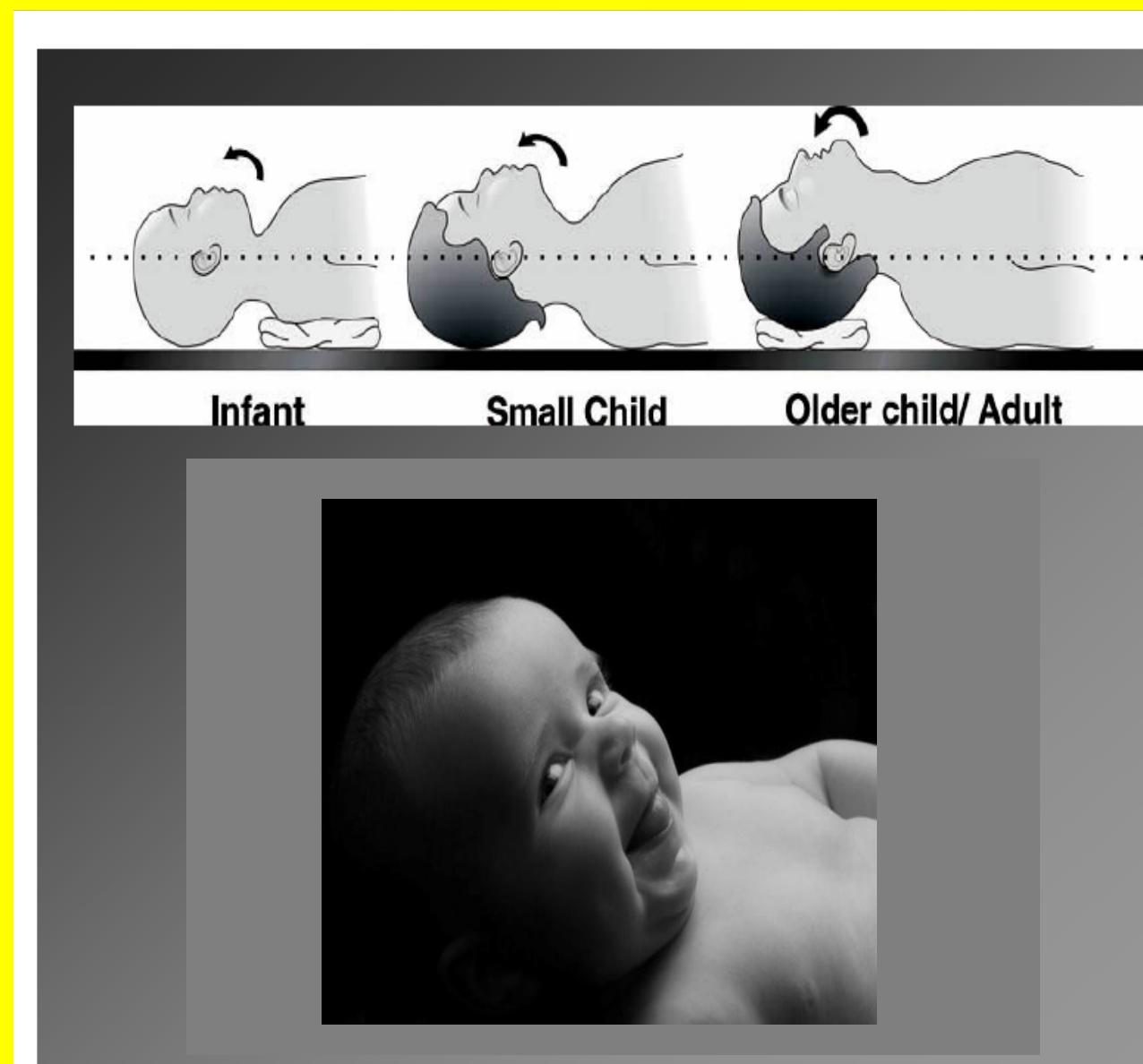
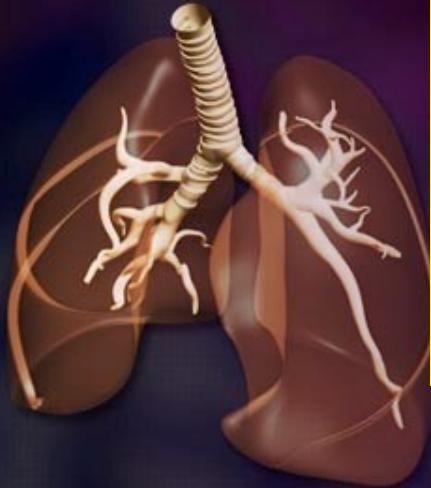
# Pediatric ET Intubation

- Appropriate ETT for  $\geq 1$  yo:  $(age/4) + 4$ 
  - Term infant: 3.0-3.5 ID
  - 6 mo: 3.5-4.0 ID
  - 1 yo: 4.0-4.5 ID
- Cuffed ETT's for pt's  $\geq 8$  yo
- If you anticipate need for high PEEP or PIP (peak inspiratory pressure) may want to use cuffed ETT with <8 yo. Use  $\frac{1}{2}$  size smaller ETT.



Length	ETT	kg	Age
9	3.5	3.5	Newborn
10	3.5	6.0	3 mos
11	4.0	10	1 yr
12	4.5	12	2 yrs

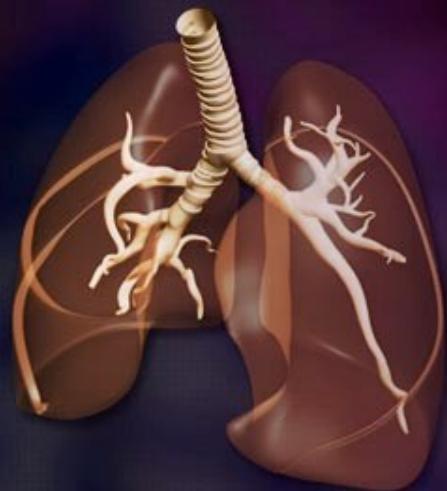
# *Positioning*



IF

*Endotracheal Intubation fails, you must have a back-up plan...*

Combi-Tube



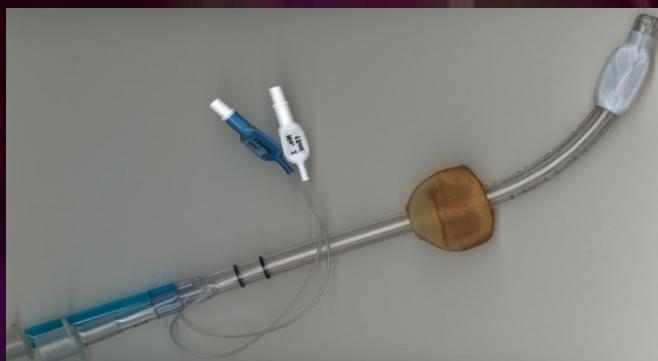
## LMA | Supreme™

Introducing the LMA Supreme™ - the next-generation airway. Use it everywhere you use a mask, and in places you have been using an ET tube.



## Rescue Devices

- *LMAs (laryngeal mask airway)*
- *Combitube*



Second generation airways



LMA Supreme™

The first and most re-used second generation airway with gastric access

LMA ProSeal™

The best way to secure the airway with a laryngeal mask

LMA Protector™

LMA Protector™ is the latest innovation from the inventors of the laryngeal mask

LMA Guardian™

A silicone, single use second generation device with scavenging port and cuff pilot valve



- *Used in any age*
- *Easy to place*
- *Few complications*
- *Does not secure airway*

# LMA Sizing

The following table shows the recommended weight-based guidelines for determining the appropriate size LMA Supreme™ for your patient.

CATALOG	MASK SIZE	PATIENT SIZE	PRODUCT DESCRIPTION	MAX INFLATION CUFF VOLUME	LARGEST SIZE OG/NG TUBE
175010	Size 1	Neonates/infants up to 5 kg	LMA Supreme™ size 1	5 mL	6 French
175015	Size 1.5	Infants 5 - 10 kg	LMA Supreme™ size 1.5	8 mL	6 French
175020	Size 2	Infants 10 - 20 kg	LMA Supreme™ size 2	12 mL	10 French
175025	Size 2.5	Children 20 - 30 kg	LMA Supreme™ size 2.5	20 mL	10 French
175030	Size 3	Children 30 - 50 kg	LMA Supreme™ size 3	30 mL	14 French
175040	Size 4	Adults 50 - 70 kg	LMA Supreme™ size 4	45 mL	14 French
175050	Size 5	Adults 70 - 100 kg	LMA Supreme™ size 5	45 mL	14 French

Also available in LMA Supreme™ Plus Pack including syringe and lubricant.

## Alternative Sizing Method: palatal – cricoid distance

Hold the LMA Supreme™ to the side of the patient's face. With the bite block positioned at the level of the palate, the distal tip of the mask should reach the level of the cricoid cartilage.

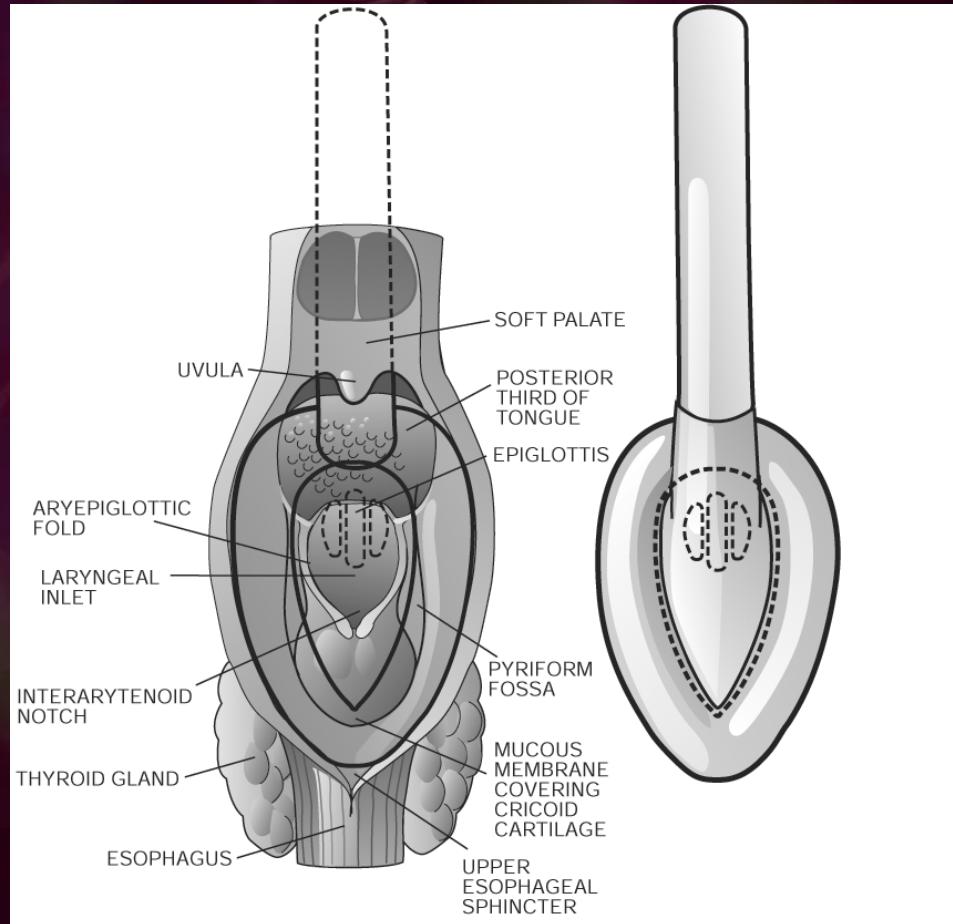
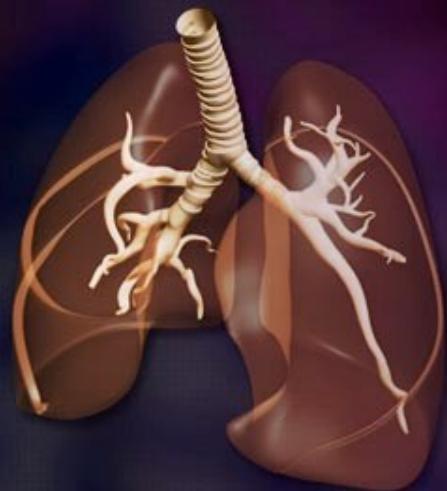


LMA | Supreme™



## **LMA™ Placement**

- When fully inserted using the recommended insertion technique, the distal tip of the LMA™ cuff presses against the upper esophageal sphincter*

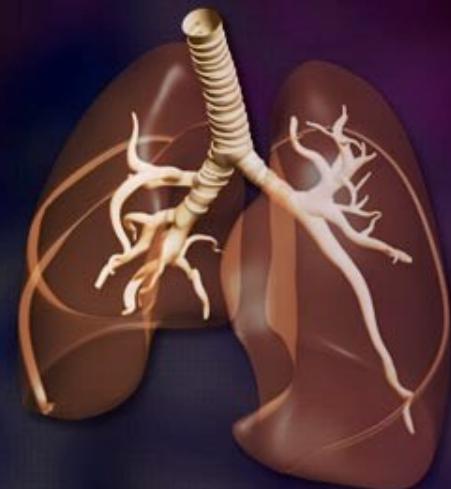


# *LMA Supreme™*

- *Contraindications and Warnings*

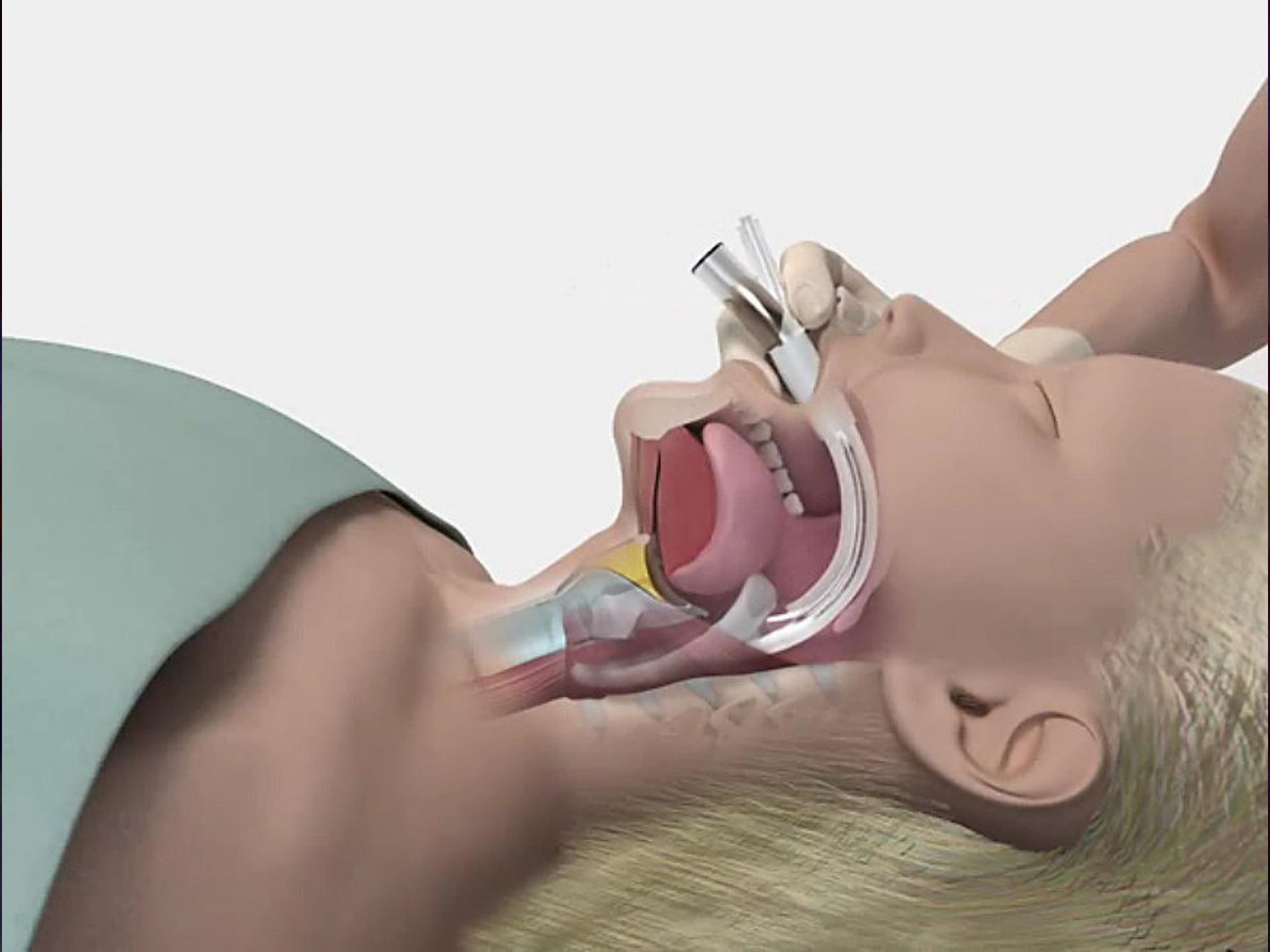
*The risk of regurgitation and aspiration is minimized as the LMA Supreme™ offers easy access to liquid gastric content.*

*The LMA Supreme™ should not be used in the resuscitation or emergency situation in patients who are not profoundly unconscious and who may resist LMA Supreme™ insertion.*

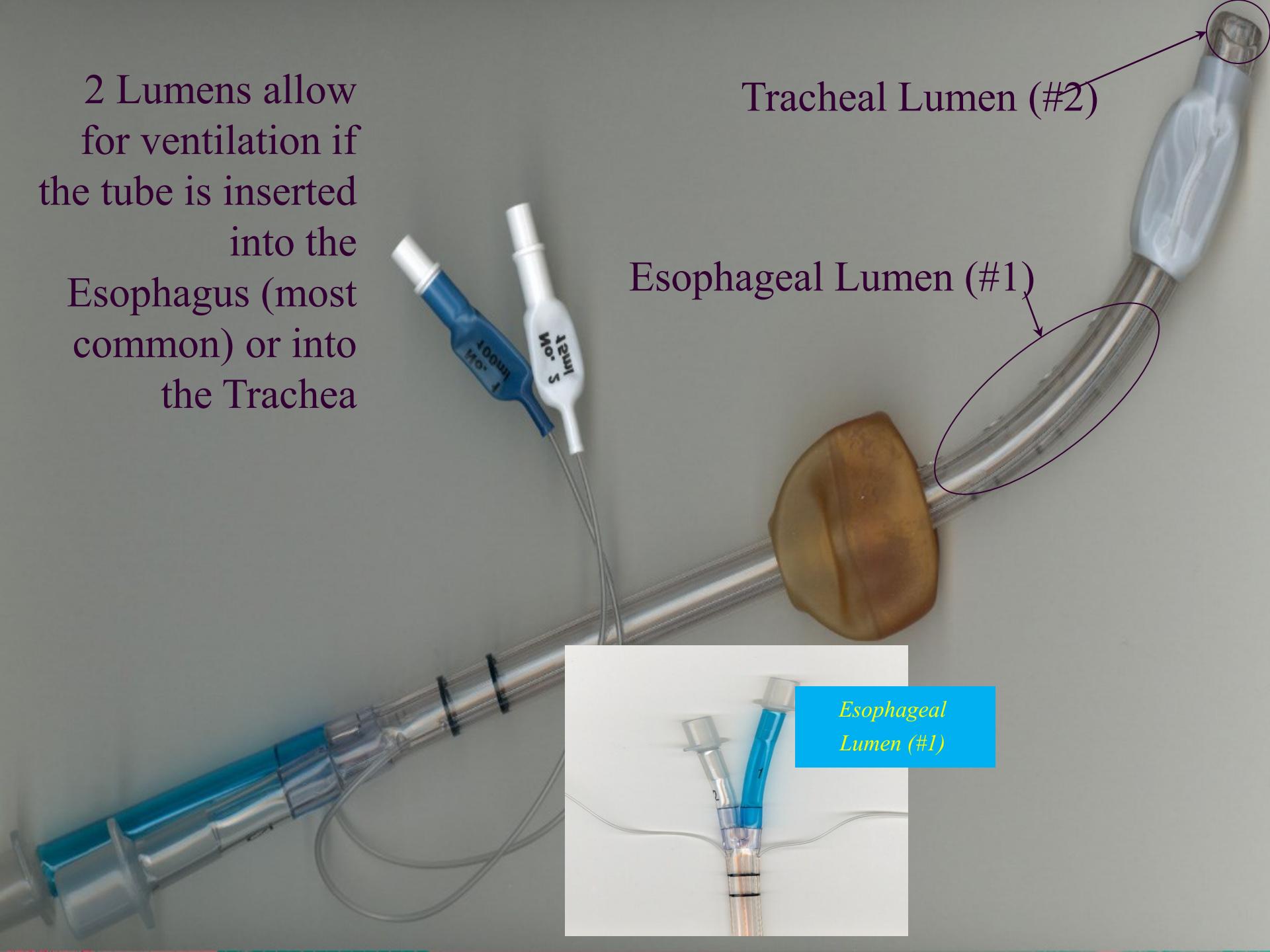


## ***Contraindications:***

- *Gag reflex*
- *FBs*
- *Airway obstruction*



2 Lumens allow  
for ventilation if  
the tube is inserted  
into the  
Esophagus (most  
common) or into  
the Trachea



Tracheal Lumen (#2)

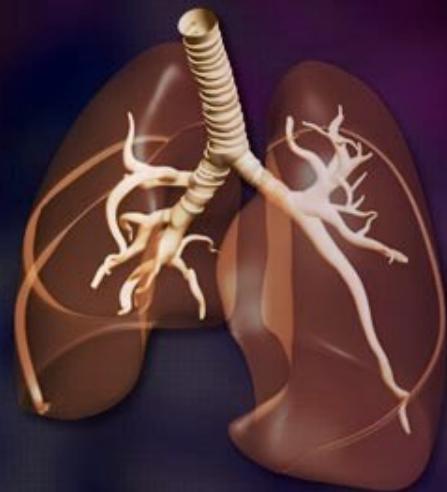
Esophageal Lumen (#1)



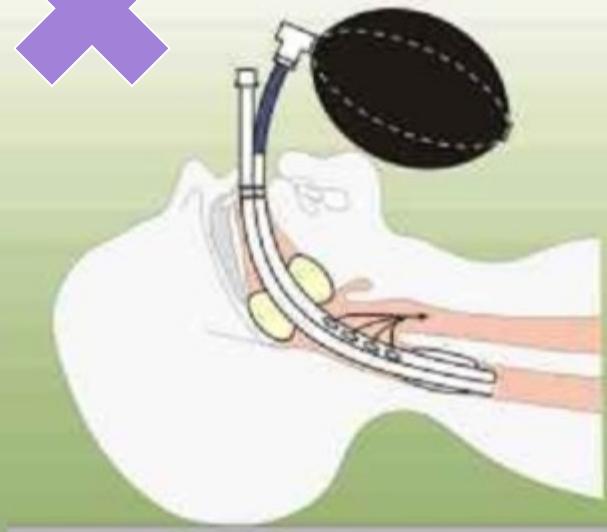
Esophageal  
Lumen (#1)

***It is available in two sizes:***

1. *37 Fr (for patients 4 to 6 ft or 122 to 183 cm tall) **Small***
2. *41 Fr (for patients more than 5 ft or 152 cm tall). **Regular***



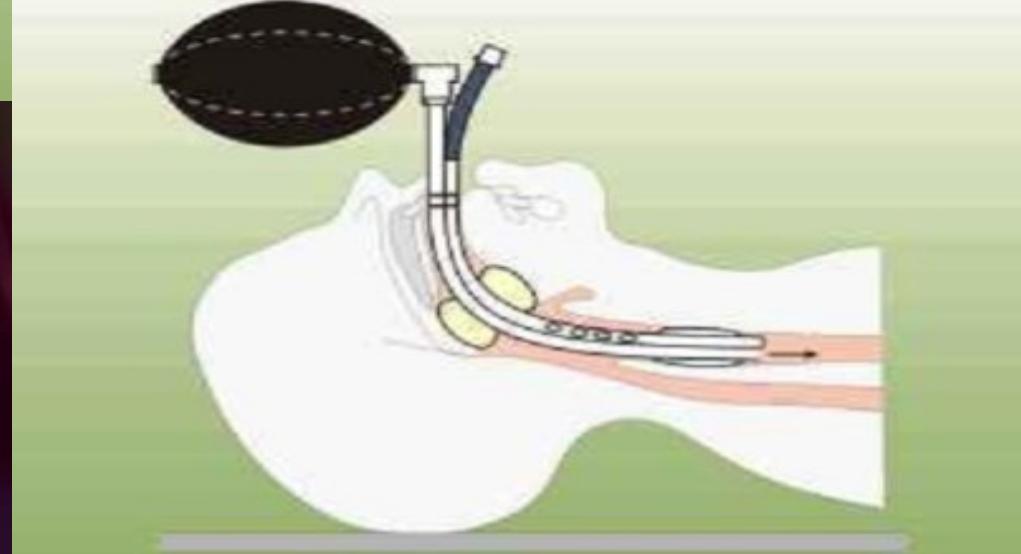
# Esophageal Placement



*Combitube® Insertion*



Tracheal Placement



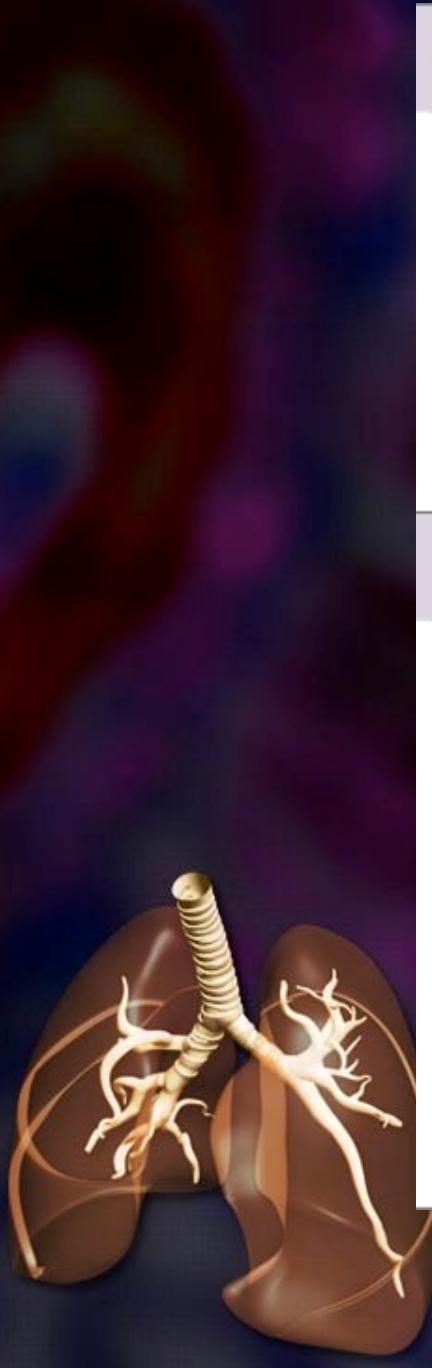
# *Disadvantages*

*(esophageal position)*

*1 # Medications can not be administered through the Combitube when it is in the esophageal position (85% of the time).*

*2 # The trachea cannot be suctioned when the Combitube is in the esophageal position.*





## General signs of choking

- Witnessed episode
- Coughing or choking
- Sudden onset
- Recent history of playing with or eating small objects

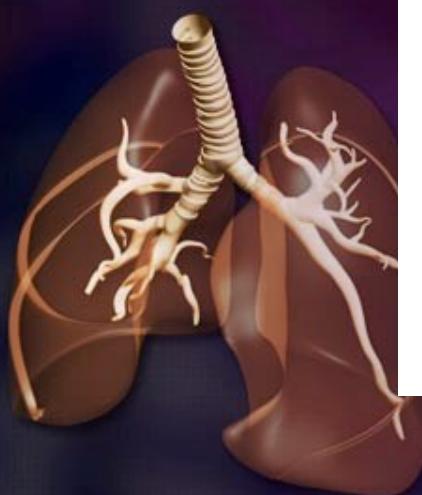
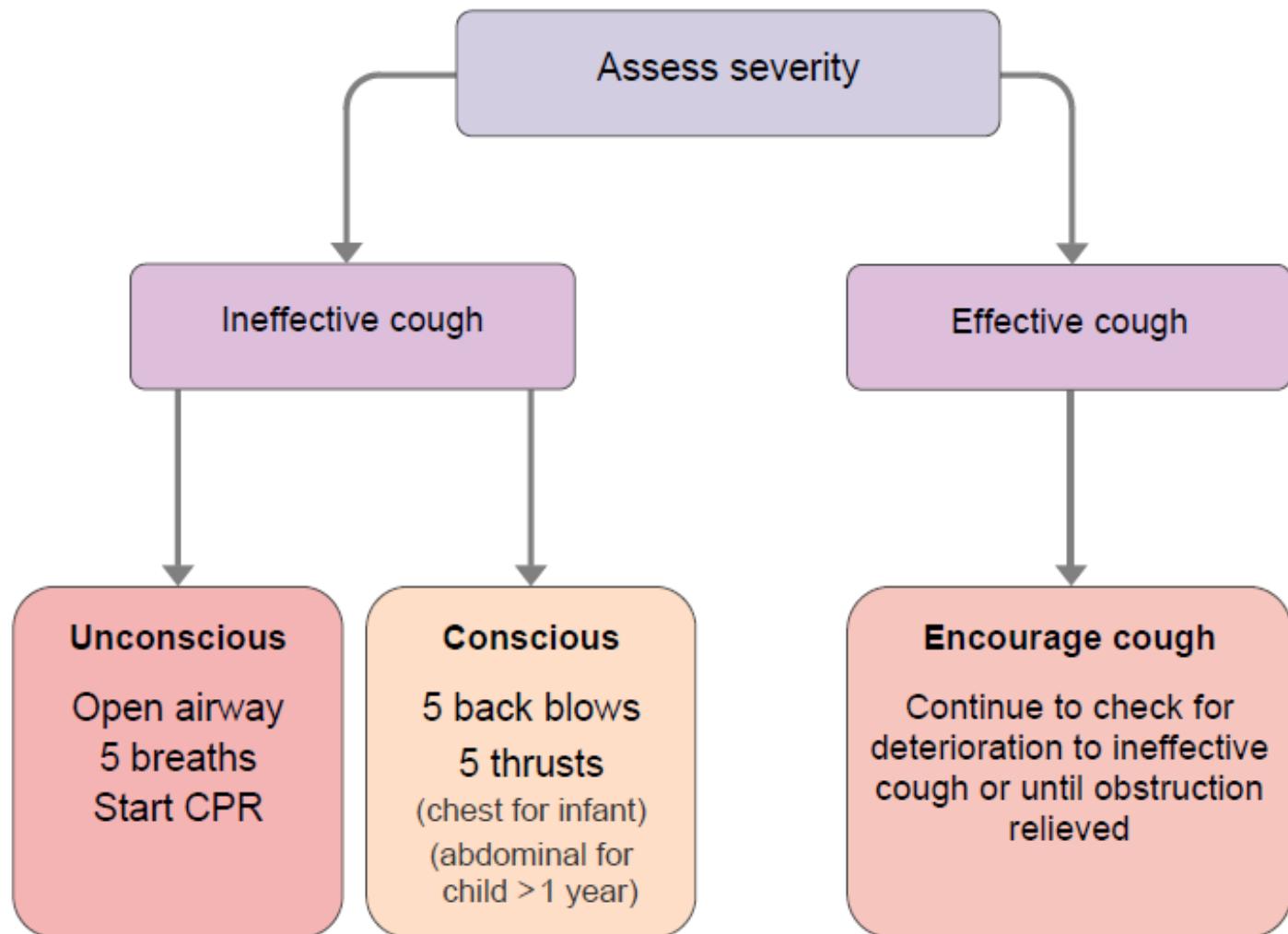
### Ineffective coughing

- Unable to vocalise
- Quiet or silent cough
- Unable to breathe
- Cyanosis
- Decreasing level of consciousness

### Effective cough

- Crying or verbal response to questions
- Loud cough
- Able to take a breath before coughing
- Fully responsive

# Paediatric Choking Treatment Algorithm



# *Heimlich Maneuver*

Place one fist just above the child's navel with the thumb side facing the abdomen



ADAM.

*On a Child*



ADAM.

Place the infant stomach-down across your forearm and give five thumps on the infant's back with heel of your hand



ADAM.



## Heimlich Maneuver

*On an Infant*

Place two fingers in the middle of the infant's breastbone and give five quick downward thrusts



ADAM.

Place the infant stomach-down across your forearm and give five thumps on the infant's back with heel of your hand



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## *infant choking*

Place two fingers in the middle of the infant's breastbone and give five quick downward thrusts



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## *Clearing the Mouth*

Sweep your finger through the child's or infant's mouth to remove debris





اگر می خواهید دشمنان خود را تنبیه  
کنید به دوستان خود محبت کنید .

هرگز برای عاشق شدن به دنبال باران و ببار و بابونه نباش، گاهی در انتهای خارهای یک کاکتوس به غنچه‌ای میرسی که ماه را بر صورت می‌نشاند.

