Controversies in Airway Management:

Pediatric and Adult

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1

Objectives

At the end of this session participants should be able to:

- Understand the benefits of video laryngoscopy compared to direct laryngoscopy
- Review common challenges with ventilating special populations
- Discuss common pitfalls in video laryngoscopy

2

CASE ONE

EMS called to evaluate 38 year old female. Family members state "she is not acting right"
RR 42 T 40 C P 132 BP 112/88
GCS is 6 and she has a petechial skin rash
SAO2 97% on 40% VM

3

EMS Management

RSI decision made based on airway protection concerns and expected transport time of 45 mins

Etomidate and Succinylcholine administered

Attempted Direct Laryngoscopy failed when trismus identified with limited mouth opening

Patient oxygenation maintained with BVM until paralytics metabolized

4

Identifying a difficult airway at the time paralytics are administered is poor form

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6

The Stakes Are High!

Retrospective review of 1,828 ED cases

Attempts	% With AE
1	**14.2 %**
2	**47.2%**
3	**63.6%**
4	**70.6%**

Adverse Events (AE): aspiration, desaturation, esophageal intubation, hypotension, dysrhythmia, arrest.

Sakles J. *Annals of Emergency Medicine* 2013; 20:71.

7

Predicting the Difficult Airway

The four dimensions of difficulty

- Difficult Bag Mask Ventilation
- Difficult Laryngoscopy and Intubation
- Difficult Extra-glottic Device
- Difficult Cricothyrotomy

8

Summary

The four dimensions of difficulty

MOANS	LEMON
RODS	SHORT

9

LEMON

- Look Externally
- Evaluate 3-3-2
- Mallampati
- Obstruction/Obesity
- Neck Mobility

10

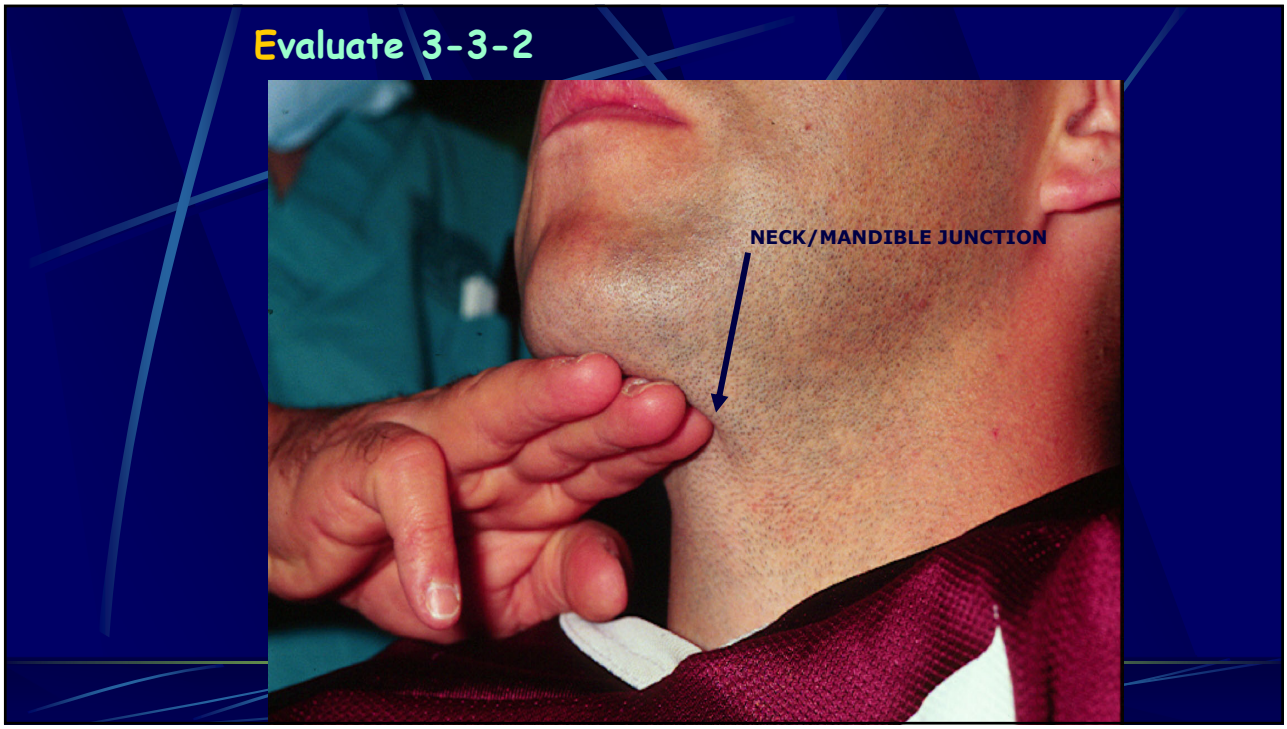
Difficult Direct Laryngoscopy LEMON

Evaluate 3-3-2

11

Evaluate 3-3-2

12


Evaluate 3-3-2
NECK/MANDIBLE JUNCTION

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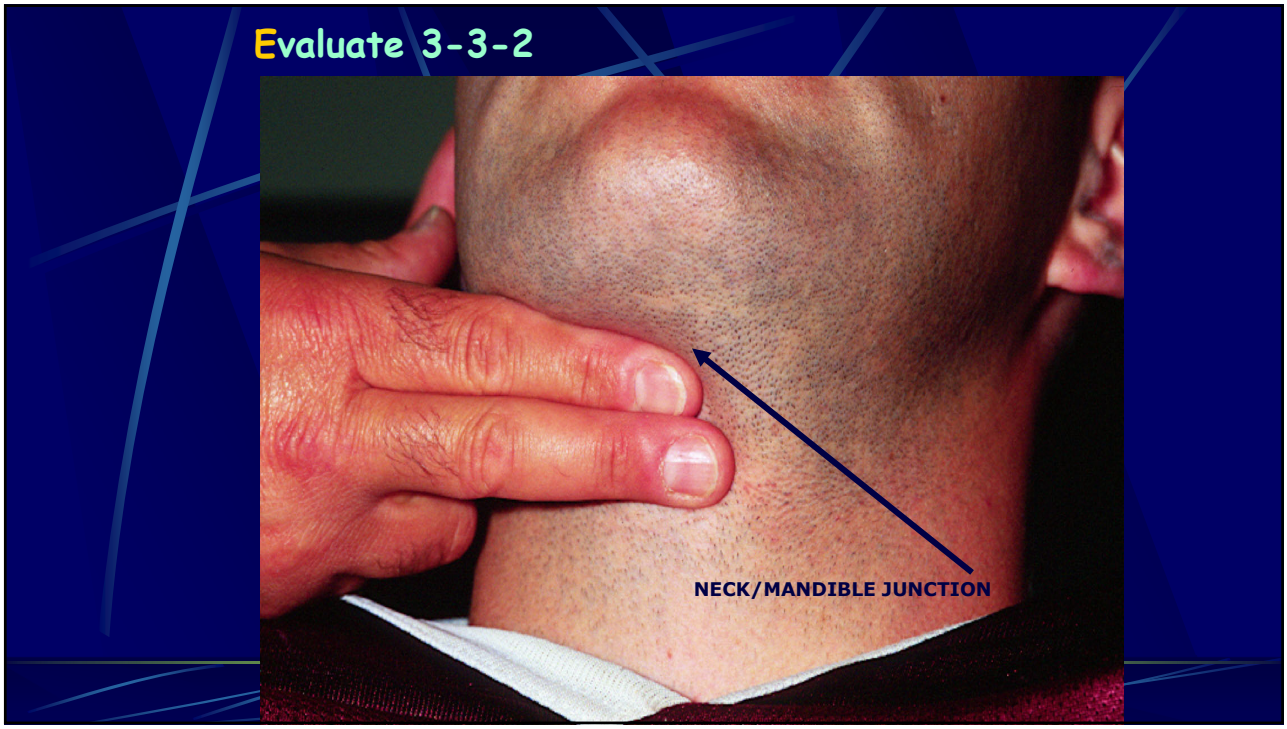
Evaluate 3-3-2
NECK/MANDIBLE JUNCTION

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Difficult Direct Laryngoscopy LEMON

Mallampati

- Sitting up
- Head in sniffing position
- Open mouth, extrude tongue

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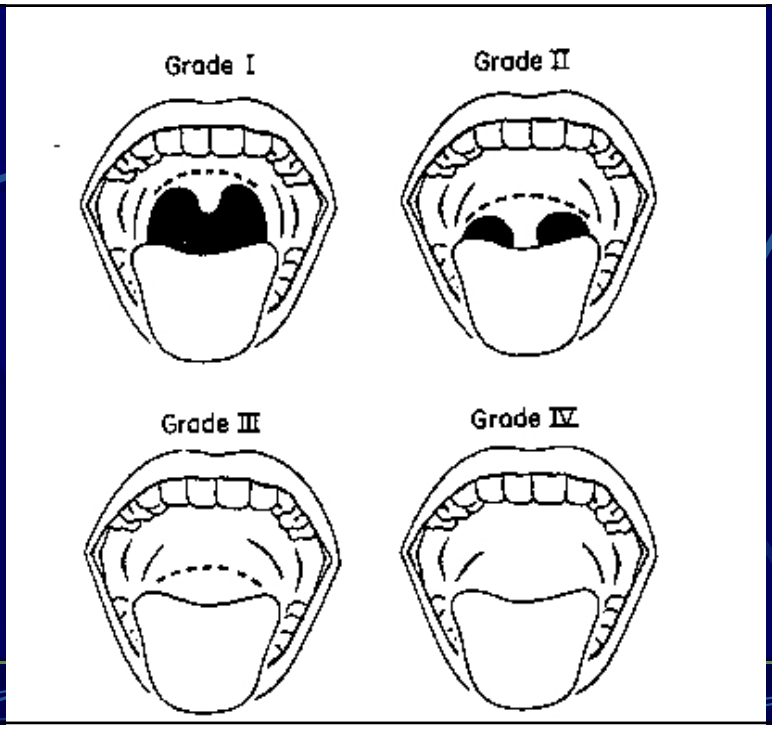

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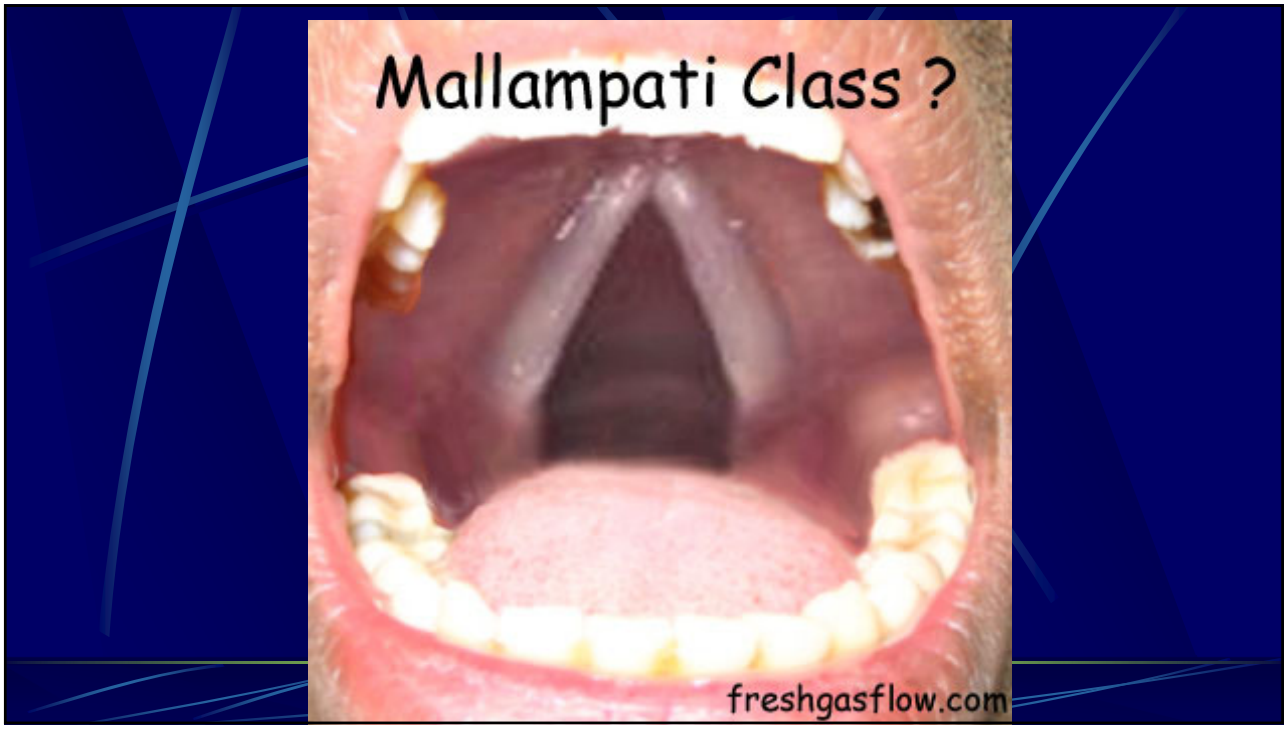


18

Difficult Direct Laryngoscopy LEMON

Obstruction/Obesity

19

Obstruction/Obesity

20

Difficult Direct Laryngoscopy LEMON

Neck Mobility

21

Neck Mobility

22

Testing The **LEMON Law**

Prospective study the LEMON Law in **156 ED patients**. Three features were highly predictive of a poor glottic view:

Big Teeth	
Small Mouth	**<3 finger breaths**
Short Neck	**<2 finger breaths**

Reed JM. ***Emerg Med Journal*** 2005; 22:102-107.

23

Difficult Bag Mask Ventilation MOANS

- Mask Seal
- Obstruction/Obesity
- Age
- No Teeth
- Stiff

24

Difficult EGD
RODS

- Restricted Mouth Opening
- Obstruction
- Distorted Anatomy
- Stiff lungs or C-spine

25

Difficult Cricothyrotomy
SHORT

- Surgery or disrupted airway
- Hematoma (or infection/abscess)
- Obesity
- Radiation
- Tumor

26

Predicting the Difficult Airway

The four dimensions of difficulty

Difficult Bag Mask Ventilation	Difficult Laryngoscopy and Intubation
Difficult Extra-glottic Device	Difficult Cricothyrotomy

27

28

CASE TWO

12 yo male GSW to head evaluation by EMS GCS 5. C-collar and spine board precautions are in place. VS P- 128 RR 14 BP 188/112 mmHg SAO2 100% on 5 Liters NC Transport time 35 mins

29

EMS Management

IV access X 2 established

Elective RSI

Etomidate and Succinylcholine IVP

30

EMS Management

Patient is relaxed and laryngoscope placed in oral cavity

Within 20 seconds Alarms announce Oxygen saturations are 86% and dropping !!!

31

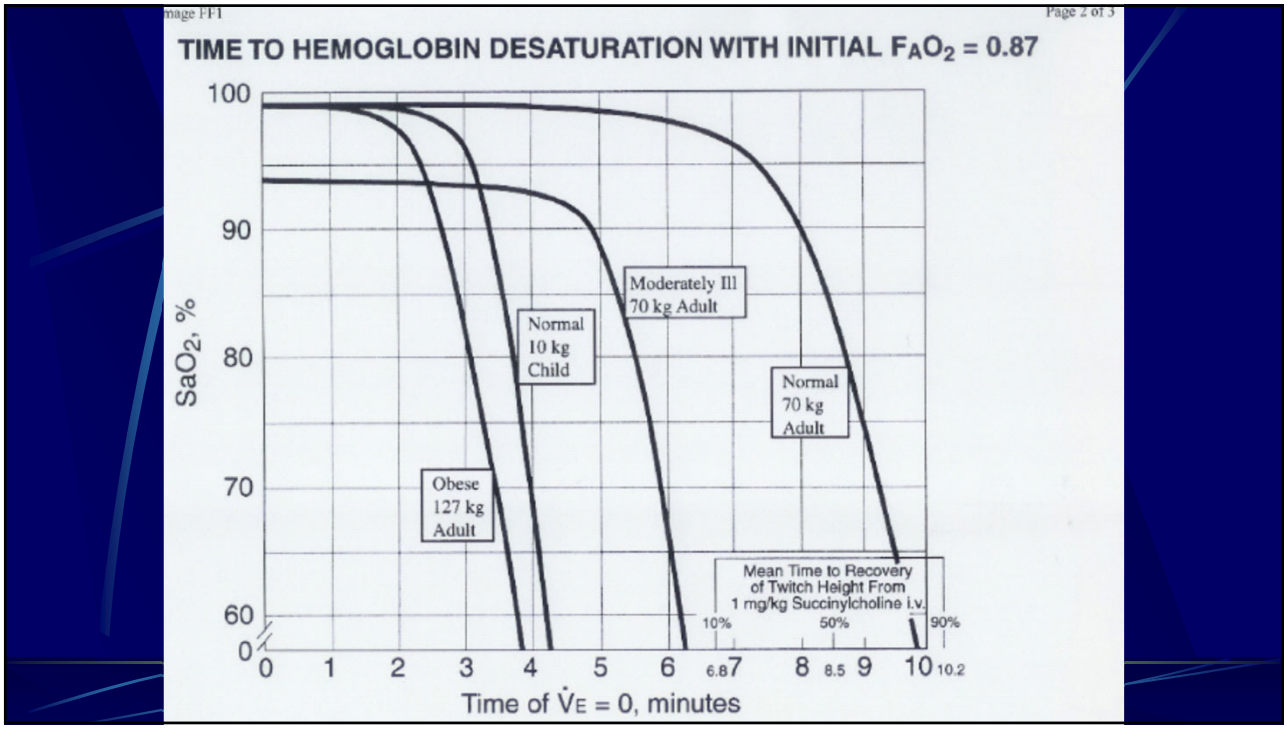
100% oxygen saturation does not mean you have an adequate oxygenation reserve

32

Who Desaturates

- 100% non rebreather apparatus delivers FiO_2 that approaches 70%
- Encourage patients to take deep breaths for 3 minutes or 8 full vital capacity breaths

33



34

Who Desaturates

- Extremes of age-pediatric and elderly patients
- Patients with co-morbidities- CHF, COPD, DM, Chronic illness
- Pregnant patients
- Morbidly obese patients

35

36

GOALS

- 100% Non rebreathing mask if saturations are 100%
- 100% Non rebreathing mask for 3-5 minutes prior to RSI
- Nasal Cannula 15 L/min
- Mask seal ventilations offers 98% FiO2

37

Etomidate Concerns

- Conflicting evidence and ongoing controversy around etomidate
- Possibly an increased mortality and adrenal insufficiency in this metanalysis
- Practice changing? NOPE

Journal of Critical Care, Volume 77,2023

38

DL vs VL

- DL maintains 80% utilization
- Failure to intubate the trachea on the 1st attempt occurs 20-30% of the time in ED or ICU
- Video laryngoscopy was associated with a significant increase in intubation 1st pass success
- The more junior the intubator the more helpful VL is in 1st pass success
- The more difficult the airway is anticipated to be, the more helpful VL is in 1st pass success

N Engl J Med. 2023 Jun 16. The DEVICE Trial

39

Pro Tips for VL

- Place the blade to the left of midline and lift the mandible to expand the viewing space
- Maximizing target visualization may impede tube delivery – keep your distance
- Hold the ET tube close to the connector to improve maneuverability
- STOP, POP and DROP once ET tip is past the cords

40

CASE THREE

32 year old male EMS response for ETOH intoxication and occipital laceration. Patient fell from bar stool with GCS 12, agitated, C- collar and spine board precautions.
~~5 ft 8 inches 340 lbs~~

41

EMS Management

100% NRB placed – SAO2 98%

Patient combative

Emesis occurs Zofran IVP

42

EMS Management

RSI medications are pushed

Patient has projectile emesis

Oxygen saturations plummet to 80%

43

What are you doing to prevent emesis?

44

Emesis Prevention

Reverse Trendelenburg

Zofran administration

Reglan administration

No EBM exists!!!!!!!

45

CASE FOUR

42 year old female is despondent after losing her job and finding out she is pregnant. She has ingested full bottles of Soma and Valium after drinking a pint of Crown Royal. Her GCS is 3 and a decision is made to electively intubate.

46

EMS Management

100% FiO2 per NRB

Elective RSI

Etomidate and Rocuronium IVP

47

ED Management

Direct laryngoscopy

Rapid desaturation to 85%

BVM unable to raise SAO2 > 86%

48

Plan B is Always Effective BVM

49

Bagging

- Insufflates and distends the stomach increasing the risk of emesis and aspiration
- If performed should be done with single hand technique and two providers
- Bring the mandible up to the mask

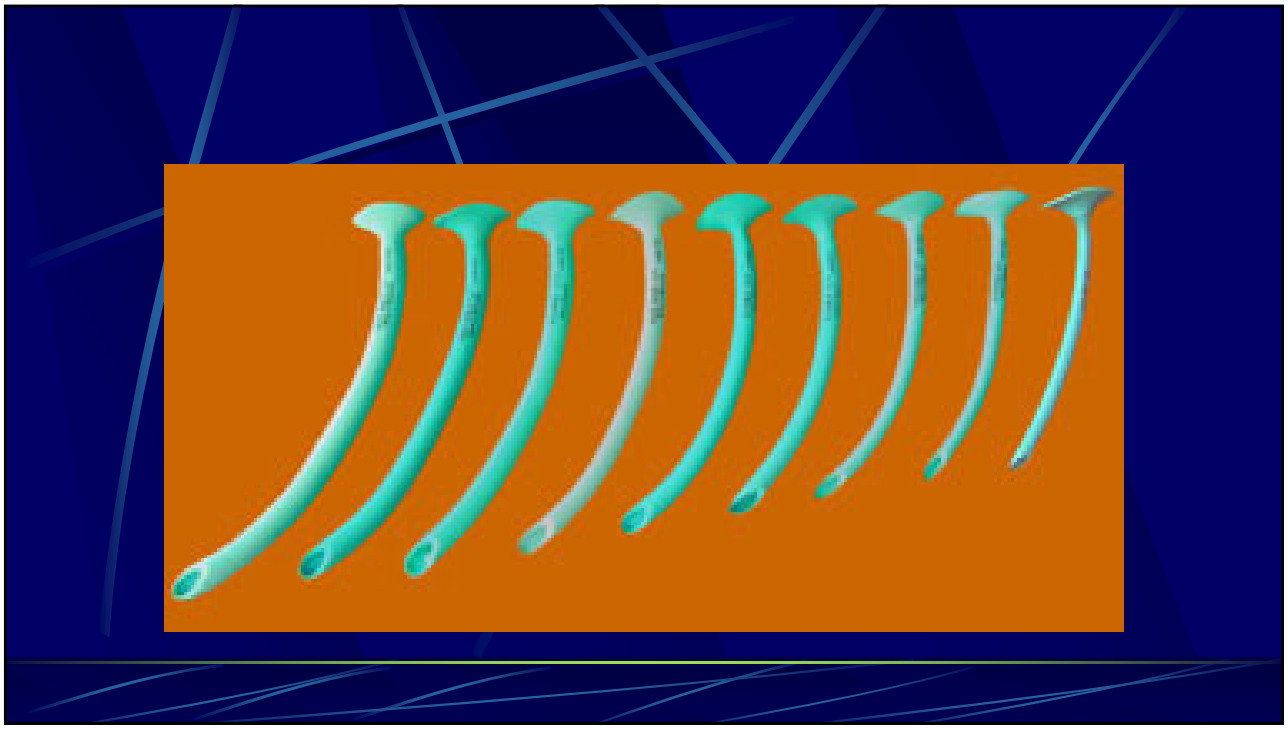
50

BVM Technique

- Bringing mandible to the mask, **not** mask to the mandible
- Nasal airway and oral airway supplies as a standard
- Failed BVM dictates better BVM technique

51

52



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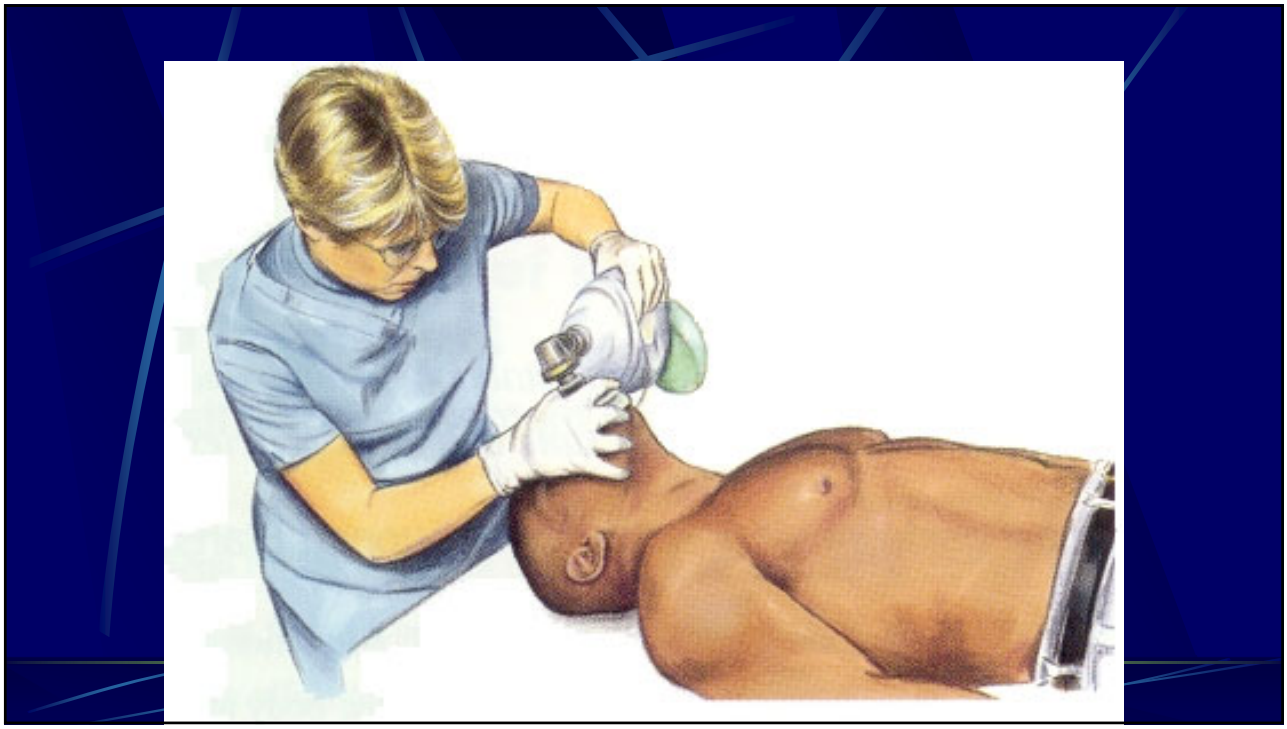

54

What's Your Bag?

Low Tidal Ventilation in intubated patients makes a difference in lung injury. Goal is to maintain Tidal Volumes in the 6-8 cc/kg PBW to improve outcome in ARDS and in those patients with multilobar disease, ARDS, Asthma/COPD, shock

Resp Care 2019;64(5):595-603

55

Your Bag

- Consider utilizing a Pediatric AMBU bag for adult patients. Peds AMBU Avg TV 663 cc vs Adult TV 981 cc
- Educate Team regarding the patient safety aspects of LTV

Resp Care 2019;64(5):595-603

56

CASE FIVE

17 year old female s/p MVC unrestrained driver with significant facial/mandible/dental trauma

Vitals:

Pulse 122 BP 134/86 mmHg

RR 24 SAO2 79% on NRB

57

EMS Management

IV access obtained

C-collar spine board

Patient's condition progresses with tongue edema and no SAO2 improvement with BVM

58

EMS Management

RSI decision made given Etomidate and Succhinylcholine

Inability to visualize the glottis, 3 attempts at intubation with video and direct laryngoscopy have failed

59

EMS Management

BVM ventilations ongoing

Incision is made through the cricothyroid membrane

Blood and air emerge

60

EMS Management

Attempts made to dilate incision in the cricothyroid membrane

Passage of tracheostomy tube and insufflation with resultant neck swelling and lack of ETCO2 confirmation

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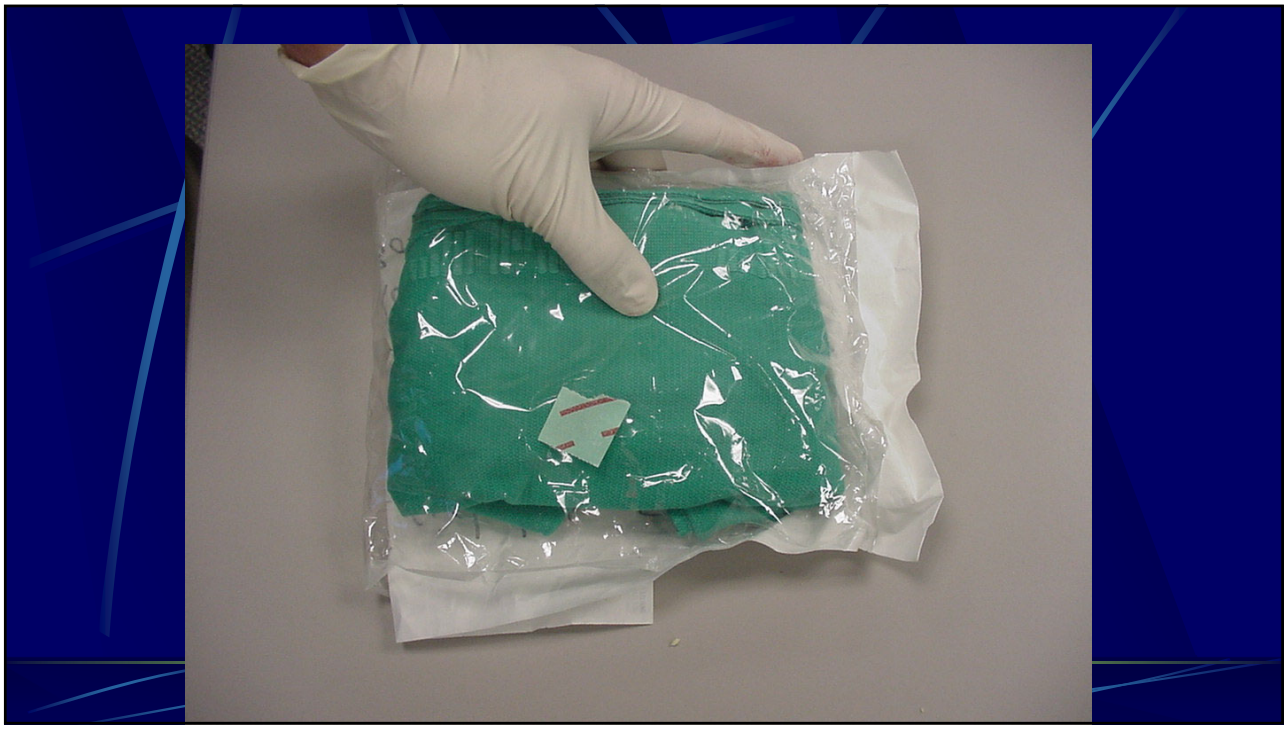
Bougie or intubating stylets should be utilized in surgical airways

62



63

64

Intubating Stylet or Bougie

65

Place pinky finger in sternal notch then the Cricothyroid membrane under the 4th finger

66

Facial trauma and no landmarks?

- The tongue is your friend – find it and follow it to the glottis
- Place a suture in the tip of the tongue and pull forward-epiglottis will follow
- Suction, suction, suction…
- 4-finger rule for the cricothyroid membrane

67

CASE SIX

67 year old male presents with fever, cough and confusion
Vitals: Pulse 122 BP 74/46 mmHg RR 34 SAO2 90% on 100%

68

EMS Management

IV access and fluid bolus of 500 cc RL initiated

Elective RSI Ketamine and Rocuronium IVP

69

EMS Management

Patient successfully intubated and confirmation of tube placement

Patient becomes pulseless - code ensues

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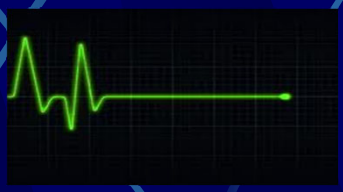
Intubation, even if indicated, may not be the first and best step.

71

Intubating the Critically Ill

"I need to intubate the patient…but I know he'll crash when I do."



- 2% risk of cardiac arrest during intubation of critically ill
- Significant hypotension (< 80mmHg) in 30%
- < 70 mmHg in 10%
- Shock Index : Heart rate > Systolic Blood Pressure is a predictor of trouble

72

Intubating the Critically Ill

Best Guess "Will the patient be better off physiologically with my resuscitation efforts in the next 15 mins?"

- If **YES**- then resuscitate before RSI
- If **NO** then there is an immediacy to act- proceed with RSI

Anesth Analg. 2021; 395-405.

73

Intubating the Critically Ill

- Planning is critical – no margin for error
- Assess and plan for difficulty
- Optimize physiology – focus on prevention of hypoxia and hypotension
- Airway may come second
- Use a checklist
- Inform your team –
  - Shared Mental Model

Anesth Analg. 2021; 395-405.

74

75