



Predikce obtížného zajištění dýchacích cest, algoritmy

Lukáš Dadák

ARK FNUSA + LF MU

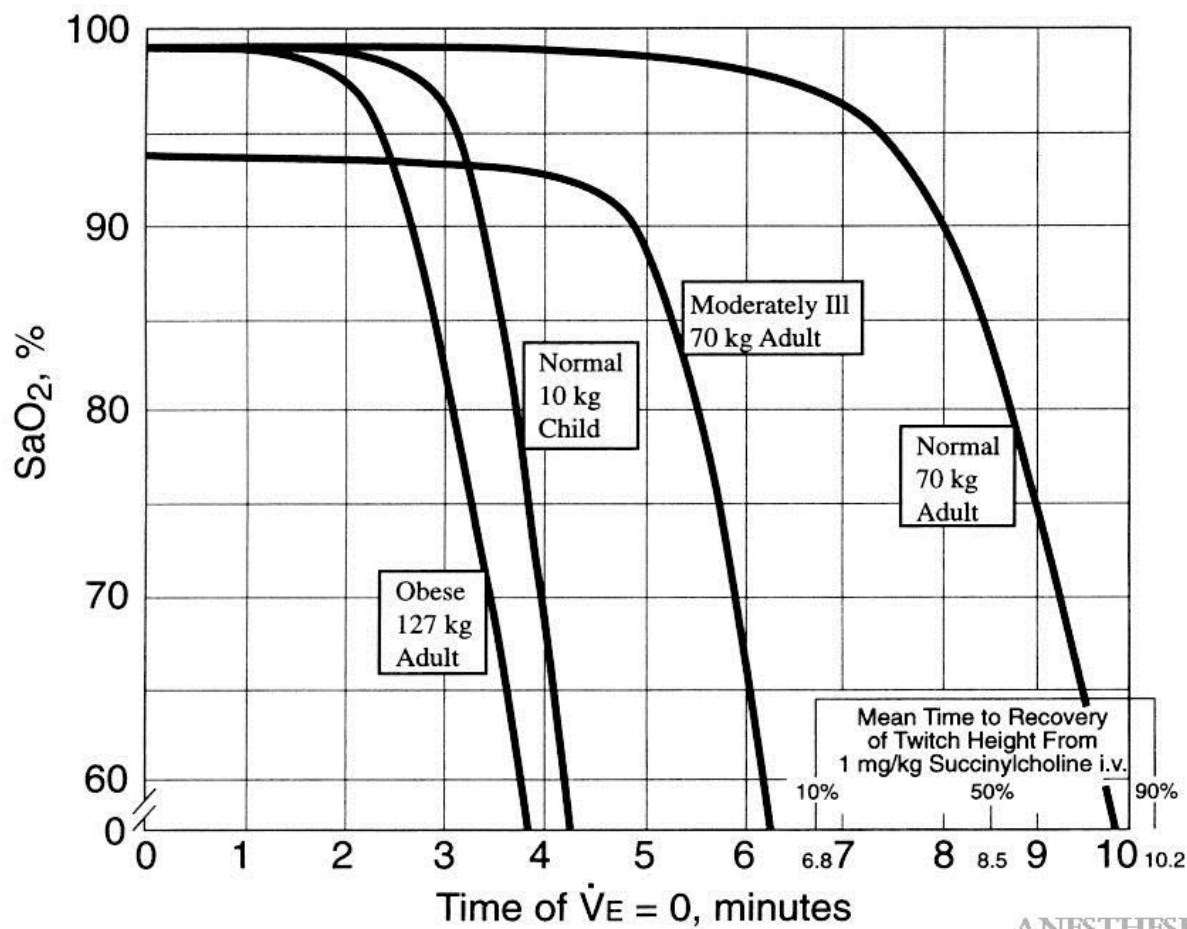
Život zachraňující výkony
VII. konference Akutně.cz

21.11.2015



Apnoe a oxygenace

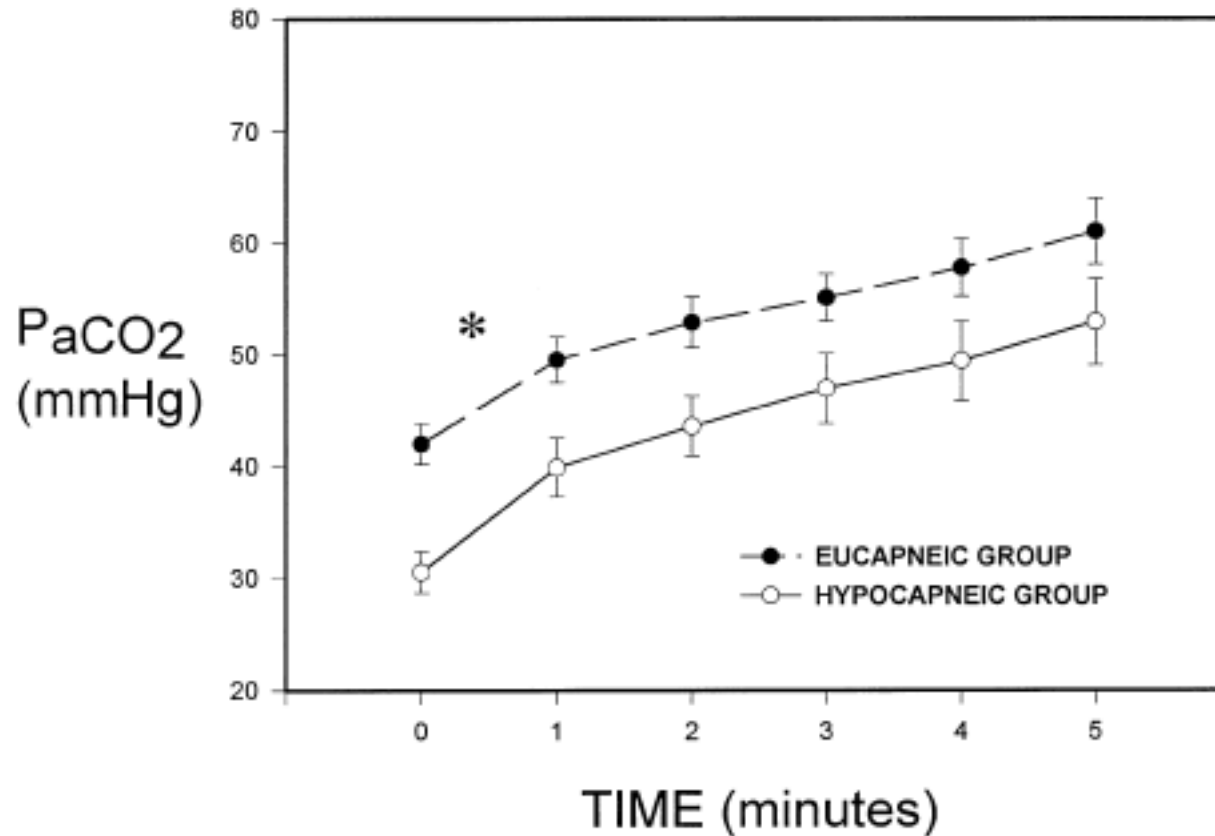
TIME TO HEMOGLOBIN DESATURATION WITH INITIAL $F_{A}O_2 = 0.87$



ANESTHESIOLOGY

Benumof, J. L. et al. Critical Hemoglobin Desaturation Will Occur before Return to an Unparalyzed State following 1 mg/kg Intravenous Succinylcholine. *Anesthesiology*. 87(4):979-982, 1997.

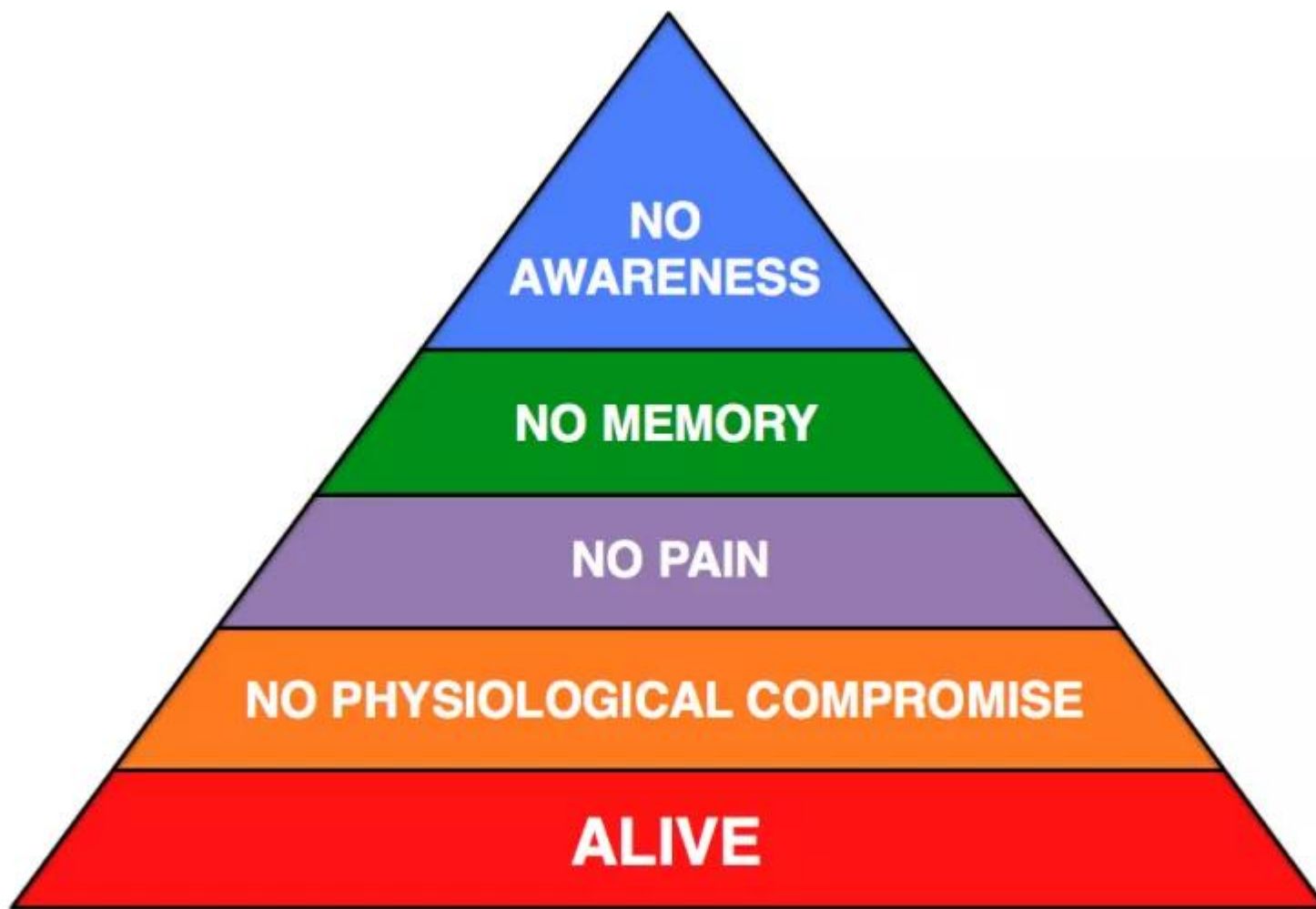
Apnoe a hyperkapnie





- **pečlivá volba priorit**
- pečlivé vyšetření dýchacích cest
... odhalí některé (70% spolehlivost)
- pečlivá preoxygenace
... získá několik minut navíc (u zdravých)
- pečlivá příprava plánu a pomůcek

Priority





- pečlivá volba priorit
- **pečlivé vyšetření dýchacích cest**
... odhalí některé (70% spolehlivost)
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- pečlivá příprava plánu a pomůcek



Practice Guidelines for Management of the Difficult Airway

*An Updated Report by the American Society of Anesthesiologists
Task Force on Management of the Difficult Airway*

Airway Examination Component

Nonreassuring Findings

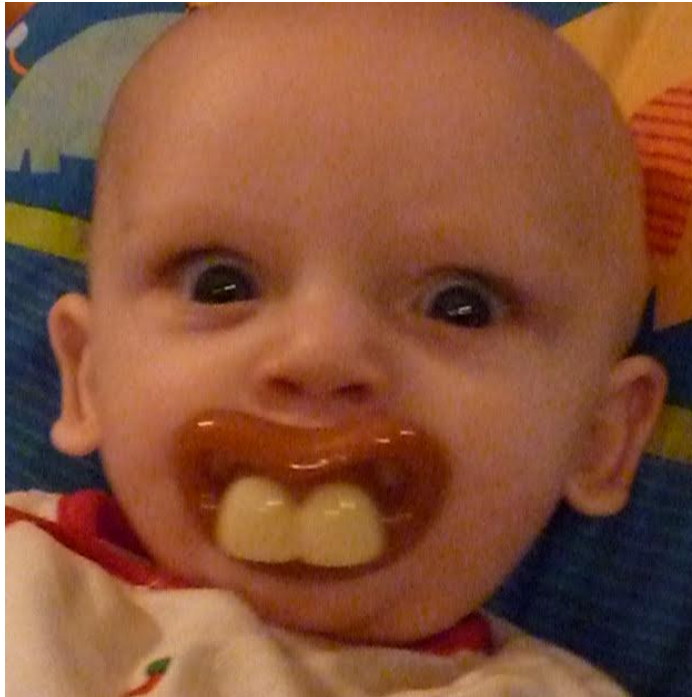
Length of upper incisors	Relatively long
Relationship of maxillary and mandibular incisors during normal jaw closure	Prominent “overbite” (maxillary incisors anterior to mandibular incisors)
Relationship of maxillary and mandibular incisors during voluntary protrusion of mandible	Patient cannot bring mandibular incisors anterior to (in front of) maxillary incisors
Interincisor distance	Less than 3 cm
Visibility of uvula	Not visible when tongue is protruded with patient in sitting position (e.g., Mallampati class >2)
Shape of palate	Highly arched or very narrow
Compliance of mandibular space	Stiff, indurated, occupied by mass, or nonresilient
Thyromental distance	Less than three ordinary finger breadths
Length of neck	Short
Thickness of neck	Thick
Range of motion of head and neck	Patient cannot touch tip of chin to chest or cannot extend neck

This table displays some findings of the airway physical examination that may suggest the presence of a difficult intubation. The decision to examine some or all of the airway components shown on this table is dependent on the clinical context and judgment of the practitioner. The table is not intended as a mandatory or exhaustive list of the components of an airway examination. The order of presentation in this table follows the “line of sight” that occurs during conventional oral laryngoscopy.

Otevření úst



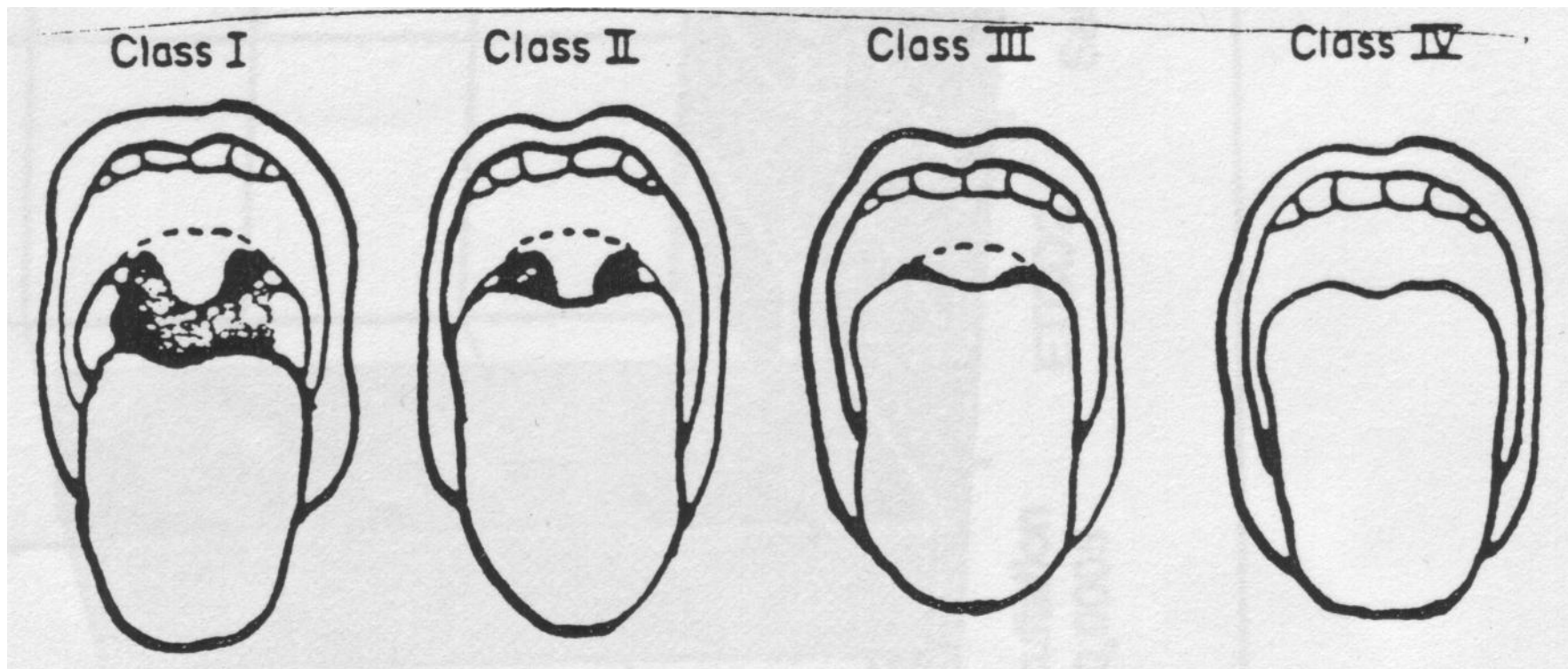
Chrup



Patro



Mallanpati



Mobilita C páteře

Neck Mobility:

With patient sitting upright, place one index finger on the patient's chin and one index finger on the occipital bone. Ask the patient to completely extend the head on the neck. The finger on the chin is (CM= cervical mobility):



- Higher than the one on the occipital bone
CM normal (Grade 1)
- Same level
CM some limitation (Grade 2)
- Lower than the one on the occipital bone
CM moderate/severe limitation (Grade 3)

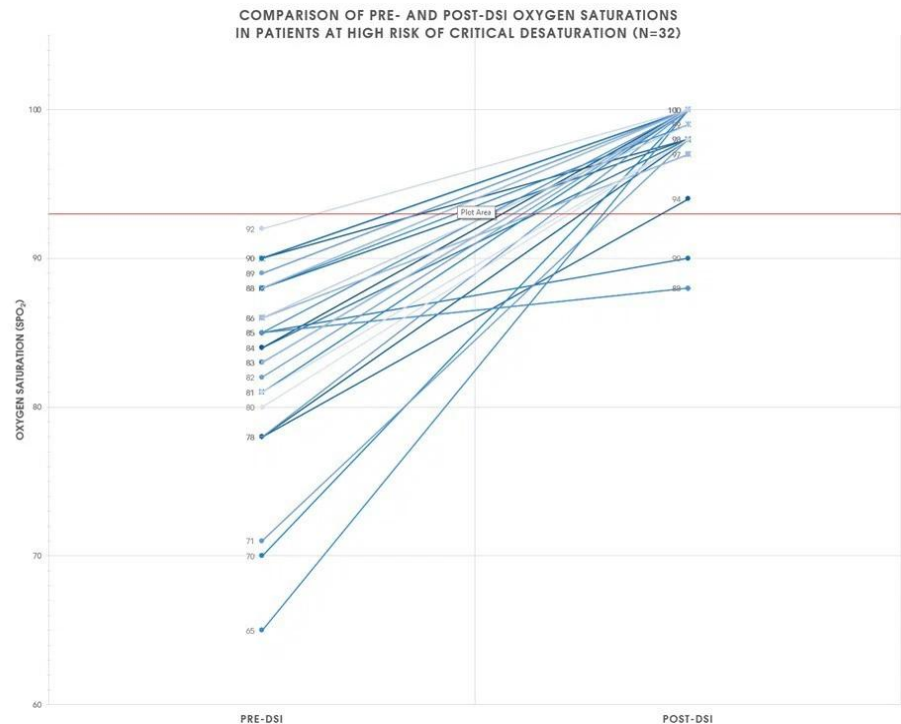
Vyšetření krku



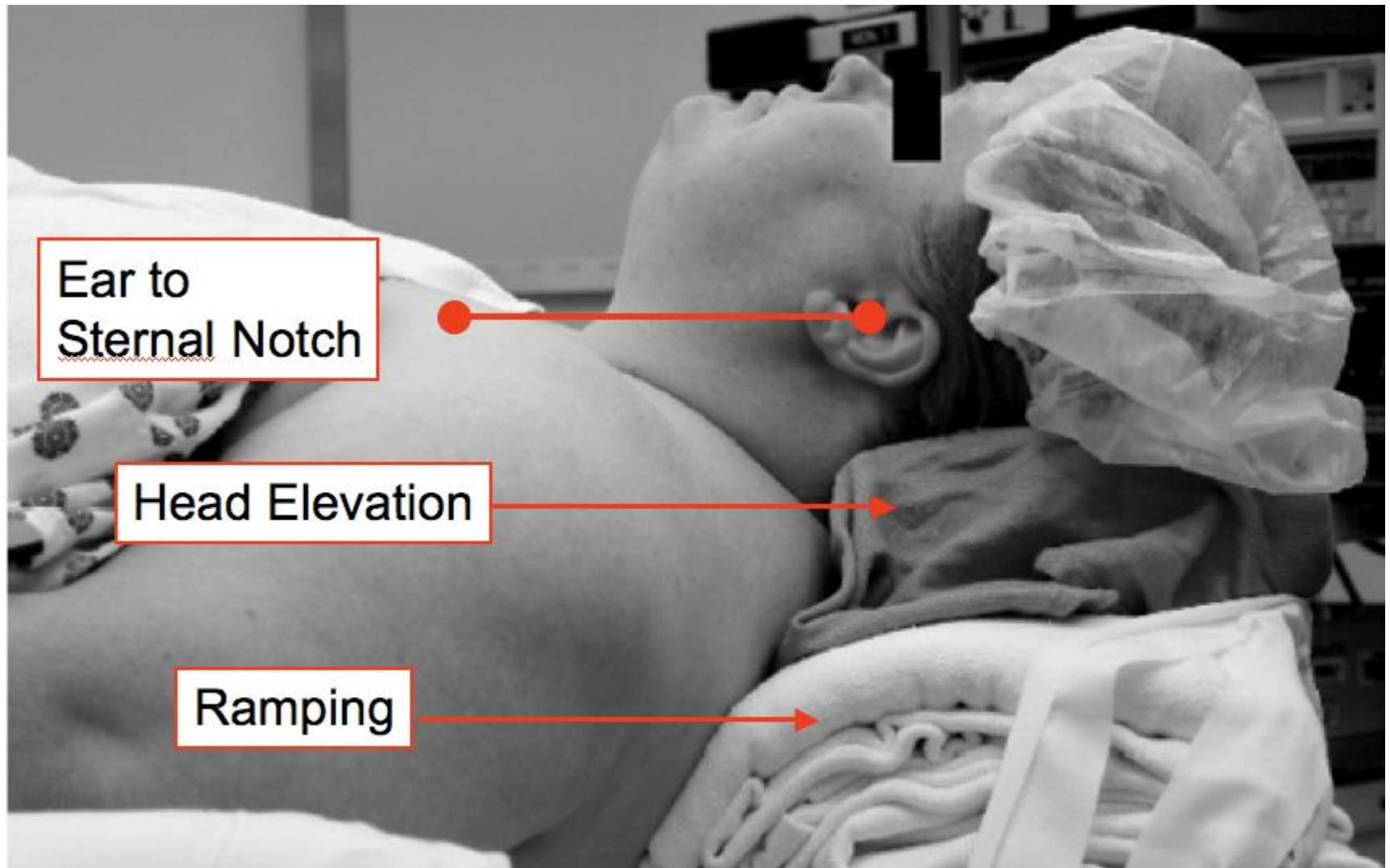
- pečlivá volba priorit
- pečlivé vyšetření dýchacích cest
... odhalí některé (70% spolehlivost)
- **pečlivá preoxygenace**
... získá několik minut navíc (u zdravých)
- pečlivá příprava plánu a pomůcek

Preoxygenace

- 3minuty, 8 l/min
- 8 hlubokých dechů těsnící maskou
- NIV



Polohování před intubací



- pečlivá volba priorit
- pečlivé vyšetření dýchacích cest
... odhalí některé (70% spolehlivost)
- pečlivá preoxygenace
... získá několik minut navíc (u zdravých)
- **pečlivá příprava plánu a pomůcek**

DAS 2004 → 2015

Direct laryngoscopy → Any problems → Call for help

FIBREOPTIC GUIDED TRACHEAL INTUBATION THROUGH SUPRAGLOTTIC AIRWAY DEVICE (SAD) USING Aintree INTUBATION CATHETER

Please ensure the SAD is in place; give 100% oxygen; confirm adequate sedation/anaesthesia, ventilation & paralysis

- Aintree catheter**
 - mean length 30cm or shorter
 - inner diameter 4.5mm or smaller
 - side ports did not fog (especially for double-lumen fiberoptic)
 - flexible enough to coil (shorter 4.5mm)
 - flexible enough for loading on fiberoptic
 - flexible enough to facilitate loading of fiberoptic
 - comes with a split adapter (to facilitate manual cuff inflation)
 - ventilator should not be used for fiberoptic intubation
- Preparation of the fiberoptic airway device system, lubricate the catheter and the Aintree intubation catheter (AIC) and, if available, confirm the airway device system with a camera bronchoscope before connecting the fiberoptic airway device to the patient. Connect the fiberoptic airway device to the patient and confirm adequate anaesthesia, muscle relaxation and depth of sedation.
- Insert the fiberoptic catheter into the supraglottic airway device (SAD) and maintain the position of the SAD, the SAD is not to be removed or rotated.
- With the fiberoptic catheter inserted into the SAD, the operator maintains the position of the SAD, the SAD is not to be removed or rotated.

Plan A: Initial tracheal intubation plan
Direct laryngoscopy → succeed → Tracheal intubation
failed intubation

Plan B: Secondary tracheal intubation plan
ILMA™ or LMA™ → succeed → Confirm - then fiberoptic tracheal intubation through ILMA™ or LMA™
failed oxygenation → failed intubation

Plan C: Maintenance of oxygenation, ventilation, postponement of surgery and awakening
Revert to face mask Oxygenate & ventilate → succeed → Postpone surgery Awaken patient
failed oxygenation

Plan D: Rescue techniques for "can't intubate, can't ventilate" situation
LMA™ → improved oxygenation → Awaken patient
increasing hypoxaemia

or

Cannula cricothyroidotomy → fail → Surgical cricothyroidotomy

DAS Extubation Guidelines: Low risk algorithm

Step 1 Plan extubation
Plan extubation

Plan
Assess airway and general risk factors

Low risk extubation
Fleeted
Uncomplicated airway
No General risk factors

Step 2 Prepare for extubation
Prepare for extubation

Prepare
Optimise patient and other factors

Optimise patient factors
Cardiovascular
Respiratory
Metabolic / temperature
Neuromuscular

Select deep or awake extubation

Step 3 Perform extubation
Perform extubation

Deep Extubation
Awake Extubation

Advanced technique
Experience essential
Vigilance until fully awake

Perform Awake Extubation
Preoxygenate with 100% O₂
Suction as appropriate
Insert a bite block (e.g. roll of gauze)
Position the patient appropriately
Antagonise neuromuscular blockade
Establish regular breathing
Ensure adequate spontaneous ventilation
Minimise head and neck movement
Wait until awake (eye opening)
Apply positive pressure, if available
Provide 100% oxygen
Check airway patency and ventilation
Continue oxygen supply

Step 4 Postextubation care
Postextubation care

Recovery and follow up

Safe transfer
Handover / communication
O₂ and airway management
Observation and monitoring
General medical and surgical management

The technique described for awake extubation is a suggested approach. Practice may vary in experienced hands.

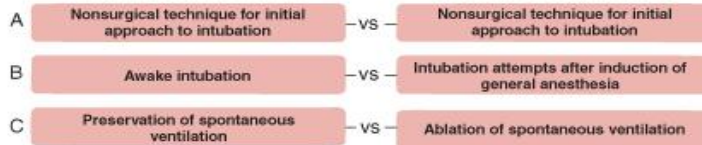
Difficult Airway Society Extubation Algorithm 2011

DIFFICULT AIRWAY ALGORITHM

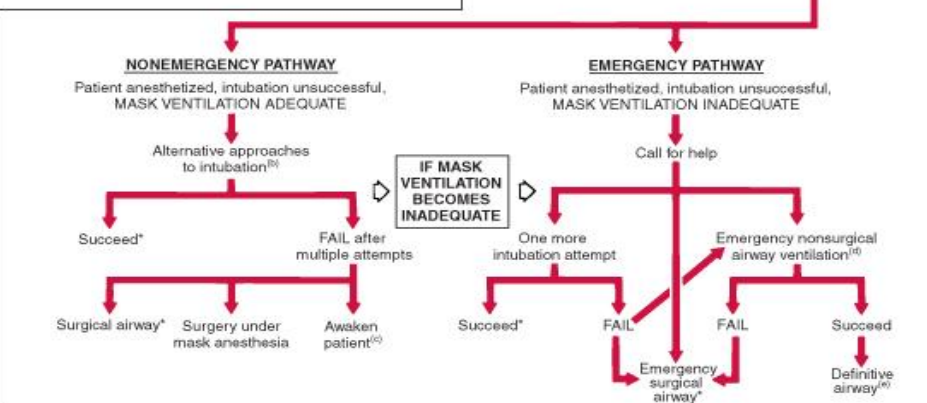
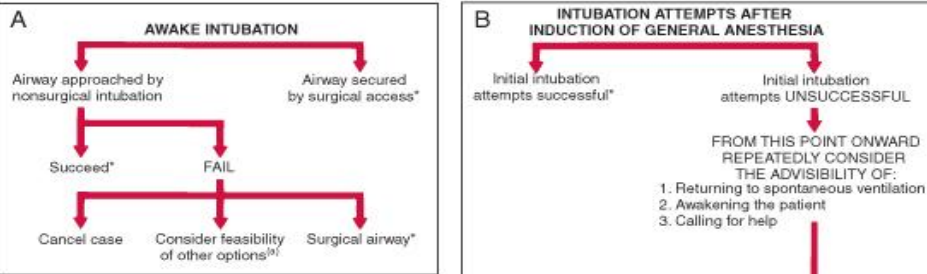
1. Assess the likelihood and clinical impact of basic management problems:

- Difficult intubation
- Difficult ventilation
- Difficulty with patient cooperation or consent

2. Consider the relative merits and feasibility of management choices:



3. Develop primary and alternative strategies:



* CONFIRM INTUBATION WITH EXHALED CO₂

(a) Other options include, but are not limited to: surgery under mask anesthesia, surgery under local anesthesia infiltration or regional nerve blockade, or intubation attempts after induction of general anesthesia.

(b) Alternate approaches to difficult intubation include, but are not limited to: use of different laryngoscope blades, awake intubation, blind oral or nasal intubation, fiberoptic intubation, intubating stylet or tube changer, light wand, retrograde intubation, and surgical airway access.

(c) See awake intubation.

(d) Options for emergency nonsurgical airway ventilation include, but are not limited to: transtracheal jet ventilation, laryngeal mask ventilation, or esophageal-tracheal combitube ventilation.

(e) Options for establishing a definitive airway include, but are not limited to: returning to awake state with spontaneous ventilation, tracheotomy, or endotracheal intubation.

1. Assess the likelihood and clinical impact of basic management problems:

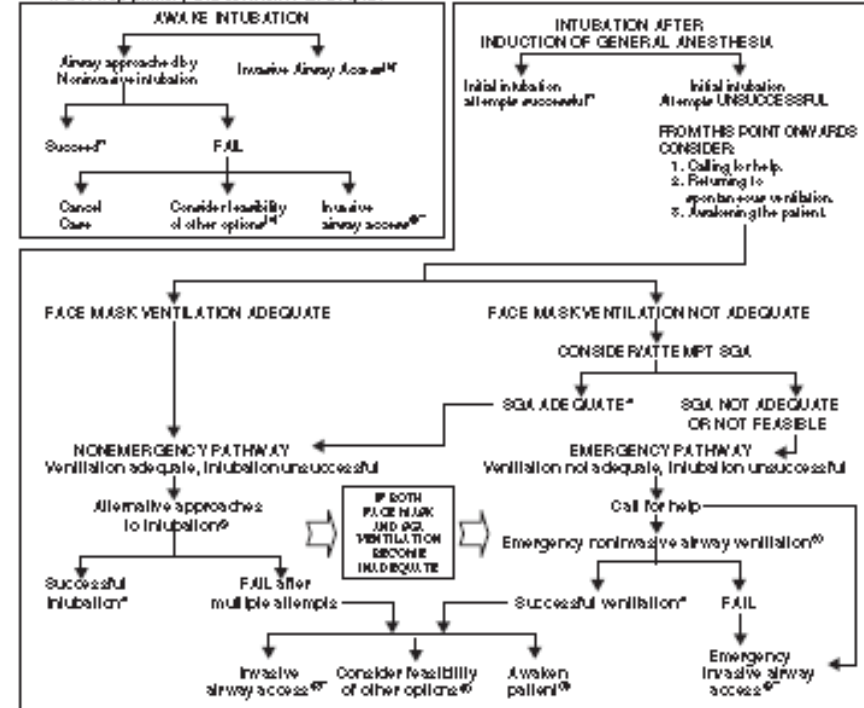
- Difficulty with patient cooperation or consent
- Difficult mask ventilation
- Difficult supraglottic airway placement
- Difficult laryngoscopy
- Difficult intubation
- Difficult surgical airway access

2. Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway management.

3. Consider the relative merits and feasibility of basic management choices:

- Awake intubation vs. intubation after induction of general anesthesia
- Non-invasive technique vs. invasive techniques for the initial approach to intubation
- Video-assisted laryngoscopy as an initial approach to intubation
- Preservation vs. ablation of spontaneous ventilation

4. Develop primary and alternative strategies:



**Confirm ventilation, tracheal intubation, or SGA placement with exhaled CO₂.

a. Other options include (but are not limited to): surgery utilizing face mask or supraglottic airway (SGA) anesthesia (e.g., LMA, ILMA, laryngeal tube), local anesthetic infiltration or regional nerve blockade. Pursuit of these options usually implies that mask ventilation will not be problematic. Therefore, these options may be of little value if this step in the algorithm has been reached via the Emergency Pathway.

b. Invasive airway access includes surgical or percutaneous airway, jet ventilation, and retrograde intubation.

c. Alternative difficult intubation approaches include (but are not limited to): video-assisted laryngoscopy, alternative laryngoscope blades, SGA (e.g., LMA or ILMA) as an intubation conduit (with or without fiberoptic guidance), fiberoptic intubation, intubating stylet or tube changer, lightwand, and blind oral or nasal intubation.

d. Consider re-orientation of the patient for awake intubation or canceling surgery.

e. Emergency non-invasive airway ventilation consists of a SGA.

Fig. 1. Difficult Airway Algorithm.

Airway management

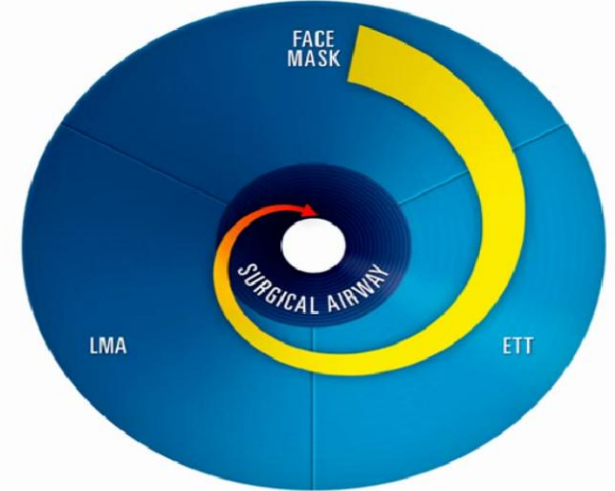
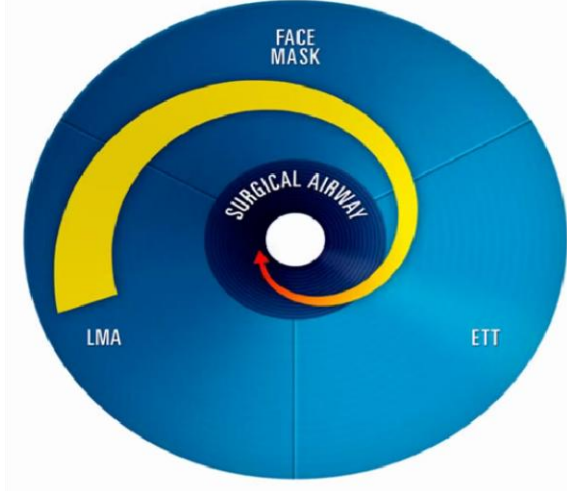
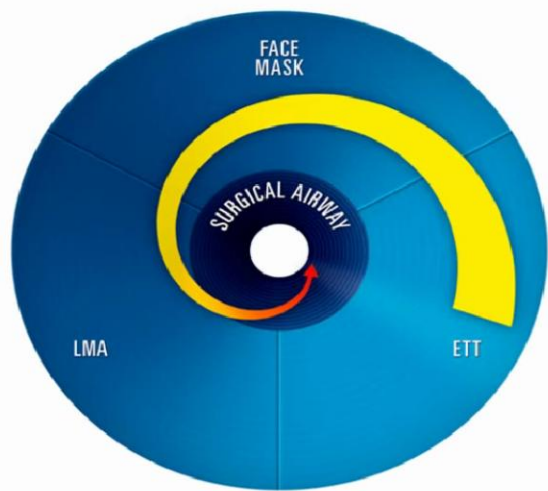


THE



VORTEX

Vír



Udržet O₂/CO₂

- 3 nechirurgické postupy



Udržet O₂/CO₂

- 3 nechirurgické postupy
- 1 chirurgický postup



Udržet O₂/CO₂

- 3 nechirurgické postu
- 1 chirurgický postup
- dostat pacienta do bezpečné zóny





Koniotomie

- Triggrem k provedení je nemožnost zajistit dýchací cesty třemi nechirurgickými technikami
- Desaturace není trigrem, ale stresorem během provedení.
- Čas, který máme k dispozici, než pacient desaturuje, je znám až retrospektivně.

Nedělej 2x to stejné

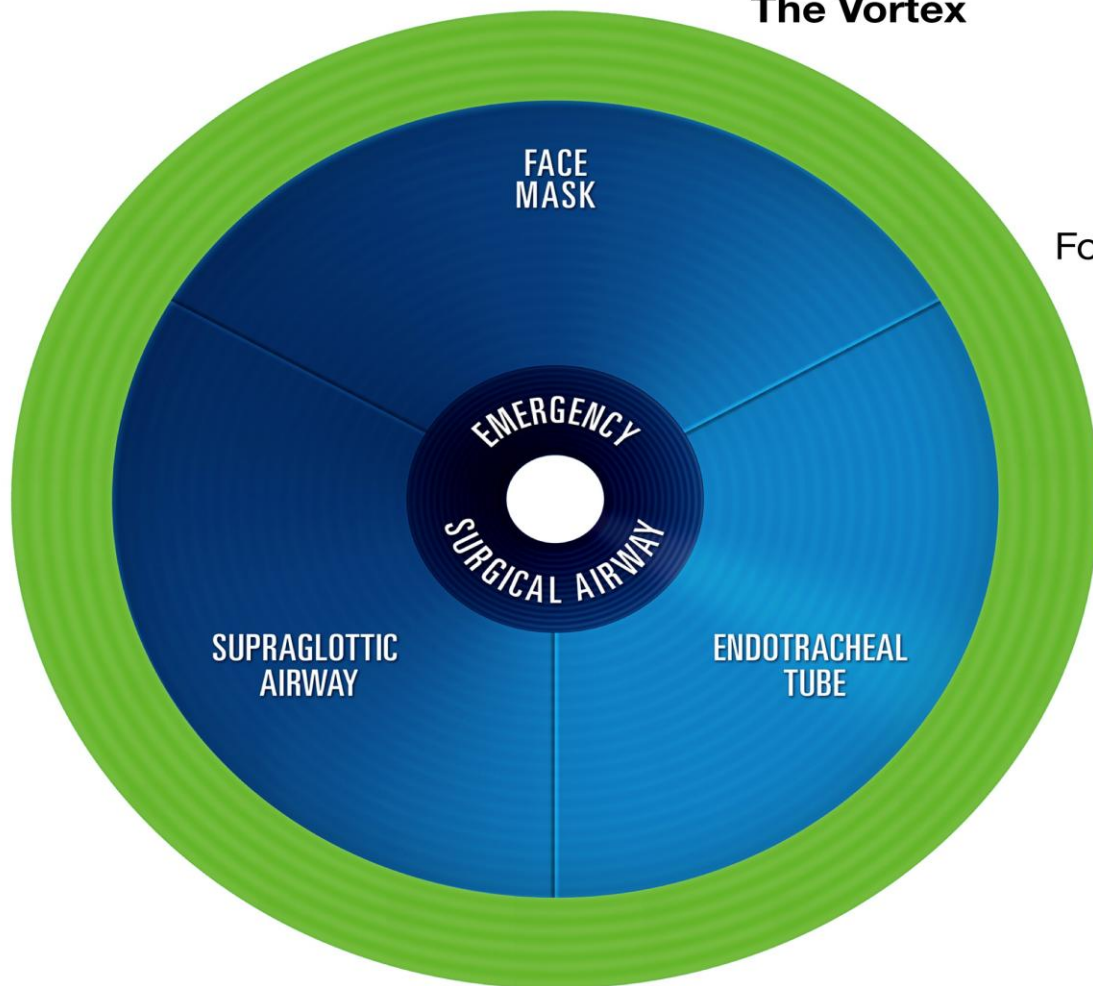


VORTEX OPTIMISATION STRATEGIES

	FACE MASK	LARYNGEAL MASK AIRWAY	ENDOTRACHEAL TUBE
1. Manipulation Head & Neck	Sniffing Position/Jaw Thrust/Bed Height		
	Dentures In		Dentures Out
Larynx	Laryngeal Manipulation (incl. ease cricoid)		
Device	2 hands	Twist Cuff Inflation	Rotate
2. Adjuncts	OPA NPA	Introducer Bougie Laryngoscope	Stylette Bougie Magill Forceps
3. Size/Type	FM	LMA	Blade/Handle/VL ETT
4. Suction			
5. Pharyngeal Muscle Tone	Prospect of recovery: consider reverse BZD's, opioids, NMBD's GZ or No prospect recovery: consider adequacy anaesthesia/m. relaxation		

Nedělej 2x to stejné

The Vortex



For Each NSA Technique Consider:

1. Manipulations:
 - Head & Neck
 - Larynx
 - Device
2. Adjuncts
3. Size/Type
4. Suction/O₂ Flow
5. Muscle Tone

**MAXIMUM THREE TRIES AT EACH NON-SURGICAL AIRWAY TECHNIQUE
AT LEAST ONE TRY SHOULD BE HAD BY MOST EXPERIENCED AVAILABLE CLINICIAN**





Literatura

- <http://vortexapproach.org/>
- <http://www.das.uk.com/>
<http://bj.oxfordjournals.org/content/early/2015/11/05/bja.aev404.full>
- Practice Guidelines for Management of the Difficult Airway: An updated report by the American Society of Anesthesiologists Task Force on management of the difficult airway. *Anesthesiology* 118:251-70, 2013.
doi:10.1097/ALN.0b013e31827773b2
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