Gestione delle vie aeree in emergenza ed elezione

Vittorio Pavoni

SOC di Anestesia e Rianimazione
PO Santissima Annunziata
AUSL Toscana Centro

Premessa

- **Vie aeree punto critico**
- **Diverso background del Personale medico ed infermieristico**
- **Setting (pre-H e H)**
- **“Inerzia”…**

DOES EARLY DEFINITIVE TRAUMA AIRWAY MANAGEMENT SAVE LIVES?

- The ABC priorities of trauma resuscitation are "stop the bleeding, maintain perfusion and oxygenate."
- Lifesaving oxygenation manoeuvres may include a jaw thrust, temporary bag-mask ventilation (BMV), placement of a SGA device or ETI.

TRAUMA AND THE DIFFICULT AIRWAY

A "difficult airway" is defined as difficulty with laryngoscopy and intubation, BMV, supra-glottic device ventilation, and/or front of neck airway (FONA) access.

"*No conclusion could be reached regarding pre-hospital intubation for patients with traumatic brain injury, with or without RSI* [rapid sequence intubation]. *Diversity of patient population, differing airway algorithms, various experience among emergency medical service personnel in ETI, and differing reporting make consensus difficult.*"

?

AIRWAY MANAGEMENT TRAUMA SCENARIOS
The Head-Injured Patient

Management pearls for the patient with traumatic brain injury (TBI)

- Hypoxemia and hypotension during airway management significantly worsens outcomes in patients with TBI.
- Airway management for airway protection should proceed only after adequate measures have been taken to prevent intubation related physiologic disturbances.
- Postintubation hypocapnia is also associated with poor outcomes in patients with TBI and often the result of adrenaline induced overzealous postintubation ventilation.
- Postinjury apnea requiring ventilation support does not necessarily predict poor outcome.

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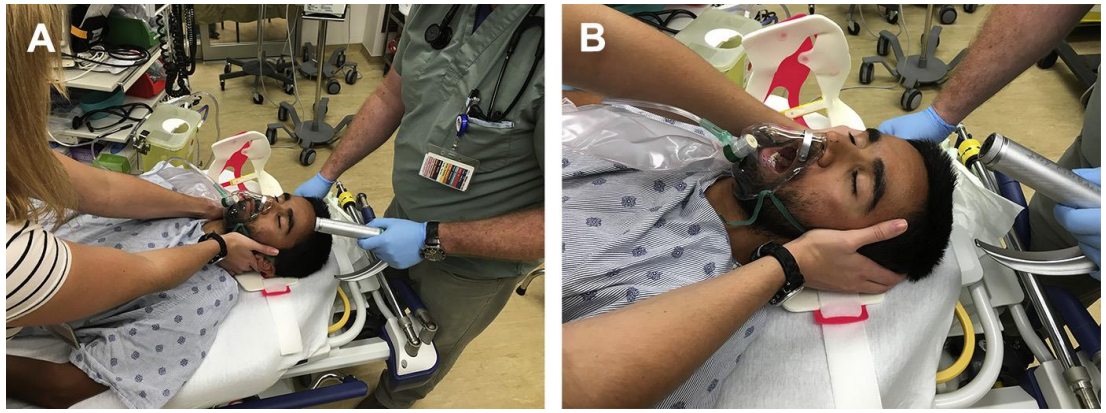
AIRWAY MANAGEMENT TRAUMA SCENARIOS

Suspected Cervical Spine Injuries



Management pearls for patients with unstable cervical spine injuries

- Imaging should not delay airway management and assume all trauma patients have unstable cervical spines.
- The provider should optimally use the intubation device he or she is most experienced with.
- Be prepared for a poor view with direct laryngoscopy (DL) and always have a bougie ready for use.
- Rigid cervical collars must be opened or removed and replaced by properly applied manual inline stabilization (MILS).
- Properly applied MILS should avoid immobilization of the mandible.
- If using a hyperangulated video laryngoscope, a deliberate restricted glottic view may facilitate difficult ETT advancement.

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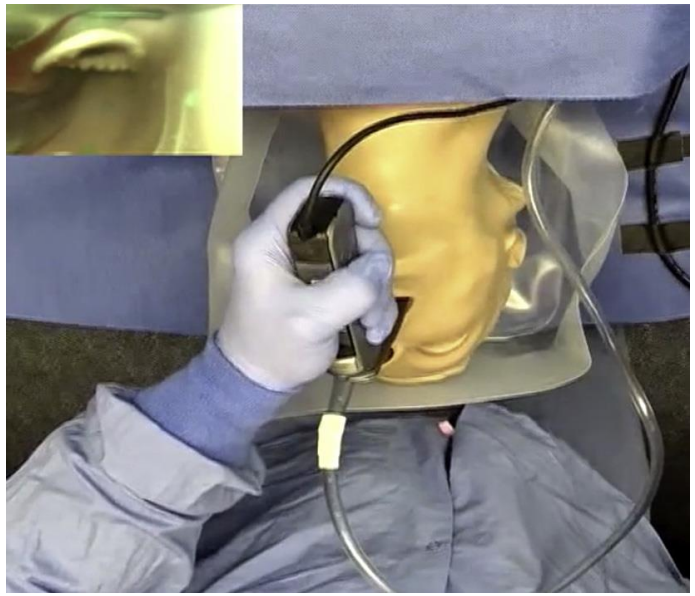
AIRWAY MANAGEMENT TRAUMA SCENARIOS

The contaminated airway

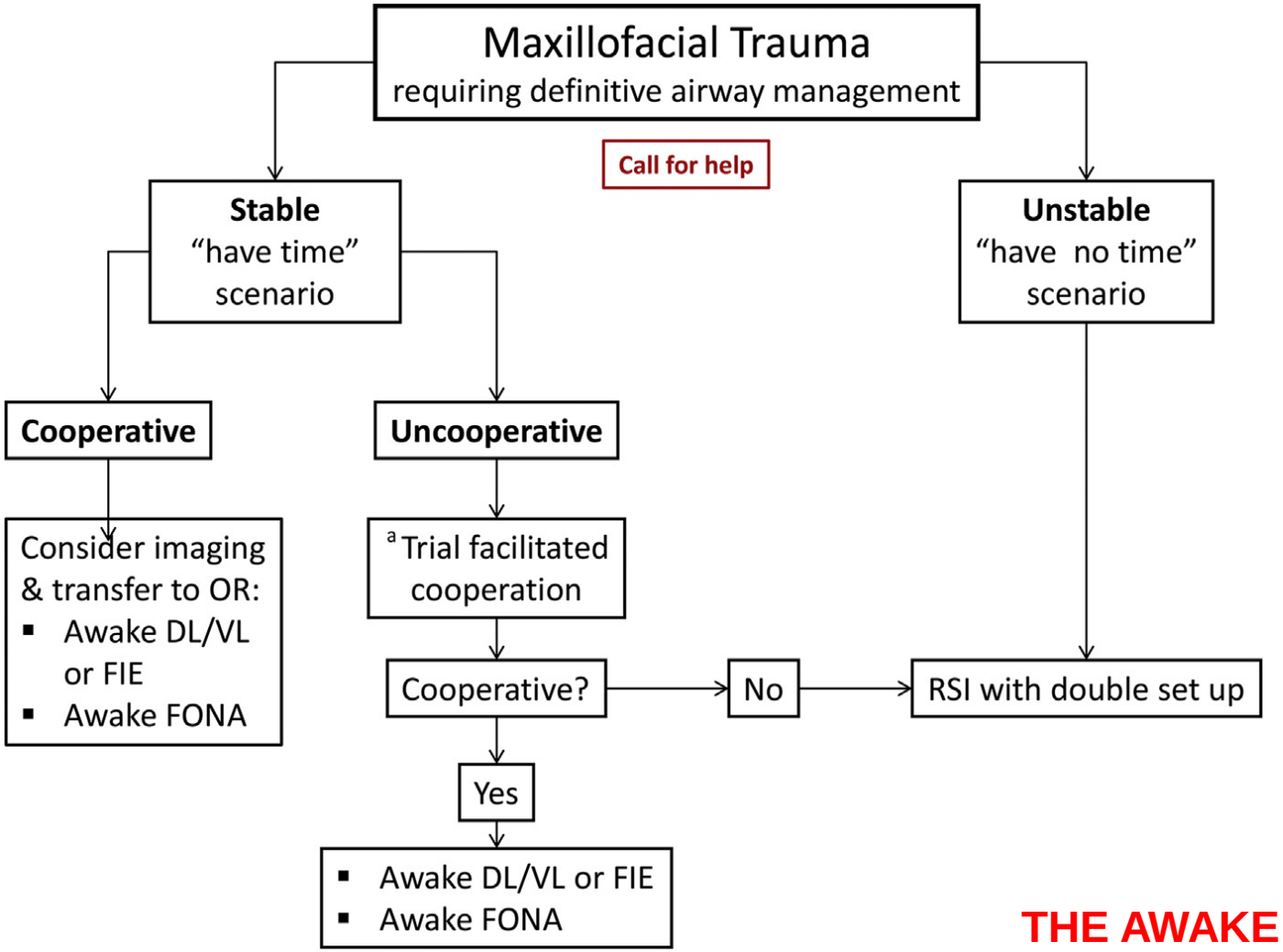
Management pearls for the patient with the contaminated airway

- Have at least 2 large-bore rigid suction catheters.
- Consider alternative options for hemorrhage control (sutures, packing, epistaxis kit).
- Minimize positive-pressure ventilation (PPV) and use a monometer for provider feedback when mask ventilation is indicated.
- Look for epiglottis as an important landmark for glottis and have a bougie prepared for use with DL.
- If a VL is considered the best option, Macintosh VL may be the preferred device, as it may be used directly if contamination obstructs camera.
- Consider esophageal ETT diversion connected to suction.
- Suction-assisted laryngoscopy airway decontamination (SALAD) approach.
- If intubation fails and patient is desaturating, front of neck airway (FONA) rescue oxygenation approach is indicated.



AIRWAY MANAGEMENT TRAUMA SCENARIOS

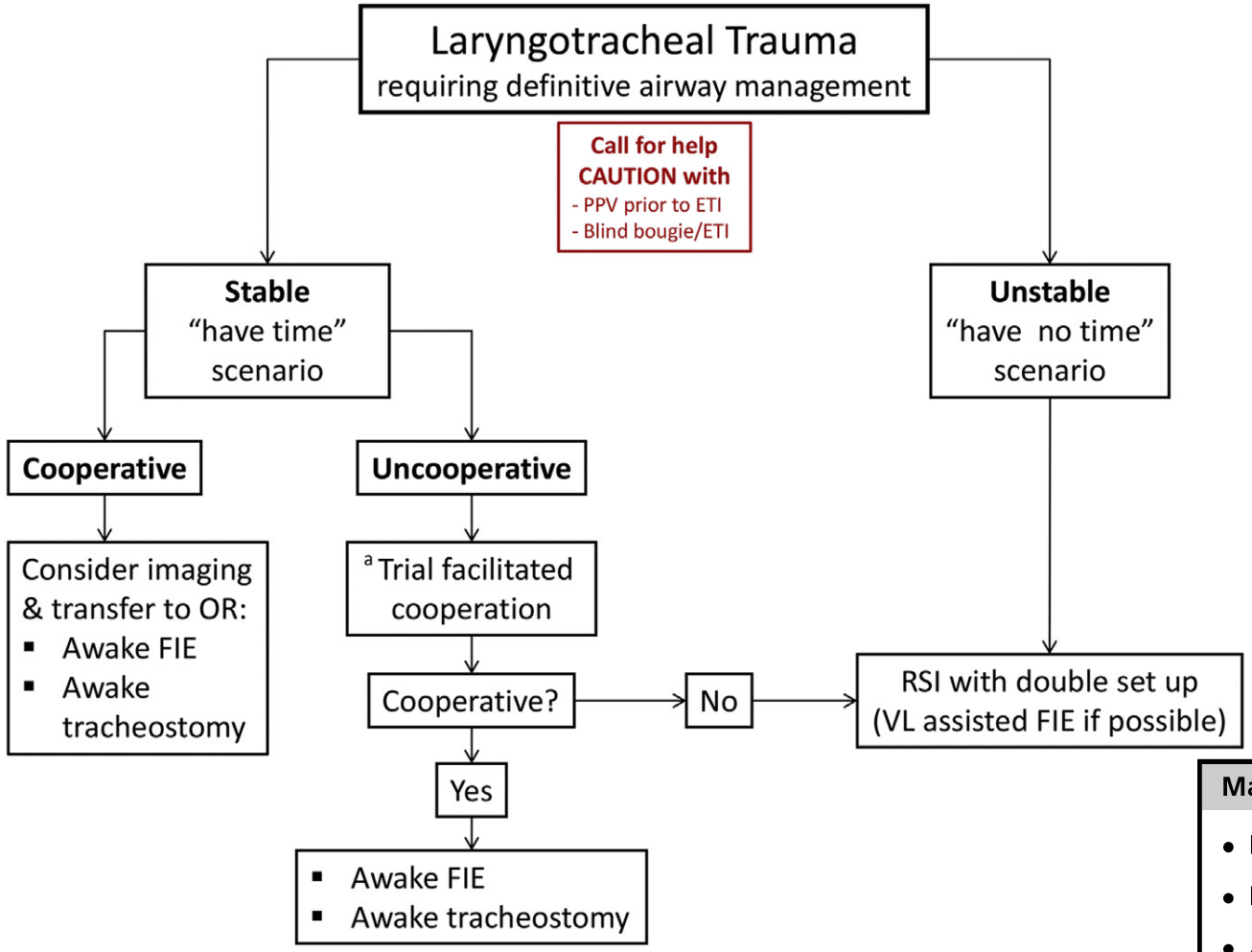
The maxyllofacial trauma



THE AWAKE INTUBATION

AIRWAY MANAGEMENT TRAUMA SCENARIOS

The traumatized airway

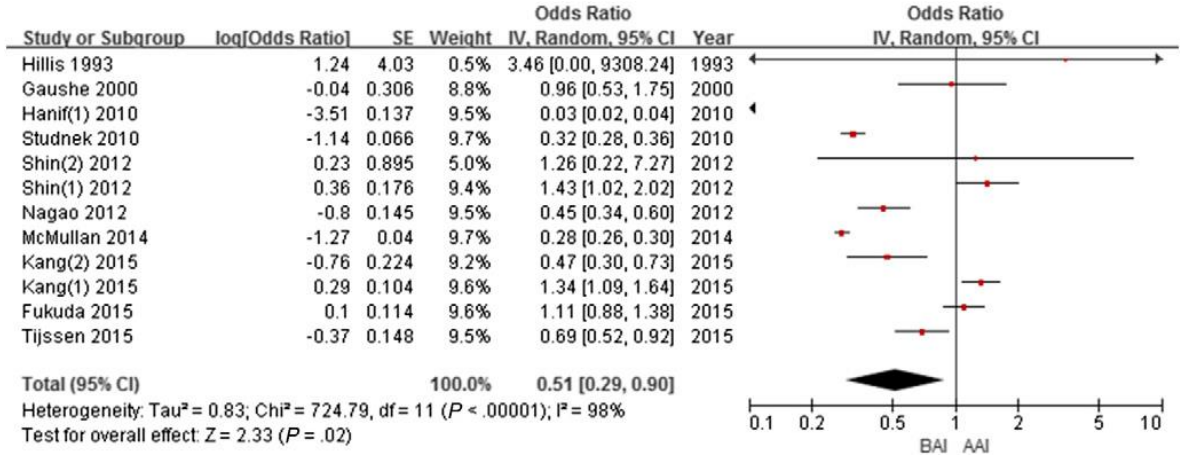


Management pearls for the patient with a primary airway injury

- Decompensation in the patient with a traumatized airway may be rapid and catastrophic.
- PPV should be avoided if possible.
- An awake approach with appropriate topicalization is the preferred approach.
- If an RSI is chosen, a double set-up with a FONA plan for accessing the trachea based on the level of the airway breach.
- ETT placement should ideally be performed with visualization of the airway using a flexible intubating endoscope (FIE).
- Advanced techniques using FIE either primarily in an awake patient or assisted by VL when an RSI is chosen are recommended when resources and skill are available.

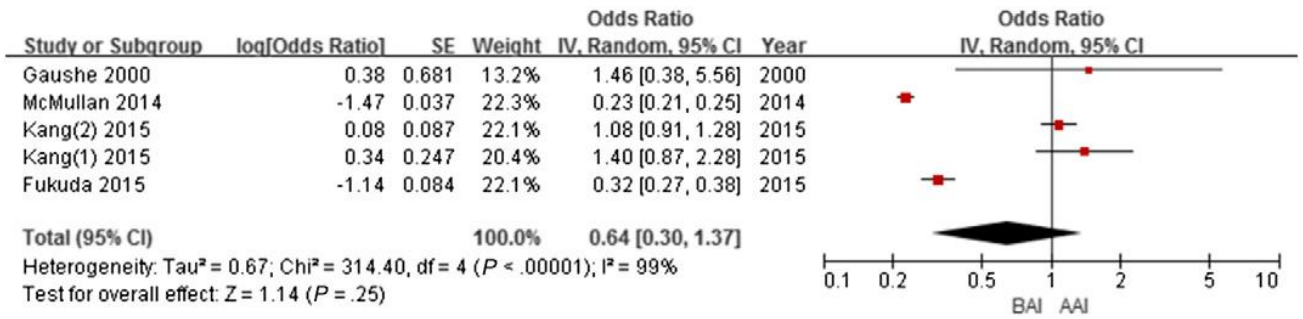
The role of prehospital advanced airway management on outcomes for out-of-hospital cardiac arrest patients: a meta-analysis☆

Advanced vs Basic Airway Managment



AAM vs BAM: lower odds of survival

Fig. 2. Forest plot for survival with AAM compared with BAM. AAM: advanced airway management, BAM: basic airway management, SE: standard error, IV: inverse variance, CI: confidence interval, BAI: basic airway intervention, AAI: advanced airway intervention.



AAM vs BAM: no statistical differences in the odds of neurologic recovery (even in the subgroups ETI and SGA)

Fig. 4. Forest plot for neurologic recovery with AAM compared with BAM. AAM: advanced airway management, BAM: basic airway management, SE: standard error, IV: inverse variance, CI: confidence interval, BAI: basic airway intervention, AAI: advanced airway intervention.

Jeong S. et al. AJEM 2016

Centrale 118 Pistoia-Empoli

Periodo 2016-2018

- 1098 out-of-hospital cardiac arrest (OHCA)
- 250 Basic Airway Management (BAM)
- 848 Advanced Airway Management (AAM) (77%)
- Trauma cranico 152 con GCS < 8 IOT (50%)

Cosa è cambiato?

- **Guide Lines**
- **Equipments**
- **Drugs**

Fonti Bibliografiche

- **LG SIAARTI sulla gestione pre ospedaliera delle Vie Aeree (Prot. 143 del 9/10/2010)**
- **Ron M. Walls “Emergency Airways Management” 4°edition Ed. Wolster Kluwer 2012**
- **J.M. Rich “Street Level Airways Management: SLAM” Ed. Brady 2002 2007**
- **“Airway management by physician-staffed Helicopter Emergency Medical Services - a prospective, multicentre, observational study of 2,327 patients.” Scand J Trauma Resusc Emerg Med 2015 Aug 7;23:57**
- **“Advances in prehospital airway management” Int J Crit Illn Inj Sci 2014 Jan-Mar; 4(1): 57–64.**

Correlation between modified LEMON score and intubation difficulty in adult trauma patients undergoing emergency surgery

Modified LEMON score

Evaluation criteria	Points
Look externally	
Facial trauma	1
Larger incisors	1
Beard or moustache	1
Large tongue	1
Evaluate the 3-3-2 rule:	
Inter-incisor distance < 3 finger breadths	1
Hyoid-to-mental distance < 3 finger breadths	1
Thyroid-to-hyoid distance < 2 finger breadths	1
Obstruction:	
Any conditions causing airway obstruction	1
Neck mobility:	
Limited neck mobility or applying neck immobilizer.	1
Total score	9

Intubation difficulty scale

Parameter	Score	Calculation
Number of intubation attempts > 1	N_1	Every additional attempt adds 1 point.
Number of involved anesthesiologist >1	N_2	Each additional anesthesiologist adds 1 point.
Number of alternative techniques	N_3	Each techniques adds 1 point.
Cormack-Lehane grade	N_4	N_4=grade at 1st attempt -1, if successful blind intubation N_4=0
Required lifting force	N_5	Normal; N_5=0, Required; N_5=1
Required laryngeal pressure	N_6	No; N_6=0, Required; N_6=1
Vocal cord mobility	N_7	Abduction; N_7=0, Adduction; N_7=1

Fig. 1 Modified LEMON (LEON) score and intubation difficulty scale score

Sung-Mi Ji. WJES 2018

Correlation between modified LEMON score and intubation difficulty in adult trauma patients undergoing emergency surgery

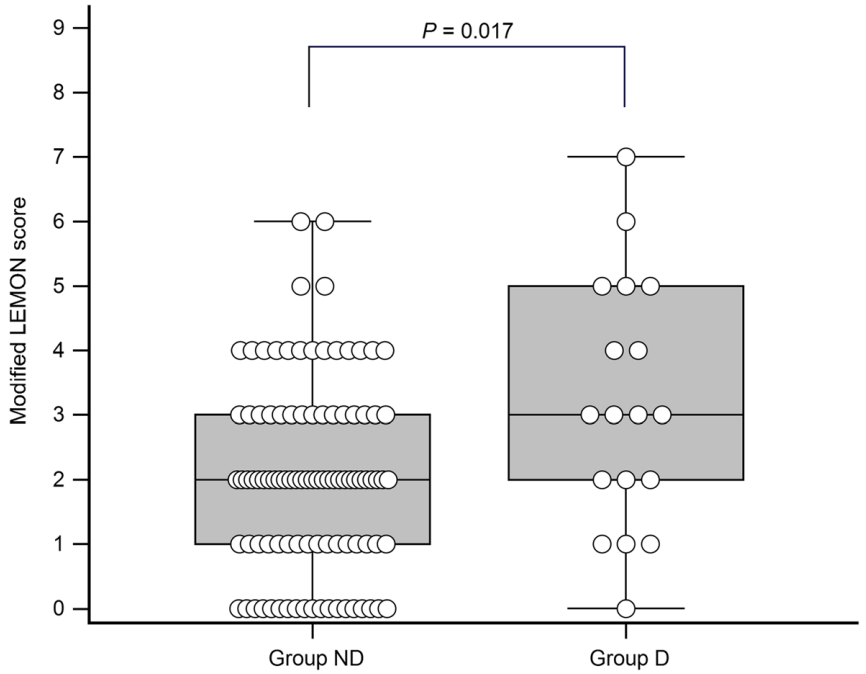


Fig. 2 Comparison of the modified LEMON (LEON) scores between group ND and group D. Patients in group ND shows intubation difficulty score ≤ 4 and patients in group D shows > 5. The modified LEMON score was 2 [1–3] in group ND and 3 [2–5] in group D ($P = 0.017$)

Conclusion

The LEON score may be used as one of the evidence predicting difficult airway, thereby being helpful to increase safety in the airway management of adult trauma patients undergoing emergency surgery. A patient with LEON score ≥ 3 may have the possibility of difficult intubation, and even in using video laryngoscopy, the limited neck mobility may contribute to the intubation difficulty.

Sung-Mi Ji. WJES 2018

SOCIETÀ ITALIANA DI ANESTESIA ANALGESIA
RIANIMAZIONE E TERAPIA INTENSIVA

9 Ottobre 2010
Prot. n. 143 SIAARTI 2009/2012

Linee-guida per la gestione preospedaliera delle vie aeree

SIAARTI – Dr. Maurizio Menarini – Prof. Flavia Petrini – D.ssa Elena Bigi – Dr. Paolo Donato – Dr. Alessandro di Filippo per il GdS Vie aeree difficili e per il GdS Emergenze

PAMIA – Dr. Giulio Giovanni Desiderio – CPSI Enrico Benedetto – Dr. Simone Baroncini

- **Concetto di Indicazione, Opportunità, Fattibilità**
- **Presa in carico del paziente in relazione alla Logistica dell'evento ed alle proprie competenze, chiarendo priorità**
- **Piano B…**

SOCIETÀ ITALIANA DI ANESTESIA ANALGESIA
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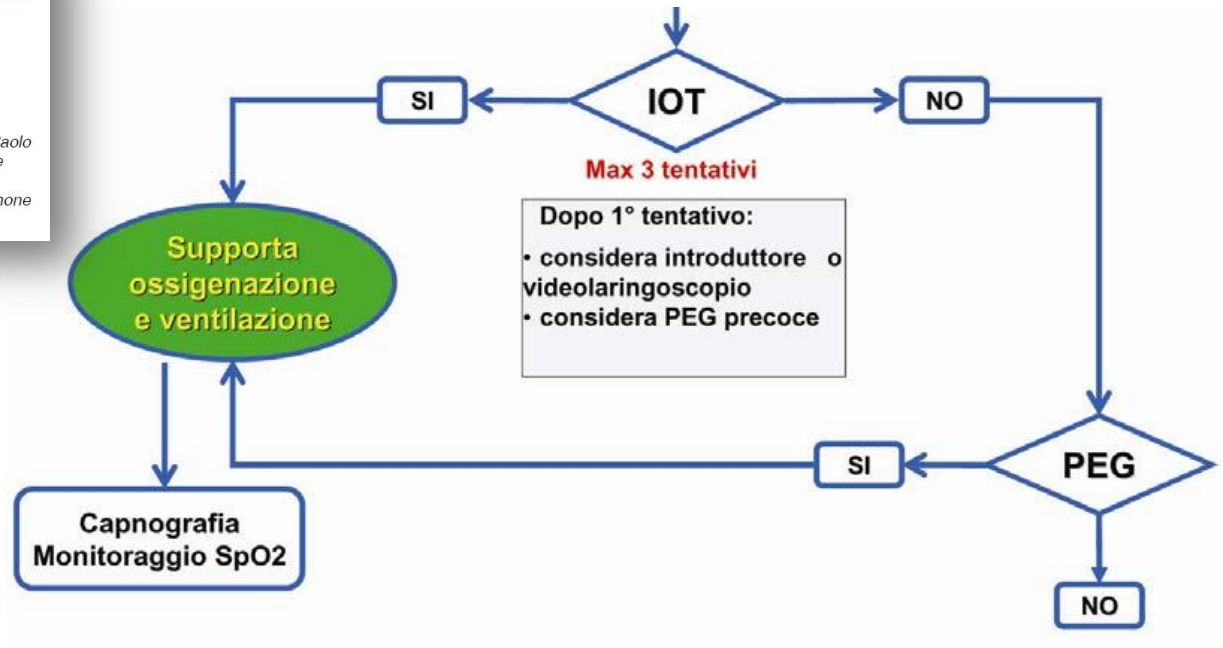


RACCOMANDAZIONI

1) E' indispensabile il ricorso precoce all'accesso tracheale rapido (con ago cannula o con almeno uno dei set commerciali per la cricotirotomia percutanea) per l'ossigenazione del paziente qualora l'intubazione tracheale fallisca e non sia possibile ventilare il paziente (CICV) **(D)**

CICO

NO!

RACCOMANDAZIONI

1) E' indispensabile dare sempre la priorità assoluta alla ossigenazione del paziente **(B)**

2) E' indispensabile utilizzare il monitoraggio con pulsiossimetro, con i limiti conosciuti di affidabilità della lettura, in tutte le fasi del soccorso preospedaliero ed in particolare durante le manovre per il raggiungimento della pervietà delle vie aeree e la ventilazione **(B)**

3) E' consigliabile non superare i 3 tentativi di intubazione tracheale in caso di insuccesso **(E)**

4) E' consigliabile che i 3 tentativi siano effettuati ricorrendo a presidi e procedure alternativi **(E)**

5) E' consigliabile, per l'intubazione tracheale in condizioni di emergenza, utilizzare sempre il mandrino corto inserito nel tubo orotracheale **(C)**

6) E' consigliabile l'utilizzo di un introduttore (gum elastic bougie) in caso di visualizzazione non ottimale dell'accesso glottico (Cormack-Lehane IIe – III), particolarmente in caso di paziente traumatizzato **(D)**

7) E' consigliabile che i mezzi di soccorso avanzato siano dotati di un videolaringoscopio da utilizzare come presidio alternativo in caso di intubazione fallita e di laringoscopia diretta non possibile (es. paziente incastrato all'interno di un veicolo) **(E)**

8) E' indispensabile verificare la corretta posizione del tubo tracheale o di un PEG sia con valutazione clinica (espansione del torace, auscultazione) che con rilievi strumentali **(C)**

9) E' indispensabile il monitoraggio della End-tidal CO_2 con metodo capnografico al fine di verificare il mantenimento del corretto posizionamento del tubo in trachea **(C)**

10) E' consigliabile l'utilizzo del bulbo auto-espansibile o di altro sistema di aspirazione per verificare il corretto posizionamento del tubo in trachea **(D)**

Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults†

Freck et al. BJA 2015

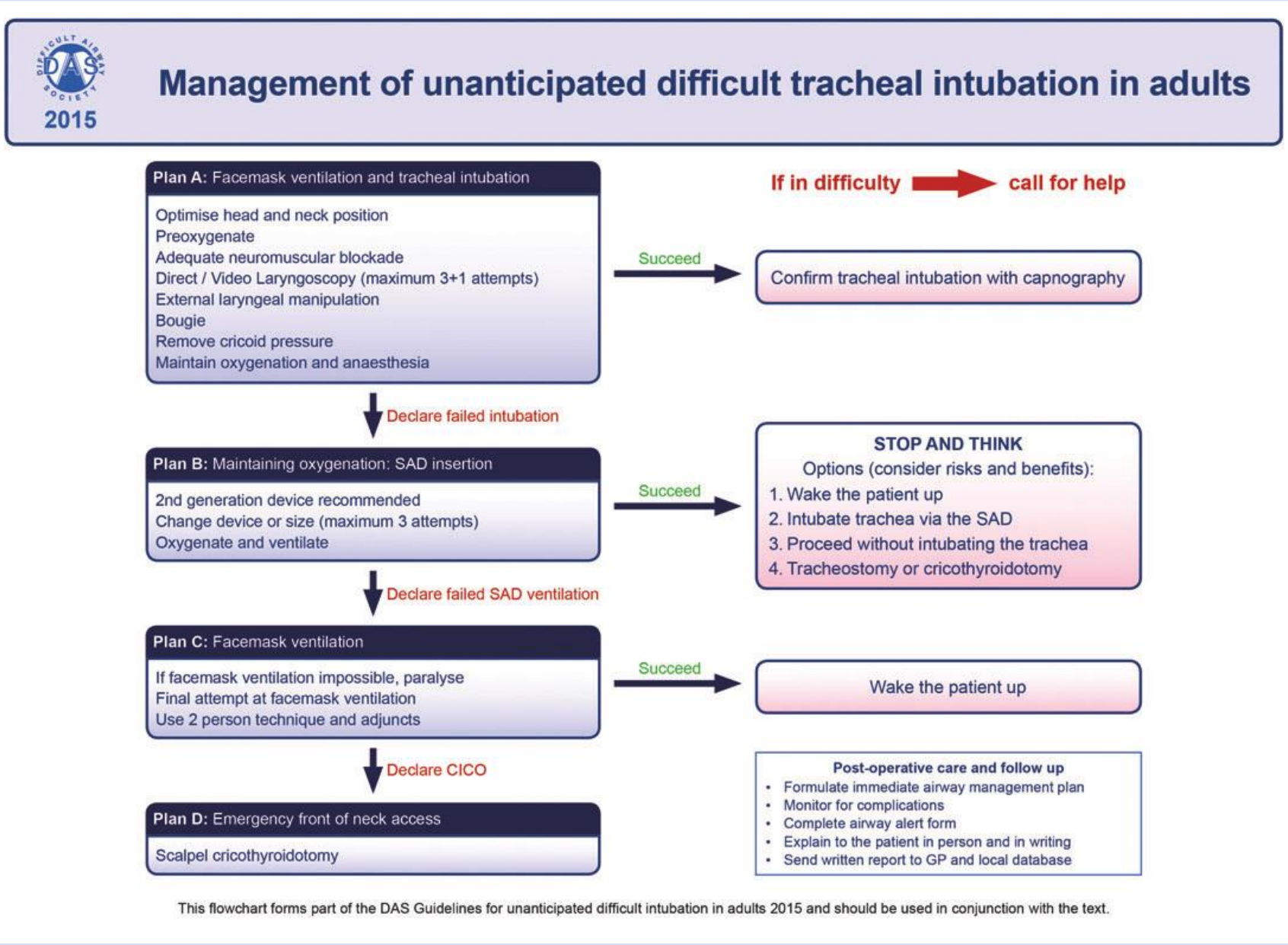


Fig 2 Management of unanticipated difficult tracheal intubation in adults. Difficult Airway Society, 2015, by permission of the Difficult Airway Society. This image is not covered by the terms of the Creative Commons Licence of this publication. For permission to re-use, please contact the Difficult Airway Society.
SAD, supraglottic airway device.

Table 1 Key features of Plan A

- Maintenance of oxygenation is the priority
- Advantages of head-up positioning and ramping are highlighted
- Preoxygenation is recommended for all patients
- Apnoeic oxygenation techniques are recommended in high-risk patients
- The importance of neuromuscular block is emphasized
- The role of videolaryngoscopy in difficult intubation is recognized
- All anaesthetists should be skilled in the use of a videolaryngoscope
- A maximum of three attempts at laryngoscopy are recommended (3+1)
- Cricoid pressure should be removed if intubation is difficult

Table 2 Key features of Plan B.
SAD, supraglottic airway device

- Failed intubation should be declared
- The emphasis is on oxygenation via a SAD
- Second-generation SADs are recommended
- A maximum of three attempts at SAD insertion are recommended
- During rapid sequence induction, cricoid pressure should be removed to facilitate insertion of a SAD
- Blind techniques for intubation through a SAD are not recommended

Table 3 Key features of Plan C.
CICO, can't intubate can't oxygenate; SAD, supraglottic airway device

- Failed SAD ventilation should be declared
- Attempt to oxygenate by face mask
- If face-mask ventilation is impossible, paralyse
- If face-mask ventilation is possible, maintain oxygenation and wake the patient up
- Declare CICO and start Plan D
- Continue attempts to oxygenate by face mask, SAD, and nasal cannulae

Fig 5 Failed intubation, failed oxygenation in the paralysed, anaesthetized patient. Technique for scalpel cricothyroidotomy. Difficult Airway Society, 2015, by permission of the Difficult Airway Society. This image is not covered by the terms of the Creative Commons Licence of this publication. For permission to re-use, please contact the Difficult Airway Society.

Laryngeal handshake technique in locating the cricothyroid membrane: a non-randomised comparative study

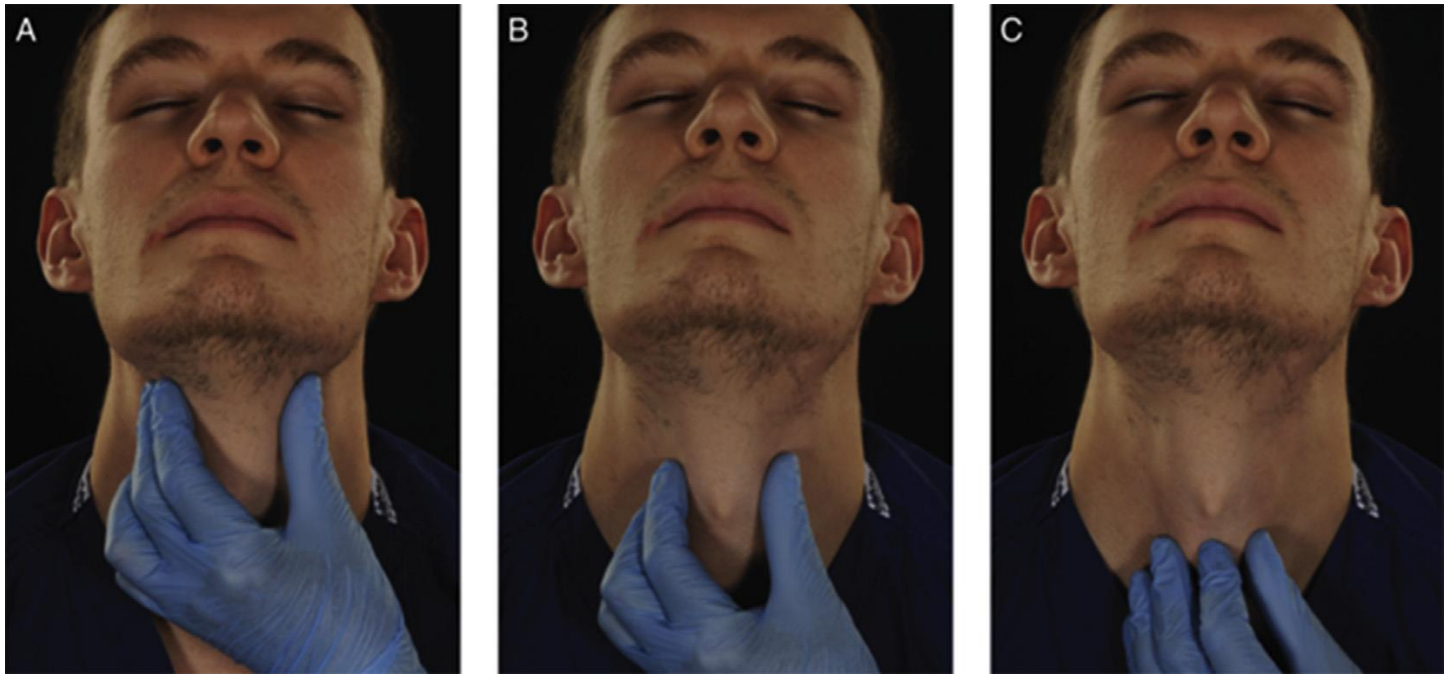


Fig 1. The laryngeal handshake as described in the DAS 2015 guidelines. (A) The index finger and thumb grasp the top of the larynx (the greater cornu of the hyoid bone) and roll it from side to side. The bony and cartilaginous cage of the larynx is a cone, which connects to the trachea. (B) The fingers and thumb slide down over the thyroid laminae. (C) Middle finger and thumb rest on the cricoid cartilage, with the index finger palpating the CTM.

Drew T. BJA 2018

Laryngeal handshake technique in locating the cricothyroid membrane: a non-randomised comparative study

Table 2 Results summary. Data are *n*/*N* (%), *n* (%), and mean (SD). CTM, cricothyroid membrane. * indicates P < 0.05.

	Group P	Group L	P-value
Accurate identification of the midline	28/45 (62)	39/45 (87)	0.008*
Accurate identification of the vertical plane	17/45 (37)	31/45 (69)	0.003*
Below (*vs* above) the level of the CTM In inaccurate vertical plane identifications	13/28 (46)	11/14 (79)	0.047*
Accurate CTM identification in non-obese subjects (BMI<30)	15/35 (43)	23/33 (70)	0.026*
Time to CTM identification (s)	18.4 (5.5)	31.2 (5.6)	<0.001*
Accurate CTM identification in obese subjects (BMI>30)	0/10 (0%)	5/12 (42)	0.04*
Correct Midline Identification in obese patients	4/10 (40%)	10/12 (83)	0.074
Mean distance to CTM in all assessments (mm)	6.8 (6.6)	3.5 (5.7)	0.012*
Mean distance to CTM in inaccurate assessments (mm)	10.3 (5.4)	9.3 (5.8)	0.711

Editor's key points

- Quick and accurate location of the cricothyroid membrane is the key for successful emergency cricothyrotomy.
- The 'laryngeal handshake' is currently advocated to be effective in locating the cricothyroid membrane, but its efficacy has not been studied formally.
- Compared with a conventional palpation technique, the 'laryngeal handshake' method was more accurate, but took longer to locate the cricothyroid membrane.

Drew T. BJA 2018

Prevalence of major vessels anterior to the trachea at sites of potential front-of-neck emergency airway access in adults

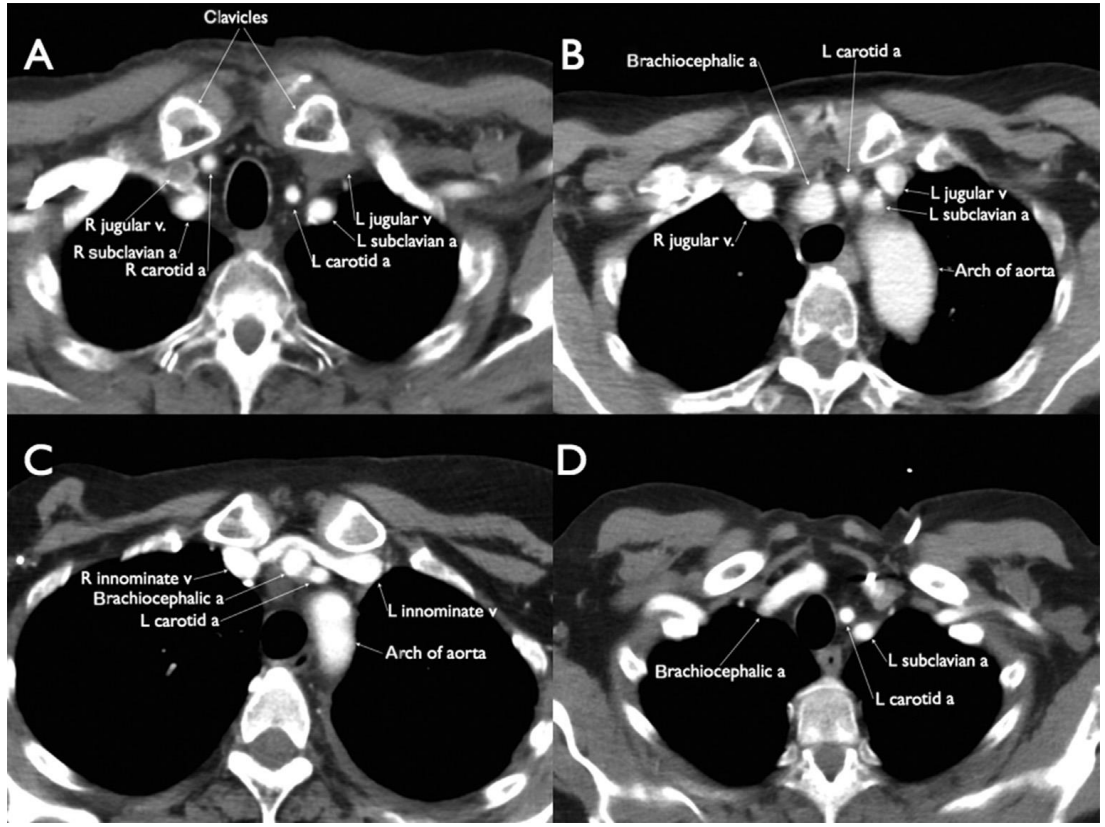


Fig 1. Computed tomography scans of the thoracic region. (A) Normal anatomy, with no major vessels anterior to the trachea in the suprasternal notch; (B) Patient with brachiocephalic artery and part of the left carotid artery anterior to the trachea in the suprasternal notch; (C) Patient with both left innominate vein and brachiocephalic artery anterior to the trachea in the suprasternal notch; and (D) Patient with brachiocephalic artery crossing the trachea 25 mm above the suprasternal notch. a, artery; L, left; R, right; v, vein.

Editor's key points

- The presence of major vessels anterior to the cricothyroid segment or the trachea can cause difficulty with front-of-neck airway access, but its incidence is not known.
- The incidence of major vessels anterior to the trachea is high (53%), but is much less at the cricothyroid segment.

Weigtman WN. BJA 2018

FONA Equipment

Airway Checklist

Before Intubation ⇨ **Intubation** ⇨ **After Intubation**

Team Ready?
- ☐ EP aware/Experienced airway staff present
- ☐ Do we need additional help?
- ☐ Assign roles: Lead/MILS/BVM/Drugs/ETI

Patient Ready?
- ☐ Monitor (Pulse ox, ECG, BP, EtCO2)
- ☐ Positioning
  - ☐ Ear to Sternal Notch
  - ☐ Reverse Trendelenberg 30⁰
  - ☐ Ramp if obese
- ☐ Dual PreOxygenation (Both)
  - ☐ Nasal Cannula @ 15+LPM AND
  - ☐ NRBM @ 15 -> flush LPM OR If Sats <96%
  - ☐ BVM/PEEP 5—10 cm (passive) OR
  - ☐ NIV
- ☐ Fluid Bolus
- ☐ Pressor support (consider if SI >.8)

Equipment Ready?
- ☐ BVM with PEEP/Pressure manometer
- ☐ DL/Mac VL ETT stylet 30—40⁰ + Bougie
- ☐ HA-VL ETT stylet 60—70⁰
- ☐ Suction (1—2)
- ☐ SGA sized
- ☐ Bougie cric equip available
- ☐ Ventilator/RT support

Airway Assessment & Plan
- ☐ Estimated Level of Difficulty Laryngoscopy/BMV/SGA/Surgical (Circle) Low, Moderate, High, Very High
- ☐ Considered Dangerous Physiology Low BP/low Sat/low pH/RV strain
- ☐ RSI vs. "Awake" approach
- ☐ Medications
  - ☐ RSI Induction/NMBA doses
  - ☐ Awake lido 4% Ez spray/5% oint
  - ☐ Ketamine facilitated coop .5—1.5 mg/kg
  - ☐ Post intubation sedation
- ☐ Plan A - Primary – DL, Mac VL+ Bougie or HA-VL
- ☐ Plan B - ReOx b/w ETI-> OPA/2-hand BVM
- ☐ Plan C – Alternative ETI approach
- ☐ Plan D - Rescue Ox-> SGA/bougie cric

Intubation
- ☐ Time Out – "All ready?" "Give drugs"
- ☐ Post RSI meds 45 sec count down
- ☐ Passive BVM+HFNO/vent prn
- ☐ Prob solve ETT advancement
  -ETT turn left over bougie
  -Stylet with VL ETT turn right
- ☐ EtCO2 (Waveform)

Post-Intubation
- ☐ Continuous Waveform Capnography
- ☐ Cycle pressures q3min
- ☐ Sedation/analgesia orders
- ☐ Consider ongoing NMBA
- ☐ OG Tube Placement prn
- ☐ CXR
- ☐ Restraints Prn
- ☐ Review ventilator settings

☐ **Debrief**

1) What went well? _____
_____ ☐ See Back

*2) What could be strengthened & how? _____
_____ ☐ See Back

☐ **Difficulty Rating** (Post Intubation)
(Circle) Low, Moderate, *High, *Very High

*For "High/Very High" Difficulty Ratings:
- ☐ Directly communicate to CC staff
- ☐ Document on chart
- What made the Airway Difficult?____
_____
_____ ☐ See Back

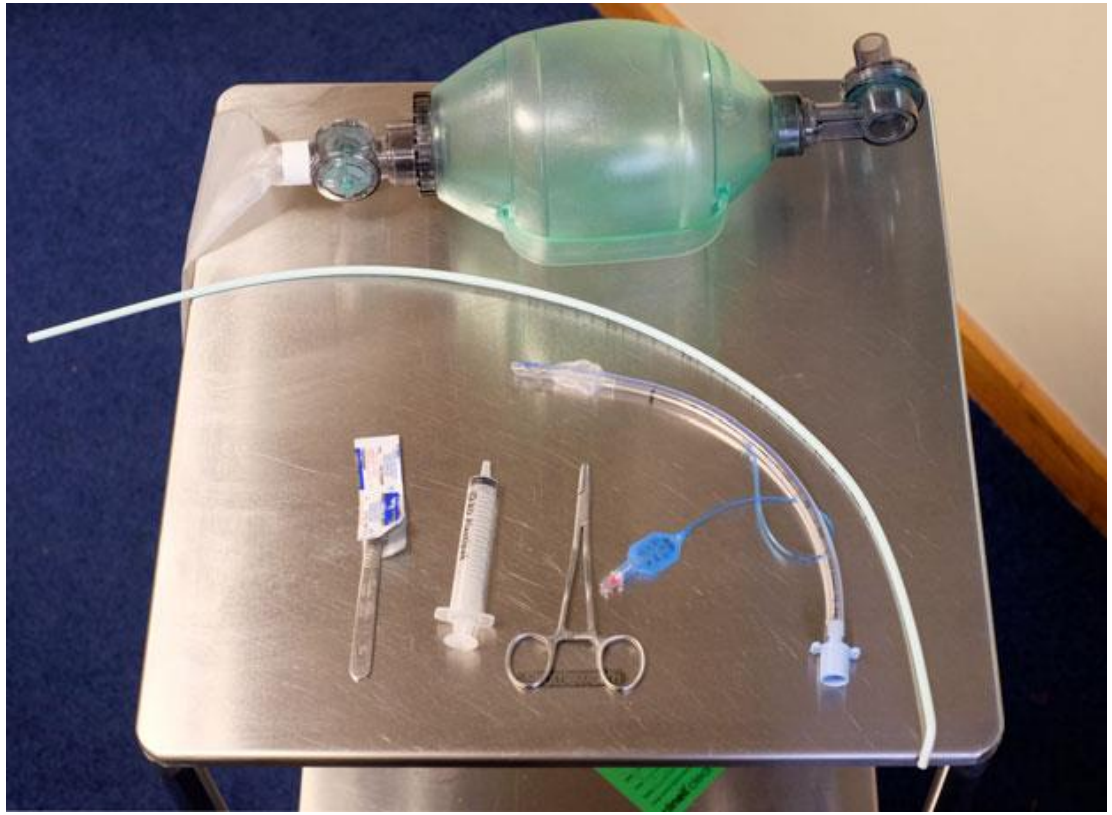


Figure 3 Airway equipment provided.

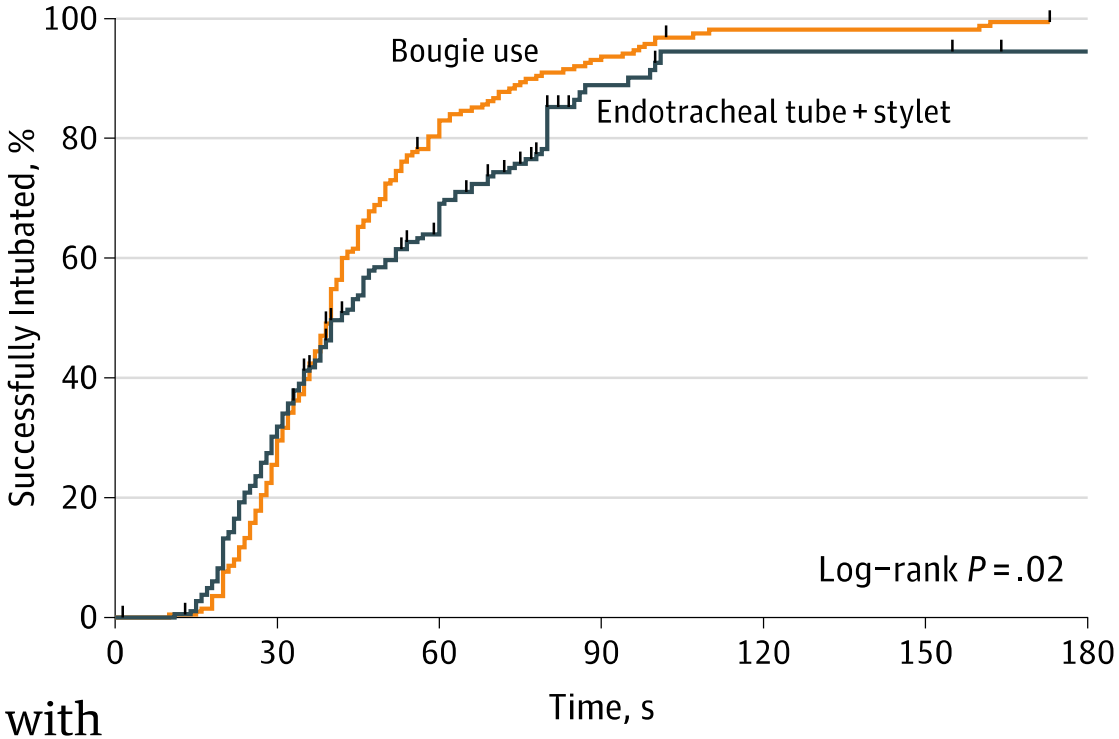
Equipments

Cosa è cambiato?

- **Guide Lines**
- **Equipments**
- **Drugs**

Effect of Use of a Bougie vs Endotracheal Tube and Stylet on First-Attempt Intubation Success Among Patients With Difficult Airways Undergoing Emergency Intubation

A Randomized Clinical Trial



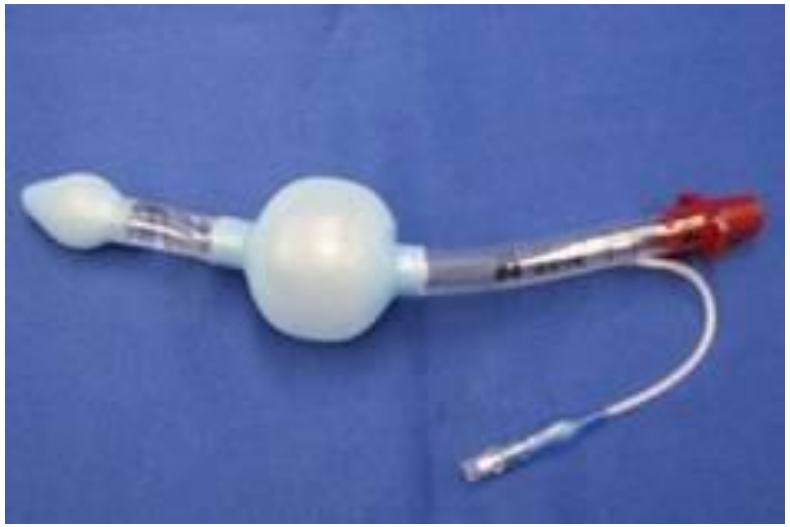
Conclusions

In this emergency department, use of a bougie compared with an endotracheal tube + stylet resulted in significantly higher first-attempt intubation success among patients undergoing emergency endotracheal intubation. However, these find-

Driver BE. JAMA 2018

King LT

- Comes in sizes 0-6, which are color coded
- Color coded syringes are also included with the devices
- Product is latex free and of silicone material
- Priced at approximately $250 each
- Reusable up to 50 times (sterilization card is included)



Br J Anaesth 1983;**55**:801-5

THE LARYNGEAL MASK—A NEW CONCEPT IN AIRWAY MANAGEMEN

A. I. J. BRAIN

SUMMARY

A new type of airway is described, which may be used as an alternative to either the endotracheal tube or the face-mask with either spontaneous or positive pressure ventilation. The results of a pilot study involving 23 patients are presented and the possible merits and disadvantages of the device are discussed, bearing in mind that the study is of a preliminary nature.

Viewed mechanically, tracheal intubation is a procedure in which two tubes, one man-made and the other anatomical, are connected together by inserting one into the other, a cuff being inflated on the inner tube to effect a gas-tight seal. In engineering terms, this solution to the problem of forming a gas-tight junction between two tubes is rather unsatisfactory, since it necessarily involves a degree of constriction at the point of junction unless the outer tube is itself expanded to compensate. Ideally, it is desirable that both tubes are of the same internal diameter at their point of junction, since this has clear advantages in terms of gas flow. This involves connecting them end to end, since the option of expanding the anatomical tube is not practicable.

An examination of postmortem specimens of the adult male and female larynx was made to assess how such a joint might be achieved. It was noted that an airtight seal could be effected against the perimeter of the laryn posteriorly by an elliptical cuff inflated in the hypopharynx This observation led to the concept of the Laryngeal Mask.

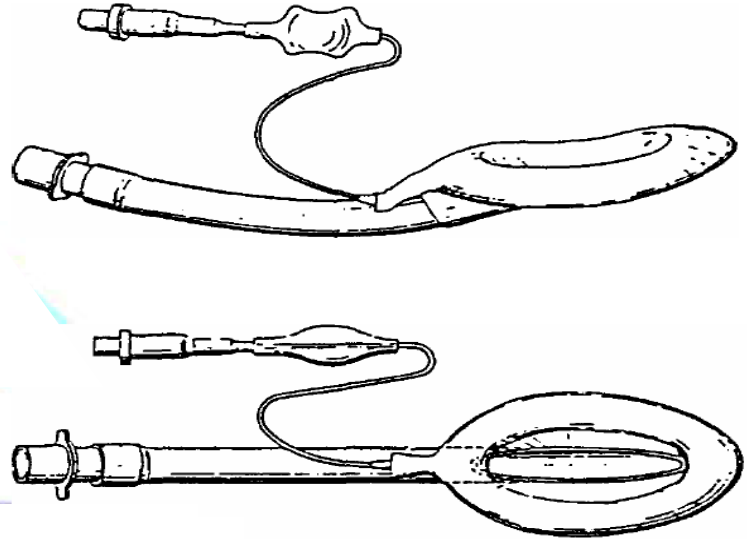


fig. 1. Prototype of the laryngeal mask.

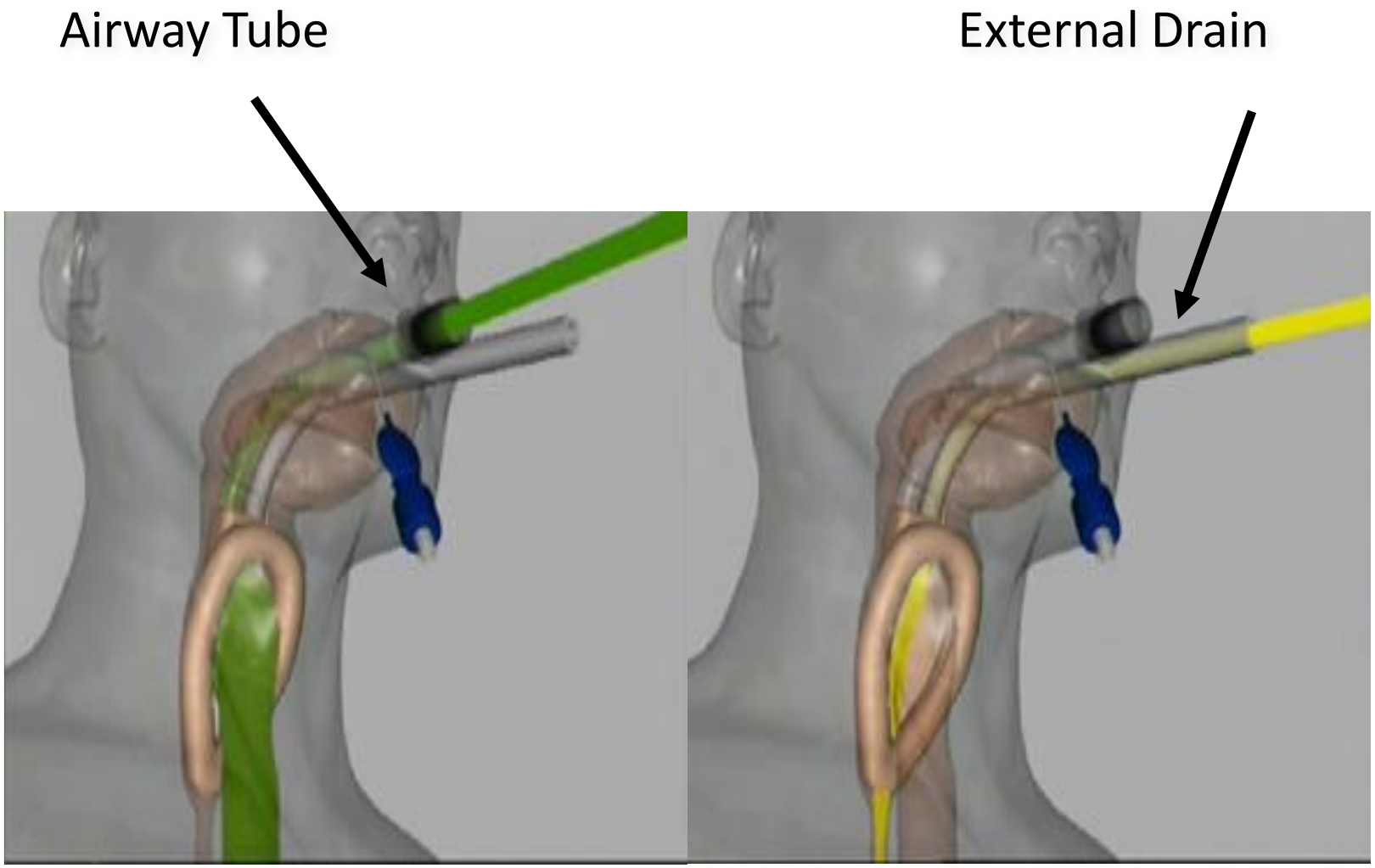
SAD 56% of all UK general anaesthetics

Teleflex: LMA Supreme

Intersurgical I-gel

Ambu AuraGain™

The Gastric Access concept



Separates alimentary and respiratory tract

Supraglottic airway devices (SAD)
II-III generation

- Allowe more dependable positive pressure ventilation
- Disposable materials
- Bite block
- **Conduits for tracheal intubation**
- **Reduce risk of pulmonary aspiration**

Advantages

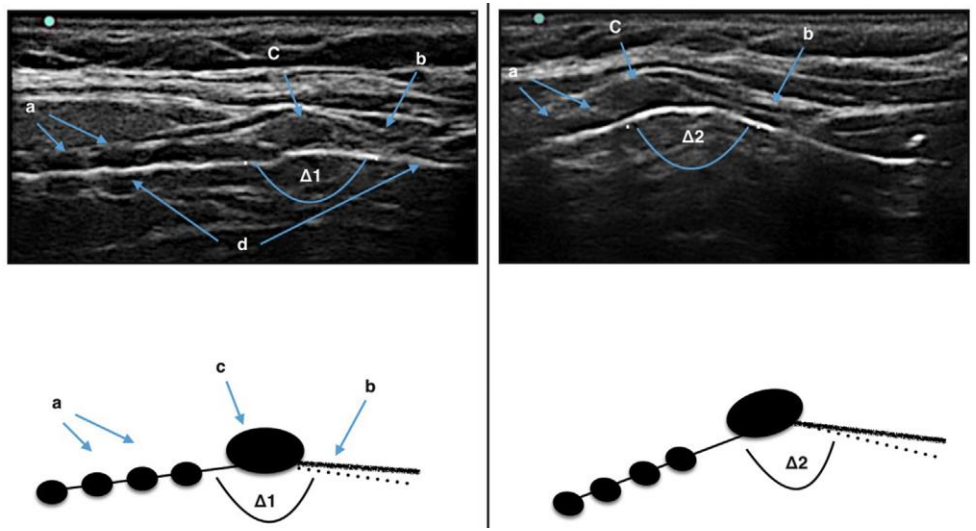
- More efficacy and ease to use
- Successful rescue ventilation in >90% pts in “CVCI”

Ramachaudron SK et al. Respir Care 2014

The effect of i-gel® insertion on the accuracy of cricothyroid membrane identification in adult females: a prospective observational study

Editor's key points

- In case of a 'cannot intubate, cannot ventilate' scenario, a supraglottic airway device is indicated; however, this may also fail, and in such a case, emergency front of neck airway is required.
- It is not known whether the presence of a supraglottic airway device affects accuracy in identifying the cricothyroid membrane in adult females.
- The presence of a supraglottic airway device (i-gel®) improved the accuracy in identifying the cricothyroid membrane in female subjects.

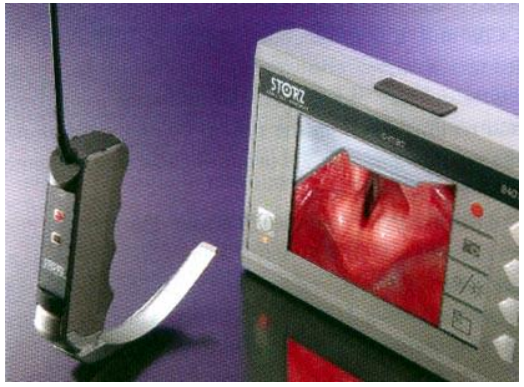


Conclusions

In the extended neck position, insertion of an i-gel® supraglottic airway device in females displaces the cricoid cartilage anteriorly in the neck, creating a more palpable landmark. This allows improved accuracy in localising the cricothyroid membrane. Clinicians should familiarise themselves with these anatomical changes, as they may assist identification of this important structure in an emergency.

Drew T. BJA 2019

Video-laryngoscopes



DIFFICULT AIRWAY MANAGEMENT: ROLE OF VLS

(da: Frova G. MINERVA ANESTESIOL 2010;76(8):637-40 mod.)

DIFFICULT VENTILATION

DIFFICULT INTUBATION

SEVERE PREDICTED

UNPREDICTED

FM

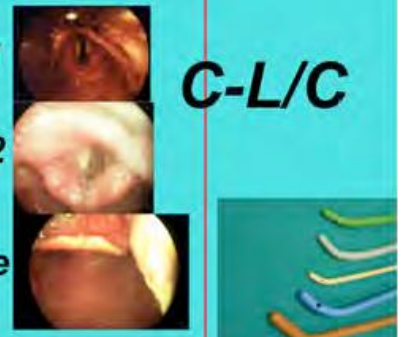
LMA EGD

CRICO

MACINTOSH C MAC

AIRTRAQ AWSCOPE LMA KING VISION GLIDESCOPE MCGRATH

C-L/C



C-L/C

AWAKENING

FOB

TT

FOB

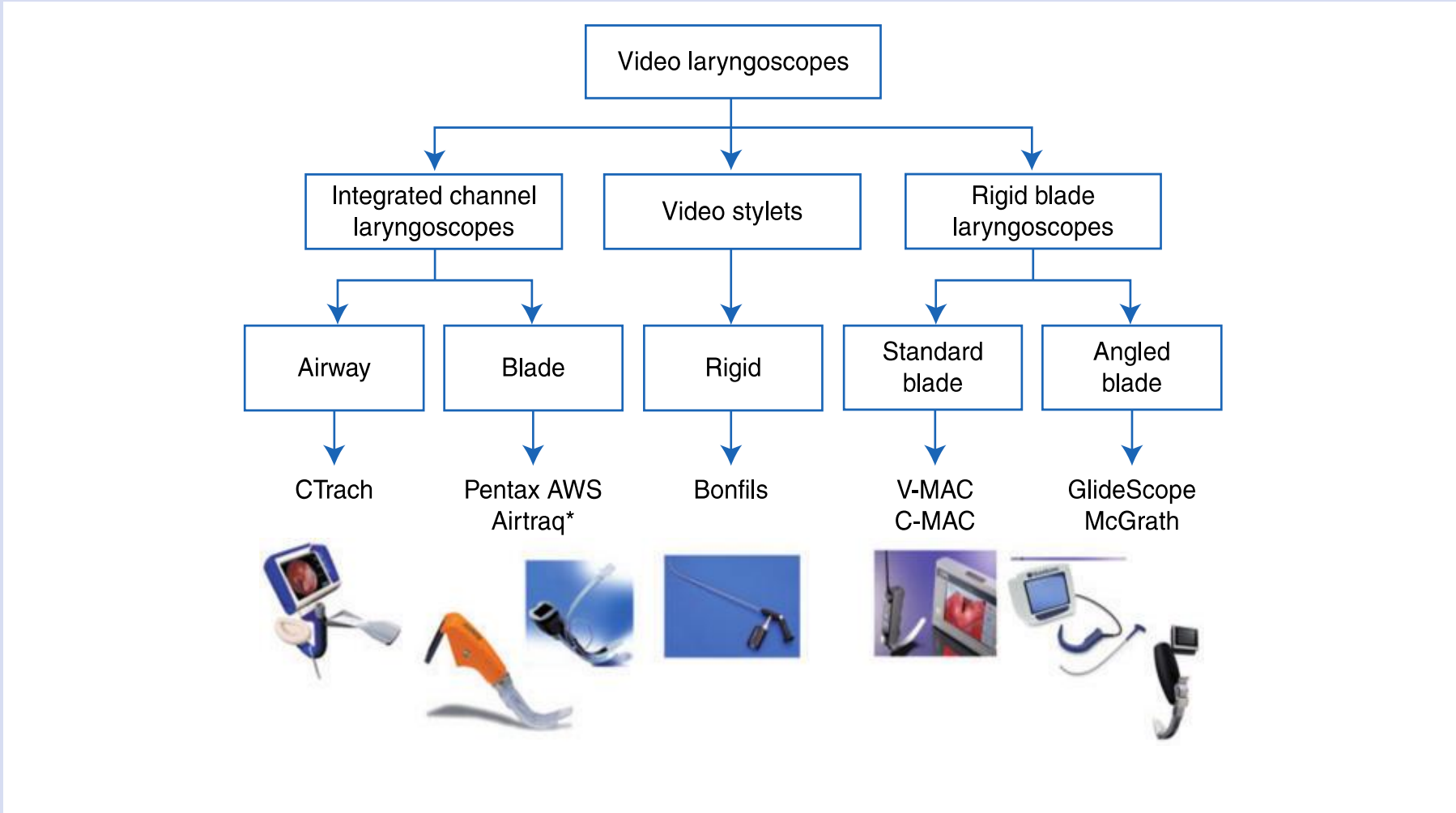


Fig 1 A classification of videolaryngoscopic devices. CTrach image courtesy of LMA North America. Pentax AWS image courtesy of Ambu USA. Airtraq image courtesy of Prodol Meditec S.A. Bonfils and C-MAC Â©2012 Photo Courtesy of KARL STORZ Endoscopy-America, Inc. GlideScope image courtesy of Verathon, USA. The McGrath series 5 image courtesy of Aircraft Medical, UK. This figure is taken from Healy et al BMC Anesthesiol. 2012; 12: 32. ©2012 Healy et al.; licensee BioMed Central Ltd. Reproduced under the terms of its Creative Commons Attribution License (2.0).

Intubation of prehospital patients with curved laryngoscope blade is more successful than with straight blade☆

- **Setting**: hospital-based suburban ALS service
- **Subjects**: 2299 pre-hospital pts with any direct IOT indication

Table 1
Baseline characteristics.

	Curved	Straight
n[a]	1865	367
Age (years, SD)	69.1 (19.2)	68.7 (20.3)
Weight (kilograms, SD)	83.8 (28.6)	84.3 (28.9)
Gender (% male)	52.8	57.4

[a] 67 patients had attempts with both curved and straight blades.

Table 2
Success rates and intubation attempts for curved and straight blade laryngoscopes.

	Curved	Straight	Difference	(95% CI)
First attempt success rate	86%	73%	13%	(9–17)
Overall success rate	96%	81%	15%	(12–18)
Attempts per patient	1.11	1.13	2%	(−3–7)

Conclusions: Our study found a significant difference in intubation success rates between laryngoscope blade types. Curved blades had higher first attempt and overall success rates when compared to straight blades. Paramedics should consider selecting a curved blade as their tool of choice to potentially improve intubation success.

Scott MA et al. AJEM 2018

Cochrane Library

Cochrane Database of Systematic Reviews

2016

Videolaryngoscopy versus direct laryngoscopy for adult patients requiring tracheal intubation (Review)

Lewis SR, Butler AR, Parker J, Cook TM, Smith AF

Authors' conclusions

Videolaryngoscopes may reduce the number of failed intubations, particularly among patients presenting with a difficult airway. They improve the glottic view and may reduce laryngeal/airway trauma. Currently, no evidence indicates that use of a VLS reduces the number of intubation attempts or the incidence of hypoxia or respiratory complications, and no evidence indicates that use of a VLS affects time required for intubation.

- Reduction of failed intubations but not of the number of intubation attempts
- Setting: all patients!

Review Article

Videolaryngoscopy vs. direct laryngoscopy use by experienced anaesthetists in patients with known difficult airways: a systematic review and meta-analysis

9 studies (1329 pts) **2017**

Results:

- increase rate of first attemp success (p<0,001)
- Better view (p<0001)
- Less mucosal trauma (p<0,02)

VLS improve outcomes in known difficult AWs

Pieters BM et al Anaesthesia 2017

Current Anaesthesia & Critical Care 21 (2010) 199–205

Contents lists available at ScienceDirect

Current Anaesthesia & Critical Care

journal homepage: www.elsevier.com/locate/cacc

FOCUS ON: OPHTHALMIC ANAESTHESIA

Videolaryngoscopy

Anjum Ahmed-Nusrath*

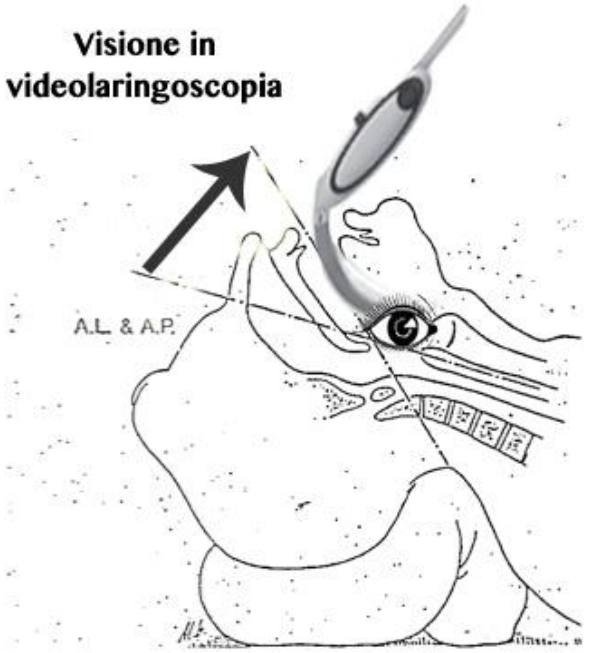
James Cook University Hospital, Middlesbrough, United Kingdom

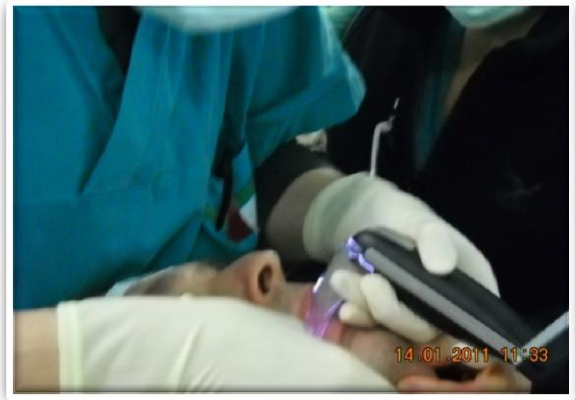
7. Specific intubation problems

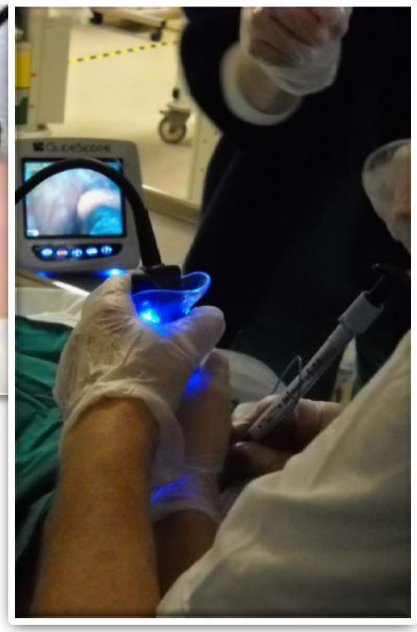
7.1. Unstable cervical spine

7.2. Morbid obesity

7.3. Rapid sequence induction







Awake intubation: VLS

European Journal of Anaesthesiology 2007; **24:** 1045–1049

Clinical evidence, Ambu ® aScope ™

Tracheal Intubation with Aura-i and aScope-2: How to Minimize Apnea Time in an Unpredicted Difficult Airway

4. Conclusion

Applying positive pressure ventilation during fiber-optic intubation through the SAD can reduce the potential risk of hypoxia and hypercapnia in case of unanticipated difficult airway.

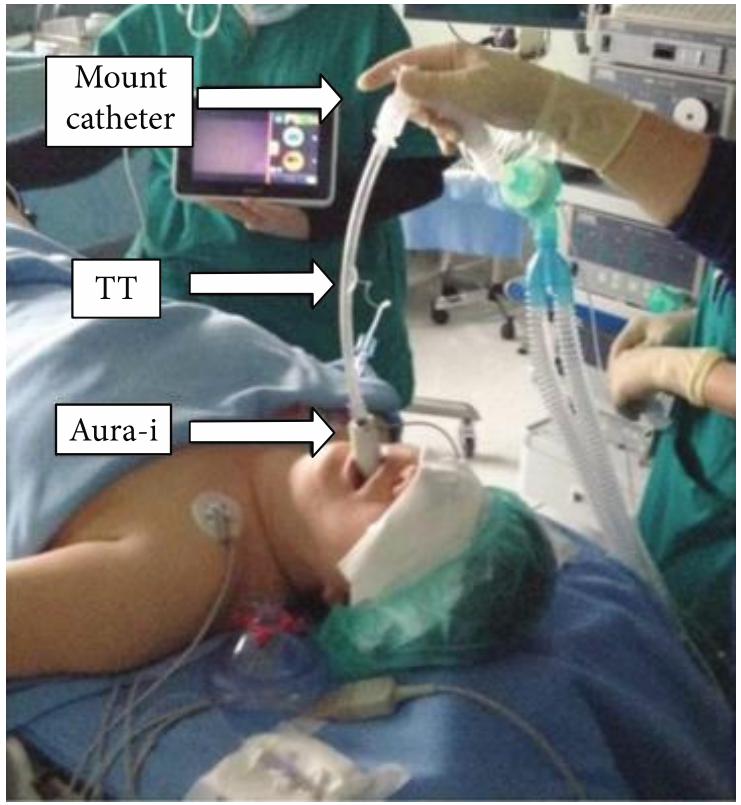
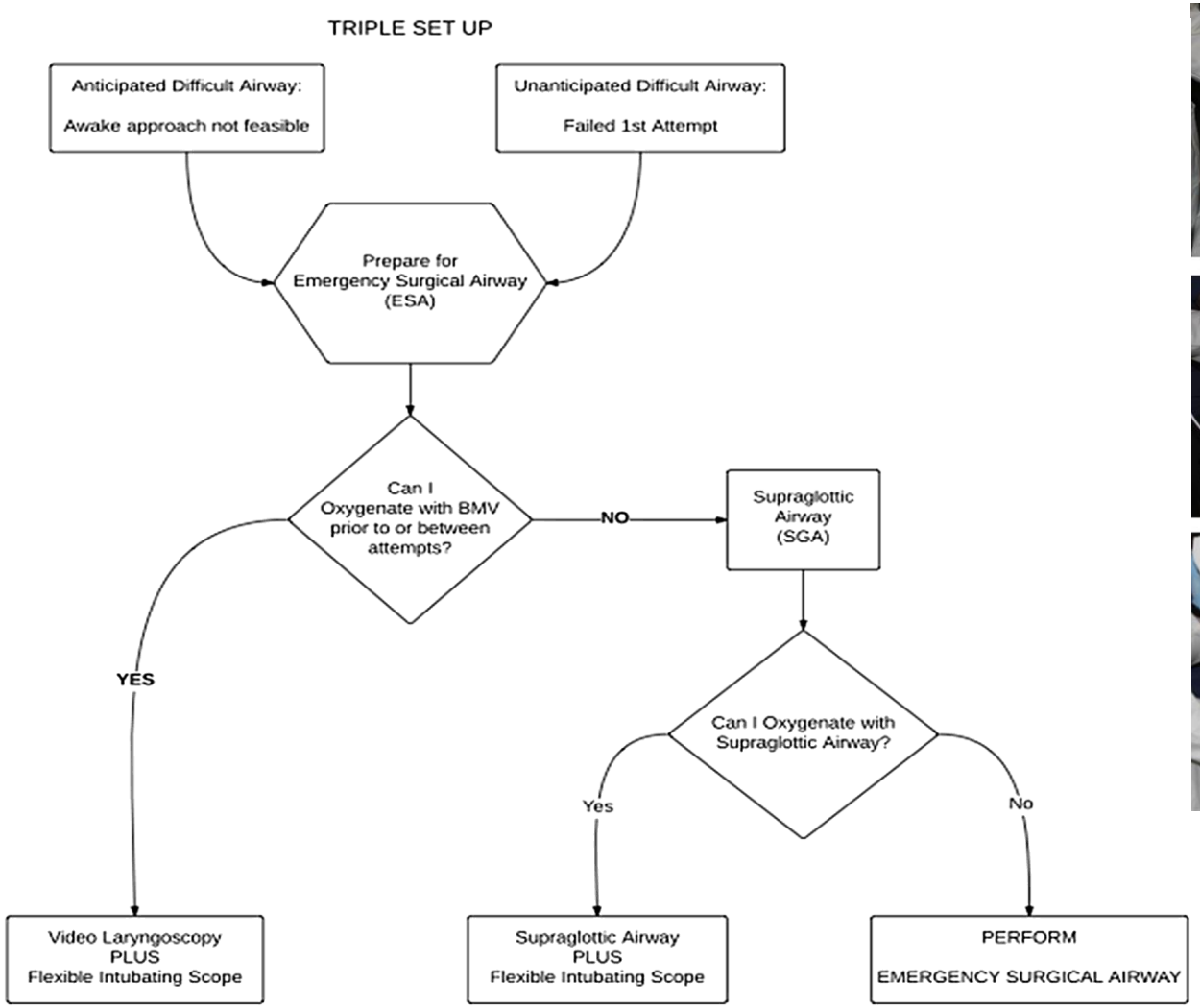
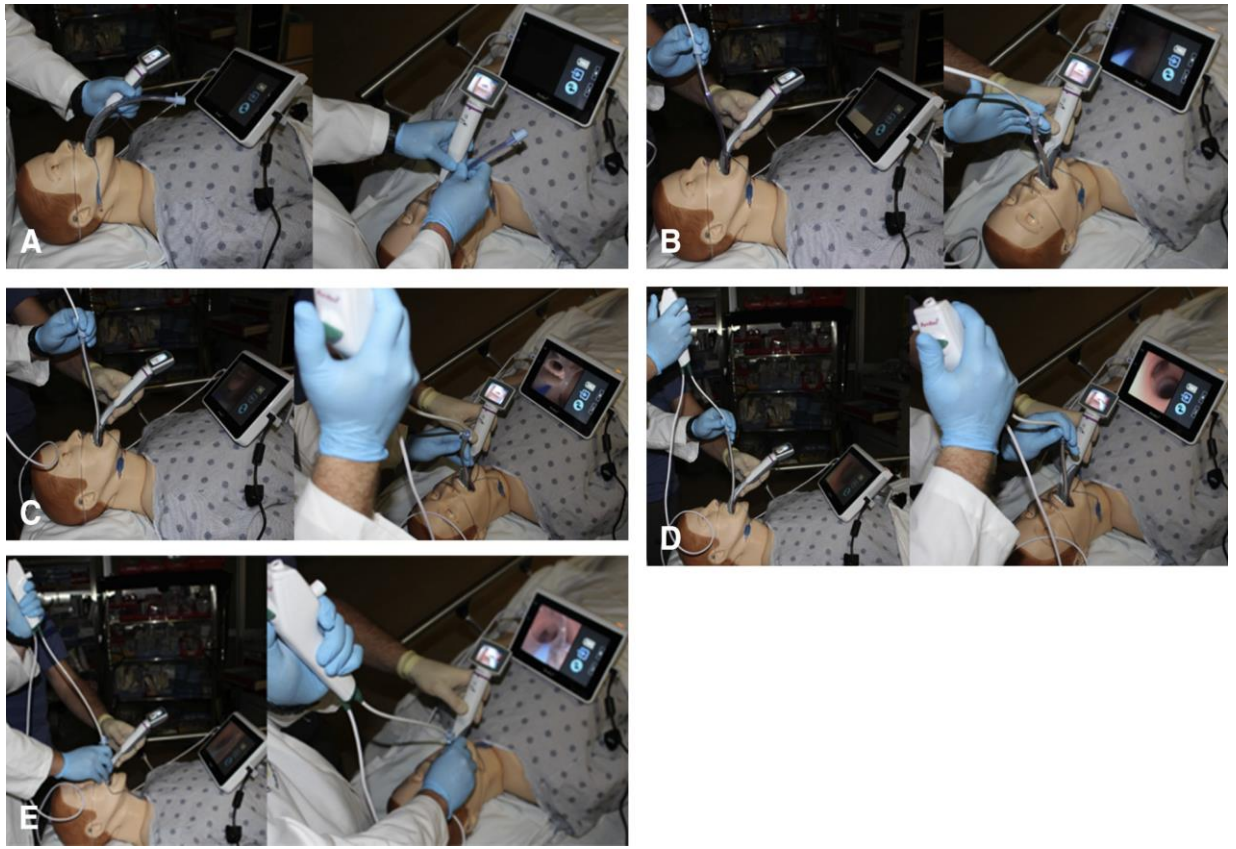


FIGURE 1: The patient is mechanically ventilated through a tracheal tube (TT) partially inserted in the airway tube of Aura-i and with the cuff inflated.

Pavoni V et al. Case Report in Anesthesiology 2015

USE OF A FLEXIBLE INTUBATING SCOPE IN COMBINATION WITH A CHANNELED VIDEO LARYNGOSCOPE FOR MANAGING A DIFFICULT AIRWAY IN THE EMERGENCY DEPARTMENT





Sowers M. Journal of Emergency Med 2015

Awake FOB for intubation

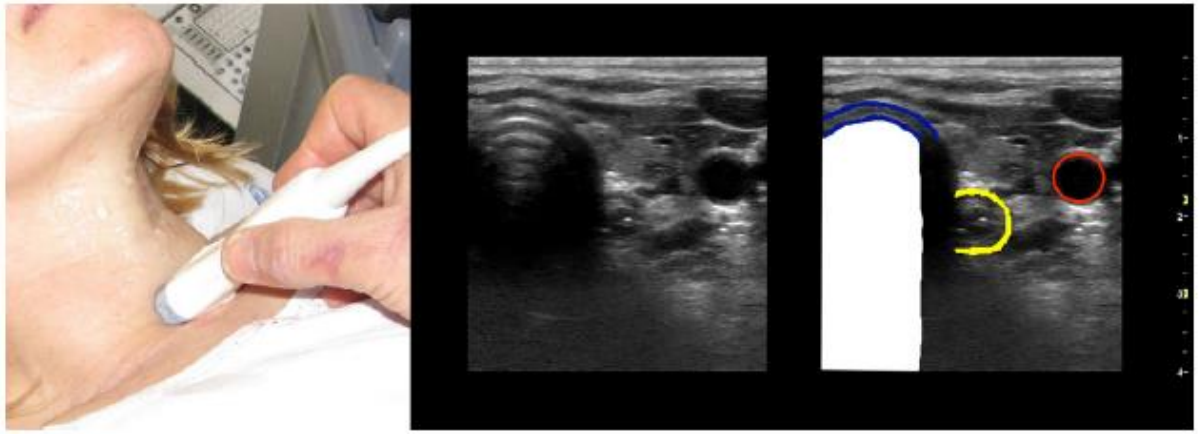
ULTRASONOGRAPHY FOR AIRWAY MANAGEMENT

Point-of-care ultrasound (POCUS) of the upper airway.

INDICAZIONI

Table Indications for airway ultrasound

Anatomical structure examined	Clinical indications
Cricothyroid membrane and trachea	Pre-anesthetic airway evaluation to be prepared for emergency front of neck airway access[6-8]
	For elective tracheostomy[9] and other kinds of access to the airway via the anterior neck[1]
Tracheal placement of endotracheal tube	Evaluation of the placement of a breathing tube, in trachea, main-stem bronchus or esophagus[10,11]
Trachea	Predicting the optimal size of endotracheal, double-lumen, and tracheostomy-tubes[12-14]
Vocal cords	Identification of vocal cord palsy and other pathology[15,16]



SELEZIONE DELLA SONDA

- SONDA LINEARE (5-14 MHz): consigliata per strutture vie aeree superficiali (0-5 cm di profondità)
- SONDA CONVEX (~4.0 MHz): visione sagittale e parasagittale della lingua e delle strutture in regione sottomandibolare e sovraglottica.

STRUTTURE VISUALIZZABILI

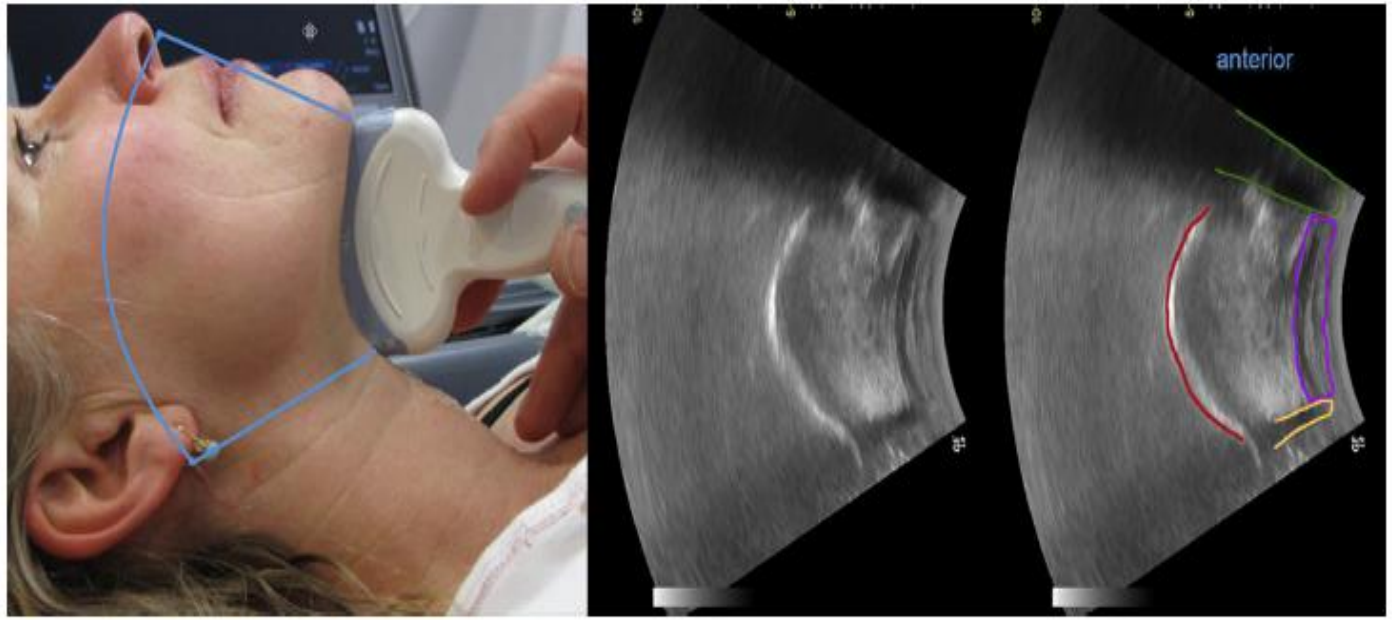
- LINGUA
- IPOFARINGE
- OSSO IOIDE
- EPIGLOTTIDE
- LARINGE
- TIROIDE E CARTILAGINE TIROIDEA
- CORDE VOCALI
- CRICOIDE E MEMBRANA CRICOTIROIDEA
- TRACHEA
- ESOFAGO
- BRONCHI PRINCIPALI

Can J Anesth 2018

Preoperative difficult airway prediction using suprahyoid and infrahyoid ultrasonography derived measurements in anesthesiology

La MACROGLOSSIA, fattore di rischio noto per vie aeree difficili, non risulta ben valutabile alla laringoscopia diretta.

SONDA CONVEX, BASSA FREQUENZA 5-2 mhZ.
VERDE: Mandibola
VIOLA: Muscoli del pavimento della cavità orale
ARANCIONE: Osso Ioide
ROSSO: Superficie dorsale della lingua.



FATTORE DI RISCHIO PER IOT DIFFICILE:
- ❑ VOLUME LINGUA > 100 cm3

Med Ultrason 2019

CRICOTIROIDOTOMIA:

LOCALIZZAZIONE DELLA MEMBRANA CRICOTIROIDEA:

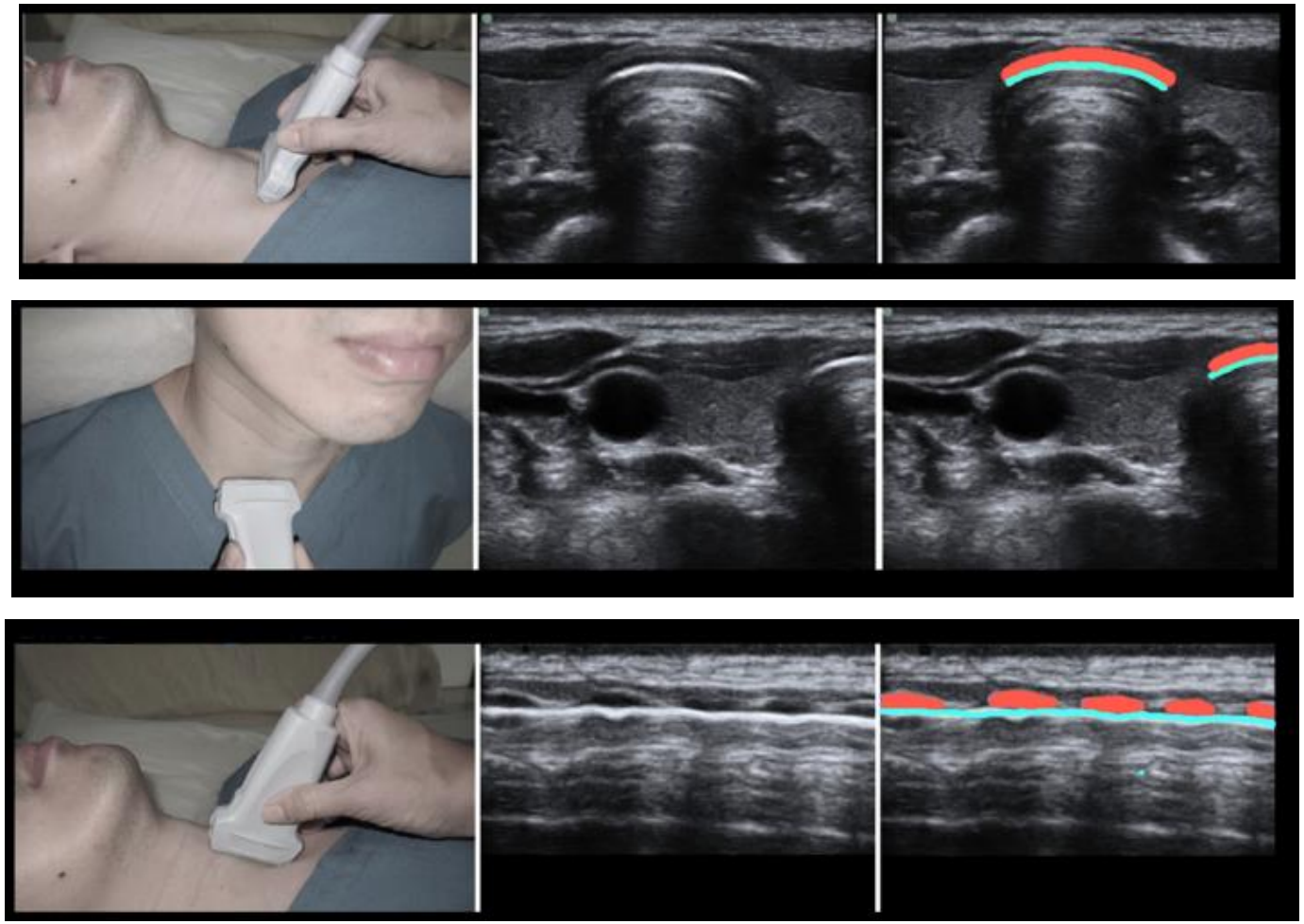
SOP (STRING OF PEARLS) TECHNIQUE.

The inability to identify the cricothyroid membrane by external visualization or palpation is an important contributor to this low success rate and misplacement is the most common complication when attempting cricothyrotomy..

1. VISUALIZZARE LA TRACHEA: posizionare la SONDA LINEARE trasversalmente al giugulo, subito al di sopra dello sterno.

2. Far scivolare la sonda verso la dx del pz (verso l'operatore) così che il margine dx della sonda sia posizionato al centro della trachea e l'immagine dell' anello tracheale sia diviso a metà.

3. VISUALIZZARE GLI ANELLI TRACHEALI (String of Pearls): far ruotare la sonda di 90° in senso orario così da ottenere una scansione longitudinale della linea mediana della trachea. Gli anelli tracheali appariranno come strutture ipoecogene al di sopra di una linea bianca iperceogena (interfaccia aria tessuto)



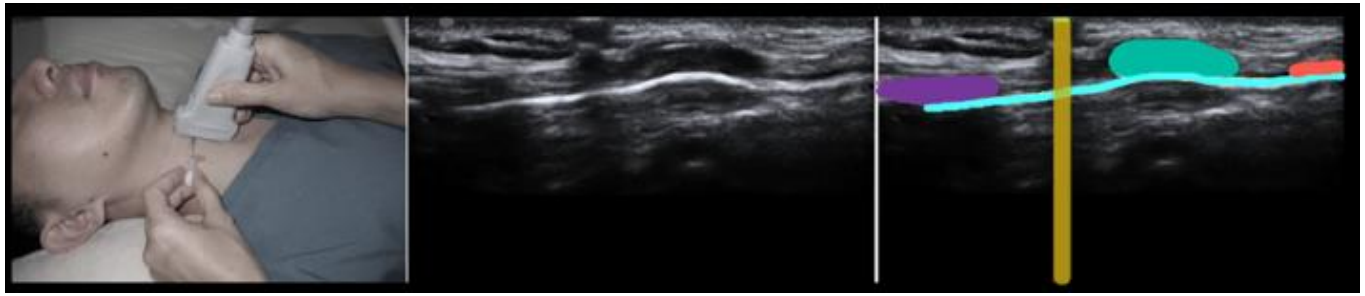
Point-of-care ultrasound (POCUS) of the upper airway, Can J Anesth 2018

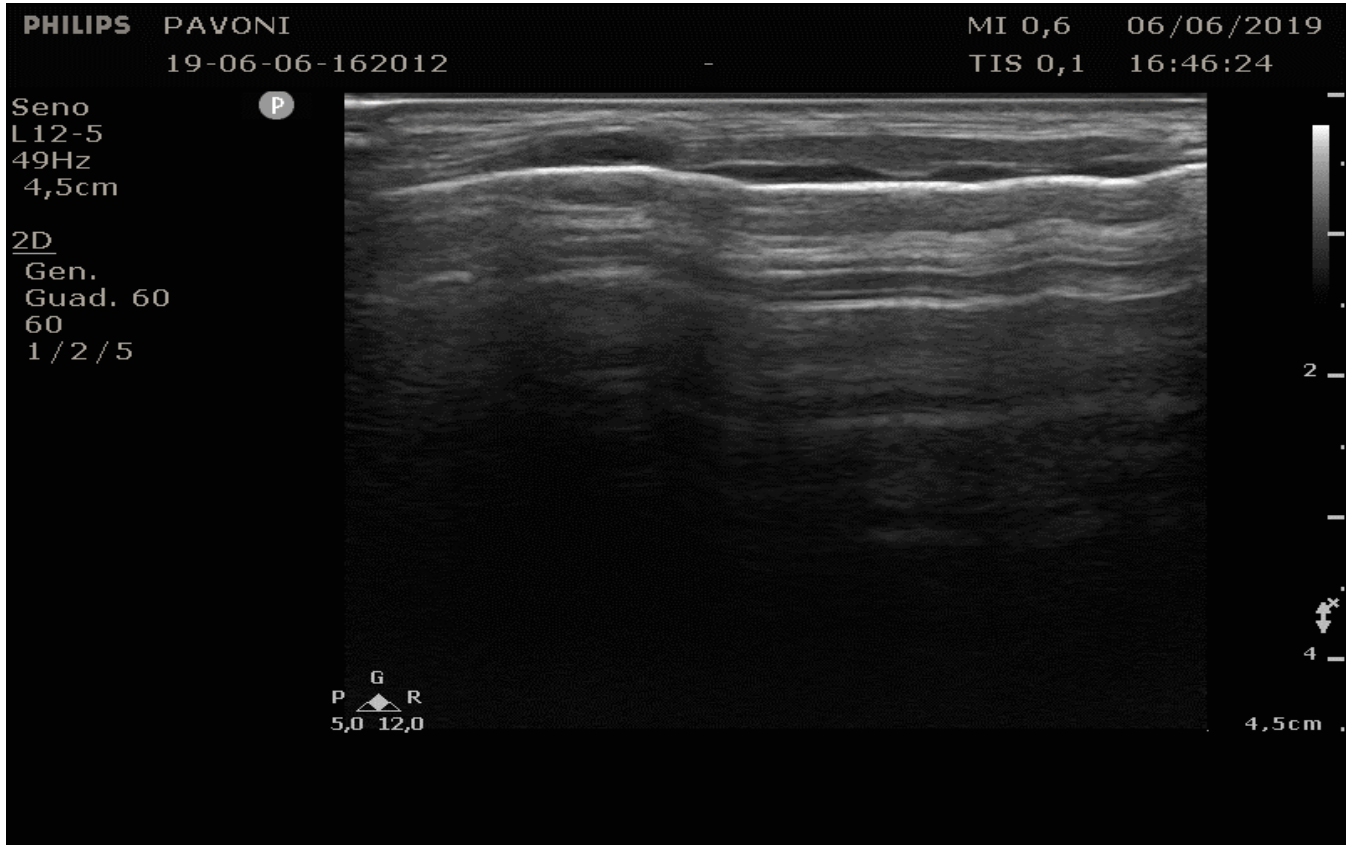
LOCALIZZAZIONE DELLA MEMBRANA CRICOTIROIDEA: SOP (STRING OF PEARLS) TECHNIQUE.

4. VISUALIZZARE LA CARTILAGINE CRICOIDEA: mantenendo la sonda longitudinale lungo la linea mediana della trachea, farla scorrere cranialmente fino a raggiungere la cartilagine cricoidea. (immagine ipoecogena più larga, allungata e anteriore rispetto agli anelli tracheali). Al di sopra di essa apparirà il margine inf. della cartilagine tiroidea.

5. INDUVIDUARE LA CARTILAGINE CRICOTIROIDEA: con un ago individuare lo spazio cricotiroideo e marcare il punto con un segno sulla cute

ROSSO: Anelli Tracheali
AZZURRO: Bordo aria-tessuto
VERDE: Cricoide
VIOLA: Porzione distale della cartilagine tiroidea
GIALLO: l' ombra della' ago tra la sonda e la cute



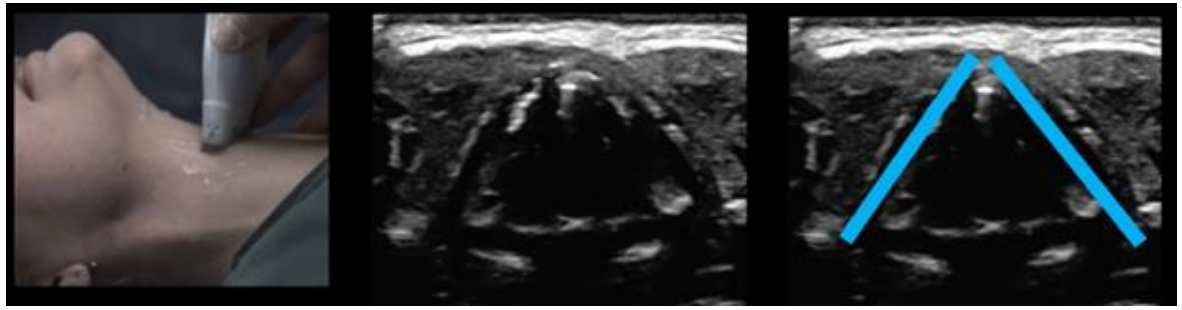


Point-of-care ultrasound (POCUS) of the upper airway, Can J Anesth 2018

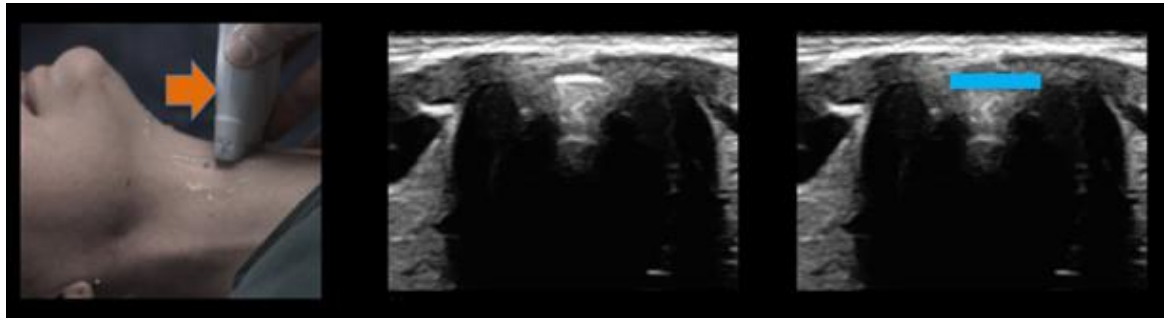
CRICOTIROIDOTOMIA:

LOCALIZZAZIONE DELLA MEMBRANA CRICOTIROIDEA: TACA technique. (Thyroid cartilage, Airline, Cricoid cartilage, Airline)

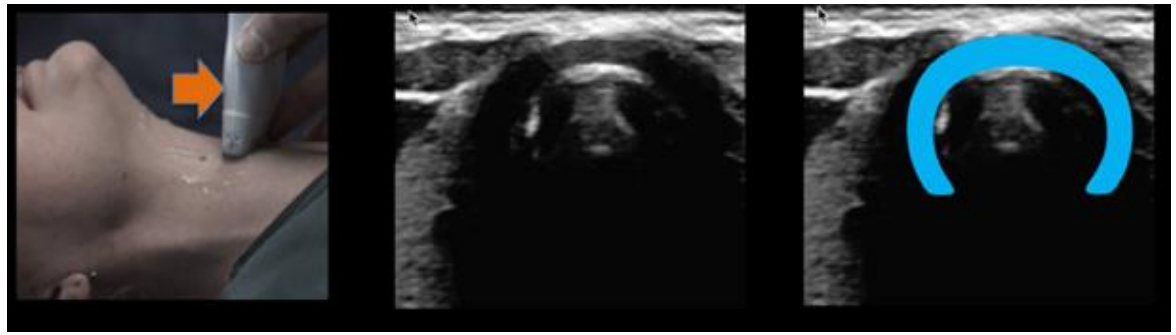
1. VISUALIZZARE LA CARTILAGINE TIROIDEA: posizionare la SONDA LINEARE trasversalmente al di sopra della cartilagine tioridea (struttura triangolare iperecogena).



2. VISUALIZZARE LA MEMBRANA CRICOTIROIDEA: far scivolare la sonda caudalmente fino a alla membrana cricotiroidea (linea bianca iperecogena)



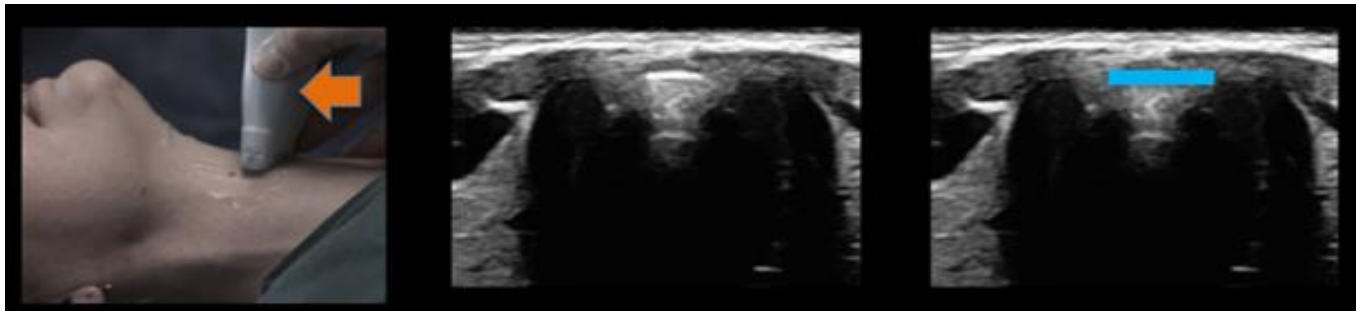
3. VISUALIZZARE LA CARTILAGINE CRICOTIROIDEA: far scivolare la sonda ancora più caudalmente fino a visualizzare la cartilagine cricoidea (immagine a C nera circondata da un bordo bianco interno).



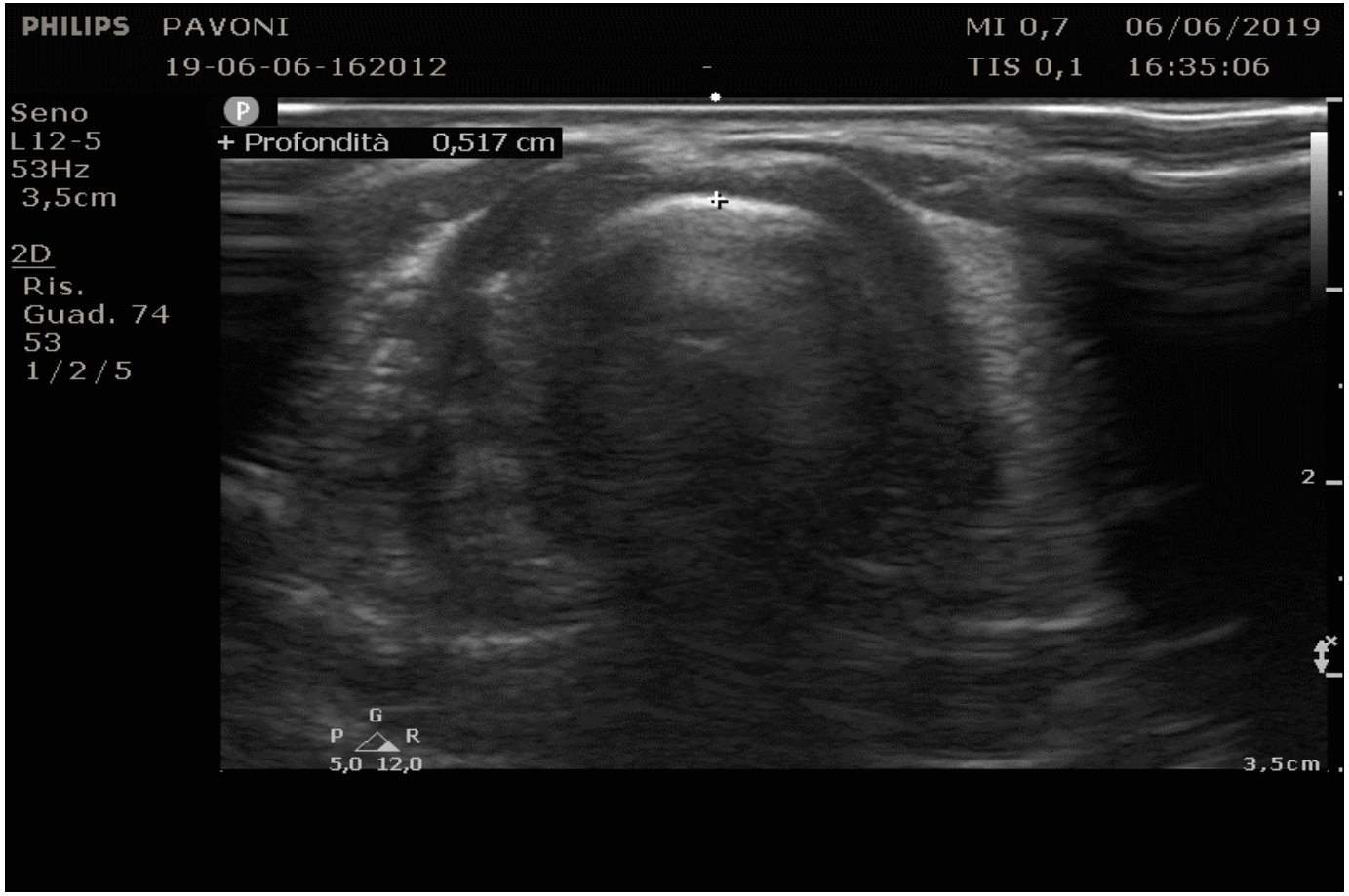
CRICOTIROIDOTOMIA:

LOCALIZZAZIONE DELLA MEMBRANA CRICOTIROIDEA: TACA technique. (Thyroid cartilage, Airline, Cricoid cartilage, Airline)

4. MARCARE LA MEMBRANA CRICOTIROIDEA: muovere leggermente in senso craniale la sonda per visualizzare la membrana cricotiroidea e marcare il punto con un segno sulla cute



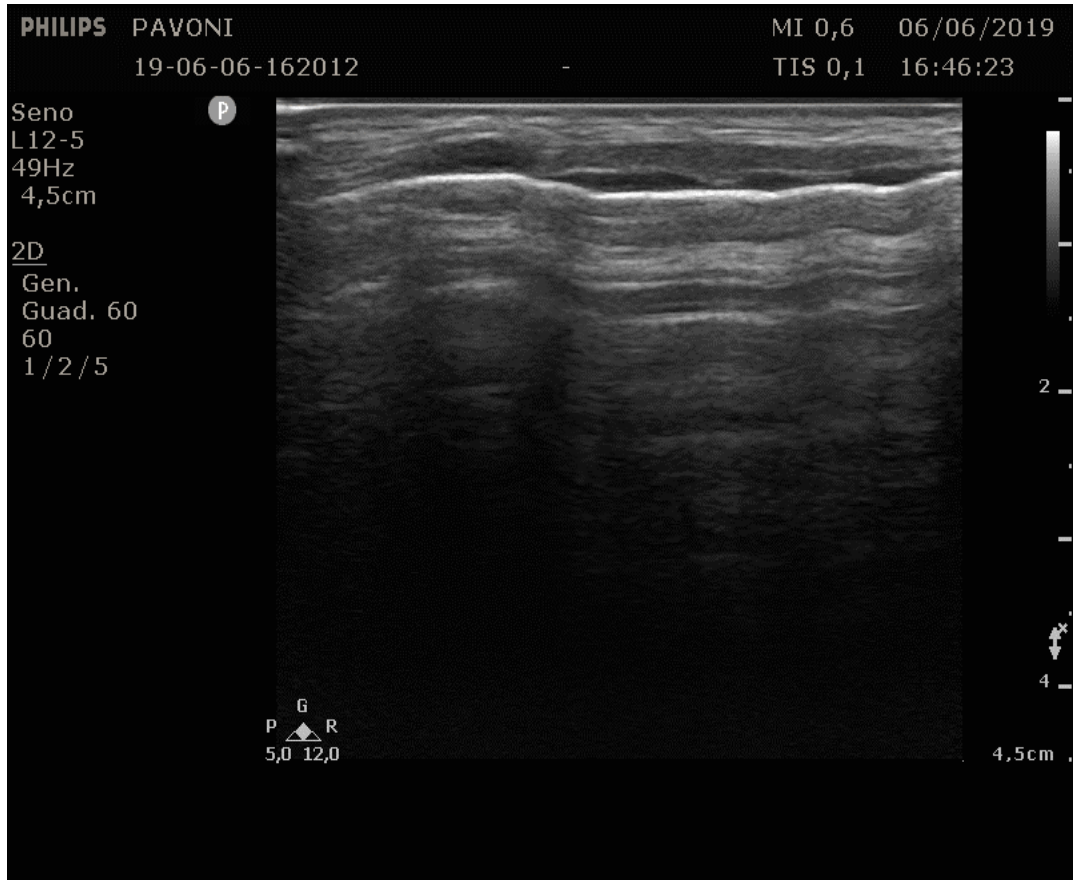
5. MISURAZIONE PROFONDITÀ



TRACHEOTOMIA:

L’utilizzo degli US può aiutare nell’ individuare:

- ❑ Lo spazio tra gli anelli tracheali
- ❑ La profondità del lume tracheale
- ❑ La presenza di eventuali vasi.



SONDA LINEARE POSTA SAGITTALMENTE SULLA LINEA MEDIANA:

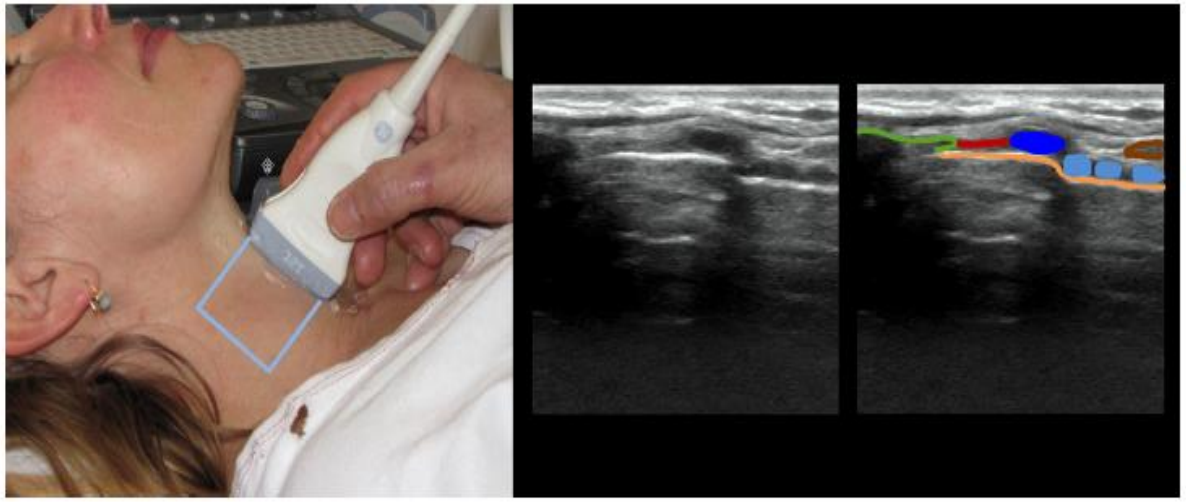
AZZURRO: Anelli tracheali

BLU: Cartilagine Cricoide

ROSSO: Membrana Cricotiroidea

VERDE: Cartilagine Tiroidea

ARANCIONE: Bordo aria/tessuto



Point-of-care ultrasound (POCUS) of the upper airway, Can J Anesth 2018

ULTRASONOGRAPHY FOR AIRWAY MANAGEMENT…FATTORI DI RISCHIO PER VIE AEREE DIFFICILI

FATTORI DI RISCHIO:

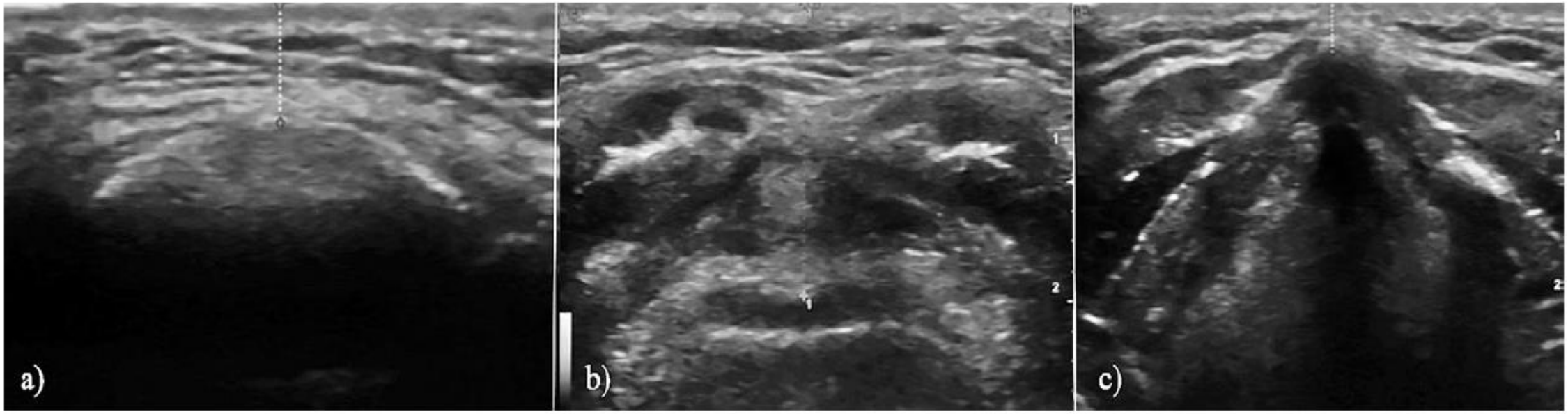
- ❑ Spessore e volume lingua
- ❑ Distanza iomentale e rapporto iomentale
- ❑ ANS (anterior neck soft tissue thickness)

Lo spessore dei tessuti molli pretracheali è da considerarsi un buon predittore di laringoscopia difficile.
Con la testa del pz posta in posizione neutra, l' ANS deve essere misurato a 3 diversi livelli anatomici.

❑ Osso ioide

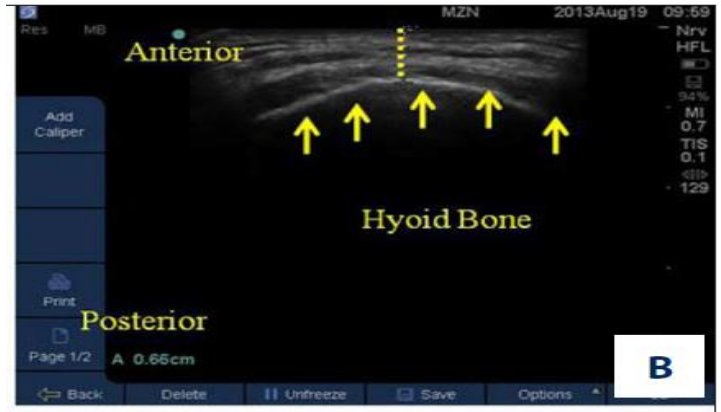
❑ Epiglottide (pre-glottica)

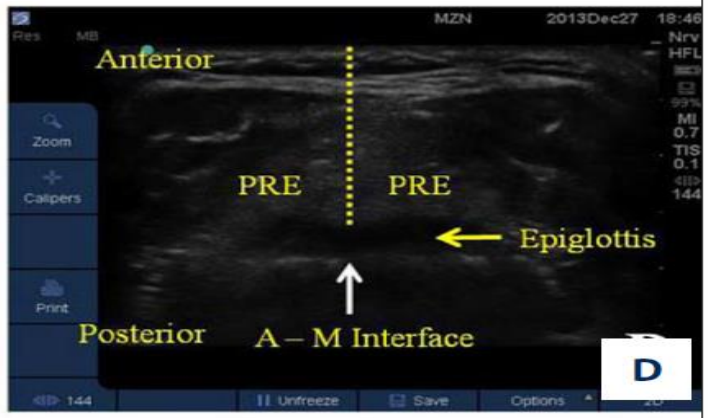
❑ Commissura ant. Corde vocali

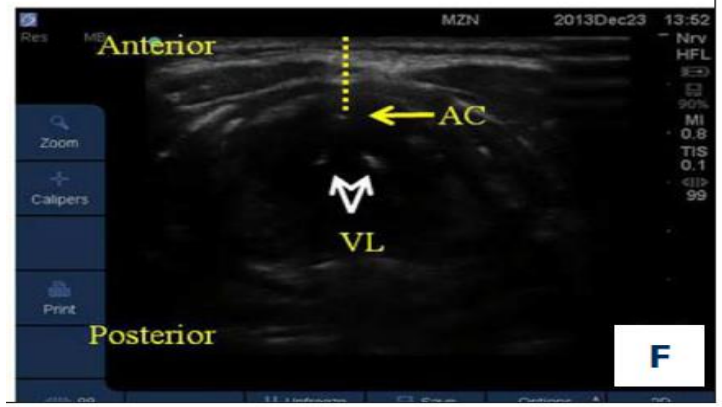


Preoperative difficult airway prediction using suprahyoid and infrahyoid ultrasonography derived measurements in anesthesiology. Med Ultrason 2019

ULTRASONOGRAPHY FOR AIRWAY MANAGEMENT…FATTORI DI RISCHIO PER VIE AEREE DIFFICILI







- ❑ Spessore e volume lingua
- ❑ Distanza iomentale e rapporto iomentale
- ❑ ANS (anterior neck soft tissue thickness)

Lo spessore dei tessuti molli pretracheali è da considerarsi buon predittore di laringoscopia difficile.
Con la testa del pz posta in posizione neutra, l' ANS deve essere misurato a 3 diversi livelli anatomici.

FATTORI DI RISCHIO:
- ❑ Distanza cute-osso ioide ≥ 1,51 cm
- ❑ Distanza cute-epiglottide ≥ 2,39 cm
- ❑ Distanza cute-commissura ant. ≥ 1,30 cm

Preoperative difficult airway prediction using suprahyoid and infrahyoid ultrasonography derived measurements in anesthesiology. Med Ultrason 2019

Cosa è cambiato?

- **Drugs**
- **Equipments**
- **Guide Lines**

Drugs

- **Midazolam/Flumazenil**
- **Fentanyl/Naloxone**
- **Ketamina**
- **Dexmedetomidina (2018)**
- **Rocuronio/Sugammadex**

Most of 118 still use benzylisoquinolones as first choice in neuro-muscolar block!

Sicurezza della gestione farmaci in Sala Operatoria, Terapia Intensiva, Terapia del Dolore e Emergenza

Autori SIAARTI:
M. Astuto, Università degli Studi di Catania
L. Brazzi, Università degli Studi di Torino
A. Corcione, Azienda Ospedaliera dei Colli, Napoli
A. De Monte, Azienda Ospedaliero Universitaria S.Maria Misericordia, Udine
E. De Robertis, Università degli Studi di Perugia
F. Petrini, Università degli Studi G. D'Annunzio Chieti-Pescara
M. Rossi, Università Cattolica del Sacro Cuore Roma
S. Taddei, AUSL Bologna - Bentivoglio

Autori SIFO:
A. D'Arpino, A.O.U. Perugia
M. Galdo, UOC Farmacia Presidio "V. Monaldi" - Napoli - AORN dei Colli
B. Rebesco, Azienda Sanitaria Ligure A.Li.Sa
S. Serao Creazzola, UOC Farmaceutica del Territorio ASL NA 1 Centro

SOCIETA' ITALIANA DI FARMACIA OSPEDALIERA E DEI SERVIZI FARMACEUTICI DELLE AZIENDE SANITARIE

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Versione
Sicurezza della gestione farmaci in sala operatoria, terapia intensiva, terapia del dolore ed emergenza - versione 02
Pubblicato il 28.02.2019

ELSEVIER

SFAR
Société Française d'Anesthésie et de Réanimation

Anaesthesia Critical Care & Pain Medicine

Original Article

Ready-to-use pre-filled syringes of atropine for anaesthesia care in French hospitals – a budget impact analysis

CrossMark

thesia. However, pre-filled syringes may eliminate dilution error and lead to cost savings due to the elimination of waste [1].

Anaesthesia 2012, 67, 294–308

Cosa è cambiato?

- **Drugs**
- **Equipments**
- **Guide Lines**
- **Expertize**

Anaesthesia 2014 doi:10.1111/anae.12878

Original Article

Defining and developing expertise in tracheal intubation using a GlideScope® for anaesthetists with expertise in Macintosh direct laryngoscopy: an in-vivo longitudinal study

P. Cortellazzi,[1] D. Caldiroli,[1,2] A. Byrne,[3] A. Sommariva,[1] E. F. Orena[4] and I. Tramacere[5]

1 Consultant Anaesthetist, 2 Director, 4 Consultant Psychologist, Department of
5 Consultant Statistician, Department of Neuroepidemiology, Fondazione Istitut
Milan, Italy
3 Professor, Institute of Medical Education, School of Medicine, Cardiff Universi

Achieving skill and expertise is necessary for the prudent and safe use of any device

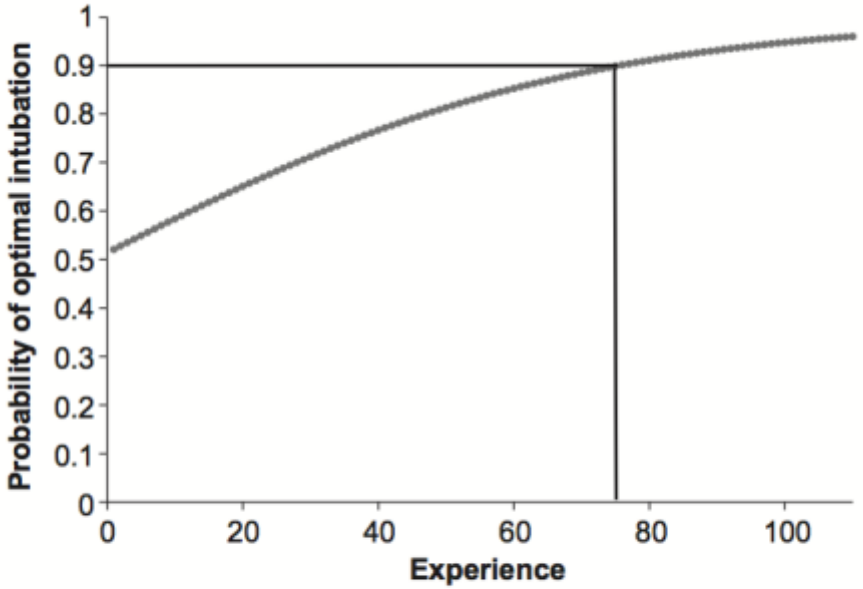


Figure 1 The probability of optimal intubation predicted by mixed-effects logistic regression model.

Livelli di Competenza

- **Medici specialisti in anestesia che operino stabilmente nell'AF 118 o nell'AF Pronto Soccorso**
- **Medici specialisti in Emergenza Urgenza che operino nei setting intra e/o Extra ospedalieri del Dipartimento EU**
- **Medici convenzionati o Dipendenti con o senza specialità equipollente alla MEU, che operino nei setting preH o H del DEU.**
- **Infermieri che operano principalmente nel setting pre ospedaliero (Automedica, HEMS, Ambulanza infermierizzata).**
- **Infermieri che operano principalmente nel setting ospedaliero del DEU (PS, OBI, medicina d'urgenza).**

Currency

Tipo di professionista	Formazione di Base (a cura DEA)	Mantenimento minimo annuale	Mantenimento avanzato annuale	Note
Medici specialisti in anestesia che operino stabilmente nell'AF 118 o Pronto Soccorso	Non necessaria, ma comunque auspicabile in base al percorso professionale del medico	10 IOT e 5 posizionamenti di PEG di seconda generazione. Almeno un caso simulato di Difficoltà	15 IOT (di cui almeno 5 farmaco assistiti) e 5 posizionamenti di PEG. Almeno un caso simulato di uso presidi avanzati (video laringo, Bugie etc)	
Medici specialisti in Emergenza Urgenza che operino nei setting intra e/o Extra ospedalieri	Non necessaria, ma comunque fortemente auspicabile in base al percorso professionale del medico	12 IOT e 6 posizionamenti di PEG di seconda generazione. Almeno un caso simulato di Difficoltà	18 IOT (di cui almeno 5 farmaco assistiti) e 8 posizionamenti di PEG. Almeno un caso simulato di uso presidi avanzati (video laringo, Bugie etc)	Sarà cura del Medico di EU, all'atto dell'arrivo al DEU, autocertificare l'avvenuta formazione di base in scuola di specialità, sulla gestione delle VA, includente una rotazione in Sala Op.

Currency

Tipo di professionista	Formazione di Base (a cura DEA)	Mantenimento minimo annuale	Mantenimento avanzato annuale	Note
Medici convenzionati o Dipendenti con o senza specialità equipollente alla MEU, che operino nei setting preH o H del DEU	Corso Gestione VA in emergenza compreso nel piano formazione del DEU (eventuale refresh ogni 5 anni)	20 IOT e 10 posizionamenti di PEG di seconda generazione. Almeno un caso simulato di Difficoltà	25 IOT (di cui almeno 5 farmaco assistiti) e 15 posizionamenti di PEG. Almeno un caso simulato di uso presidi avanzati (videolaringo, Bugie etc)	
Infermieri che operano principalmente nel setting pre ospedaliero (Automedica, HEMS, Ambulanza infermierizzata).	Corso Gestione VA in emergenza compreso nel piano formazione del DEU (eventuale refresh ogni 5 anni)	20 IOT e 10 posizionamenti di PEG di seconda generazione. Almeno un caso simulato di Difficoltà	25 IOT (di cui almeno 5 farmaco assistiti) e 15 posizionamenti di PEG.	L'impiego dei farmaci per IOT da parte del personale infermieristico verrà disciplinato da apposita disposizione aziendale
Infermieri che operano principalmente nel setting ospedaliero del DEU (PS, OBI, medicina d'urgenza)	Corso Gestione VA in emergenza compreso nel piano formazione del DEU (eventuale refresh ogni 5 anni)	5 IOT e 15 posizionamenti di PEG di seconda generazione	30 IOT (di cui almeno 5 farmaco assistiti) e 25 posizionamenti di PEG	Di norma la gestione delle vie aeree da parte di un infermiere che lavora in setting intra osp senza supervisione medica non è previsto, per cui i livelli di addestramento imposti sono minori

Piano di formazione annuale del DEU

- **Appositi periodi di rotazione in Sala Operatoria con tutor anestesista appositamente formato**
- **Sessioni di simulazione ad alta fedeltà in situ e non,**
- **Le rotazioni in sala operatoria, di norma, avverranno solo nei presidi provinciali di Arezzo e Grosseto (o eventualmente, previa appositi accordi, presso il Policlinico dell'AOUS.**
- **Il Direttore dell'Area anestesia e rianimazione del DEU, provvede annualmente ad individuare i Tutor per tale attività di rotazione ed i presidi ospedalieri in cui essa può essere svolta.**

Mantenimento della Currency

Livelli di *Currency*

- **Livello minimo consente al personale di tentare l'IOT senza farmaci o con il ricorso a Midazolam, Fentanil e/o Ketamina.**
- **Livello ottimale, il personale è autorizzato all'uso di ogni farmaco ed anche dei presidi complessi per la gestione delle difficoltà.**

Piano B

- **Presidio extraglottico di seconda generazione idoneo all'uso in emergenza (ML di 2° generazione);**
- **Facilitatori: l'Introduttore di Frova (mandrino cavo) o Bugie;**
- **il Videolaringoscopio.**

Indicazione	Condizioni Cliniche	Note	Strategia Farmacologica Raccomand.	Sanitari raccom
Compromissione delle vie aeree immediata	Corpo Estraneo Liquido o Fluido, Laringospasmo, Anafilassi	Elevato rischio di difficoltà Tecnica, indicazione stringente, difficoltà di applicare Piano B	c) Strategia per pazienti con anticipata difficoltà	1
Compromissione delle vie aeree in progressione	Frattura laringea / tracheale, edema progressivo delle prime vie, ustione /inalazione di fumi, Sanguinamento prime vie	Valutare bene logistica intervento / possibilità di aiuto esperto, difficoltà di applicare il Piano B	c) Strategia per pazienti con anticipata difficoltà	2
Insufficienza Respiratoria	Pnx, Contusione Polmonare, EPA, BPCO riacutizzata, Bradipnea grave	Valutare indicazione a decompressione toracica (prima o immed dopo IOT), Possibile indicazione a CPAP. Valutare storia clinica BPCO	A) Valutazione B) Verifica Fattibilità C) Attenta preparazione D) Strategia 3:2:1	1

Altri strumenti di sicurezza

- **Check list pre-induzione**
- **Standardizzazione dotazione farmaci e presidi**
- **Tabella diluizioni standard dei farmaci (possibilmente 1:1) ed introduzione dei farmaci pre-diluiti pronti all'uso**
- **Uso dei curari solo se disponibile antidoto (Rocuronio/Sugammadex)**

Revisione Procedura Vie Aeree DEU: Criticità ed *Open Items*

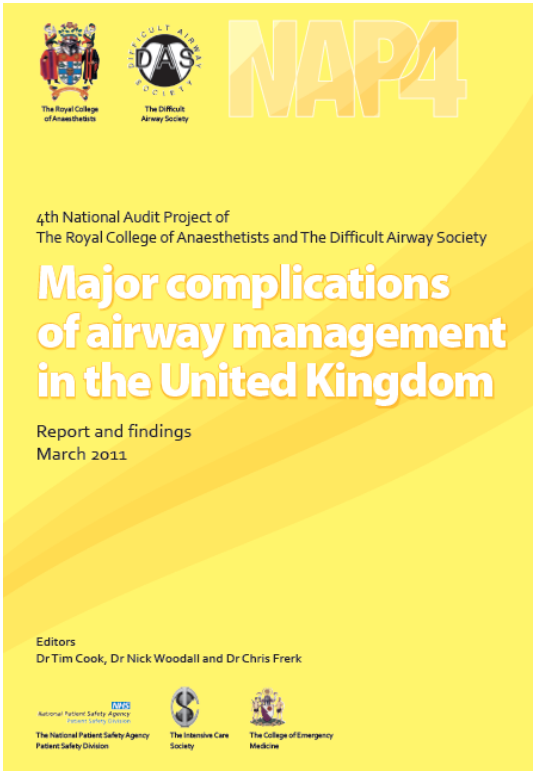
Massimo Mandò
Marco Feri
Raffaella Pavani
Alessandra Roggi
Giovanni Sbrana
DEU ASL Sud Est

Arezzo 30 ottobre 2017

Attuali criticità

- **Materiali utilizzati: introduzione delle ML di sec. gen.**
- **Farmaci utilizzati durante le manovre di gestione delle VA**
- **Formazione ed aggiornamento alla gestione delle VA del personale sanitario impegnato nel soccorso pre-ospedaliero**
- **Valutazione degli standard qualitativi degli interventi effettuati**

Risultati attesi



- **Miglioramento dell'outcome**
- **Adeguamento agli standard internazionali**
- **Continuità di soccorso con A.R. ospedaliero**

Airway management