UNIVERSITY HOSPITAL BRNO
FACULTY OF MEDICINE
MASARYK UNIVERSITY

DEPARTMENT OF PAEDIATRIC
ANAESTHESIOLOGY
AND INTENSIVE CARE MEDICINE

Perioperační zajištění dýchacích cest up-to date

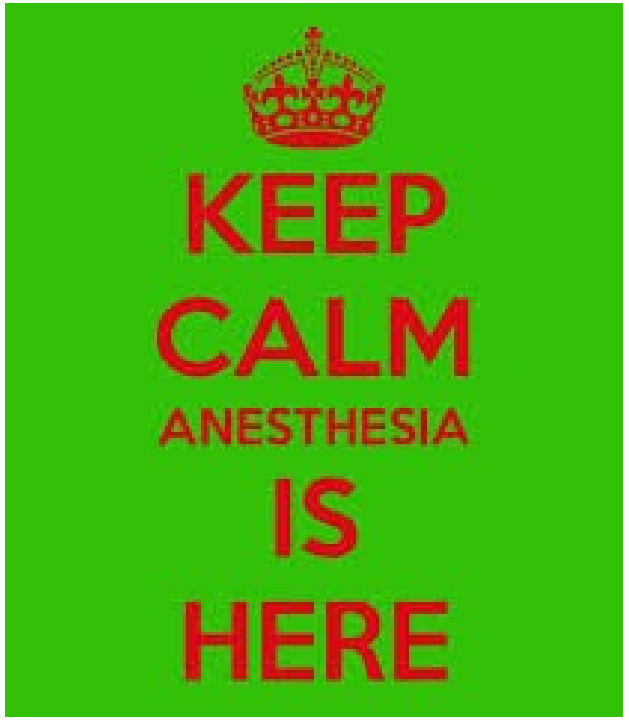
MUDr. Jozef Klučka, Ph.D.

FAKULTNÍ NEMOCNICE BRNO

MUNI MED

Obsah

- Základní principy zajištění dýchacích cest
- Anatomie dýchacích cest
  - Specifika dětských pacientů
  - Anatomie dýchacích cest – poloha hlavy
- Možnosti zajištění DC
  - Supraglotické pomůcky – laryngeální maska
  - Tracheální intubace
    - Balonkové vs. bezbalonkové tracheální kanyly u pediatrických pacientů
- Specifické situace
  - Bleskový úvod do anestezie
  - Obtížné zajištění dýchacích cest
  - COVID 19 – SARS-COV2
  - Reziduální neuromuskulární blokáda
- Závěr



https://www.keepcalmandposters.com/poster/2189561_keep_calm_and_anesthesia_technician_is_here

Zajištění dýchacích cest

Zajištění průchodnosti dýchacích cest

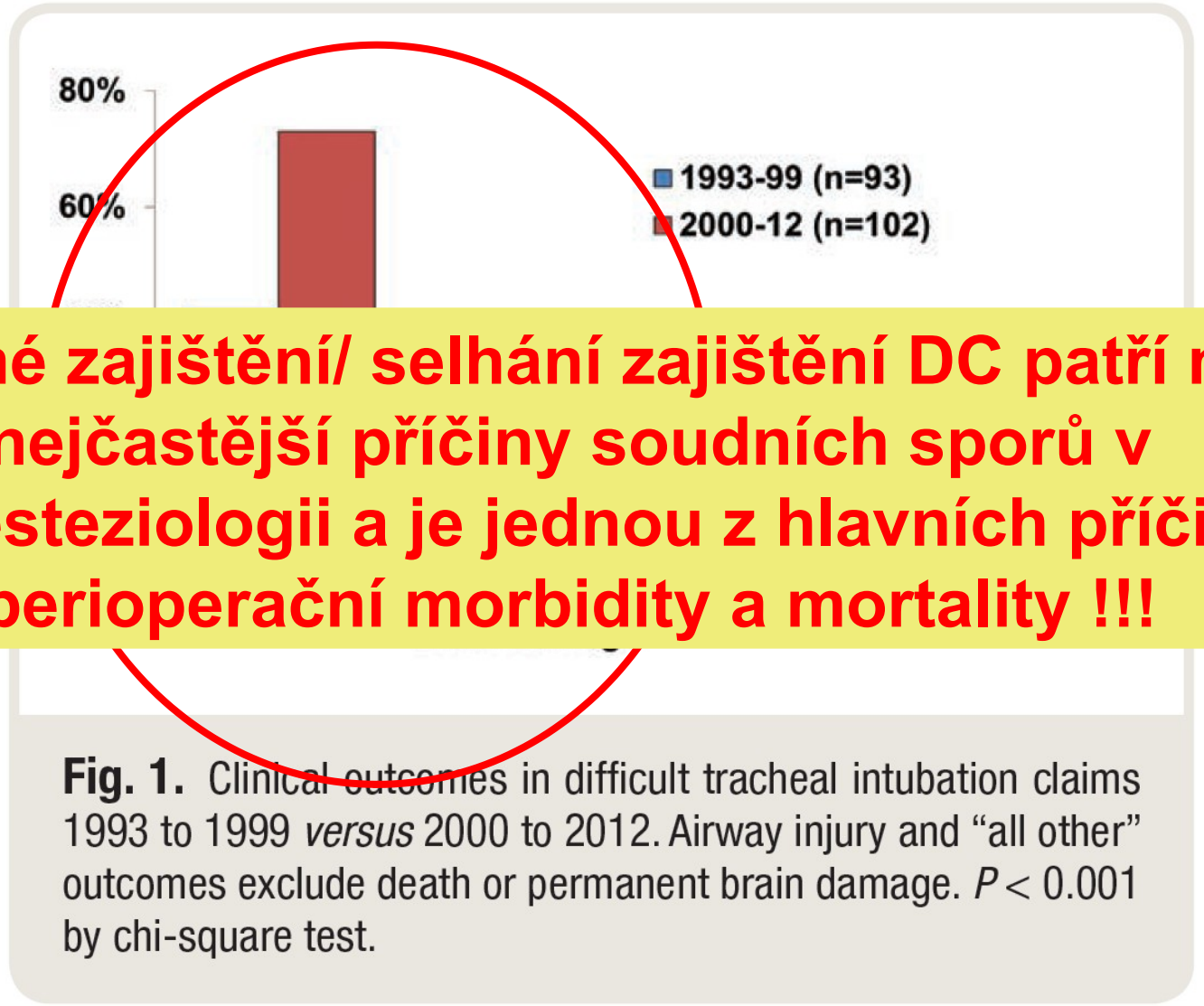
+

efektivní **ventilace/oxygenace**

=

základní cíl perioperační péče

Je to tak jednoduché?



Obtížné zajištění/ selhání zajištění DC patří mezi nejčastější příčiny soudních sporů v anesteziologii a je jednou z hlavních příčin perioperační morbidity a mortality !!!

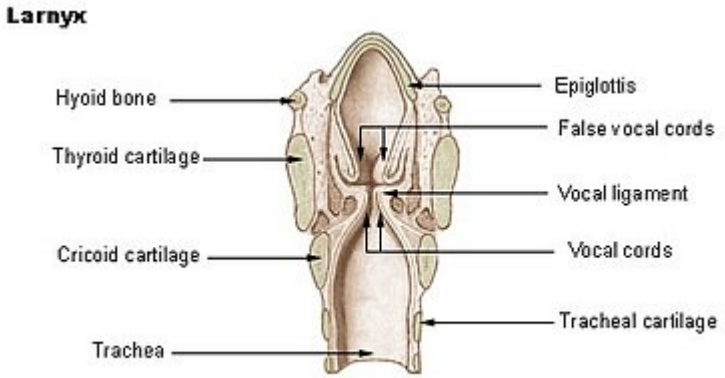
Fig. 1. Clinical outcomes in difficult tracheal intubation claims 1993 to 1999 *versus* 2000 to 2012. Airway injury and "all other" outcomes exclude death or permanent brain damage. $P < 0.001$ by chi-square test.

Základní principy zajištění DC

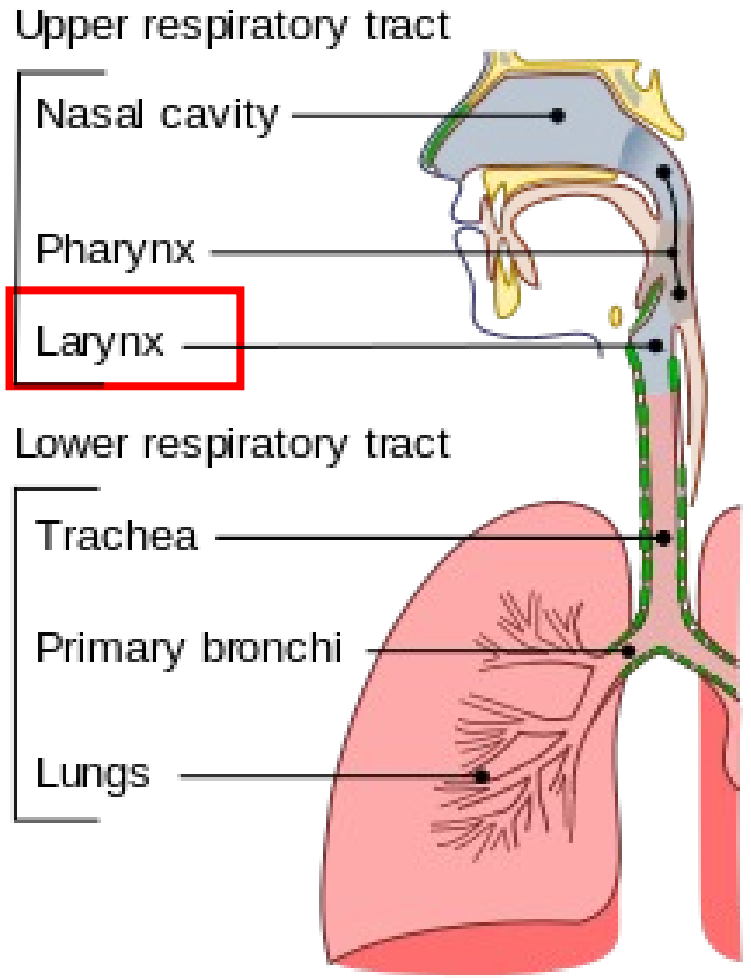
- Základní dovednosti anesteziologa, lékaře na JIP, urgentním příjmu, v přednemocniční péči
- Ochrana DC + možnost ventilace/oxygenace
- Zvolit co nejvíce bezpečnou a nejméně invazivní metodu zajištění = **individuální přístup** !!!
- **Cílem je vždy oxygenace !!!**

Anatomie dýchacích cest

Supraglotické zajištění DC



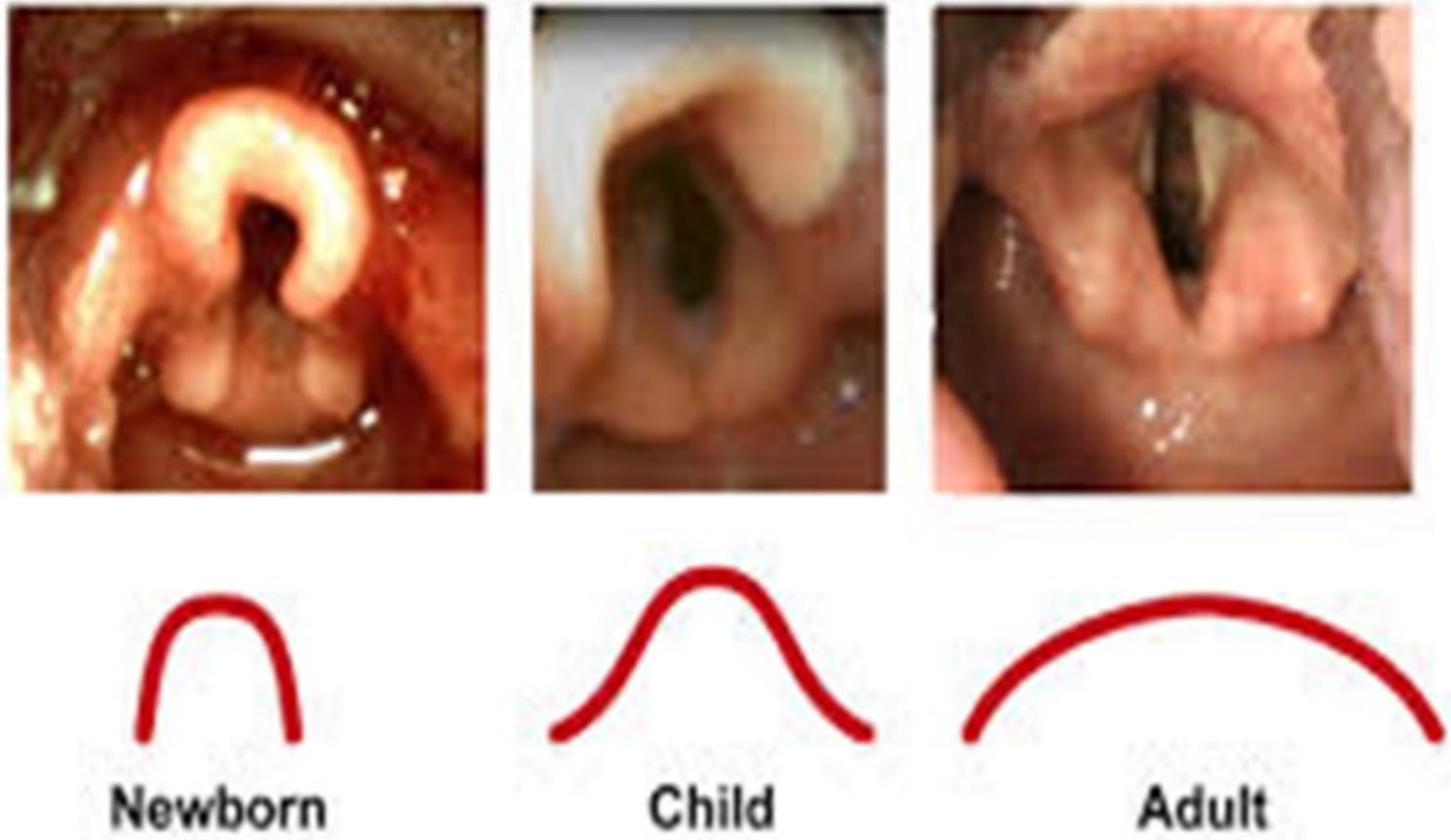
Infraglotické zajištění DC



https://en.wikipedia.org/wiki/Respiratory_tract

Specifika dětských pacientů

- Promir
- Dlouha
- Větší p
- Subglo
- Vyšší s
- Menší



https://www.futurelearn.com/courses/airway-matters/0/steps/68695

Review

Contr

Jozef Klučka,[1] Petr Štourač,[1] Roman Štoudek,[1] Michaela Ťoukálková,[1] Hana Harazim,[2] and Martina Kosinová[2]

Hindawi Publishing Corporation
BioMed Research International
Volume 2015, Article ID 368761, 11 pages
http://dx.doi.org/10.1155/2015/368761

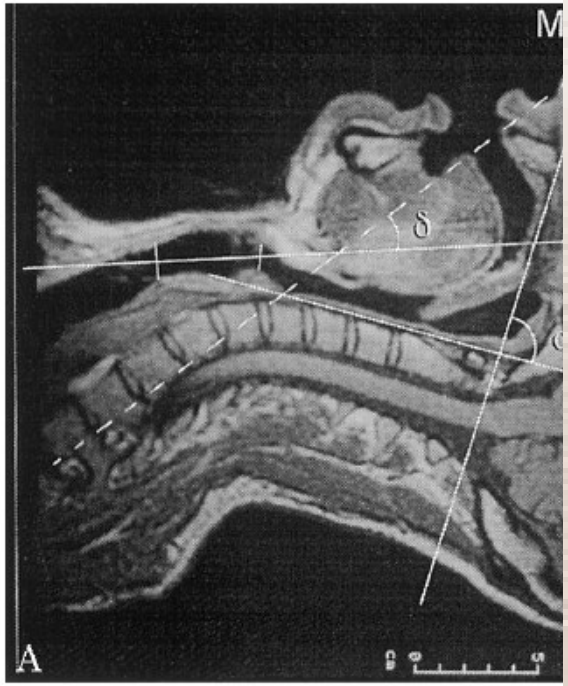
Poloha hlavy

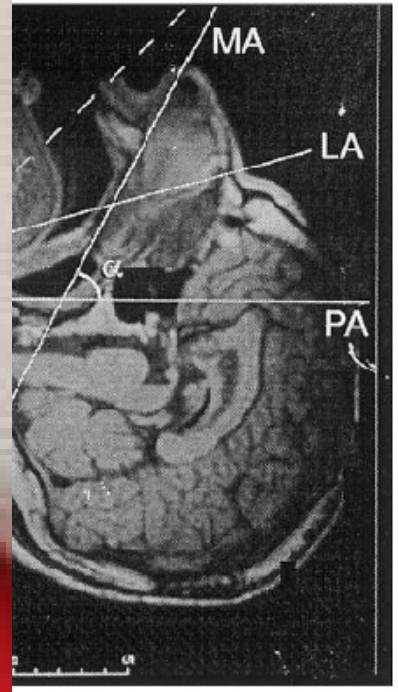
- **Ideální poloha hlavy = min obstrukce + ideální zobrazení aditus laryngis**
- Ideální poloha hlavy se **mění s věkem pacienta**

Walls RM, Murphy MF, Luten RC, et al, editors: Manual of emergency airway management, ed 2, Philadelphia, 2004, Lippincott Williams & Wilkins

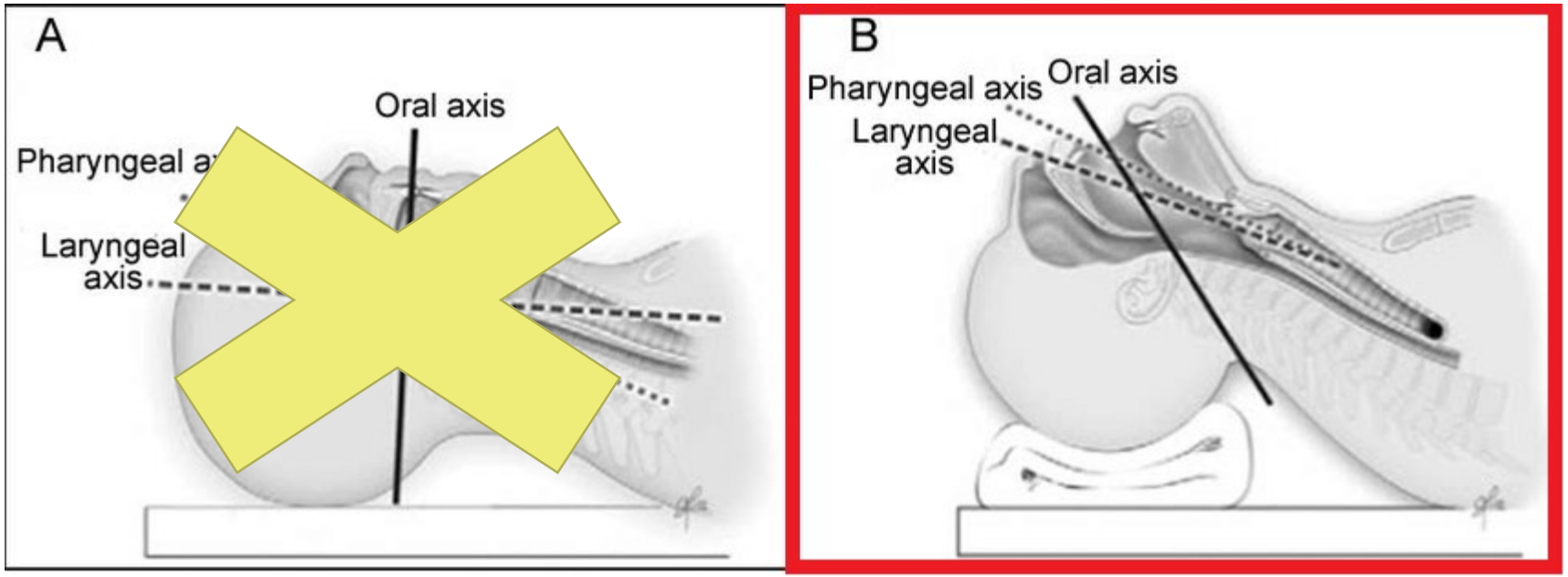
Optimální poloha hlavy k zajištění DC

- Optimální poloha hlavy je když dojde k paralelnímu uspořádaní osy larnygu, pharyngu a dutiny ústní = tzv. čichací (sniffing) pozice





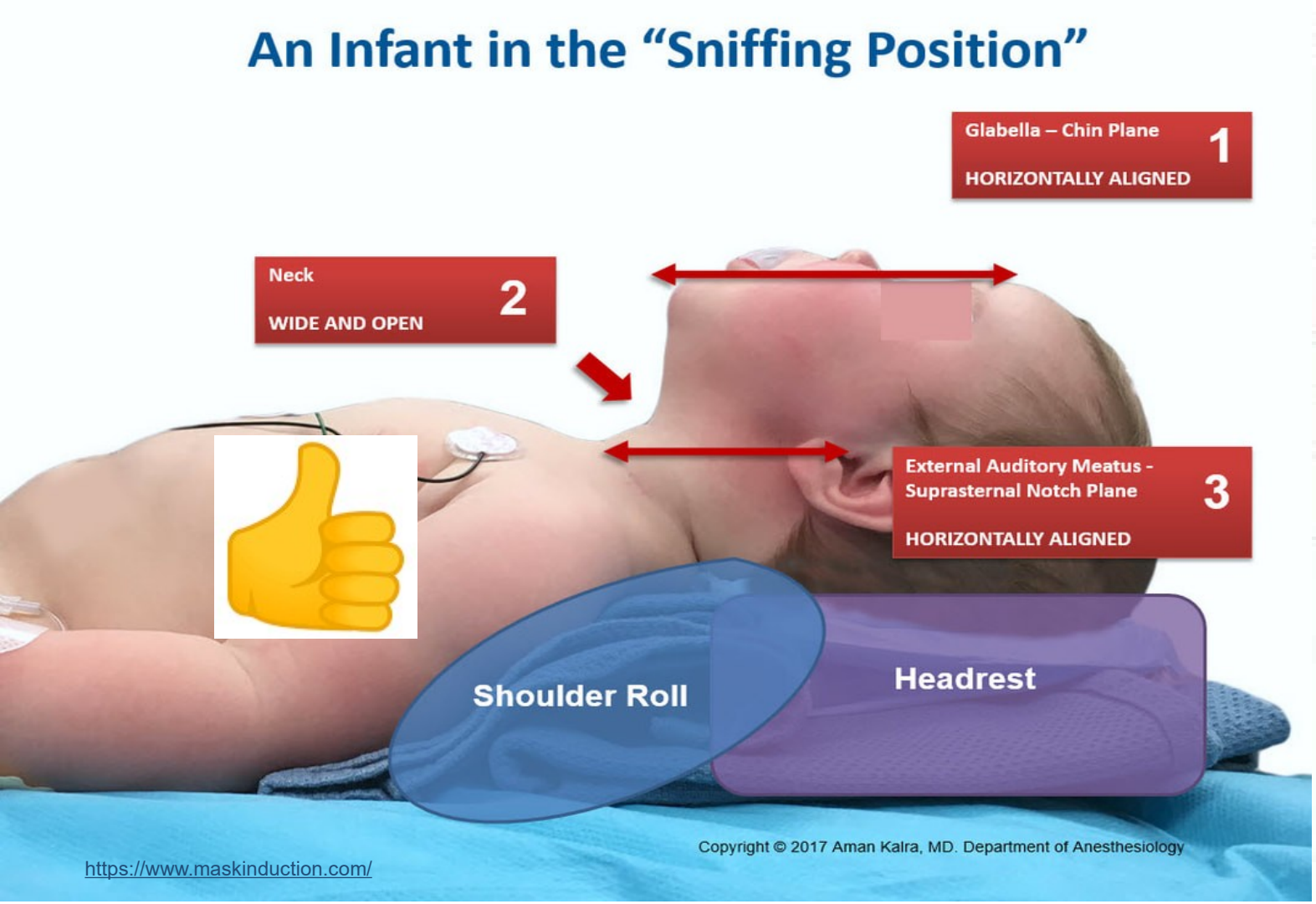
Kde je pravda?

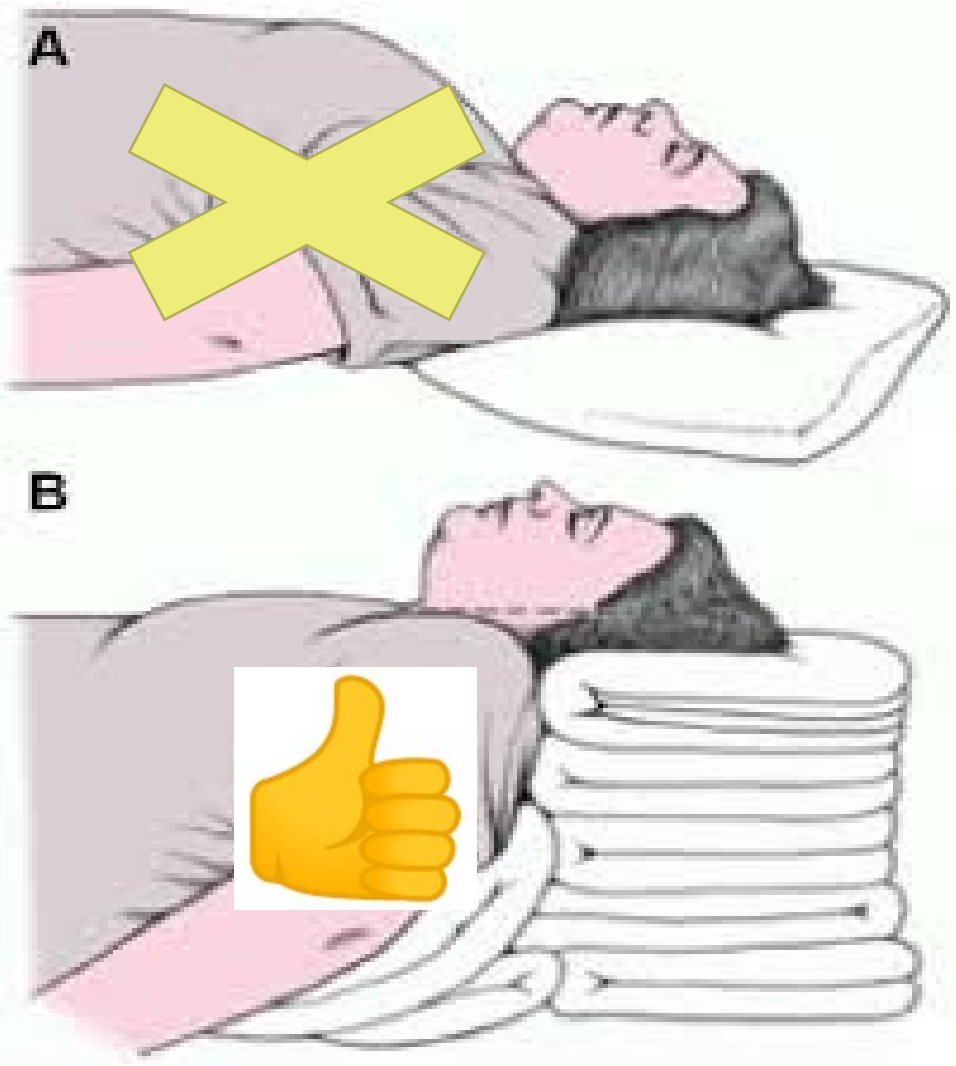


Results: Compared with the other head positions, the sniffing position did not improve glottic visualization, success rate of the first intubation, or intubation time. However, the sniffing position was significantly associated with better Intubation Difficulty Scale compared with the simple head extension position. (RR,1.28; 95% CI, 1.15-1.42; $p<0.0001$)
Conclusions: Although patients do not benefit from the sniffing position in terms of glottic visualization, success rate of the first intubation, or intubation time, the sniffing position can still be recommended as the initial head position for tracheal intubation because the sniffing position provides easier intubation conditions.

Poloha hlavy – návod do praxe

- Tragus (externí zvukovod) v úrovni jugula !!!





Beyond sniffing (zvýšená čichací poloha) ?

- O 3,8 c…oha

Comparison … n and further neck…

Kiran Kumar Gudiv…
Chaitanya Prathyus…

Aktuálně není dostatek dat – prostor k výzkumu.
Neutrální poloha hlavy jen u pacientů s rizikem poranění krční páteře + pediatrických pacientů.
U všech ostatních čichací poloha !!!

Hubert J Schmitt , Harald Mang. Head and Neck Elevation Beyond the Sniffing Position Improves Laryngeal View in Cases of Difficult Direct Laryngoscopy. J Clin Anesth . 2002 Aug;14(5):335-8. doi: 10.1016/s0952-8180(02)00368-9.

Možnosti zajištění DC

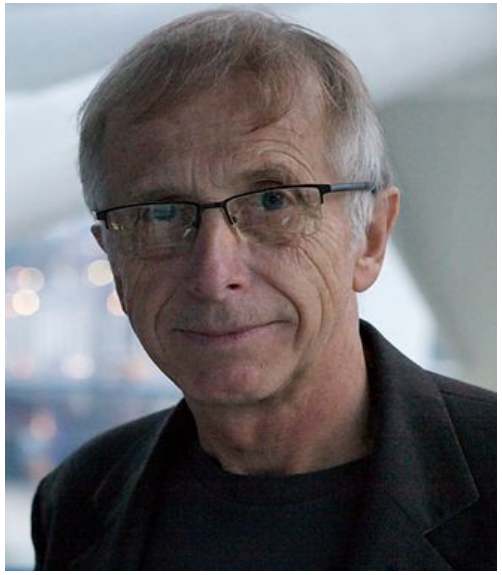
- Obličejová maska
- Vzduchovody
- Laryngeální tubus
- Kombirourka
- Laryngeální maska

Supraglotické zajištění DC

- Tracheální kanyla
- Tracheostomie
- Koniopunkce/koniotomie

Infraglotické zajištění DC

Laryngeální maska



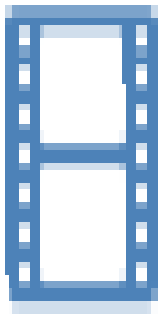
- Na trhu přes 30 let (dr. Brain)
- Snaha o menší invazivitu
- Jednodušší zavedení
- **Vysoká spolehlivost (selhání 1-2%)**
- Potenciálně vyšší riziko aspirace – nepotvrzeno EBM
- Preferovaná 2. generace LM – gastrický port
- Obtížné zajištění DC? → Laryngeální maska (SAD 2. generace !!!)

https://en.wikipedia.org/wiki/Archie_Brain

https://www.howequipmentworks.com/lma_history/

Kdy po masku?

- Pacient s min. rizikem as ní operační výkon)
- Přístup k dýchacím cest
- Obtížné zajištění dýchac



Laryngeální maska v enefit přesahuje riziko !!!
Riziko pacienta ologického týmu +
spo eratéra

The Laryngoscope
© 2012 The American Laryn
Rhinological and Otological

MINERVA ANESTESIOL 2007;73:33-7

Laparoscopic Surgical Procedures under Gene
Random Comparative Study

Suchita Shailesh Parikh, Shivam Bipin Parekh,[1] Chaula Doshi, and Varsha Vy

k in prone position:
pure exhibitionism or a valid technique

N. WEKSLER [1], M. KLEIN [1], V. ROZENTSVEIG [1], D. WEKSLER [2],
C. SIDELNIK [1], M. LOTTAN [3], G. M. GURMAN [1]

Journal of Clinical Anesthesia 36 (2017) 142–150

Contents lists available at ScienceDirect

Journal of Clinical Anesthesia

Review

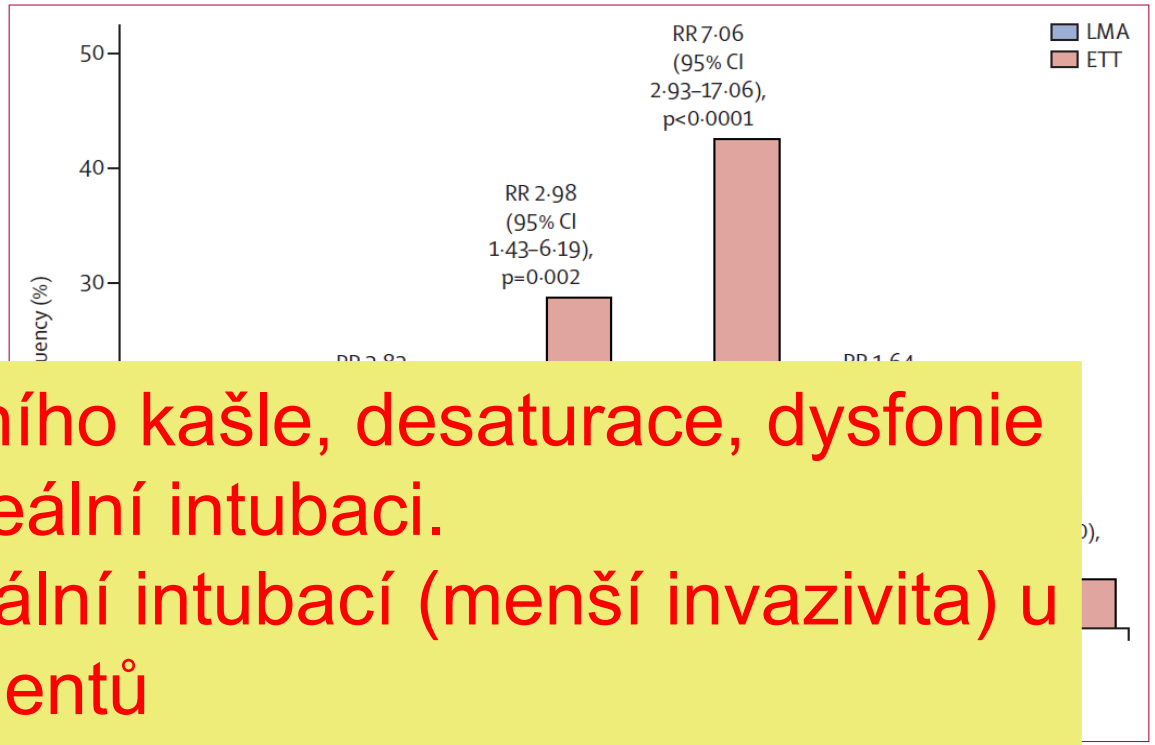
Comparison of laryngeal mask airway vs tracheal intubation: a systematic review on airway complications☆

Babette F. van Esch, MD, PhD, (Candidate) [a,*,1], Inge Stegeman, MD, PhD, (Clinical Epidemiologist) [b,1], Adriana. L. Smit, MD, PhD, (Otorhinolaryngologist) [b,1]

Table 6
Comparison of the LMA Supreme with the TT for incidence on sore throat, dysphagia, and dysphonia

Study	N	Time interval (h)	Incidence of airway complications		P
			LMA (%)	TT (%)	
Sore throat					
Abdi et al 2010 [27]	138	0	**19**	**32**	<.05
B					
T					
Dys					
A					
B					
T					
Dys					
A					
Total	138	<1	16 (12)	47 (34)	

The effect of endotracheal tubes versus laryngeal mask airways on perioperative respiratory adverse events in infants: a randomised controlled trial

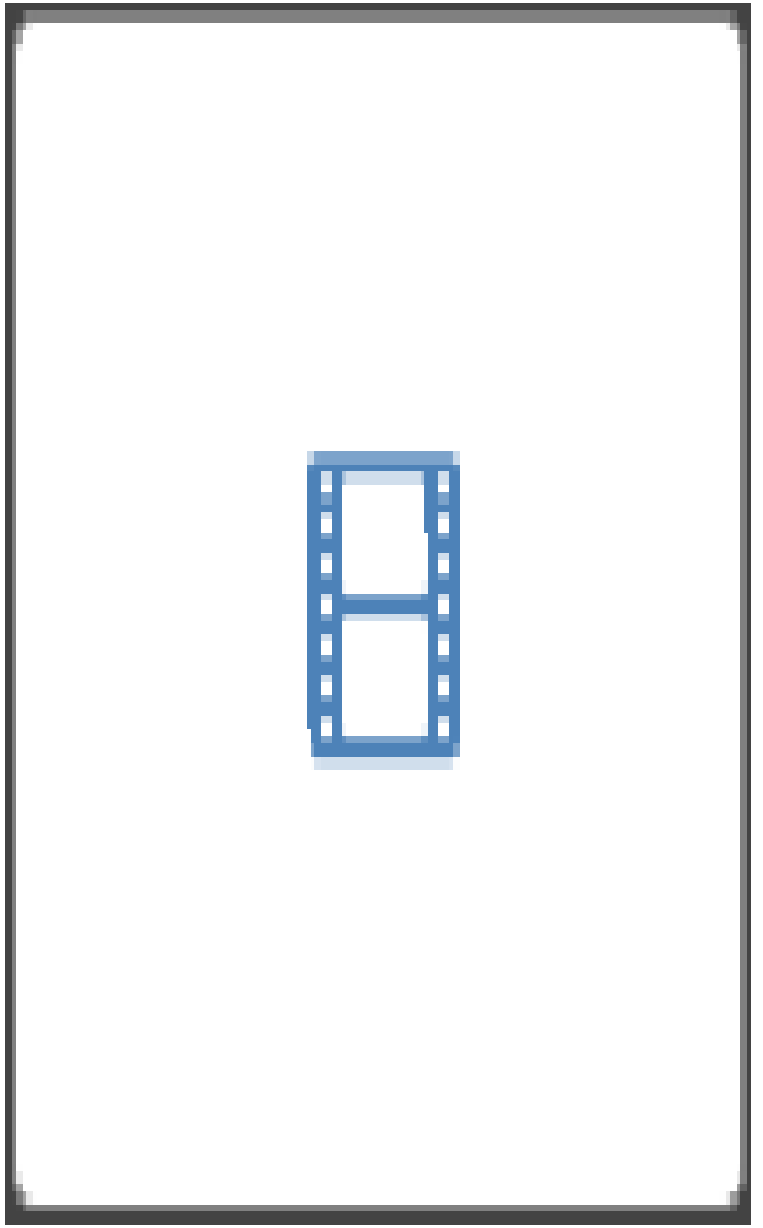


ETT=endotracheal tubes.

Vyšší výskyt bolesti v krku, pooperačního kašle, desaturace, dysfonie a dysfagie při tracheální intubaci.
Pokud možno preferuj LM před tracheální intubací (menší invazivita) u všech pacientů

Tracheální intubace

- **Zlatý standard zajištění dýchacích cest**
- Invazivní metoda
- Vyžaduje zkušenost - K dosažení > 90% úspěšnosti (10 neúspěšných ze 100 intubací!!!) min. 50 pokusů
- Zavedení tracheální kanyly mezi hlasové vazy (infragloticky)
- Přímá laryngoskopie (event. bronchoskopie) – kontrola zraku
- Videolaryngoskopie – kamera na konci lžíce
- Ověření korektní pozice v trachey = kapnometrie/kapnografie



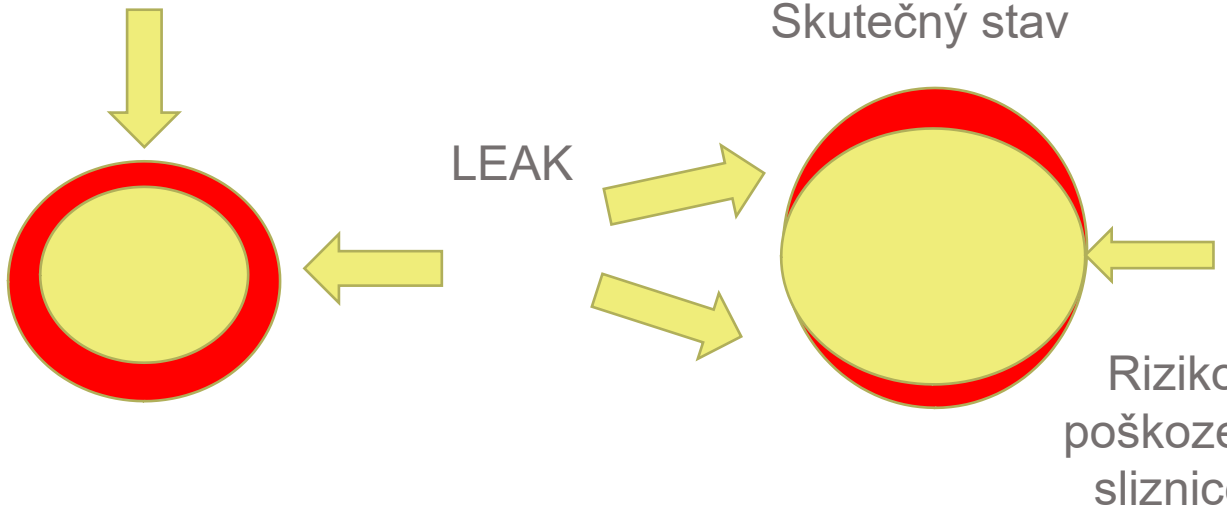
https://www.rcoa.ac.uk/safety-standards-quality/guidance-resources/capnography-no-trace-wrong-place

Balonkové vs. bezbalonkové kanyly u pediatrických pacientů?

- U pediatrických pacientů je nejužší místo subgloticky
- Fragilní sliznice je náchylná na poranění = otok = post-extubační stridor
- U dětských pacientů < 8 let použij jenom bezbalonkové kanyly ???

Pediatric Pulmonology 51:267–271 (2016)

Ideální stav -kanyla bez balonku



Age-Based Analysis of Pediatric Upper Airway Dimensions Using Computed Tomography Imaging

Tariq M. Wani, MD,[1*] Bruno Bissonnette, MD,[1,2] Mahmoud Rafiq Malik, MD,[3] Don Hayes Jr., MD,[4] Archana S. Ramesh, MD,[1] Mazen Al Sohaibani, MD,[3] and Joseph D. Tobias, MD[1]

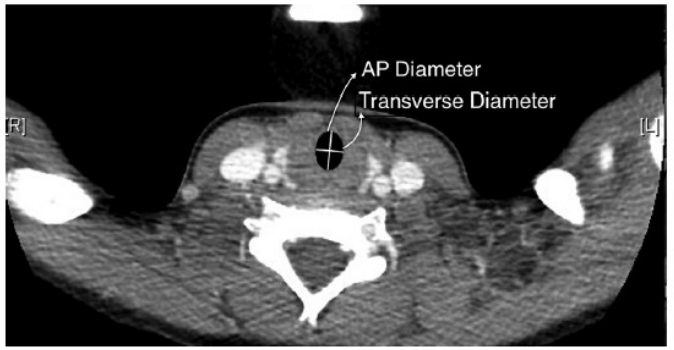


Fig. 4. CT image of airway in transverse plane at subglottis.

Anaesthesia 2018, 73, 160–168 doi:10.1111/anae.14113

Original Article

Cuffed Endotracheal Tube Use in Children: Times (and Minds) Are 'A Changing*

Donald H. Shaffner, MD
John J. McCloskey, MD
Jamie McElrath Schwartz, MD
Division of Pediatric Anesthesiology and Critical Care Medicine
Department of Anesthesiology and Critical Care Medicine
Johns Hopkins University School of Medicine
Baltimore, MD

We are surprised that a controversy persists regarding the use of cuffed versus uncuffed endotracheal tubes (ETTs) in children. In this issue of *Pediatric Critical Care Medicine*, Mizuguchi et al (1) provide more evidence that children's upper airway anatomy is not consistent

most rostral part (1, 2, 4, 5). These findings, similar to Mizuguchi et al (1), that demonstrated the cricoid ring to be greater in diameter as compared with the infraglottic area led to changes in the perceptions about airway anatomy in children under 8 years old and laid the ground work for investigations that show that cuffed ETTs can be used safely both in the pediatric OR and ICU and are preferred by pediatric anesthesiologists (6–9).

The benefits of cuffed ETTs for children include the decreased need for tube exchanges (in the OR, the PICU, and on transport), increased effectiveness of delivering positive pressure ventilation when pulmonary compliance worsens, increased protection from microaspiration, less gas pollution in the OR, accurate capnography, and reliable tidal volumes (10–13). However, there are some potential pitfalls to the acceptance of cuffed endotracheal for pe-

ETTs in the pediatric ORs due to space limitations.

Pressure support and tube compensation may be ventilator strat-

Table 9 Peri-op … ncuffed groups.
Values number … tio

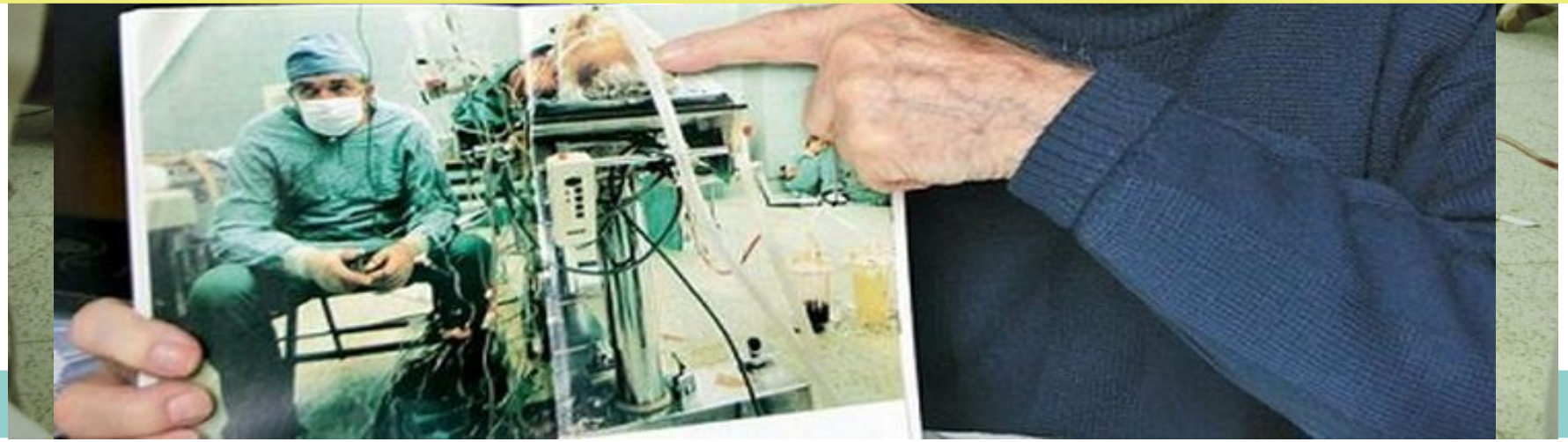
Peri-operative res…				
Laryngospasm				
Bronchospasm				
Severe persiste…				…18.4)
De…turation …				…7.5)
Ai…				
St…				
Ar…				
Follo…				
Sore throat				…21.0)
Hoarse voice	5 (9.6%)	9 (26.5%)	0.046	3.4 (1.0–11.2)

Balonkové tracheální kanyly jsou bezpečné u všech pediatrických pacientů a vedou k redukci airway-related komplikací (podmínkou je měřit tlak v obturační manžetě a udržovat <20 cmH_2O) !!!

Specifické situace

Specifické situace v airway managementu (každodenní):

- **Bleskový úvod**
- **Obtížné zajištění DC**



Bleskový úvod

3. Doporučení pro neodkladné výkony

- U pacientů podstupujících neodkladné výkony je **vždy** třeba postupovat jako u výkonů „s plným žaludkem“ a zvolit tzv. bleskový úvod do anestezie *(rapid sequence induction)*.

Česká společnost anesteziologie, resuscitace a intenzivní medicíny
ČLS JEP

DOPORUČENÍ PRO OMEZOVÁNÍ PŘÍJMU TEKUTIN A STRAVY PŘED ANESTEZIOLOGICKOU PÉČÍ

Co je bleskový úvod?

- Soubor opatření a postupů s cílem minimalizovat riziko aspirace a regurgitace u
- Stept and Safar 1970 R iopental + sukcinylcholin, Sellickův kovou tracheální kanylou, bez manuální v

https://www.keepcalmandposters.com/poster/633915_keep_calm_and_dont_breathe

Ventilace v úvodu do RSI u dětí ???

Pediatric Anesthesia

Pediatric Anesthesia ISSN 1155-5645

REVIEW ARTICLE

Rapid sequence induction has no use in pediatric anesthesia

Thomas Engelhardt

Department of Anaesthesia, Royal Aberdeen Children's Hospital, Aberdeen, UK

Table

	Age (years)	SpO_2 80–89%	SpO_2 <80%	HR <60 min^{-1}	Difficult intubation
Controlled RSII (32) n = 1001	0–22.4 (8.9)	0.5*	0.3*	0.0	0.3
'Classical' RSII (30) n = 1071	3–12 (8.1)	1.9	1.8	0.8	1.7

*These 8 patients had a median age of 0.8 years and an ASA-PS >3. The majority of patients were compromised preoperatively (hemorrhagic shock, pulmonary hemorrhage/edema, pleural effusions, and severe anemia).

Dítě není zmenšený dospělý?!?

Bag-mask ventilation in rapid sequence induction

A survey of current practice among members of the UK Difficult Airway Society

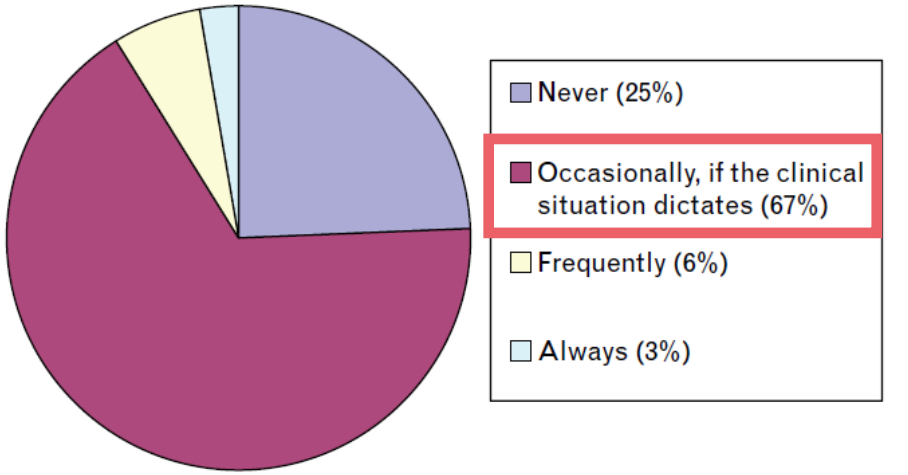
James P.R. Brown and Gavin C. Werrett

From the BC Women's Hospital, Vancouver, British Columbia, Canada (JPRB) and Derriford Hospital, Plymouth, UK (GCW)

Correspondence to Dr James P.R. Brown, Department of Anesthesia, BC Women's Hospital, 4500, Oak Street, Vancovuer, BC. V6H 3V5 Canada
E-mail: james.brown@cw.bc.ca

Published online 22 April 2015

Fig. 1



Pie-chart demonstrating responses to how frequently do you bag mask

CME

Modified Rapid Sequence Induction and Intubation:

Až 85% respondentů používá modifikovaný RSI = manuální ventilaci

Nathaniel D. Mercaldo, MS,‡ and Warren S. Sandberg, MD, PhD*

EJA

OPEN

Eur J Anaesthesiol 2020; **37**:435–442

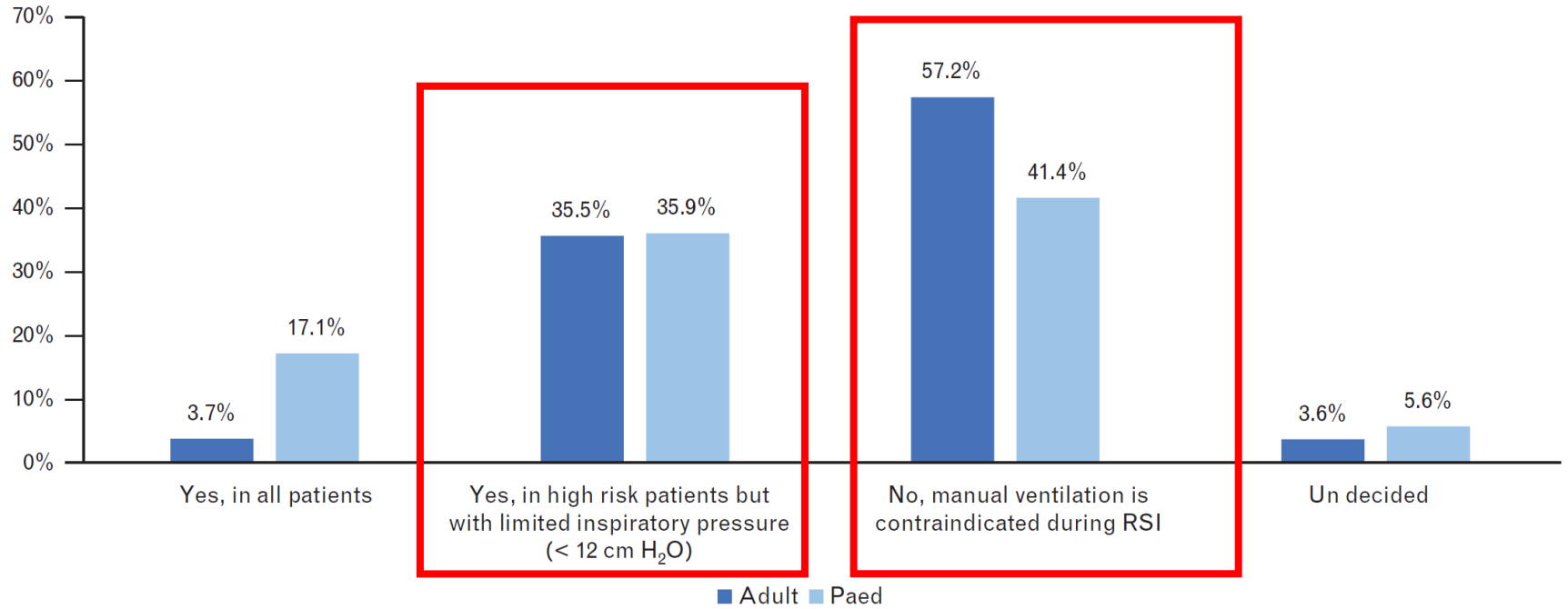
ORIGINAL ARTICLE

Rapid sequence induction

An international survey

Jozef Klucka*, Martina Kosinova*, Kai Zacharowski, Stefan De Hert, Milan Kratochvil, Michaela Toukalkova, Roman Stoudek, Hana Zelinkova and Petr Stourac

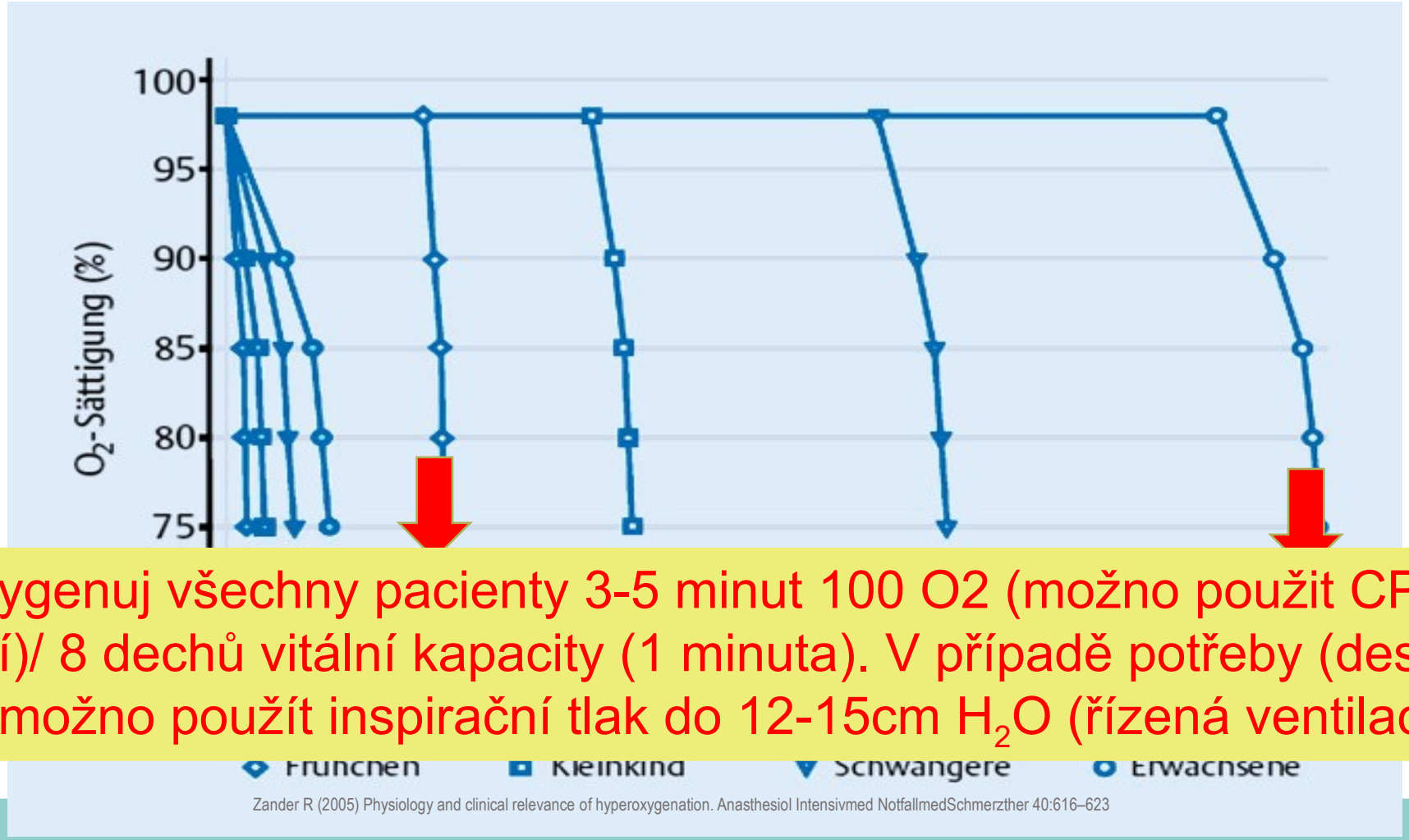
Do you ventilate the patient via face mask before anaesthesia induction (before first intubation attempt)?



Do you ventilate the patient via face mask before anaesthesia induction (before first intubation attempt)?

Co je správně?

- Preoxygenovat !!!



Zander R (2005) Physiology and clinical relevance of hyperoxygenation. Anasthesiol Intensivmed NotfallmedSchmerzther 40:616–623

Preoxygenuj všechny pacienty 3-5 minut 100 O2 (možno použit CPAP jestli tolerují)/ 8 dechů vitální kapacity (1 minuta). V případě potřeby (desaturace) možno použít inspirační tlak do 12-15cm H_2O (řízená ventilace)

Sellickův hmat

- **Tlak na prstencovou chrupavku → okluze jícnu**
- 10 N při vědomí → 30 N po indukci do anestezie
- Až v 70% aplikován nekorektně (např. až po indukci)
- Nutno povolit při aktivním zvracení (riziko ruptury jícnu)
- Neexistují EBM (RCT) data potvrzující jeho účinnost
- Tak proč používáme?

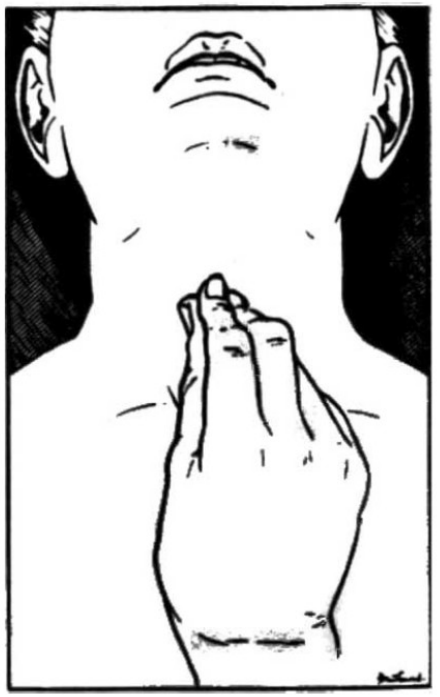


Fig. 3 The Sellick Manoeuvre for applying Cricoid Pressure (reproduced with kind permission of the Lancet 1961;2:404).

https://litfl.com/brian-arthur-sellick/

Research

JAMA Surgery | Original Investigation

Effect of Cricoid Pressure Compared With a Sham Procedure in the Rapid Sequence Induction of Anesthesia
The IRIS Randomized Clinical Trial

Aurélie Birenbaum, MD; David Hajage, MD, PhD; Sabine Roche, MD; Alexandre Ntouba, MD; Mathilde Eurin, MD; Philippe Cuvillon, MD, PhD; Aurélien Rohn, MD; Vincent Compere, MD, PhD; Dan Benhamou, MD; Matthieu Biais, MD, PhD; Remi Menut, MD; Sabiha Benachi, MD; François Lenfant, MD, PhD; Bruno Riou, MD, PhD; for the IRIS Investigators Group

IRIS trial

Figure 2. Comparison of the Incidence of Pulmonary Aspiration (Primary End Point) Between the Sellick Group and the Sham Group

	No. of Events/Total No. (%)		Relative Risk (90% CI)
	Sellick	Sham	
Intention-to-treat analysis	10/1784 (0.6)	9/1736 (0.5)	0.90 (0.39-1.99)
Per-protocol analysis	10/1729 (0.6)	9/1730 (0.5)	0.90 (0.39-2.00)

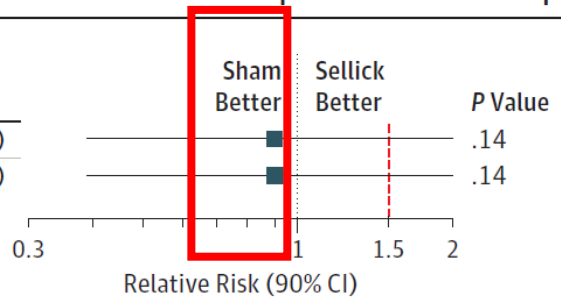


Table 2. Tracheal Intubation and Extubation

Variable	No. (%) Sellick Group (n = 1735)	Sham Group (n = 1736)	P Value
Tracheal intubation			
Intubation time, median (IQR), s	27 (19-40)	23 (15-37)	<.001
Intubation time >30 s	792 (47)	677 (40)	<.001
Missing values, No.	5	5	NA
Improvement in Cormack and Lehane Grade after cricoid pressure interruption	152 (62)	28 (33)	<.001

Studie neprokázala noninferioritu v kontrolní skupině (nižší výskyt aspirace = underpowered).
Sellickův hmat vedl k prolongaci intubace a horším intubačním podmínkám !!!

EJA

OPEN

Eur J Anaesthesiol 2020; **37**:435–442

ORIGINAL ARTICLE

Rapid sequence induction

An international survey

Jozef Klucka*, Martina Kosinova*, Kai Zacharowski, Stefan De Hert, Milan Kratochvil, Michaela Toukalkova, Roman Stoudek, Hana Zelinkova and Petr Stourac

Do you use Sellick manoeuvre in rapid sequence induction?

https://www.franksonnenbergonline.com/blog/are-you-blurring-the-line-between-right-and-wrong/

Anaesthesist 2018 · 67:568–583
https://doi.org/10.1007/
Eingegangen: 27. Dezer
Überarbeitet: 23. April 2
Angenommen: 3. Mai 2
Online publiziert: 29. Ju

C. Eichelsbacher[1] · H. Ilper[2] · R. Noppens[3] · J. Hinkelbein[4] · T. Loop[5]

rsität Mainz, Mainz,

klinikum Frankfurt,

ı Köln (AöR), Köln,

Freiburg im Breisgau,

Aufgrund der nichtvorhandenen, wissenschaftlichen Evidenz für eine Reduktion der Aspiration durch die Anwendung des Krikoiddrucks sowie der erheblichen, potenziell schädigenden Nebenwirkungen und der negativen Beeinflussung der Sicht auf die Epiglottis sollte der Krikoiddruck nicht angewandt werden.

ın and

ons-

praktische

anästhesiologische Management

Obtížné zajištění DC

- Heterogenní skupina – obtížná ventilace obličejovou maskou, obtížné zavedení laryngeální masky, obtížná intubace, situace cannot intubate/cannot oxygenate
- Výskyt 0,1-10% (desaturace, bradykardie)

Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub. 2020; 164:XX.

Difficult airway prediction in paediatric anaesthesia (Diffair): prospective observational study

Jozef Klucka[a#], Martina Kosinova[a#], Milan Kratochvil[a], Lukas Marecek[a], Petra Kovalcikova[b], Milan Urik[c], Petr Stourac[a]

DOPORUČENÝ POSTUP

Zajištění obtížných dýchacích cest u dospělých a dětí

Anest intenziv Med. 2019;30:173–186

Černý V.
Vymazal
ač P.[7],

Očekávané obtížné

obtížné zajištění DC

- Příprava + plán
- Fibrooptická intubace při věd
- Videolaryngoskopie event. Fi
  přes supraglotickou pomůcku
  dospělý 2. možnost)
- Oxygenace – obličejová mas
- Chirurgická koniopunkce BA
- Rigidní BSK + trysková venti
  koniopunkce (< 12 let)

u maskou

yngoskop

t oxygenate

ce BACT (>12 let)

á ventilace (< 12 let) event

ce

Situace cannot intubate/cannot oxygenate (CICO)

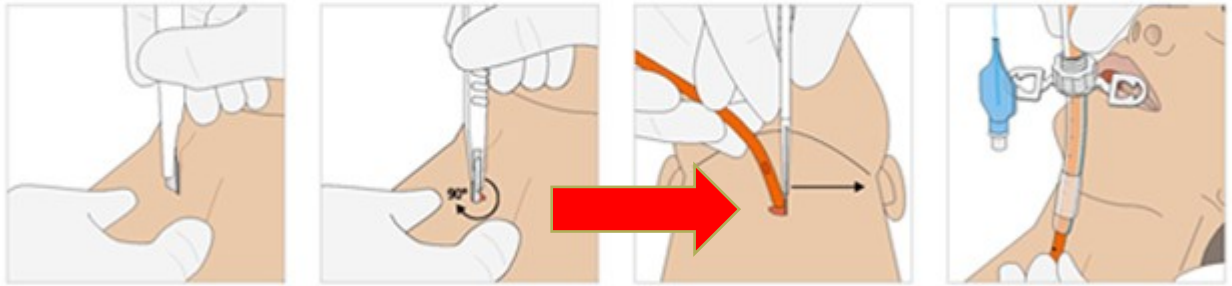
Failed intubation, failed oxygenation in the paralysed, anaesthetised patient

CALL FOR HELP

↓ Continue 100% O_2
Declare CICO

Plan D: Emergency front of neck access

Based on the simple description of 'stab, twist, bougie, tube', the ScalpelCric is meant to facilitate the execution of the scalpel technique.



1. stab 2. twist 3. bougie 4. tube

https://www.vbm-medical.com/products/airway-management/surgical-cricothyrotomy-scalpelcric/

C. Frerk, V. S. Mitchell, A. F. McNarry, C. Mendonca, R. Bhagrath, A [illegible] rking group. Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults. *British J[illegible]*

Chirurgická koniopunkce - BACT

Hindawi
BioMed Research International
Volume 2017, Article ID 4215159, 6 pages
https://doi.org/10.1155/2017/4215159

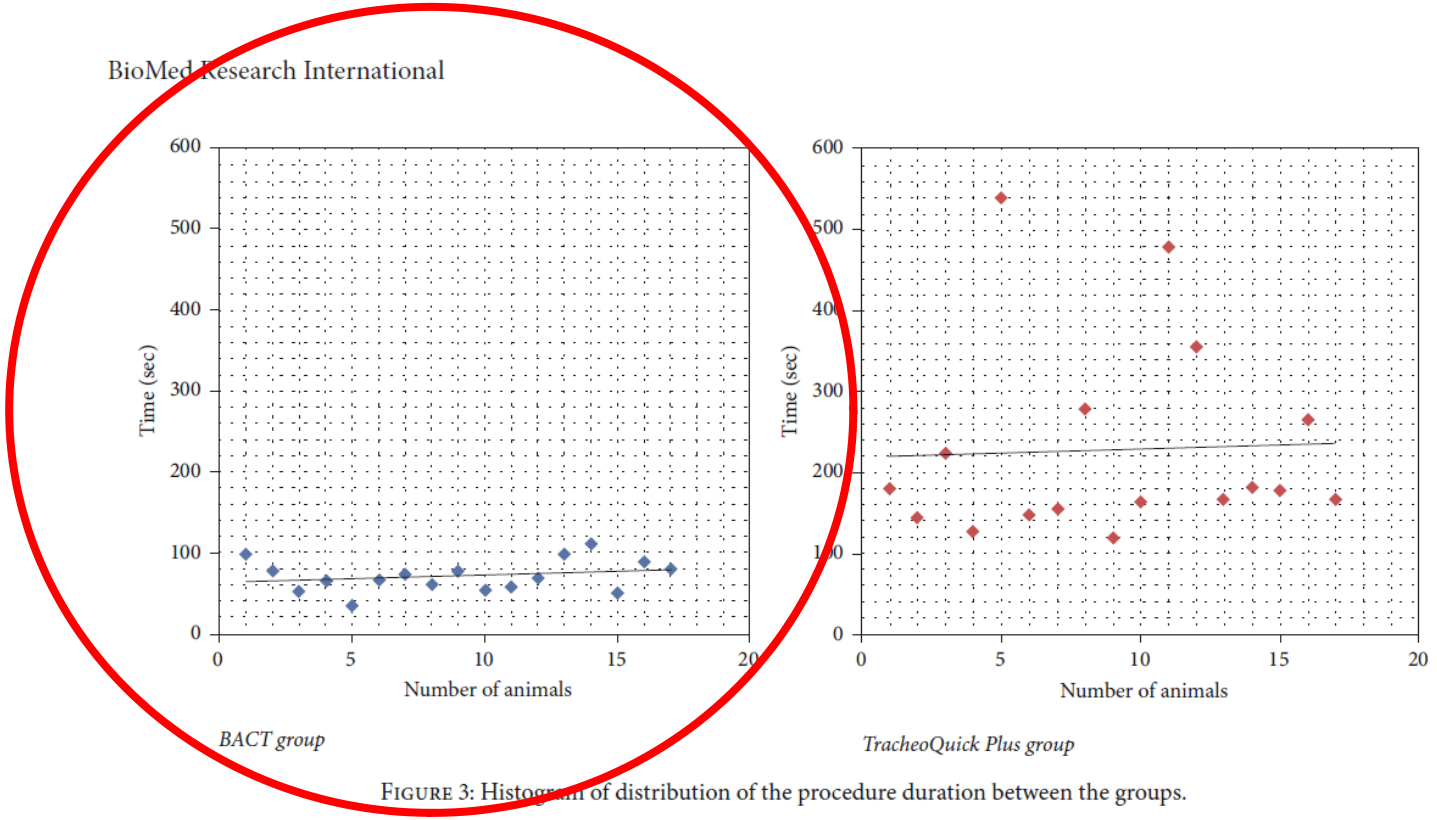
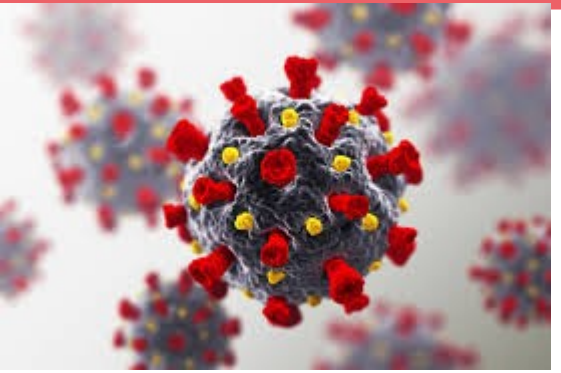


FIGURE 3: Histogram of distribution of the procedure duration between the groups.



CC

ement

- Aerosol-generují

extubace, HFNC

materiálu, KPR,

kou, **intubace**,

krobiologického

Anaesthesia 2C

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Guidelines
Intensive C
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T. M. Cook,

e.15054

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A SUMMARY FOR EMERGENCY TRACHEAL INTUBATION OF THE ADULT COVID-19 PATIENT

- ☐ Tracheal intubation of the patient with COVID-19 is a high-risk procedure for staff, irrespective of the clinical severity of disease.
- ☐ In severe COVID-19 it is also a high-risk procedure for the patient.
- ☐ Limit staff present at tracheal intubation: one intubator; one assistant; and one to administer drugs and monitor the patient. A runner should be outside the room.
- ☐ Create a COVID-19 tracheal intubation trolley or pack that can be used in ICU or elsewhere.
- ☐ Wear full personal protective equipment (PPE) at all times. Consider double gloving. Defog goggles and/or eye wear if possible
- ☐ Intubate i
- ☐ Know and
- ☐ Take the a
- ☐ Prepare a ailable.
- ☐ Plan how
- ☐ The best s
- ☐ Be safe, a se risk to sick patients a
- ☐ Use reliab ue may differ according
  - ○ Pre 3–5 minutes.
  - ○ Vid
  - ○ 2-p
  - ○ A se
- ☐ Place a HM ng.
- ☐ Avoid aer choscopy and tracheal s
- ☐ Establish f al intubation.
- ☐ Use RSI w
- ☐ To avoid c
- ☐ Paralyse e lar blockade before at
- ☐ Have a va
- ☐ Do not fac eded.
- ☐ Intubate v on port.
- ☐ Pass the c earing PPE.
- ☐ Inflate the
- ☐ Confirm tr ardiac arrest.
- ☐ Avoid circ
- ☐ Clamp tub
- ☐ Use a star
- ☐ Communi quate volume without shouting.
- ☐ Place a nasogastric tube after tracheal intubation is completed and ventilation established safely.
- ☐ If COVID-19 status not already confirmed take a deep tracheal aspirate for virology using closed suction.
- ☐ Discard disposable equipment safely after use. Decontaminate reusable equipment fully and according to manufacturer's instructions.
- ☐ After leaving the room ensure doffing of PPE is meticulous.
- ☐ Clean the room 20 minutes after tracheal intubation (or last aerosol-generating procedure).
- ☐ A visual record of ease of tracheal intubation should be prominently visible in the patient's room.
- ☐ If airway difficulty occurs the subsequent plan should be displayed in the room and communicated between shifts.

Figure 1 One-page summary for emergency tracheal intubation of the coronavirus disease 2019 patient.

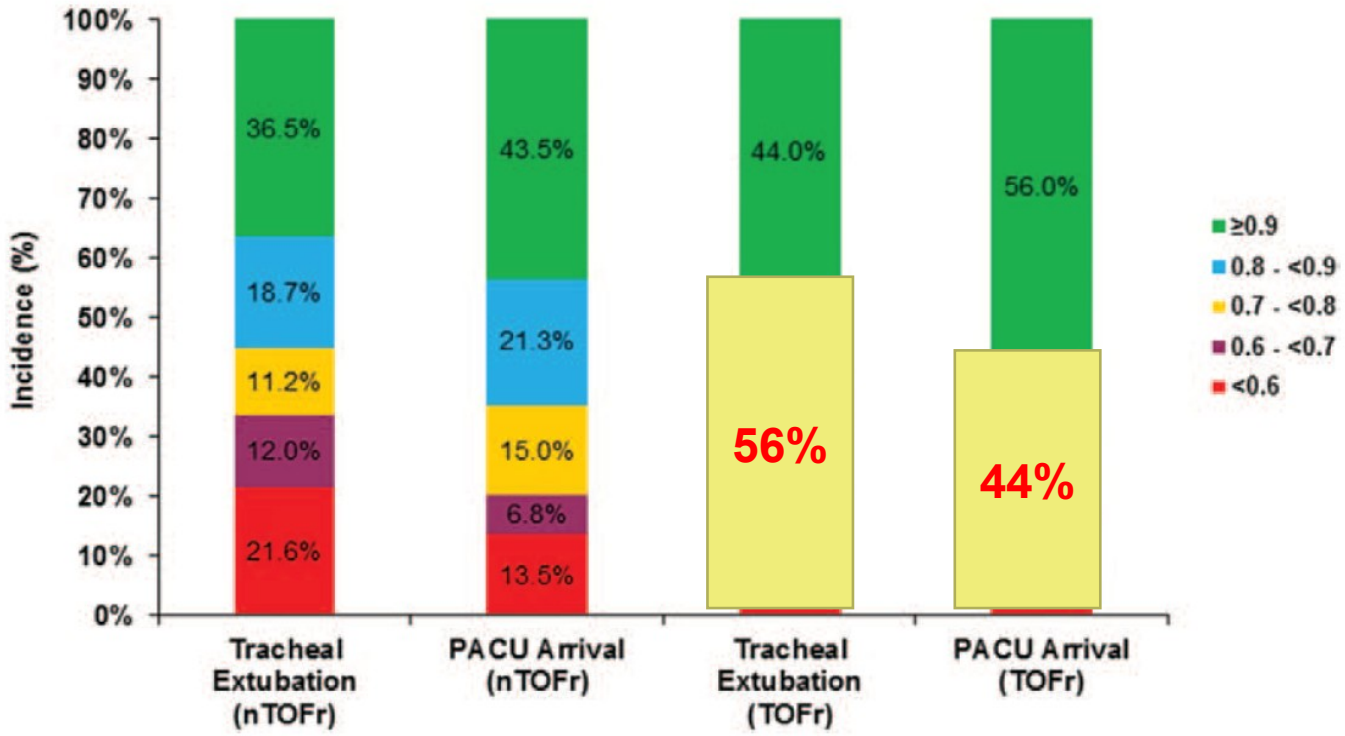
Figure 7 Emergency tracheal intubation checklist in a patient with coronavirus disease 2019. Adapted from [20] with permission.

Reziduální neuromuskulární blokáda

- Inkompletní zotavení (TOFr<0,9) = ↑ morbidita a mortalita

The RECITE Study: A Canadian Prospective, Multicenter Study of the Incidence and Severity of Residual Neuromuscular Blockade

Louis-Philippe Fortier, MSc, MD, FRCPC,* Dolores McKeen, MD, MSc, FRCPC,†
Kim Turner, BScPhm, MSc, MD, FRCPC,‡§ Étienne de Médicis, MD, FRCPC,‖ Brian Warriner, MD, FRCPC,¶



Reziduální neuromuskulární blokáda

Residual neuromuscular block in paediatric anaesthesia

J. Klucka, M. Kosinova, I. Krikava, R. Stoudek, M. Toukalkova and P. Stourac*

Brno, Czech Republic

*Corresponding author. E-mail: petr.stourac@gmail.com

British Journal of Anaesthesia, ■ (■): 1–2 (2018)

Table 1 Residual neuromuscular block (RNB) incidence in OR and PACU. CI, confidence interval; OR, operating room; TOF, train-of-four count

RNB incidence	Patients measured in OR (n=282)			Patients measured in PACU (n=119)		
	n	%	95% CI in %	n	%	95% CI in %
TOF ≥ 0.9	146	51.8	45.9–57.6	87	73.1	64.7–80.5
TOF < 0.9 (RNB)	136	48.2	42.4–54.1	32	26.9	19.5–35.3

The Impact of Res… Oversedation, and… Events in a Postar… Study of Prevalenc…

Paul A. Stewart, MBBS, FANZCA,*†
Qiushuang Susan Li, MBBS,‖ Min…
Ayse B. Bilgin, BEng, MBA, MMath…
and Stephanie Phillips, BMed, FAN…

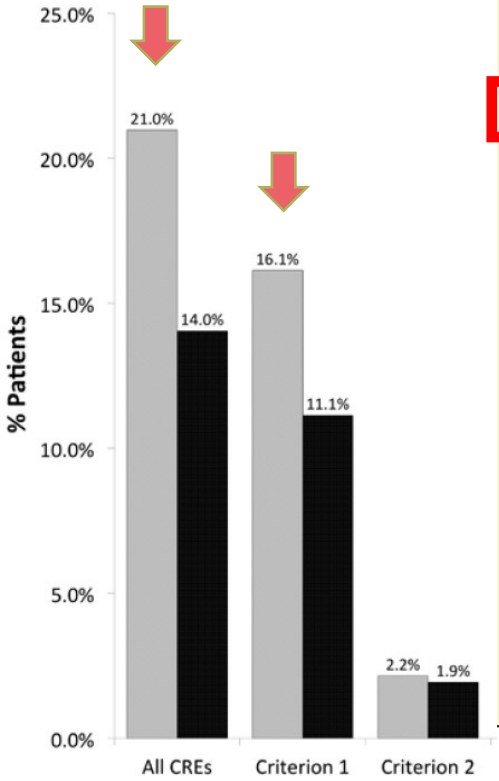
…h Analg 2016;123:859–68

- Reziduální …cím pokoji

Table 1. Types of Adverse Respiratory Events (Modified Murphy's Criteria)

1. Upper airway obstruction requiring an intervention
   a. Jaw thrust or chin lift
   b. Oral airway
   c. Nasal airway
2. Mild-moderate hypoxemia (peripheral Spo_2, 90%–93%) on 6 l/min O_2 through Hudson mask, which was not improved after active interventions
   a. Increasing O_2 flow to >6 l/min
   b. Application of high-flow facemask O_2
   c. Verbal requests to breathe deeply
   d. Tactile stimulation
3. Severe hypoxemia (Spo_2 <90%) on 6 l/min O_2 through Hudson mask, which was not improved after active interventions
   a. Increasing O_2 flow to >6 l/min
   b. Application of high-flow facemask O_2
   c. Verbal requests to breathe deeply
   d. Tactile stimulation
4. Signs of respiratory distress or impending ventilatory failure
   a. Respiratory rate >20 breaths/min
   b. Accessory muscle use
   c. Tracheal tug
5. Inability to breathe deeply, when requested to by the PACU nurse, in the conscious patient
6. Patient complaining of symptoms of respiratory or upper airway muscle weakness
   a. Difficulty breathing
   b. Difficulty swallowing
   c. Difficulty speaking
7. Patient requiring assisted ventilation
   a. Facemask IPPV
   b. Reintubation in the PACU
8. Clinical evidence or suspicion of pulmonary aspiration after tracheal extubation with gastric contents observed in the oropharynx and hypoxemia

Abbreviations: IPPV, intermittent positive pressure ventilation; PACU, …



…2. The prevalence of adverse respi… …events (AREs) was significantly …in patients with residual neuro… …ar blockade (RNMB), defined as …our ratio <0.90, on arrival in the …sthetic care unit compared with … without RNMB (21.0% vs 14.0%, …33). The graph also shows the …nce of each type of ARE (modified …s criteria; see Table 1) in patients …d without RNMB.

Anesthetic Clinical Pharmacology Section Editor: Ken B. Johnson
Preclinical Pharmacology Section Editor: Markus W. Hollmann

The Effects of Postoperative Residual Neuromuscular Blockade on Hospital Costs and Intensive Care Unit Admission: A Population-Based Cohort Study

Stephanie D. Grabitz, MD,* Nishan Rajaratnam, MD,* Khushi Chhagani, BS,*
Tharusan Thevathasan, Cand Med,* Bijan J. Teja, MD, MBA,† Hao Deng, MD, MPH,*
Matthias Eikermann, MD, PhD,†‡ and Barry J. Kelly, MD, MSc†

RESULTS: Overall, 457 (20.5%) patients in our cohort had residual neuromuscular blockade on admission to the PACU. Postoperative residual neuromuscular blockade was not independently

	Unadjusted Analysis	Adjusted Analysis
Primary outcome		
Total costs, incidence rate ratio (95% CI)	1.14 (1.06–1.22)[a]	1.04 (0.98–1.11)
Direct variable costs, incidence rate ratio (95% CI)	1.15 (1.07–1.25)[a]	1.03 (0.96–1.11)
Direct fixed costs, incidence rate ratio (95% CI)	1.09 (1.02–1.16)[a]	1.06 (0.99–1.12)
Indirect costs, incidence rate ratio (95% CI)	1.15 (1.07–1.24)[a]	1.04 (0.98–1.12)
Secondary outcomes		
Postoperative intensive care unit admission, odds ratio (95% CI)	2.20 (1.16–4.16)[a]	3.03 (1.33–6.87)[a]
Postoperative hospital length of stay, incidence rate ratio (95% CI)	1.13 (1.02–1.26)[a]	1.09 (1.00–1.19)
Sensitivity analyses		
Imputed database		
Total costs, incidence rate ratio (95% CI)		1.05 (0.99–1.12)
Subgroup same-day admission and ambulatory surgery		
Total costs, incidence rate ratio (95% CI)		1.04 (0.99–1.09)
Adjustment for preoperative opioid prescription		
Postoperative intensive care unit admission, odds ratio (95% CI)		3.40 (1.46–7.91)[a]
Adjustment for postoperative opioid prescription		
Postoperative intensive care unit admission, odds ratio (95% CI)		2.93 (1.28–6.70)[a]
Adjustment for surgery completion time		
Postoperative intensive care unit admission, odds ratio (95% CI)		2.92 (1.27–6.70)[a]

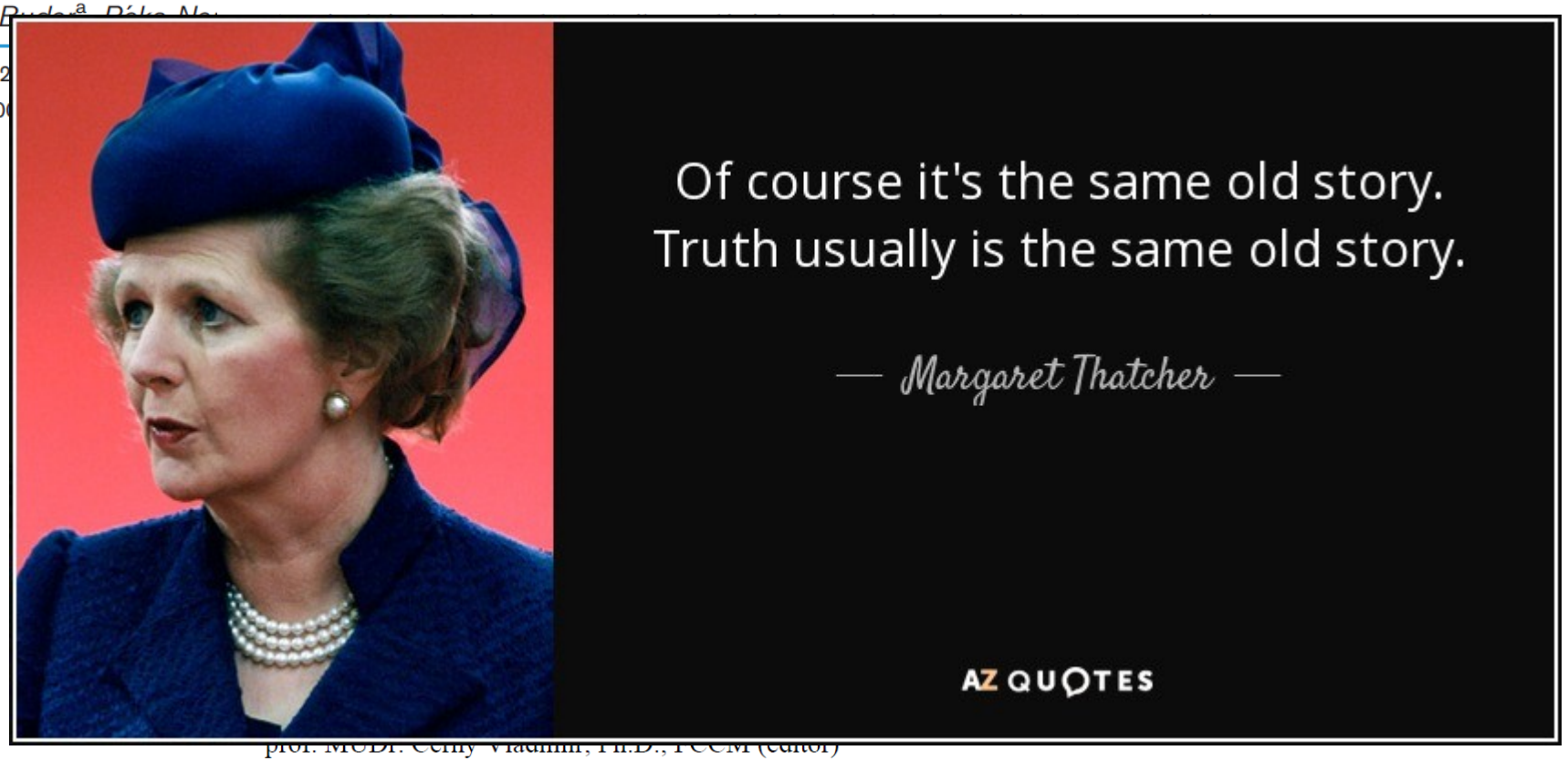
Adjusted regression analyses were performed using covariate adjustment for patient characteristics, intraoperative management, and procedural severity as described in the methods section unless otherwise stated.

[a]Statistical significance ($P < .05$).

Residual neuromuscular bl
impact on postoperative pu

Thomas Fuchs-Bu[a], Péka Ne

Curr Opin Anesthesiol 2016, 2
DOI:10.1097/ACO.0000000000



Česká společnost anesteziologie, resuscitace a intenzivní medicíny ČLS JEP

STANOVISKO K PŘÍSTROJOVÉ MONITORACI HLOUBKY NERVOSVALOVÉ BLOKÁDY

prof. MUDr. Cvachovec Karel, CSc., MBA
MUDr. Mach Dušan
doc. MUDr. Štourač Petr, Ph.D.

Klinick

zitivní

Stanovisko bylo schváleno výborem ČSARIM dne 8.4.2017.

prof. MUDr. Cvachovec Karel, CSc., MBA
předseda výboru ČSARIM

Závěr

- Airway ma ečné perioperač
- Ideální por ná
- Nutno indiv
- Tréning – s
- Základ je c
- Záložní plá

Děkuji za pozornost!

Děkuji všem kolegům za spolupráci!

Děkuji týmu AKUTNĚ.CZ!