

Stále platí, že na porodnici vždy RSI...?

JAN BLÁHA

KLINIKA ANESTEZIOLOGIE, RESUSCITACE
A INTENZIVNÍ MEDICÍNY



1. LÉKAŘSKÁ
FAKULTA
Univerzita Karlova



VŠEOBECNÁ FAKULTNÍ
NEMOCNICE V PRAZE

jan.blaha@vfn.cz



XXXI.

kongres České společnosti
anesteziologie, resuscitace
a intenzivní medicíny

9.-11. ŘÍJNA 2025
PRAHA

Nemám konflikt zájmů

CÍSAŘSKÝ ŘEZ ... v celkové anestezii

The salient characteristics of RSI were delineated by Stept and Safar in 1970 [3].

- Preoxygenation
- Predetermined doses of thiopental and SCh
- Cricoid force
- Avoidance of ventilation by bag and mask
- Tracheal intubation

Sharp LM, Levy DM. Current Opinion in Anaesthesiology 2009, 22:357-361

INTUBACE

BOLEST

VYBAVENÍ PLODU



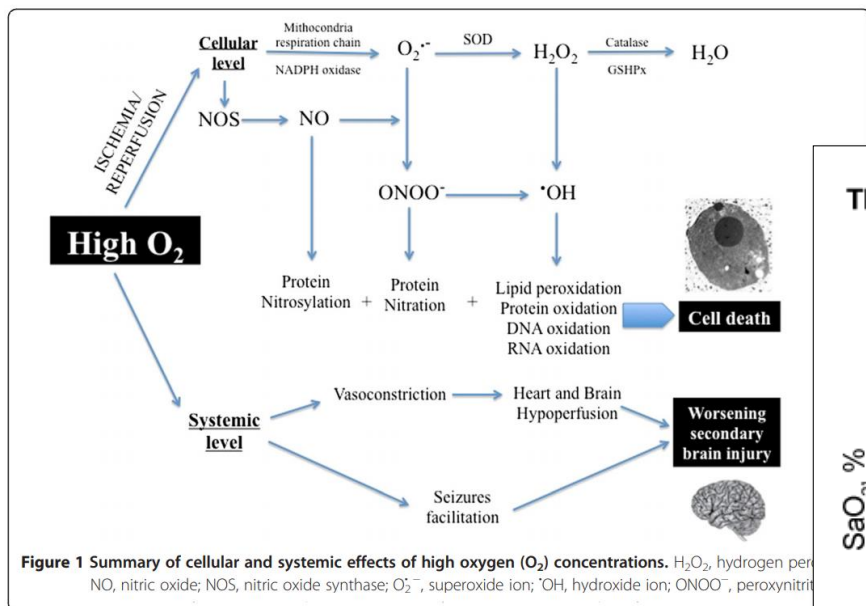
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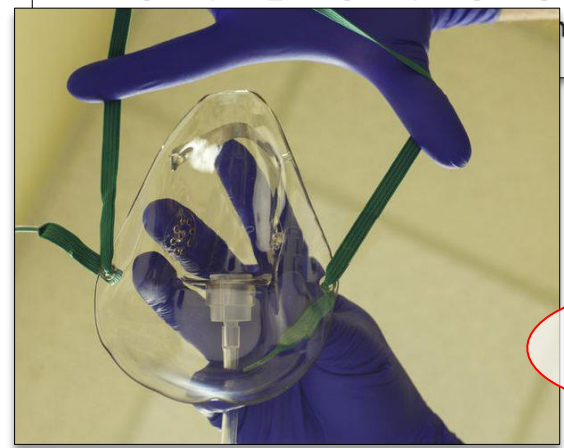
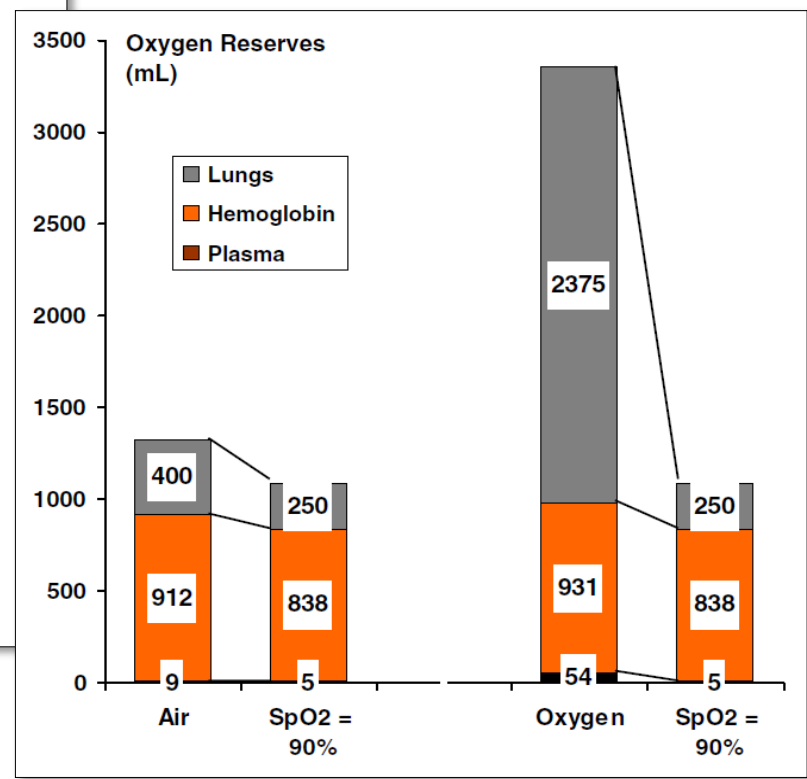
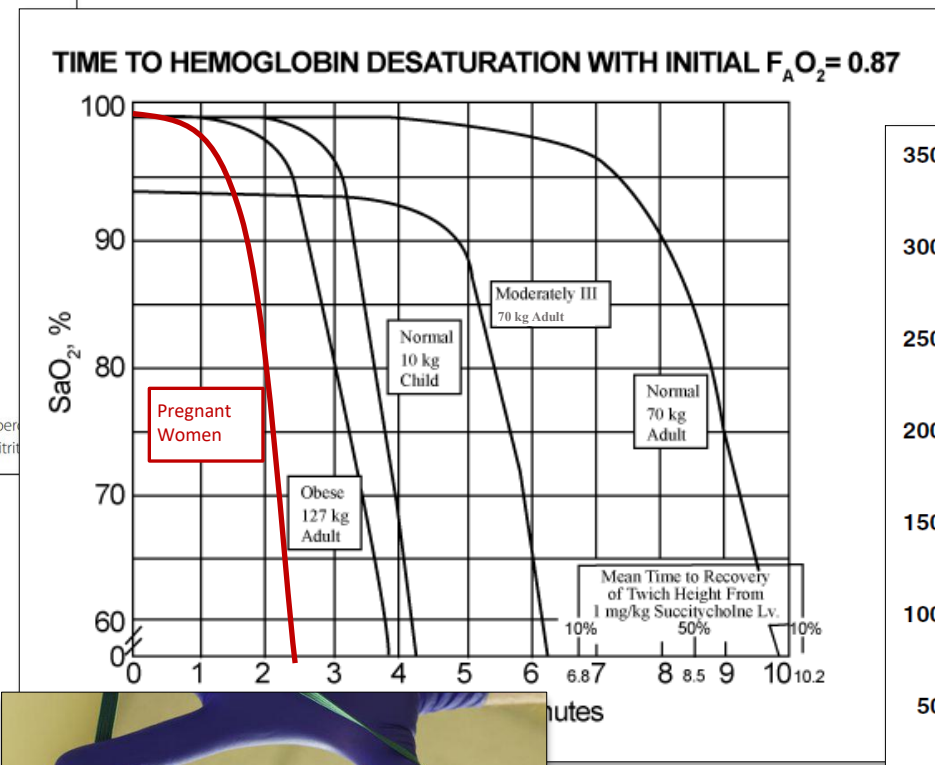


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Dell'Anna et al. Critical Care 2014, 18:555
 Benumof JL et al. Anesthesiology 1997; 87:979-8236
 Tanoubi I. Can J Anesth/J Can Anesth (2009) 56:449-466



menší stres pro matku

3-8 vdechů v objemu vitální kapacity (100% O_2)

5-8 minut dýchání (100% 8-10 l/min) O_2 normálním objemem

CÍSAŘSKÝ ŘEZ ... v celkové anestezii

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- ~~Preoxygenation~~
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Thiopental

mg/mL

PROPOFOL

mg/mL

Sharp LM, Levy DM. Current Opinion in Anaesthesiology 2009, 22:357-361

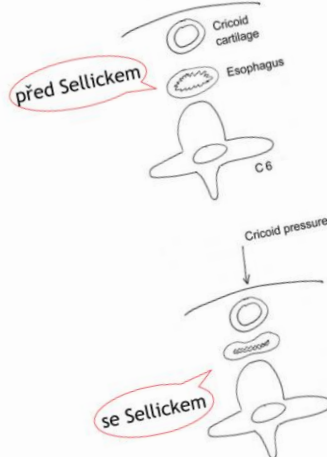
THE LANCET

Preliminary Communications

CRICOID PRESSURE TO CONTROL REGURGITATION OF STOMACH CONTENTS DURING INDUCTION OF ANESTHESIA

When the contents of stomach or esophagus gain access to the air-passages during anaesthesia the consequences are disastrous. In spite of modern anesthetic techniques—or sometimes, regrettably, because of them—regurgitation is still a considerable hazard during the induction of anaesthesia, particularly for operative obstetrics and emergency general surgery.

By a simple manœuvre during induction of anaesthesia, regurgitation of gastric or esophageal contents can be controlled until intubation with a cuffed endotracheal tube is completed. The same manœuvre may also be used to prevent inflation of the stomach (a potent cause of regurgitation) resulting from positive-pressure ventilation.



1. De Lee, J. B., Greenhill, J. P., *Principles and Practice of Obstetrics*, 1917.
2. 1925, Philadelphia, 1917.
3. Mandelstam, J. V., *Am. J. Obst. Gynec.*, 1940, 82, 191.
4. Mandelstam, J. V., *Am. J. Obst. Gynec.*, 1940, 82, 191.
5. Mandelstam, J. V., *Am. J. Obst. Gynec.*, 1940, 82, 191.
6. Mandelstam, J. V., *Am. J. Obst. Gynec.*, 1940, 82, 191.
7. Mandelstam, J. V., *Am. J. Obst. Gynec.*, 1940, 82, 191.
8. Mandelstam, J. V., *Am. J. Obst. Gynec.*, 1940, 82, 191.

Seminář KARIM 5.5.2025

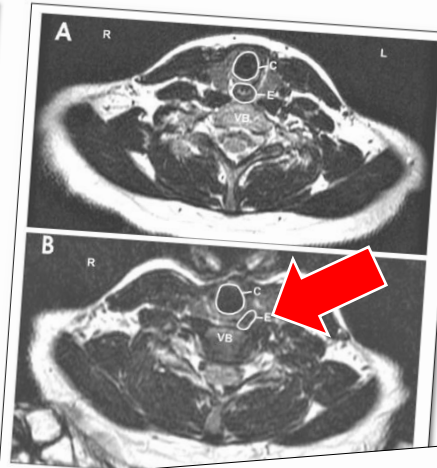
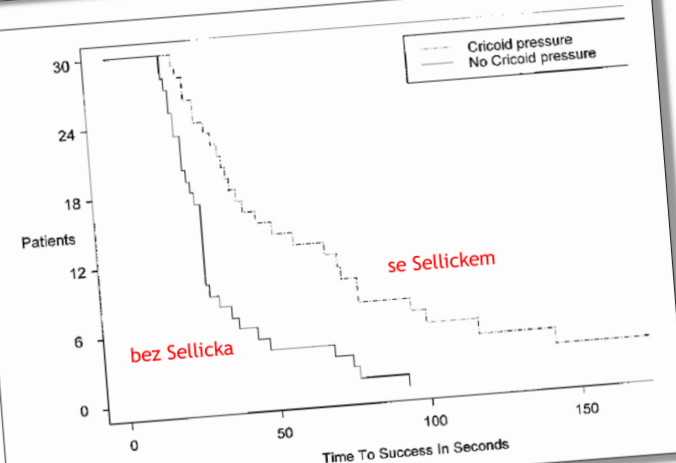


Fig. 3. (A) Magnetic resonance image of the neck demonstrating 12.1 mm of the left with application of cricoid pressure. (B) Magnetic resonance image of the neck demonstrating 12.1 mm of the left with application of cricoid pressure. E = esophagus, C = cricoid cartilage.

Smith KJ et al. *Anesthesiology* 2003; 99:60-4
Rice et al. *Anesth Analg* 2009;109:1546-52
Haslam et al. *Anaesthesia* 2005; 60: 41-47

Effect of Cricoid Pressure on the Success of Endotracheal Intubation with a Lightwand

R. Eric Hodgson, M.B., Ch.B.(Hons.), F.C.A.(S.A.)(Crit. Care),* P. Dean Gopalan, M.B., Ch.B., F.C.A.(S.A.),* Richard C. Burrows, M.B., Ch.B., F.C.A.(S.A.)(Crit. Care),† Khangelani Zuma, M.Sc.‡



Hodgson. *Anesthesiology* 2001; 94:259-62

Original Investigation

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

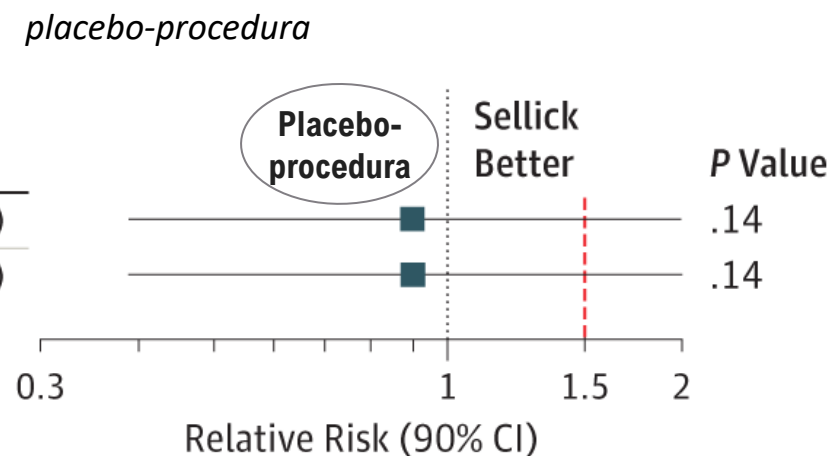
Aurélie Birenbaum, MD¹; David Hajage, MD, PhD²; Sabine Roche, MD¹; [et al](#)

JAMA Surg

Published Online: January 2019

2019;154;(1):9-17. doi:10.1001/jamasurg.2018.3577

	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)



Comparison of the Incidence of Pulmonary Aspiration Between the Sellick Group and the Sham Group

The points represent the estimates of relative risk (sham group/Sellick group), and the horizontal bars represent the associated 2-sided 90% CI. The upper limits are identical to those of the 1-sided 95% CI used in this study for establishing noninferiority. Clinical noninferiority of the sham procedure would be accepted if the upper limit of these intervals fell below the predefined noninferiority margin represented in red dotted line.

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Prodýchání maskou u sekce... ... A PROČ NE?



Facemask Ventilation during Induction of Anesthesia How “Gentle” Is “Gentle” Enough?

Shiroh Isono, M.D., Ph.D., Matthias Eikermann, M.D., Ph.D., Takeo Odaka, M.D., Ph.D.



“‘Gentle’ facemask ventilation has been recommended—but what does that mean? ... Bouvet et al. give us new important information to answer that question.”

THE ASPIRATION OF STOMACH CONTENTS INTO THE LUNGS DURING OBSTETRIC ANESTHESIA*

CURTIS L. MENDELSON, M.D., NEW YORK, N. Y.

(From the Department of Obstetrics and Gynecology, Cornell University Medical College and New York Hospital)

Summary

Sixty-six cases of aspiration of stomach contents into the lungs during obstetric anesthesia are analyzed. The incidence of this complication is 0.15 per cent in 44,016 pregnancies at the New York Lying-In Hospital from 1932 to 1945.

Am J Obstet Gynecol 1945;49:554-66.

Table 7 Reported incidence of aspiration in obstetric and general surgical populations

Study	No. of cases	Patient group characteristics	Incidence of aspiration [no. of cases]
This study	1870	Obstetric; peripartum; nonintubated	0.053% [1]
Kranz & Edwards [3]	37 282	Obstetric; vaginal delivery; nonintubated	0.013% [5]
Kranz & Edwards [3]	3076	Obstetric; Caesarean section; intubated	0.228% [7]
Olsson <i>et al.</i> [2]	2643	Obstetric; Caesarean section; intubated	0.15% [4]
Olsson <i>et al.</i> [2]	111 215	General surgery; nonintubated	0.018% [20]
Olsson <i>et al.</i> [2]	74 143	General surgery; intubated	0.085% [63]
Cohen <i>et al.</i> [5]	112 000	General surgery; intubated and nonintubated	0.064% [72]
Kallar [6]	529 150	Outpatients; intubated and nonintubated	0.017% [90]
Warner <i>et al.</i> [4]	13 427	General surgery; emergency	0.112% [15]
Warner <i>et al.</i> [4]	202 061	General surgery; elective	0.0257% [52]

Ezri *et al.* Anaesthesia 2000; 55:421-426

Anaesthesia, 1993, Volume 48, pages 53-57

Forum

An evaluation of gastric emptying times in pregnancy and the puerperium

E. M. Whitehead,* BSc, FFARCS, Research Registrar, M. Smith,† MB, BS, FFARCS, Y. Dean, MB, BS, FRCA, Senior Registrars, G. O'Sullivan, MD, FFARCS, Consultant Anaesthetist, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH.

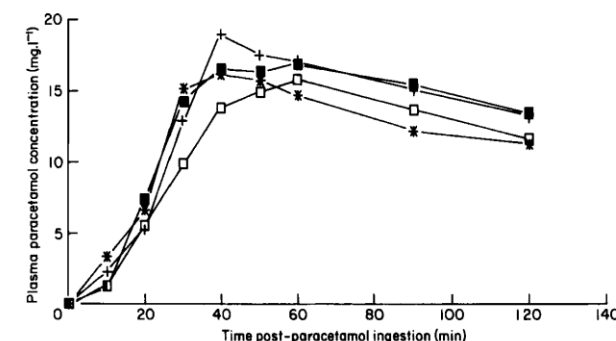


Fig. 1. Plasma paracetamol concentration vs time postparacetamol ingestion for the control (■), first (+), second (*) and third (□) trimester groups. Plasma paracetamol concentrations are expressed as median values.

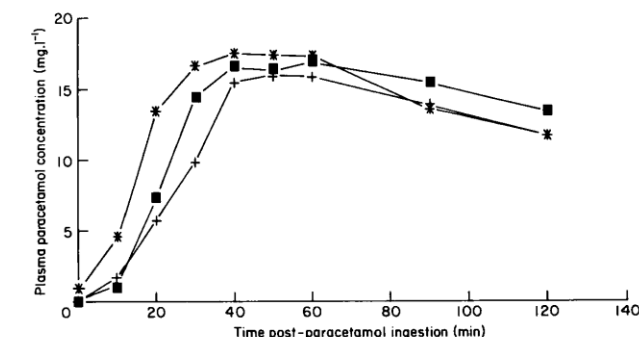


Fig. 2. Plasma paracetamol concentration vs time postparacetamol ingestion for the control group (■) and 30 females during the third trimester of pregnancy (+) and postdelivery between 18 and 48 h (*). Plasma paracetamol concentrations are expressed as median values.

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Ezri *et al.* Anaesthesia 2000; 55:421-426



Table 1. Lower Esophageal Sphincter, Intra gastric, and Barrier Pressures Obtained before and after Administration of 0.15 mg/kg Intravenous Metoclopramide

	Before Metoclopramide	After Metoclopramide	
	Baseline	Baseline	Cricoid Pressure Applied
Lower esophageal pressure	14.1 ± 2.9	19.6 ± 4.7†	5.0 ± 4.3*
Intra gastric pressure	4.6 ± 1.4	5.7 ± 1.9	5.8 ± 2.3
Barrier pressure	9.6 ± 3.4	14.1 ± 5.5†	-0.2 ± 5.1*

Data are in mmHg ± SD.

* $P < 0.05$ vs. respective baseline value. † $P < 0.05$ vs. respective pre-metoclopramide value.

Salem *et al.* Anesthesiology 2008; 109:806-10

TABLE 9. *Side effects of succinylcholine.*

- Massive hyperkalemia in susceptible patients
- Cardiac arrhythmias
- Muscle fasciculations
- Myalgias
- Rhabdomyolysis
- Increased intracranial pressure
- Increased intragastric pressure
- Increased intraocular pressure
- Malignant hyperthermia
- Masseter muscle spasm or jaw rigidity
- Prolonged apnea (1–4 hours), if atypical plasma cholinesterase



From Bevan DR. Complications of muscle relaxants. *Semin Anesth.* 1995;14:63.

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

FEBRUARY 28, 2019

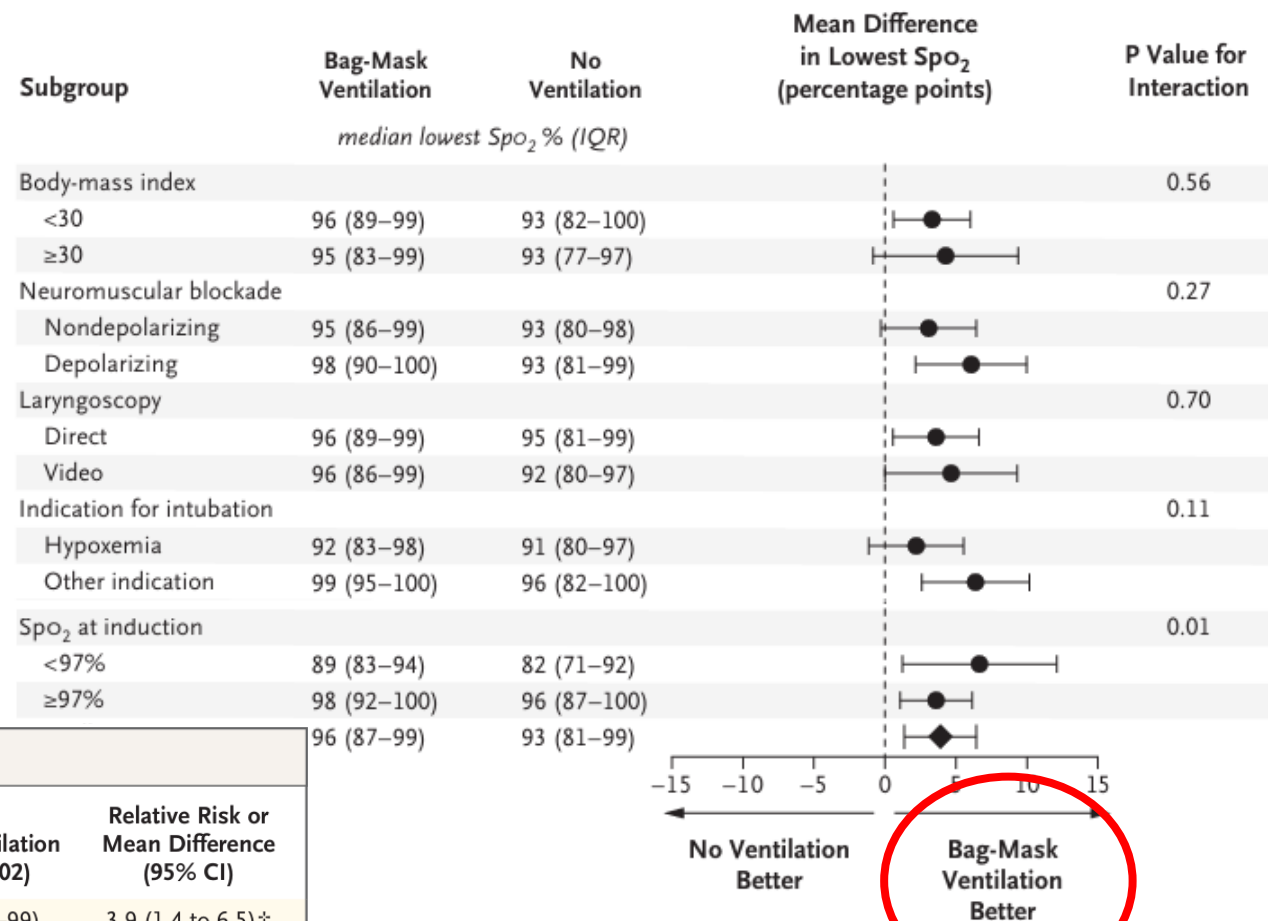
VOL. 380 NO. 9

Bag-Mask Ventilation during Tracheal Intubation of Critically Ill Adults

Jonathan D. Casey, M.D., David R. Janz, M.D., Derek W. Russell, M.D., Derek J. Vonderhaar, M.D., Aaron M. Joffe, D.O., Kevin M. Dischert, M.D., Ryan M. Brown, M.D., Aline N. Zouk, M.D., Swati Gulati, M.B., B.S., Brent E. Heideman, M.D., Michael G. Lester, M.D., Alexandra H. Toporek, M.D., Itay Bentov, M.D., Ph.D., Wesley H. Self, M.D., Todd W. Rice, M.D., and Matthew W. Semler, M.D., for the PreVent Investigators and the Pragmatic Critical Care Research Group*

Table 3. Outcomes of Tracheal Intubation.

Outcome	Bag-Mask Ventilation (N=199)	No Ventilation (N=202)	Relative Risk or Mean Difference (95% CI)
Primary: median lowest oxygen saturation (IQR) — %*	96 (87–99)	93 (81–99)	3.9 (1.4 to 6.5)†
Secondary: lowest oxygen saturation of <80% — no./total no. (%)	21/193 (10.9)	45/197 (22.8)	0.48 (0.30 to 0.77)
Exploratory safety outcomes			
Operator-reported aspiration — no. (%)	5 (2.5)	8 (4.0)	0.63 (0.21 to 1.91)
New opacity on chest radiography — no./total no. (%)	31/189 (16.4)	29/196 (14.8)	1.11 (0.70 to 1.77)
New pneumothorax — no./total no. (%)	2/189 (1.1)	6/196 (3.1)	0.34 (0.07 to 1.66)
New vasopressor after induction — no./total no. (%)	39/196 (19.9)	46/199 (23.1)	0.86 (0.59 to 1.26)
New systolic blood pressure of <65 mm Hg — no./total no. (%)	8/195 (4.1)	17/197 (8.6)	0.48 (0.21 to 1.08)
Cardiac arrest within 1 hr after intubation — no. (%)	2 (1.0)	4 (2.0)	0.51 (0.09 to 2.74)



Real-time Detection of Gastric Insufflation Related to Facemask Pressure-controlled Ventilation Using Ultrasonography of the Antrum and Epigastric Auscultation in Nonparalyzed Patients

A Prospective, Randomized, Double-blind Study

Lionel Bouvet, M.D., Marie-Laure Albert, M.D., Caroline Augris, M.D., Emmanuel Boselli, M.D., Ph.D., René Ecochard, M.D., Ph.D., Muriel Rabilloud, M.D., Ph.D., Dominique Chassard, M.D., Ph.D., Bernard Allaouchiche, M.D., Ph.D.

ABSTRACT

Background: The authors sought to determine the level of inspiratory pressure minimizing the risk of gastric insufflation while providing adequate pulmonary ventilation. The primary endpoint was the increase in incidence of gastric insufflation detected by ultrasonography of the antrum while inspiratory pressure for facemask pressure-controlled ventilation increased from 10 to 25 cm H₂O.

Methods: In this prospective, randomized, double-blind study, patients were allocated to one of the four groups (P10, P15, P20, and P25) defined by the inspiratory pressure applied during controlled-pressure ventilation: 10, 15, 20, and 25 cm H₂O. Anesthesia was induced using propofol and remifentanyl; no neuromuscular-blocking agent was administered. Once loss of eyelash reflex occurred, facemask ventilation was started for a 2-min period while gastric insufflation was detected by auscultation and by real-time ultrasonography of the antrum. The cross-sectional antral area was measured using ultrasonography before and after facemask ventilation. Respiratory parameters were recorded.

Results: Sixty-seven patients were analyzed. The authors registered statistically significant increases in incidences of gastric insufflation with inspiratory pressure, from 0% (group P10) to 41% (group P25) according to auscultation, and from 19 to 59% according to ultrasonography. In groups P20 and P25, detection of gastric insufflation by ultrasonography was associated with a statistically significant increase in the antral area. Lung ventilation was insufficient for group P10.

Conclusion: Inspiratory pressure of 15 cm H₂O allowed for reduced occurrence of gastric insufflation with proper lung ventilation during induction of anesthesia with remifentanyl and propofol in nonparalyzed and nonobese patients. (ANESTHESIOLOGY 2014; 120:XX-XX)

Table 3. Probability (95% CI) of Absence of Gastric Insufflation and Probability of Acceptable Facemask Ventilation According to the Applied Peak Airway Pressure

Peak Airway Pressure (cm H ₂ O)	Probability of No Gastric Insufflation (%)		Probability of Hypoventilation (%)	Probability of Too High Tidal Volume (%)	Probability of Acceptable Ventilation (%)
	According to Auscultation	According to Real-time US			
10	100 (83–100)	81 (57–95)	75 (50–91)	7 (1–27)	19 (5–43)
15	88 (66–98)	65 (41–84)	12 (2–34)	24 (8–47)	65 (41–84)
20	59 (35–80)	47 (25–70)	6 (0–26)	59 (35–80)	35 (16–60)
25	59 (35–80)	41 (20–65)	0 (0–16)	100 (84–100)	0 (0–16)

US = ultrasonography.

Obstetric Anaesthetists' Association/Difficult Airway Society difficult and failed tracheal intubation guidelines – the way forward for the obstetric airway

M. C. Mushambi^{1,*} and S. M. Kinsella²

Box 1 Summary of important points and changes in obstetric airway management

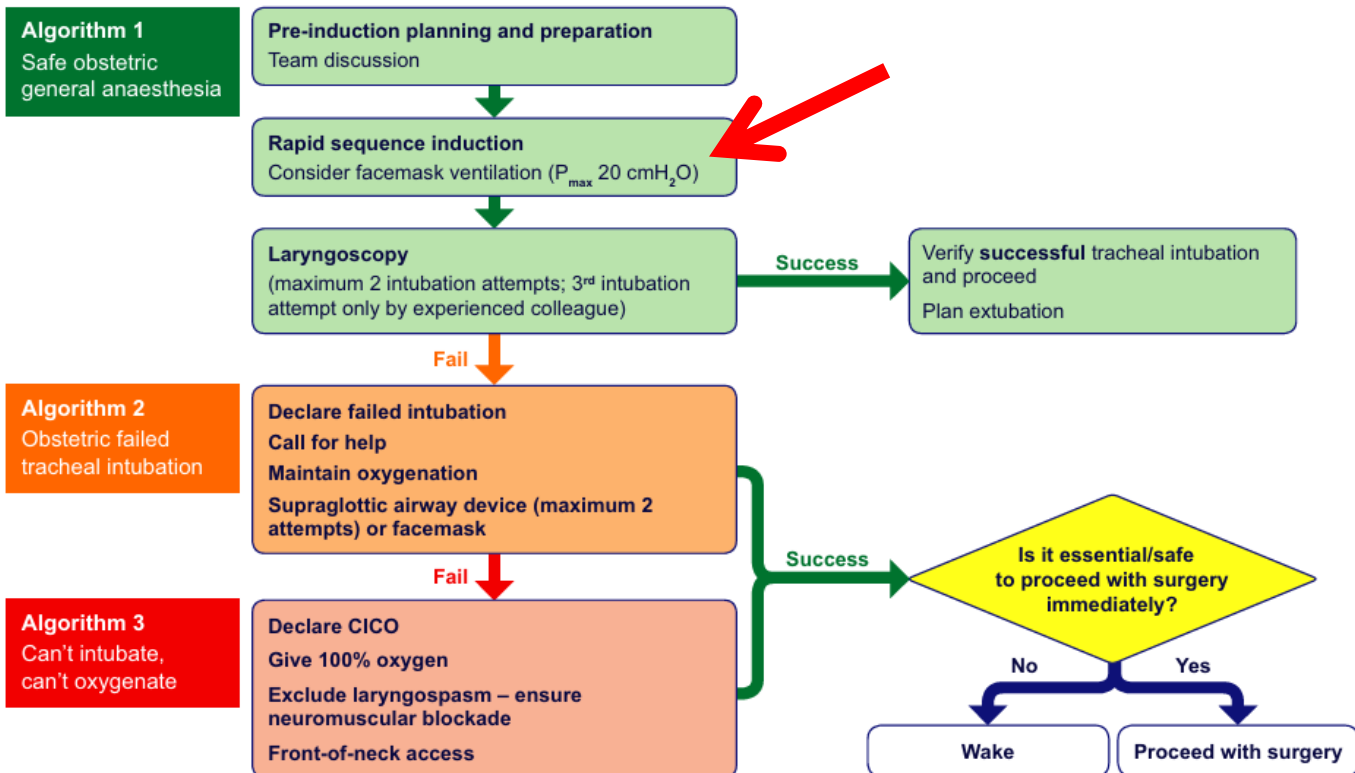
- Gentle mask ventilation with cricoid pressure after administering induction agents is recommended.
- Cricoid pressure should be reduced or released if there is a poor view at laryngoscopy.
- Supraglottic airway device or facemask ventilation are valid first options after failed tracheal intubation. A second-generation supraglottic airway device is recommended.

Guidelines

Obstetric Anaesthetists' Association and Difficult Airway Society guidelines for the management of difficult and failed tracheal intubation in obstetrics*

M. C. Mushambi,¹ S. M. Kinsella,² M. Popat,³ H. Swales,⁴ K. K. Ramaswamy,⁵ A. L. Winton⁶ and A. C. Quinn^{7,8}

Master algorithm – obstetric general anaesthesia and failed tracheal intubation



Consider facemask ventilation: Mask ventilation before laryngoscopy has generally been avoided during rapid sequence induction for fear of gastric insufflation and increasing the risk of regurgitation [104], but this should not occur with correctly applied cricoid pressure and using low peak ventilatory pressures [105, 106]. Currently, gentle bag/facemask ventilation (maximal inflation pressure < 20 cmH₂O) is recommended after administration of induction drugs during rapid sequence induction as it can reduce oxygen desaturation [104], and may allow an estimation of the likelihood of successful bag–facemask ventilation should it be required during prolonged or failed intubation attempts.

The salient characteristics of RSI were delineated by Stept and Safar in 1970 [3].

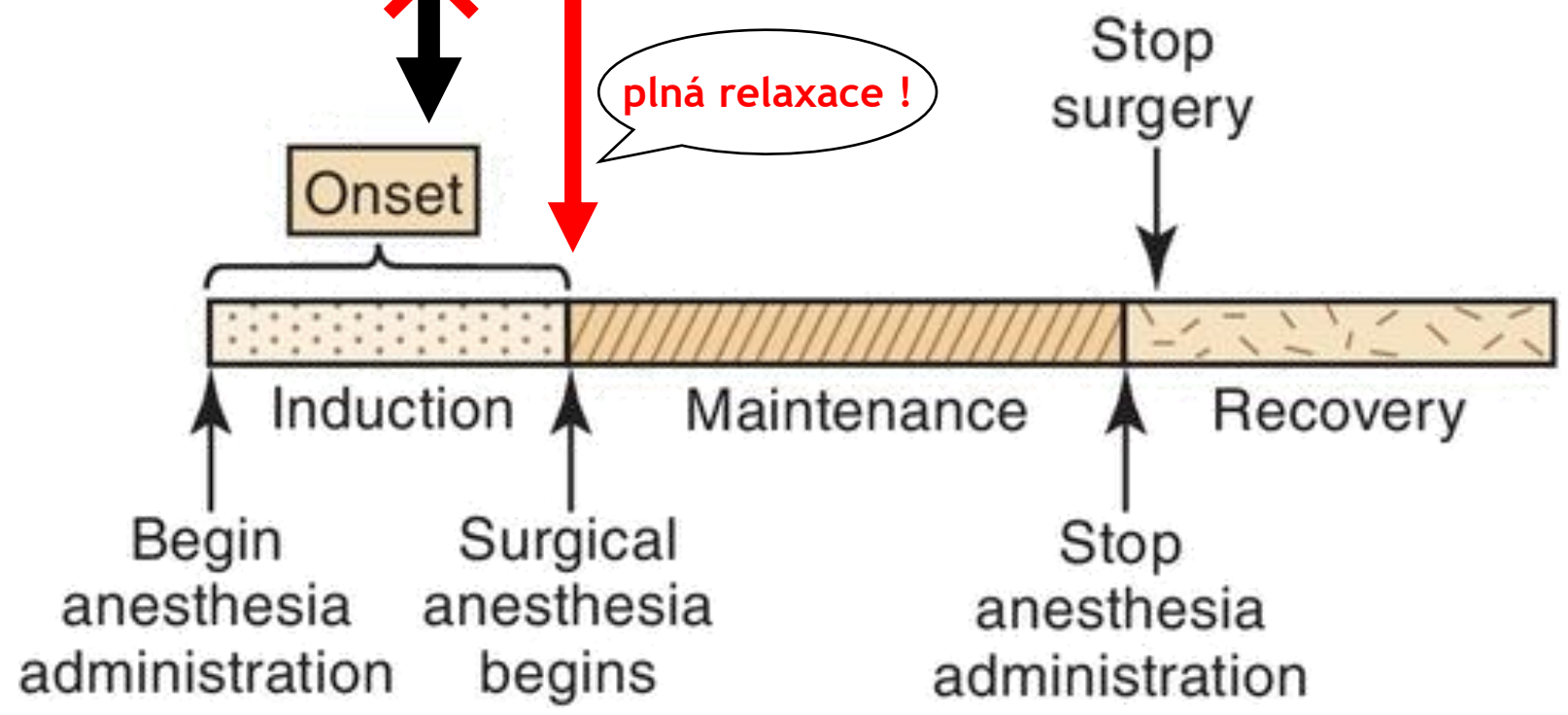
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- Predetermined doses of thiopental and SCh
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U těhotné je 10x vyšší riziko obtížné intubace,
tak si musíme vytvořit **OPTIMÁLNÍ PODMÍNKY**,
a ne **NEDOSTATEČNÉ** !



plná relaxace !



fascikulace v čase **0:10**

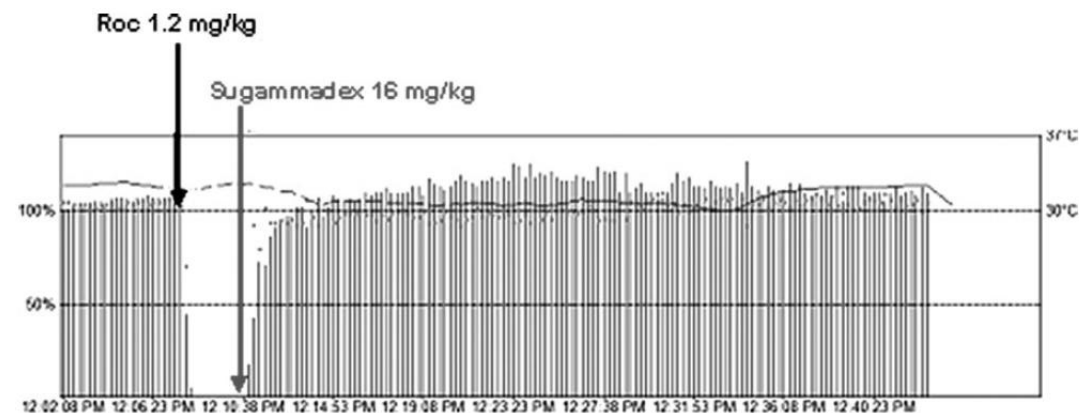
The Response of Newborns to Succinylcholine and d-Tubocurarine

Leonard F. Walts, M.D.,* and John B. Dillon, M.D.†

Anesthesiology. 1969 Jul;31(1):35-8.

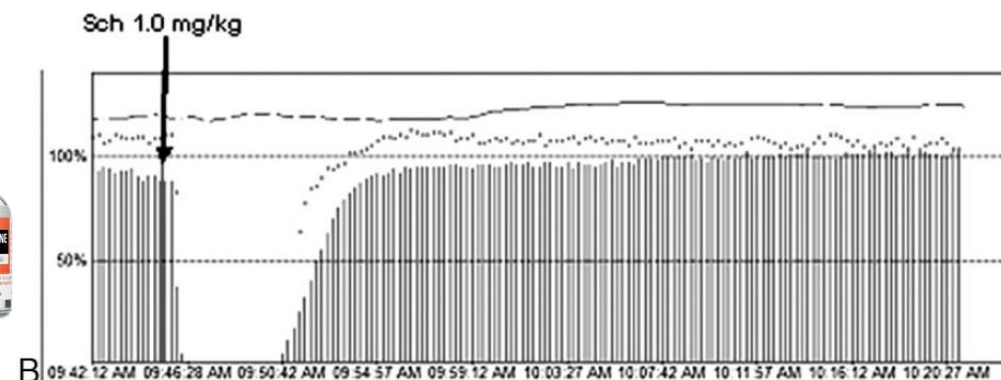
Results

Mean age of the 60 adult patients was 41 years. The group given succinylcholine received an average of 68 mg (range 54–83) of drug. All patients had 100 per cent depression in twitch force. Recovery times to 10, 50 and 90 per cent of control values averaged 7.0, 8.5, and 10 minutes, respectively.



A

3 min



B

Figure 4. Panel A shows the recovery of the twitch height and train-of-four (TOF) ratio after administration of 1.2 mg/kg rocuronium followed 3 min later by 16 mg/kg sugammadex, both given IV. Recovery to a first twitch height (T1) of 90% and a TOF ratio of 0.94 occurred 110 s later. The onset-offset time with this sequence (i.e., the time from the end of the injection of rocuronium to a T1 recovery to 90%) was 4 min 47 s. Panel B shows the effects of administering 1.0 mg/kg succinylcholine (Sch) with spontaneous recovery to a T1 of 90% occurring after 9 min and 23 s.

The Response of Newborns to Succinylcholine and d-Tubocurarine

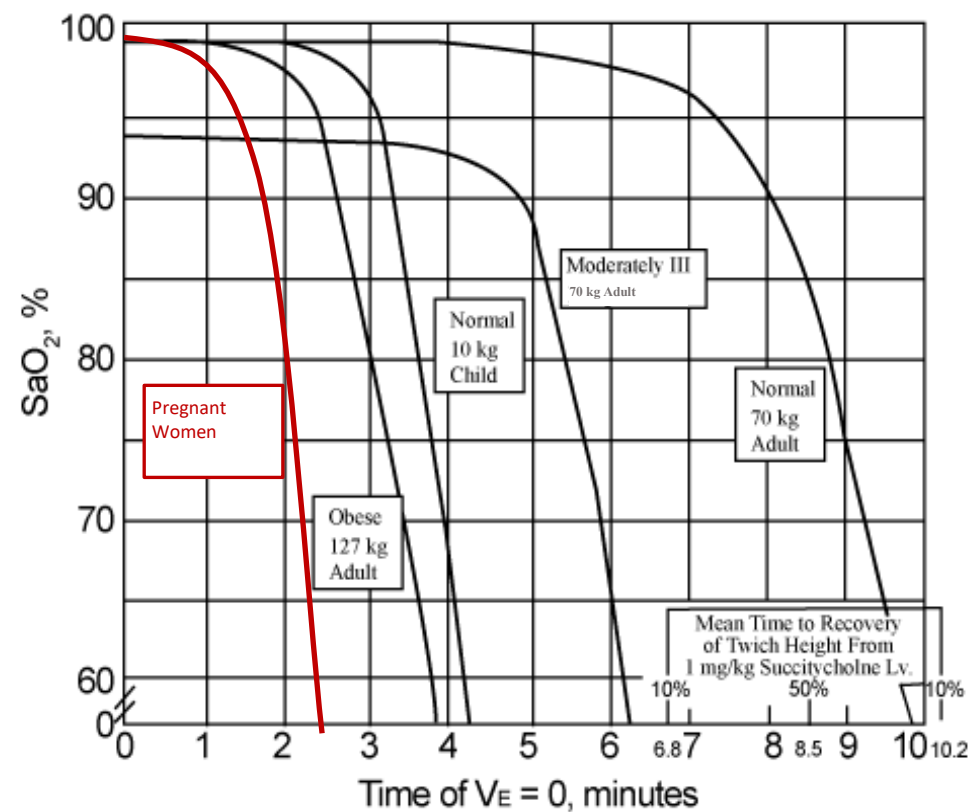
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TIME TO HEMOGLOBIN DESATURATION WITH INITIAL $F_A O_2 = 0.87$



Benumof JL et al. Anesthesiology 1997; 87:979-82

Clinical Workshop

C. PHILIP LARSON, JR., M.D., Editor

The Effect of a Single Consumption and C

PETER H. ERBGUTH, M.D.

Neuromuscular succinylcholine is often used in clinical practice. We have observed that abrupt and frequent use might be associated with increases in total-body succinylcholine increases. It is known that consumption of succinylcholine increases following to increased muscle activity. We therefore studied the effect of succinylcholine on pulmonary and arterial blood-gas changes.

Acta Anaesthesiol Scand 2011; 55: 203–208

Desaturation following rapid sequence induction using succinylcholine vs. rocuronium in overweight patients

L. TANG¹, S. LI¹, S. HUANG¹, H. MA¹ and Z. WANG²
Departments of ¹Anesthesiology and ²Pain Management, Shanghai First People's Hospital, Shanghai Jiaotong University, Shanghai, China

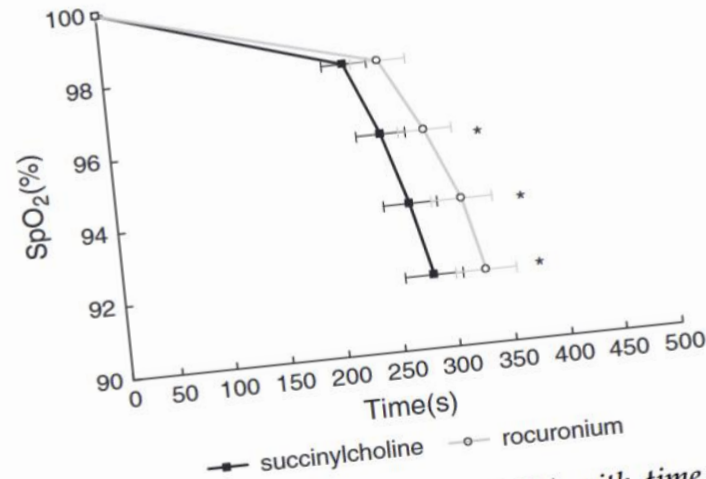


Fig. 2. Changes in oxygen saturation (S_pO_2) with time during non-hypoxic apnea in the succinylcholine or the rocuronium group. Mean values (points) for both groups are shown. The vertical lines indicate 95% CI. The curves show smooth before S_pO_2 reach 98%, but afterward fall straightly to 92% S_pO_2 . * $P < 0.05$ compared with succinylcholine.

Anaesthesia, 2010, 65, pages 358–361

doi:10.1111/j.1365-2044.2010.06243.x

ORIGINAL ARTICLE Effect of suxamethonium vs rocuronium on onset of oxygen desaturation during apnoea following rapid sequence induction

S. K. Taha,¹ M. F. El-Khatib,² A. S. Baraka,³ Y. A. Haidar,⁴ F. W. Abdallah,⁵ R. A. Zbeidy⁴ and S. M. Siddik-Sayyid¹

Suxamethonium vs rocuronium and arterial desaturation

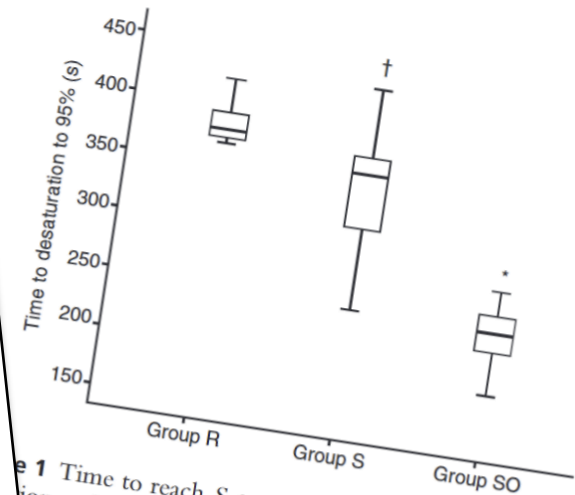
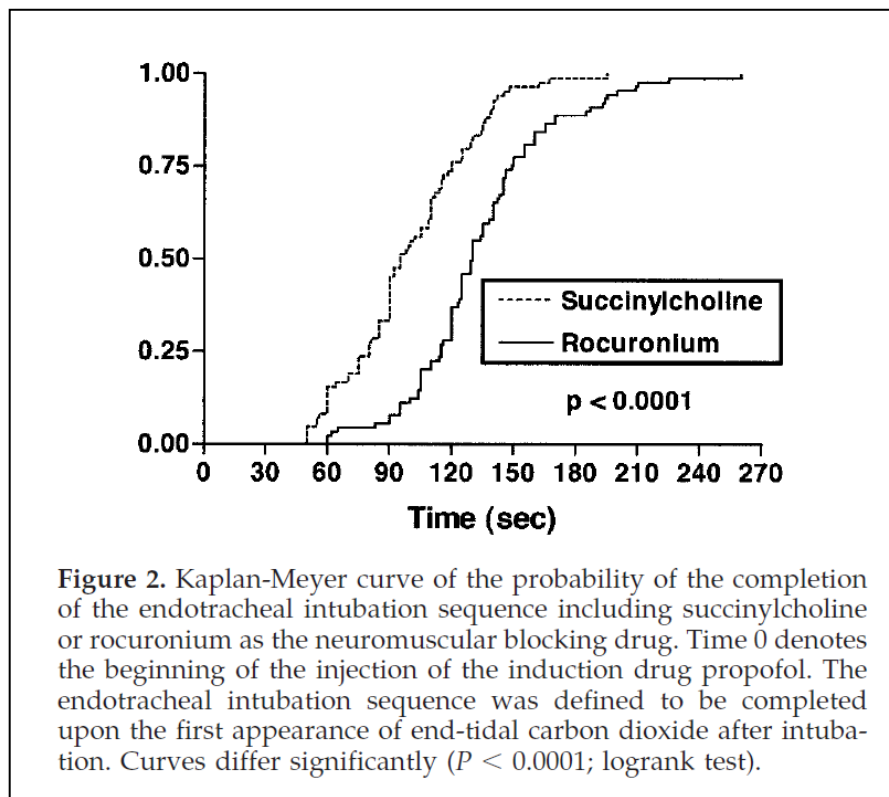
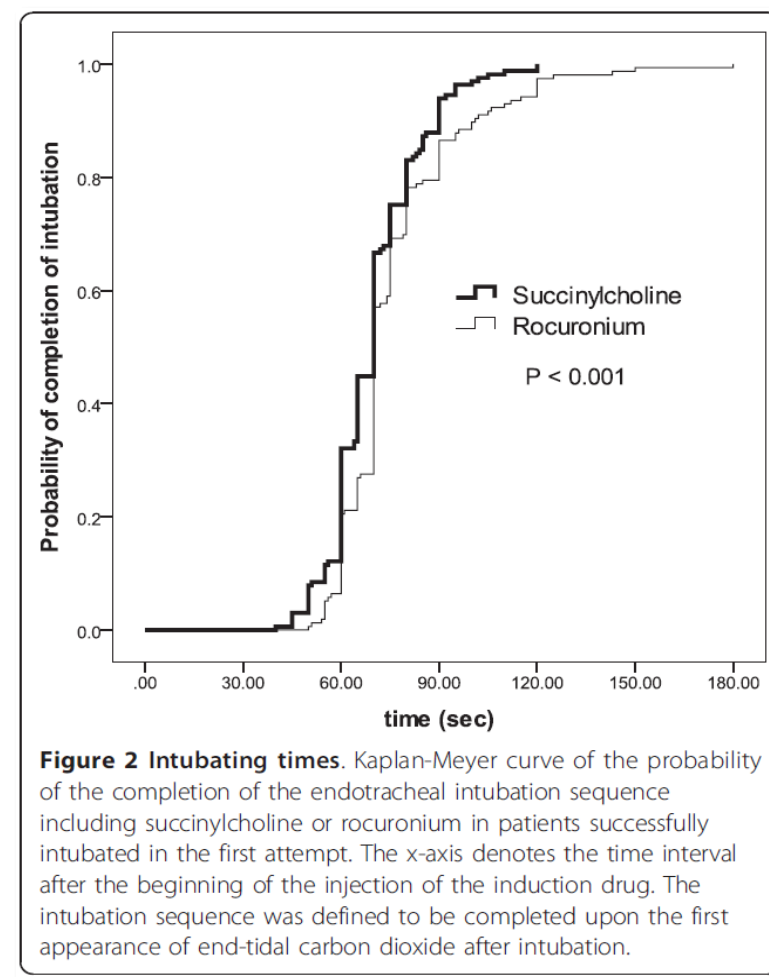


Fig. 1 Time to reach S_pO_2 of 95% during apnoea following induction of anaesthesia with lidocaine/fentanyl/propofol/rocuronium (Group R), lidocaine/fentanyl/propofol/suxamethonium (Group S), or propofol/suxamethonium (Group SO). Horizontal line, median; box, IQR; whiskers, range. * $P < 0.001$ compared with Group R and Group S; † $P = 0.003$ compared with Group R.

0,6 mg/kg



1 mg/kg



Sluga M et al. Anesth Analg 2005;101:1356–61

Stephan C Marsch, et al. Crit Care. 2011;15(4):R199-R199

Najdi odborné články, která doporučují u císařského řezu v celkové anestezii použití rokuronu místo suxamethonia (nebo sukcinylcholinu). Uveď jejich počet

Thought for 45s

Jasně. Níže jsou zdroje (guidelines, přehledové/edukační články a doporučení), které výslovně doporučují nebo považují za vhodné použít rokuronium (obvykle 1.0–1.2 mg/kg) pro RSI u císařského řezu v celkové anestezii, typicky s podmínkou dostupnosti/ochoty použít sugammadex k rychlé reverzi.

Počet nalezených doporučení: 4

📄 👍 💬 ↗️ ↺️ ... Sources

Chci všechny články, nejen guidelines, které zmiňují vhodnost použití rokuronu u císařského řezu a dej jejich seznam



Počet

- Články (studie + přehledy + meta-analýzy): 14
- Guidelines / edukační doporučení: 2

Randomizované / prospektivní studie

1. Abouleish E. et al., 1994 – multicentrická prospektivní studie u elektivních SC; rokuronium u term porodu bylo vhodné pro GA. [PubMed](#)
2. Abu-Halaweh S.A. et al., 2007 (Saudi Med J) – RCT: rokuronium 1.0 mg/kg vs. suxamethonium; závěr: rokuronium 1 mg/kg lze bezpečně použít pro RSI u SC a podmínky byly srovnatelné. [PubMed](#) +1
3. Stourac P. et al., 2016 (Anesth Analg) – RCT non-inferiority: rokuronium (1 mg/kg) + sugammadex vs. suxamethonium; ne-inferiorní čas k intubaci, validuje strategii rokuronium + sugammadex u SC. [journals.lww.com](#) +1
4. Bláha J. et al., 2020 (Int J Obstet Anesth) – RCT: lepší chirurgické podmínky pro vybavení plodu s rokuroniem než se suxamethoniem. [obstetranesthesi...](#) +1
5. Hwang B. et al., 2024 (Int J Med Sci) – studie dávky u SC: 1.0 mg/kg rokuronia bylo bezpečné pro matku i plod a bez prodloužení zotavení; podporuje vhodnost dávky 1.0 mg/kg u SC. [PMC](#) +1
6. Ahad A. et al., 2018 (Anaesthesia, Pain & Intensive Care) – komparativní studie rokuronium vs. suxamethonium pro RSI u SC (intubační podmínky). [apicareonline.com](#)

Meta-analýzy / systematické přehledy specificky k SC

7. BMC Anesthesiology, 2025 – systematický přehled a meta-analýza rokuronium vs. suxamethonium u SC (airway conditions, neonatální výsledky); hodnotí obě látky, rokuronium jako akceptovatelnou volbu při správném dávkování/monitoraci. [BioMed Central](#)

Přehledové/edukační články k obsterické GA a RSI (výslovně zmiňují vhodnost rokuronia u SC, typicky s dostupností sugammadexu)

8. Sharp L.M., 2009 (Curr Opin Anaesthesiol) – „Rapid sequence induction in obstetrics revisited“; se sugammadexem je reálné a vhodné používat rokuronium pro obsterický RSI. [PubMed](#)
9. McGuigan P.J. & Pühringer F.K., 2011 (BJA) – doporučují rokuronium 1.0 mg/kg pro obsterický RSI; role sugammadexu pro rychlou reverzi. [OUP Academic](#) +1
10. Fawcett W.J., 2019 (BJA Education) – „Suxamethonium or rocuronium for RSI?“; v prostředí s dostupným sugammadexem lze preferovat rokuronium 1.0–1.2 mg/kg (vč. obsterie). [PMC](#)
11. Delgado C. et al., 2020 (BJA Education) – „General anaesthesia in obstetrics“; shrnuje volbu sux vs. rokuronium (+ sugammadex) a uvádí rokuronium jako validní možnost pro SC. [bjaed.org](#)
12. Choi S.U. et al., 2022 (Anesth Pain Med) – přehled GA pro SC; uvádí rokuronium 1.0 mg/kg jako vhodnou volbu pro RSII při kvantitativním monitorování NMB a dostupném sugammadexu. [anesth-pain-me...](#) +1
13. Shatalin D. et al., 2025 (report/review, Israel) – přehled praxe GA pro SC; popisuje současné používání rokuronia v režimech pro SC. [PMC](#)

Low-Dose or High-Dose Rocuronium Reversed with Neostigmine or Sugammadex for Cesarean Delivery Anesthesia: A Randomized Controlled Noninferiority Trial of Time to Tracheal Intubation and Extubation

Petr Stourac, MD, PhD,* Milan Adamus, MD, PhD,† Dagmar Seidlova, MD, PhD,‡ Tomas Pavlik, MSc, PhD,§ Petr Janku, MD, PhD,|| Ivo Krikava, MD, PhD,¶ Zdenek Mrozek, MD, PhD,‡ Martin Prochazka, MD, PhD,# Jozef Klucka, MD,* Roman Stoudek, MD,* Ivana Bartikova, MD,¶ Martina Kosinova, MD,¶ Hana Harazim, MD,¶ Hana Robotkova, MD,‡ Karel Hejduk, MSc,§ Zuzana Hodicka, MD, PhD,|| Martina Kirchnerova, MD,† Jana Francakova, MD,† Lenka Obare Pyszkova, MD,† Jarmila Hlozkova, MD,† and Pavel Sevcik, MD, PhD**

BACKGROUND: Rocuronium for cesarean delivery under general anesthesia is an alternative to succinylcholine for rapid-sequence induction of anesthesia because of the availability of sugammadex for reversal of neuromuscular blockade. However, there are no large well-controlled studies in women undergoing general anesthesia for cesarean delivery. The aim of this noninferiority trial was to determine whether rocuronium and sugammadex confer benefit in time to tracheal intubation (primary outcome) and other neuromuscular blockade outcomes compared with succinylcholine, rocuronium, and neostigmine in women undergoing general anesthesia for cesarean delivery.

METHODS: We aimed to enroll all women undergoing general anesthesia for cesarean delivery in the 2 participating university hospitals (Brno, Olomouc, Czech Republic) in this single-blinded, randomized, controlled study. Women were randomly assigned to the ROC group (muscle relaxation induced with rocuronium 1 mg/kg and reversed with sugammadex 2–4 mg/kg) or the SUX group (succinylcholine 1 mg/kg for induction, rocuronium 0.3 mg/kg for maintenance, and neostigmine 0.03 mg/kg for reversal of the neuromuscular blockade). The interval from the end of propofol administration to tracheal intubation was the primary end point with a noninferiority margin of 20 seconds. We recorded intubating conditions (modified Vby-Mogensen score), neonatal outcome (Apgar score <7; umbilical artery pH), anesthesia complications, and subjective patient complaints 24 hours after surgery.

RESULTS: We enrolled 240 parturients. The mean time to tracheal intubation was 2.9 seconds longer in the ROC group (95% confidence interval, –5.3 to 11.2 seconds), noninferior compared with the SUX group. Absence of laryngoscopy resistance was greater in the ROC than in the SUX groups (ROC, 87.5%; SUX, 74.2%; $P = 0.019$), but there were no differences in vocal cord position ($P = 0.45$) or intubation response ($P = 0.31$) between groups. No statistically significant differences in incidence of anesthesia complications or in neonatal outcome were found (10-minute Apgar score <7, $P = 0.07$; umbilical artery pH, $P = 0.43$). The incidence of postpartum myalgia was greater in the SUX group (ROC 0%; SUX 6.7%; $P = 0.007$). The incidence of subjective complaints was lower in the ROC group (ROC, 21.4%; SUX, 37.5%; $P = 0.007$).

CONCLUSIONS: We conclude that rocuronium for rapid-sequence induction is noninferior for time to tracheal intubation and is accompanied by more frequent absence of laryngoscopy resistance and lower incidence of myalgia in comparison with succinylcholine for cesarean delivery under general anesthesia. (Anesth Analg 2016;122:1536–45)

	ROC	Estimated timeline	SUX
Written Patient Informed Consent			Written Patient Informed Consent
Randomization			Randomization
TOF-Watch SX preparation			TOF-Watch SX preparation
Rapid Sequence Induction preparation			Rapid Sequence Induction preparation
Preoxygenation 100% 6 L/min O ₂ 3 min			Preoxygenation 100% 6 L/min O ₂ 3 min
Propofol 2 mg/kg IV administration		Time 0	Propofol 2 mg/kg IV administration
in 10 s			in 10 s
TOF-Watch SX calibration in mode 2 (10s)		Time 10s	TOF-Watch SX calibration in mode 2 (10s)
Rocuronium 1 mg/kg IV administration (5s)		Time 15s	Succinylcholine 1 mg/kg IV administration (5s)
Single Twitch drop under 10% or absence of visible finger movement during stimulation		Time 60s	Single Twitch drop under 10% or absence of visible finger movement during stimulation
Intubation (first visible etCO ₂ curve wave)		Time 90s	Intubation (first visible etCO ₂ curve wave)
Incision		Time 100s	Incision
			Attainment of Single Twitch 20-30%
Umbilical cord cut		Time 300s	Umbilical cord cut

Table 2. Evaluation of Times Recorded During the Procedure According to Intention to Treat

	ROC group (n = 120)		SUX group (n = 120)		P ^b
	Mean (SD)	Median (min–max)	Mean (SD)	Median (min–max)	
Time from induction to first wave on ETCO ₂ curve (s)	87 (28)	85 (34–200)	84 (36)	78 (33–284)	
Time from induction ^a to ST 10% (s)	65 (25)	59 (22–170)	61 (29)	56 (20–258)	0.05



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ORIGINAL ARTICLE

Surgical conditions with rocuronium versus suxamethonium in cesarean section: a randomized trial

J. Bláha,^{a,†} P. Nosková,^{a,†} K. Hlinecká,^b V. Krakovská,^c V. Fundová,^a T. Bartošová,^a
P. Michálek,^a M. Stříteský^a



Table 2 Times from induction of anesthesia to end of surgery; and induction characteristics.

	Rocuronium group		Suxamethonium group		Difference in means	P-value
	Mean	Median	mean	median		
Induction – delivery interval (s)	268.4 (72.9)	265 (223–330)	275.6 (63.4)	267 (239–400)	–7.2 (–39.5 to 19.3)	0.62
Induction – intubation interval (s)	105.8 (33.7)	108 (77–134)	67.6 (32.1)	63 (50–123)	38.2 (24.4 to 52.0)	<0.001
Incision – delivery interval (s)	146.6 (68.3)	130 (99–179)	196.2 (50.7)	201 (167–277)	–49.7 (–74.8 to –24.4)	0.0002
Intubation – incision interval (min)	15.8 (6.9)	15 (4–43)	11.7 (6.4)	10 (3–29)	4.1 (0.4 to 7.8)	0.061
Length of surgery (min)	39.3 (8.9)	39 (27–53)	39.4 (9.6)	38 (26–54)	0.1 (–4.0 to 3.8)	0.976
End of surgery to extubation (min)	5.2 (4.6)	4 (0–13)	8.8 (5.8)	8 (2–19)	–3.5 (–5.8 to 1.4)	0.002
SRSD (points)	3.73 (0.53)	4 (3–5)	2.77 (0.55)	3 (2–4)	1.0 (–0.01 to 0.20)	<0.001
Blood loss (mL)	533 (76)	500 (500–600)	538 (98)	500 (500–650)	–5 (–38 to 28)	0.859
Thiopental (mg/kg)	4.7 (0.16)	4.7 (4.5–5.1)	4.7 (0.21)	4.7 (4.5–5.3)		0.471
Muscle relaxant dose (mL/kg)	0.092 (0.01)	0.093 (0.090–0.106)	0.095 (0.00)	0.094 (0.09–0.106)		0.072
Muscle relaxant dose (mg/kg)	0.55 (0.05)	0.56 (0.54–0.65)	0.95 (0.04)	0.94 (0.9–0.11)		0.177

Data are presented as mean (SD) or median (range). Difference between the groups is expressed as median (95% confidence interval). SRSD: Surgical rating scale for delivery.



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Data are presented as mean (SD) or median (range). Difference between the groups is expressed as median (95% confidence interval). SRSD: Surgical rating scale for delivery.

Intubační podmínky SX vs ROC ...?

Anesth Analg 2016;122:1536–45)

Low-Dose or High-Dose Rocuronium Reversed with Neostigmine or Sugammadex for Cesarean Delivery Anesthesia: A Randomized Controlled Noninferiority Trial of Time to Tracheal Intubation and Extubation

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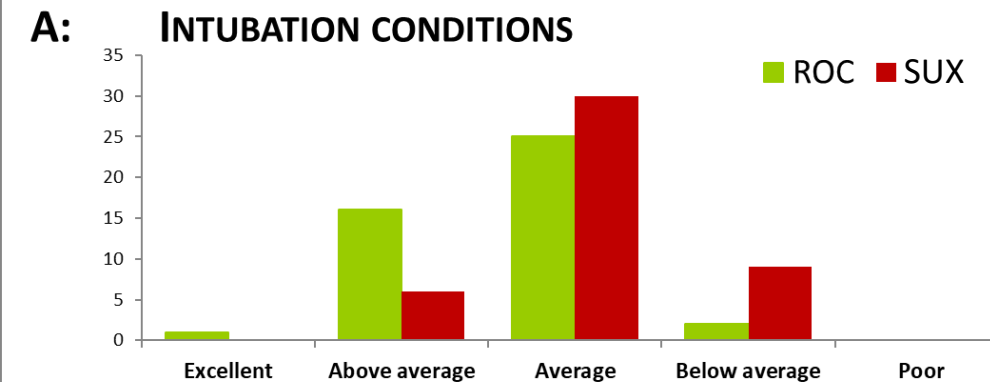
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Surgical conditions with rocuronium versus suxamethonium in cesarean section: a randomized trial

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Table 3. Evaluation of Intubating Conditions

	ROC group (n = 120)		SUX group (n = 120)		P ^a
	n	%	n	%	
Resistance to laryngoscopy					0.019
None	105	88	89	74	
Mild (slight)	14	12	25	21	
Severe (active)	1	1	6	5	



Rocuronium (Org 9426) for Caesarean section

E. ABOULEISH, T. ABBOUD, T. LECHEVALIER, J. ZHU, A. CHALIAN AND K. ALFORD

Table 2 Intubation scores (excellent = jaw relaxed, cords immobile and apart, no movement on intubation; good = jaw relaxed, cords immobile and apart, some diaphragmatic movement; poor = jaw relaxed, cords moving, strong diaphragmatic movement; inadequate = jaw not relaxed and cords closed) (No. (%)) and intubation conditions (mean (SE)). Significant differences ($P < 0.05$) vs: † excellent, * good and excellent scores (Kruskal–Wallis one-way ANOVA)

	No. (%)	No. of twitches present	Injection to start of intubation (s)	Onset time(s) (injection to max. effect)	Thiopentone dose (mg kg ⁻¹)
Inadequate	1 (2.5)	4*	72	132†	4.0†
Poor	3 (7.5)	4*	63.7 (14.3)	156 (94)†	4.0
Good	16 (40.0)	2	82.6 (4.3)	124 (12)†	5.6 (0.2)
Excellent	20 (50.0)	0.79	79.4 (2.9)	72 (11)	5.9 (0.1)

Summary

This was a prospective, non-randomized, multi-centre study of rocuronium (Org 9426) in 40 elective Caesarean section patients at full term without fetal distress. Anaesthesia was induced with thiopentone 4–6 mg kg⁻¹ i.v. and rocuronium 0.6 mg kg⁻¹ and maintained with isoflurane and nitrous oxide in oxygen. Monitors included ECG, arterial pressure, pulse oximeter and train-of-four (TOF) produced by ulnar nerve stimulation. In all patients, full neuromuscular block at the hand indicating the maximum effect of rocuronium ($T_1 = 0$) occurred at a mean time of 98.1 (SE 9.4) s. However, after 79.3 (2.9) s, excellent to good intubating conditions were achieved in 90% of patients. Injection to delivery time was 12.7 (0.9) min and the surgical procedure lasted 53.1 (3.5) min. After administration of rocuronium, T_2 appeared after 32.7 (1.8) min (indicating duration of effect). At the end of the surgical procedure in 39 patients, glycopyrronium 0.2 mg and neostigmine 1 mg were given every 5 min to antagonize residual neuromuscular effect. The mean dose of neostigmine required was 1.54 (0.1) mg. Rocuronium had no clinically significant effect on maternal heart rate or arterial pressure. After administration of thiopentone and rocuronium in two patients, temporary erythema occurred, one along the site of injection and the other on the chest wall. Rocuronium had no untoward effects on the neonates, evaluated by 1- and 5-min Apgar scores, time to sustained respiration, total and muscular neuroadaptive capacity scores, acid–base status and blood-gas tensions in umbilical arterial and venous blood. At delivery in 32 patients, concentrations of rocuronium in maternal venous (MV) and umbilical venous (UV) plasma were 2412 (180) ng ml⁻¹ and 389.6 (27.8) ng ml⁻¹, respectively (UV/MV ratio 0.16). In 12 patients, the mean concentration of rocuronium in umbilical arterial (UA) plasma was 271.2 (34.7) ng ml⁻¹ with a UA/UV ratio of 0.62. 17-Desacetylrocuronium (Org 9943), the main metabolite of rocuronium, was below the sensitivity level (25 ng ml⁻¹) in umbilical venous and arterial plasma; the maternal venous plasma concentration was 178 (31) ng ml⁻¹. (*Br. J. Anaesth.* 1994; 73: 336–341)

Key words

Anaesthesia, obstetric. Neuromuscular block, rocuronium.

Why do we still use suxamethonium for caesarean section?

Authors: [AJ England](#) and [Vinnie Sodhi](#) | [AUTHORS INFO & AFFILIATIONS](#)

Publication: [Hospital Medicine](#) • [Volume 62, Number 12](#) • <https://doi.org/10.12968/hosp.2001.62.12.1717>

Abstract

The argument for retaining suxamethonium for general anaesthesia revolves around its rapid onset and short duration. Suxamethonium has served anaesthesia well for over 40 years, but has many adverse effects. Most women experience myalgia and histamine release, others suffer life-threatening cardiac dysrhythmias, anaphylactoid reactions, electrolyte disturbances, and muscle abnormalities such as malignant hyperpyrexia, masseter spasm and myotonic crises. Rocuronium provides comparable conditions for tracheal intubation without these problems.

OBSTETRIC AND GYNECOLOGICAL ANESTHESIA: EDITED BY MARC VAN DE VELDE

Rapid sequence induction in obstetrics revisited

Sharp, Lisa M^a; Levy, David M^b

[Author Information](#) 

Current Opinion in Anaesthesiology 22(3):p 357-361, June 2009. | DOI: 10.1097/ACO.0b013e3283294c4a

Abstract

Purpose of review

The regimen of thiopental, succinylcholine (SCh) and unsupplemented nitrous oxide/oxygen for Caesarean section was first introduced 50 years ago. This review examines which elements have endured, what has changed, and how practice might alter in the very near future.

Recent findings

Sugammadex, a cyclodextrin, is capable of rapid reversal of profound rocuronium neuromuscular blockade.

Summary

It is now feasible that SCh might be replaced with a high-dose rocuronium-sugammadex combination.

SYSTEMATIC REVIEW Open Access

Intubation conditions and neonatal outcomes with rocuronium versus suxamethonium in cesarean sections: A systematic review and meta-analysis

Atef A. Hassan¹, Mohamed A. Khalafallah², Noha Rami Ismail³, Esraa Menshawy⁴, Abdulrhman Mady⁵, Moaz Abouelmagd⁶, Amr Menshawy⁷ and Ahmed Mensahwy^{7*}

Abstract

Background While general anesthesia is necessary for some emergency deliveries, it carries risks such as failed intubation and neonatal complications. This study investigates whether rocuronium and suxamethonium (also known as Succinylcholine) provide equivalent conditions for airway management and neonatal outcomes during cesarean sections. Ensuring the safety and efficacy of these agents is crucial due to the physiological and hemodynamic changes associated with pregnancy and delivery.

Method We conducted a systematic review and meta-analysis following PRISMA guidelines. We included studies involving pregnant women undergoing cesarean sections that used rocuronium as an intervention and suxamethonium as a comparator, reporting outcomes such as Apgar scores, surgery duration, and time-related metrics. A comprehensive search of databases was performed up to July 2025. Statistical analyses were performed using RevMan Software, assessing heterogeneity and summarizing findings through mean differences and risk ratios.

Results Our metaanalysis of six studies comprising 1,122 patients showed that succinylcholine significantly reduced the time from induction to umbilical cord clamping compared with rocuronium (mean difference [MD] 19.21 s; 95% CI 5.15 to 33.27; $P=0.007$; $I^2=0\%$). There was no significant difference between groups in time from incision to delivery (MD -12.72 s; 95% CI -84.84 to 59.41; $P=0.73$; $I^2=94\%$) or in total surgery duration (MD -1.20 min; 95% CI -3.70 to 1.30; $P=0.34$; $I^2=63\%$). Newborns in the succinylcholine group were more likely to achieve favorable 1 min Apgar scores (risk ratio [RR] 1.87; 95% CI 1.31 to 2.67; $P=0.0006$; $I^2=0\%$) and 5 min Apgar scores (RR 2.52; 95% CI 1.21 to 5.25; $P=0.01$; $I^2=30\%$), whereas 10 min Apgar scores did not differ significantly (RR 2.51; 95% CI 0.66 to 9.64; $P=0.18$; $I^2=34\%$). In the subgroup of scheduled cesarean deliveries, only the 1 min Apgar score remained significantly higher with succinylcholine (RR 1.75; 95% CI 1.10 to 2.77; $P=0.02$; $I^2=0\%$).

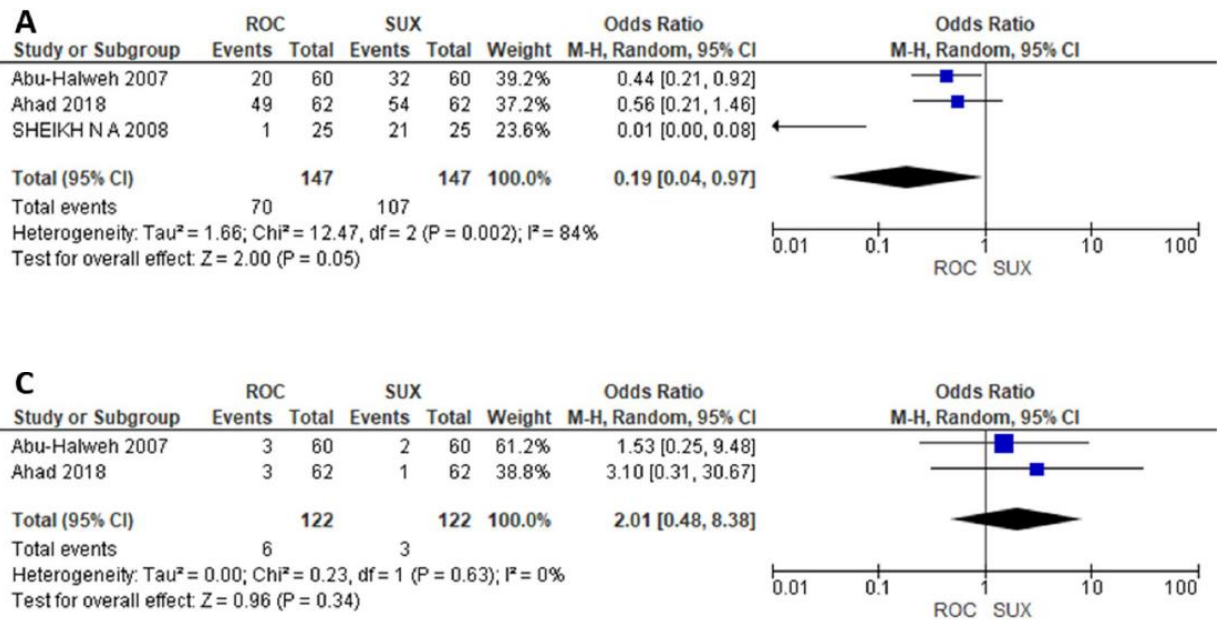


Fig. 7 A) Excellent conditions, B) good conditions, C) poor conditions



FIGURE 1: Photograph showing the improved airway position obtained by the use of a 'ramping' technique.

Authors received permission for use of photograph. *Anaesthesia and Intensive Care*, Vol. 39, No. 4, July 2011



OBAAMA-COV



Table 3: GENERAL ANESTHESIA - characteristics of elective and acute caesarean sections

	Czech Republic		Slovakia	
	Elective	Emergent	Elective	Emergent
	N = 154	N = 387	N = 90	N = 127
Reason for administering general anaesthesia				
Urgency	0,6	69,5	5,6	86,6
Preferences of the mother	59,7	14,4	59,6	5,5
LMWH applied	2,6	1,0	1,1	1,6
Bleeding complications	0,6	1,6	2,2	1,6
Failure of neuraxial blockade	16,9	5,7	16,9	2,4
Placentation disorder	1,9	1,8	0,0	0,0
Other	17,7	6,0	14,6	2,4
Securing the airway				
RSI induction	87,8	96,5	96,6	98,4
Sellick's manoeuvre	10,6	28,1	4,9	34,0
Complications in securing the airway				
Difficult intubation	2,6	1,6	2,2	0,8
Regurgitation	0,0	0,8	0,0	0,8
Aspiration	0	0	0	0
Vomiting	0	0	0	0
Hyposaturation	3,2	0,5	0,0	0,0
Other	1,3	0,0	0,0	0,0
Induction to anaesthesia				
Thiopental	41,6	37,6	24,7	32,3
Propofol	53,9	60,8	75,3	66,1
Hypnomidate	1,3	0,3	0,0	0,0
Suxamethonium	94,2	97,4	94,4	95,3
Rocuronium	2,6	2,3	2,2	3,1

Data are given in %.

General anesthesia for cesarean delivery: Israeli national survey

Daniel Shatalin^{1†}, Yair Binyamin^{2†}, Jacob Weinstein³, Jana Pirogov¹, Carolyn F. Weiniger⁴, Sharon Orbach-Zinger^{5,6} and Alexander Ioscovich¹

Abstract

Background Cesarean delivery is one of the most common surgeries performed worldwide. Given the unavoidable use of general anesthesia in some situations, and the potential for complications, we performed a multicenter national survey in order to investigate aspects related to the use of general anesthesia for cesarean delivery.

Methods This multicenter national survey questionnaire study was performed from October 2020 to March 2021. After Institutional Review Board waiver, we surveyed 25 eligible medical centers with an active obstetric anesthesia unit. The survey covered issues related to general anesthesia: preoperative management, personnel, induction, maintenance and emergence phases of anesthesia, intraoperative and postoperative pain management, protocol use, availability of difficult airway algorithm, and complications that are related to cesarean delivery under general anesthesia.

Results A total of 113 participants among the 25 medical centers participated in the study. Routine pharmacological aspiration prophylaxis use was reported by 100/113 (88.5%). Administration of opiates during induction before fetal delivery was in 16.8%. We found only 27/113 (23.9%) of respondents ventilate their patients during RSI. Routine use of depth of anesthesia monitoring was reported by 21/113 (18.6%) respondents. Routine postoperative intravenous patient-controlled analgesia (IV-PCA) use with morphine was reported by 6/113 (5.3%) respondents.

Conclusions In this national survey, we emphasize the importance of the presence of highly qualified anesthesiologic personnel during the surgery, benefit from the use of short-acting opiates during induction, availability of videolaryngoscope, ventilation of the patient during RSI, and availability of institutional difficult airway protocols. We observe underuse of intraoperative anesthesia-depth monitoring and poor postoperative pain control.

Keywords Cesarean delivery, General anesthesia, Obstetric anesthesia, Survey

	Duration of fasting (h)	Hospital size		p-value
		Small n = 54 (100%)	Medium + large n = 59 (100%)	
Aspiration prophylaxis medications*				
Medication				
Sodium citrate		22 (40.74%)	27 (45.77%)	0.5892
Ranitidine (Zantac)		13 (24.07%)	7 (11.86%)	.08914
Famotidine		9 (16.67%)	6 (10.17%)	0.30772
Pantoprazole		5 (9.26%)	10 (16.94%)	0.23014
Esomeprazol (Nexium)		2 (3.7%)	0 (00%)	0.13622

Table 2 Airway management

	Hospital size	
	Small (n = 54)	Medium + large (n = 59)
Type of RSI		
• Classical RSI	38 (70.37%)	38 (64.41%)
• Modified RSI	16 (29.63%)	18 (30.51%)
• No RSI	0	3 (5.08%)
Cricoid pressure (Sellick maneuver)		
• Yes, always	48 (88.89%)	46 (77.97%)
• Yes, occasionally	5 (9.26%)	8 (13.56%)
• No	1 (1.85%)	5 (8.47%)
Ventilation during RSI	7 (12.96%)	20 (33.9%)
Videolaryngoscopy		
• Always	2 (3.7%)	13 (22.03%)
• In case of difficult or suspected difficult airway)	52 (96.3%)	44 (74.58%)
• Not available	0	2 (3.39%)
Routine preoxygenation	51 (94.44%)	59 (100%)
Preoxygenation type		
• TV for 3 min	33 (61.11%)	48 (81.35%)
• 8 VC breaths in 1 min	3 (5.56%)	3 (13.56%)
• Pre-oxygenate at least four VC breaths	16 (29.63)	8 (15.38%)
• Other	2 (3.7%)	0

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Table 3 Induction medications

	Hospital size	
	Small (n = 54)	Medium + large (n = 59)
Neuromuscular blockers		
Succinylcholine	44 (81.48%)	39 (66.10%)
Rocuronium	10 (18.52%)	20 (33.9%)
Opiates**		
Remifentanyl	0	4
Fentanyl	5	10
Total	5 (9.26%)	14 (23.73%)

**Routine use of opiates in induction (before fetal delivery)

Original Article

General anaesthetic and airway management practice for obstetric surgery in England: a prospective, multicentre observational study*

P. M. Odor,¹  S. Bampoe,¹ S. R. Moonesinghe,² J. Andrade,³ J. J. Pandit,⁴ D. N. Lucas⁵ and Pan-London Perioperative Audit and Research Network (PLAN), for the DREAMY Investigators Group[†]

1 Consultant, Centre for Anaesthesia and Peri-operative Medicine, University College London Hospital, London, UK

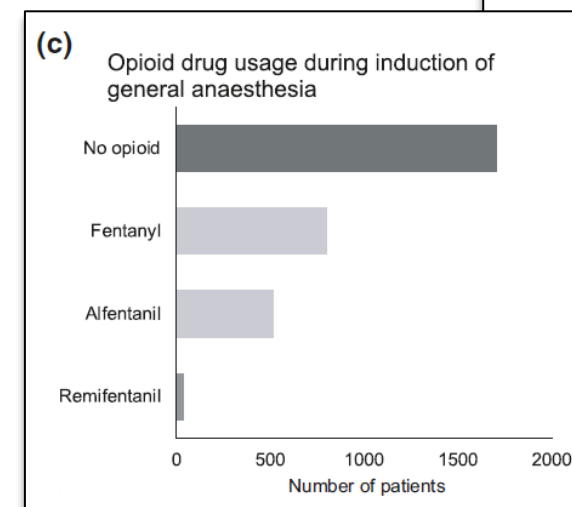
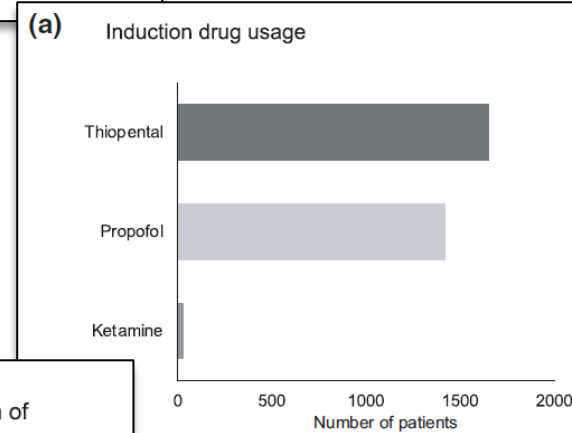
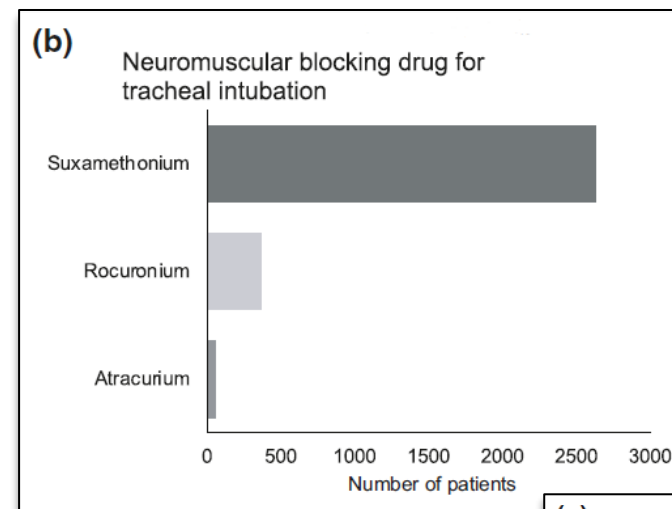
2 Professor, Centre for Peri-operative Medicine, Research Department for Targeted Intervention, University College London, UK

3 Professor, School of Psychology, University of Plymouth, Plymouth, UK

4 Consultant, Nuffield Department of Anaesthetics, Oxford University Hospitals NHS Trust, and Professor, St John's College Oxford, University of Oxford, Oxford, UK

5 Consultant, Department of Anaesthesia, Northwick Park Hospital, London, UK

Characteristic		CS surgery n = 2554
Induction hypnotic drug	Thiopental	1431 (56.0%)
	Propofol	1093 (42.8%)
	Ketamine	9 (0.4%)
	Unknown	18 (0.7%)
Neuromuscular blocking drug for tracheal intubation	Suxamethonium	2158 (84.5%)
	Rocuronium	292 (11.4%)
	Atracurium	50 (2.0%)
	Unknown	54 (2.1%)
Opioid use during GA induction	None	1623 (63.5%)
	Fentanyl	487 (19.1%)
	Alfentanil	411 (16.1%)
	Remifentanyl	33 (1.3%)



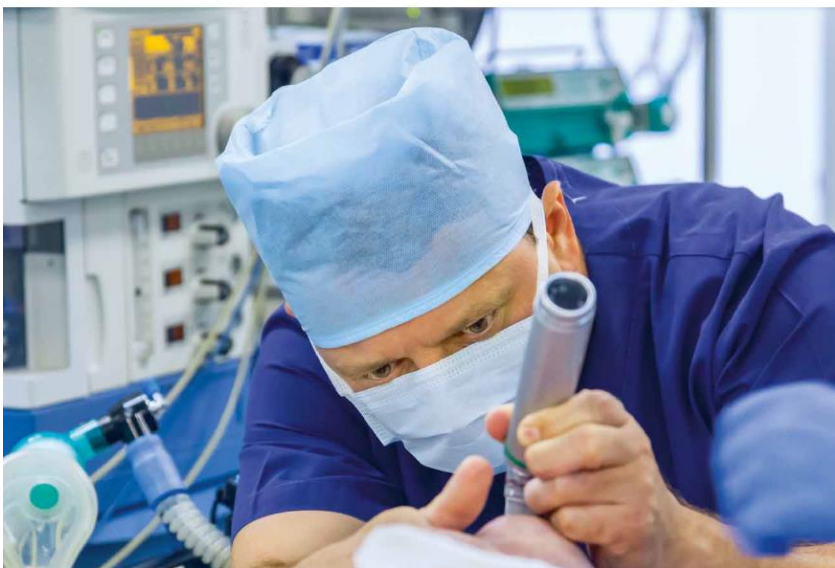
General Anaesthesia for Caesarean Section Clinical Guideline

V5.1 April 2024

- Give sodium citrate and omeprazole if not already administered.
- Pre-oxygenate with high flow oxygen via a face mask. Consider the use of high flow nasal oxygen (HFNO).
- Anaesthetist and obstetrician should discuss before induction, whether the plan would be to wake the patient or proceed in the event of a failed tracheal intubation according to the Obstetric Anaesthetists' Association (OAA) DAS algorithm (Appendix 3).
- Thiopentone at a dose of no less than 5mgs/kg (unless cardiovascular instability is evident) and suxamethonium are routinely used for Rapid Sequence Induction (RSI) in obstetrics. Remember to give >100mg (up to 150mg) of suxamethonium if the woman weighs >100kg.
- Rocuronium may be used as an alternative to Suxamethonium with a pre calculated dose of Sugammadex available to be drawn up in the event of a failed intubation.

Anesteziologie (nejen) k atestaci

2., přepracované a doplněné vydání



75.3 Celková anestezie

Nejčastěji užívaným svalovým relaxanciem k intubaci u císařského řezu je stále sukcynylcholin v dnes doporučené dávce 1,2–1,5 mg/kg. Dávka 1 mg/kg může být pro vytvoření optimálních intubačních podmínek nedostatečná. Doporučeno je každopádně používání relaxometrie k monitorování nástupu účinku, protože proběhnutí fascikulací je nespolehlivou známkou nástupu plného efektu. Navíc v těhotenství je výskyt fascikulací nižší, nižší je ale i výskyt svalových bolestí po sukcinylcholinu. Podání prekurarizační dávky není doporučeno, protože může zpomalit nástup plného účinku sukcinylcholinu. Důvodů, proč u císařského řezu si udržel sukcinylcholin (na rozdíl od ostatní břišní chirurgie) svoje výsostné postavení, je několik. Tím prvním je nepochybně obrovská tradice jeho používání v této indikaci. A tím druhým je fakt, že při průměrné délce císařského řezu 25–40 minut je účinek alternativy, tj. rokuronium, příliš dlouhý. Přitom rokuronium je z mnoha důvodů výhodnější alternativou sukcinylcholinu. Rokuronium v dávce 1 mg/kg i u těhotných žen navozuje shodné intubační podmínky jako sukcinylcholin, a to v přijatelném čase pro apnoickou intubaci. Výhodou rokuronium ve srovnání se sukcinylcholinem je jeho příznivější farmakologický profil s méně nežádoucími účinky, ale především existence specifického antidota sugammadexu. V případě nezdařené intubace lze totiž podáním sugammadexu okamžitě a trvale antagonizovat efekt rokuronium s úplným odezněním relaxace v kratším čase, než je tomu po podání sukcinylcholinu. Víra, že spontánní odeznění účinku sukcinylcholinu v případě selhání intubace je dostatečně rychlé k včasnému obnovení spontánního dýchání, je totiž u těhotných žen s fyziologicky zvýšenou spotřebou kyslíku mylná. V této situaci se nabízí jasná otázka, zda rokuronium v dávce 1 mg/kg, které nabízí srovnatelné intubační podmínky se sukcinylcholinem, by v kombinaci se sugammadexem nemělo již sukcinylcholin i u císařského řezu nahradit.

Barbora Jindrová, Jan Kunstýř, Jan Bláha a kolektiv

Praktické postupy v anestezii

3., přepracované a doplněné vydání



Celková anestezie

Aktuální vyhodnocení rizika obtížnosti OTI, CAVE: piercing v oblasti úst!

Zkontrolovat okamžitou dostupnost vybavení pro alternativní zajištění DC, včetně funkční odsávačky.

U rodiček s těžší HT je vhodná redukce TK před úvodem do CA: pro rychlé snížení TK na OS lze použít především urapidil v dávce 10–20 mg à 5 min.

Preoxygenace/denitrogenace plic!

Úvod do CA: TP 5 mg/kg nebo propofol (2,5 mg/kg) + rokuronium 1 mg/kg (SCH 1,2–1,5 mg/kg).

Intubace za 50 sekund od podání relaxancia!

NE Sellickův manévr!

- Zvaž:
- Při HT remifentanil 0,5–1 µg/kg.
 - Při hypotenzi ketamin 0,5–1 mg/kg.
 - Laryngoskop s flexitipem; ETK č. 7, event. se zavaděčem.
 - Už po 1 nezdařilém pokusu o OTI jako první alternativu použít LM.
- Podstatná je oxygenace, nikoli intubace!

Anestezie do vybavení plodu: inhalace O₂ + vzduch + sevofluran 0,7% (zvaž N₂O jako analgetikum).

Relaxace: při OTI v SCH podat nedepolarizující svalové relaxans ihned po OTI (neprostupují placentou), např. atrakurium 15–25 mg.

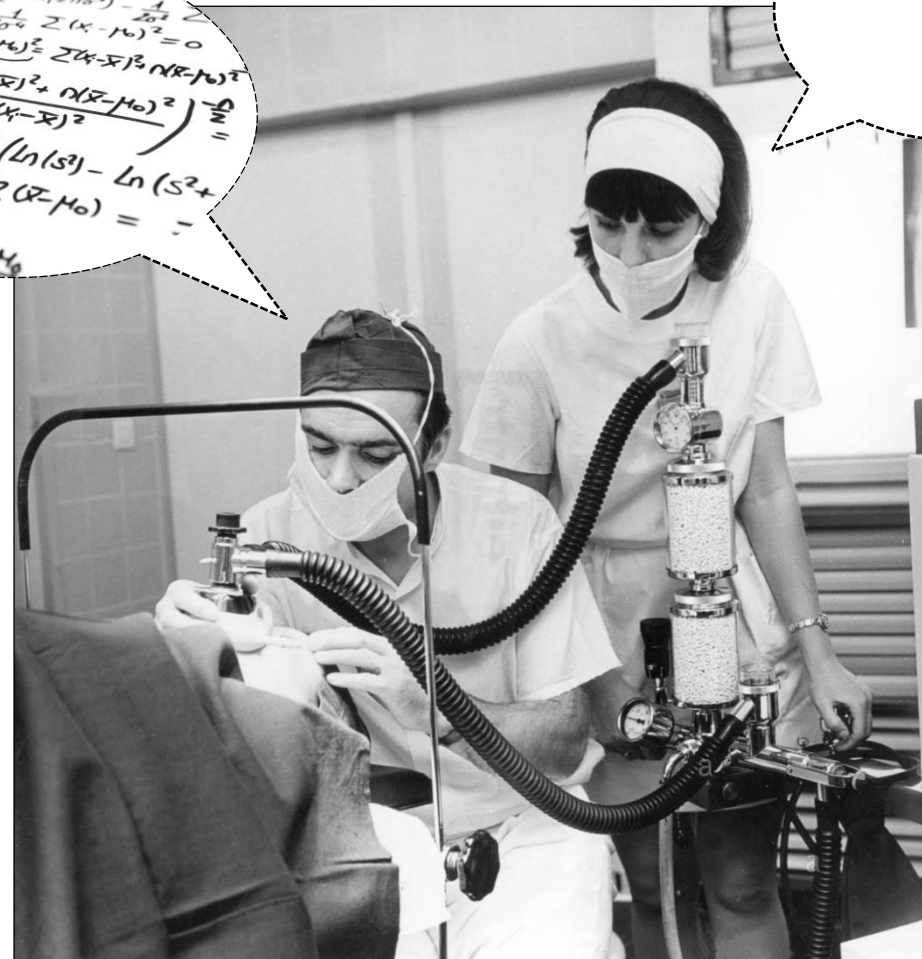
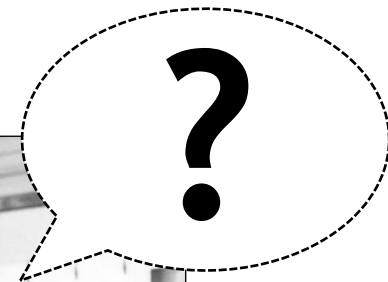
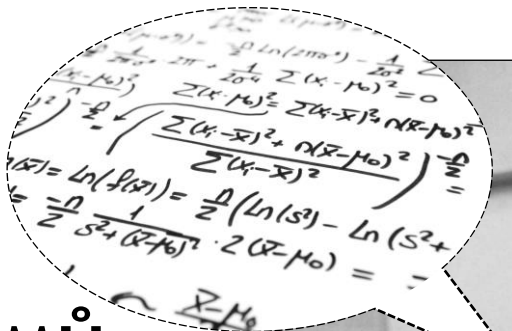
Anestezie po vybavení plodu: sufentanil bolus 30–50 µg, sevofluran zvýšit na 1,0 MAC nebo dle potřeby. A dále standardní postup pro CA.

Změna standardu CA u císařského řezu na KARIM VFN v Praze:

- *thiopental 5 mg/kg*
- *rokuronium 0,6/ 1 mg.kg⁻¹ + sugammadex*
- *zvaž remifentanil 1 µg/kg*

PROČ MÁME VĚTŠINU PROBLÉMŮ

1. Přecenění vlastních schopností.
2. Pozdní volání o pomoc.
3. Nedostatečně promyšlený postup bez plánu B
4. Špatná / nedostatečná komunikace s ostatními



IT'S ABOUT TIME

jan.blaha@vfn.cz