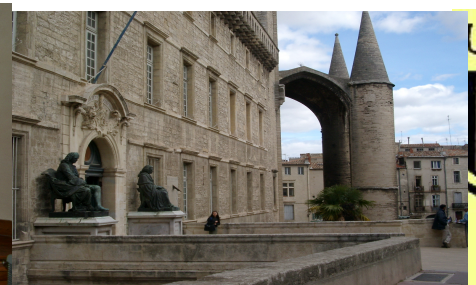
Symposium MSD

Curare et intubation: nos pratiques évoluent

Pr Philippe Cuvillon

CHU NIMES



UNIVERSITÉ MONTPELLIER I
FACULTÉ de MÉDECINE
Montpellier-Nîmes

Recommandation d'expert

- Indication de la curarisation en anesthésie

RPC: 12 juillet 1999

« Lorsque l'acte chirurgical ne nécessite pas de curarisation, l'intubation peut se faire avec ou sans curare (A). »

Depuis 1999….

Anesthesiology 2010; 112:1013–22

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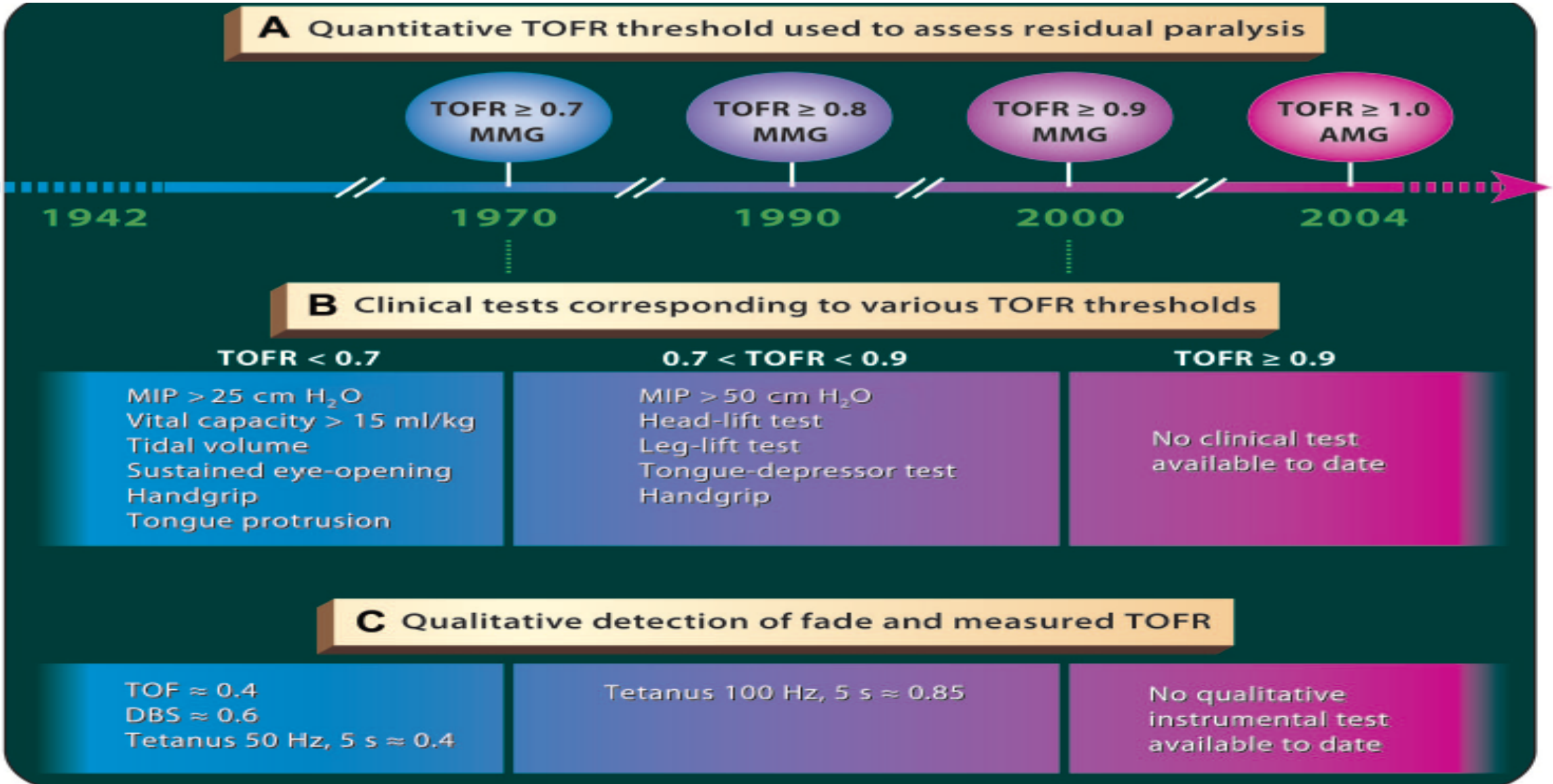
Residual Paralysis after Emergence from Anesthesia

Benoît Plaud, M.D., Ph.D.,* Bertrand Debaene, M.D., Ph.D.,†
François Donati, Ph.D., M.D., F.R.C.P.C.,‡ Jean Marty, M.D., Ph.D.§



INFORMATIONS
SÉCURITÉ PATIENTS

INFORMATION TRANSMISE SOUS L'AUTORITE DE L'ANSM

Lettre aux professionnels de santé

Décembre 2017

Compte-tenu, d'une part du fait que l'utilisation du suxaméthonium pour assurer le relâchement musculaire lors des actes chirurgicaux programmés de courte durée ne correspond plus aux standards actuels, et, d'autre-part, du risque de réaction anaphylactique lié à l'utilisation des curares en général et plus particulièrement au suxaméthonium, **les spécialités à base de suxaméthonium ne sont plus indiquées dans les *« actes brefs en chirurgie programmée »*.**

Les indications du suxaméthonium sont désormais restreintes comme adjuvant de l'anesthésie générale :

- Chez l'adulte et chez l'enfant : pour faciliter l'intubation endotrachéale dans l'induction en séquence rapide justifiée par un risque d'inhalation du contenu gastrique ;

- Chez l'adulte : lors des traitements par électroconvulsivothérapie, pour obtenir une curarisation très brève.

Recommandations Formalisées d'Experts

SFAR

Actualisation de recommandations

« Intubation difficile » et extubation en anesthésie chez l'adulte

2017

Société Française d'Anesthésie et de Réanimation

Recommandations Formalisées d'Experts

SFAR

Actualisation de recommandations

Curarisation et décurarisation en anesthésie

Muscle relaxants and reversal in anaesthesia. Guidelines from the French Society of Anaesthesia & Intensive Care Medicine

2018

Société Française d'Anesthésie et de Réanimation

Evaluation (VMD, IT D)
Application d'algorythme
Pré oxygénation
Dispositifs supraglotiques

Place des curares lors ventiation au masque ?
Place des curares lors IOT ?

Quelles approches?

Induction

VM facile

curare

Ventilation au masque facial

- difficulté: 0.08 à 15 %
  - score de Han
  - score de Warters

- facteur prédictif de difficulté

Table 1 Warters grading scale for mask ventilation. The point system is based on the ability to achieve a target volume of 5 $ml.kg^{-1}$ [9].

Description/Definition	Points
Oral or nasal airway	1
PIP 20–25 cmH_2O	1
PIP 26–30 cmH_2O	2
PIP > 30 cmH_2O	3
Unable to generate PIP > 30 cmH_2O	3
Two-person ventilation	2
Tidal volume 2–5 $ml.kg^{-1}$	2
Unable to ventilate	4

PIP, peak inspiratory pressure.

Table 1 Han scale for mask ventilation [13].

	Description
Grade 1	Ventilated by mask single-handed
Grade 2	Difficult to ventilate, oropharyngeal airway inserted
Grade 3	Ventilated by mask with jaw thrust, airway manoeuvers and two-handed technique
Grade 4	Unable to ventilate

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Anesthesiology 2009; 110:891–7 Copyright © 2009, the American Society of Anesthesiologists, Inc. Lippincott Williams & Wilkins, Inc.

Prediction and Outcomes of Impossible Mask Ventilation

A Review of 50,000 Anesthetics

Sachin Kheterpal, M.D., M.B.A.,* Lizabeth Martin, M.D.,† Amy M. Shanks, M.S.,‡ Kevin K. Tremper, Ph.D., M.D.§

Incidence : 77 sur 55 000 soit 0,15 % de ventilation au masque impossible
(pas de décès, 2 crico de sauvetage, facteur majeur Radiothérapie cervicale)

Table 1. Preoperative Patient Characteristics

Risk Factor	Impossible Mask Ventilation Yes (n = 77)	Impossible Mask Ventilation No (n = 52,964)	*P* Value*	Percent Data Complete
Age, yr†	55 ± 15	51 ± 17	0.04	100.0%
Body Mass Index, kg/m^2†	31 ± 8	28 ± 6	< 0.001	99.3%
Male sex	61 (79%)	24,323 (46%)	< 0.001	100.0%
Cardiac surgery	8 (11%)	3,248 (6.2%)	0.09	98.6%
Junior anesthesia provider	47 (61%)	25,034 (47%)	0.02	100.0%
Sleep apnea	20 (26%)	3,660 (7.1%)	< 0.001	97.8%
Snoring	28 (37%)	12,894 (25%)	0.02	97.2%
Presence of beard	22 (29%)	5,587 (11%)	< 0.001	97.4%
Unstable cervical spine	1 (1.3%)	195 (0.4%)	0.25	99.4%
Limited neck extension	10 (13%)	4,139 (7.9%)	0.10	99.4%
Edentulous	10 (13%)	3,631 (7.0%)	0.04	97.6%
Thick neck	27 (35%)	6,232 (12%)	< 0.001	97.6%
Neck radiation changes	3 (3.9%)	307 (0.6%)	0.01	97.6%
Limited thyromental distance	10 (13%)	2,955 (5.7%)	0.01	97.7%
Limited jaw protrusion	10 (13%)	4,858 (9.4%)	0.28	97.6%
Severely limited jaw protrusion	0 (0%)	244 (0.5%)	1.00	97.6%
Limited mouth opening	5 (6.5%)	1,891 (3.7%)	0.21	97.8%
Mallampati III or IV	23 (30%)	5,950 (12%)	< 0.001	95.9%

* All patient characteristics were compared using Mann-Whitney U test for continuous variables and chi-square or Fisher exact test for categorical variables;
† Mean ± standard deviation.

Anesthesiology
2000; 92:1229–36
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Lippincott Williams & Wilkins, Inc.

Prediction of Difficult Mask Ventilation

Olivier Langeron, M.D., Eva Masso, M.D.,† Catherine Huraux, M.D.,‡ Michel Guggiari, M.D.,‡ André Bianchi, M.D.,‡ Pierre Coriat, M.D.,§ Bruno Riou, M.D., Ph.D.‖*

Table 2. Comparison of Patients (n = 1,502) with or without Difficult Mask Ventilation (DMV)

	No DMV (n = 1,427)	DMV (n = 75)	*P* value
Height (cm)	167 ± 10	168 ± 10	NS
Weight (kg)	68 ± 14	82 ± 20	<0.001
Body mass index (kg/m^2)	24.5 ± 4.5	29.0 ± 6.8	<0.001
Age (yr)	50 ± 16	60 ± 15	<0.001
Sex (Male)	634 (44%)	37 (49%)	NS
Mallampati Class			
1	775 (54%)	24 (32%)	
2	466 (33%)	34 (45%)	0.02
3	140 (10%)	13 (17%)	
4	46 (3%)	4 (5%)	
Mouth opening (mm)	46 ± 9	46 ± 11	NS
Thyromental distance (mm)	89 ± 16	85 ± 13	0.002
Macroglossia	82 (6%)	13 (17%)	<0.001
Receding mandible	73 (5%)	3 (4%)	NS
Lack of teeth	137 (10%)	19 (25%)	<0.001
Beard	49 (3%)	9 (12%)	0.002
History of snoring	311 (22%)	34 (45%)	<0.001
[illegible]	[illegible]	[illegible]	[illegible]
Paralyzing agent use	672 (47%)	42 (56%)	NS

Data are mean ± SD or number (percent). NS = not significant.
Because of rounding, adding percentages may not provide a sum of 100%.

Table 3. Identification of Risk Factors for Difficult Mask Ventilation with Multivariate Analysis (n = 1,502)

Variables	Odds Ratio (95% CI)	*P* Value
Presence of beard	3.18 (1.39–7.27)	0.006
Body mass index > 26 kg/m^2	2.75 (1.64–4.62)	<0.001
Lack of teeth	2.28 (1.26–4.10)	0.006
Age > 55 yr	2.26 (1.34–3.81)	0.002
History of snoring	1.84 (1.09–3.10)	0.02

CI = confidence interval.

Curare pas d'intérêt …

4 Mécanismes de VMD

- Interface (barbe…)
- Difficulté à maintenir un alignement de la filière

  (nez-pharynx- larynx- trachée)

  - inexpérience opérateur
  - anesthésie peu profonde

  Br J Anaesth 2010
- Collapsus des VAS: curare ?

  Xue FS, Anesthesiology 2013
- Hyper réactivité VAS post induction

  Eastwood PR, Lancet 2002

Anaesthesia 2011

There is little or no rational defence to giving long-acting NBD (that cannot be quickly reversed) to patients without first checking, since such blind administration may close the door on a possible rescue route to those few in whom mask ventilation was, in fact, always inherently difficult.

J. J. Pandit
John Radcliffe Hospital,
Oxford, UK
Email: jaideep.pandit@dpag.ox.ac.uk

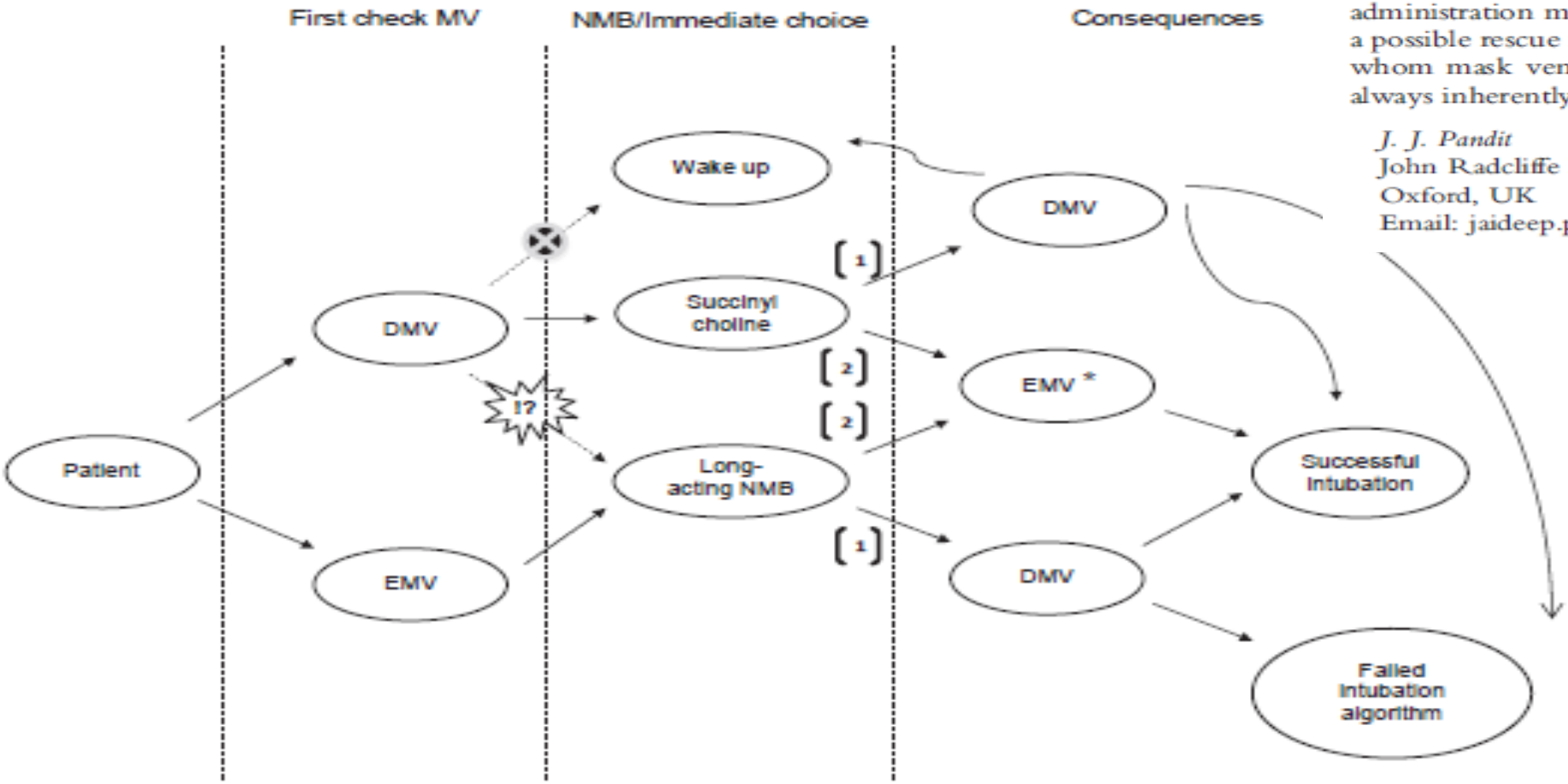


Figure 1 Possible sequences of events relating to mask ventilation during anaesthetic induction. There are three broad phases delineated by vertical dotted lines: after induction, mask ventilation is checked ('check MV'); then there is choice of three options depending upon ability to mask ventilate ('NMB/immediate choice'); then there are several consequences of those choices. NMB, neuromuscular blockade; DMV, difficult mask ventilation; EMV, easy mask ventilation; *Failed intubation may be possible with EMV; [1] = DMV after NMB; [2] = EMV after NMB; ☢ = route followed by very few anaesthetists. Note that wake-up is only an option if suxamethonium is administered. The step that could lead to a potentially dangerous situation is marked by ⚠.

Crainte avec curarisation et VMF?

- Ventilation impossible: 0.08 à 1.4 % selon les études

Langeron et al, Anesthesiology 2000
Kheterpal et al, Anesthesiology 2009

Dispositifs supra glottiques ont changé la donné

Editorial

Facemask ventilation before or after neuromuscular blocking drugs: where are we now?

Que se passe t-il lors administration de curare ?

Effects of Muscle Relaxants on Mask Ventilation in Anesthetized Persons with Normal Upper Airway Anatomy

Aya Ikeda, M.D.,* Shiroh Isono, M.D.,† Yumi Sato, M.D.,‡ Hisanori Yogo, M.D.,‡ Jiro Sato, M.D.,§ Teruhiko Ishikawa, M.D.,† Takashi Nishino, M.D.‖

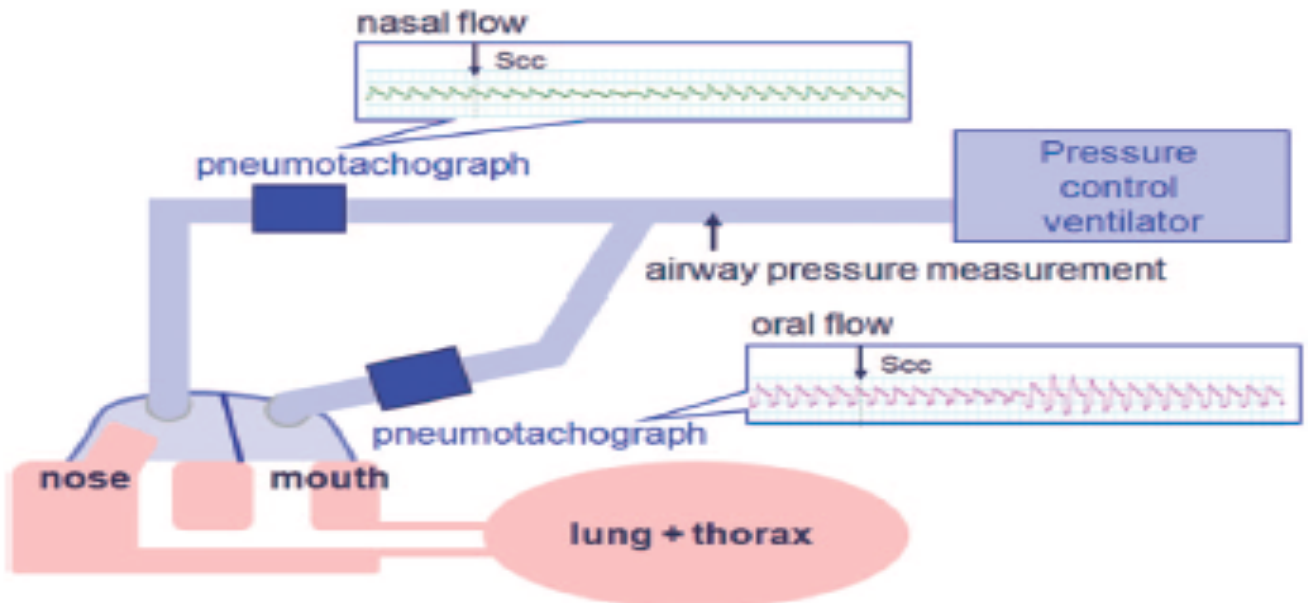


Fig. 1. The experimental setting. Scc = sucinylcholine.

Table 3. Changes of Ventilation during the Interval of Succinylcholine-induced Paralysis (n = 17)

Tidal Volume Times	Nasal Route	Oral Route	*P* Value
Onset of tidal volume change (sec)	23 ± 8.4	23 ± 8.1	0.98
Time to minimum tidal volume (sec)	29 ± 9	33 ± 12	0.30
Minimum tidal volume (ml/kg)	0.34 ± 0.42	1.0 ± 1.0	0.01
Tidal volume ratio: minimum/control	0.33 ± 0.39	0.74 ± 0.49	0.01
Time to maximum tidal volume (sec)	50 ± 12	35 ± 11	0.001
Maximum tidal volume (ml/kg)	4.0 ± 3.1	4.0 ± 2.7	0.97
Tidal volume ratio: maximum/control	2.0 ± 1.5	3.7 ± 2.6	0.02

Values are mean ± SD. *P* values were obtained by comparing variables between the airway routes with paired Student *t* test.

The maximum tidal volumes were achieved earlier in the oral airway route (35 s) than the nasal airway route (50 s). Although the achieved maximum tidal volumes after succinylcholine injection did not differ between the airway routes,

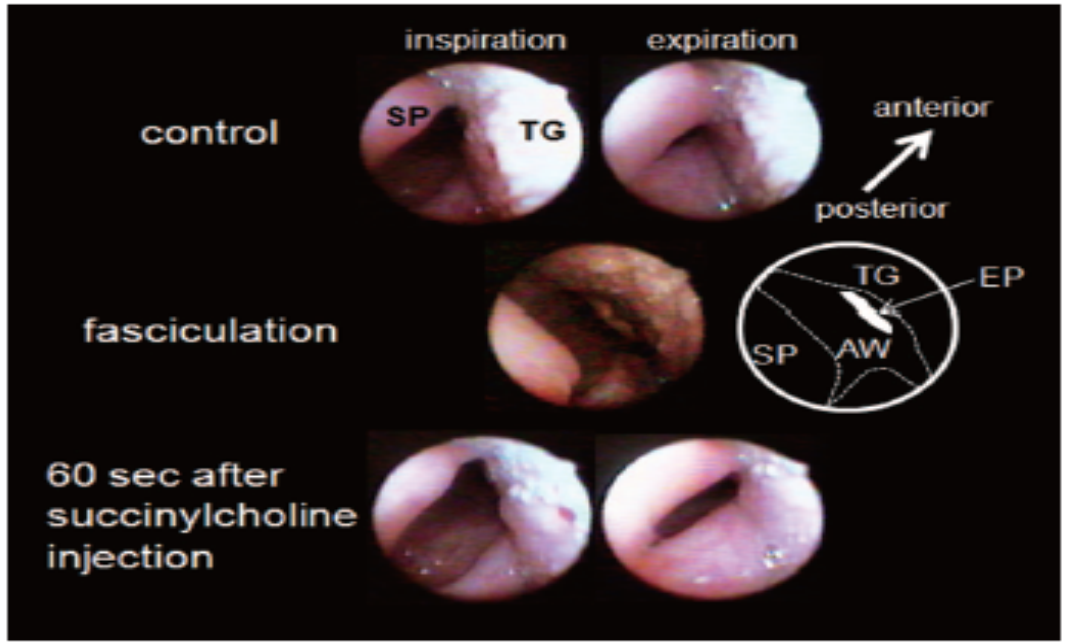


Fig. 4. Endoscopic observation of the space at the isthmus of the fauces during facemask ventilation in the process of muscle paralysis with intravenous administration of succinylcholine. The images were obtained by an endoscope inserted through the mouth. Note significant dilation of the airway space during succinylcholine-induced pharyngeal fasciculation. AW = airway space; EP = epiglottis; SP = soft palate; TG = tongue base.

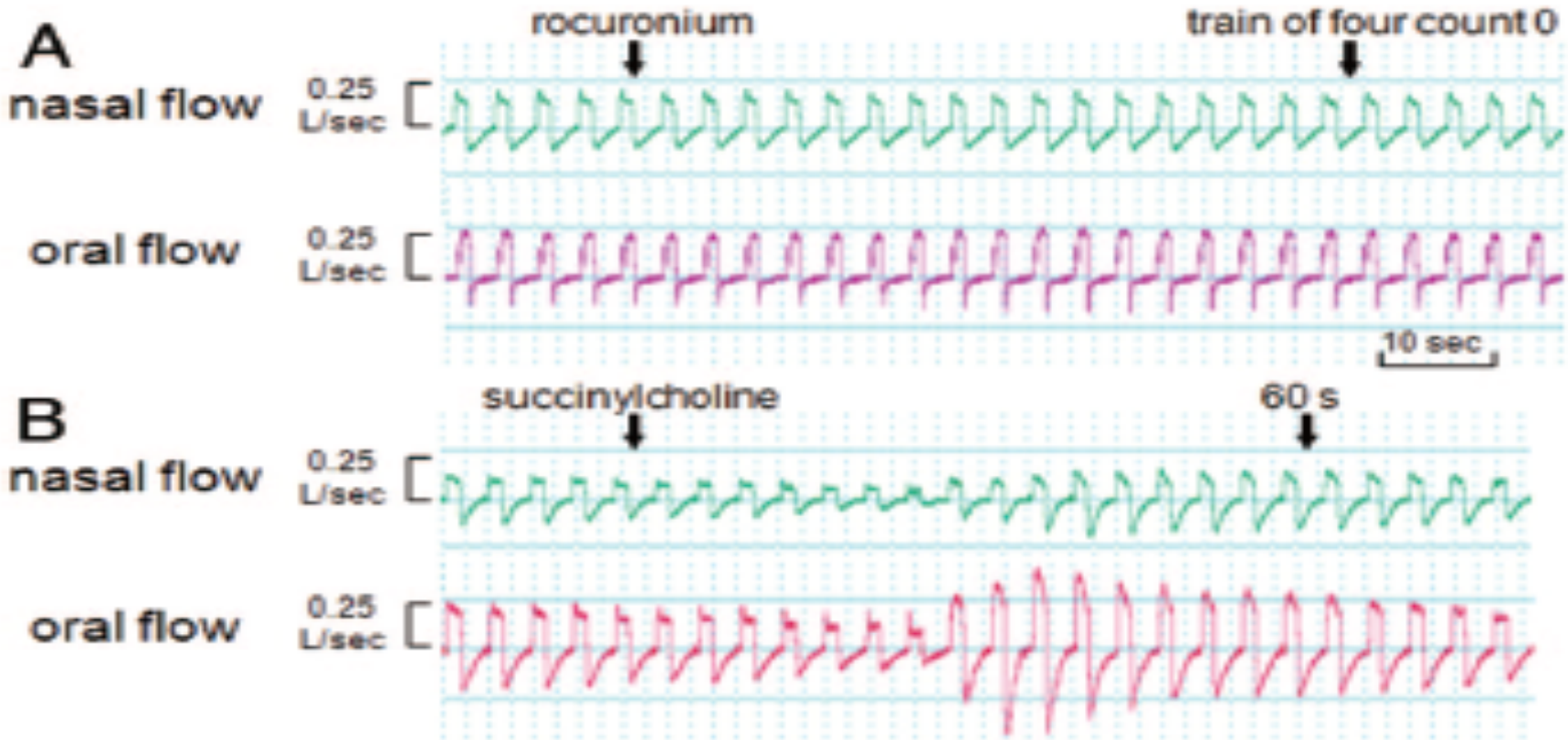


Fig. 2. Typical changes of oral and nasal airflows following intravenous injection of rocuronium (*A*) and succinylcholine (*B*). Note the abrupt increase of airflow, particularly through oral airway route during the process of succinylcholine-induced muscle paralysis.

Délai trop court pour 0.6 mg/kg de rocuronium

Anaesthesia 2014, 69, 826–831 doi:10.1111/anae.12677

Original Article

Evaluation of changes in tidal volume during mask ventilation following administration of neuromuscular blocking drugs*

R. Sachdeva,[1] T. R. Kannan,[2] C. Mendonca[3] and M. Patteril[3]

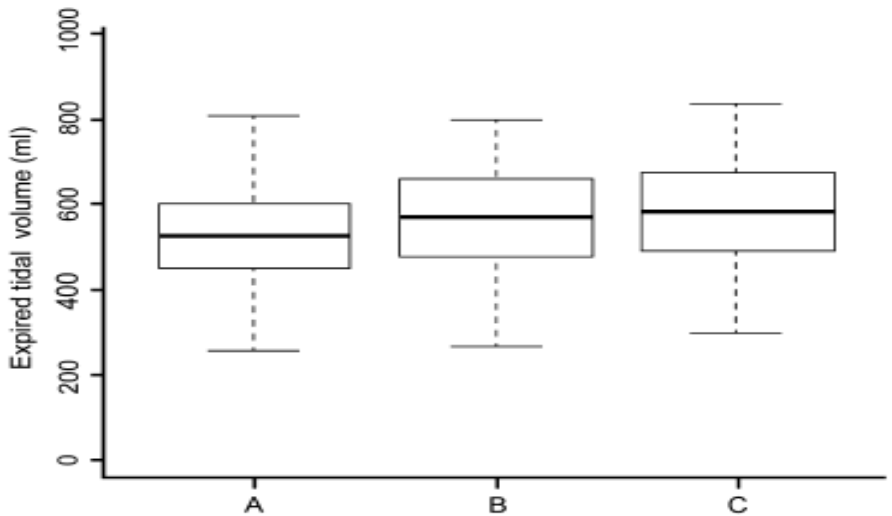


Figure 3 Expired tidal volumes before and after administering neuromuscular blocking drug (NBD). A = before administering NBD, B = 1 min after disappearance of the fourth twitch and C = 2 min after disappearance of fourth twitch of the train-of-four. $p < 0.001$ for A vs B and C. The thick horizontal line within the box is the median; the edges of the box the IQR and the whiskers the range.

Table 2 Patients' baseline and peri-operative characteristics. Values are mean (SD) or numbers. The laryngoscopy grade is a modified Cormack–Lehane grading [14].

Age; years	50.7 (17.6)
Weight; kg	75.9 (15.7)
BMI; $kg.m^{-2}$	27.4 (4.7)
Male:female	48:77
Mallampati score; 1/2/3/4	40/76/9/0
Edentulous; yes/no	25/100
Receding jaw/small neck/limited extension at neck/nil	3/7/3/112
Beard; yes/no	8/117
Grade of mask ventilation before NBD; 1/2/3/4	45/72/8/0
History of snoring; yes/no	56/69
Laryngoscopic grade 1/2a/2b/3/4	77/37/7/4/0

RESEARCH ARTICLE Open Access

Ventilation by mask before and after the administration of neuromuscular blockade: a pragmatic non-inferiority trial

Aaron M. Joffe[1*], Ramesh Ramaiah[1], Eric Donahue[2], Richard E. Galgon[3], Stephan R. Thilen[1], Charles F. Spiekerman[4] and Sanjay M. Bhananker[1]

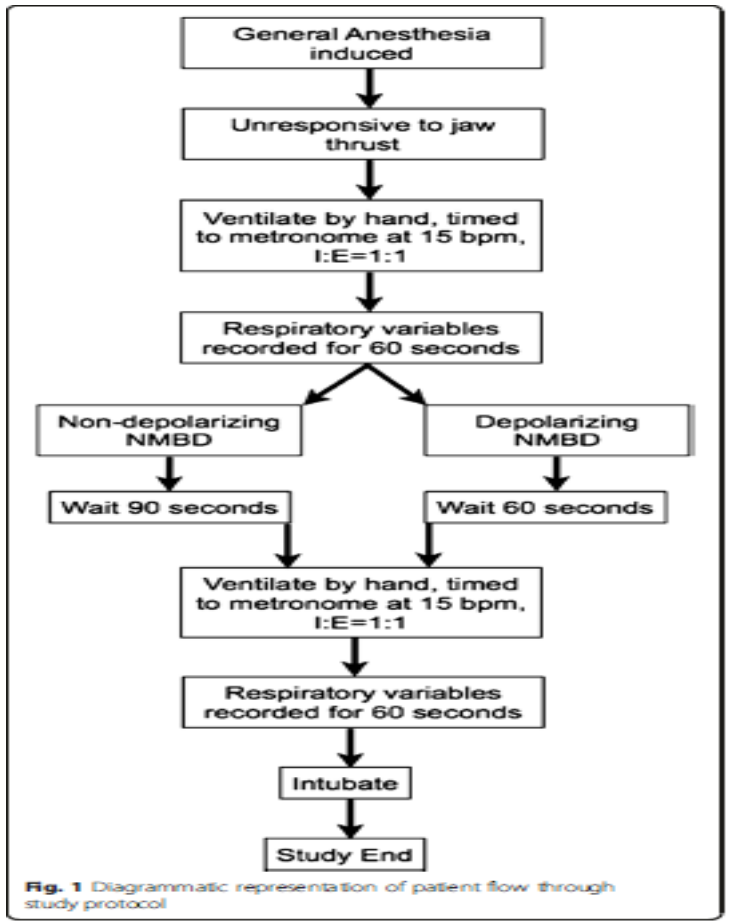


Fig. 1 Diagrammatic representation of patient flow through study protocol

Joffe *et al. BMC Anesthesiology* (2015) 15:134
DOI 10.1186/s12871-015-0111-z

Induction : propofol, fentanyl
Evaluation puis Intervention : curare (au choix)
Patient est son propre témoin

Table 1 Baseline characteristics of 210 patients undergoing face mask ventilation before and after neuromuscular blockade. Data are presented as number (%), mean (SD), or median (IQR [range])

Age, years	45 (17)
Male gender	135 (64.3)
ASA physical status	2 (1–2[1–4])
Height, cm	173 (13)
Weight, kg	85 (22)
BMI, $kg.m^{-2}$	27 (23-32[15–53])
Risk factors for DMV	
None	36 (17.1)
1	68 (32.4)
2	64 (30.5)
3	28 (13.3)
4	12 (5.7)
≥5	2 (1)

ASA American Society of Anesthesiologists, *BMI* body mass index, *DMV* difficult mask ventilation

Table 4 Comparison of selected outcomes of face mask ventilation before and after administration of neuromuscular blocking drugs. Data presented as mean (SD), median (IQR [range]), or number (%)

	Before	After	Mean difference (95 % CI)	*p*-value[a,b]
Vt, ml.breath^{-1}	399 (169)	428 (166)	30 (12, 47)	0.001
PIP, cmH_2O	19 (5.5)	17 (3.4)	−1.7 (−1, −2.4)	<0.001
Breaths delivered	14 (2.2)	15 (1.5)	—	<0.001
V_E, l.min^{-1}	5.6 (2.5)	6.3 (2.5)	0.6 (0.4, 0.9)	<0.001
Han scale	1 (1-2 [1–4])	1 (1-2 [1–4])	—	0.11
Warters scale	5 (0-6 [0–10])	2 (0-5 [0–9])	−0.7 (−0.4, −1)	<0.001
MV_i or V_{ds}	35 (16.6)	27 (12.8)	—	0.20

Predicted body weight based on height in inches and gender from National Heart, Lung and Blood Institute Acute Respiratory Distress Syndrome Network formula, which can be accessed at http://www.ardsnet.org/files/pbwtables_2005-02-02.pdf

[a]Comparisons made by paired t-test or Wilcoxon signed rank test for normally and non-normally distributed paired continuous data, respectively. Mean difference displayed for normally distributed continuous data only.[b]Comparison made by McNemar's test for paired proportions of binomial data

Vt tidal volume, *PIP* peak inspiratory pressure, *CI* confidence interval, *SD* standard deviation, V_E minute ventilation, MV_i inadequate mask ventilation (<4 ml.kg^{-1} predicted body weight), V_{ds} dead-space ventilation (<150 ml, no clinical sign of ventilation)

Anaesthesia
Journal of the Association of Anaesthetists of Great Britain and Ireland

Original Article | Full Access

The effect of neuromuscular blockade on the efficiency of facemask ventilation in patients difficult to facemask ventilate: a prospective trial

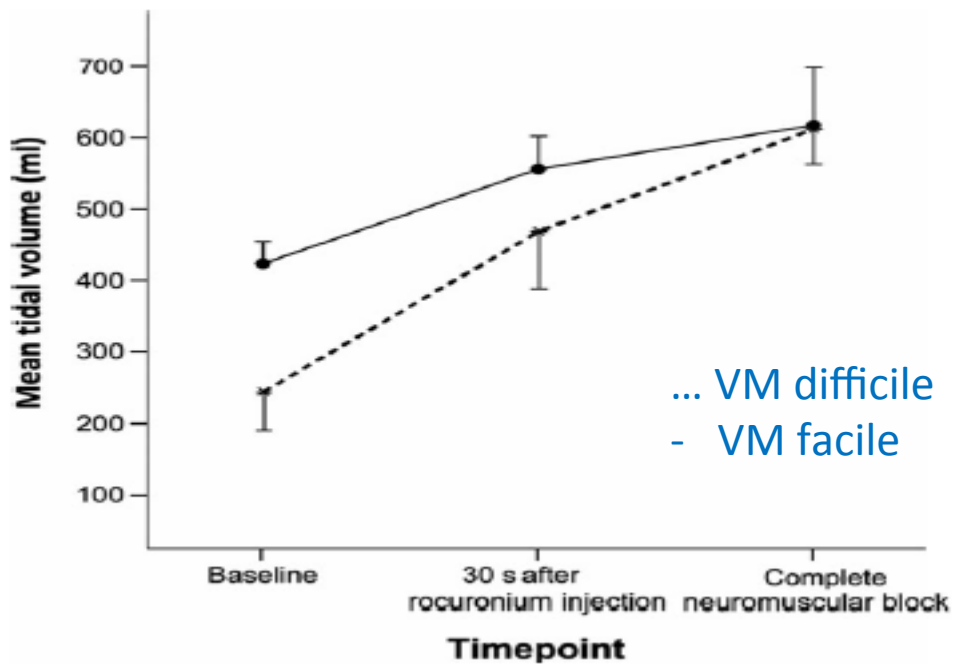
S. Soltész ✉, P. Alm, A. Mathes, M. Hellmich, J. Hinkelbein

First published: 14 September 2017 | https://doi.org/10.1111/anae.14035 | Cited by: 4

Table 2 Risk factors for difficult mask ventilation [2, 13]. Values are number (proportion).

	n =113
Neck radiation changes	0
Sex; male	67 (59%)
Snoring/sleep apnea	90 (80%)
Mallampati 3 or 4	90 (80%)
Presence of beard	33 (29%)
BMI ≥ 30 kg.m^{-2}	62 (55%)
Age ≥ 57 years	83 (73%)
Jaw protrusion limited	38 (34%)

Cumulative number of risk factors for difficult mask ventilation	
3	37 (33%)
4	50 (44%)
5	16 (14%)
6	8 (7%)
7	2 (1.8%)
8	0
Sum of risk factors	4 (3-4 [3-7])



… VM difficile
- VM facile

Faut il curariser tout le monde pour faciliter la ventilation au masque facial ?

- **Patient sans facteur de risque : peu de bénéfice, mais pas délétère en terme de ventilation**

- **Patient avec facteur de risque : bénéfice majeur**

Anesthesiology 2012; 117:456–8

Ventilation before Paralysis

Crossing the Rubicon, Slowly

Michael G. Richardson, M.D.,‡ Ronald S. Litman, D.O.,§
‡Department of Anesthesiology, Vanderbilt University School of Medicine, Nashville, Tennessee. §Department of Anesthesiology and Pediatrics, Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, and Department of Anesthesiology and Critical Care, The Children's Hospital of Philadelphia, Philadelphia, Pennsylvania. litmanr@email.chop.edu

route. These results are consistent with several recent studies that demonstrated improved facemask ventilation after administration of neuromuscular blockade.[2,3] The results will serve as additional supportive evidence for those who advocate discarding the traditional anesthetic induction sequence taught on day 1 of residency:[4] induce unconsciousness, establish facemask ventilation, and then administer neuromuscular blockade. The rationale for this traditional, perhaps dogmatic approach of refraining from neuromuscular blockade before establishing mask ventilation includes fear that muscle paralysis might (1) worsen

2 approches

Yentis, Anaesthesia 2002
Richardson, Anesthesiology 2012
Nilesen, Anesthesiology 2013

Induction

curare

VM ?

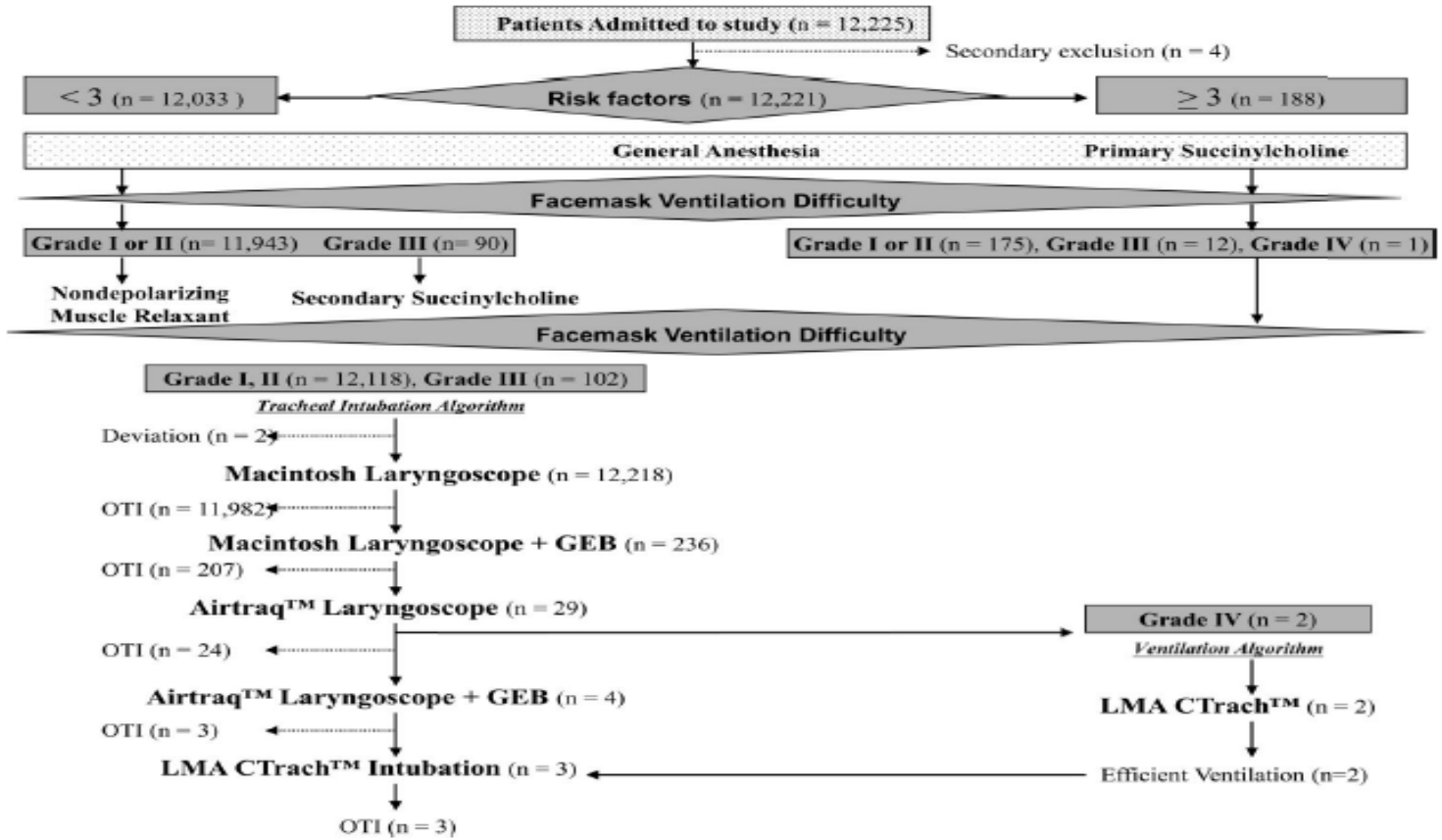
VM ?

An Algorithm for Difficult Airway Management, Modified for Modern Optical Devices (Airtraq Laryngoscope; *LMA CTrach™*)

A 2-Year Prospective Validation in Patients for Elective Abdominal, Gynecologic, and Thyroid Surgery

Roland Amathieu, M.D.,* Xavier Combes, M.D.,* Widad Abdi, M.D.,† Loutfi El Housseini, M.D.,† Ahmed Rezzoug, M.D.,† Andrei Dinca, M.D.,† Velislav Slavov, M.D.,† Sébastien Bloc, M.D.,† Gilles Dhonneur, M.D., Ph.D.‡

Anesthesiology 2011



N= 12 225
1 IOT impossible
mais Ventilable avec LMACtrach

Management of unanticipated difficult tracheal intubation in adults

2015

If in difficulty → call for help

Plan A: Facemask ventilation and tracheal intubation

- Optimise head and neck position
- Preoxygenate
- Adequate neuromuscular blockade
- Direct / Video Laryngoscopy (maximum 3+1 attempts)
- External laryngeal manipulation
- Bougie
- Remove cricoid pressure
- Maintain oxygenation and anaesthesia

Succeed → Confirm tracheal intubation with capnography

↓ Declare failed intubation

Plan B: Maintaining oxygenation: SAD insertion

- 2nd generation device recommended
- Change device or size (maximum 3 attempts)
- Oxygenate and ventilate

Succeed →

STOP AND THINK

Options (consider risks and benefits):

1. Wake the patient up
2. Intubate trachea via the SAD
3. Proceed without intubating the trachea
4. Tracheostomy or cricothyroidotomy

↓ Declare failed SAD ventilation

Plan C: Facemask ventilation

- If facemask ventilation impossible, paralyse
- Final attempt at facemask ventilation
- Use 2 person technique and adjuncts

Succeed → Wake the patient up

↓ Declare CICO

Plan D: Emergency front of neck access

- Scalpel cricothyroidotomy

Post-operative care and follow up

- Formulate immediate airway management plan
- Monitor for complications
- Complete airway alert form
- Explain to the patient in person and in writing
- Send written report to GP and local database

This flowchart forms part of the DAS Guidelines for unanticipated difficult intubation in adults 2015 and should be used in conjunction with the text.

Quelle anesthésie effectuer chez un patient avec des critères d'intubation difficile dont la ventilation au masque facial s'avère potentiellement difficile ?

Prérequis
Il est indispensable de s'assurer de la disponibilité des techniques d'oxygénation avant d'envisager une anesthésie générale.

R4.1 – Il faut maintenir un niveau d'anesthésie profond afin d'optimiser les conditions de ventilation au masque et d'intubation en utilisant des agents rapidement réversibles. (Grade 1+) Accord FORT.

Recommandations Formalisées d'Experts

SFAR

Actualisation de recommandations

« Intubation difficile » et extubation en anesthésie chez l'adulte

2017

R4.1 – Il faut maintenir un niveau d'anesthésie profond afin d'optimiser les conditions de ventilation au masque et d'intubation en utilisant des agents rapidement réversibles.
(Grade 1+) Accord FORT

R4.2 – En cas d'intubation difficile prévue, Il faut probablement utiliser un curare afin d'améliorer les conditions de ventilation au masque et d'intubation, en utilisant un curare d'action courte ou rapidement inactivé sous couvert du monitorage systématique de la curarisation.
(Grade 2+) Accord FORT

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(Grade 2+) Accord FORT.
Argumentaire : L'utilisation d'un curare améliore les conditions de ventilation au masque [64–66] et d'intubation [67,68]. En cas d'intubation difficile prévue, il est recommandé d'utiliser un curare afin d'augmenter les chances de réussite [69]. Le niveau de curarisation doit être évalué de façon quantitative à l'aide d'un moniteur de la curarisation. Tester la ventilation au masque avant l'injection de curare est une pratique qui ne repose sur aucune donnée publiée. Bien au contraire, l'administration d'un curare en

Quelles approches: IOT?

Induction

IOT

Curare ?

IOT : célocurine vs rocuronium

Cochrane Database of Systematic Reviews

Rocuronium versus succinylcholine for rapid sequence induction intubation

New search | Review | Intervention

Diem TT Tran, Ethan K Newton, Victoria AH Mount, Jacques S Lee, George A Wells, Jeffrey J Perry

We found no statistical difference in intubation conditions
when succinylcholine was compared to 1.2 mg/kg rocuronium;
however, succinylcholine was clinically superior as it has a shorter duration of action.

DeepRocuStudy: étude observationnelle (Loi Jardet 3)

103 patients sont colligés et 100 analysés (âge: 59 ± 16 ans , IMC: 29 ± 7 Kg/T^2, poids idéal : 63 ± 7 kg.

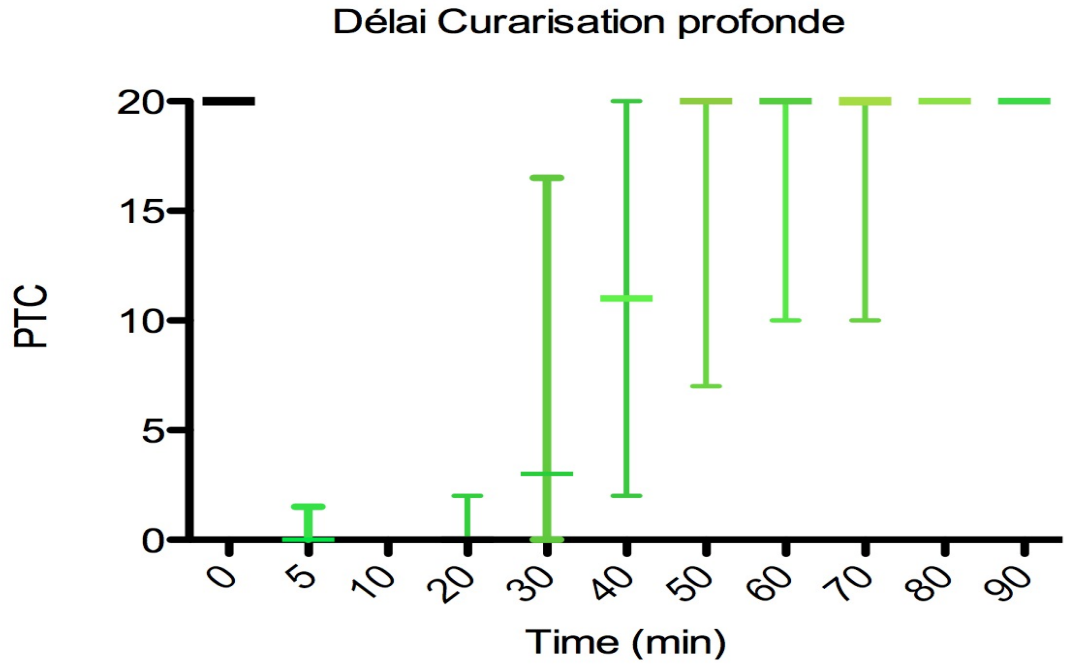
Dose de rocuronium administrée: 65 (60-70) mg.

L'intubation était jugée très facile à facile dans 95% des cas.

Délai d'intubation: 120 (80-135)s.

A 5min, 83 % des patients ont un PTC à 0.

Abstract SFAR 2018



Cochrane Library

Cochrane Database of Systematic Reviews

Cochrane 2017
Br J Anaesth 2018

Avoidance versus use of neuromuscular blocking agents for improving conditions during tracheal intubation or direct laryngoscopy in adults and adolescents (Review)

Lundstrøm LH, Duez CHV, Nørskov AK, Rosenstock CV, Thomsen JL, Møller AM, Strande S, Wetterslev J

Figure 2. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

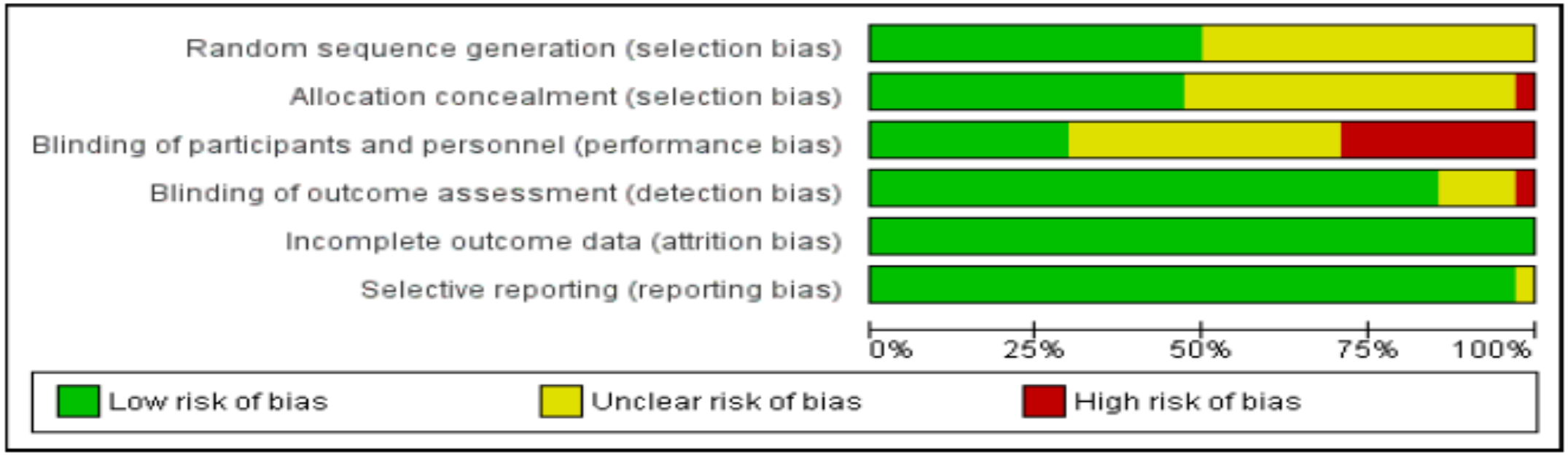
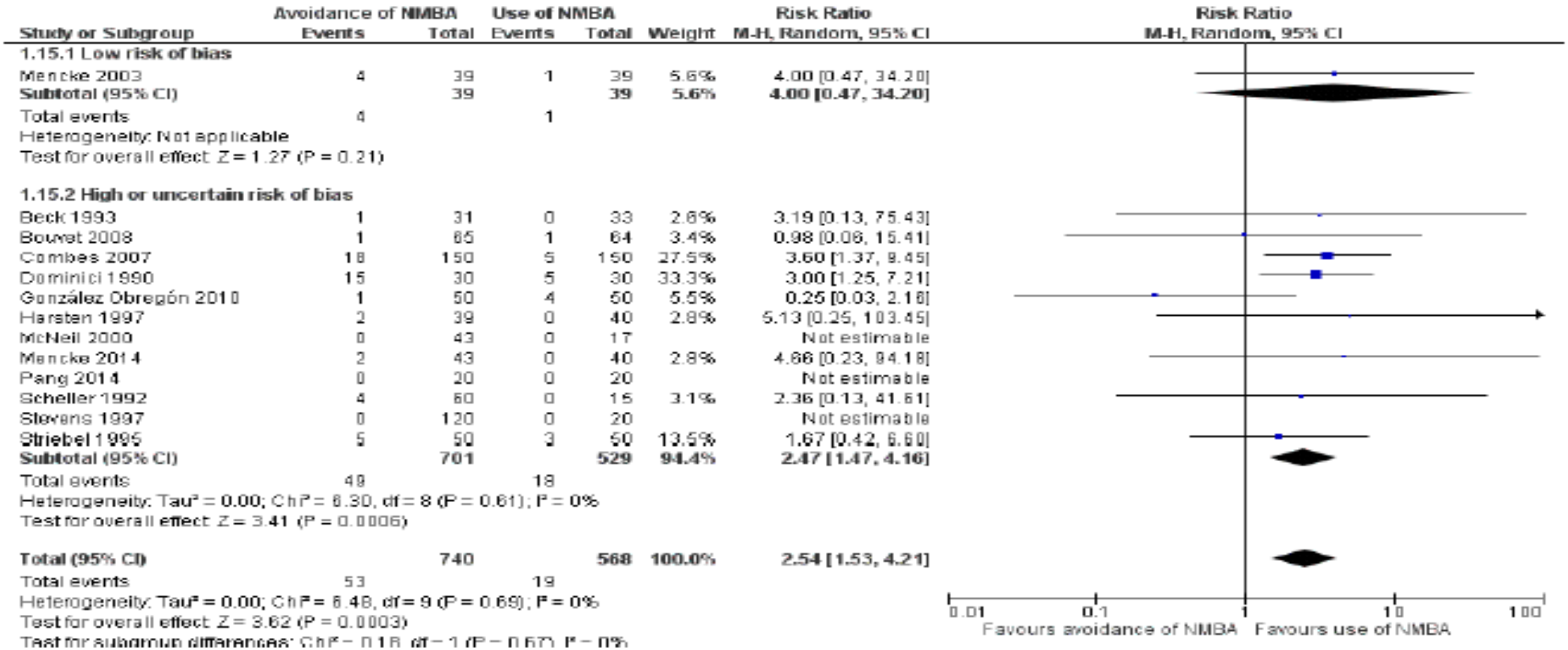


Figure 6.



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Messages

- Place des curares : aide, pas une contrainte
- Bonnes pratiques: les appliquer…
- Fixer des objectifs
  - RFE 2017 : IOT difficile
  - RFE 2018 : Curare…à suivre