Optimiser l'intubation en situation difficile

Sommaire

- Guidelines
- Pro-con: la vidéolaryngoscopie pour tous?
- Optimiser la péri-intubation
- Conclusions

Guidelines

2. **Faut-il utiliser des videolaryngoscopes plutôt que la laryngoscopie standard avec ou sans long mandrin pour obtenir un meilleur taux de succès d'intubation après le premier essai lors de l'intubation difficile prévue hors fibroscopie ?**

Prérequis
- Un vidéolaryngoscope ne doit pas être utilisé si un des cas suivants est rencontré : 1) une ouverture de bouche du patient <2,5 cm ; 2) un rachis cervical fixé en flexion ; 3) une tumeur des voies aéro-digestives supérieures avec stridor. - Il est nécessaire de s'assurer de la possibilité d'introduire un vidéolaryngoscope dans la bouche avant d'endormir un patient. - Une désaturation < 95% impose l'arrêt des manœuvres d'intubation au profit de celles permettant une oxygénation. En cas de risque avéré d'hypoxémie, le vidéolaryngoscope ne peut pas se substituer à un dispositif supra glottique.

R2.1 – Dans le cadre d'une chirurgie programmée, il faut utiliser en première intention les vidéolaryngoscopes chez les patients avec une ventilation au masque possible et au moins deux critères d'intubation difficile.
(Grade 1+) Accord FORT
Argumentaire : Chez des patients avec au moins deux facteurs prédictifs d'intubation difficile (notamment un score de Mallampati III ou IV), les vidéolaryngoscopes améliorent la vision glottique et le taux de succès d'intubation de la trachée à la première tentative, comparativement à la lame de Macintosh [34-40]. Chez ces patients, les vidéolaryngoscopes permettent d'améliorer la vision de la glotte, le score d'intubation difficile et d'augmenter le taux de succès d'intubation de la trachée dès la première tentative. La performance des vidéolaryngoscopes dépend du type de dispositif, de l'expertise de l'opérateur et du terrain. Aujourd'hui, il est classique de décrire les dispositifs avec et sans gouttière, avec des caractéristiques propres, dont la maniabilité. Les vidéolaryngoscopes doivent être utilisés chez les patients avec des critères d'intubation difficile par des praticiens entraînés à l'utilisation de ces dispositifs [41]. L'utilisation des vidéolaryngoscopes chez les patients ayant au moins un critère d'intubation difficile pourrait probablement permettre l'apprentissage et le maintien de l'expertise du praticien. Dans la plupart des études comparant laryngoscopie

Dans le cas d'une induction à séquence rapide pour estomac plein, les données de la littérature ne permettent pas de formuler de recommandation concernant l'utilisation des vidéolaryngoscopes.

PAS DE RECOMMANDATION
Argumentaire : La durée nécessaire pour une intubation trachéale avec un vidéolaryngoscope peut être plus courte, identique ou plus longue qu'avec un laryngoscope équipé d'une lame de Macintosh [38, 42, 44, 45]. Ce paramètre étant aléatoire et dépendant de nombreux facteurs (type de dispositif, de l'expertise de l'opérateur et du terrain), les vidéolaryngoscopes ne peuvent pas à l'heure actuelle être proposés systématiquement en première intention dans la prise en charge des patients à risque de régurgitation et d'inhalation. La manœuvre de Sellick pourrait altérer la vision glottique sous vidéolaryngoscope et le taux de réussite de l'intubation chez un patient avec un estomac plein [46, 47].

Prérequis
- Chez le patient avec une intubation difficile non prévue, une à deux laryngoscopies par un praticien expert sont effectuées en première intention, en utilisant tous les moyens d'optimisation possibles (repositionnement de la tête du patient, long mandrin béquillé type Eschmann, appui laryngé externe BURP) pour visualiser la glotte et parvenir à intuber la trachée. - Le mandrin béquillé fait partie de la première étape de la stratégie d'optimisation de la gestion des voies aériennes en cas d'intubation difficile non prévue.

R2.2 – Si une intubation difficile n'est pas prévue, Il faut probablement utiliser les vidéolaryngoscopes en seconde intention chez les patients avec un stade de Cormack et Lehane III ou plus, si la ventilation au masque est possible.
(Grade 2+) Accord FORT

Prérequis

- En cas d'intubation impossible, la fibroscopie reste la méthode de référence. Les tumeurs de la base de langue sont des indications privilégiées de fibroscopie. En cas de stridor associé à une détresse respiratoire, une trachéotomie première doit être envisagée en première intention.
- Le taux d'échec de la fibroscopie n'est pas nul et les indications de cette technique diminuent avec l'arrivée des vidéolaryngoscopes [51].
- L'intubation avec un fibroscope, comme la vidéolaryngoscopie, est une technique opérateur dépendant, qui nécessite un apprentissage spécifique [52].
- En cas d'échec d'intubation avec fibroscope, les vidéolaryngoscopes ont probablement une place chez les patients avec une ouverture de bouche suffisante (>2,5 cm) seuls ou en association
- Quel que soit la technique choisie pour contrôler les VAS en cas d'intubation et de ventilation au masque difficiles, le patient bénéficiant d'une sédation doit garder une respiration spontanée efficace

R2.3 – Il faut probablement utiliser les vidéolaryngoscopes en technique alternative à l'utilisation du fibroscope chez les patients en ventilation spontanée, avec des critères d'intubation prévue difficile ou impossible et de ventilation au masque difficile.

(Grade 2+) Accord faible

6. **Faut-il s'appuyer sur des arbres décisionnels et des stratégies (algorithmes) pour optimiser la prise en charge d'une difficulté prévue ou non lors du contrôle des voies aériennes ? (avec la remontée des informations émanant des cinq questions précédentes).**

R6.1 – Il faut s'appuyer sur des arbres décisionnels ou algorithmes pour optimiser la gestion d'un contrôle difficile des voies aériennes
(Grade 1+) Accord FORT

ALGORITHME INTUBATION DIFFICILE PREVUE

Accord FORT

INTUBATION DIFFICILE (ID) PREVUE

Orientation stratégique

↓

Évaluer la difficulté prévisible de la VENTILATION AU MASQUE FACIAL

PRÉVOIR LE MAINTIEN DE L'OXYGÉNATION

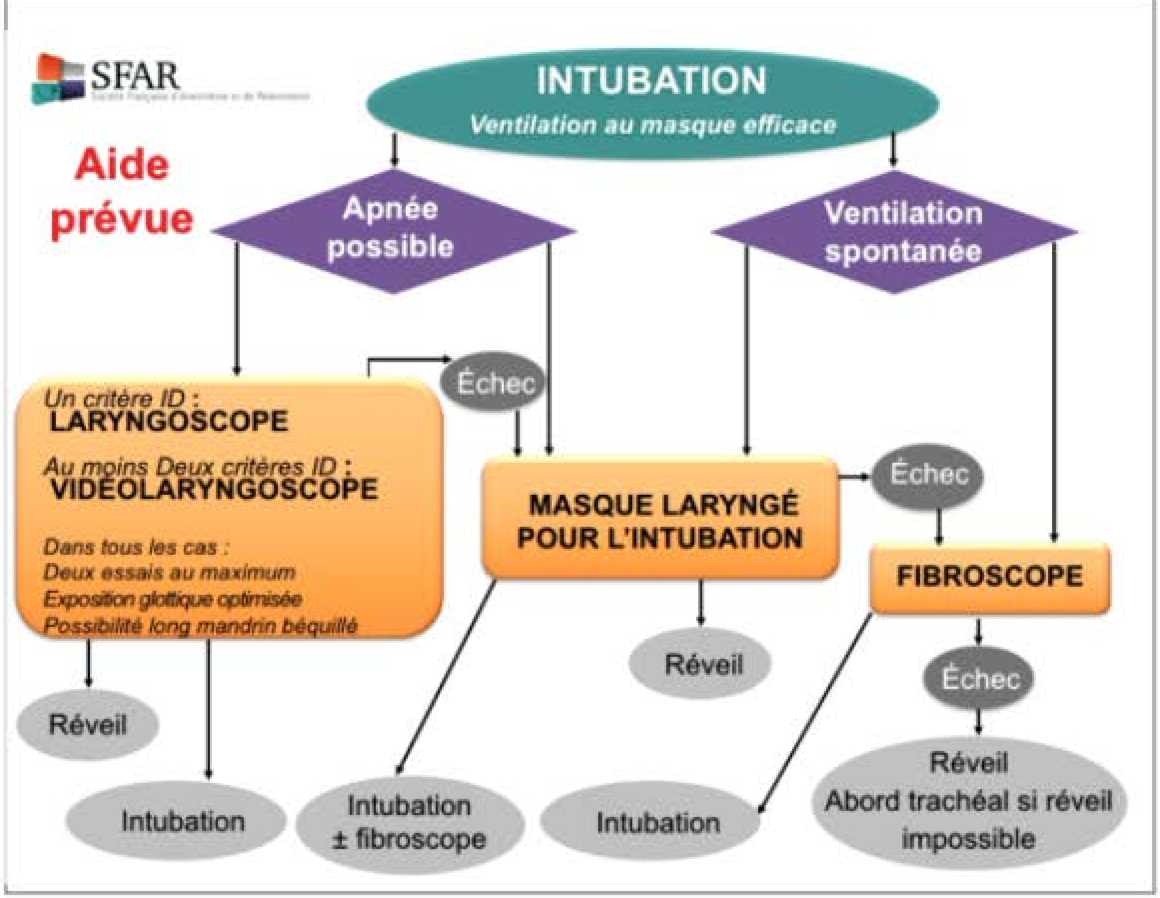
(*Masque laryngé ou masque laryngé pour l'intubation utilisables? Abord trachéal possible? Repérage échographique préalable ?*)

CHOIX DES TECHNIQUES D'ANESTHÉSIE

(*apnée ou ventilation spontanée ?*)

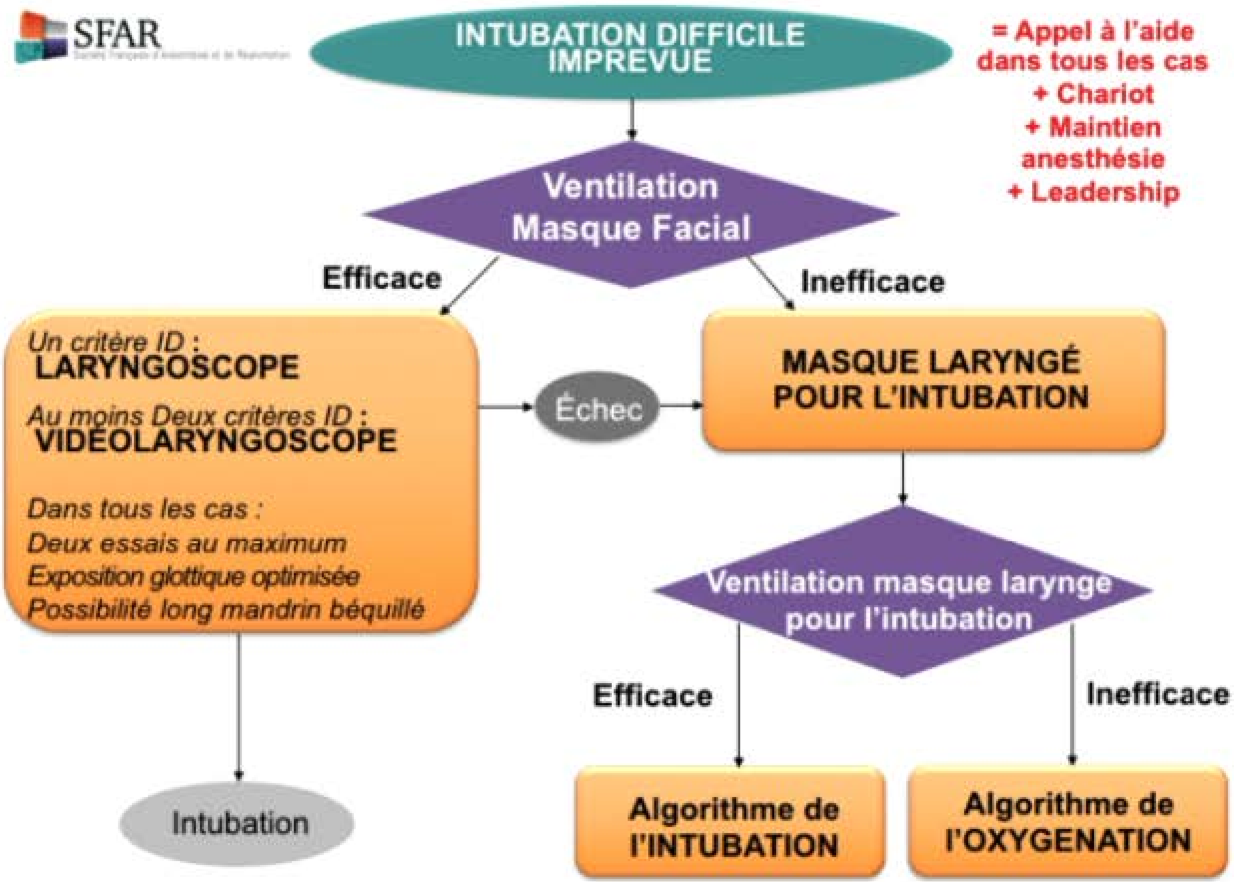
ALGORITHME INTUBATION AVEC VENTILATION EFFICACE PREVUE

Accord FORT



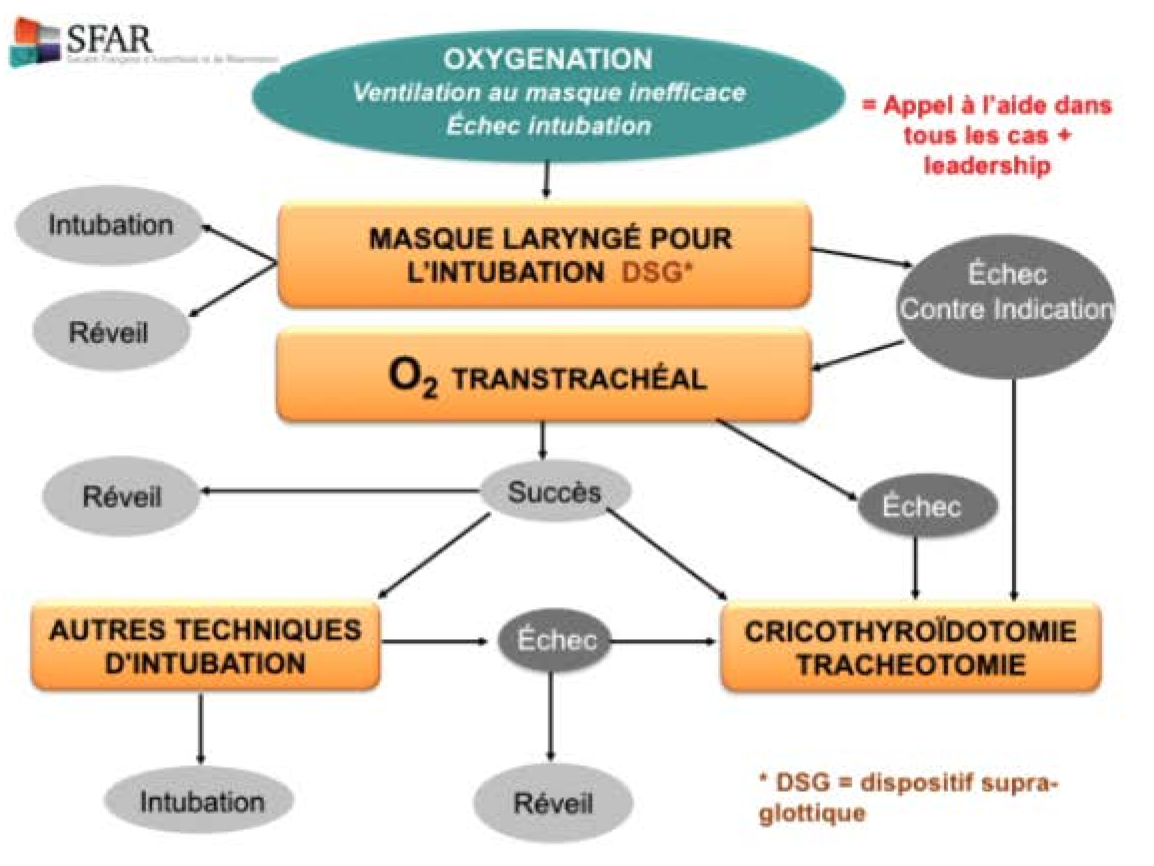
ALGORITHME INTUBATION DIFFICILE NON PREVUE

Accord FORT



ALGORITHME OXYGENATION AVEC VENTILATION AU MASQUE INEFFICACE
ET ÉCHEC INTUBATION

Accord FORT



PRACTICE PARAMETER

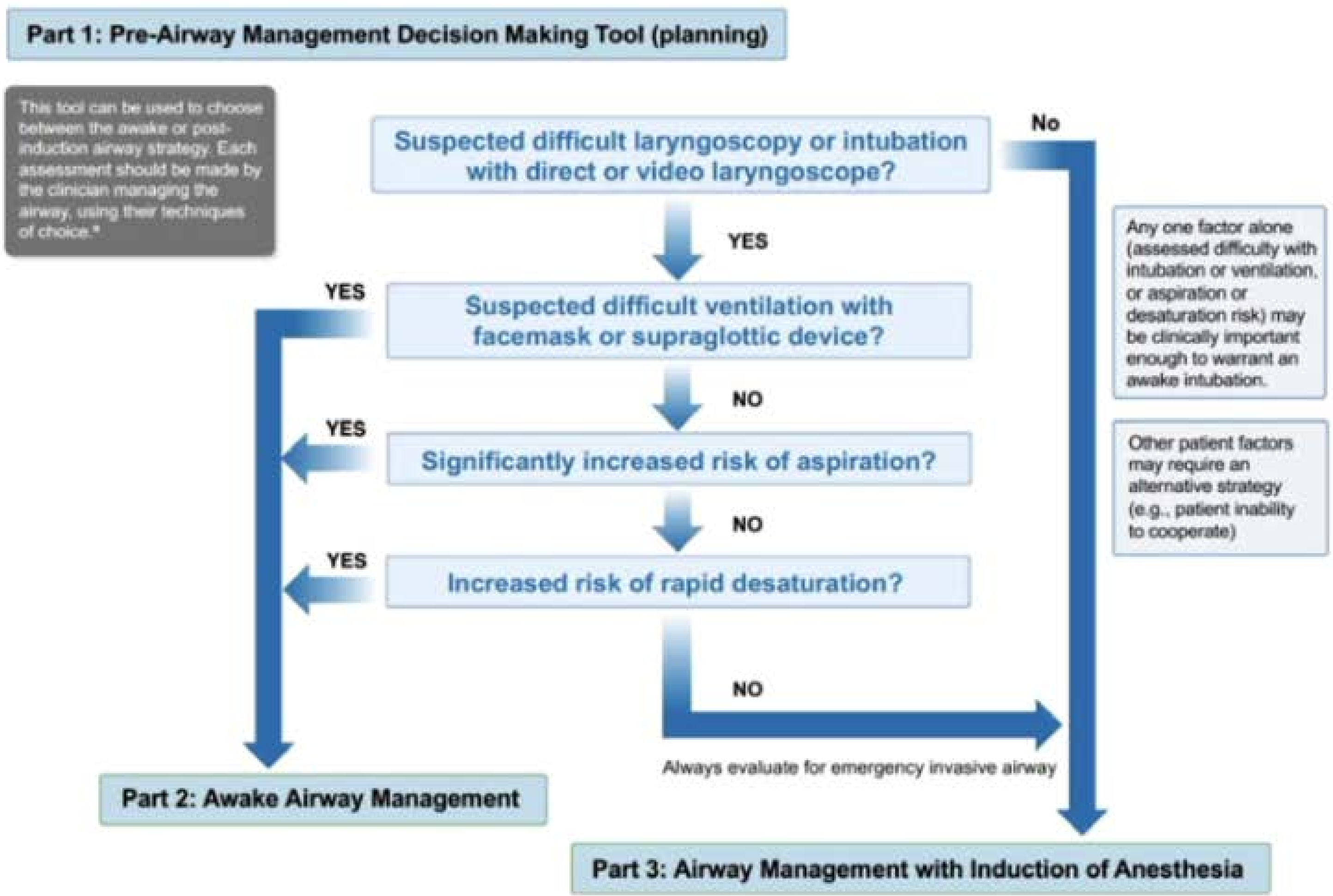
2022 American Society of Anesthesiologists Practice Guidelines for Management of the Difficult Airway*

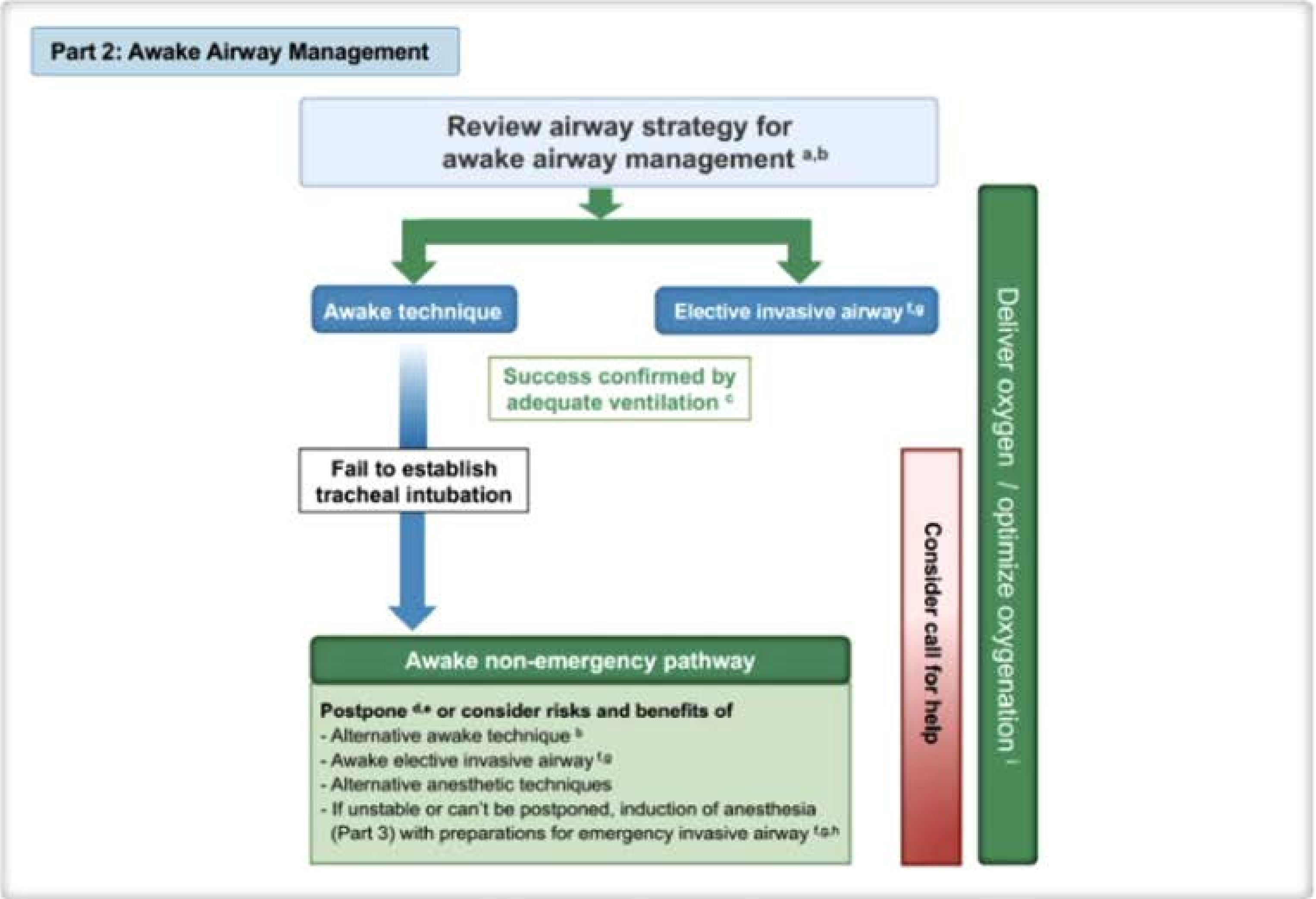
Jeffrey L. Apfelbaum, M.D., Carin A. Hagberg, M.D., Richard T. Connis, Ph.D., Basem B. Abdelmalak, M.D., Madhulika Agarkar, M.P.H., Richard P. Dutton, M.D., John E. Fiadjoe, M.D., Robert Greif, M.D., P. Allan Klock, Jr., M.D., David Mercier, M.D., Sheila N. Myatra, M.D., Ellen P. O'Sullivan, M.D., William H. Rosenblatt, M.D., Massimiliano Sorbello, M.D., Avery Tung, M.D.

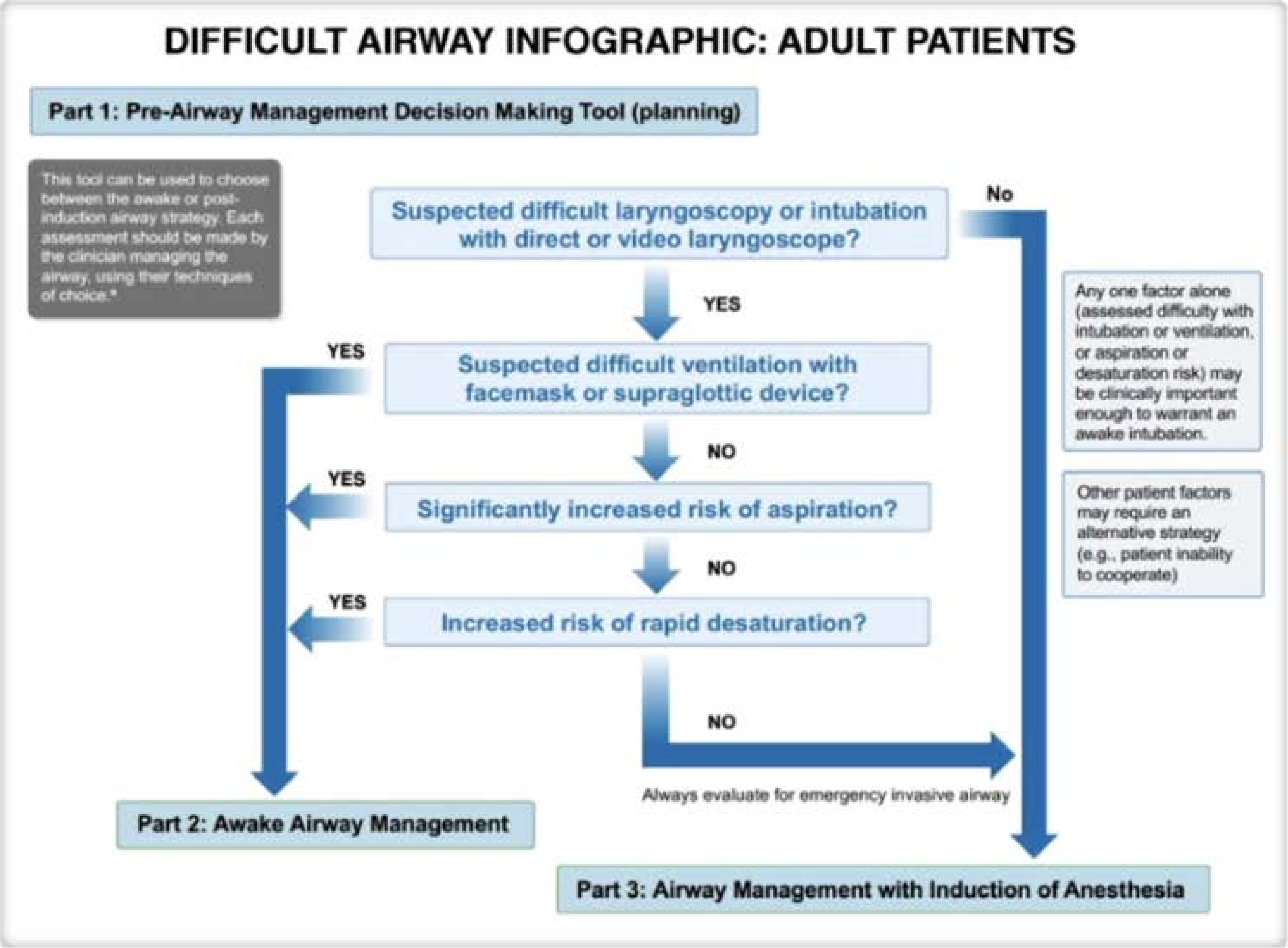
Anesthesiology 2022; 136:31–81

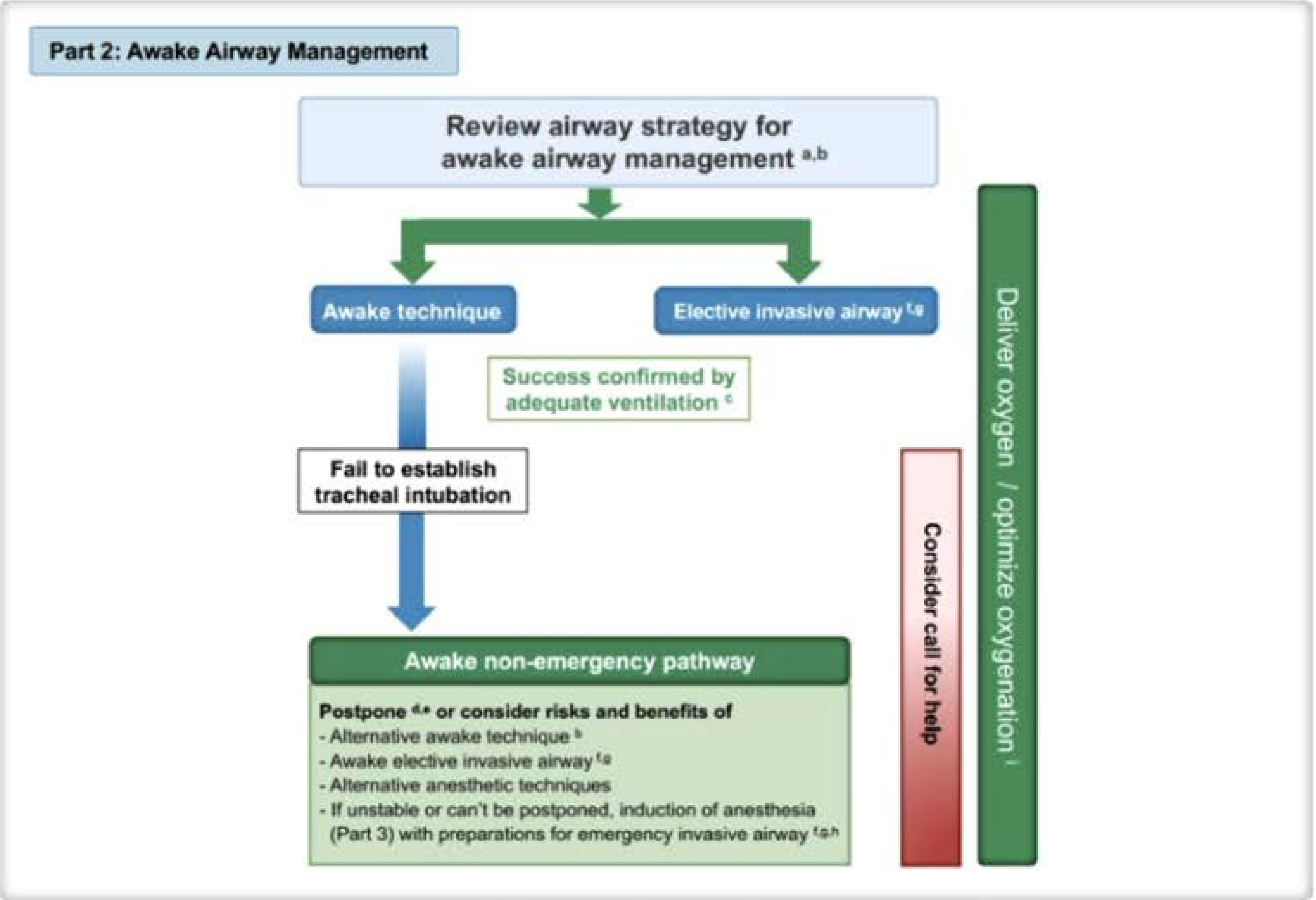
Une Américaine obtient 720 000 euros de dommages et intérêts après avoir été brûlée par un nugget

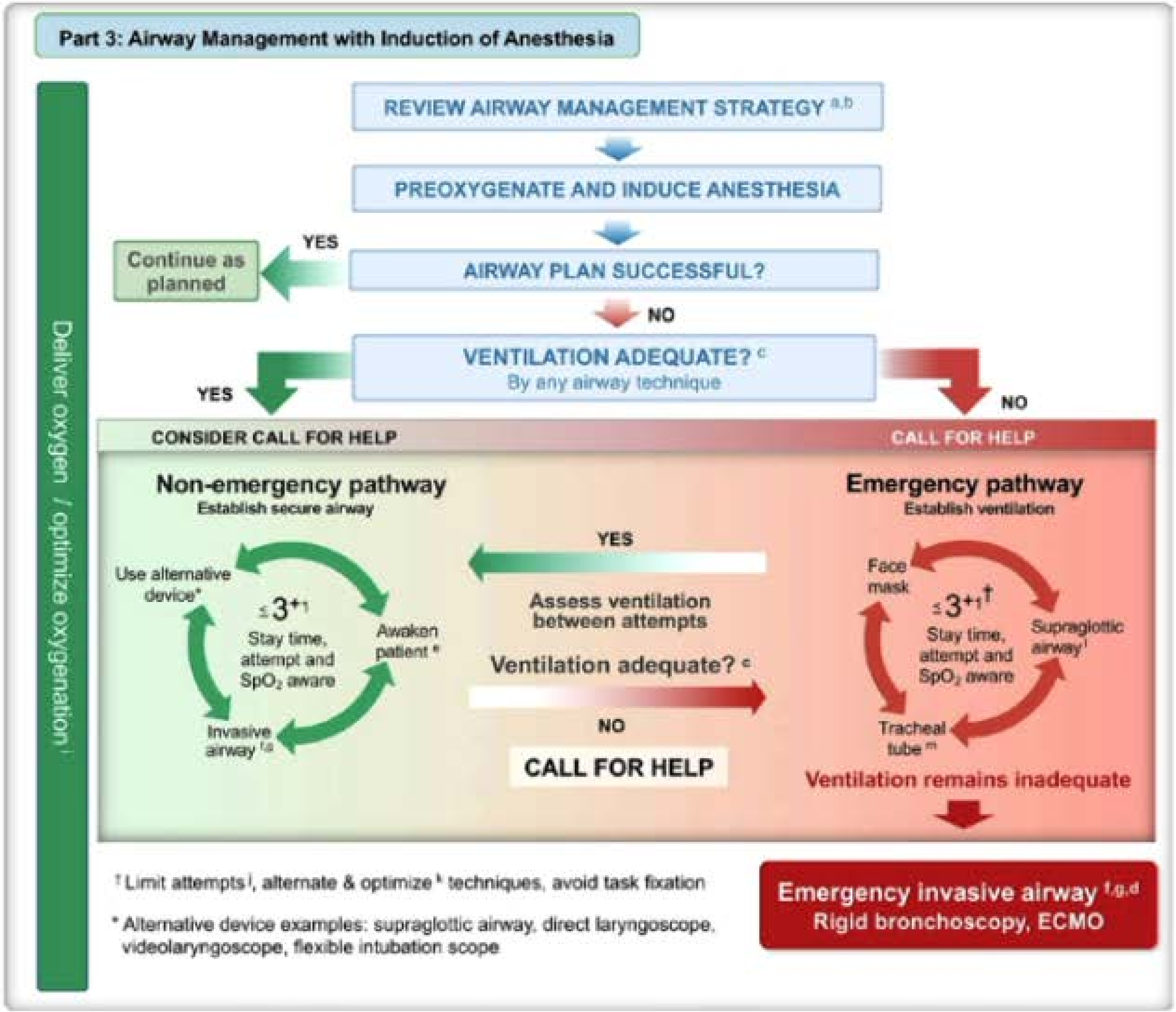
DIFFICULT AIRWAY INFOGRAPHIC: ADULT PATIENTS




Part 2: Awake Airway Management
Review airway strategy for awake airway management a,b
Awake technique
Elective invasive airway f,g
Success confirmed by adequate ventilation c
Fail to establish tracheal intubation
Awake non-emergency pathway
Postpone d,e or consider risks and benefits of
- Alternative awake technique b
- Awake elective invasive airway f,g
- Alternative anesthetic techniques
- If unstable or can't be postponed, induction of anesthesia (Part 3) with preparations for emergency invasive airway f,g,h
Consider call for help
Deliver oxygen / optimize oxygenation i


DIFFICULT AIRWAY INFOGRAPHIC: ADULT PATIENTS
Part 1: Pre-Airway Management Decision Making Tool (planning)
This tool can be used to choose between the awake or post-induction airway strategy. Each assessment should be made by the clinician managing the airway, using their techniques of choice.*
Suspected difficult laryngoscopy or intubation with direct or video laryngoscope?
No
YES
YES
Suspected difficult ventilation with facemask or supraglottic device?
NO
YES
Significantly increased risk of aspiration?
NO
YES
Increased risk of rapid desaturation?
NO
Always evaluate for emergency invasive airway
Any one factor alone (assessed difficulty with intubation or ventilation, or aspiration or desaturation risk) may be clinically important enough to warrant an awake intubation.
Other patient factors may require an alternative strategy (e.g., patient inability to cooperate)
Part 2: Awake Airway Management
Part 3: Airway Management with Induction of Anesthesia


Part 2: Awake Airway Management
Review airway strategy for awake airway management a,b
Awake technique
Elective invasive airway f,g
Success confirmed by adequate ventilation c
Fail to establish tracheal intubation
Awake non-emergency pathway
Postpone d,e or consider risks and benefits of
- Alternative awake technique b
- Awake elective invasive airway f,g
- Alternative anesthetic techniques
- If unstable or can't be postponed, induction of anesthesia (Part 3) with preparations for emergency invasive airway f,g,h
Consider call for help
Deliver oxygen / optimize oxygenation i



Part 3: Airway Management with Induction of Anesthesia
Deliver oxygen / optimize oxygenation
REVIEW AIRWAY MANAGEMENT STRATEGY a,b
PREOXYGENATE AND INDUCE ANESTHESIA
AIRWAY PLAN SUCCESSFUL?
YES
Continue as planned
NO
VENTILATION ADEQUATE? c
By any airway technique
YES
NO
CONSIDER CALL FOR HELP
CALL FOR HELP
Non-emergency pathway
Establish secure airway
Use alternative device*
≤3+1
Stay time, attempt and SpO2 aware
Awaken patient
Invasive airway
YES
Assess ventilation between attempts
Ventilation adequate? c
NO
CALL FOR HELP
Emergency pathway
Establish ventilation
Face mask
≤3+1†
Stay time, attempt and SpO2 aware
Supraglottic airway
Tracheal tube
Ventilation remains inadequate
† Limit attempts, alternate & optimize techniques, avoid task fixation
* Alternative device examples: supraglottic airway, direct laryngoscope, videolaryngoscope, flexible intubation scope
Emergency invasive airway f,g,d
Rigid bronchoscopy, ECMO

2015

Management of unanticipated difficult tracheal intubation in adults

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

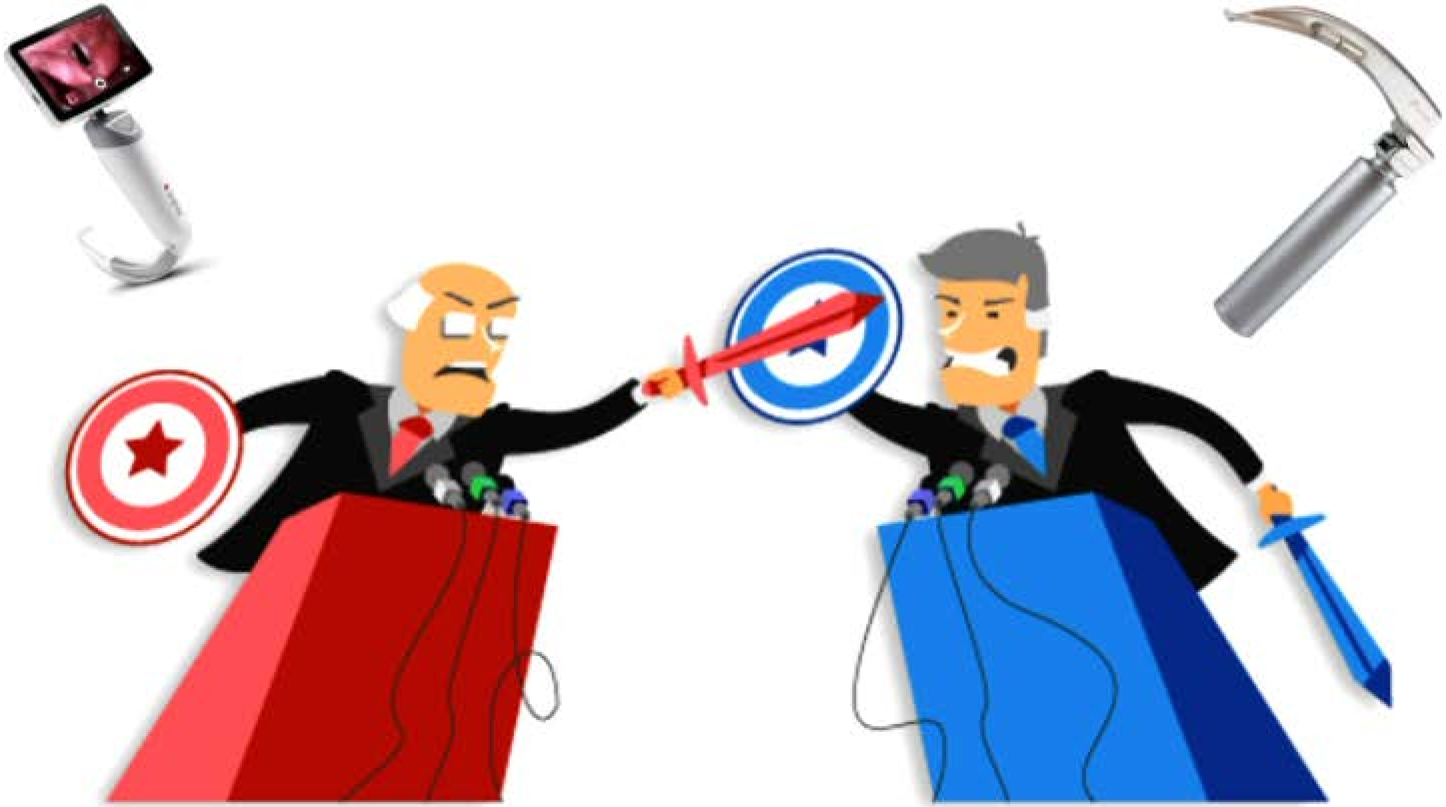
Plan D: Emergency front of neck access

- 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

Pro~con:
le vidéolaryngoscope
pour tous?

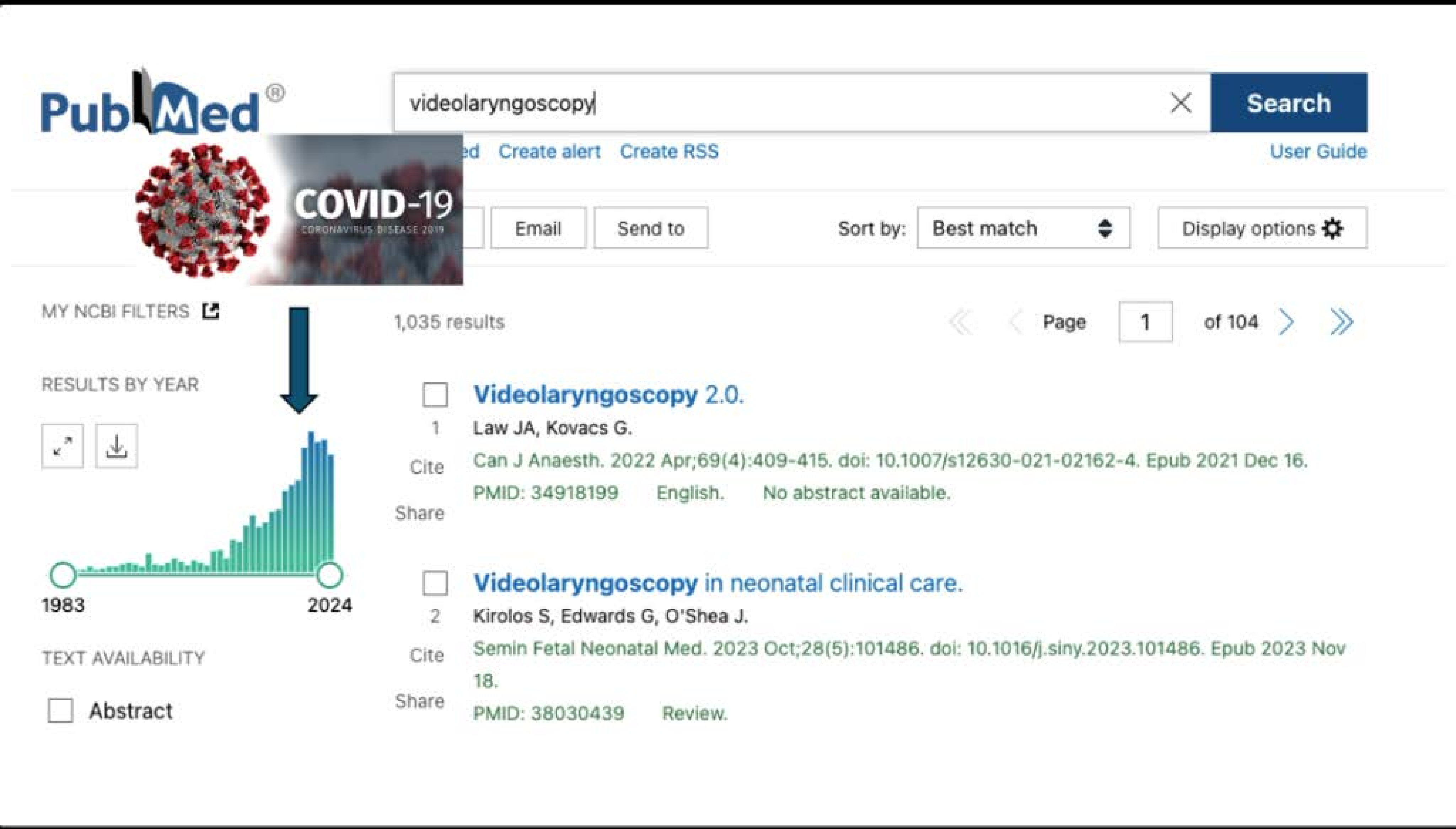


Videolaryngoscopy as a first-intention technique for tracheal intubation in unselected surgical patients: a before and after observational study

Audrey De Jong[1,†], Thomas Sfara[2,†], Yvan Pouzeratte[2], Joris Pensier[2], Amélie Rolle[2], Gérald Chanques[1] and Samir Jaber[1,*]

Use of videolaryngoscopy as the first option for all tracheal intubations: not so fast. Comment on *Br J Anaesth* 2022; 129: 624–634

Aibek E. Mirrakhimov[*] and Eli Torgeson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Best match
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1
of 104
RESULTS BY YEAR
1983
2024
TEXT AVAILABILITY
Abstract
Videolaryngoscopy 2.0.
1
Law JA, Kovacs G.
Cite
Can J Anaesth. 2022 Apr;69(4):409-415. doi: 10.1007/s12630-021-02162-4. Epub 2021 Dec 16.
PMID: 34918199 English. No abstract available.
Share
Videolaryngoscopy in neonatal clinical care.
2
Kirolos S, Edwards G, O'Shea J.
Cite
Semin Fetal Neonatal Med. 2023 Oct;28(5):101486. doi: 10.1016/j.siny.2023.101486. Epub 2023 Nov 18.
PMID: 38030439 Review.
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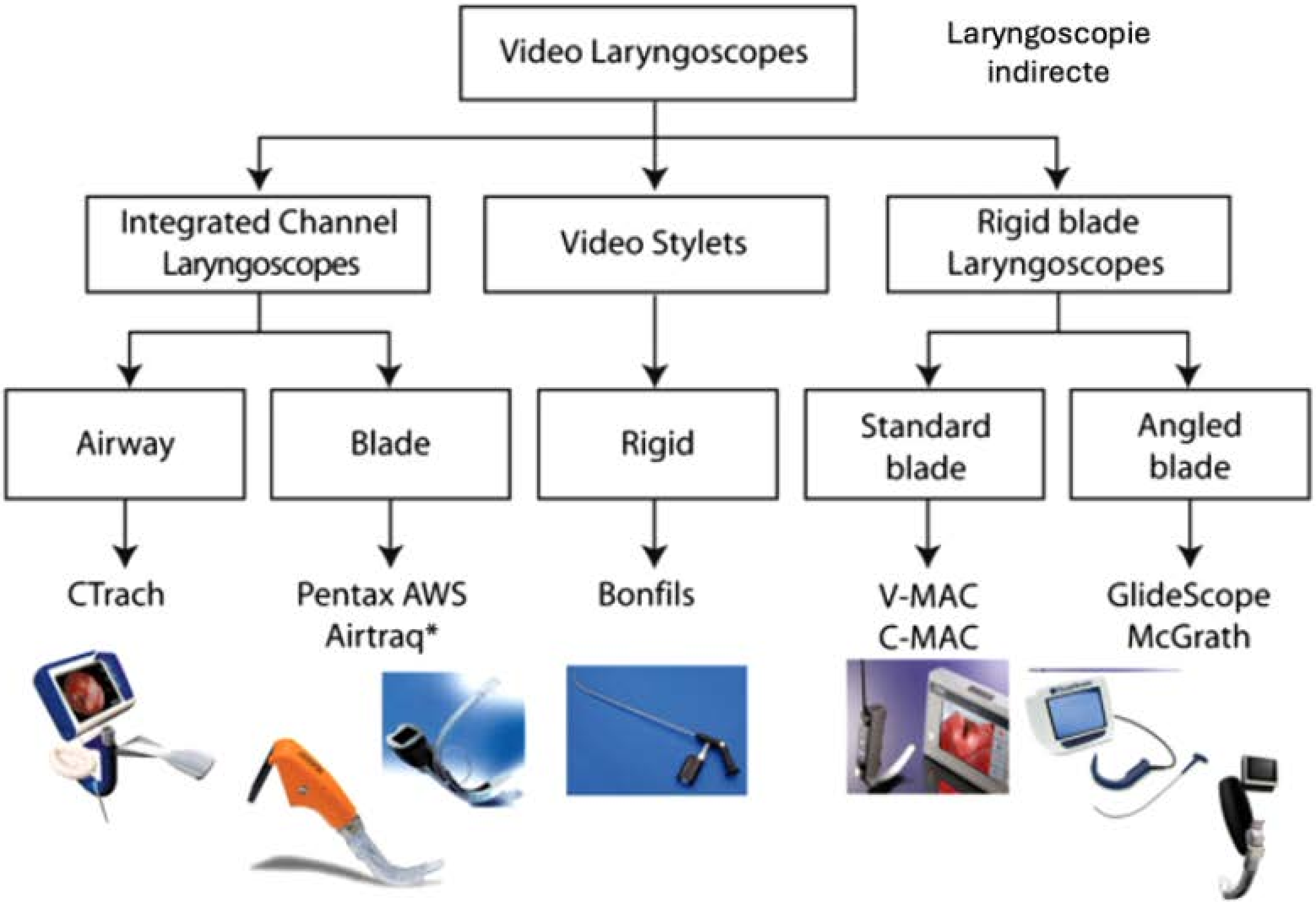
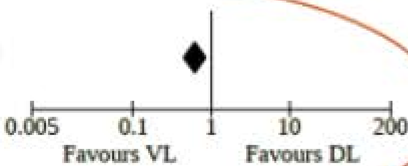


Laryngoscopie
indirecte
Video Laryngoscopes
Integrated Channel Laryngoscopes
Video Stylets
Rigid blade Laryngoscopes
Airway
Blade
Rigid
Standard blade
Angled blade
CTrach
Pentax AWS
Airtraq*
Bonfils
V-MAC
C-MAC
GlideScope
McGrath

Analysis 4.2. Comparison 4: VL versus DL (all devices combined), Outcome 2: Hypoxia

Total (95% CI)	**2870**	**2564**	**100.0%**	**0.61 [0.44 , 0.85]**
Total events:	110	169		

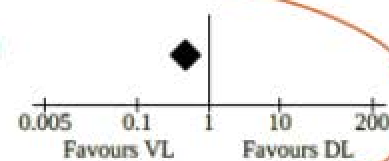
Heterogeneity: $Tau^2 = 0.13$; $Chi^2 = 25.64$, df = 17 (P = 0.08); $I^2 = 34\%$
Test for overall effect: Z = 2.92 (P = 0.003)
Test for subgroup differences: Not applicable



Analysis 4.4. Comparison 4: VL versus DL (all devices combined), Outcome 4: Oesophageal intubation

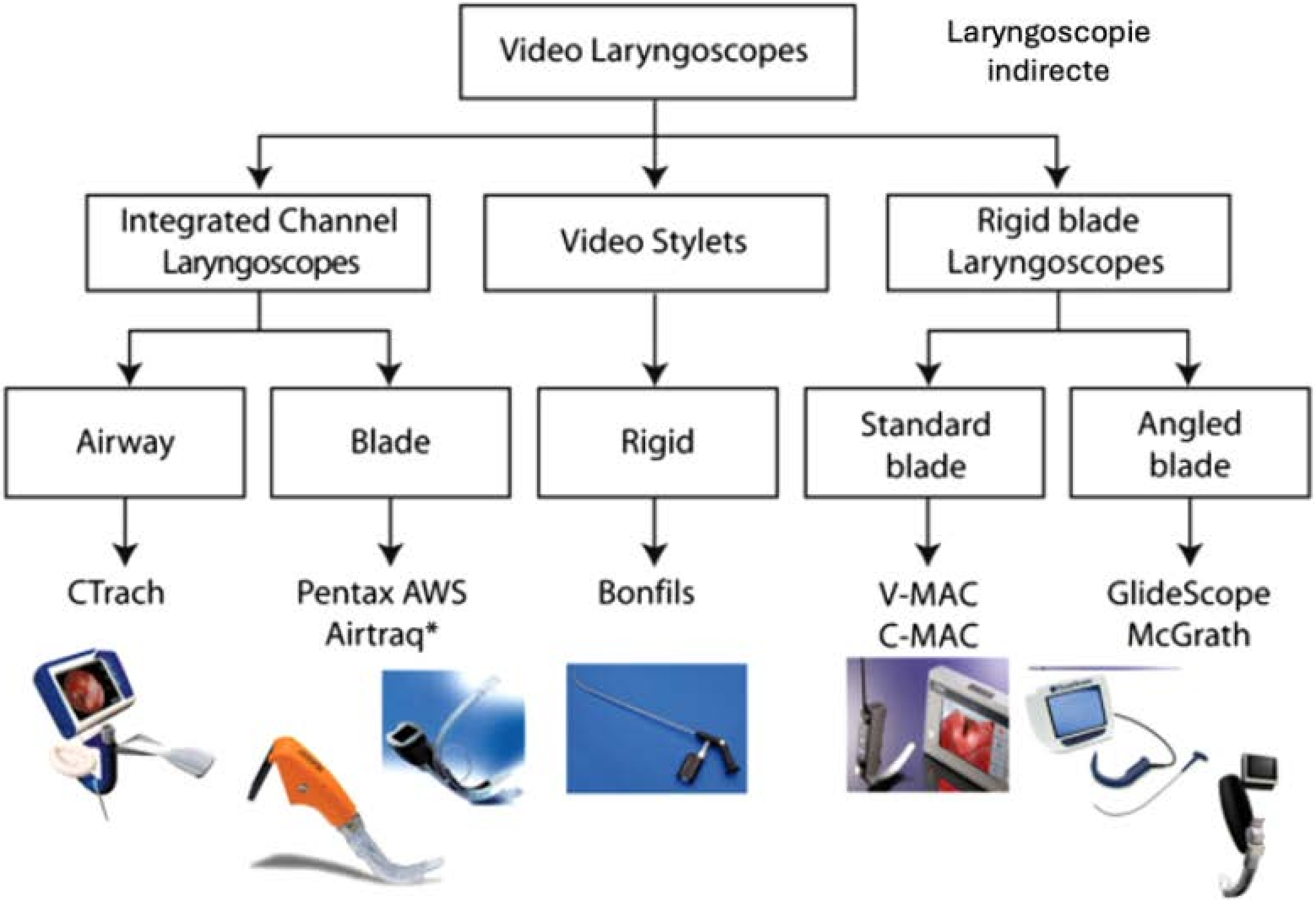
Total (95% CI)	**3143**	**2625**	**100.0%**	**0.47 [0.29 , 0.77]**
Total events:	37	85		

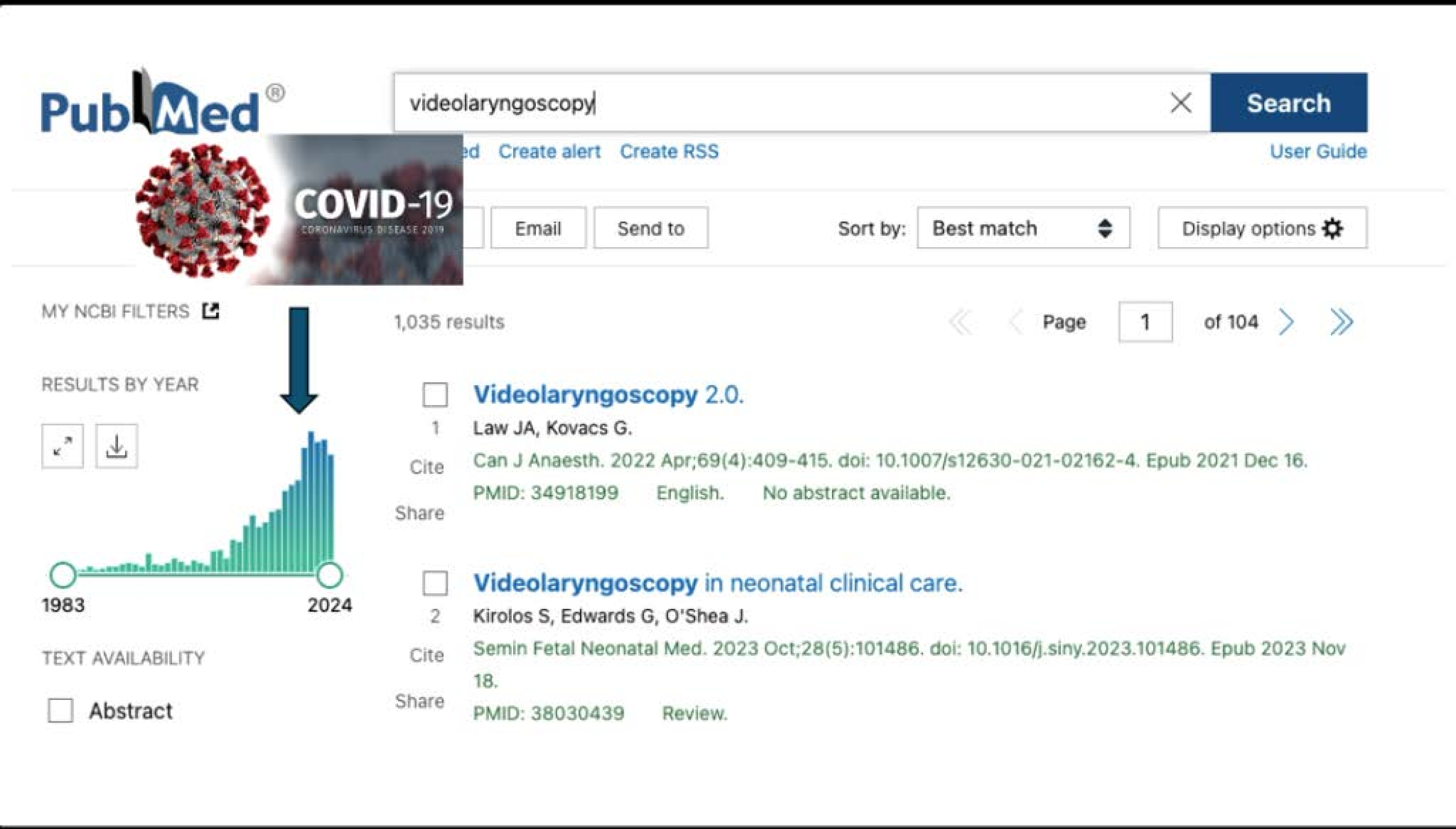
Heterogeneity: $Tau^2 = 0.22$; $Chi^2 = 28.44$, df = 24 (P = 0.24); $I^2 = 16\%$
Test for overall effect: Z = 3.01 (P = 0.003)
Test for subgroup differences: Not applicable




PROS

Laryngoscopie indirecte

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Send to
Sort by:
Best match
Display options
MY NCBI FILTERS
RESULTS BY YEAR
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2024
TEXT AVAILABILITY
Abstract
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1
of 104
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PMID: 38030439 Review.

MCL
Macintosh

GVL
Glidescope

CM
C-MAC

CMD
C-MAC D-blade

MG
McGrath

AWS
Airwayscope

ATQ
Airtraq

KV
King Vision

EDITORIAL

Videolaryngoscopy Is Extremely Valuable, But Should It Be the Standard for Tracheal Intubation?

Takashi Asai, MD, PhD,* and Narasimhan Jagannathan, MD, MBA†‡

+

PROS

Cochrane
Library

Cochrane Database of Systematic Reviews

2022
26.149 patients
222 RCT de 2015 à 2021
590 pages

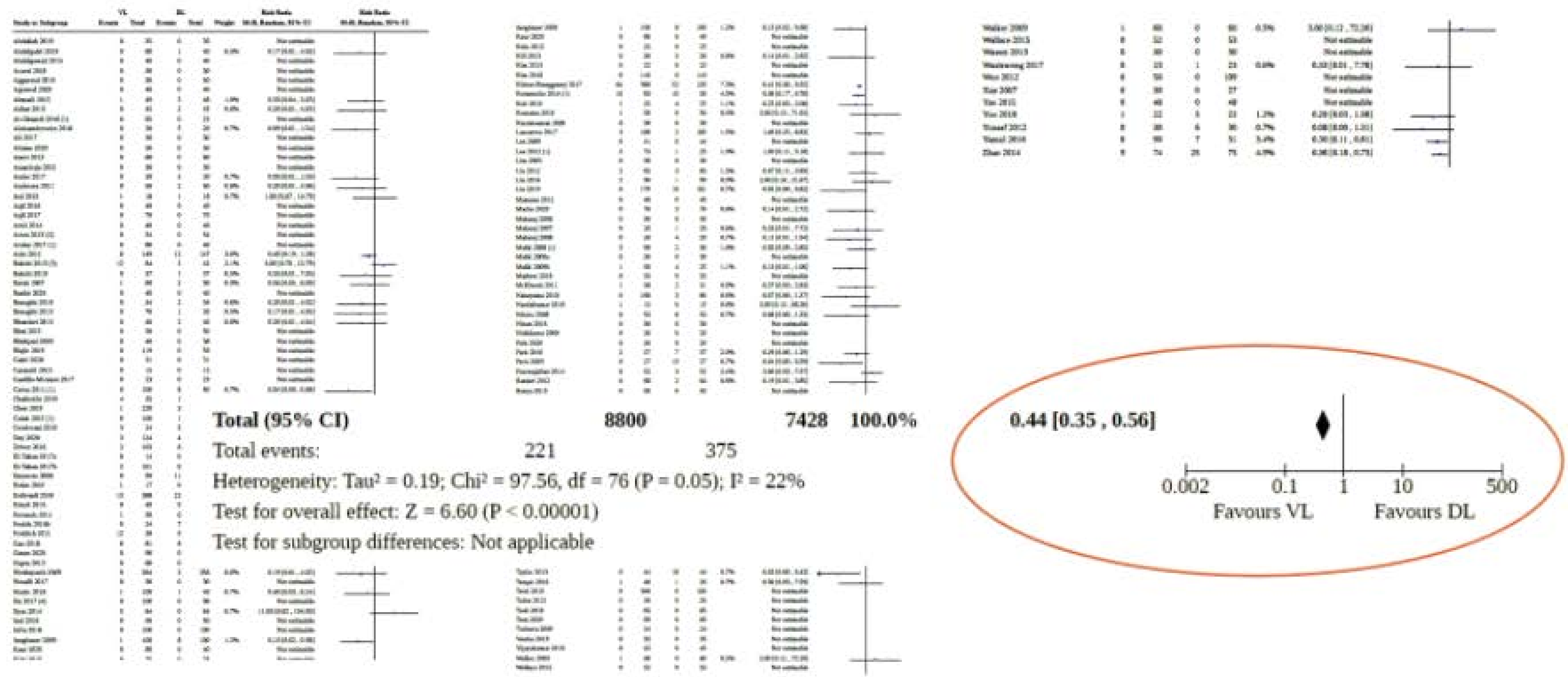
Videolaryngoscopy versus direct laryngoscopy for adults undergoing tracheal intubation (Review)

Hansel J, Rogers AM, Lewis SR, Cook TM, Smith AF

Cochrane Library

Trusted evidence.
Informed decisions.
Better health.

Analysis 4.1. Comparison 4: VL versus DL (all devices combined), Outcome 1: Failed intubation



Cochrane
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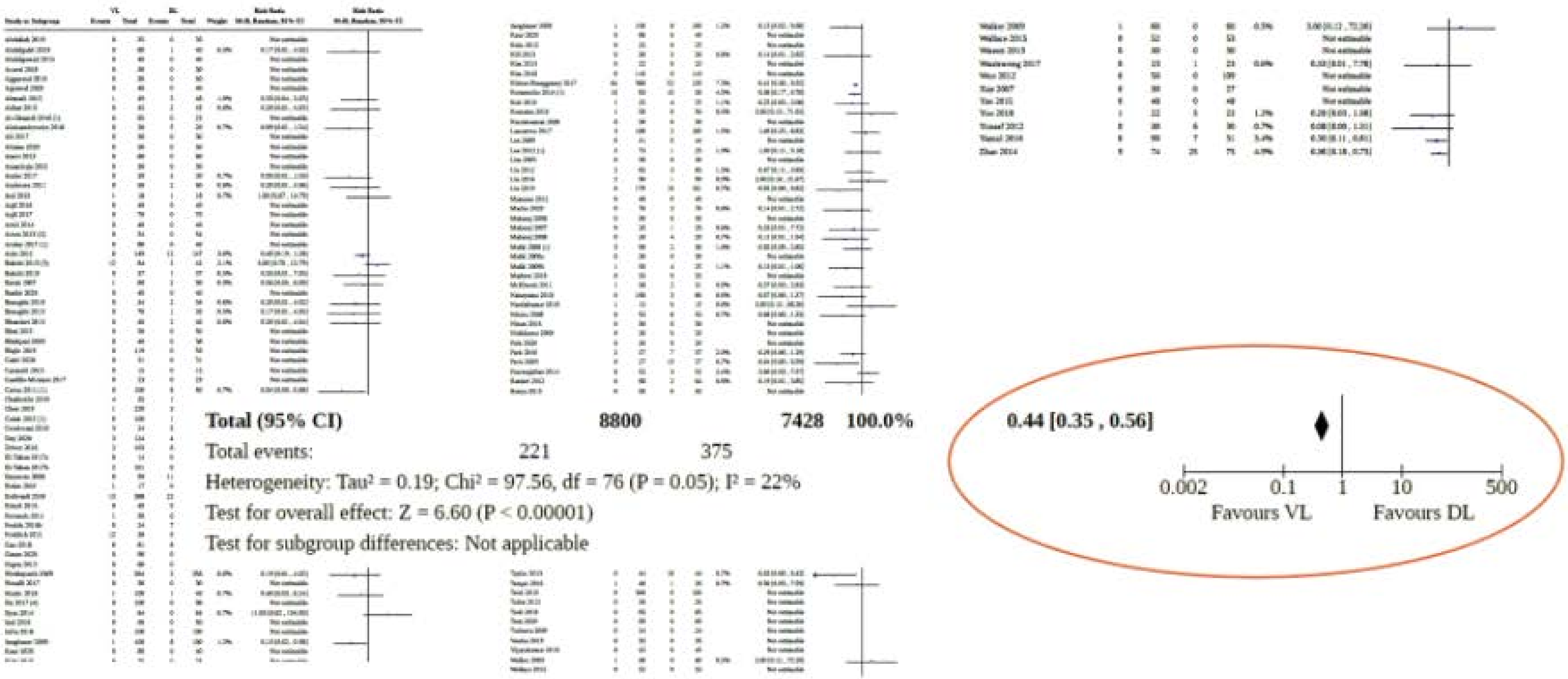


Summary of findings 2. Hyperangulated videolaryngoscopy compared to direct laryngoscopy for adults undergoing tracheal intubation

Hyperangulated videolaryngoscopy compared to direct laryngoscopy for adults undergoing tracheal intubation

Patient or population: adults undergoing tracheal intubation
Setting: hospital and out-of-hospital; international
Intervention: hyperangulated videolaryngoscopy
Comparison: direct laryngoscopy

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with direct laryngoscopy	Risk with hyperangulated videolaryngoscopy				
Failed intubation	Study population		RR 0.51 (0.34 to 0.76)	7146 (63 RCTs)	⊕⊕⊕◯ Moderate[a]	
	56 per 1000	29 per 1000 (19 to 43)				
Hypoxaemia	Study population		RR 0.49 (0.22 to 1.11)	1691 (15 RCTs)	⊕⊕◯◯ Low[a,b]	
	44 per 1000	22 per 1000 (10 to 49)				
Successful first attempt	Study population		RR 1.03 (1.00 to 1.05)	8086 (66 RCTs)	⊕⊕◯◯ Low[a,c]	
	854 per 1000	879 per 1000 (854 to 896)				
Oesophageal intubation	Study population		RR 0.39 (0.18 to 0.81)	1968 (14 RCTs)	⊕⊕⊕◯ Moderate[a]	
	26 per 1000	10 per 1000 (5 to 21)				
Dental trauma	Study population		RR 0.51 (0.16 to 1.59)	3497 (30 RCTs)	⊕◯◯◯ Very low[a,d]	
	4 per 1000	2 per 1000 (1 to 7)				
Cormack-Lehane grade	Study population		RR 0.15 (0.10 to 0.24)	6058 (54 RCTs)	⊕⊕⊕◯ Moderate[a,c]	Data presented for frequency of Cormack-Lehane grade 3 and 4 views
	189 per 1000	28 per 1000 (19 to 45)				
Time for tracheal intubation	see comment	see comment	-	6644 (59 RCTs)	⊕◯◯◯ Very low[a,e]	High level of statistical heterogeneity between studies; therefore meta-analysis not completed

We conclude that VLs of any of the three designs likely reduce rates of failed intubation with increased rates of successful intubation on the first attempt and better glottic views across patient groups and settings. Hyperangulated designs are likely favourable in terms of reducing the rate of oesophageal intubation, and result in improved rates of successful intubation in individuals presenting with difficult airway features.

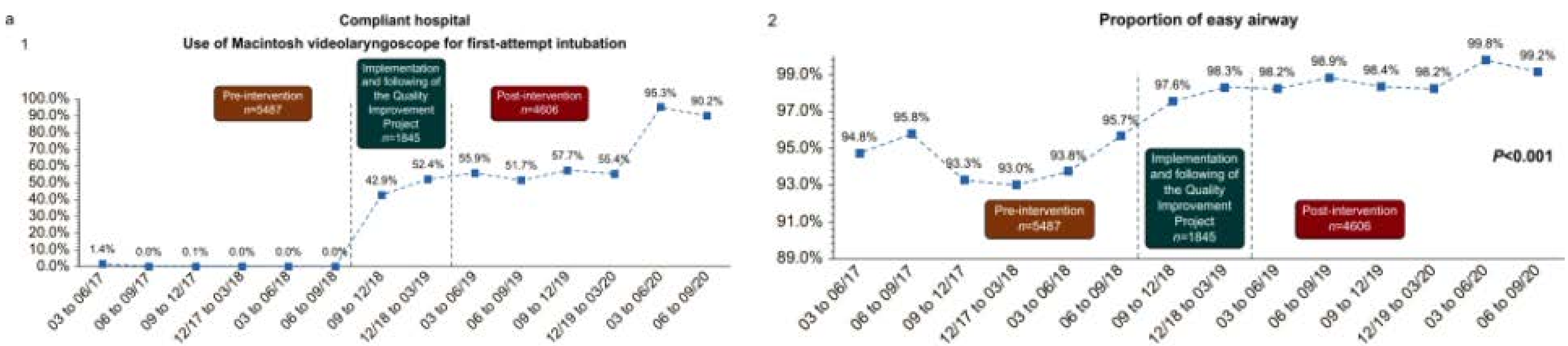
BJA

British Journal of Anaesthesia, 129 (4): 624–634 (2022)

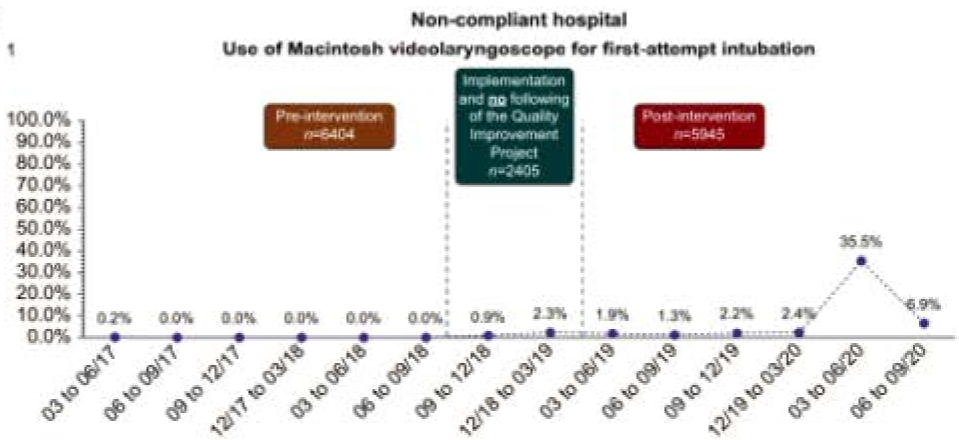
doi: 10.1016/j.bja.2022.05.030
Advance Access Publication Date: 8 July 2022
Respiration and the Airway

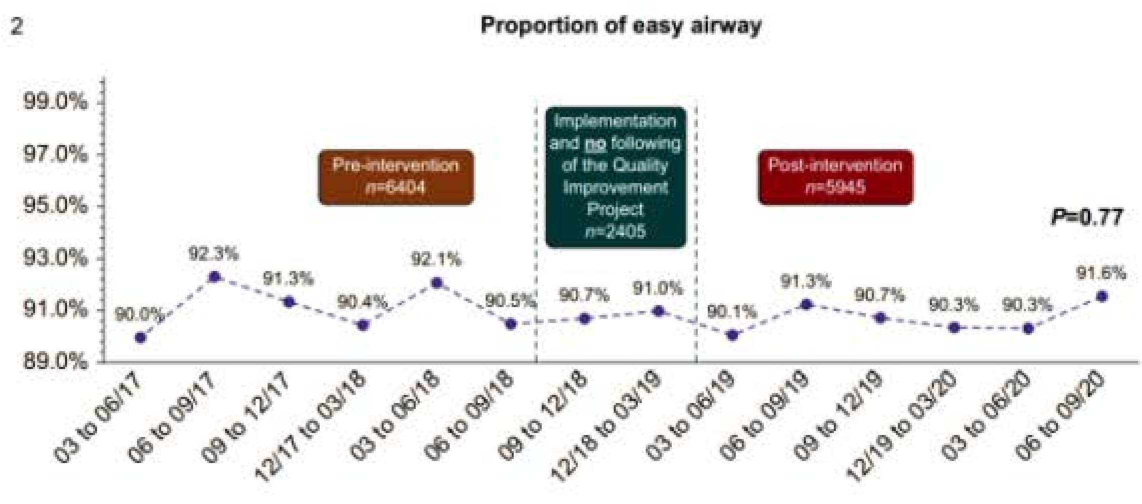
Videolaryngoscopy as a first-intention technique for tracheal intubation in unselected surgical patients: a before and after observational study

Audrey De Jong[1,†], Thomas Sfara[2,†], Yvan Pouzeratte[2], Joris Pensier[2], Amélie Rolle[2], Gérald Chanques[1] and Samir Jaber[1,*]



b


1
Non-compliant hospital
Use of Macintosh videolaryngoscope for first-attempt intubation
Pre-intervention
n=6404
Implementation and no following of the Quality Improvement Project
n=2405
Post-intervention
n=5945
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.2%
0.0%
0.0%
0.0%
0.0%
0.0%
0.9%
2.3%
1.9%
1.3%
2.2%
2.4%
35.5%
6.9%
03 to 06/17
06 to 09/17
09 to 12/17
12/17 to 03/18
03 to 06/18
06 to 09/18
09 to 12/18
12/18 to 03/19
03 to 06/19
06 to 09/19
09 to 12/19
12/19 to 03/20
03 to 06/20
06 to 09/20


2
Proportion of easy airway
Pre-intervention
n=6404
Implementation and no following of the Quality Improvement Project
n=2405
Post-intervention
n=5945
P=0.77
99.0%
97.0%
95.0%
93.0%
91.0%
89.0%
90.0%
92.3%
91.3%
90.4%
92.1%
90.5%
90.7%
91.0%
90.1%
91.3%
90.7%
90.3%
90.3%
91.6%
03 to 06/17
06 to 09/17
09 to 12/17
12/17 to 03/18
03 to 06/18
06 to 09/18
09 to 12/18
12/18 to 03/19
03 to 06/19
06 to 09/19
09 to 12/19
12/19 to 03/20
03 to 06/20
06 to 09/20

Araújo et al. Critical Care (2024) 28:1
https://doi.org/10.1186/s13054-023-04727-9

Critical Care

RESEARCH **Open Access**

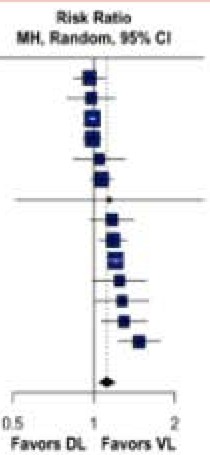
Video versus direct laryngoscopy in critically ill patients: an updated systematic review and meta-analysis of randomized controlled trials

Beatriz Araújo[1], André Rivera[1], Suzany Martins[1], Renatha Abreu[1], Paula Cassa[1], Maicon Silva[1] and Alice Gallo de Moraes[2*]

A. Sucessful intubation in first attempt

Study	Year	VL Events	VL Total	DL Events	DL Total	Weight	RR	95% CI
MACMAN	2017	126	186	130	185	8.1%	0.96	[0.84; 1.10]
Gao et al.	2018	55	81	57	82	5.8%	0.98	[0.79; 1.20]
Sulser et al.	2016	73	74	73	73	11.5%	0.99	[0.96; 1.01]
Yeatts et al.	2013	242	303	259	320	10.2%	0.99	[0.91; 1.07]
FELLOW	2016	51	74	50	76	5.4%	1.05	[0.84; 1.31]
Driver et al.	2016	95	103	82	95	9.5%	1.07	[0.97; 1.18]
VICI	2012	8	20	7	20	0.7%	1.14	[0.51; 2.55]
Ajith et al.	2022	35	38	30	38	6.3%	1.17	[0.97; 1.41]
Dharanindra et al.	2023	70	73	57	70	8.6%	1.18	[1.04; 1.33]
DEVICE	2023	600	705	504	712	10.9%	1.20	[1.14; 1.27]
Sanguanwit et al.	2021	57	78	47	80	5.2%	1.24	[0.99; 1.56]
Goksu et al.	2016	56	75	44	75	5.1%	1.27	[1.01; 1.60]
Abdelgalel et al.	2018	75	80	29	40	6.0%	1.29	[1.06; 1.58]
Dey et al.	2020	91	108	63	110	6.6%	1.47	[1.23; 1.76]
Total (95% CI)		**1634**	**1998**	**1432**	**1976**	**100.0%**	**1.12**	**[1.04; 1.20]**

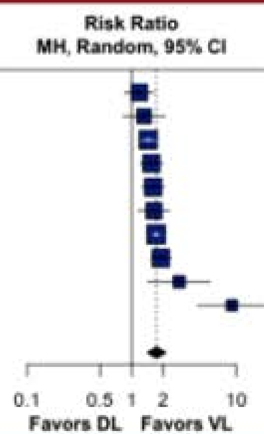
Heterogeneity: $Tau^2 = 0.0109$; $Chi^2 = 73.70$, df = 13 ($P < 0.01$); $I^2 = 82\%$
Test for overall effect: $Z = 3.11$ ($P = 0.002$)



B. CL grade view I

Study	Year	VL Events	VL Total	DL Events	DL Total	Weight	RR	95% CI
Gao et al.	2018	42	81	36	82	10.4%	1.18	[0.86; 1.63]
Ajith et al.	2022	21	38	16	38	8.1%	1.31	[0.82; 2.10]
MACMAN	2017	133	176	93	177	12.9%	1.44	[1.22; 1.69]
FELLOW	2016	57	74	38	76	11.5%	1.54	[1.19; 1.99]
Sulser et al.	2016	60	74	37	73	11.6%	1.60	[1.24; 2.06]
Abdelgalel et al.	2018	62	80	19	40	10.0%	1.63	[1.15; 2.31]
DEVICE	2023	538	705	318	712	13.6%	1.71	[1.56; 1.87]
Dey et al.	2020	91	108	49	110	12.0%	1.89	[1.51; 2.37]
VICI	2012	17	20	6	20	5.4%	2.83	[1.42; 5.67]
Dharanindra et al.	2023	57	73	6	70	4.7%	9.11	[4.20; 19.77]
Total (95% CI)		**1078**	**1429**	**618**	**1398**	**100.0%**	**1.73**	**[1.41; 2.12]**

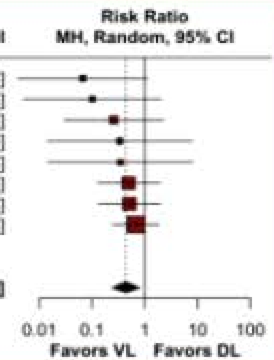
Heterogeneity: $Tau^2 = 0.0779$; $Chi^2 = 31.10$, df = 9 ($P < 0.01$); $I^2 = 71\%$
Test for overall effect: $Z = 5.24$ ($P < 0.001$)



A. Esophageal intubation

Study	Year	VL Events	VL Total	DL Events	DL Total	Weight	RR	95% CI
Goksu et al.	2016	0	75	7	75	4.6%	0.07	[0.00; 1.15]
Abdelgalel et al.	2018	0	80	2	40	4.1%	0.10	[0.00; 2.05]
FELLOW	2016	1	74	4	76	8.0%	0.26	[0.03; 2.24]
Ajith et al.	2022	0	38	1	38	3.7%	0.33	[0.01; 7.93]
Sanguanwit et al.	2021	0	78	1	80	3.7%	0.34	[0.01; 8.26]
MACMAN	2017	3	184	6	181	19.9%	0.49	[0.12; 1.94]
Gao et al.	2018	3	81	6	82	20.5%	0.51	[0.13; 1.96]
DEVICE	2023	6	705	9	712	35.4%	0.67	[0.24; 1.88]
Sulser et al.	2016	0	74	0	73	0.0%		
Total (95% CI)		**13**	**1389**	**36**	**1357**	**100.0%**	**0.44**	**[0.24; 0.80]**

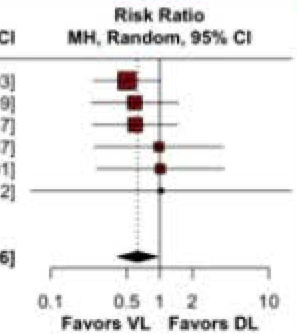
Heterogeneity: $Tau^2 = 0$; $Chi^2 = 3.63$, df = 7 (P = 0.82); $I^2 = 0\%$
Test for overall effect: Z = -2.66 (P = 0.008)



B. Aspiration

Study	Year	VL Events	VL Total	DL Events	DL Total	Weight	RR	95% CI
Ajith et al.	2022	8	38	16	38	34.9%	0.50	[0.24; 1.03]
DEVICE	2023	7	705	12	712	21.1%	0.59	[0.23; 1.49]
Driver et al.	2016	7	96	11	90	22.2%	0.60	[0.24; 1.47]
MACMAN	2017	4	184	4	181	9.6%	0.98	[0.25; 3.87]
Gao et al.	2018	4	81	4	82	9.9%	1.01	[0.26; 3.91]
FELLOW	2016	1	74	1	76	2.4%	1.03	[0.07; 16.12]
Yeatts et al.	2013	0	303	0	320	0.0%		
Total (95% CI)		**31**	**1481**	**48**	**1499**	**100.0%**	**0.63**	**[0.41; 0.96]**

Heterogeneity: $Tau^2 = 0$; $Chi^2 = 1.43$, df = 5 (P = 0.92); $I^2 = 0\%$
Test for overall effect: Z = -2.16 (P = 0.031)



Study or Subgroup	Year	VL Events	VL Total	DL Events	DL Total	Weight	RR	95% CI
Experienced								
Sulser et al.	2016	73	74	73	73	12.1%	0.99	[0.96; 1.01]
FELLOW	2016	51	74	50	76	5.7%	1.05	[0.84; 1.31]
Driver et al.	2016	95	103	82	95	10.1%	1.07	[0.97; 1.18]
Dharanindra et al.	2023	70	73	57	70	9.2%	1.18	[1.04; 1.33]
DEVICE	2023	600	705	504	712	11.4%	1.20	[1.14; 1.27]
Abdelgalel et al.	2018	75	80	29	40	6.4%	1.29	[1.06; 1.58]
Dey et al.	2020	91	108	63	110	7.0%	1.47	[1.23; 1.76]
Total (95% CI)		**1055**	**1217**	**858**	**1176**	**61.9%**	**1.15**	**[1.05; 1.27]**
Heterogeneity: $Tau^2 = 0.0131$; $Chi^2 = 63.67$, df = 6 (P < 0.01); $I^2 = 91\%$								
Test for overall effect: Z = 2.85 (P = 0.004)								
Inexperienced								
MACMAN	2017	126	186	130	185	8.6%	0.96	[0.84; 1.10]
Yeatts et al.	2013	242	303	259	320	10.8%	0.99	[0.91; 1.07]
VICI	2012	8	20	7	20	0.8%	1.14	[0.51; 2.55]
Ajith et al.	2022	35	38	30	38	6.8%	1.17	[0.97; 1.41]
Sanguanwit et al.	2021	57	78	47	80	5.6%	1.24	[0.99; 1.56]
Goksu et al.	2016	56	75	44	75	5.5%	1.27	[1.01; 1.60]
Total (95% CI)		**524**	**700**	**517**	**718**	**38.1%**	**1.09**	**[0.97; 1.21]**
Heterogeneity: $Tau^2 = 0.0093$; $Chi^2 = 9.66$, df = 5 (P = 0.09); $I^2 = 48\%$								
Test for overall effect: Z = 1.43 (P = 0.152)								
Total (95% CI)		**1579**	**1917**	**1375**	**1894**	**100.0%**	**1.13**	**[1.05; 1.21]**

Heterogeneity: $Tau^2 = 0.0114$; $Chi^2 = 73.37$, df = 12 (P < 0.01); $I^2 = 84\%$
Test for overall effect: Z = 3.21 (P = 0.001)
Test for subgroup differences: $Chi^2 = 0.65$, df = 1 (P = 0.42)

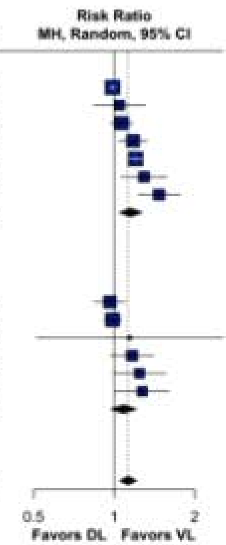


Fig. 5 Subgroup analysis of primary outcome by operator's experience in intubating critically ill patients with VL. Abbreviations: CI, confidence interval; MH, Mantel–Haenszel; DL, direct laryngoscope; VL, video laryngoscope; RR, risk ratio

Anaesthesia 2017, 72, 1532-1541 doi:10.1111/anae.14057

Review Article

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

B. M. A. Pieters,[1] E. H. A. Maas,[2] J. T. A. Knape[3] and A. A. J. van Zundert[4]

Study or subgroup	Videolaryngoscopy Events	Videolaryngoscopy Total	Direct laryngoscopy Events	Direct laryngoscopy Total	Weight	Odds ratio (Non-event) M-H, Random, 95% CI
Aziz (2012)[19]	138	149	124	147	35.7%	0.43 [0.20, 0.92]
Cavus (2011)[14]	55	55	44	50	4.7%	0.06 [0.00, 1.12]
Jungbauer (2009)[22]	99	100	92	100	8.5%	0.12 [0.01, 0.95]
Liu (2014)[21]	39	40	30	40	8.4%	0.08 [0.01, 0.63]
Maharaj (2008)[17]	20	20	16	20	4.4%	0.09 [0.00, 1.78]
Ng (2011)[16]	39	40	38	40	6.4%	0.49 [0.04, 5.60]
Serocki (2013)[20]	27	32	27	32	17.4%	1.00 [0.26, 3.86]
Serocki (2013)[20]	29	32	27	32	14.4%	0.56 [0.12, 2.57]
Total (95% CI)		**468**		**461**	**100.0%**	**0.34 [0.18, 0.66]**
Total events	446		398			

Heterogeneity: $\tau^2 = 0.16$; $\chi^2 = 8.55$, d.f. = 7 ($p = 0.29$); $I^2 = 18\%$

Test for overall effect: $Z = 3.21$ ($p = 0.001$)

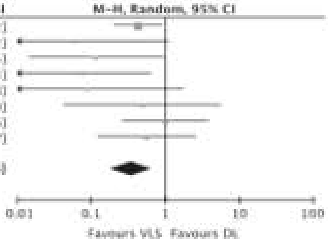


Figure 2 Forest plot: first-attempt intubation success. VLS, videolaryngoscope; DL, direct laryngoscopy.

Study or subgroup	Videolaryngoscopy Events	Videolaryngoscopy Total	Direct laryngoscopy Events	Direct laryngoscopy Total	Weight	Odds ratio M-H, Random, 95% CI
Aziz (2012)[19]	10	149	28	147	16.1%	0.31 [0.14, 0.66]
Jungbauer (2009)[22]	10	100	36	100	16.0%	0.20 [0.09, 0.43]
Maharaj (2008)[17]	0	20	17	20	9.0%	0.00 [0.00, 0.10]
Ng (2011)[16]	0	40	2	40	8.9%	0.19 [0.01, 4.09]
Serocki (2013)[20]	0	95	81	95	9.6%	0.00 [0.00, 0.02]
Serocki (2013)[20]	3	95	81	95	14.6%	0.01 [0.00, 0.02]
Stroumpoulis (2009)[18]	11	112	41	112	16.1%	0.19 [0.09, 0.39]
Suzuki (2008)[15]	0	320	46	320	9.7%	0.01 [0.00, 0.15]
Total (95% CI)		**931**		**929**	**100.0%**	**0.04 [0.01, 0.15]**
Total events	34		332			

Heterogeneity: $\tau^2 = 2.70$; $\chi^2 = 57.02$, d.f. = 7 ($p < 0.00001$); $I^2 = 88\%$

Test for overall effect: $Z = 4.77$ ($p < 0.00001$)

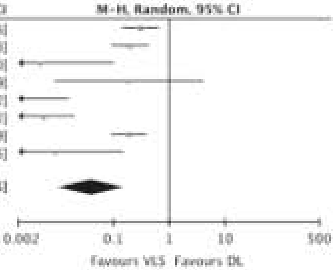


Figure 4 Forest plot: Cormack and Lehane grades 3 and 4. VLS, videolaryngoscope; DL, direct laryngoscopy.

McGrath Video Laryngoscope Versus Macintosh Direct Laryngoscopy for Intubation of Morbidly Obese Patients: A Randomized Trial

ANESTHESIA & ANALGESIA

Kurt Ruetzler, MD,* Eva Rivas, MD,†‡ Barak Cohen, MD,§ Lauretta Mosteller, BA,†
Adriana Martin, MD,‖ Allen Keebler, MD,‖ Kamal Maheshwari, MD, MPH,* Karen Steckner, MD,‖
Mi Wang, MD,‖ Chahar Praveen, MD,* Sandeep Khanna, MD,* Natalya Makarova, MS,¶
Daniel I. Sessler, MD,† and Alparslan Turan, MD*

Table 3. Primary and Secondary Outcomes

Outcomes	McGrath Video Laryngoscopy (N = 66)	Macintosh Direct Laryngoscopy (N = 63)	Odds Ratio (95% Confidence Interval)	P
Primary outcome				
Best glottis visualization: Cormack and Lehane			4.65 (2.22–9.75)	<.01[a]
1	45 (68)	23 (37)		
2a	11 (17)	16 (25)		
2b	7 (11)	14 (22)		
3	3 (5)	6 (10)		
4	0 (0)	4 (6)		

Journal of Clinical Anesthesia
Volume 44, February 2018, Pages 69-75

Original Contribution

Videolaryngoscope versus Macintosh laryngoscope for tracheal intubation in adults with obesity: A systematic review and meta-analysis

Hiroshi Hoshijima DDS (Assistant Professor) [a], Yohei Denawa MD (Resident) [b],

Main results

Eleven articles describing 13 trials met the inclusion criteria. The performance of videolaryngoscopes was superior to that of the Macintosh laryngoscope for all outcomes. (Success rate; RR = 1.11, 95% CI 1.04 to 1.18, $p = 0.001$, $I^2 = 63\%$, Intubation time; WMD = −16.1, 95% CI −31.1 to −1.10, $p = 0.04$, $I^2 = 97\%$, Glottic visualisation; RR = 1.19, 95% CI 1.09 to 1.30, $p < 0.0001$, $I^2 = 76\%$) In the subgroup analysis, the performance of both types of videolaryngoscopes (with and without a tracheal tube guide channel) was superior to that of the Macintosh laryngoscope, except for intubation time with the videolaryngoscopes without a tracheal tube guide channel.

Conclusions

Videolaryngoscopes were superior to the Macintosh laryngoscope for tracheal intubation in adults with obesity. (GRADE score: low or very low.)


CONS

Cochrane Library

Cochrane Database of Systematic Reviews

Videolaryngoscopy versus direct laryngoscopy for adults undergoing tracheal intubation (Review)

Hansel J, Rogers AM, Lewis SR, Cook TM, Smith AF

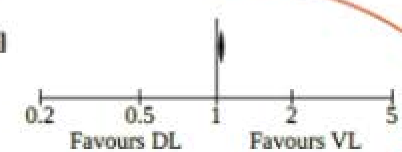
Analysis 4.3. Comparison 4: VL versus DL (all devices combined), Outcome 3: Successful first attempt

Total (95% CI)	**10525**	**9272**	**100.0%**	**1.05 [1.03 , 1.07]**
Total events:	9364	7739		

Heterogeneity: $Tau^2 = 0.01$; $Chi^2 = 736.62$, $df = 138$ ($P < 0.00001$); $I^2 = 81\%$

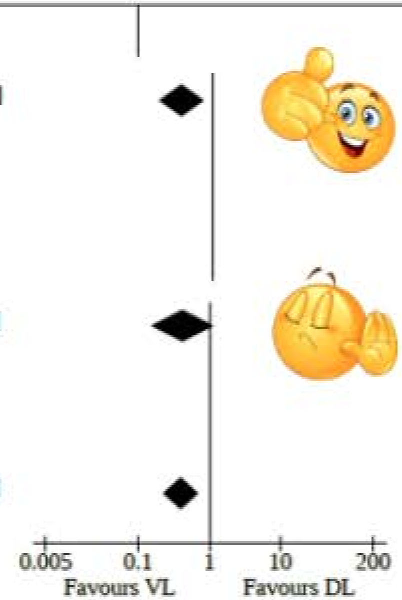
Test for overall effect: $Z = 5.13$ ($P < 0.00001$)

Test for subgroup differences: Not applicable



Analysis 1.13. Comparison 1: Macintosh-style VL versus DL, Outcome 13: Subgroup analysis of failed intubation: airway difficulty

Study or Subgroup	VL Events	VL Total	DL Events	DL Total	Weight	Risk Ratio M-H, Random, 95% CI	Risk Ratio M-H, Random, 95% CI	Risk of Bias A B C D E F G
1.13.1 Predicted, known or simulated difficulty								
Subtotal (95% CI)		**696**		**697**	**58.1%**	**0.37 [0.19 , 0.74]**		
Total events:	51		99					
Heterogeneity: Tau² = 0.35; Chi² = 13.39, df = 8 (P = 0.10); I² = 40%								
Test for overall effect: Z = 2.81 (P = 0.005)								
1.13.2 No difficulty								
Subtotal (95% CI)		**1291**		**1241**	**41.9%**	**0.42 [0.16 , 1.10]**		
Total events:	19		33					
Heterogeneity: Tau² = 0.99; Chi² = 16.50, df = 10 (P = 0.09); I² = 39%								
Test for overall effect: Z = 1.77 (P = 0.08)								
Total (95% CI)		**1987**		**1938**	**100.0%**	**0.40 [0.23 , 0.68]**		
Total events:	70		132					
Heterogeneity: Tau² = 0.37; Chi² = 29.05, df = 19 (P = 0.07); I² = 35%								
Test for overall effect: Z = 3.40 (P = 0.0007)								
Test for subgroup differences: Chi² = 0.04, df = 1 (P = 0.85), I² = 0%								



	MacIntosh Style	Hyperangulé	Channel
IOT au 1er essai			
Nombre de tentatives			
Intubation oesophagienne			
Echec intubation prévue difficile O/N	 	 	 
Bris dentaire			
Douleurs pharyngées			

BJA

British Journal of Anaesthesia, 129 (4): 624–634 (2022)

doi: 10.1016/j.bja.2022.05.030
Advance Access Publication Date: 8 July 2022
Respiration and the Airway

Videolaryngoscopy as a first-intention technique for tracheal intubation in unselected surgical patients: a before and after observational study

Audrey De Jong[1,†], Thomas Sfara[2,†], Yvan Pouzeratte[2], Joris Pensier[2], Amélie Rolle[2], Gérald Chanques[1] and Samir Jaber[1,*]

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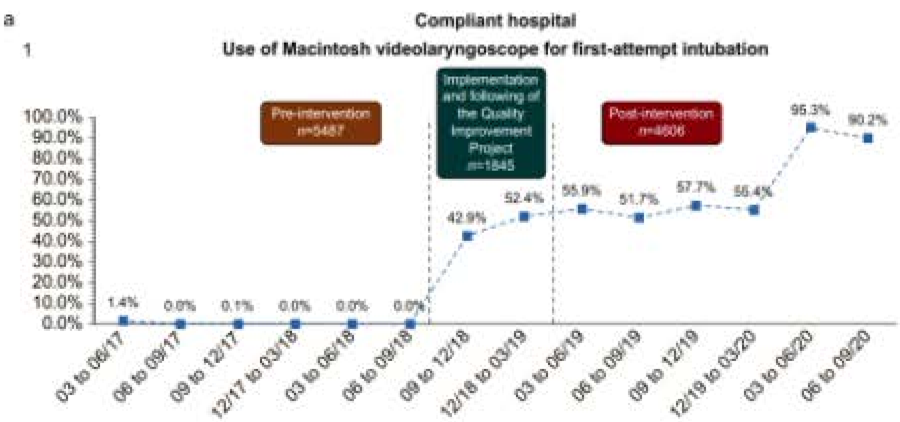

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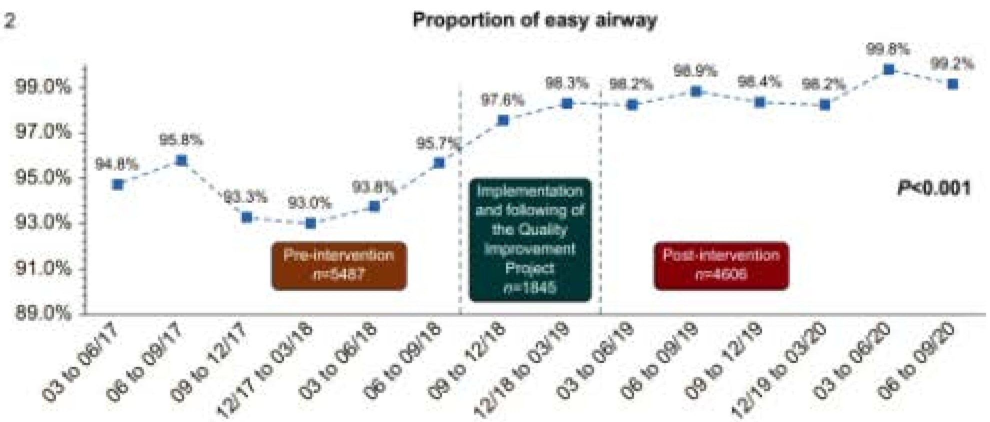


BJA

British Journal of Anaesthesia, 131 (3): 607–616 (2023)

doi: 10.1016/j.bja.2023.04.022
Advance Access Publication Date: 17 May 2023
Respiration and the Airway

RESPIRATION AND THE AIRWAY

Efficacy and adverse events profile of videolaryngoscopy in critically ill patients: subanalysis of the INTUBE study

Vincenzo Russotto[1], Jean Baptiste Lascarrou[2], Elena Tassistro[3,4], Matteo Parotto[5],

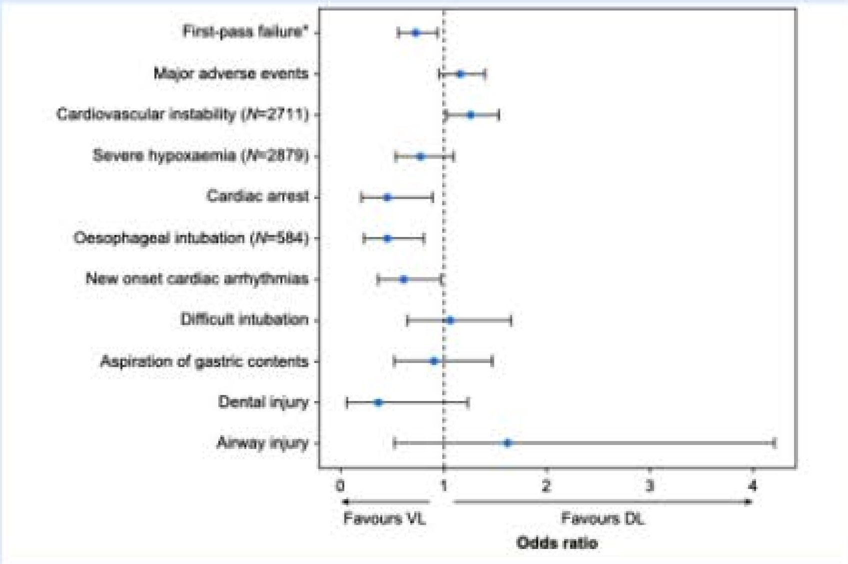


Fig 3. Forest plot of the odds ratio and 95% confidence intervals obtained from bivariable logistic regression models to evaluate the impact of the type of laryngoscopy on the outcomes of interest. In this figure we reformulated the outcome *first-pass success* to *first-pass failure* to make it consistent in direction with the benefit of videolaryngoscopy (VL) over direct laryngoscopy (DL).

Can J Anesth/J Can Anesth (2021) 68:546–565
https://doi.org/10.1007/s12630-020-01908-w

REVIEW ARTICLE/BRIEF REVIEW

Comparison of videolaryngoscopy and direct laryngoscopy for tracheal intubation in obstetrics: a mixed-methods systematic review and meta-analysis

Comparaison de la vidéolaryngoscopie et de la laryngoscopie directe pour l'intubation endotrachéale en obstétrique : une revue systématique de méthodes mixtes et une méta-analyse

Ryan Howle, MBChB, FRCA · Desire Onwochei, MBBS, FRCA · Siew-Ling Harrison, MBBS, FRCA · Neel Desai, MBChB, FRCA

	VLS		DL			Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M–H, Fixed, 95% CI
Arici et al, 2014	39	40	39	40	19.5%	1.00 [0.93, 1.07]
Blajic et al, 2019_C-MAC	59	60	56	59	28.2%	1.04 [0.97, 1.11]
Blajic et al, 2019_KVL	56	59	56	59	28.0%	1.00 [0.92, 1.09]
Toker et al, 2019	50	50	48	50	24.3%	1.04 [0.97, 1.11]
Total (95% CI)		**209**		**208**	**100.0%**	**1.02 [0.98, 1.06]**
Total events	204		199			

Heterogeneity: $Chi^2 = 1.08$, df = 3 (P = 0.78); $I^2 = 0\%$
Test for overall effect: Z = 1.06 (P = 0.29)

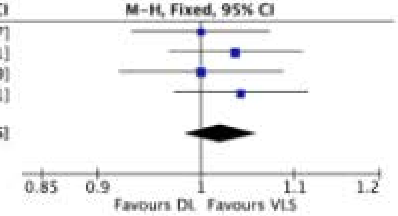


Fig. 3 Forest plot of the first-pass success rate at tracheal intubation. For each trial, the square depicts the risk ratio and the horizontal lines either side of it represent the 95% CI. The summary result is presented as a diamond. CI = confidence interval; DL = direct laryngoscopy; SD = standard deviation; VLS = videolaryngoscope

	VLS			DL				Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI
Arici et al, 2014	47.25	14.92	40	32.2	6.58	40	24.0%	15.05 [10.00, 20.10]
Blajic et al, 2019_C-MAC	25	7	60	29	14	59	25.0%	-4.00 [-7.99, -0.01]
Blajic et al, 2019_KVL	29	9	59	29	14	59	24.8%	0.00 [-4.25, 4.25]
Toker et al, 2019	34.7	5.2	50	40.1	5.4	50	26.2%	-5.40 [-7.48, -3.32]
Total (95% CI)			**209**			**208**	**100.0%**	**1.20 [-6.63, 9.04]**

Heterogeneity: $Tau^2 = 59.79$; $Chi^2 = 55.65$, df = 3 (P < 0.00001); $I^2 = 95\%$
Test for overall effect: Z = 0.30 (P = 0.76)

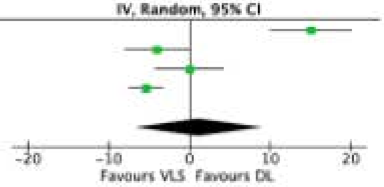


Fig. 4 Forest plot of the time to tracheal intubation. For each trial, the square depicts the mean difference and the horizontal lines either side of it represent the 95% CI. The summary result is presented as a diamond. CI = confidence interval; DL = direct laryngoscopy; SD = standard deviation; VLS = videolaryngoscope

Randomized Controlled Trial > Int J Obstet Anesth. 2019 Aug:39:35-41.
doi: 10.1016/j.ijoa.2018.12.008. Epub 2018 Dec 29.

A randomised comparison of C-MAC™ and King Vision® videolaryngoscopes with direct laryngoscopy in 180 obstetric patients

I Blajic [1], I Hodzovic [2], M Lucovnik [3], D Mekis [4], V Novak-Jankovic [1], T Stopar Pintaric [5]

Results: The time to successful intubation, first-pass and overall success rates did not differ between the devices. The difficulty of intubation was less for C-MAC than King Vision® (P <0.001). No difference was observed between King Vision® and direct laryngoscopy (P=0.06) or C-MAC and direct laryngoscopy (P=0.05). King Vision® required the longest time to best laryngeal view (9 ± 6 s, P=0.028), had the highest rate of grade 1 view (47 (80%) patients, P <0.001), and the highest need for optimisation manoeuvres (59 (100%) patients, P <0.0001). Five minor complications were recorded with King Vision® and one with direct laryngoscopy.

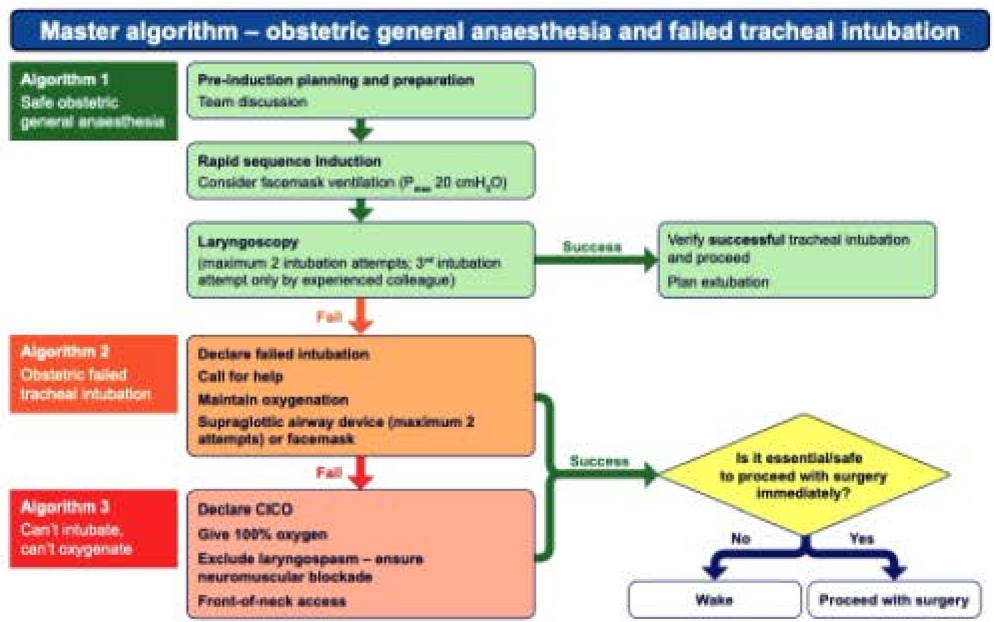
Conclusions: Compared to direct laryngoscopy, C-MAC and King Vision® did not prolong the time to intubation, supporting these videolaryngoscopes as primary intubation devices in obstetric anaesthesia. The C-MAC was easier to use and needed fewer additional manoeuvres than the King Vision®. The C-MAC may be better suited for tracheal intubation of obstetric patients undergoing caesarean section.

Anaesthesia 2015, 70, 1286–1306 doi:10.1111/anae.13260

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. Winton[6] and A. C. Quinn[7,8]



Algorithm 1 – safe obstetric general anaesthesia

Pre-theatre preparation

Airway assessment
Fasting status
Antacid prophylaxis
Intrauterine fetal resuscitation if appropriate

Plan with team

WHO safety checklist/general anaesthetic checklist
Identify senior help, alert if appropriate
Plan equipment for difficult/failed intubation
Plan for/discuss: wake up or proceed with surgery (Table 1)

Rapid sequence induction

Check airway equipment, suction, intravenous access
Optimise position – head up/ramping + left uterine displacement
Pre-oxygenate to $F_{ET}O_2 \geq 0.9$/consider nasal oxygenation
Cricoid pressure (10 N increasing to 30 N maximum)
Deliver appropriate induction/neuromuscular blocker doses
Consider facemask ventilation (P_{max} 20 cmH_2O)

1st intubation attempt

If poor view of larynx optimise attempt by:

- reducing/removing cricoid pressure
- external laryngeal manipulation
- repositioning head/neck
- using bougie/stylet

Fail

Ventilate with facemask
Communicate with assistant

2nd intubation attempt

Consider:

- alternative laryngoscope
- removing cricoid pressure

3rd intubation attempt only by experienced colleague

Fail

Follow Algorithm 2 – obstetric failed tracheal intubation

Success

Verify successful tracheal intubation

Proceed with anaesthesia and surgery

Plan extubation

Video Laryngoscopy vs Direct Laryngoscopy on Successful First-Pass Orotracheal Intubation Among ICU Patients

A Randomized Clinical Trial

Jean Baptiste Lascarrou, MD; Julie Boisrame-Helms, MD, PhD; Arthur Bailly, MD; Aurelie Le Thuaut, MSc; Toufik Kamel, MD; Emmanuelle Mercier, MD; Jean-Damien Ricard, MD, PhD; Virginie Lemiale, MD; Gwenhael Colin, MD; Jean Paul Mira, MD, PhD; Ferhat Meziani, MD, PhD; Jonathan Messika, MD; Pierre Francois Dequin, MD, PhD; Thierry Boulain, MD; Elie Azoulay, MD, PhD; Benoit Champigneulle, MD; Jean Reignier, MD, PhD; for the Clinical Research in Intensive Care and Sepsis (CRICS) Group

Table 2. Intubation Characteristics and Outcomes of Patients

	No./Total (%) of Patients[a]			
	Video Laryngoscopy	Direct Laryngoscopy	Absolute Difference (95% CI), %	P Value
Primary Outcome: Successful First-Pass Intubation				
Intention-to-treat analysis	126/186 (67.7)	130/185 (70.3)	−2.5 (−11.9 to 6.9)	.60
Per-protocol analysis	126/183 (68.9)	130/182 (71.4)	−2.5 (−12.3 to 6.4)	.54
Secondary Outcomes				
Cormack-Lehane grade[b]				
1	133/176 (75.6)	93/177 (52.5)	23.1 (13.3 to 32.7)	<.001
2	25/176 (14.2)	51/177 (28.8)	−14.6 (−23.0 to −6.2)	
3	10/176 (5.7)	20/177 (11.3)	−5.6 (−11.4 to 0.2)	
4	8/176 (4.5)	13/177 (7.3)	−2.8 (−7.7 to 2.1)	
Percentage of glottic opening score, median (IQR)[c]	100 (80 to 100)	80 (50 to 100)	20 (0 to 20)	<.001
No. of intubation attempts, median (range)	1 (1 to 4)	1 (1 to 5)	0 (0 to 0)	.68
Difficult intubation[h]	14/186 (7.5)	14/185 (7.6)	−0.1 (−5.5 to 5.4)	.99
Duration of intubation, median (IQR), min	3 (2 to 4)	3 (2 to 4)	0 (0 to 0)	.95
Need for facial mask ventilation after first-attempt laryngoscopy	16/73 (21.9)	15/66 (22.7)	−0.8 (−30.1 to 28.5)	.91
Need for gum elastic bougie	49/257 (19.1)	34/247 (13.8)	5.3 (2.2 to 25.4)	.11
After first-attempt laryngoscopy	22/184 (12.0)	10/181 (5.5)	6.5 (0.7 to 12.2)	.03
After second- to fifth-attempt laryngoscopy	27/73 (37.0)	24/66 (36.4)	0.6 (−25.9 to 27.1)	.94
Type of complication				
Death	1/184 (0.5)	0/181	0.5 (−0.5 to 1.6)	.99
Cardiac arrest	4/184 (2.2)	0/181	2.2 (0.07 to 4.3)	.12
Arrhythmia	3/184 (1.6)	4/181 (2.2)	−0.6 (−3.4 to 2.2)	.69
Esophageal intubation	3/184 (1.6)	6/181 (3.3)	−1.7 (−4.9 to 1.5)	.33
Aspiration	4/184 (2.2)	4/181 (2.2)	0 (−3.0 to 3.0)	.99
Tooth injury	0/184	1/181 (0.6)	−0.6 (−1.6 to 0.5)	.50
Hypoxemia[i]	14/173 (8.1)	19/174 (10.9)	−2.8 (−9.0 to 3.3)	.37
Severe hypoxemia[j]	6/176 (3.4)	1/181 (0.5)	2.9 (−0.03 to 5.7)	.06
Hypotension[k]	8/180 (4.4)	4/179 (2.2)	2.2 (−1.5 to 5.9)	.24
≥1 Life-threatening complication	24/180 (13.3)	17/179 (9.5)	3.8 (−2.7 to 10.4)	.25
Type of life-threatening complication[l]				
Mild to moderate[m]	10/181 (5.4)	14/181 (7.7)	−2.3 (−7.4 to 2.8)	.37
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Perioperative Care and Operating Room Management 35 (2024) 100390

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Airway management for individuals with suspected or confirmed traumatic cervical spine injuries: A comprehensive review and analysis

Debas Yaregal Melesse *, Tadesse Teshale Tesema, Zemenay Ayinie Mekonnen, Wubie Birlie Chekol

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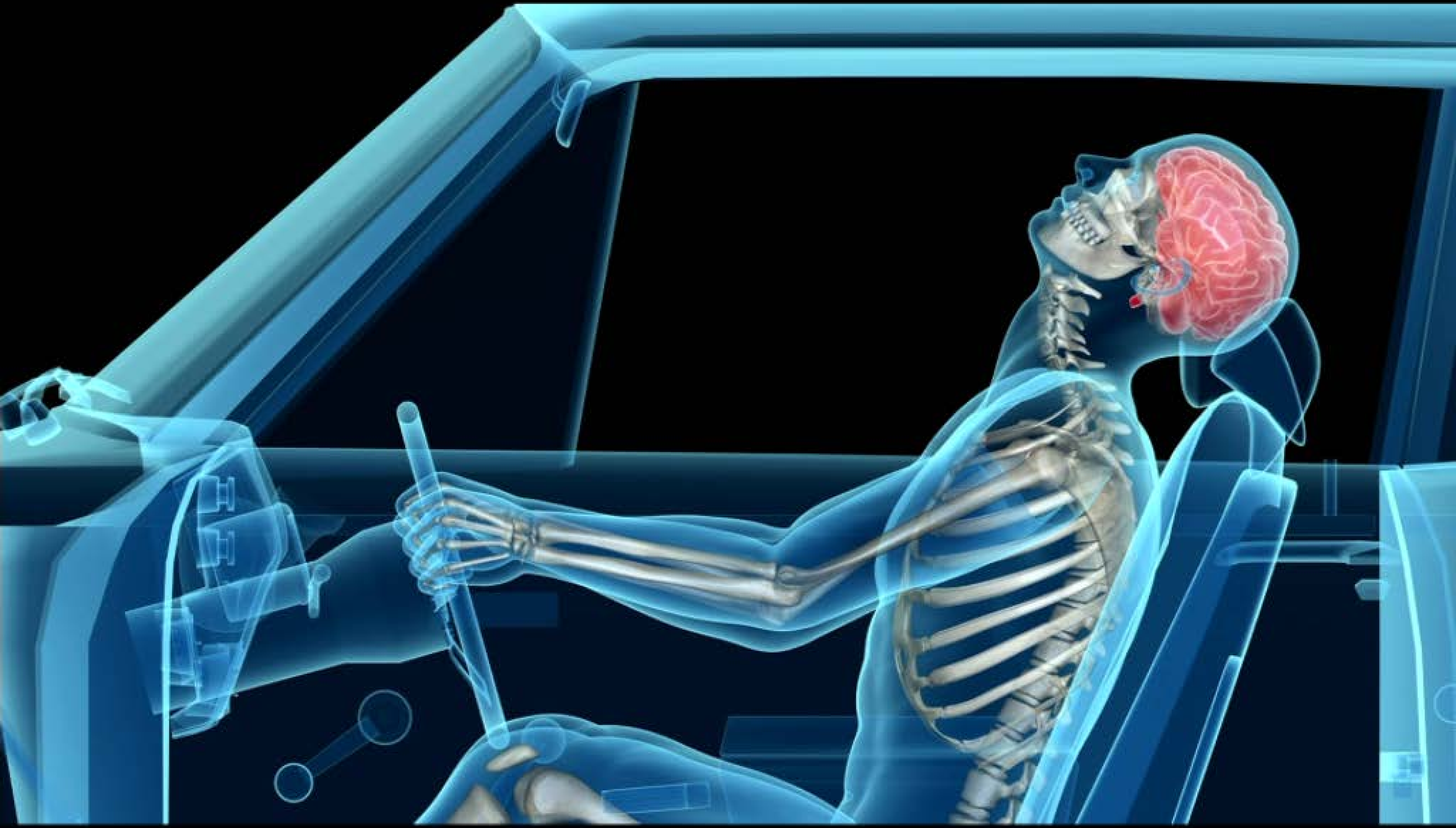
Conclusions: Video laryngoscopy is an excellent alternative to direct visualizations techniques, especially for patients who are anticipated to have less an optimal airway view. Awake fiberoptic intubation allows for neurological exam before and after intubation to ensure minimal damage to spinal cord. However, patient selection is key and requires high level of patient cooperation, provider experience, and availability of local anesthetics.



Video Laryngoscopy vs Direct Laryngoscopy on Successful First-Pass Orotracheal Intubation Among ICU Patients
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BJA

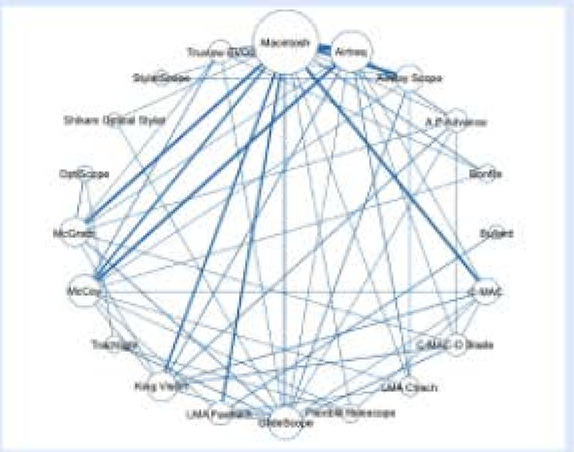
British Journal of Anaesthesia, 126 (5): 1055–1066 (2021)

doi: 10.1016/j.bja.2020.12.041
Advance Access Publication Date: 17 February 2021
Review Article

RESPIRATION AND THE AIRWAY

Effectiveness of intubation devices in patients with cervical spine immobilisation: a systematic review and network meta-analysis

Barry N. Singleton[1,*], Fiachra K. Morris[2], Barbaros Yet[3], Donal J. Buggy[4] and Zane B. Perkins[5]



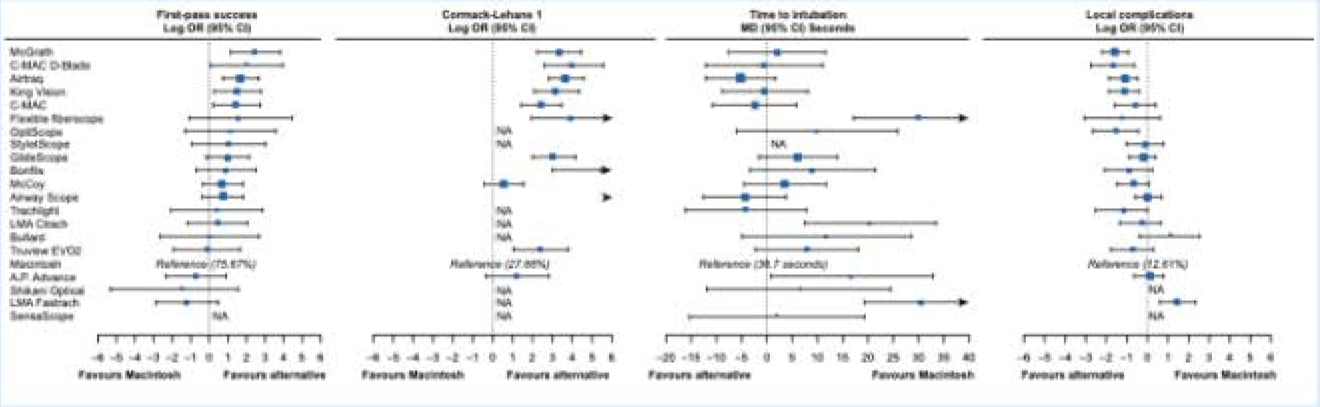


Fig 4. Forest plots of network meta-analyses of first-pass success Cormack-Lehane 1, time to intubation, and local complications for Macintosh *vs* other intubation devices. CrI, credible interval; OR, odds ratio; MD, mean difference; NA, not applicable or available.

Cochrane Library

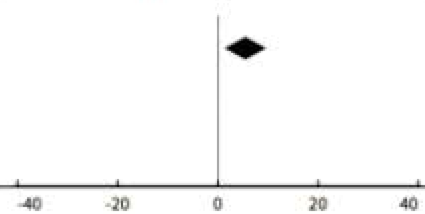
Cochrane Database of Systematic Reviews

Videolaryngoscopy versus direct laryngoscopy for tracheal intubation in children (excluding neonates) (Review)

Abdelgadir IS, Phillips RS, Singh D, Moncreiff MP, Lumsden JL

Analysis 1.1. Comparison 1 Indirect videolaryngoscope vs conventional laryngoscope for intubation of children, Outcome 1 Unsuccessful or more than 2 intubation attempts.

Study or subgroup	Indirect laryngoscopy		Direct laryngoscopy		Mean Difference	Weight	Mean Difference
	N	Mean(SD)	N	Mean(SD)	Random, 95% CI		Random, 95% CI
Total ***	400		398			100%	5.49[1.37,9.6]
Heterogeneity: Tau²=42.4; Chi²=114.1, df=11(P<0.0001); I²=90.36%							
Test for overall effect: Z=2.61(P=0.01)							
Test for subgroup differences: Chi²=3.07, df=1 (P=0.22), I²=34.76%							

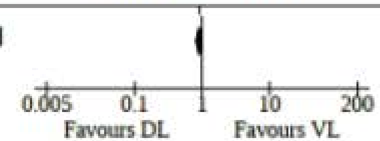


Indirect laryngoscopy — Direct laryngoscopy

Analysis 1.6. Comparison 1: Macintosh-style VL versus DL, Outcome 6: Cormack-Lehane (CL) grade

Study or Subgroup	Videolaryngoscope Events	Videolaryngoscope Total	Direct laryngoscope Events	Direct laryngoscope Total	Weight	Risk Ratio M-H, Random, 95% CI
Total (95% CI)		**6624**		**6480**	**100.0%**	**0.90 [0.81 , 1.00]**
Total events:	2202		2156			
Heterogeneity: $Tau^2 = 0.18$; $Chi^2 = 592.41$, df = 107 ($P < 0.00001$); $I^2 = 82\%$						
Test for overall effect: Z = 1.87 (P = 0.06)						
Test for subgroup differences: $Chi^2 = 154.56$, df = 2 ($P < 0.00001$), $I^2 = 98.7\%$						

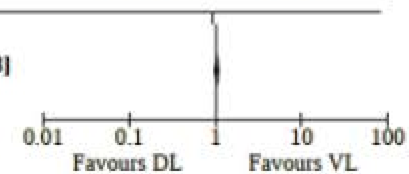
Risk Ratio M-H, Random, 95% CI — Risk of Bias A B C D E F G



Analysis 1.9. Comparison 1: Macintosh-style VL versus DL, Outcome 9: Number of attempts

Study or Subgroup	Videolaryngoscope Events	Videolaryngoscope Total	Direct laryngoscope Events	Direct laryngoscope Total	Weight	Risk Ratio M-H, Random, 95% CI
Total (95% CI)		**3324**		**3156**	**100.0%**	**1.03 [0.98 , 1.08]**
Total events:	1651		1559			
Heterogeneity: $Tau^2 = 0.01$; $Chi^2 = 193.51$, df = 59 ($P < 0.00001$); $I^2 = 70\%$						
Test for overall effect: Z = 1.25 (P = 0.21)						
Test for subgroup differences: $Chi^2 = 4.67$, df = 1 (P = 0.03), $I^2 = 78.6\%$						

Risk Ratio M-H, Random, 95% CI



Comparative Effectiveness of the C-MAC Video Laryngoscope *versus* Direct Laryngoscopy in the Setting of the Predicted Difficult Airway

Michael F. Aziz, M.D.,* Dawn Dillman, M.D.,† Rongwei Fu, Ph.D.,‡ Ansgar M. Brambrink, M.D., Ph.D.§

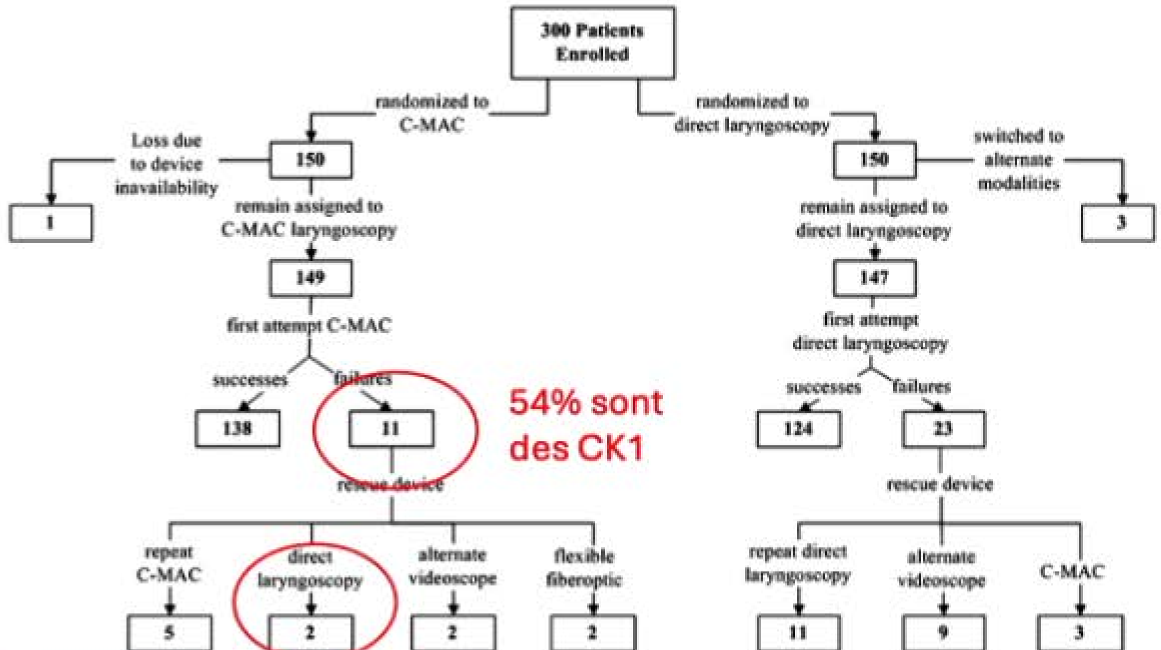


Fig. 1. Flow diagram of patient inclusion and randomization.

McGrath Video Laryngoscope Versus Macintosh Direct Laryngoscopy for Intubation of Morbidly Obese Patients: A Randomized Trial

ANESTHESIA & ANALGESIA

Kurt Ruetzler, MD,* Eva Rivas, MD,†‡ Barak Cohen, MD,§ Lauretta Mosteller, BA,†
Adriana Martin, MD,‖ Allen Keebler, MD,‖ Kamal Maheshwari, MD, MPH,* Karen Steckner, MD,‖
Mi Wang, MD,‖ Chahar Praveen, MD,* Sandeep Khanna, MD,* Natalya Makarova, MS,¶
Daniel I. Sessler, MD,† and Alparslan Turan, MD*

Table 3. Primary and Secondary Outcomes

Outcomes	McGrath Video Laryngoscopy (N = 66)	Macintosh Direct Laryngoscopy (N = 63)	Odds Ratio (95% Confidence Interval)	*P*
Primary outcome				
Best glottis visualization: Cormack and Lehane			4.65 (2.22–9.75)	<.01[a]
1	45 (68)	23 (37)		
2a	11 (17)	16 (25)		
2b	7 (11)	14 (22)		
3	3 (5)	6 (10)		
4	0 (0)	4 (6)		
Secondary outcome				
Intubation failure	2 (3)	5 (8)	0.30 (0.04–2.28)	.08[b]
Intubation attempts among those with successful intubation	...	...	0.87 (0.10–7.77)	.41[b]
1	61 (95)	56 (97)		
2	3 (5)	2 (3)		

The NEW ENGLAND JOURNAL of MEDICINE

2023

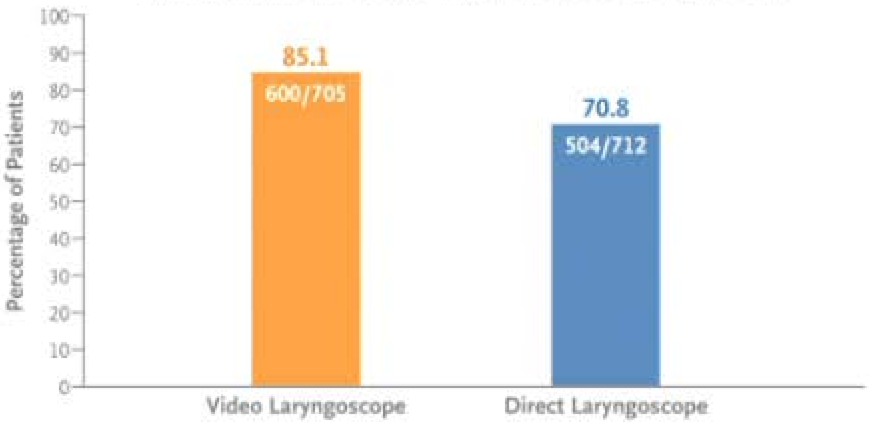
RESEARCH SUMMARY

Video versus Direct Laryngoscopy for Tracheal Intubation of Critically Ill Adults

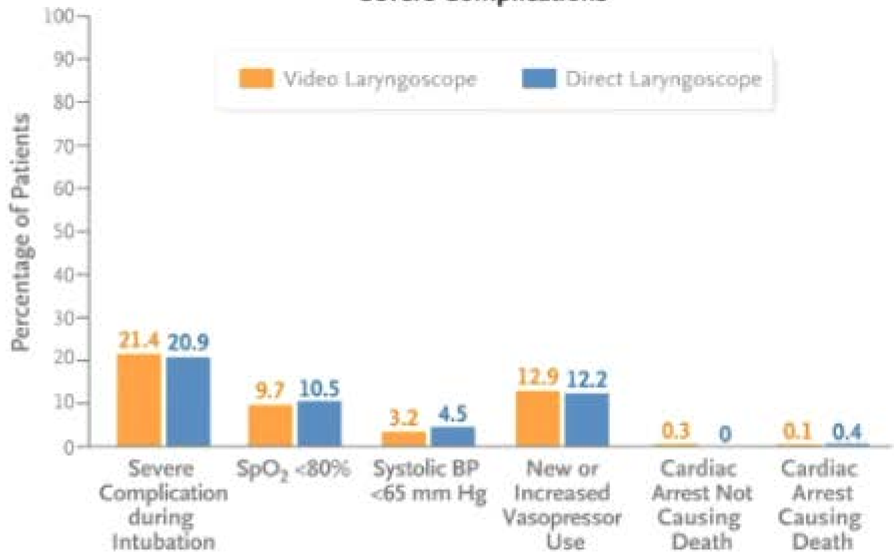
Prekker ME et al. DOI: 10.1056/NEJMoa2301601

Successful Intubation on the First Attempt

Absolute risk difference, 14.3 percentage points (95% CI, 9.9–18.7); P<0.001



Severe Complications



Videolaryngoscopy *versus* direct laryngoscopy for emergency orotracheal intubation outside the operating room: a systematic review and meta-analysis

British Journal of Anaesthesia, 120 (4): 712–724 (2018)

doi: 10.1016/j.bja.2017.12.041
Advance Access Publication Date: 26 February 2018
Review Article

N. Arulkumaran[1,*], J. Lowe[2], R. Ions[3], M. Mendoza[4], V. Bennett[5] and M. W. Dunser[6]

Total (95% CI)		**6303**		**8761**	**100.0%**	**1.28 [0.99, 1.65]**
Total events	4972		6721			

Heterogeneity: $Tau^2 = 0.39$; $Chi^2 = 199.08$, df = 31 ($P < 0.00001$); $I^2 = 84\%$
Test for overall effect: Z = 1.91 (P = 0.06)
Test for subgroup differences: $Chi^2 = 9.11$, df = 3 (P = 0.03), $I^2 = 67.1\%$

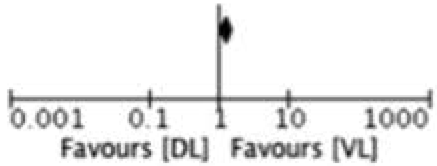
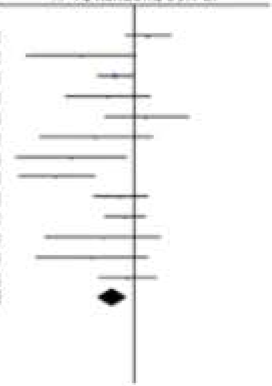


Fig 2. Comparison of first-pass intubation success rates by location. Weight is the relative contribution of each study to the overall odds ratio (random effects model with 95% CI). CI, confidence interval; DL, direct laryngoscopy; VL, videolaryngoscopy.

Study or Subgroup	VL Events	VL Total	DL Events	DL Total	Weight	Odds Ratio M-H, Random, 95% CI
Oesophageal intubations						
De Jong 2013	6	70	6	140	2.5%	2.09 [0.65, 6.75]
Goksu 2016	0	75	7	75	0.6%	0.06 [0.00, 1.08]
Hypes 2016	13	673	7	136	3.3%	0.36 [0.14, 0.93]
Janz 2016	1	74	4	76	0.9%	0.25 [0.03, 2.26]
Khandelwal 2014	1	49	4	171	0.9%	1.91 [0.21, 17.46]
Kim 2016	0	71	3	69	0.5%	0.13 [0.01, 2.62]
Kory 2013	0	78	7	50	0.6%	0.04 [0.00, 0.66]
Lakitcova 2015	1	252	27	140	1.1%	0.02 [0.00, 0.12]
Lascarrou 2017	3	186	6	185	1.9%	0.49 [0.12, 1.99]
Michailidou 2015	6	387	8	322	2.8%	0.62 [0.21, 1.80]
Noppens 2012	0	117	2	113	0.5%	0.19 [0.01, 4.00]
Silverberg 2015	0	57	4	60	0.6%	0.11 [0.01, 2.07]
Trimmel 2016	3	168	4	158	1.7%	0.70 [0.15, 3.18]
Subtotal (95% CI)		**2257**		**1895**	**18.0%**	**0.32 [0.14, 0.70]**
Total events	34		89			

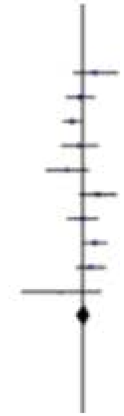
Heterogeneity: $Tau^2 = 1.08$; $Chi^2 = 29.73$, df = 12 ($P = 0.003$); $I^2 = 60\%$
Test for overall effect: Z = 2.85 (P = 0.004)

Odds Ratio
M-H, Random, 95% CI



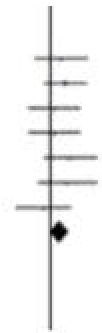
Hypoxaemia/ desaturation						
De Jong 2013	9	70	11	140	3.3%	1.73 [0.68, 4.39]
Driver 2016	26	103	26	95	4.7%	0.90 [0.48, 1.69]
Hypes 2016	123	673	35	136	5.8%	0.65 [0.42, 0.99]
Janz 2016	14	74	16	76	3.8%	0.88 [0.39, 1.95]
Kory 2013	11	78	12	50	3.4%	0.52 [0.21, 1.29]
Lakitcova 2015	30	252	9	140	4.0%	1.97 [0.91, 4.27]
Lascarrou 2017	20	186	20	185	4.6%	0.99 [0.52, 1.92]
Michailidou 2015	48	387	25	322	5.4%	1.68 [1.01, 2.80]
Mosier 2013	103	234	20	56	4.8%	1.42 [0.77, 2.59]
Silverberg 2015	2	57	5	60	1.5%	0.40 [0.07, 2.15]
Subtotal (95% CI)		**2114**		**1260**	**41.2%**	**1.05 [0.77, 1.42]**
Total events	386		179			

Heterogeneity: $Tau^2 = 0.10$; $Chi^2 = 16.78$, df = 9 ($P = 0.05$); $I^2 = 46\%$
Test for overall effect: Z = 0.31 (P = 0.76)



Hypotension/ cardiovascular compromise						
De Jong 2013	6	70	8	140	2.7%	1.55 [0.52, 4.65]
Hypes 2016	54	673	6	136	3.6%	1.89 [0.80, 4.49]
Janz 2016	8	74	7	76	2.8%	1.19 [0.41, 3.48]
Kory 2013	11	78	6	50	2.8%	1.20 [0.42, 3.49]
Lakitcova 2015	16	252	4	140	2.7%	2.31 [0.76, 7.04]
Lascarrou 2017	8	186	4	185	2.4%	2.03 [0.60, 6.87]
Silverberg 2015	6	57	8	60	2.6%	0.76 [0.25, 2.36]
Subtotal (95% CI)		**1390**		**787**	**19.5%**	**1.49 [1.00, 2.23]**
Total events	109		43			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 2.81$, df = 6 ($P = 0.83$); $I^2 = 0\%$
Test for overall effect: Z = 1.95 (P = 0.05)



Open Access Review Article

DOI: 10.7759/cureus.51720

2024

Video Versus Direct Laryngoscopy for Intubation: Updated Systematic Review and Meta-Analysis

Saad Azam [1], Zainab Z. Khan [2], Haania Shahbaz [3], Aisha Siddiqui [4], Natasha Masood [5], Anum . [6], Yumna Arif [7], Zeenat U. Memon [4], Muhammad Hasnain Khawar [8], Farina F. Siddiqui [4], Fiza Azam [9], Aman Goyal [10]

A total of eight studies were included with a total of 5348 patients, with 1780 in the DL group and 3568 in the VL group. Analysis revealed that in emergency situations, the success rate of intubation on the first attempt was significantly higher for VL than DL [81.5% vs 68%; RR= 1.19; 95% CI: 1.10, 1.29; p <0.00001; I2=70%]. There was no significant correlation between VL and severe hypoxemia [13.4% vs 11.6%; RR= 0.99; 95% CI: 0.74, 1.33; p =0.97; I2=46%], severe hypotension [6.09% vs 4.78%; RR:1.19; 95% CI: 0.83, 1.72; p =0.35, I2-15%], and cardiac arrest, [0.8% vs 0.4%; RR= 1.17; 95% CI: 0.37, 3.70]; p =0.79; I2=0%].

Our meta-analysis confirmed that VL has a higher success rate for first-pass intubation than DL. Furthermore, our analysis has shown no significant evidence linking VL to any adverse events.

Study or Subgroup	VL Events	VL Total	DL Events	DL Total	Weight	Odds Ratio M-H, Random, 95% CI
Oesophageal intubations						
De Jong 2013	6	70	6	140	2.5%	2.09 [0.65, 6.75]
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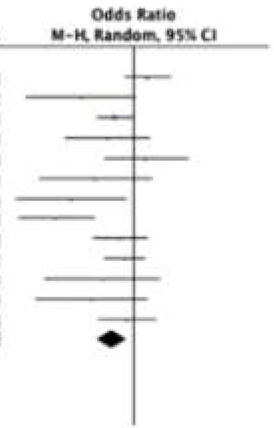

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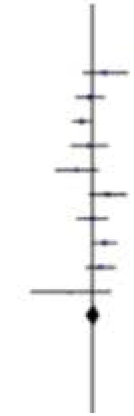

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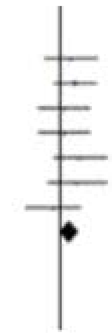


Beaucoup de variables

P Population (générale, obèses, trauma cervical, intubations difficiles, femmes enceintes, enfants)

I Intervention (beaucoup de vidéolaryngoscopes différents)

C Comparateur (expérimentés vs novices)

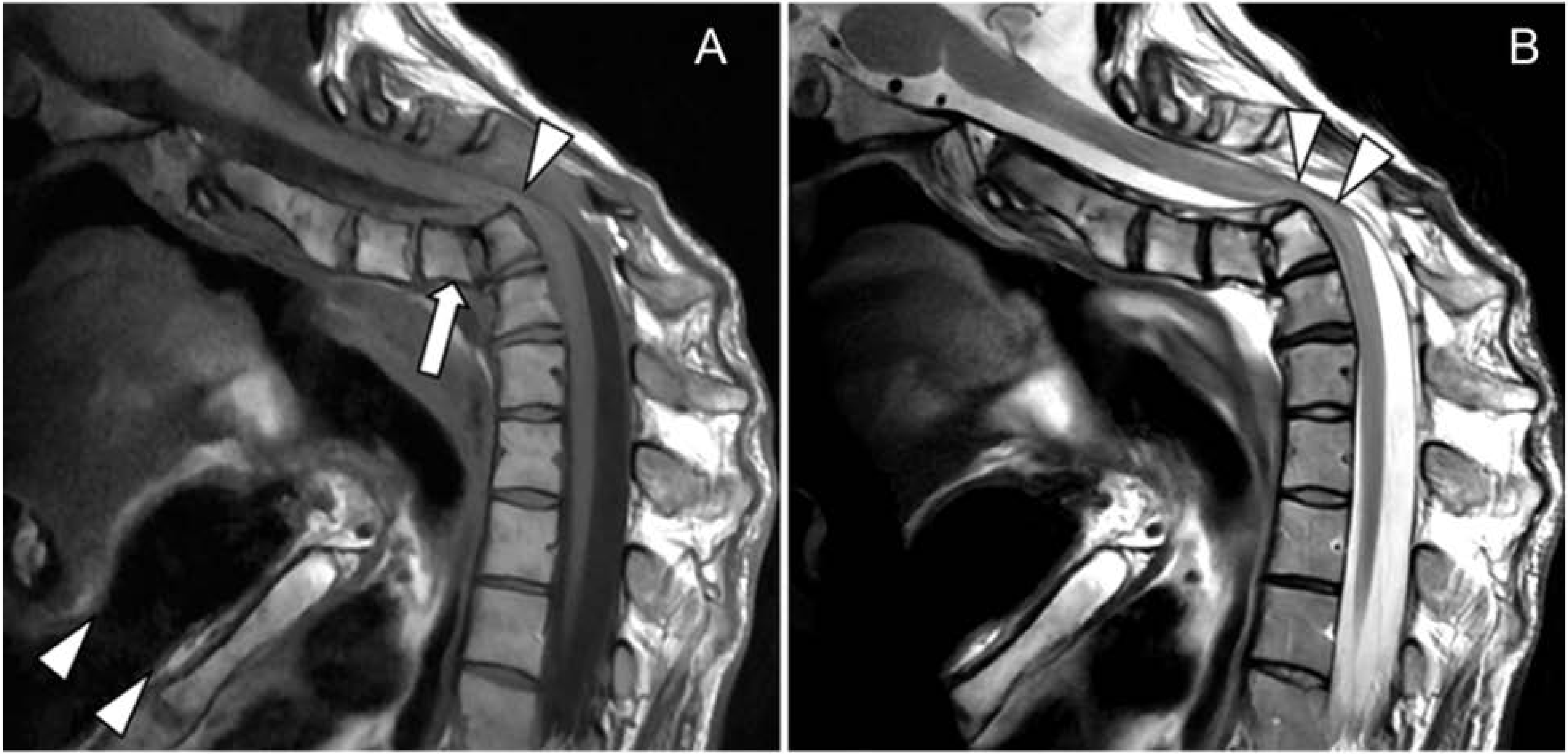
O Outcomes (efficacité =/= sécurité)

En résumé

- Importance d'évaluer nos patients avant d'entrer en salle
- Prévoir un plan d'action
- Importance de se former ET garder une expertise
- Le vidéolaryngoscope pour tous? NON
- Avoir à disposition plusieurs type de vidéolaryngoscope (hyperangulé et channel) ET savoir les utiliser
- Développer et mettre en place des protocoles internes et des formations d'équipes

Pour qui?

- Antécédent ou haute suspicion intubation difficile
- En cas d'intubation difficile ou impossible en laryngoscopie directe
- Obèse sévère
- (Traumatisme cervicaux)


A
B

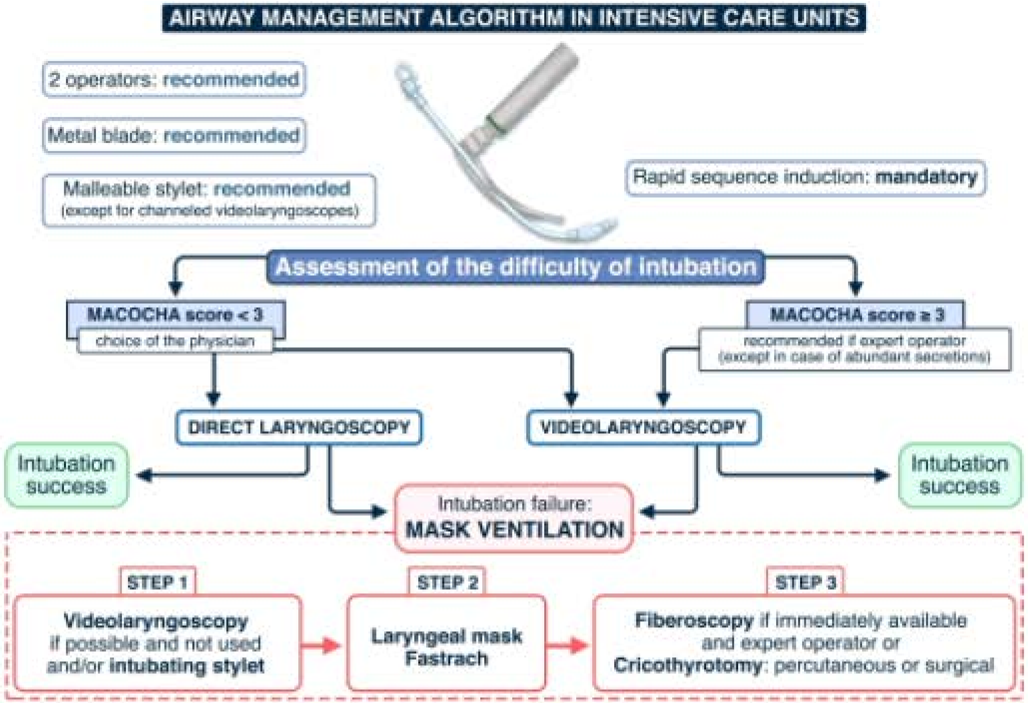
Optimiser la péri-intubation

Intensive Care Med (2022) 48:1287–1298
https://doi.org/10.1007/s00134-022-06849-0

NARRATIVE REVIEW

How to improve intubation in the intensive care unit. Update on knowledge and devices

Audrey De Jong[1], Sheila Nainan Myatra[2], Oriol Roca[3,4] and Samir Jaber[1*]



UPDATE OF THE MONTPELLIER INTUBATION PROTOCOL

PRE-INTUBATION

1. **Two operators** (i.e, 4 hands)

2. **Fluid loading associated with** early introduction of **vasopressors**

3. Preparation of **long-term sedation**
4. For preoxygenation, consider **upright position** (20° to 30° bed)
5. Preoxygenation during at least 3 minutes with **noninvasive ventilation in case of hypoxemic acute respiratory failure** (FiO_2 100 %, pressure support between 5 and 10 cmH_2O to obtain an expired tidal volume between 6 and 8 mL/kg of predicted body weight and a PEEP of 5 cmH_2O), associated with **apnoeic oxygenation** when available and high-risk of hypoxaemia (OPTINIV method)

PER-INTUBATION

6. Use first **videolaryngoscope** for intubation procedure if predicted difficult intubation, if no videolaryngoscope available, consider **Macintosh laryngoscopy with Stylet or bougie**

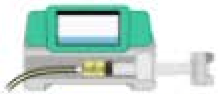
7. **Rapid sequence induction:**
   - Etomidate 0,2-0,3 mg/kg or Ketamine 1-2 mg/kg predicted body weight
   - Succinylcholine 1 mg/kg real body weight (without contra-indications) or Rocuronium 1,2 mg/kg predicted body weight in case of contra-indications to succinylcholine
8. **Sellick manoeuvre**

9. **Ventilation** in case of oxygenation desaturation < 90% or if elevated risk of oxygen desaturation higher than the risk of aspiration

POST-INTUBATION

10. **Capnography** to check correct placement of the tube

11. Increase **vasopressors** especially if diastolic arterial pressure < 35 mmHg or systolic arterial pressure < 90 mmHg



12. Start early **long-term sedation**
13. **Low airway pressure ventilation** at the beginning: tidal volume 6-8 mL/kg, PEEP < 5 cmH_2O, FiO_2 100 %, for a plateau pressure< 30 cmH_2O (protective ventilation will be started after hemodynamic stabilization)
14. **Recruitment manoeuvre:** PEEP of 30-40 cmH2O during 20-30 s (if no cardiovascular collapse and in non-hypovolemic patient)
15. **Cuff pressure** of the tube between 25-30 cmH2O without leaks

Outcomes défavorables de l'intubation (et la sédation) chez le patient critique

3 objectifs pour une optimiser la péri-intubation

1. DIMINUER LE RISQUE D'HYPOXÉMIE

2. DIMINUER LE RISQUE DE COLLAPSUS CARDIOVASCULAIRE

3. MAXIMISER LES CHANCES D'UNE INTUBATION TRACHÉALE RÉUSSIE AU 1ER ESSAI

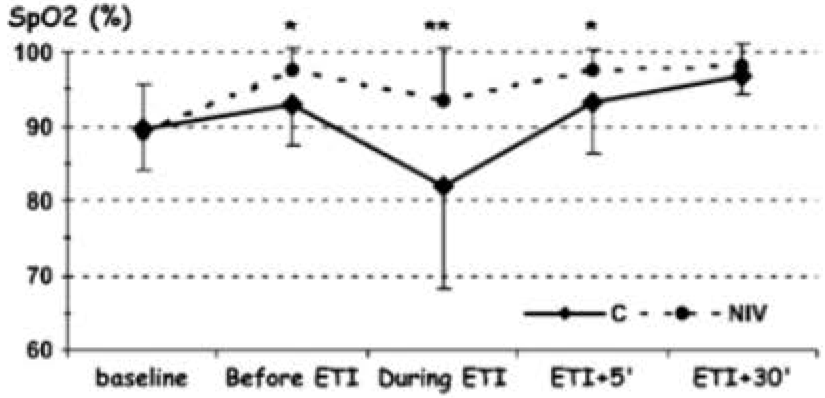
Optimiser la préoxygénation

Noninvasive Ventilation Improves Preoxygenation before Intubation of Hypoxic Patients

Christophe Baillard, Jean-Philippe Fosse, Mustapha Sebbane, Gérald Chanques, François Vincent, Patricia Courouble, Yves Cohen, Jean-Jacques Eledjam, Frédéric Adnet, and Samir Jaber

Department of Anesthesiology and Intensive Care, and SAMU 93, Avicenne Hospital, Paris 13 University–AP-HP, Bobigny; Intensive Care Unit, Department of Anesthesiology, DAR B University Hospital of Montpellier, and Saint Eloi Hospital, Montpellier University, Montpellier, France

Methods: Prospective randomized study performed in two surgical/medical intensive care units (ICUs). Preoxygenation was performed, before a rapid sequence intubation, for a 3-min period using a nonrebreather bag-valve mask (control group) or pressure support ventilation delivered by an ICU ventilator through a face mask (NIV group) according to the randomization.



Ventilation non invasive supérieure à la préoxygénation classique

Non-invasive ventilation versus high-flow nasal cannula oxygen therapy with apnoeic oxygenation for preoxygenation before intubation of patients with acute hypoxaemic respiratory failure: a randomised, multicentre, open-label trial

Jean-Pierre Frat, Jean-Damien Ricard, Jean-Pierre Quenot, Nicolas Pichon, Alexandre Demoule, Jean-Marie Forel, Jean-Paul Mira, Rémi Coudroy, Guillaume Berquier, Benoit Voisin, Gwenhaël Colin, Bertrand Pons, Pierre Eric Danin, Jérome Devaquet, Gwenael Prat, Raphaël Clere-Jehl, Franck Petitpas, Emmanuel Vivier, Keyvan Razazi, Mai-Anh Nay, Vincent Souday, Jean Dellamonica, Laurent Argaud, Stephan Ehrmann, Aude Gibelin, Christophe Girault, Pascal Andreu, Philippe Vignon, Laurence Dangers, Stéphanie Ragot, Arnaud W Thille, for the FLORALI-2 study group and REVA network*

Randomized Controlled Trial > Lancet Respir Med. 2019 Apr;7(4):303-312.
doi: 10.1016/S2213-2600(19)30048-7. Epub 2019 Mar 18.

Oxygène nasal à haut débit n'est pas une bonne méthode de préoxygénation

Concept d'oxygénation apnéique

	Severe-to-moderate hypoxaemia (PaO_2/FiO_2 ≤200 mm Hg)				Mild hypoxaemia (PaO_2/FiO_2 >200 mm Hg)			
	Non-invasive ventilation (n=117)	High-flow nasal cannula oxygen therapy (n=125)	Absolute difference estimate (95% CI)	p value	Non-invasive ventilation (n=25)	High-flow nasal cannula therapy (n=46)	Absolute difference estimate (95% CI)	p value
Primary outcome								
SpO_2 <80% during intubation procedure	28 (24%)	44 (35%)	−11·3 (−22·3 to 0·3)	0·0553	5 (20%)	3 (7%)	13·4 (−2·2 to 33·1)	0·1197
95% CI	16–32	27–44	..	..	4–36	0–14	..	..
Adjusted on PaO_2	..	..	..	0·0459	..	..	..	0·1003
Secondary outcomes								
SpO_2 at the beginning of preoxygenation	94% (5)	94% (4)	0·0 (−1·1 to 1·1)	0·75	97% (3)	97% (4)	0·0 (−1·8 to 1·8)	0·36
SpO_2 at the end of preoxygenation	97% (4)	96% (6)	1·0 (−0·0 to 2·0)	0·02	99% (3)	98% (4)	1·0 (−0·8 to 2·8)	0·31
Lowest SpO_2 during intubation procedure	86% (12)	81% (17)	5·0 (1·2 to 8·7)	0·02	90% (15)	93% (8)	−3·0 (−8·4 to 2·4)	0·31

Data are n (%) or mean % (SD), unless otherwise indicated. SpO_2=pulse oximetry.

Table 3: Outcomes in the intention-to-treat population, by subgroup of stratification and treatment group

VNI + Optiflow

=

OPTINIV

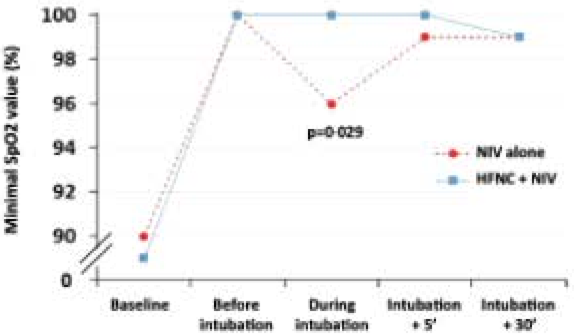
Intensive Care Med (2016) 42:1877–1887
DOI 10.1007/s00134-016-4588-9

SEVEN-DAY PROFILE PUBLICATION

Apnoeic oxygenation via high-flow nasal cannula oxygen combined with non-invasive ventilation preoxygenation for intubation in hypoxaemic patients in the intensive care unit: the single-centre, blinded, randomised controlled OPTINIV trial

Samir Jaber[1,2*], Marion Monnin[1], Mehdi Girard[1], Matthieu Conseil[1], Moussa Cisse[1], Julie Carr[1], Martin Mahul[1], Jean Marc Delay[1], Fouad Belafia[1], Gérald Chanques[1,2], Nicolas Molinari[3] and Audrey De Jong[1,2]

Combiner VNI + Optiflow chez les patients à risque



	Baseline	Before intubation	During intubation	Intubation + 5'	Intubation + 30'
NIV Median [IQR] Range [min-max]	90 [86-93] [73-99]	100 [96-100] [75-100]	96 [92-99] [54-100]	99 [92-100] [93-100]	99 [97-100] [93-100]
HFNC + NIV Median [IQR] Range [min-max]	89 [87-92] [78-100]	100 [99-100] [85-100]	100 [95-100] [35-100]	100 [100-100] [92-100]	99 [98-100] [89-100]
NIV Mean (SD)	89·0 (5·7)	96·2 (5·8)	91·5 (12·5)	91·3 (8·0)	97·8 (2·5)
HFNC + NIV Mean (SD)	89·6 (5·5)	98·4 (3·6)	94·6 (15·0)	92·8 (6·7)	98·1 (2·8)

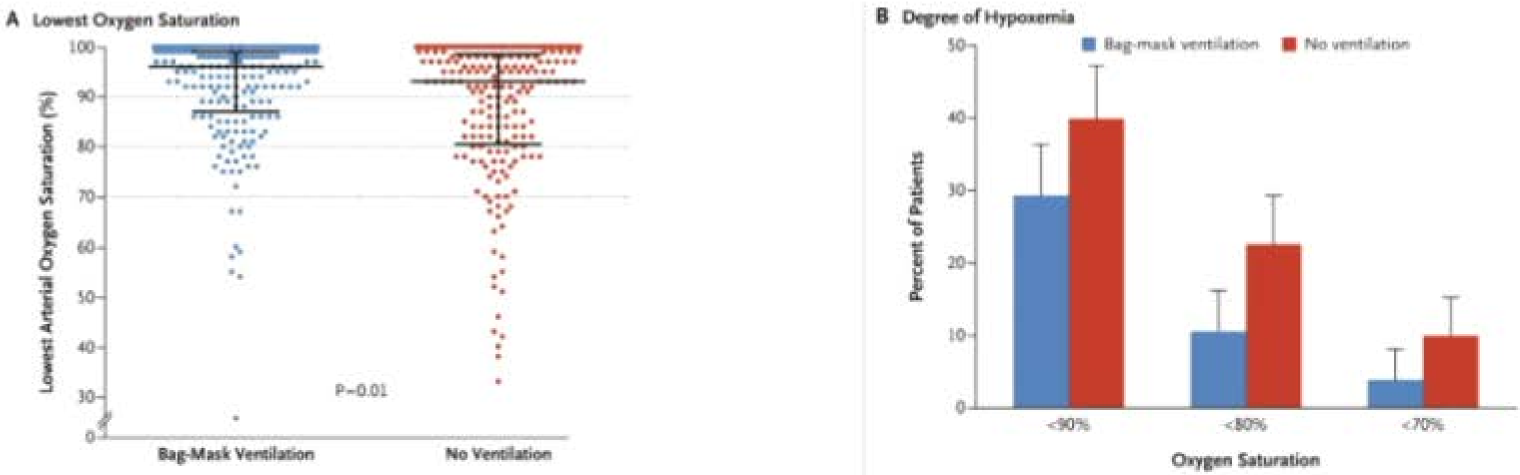
Fig. 3 Variations in minimal SpO_2 values from baseline to the end of the intubation procedure. SpO_2 peripheral capillary oxygen saturation, NIV non-invasive ventilation, HFNC high flow nasal cannula oxygen therapy. At baseline (defined as values obtained at time of randomisation), before the intubation procedure, minimal SpO_2 values were similar between groups, and remain similar at the end of preoxygenation. However, during the intubation procedure, minimal SpO_2 values were significantly higher in the interventional group compared to the reference group ($p = 0.029$)

ORIGINAL ARTICLE

Bag-Mask Ventilation during Tracheal Intubation of Critically Ill Adults

The NEW ENGLAND JOURNAL of MEDICINE

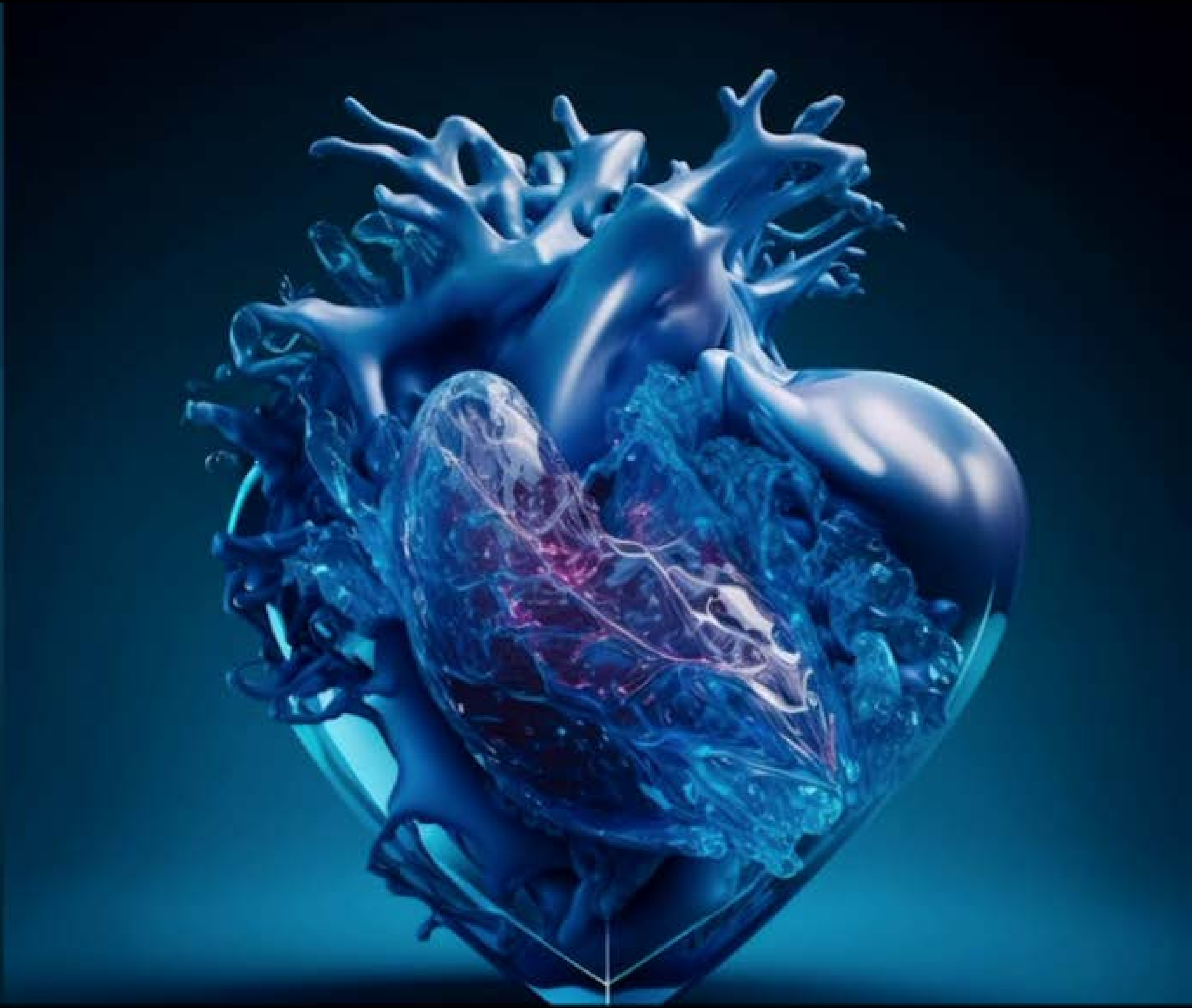
Jonathan D. Casey, M.D., David R. Janz, M.D., Derek W. Russell, M.D., Derek J. Vonderhaar, M.D., Aaron M. Joffe, D.O., Kevin M. Dischert, M.D., Ryan M. Brown, M.D., Aline N. Zouk, M.D., Swati Gulati, M.B., B.S., Brent E. Heideman, M.D., Michael G. Lester, M.D., Alexandra H. Toporek, M.D., et al., for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



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 oxygen-saturation outcomes			
Lowest oxygen saturation of <90% — no./total no. (%)	57/193 (29.5)	79/197 (40.1)	0.74 (0.56 to 0.97)
Lowest oxygen saturation of <70% — no./total no. (%)‡	8/193 (4.1)	20/197 (10.2)	0.41 (0.18 to 0.90)
Median decrease in oxygen saturation (IQR) — percentage points	1 (0–7)	5 (0–14)	-4.5 (-6.8 to -2.2)†

Utiliser la ventilation au masque si possible

Optimiser l'hémodynamique



JAMA | Original Investigation

Effect of Fluid Bolus Administration on Cardiovascular Collapse Among Critically Ill Patients Undergoing Tracheal Intubation
A Randomized Clinical Trial

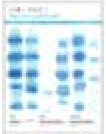
Derek W. Russell, MD; Jonathan D. Casey, MD, MSc; Kevin W. Gibbs, MD; Shekhar Ghamande, MD;
James M. Dargin, MD; Derek J. Vonderhaar, MD; Aaron M. Joffe, DO; Akram Khan, MD;
Matthew E. Prekker, MD, MPH; Joseph M. Brewer, DO; Simanta Dutta, MD; Janna S. Landsperger, MS, ACNP-BC;
Heath D. White, DO, MS; Sarah W. Robison, MD; Joanne M. Wozniak, MS, PA-C; Susan Stempek, MMSc, PA-C;
Christopher R. Barnes, MD; Olivia F. Krol, BS; Alejandro C. Arroliga, MD, MS; Tasnim Lat, DO;
Sheetal Gandotra, MD; Swati Gulati, MBBS, MS; Itay Bentov, MD, PhD; Andrew M. Walters, MD;
Kevin M. Dischert, MD; Stephanie Nonas, MD; Brian E. Driver, MD; Li Wang, MS; Christopher J. Lindsell, PhD;
Wesley H. Self, MD, MPH; Todd W. Rice, MD, MSc; David R. Janz, MD, MSc; Matthew W. Semler, MD, MSc;
for the PREPARE II Investigators and the Pragmatic Critical Care Research Group

Table 3. Outcomes of Tracheal Intubation

	Fluid bolus (n = 538)	No fluid bolus (n = 527)	Difference (95% CI)[a]
Primary outcome			
Cardiovascular collapse, No. (%)[b]	113 (21.0)	96 (18.2)	Absolute, 2.8 (−2.2 to 7.7)
New or increased receipt of vasopressors	111 (20.6)	93 (17.6)	Absolute, 3.0 (−1.9 to 7.9)
Systolic blood pressure <65 mm Hg[c]	(n = 535) 21 (3.9)	(n = 524) 22 (4.2)	Absolute, −0.3 (−2.8 to 2.3)
Cardiac arrest	9 (1.7)	8 (1.5)	Absolute, 0.2 (−1.5 to 1.8)
Death	4 (0.7)	3 (0.6)	Absolute, 0.2 (−1.0 to 1.3)
Secondary outcome			
In-hospital death prior to 28 d, No. (%)	218 (40.5)	223 (42.3)	Absolute, −1.8 (−7.9 to 4.3)

ELSEVIER

The Lancet Respiratory Medicine
Volume 7, Issue 12, December 2019, Pages 1039-1047



Articles

Effect of a fluid bolus on cardiovascular collapse among critically ill adults undergoing tracheal intubation (PrePARE): a randomised controlled trial

David R Janz MD [a], Jonathan D Casey MD [c], Matthew W Semler MD [c],

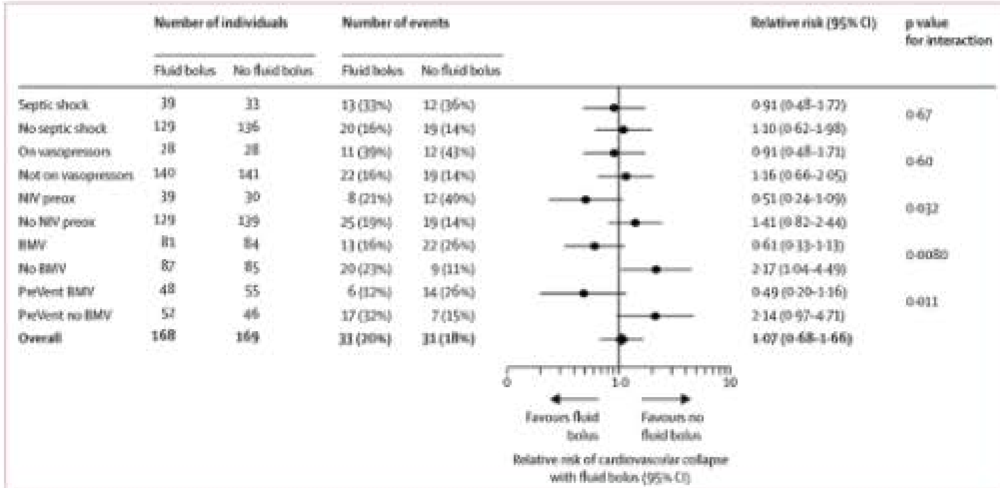
Interpretation

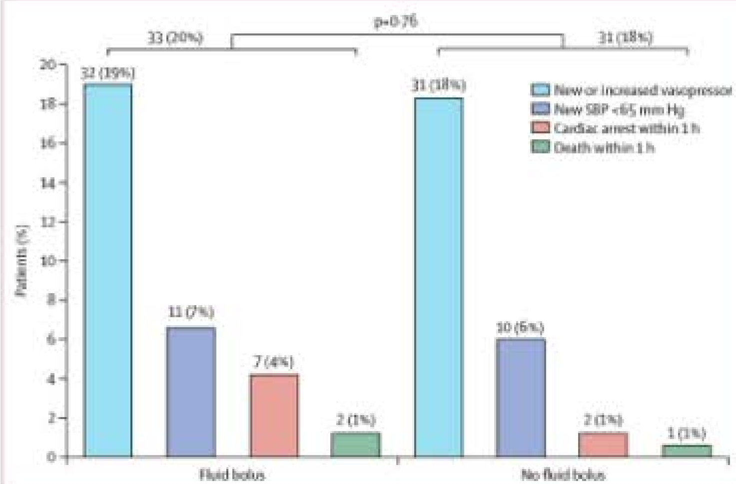
Administration of an intravenous fluid bolus did not decrease the overall incidence of cardiovascular collapse during tracheal intubation of critically ill adults compared with no fluid bolus in this trial.

Randomized Controlled Trial > Lancet Respir Med. 2019 Dec;7(12):1039-1047.
doi: 10.1016/S2213-2600(19)30246-2. Epub 2019 Oct 1.

Effect of a fluid bolus on cardiovascular collapse among critically ill adults undergoing tracheal intubation (PrePARE): a randomised controlled trial

David R Janz [1], Jonathan D Casey [2], Matthew W Semler [2], Derek W Russell [3], James Dargin [4], Derek J Vonderhaar [5], Kevin M Dischert [6], Jason R West [7], Susan Stempek [4], Joanne Wozniak [4], Nicholas Caputo [7], Brent E Heideman [2], Aline N Zouk [3], Swati Gulati [3], William S Stigler [3], Itay Bentov [8], Aaron M Joffe [8], Todd W Rice [2]; PrePARE Investigators; Pragmatic Critical Care Research Group





> CJEM. 2024 Aug 27. doi: 10.1007/s43678-024-00764-7. Online ahead of print.

The use of vasopressors to reduce post-intubation hypotension in critically ill adult patients undergoing emergent endotracheal intubation: a scoping review

Patricia L G Marks [1], Jakob M Domm [2], Laura Miller [3], Zoey Yao [4], James Gould [5], Osama Loubani [5 6]

Results: The systematic search yielded 13,126 articles, with 61 selected for final inclusion. There were 24,547 patients with a mean age of 57.2 years and a slight male predominance (63.8%). Respiratory failure was the most common intubation indication. Across 18 studies reporting on vasopressor use prior to intubation, 1171/7085 patients received vasopressors pre-intubation. Post-intubation hypotension occurred in 22.2% of patients across all studies, and in 34.3% of patients in studies where vasopressor administration pre-intubation was specifically reported. One-hour mortality of patients across all studies and within the vasopressor use studies was 1.2% and 1.6%, respectively. In-hospital mortality across studies was 21.5%, and 13.1% in studies which reported on vasopressor use pre-intubation.

Conclusion: Patients requiring emergent intubation have a high rate of post-intubation hypotension and in-hospital mortality. While there is an intuitive rationale for the use of vasopressors during emergent intubation, current evidence is limited to support a definitive change in clinical practice at this time.

> Crit Care Explor. 2023 Jul 12;5(7):e0946. doi: 10.1097/CCE.0000000000000946.
eCollection 2023 Jul.

Prophylactic Administration of Vasopressors Prior to Emergency Intubation in Critically Ill Patients: A Secondary Analysis of Two Multicenter Clinical Trials

Mikita Fuchita [1], Jack Pattee [2], Derek W Russell [3 4], Brian E Driver [5], Matthew E Prekker [5 6], Christopher R Barnes [7], Joseph M Brewer [8], Kevin C Doerschug [9], John P Gaillard [10 11], Sheetal Gandotra [3], Shekhar Ghamande [12], Kevin W Gibbs [13], Christopher G Hughes [14], David R Janz [15 16], Akram Khan [17], Steven H Mitchell [18], David B Page [3 19], Todd W Rice [20], Wesley H Self [21 22], Lane M Smith [9], Susan B Stempek [23], Stacy A Trent [24 25], Derek J Vonderhaar [26], Jason R West [27], Micah R Whitson [3], Kayla Williamson [2], Matthew W Semler [20], Jonathan D Casey [20], Adit A Ginde [24]

Important d'optimiser l'hémodynamique avant/pendant et après l'intubation

Outcomes in the Propensity-Matched Cohort

	Propensity-Matched cohort		
Outcomes	**Vasopressor[a] (n = 187)**	**No Vasopressor (n = 187)**	p
Peri-intubation hypotension[b]	76 (41%)	60 (32%)	0.08
Change in systolic blood pressure[c]	−12 ± 23	−11 ± 22	0.66[e]
New initiation of vasopressors[d]	75 (40%)	54 (29%)	0.03
Cardiac arrest within 1 hr	7 (4%)	5 (3%)	0.77
30-d mortality	106 (57%)	88 (47%)	0.08

Check for updates

ORIGINAL ARTICLE

Peri-intubation Cardiovascular Collapse in Patients Who Are Critically Ill

Insights from the INTUBE Study

Vincenzo Russotto[1*], Elena Tassistro[2,3*], Sheila N. Myatra[4], Matteo Parotto[5,6], Laura Antolini[2,3], Philippe Bauer[7], Jean Baptiste Lascarrou[8], Konstanty Szułdrzyński[9,10], Luigi Camporota[11], Christian Putensen[12], Paolo Pelosi[13,14], Massimiliano Sorbello[15], Andy Higgs[16], Robert Greif[17,18], Antonio Pesenti[19], Maria Grazia Valsecchi[2,3], Roberto Fumagalli[3,20], Giuseppe Foti[3,21], Giacomo Bellani[3,21], and John G. Laffey[22,23]; for the INTUBE Study Investigators

Conclusions: Peri-intubation cardiovascular instability/collapse was associated with an increased risk of both ICU and 28-day mortality. The use of propofol for induction was identified as a modifiable intervention significantly associated with cardiovascular instability/collapse.Clinical trial registered with clinicaltrials.gov (NCT03616054).

Intensive Care Med (2022) 48:78–91
https://doi.org/10.1007/s00134-021-06577-x

ORIGINAL

Etomidate versus ketamine for emergency endotracheal intubation: a randomized clinical trial

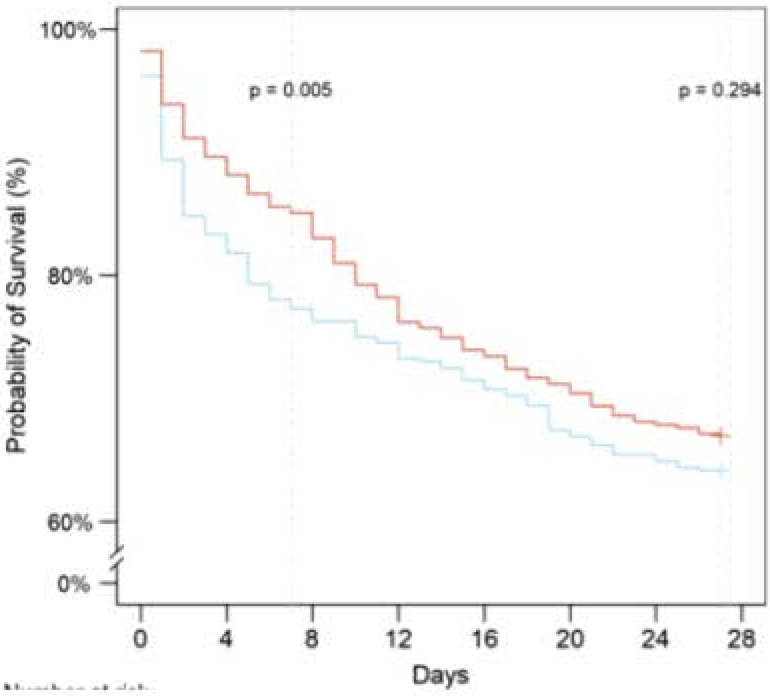
Gerald Matchett[1*], Irina Gasanova[1], Christina A. Riccio[1], Dawood Nasir[1], Mary C. Sunna[2], Brian J. Bravenec[1], Omaira Azizad[1], Brian Farrell[2], Abu Minhajuddin[3,4], Jesse W. Stewart[1], Lawrence W. Liang[1], Tiffany Sun Moon[1], Pamela E. Fox[1], Callie G. Ebeling[1], Miakka N. Smith[1], Devin Trousdale[1] and Babatunde O. Ogunnaike[1] on behalf of the EvK Clinical Trial Collaborators

Moins, c'est mieux

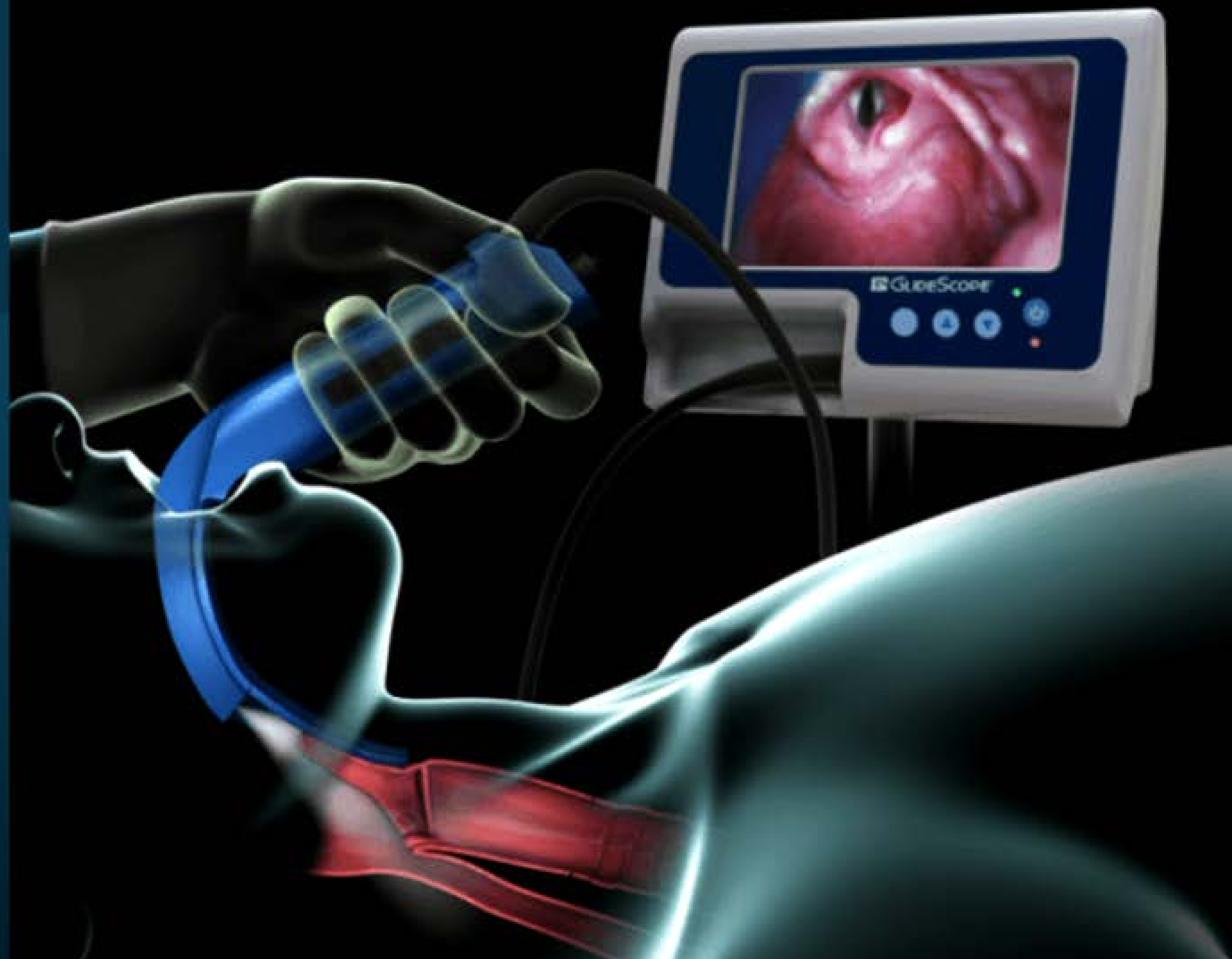
Ketamine 1-2mg/kg
Hyptomidate 0,2 – 0,3mg/kg

Table 2 Primary and secondary outcomes

Variable	Etomidate (*n* = 396)	Ketamine (*n* = 395)	Difference (95% confidence interval)	*p* value
Receiving vasopressor or inotrope infusion(s), *n* (%)[a]	235 (59.3)	213 (53.9)	5.4 (− 1.5, 12.3)	0.124
Duration of vasopressor or inotrope infusion(s) (days), median (IQR)	1 (0, 3)	1 (0, 3)	0 (0, 0)	0.498
Duration of mechanical ventilation, median (IQR)	5 (3, 9)	5 (3, 10)	0 (− 1, 0)	0.446
ICU length-of-stay, median (IQR)	8 (4, 16)	9 (5, 14)	− 1 (− 1, 0)	0.302
Diagnosis of adrenal insufficiency, *n* (%)	11 (2.8)	4 (1)	1.8 (− 0.1, 3.7)	0.115
Day 7 survival, *n* (%)	306 (77.3)	336 (85.1)	− 7.8 (− 13, − 2.4)	0.005
Day 28 survival, *n* (%)	254 (64.1)	264 (66.8)	− 2.7 (− 9.3, 3.9)	0.294



Optimiser l'intubation



Identifier le patient à risque d'intubation difficile

S'adapter à chaque patient

S'entrainer pour garder une maitrise

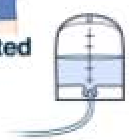
Utiliser des devices que l'on connait et sait utiliser

UPDATE OF THE MONTPELLIER INTUBATION PROTOCOL

PRE-INTUBATION

1. **Two operators** (i.e, 4 hands)

2. **Fluid loading associated with** early introduction of **vasopressors**



3. Preparation of **long-term sedation**
4. For preoxygenation, consider **upright position** (20° to 30° bed)
5. Preoxygenation during at least 3 minutes with **noninvasive ventilation in case of hypoxemic acute respiratory failure** (FiO_2 100 %, pressure support between 5 and 10 cmH_2O to obtain an expired tidal volume between 6 and 8 mL/kg of predicted body weight and a PEEP of 5 cmH_2O), associated with **apnoeic oxygenation** when available and high-risk of hypoxaemia (OPTINIV method)

PER-INTUBATION

6. Use first **videolaryngoscope** for intubation procedure if predicted difficult intubation, if no videolaryngoscope available, consider **Macintosh laryngoscopy with Stylet or bougie**

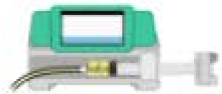
7. **Rapid sequence induction:**
   - Etomidate 0,2-0,3 mg/kg or Ketamine 1-2 mg/kg predicted body weight
   - Succinylcholine 1 mg/kg real body weight (without contra-indications) or Rocuronium 1,2 mg/kg predicted body weight in case of contra-indications to succinylcholine
8. **Sellick manoeuvre**

9. **Ventilation** in case of oxygenation desaturation < 90% or if elevated risk of oxygen desaturation higher than the risk of aspiration

POST-INTUBATION

10. **Capnography** to check correct placement of the tube

11. Increase **vasopressors** especially if diastolic arterial pressure < 35 mmHg or systolic arterial pressure < 90 mmHg



12. Start early **long-term sedation**
13. **Low airway pressure ventilation** at the beginning: tidal volume 6-8 mL/kg, PEEP < 5 cmH_2O, FiO_2 100 %, for a plateau pressure< 30 cmH_2O (protective ventilation will be started after hemodynamic stabilization)
14. **Recruitment manoeuvre:** PEEP of 30-40 cmH2O during 20-30 s (if no cardiovascular collapse and in non-hypovolemic patient)
15. **Cuff pressure** of the tube between 25-30 cmH2O without leaks

Mais est-ce que cela marche?

UPDATE OF THE MONTPELLIER INTUBATION PROTOCOL

PRE-INTUBATION

(1) **Two operators** (i.e, 4 hands)

(2) **Fluid loading associated with** early introduction of **vasopressors**

(3) Preparation of **long-term sedation**

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POST-INTUBATION

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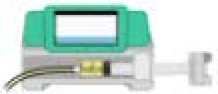

(12) Start early **long-term sedation**

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Mais est-ce
que cela
marche?

Intensive Care Med (2010) 36:248–255
DOI 10.1007/s00134-009-1717-8

ORIGINAL

Samir Jaber
Boris Jung
Philippe Corne
Mustapha Sebbane
Laurent Muller
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Olivier Jonquet
Jean-Jacques Eledjam
Jean-Yves Lefrant

An intervention to decrease complications related to endotracheal intubation in the intensive care unit: a prospective, multiple-center study

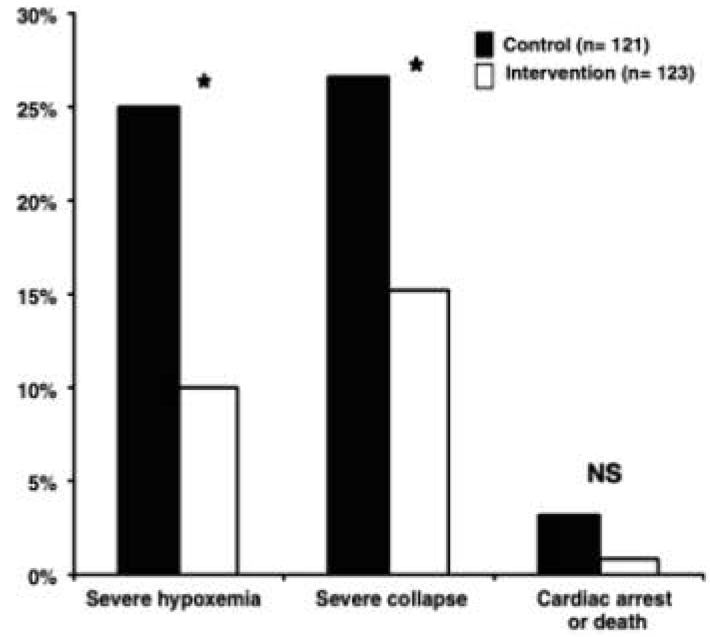
Importance de mettre en place et de suivre des procédures et des protocoles clairs et précis

Pre-intubation
1. Presence of two operators
2. Fluid loading (isotonic saline 500 ml or starch 250 ml) in absence of cardiogenic pulmonary edema
3. Preparation of long-term sedation
4. Preoxygenation for 3 min with NIPPV in case of acute respiratory failure (FiO_2 100%, pressure support ventilation level between 5 and 15 cmH_2O to obtain an expiratory tidal volume between 6 and 8 ml/kg and PEEP of 5 cmH_2O)

During intubation
5. Rapid sequence induction: etomidate 0.2–0.3 mg/kg or ketamine 1.5–3 mg/kg combined with succinylcholine 1–1.5 mg/kg in absence of allergy, hyperkaliemia, severe acidosis, acute or chronic neuromuscular disease, burn patient for more than 48 h and medullar trauma
6. Sellick maneuver

Post-intubation
7. Immediate confirmation of tube placement by capnography
8. Norepinephrine if diastolic blood pressure remains <35 mmHg
9. Initiate long-term sedation
10. Initial "protective ventilation": tidal volume 6–8 ml/kg of ideal body weight, PEEP <5 cmH_2O and respiratory rate between 10 and 20 cycles/min, FiO_2 100% for a plateau pressure <30 cmH_2O

NIPPV non-invasive positive pressure ventilation, *PEEP* positive end expiratory pressure, *FiO_2* inspired oxygen fraction



Conclusions

- Importance d'évaluer nos patients avant d'entrer en salle
- Plan d'action
- Importance de se former ET garder une expertise
- Le vidéolaryngoscope pour tous? NON
- Avoir à disposition plusieurs type de vidéolaryngoscope (hyperangulé et channel) ET savoir les utiliser
- Développer et mettre en place des protocoles internes et des formations d'équipes
- Optimiser le patient avec l'induction