INSTITUT FÜR ANÄSTHESIOLOGIE UND SCHMERZTHERAPIE

Symposium
Der Atemweg

Dienstag, 20. Oktober 2015
16.15–20.00 Uhr
Kantonsspital Winterthur, Aula U1

KANTONSSPITAL WINTERTHUR

Liebe Kolleginnen, liebe Kollegen

Gelegentlich hätte man fast meinen können, dass sich die Diskussion über den menschlichen Atemweg aus der Perspektive des Anästhesisten erschöpft hätte. Die Einleitungsalgorithmen waren gesetzt, die Intubationshilfsmittel mannigfach und die Meinungen dazu ebenfalls. Und doch kommt plötzlich Bewegung auf: Soll jetzt während der Einleitung noch zur Probe beatmet werden, ist die flexible Fiberoptik noch aktuell, oder wie verfahren wir nun effektiv beim unerwartet schwierigen Atemweg?
Darüber werden wir uns im Rahmen des neunten Anästhesiesymposiums informieren und mit den Referenten austauschen können. Um nicht allzu sehr Nabelschau zu betreiben, lohnt sich gelegentlich auch der Blick über den humanmedizinischen Tellerrand hinaus. Frau Professorin Bettschart wird uns mit ihrem Vortrag definitiv überraschen und vielleicht sogar auf neue, nützliche Gedanken bringen.

Wir freuen uns auf wiederum kollegiale, informative und diskussionsreiche Stunden mit Ihnen und laden Sie herzlich ein, unser Symposium zu besuchen.

Beste Grüsse

Dr. med. Daniel Borer
Leitender Arzt
Institut für Anästhesiologie
und Schmerztherapie
Kantonsspital Winterthur

PD Dr. med. Michael Ganter
Direktor
Institut für Anästhesiologie
und Schmerztherapie
Kantonsspital Winterthur

Referentin und Referenten

Prof. em. Dr. med.
Hans-Joachim Priebe
Professor emeritus
Albert-Ludwigs-Universität
Freiburg (D)

PD Dr. med. Thomas Heidegger
Chefarzt Departement Anästhesie,
Intensivmedizin & Reanimation
Spital Grabs

Dr. med. Jörg Schäuble
Oberarzt Institut für Anästhesiologie und Schmerztherapie
Kantonsspital Winterthur

Prof. Dr. Regula Bettschart-Wolfensberger
Abteilungsleiterin Abteilung für Anästhesiologie
Tierspital Universität Zürich

Moderation
Dr. med. Daniel Borer
Leitender Arzt Institut für Anästhesiologie und Schmerztherapie
Kantonsspital Winterthur

Symposium
Der Atemweg

Datum	**Dienstag, 20. Oktober 2015**
Ort	**Kantonsspital Winterthur, Aula U1**
Zeit	**16.15 bis 20.00 Uhr**

16.15–16.20 Uhr	**Eröffnung des Symposiums** PD Dr. med. Michael Ganter
16.20–17.05 Uhr	**Der Nachweis einer effektiven Maskenbeatmung vor Gabe des Muskelrelaxans dient der Patientensicherheit: Fakt oder Fiktion?** Prof. em. Dr. med. Hans-Joachim Priebe
17.05–17.50 Uhr	**Die flexible Fiberoptik: Zunehmend vergessener Goldstandard oder überholtes Relikt?** PD Dr. med. Thomas Heidegger
17.50–18.20 Uhr	**Pause mit Apéro**
18.20–19.05 Uhr	**Der unerwartet schwierige Atemweg im Erwachsenenalter** Dr. med. Jörg Schäuble
19.05–19.50 Uhr	**Atemweg ist nicht gleich Atemweg!** Prof. Dr. Regula Bettschart-Wolfensberger
19.50–20.00 Uhr	**Diskussion**

Die Veranstaltung wird von der SGAR mit 3,5 Credits und von der SGNOR mit 2 Fortbildungscredits anerkannt.

KANTONSSPITAL WINTERTHUR

Brauerstrasse 15
Postfach 834
8401 Winterthur
Tel. 052 266 21 21
info@ksw.ch
www.ksw.ch

Save the Date

Symposien 2016 am Institut für Anästhesiologie und Schmerztherapie:

9. Februar 2016
Ambulante Anästhesie

21. Juni 2016
Rettungsmedizin

4. Oktober 2016
Neuromonitoring in der Anästhesie

jeweils von 16.15 bis 20.00 Uhr

Kontakt

Institut für Anästhesiologie und Schmerztherapie

Organisation
Dr. med. Daniel Borer
Leitender Arzt

Dr. med. Jörg Schäuble
Oberarzt

PD Dr. med. Michael Ganter
Direktor

Information und Anmeldung
Regina Broger
Chefsekretariat
Tel. 052 266 27 92

Anmeldung bis spätestens
18. Oktober 2015
an anaesthesiologie@ksw.ch.

Die Veranstaltung wird unterstützt von:

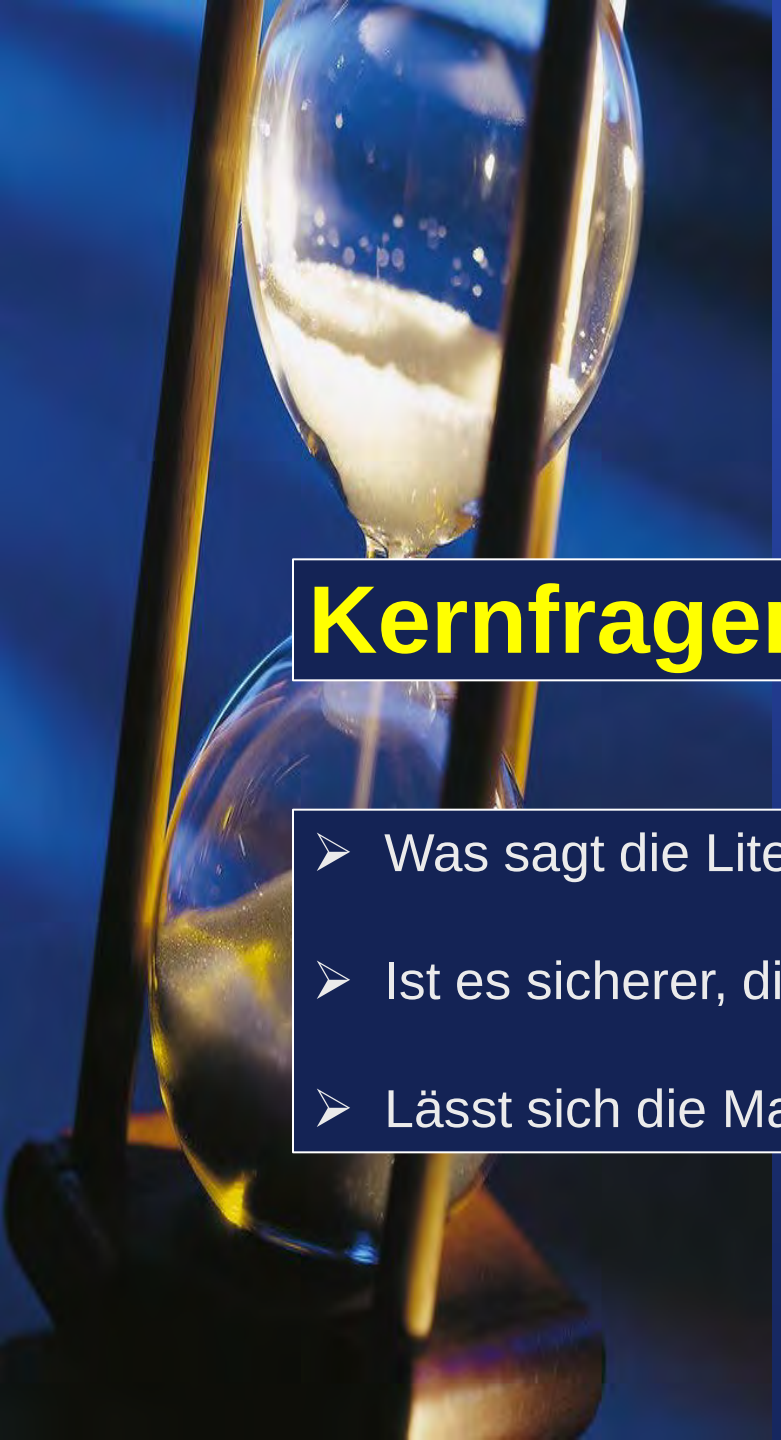
abbvie · anandic medical systems · arcomed ag Medical Systems · Baxter · CSL Behring · Dräger · ERMED AG · MSD

9/2015

Stellenwert der Probebeatmung

20. Oktober 2015

Dr. med. Daniel Button



Kernfragen / Ziele

- Was sagt die Literatur zur Probebeatmung?
- Ist es sicherer, die Patienten erst nach erfolgreicher Maskenbeatmung zu relaxieren?
- Lässt sich die Maskenbeatmung durch die Relaxation beeinflussen?

KANTONSSPITAL WINTERTHUR

….aus den Lehrbüchern für Anästhesie:

«ES IST SICHERER, DIE PATIENTEN ERST NACH ERFOLGREICHER PROBEBEATMUNG ZU RELAXIEREN!»

→ wirklich?

Szenario

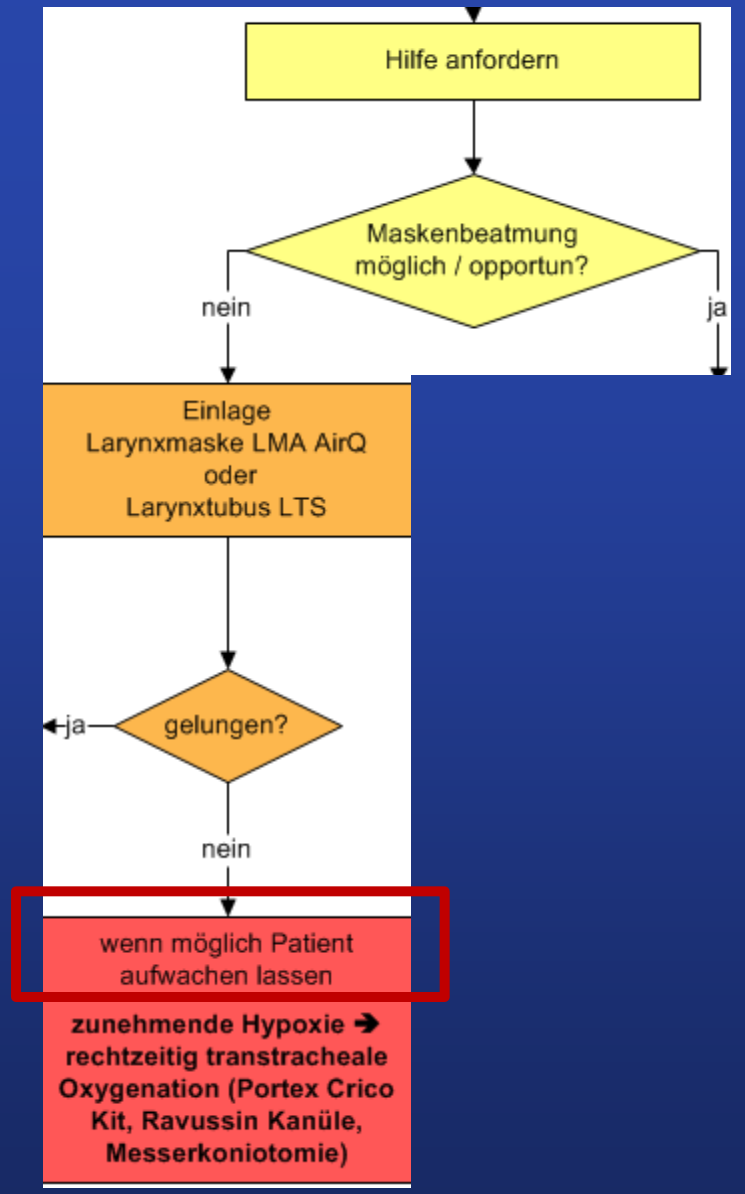
Setting: 1 AA im 2. Jahr, 1 erfahrene Pflegefachperson

35jährige ASA I-Patientin für elektive laparoskopische Cholezystektomie, Aussenklinik

Präoxygenation nach Standard - Fentanyl, Propofol

Die Maskenbeatmung geht nicht!

→ unerwartet schwieriger Atemweg?



KANTONSSPITAL WINTERTHUR

Ab wann sprechen wir vom unerwartet schwierigen Atemweg?

*« …It is interesting that considerable attention has been given to the development of algorithms to aid the anaesthetist in decision making after failed intubation, but not to what the response to difficulty with mask ventilation **before** an attempt at intubation should be.»*

«…It may be that when a patient has an obstructed airway it is not feasible to await awakening; something has to be done to ventilate the lungs before catastrophic desaturation occurs.»

Anaesthesia, 2008, 63, pages 113–115

OHNE RELAXATION BLEIBT DIE OPTION ZUM «WEG ZURÜCK»

Maskenbeatmung vor Relaxation

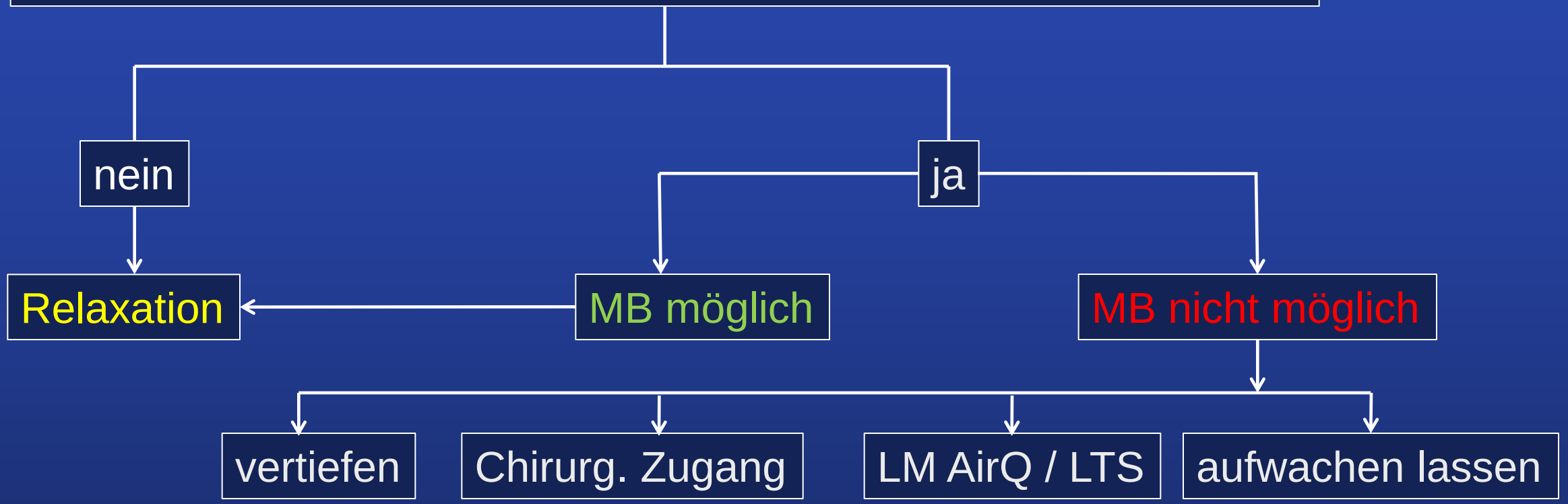
Vom Dogma zur Individualität

Byhahn C; Anaesthesist 2012 · 61:397–398

„Der Glaube, man könne einen prämedizierten Patienten nach Gabe eines potenten Opioids und eines Hypnotikums innerhalb der Hypoxietoleranz wieder in die Spontanatmung überführen, ist ein Irrglaube – und ein sehr gefährlicher noch dazu.“

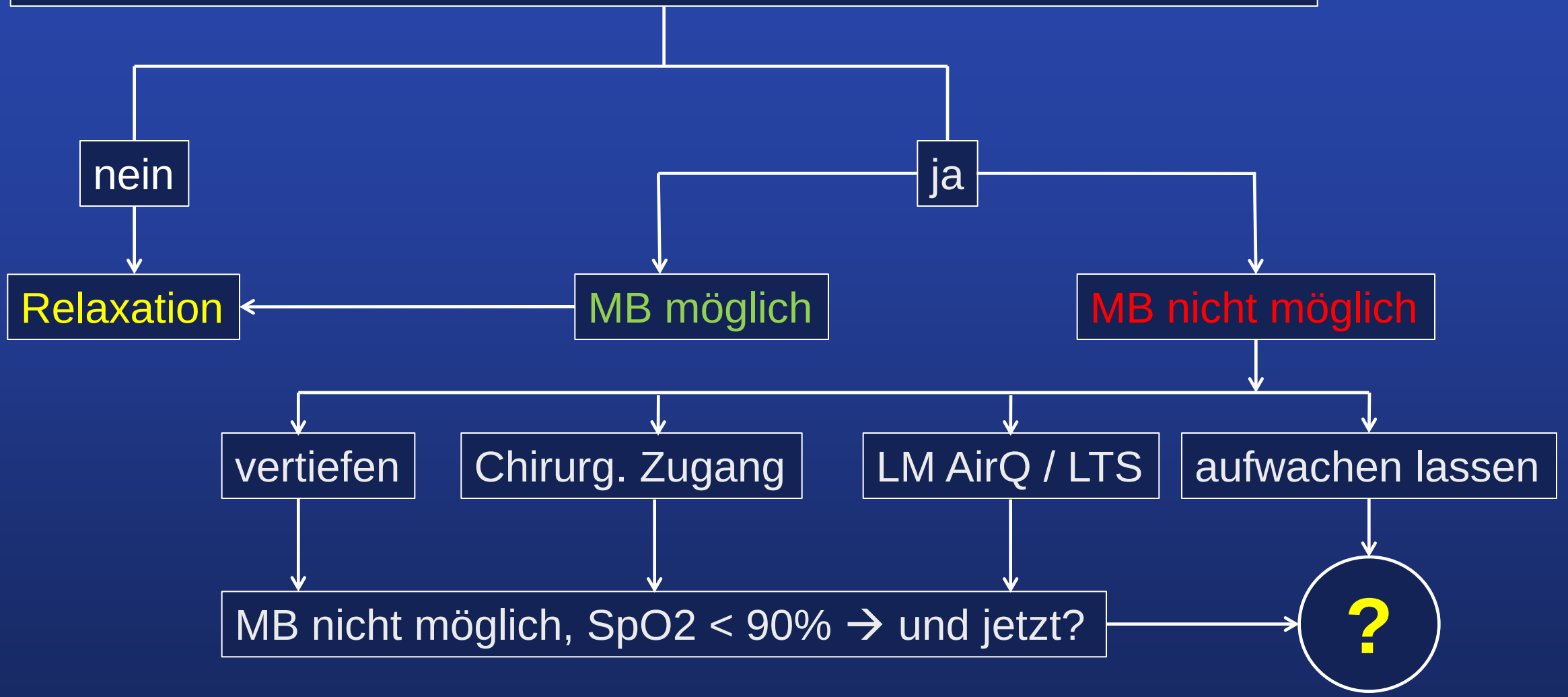
„Und seien Sie ehrlich: Wie oft haben Sie allein aufgrund erschwerter oder gar unmöglicher Maskenbeatmung tatsächlich den „Weg zurück“ eingeschlagen und die Narkose wieder ausgeleitet?“

Maskenbeatmung (MB) zwingend vor Relaxation?



Modifikation von Priebe Hans-Joachim, Dept. Anesthesia, Freiburg – ASA Washington 2013

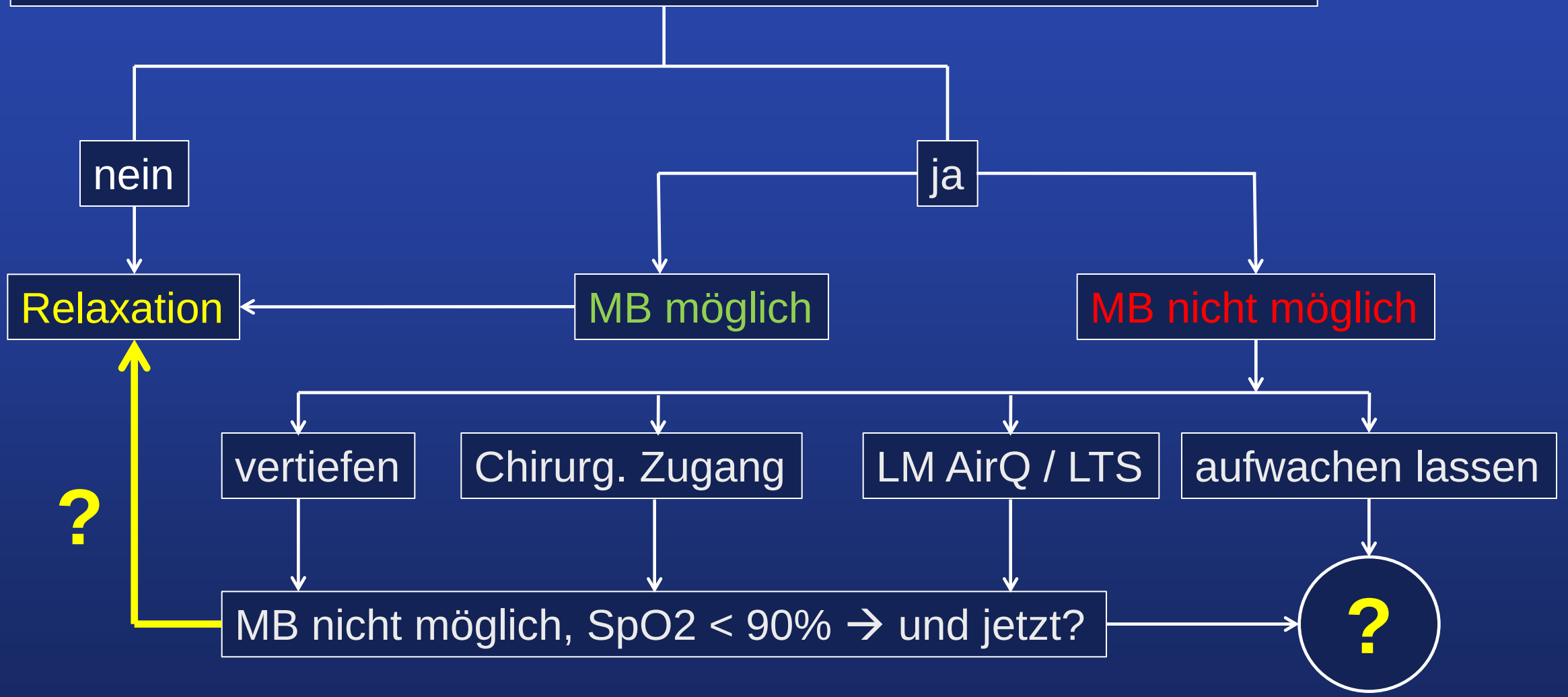
Maskenbeatmung (MB) zwingend vor Relaxation?



Modifikation von Priebe Hans-Joachim, Dept. Anesthesia, Freiburg – ASA Washington 2013

KANTONSSPITAL WINTERTHUR

Maskenbeatmung (MB) zwingend vor Relaxation?



Modifikation von Priebe Hans-Joachim, Dept. Anesthesia, Freiburg – ASA Washington 2013

KANTONSSPITAL WINTERTHUR

Incidence, predictors, and outcome of difficult mask ventilation combined with difficult laryngoscopy: a report from the multicenter perioperative outcomes group.

Kheterpal S[1], Anesthesiology. 2013 Dec;119(6):1360-9.

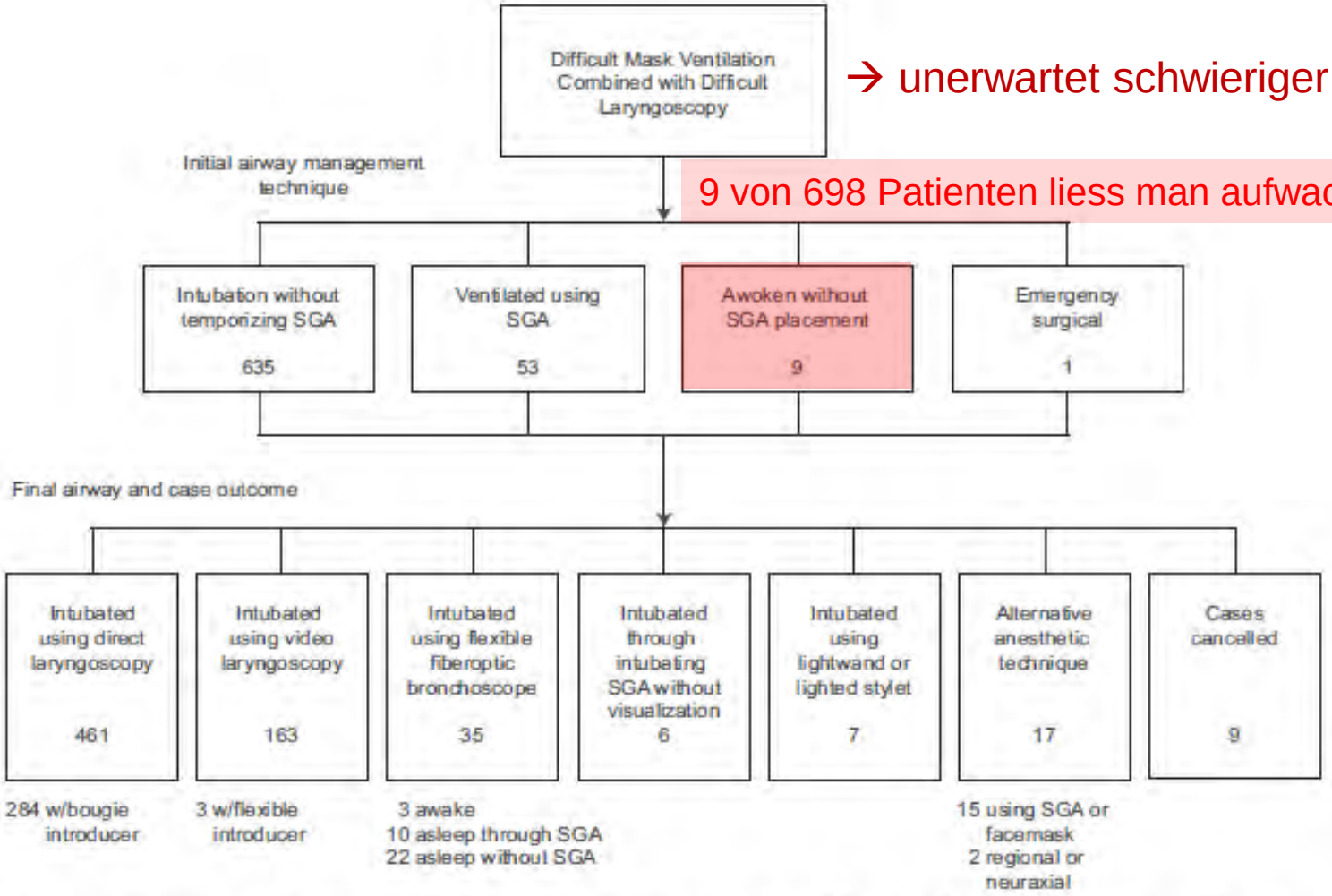
176,679 included a documented face mask ventilation and laryngoscopy attempt.
698 patients experienced the primary outcome of difficult mask ventilation combined with difficult laryngoscopy.

→ overall incidence of 0.40%

Independent predictors of the primary outcome included:

age 46 yr or more
body mass index 30 or more
male sex
Mallampati III or IV
neck mass or radiation
limited thyromental distance
sleep apnea
presence of teeth
beard, thick neck
limited cervical spine mobility
and limited jaw protrusion

Kheterpal S[1], Anesthesiology. 2013 Dec;119(6):1360-9.



→ unerwartet schwieriger Atemweg!

9 von 698 Patienten liess man aufwachen!

Fig. 1. Initial airway management technique and final airway outcome for 698 patients demonstrating difficult mask ventilation combined with difficult laryngoscopy. SGA = supraglottic airway.

Incidence and predictors of difficult and impossible mask ventilation

Kheterpal S, Han R et al.; Anesthesiology. 2006 Nov;105(5):885-91.

Table 3. Mask Ventilation Scale and Incidence

Grade	Description	n (%)
1	Ventilated by mask	17,535 (77.4)
2	Ventilated by mask with oral airway/ adjuvant with or without muscle relaxant	4,775 (21.1)
3	Difficult ventilation (inadequate, unstable, or requiring two providers) with or without muscle relaxant	313 (1.4)
4	Unable to mask ventilate with or without muscle relaxant	37 (0.16)
	Total cases	22,260

1/37 benötigte einen chirurgischen Atemweg
0/37 liess man aufwachen
36/37 wurden endotracheal intubiert! → Intubationsbedingungen besser **mit** Relaxation!

Lieutaud T, Muscle relaxation and increasing doses of propofol improve intubating conditions. Canadian Journal of Anaesthesia 2003; 50: 121–6.

Aufwachen / chirurgischer Atemwegszugang – oft zitiert, seltenst praktiziert

- 53’041 Patienten mit Versuch der Maskenbeatmung in Allgemeinanästhesie
- Bei 77/53’041 keine Maskenbeatmung möglich (0.14%)

- 73/77 Intubation
- 3 wurden wach
- 1 wurde cricothyreotomiert

Anesthesiology 2009; 110: 891–7.

! “…**The critical step in difficult airway management is the decision to induce anaesthesia** in the first place before securing the airway.” !

Patel A, Pearce A. Progress in management of the obstructed airway. Anaesthesia 2011; 66: 93–100.

Prediction of difficult mask ventilation

Langeron O et al.; Anesthesiology 2000 May;92(5):1229-36.

→ Kein einziger Patient wach!

RESULTS:

A total of 1,502 patients were prospectively included. Difficult mask ventilation was reported in 75 patients (5%; 95% confidence interval, 3.9-6.1%), with one case of impossible ventilation.

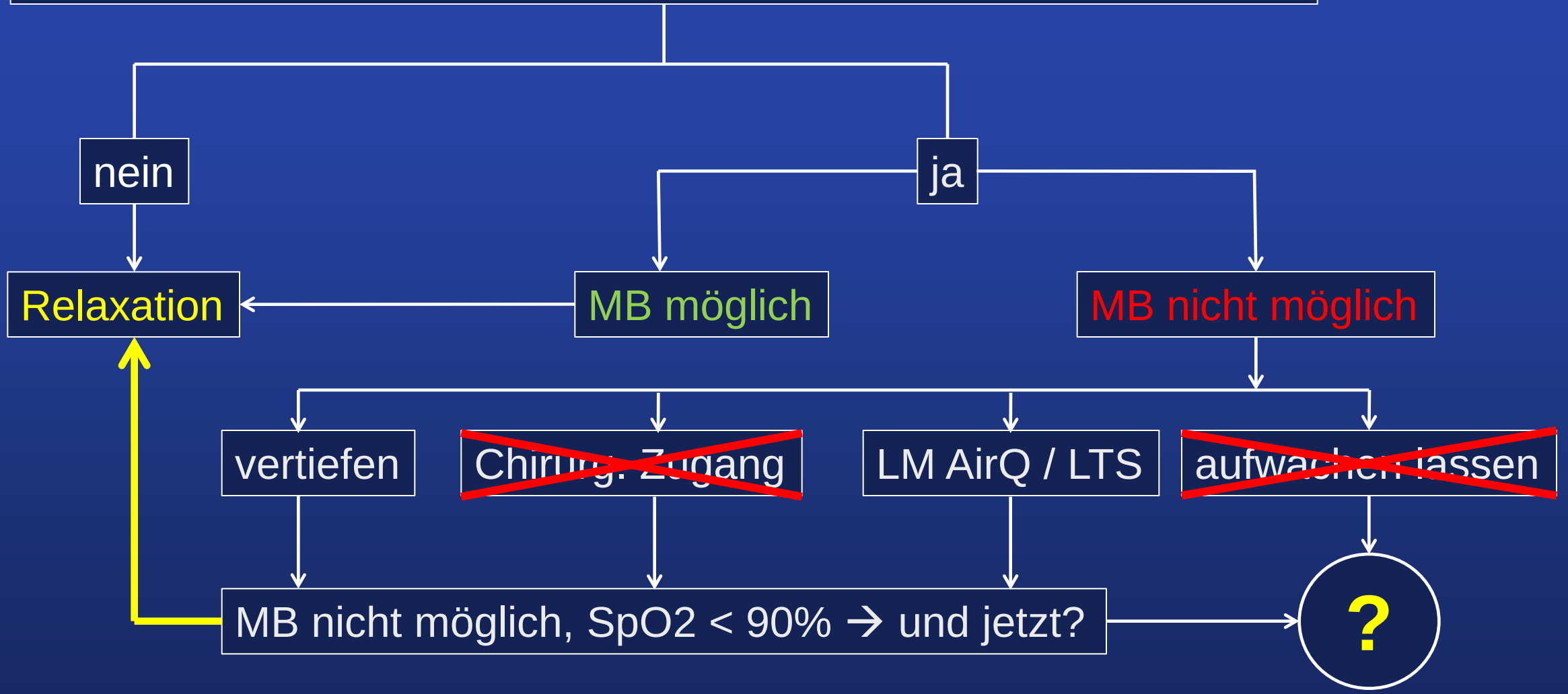
“Secondly, it to some extent places anaesthetists on the horns of a dilemma.
On the one hand enough anaesthetic must be given to permit face mask ventilation (FMV), but on the other hand the dose must allow a reasonably rapid return of consciousness should FMV prove impossible.»

Anaesthesia, 2008, 63, pages 113-115

OHNE RELAXATION BLEIBT DIE OPTION ZUM «WEG ZURÜCK»

→ **wird nicht praktiziert!**

Maskenbeatmung (MB) zwingend vor Relaxation?



Modifikation von Priebe Hans-Joachim, Dept. Anesthesia, Freiburg – ASA Washington 2013

KANTONSSPITAL WINTERTHUR

Maskenbeatmung (MB) zwingend vor Relaxation?

Modifikation von Priebe Hans-Joachim, Dept. Anesthesia, Freiburg – ASA Washington 2013

Wann überqueren wir den Rubicon?

Noch heute steht der Ausdruck „den Rubikon überschreiten“ dafür, sich unwiderruflich auf eine riskante Handlung einzulassen

«to cross the Rubicon…our goal must not be to “consider preserving a way back over the bridge” (*i.e.*, awaken the patient), but to provide as quickly as possible optimal conditions not only for FMV but also for endotracheal intubation or insertion of a supraglottic airway device.

Ventilation before paralysis.
Priebe HJ; Anesthesiolog. 2013 Apr;118(4):992-3.

«Maskenbeatmer» oder nicht?

Befragung an Anästhesisten in London

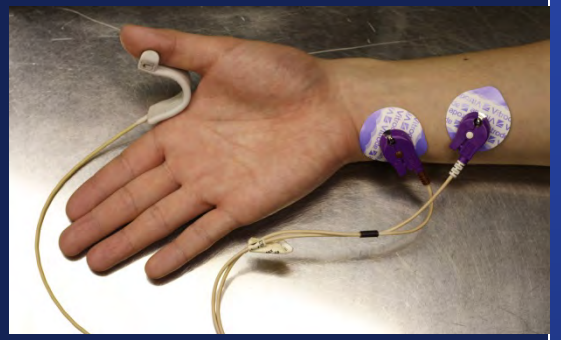
- 57% (78/136) führen eine Probebeatmung vor Relaxation durch
  → Häufiger Grund: Möglichkeit, Patient aufwachen zu lassen
- Je unerfahrener, desto eher wird probe-beatmet

- «Was machen Sie, wenn es zu einer Can not ventilate – Situation kommt»?
  → 85% aller Befragten versuchen supraglottisches Device
  → 89% **aller** (inkl. Probebeatmer!) Befragten relaxieren mit Succinylcholin

Warum nicht Rocuronium?

Confirmation of the ability to ventilate by facemask before administration of neuromuscular blocker: a non-instrumental piece of information?
Broomhead RH; Br J Anaesth. 2010 Mar;104(3):313-7. Epub 2009 Dec 30.

Rapid sequence induction and intubation with rocuronium–sugammadex compared with succinylcholine: A randomized trial.
Sørensen MK, Bretlau C, Gätke MR, Sørensen AM, Rasmussen
Br J Anaesth 2012; 108:682–9



RSI-Einleitung mit Propofol 2mg/kg und Alfentanyl 10mcg/kg
Relaxation mit Rocuronium 1mg/kg oder Succinylcholin 1mg/kg

Zeitpunkt vom korrekt platzierten Tubus bis zur Spontanatmung (Tidal > 3ml/kg und Af>8/min)
Antagonisierung mit Sugammadex 16mg/kg in der Rocuroniumgruppe

Resultate: Succinylcholin im Median 406sek, Rocuronium-Sugammadex 216sek

→ Als «Way-back-Strategie» macht Succinylcholin seit Sugammadex keinen Sinn mehr

Mögliche Gründe für erschwerte Maskenbeatmung

- Mechanische Probleme (Maske undicht)
- Offenhalten der Atemwege (naso-laryngo-pharyngeal) nicht möglich
  → abhängig vom Erfahrungsstand Anesthesiology 2013; 118: 991–2.

- Reduzierter Muskeltonus in den oberen Atemwegen durch Anästhetika und Relaxantien
  → Airway narrowing and collapse Lancet 2002; 359: 1207–9.; British Journal of Anaesthesia 2003; 91:31–9.
- Erhöhung der oberen Atemwegsreflexe (inkl. Laryngospasmus und Thoraxrigidität) in der unmittelbaren Postinduktionsphase Anaesthesia 2011; 66: 40–4.; Anesthesiology 1997; 87: 1070–4.

Erleichtert die Relaxation die Maskenbeatmung?

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

Sachdeva R et al.; Anaesthesia Volume 69, Issue 8, pages 826-831, 7 MAY 2014

125 patients recruited

↓

General anaesthesia induced

↓

Grade of mask ventilation recorded

↓

Ventilator switched on (15 cmH_2O, 12 $breaths.min^{-1}$)

↓

Isoflurane 1 MAC achieved

↓

Expired tidal volume recorded for 2 minutes

↓

Rocuronium administered

↓

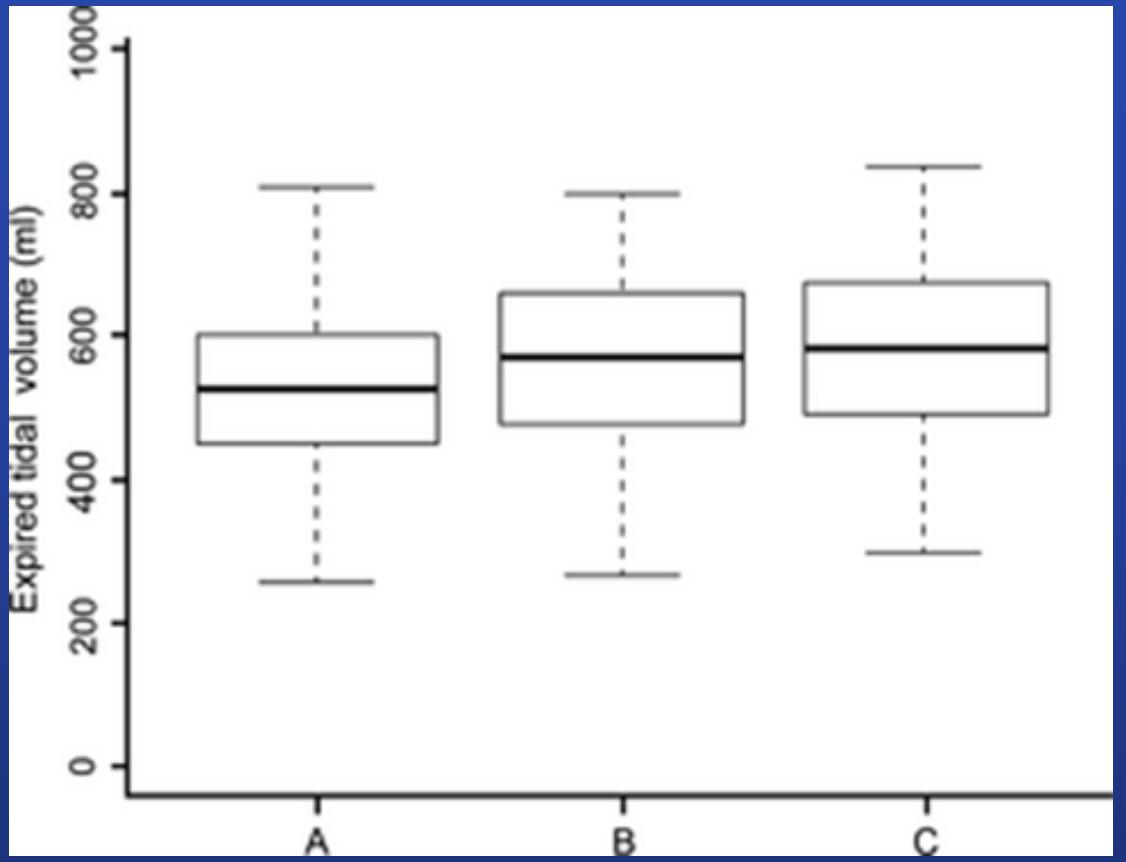
Disappearance of 4^{th} twitch on TOF

↓

Expired tidal volume recorded for 2 minutes

↓

Mean pre- and post-NBD expired tidal volumes compared

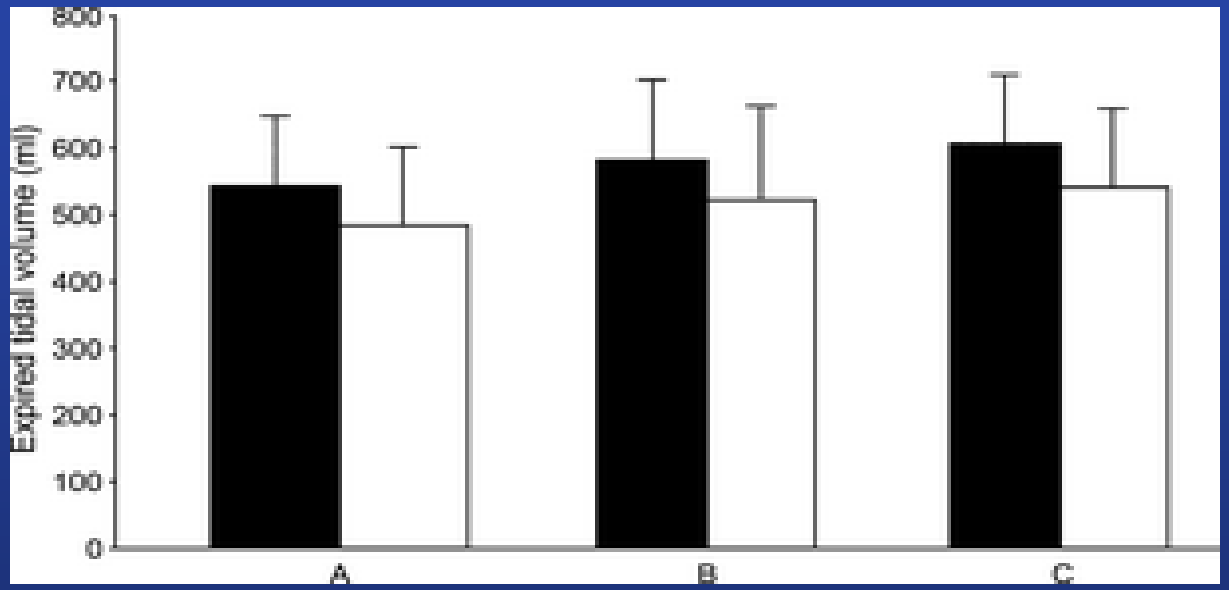


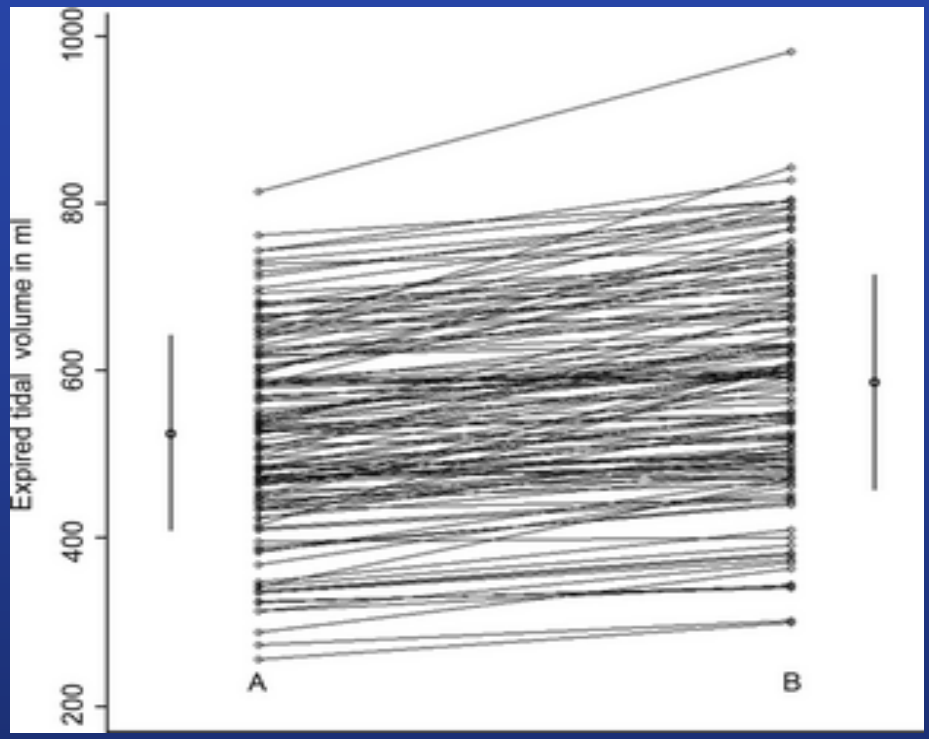
A Tidalvolumina vor Relaxation
B 1min nach Verschwinden des 4. Twitches
C 2min nach Verschwinden 4. Twitch des TOF

Anaesthesia
Volume 69, Issue 8, pages 826-831, 7 MAY 2014

KANTONSSPITAL WINTERTHUR

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





Mean expired tidal volumes before and after administering neuromuscular blocking drug (NBD) in low- and high-BMI groups. A = before administering NBD, B = 1 min after disappearance of the fourth twitch and C = 2 min after disappearance of the fourth twitch of the train-of-four.

- ■ BMI < 30 $kg.m^{-2}$
- □ BMI ≥ 30 $kg.m^{-2}$

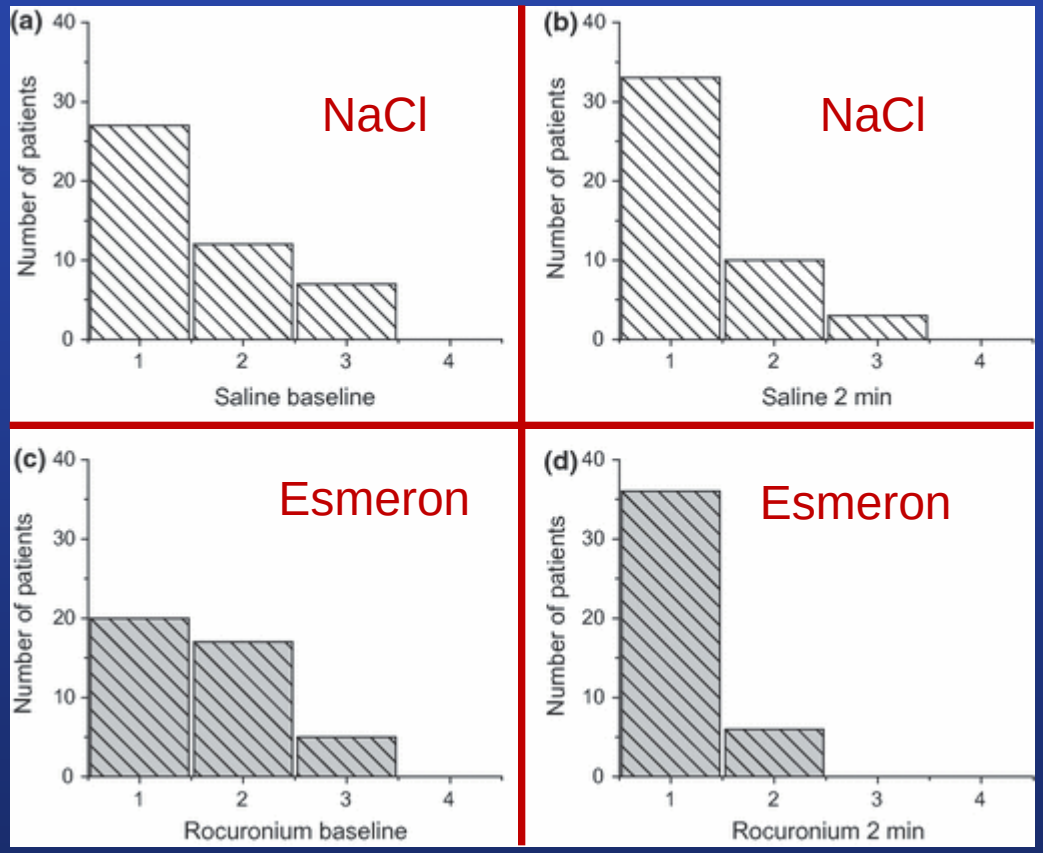
Anaesthesia
Volume 69, Issue 8;pages 826-831, 7 MAY 2014

Han Grades at Baseline and 2 Min after Administration of Saline or Rocuronium

Warters RD et al.; Anaesthesia. 2011 Mar;66(3):163-7.

Classification	Description/Definition
Grade 1	Ventilated by mask
Grade 2	Ventilated by mask with oral airway or other adjuvant
Grade 3	Difficult to ventilate
Grade 4	Unable to ventilate

Han R. Grading Scale for Mask Ventilation Anesthesiology 2004; 101: 267



KANTONSSPITAL WINTERTHUR

«…and since our data further indicate that neuromuscular blockade facilitates mask ventilation, it follows that administering neuromuscular blockade is an advantage, rather than a hindrance when given early in a case of unrecognised difficult mask ventilation.»

Warters RD et al.; Anaesthesia. 2011 Mar;66(3):163-7.

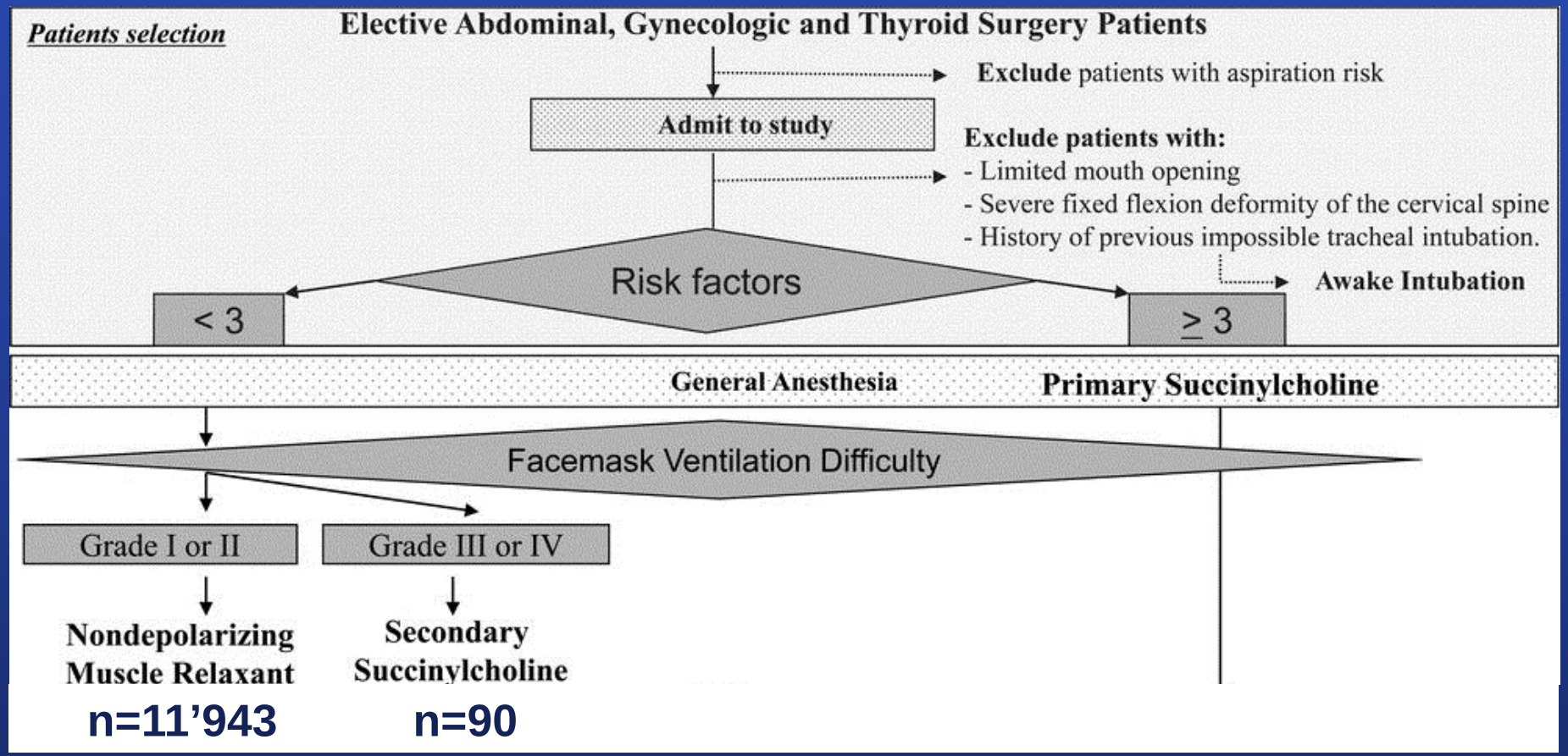
An algorithm for difficult airway management, modified for modern optical devices (Airtraq laryngoscope; LMA CTrach™): a 2-year prospective validation in patients for elective abdominal, gynecologic, and thyroid surgery.

Amathieu R et al.; Anesthesiology. 2011 Jan;114(1):25-33.

Table 1. Risk Factors for Airway Management Difficulty Systematically Assessed at the Preoperative Visit

Feature	Details
Men > 50 yr	
Obesity with BMI > 30 kg/m^{-2}	
Sleep apnea syndrome	Diagnosed, treated, or highly suspected on the base of the daytime sleepiness[23] scale > 9 and a preoperative sleep apnea screening tool[24] > 15
Mallampati classes III and IV	Patient sitting, head in neutral flexion/extension position, tongue out, without phonation
Mouth opening or intergingival distance < 35 mm	
Thyroid to mentum distance < 65 mm	
Severely limited jaw protrusion	Lower incisors cannot advance to meet upper incisors [9,25]
Neck circumference: > 40 cm in women and 45 cm in men	Measured at the level of the thyroid cartilage[26]

BMI = body mass index.



Anesthesiology. 2011 Jan;114(1):25-33.

"…Indeed, of the 90 patients that received secondary succinylcholine injection, 56 improved by one grade their ventilation quality. Moreover, none of the 11,943 grade I and II difficult mask ventilation patients who were injected with nondepolarizing muscle relaxant altered ventilation quality."

Anesthesiology. 2011 Jan;114(1):25-33.

Limitationen

- Es existiert keine einheitliche Definition der schwierigen Maskenbeatmung
- N=125 (Sachdeva et al.) sind zu wenig für eindeutige Interpretationen
- Schwierige Maskenbeatmung ist sehr selten – Studien zum Thema sind deshalb rar und haben eine zu geringe Anzahl Patienten für objektive Schlussfolgerungen (ungenügende Power)

Spätdienst, 20:30uhr…

68jähriger Patient (Mann) mit Bridenileus. BMI 30, mehrmaliges Erbrechen (liegende Magensonde)
Zahnstatus unauffällig, aktenanamnestisch OSAS. Mallampati II, gute Mundöffnung, Atemweg optisch unauffällig.

→ RSI oder fiberoptisch wache Intubation?

Independent predictors of the primary outcome (DMV and DL) included:

age 46 yr or more
body mass index 30 or more
male sex
Mallampati III or IV
neck mass or radiation
limited thyromental distance
sleep apnea
presence of teeth
beard, thick neck
limited cervical spine mobility
and limited jaw protrusion

Kheterpal S[1], Anesthesiology. 2013 Dec;119(6):1360-9.

Ist das logisch?

Wir verarbreichen Patienten mit hohem Aspirationsrisiko routinemässig Muskelrelaxantien ohne zu prüfen, ob wir eine Maskenbeatmung durchführen können. Und dies, obwohl wir *aus Sicherheitsgründen* standardmässig nur bei gesicherter Maskenbeatmung relaxieren!

→ konsequenterweise brauchen alle Patienten mit Indikation für eine RSI eine fiberoptisch wache Intubation!

Was, wenn das Muskelrelaxans selbst eine Gefahr ist?

Literatur: Mehrere Case-reports von Anaphylaxien nach Rocuronium

Wenn wir sofort relaxieren, riskieren wir einen (allergischen) Bronchospasmus

→ wird behoben durch Sugammadex

Fast recovery of haemodynamic and ventilatory functions after sugammadex bolus following rocuronium-induced anaphylactic shock refractory to conventional treatment
Ann Fr Anesth Reanim. 2012 Feb;31(2):158-61.

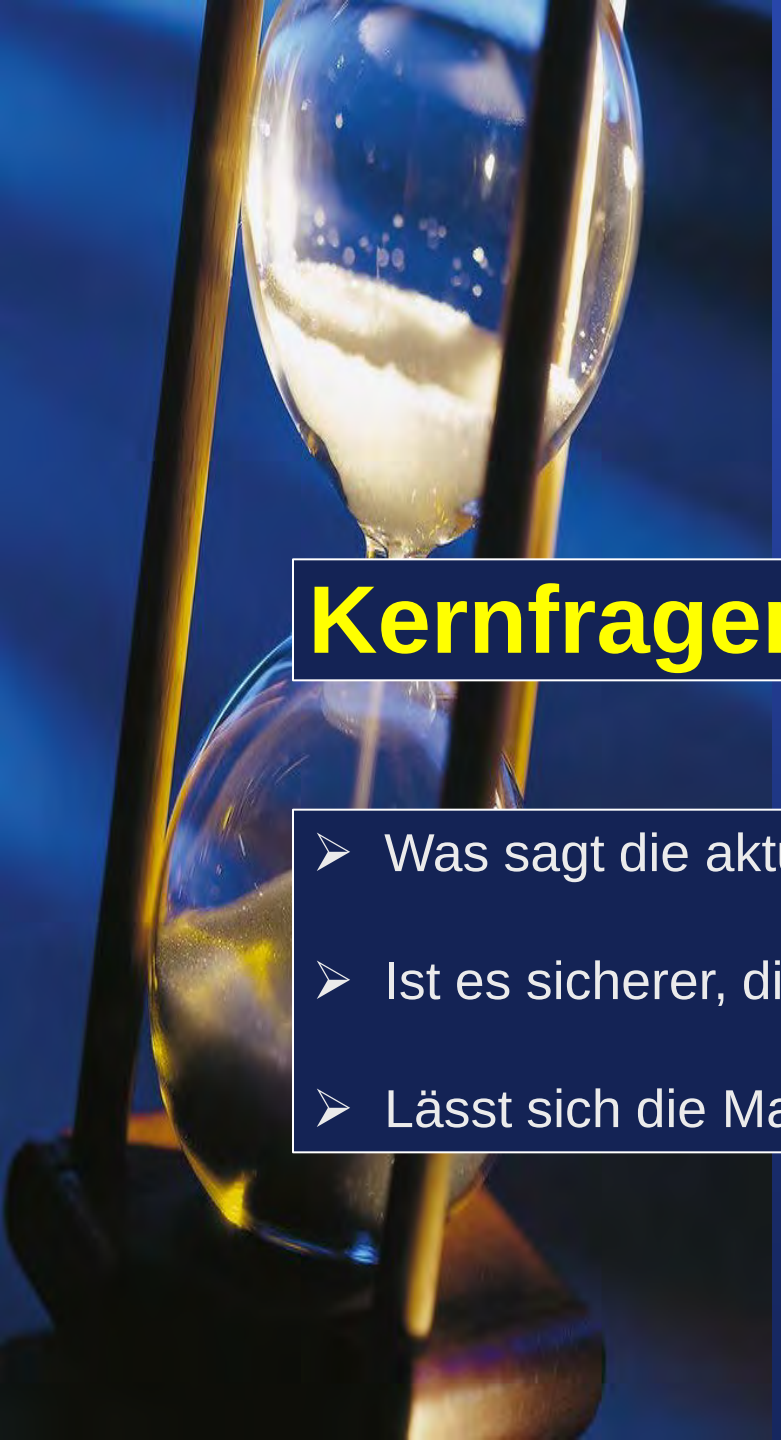
Sugammadex in the management of rocuronium-induced anaphylaxis
Br J Anaesth. 2011 Feb;106(2):199-201

A case of rocuronium-induced anaphylactic shock, improved by sugammadex
Can J Anaesth. 2012 Sep;59(9):909-10.

Reversal of a rocuronium-induced grade IV anaphylaxis via early injection of a large dose of sugammadex
Can J Anaesth. 2014 Jun;61(6):558-62

Zusammenfassung

- Die «way-back»-Strategie wird extrem selten angewendet
- Die Probebeatmung vor Relaxation ist bei weitem nicht so sicher wie wir es gerne hätten **→ im Gegenteil!**
- Die frühe Relaxation verbessert nicht nur die Intubationsbedingungen, sondern vereinfacht auch die Maskenbeatmung
- Der Erfolg der Maskenbeatmung ist erfahrungsabhängig
- Eine frühe Relaxation verbessert die Intubationsbedingungen im Falle eines unerwartet schwierigen Atemweges
- Die Verarbreichung von nicht-depolarisierenden MR erfordert die rasche Verfügbarkeit von Sugammadex
- Die präoperative Beurteilung des Atemweges hat oberste Priorität → gefährlich ist nicht die Relaxation, sondern die Induktion!



Kernfragen / Ziele

- Was sagt die aktuelle Literatur zur Probebeatmung?
- Ist es sicherer, die Patienten erst nach erfolgreicher Maskenbeatmung zu relaxieren?
- Lässt sich die Maskenbeatmung durch die Relaxation beeinflussen?

KANTONSSPITAL WINTERTHUR

Herzlichen Dank für Ihre Aufmerksamkeit!

daniel.button@ksw.ch

Die flexible Fiberoptik: Zunehmend vergessener Goldstandard oder überholtes Relikt?

Thomas Heidegger

SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

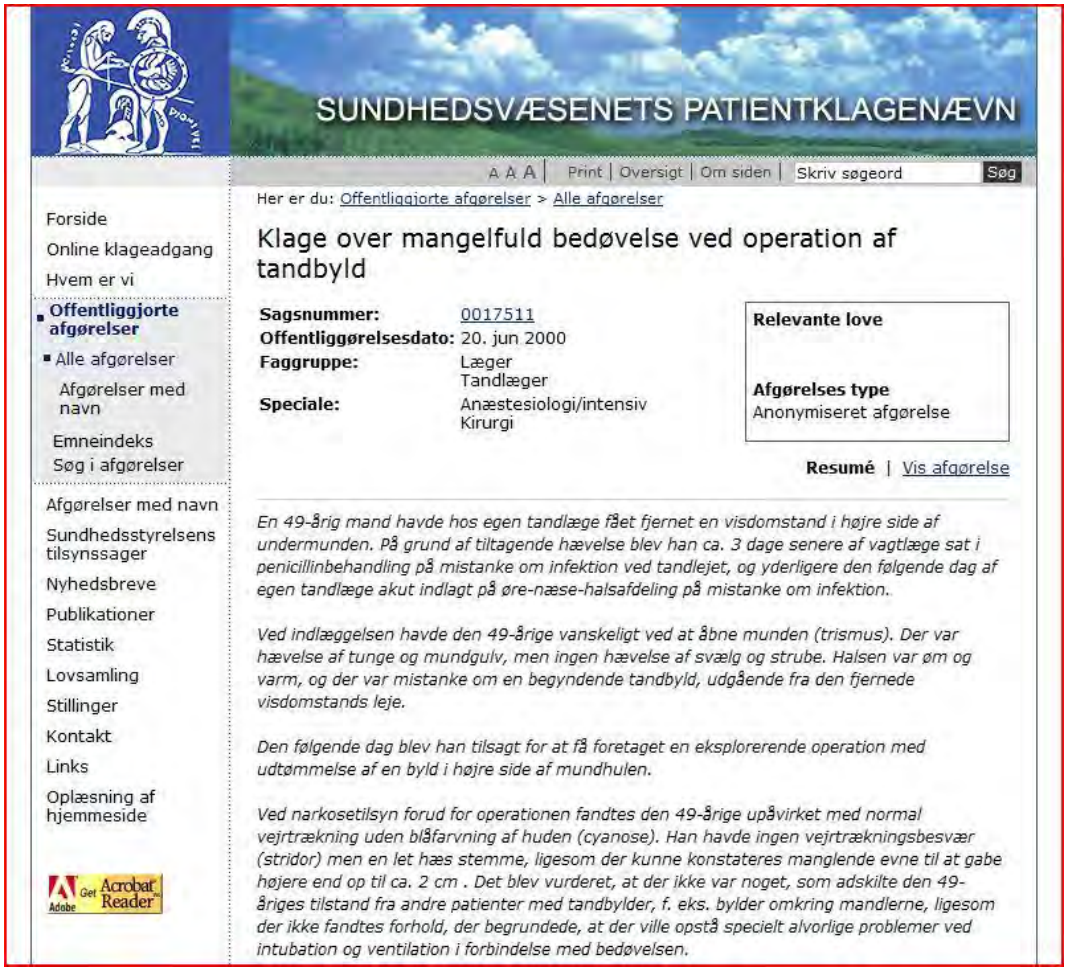
KGW
KANTONSSPITAL WINTERTHUR

Die flexible Fiberoptik: Zunehmend vergessener Goldstandard oder überholtes Relikt?

Thomas Heidegger

Keinerlei Interessenskonflikte

Keine finanziellen Abhängigkeiten



SUNDHEDSVÆSENETS PATIENTKLAGENÆVN

A A A | Print | Oversigt | Om siden | Skriv søgeord Søg

Her er du: Offentliggjorte afgørelser > Alle afgørelser

- Forside
- Online klageadgang
- Hvem er vi
- **Offentliggjorte afgørelser**
  - Alle afgørelser
  - Afgørelser med navn
  - Emneindeks
  - Søg i afgørelser
- Afgørelser med navn
- Sundhedsstyrelsens tilsynssager
- Nyhedsbreve
- Publikationer
- Statistik
- Lovsamling
- Stillinger
- Kontakt
- Links
- Oplæsning af hjemmeside

Get Acrobat Reader

Klage over mangelfuld bedøvelse ved operation af tandbyld

Sagsnummer: 0017511
Offentliggørelsesdato: 20. jun 2000
Faggruppe: Læger, Tandlæger
Speciale: Anæstesiologi/intensiv, Kirurgi

Relevante love

Afgørelses type
Anonymiseret afgørelse

Resumé | Vis afgørelse

En 49-årig mand havde hos egen tandlæge fået fjernet en visdomstand i højre side af undermunden. På grund af tiltagende hævelse blev han ca. 3 dage senere af vagtlæge sat i penicillinbehandling på mistanke om infektion ved tandlejet, og yderligere den følgende dag af egen tandlæge akut indlagt på øre-næse-halsafdeling på mistanke om infektion.

Ved indlæggelsen havde den 49-årige vanskeligt ved at åbne munden (trismus). Der var hævelse af tunge og mundgulv, men ingen hævelse af svælg og strube. Halsen var øm og varm, og der var mistanke om en begyndende tandbyld, udgående fra den fjernede visdomstands leje.

Den følgende dag blev han tilsagt for at få foretaget en eksplorerende operation med udtømmelse af en byld i højre side af mundhulen.

Ved narkosetilsyn forud for operationen fandtes den 49-årige upåvirket med normal vejrtrækning uden blåfarvning af huden (cyanose). Han havde ingen vejrtrækningsbesvær (stridor) men en let hæs stemme, ligesom der kunne konstateres manglende evne til at gabe højere end op til ca. 2 cm . Det blev vurderet, at der ikke var noget, som adskilte den 49-åriges tilstand fra andre patienter med tandbylder, f. eks. bylder omkring mandlerne, ligesom der ikke fandtes forhold, der begrundede, at der ville opstå specielt alvorlige problemer ved intubation og ventilation i forbindelse med bedøvelsen.

http://www.pkn.dk/offentliggjorteafgoerelser/afgoerelser/0017511/

A 49-year old man had a tooth extracted by his dentist.Three days later he was treated with antibiotics because of increased swelling and an infection was suspected. The next day he was admitted to an ENT department. Mouth opening was limited and there was a swelling of tongue and base of the mouth, but no abnormalities in the pharynx or larynx. The neck was tender and a dental abscess was suspected. He was scheduled for exploration and drainage of the infection the next day. The anaesthesiologist found normal respiration and no stridor but there was slight hoarseness and mouth opening was limited to 2 cm. No airway management difficulty was anticipated. After induction of general anaesthesia, it turned out to be impossible to visualise the vocal cords using a Macintosh laryngoscope because of limited mouth opening.

Oxygen saturation decreased to 67% and mask ventilation was attempted. Abnormal cardiac rhythm was observed and a laryngeal mask was inserted. Oxygen saturation increased but blood pressure was low and heart rate decreased. Atropin was injected and it was decided to perform tracheostomy but oxygen saturation stayed around 57%. Cardiac arrest occurred and adrenalin was injected (1 mg 3 times). Chest compressions and ventilation was also given but he died 45 minutes after induction of anaesthesia.

Prof. Lars Rasmussen, Kopenhagen, mit Erlaubnis

- Junger, gesunder Mann
- Atemnot aufgrund eines allergischen Ödems
- «wach» fiberoptische Intubation misslang
- Einleitung einer Allgemeinanästhesie ⇨

«cannot intubate – cannot ventilate»

Patient verstarb

Airway Management

British Journal of Anaesthesia **106** (5): 617–31 (2011)
Advance Access publication 29 March 2011 · doi:10.1093/bja/aer058

BJA

SPECIAL ARTICLES

Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: Anaesthesia†

T. M. Cook[1*], N. Woodall[2] and C. Frerk[3], on behalf of the Fourth National Audit Project

SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

Fiberoptische Intubation und NAP4

Failure to use awake fibreoptic intubation.
There were 18 patients in whom AFOI might have offered advantages over airway management under general anaesthesia. These patients showed clinical features

http://www.rcoa.ac.uk/nap4

Fiberoptische Intubation und NAP4

Failure to use awake fibreoptic intubation.
There were 18 patients in whom AFOI might have offered advantages over airway management under general anaesthesia. These patients showed clinical features

Failed awake fibreoptic intubation
There were 15 reports in which AFOI was unsuccessful. Airway obstruction or apnoea was widely reported in association with failure of AFOI, as were lack of patient co-operation, inability to recognise appropriate airway anatomy, anatomical distortion and airway contamination

http://www.rcoa.ac.uk/nap4

Fiberoptische Intubation und NAP4

Recommendation

- Fiberoptische Intubation gehört zum Standard
- Bei entsprechender Indikation soll die fiberoptische Intubation auch durchgeführt werden

http://www.rcoa.ac.uk/nap4

Fiberoptische Intubation und NAP4

Recommendation

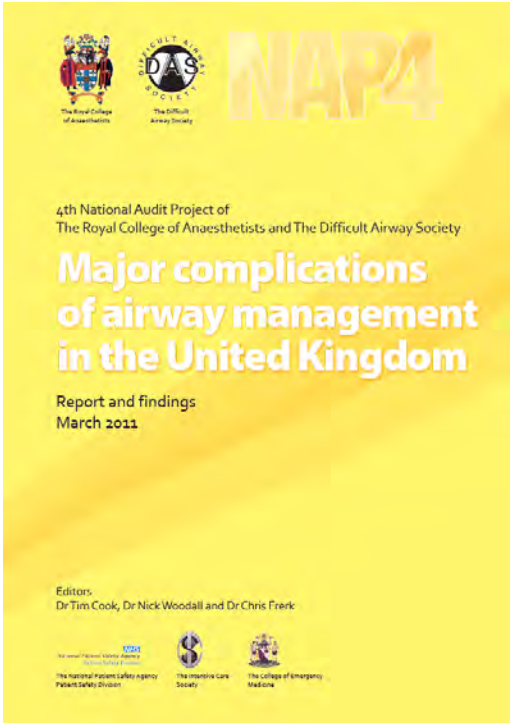
Recommendation: Fibreoptic intubation is most effective in co[illegible] operation may be lost by over-sedation. Where complex sedation techniques are to be used strong consideration should be given [illegible] the provision of sedation to an anaesthetist not performing the tracheal intubation.

Recommendation: [illegible] A back-up plan should always be worked out in advance

- Gefahr der Sedation bei der «wach» fiberoptischen Intubation
- Plan B, Plan C

http://www.rcoa.ac.uk/nap4

Practicing fiberoptic intubation on patients with normal airways?



In the majority of cases airway difficulty was not expected

O'Sullivan E. Anaesthesia, 2011; 66: 331–340

- Underestimation of the problem
- Overestimation of the own competence
- Failed competence

Management des erwartet schwierigen Atemweges

DAS (UK)	No recommendations
ASA (United States)	Awake intubation**:** non-invasive (e.g. **fiberoptics**) vs. invasive access (e.g. cricothyroidotomy)
CAFG (Canada)	Awake intubation (**flexible bronchoscope**)
SIAARTI (Italy)	Awake intubation in severe cases (expert decision): **fiberoptic** or retrograde **intubation**; general anaesthesia in borderline cases
France	Awake technique **(fiberoptic intubation**, transtracheal oxygenation, retrograde intubation or tracheostomy)
DGAI	Maintenance of spontaneous breathing, awake technique: (**fiberoptic intubation**, LMA, tracheostomy)

Schäuble J, Heidegger T. Strategies and algorithms for management of the difficult airway. An update. Trends in Anaesthesia and Intensive Care. 2012; 208-217
Law JA. The difficult airway with recommendations for management – Part 2 – The anticipated difficult airway. Can J Anesth 2013; 60:1119–1138

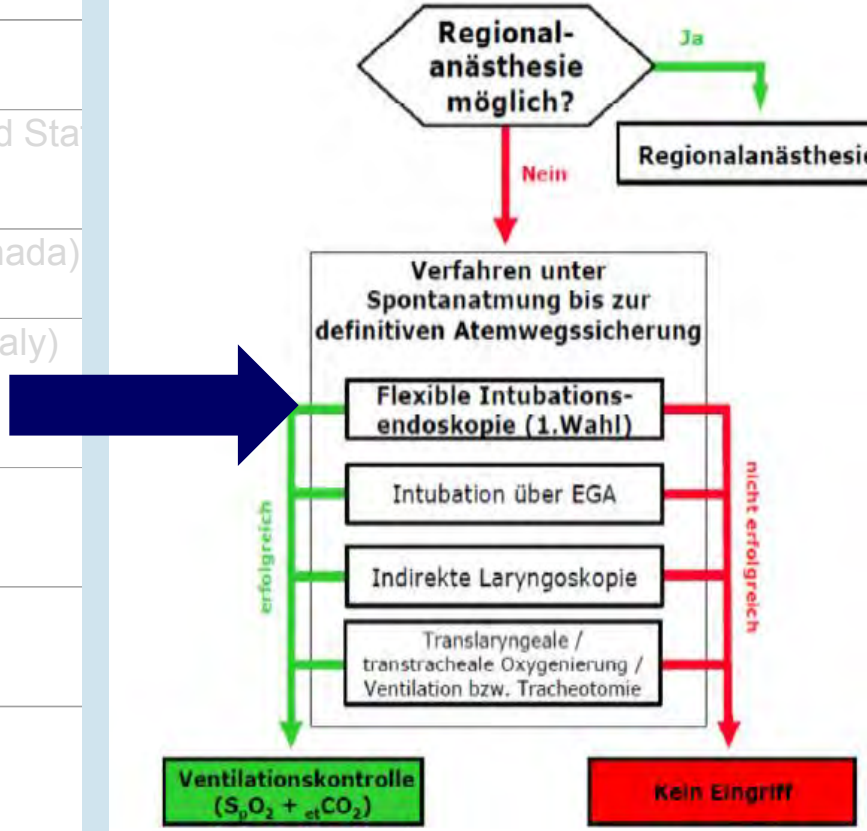
Management des erwartet schwierigen Atemweges

DAS (UK)	No recommendations
ASA (United States)	Awake intubation**:** non-invasive (e.g. **fiberoptics**) vs. invasive access (e.g. cricothyroidotomy)
CAFG (Canada)	Awake intubation (**flexible bronchoscope**)
SIAARTI (Italy)	Awake intubation in severe cases (expert decision): **fiberoptic** or retrograde **intubation**; general anaesthesia in borderline cases
France	Awake technique **(fiberoptic intubation**, transtracheal oxygenation, retrograde intubation or tracheostomy)
DGAI	Maintenance of spontaneous breathing, awake technique: (**fiberoptic intubation**, LMA, tracheostomy)

Schäuble J, Heidegger T. Strategies and algorithms for management of the difficult airway. An update. Trends in Anaesthesia and Intensive Care. 2012; 208-217
Law JA. The difficult airway with recommendations for management – Part 2 – The anticipated difficult airway. Can J Anesth 2013; 60:1119–1138

Management des erwartet schwierigen Atemweges

DAS (UK)		
ASA (United Sta		tics) vs.
CAFG (Canada)		
SIAARTI (Italy)		cision):
France		nstracheal ostomy)
DGAI		ke cheostomy)



Piepho T et al. 2015; 56:505-23

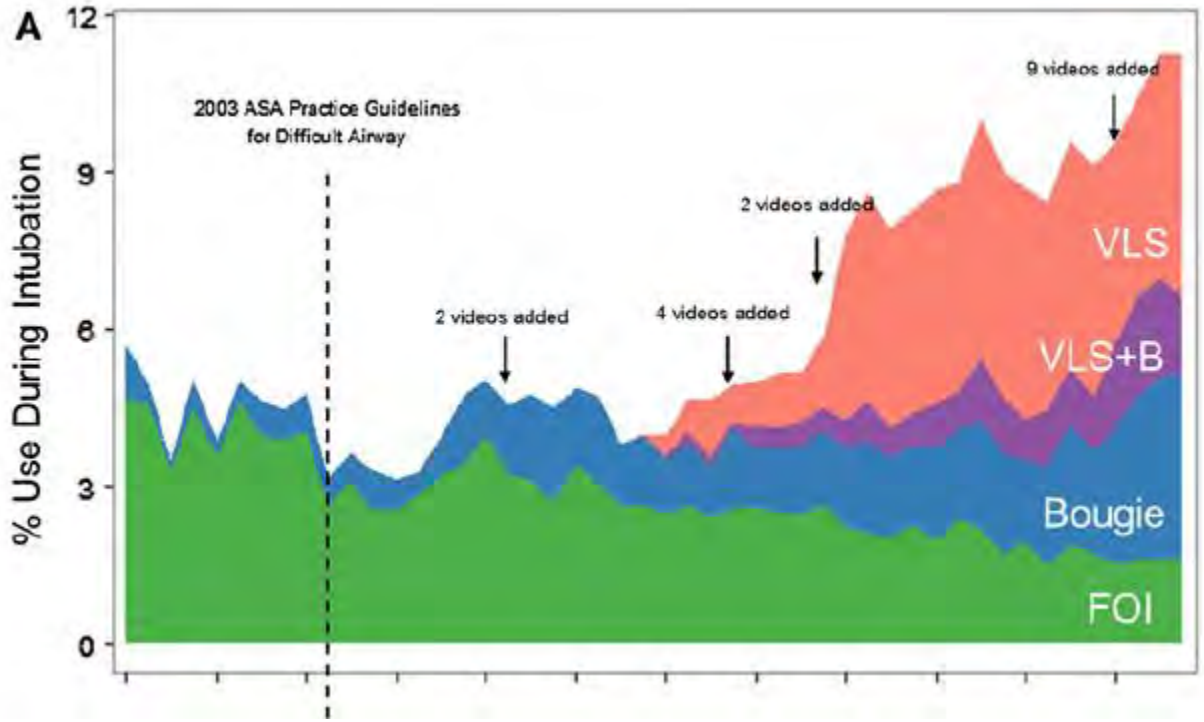
SPITALREGION RHEINTAL WERDENBERG SARGANSERLAND

A&I ANÄSTHESIOLOGIE & INTENSIVMEDIZIN

Airway Management – Entwicklung

The changing scope of difficult airway management

Wanderer JP et al. Can J Anaesth 2013; 60: 1022-24

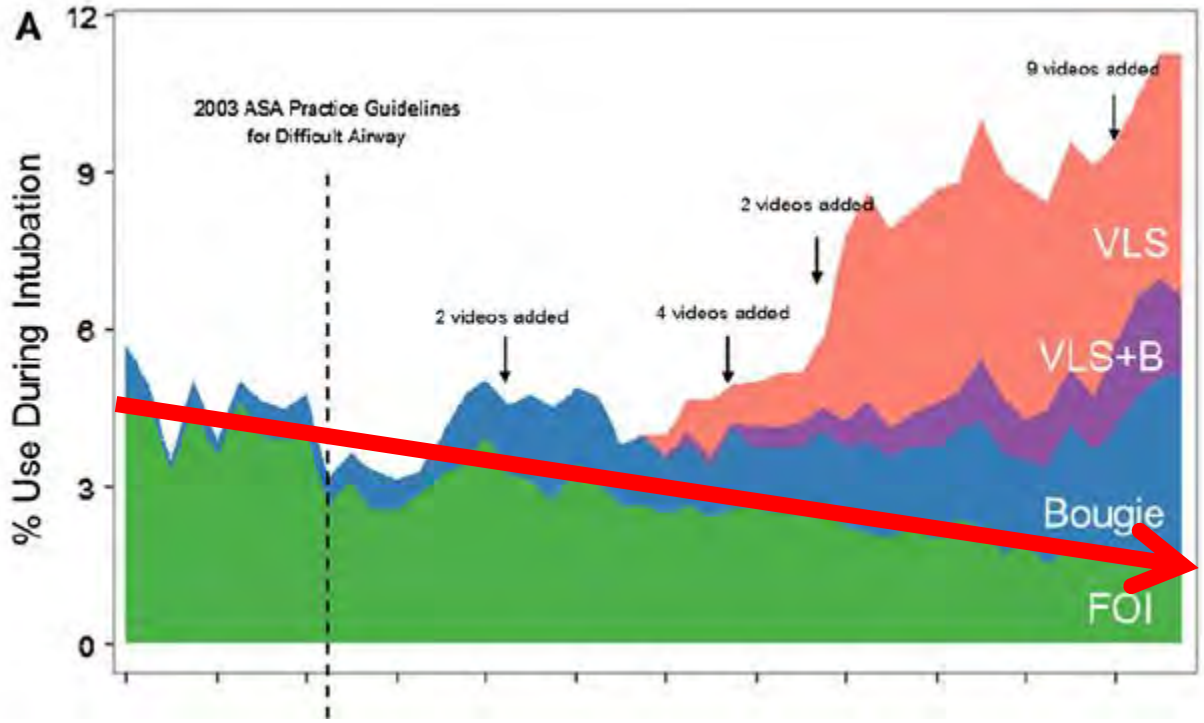


SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

Airway Management – Entwicklung

The changing scope of difficult airway management

Wanderer JP et al. Can J Anaesth 2013; 60: 1022-24



SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

Can J Anesth/J Can Anesth (2015) 62:736–744
DOI 10.1007/s12630-015-0387-y

REPORTS OF ORIGINAL INVESTIGATIONS

The incidence, success rate, and complications of awake tracheal intubation in 1,554 patients over 12 years: an historical cohort study

J. Adam Law, MD · Ian R. Morris, MD · Paul A. Brousseau, BEd · Sylvia de la Ronde, MSc · Andrew D. Milne, MD

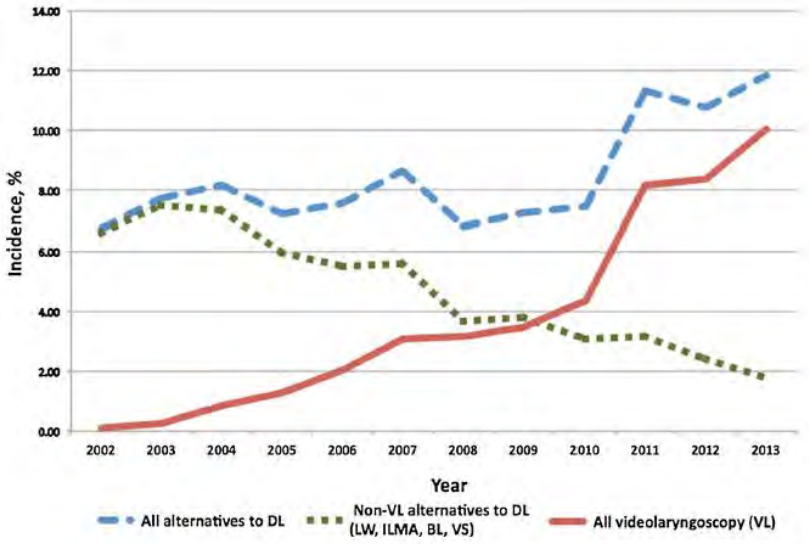


Fig. 2 Use of alternatives to direct laryngoscopy after induction of general anesthesia from 2002-2013. DL = direct laryngoscopy; VL = video laryngoscopy; LW = lighted stylet; ILMA = LMA-Fastrach; BL = Bullard laryngoscope; VS = viewing stylet

Can J Anesth/J Can Anesth (2015) 62:736–744
DOI 10.1007/s12630-015-0387-y

REPORTS OF ORIGINAL INVESTIGATIONS

The incidence, success rate, and complications of awake tracheal intubation in 1,554 patients over 12 years: an historical cohort study

J. Adam Law, MD · Ian R. Morris, MD · Paul A. Brousseau, BEd · Sylvia de la Ronde, MSc · Andrew D. Milne, MD

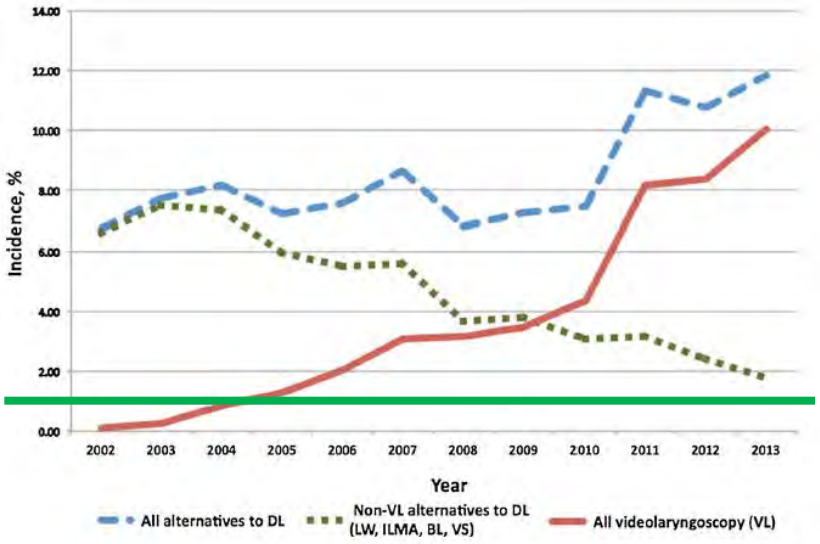


Fig. 2 Use of alternatives to direct laryngoscopy after induction of general anesthesia from 2002-2013. DL = direct laryngoscopy; VL = video laryngoscopy; LW = lighted stylet; ILMA = LMA-Fastrach; BL = Bullard laryngoscope; VS = viewing stylet

Videolaryngoskopie

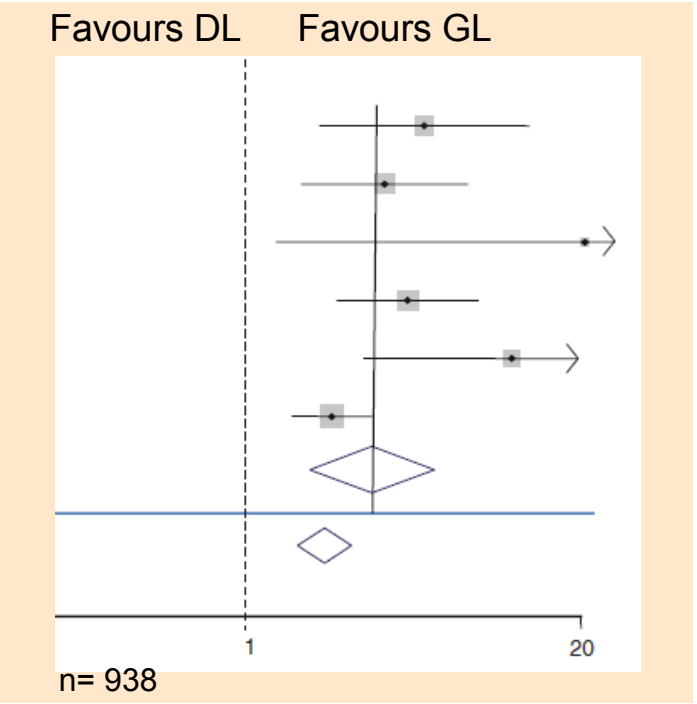
Can J Anesth/J Can Anesth (2012) 59:41–52
DOI 10.1007/s12630-011-9620-5

REPORTS OF ORIGINAL INVESTIGATIONS

Glidescope® video-laryngoscopy versus direct laryngoscopy for endotracheal intubation: a systematic review and meta-analysis

Donald E. G. Griesdale, MD · David Liu, MD · James McKinney, MD · Peter T. Choi, MD

Compared to direct laryngoscopy, Glidescope video-laryngoscopy is associated with improved glottic visualization, particularly in patients with potential or simulated difficult airways



SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

Videolaryngoskopie

British Journal of Anaesthesia Page 1 of 3
doi:10.1093/bja/aeu266

BJA 2015 Feb;114:181-3

EDITORIAL

Videolaryngoscopy as a new standard of care

C. Zaouter[1], J. Calderon[1] and T. M. Hemmerling[2,3,4*]

SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

Videolaryngoskopie

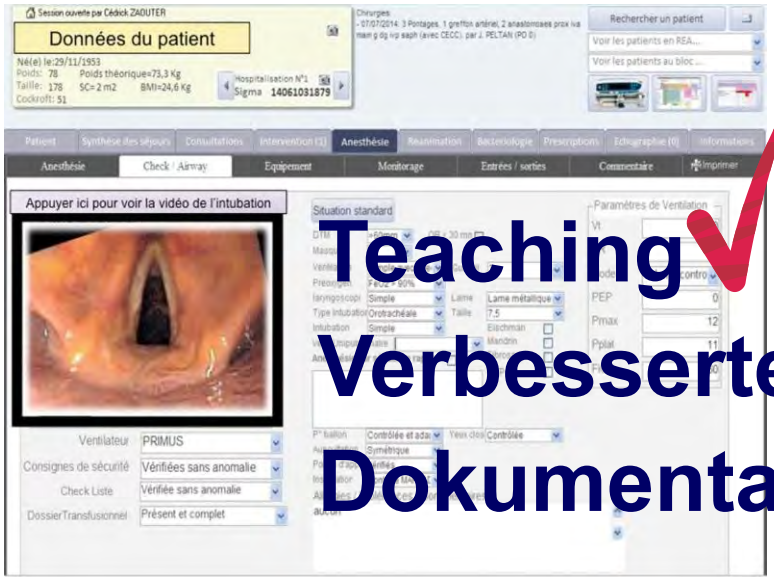
British Journal of Anaesthesia Page 1 of 3
doi:10.1093/bja/aeu266

BJA 2015 Feb;114:181-3

EDITORIAL

Videolaryngoscopy as a new standard of care

C. Zaouter[1], J. Calderon[1] and T. M. Hemmerling[2,3,4*]



Teaching ✓

Verbesserte Sicht ✓

Dokumentation ✓

Videolaryngoskopie

Routine Clinical Practice Effectiveness of the Glidescope in Difficult Airway Management

An Analysis of 2,004 Glidescope Intubations, Complications, and Failures from Two Institutions

Aziz MF et al. Anesthesiology Jan 2011

Intubationen mit dem Glidescope – success rates	
Overall success rate	97%
Predicted difficult airway	96%
Failed direct (conventional) laryngoscopy	94%

Videolaryngoskopie

Routine Clinical Practice Effectiveness of the Glidescope in Difficult Airway Management

An Analysis of 2,004 Glidescope Intubations, Complications, and Failures from Two Institutions

Aziz MF et al. Anesthesiology Jan 2011

- **Conclusions**
  - Glidescope intubation is not always successful
  - Maintain competency with alternate methods of intubation (fiberoptics), especially for patients with neck pathology

Original Article

Fibreoptic vs videolaryngoscopic (C-MAC® D-BLADE) nasal awake intubation under local anaesthesia*

Kramer A, Müller D, Pförtner R, Mohr C, Groeben H. Anaesthesia 2015; 70:400-406

Table 1 Characteristics of patients randomly assigned to videolaryngoscopic or fibreoptic nasal intubation. Values are median (IQR [range]) or number.

	Videolaryngoscopy (n = 50)	Fibreoptic intubation (n = 50)
Height; cm	173 (169–178 [157–192])	175 (170–180 [147–193])
Weight; kg	75 (67–84 [43–125])	74 (58–85 [37–160])
Age; years	57 (51–68 [22–89])	54 (42–62 [20–88])
Midazolam; mg	4.0 (4.0–6.0 [2.0–9.0])	4.5 (3.0–6.0 [2.0–10.0])
Ramsay score; 0 / 1 / 2 / 3 / 4 / 5 / 6	0 / 0 / 33 / 17 / 0 / 0 / 0	0 / 0 / 27 / 23 / 0 / 0 / 0
Remifentanil; $\mu g.kg^{-1}.min^{-1}$	0.03 (0.01–0.04 [0.0–0.08])	0.03 (0.02–0.04 [0.0–0.08])
Lidocaine; $mg.kg^{-1}$	3.9 (3.0–4.9 [1.3–9.3])	4.0 (3.8–5.0 [1.9–9.1])

Original Article

Fibreoptic vs videolaryngoscopic (C-MAC® D-BLADE) nasal awake intubation under local anaesthesia*

?

Kramer A, Müller D, Pförtner R, Mohr C, Groeben H. Anaesthesia 2015; 70:400-406

Table 1 Characteristics of patients randomly assigned to videolaryngoscopic or fibreoptic nasal intubation. Values are median (IQR [range]) or number.

	Videolaryngoscopy (n = 50)	Fibreoptic intubation (n = 50)
Height; cm	173 (169–178 [157–192])	175 (170–180 [147–193])
Weight; kg	75 (67–84 [43–125])	74 (58–85 [37–160])
Age; years	57 (51–68 [22–89])	54 (42–62 [20–88])
Midazolam; mg	4.0 (4.0–6.0 [2.0–9.0])	4.5 (3.0–6.0 [2.0–10.0])
Ramsay score; 0 / 1 / 2 / 3 / 4 / 5 / 6	0 / 0 / 33 / 17 / 0 / 0 / 0	0 / 0 / 27 / 23 / 0 / 0 / 0
Remifentanil; $\mu g.kg^{-1}.min^{-1}$	0.03 (0.01–0.04 [0.0–0.08])	0.03 (0.02–0.04 [0.0–0.08])
Lidocaine; $mg.kg^{-1}$	3.9 (3.0–4.9 [1.3–9.3])	4.0 (3.8–5.0 [1.9–9.1])

SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

Editorial

'From darkness into light': time to make awake intubation with videolaryngoscopy the primary technique for an anticipated difficult airway?

Fitzgerald E, Hodzovic I, Smith AF. Anaesthesia 2015; 70:375 - 392

'The potential danger of using this new technique to replace the fibrescope for awake fibreoptic intubation could be a significant loss of experience and skill with the latter method, which may be a particular problem when intubation using indirect laryngoscopy is not successful or contraindicated'

Does it make sense to practice fiberoptic intubation only on patients with difficult airways?

Anesthesia Patient Safety Foundation

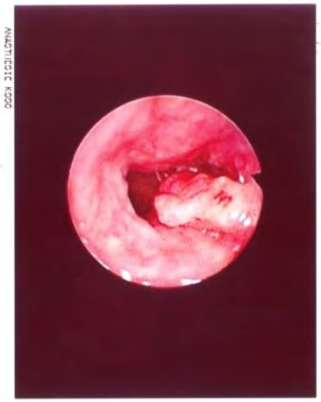
Section Editor: **Sorin J. Brull**

Preoperative Endoscopic Airway Examination (PEAE) Provides Superior Airway Information and May Reduce the Use of Unnecessary Awake Intubation

William Rosenblatt, MD,* Andreea I. Ianus, MD,* Wariya Sukhupragarn, MD,*
Alexandra Fickenscher, MPH,† and Clarence Sasaki, MD‡

Anesth Analg 2011; 112: 602-7

Does it make sense to practice fiberoptic intubation only on patients with difficult airways?



Sitting, awake

Anesthesia Patient Safety Foundation

Section Editor: **Sorin J. Brull**

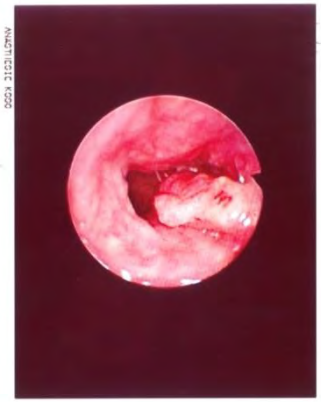
Preoperative Endoscopic Airway Examination (PEAE) Provides Superior Airway Information and May Reduce the Use of Unnecessary Awake Intubation

William Rosenblatt, MD,* Andreea I. Ianus, MD,* Wariya Sukhupragarn, MD,* Alexandra Fickenscher, MPH,† and Clarence Sasaki, MD‡

Anesth Analg 2011; 112: 602-7

SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

Does it make sense to practice fiberoptic intubation only on patients with difficult airways?



Sitting, awake

Supine, awake

Anesthesia Patient Safety Foundation

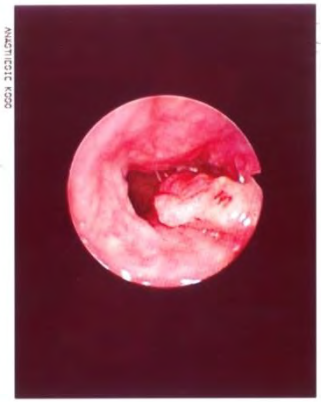
Section Editor: **Sorin J. Brull**

Preoperative Endoscopic Airway Examination (PEAE) Provides Superior Airway Information and May Reduce the Use of Unnecessary Awake Intubation

William Rosenblatt, MD,* Andreea I. Ianus, MD,* Wariya Sukhupragarn, MD,* Alexandra Fickenscher, MPH,† and Clarence Sasaki, MD‡

Anesth Analg 2011; 112: 602-7

Does it make sense to practice fiberoptic intubation only on patients with difficult airways?



Sitting, awake

Supine, awake

Anesthesia Patient Safety Foundation

Section Editor: **Sorin J. Brull**

Preoperative Endoscopic Airway Examination (PEAE) Provides Superior Airway Information and May Reduce the Use of Unnecessary Awake Intubation

William Rosenblatt, MD,* Andreea I. Ianus, MD,* Wariya Sukhupragarn, MD,* Alexandra Fickenscher, MPH,† and Clarence Sasaki, MD‡

Anesth Analg 2011; 112: 602-7

Supine, anesthetized

SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

«Die Kunst des Übens»

‚Vor allem muss man üben, das ist unumgänglich. Diejenigen, die Berufsmusiker werden, haben schon bevor sie ins Konservatorium eintreten, bis etwa 10 000 Stunden geübt. Man muss aber auch repetieren.

Alles, was wir wirklich können, haben wir mindestens 1 Million Mal gemacht.‘

Ericsson KA et al. The role of deliberate practice in the acquisition of expert performance. Pschol Rev 1993

SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

«Die Kunst des Übens, um ein Experte in Fiberoptischer Intubation zu werden»

SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

Die flexible Fiberoptik: Zunehmend vergessener Goldstandard oder überholtes Relikt?

SPITALREGION
RHEINTAL
WERDENBERG
SARGANSERLAND

Editorial

'From darkness into light': time to make awake intubation with videolaryngoscopy the primary technique for an anticipated difficult airway?

Fitzgerald E, Hodzovic I, Smith AF. Anaesthesia 2015; 70:375 - 392

'… we feel that awake fiberoptic intubation is reaching the point where it can be considered as a primary airway management technique that we should teach in the same way that we teach rapid sequence induction'

Unacceptable

http://www.pkn.dk/offentliggjorteafgoerelser/afgoerelser/0017511/

Vielen Dank für Ihre Aufmerksamkeit!

Der unerwartet schwierige Atemweg im Erwachsenenalter

Jörg Schäuble
Institut für Anästhesiologie und Schmerztherapie
Kantonsspital Winterthur

Definition + Inzidenz

Strategien + Handlungsprinzipien

Material

Cannot intubate-cannot oxygenate

Anesthesiology
78:597–602, 1993

Practice Guidelines for Management of the Difficult Airway

A Report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway

Introduction

Practice guidelines are systematically developed recommendations that assist the practitioner and patient in making decisions about health care. These recommendations may be adopted, modified, or rejected according to clinical needs and constraints.

Practice guidelines are not intended as standards or absolute requirements. The use of practice guidelines cannot guarantee any specific outcome. Practice guidelines are subject to revision from time to time, as warranted by the evolution of medical knowledge, technology, and practice.

A. Purpose of Guidelines for Difficult Airway Management

The purpose of these guidelines is to facilitate the management of the difficult airway and to reduce the likelihood of adverse outcomes. The principal adverse outcomes associated with the difficult airway include (but are not limited to): death, brain injury, myocardial injury, and airway trauma.

B. Focus

The primary focus of the guidelines is the management of the difficult airway encountered during tracheal intubation.* Some aspects of the guidelines may be relevant in other clinical contexts. The guidelines do not represent an exhaustive consideration of all manifestations of the difficult airway or all possible approaches to management.

C. Application

The guidelines are intended for use by anesthesiologists and by individuals who deliver anesthetic care under the direct supervision of an anesthesiologist.

The guidelines apply to all types of anesthetic care delivered in anesthetizing locations.†

The guidelines are intended for patients of all ages.

Guidelines

I. Evaluation of the Airway

History. The literature and consultant opinion strongly support the conduct of an airway history. This support is based upon recognized associations between the difficult airway and a variety of congenital, acquired, and traumatic disease states. The predictive value of the airway history and its effect on outcome have not been clearly defined in the literature.

Recommendations: A. An airway history should be conducted, whenever feasible, prior to the initiation of anesthetic care in all patients. The intent of the airway history is to detect medical, surgical, and anesthetic factors that may indicate the presence of a difficult airway. Examination of previous anesthetic records, if available, may provide useful information.

Physical Examination. The literature and consultant opinion strongly support the conduct of an airway

Developed by the Task Force on Guidelines for Management of the Difficult Airway: Robert A. Caplan, M.D. (Chairman); Jonathan L. Benumof, M.D.; Frederic A. Berry, M.D.; Casey D. Blitt, M.D.; Robert H. Bode, M.D.; Frederick W. Cheney, M.D.; Richard T. Connis, Ph.D. (Health Services Research Methodologist); Orin F. Guidry, M.D.; and Andranik Ovassapian, M.D. Approved by the House of Delegates, October 21, 1992. To become effective July 1, 1993.

Accepted for publication December 1, 1992. Support for guideline development was provided by the American Society of Anesthesiologists, under the direction James F. Arens, M.D., Chairman of the Ad Hoc Committee on Practice Parameters.

Address reprint requests to American Society of Anesthesiologists, 520 North Northwest Highway, Park Ridge, Illinois 60068-2573.

Key words: Airway: difficult. Intubation: difficult; tracheal. Practice guidelines: difficult airway management. Ventilation: difficult.

* See Appendix, Section A, for additional comments on the definition of the difficult airway and related terms.

† An anesthetizing location is defined as a physical space in a healthcare facility that is specifically equipped and intended for the delivery of anesthetic care.

- Schwierige Beatmung mit Maske oder supraglottischem Hilfsmittel (SGA)
- Schwierige Platzierung SGA
- Schwierige Laryngoskopie
- Schwierige tracheale Intubation
- Misslungene tracheale Intubation

American Society of Anesthesiologists: Practice guidelines for management of the difficult airway: An updated report. Anesthesiology 2013; 98:1269–1277

Schwierige oder unmögliche Maskenbeatmung

-0,15 % unmöglich (77 auf 50.000)

- 2,2% schwierig (1.141 auf 50.000)

Kheterpal S, Martin L, Shanks AM Prediction and Outcomes of Impossible Mask Ventilation. A Review of 50,000 Anesthetics. Anesthesiology 2009; 110:891–7

5% schwierig (75 auf 1502)

Langeron O, Masso E, Huraux C. Prediction of difficult mask ventilation. Anesthesiology 2000; 92:1229–36

- Schwierige Laryngoskopie und schwierige Intubation
  - 4,4% (698 von 176679)

- Schwierige Maskenbeatmung + schwierige Intubation
  - 0,4%

Incidence, Predictors, and Outcome of Difficult Mask Ventilation Combined with Difficult Laryngoscopy
Sachin Kheterpal, M.D., M.B.A.,* David Healy, M.D., M.R.C.P., F.R.C.A.,,* Michael F. Aziz, M.D.,et. al.
Anesthesiology 2013; 119:1360-9

Für den schwierigen Atemweg soll ein der Klinik angepasster Algorithmus verfügbar sein,
der
allen beteiligten Personen bekannt ist
und
die Instrumente und Techniken beinhaltet, die vorgehalten sowie beherrscht werden

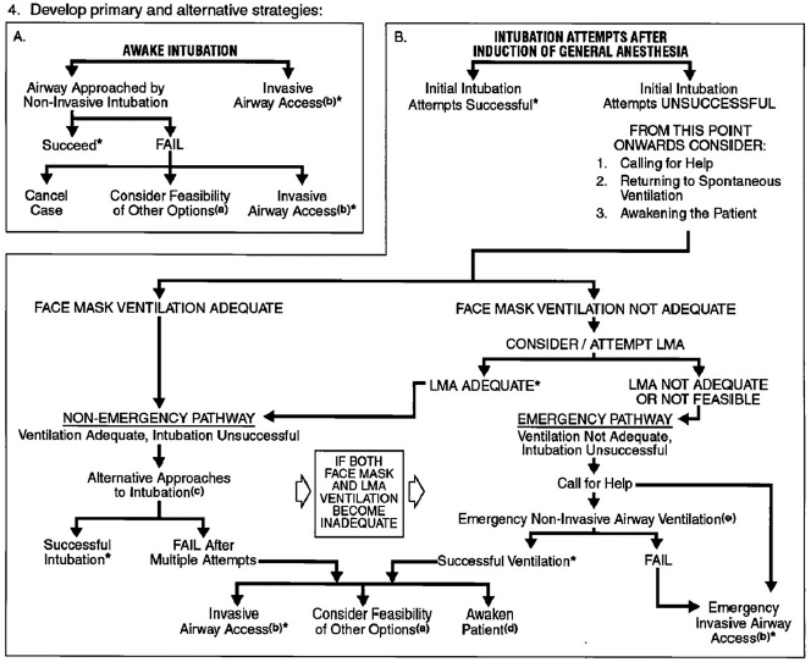
S1-Leitlinie Atemwegsmanagement der Kommission Atemwegsmanagement der DGAI 2014

Anästh Intensivmed 2015;56:505-523

AMERICAN SOCIETY OF ANESTHESIOLOGISTS

DIFFICULT AIRWAY ALGORITHM

1. Assess the likelihood and clinical impact of basic management problems:
   - A. Difficult Ventilation
   - B. Difficult Intubation
   - C. Difficulty with Patient Cooperation or Consent
   - D. Difficult Tracheostomy
2. Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway management
3. Consider the relative merits and feasibility of basic management choices:
   - A. Awake Intubation —vs.— Intubation Attempts After Induction of General Anesthesia
   - B. Non-Invasive Technique for Initial Approach to Intubation —vs.— Invasive Technique for Initial Approach to Intubation
   - C. Preservation of Spontaneous Ventilation —vs.— Ablation of Spontaneous Ventilation
4. Develop primary and alternative strategies:



*** Confirm ventilation, tracheal intubation, or LMA placement with exhaled CO_2**

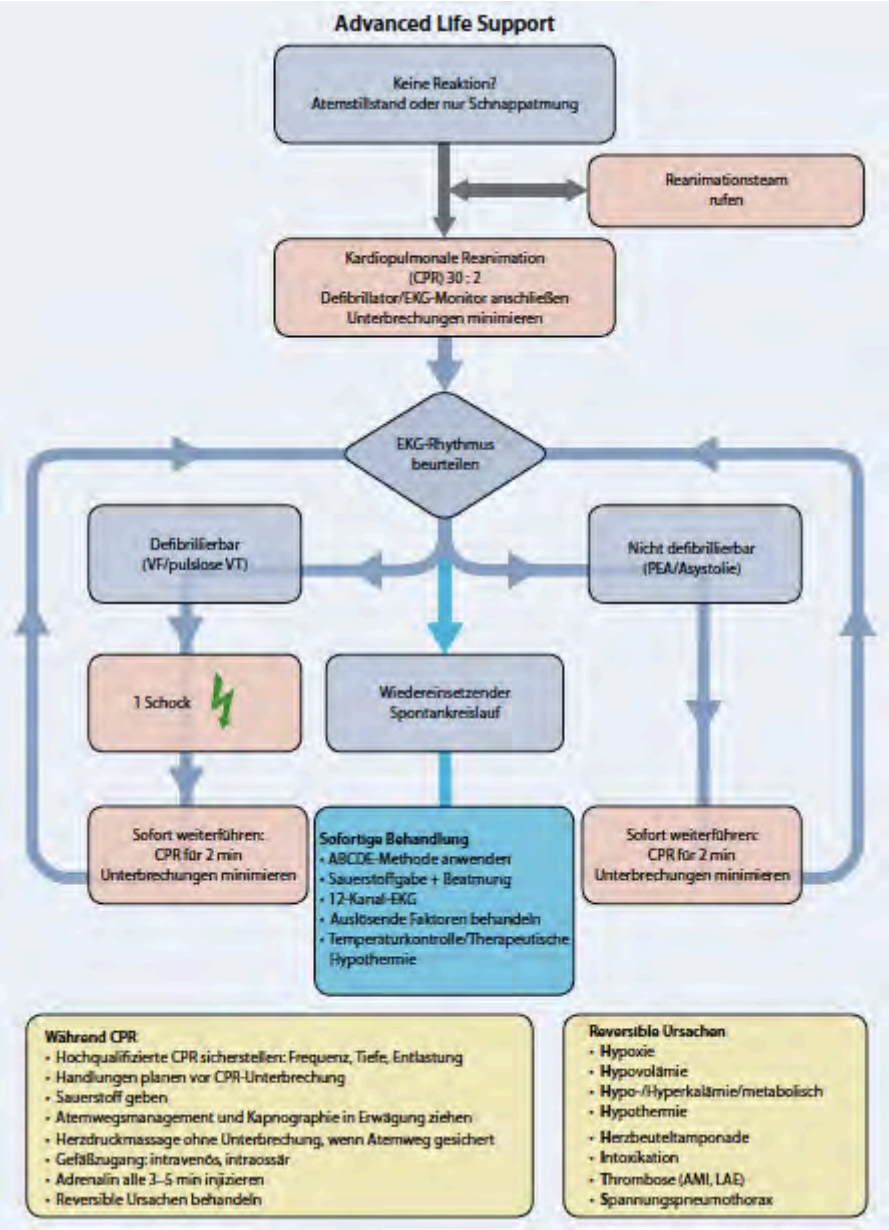
a. Other options include (but are not limited to): surgery utilizing face mask or LMA anesthesia, local anesthesia infiltration or regional nerve blockade. Pursuit of these options usually implies that mask ventilation will not be problematic. Therefore, these options may be of limited value if this step in the algorithm has been reached via the Emergency Pathway.

b. Invasive airway access includes surgical or percutaneous tracheostomy or cricothyrotomy.

c. Alternative non-invasive approaches to difficult intubation include (but are not limited to): use of different laryngoscope blades, LMA as an intubation conduit (with or without fiberoptic guidance), fiberoptic intubation, intubating stylet or tube changer, light wand, retrograde intubation, and blind oral or nasal intubation.

d. Consider re-preparation of the patient for awake intubation or canceling surgery.

e. Options for emergency non-invasive airway ventilation include (but are not limited to): rigid bronchoscope, esophageal-tracheal combitube ventilation, or transtracheal jet ventilation.



C.D. Deakin, J.P. Nolan, J. Soar, K. Sunde, R.W. Koster, G.B. Smith, G.D. Perkins
Erweiterte Reanimationsmaßnahmen für Erwachsene („advanced life support“)
Sektion 4 der Leitlinien zur Reanimation 2010 des European Resuscitation Council
Notfall Rettungsmed 2010 · 13:559–620

Airwayrucksack KSW

- Orientierung an klinischen und lokalen Bedürfnissen
- Einfache, klare Struktur
- Schwierige Beatmung mit Maske /SGA
- Schwierige/unmögliche Intubation
- Limitierte Anzahl Hilfsmittel
- „Cannot intubate-cannot oxygenate “
- Verbindlichkeit
- Keine Improvisation

Schaeuble JC, Heidegger T. Strategies and algorithms for the management of the difficult airway: An update
Trends in Anaesthesia and Critical Care 2 (2012) 208-217

Vor Einleitung der Allgemeinanästhesie soll immer

eine Präoxygenierung bei spontan atmendem Patienten durchgeführt werden

S1-Leitlinie Atemwegsmanagement der Kommission Atemwegsmanagement der DGAI 2014

Anästh Intensivmed 2015;56:505-523

Handlungsprinzipien:

- Präoxygenation
- Hilfe holen
- Oxygenation vor Ventilation
- Ventilation vor Intubation
- Rechtzeitiger Wechsel der Eskalationsstufe
- Rückkehr zur Ausgangssituation
- Tubuslagekontrolle

- Hoher Stellenwert der Maskenbeatmung

- Neue Handlungsoptionen durch frühe Anwendung von Muskelrelaxantien

Bei unerwartet schwierigem Atemweg

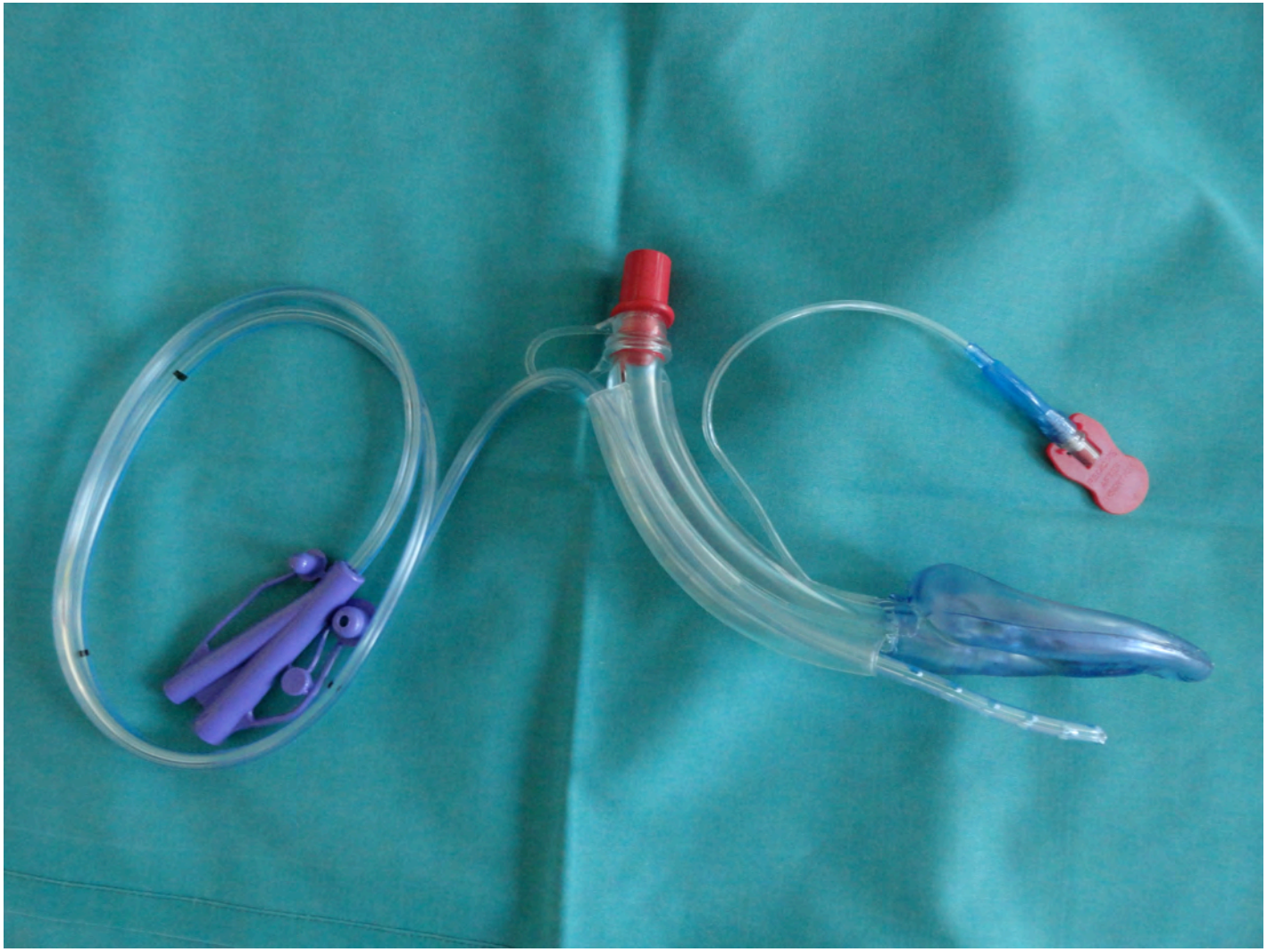
soll nach einem erfolglosen Intubationsversuch ein weiterer Versuch mit direkter Laryngoskopie nur dann unternommen werden,

wenn Massnahmen zur Optimierung

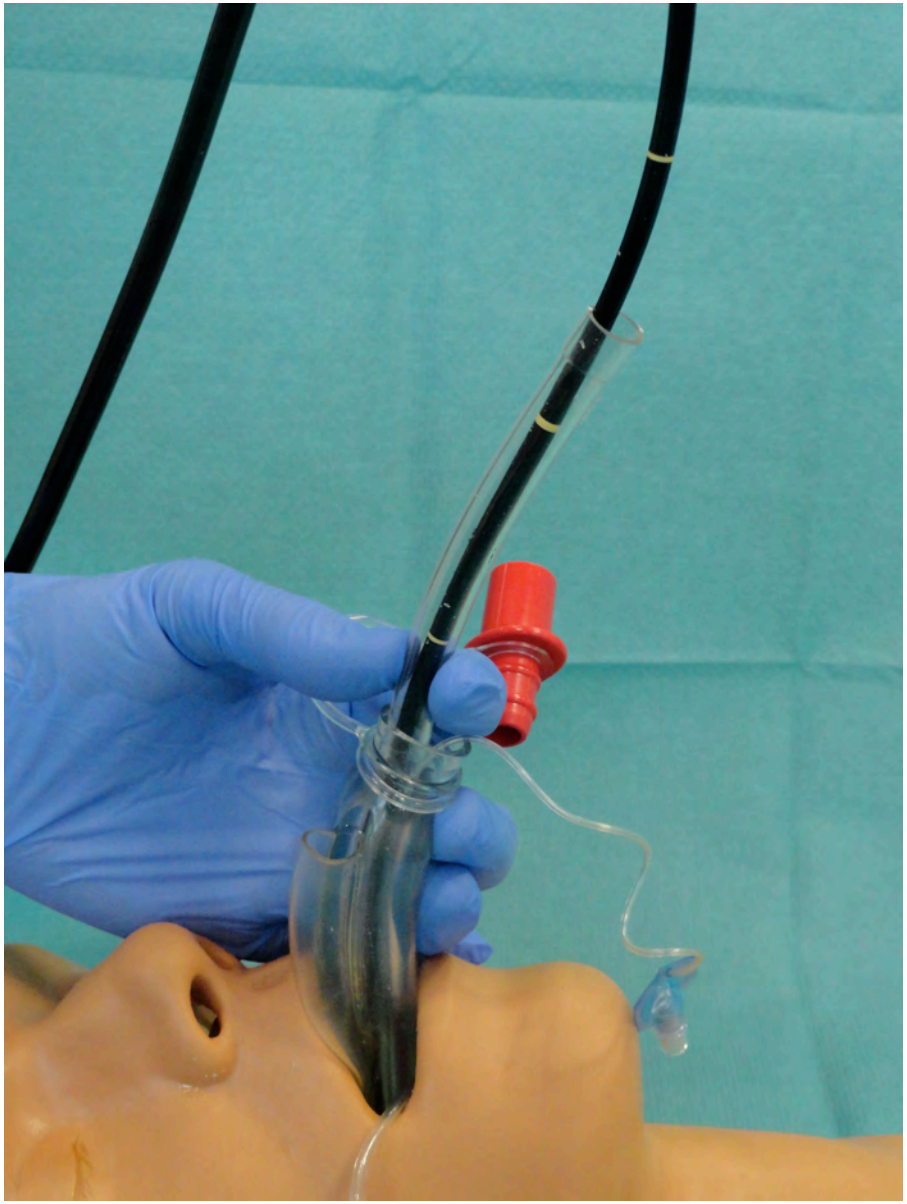
der Intubationsbedingungen getroffen wurden

S1-Leitlinie Atemwegsmanagement der Kommission Atemwegsmanagement der DGAI 2014

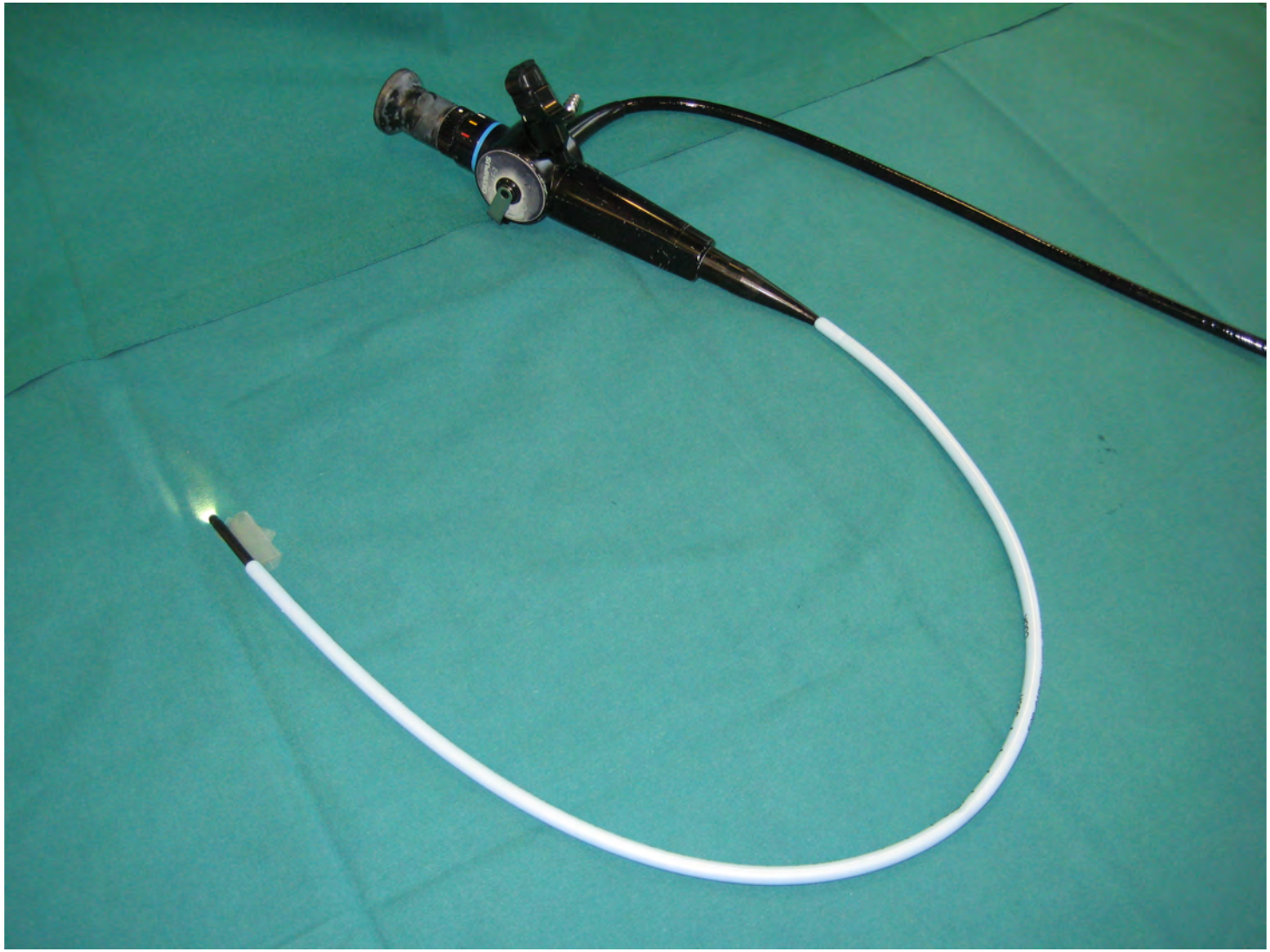
Anästh Intensivmed 2015;56:505-523



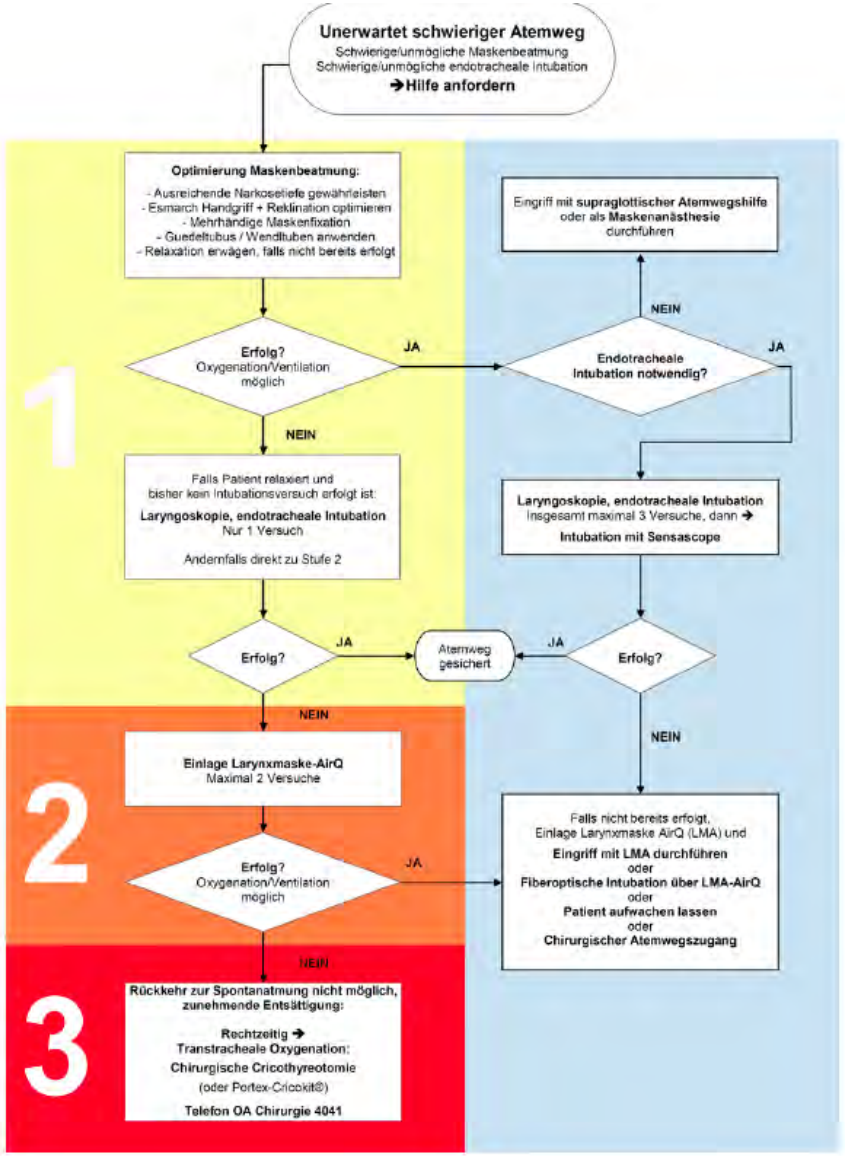
LMA AirQ®



Fiberoptische Intubation via Larynxmaske Air Q®



Aintreekatheter



Algorithmus „Unerwartet schwieriger Atemweg“ Kantonsspital Winterthur

„Es muss in diesen Fällen das Ziel sein,
vor Eintritt einer schweren Hypoxie
einen transtrachealen Zugang angelegt zu haben.“

„A failed oxygenation/CICO situation with a
rapidly declining SaO2
despite maximum attempts at oxygenation
should betaken as an indication for cricothyrotomy,
especially with the onset of bradycardia“

Major complications of airway management in the UK:

Results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society.

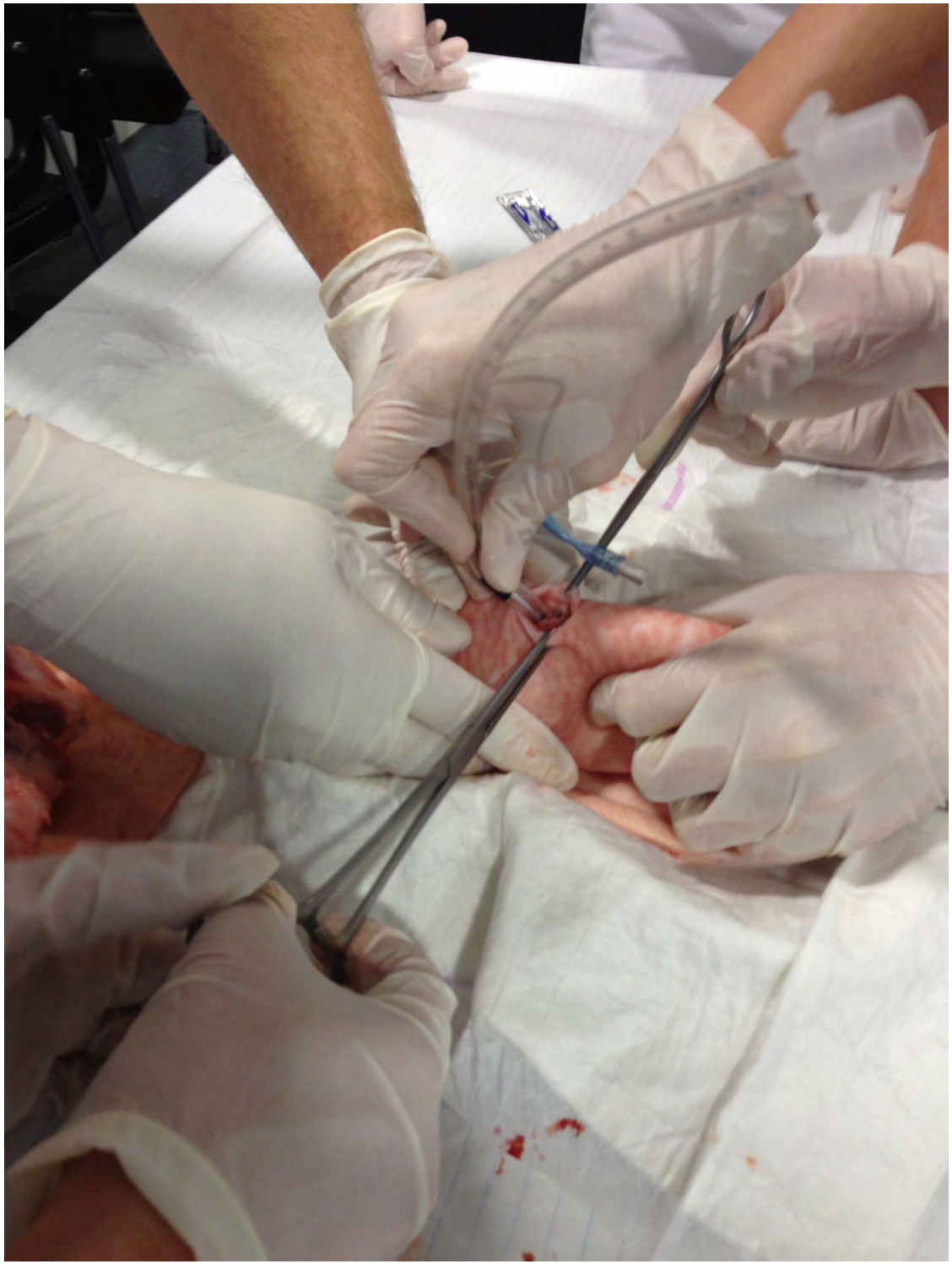
Part 1: Anaesthesia

T. M. Cook, N. Woodall and C. Frerk, on behalf of the Fourth National Audit Project

British Journal of Anaesthesia 106 (5): 617–31 (2011)

„The NAP 4 project provides evidence that cricothyroidotomy is used by anaesthetists, **but failure rates are high**, suggesting additional training and practise in this procedure is needed.“

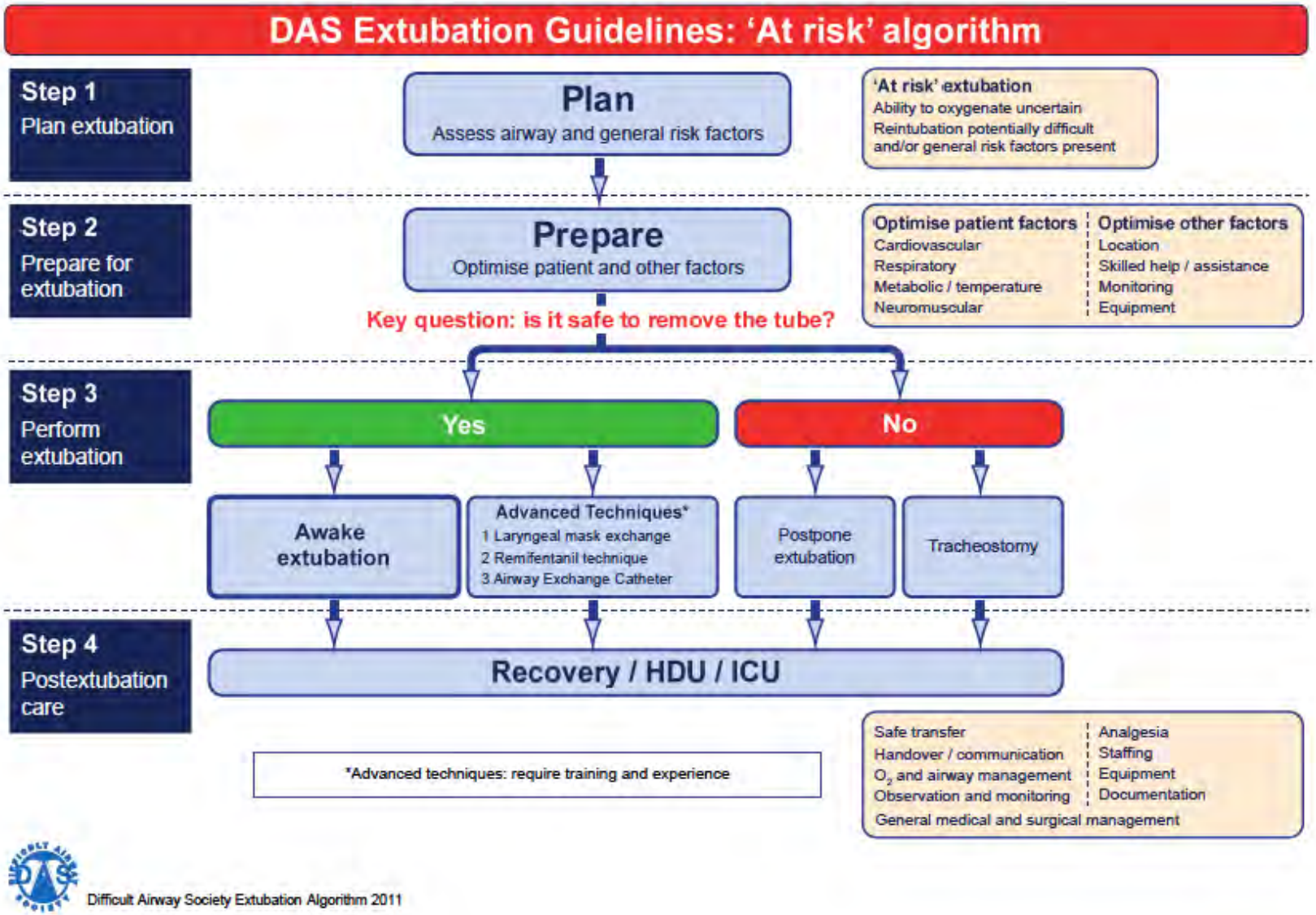
„Meanwhile surgical cricothyroidotomy should be taught alongside needle or cannula techniques.“



... all anaesthetists should be able
to perform a surgical technique
and
that the surgical approach should be
considered as the first technique
more often

...and many happy landings

DAS Extubation Guidelines: 'At risk' algorithm



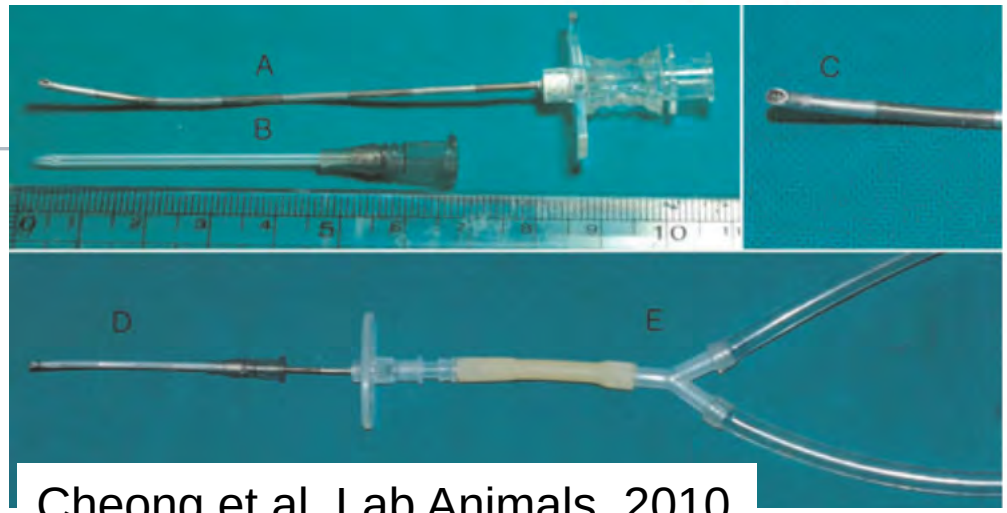
Difficult Airway Society Extubation Algorithm 2011

Fazit:

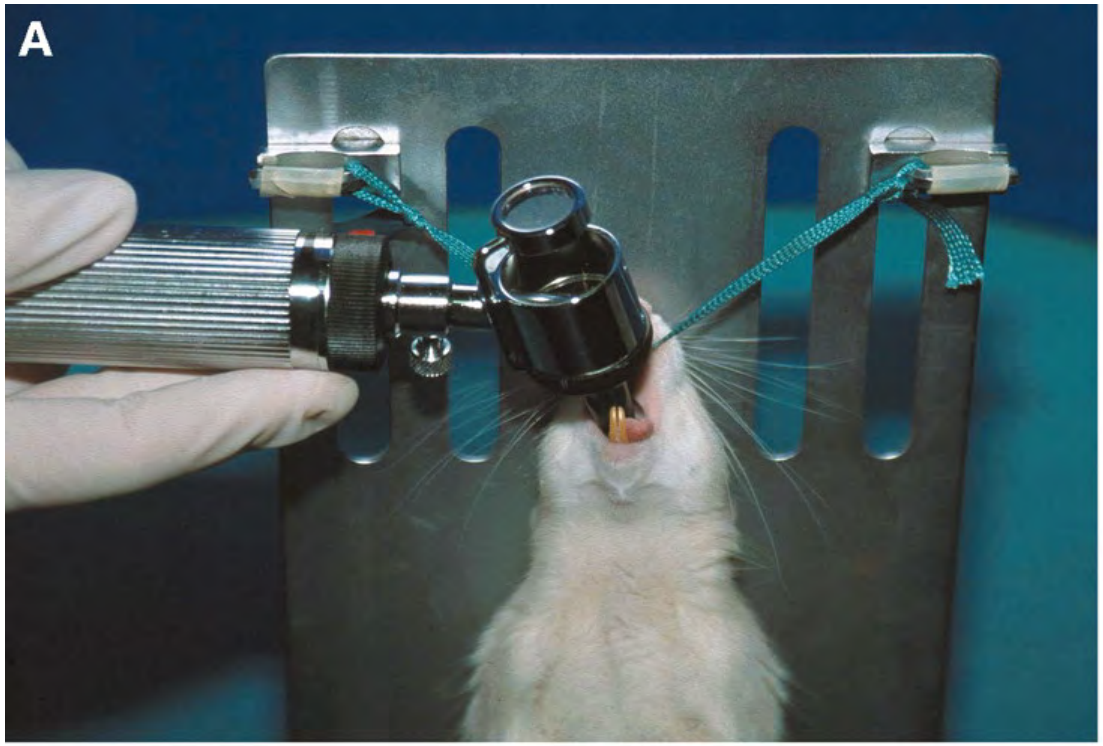
- Einfache und verbindliche Algorithmen
- Limitierte Anzahl vertrauter Tools
- Cannot intubate – cannot oxygenate
- Regelmässiges Training aller Mitarbeiter
- Evaluation und Optimierung

Atemweg ist nicht gleich Atemweg!

Intubation Ratte



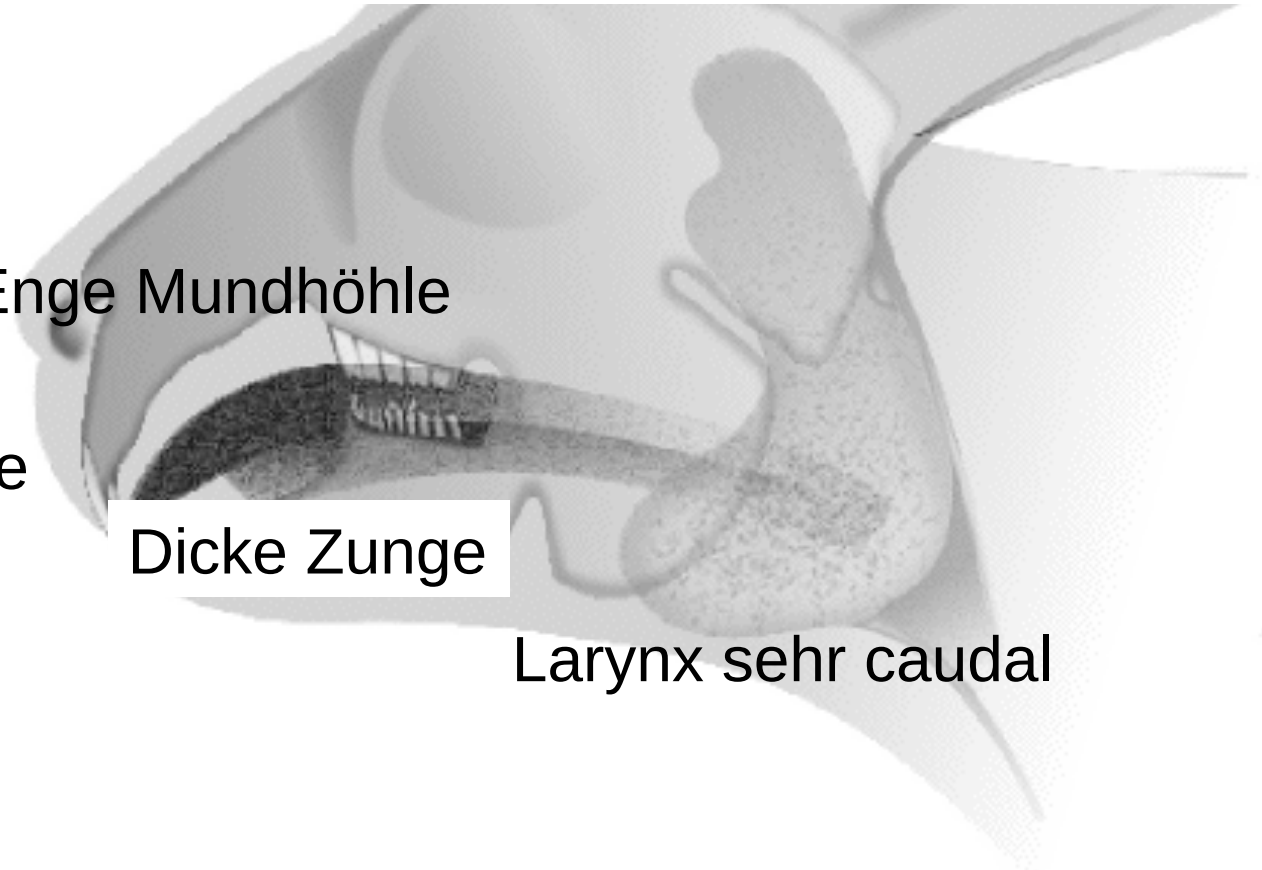
Cheong et al, Lab Animals, 2010


A


B


C

Kaninchen = sehr schwierige Intubation



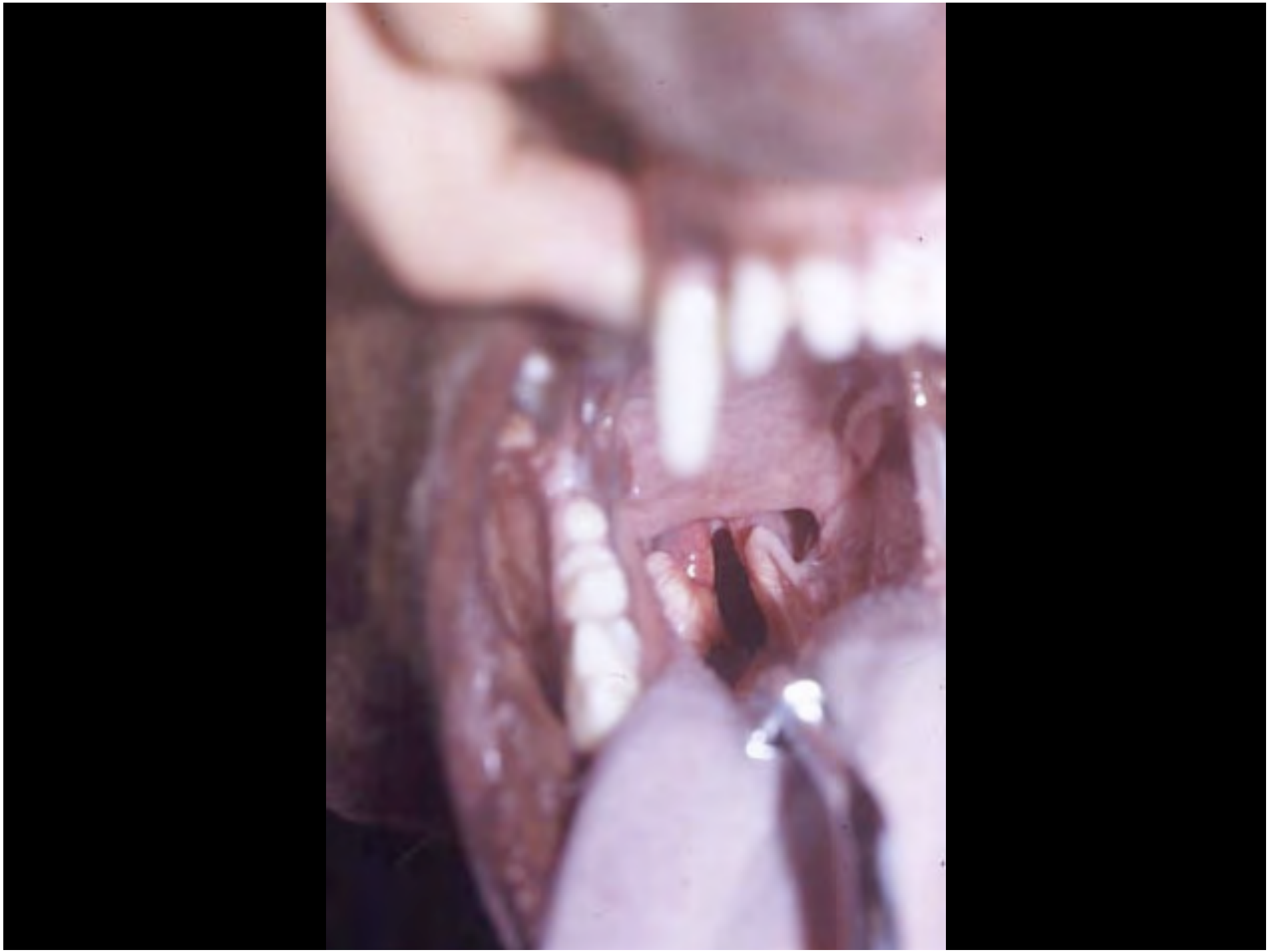
Enge Mundhöhle

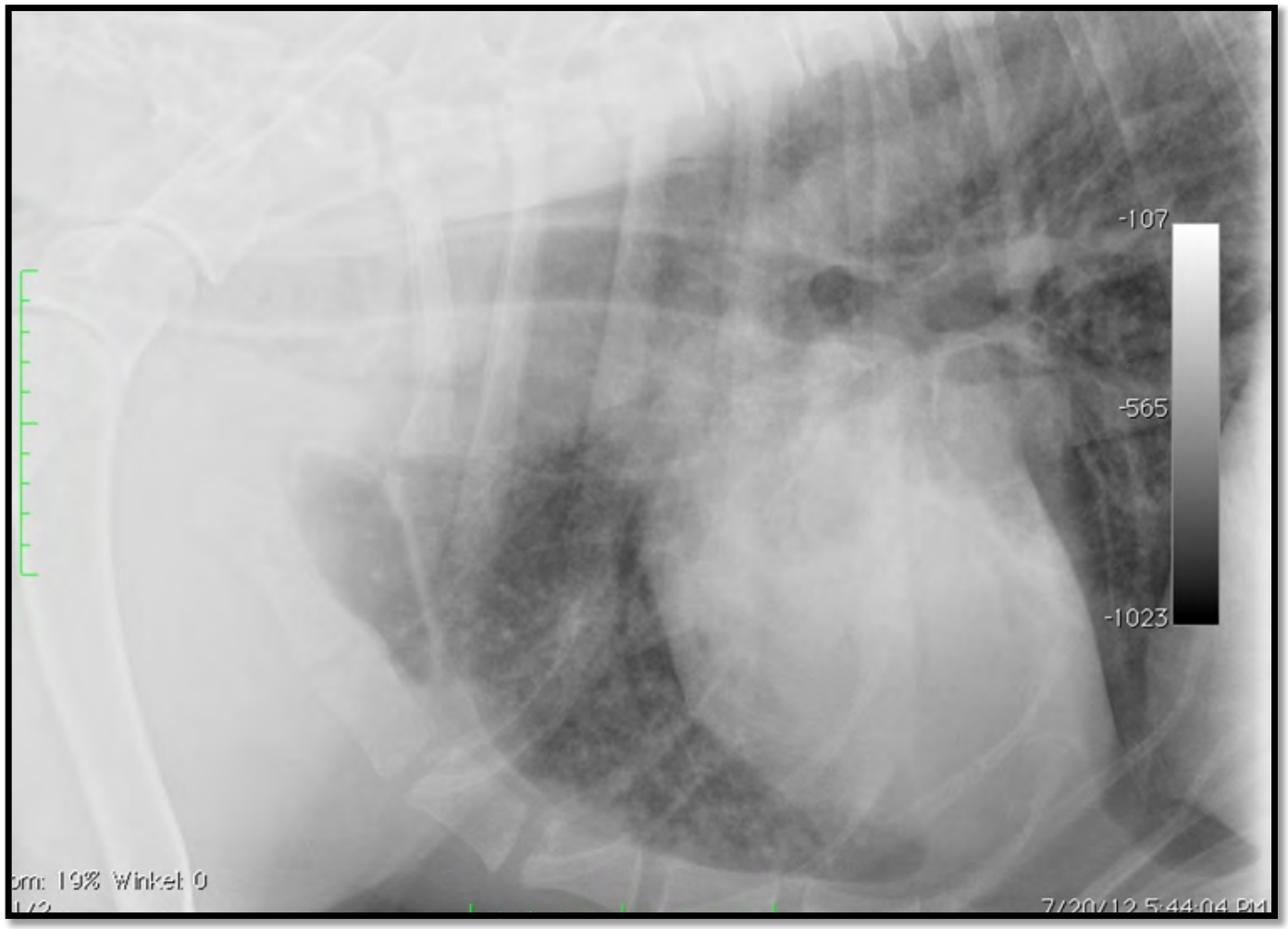
Lange Zähne

Dicke Zunge

Larynx sehr caudal

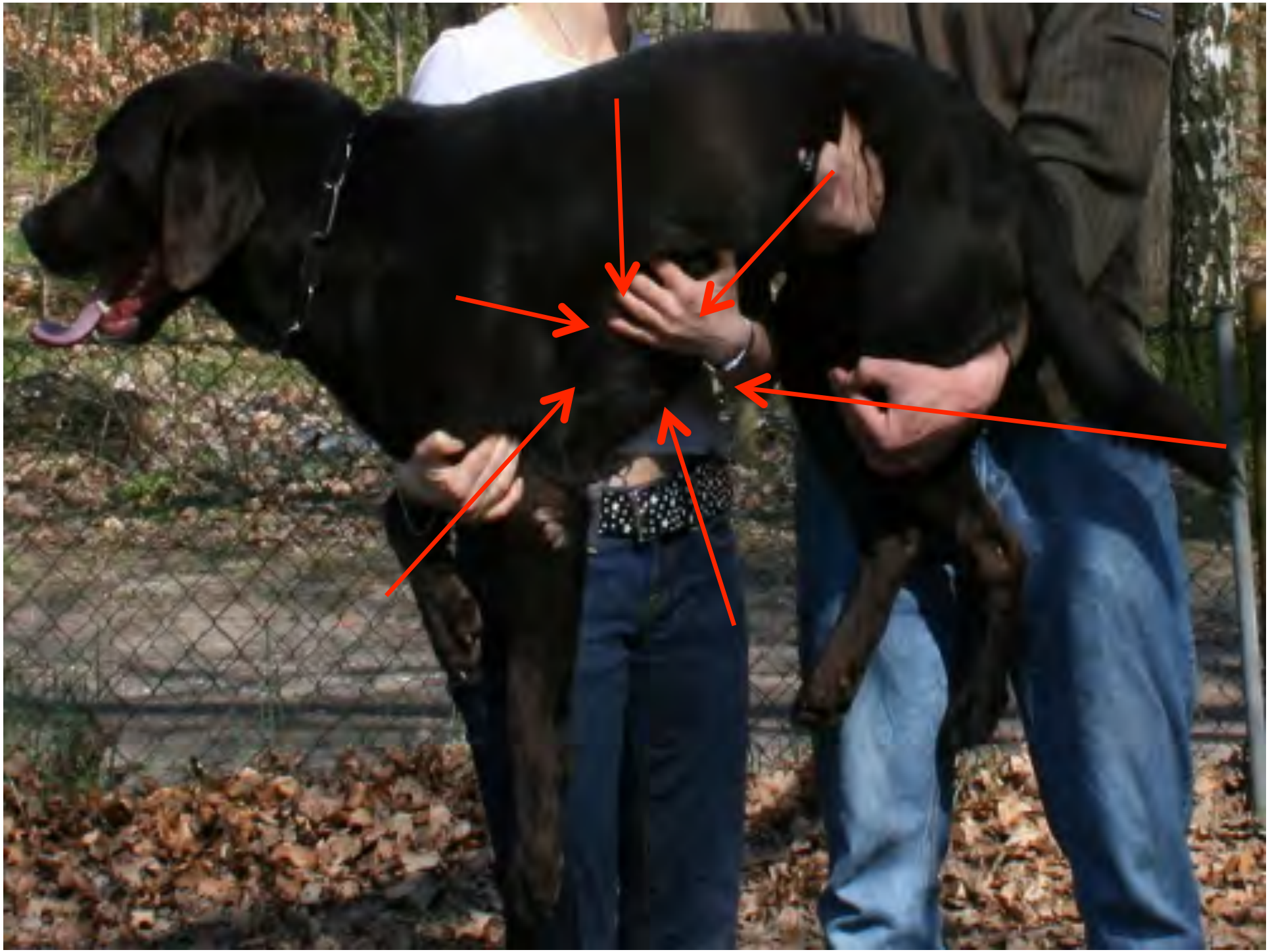

Acq T



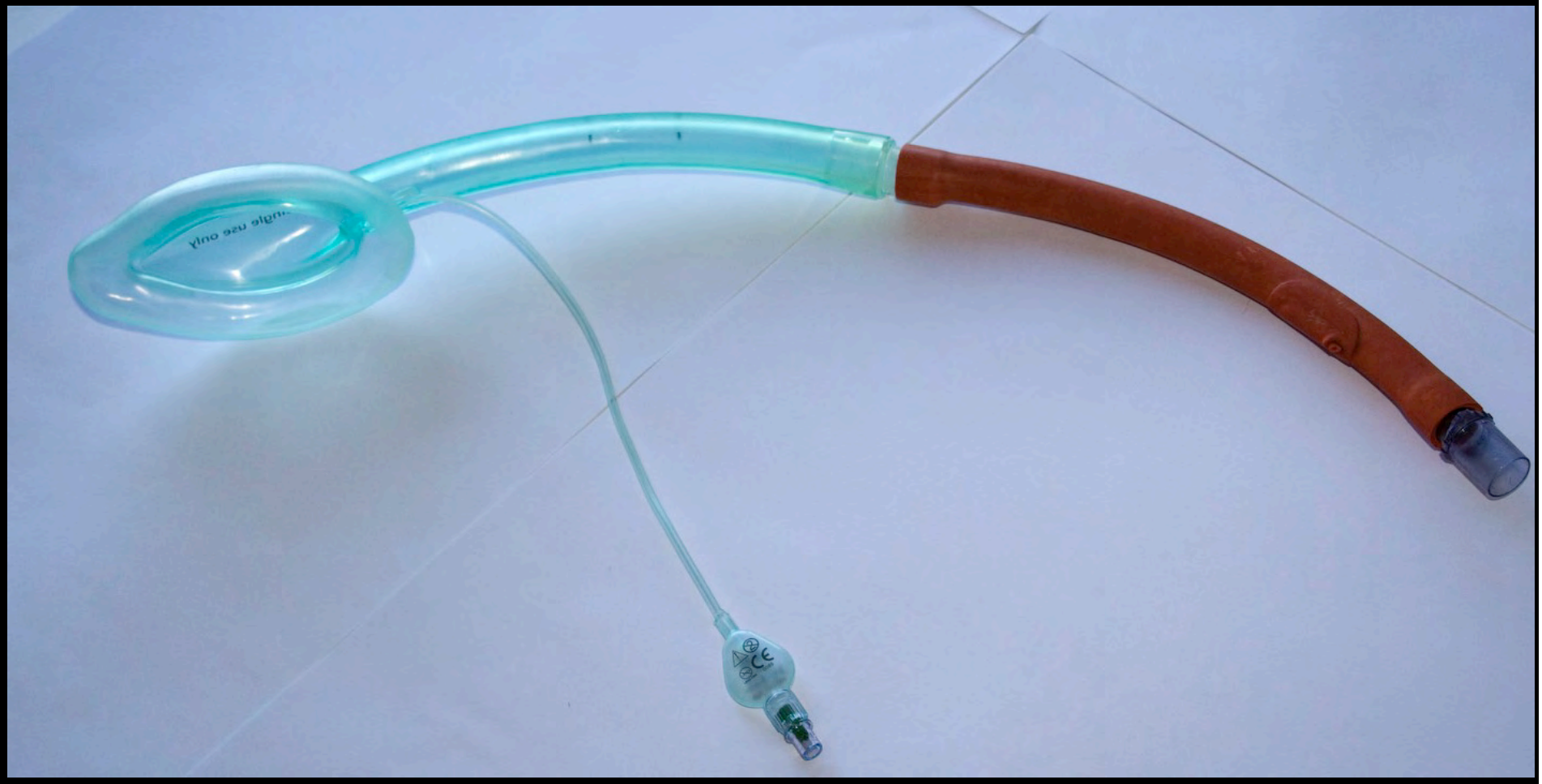


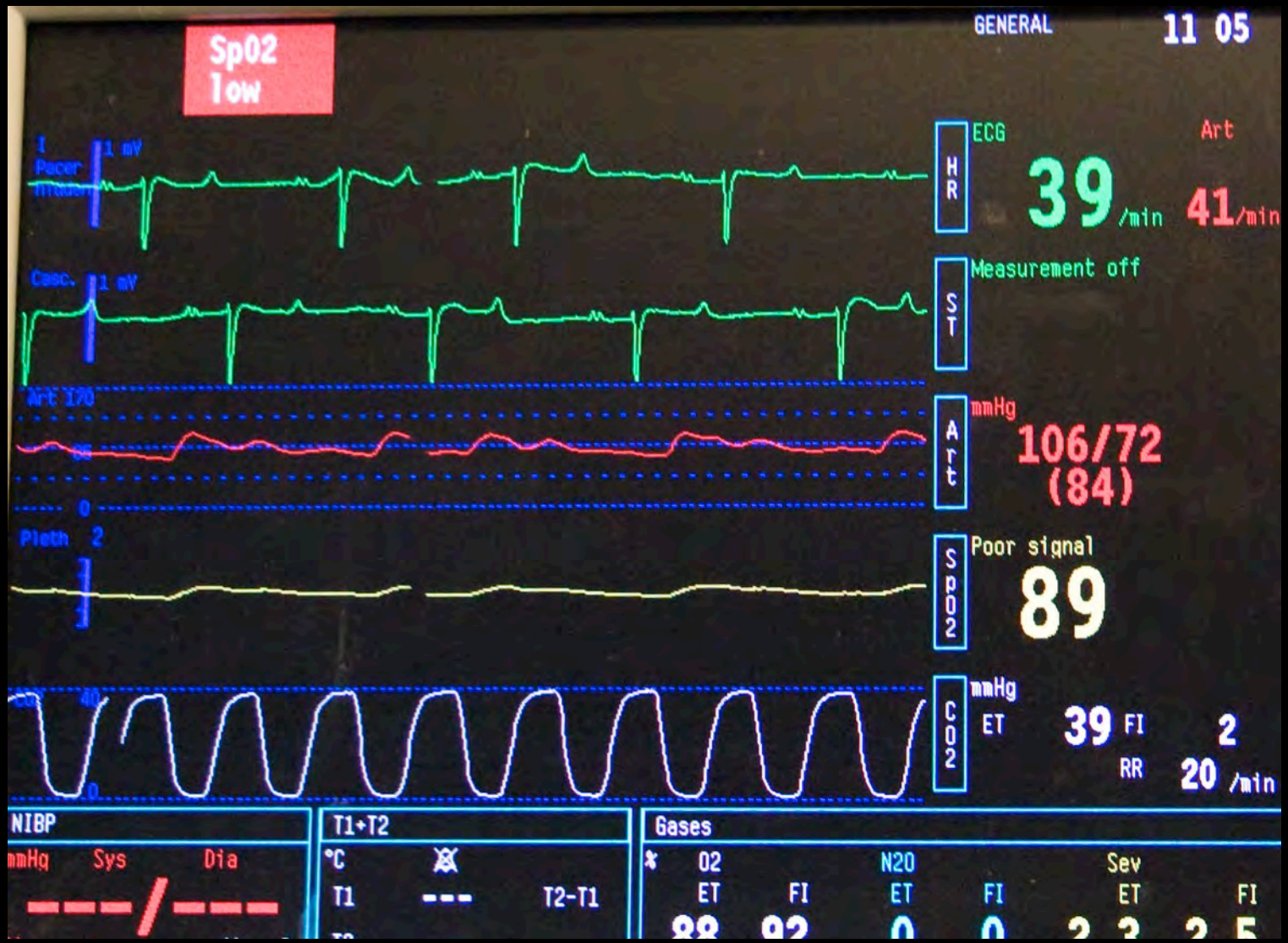
«Rose» Irisher Wolfshund, 5 y, 65 kg
Aspirationspneumonie

Kogan et. al 2008,
Java et al. 2009

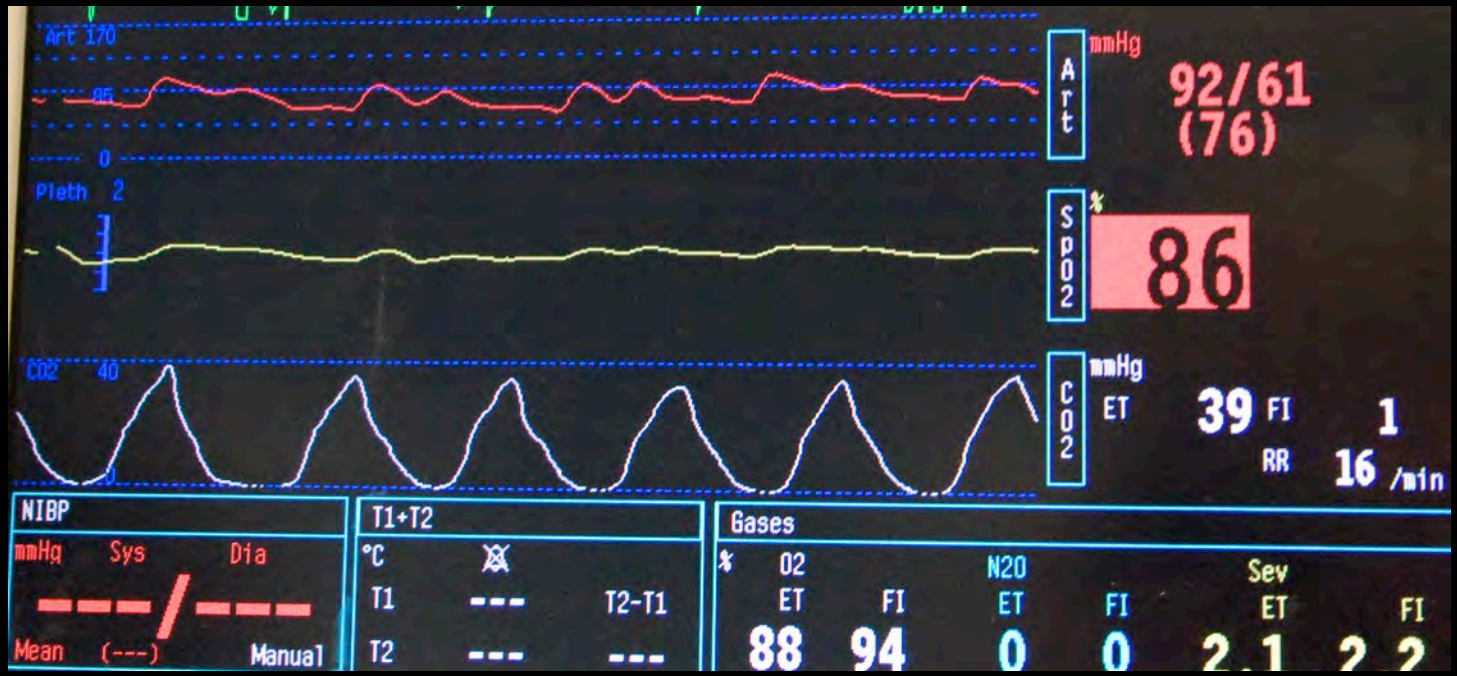



6100 SATH

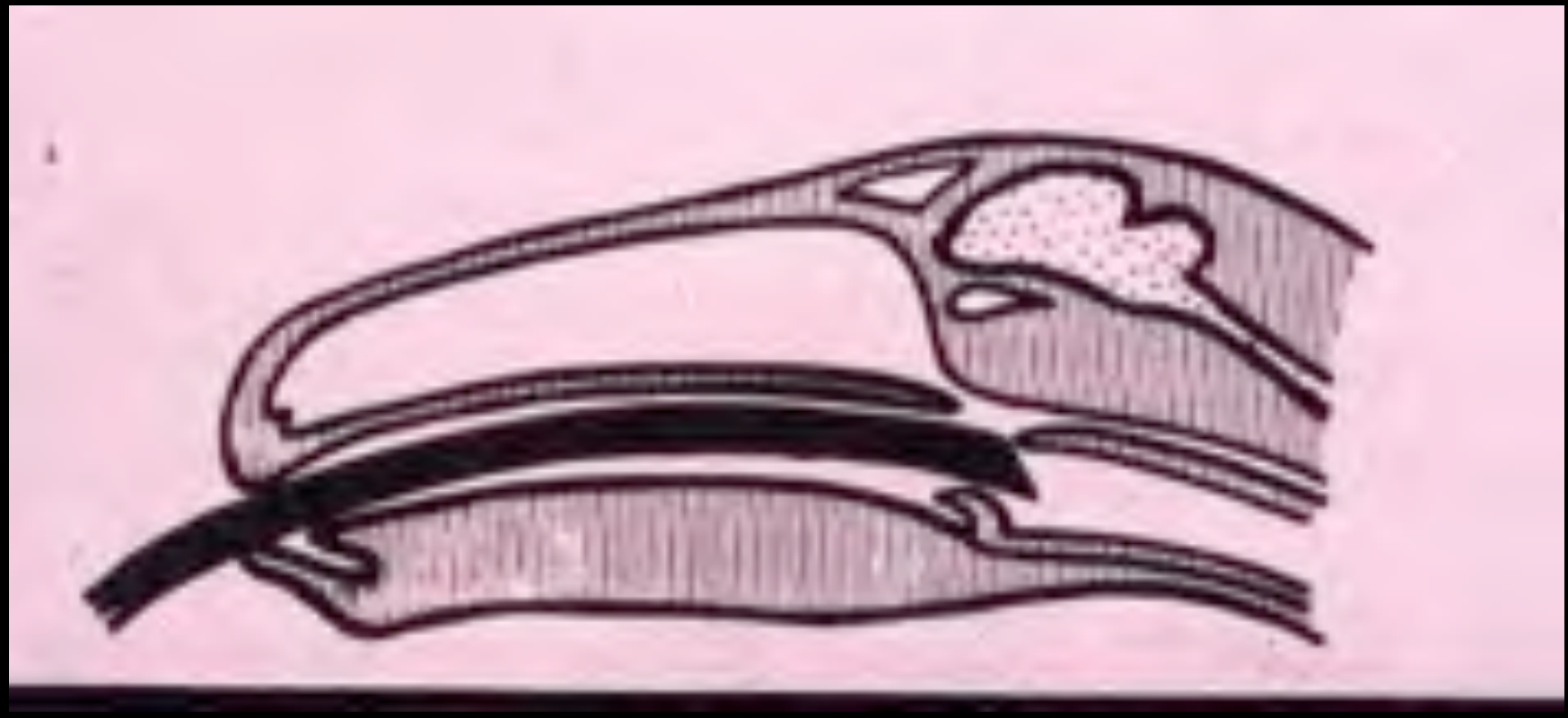



Sp02
low
GENERAL
11 05
I
Pacer
1 mV
ECG
Art
HR
39 /min
41 /min
Casc.
1 mV
Measurement off
ST
Art 170
mmHg
Art
106/72
(84)
Plath 2
Poor signal
SPO2
89
mmHg
ET
39
FI
2
RR
20 /min
CO2
NIBP
mmHg
Sys
Dia
---/---
T1+T2
°C
T1

T2-T1
Gases
%
O2
ET
FI
N2O
ET
FI
Sev
ET
FI

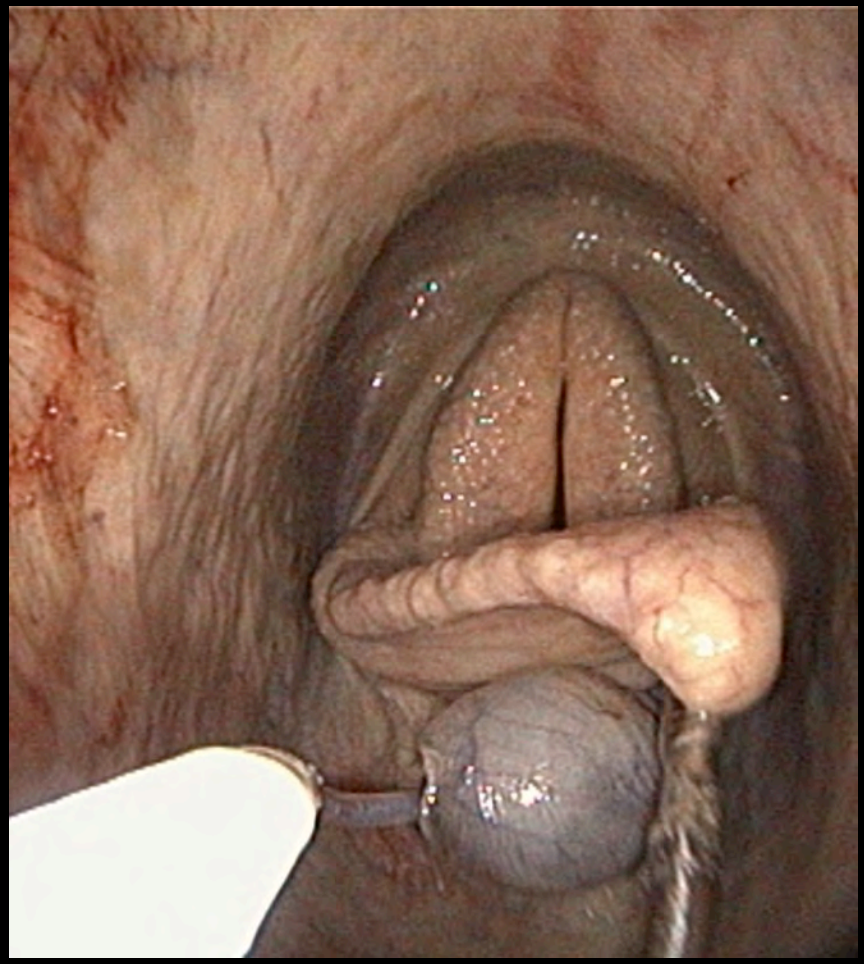


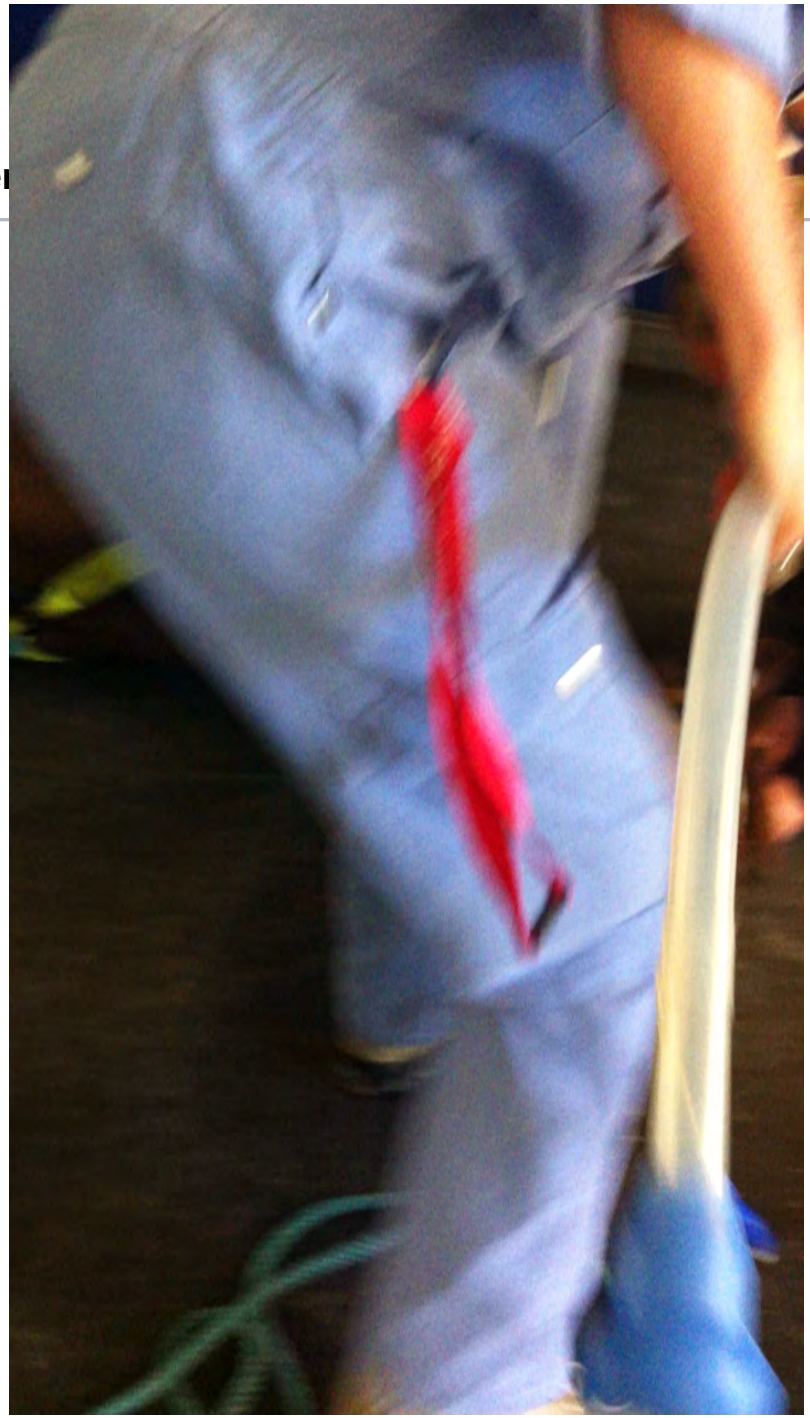
pH 7.37, pCO2 50 mmHg, pO2 43 mmHg



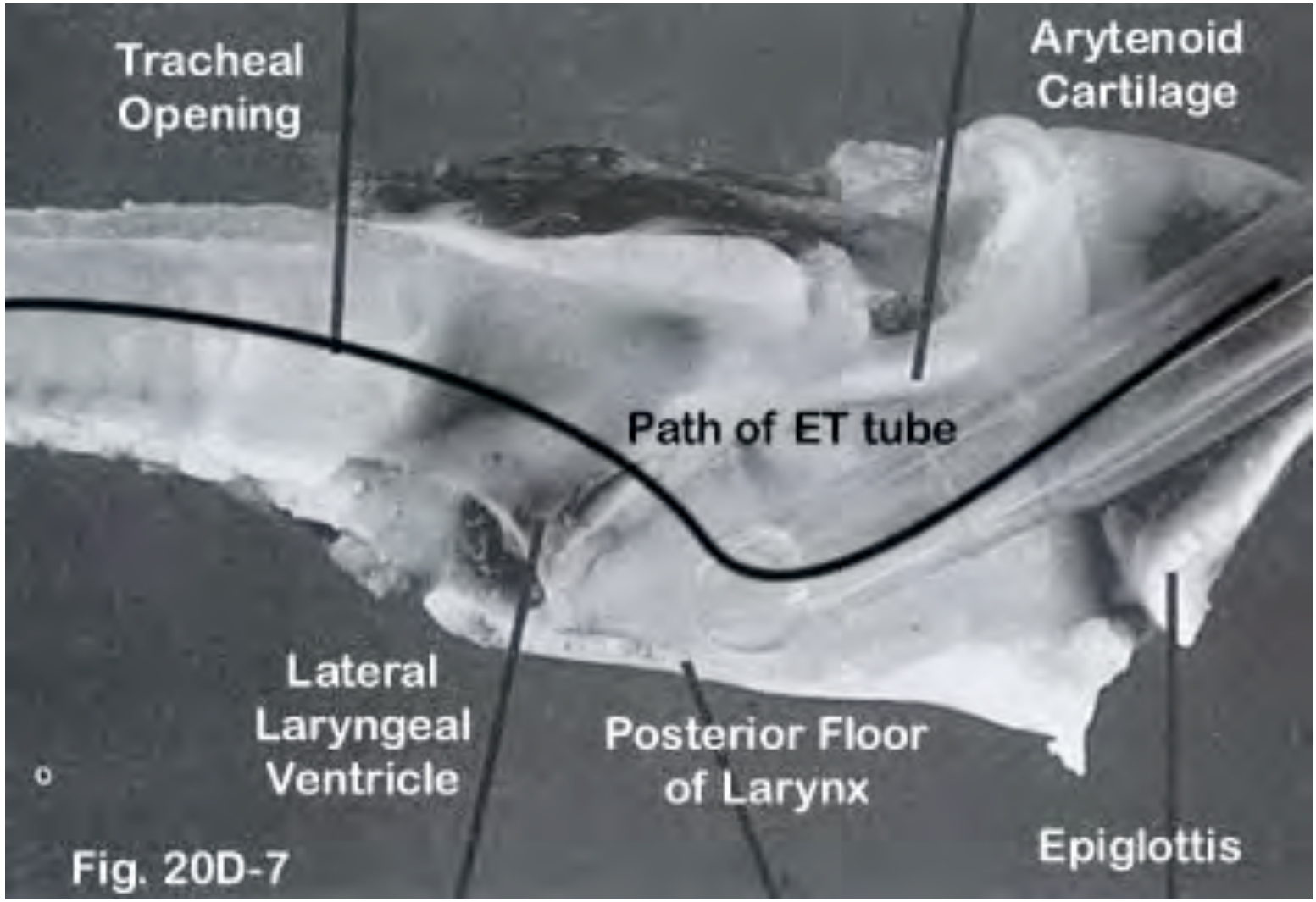

Patientin: Sandra Golaya 2225062 (6 y , 6 y)
Respirationstrakt Gesamt
BASE Untersuchung
05/01/15 10:45:00
Made In OsiriX

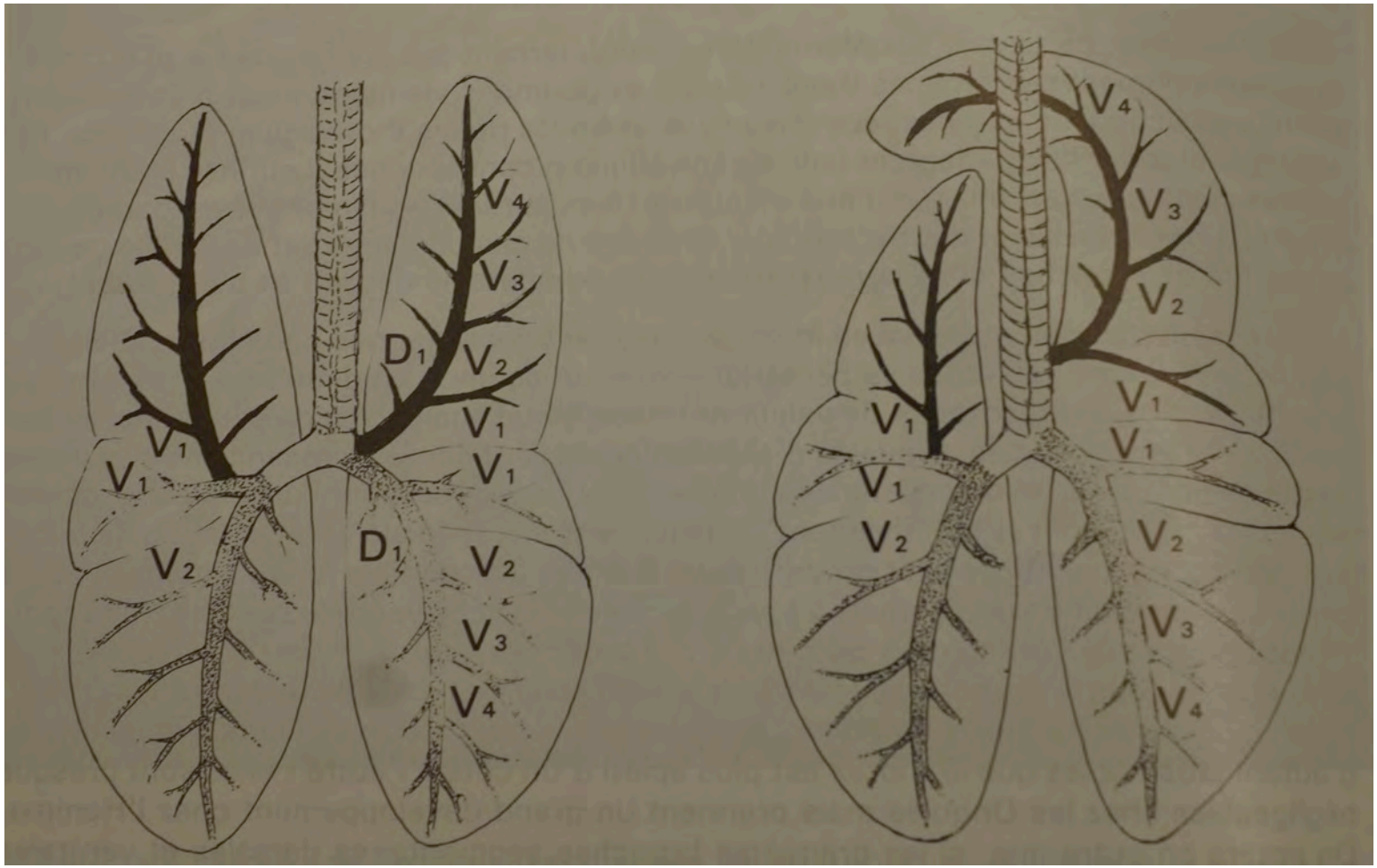

Bild-Größe: 4280 x 3520
Ansichts-Größe: 984 x 810
WL: -511 WW: 1023
X: 88 px Y: 3498 px Wert: -971.00
Zoom: 23% Winkel: 0
B: 171
JPEGLossless:Non-hierarchical-1stOrderPrediction



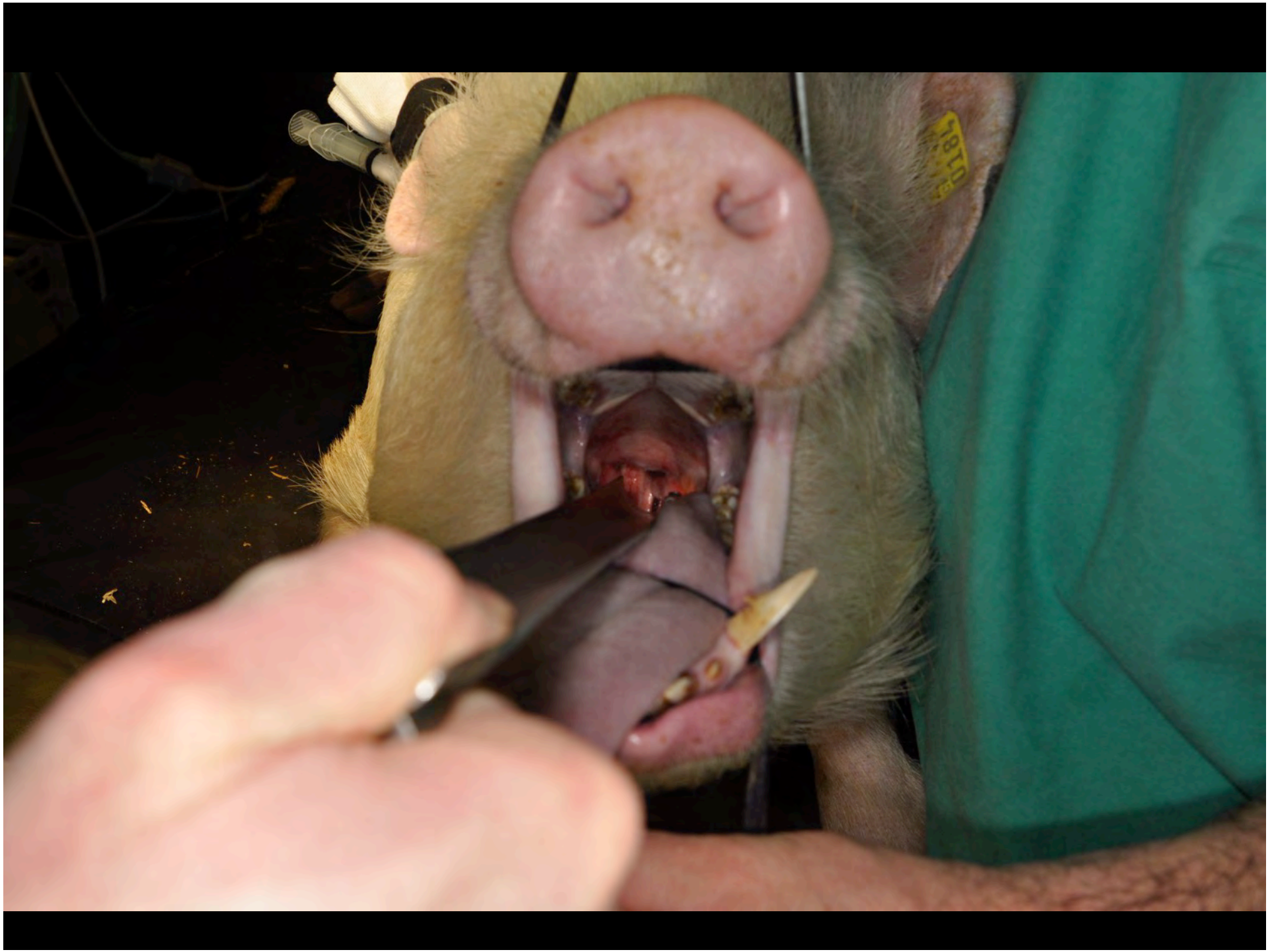


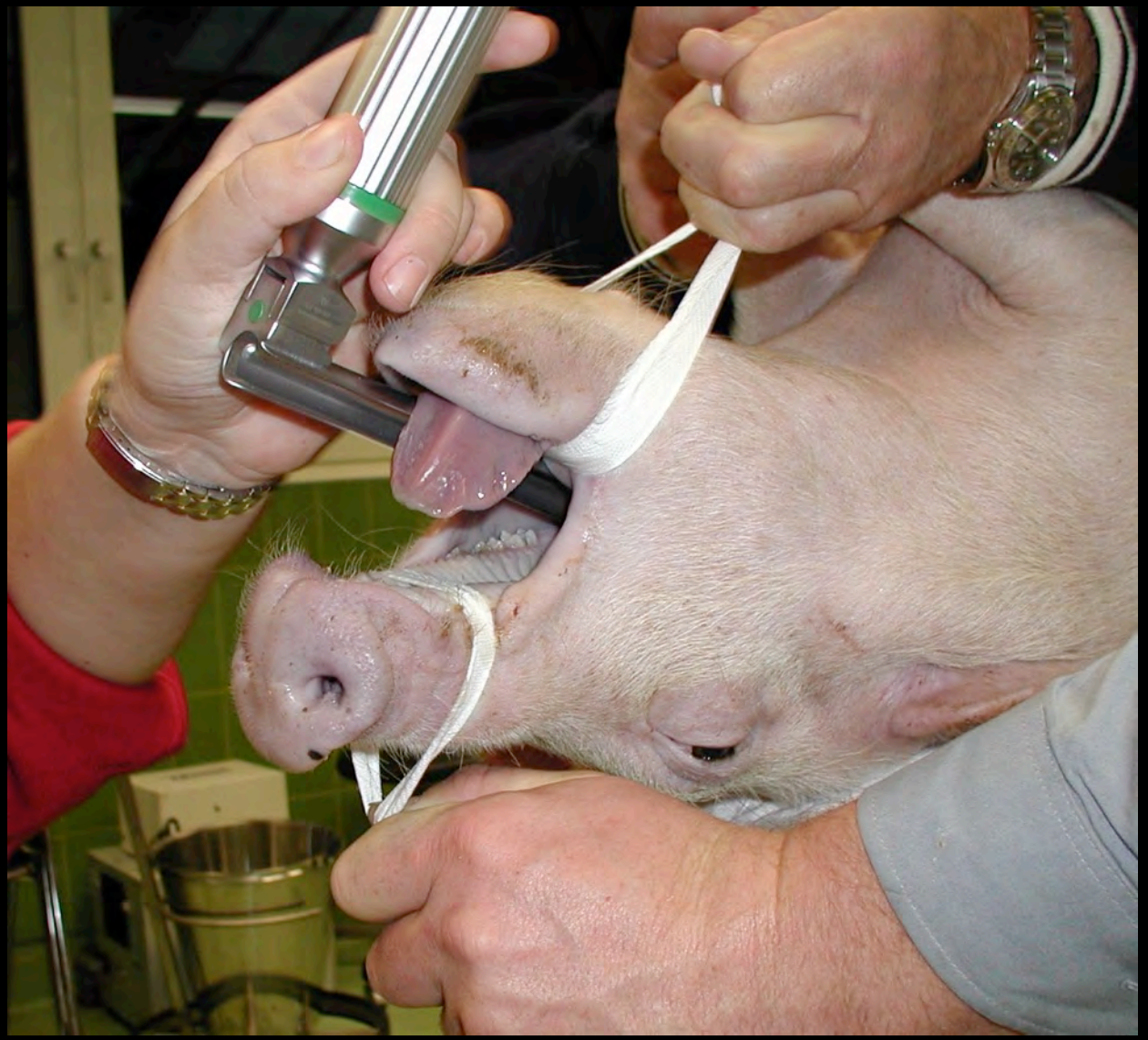
Schweine - schwieriger Atemweg




V1
V1
V2
D1
V4
V3
V2
V1
V1
D1
V2
V3
V4
V4
V3
V2
V1
V1
V1
V2
V1
V1
V2
V3
V4

Kieferschlinge





Tieranästhesie

- I.V. Einleitung wenn möglich langsam nach Wirkung
- Keine peripheren Muskelrelaxantien zur Intubation
- Intubation in Sternal- oder Seitenlage-Zunge raus


Danke!