

Úvod do anestezie S ochranou plic

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Oddělení anesteziologie, intenzivní a resuscitační medicíny nemocnice Děčín



KLINIKA ANESTEZIOLOGIE, PERIOPERAČNÍ A INTENZIVNÍ MEDICÍNY
FAKULTY ZDRAVOTNICKÝCH STUDIÍ UNIVERZITY J. E. PURKYNĚ V ÚSTÍ NAD LABEM
A KRAJSKÉ ZDRAVOTNÍ, a.s. – MASARYKOVY NEMOCNICE V ÚSTÍ NAD LABEM, o.z.



Krajská zdravotní
Nemocnice Děčín



Osnova

- Ochrana plic
- Význam PPC
- Protektivní ventilace koncept
- Úvod do anestezie s IOLPV strategií
- Jak to dělám já prakticky
- Jak dál s IOLPV
- Jak si stojíme s IOLPV



Proč je ochrana plic relevantní téma?

Postoperative pulmonary complications

A. Miskovic and A. B. Lumb*

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**Incidence PPC až
30% u LPSK i více!**

Incidence

It has been estimated that worldwide >230 million major operations occur annually.²⁸ The incidence of PPCs in major surgery ranges from <1 to 23%.^{45 78 12 17 20 22 23 29} Several studies have shown pulmonary complications to be more common than cardiac complications,^{8 30 31} and postoperative respiratory failure is the most common PPC.^{6 29} Table 2 shows major studies from

British Journal of Anaesthesia, 118 (3): 317–34 (2017)

doi: 10.1093/bja/aex002

Review Article

Incidence and Risk Factors of Pulmonary Complications after Robot-Assisted Laparoscopic Prostatectomy: A Retrospective Observational Analysis of 2208 Patients at a Large Single Center

by Jihion Yu¹ ✉, Jun-Young Park¹ , Doo-Hwan Kim¹ ✉, Sungwon Kim¹ ✉, Jai-Hyun Hwang¹ ✉, Hyungseok Seo^{2,*†} , and Young-Kug Kim^{1,*†} 

PPCs occurred in 30.9% of patients who underwent RALP. PPCs were associated with older age, higher body mass index, hypoalbuminemia, and lack of PEEP. The rate of ICU admission and the duration of ICU stay were greater in patients with than without PPCs. These findings emphasize the importance of identifying and managing risk factors for PPCs in prostate cancer patients undergoing RALP requiring the steep Trendelenburg position combined with pneumoperitoneum.



Jsou PPC ale klinicky významné?

Incidence of mortality and morbidity related to postoperative lung injury in patients who have undergone abdominal or thoracic surgery: a systematic review and meta-analysis

Ary Serpa Neto, Sabine NT Hemmes, Carmen SV Barbas, Martin Beiderlinden, Ana Fernandez-Bustamante, Emmanuel Futier, Markus W Hollmann, Samir Jaber, Alf Kozian, Marc Licker, Wen-Qian Lin, Pierre Moine, Federica Scavonetto, Thomas Schilling, Gabriele Selmo, Paolo Severgnini, Juraj Sprung, Tanja Treschan, Carmen Unzueta, Toby N Weingarten, Esther K Wolthuis, Hermann Wrigge, Marcelo Gama de Abreu, Paolo Pelosi, Marcus J Schultz, for the the PROVE Network investigators

The risk of postoperative lung injury was **lower in those who received lung-protective ventilation** during surgery than in those who received conventional ventilation (adjusted HR 0.31, 95% CI 0.19–0.45)

	HR for in-hospital mortality (95% CI)	HR for ICU discharge (95% CI)
All patients	9.58 (5.32–17.34)	0.45 (0.33–0.66)
Ventilation		
Conventional	14.22 (5.91–34.26)	0.39 (0.25–0.58)
Protective	6.07 (2.47–14.55)	0.71 (0.42–1.19)

HR=hazard ratio. ICU=intensive-care unit.

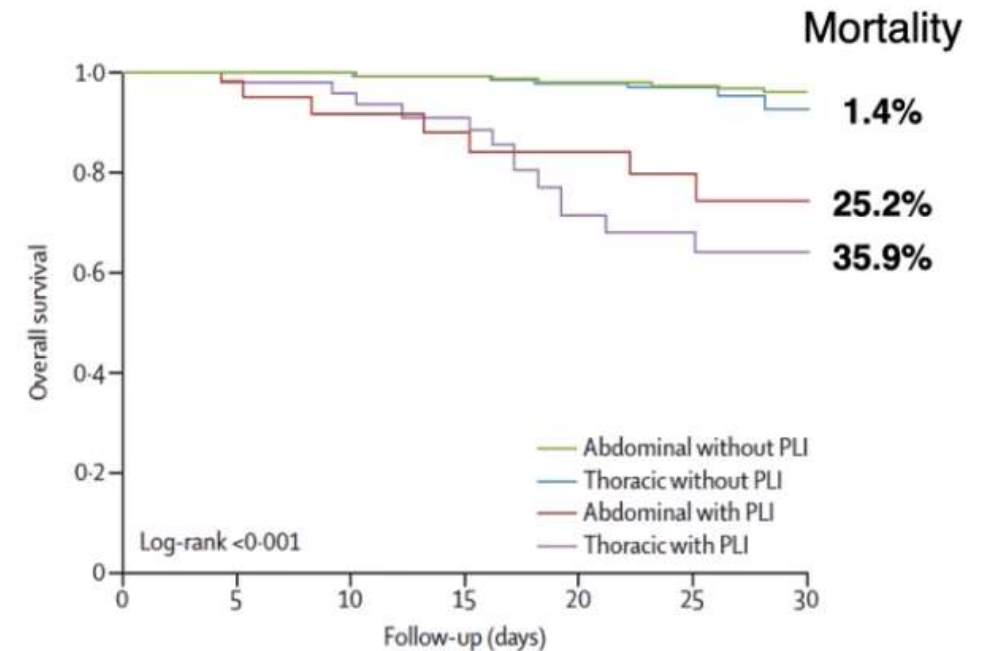
Table 4: Outcomes in patients with postoperative lung injury

Adjusted for age, severity of illness according to ASA score, smoking, and predisposing disorders

Articles



PPC skupina s vyšší mortalitou o 34%





Víme jak snížit riziko rozvoje PPC?

The New England Journal of Medicine

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VENTILATION WITH LOWER TIDAL VOLUMES AS COMPARED WITH
TRADITIONAL TIDAL VOLUMES FOR ACUTE LUNG INJURY
AND THE ACUTE RESPIRATORY DISTRESS SYNDROME

THE ACUTE RESPIRATORY DISTRESS SYNDROME NETWORK*

BJA

British Journal of Anaesthesia, 123 (6): 898–913 (2019)

RESPIRATION AND THE AIRWAY

Lung-protective ventilation for the surgical patient: international expert panel-based consensus recommendations

Christopher C. Young^{1,2,*}, Erica M. Harris², Charles Vacchiano^{1,3}, Stephan Bodnar³, Brooks Bukowy³, R. Ryland D. Elliott², Jaclyn Migliarese³, Chad Ragains², Brittany Trethewey³, Amanda Woodward⁴, Marcelo Gama de Abreu⁵, Martin Girard⁶, Emmanuel Futier⁷, Jan P. Mulier⁸, Paolo Pelosi^{9,10} and Juraj Sprung¹¹

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Non-invasive ventilation during induction

Non-invasive positive-pressure ventilation (NIPPV) or continuous positive airway pressure (CPAP) should be considered as useful adjuncts during anaesthesia induction. Contraindications, such as altered mental status, certain procedures (face/nose/oesophageal resection), or emergency procedures, should be considered before applying NIPPV or CPAP (Table 1; Q3.1). Head-up positioning combined with NIPPV/CPAP³⁰ further attenuates FRC decrease with anaesthesia induction. Using NIPPV/CPAP during induction increases P_aO_2 and duration of non-hypoxic apnoea.^{29,31–33} Two meta-analyses of

**Elevace horní poloviny těla
a NIV/CPAP/THRIVE
redukuje velikost atelektázy**

Effect of positive airway pressure during pre-oxygenation and induction of anaesthesia upon safe duration of apnoea

Melveetil S Sreejit¹, Venkateswaran Ramkumar

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TECHNOLOGY, COMPUTING, AND SIMULATION: RESEARCH REPORT

Prevention of Atelectasis Formation During Induction of General Anesthesia

Rusca, Marco MD^{*}; Proietti, Stefania MD[†]; Schnyder, Pierre MD[†]; Frascarolo, Philippe PhD^{*}; Hedenstierna, Göran MD, PhD[†]; Spahn, Donat R. MD^{*}; Magnusson, Lennart MD, PhD^{*}

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Anesthesia & Analgesia 97(6):p 1835–1839, December 2003. | DOI: 10.1213/01.ANE.0000087042.02266.F6

Lung recruitment and positive airway pressure before extubation does not improve oxygenation in the post-anaesthesia care unit: a randomized clinical trial

A.B. Lumb¹ • S.J. Greenhill^{1,2} • M.P. Simpson¹ ✉ • J. Stewart¹





Effectiveness of preoxygenation strategies: a systematic review and network meta-analysis

Clístenes Crístian de Carvalho^{1,*}, Helen A. Iliff², Jayme M. Santos Neto³, Thomas Potter⁴, Max B. Alves⁵, Lindsay Blake⁶ and Kariem El-Boghdady^{4,7}

¹Department of Surgery, Federal University of Campina Grande, Campina Grande, Brazil, ²Department of Anaesthesia, The Grange University Hospital, Cwmbran, UK, ³Hospital das Clínicas, Federal University of Pernambuco, Recife, Brazil, ⁴Department of Anaesthesia and Perioperative Medicine, Guy's and St. Thomas' NHS Foundation Trust, London, UK, ⁵Hospital Universitário Onofre Lopes, Natal, Brazil, ⁶University of Arkansas for Medical Sciences Library, Little Rock, AR, USA and ⁷King's College London, London, UK

Conclusions: Preoxygenation of adults before induction of general anaesthesia was most effective in terms of safe apnoea time when performed with high-flow nasal oxygen with patients in the head-up position in comparison with facemask alone. Also, high-flow nasal oxygen in the head-up position is likely to be the most effective technique to prolong safe apnoea time among those evaluated. Clinicians should consider this technique and patient position in routine practice.

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Review Article

Anaesthesia 2015, 70, 323–329

doi:10.1111/anae.12923

Original Article

Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE): a physiological method of increasing apnoea time in patients with difficult airways

A. Patel^{1,2} and S. A. R. Nouraei³

¹ Consultant Anaesthetist, The Royal National Throat Nose and Ear Hospital, London, UK

² Consultant Anaesthetist, ³ Specialist Registrar in Academic Otolaryngology, University College Hospital NHS Foundation Trust, London, UK



Pre-oxygenation with high-flow oxygen through the nasopharyngeal airway compared to facemask on carbon dioxide clearance in emergency adults: a prospective randomized non-blinded clinical trial

Original Article | Open access | Published: 26 December 2023

**Elevace horní poloviny těla
a THRIVE prodlužuje dobu
bezpečné apnoické pauzy**



A prospective, randomised controlled trial comparing the efficacy of pre-oxygenation in the 20° head-up *vs* supine position★

S. Lane,¹ D. Saunders,² A. Schofield,² R. Padmanabhan,² A. Hildreth³ and D. Laws⁴

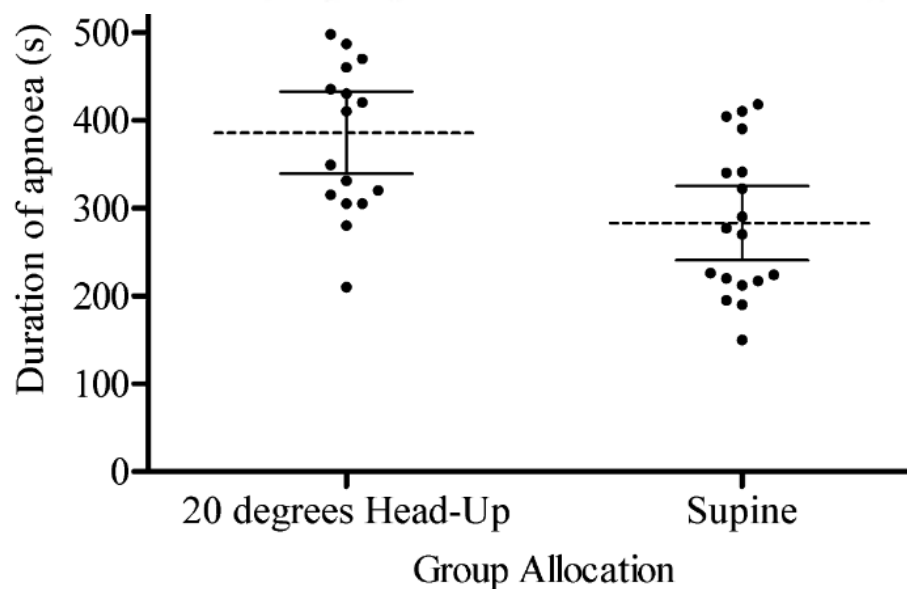
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⁴ Consultant Anaesthetist, City Hospitals Sunderland NHS Foundation Trust, Sunderland, SR4 7TP, UK

Doba bezpečné apnoické pauzy delší o 103 sekund u skupiny s elevací horní poloviny těla



(Table 2). Patients positioned 20° head-up had a longer mean (95% CI) apnoea time than those in the supine position (386 (343–429) s *vs* 283 (243–322) s, respectively; difference between the means 103 (42–163) s; $p = 0.002$) (Fig. 1).

Jak to dělám já...



Průtok 8 – 10 l/min

Těsnící obličejová maska



APL ventil 10 – 20 cmH2O



Jak to dělám já...

Anaesthesia 2015, 70, 323-329

doi:10.1111/anae.12923

Original Article

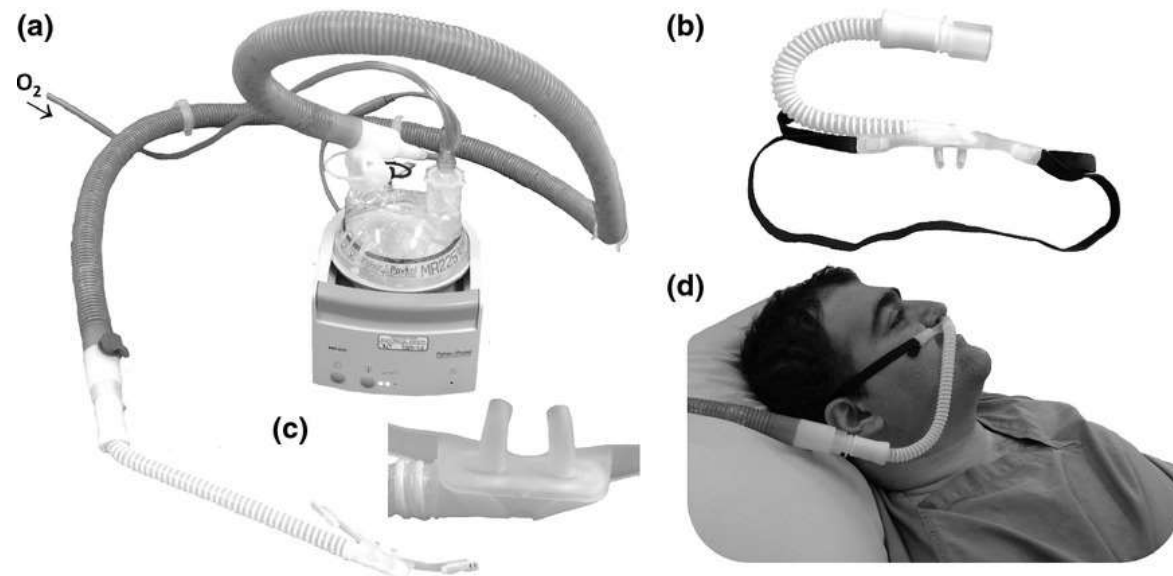
Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE): a physiological method of increasing apnoea time in patients with difficult airways

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Moje metoda volby THRIVE / HFNO

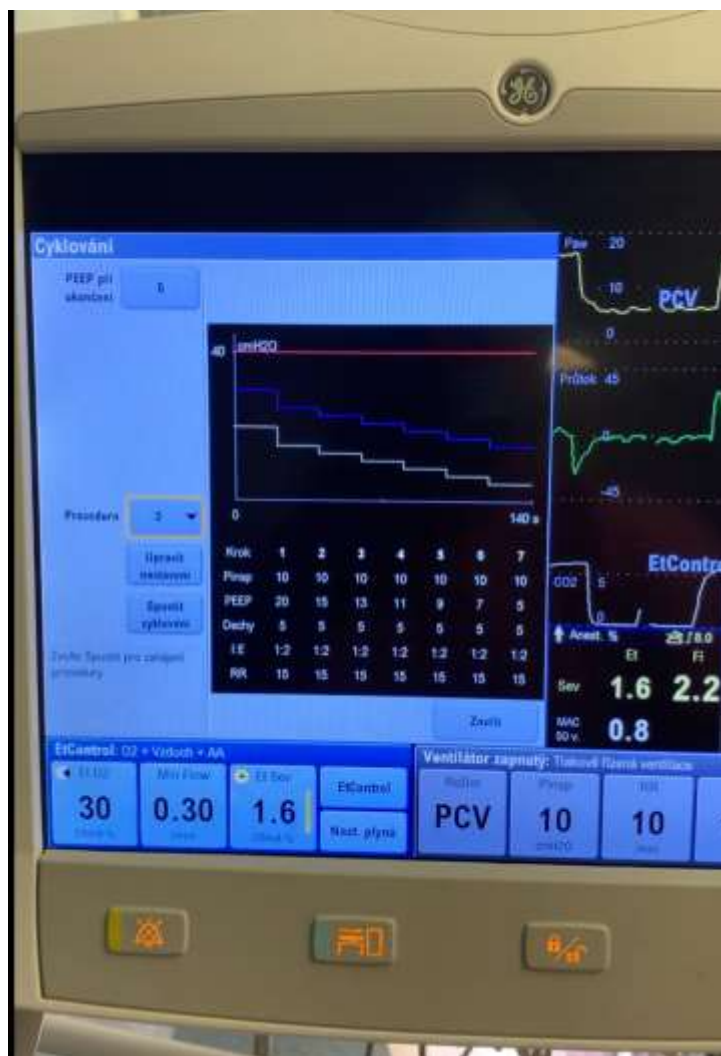


Efficacy of high-flow nasal cannula in improving the view of the glottis during flexible bronchoscopy for tracheal intubation

Ryosuke Osawa · Takashi Asai · Yasuhisa Okuda

THRIVE / HFNO prodlouží dobu bezpečné apnoické pauzy a zlepší laryngoskopický obraz

Co dál?



Jak na IOLPV dál...



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KZ03_STXXXX UL KAPIM SPLP Název dokumentu – příloha 1

STANDARDNÍ POSTUP
LÉČEBNÉ PÉČE



PROTEKTIVNÍ PLICNÍ VENTILACE BĚHEM CELKOVÉ ANESTEZIE U

Initial vent settings

Breathing volume - 8 ml/kg (IBW)

IBW calculation

- **Men** - IBW = height (cm) - 105

- **Women** - IBW = height (cm) - 108

PEEP - Initially 8 cmH₂O, then individualize PEEP

- Automatic PEEP titration preferred (available on GE Aysis CS 2 instruments)

- manual PEEP titration if automatic titration is not available e.g. according to maximum compliance

I: E - 1:2

- change I: E according to clinical situation, air trapping should be avoided (e.g. COPD or asthma patients)

Frequency - 15/min

FiO₂ - 0.4

- Aim to use the lowest possible FiO₂ to achieve a SpO₂ of 92 - 98% (or 88 - 92% in COPD patients)

Driving pressure - up to 15 cmH₂O (applies throughout the procedure)

- Driving pressure is calculated as P_{plateau} - PEEP (applies to volume-controlled mode)

- driving pressure is calculated as P_{high} - PEEP (applies to pressure-controlled mode)

P_{plateau} - up to 30 cmH₂O (valid for the entire performance period)

P_{high} - up to 30 cmH₂O (valid for the entire performance period)

Inspiration pauses for volume-controlled modes - 30%



Stále opomíjené IOLPV

The mandatory educational module increases the effect of implementing the standard operating procedure and adherence to the lung-protective ventilation concept during anaesthesia

[Kalina Michal](#) ✉, [Beneš Jan](#), [Škola Josef](#), [Vargová Patricia](#), [Bubeníková Adéla](#), [Škulec Roman](#) & [Černý Vladimír](#)

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Variability in the Use of Protective Mechanical Ventilation During General Anesthesia

Ladha, Karim S. MD, MSc^{*,†}; Bateman, Brian T. MD, MSc^{*,‡,§}; Houle, Timothy T. PhD^{*}; De Jong, Myrthe A. C.^{*}; Vidal Melo, Marcos F. MD, PhD^{*}; Huybrechts, Krista F. MS, PhD[‡]; Kurth, Tobias MD, ScD[§]; Eikermann, Matthias MD, PhD^{*}

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