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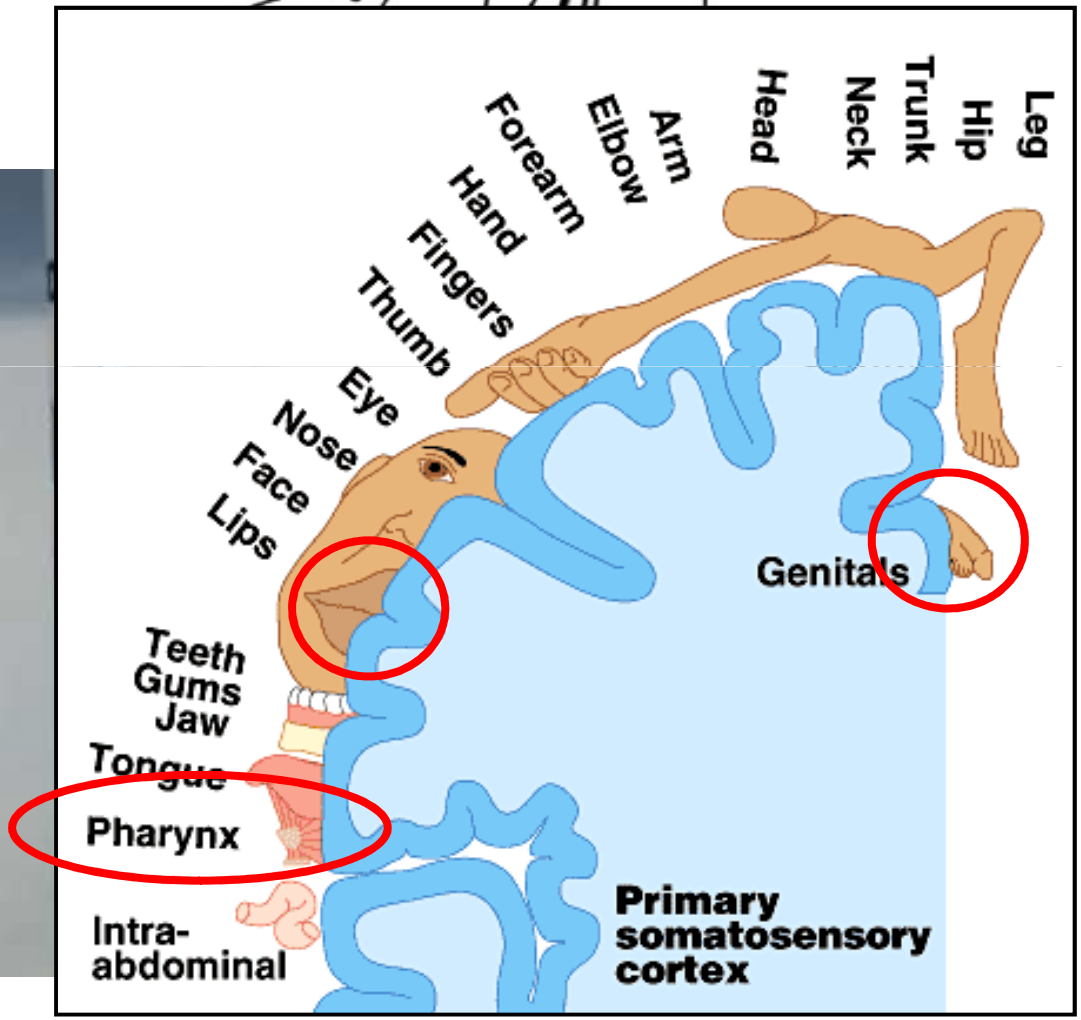
Tracheostomie v IM

MUDr. Michal Otáhal

Klinika anesteziologie, resuscitace a intenzivní medicíny
1. lékařská fakulta UK a Všeobecná fakultní nemocnice v Praze
U nemocnice 2, 128 08 Praha 2
www.karim-vfn.cz

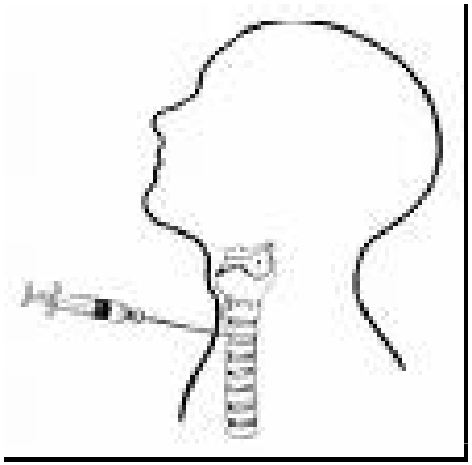
Mikroaspirace / VAP
Bolestivost
Sedace = ztráta reflexů



Historie PDTS

1969

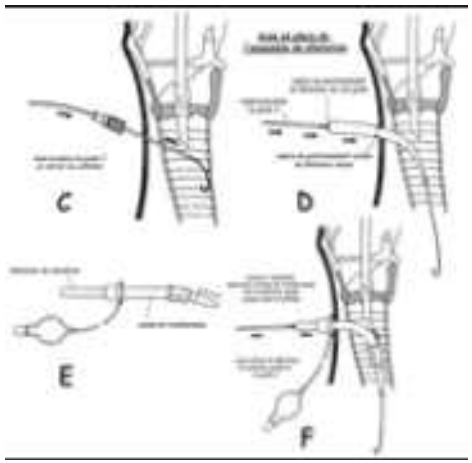
- **Toye and Weinstein et al.**
- **poprvé “Seldingerova technika” perkutánní TS**
- **publikováno v Surgery**



1985

- **Pasquale Ciaglia**
- **poprvé publikuje**

  “Dilational Percutaneous Tracheostomy”
- **Seldingerova technika**
- **CHEST**



1989

- **Paul et al.**
- **poprvé publikuje**

„ Bronchoscope-assisted percutaneous tracheostomy“

Techniky PDTS

Plastový dilatator

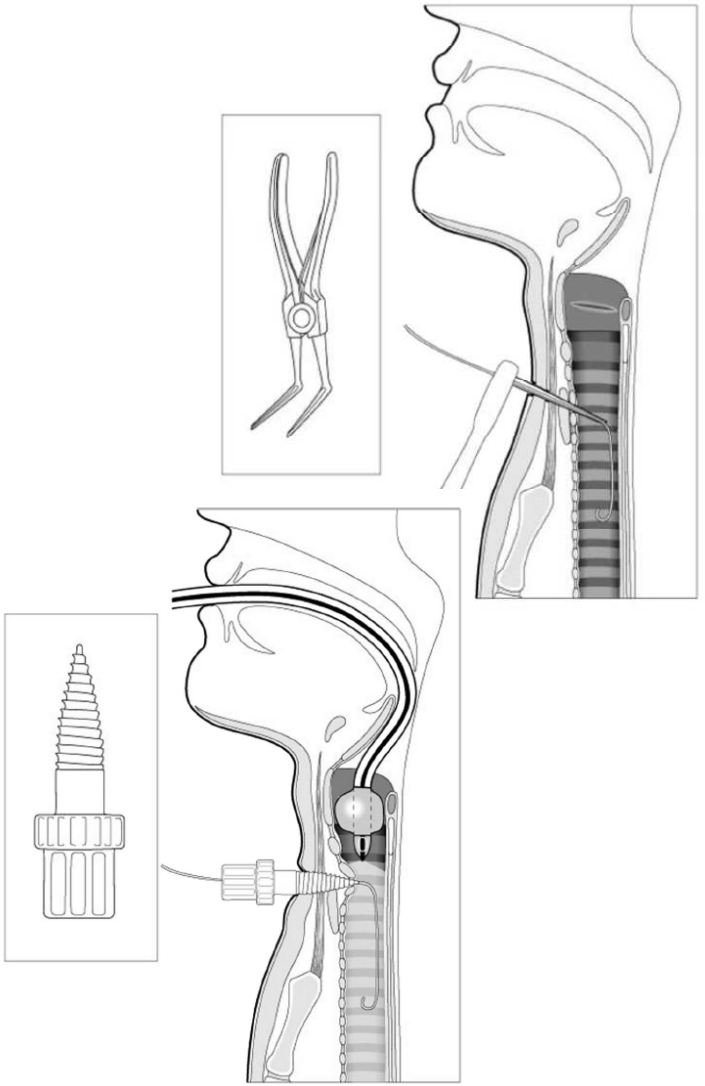
- **Ciaglia Technique, Blue Rhino**
  SSDT - single stage dilatation

Dilatace peán / kleště

- **Rapitrach**
- **Griggs Technique**
  (GWDF guidwire-dilating forceps)

Ostatní

- **Fantoni Translaryngeal Technique**
- **PercuTwist**
- **Ciaglia Blue Dolphin**



Punční versus chirurgická PDT/ST

Percutaneous dilatational tracheostomy versus surgical tracheostomy in critically ill patients: a systematic review and meta-analysis

Anthony Delaney[1], Sean M Bagshaw[2] and Marek Nalos[3]

17 x RTC studie, 1212 pacientů

71% multiple dilatator

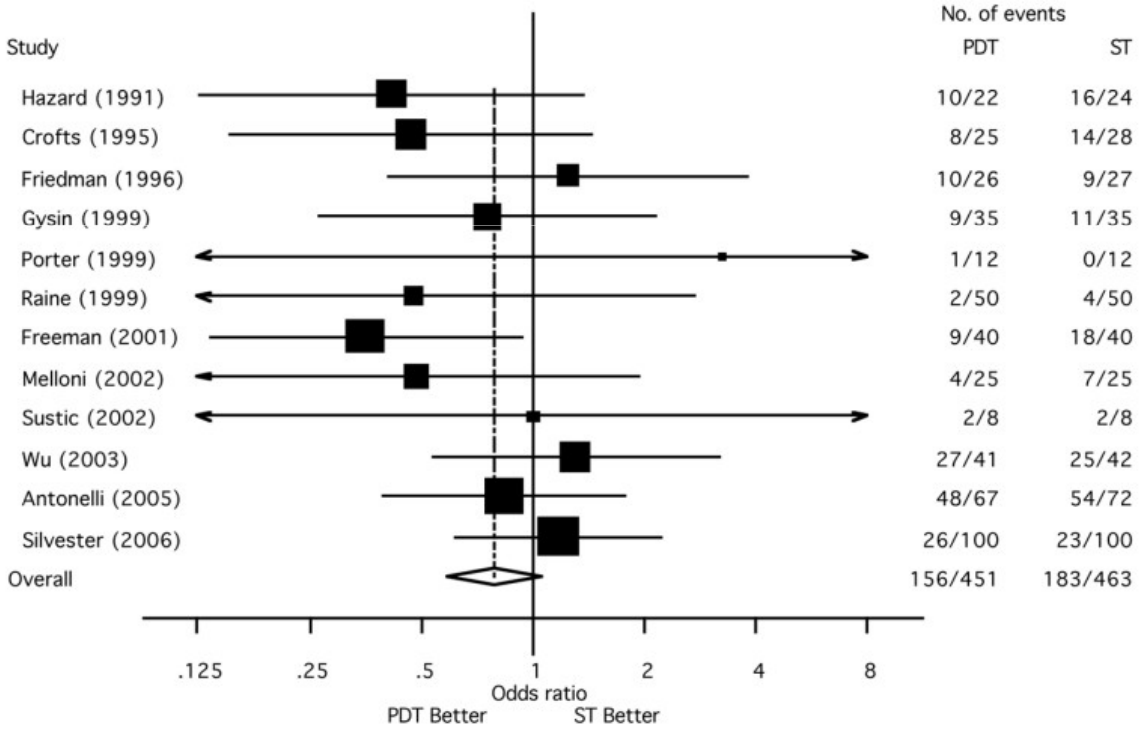
94% provedeno na ICU

Delaney, Critical Care 2006

Mortalita PDT/ST

Celkově 37% t.j. 339/914

není signifikantní rozdíl



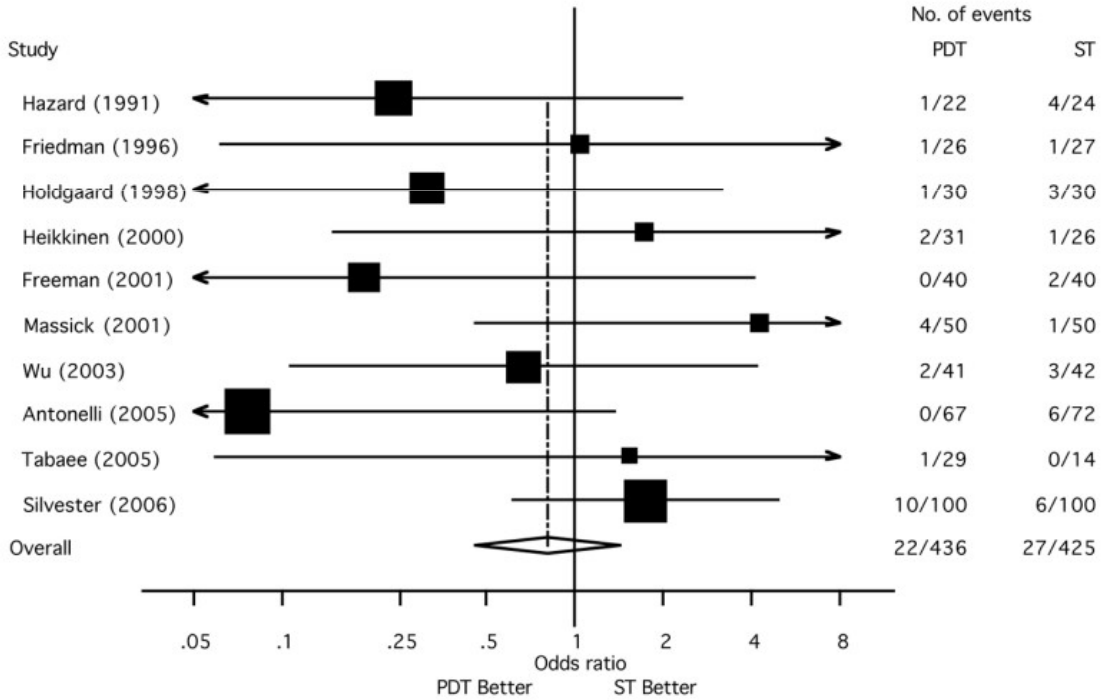
Pooled estimate of OR = 0.79 (95% CI 0.59 to 1.07, p=0.13)

Delaney, Critical Care 2006

Krvácení PDT/ST

- definované jako „vyžadující intervenci“
- chirurgická hemostáza nebo TRF
- ne krvácení, které ustane spontánně
- 5,7% t.j. 49/861

není signifikantní rozdíl



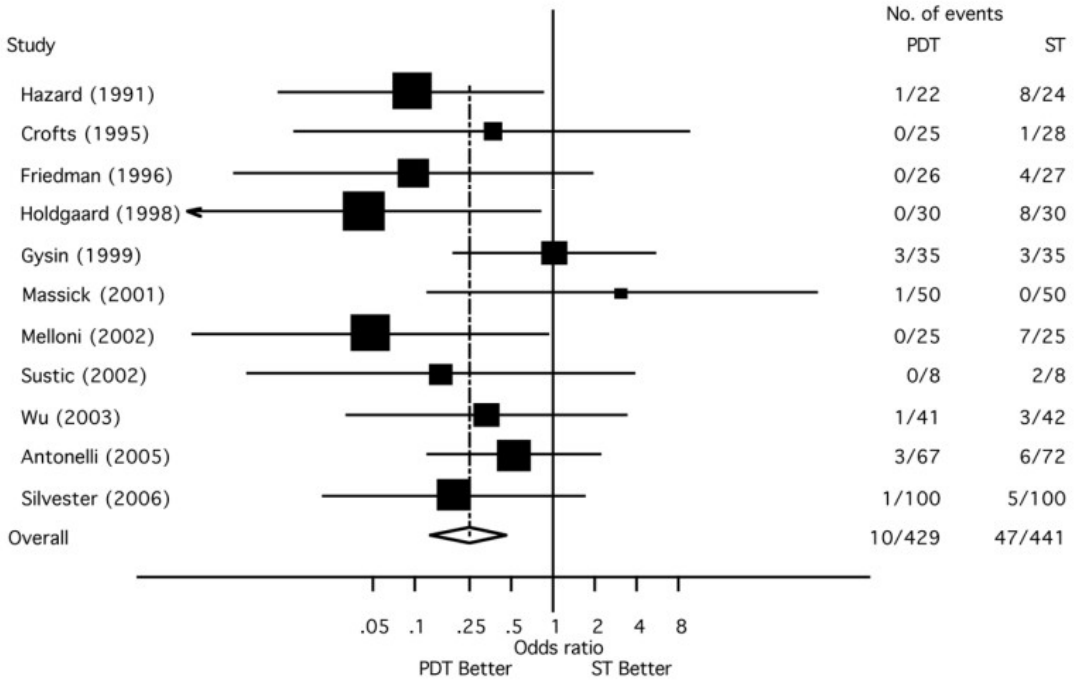
Pooled estimate of OR = 0.80 (95% CI 0.46 to 1.41) p=0.44

Delaney, Critical Care 2006

Ranné infekce PDT/ST

- definovné jako infekce vyžadující ATB
- 6,6% t.j. 57/870
- připisováno menší invazivitě výkonu

SIGNIFIKANTNÍ REDUKCE



Pooled estimate of OR = 0.28 (95% CI 0.16 to 0.49, p<0.0005)

Delaney, Critical Care 2006

Punční versus chirurgická PDT/ST

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- **Časné komplikace 2,6% 15/574**
  - **není signifikantní rozdíl**

  PDT or ST (OR = 1.3; 95% CI, 0.50 to 3.42, p = 0.59)

- **Pozdní komplikace**
  - **není signifikantní rozdíl**

Summary of long-term complications comparing percutaneous dilatational and surgical tracheostomy in critically ill patients

Study	Proportion available for long-term follow-up (%)		Duration of follow-up	Reported complications		
	ST	PDT		Complication	ST (%)	PDT (%)
Hazard [30]	8/24 (33)	11/22 (50)	1.5–3 months	Delayed closure	3 (38)	0 (0)
				Tracheal stenosis	5 (63)	2 (18)
				Cosmetic deformity	2 (25)	1 (9)
Gysin [29]	20/35 (57)	10/35 (29)	3 months	Delayed closure	2 (10)	1 (10)
				Tracheal cartilage lesion	1 (5)	0 (0)
				Unesthetic scar	8 (40)	2 (20)
Raine [35]	26/50 (52)	24/50 (48)	4 months	Tracheal stenosis	11 (46)	7 (27)
				Scar requiring surgical revision	5 (21)	2 (8)
Heikkinen [31]	11/56 (20)	11/56 (20)	18 months	Delayed closure	1	0
				Airway symptoms[a]	2	2
				Dysphagia	1	0
Wu [38]	12/42 (29)	15/41 (37)	2–4 years	Tracheal malacia	1 (8)	0 (0)
Melloni [33]	13/25 (52)	15/25 (60)	6 months	Tracheal malacia	0 (0)	1 (7)
				Tracheal stenosis	0 (0)	1 (7)
Antonelli [25]	13/72 (18)	18/67 (27)	12 months	Delayed closure	7 (54)	7 (39)
				Airway symptoms[a]	6 (46)	5 (28)
				Tracheal stenosis	2 (11)	1 (6)
				Need for stomaplasty	3 (16)	1 (6)
Silvester [39]	42/100 (42)	29/100 (29)	20 months	Airway symptoms[a]	10 (24)	12 (41)
				Stridor	2 (5)	0 (0)
				Vocal cord paralysis	1 (2)	0 (0)
				Unesthetic scar	2 (5)	0 (0)

Delaney, Critical Care 2006

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Punční versus chirurgická PDT/ST

- **PDT / ST na operačním sále**
  - **signifikantní redukce krvácení**

    OR = 0.29; 95% CI, 0.12 to 0.75, p = 0.01

  - **signifikantní redukce mortality**

    OR = 0.71; 95% CI, 0.50 to 1.0, p = 0.05

  - **trend k kratšímu trvání OTI před PDT**

    SMD = -0.15; 95% CI, -0.31 to 0.02, p = 0.08

Delaney, Critical Care 2006

Punční versus chirurgická PDT/ST

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Meta-Analysis Comparison of Open Versus Percutaneous Tracheostomy

Kevin M. Higgins, MD, FRCSC; Xerxes Punthakee, MD

15 studií – 973 patientů

- **PDTS vyšší riziko akcidentální dekanylace**
- **PDTS má nižší riziko:**
  - **ranných infekcí**
  - **jizvení**
- **PDTS mají trend k nižším komplikacím (OR = 0.75, CI 0.56 – 1.0)**
- **žádná diference: krvácení, subglotické stenozy, smrt**

„The **PDT technique, performed in the ICU, should be considered the technique of choice** for critically ill patients who require a tracheostomy“

Kevin, Laryngoscope, 2007

Punční versus chirurgická PDT/ST

European Journal of Cardio-thoracic Surgery 32 (2007) 412–421

www.elsevie

Review

Tracheotomy: clinical review and guidelines☆

Paul De Leyn [a,*], Lieven Bedert [b], Marion Delcroix [c], Pieter Depuydt [d], Geert Lauwers [e], Youri Sokolov [f], Alain Van Meerhaeghe [g], Paul Van Schil

- **reduction in tracheal stenosis** with PDT
- **cost savings** compared with ST on operating theatre

  (time as well as the use of operation room personnel and equipment)
- **time** interval between deciding for TS and performing the procedure is **shorter**

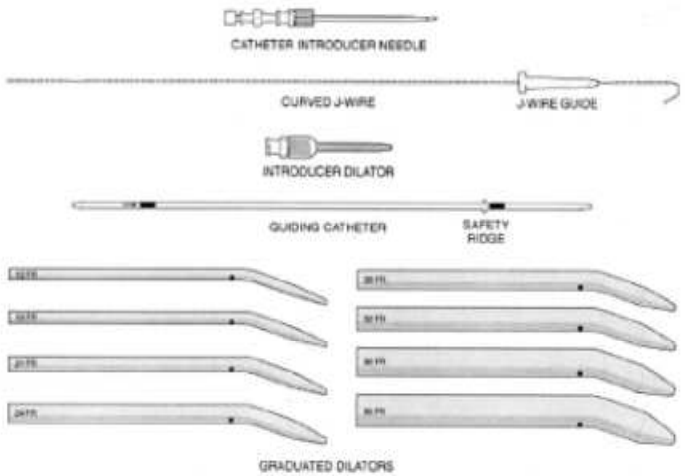
Recommendation:

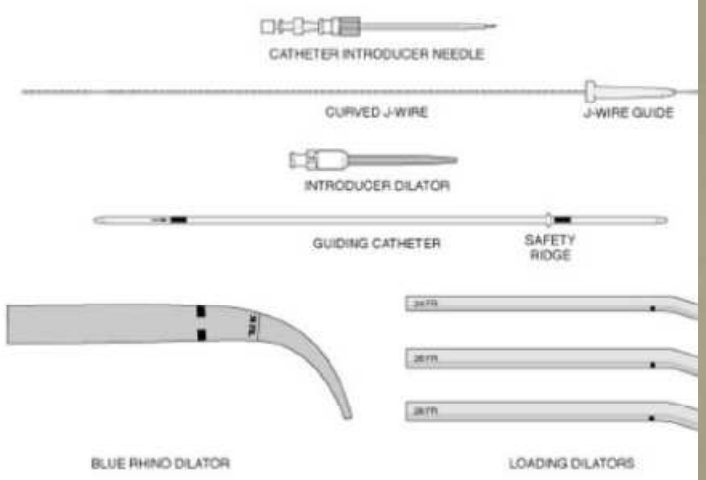
„PDT is recommended as the procedure of choice for performing elective tracheotomy in critically ill adult“

De Leyn, European Journal of Cardio-thoracic Surgery, 2007

Ciaglia, BlueRhino/BR – SSDT

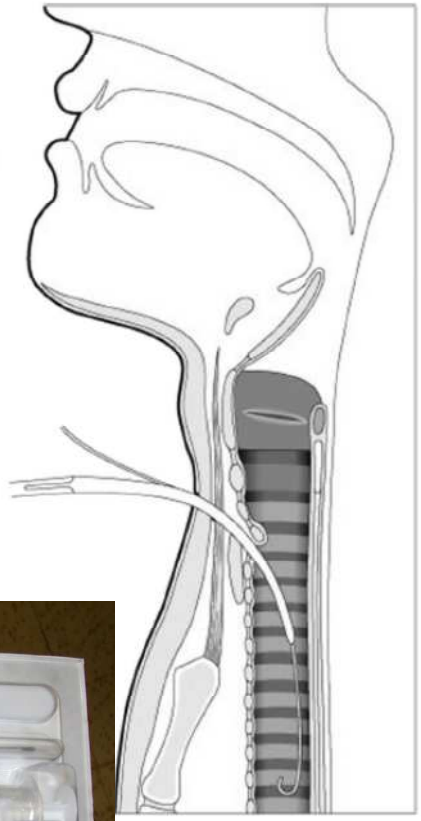
- 1985
- dilatační
- Seldingerova technika
- naslepo, únik vzduchu
- mezi cart.cricoidea a první tracheální





Griggsova technika

- 1990
- modifikovaný Howard-Kelly peán
- Seldingerova technika



Timing PDTS

A prospective, randomized, study comparing early percutaneous

Baseline Characteristics	Early Tracheotomy (n = 60)	Prolonged Translaryngeal Intubation (n = 60)
Human immunodeficiency virus[a]	2	3
Diabetes mellitus[a]	5	4
Coronary artery disease[a]	3	3
Malignancy[a]	3	3
Respiratory failure[a]	60	60
Renal failure (new onset)[a]	27	25
Severe sepsis[a]	42	40
Organ failure (≥3)[a]	35	33
High-dose vasopressor use (dopamine ≥5 $\mu \cdot kg^{-1} \cdot min^{-1}$ or norepinephrine)[a]	51	50
Overt disseminated intravascular coagulation[a]	51	50
Lactic acidosis[a]	32	33
Initial platelet count <50,000[a]	25	23
Community-acquired pneumonia[a]	15	16
Chronic obstructive lung disease[a]	32	31
Congestive heart failure[a]	10	9
Diabetic ketoacidosis[a]	4	3
Aspiration pneumonia[a]	12	11
Urinary tract infection[a]	11	13

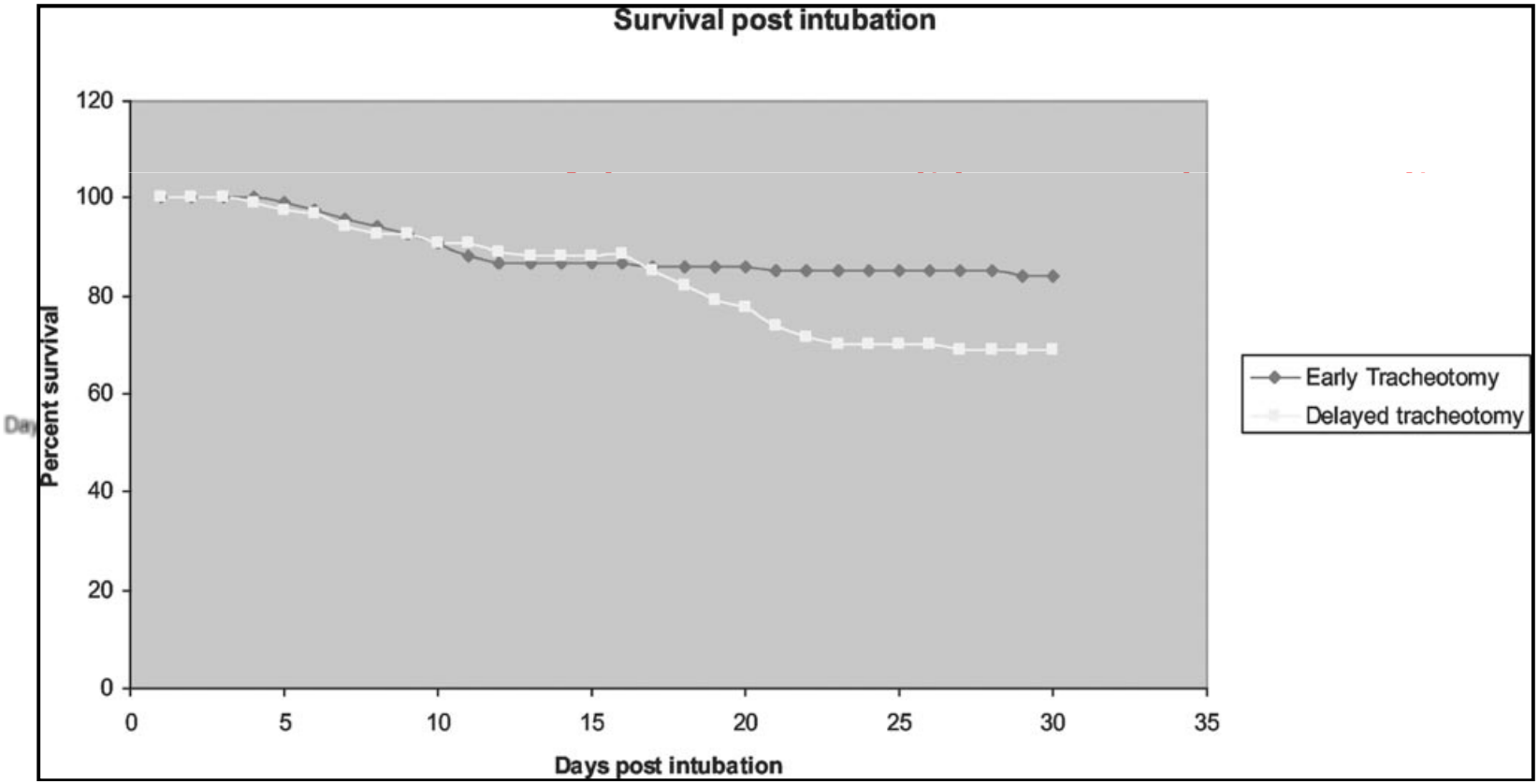
Rumbak MJ: *Crit Care Med* 2004

Timing PDTS

A prospective, randomized, study comparing early percutaneous dilational tracheotomy to prolonged translaryngeal intubation (delayed tracheotomy) in critically ill medical patients*

Mark J. Rumbak, MD; Michael Newton, MD; Thomas Truncale, DO; Skai W. Schwartz, PhD;

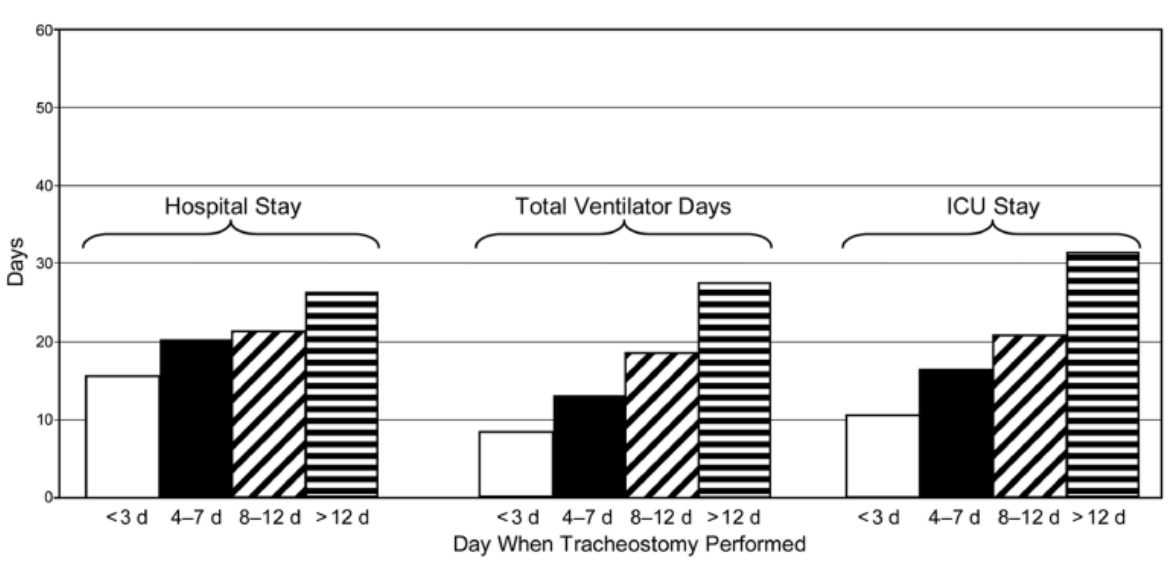
PDTS do 48h !!! X 14-16dní, 60+60 pacientů

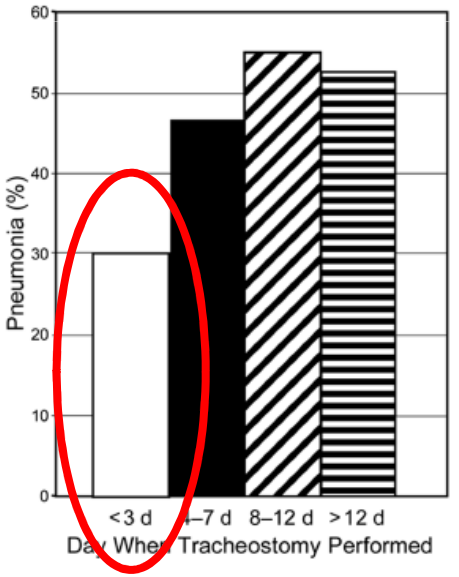


Timing PDTS

Schauer JM, Does acuity matter? Optimal timing of tracheostomy stratified by injury severity.
J Trauma 2009;6

- 6,880 intubovaných pacientů, 685 TS
- **snížení času pobytu v nemocnici, nižší čas na UPV, pobytu na ICU**
- **snížení incidence VAPu** ($p < 0.05$)





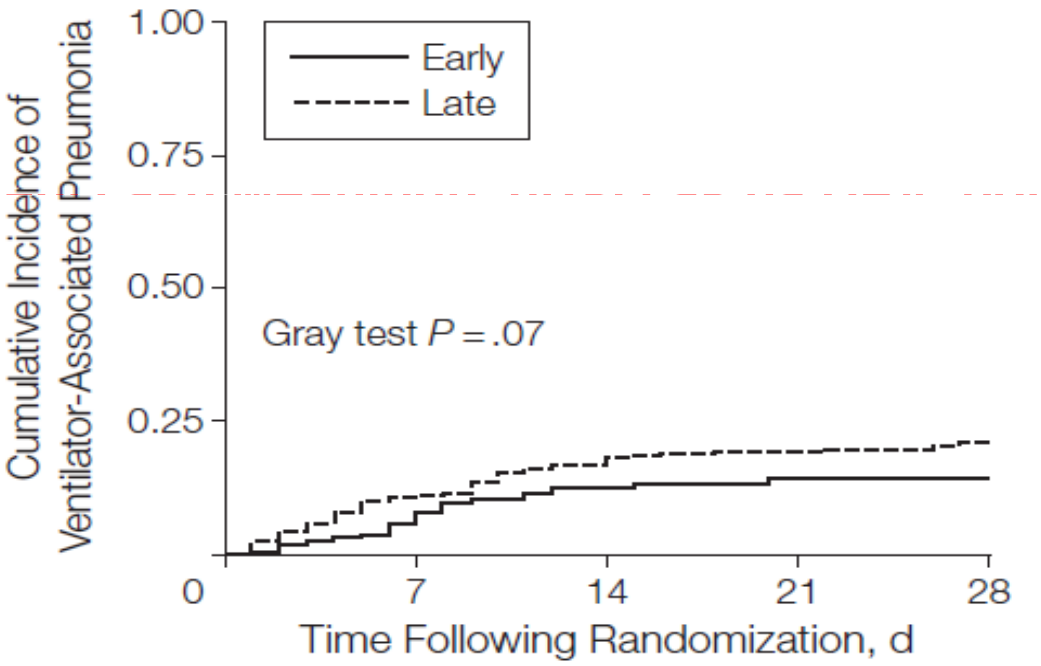
Timing PDTS

- ne
- sn ytu na ICU

Early vs Late Tracheotomy for Prevention
cally Ventilated

CARING FOR THE CRITICALLY ILL PATIENT

Ventilator-Associated Pneumonia According to Whether Patients Received an Early or a Late Tracheotomy



	Tracheotomy (n = 210)	P Value[a]
No. of day Ventilat	(0-17)	.02
ICU-fre	(0-8)	.02
Successfu	(68) [61-74]	.002
ICU discha	(39) [32-46]	.03
Survival at	(68) [63-75]	.25

Abbreviation
[a]P values ar

ril 21, 2010—Vol 303, No. 15

Terragni, JAMA 2010

Timing PDTS

European Journal of Cardio-thoracic Surgery 32 (2007) 412–421

www.elsevie

Review

Tracheotomy: clinical review and guidelines☆

Paul De Leyn [a,*], Lieven Bedert [b], Marion Delcroix [c], Pieter Depuydt [d], Geert Lauwers [e], Youri Sokolov [f], Alain Van Meerhaeghe [g], Paul Van Schil

In critically ill adult patients requiring prolonged mechanical ventilation, tracheotomy performed at an early stage (within the first week) may shorten the duration of artificial ventilation and length of stay in intensive care (level 1B)

Predikce dlouhodobé UVP

Prediction of Need for More Than 14 Days of Mechanical Ventilation

	Sensitivity (%)	Specificity (%)	Predictive Value Positive (%)	Predictive Value Negative (%)
PEEP > 10 cm H_2O	71	100	100	71
P_{aO_2}/P_{AO_2} < 0.40	57	80	80	57
No radiographic improvement	67	100	100	67
> 50% of lung fields with radiographic alveolar infiltrates	78	100	100	75

Heffner JFClinical predictors of prolonged translaryngeal intubation in patients with the adult respiratory distress syndrome Chest 1990;97(2):

Predictors for prolonged mechanical ventilation

Factors	Comments
Older age	Age >40 associated with prolonged mechanical ventilation but only in conjunction with other factors
Low GCS	GCS ≤7-8 on admission is highly predictive of prolonged mechanical ventilation Mean GCS ≤6 on day 3
Oxygenation	Measured either as A-a O2 gradient or PaO2/FiO2 ratio, low oxygenation associated with prolonged mechanical ventilation (A-a O2 ≥100 or PaO2/FiO2 ≤250)
Injury Severity Score	>25 associated with prolonged mechanical ventilation
Nosocomial pneumonia/ witness aspiration	Increased risk of prolonged mechanical ventilation
Reintubation	Increased risk of prolonged mechanical ventilation by 2.21 times
Hemodynamic/fluid balance	Use of Swan Ganz Catheter and positive fluid balance were associated with prolonged mechanical ventilation
SAPS	SAPS ≥16 on day 4 of ICU

Shiraw N, Bench-to-bedside review: Early tracheostomy in critically ill trauma patients *Critical Care* 2006, 10:201

Predikce dlouhodobé UVP

Predicting the need of tracheostomy amongst patients admitted to an intensive care unit: A multivariate model

American Journal of OTOLARYNGOLOGY
Head and Neck Medicine and Surgery

- 349 patients were admitted to the ICU
- 142 (40.7%) required invasive mechanical ventilation
- Most of them were male (60.5%), with a mean age of 65.8±16.7years.
- 24% patients required to be ventilated for 7days or more,
- 16 (46%) were tracheostomized for this reason

the regression model showed that

- **older age** (p=0.026),
- **Pa/Fi ratio < 200** (p=0.046)
- **presence of COPD** (p=0.035)
- **hypernatremia** (p=0.012) on intubation day were significantly associated with the requirement of prolonged OTI

Multivariate logistic regression			
	β coefficient (95% CI)	aOR (95% CI)	*p* value
Age (in tertiles)	0.68 (0.081 to 1.27)	1.97 (1.1 to 3.6)	0.026
Intubation day Pa/Fi < 200	0.97 (0.016 to 1.92)	2.63 (1.02 to 6.8)	0.046
Intubation day hypernatremia	1.35 (0.3 to 2.4)	3.9 (1.34 to 11.2)	0.012
Chronic obstructive pulmonary disease	1.1 (0.08 to 2.11)	3.0 (1.1 to 8.2)	0.035

Papuzinski, AJ of Otolaryngology, 2013

Timing PDTS + VAP

Should Tracheostomy Be Performed as Early as 72 Hours in Patients Requiring Prolonged Mechanical Ventilation?

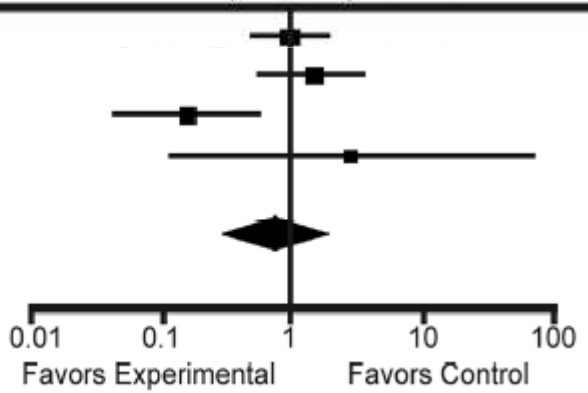
Charles G Durbin, Jr MD FAARC, Michael P Perkins MD, and Lisa K Moores MD

Pneumonia rate

First Author	Early Tracheostomy *n/N*	Late Tracheostomy *n/N*
Blot[5]	30/61	31/62
Dunham[10]	20/34	20/40
Rumbak[13]	3/60	15/60
Saffle[14]	21/21	22/23
Total	74/176	88/185

Heterogeneity: tau² = 0.59, chi-square = 8.43, degrees of freedom = 3, *P* = .04, I² = 64%

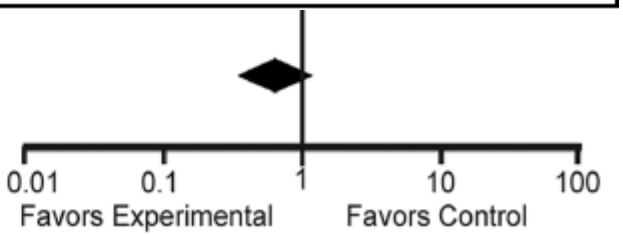
Test for overall effect: *P* = .58



Total	158/311	192/330

Heterogeneity: tau² = 0.34, chi-square = 13.39, degrees of freedom = 6, *P* = .04, I² = 55%

Test for overall effect: Z = 1.29, *P* = .20



Durbin CG, Respir Care. 2010

Timing PDTS - mortalita

Should Tracheostomy Be Performed as Early as 72 Hours in Patients Requiring Prolonged Mechanical Ventilation?

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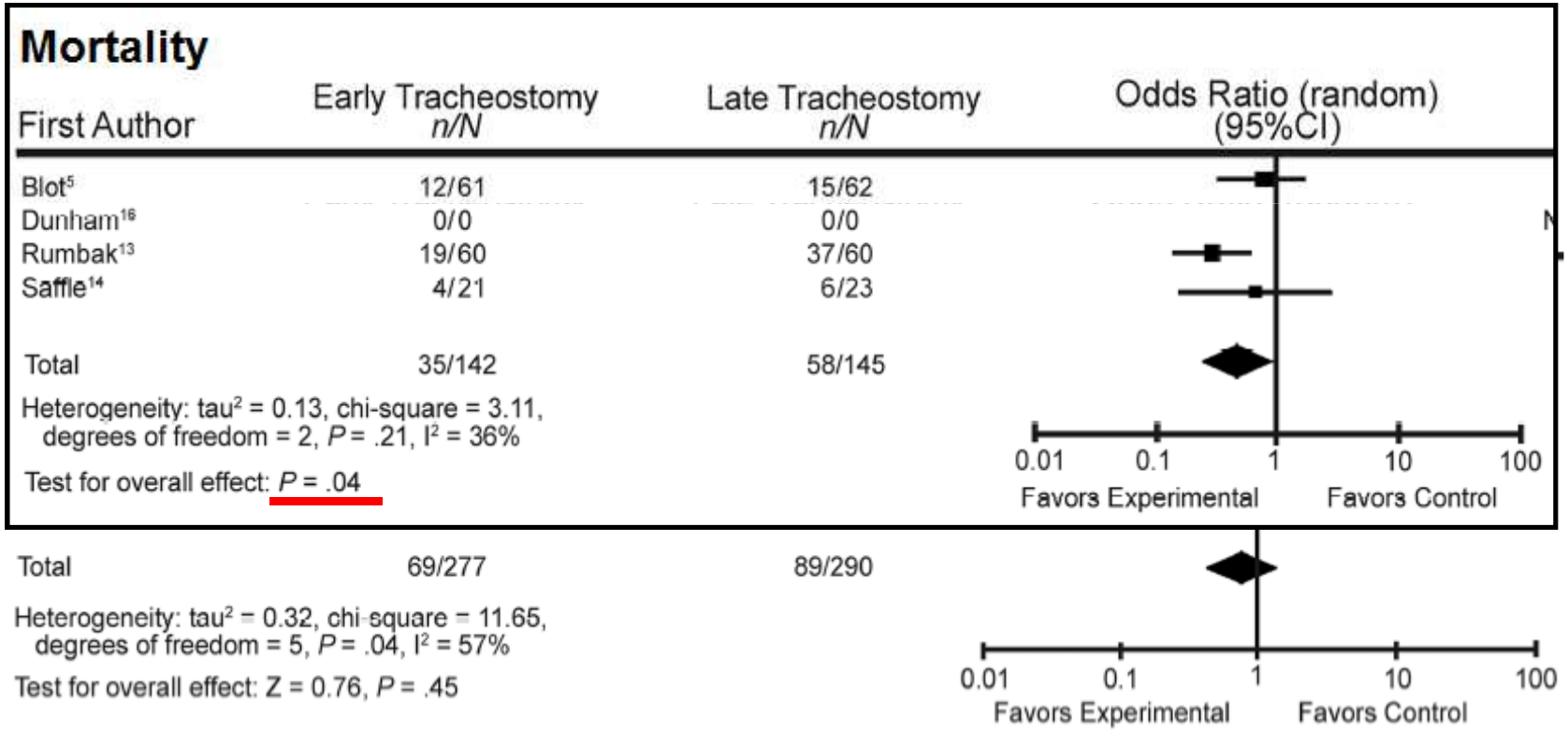


Durbin CG, Respir Care. 2010

Timing PDTS - TracMan study

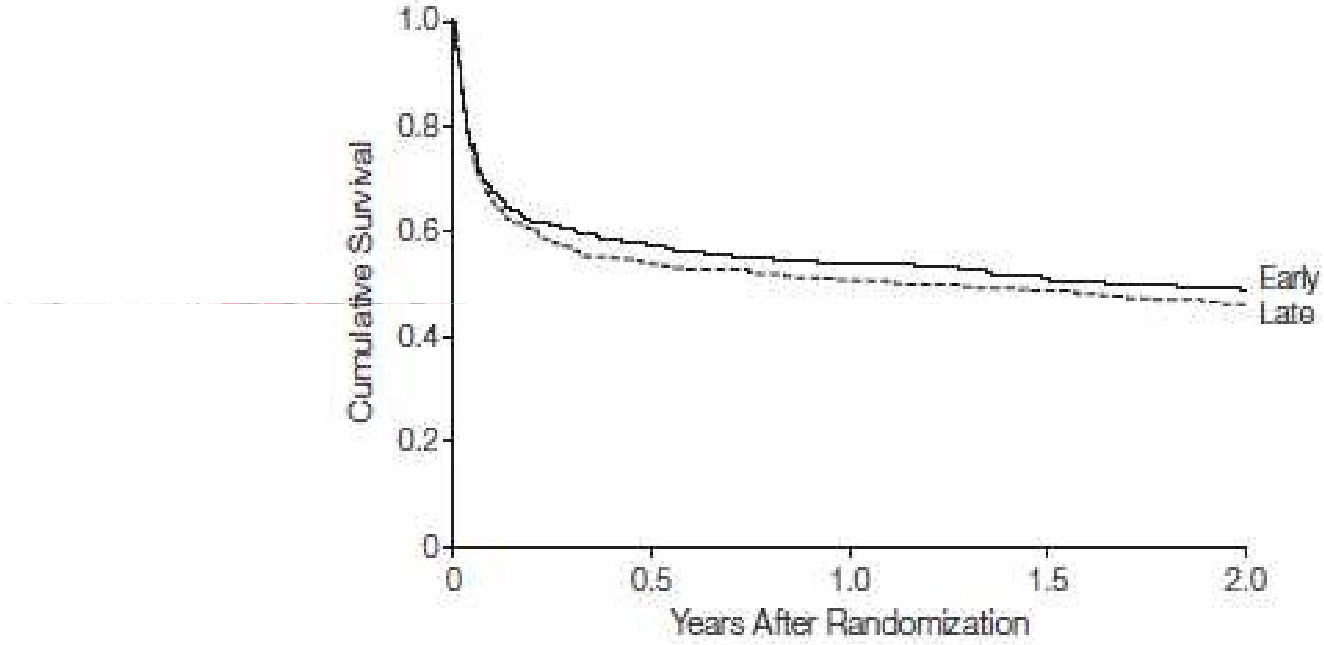
Effect of Early vs Late Tracheostomy Placement on Survival in Patients Receiving Mechanical Ventilation
The TracMan Randomized Trial

- multicentric, 2004 and 2011 involving 70 adult general and 2 cardiothoracic critical care units in 13 university and 59 nonuniversity hospitals in the UK
- **455 pts. Early - E (within 4 days) X 454 late - L (after 10 days) TS**
- **mortality 30 days after randomization was 30.8% E x 31.5% L**
- **2-year mortality was 51.0% E x 53.7% L**
- days of respiratory supp. **E 13.6** (12.0) X **L 15.2** (14.4) days (*P*=.06)
- through a TS **E 12.9** (11.8) X **L 16.1** (14.7) days
- median **ICU LOS** in survivors was **13.0 days E x 13.1 days L**

Tracheostomy-related complications were reported for 6.3% of patients
(5.5% in the early group, 7.8% in the late group)
Young D, JAMA, 2013

Timing PDTS - TracMan study

Figure 3. Kaplan-Meier Survival Curve to 2 Years After Randomization



No. at risk					
Early	451	261	244	230	221
Late	448	242	226	217	205

The survival of patients by treatment group for 2 years after randomization ($P = .45$, Cox-Mantel log rank test).

Young D, JAMA, 2013

PDTS

- **Jednoznačně PDTS**
- **Mortalitní efekt …. asi NE**
- **VAP ? ….. ANO u časné … časnější ☺**

- **časné provedení PDTS ? …… ANO**
- **CHOPN, stáří, APACHE II, AKI, paO2/FiO2**

- **Je to levnější …. sedace, dny UPV, dny ICU a komfortnější pro pacienta**

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Kurz Perkutánní dilatační tracheostomie

Program:

8:30 - 10:15 teoretická část - tracheostomie, PDTS

- koniotomie, BACT

10:25 - 11:15 praktický nácvik na modelu

11:30 - 12:30 praktický nácvik na kadaveru

oběd

13:30 - 14:15 možnosti řešení post-tracheostomických stenóz

14:30 - 15:30 real PDTS / event. opět nácvik na modelu

Pooperační

- nepolohovat 24h – minimalizovat možnost akcidentální dekanylace
- prvních 48-72 h při malpozici / dekanylaci **NEVRACET** kanylu, není kanál
- dle lit. 5-7dní, dle zkušeností 3. den již bezpečně
- při dekanylaci / malpozici provést OTI – pneumomediastinum, kontrolní RTG
- následné semioperační zavedení po identifikaci stomatu přes zavaděč

  (odsávací cévka, kanyla + drát)

- bronchoskopie, k toaletě DC, event. i k optimalizaci polohy kanyly v případě k.RUSCH

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1.LF UK A VFN V PRAZE

Děkuji za pozornost