



**KARIM**  
1.LF UK A VFN V PRAZE

# Tracheostomie

## v intenzivní péči v roce 2022

ČSARIM 2022

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**VŠEOBECNÁ FAKULTNÍ  
NEMOCNICE V PRAZE**



**1. LÉKAŘSKÁ  
FAKULTA**  
Univerzita Karlova

.... ŽÁDNÝ

# Tracheostomie na ICU

- **Techniky SSDT / GWDT**
- **msPDT, semi-open PT**
- **SONO kontrola – VŽDY!!!!**
- Příprava pacienta
- Tupá preparace až na tracheu, **NEJVÍCE BEZPEČNÉ!!!** provedení
- Punkce trachey/ FOB kontrola?
- Dilatace - SSD / HK peán
- Inserce, kontrola ventilace
- Prevence **AKCIDENTÁLNÍ** dekanylace

# Tracheostomie na ICU

- **Techniky provedení GWDT / SSDT**



GWDT

Ciaglia = SSDT

# Semi-Open PT

Volume 11 Supplement 2

27th International Symposium on Intensive Care and Emergency Medicine

## Safety of semi-open percutaneous tracheotomy when performed in critically ill burn patients

Poster presentation | [Open Access](#)

[K Gerold](#), [K Dhanjani](#), [L Price](#), [D Noppenberger](#) and [S Milner](#)

*Critical Care* 2007 11(Suppl 2):P216



- 20 patients admitted to a regional burn center
- The Blue Rhino tracheostomy kit was used for all PT
- **Major differences** from other approaches included **dissecting down to the pretracheal fascia, allowing the trachea to be seen and palpated**; bleeding was controlled using an electrocautery, and blood vessels were retracted from the field or ligated. The trachea was palpated as the endotracheal tube was withdrawn into the proximal trachea and a flexible **bronchoscope was used only to confirm the proper placement of the guidewire.**

# Semi-Open PT

## Semi-open percutaneous tracheostomy in burn patients

Michael J. Feldman<sup>a,\*</sup>, Stephen M. Milner<sup>b</sup>, Kamal M. Dhanjani<sup>c</sup>, Zeljko Stjepanovic<sup>b</sup>  
Kevin Gerold<sup>c</sup>

<sup>a</sup> Evans-Haynes Burn Center, Virginia Commonwealth University, 1213 East Clay St., Richmond, VA, United States

<sup>b</sup> Johns Hopkins Burn Center, Johns Hopkins University School of Medicine, Baltimore, MD, United States

<sup>c</sup> Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine, Baltimore, MD, United States

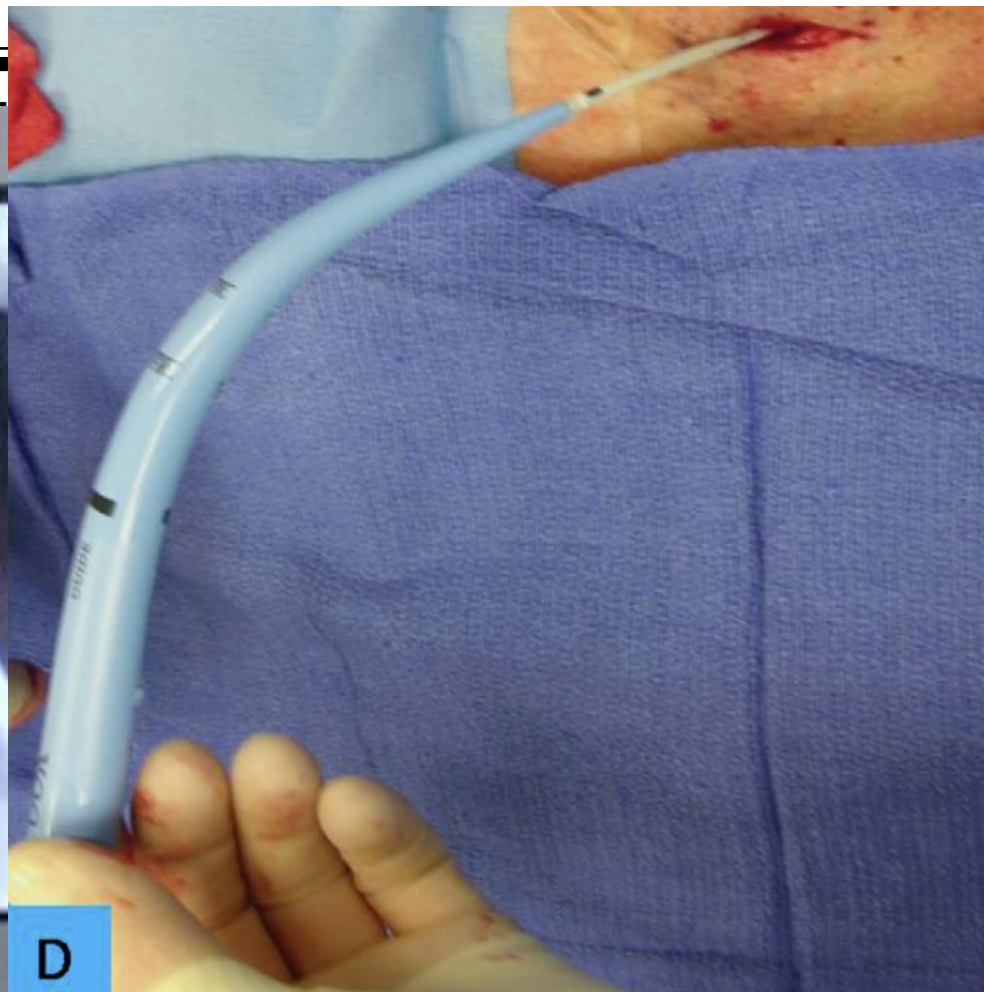


39 consecutive adult Burn ICU patients requiring long term ventilation underwent elective **semi-open percutaneous tracheostomy** during the 2 year time period (2005–2007)

The subcutaneous tissue and anterior cervical fascia were **dissected bluntly in the vertical plane down to the pretracheal fascia**. Electrocautery was used to achieve wound hemostasis and aid in the neck dissection during selective cases. Larger vessels, when encountered within the plane of dissection, were cauterized or ligated, and divided. This occurred infrequently.

Once the trachea was exposed, the **trachea was palpated** and the endotracheal tube was withdrawn carefully until its tip was felt to pass above the surgical site

# Semi-Open PT



Semi-open percutaneous

# msPDT

## mini-surgical PDT

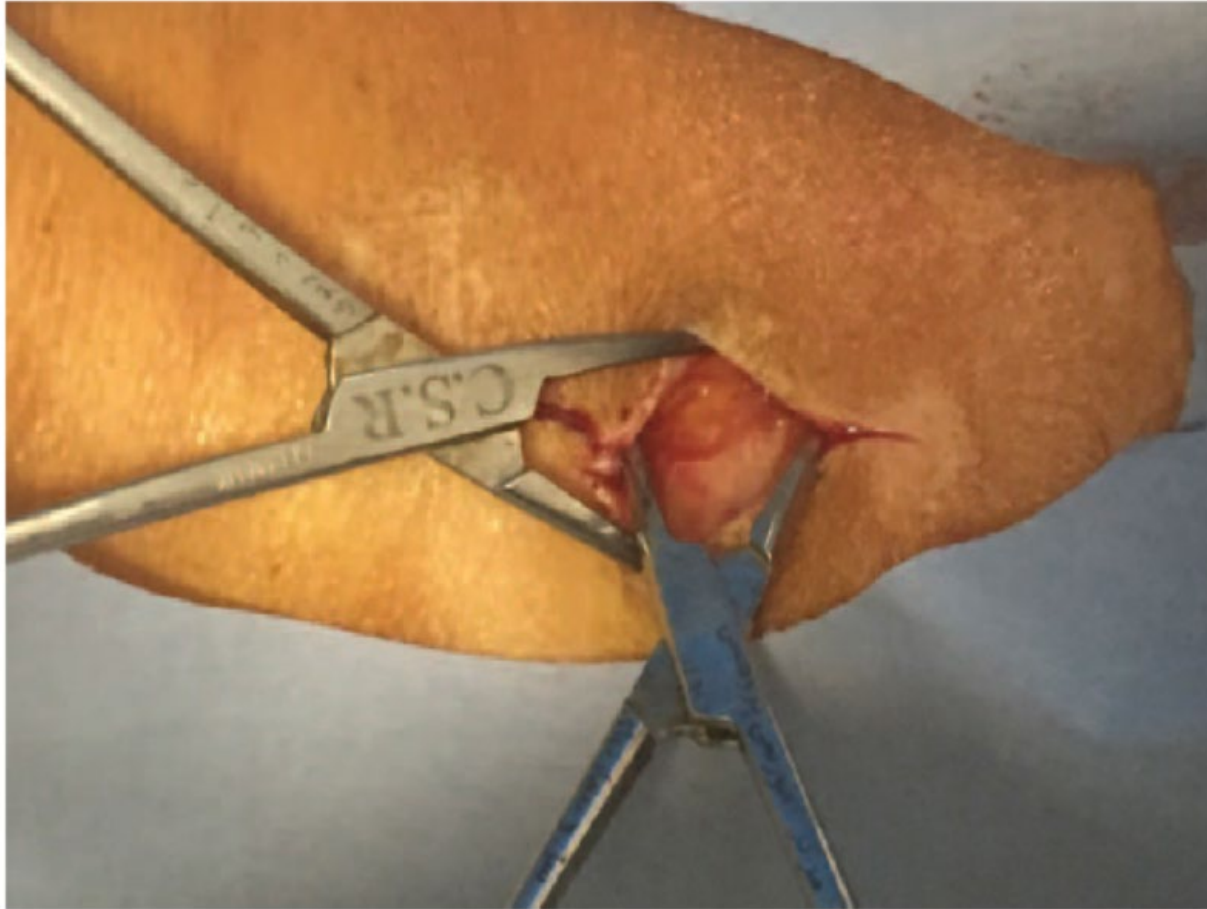


FIGURE 3. Step by step tissue retraction in msPDT procedure. msPDT = mini-surgical percutaneous dilatational tracheostomy.

OPEN

A Prospective Randomized Study Comparing Mini-surgical Percutaneous Dilatational Tracheostomy With Surgical and Classical Percutaneous Tracheostomy

*A New Method Beyond Contraindications*

*Seyed Mohammad-Reza Hashemian, MD, FCCM and Hadi Digaleh, MD,  
the Massih Daneshvari Hospital Group*

- **separation of subcutaneous tissue** through 2 curved **hemostats** was performed at vertical and horizontal directions by incision
- **step by step and progressively deep** in subcutaneous tissue so that the fibromuscular tissue, overlaying the tracheal ring, was seen
- **trachea was then manually palpated** by the left index finger and a catheter introducer needle **injected** between the **2. and 3. tracheal rings** with a **45° oblique angle to prevent posterior wall injury**



# msPDT

## mi

TABLE 3. Compared Complications of Classical PDT Versus msPDT

Variables	Standard PDT (n = 160)	Mini-surgical (n = 160)	P value
Time (min, mean [SD])**	7.5 (3.3)	2 (0.7)	<0.001**
<b>Minor complications</b>			
Cuff leak (number [%])	5 (3.1)	5 (3.1)	1.00
Posterior wall injury (number [%])	1 (0.6)	0 (0.0)	0.32
Difficult dilatation (number [%])	3 (1.9)	3 (1.9)	1.00
Hypotension (number [%])	37 (23.1)	32 (20.0)	0.50
Hypoxemia (number [%])	6 (3.8)	0 (0.0)	0.01**
<b>Intraoperative bleeding (number [%])</b>			
Mild (<2 cc)	120 (75.0)	112 (70.0)	0.32
Moderate (2–5 cc)	12 (7.5)	6 (3.8)	0.14
Severe (>5 cc)	11 (6.9)	2 (1.3)	0.01**
Loss of airway (number [%])	3 (1.9)	2 (1.3)	0.65
Postoperative bleeding (number [%])	2 (1.3)	1 (0.6)	0.56
Multiple attempts at insertion (number [%])	6 (3.8)	5 (3.1)	0.75
Paratracheal insertion (number [%])	6 (3.8)	0 (0.0)	0.01**
Reintubation (number [%])	3 (1.9)	1 (0.6)	0.31
<b>Major complications</b>			
Pneumomediastinum (number [%])	0 (0.0)	1 (0.6)	0.32
Pneumothorax (number [%])	3 (1.9)	2 (1.3)	0.65
Subcutaneous emphysema (number [%])	3 (1.9)	2 (1.3)	0.65

msPDT = mini-surgical percutaneous dilatational tracheostomy, SD = standard deviation.

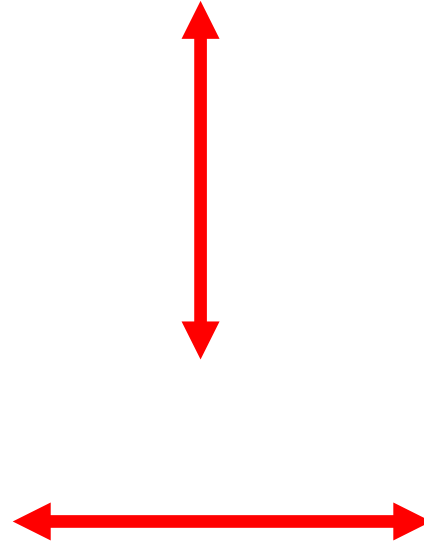
\*\* Significance of the effect at significance level of 5%. Values are mean (SD) or number (percentage).

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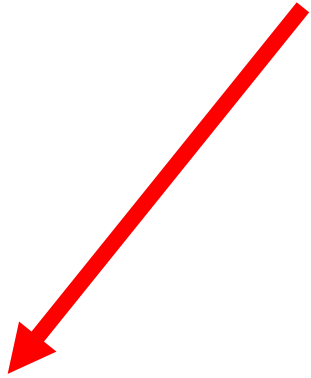
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# SONO kontrola – VŽDY!!!

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# SONO - zvyšuje bezpečnost?

**REVIEW** Open Access

Use of ultrasound guidance to improve the safety of percutaneous dilatational tracheostomy: a literature review

 **CRITICAL CARE**

**Table 1** Summary of the best available evidence supporting the use of ultrasound-percutaneous dilatational tracheostomy

Type of US guidance used	Author	Study design	Number of patients	Outcome	Complications
Pre-procedural	Bonde <i>et al.</i> [39]	Prospective Observational No control group	25	Changed puncture location in nine patients (32.1 %); elective vessel ligation in three patients (10.7 %)	in two
	Kollig <i>et al.</i> [43]	Prospective Observational No control group			in one
Real-time	Sustić <i>et al.</i> [34]	Retrospective Control group was landmark-guided.	62	Changed puncture location in 17 patients (23.6 %); changed to surgical tracheostomy in one patient (1.3 %)	cture: 36 % t significant)
	Rajajee <i>et al.</i> [46]	Prospective Feasibility No control group			mplications
Pre-procedural US and real-time	Guinot <i>et al.</i> [24]	Prospective Observational No control group	25 (patients with severe coagulopathy were excluded)	was changed in 25 patients (50 %).	(6 %); wound infection in one patient (2 %)
Real-time US guidance	Rudas <i>et al.</i> [47]	Randomised controlled trial	164	The puncture sites designated at the physical examination were reconsidered in 23.8 % of 164 cases. The mean procedure times for the US group and the controls were 24.09 minutes ± 8.05 and 18.62 minutes ± 6.34, respectively (P = .001).	decrease in procedural complications was not statistically significant: 22 % in the US group versus 37 % in the landmark group (P = 0.24).
Pre- and post-procedural US	Yavuz <i>et al.</i> [48]	Randomised controlled trial	100		perioperative complication were slightly lower in the US group (7.8 %) than in the control group (15.0 %); not statistically significant (P = 0.054).



# Příprava před PDTs

# Lokalizace a LA

# Incize a TUPÁ preparace

# TUPÁ preparace

# Punkce

- mezi 3-4 prstencem? nejméně komplikací ? 1/2-2/3, horní / dolní  
*Ciaglia mezi cric. a 1.*
- kanál / **punkce kolmo** – malpozice kanyly – konec proti přední stěně  
**max. ve středu** X tangenciálně - následné obtížné zavádění
- mezi chrupavky !!!, tuhý odpor, obtížná dilatace, „**drnkání**“ **jehly o OT kanylu**
- fraktura chrupavek není vyjímečná, ale může být stenóza
- **kont. sukce při punkci** + promptní stáhnutí kanyly zabrání poškození zadní stěny
- **Zásada!!** - volný pohyb vodícího drátu, všechny manipulace s retrakcí,  
prevence zalomení drátu

# Punkce

# Punkce ..... „drnkání“

# Pre-dilatace



# Dilatace peánem

# Inserce + kontrola

# SSDT



# Dilatace SSD

# Dilatace SSD bez prepáce

# Post - PDTS péče

## - prevence AKCIDENTÁLNÍ dekanylace

- 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 **urgentně OTI**  
nebezpečí paratracheální inserce, pneumomediastina, kontrolní RTG
- **následné semioperační zavedení po identifikaci stomatu přes zavaděč**  
(odsávací cévka, kanyla + drát)

# Výměna za ARMOVANOU

prevence AKCIDENTÁLNÍ dekanylace



# Reinzerce po urgentní OTI po AKCIDENTÁLNÍ dekanylaci





# FOB kontrola ?????

- **snížení rizika poškození zadní stěny**
  - verifikace umístění vpichu i pozice TS kanyly
  - promptní reintubace při akcidentální extubaci (doporučení - level 1C)
  - průsvit - omezení ventilace, kanyla min. 7,5 (6?), reintubace
  - event. LMA, ale zvyšuje riziko aspirace
  - **monitorace CO2 kruciální**, limitace u elevace ICP>20, pH < 7,2, pCO<sub>2</sub> > 8
  - **bronchoskop vždy v ET kanyle!!!**, kontrola - světlo nad místem punkce
- X**
- další specialista, cena
  - **střední linie – msPDTS ... preparace až na tracheu eliminuje potřebu FOB**
  - **kont. sukce prevencí poškození zadní stěny**
  - když uvidíme krvácení / frakturu chrupavky .... tak ? kontrola
  - **akcidentální punkce - extrémní cena za opravu**

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Original Investigation

## Use of Bronchoscopy in Percutaneous Dilational Tracheostomy

Shekhar K. Gadkaree, BS; Diane Schwartz, MD; Kevin Gerold, DO, JD; Young Kim, MD, PhD

149 patients who underwent **modified PDT** during the study period and met the inclusion criteria,

107 were in the

42 were in the

**Complication**

(n=)

The rate of co

The mean (SD)

the no-bronc

**Table 3. Multiple Logistic Regression of Factors Associated With Modified Percutaneous Tracheostomy Complications**

Characteristic	Complications <sup>a</sup>	
	Odds Ratio (95% CI)	P Value <sup>b</sup>
Bronchoscope use	6.7 (1.3-43.4)	.04
OR procedure <sup>c</sup>	1.1 (0.2-7.6)	.91

Abbreviation: OR, operating room.

## CONCLUSIONS AND RELEVANCE:

Percutaneous dilational tracheostomy can be performed with similarly low complication rates with or without the use of bronchoscopy



# Přeji více spok

# ntů

