Pronační poloha

- good end of a long story

Stibor B.

ICU, Landesklinikum Baden bei Wien, Austria

no conflict of interest

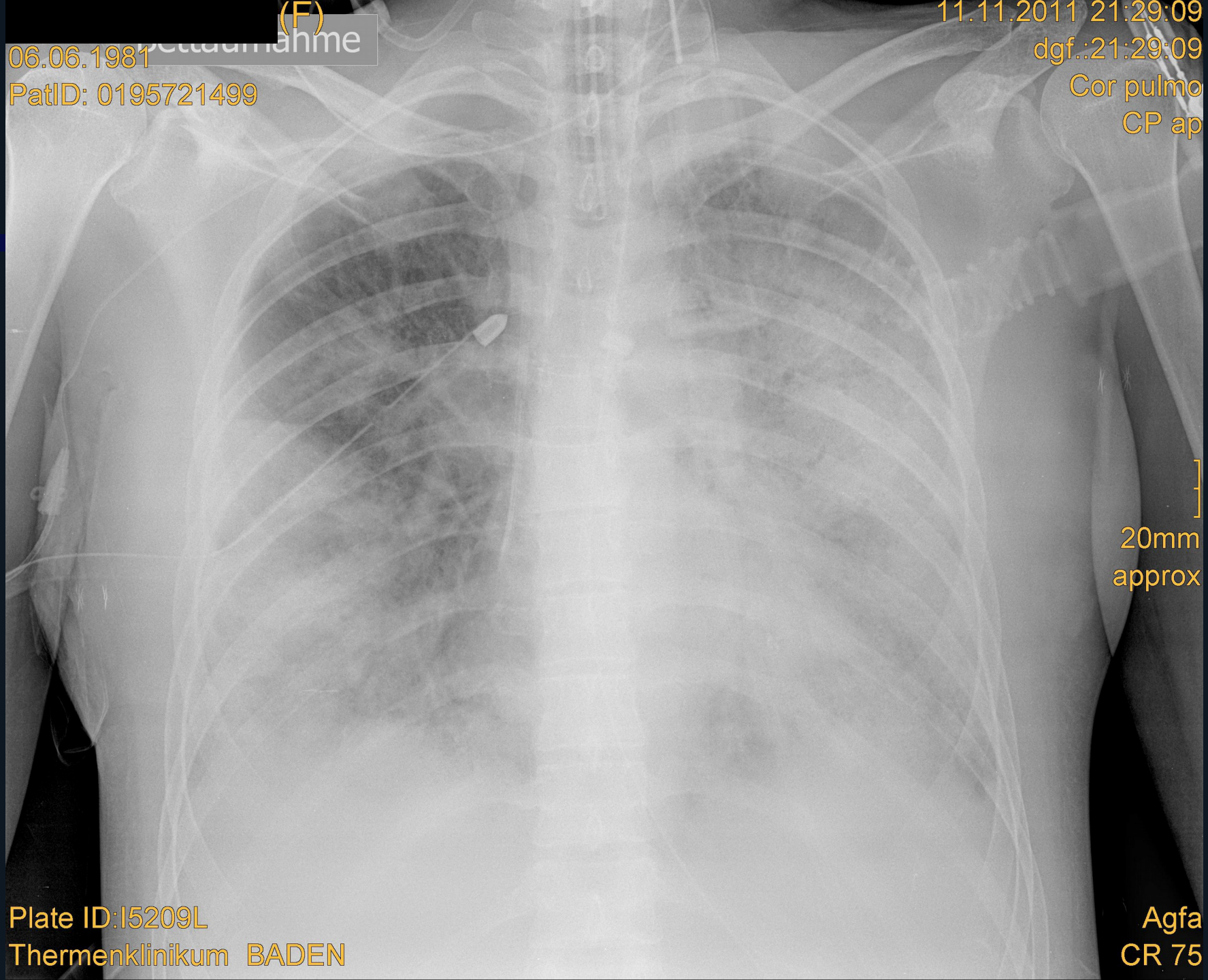
Stibor B.

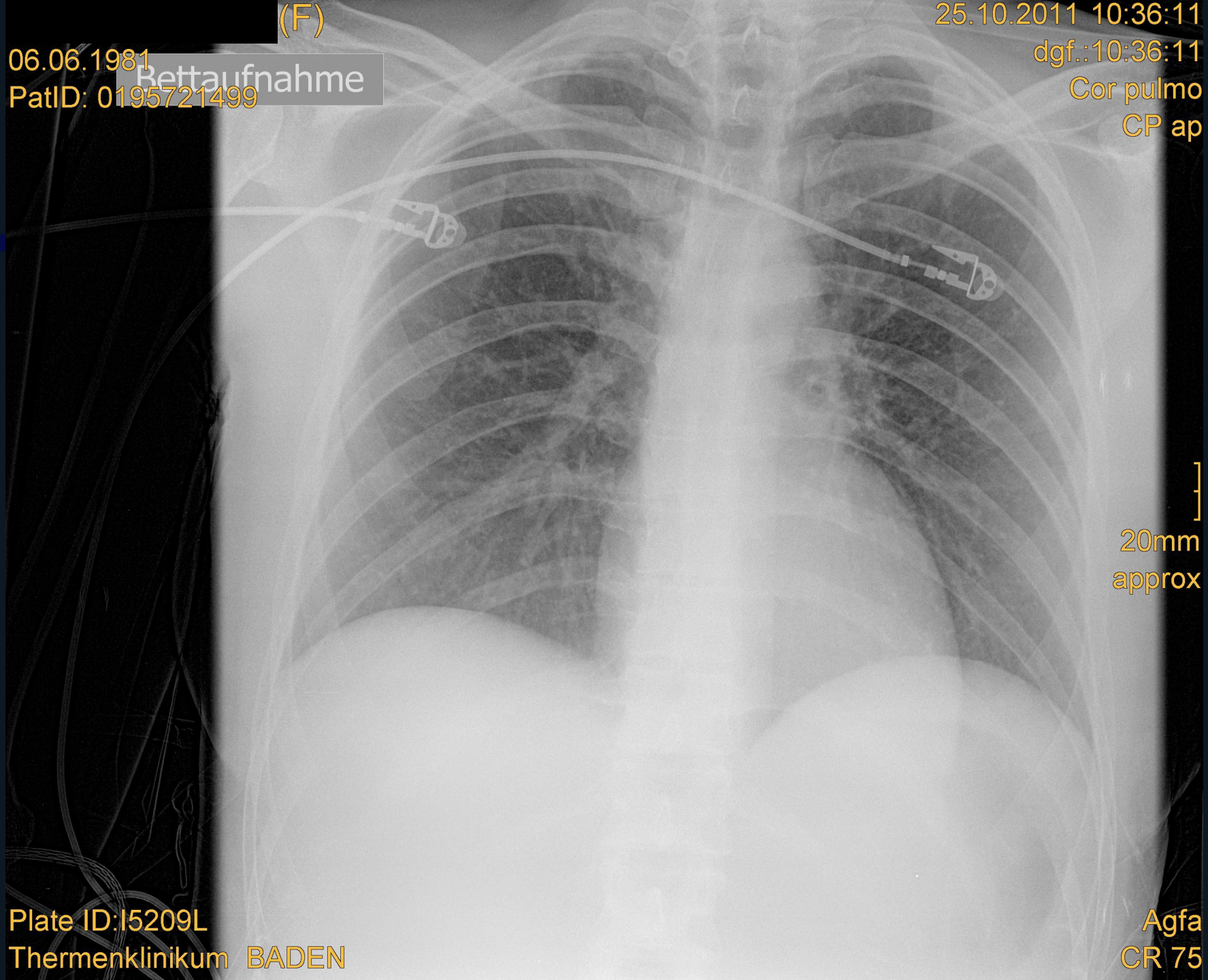
ICU, Landesklinikum Baden bei Wien, Austria

přehled

1. ARDS
2. léčebné modality
3. pronační poloha – historie, studie
4. mechanismus účinku pronace
5. indikace, kontraindikace, podmínky
6. praktické provedení pronace
7. pronace a … ?

ARDS


(F)
06.06.1981
PatID: 0195721499
11.11.2011 21:29:09
dgf.:21:29:09
Cor pulmo
CP ap
20mm
approx
Plate ID:I5209L
Thermenklinikum BADEN
Agfa
CR 75


[redacted] (F)
06.06.1981
PatID: 0195721499
Bettaufnahme
25.10.2011 10:36:11
dgf.:10:36:11
Cor pulmo
CP ap
20mm
approx
Plate ID:I5209L
Thermenklinikum BADEN
Agfa
CR 75

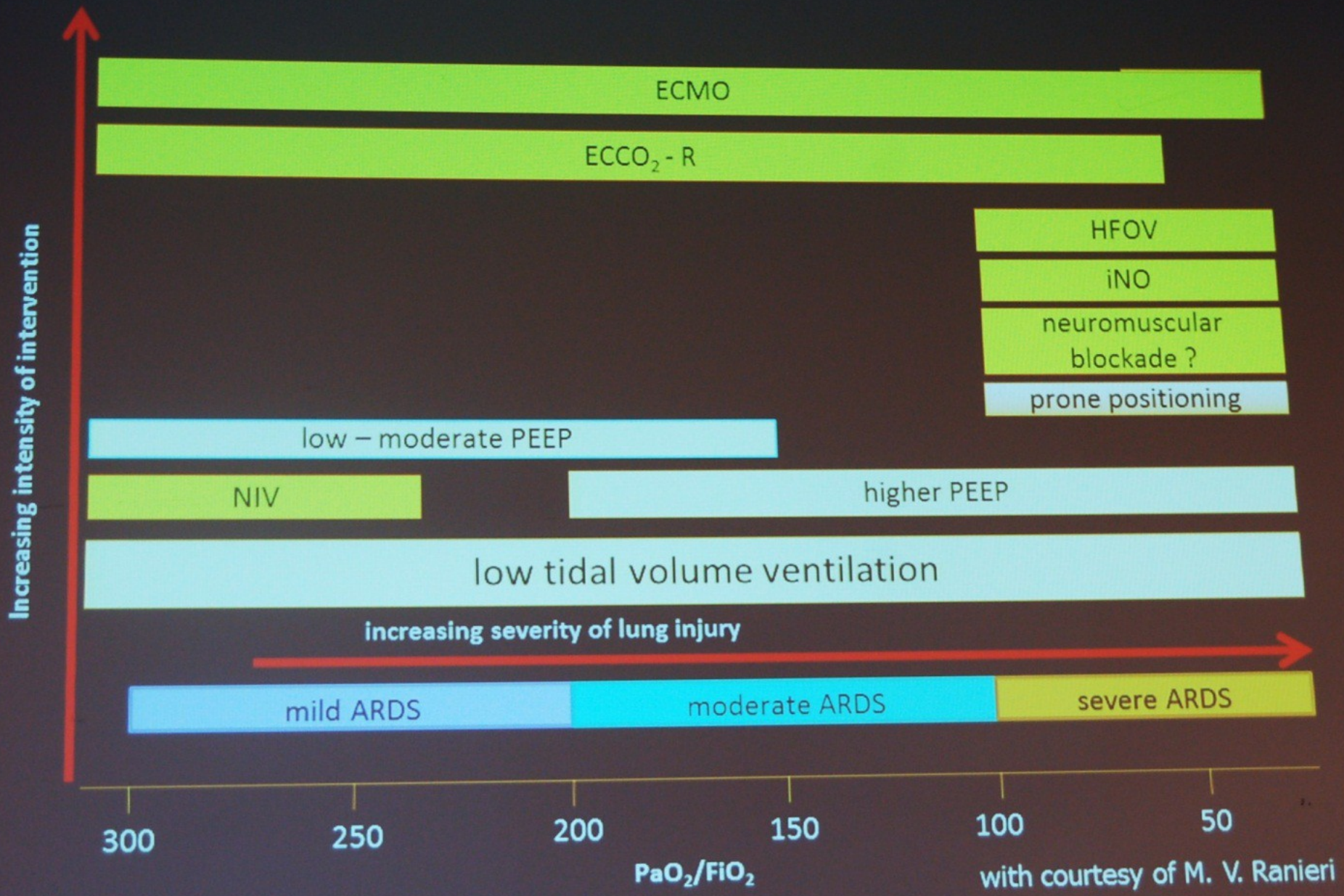
léčebné modality

ventilation options in ARDS

lung protective ventilation
- lower tidal volume
- higher PEEP
- $P_{plateau}$ < 30 mm Hg
- FiO_2 < 0,60
inverse ratio ventilation IRV
open lung concept
baby lung concept, permissive hypercapny

non-ventilation options in ARDS

- pronační poloha
- extrakorporální oxygenace a CO_2 eliminace
- HFOV
- inhalace NO
- *others …*


ECMO
ECCO2 - R
HFOV
iNO
neuromuscular blockade ?
prone positioning
low – moderate PEEP
NIV
higher PEEP
low tidal volume ventilation
Increasing intensity of intervention
increasing severity of lung injury
mild ARDS
moderate ARDS
severe ARDS
300
250
200
150
100
50
PaO2/FiO2
with courtesy of M. V. Ranieri

pronační poloha

pronační poloha

- ✓ *„prone position“, „Bauchlage“*
- ✓ poloha vleže na břiše
- ✓ v souvislosti s plicní patologií se používá u těžkého akutního respiračního selhání *(severe ARDS)*

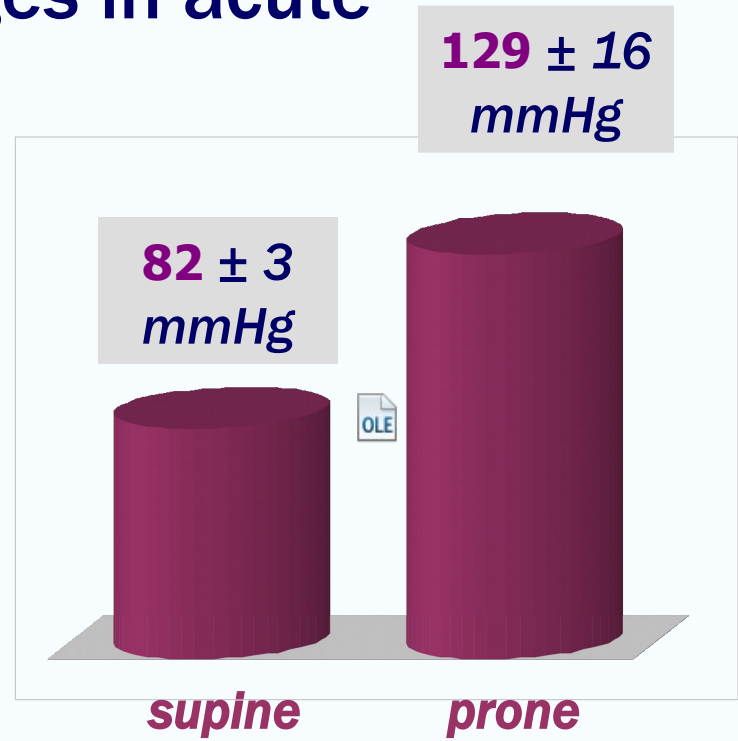
historie, studie

historie

Use of extreme position changes in acute respiratory failure

*Piehl et al. **Crit Care Med**;1976;4:13-14.*

- 5 pacientů s ARDS
- při UPV nutné FiO_2 > 0,60
- těžká hypoxémie před UPV (P_aO_2 < 50 mmHg)
- *otáčení pomocí CircOlectric Bed*



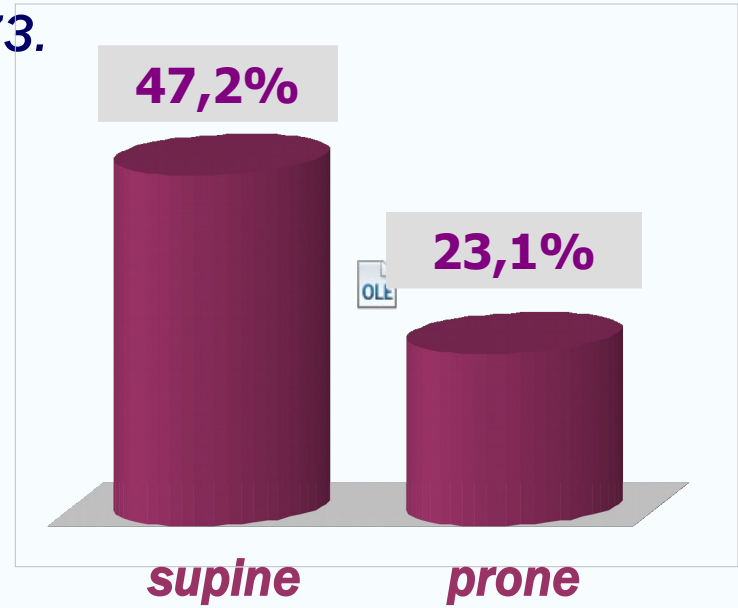
…. poprvé použita před 38 lety

studie

Effect of prone positioning on the the survival of patients with acute respiratory failure

*Gattinoni et al. **N Engl J Med**;2001;345:568-73.*

- 304 pacientů s ARDS
- délka pronace 7,0± 1,8h/day
- zlepšení oxygenace (P_aO_2/FiO_2)
- není rozdíl v mortalitě
- *post hoc analýza:*



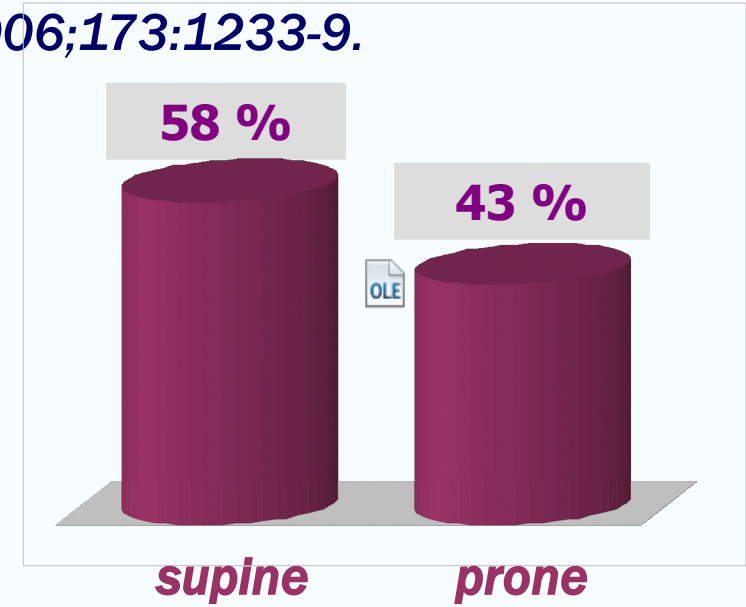
…. 响10d mortality u nejtěžších ARDS

studie

Multicenter trial of prolonged prone ventilation in severe ARDS

Mancebo et al. ***Am J Respir Crit Care Med****;2006;173:1233-9.*

- 136 pacientů s ARDS
- délka pronace ø17h/day
- zlepšení oxygenace (P_aO_2/FiO_2)
- snížení ICU mortality



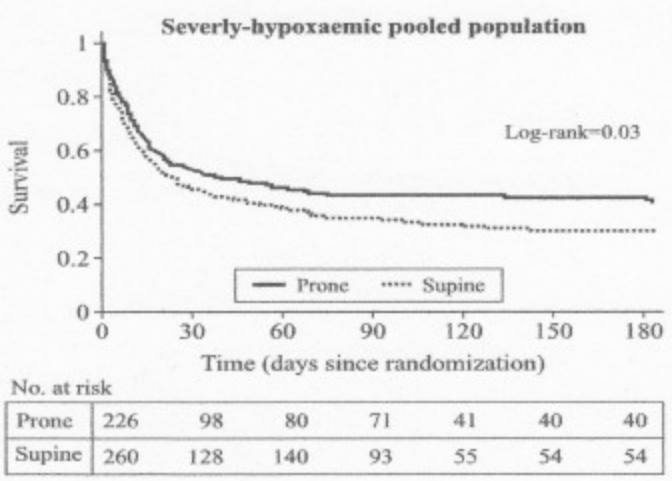
... may reduce mortality when it is initiated early and applied for most of the day ...

studie

Prone positioning improves survival in severe ARDS: a review and meta-analysis

*Gattinoni et al. **Minerva Anestesiol**;2010;76:448-54.*

- four major clinical trials
- 1573 patients
- moderate hypoxemia *(200-100mmHg)*
- severe hypoxemia *(<100mmHg)*



... absolute mortality of severely hypoxemic ARDS patients may be reduced by approximately 10% *(p<0,05)*

Abroug et al. Critical Care 2011, 15:R6
http://ccforum.com/content/15/1/R6

CRITICAL CARE

An updated study-level meta-analysis of randomised controlled trials on proning in ARDS and acute lung injury

Fekri Abroug[1*], Lamia Ouanes-Besbes[1], Fahmi Dachraoui[1], Islem Ouanes[1], Laurent Brochard[2,3,4]

Abstract

Introduction: In patients with acute lung injury (ALI) and/or acute respiratory distress syndrome (ARDS), recent randomised controlled trials (RCTs) showed a consistent trend of mortality reduction with prone ventilation. We updated a meta-analysis on this topic.

Methods: RCTs that compared ventilation of adult patients with ALI/ARDS in prone versus supine position were included in this study-level meta-analysis. Analysis was made by a random-effects model. The effect size on intensive care unit (ICU) mortality was computed in the overall included studies and in two subgroups of studies: those that included all ALI or hypoxemic patients, and those that restricted inclusion to only ARDS patients. A relationship between studies' effect size and daily prone duration was sought with meta-regression. We also computed the effects of prone positioning on major adverse airway complications.

Results: Seven RCTs (including 1,675 adult patients, of whom 862 were ventilated in the prone position) were included. The four most recent trials included only ARDS patients, and also applied the longest proning durations and used lung-protective ventilation. The effects of prone positioning differed according to the type of study. Overall, prone ventilation did not reduce ICU mortality (odds ratio = 0.91, 95% confidence interval = 0.75 to 1.2; $P = 0.39$), but it significantly reduced the ICU mortality in the four recent studies that enrolled only patients with ARDS (odds ratio = 0.71; 95% confidence interval = 0.5 to 0.99; $P = 0.048$; number needed to treat = 11). Meta-regression on all studies disclosed only a trend to explain effect variation by prone duration ($P = 0.06$). Prone positioning was not associated with a statistical increase in major airway complications.

Conclusions: Long duration of ventilation in prone position significantly reduces ICU mortality when only ARDS patients are considered.

An updated study-level meta-analysis of randomised controlled trials on proning in ARDS and acute lung injury

Fekri Abroug[1*], Lamia Ouanes-Besbes[1], Fahmi Dachraoui[1], Islem Ouanes[1], Laurent Brochard[2,3,4]

Study name	Cumulative statistics			
	Point	Lower limit	Upper limit	p-Value
Gattinoni_ 2001	1,111	0,709	1,742	0,646
Guerin_ 2004	1,065	0,830	1,366	0,620
Voggenreiter_ 2005	1,049	0,819	1,344	0,706
Mancebo_ 2006	0,924	0,663	1,287	0,641
Chan_ 2007	0,939	0,710	1,243	0,660
Fernandez_ 2008	0,931	0,722	1,200	0,579
Taccone_ 2009	0,916	0,750	1,120	0,392
	0,916	0,750	1,120	0,392

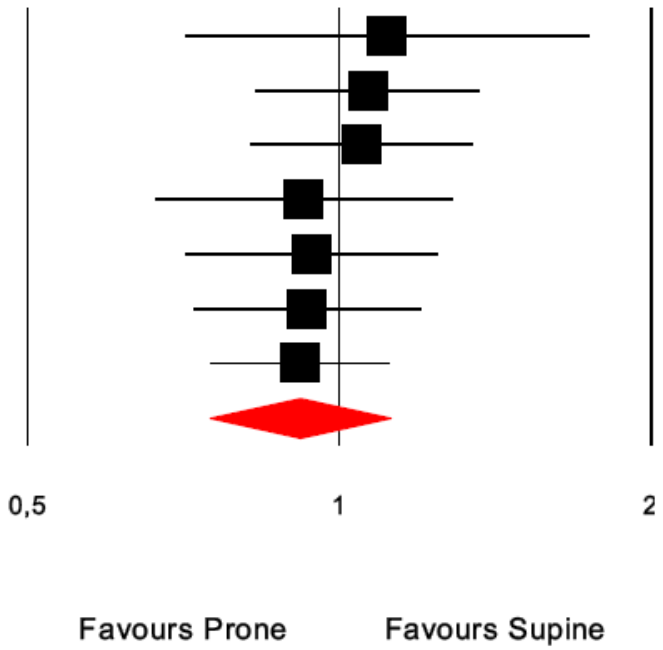


Figure 2 Cumulative meta-analysis of prone ventilation on intensive care unit mortality. The first row shows the effect based on one study, the second row shows the cumulative effects based on two studies, and so on. CI, confidence interval.

debate continues…

con

M. Amato

pro

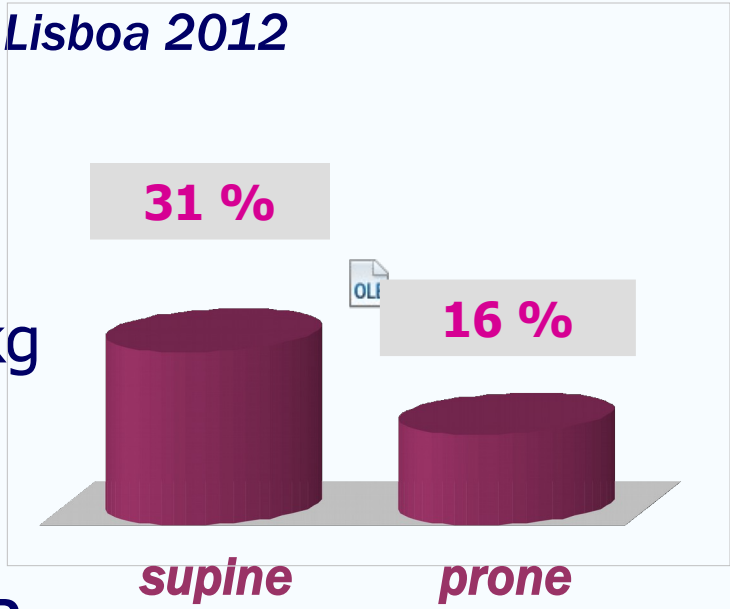
L. Gattinoni

studie

PROSEVA trial: Effect of prone positioning in patients with severe and persistent ARDS.

Guérin Claude, presented at ESICM Congress, Lisboa 2012

- multicenter French + Spanisch
- $p_aO_2/FiO_2 < 150$
- $FiO_2 \geq 0{,}60$, PEEP ≥ 5, Vt 6 ml/kg
- 460 pts, prone > 16h/day
- 28-day mortality
- 90-day mortality, incidence of VAP



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JUNE 6, 2013 VOL. 368 NO. 23

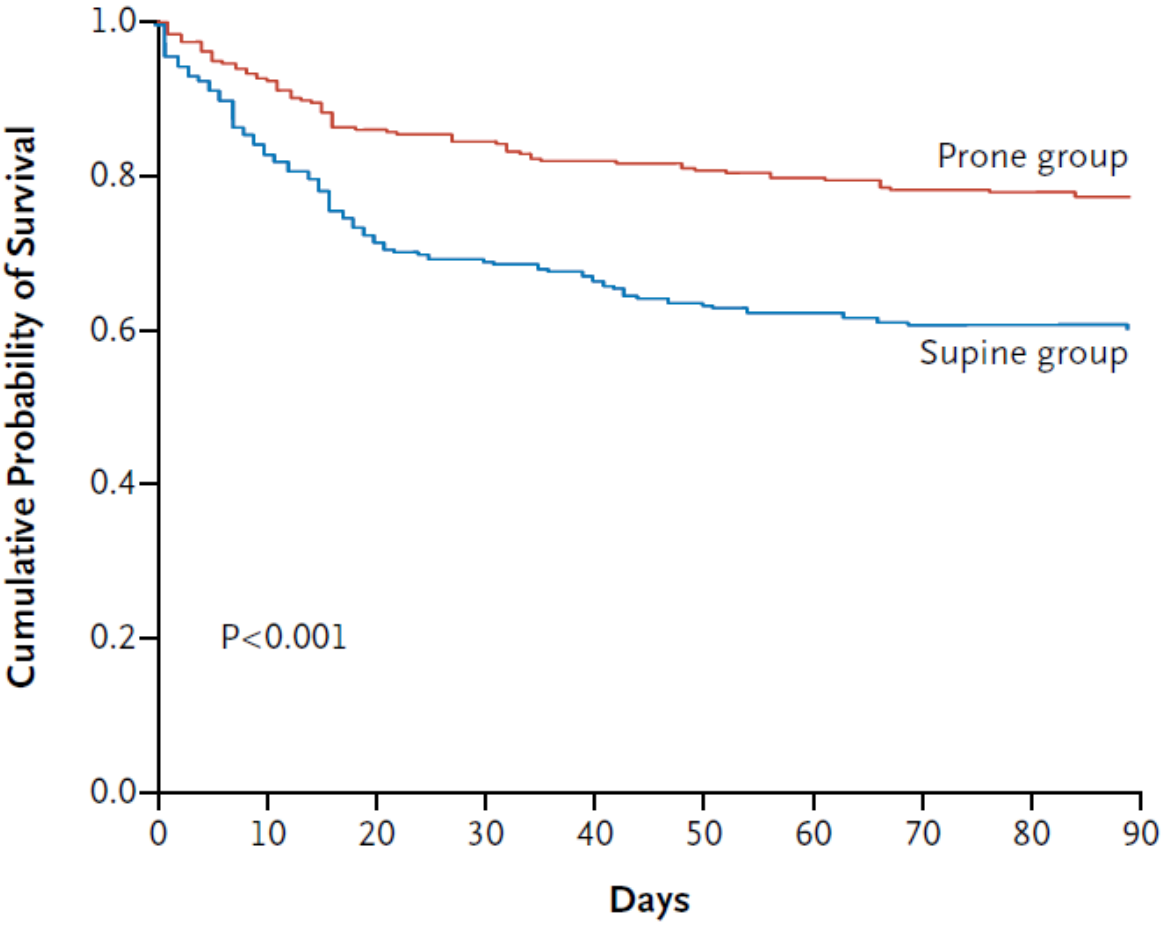
Prone Positioning in Severe Acute Respiratory Distress Syndrome

RESULTS

A total of 237 patients were assigned to the prone group, and 229 patients were assigned to the supine group. The 28-day mortality was 16.0% in the prone group and 32.8% in the supine group (P<0.001). The hazard ratio for death with prone positioning was 0.39 (95% confidence interval [CI], 0.25 to 0.63). Unadjusted 90-day mortality was 23.6% in the prone group versus 41.0% in the supine group (P<0.001), with a hazard ratio of 0.44 (95% CI, 0.29 to 0.67). The incidence of complications did not differ significantly between the groups, except for the incidence of cardiac arrests, which was higher in the supine group.

Table 3. Primary and Secondary Outcomes According to Study Group.*

Outcome	Supine Group (N=229)	Prone Group (N=237)	Hazard Ratio or Odds Ratio with the Prone Position (95% CI)	P Value
Mortality — no. (% [95% CI])				
At day 28				
Not adjusted	75 (32.8 [26.4–38.6])	38 (16.0 [11.3–20.7])	0.39 (0.25–0.63)	<0.001
Adjusted for SOFA score†			0.42 (0.26–0.66)	<0.001
At day 90				
Not adjusted	94 (41.0 [34.6–47.4])	56 (23.6 [18.2–29.0])	0.44 (0.29–0.67)	<0.001
Adjusted for SOFA score†			0.48 (0.32–0.72)	<0.001
Successful extubation at day 90 — no./total no. (% [95% CI])	145/223 (65.0 [58.7–71.3])	186/231 (80.5 [75.4–85.6])	0.45 (0.29–0.70)	<0.001
Time to successful extubation, assessed at day 90 — days				
Survivors	19±21	17±16		0.87
Nonsurvivors	16±11	18±14		
Length of ICU stay, assessed at day 90 — days				
Survivors	26±27	24±22		0.05
Nonsurvivors	18±15	21±20		
Ventilation-free days				
At day 28	10±10	14±9		<0.001
At day 90	43±38	57±34		<0.001



No. at Risk

Prone group	237	202	191	186	182
Supine group	229	163	150	139	136

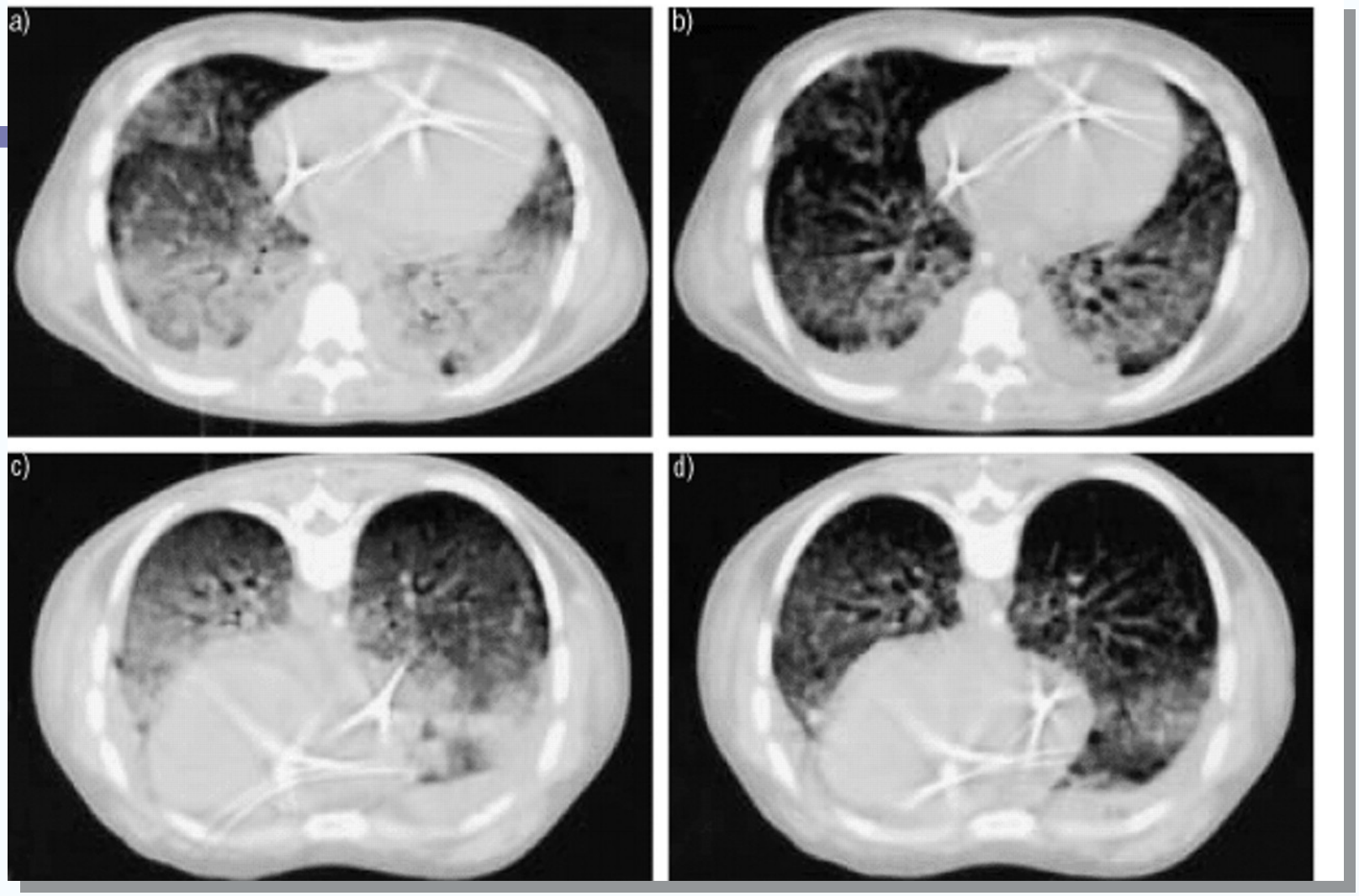
Figure 2. Kaplan–Meier Plot of the Probability of Survival from Randomization to Day 90.

mechanismus účinku

pronační poloha

- ✓ recruitment dorsálních (atelektatických) partií
- ✓ homogenizace ventilačně-perfúzních nepoměrů
- ✓ ↓ intrapulmonálních pravolevých zkratů
- ✓ vzestup funkční reziduální kapacity

zlepšení oxygenace


a)
b)
c)
d)

pozitivní efekty

- ✓ zlepšení oxygenace
- ✓ drenážní plicní poloha (mobilizace sekretu z DC)
- ✓ snížení incidence VAP
- ✓ snížení rizika dorsálních dekubitů

snížení mortality

typy pronace

intermitentní dorsoventrální polohování

- 180º 2 x denně

kontinuální axiální rotace

- *RotoRest*

intermitentní jednostranné polohování

- „down with the good lung“, *Fischman, 1981*

přetočená poloha 135º

kdy do pronační polohy?

- ✓ těžká porucha oxygenace (*severe ARDS*)
- ✓ Horowitz index P_aO_2/FiO_2 <100 (150) mmHg

protektivní ventilační režim

nutnost $FiO_2 \geq 0,60$

kontraindikace

- ✓ akutní fáze KCP (傺ICP)
- ✓ nestabilní úrazy páteře
- ✓ těžká akutní kardiovaskulární instabilita, ev. maligní arytmie
- ✓ bezprostředně po hrudní či abdominální operaci

jak dlouho pronaci?

délka pronace souvisí
se snížením mortality

7 – 10 h/day?
12 – 14 h/day?
20 – 24 h/day?

20 – 24 h/day

pronace a typ ARDS

primární	sekundární
pozitivní vliv později (odstup až 12 h)	pozitivní vliv dříve (odstup 1-3 h)

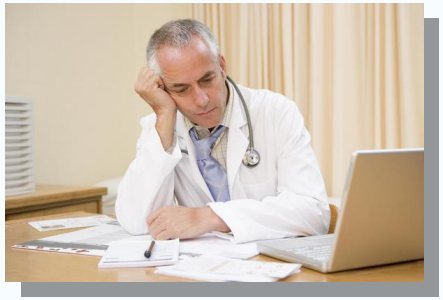
kdy ukončit pronaci?

- ✓ pacient je *nonrespondent*
- ✓ zlepšení klinického stavu
- ✓ snížení agresivity ventilace
- ✓ snížení FiO_2 na 0,60 a méně

praktické provedení

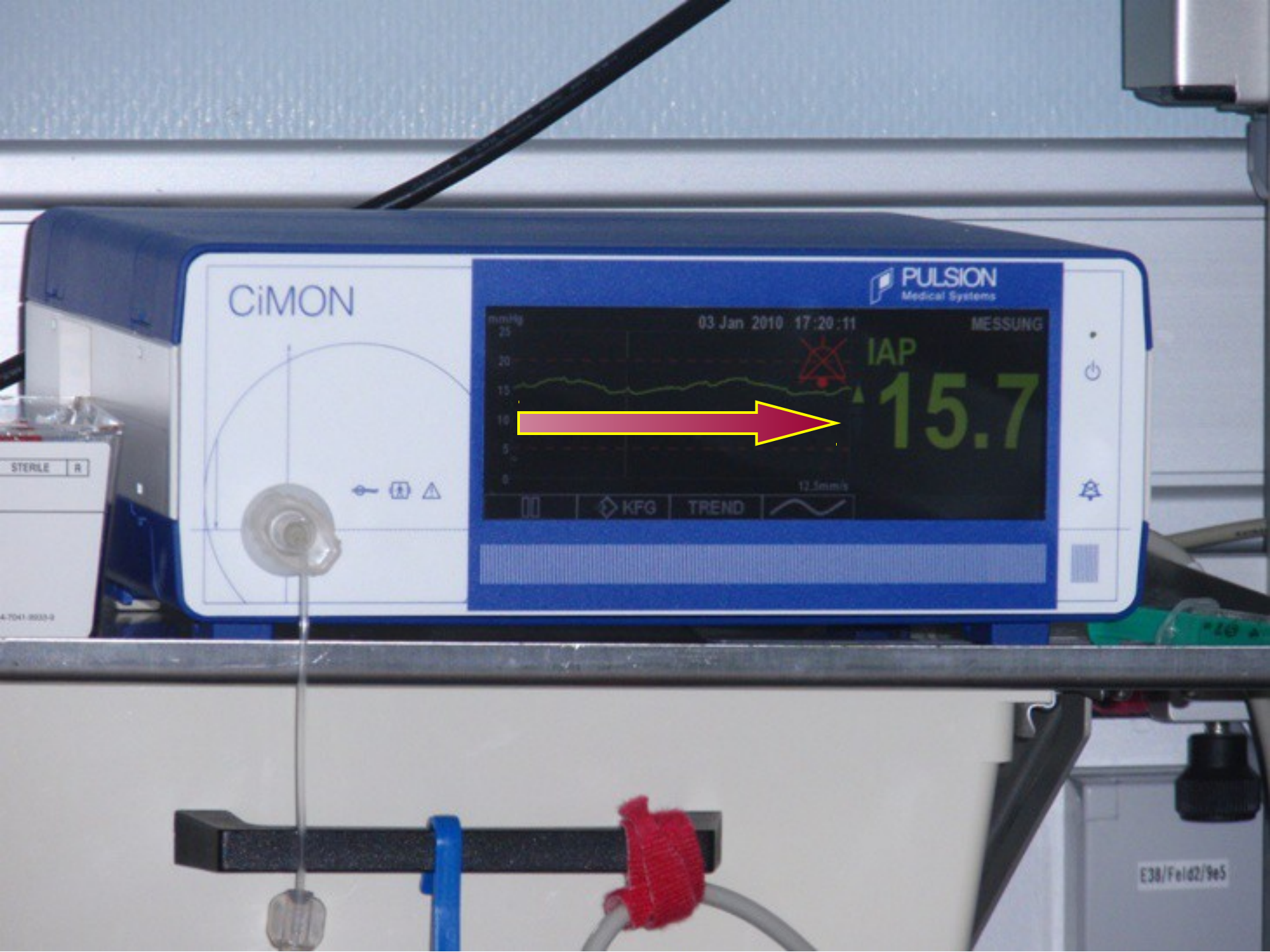
provedení

- ✓ otočení trvá cca 10 – 15 min
- ✓ potřeba 3 osoby *(2 v nouzi)*
- ✓ cave:
  - ✓ endotracheální či tracheostomická kanyla
  - ✓ cévní vstupy (CVK, *artery line*, PiCCO…)
  - ✓ jiné vstupy (NGS, PEG sonda, močový katetr, drenáže, hrudní sání…)
- ✓ *přítomnost lékaře na ICU*




17.6


HABEL
116
112/48
98
24


CiMON
PULSION
Medical Systems
03 Jan 2010 17:20:11
MESSUNG
IAP
15.7
KFG
TREND
STERILE
R

pronace ovlivňuje

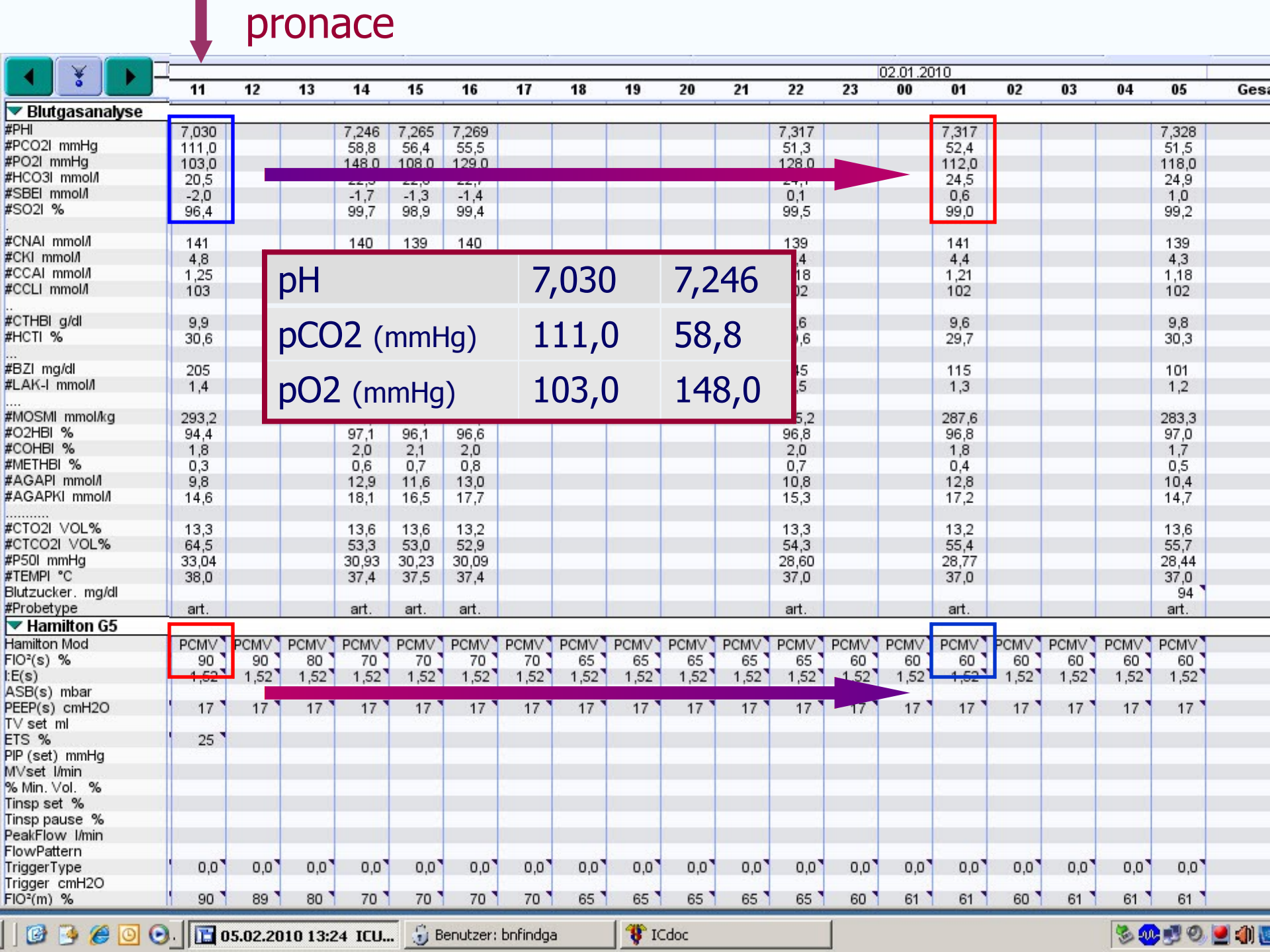
- ✓ vnitřní prostředí
- ✓ parametry UPV

pronace

02.01.2010

	11	12	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05
Respirator Eins																			
Hamilton Mod	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV
FIO²(s) %	90	90	80	70	70	70	70	65	65	65	65	65	60	60	60	60	60	60	60
% Min. Vol. %																			
MVset l/min																			
TV set ml																			
I:E(s)	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52
Tinsp set %																			
Paw (s) cmH2O																			
PS set cmH2O	15																		
PEEP2(s) cmH2O	18	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
PEEP(s) cmH2O	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
ETS %	25																		
Druckrampe msec	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Respirator Meß																			
Hamilton Mod	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV
FIO²(m) %	90	89	80	70	70	70	70	65	65	65	65	65	60	61	61	60	61	61	61
f total /min	15	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
f spontan /min	0																		
AF(CO2) /min																			
AF(EKG) /min	15	15	15																
SpO2 %	97	98	100	97	97	98	98	97	98	98	98	98	97	97	97	97	97	97	98
ETCO2 mmHg																			
I:E(m)	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49	1,49
Tinsp(m) s	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Texp(m) s	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ppeak (m) cmH2O	38	37	38	38	38	38	38	38	38	38	38	38	38	38	39	38	38	38	38
PEEP(m) cmH2O	15	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
PEEPint cmH2O	0,0	0,0	0,0					4,0	0,0	2,0	1,0		7,0	1,0					6,0
VTinsp(m) ml	542	740	669	709	709	708	701	857	785	773	728	755	760	736	767	762	774	760	774
VTexp(m) ml	538	729	647	679	669	669	669	792	731	720	684	727	708	708	742	726	718	725	747
ExpMinVol l/min	8,1	10,7	10,3	10,8	10,7	10,7	10,7	12,7	11,6	11,6	11,4	11,7	11,6	11,4	11,9	11,7	11,7	11,7	11,8
InspFlow l/min	60,0	53,0	55,0	59,0	60,0	60,0	60,0	61,0	62,0	61,0	62,0	64,0	64,0	63,0	64,0	64,0	65,0	64,0	64,0
ExpFlow l/min	67,4	67,5	69,8	69,9	69,7	69,4	69,0	70,1	71,6	71,5	71,6	72,4	71,2	72,1	73,7	72,8	73,0	72,0	75,1
Compl stat ml/cmH2O	30	41												38	39	39	40	39	40
Resistance cmH2O/l/	5	9	7	8	7	7	7	6	8	7	7	6	6	6	6	6	6	6	5
Blutgasanalyse																			
#PHI	7,030			7,246	7,265	7,269						7,317			7,317				7,328

pronace



	11	12	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	Ges
	02.01.2010																			
Blutgasanalyse																				
#PHI	7,030			7,246	7,265	7,269						7,317			7,317				7,328	
#PCO2I mmHg	111,0			58,8	56,4	55,5						51,3			52,4				51,5	
#PO2I mmHg	103,0			148,0	108,0	129,0						128,0			112,0				118,0	
#HCO3I mmol/l	20,5														24,5				24,9	
#SBEI mmol/l	-2,0			-1,7	-1,3	-1,4						0,1			0,6				1,0	
#SO2I %	96,4			99,7	98,9	99,4						99,5			99,0				99,2	
.																				
#CNAI mmol/l	141			140	139	140						139			141				139	
#CKI mmol/l	4,8											,4			4,4				4,3	
#CCAI mmol/l	1,25											18			1,21				1,18	
#CCLI mmol/l	103											02			102				102	
..																				
#CTHBI g/dl	9,9											,6			9,6				9,8	
#HCTI %	30,6											,6			29,7				30,3	
...																				
#BZI mg/dl	205											45			115				101	
#LAK-I mmol/l	1,4											,5			1,3				1,2	
....																				
#MOSMI mmol/kg	293,2											5,2			287,6				283,3	
#O2HBI %	94,4			97,1	96,1	96,6						96,8			96,8				97,0	
#COHBI %	1,8			2,0	2,1	2,0						2,0			1,8				1,7	
#METHBI %	0,3			0,6	0,7	0,8						0,7			0,4				0,5	
#AGAPI mmol/l	9,8			12,9	11,6	13,0						10,8			12,8				10,4	
#AGAPKI mmol/l	14,6			18,1	16,5	17,7						15,3			17,2				14,7	
.....																				
#CTO2I VOL%	13,3			13,6	13,6	13,2						13,3			13,2				13,6	
#CTCO2I VOL%	64,5			53,3	53,0	52,9						54,3			55,4				55,7	
#P50I mmHg	33,04			30,93	30,23	30,09						28,60			28,77				28,44	
#TEMPI °C	38,0			37,4	37,5	37,4						37,0			37,0				37,0	
Blutzucker. mg/dl																			94	
#Probetype	art.			art.	art.	art.						art.			art.				art.	
Hamilton G5																				
Hamilton Mod	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	PCMV	
FIO²(s) %	90	90	80	70	70	70	70	65	65	65	65	65	60	60	60	60	60	60	60	
I:E(s)	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	1,52	
ASB(s) mbar																				
PEEP(s) cmH2O	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	
TV set ml																				
ETS %	25																			
PIP (set) mmHg																				
MVset l/min																				
% Min. Vol. %																				
Tinsp set %																				
Tinsp pause %																				
PeakFlow l/min																				
FlowPattern																				
TriggerType	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	
Trigger cmH2O																				
FIO²(m) %	90	89	80	70	70	70	70	65	65	65	65	65	60	61	61	60	61	61	61	

pH	7,030	7,246
pCO2 (mmHg)	111,0	58,8
pO2 (mmHg)	103,0	148,0

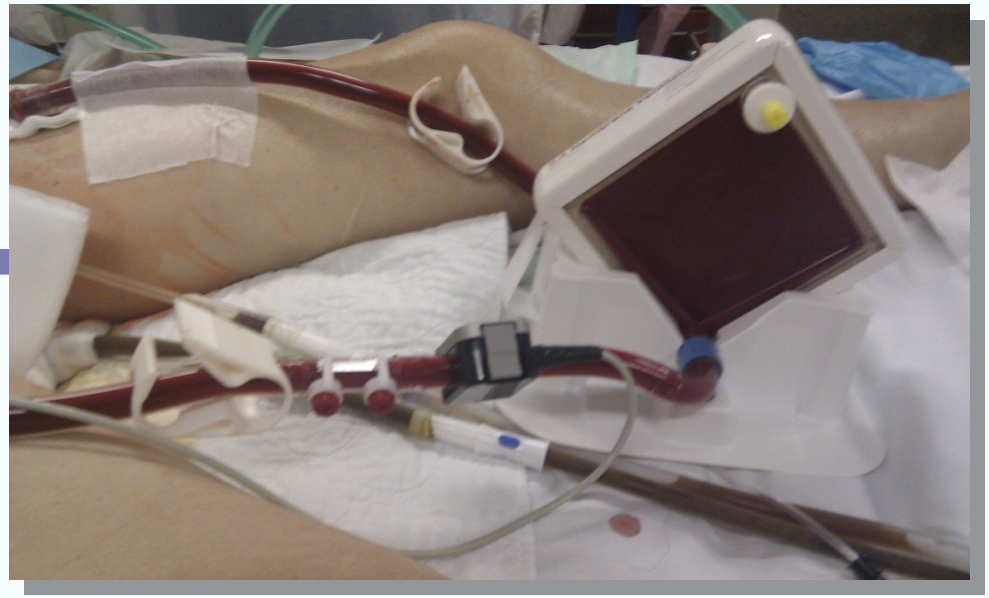
pronace

a

… ?

pronace a …

- ✓ enterální výživa
- ✓ CRRT
- ✓ tracheotomie
- ✓ bronchofibroskopie
- ✓ resuscitace
- ✓ *ostatní …*




HAUPTMENÜ
PFLEGEHILFEMENÜ
PULS:EIN AUS
DREHHILFE:EIN AUS
MAX DRUCK
GESAMKISSEN ENTLEEREN
KOPFTEIL ENTLEEREN
MENÜ
STATUS


BariAir
KCI

to take home message:

- pronaci používat rutinně u těžkého ARDS
- vhodný druh pronace (135°)
- nasadit včas (FiO_2>0,60 při protekci)
- ponechat déle (17 – 22 h/day)
- *zaškolit personál*

↑↑oxygenace, ↓snížení mortality

Cicero

„Don´t speak longer in public

than you can make love in private."

…děkuji Vám za pozornost