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du 23 au 25 Septembre 2021
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Problématiques non résolues en pédiatrie ?

Modes ventilatoires per-opératoires…

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Déclaration d'intérêts

Pas de conflits d'intérêts en relation avec cette présentation

Introduction

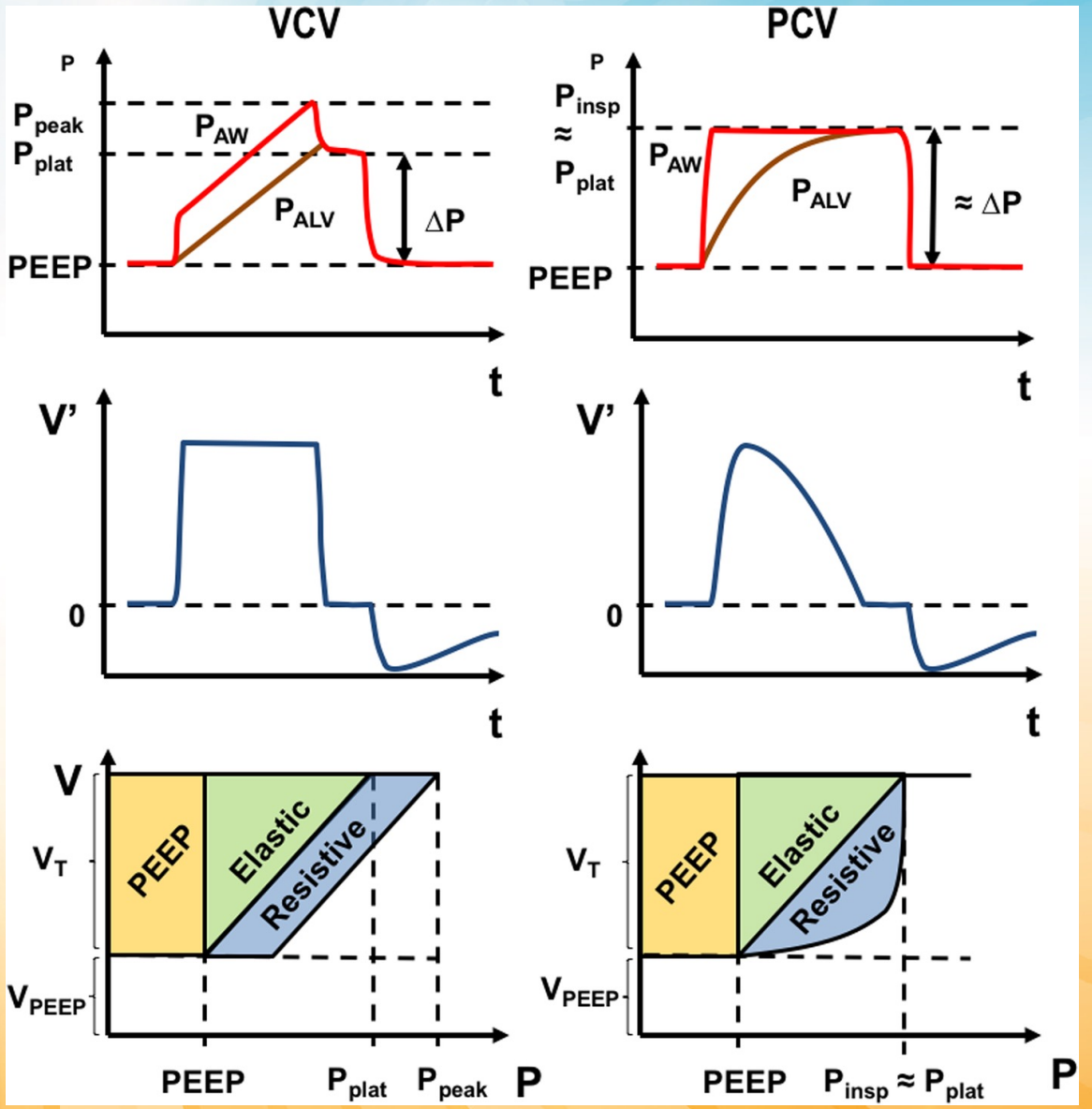
Equation du mouvement

$$P_{aw} = P_0 + P_{el}(t) + P_{re}(t)$$

- P_{aw} : Pression VA
- P_0 : PEEP
- $P_{el}(t)$: **Volume** x Elastance
- $P_{re}(t)$: Débit x Résistance

Courbes

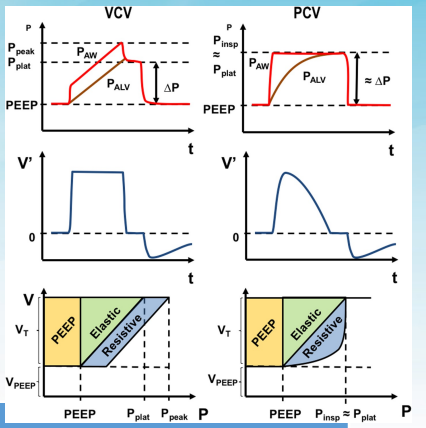
Comparaison des modes



Silva et al. ICMx , 2019

Courbes

Silva et al. ICMx , 2019



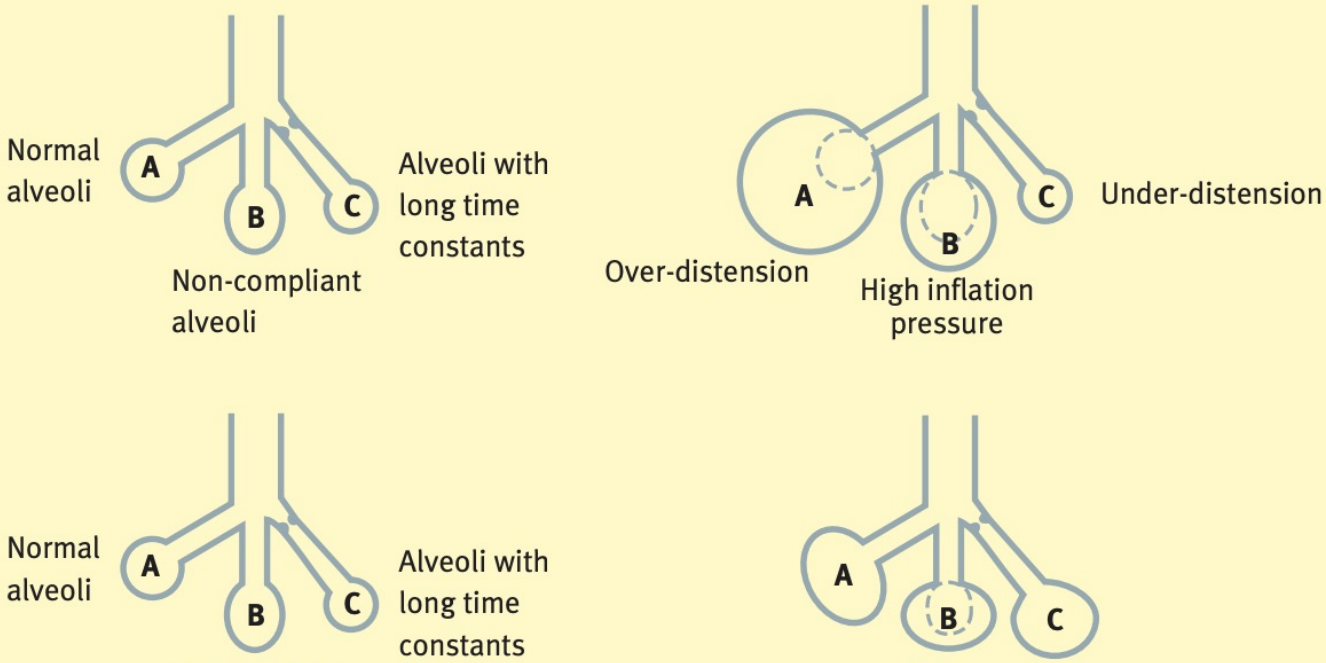
Comparaison des modes

VCV	PCV
Maintain minute ventilation, constant tidal volume Changes in compliance or resistance reflected in PIP	Decrease risk of barotraumas / Prevents excess inflating pressure Better V/Q matching in diseases with low compliance
Altering compression volume (lost volume) May deliver high PIP May increase risk of barotrauma	Delivered tidal volume is variable Changes in compliance or resistance are difficult to detect

Courbes

Bénéfice de la PCV

Effects of volume- and pressure-controlled ventilation on lung units with different compliance and time constants



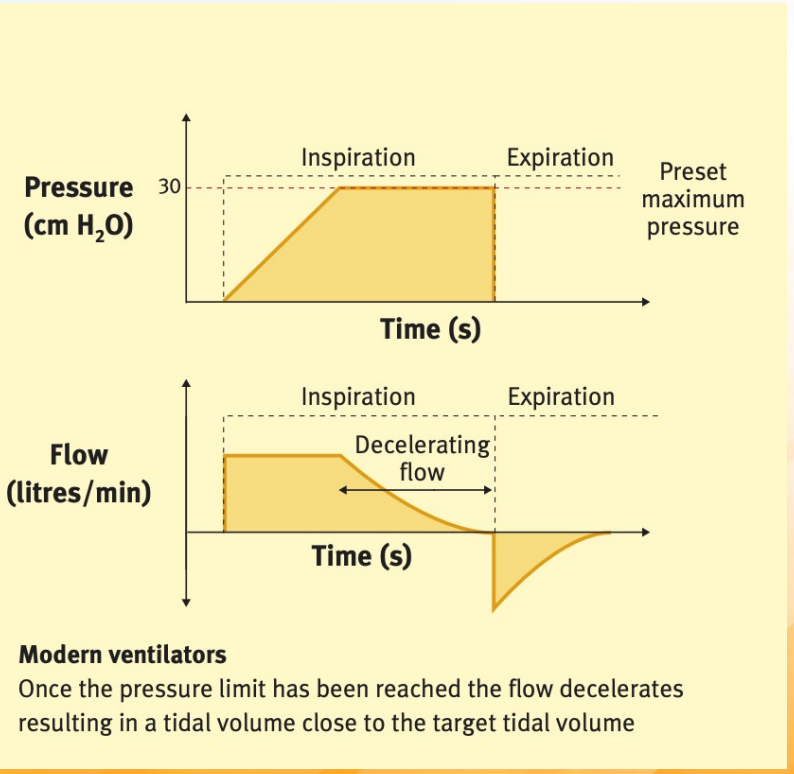
Volume-controlled, constant-flow ventilation
Gas passes into the most compliant alveoli and results in relative over-distension of compartments A and B while compartment C does not have enough time to inflate

Pressure-controlled ventilation
With better distribution of gas, A will not over-distend as before and there is sufficient time for C to inflate more completely

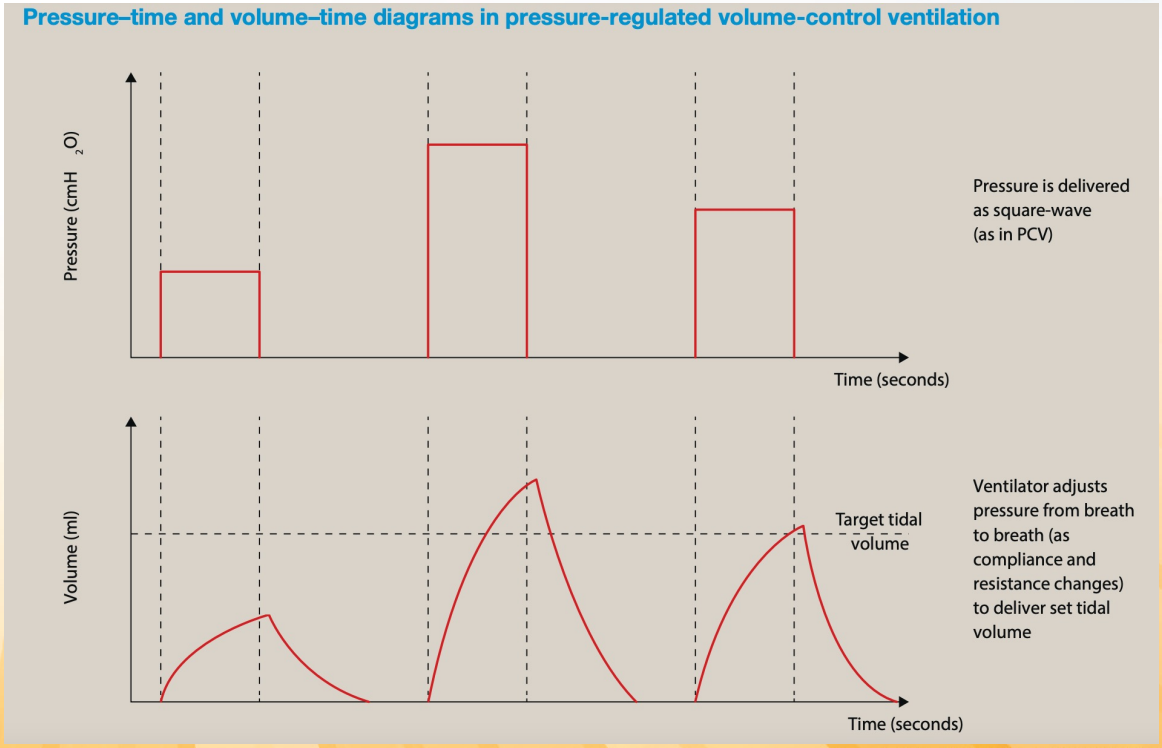
Gould T, De BEER JMA; Principles of artificial ventilation, Anaesthesia and intensive care medicine, 2007

Dual mode

Autoflow , VCRP, PC-VG



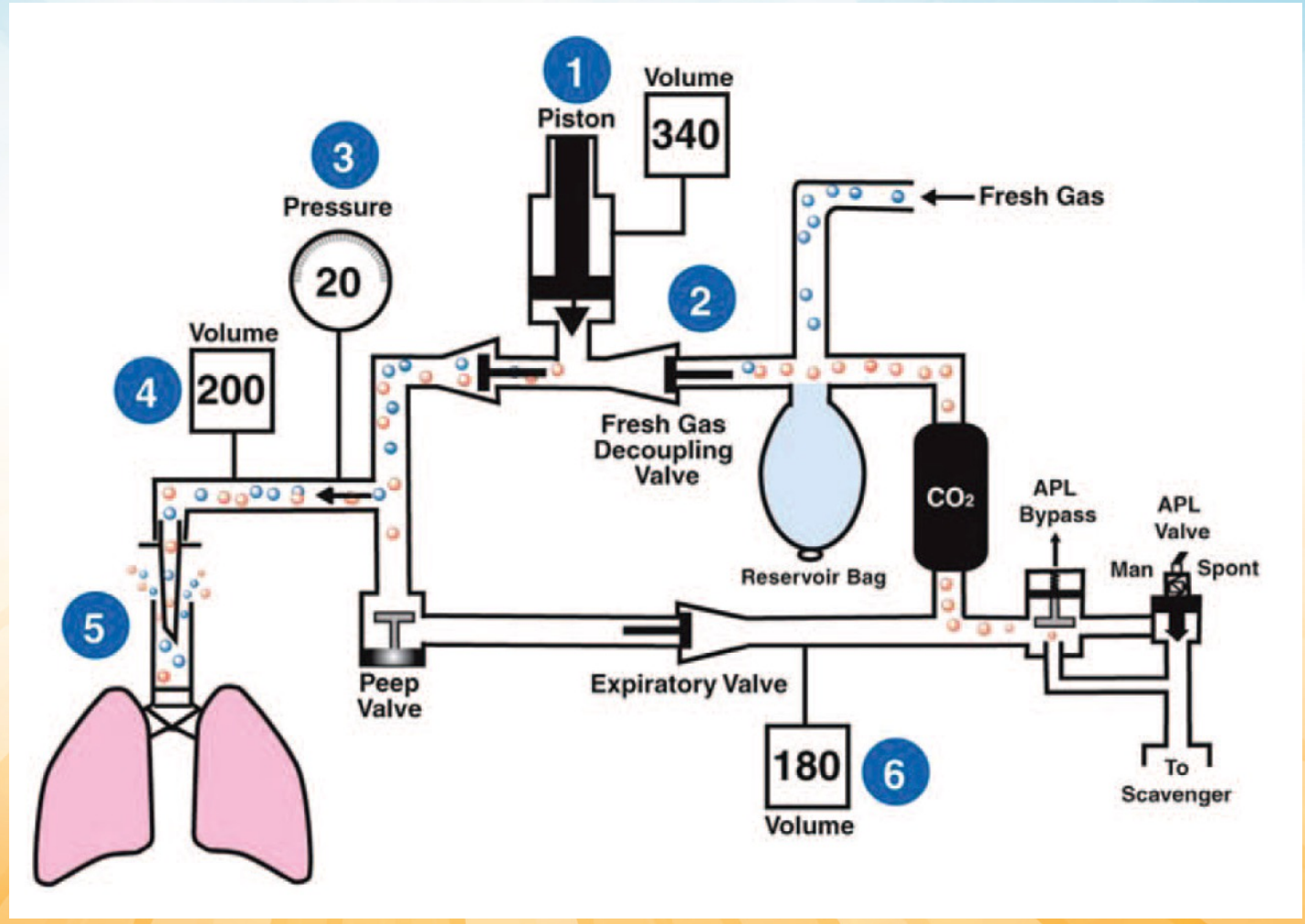
Modern ventilators
Once the pressure limit has been reached the flow decelerates resulting in a tidal volume close to the target tidal volume



Brown B, Roberts J, Principles of artificial ventilation, Anaesthesia and intensive care medicine, 2019

Respirateur





Feldman et al. Anesth Analg 2015;

VOTES

Quel mode peropératoire utilisez vous préférentiellement en pédiatrie?

1. Pression contrôlée

2. Volume contrôlée

3. Dual mode (autoflow, VCRP,…)

En pratique

Etude PEDIAVENT

Received: 27 January 2020 | Revised: 4 May 2020 | Accepted: 6 May 2020
DOI: 10.1111/pan.13909

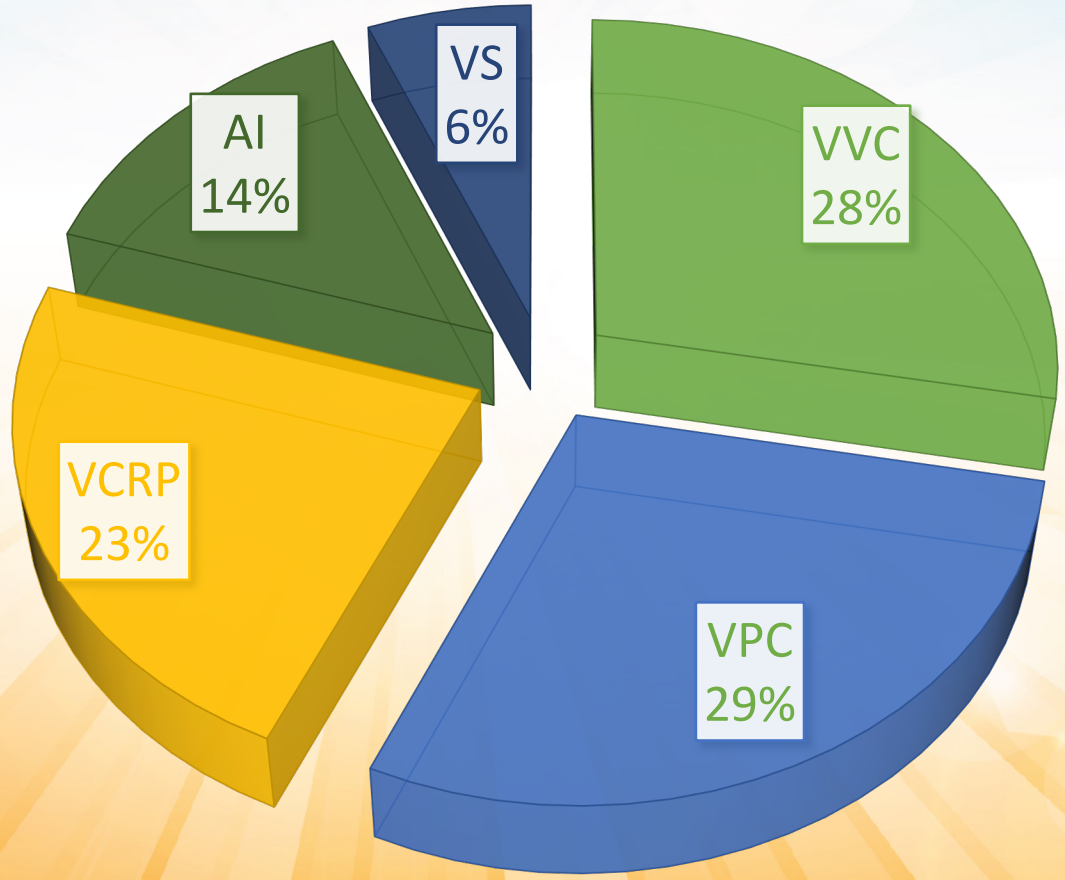
RESEARCH REPORT

Pediatric Anesthesia WILEY

Ventilation in pediatric anesthesia: A French multicenter prospective observational study (PEDIAVENT)

Marion Lebossé[1] | Delphine Kern[2] | Mathilde De Queiroz[1] | Nathalie Bourdaud[1] | Francis Veyckemans[3] | Dominique Chassard[1,4] | Florent Baudin[1,4] | on behalf of the ADARPEF (Association Des Anesthésistes Réanimateurs Pédiatriques d'Expression Française)[a]

Modes ventilatoires



Chez l'adulte

Study	Number	Patients	Laparoscopic	Surgery	Airway	Ppeak	Compliance	Haemodynamics	Gas Exchange
De Baerdemaeker 2008[43]	24	Morbidly obese	Yes	Gastric banding	Tracheal Tube	=	=	=	↑$PaCO_2$
Hans 2008[42]	40	Morbidly obese	No	Gastric bypass	Tracheal Tube	↓	=	=	=
Cadi 2008[44]	36	BMI>35 kg/m^2	Yes	Gastric banding	Tracheal Tube	=	=	=	↑PaO_2 ↓PCO_2
Oğurlu 2010[45]	60	Women, ASA I and II	Yes	Gynecologic surgery	Tracheal Tube	↓	↑	=	N/A
Jeon 2011[46]	60	Women	Yes	Gynecologic surgery	Laryngeal Mask	↓	=	=	↓$PaCO_2$
Tyagi 2011[49]	42	BMI<30 kg/m^2	Yes	Cholecystectomy	Tracheal Tube	↓	↑	=	=
Kim 2011[47]	34	Children	Yes	Appendicectomy	Tracheal Tube	↓	↑	=	N/A
Gupta 2012[48]	102	ASA I and II, Obese (BMI 30-40 kg/m^2)	Yes	Cholecystectomy	Tracheal Tube	↓	N/A	=	↑PaO_2
Aydin 2014[50]	70	ASA I and II	Yes	Cholecystectomy	Tracheal Tube	=	=	=	↓PAO_2-PaO_2

Table 3. Studies comparing VCV and PCV during general anaesthesia. Outcomes are reported as PCV vs. VCV with VCV as control group. $PaCO_2$

Ball et al. Best Practice & Research Clinical Anaesthesiology 2015

Chez l'adulte

J Cardiothorac Vasc Anesth. 2016

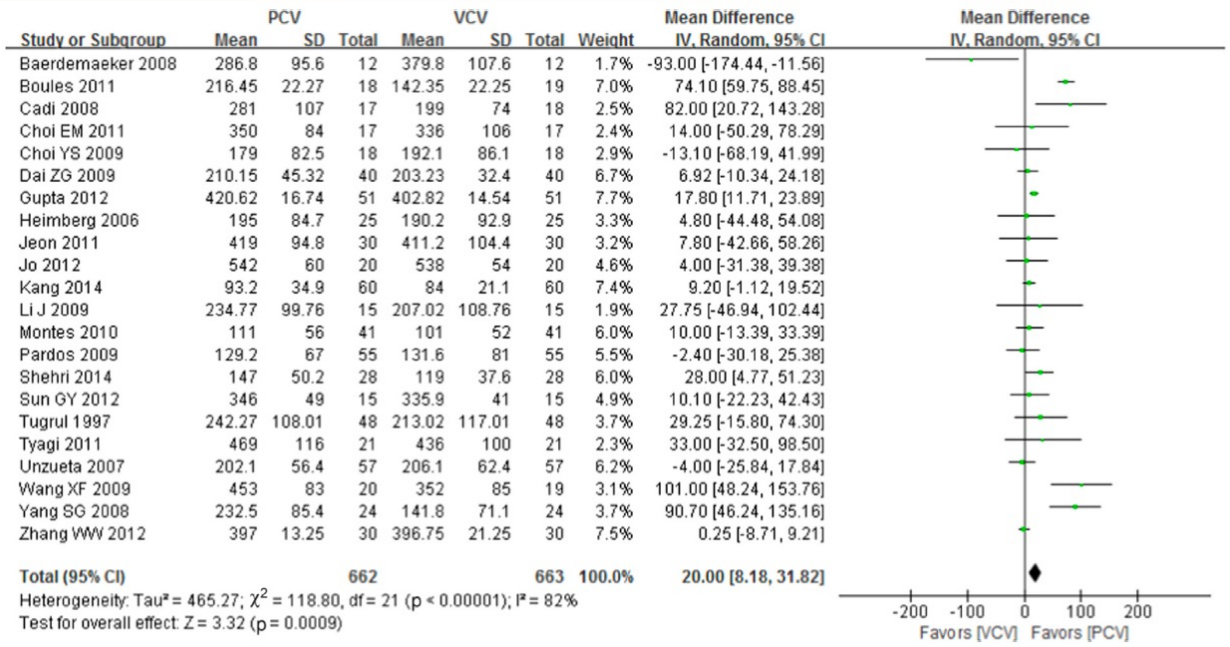
REVIEW ARTICLE

Paul G. Barash, MD, PhD
Giovanni Landoni, MD
Section Editors

Pressure-Controlled Versus Volume-Controlled Ventilation for Surgical Patients: A Systematic Review and Meta-analysis

Jia Jiang, MD,* Bo Li, MD,† Na Kang, MD,* Anshi Wu, MD, PhD,* and Yun Yue, MD*

Under normal circumstances, the selection of PCV or VCV may be of little significance and can be chosen by clinicians' preference.

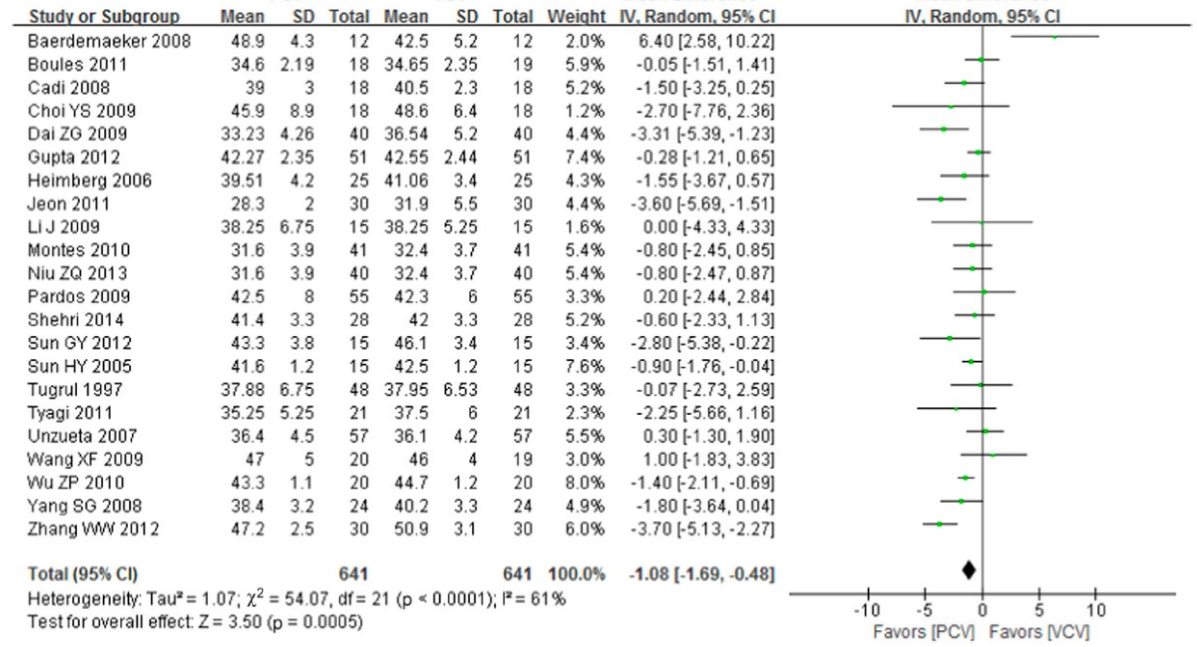


Study or Subgroup	PCV Mean	PCV SD	PCV Total	VCV Mean	VCV SD	VCV Total	Weight	Mean Difference IV, Random, 95% CI
Baerdemaeker 2008	286.8	95.6	12	379.8	107.6	12	1.7%	-93.00 [-174.44, -11.56]
Boules 2011	216.45	22.27	18	142.35	22.25	19	7.0%	74.10 [59.75, 88.45]
Cadi 2008	281	107	17	199	74	18	2.5%	82.00 [20.72, 143.28]
Choi EM 2011	350	84	17	336	106	17	2.4%	14.00 [-50.29, 78.29]
Choi YS 2009	179	82.5	18	192.1	86.1	18	2.9%	-13.10 [-68.19, 41.99]
Dai ZG 2009	210.15	45.32	40	203.23	32.4	40	6.7%	6.92 [-10.34, 24.18]
Gupta 2012	420.62	16.74	51	402.82	14.54	51	7.7%	17.80 [11.71, 23.89]
Heimberg 2006	195	84.7	25	190.2	92.9	25	3.3%	4.80 [-44.48, 54.08]
Jeon 2011	419	94.8	30	411.2	104.4	30	3.2%	7.80 [-42.66, 58.26]
Jo 2012	542	60	20	538	54	20	4.6%	4.00 [-31.38, 39.38]
Kang 2014	93.2	34.9	60	84	21.1	60	7.4%	9.20 [-1.12, 19.52]
Li J 2009	234.77	99.76	15	207.02	108.76	15	1.9%	27.75 [-46.94, 102.44]
Montes 2010	111	56	41	101	52	41	6.0%	10.00 [-13.39, 33.39]
Pardos 2009	129.2	67	55	131.6	81	55	5.5%	-2.40 [-30.18, 25.38]
Shehri 2014	147	50.2	28	119	37.6	28	6.0%	28.00 [4.77, 51.23]
Sun GY 2012	346	49	15	335.9	41	15	4.9%	10.10 [-22.23, 42.43]
Tugrul 1997	242.27	108.01	48	213.02	117.01	48	3.7%	29.25 [-15.80, 74.30]
Tyagi 2011	469	116	21	436	100	21	2.3%	33.00 [-32.50, 98.50]
Unzueta 2007	202.1	56.4	57	206.1	62.4	57	6.2%	-4.00 [-25.84, 17.84]
Wang XF 2009	453	83	20	352	85	19	3.1%	101.00 [48.24, 153.76]
Yang SG 2008	232.5	85.4	24	141.8	71.1	24	3.7%	90.70 [46.24, 135.16]
Zhang WW 2012	397	13.25	30	396.75	21.25	30	7.5%	0.25 [-8.71, 9.21]
Total (95% CI)			**662**			**663**	**100.0%**	**20.00 [8.18, 31.82]**

Heterogeneity: Tau² = 465.27; χ^2 = 118.80, df = 21 (p < 0.00001); I² = 82%
Test for overall effect: Z = 3.32 (p = 0.0009)

Mean Difference IV, Random, 95% CI
-200 -100 0 100 200
Favors [VCV] Favors [PCV]

Figure 4. PCV v VCV: intraoperative oxygenation index. Twenty-two studies reported the intraoperative oxygenation index (N = 1,325)



Study or Subgroup	PCV Mean	PCV SD	PCV Total	VCV Mean	VCV SD	VCV Total	Weight	Mean Difference IV, Random, 95% CI
Baerdemaeker 2008	48.9	4.3	12	42.5	5.2	12	2.0%	6.40 [2.58, 10.22]
Boules 2011	34.6	2.19	18	34.65	2.35	19	5.9%	-0.05 [-1.51, 1.41]
Cadi 2008	39	3	18	40.5	2.3	18	5.2%	-1.50 [-3.25, 0.25]
Choi YS 2009	45.9	8.9	18	48.6	6.4	18	1.2%	-2.70 [-7.76, 2.36]
Dai ZG 2009	33.23	4.26	40	36.54	5.2	40	4.4%	-3.31 [-5.39, -1.23]
Gupta 2012	42.27	2.35	51	42.55	2.44	51	7.4%	-0.28 [-1.21, 0.65]
Heimberg 2006	39.51	4.2	25	41.06	3.4	25	4.3%	-1.55 [-3.67, 0.57]
Jeon 2011	28.3	2	30	31.9	5.5	30	4.4%	-3.60 [-5.69, -1.51]
Li J 2009	38.25	6.75	15	38.25	5.25	15	1.6%	0.00 [-4.33, 4.33]
Montes 2010	31.6	3.9	41	32.4	3.7	41	5.4%	-0.80 [-2.45, 0.85]
Niu ZQ 2013	31.6	3.9	40	32.4	3.7	40	5.4%	-0.80 [-2.47, 0.87]
Pardos 2009	42.5	8	55	42.3	6	55	3.3%	0.20 [-2.44, 2.84]
Shehri 2014	41.4	3.3	28	42	3.3	28	5.2%	-0.60 [-2.33, 1.13]
Sun GY 2012	43.3	3.8	15	46.1	3.4	15	3.4%	-2.80 [-5.38, -0.22]
Sun HY 2005	41.6	1.2	15	42.5	1.2	15	7.6%	-0.90 [-1.76, -0.04]
Tugrul 1997	37.88	6.75	48	37.95	6.53	48	3.3%	-0.07 [-2.73, 2.59]
Tyagi 2011	35.25	5.25	21	37.5	6	21	2.3%	-2.25 [-5.66, 1.16]
Unzueta 2007	36.4	4.5	57	36.1	4.2	57	5.5%	0.30 [-1.30, 1.90]
Wang XF 2009	47	5	20	46	4	19	3.0%	1.00 [-1.83, 3.83]
Wu ZP 2010	43.3	1.1	20	44.7	1.2	20	8.0%	-1.40 [-2.11, -0.69]
Yang SG 2008	38.4	3.2	24	40.2	3.3	24	4.9%	-1.80 [-3.64, 0.04]
Zhang WW 2012	47.2	2.5	30	50.9	3.1	30	6.0%	-3.70 [-5.13, -2.27]
Total (95% CI)			**641**			**641**	**100.0%**	**-1.08 [-1.69, -0.48]**

Heterogeneity: Tau² = 1.07; χ^2 = 54.07, df = 21 (p < 0.0001); I² = 61%
Test for overall effect: Z = 3.50 (p = 0.0005)

Mean Difference IV, Random, 95% CI
-10 -5 0 5 10
Favors [PCV] Favors [VCV]

Figure 7. PCV v VCV: intraoperative arterial $PaCO_2$. Twenty-two studies provided the intraoperative $PaCO_2$ (N = 1,282). Pooled analysis

Recommandations

Uptodate

Choice of the mode of ventilation should be based on patient factors, the surgical procedure, and available technology. For many healthy patients who undergo routine surgery, any mode of ventilation may be used to provide effective and safe intraoperative ventilation. Pressure-controlled ventilation (PCV) may be preferred in some clinical scenarios, as follows:

- PCV or pressure control with volume guarantee (PCV-VG) may be preferred when a supraglottic airway is in place, and for patients in whom high inspiratory pressures may be dangerous **(eg, emphysema, neonates, and infants).**

- PCV-VG may be preferred to maintain minute ventilation in patients with high or changing intraabdominal pressure (eg, severe obesity, during laparoscopy or thoracoscopy, pregnancy).

En pédiatrie..

On est différent !!

Faible Vt

Fréquence élevée

Gestion espace mort

Faible compliance pulmonaire

En pédiatrie..

Anesth Analg 2015;120:165–75)

REVIEW ARTICLE

Optimal Ventilation of the Anesthetized Pediatric Patient

Jeffrey M. Feldman, MD, MSE

On est différent !!

When using an anesthesia ventilator with compliance compensation and PEEP capability, VCV or best-of-both ventilation will support a lung-protective ventilation strategy for pediatric surgical patients. When available, best-of-both-ventilation may be preferred to gain the benefit of the maximum inspiratory pressure for the entire i-time;

If there is a leak that cannot be eliminated (e.g., uncuffed endotracheal tube), or the desired tidal volume is below the specifications of the ventilator (20 mL for most ventilators), PCV with PEEP would be the better choice, but the delivered volume should be monitored carefully.

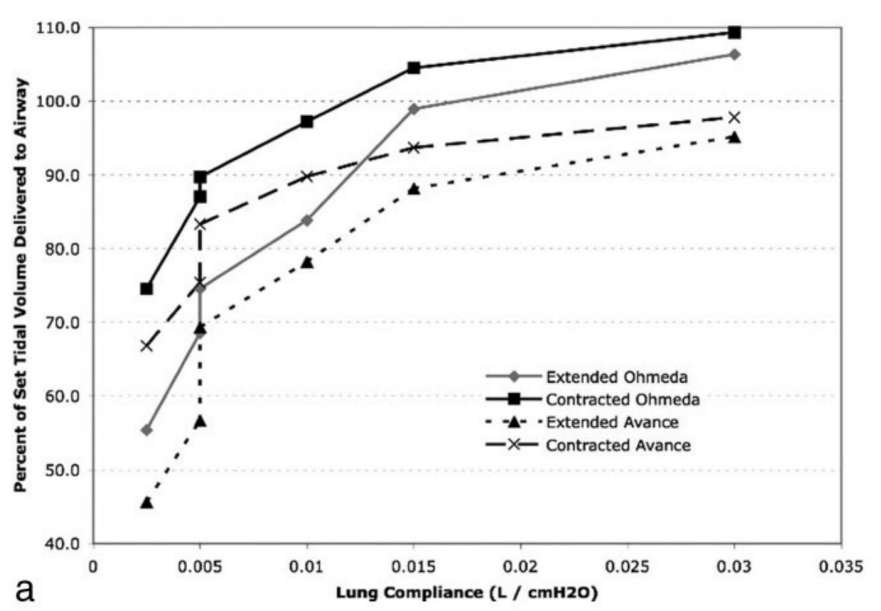
Précision des volumes

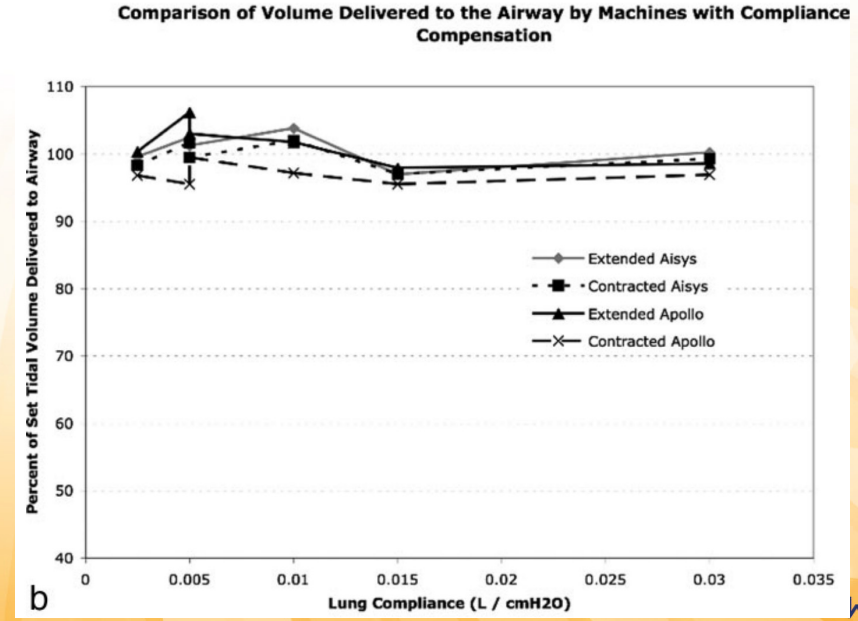
En mode volume …

Pediatric Anesthesiology
Section Editor: Peter J. Davis

Anest Analg 2008;106:1392–400

Do New Anesthesia Ventilators Deliver Small Tidal Volumes Accurately During Volume-Controlled Ventilation?





Précision des volumes

Test de fuite … ou de compensation de la compliance

Accepted: 30 March 2017
DOI: 10.1111/pan.13164

RESEARCH REPORT

WILEY Pediatric Anesthesia

Breathing circuit compliance and accuracy of displayed tidal volume during pressure-controlled ventilation of infants: A quality improvement project

Todd A. Glenski | Carrie Diehl | Rachel G. Clopton | Robert H. Friesen

PCV mode
PI: 18/4,
RR 24 (infant) or 15 (adult)
I:E ratio 1:2.

tubing not expanded vs expanded

TABLE 1 Changes in circuit compliance and displayed tidal volume measurements in infant and adult test lungs during pressure-controlled ventilation at 18/4 cm H_2O when the anesthesia machine preuse self-test was performed before and after circuit tubing expansion

Machine	Drager Apollo (n=4)	GE Avance S5 (n=10)	GE Aisys (n=4)	All Combined (n=18)
Compliance[a] (mL/cm H_2O)	0.43±0.05	0.45±0.07	0.47±0.07	0.45±0.07
Compliance[b] (mL/cm H_2O)	0.97±0.05	0.92±0.10	0.95±0.07	0.94±0.09
Infant TV[c] (mL)	14±5	15±3	19±6	15±5
Infant TV[d] (mL)	8±2	8±3	12±5	9±4
Adult TV[c] (mL)	246±11	234±92	284±14	245±74
Adult TV[d] (mL)	249±18	227±89	278±15	241±72

Sans extension

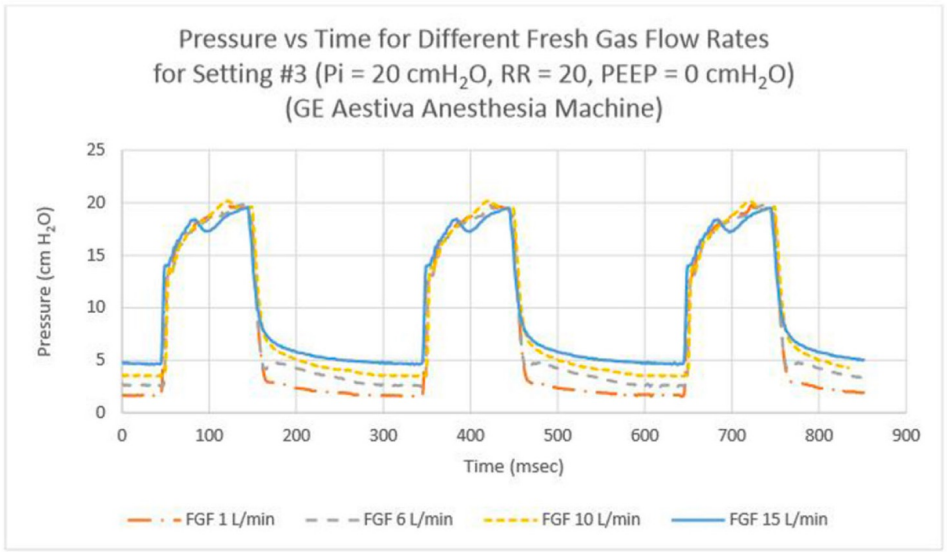
Sans extension

Précision des volumes

Et le débit de gaz frais?

Anesth Analg. 2017 May ; 124(5): 1506–1511. doi:10.1213/ANE.0000000000001944.

Higher Fresh Gas Flow Rates Decrease Tidal Volume During Pressure Control Ventilation



Average Tidal Volume (milliliters), Standard Deviation, and Coefficient of Variation for Each Setting at Varying Fresh Gas Flow Rates for GE Aestiva and Avance CS2.

FGF[a] (L/min)	1	6	10	15
GE Aestiva	**Mean ± Standard Deviation (Coefficient of Variation %)**			
Settings 1[a] Standard (mL)	48 ± 0 (0)	34.9 ± 0.3 (0.9)	16.5 ± 0.5 (3.2)	10 ± 0 (0)
Settings 2 (PEEP 5 cm H_2O; mL)	62 ± 0 (0)	57.3 ± 0.5 (0.8)	45 ± 0 (0)	41 ± 0 (0)
Settings 3 (Pi 20 cm H_2O; mL)	108 ± 0 (0)	85.8 ± 0.4 (0.5)	78.9 ± 0.6 (0.7)	72.4 ± 0.5 (0.7)
Settings 4 (RR 10; mL)	48 ± 0 (0)	37 ± 0 (0)	15.1 ± 0.3 (2.1)	9.6 ± 0.5 (5.4)
GE Avance CS2	**Mean ± Standard Deviation (Coefficient of Variation %)**			
Settings 1 Standard (mL)	46 ± 0 (0)	43 ± 0 (0)	40.4 ± 0.5 (1.2)	39.7 ± 0.49 (1.3)
Settings 2 (PEEP 5 cm H_2O; mL)	65 ± 0 (0)	68.5 ± 2.6 (3.8)	64.2 ± 3.7 (5.8)	65.3 ± 0.5 (0.7)
Settings 3 (Pi 20 cm H_2O; mL)	105 ± 0 (0)	102.7 ± 0.7 (0.6)	106.1 ± 0.6 (0.5)	98 ± 1.4 (1.4)
Settings 4 (RR 10; mL)	50.1 ± 1 (1.9)	44.1 ± 0.6 (1.3)	42 ± 0 (0)	41.2 ± 1.8 (4.2)

Abbreviations: FGF, fresh gas flow; PEEP, positive end-expiratory pressure; Pi, inspired pressure; RR, respiratory rate.

Précision des volumes

En mode volume …

Medical Devices: Evidence and Research 2020:13 205–211



Medical Devices: Evidence and Research — Dovepress
open access to scientific and medical research

Open Access Full Text Article — ORIGINAL RESEARCH

The Difference Between Set and Delivered Tidal Volume: A Lung Simulation Study

This article was published in the following Dove Press journal:
Medical Devices: Evidence and Research

Vt = 30 ml x 25
3 modèles

Group	Resistance (cmH_2O/L/sec)	Compliance (mL/cmH_2O)
1	50	2
2	100	1
3	150	0.5

Table 2 Ventilator Displayed or Measured Tidal Volume and Actually Delivered Tidal Volume

	Group 1			Group 2			Group 3		
	aVT	mVT	P value	aVT	mVT	P value	aVT	mVT	P value
Fabius GS VCV	26.6 ± 0.56	23.0 ± 0.58	<0.001	26.7 ± 0.18	15.6 ± 0.9	<0.001	25.7 ± 0.49	17.6 ± 3.9	<0.001
Servo-I, VCV	31.4 ± 0.12	29.4 ± 0.53	<0.001	30.1 ± 0.13	27.7 ± 0.49	<0.001	29.2 ± 0.26	26 ± 0.0	<0.001
Servo-I, DCV	30.1 ± 0.17	26.6 ± 0.53	<0.001	28.9 ± 0.24	24.9 ± 0.38	<0.001	27.4 ± 0.14	23.5 ± 0.55	<0.001
Infinity V500, VCV	30.2 ± 0.13	29.9 ± 0.9	0.28	30.1 ± 0.12	30.0 ± 0.0	0.04	28.9 ± 0.08	30.0 ± 0	<0.001
Infinity V500, DCV	30.6 ± 0.13	30.0 ± 0.0	<0.001	30.9 ± 0.18	30.0 ± 0.0	<0.001	30.6 ± 0.07	30.0± 0.0	<0.001

Précision des volumes

Modèle pédiatrique

Anaesthesia 2018, 73, 972-979 doi:10.1111/anae.14245

Original Article

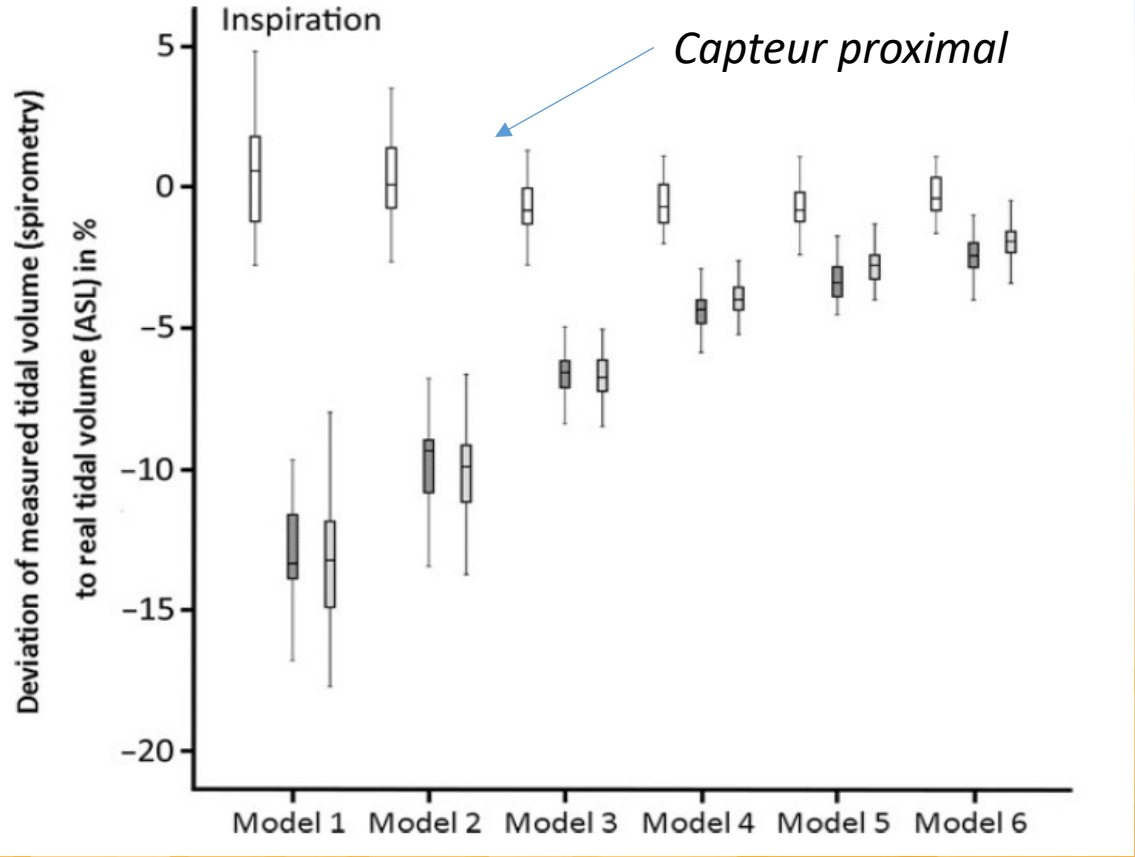
Accuracy of near-patient vs. inbuilt spirometry for monitoring tidal volumes in an in-vitro paediatric lung model

S. Morgenroth,[1] J. Thomas,[2] V. Cannizzaro,[3] M. Weiss[4] and A. R. Schmidt[2]

GE Aisys CS2

Mode PCV

	Model 1	Model 2	Model 3
Body weight; kg	3.0	6.0	12.0
Age; years	0.01	0.5	2.0
Compliance; ml. cmH_2O^{-1}	5.5	9.5	24.5
Resistance; $cmH_2O.l.s^{-1}$	62.5	43.5	27.5
Respiratory rate; min^{-1}	40	30	24
Target tidal volume; ml	25	50	100
Cuffed tracheal tube internal diameter; mm	3.0	3.0	4.0



Précision des volumes

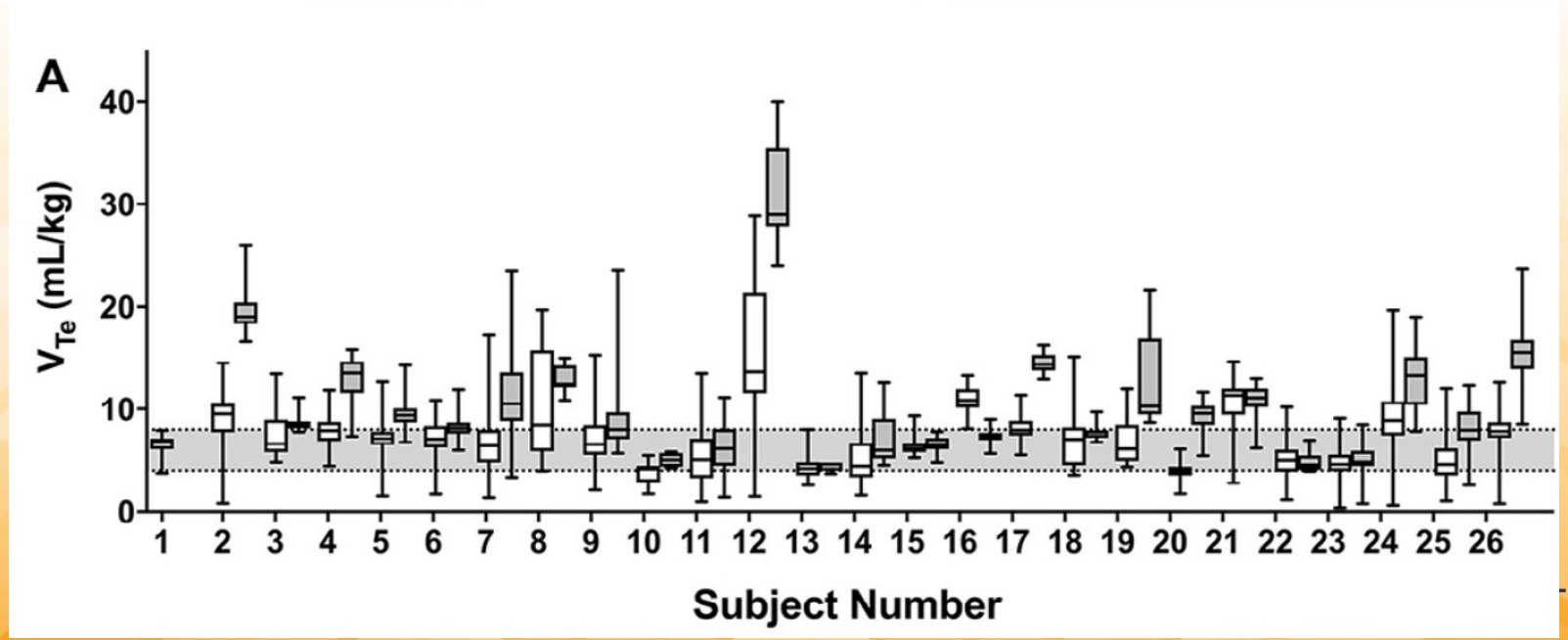
En néonatologie …

ARTICLE IN PRESS
THE JOURNAL OF PEDIATRICS • www.jpeds.com
ORIGINAL ARTICLES

Tidal Volume Delivery during the Anesthetic Management of Neonates Is Variable

Thanaa Abouzeid, BBiomed[1,2], Elizabeth J. Perkins, RN[1], Prue M. Pereira-Fantini, PhD[1], Anushi Rajapaksa, PhD[1,2], Asha Suka, BSci[1,2], and David G. Tingay, PhD[1,2,3]

Characteristics	Values
GA at birth (completed wk), mean (SD)	35.7 (4.8)
Corrected GA (completed wk), mean (SD)	39.9 (3.3)
Birth weight, g, mean (SD)	2634 (1041)
Weight, g, mean (SD)	3167 (736)



En pratique

Etude PEDIAVENT

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DOI: 10.1111/pan.13909

RESEARCH REPORT

Pediatric Anesthesia WILEY

Ventilation in pediatric anesthesia: A French multicenter prospective observational study (PEDIAVENT)

Marion Lebossé[1] | Delphine Kern[2] | Mathilde De Queiroz[1] | Nathalie Bourdaud[1] | Francis Veyckemans[3] | Dominique Chassard[1,4] | Florent Baudin[1,4] | on behalf of the ADARPEF (Association Des Anesthésistes Réanimateurs Pédiatriques d'Expression Française)[a]

	Laryngeal mask airway n = 254	Tracheal tube n = 346	*P*
Median age, months [IQR]	63.5 [31.8-120.0]	60 [24.0-132]	.82
Median duration of anesthesia, min [IQR] *(N = 576)*	55 [40-70]	80 [52-135]	**<.001**
Ventilatory mode (maintenance), n (%) *(N = 592)*			
PCV	118 (46.8)	75 (22.1)	**<.001**
VCV	28 (11.1)	154 (45.3)	
PRVC	50 (19.8)	106 (31.2)	
PSV	54 (21.4)	5 (1.5)	
Spontaneous breathing	2 (0.8)	0 (0)	
Median tidal Volume, mL/kg [IQR] *(N = 515)*	8.2 [7.3-9.0]	7.8 [7.0-8.7]	**.004**
Median PEEP, cmH_2O *(N = 554)*	4.0 [3.0-5.0]	4.0 [4.0-5.0]	**<.001**
Zero end-expiratory pressure, n (%) *(N = 554)*	30 (12.8)	18 (5.6)	**.003**

Masque laryngé

Paediatric Anaesthesia 2001 **11**: 691–694

Pressure versus volume-controlled ventilation with a laryngeal mask airway™ in paediatric patients

I. KEIDAN, H. BERKENSTADT, E. SEGAL AND A. PEREL

Department of Anesthesiology and Intensive Care, Sheba Medical Center, Sackler School of Medicine, Tel-Aviv University, Israel

RCT
32 patients
Age: 4.5 ± 4 years

Pression inspiratoire
Insufflation gastrique

	PCV	*VCV*	*P*
Peak pressure (cmH_2O)	14.1 ± 1.6	16.7 ± 2.3	< 0.001
Plateau pressure (cmH_2O)	14.1 ± 1.6	16.5 ± 2.3	< 0.001
Peak pressure >20 cmH_2O (no. of patients)	0	6	0.015
Expiratory tidal volume ($ml \cdot kg^{-1}$)	8.8 ± 3.0	8.4 ± 2.3	NS
% leak	9.7 ± 7.7	9.9 ± 7.4	NS
Endtidal CO_2 (mmHg)	41.7 ± 3.7	40.1 ± 3.4	NS

Insufflation gastrique = 0

Masque laryngé

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ACTA ANAESTHESIOLOGICA SCANDINAVICA
doi: 10.1111/j.1399-6576.2006.1148.x

Pressure-controlled ventilation is superior to volume-controlled ventilation with a laryngeal mask airway in children

M. Bordes[1], F. Semjen[1], C. Degryse[1], J. L. Bourgain[2] and A. M. Cros[1]
[1]Pellegrin Children's Hospital, Bordeaux 2 University, Bordeaux and [2]Department of Anesthesia, Institut Gustave Roussy, Villejuif, France

RCT
41 patients
Age: 6 years (2–15)

Insufflation gastrique (auscultatoire)

Table 1

Comparison of respiratory parameters between two modes (mean ± SD).

	PCV		VCV	
	2 min	5 min	2 min	5 min
Pinsp (cm H_2O)	12.3 ± 2.6*	12.4 ± 2.6*	13.9 ± 2.8	14.2 ± 2.8
VT_{exp} (ml)	199 ± 68	204 ± 65*	196 ± 62	196 ± 61
$P_{ET}CO_2$ (mm Hg)	39.8 ± 3.4	38.7 ± 3.2*	40.3 ± 3.9	39.7 ± 4.1

*Significant difference between PCV and VCV, $p < 0.05$.

Masque laryngé

Medicine (2017) 96:18(e6772)
Clinical Trial/Experimental Study
Medicine® OPEN

A randomized comparison of volume- and pressure-controlled ventilation in children with the i-gel

Effects on peak inspiratory pressure, oropharyngeal leak pressure, and gastric insufflation

Jin Ha Park, MD, Ji Young Kim, MD, PhD, Kyoungun Park, MD, Hae Keum Kil, MD*

RCT
34 patients
Age: 23 [12–42] et 26 [20–39] mois

Pression inspiratoire
Echo gastrique

Table 2

Peak inspiratory pressure, oropharyngeal leak pressure.

Variables	VCV (n = 17)	PCV (n = 17)	P
Peak inspiratory pressure (cm H_2O)			
After insertion	12 [11–15]	10 [9–12]	.021
After caudal block	13 [11–15]	11 [10–12]	.014
End of surgery	13 [11–14]	10 [10–12]	.002

Insufflation gastrique:
- 4/17 in the VCV group
- 3/17 in the PCV group (P>.999).

Laparoscopie

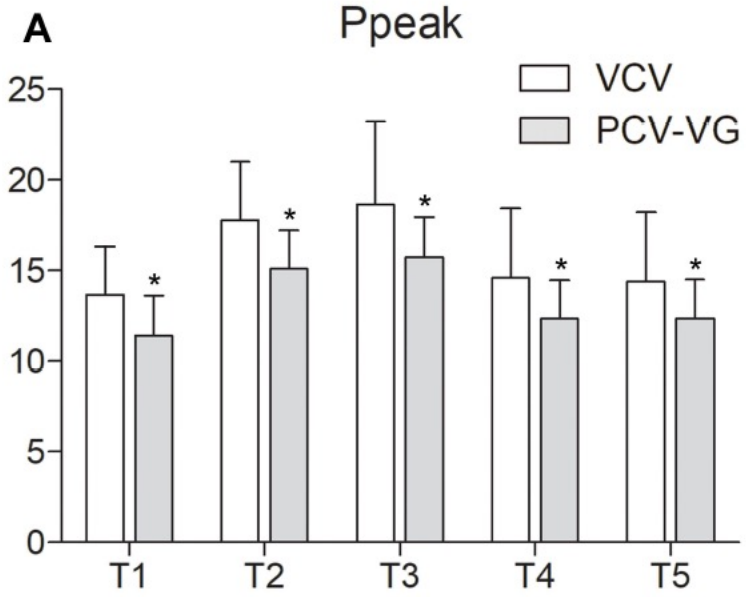
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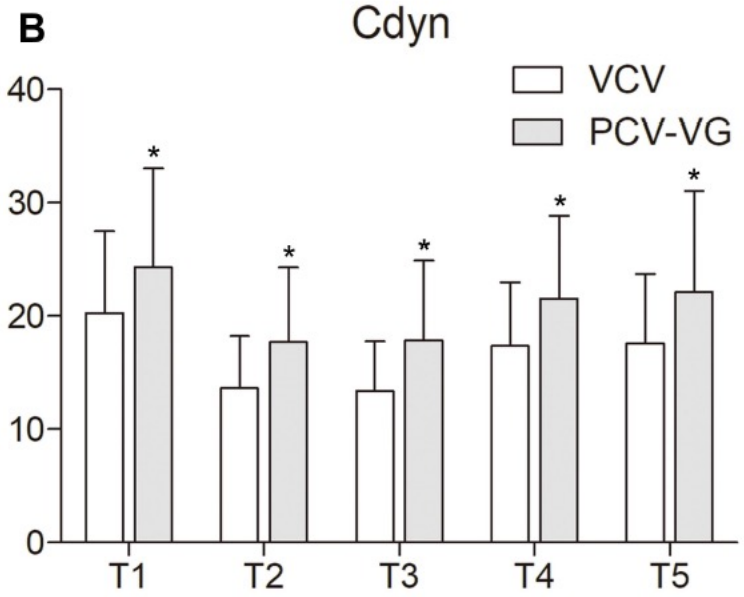
Pressure-Controlled Volume-Guaranteed Ventilation Improves Respiratory Dynamics in Pediatric Patients During Laparoscopic Surgery: A Prospective Randomized Controlled Trial

RCT
64 patients
Age: 2 years (1–8) Vs 3 years (1-8)

Pression d'insufflation (PI)
Compliance dynamique

laryngeal mask airway





Pas de différence sur complications

Laparoscopie

JOURNAL OF LAPAROENDOSCOPIC & ADVANCED SURGICAL TECHNIQUES
Volume 21, Number 7, 2011
© Mary Ann Liebert, Inc.
DOI: 10.1089/lap.2011.0051

Full Report: Pediatrics

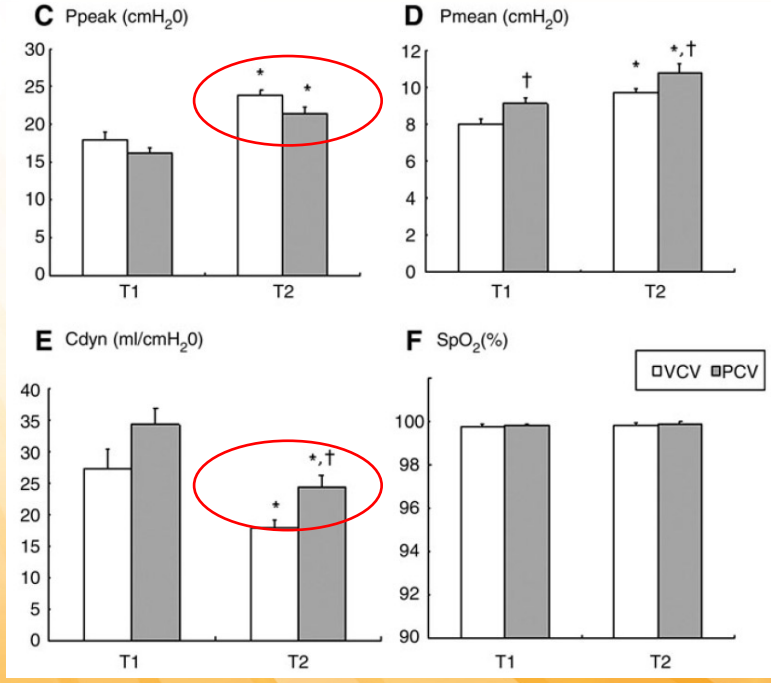
Effect of Pressure- Versus Volume-Controlled Ventilation on the Ventilatory and Hemodynamic Parameters During Laparoscopic Appendectomy in Children: A Prospective, Randomized Study

Ji Young Kim, MD,[1,2] Cheung Soo Shin, MD,[1,2] Kyung Cheon Lee, MD,[3] Young Jin Chang, MD,[3] and Hyun Jeong Kwak, MD[3]

As there were no differences in other ventilatory parameters and oxygen saturation, both VCV and PCV can be used safely in children undergoing laparoscopic surgery

RCT
34 patients
Age: 10 years (8–11) Vs 12 years (10-12)

MAP
Compliance dynamique



Laparoscopie et atelectasies

Hassan *et al. Ain-Shams Journal of Anesthesiology* (2020) 12:27
https://doi.org/10.1186/s42077-020-00076-9

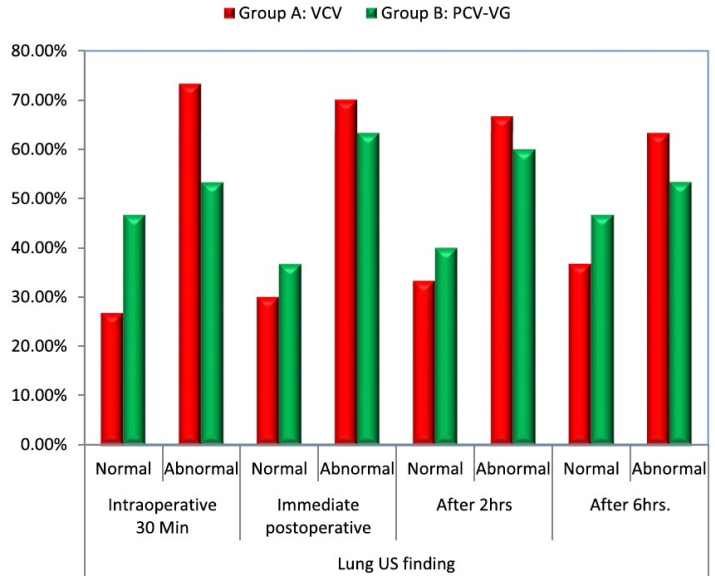
Ain-Shams Journal of Anesthesiology

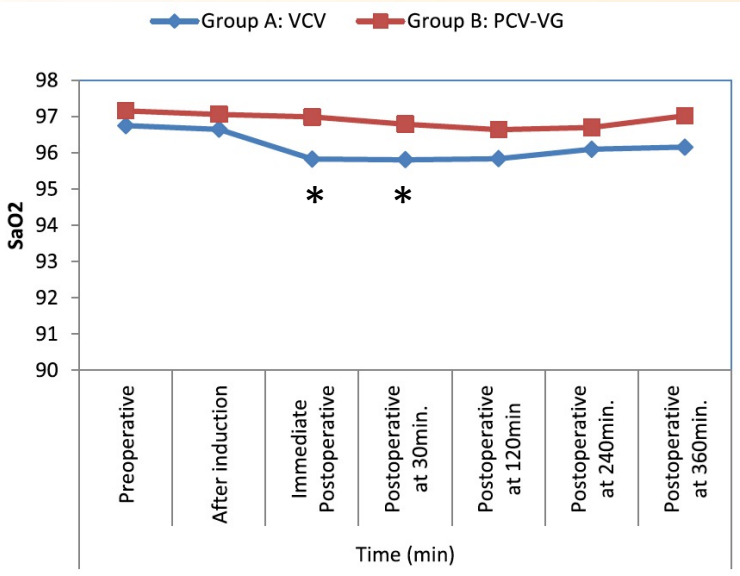
ORIGINAL ARTICLE Open Access

Comparison between volume-controlled ventilation and pressure-controlled volume-guaranteed ventilation in postoperative lung atelectasis using lung ultrasound following upper abdominal laparotomies: a prospective randomized study

RCT
60 patients
Age: 30

Atelectatsies
PaO_2, SaO_2, CO_2





Ventilation unipulmonaire

British Journal of Anaesthesia **105** (3): 377–81 (2010)
Advance Access publication 16 June 2010 · doi:10.1093/bja/aeq130

BJA

RESPIRATION AND THE AIRWAY

Pressure-controlled ventilation and intrabronchial pressure during one-lung ventilation†

H. Rozé[1]*, M. Lafargue[1], H. Batoz[1], M. Q. Picat[2], P. Perez[2], A. Ouattara[1] and G. Janvier[1]

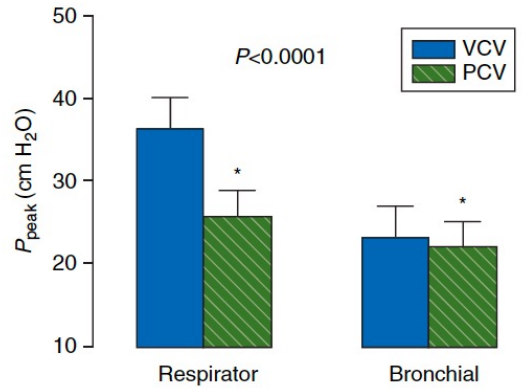
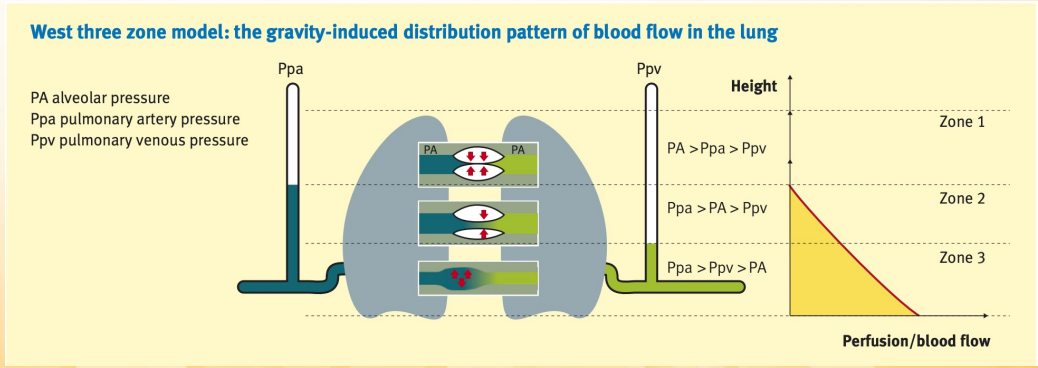


Fig 2 Effects of a switch from VCV to PCV on peak airway pressure (P_{peak}) measured simultaneously in the breathing circuit and in the bronchus of the lung being ventilated during OLV (n=15). *P<0.05 *vs* VCV. The P-value refers to the interaction between ventilation and site of measurement.

Observationnelle Cross-Over
15 patients
Age: 56 years

Pression dans les VAS



CONCLUSION

- Pas de supériorité évidente d'un mode sur l'autre
- Pour le quotidien = le mode que l'on maitrise +++
- Comprendre les dual mode pour ne pas faire d'erreur
- Considérer la pression avec un dispositif supra glottique / Nouveau né ?

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