Utilidad de la VMNI en el proceso de weaning

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Especialista en Kinesiología Intensiva
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Weaning Dificultoso: Definición

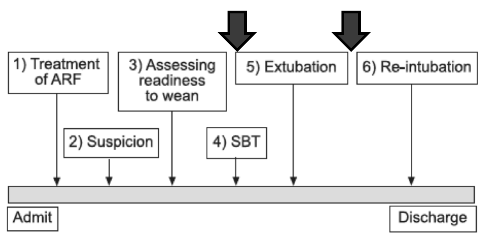
TABLE 3 Classification of patients according to the weaning process

Group/category	Definition
Simple weaning	Patients who proceed from initiation of weaning to successful extubation on the first attempt without difficulty
Difficult weaning	Patients who fail initial weaning and require up to three SBT or as long as 7 days from the first SBT to achieve successful weaning
Prolonged weaning	Patients who fail at least three weaning attempts or require >7 days of weaning after the first SBT

SBT: spontaneous breathing trial.

Eur Respir J 2007; 29: 1033–1056

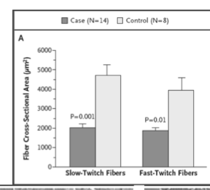
Weaning de Ventilación Mecánica

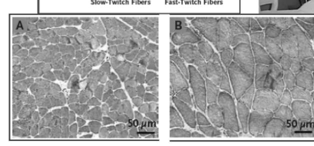


Eur Respir J 2007; 29: 1033–1056)

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MARCH 27, 2008 VOL. 358 NO. 13





N Engl J Med 2008;358:1327-35

Evidence-Based Guidelines for Weaning and Discontinuing Ventilatory Support*

A Collective Task Force Facilitated by the American College of Chest Physicians; the American Association for Respiratory Care; and the American College of Critical Care Medicine

Chairman
Neil R. MacIntyre, MD, FCCP

Table 2—*Causes of Ventilator Dependency*

Causes	Description
Neurologic controller	Central drive; peripheral nerves
Respiratory system	Mechanical loads: respiratory system mechanics; imposed loading
	Ventilatory muscle properties: inherent strength/endurance; metabolic state/ nutrients/oxygen delivery and extraction
	Gas exchange properties: vascular properties and ventilation/perfusion matching
Cardiovascular system	Cardiac tolerance of ventilatory muscle work; peripheral oxygen demands
Psychological issues	

CHEST 2001; 120:375S–395S6

Rol de la VMNI en el weaning

La VNI se ha empleado en tres escenarios clínicos distintos en la desconexión de ventilación mecánica:

- La VNI facilitaría la desconexión del ventilador.
- La VNI disminuiría el riesgo de fracaso de la extubación en pacientes con riesgo elevado.
- La VNI permitiría reducir el riesgo de fracaso de la extubación en pacientes con falla respiratoria progresiva post extubación

Rev Chil Enf Respir 2008; 24: 219-224

La VNI facilitaría la desconexión del ventilador

La VNI facilitaría la desconexión del ventilador

Efecto de VNI	Nava[8]	Girault[9]	Chen[10]	Ferrer[11]
Publicación	1998	1999	2001	2003
Modalidad	VNI-PS	VNI-P/F	VNI-PS	BiPAP
Interface	Máscara facial	Máscara facial o nasal	Máscara facial	Máscara facial o nasal
Pacientes	50 pacientes con EPOC exacerbado, falla respiratoria hipercápnica y destete fallido a las 48 horas	33 pacientes con falla respiratoria aguda sobre crónica y destete fallido a las 48 horas	24 pacientes con EPOC exacerbado y destete a las 72 horas	43 pacientes con falla respiratoria aguda y destete fallido durante tres días consecutivos
Intervención	VNI: 25 VM: 25	VNI: 17 VM: 16	VNI: 12 VM: 12	VNI: 21 VM: 22
Incidencia de neumonía	VNI: 0% VM: 28% p < 0,05	VNI: 5,8% VM: 6,2% NS	VNI: 0% VM: 58% p = 0,027	VNI: 24% VM: 59% p = 0,042
Estadía en UCI	VNI: 15,1 ± 5,4 d VM: 24,0 ± 13,7 p = 0,005	VNI: 12,3 ± 6,8 d VM: 14,0 ± 7,5 d NS		VNI: 14,1 ± 9,2 d VM: 25,0±12,5 d p = 0,002
Estadía en el hospital		VNI: 27,1 ± 14,3 d VM: 27,6 ± 13,0 d NS	VNI: 16 ± 6 d VM: 25 ± 12 d p < 0,05	VNI: 27,8 ± 14,6 d VM: 40,8 ± 21,4 d p = 0,026
Sobrevida en el seguimiento	VNI: 92% VM: 72% p = 0,009	VNI: 100% VM: 87,5% NS	VNI: 100% VM: 75% NS	VNI: 71,4% VM: 40,9% p = 0,018

Rev Chil Enf Respir 2008; 24: 219-224

Noninvasive Mechanical Ventilation in the Weaning of Patients with Respiratory Failure Due to Chronic Obstructive Pulmonary Disease

A Randomized, Controlled Trial

Ann Intern Med 1998; 128: 721-8

Stefano Nava, MD; Nicolino Ambrosino, MD; Enrico Clini, MD; Maurizio Prato, MD; Giacomo Orlando, MD; Michele Vitacca, MD; Paolo Brigada, MD; Claudio Fracchia, MD; and Fiorenzo Rubini, MD

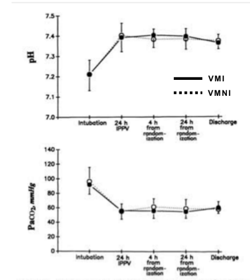


Figure 1. **Mean ± SD pH and Pa_{CO_2} in the two groups of patients at admission to the hospital; after 24 hours of controlled, intermittent positive-pressure ventilation (*24 h IPPV*); at 4 hours after randomization to invasive or noninvasive pressure support ventilation; at 24 hours after randomization; and at discharge.** White circles represent noninvasive pressure support ventilation; black circles represent invasive pressure support ventilation.

Riesgo de neumonía nosocomial (0% vs 28%)
Muerte en el seguimiento a 60 días (8% vs 28%)

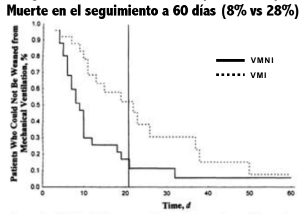


Figure 2. **Kaplan–Meier curves for patients who could not be weaned from mechanical ventilation (defined as weaning failure or death linked to mechanical ventilation) in the two groups.** The probability of weaning failure was significantly lower for the noninvasive ventilation group (cumulative probability for 60 days, $P < 0.01$ by the log-rank test). The vertical line represents day 21, usually considered the threshold between weanable and unweanable patients. The solid line represents noninvasive pressure support ventilation; the dashed line represents invasive pressure support ventilation.

$$\text{WOB} = \frac{\text{Volumen}}{\text{Distensibilidad}} + \text{Resistencia x Flujo}$$

Table 2—*Causes of Ventilator Dependency*

Causes	Description
Neurologic controller	Central drive; peripheral nerves
Respiratory system	Mechanical loads: respiratory system mechanics; imposed loading
	Ventilatory muscle properties: inherent strength/endurance; metabolic state/nutrients/oxygen delivery and extraction
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Cardiovascular system	Cardiac tolerance of ventilatory muscle work; peripheral oxygen demands
Psychological issues	

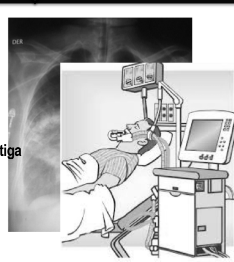
CHEST 2001; 120:375S–395S6

Aumento de la Carga Elástica
Paciente Restrictivo

↑ Presión = ↓ Volumen (mL) / ↓ Distensibilidad (mL/cmH_2O)

↑ WOB

Riesgo de fatiga muscular



Hipoventilación

Compromiso de conciencia

Aumento de la Carga Resistiva
Paciente Obstructivo

↑ Presión = ↑ Resistencia x ↓ Flujo

↓ Volumen

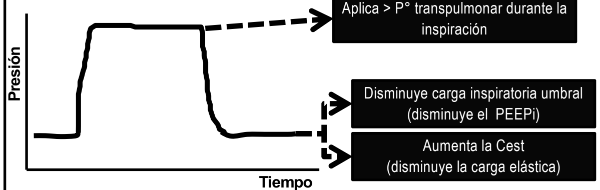
Hipoventilación

Compromiso de conciencia

↑ WOB

Riesgo de fatiga muscular

Efectos VNI
Efecto del Nivel de Soporte



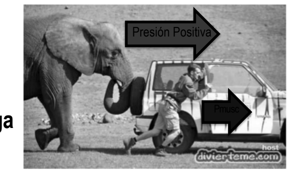
Ecuación de Movimiento Respiratorio

Presión Positiva

↑Presión = Volumen / ↓Distensibilidad + ↑Resistencia x Flujo

↑WOB

Riesgo de fatiga muscular



VNI y Tolerancia al ejercicio

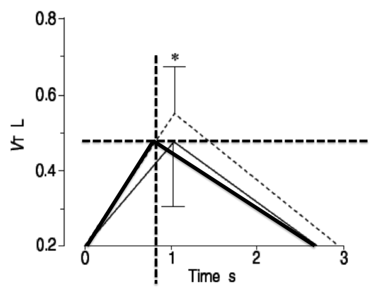
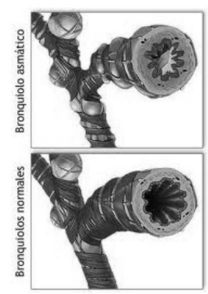


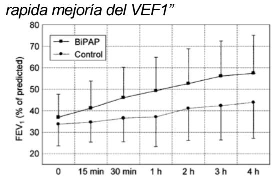
Fig. 3. – Breathing pattern of the whole population during unsupported (——) and proportional assist (- - -) ventilation (mean±SD). *: $p<0.05$.

Eur Respir J 1997; 10: 2829–2834

Falla Respiratoria Aguda
HIPERCAPNICA
ASMA BRONQUIAL



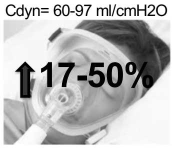
Sorokský et al. (VNI v/s placebo en asma)
"Menor necesidad de hospitalización y mas rapida mejoría del VEF1"



Chest 2003;123(4):1018-1025

Efectos VNI
Efectos sobre la Mecánica Respiratoria

Compliance Dinámica	Resistencia Vía Aérea	PEEPi
Sujetos Normales: Cdyn= ±130 ml/cmH2O (80 – 230)	**Sujetos Normales:** Rva = 2 – 4 cmH2O/L/s	**Respiración espont.:** PEEPi = 3,4 cmH2O
EPOC con FRCrónica: Cdyn= 60-97 ml/cmH2O	**EPOC, obeso o restrict.:** Cdyn= 11 – 18 cmH2O/L/s	PEEP 5 cmH2O ↓
		PS 15 + PEEP 5 ↑
↑17-50%	↓23-70%	"PEEP afecta mayormente el PEEPi"



AJRCCM 1994;149(5): 1069-1076

La VNI disminuiría el riesgo de fracaso de la extubación en pacientes con riesgo elevado.

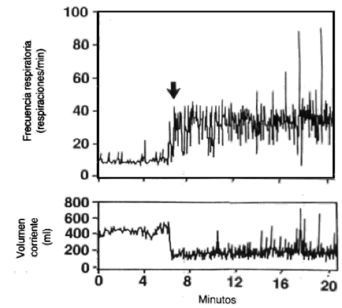
Tabla 2. Estudios clínicos controlados que examinan la eficacia de la ventilación no invasiva en pacientes de alto riesgo de fracaso en el destete del ventilador mecánico

Efecto de VNI	Nava[15]	Ferrer[16]
Publicación	2005	2006
Modalidad	BiPAP / VNI-PS	BiPAP
Interface	Máscara facial o nasal	Máscara facial o nasal
Pacientes	97 pacientes ventilados que toleraron una prueba de respiración espontánea y fueron considerados de alto riesgo de fracaso en el destete	162 pacientes ventilados que toleraron una prueba de respiración espontánea y fueron considerados de alto riesgo de fracaso en el destete
Intervención	VNI: 48 CT: 49	VNI: 79 CT: 83
Falla respiratoria post extubación	VNI: 8,3% CT: 24,5% p = 0,027	VNI: 16% CT: 33% p = 0,029
Estadía en UCI	VNI: 8,9 ± 5,7 d CT: 11,6 ± 14,9 d NS	VNI: 11 ± 8 d CT: 13 ± 11 d NS
Estadía en el hospital	VNI: 23,3 ± 16,4 d CT: 25,5 ± 21,4 d NS	VNI: 30 ± 23 d CT: 29 ± 18 d NS
Mortalidad en la UCI	VNI: 6,2% CT: 18,4% p < 0,001	VNI: 3% CT: 14% p = 0,015
Mortalidad en el hospital	VNI: 12% CT: 18% NS	VNI: 16% CT: 23% NS

VNI: ventilación no invasiva, CT: grupo control, VNI-PS: ventilación no invasiva-presión de soporte, BiPAP: presión positiva en la vía aérea de dos niveles.

Rev Chil Enf Respir 2008; 24: 219-224

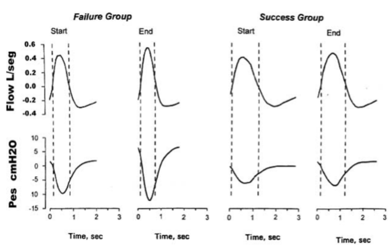
Falla Respiratoria post-extubación



AJRCCM 134(6): 1111-1118 (1986)

WOB y Weaning

- Jubran: "Stress de los músculos respiratorios en weaning fallido".

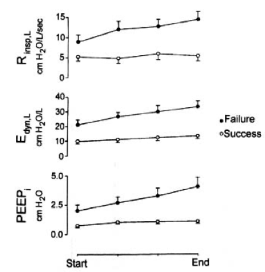


AJRCCM; 155(3):906-915 (1997)

¿Por qué está aumentado el Trabajo Respiratorio en pacientes que fallan el weaning?

- Jubran et al.:
  - Medición Rva, Elastancia Dinámica y autoPEEP.
  - Valores > en weaning fallido.
  - Parámetros empeoran.
  - Alt. Mecánica Respiratoria

AUMENTO TRABAJO RESPIRATORIO



AJRCCM; 155(3):906-915 (1997)

Noninvasive ventilation immediately after extubation improves weaning outcome after acute respiratory failure: a randomized controlled trial

CRITICAL CARE

Susana R Ornico[1], Suzana M Lobo[1], Helder S Sanches[1], Maristela Deberaldini[1], Luciane T Tófoli[1], Ana M Vidal[1], Guilherme P Schettino[2], Marcelo B Amato[2], Carlos R Carvalho[2] and Carmen S Barbas[2*]

Patients with more than 72 hours of Mechanical Ventilation due to Acute Respiratory Failure

↓

Demographic Data, Weaning Protocol.

Randomization

Extubation

Noninvasive Ventilation immediately after extubation — Oxygen Mask 5 L/min

IPAP= 8 cmH20 and EPAP= 4 cmH20

↑ EPAP if PaO2 < 60 mmHg ou SpO2< 90%

↑ IPAP if PaCO2 > 50 mmHg

↑ or ↓ IPAP according to RR/TV(L)

Monitoring after extubation:

- 15 minutes
- 2 hours
- 24 hours

Arterial blood gas analysis: PaO2, PaCO2; Oxygen Saturation , Respiratory Rate; Heart rate, Mean arterial Pressure

- 48 hours → Reintubation rate
- ICU length of stay
- Hospital Mortality

Critical Care 2013, 17:R39

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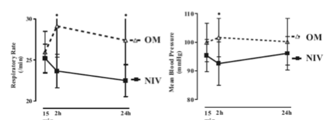
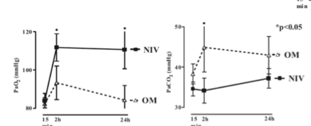
- 40 pacientes
- 20 vmni
- 20 oxigenoterapia por mascarilla





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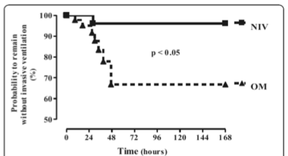

Figure 4 Probability of avoiding reintubation after 168 study hours, by using the Kaplan-Meier curve, with a *P* value obtained with the log-rank test.

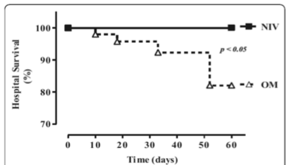

Figure 5 Estimated hospital survival, by using the Kaplan-Meier curve.

Critical Care 2013, 17:R39

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Table 2 Outcomes for the study groups

Outcomes	NIV (n = 20)	Oxygen mask (n = 18)	*P* value[a]
Reintubation, number (%)	1 (5%)	7 (39%)	0.016
Reintubation after excluding COPD, number (%)	0 (0) n = 13	5 (33%) n = 15	0.044
ICU length of stay, mean (SD)	16.8 (11.6)	18.4 (12.2)	0.681
Hospital mortality, number (%)	0 (0)	4 (22.2%)	0.041

*Significant values with significance level of 0.05. COPD, chronic obstructive pulmonary disease; ICU, intensive care unit; NIV, noninvasive positive-pressure ventilation.

Table 3 Causes of reintubation for the NIV and OM groups

	Respiratory muscle fatigue	Atelectasis	Bronchospasm	Depressed level of consciousness
90 mm Hg ≥ SAP ≥ 180 mm Hg	2 3		6	
HR ≥ 140 beats/min				
Severe arrhythmia				
RR ≥ 30 per minute	1 2 3	4 5	6	
PaO_2 ≤ 60 mm Hg or SaO_2 ≤ 90%	1 2 3	4 5	6	7 1[a]
$PaCO_2$ ≥ 50 mm Hg	1 2 3	4 5	6	7 1[a]
Difficulty in expectorating	1 2 3			7 1[a]

1, 2, 3, 4, 5, 6, 7, Seven patients in the Oxygen Mask group undergoing reintubation. [a]Patient in the NIV group undergoing reintubation. HR, heart rate; NIV, noninvasive ventilation; RR, respiratory rate.

Critical Care 2013, 17:R39

SYSTEMATIC REVIEW

Non-invasive ventilation as a strategy for weaning from invasive mechanical ventilation: a systematic review and Bayesian meta-analysis

Joyce Yeung[1,2*], Keith Couper[1,2], Elizabeth G. Ryan[1,3], Simon Gates[3], Nick Hart[4] and Gavin D. Perkins[1,2]

25 estudios, 1069 pacientes

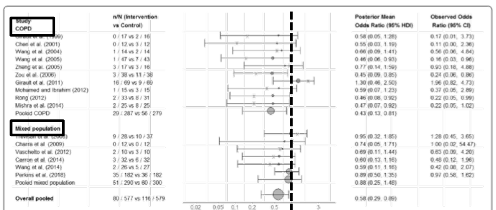

Fig. 3 Forest plot comparing hospital mortality rates for NIV and invasive weaning, by patient population (COPD vs. mixed ICU population). The estimated odds ratio (OR) from the posterior distribution for each study is shown as a circle, with 95% HDI represented by horizontal lines. The observed OR are given by crosses. The pooled OR estimates (and 95% HDI) are also displayed as the last row for each patient population, and the overall pooled estimate for all studies is displayed as the last row. An OR < 1 means that the intervention is superior

Intensive Care Med, Oct 2018 (In press)

SYSTEMATIC REVIEW

Non-invasive ventilation as a strategy for weaning from invasive mechanical ventilation: a systematic review and Bayesian meta-analysis

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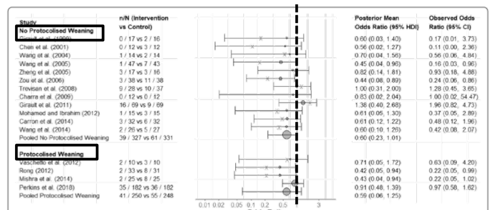

Fig. 4 Forest plot comparing hospital mortality rates for NIV and invasive weaning, by studies that used protocolised weaning and those that did not. The estimated odds ratio (OR) from the posterior distribution for each study is shown as a circle, with 95% HDI represented by horizontal lines. The observed OR are given by crosses. The pooled OR estimates (and 95% HDI) are also displayed as the last row for each patient population. An OR < 1 means that the intervention is superior

Intensive Care Med, Oct 2018 (In press)

Noninvasive ventilation as a weaning strategy for mechanical ventilation in adults with respiratory failure: a Cochrane systematic review

Karen E.A. Burns MD MSc, Maureen O. Meade MD MSc, Azra Premji MSc RRT, Neill K.J. Adhikari MDCM MSc

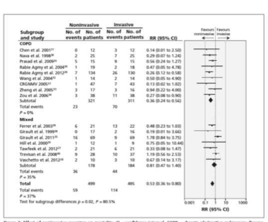

Figure 2: Effect of noninvasive weaning on mortality. CI = confidence interval, COPD = chronic obstructive pulmonary disease, CRGNMV = Collaborating Research Group for Noninvasive Mechanical Ventilation, RR = risk ratio.

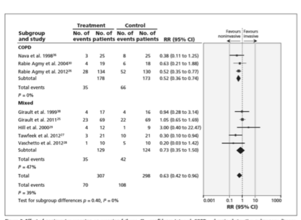

Figure 3: Effect of noninvasive weaning on weaning failures. CI = confidence interval, COPD = chronic obstructive pulmonary disease, CRGNMV = Collaborating Research Group for Noninvasive Mechanical Ventilation, RR = risk ratio.

CMAJ 2014, 186(3): E112-122

Noninvasive ventilation as a weaning strategy for mechanical ventilation in adults with respiratory failure: a Cochrane systematic review

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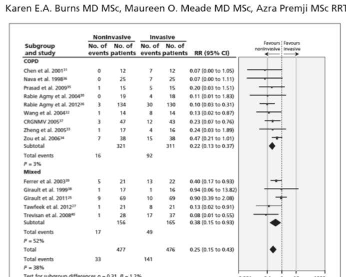

Figure 4: Effect of noninvasive weaning on ventilator associated pneumonia. CI = confidence interval, COPD = chronic obstructive pulmonary disease, CRGNMV = Collaborating Research Group for Noninvasive Mechanical Ventilation, RR = risk ratio.

Interpretation: Noninvasive weaning reduces rates of death and pneumonia without increasing the risk of weaning failure or reintubation. In subgroup analyses, mortality benefits were significantly greater in patients with COPD.

CMAJ 2014, 186(3): E112-122

REVIEW ARTICLES

Non-invasive ventilation for weaning, avoiding reintubation after extubation and in the postoperative period: a meta-analysis

BJA

A. J. Glossop[1]*, N. Shepherd[2], D. C. Bryden[3] and G. H. Mills[3]

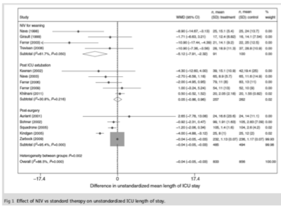

Fig 1. Effect of NIV vs standard therapy on unstandardized ICU length of stay.

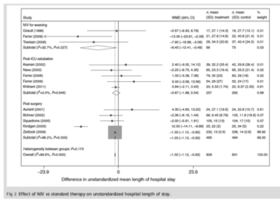

Fig 2. Effect of NIV vs standard therapy on unstandardized hospital length of stay.

British Journal of Anaesthesia 109 (3): 305–14 (2012)

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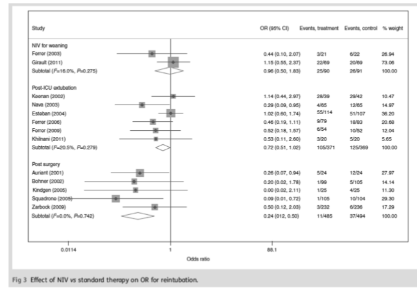


Fig 3. Effect of NIV vs standard therapy on OR for reintubation.

British Journal of Anaesthesia 109 (3): 305–14 (2012)

REVIEW ARTICLES

Non-invasive ventilation for weaning, avoiding reintubation after extubation and in the postoperative period: a meta-analysis

BJA

A. J. Glossop[1]*, N. Shepherd[2], D. C. Bryden[3] and G. H. Mills[3]

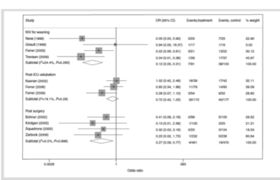


Fig 4. Effect on NIV vs standard therapy on OR for pneumonia.

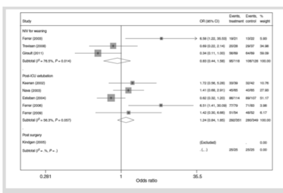


Fig 5. Effect of NIV vs standard therapy on OR for ICU survival.

British Journal of Anaesthesia 109 (3): 305–14 (2012)

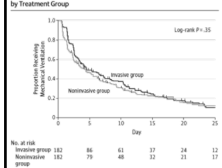
JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Protocolized Weaning With Early Extubation to Noninvasive Ventilation vs Invasive Weaning on Time to Liberation From Mechanical Ventilation Among Patients With Respiratory Failure

The Breathe Randomized Clinical Trial

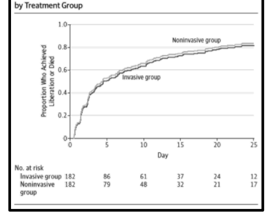
Gavin D. Perkins, MD; Dipesh Mistry, PhD; Simon Gates, PhD; Fang Gao, MD; Catherine Snelson, MB; Nicholas Hart, PhD; Luigi Camporota, PhD; James Varley, MB; Coralie Carle, MB; Elankumaran Paramasivam, MB; Beverley Hoddell; Daniel F. McAuley, MD; Timothy S. Walsh, MD; Bronagh Blackwood, PhD; Louise Rose, PhD; Sarah E. Lamb, DPhil; Stavros Petrou, PhD; Duncan Young, DM; Ranjit Lall, PhD; for the Breathe Collaborators

Figure 2. Time to Liberation From Mechanical Ventilation by Treatment Group



Hash marks indicate each censoring time. Median time to liberation from ventilation was 4.5 days (95% CI, 3.46-7.25 days) in the invasive group and 4.3 days (95% CI, 2.63-5.58 days) in the noninvasive group.

Figure 3. Cumulative Incidence of Liberation From Ventilation or Death by Treatment Group



- < ventilación invasiva (1 vs 4 días) pero igual tiempo de liberación de VM (4,3 vs 4,5 días)
- Reintubación, TQT, sobrevida: n.s.
- Eventos adversos: 24,7% vs 25,8%

JAMA, Oct 2018 (In press)

La VNI permitiría reducir el riesgo de fracaso de la extubación en pacientes con falla respiratoria progresiva post extubación

Rol de la VMNI en el weaning

Tabla 3. Estudios clínicos controlados que examinan la eficacia de la ventilación no invasiva en pacientes con falla respiratoria post extubación

Efecto de VNI	Keenan[18]	Esteban[19]
Publicación	2002	2004
Modalidad	BiPAP	VNI-PS
Interface	Máscara facial	Máscara facial
Pacientes	81 pacientes ventilados, con enfermedad cardíaca o pulmonar, que desarrollaron dificultad respiratoria en las 48 horas post extubación	221 pacientes ventilados que desarrollaron dificultad respiratoria en las 48 horas post extubación
Intervención	VNI: 39 CT: 42	VNI: 114 CT: 107
Tasa de intubación	VNI: 72% CT: 69% NS	VNI: 48% CT: 48% NS
Estadía en UCI	VNI: 15,1 ± 10,9 d CT: 19,4 ± 25,0 d NS	VNI: 18 d (R: 11-30) CT: 18 d (R: 11-26) NS
Estadía en el hospital	VNI: 32,2 ± 25,4 d CT: 29,8 ± 28,4 d NS	
Mortalidad en la UCI	VNI: 15% CT: 24% NS	VNI: 25% CT: 14% p = 0,048
Mortalidad en el hospital	VNI: 31% CT: 31% NS	

VNI: ventilación no invasiva, CT: grupo control, BiPAP: presión positiva en la vía aérea de dos niveles, VNI-PS: ventilación no invasiva-presión de soporte.

Rev Chil Enf Respir 2008; 24: 219-224

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Noninvasive Positive-Pressure Ventilation for Respiratory Failure after Extubation

CONCLUSIONS

Noninvasive positive-pressure ventilation does not prevent the need for reintubation or reduce mortality in unselected patients who have respiratory failure after extubation.

Esteban A. Et al. NEJM 350: 2452 - 60 (2004)

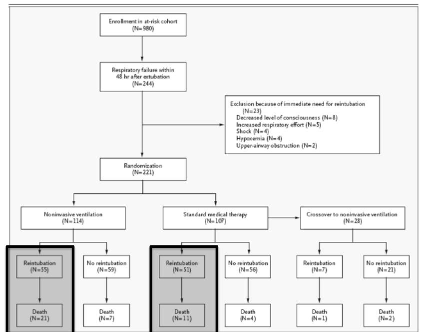


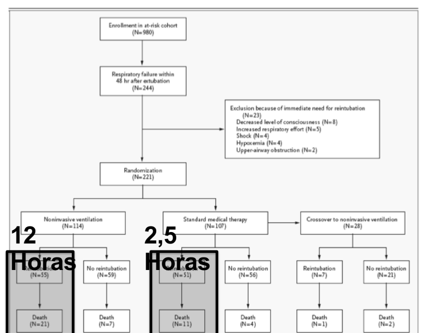
Figure 1. **Randomization and Patient Outcomes.**
The numbers of patients with various outcomes in the crossover group are included among the numbers of patients with those outcomes in the standard-therapy group.

Esteban A. Et al. NEJM 350: 2452 - 60 (2004)

Table 4. **Reasons for Reintubation, as Defined in the Protocol Guidelines, According to Study Group.**

Reason	Noninvasive Ventilation (N=55)	Standard Medical Therapy (N=51)	P Value
	no. (%)		
Lack of improvement in signs of muscle fatigue	25 (45)	23 (45)	0.97
Hypoxemia	9 (16)	15 (29)	0.11
Copious secretions	5 (9)	6 (12)	0.65
Lack of improvement in pH or partial pressure of carbon dioxide	8 (15)	3 (6)	0.13
Changes in mental status	4 (7)	2 (4)	0.45
Hypotension	4 (7)	2 (4)	0.45

Esteban A. Et al. NEJM 350: 2452 - 60 (2004)



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Esteban A. Et al. NEJM 350: 2452 - 60 (2004)

Efectos VNI

Efectos sobre la Función Cardiovascular

Varía según:

- Estado de la patología
- PEEP usado
- Tipo de Interfase de la VNI

Weaning y Disfunción Cardíaca

Mecanismos Fracaso de Weaning

- Isquemia Miocárdica
- Edema Pulmonar

Chest 1996;109:1577-1583

Weaning y Disfunción Cardíaca

EFECTOS FISIOLOGICOS DEL WEANING:

- Paso a respiración espontánea.
- ⬆actividad de los MR.
- ⬆Consumo de O2.
- ⬆trabajo respiratorio
- ⬇Presión intratoráxica
- ⬆tono simpático

- ⬆**Demanda Cardíaca**
- ⬆ **Trabajo cardíaco**

Pulmon 2007; 9 : 2 : 47 - 50

Weaning y Disfunción Cardíaca

Presión Intratoráxica (PIT):

- Presión Negativa
- ⬆ RV Sistémico (△P°)
- ⬇Gradiente eyección VI
- ⬆ Volumen sanguíneo central
- EDEMA PULMONAR

Pulmon 2007; 9(2()): 47 - 50

Factors Associated With Failure of Weaning From Long-term Mechanical Ventilation After Cardiac Surgery

Emilia NOZAWA,[1] PT, Estela AZEKA,[1] MD, Maria Ignêz Z Zanetti FELTRIM,[1] PT, *and* José Otávio Costa AULER Júnior,[1] MD

Table IV. Comparison of Parameters of Cardiac, Renal, Pulmonary, and Neurological Function

Variable	Failure[a] ($n = 27$)	Success[a] ($n = 25$)	*P* Value[b]
LVEF (%)	48 ± 15.1	60 ± 13.6	0.0030
Use of vasoactive agents	23	11	0.0018
Need for dialysis	18	4	0.0003
Atelectasis	23	19	NS
Left pleural effusion	16	14	NS
Right pleural effusion	18	17	NS
Pneumonia	15	5	0.0086
Diaphragmatic paralysis	3	2	NS
Neurological changes	5	11	0.0467
GCS	5 ± 3	11 ± 4	0.0487

Int Heart J 2005; 46: 819-831

Efectos VNI

Efectos sobre la Función Cardiovascular

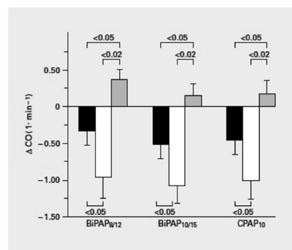


Fig. 1. Variation of mean CO ± SEM relative to control values during nasal ventilation in patients with normal LV function and with CHF. ■ = Normal LV function; □ = CHF (MPWP ≤ 12 mm Hg); ▩ = CHF (MPWP > 12 mm Hg).

Philip-Joët et al.
- 20 pacientes con ICCr
- 7 sanos
- 3 regímenes de presión

J Appl Physiol 2005;99(6):2137-2143

Efectos VNI

Efectos sobre la Función Cardiovascular

Baratz et al. (Efectos CPAP en pacientes con falla cardiaca descompensada)

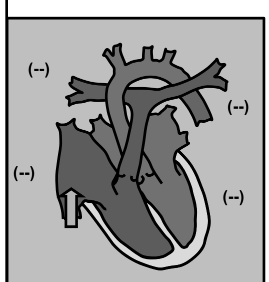
Table 2—*Hemodynamic Measurements, Cardiac Output, and Oxygen Delivery in the Responder Group at Baseline, Highest CPAP Tolerated, and Posttreatment (Mean ± SD)**

Parameter	Baseline	CPAP	Posttreatment
HR, beats/min	92.7 ± 19.3	93.1 ± 15.1	92.6 ± 15.6
RR, breaths/min	19.4 ± 3.0	23.4 ± 4.4	20.9 ± 2.0
BP, mean, mm Hg	87.6 ± 12.5	91.7 ± 19.9	87.2 ± 16.7
RA, mm Hg	9.3 ± 4.4	9.6 ± 3.8	8.0 ± 3.4
PCW, mm Hg	25.7 ± 2.9	27.6 ± 6.4	25.8 ± 3.9
PA, mean, mm Hg	32.5 ± 10.4	34.9 ± 8.3	30.5 ± 10.4
CO, L/min	4.4 ± 1.1	5.2 ± 1.3†	4.4 ± 1.1
CI, L/min/m^2	2.5 ± 0.7	2.9 ± 0.9†	2.5 ± 0.7
SV, ml	49.4 ± 15.8	57.3 ± 16.4†	49.2 ± 14.6
SVI, ml/m^2	27.8 ± 10.1	32.3 ± 10.9†	27.7 ± 9.5
PVR, mm Hg/L/min	2.0 ± 1.9	1.8 ± 1.5	1.5 ± 1.4
SVR, mm Hg/L/min	21.5 ± 9.7	16.1 ± 5.2	18.6 ± 5.3
PaO_2, mm Hg	107.0 ± 44.6	93.4 ± 38.1	—
MVo_2, mm Hg	32.8 ± 3.6	31.3 ± 2.9	—
$\dot{V}o_2$, ml/min/kg	3.3 ± 1.2	4.3 ± 1.6†	—
$\dot{D}o_2$, ml/min/kg	10.3 ± 5.1	12.3 ± 6.0†	—
EF, %	30.5 ± 7.4	—	—

"La positivización de la P° pleural disminuye la postcarga del Ventric. Izq."

Chest 1992;102(5):1397-1401

Efectos de la Pº positiva sobre la función cardíaca

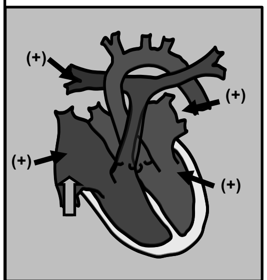


1. **Reducción de Retorno Venoso:**
- **Expansión pulmonar**
- **Aumento de la Presión Intratoráxica**
- **Aumento de la Presión Pericárdica**
- **Aumento de la PAD**
- **Disminución de la Presión transmural de AD**

- **Caída de la precarga del VD**

Rev Méd Chile 2002, 130;1419 -1430

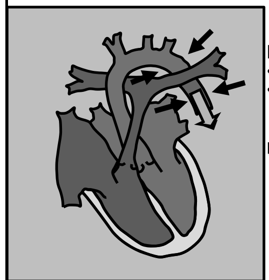
Efectos de la Pº positiva sobre la función cardíaca



Aumento de la Postcarga del VD:
- **Aumento de la RVP**
- **Compresión de los vasos peri-alveolares**

Rev Méd Chile 2002, 130;1419 -1430

Efectos de la Pº positiva sobre la función cardíaca



Disminucón de la Postcarga VI:
- **Compresión Ao**
- **Aorta sale de caja toráxica**

Disminución de precarga de VI

Rev Méd Chile 2002, 130;1419 -1430

Uso Profiláctico de la Pº en Falla Cardíaca y Edema Pulmonar

Consideraciones finales…

Weaning from mechanical ventilation

J-M. Boles*, J. Bion#, A. Connors¶, M. Herridge+, B. Marsh§, C. Melot, R. Pearl, H. Silverman##, M. Stanchina¶¶, A. Vieillard-Baron++, T. Welte§§**

Statement of the Sixth International Consensus Conference on Intensive Care Medicine

Recommendations

In group 2 and 3 patients (patients failing prior attempts at SBT), PSV or assist–control ventilation should be favoured. NIV techniques to shorten the duration of intubation should be considered in selected patients, especially those with hypercapnic respiratory failure. NIV should not be routinely used as in the event of extubation failure and should be used with caution in those patients with hypoxic respiratory failure. CPAP may be effective in preventing hypoxic respiratory failure in patients after major surgery; otherwise there is no clear advantage over other modes of mechanical ventilation used during weaning. Servo-controlled ventilation may be an additional tool for reducing time on mechanical ventilation; however, the numbers of studies are too limited to make firm recommendations.

Eur Respir J 2007; 29: 1033–1056
DOI: 10.1183/09031936.00010206

Weaning from mechanical ventilation

J-M. Boles*, J. Bion#, A. Connors¶, M. Herridge+, B. Marsh§, C. Melot, R. Pearl, H. Silverman##, M. Stanchina¶¶, A. Vieillard-Baron++, T. Welte§§**

Statement of the Sixth International Consensus Conference on Intensive Care Medicine

be found in the NIV group. However, two points need emphasis. First, although early extubation can avoid all of the complications of mechanical ventilation, the patients who fail SBTs may be sick with substantial comorbidities and at risk for extubation failure (discussed further later). Thus, although NIV is useful in very selected populations, its use cannot be recommended for all patients failing a SBT. Secondly, based on the definitions outlined in this statement, patients who are extubated to NIV should not be considered a weaning success until they are completely liberated from NIV as a form of therapy for ARF.

Eur Respir J 2007; 29: 1033–1056
DOI: 10.1183/09031936.00010206

Consideraciones finales…

Ventilador Mecánico

Muchas gracias por su atención…