Curso de actualización en Miastenia Gravis

Tratamiento intensivo de la crisis miastenica

Dr Felipe Bobillo de Lamo

Servicio de Medicina Intensiva. HCUV

Valladolid 21 y 22 de febrero 2012

MIASTENIA GRAVIS: 2447 CITAS

ÚLTIMOS
10 AÑOS

CRISIS MIASTÉNICA: 143 CITAS


P

2003

Yearbook of Intensive Care and Emergency Medicine

Edited by J.-L.Vincent

Springer

2011

Annual Update in Intensive Care and Emergency Medicine 2011

Edited by J.-L.Vincent

Springer

Neurological Crises

Emergency Medicine

Therapy of myasthenic crisis

Jörg Berrouschot, MD; Irene Baumann, MD; Petra Kalischewski, MD; Mario Sterker, MD; Dietmar Schneider, MD

Crit Care Med 1997 Vol. 25, No.7

Literature survey of the number of myasthenic crises (MC), crisis mortalities, and durations of mechanical ventilation (MV)

Author/Yr	Period	Patients With MG	No. of MC	Death in MC	Time on MV (day)	Additional Remarks
Tether (35) 1955	1942–1954	186	20	16 (80)	?	—
Osserman et al. (33) 1958	?	282	59	24 (41)	?	—
Osserman and Genkins (32) 1963	1951–1958	325	67	29 (43)	?	NPV
	1958–1962	300	47	8 (17)		PPV
Simpson et al. (34) 1966	1940–1965	295	34	?	?	—
Glaser (31) 1966	1966	80	20	8 (40)	?	MC and precrisis
Kunst (46) 1976	?	?	15	4 (27)	26	—
Cohen and Younger (1) 1981	1960–1980	447	91	23 (25)	14	Cholinergic drugs + P
	1960–1969	?	48	18 (38)	?	
	1970–1980	?	43	5 (12)	?	
Oosterhuis (16) 1981	1960–1980	432	80	32 (40)	?	With P, mortality rate: 1/27; without P, mortality rate: 31/53
Gracey et al. (5) 1983	1978–1979	288	22	1 (5)	8	15 P; 2 PE
Sellman and Mayer (10) 1985	?	32	20	0	33	Age 52–85 yrs; 7 PE
Voigt (47) 1986	1962–1982	?	38	3 (8)	12	—
Chang and Fink (38) 1992	1983–1991	?	35	0	14	24 PE
Berrouschot et al. 1997	1970–1995	235	63	8 (13)	9	21 PE

MG, myasthenia gravis; ?, not described in the source; —, no additional remarks; NPV, negative-pressure ventilation; PPV, positive-pressure ventilation; P, prednisolone; PE, plasma exchange.

Values in parentheses are percentages.

Incidence and mortality rates of myasthenia gravis and myasthenic crisis in US hospitals

Alshekhlee et al,Neurology 2009

Univariate analysis of mortality for myasthenia gravis hospital-associated complications

Hospital complications	No. of deaths (%)	OR (95% CI)	p Value
All respiratory failure	63 (11.4)	10.8 (7.5, 15.7)	<0.0001
Respiratory failure needing endotracheal intubation	47 (10.8)	8.2 (5.6, 12.0)	<0.0001
Respiratory failure needing positive airway pressure ventilation without endotracheal intubation	11 (8.4)	4.4 (2.3, 8.4)	<0.0001
Cardiac complications	23 (6.8)	3.78 (2.4, 6.0)	<0.0001
Sepsis	4 (14.8)	7.32 (2.5, 21.4)	<0.0001
Deep vein thrombosis	1 (14.3)	7.5 (0.89, 62.5)	0.03

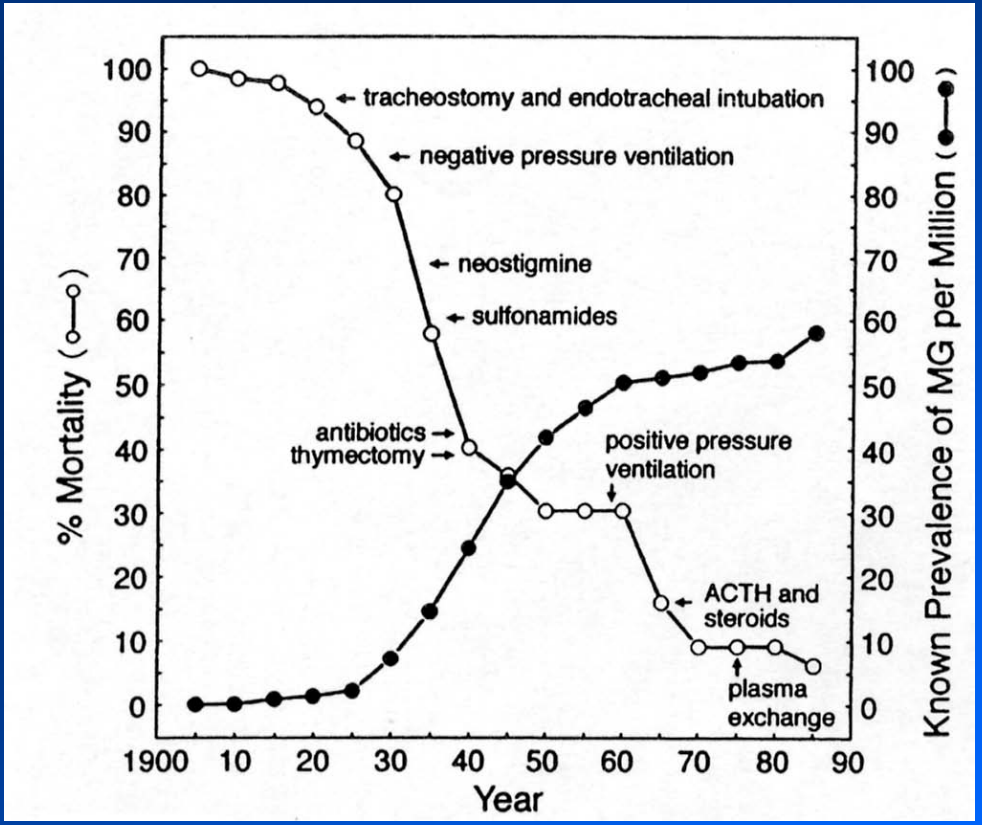
Independent predictors of in-hospital mortality in myasthenia gravis (MG)

Predictors	OR (95% CI)
Age, y	
50–70 vs <50	9.28 (3.31, 26.0)
75+ vs <50	24.7 (8.99, 67.9)
Diagnosis of myasthenia crisis according to the ICD-9-CM code	1.99 (1.20, 3.30)
MG with coexisting respiratory failure	3.58 (2.01, 6.38)
MG with coexisting respiratory failure needing endotracheal intubation	1.77 (1.02, 3.06)
MG with coexisting respiratory failure needing positive airway pressure ventilation	1.86 (0.92, 3.76)

The Hosmer and Lemeshow test $p = 0.17$ with maximum variance inflation of the model was 2.19.
ICD-9-CM = International Classification of Diseases, 9th edition-Clinical Modification; OR = odds ratio; CI = confidence interval.

CRISIS MIASTÉNICA

- ENTIDAD CLÍNICA POCO FRECUENTE
- NECESIDAD DE VM (VMNI ??)
- POTENCIALMENTE FATAL
- PRESENTE EN EL 15-20% DE MG



CAUSAS DESENCADENANTES DE CM

- INFECCIÓN (RESPIRATORIA)
- ESTRÉS (CIRUGÍA)
- EMBARAZO
- FÁRMACOS
- MEDICACIÓN INMUNOMODULADORA
- IDIOPÁTICA (30%)

FÁRMACOS QUE EMPEORAN MG

- BLOQUEANTES NEUROMUSCULARES
- ANTIBIÓTICOS: Aminoglucósisdos, Macrólidos, Quinolonas, Clindamicina
- CARDIOVASCUALARES: B-Bloqueantes, Ca antagonistas, Procainamida, Quinidina
- FENITOINA
- QUININA
- CORTICOIDES
- SALES DE Mg (antiácidos laxantes)
- CONTRASTES YODADOS
- D- PENICILAMINA
- HORMONAS TIROIDEAS

Drugs that may unmask or exacerbate myasthenia gravis*

Anesthetic agents
Chloroprocaine
Diazepam
Ether
Halothane
Ketamine
Lidocaine
Neuromuscular blocking agents
Propanidid
Procaine
Antibiotics
Aminoglycosides
Amikacin
Gentamicin
Kanamycin
Neomycin
Netilmicin
Paromomycin
Spectinomycin
Streptomycin
Tobramycin
Fluoroquinolones
Ciprofloxacin
Levofloxacin
Norfloxacin
Others
Ampicillin
Clarithromycin
Clindamycin
Colistin
Erythromycin
Lincomycin
Quinine
Telithromycin
Tetracyclines
Anticonvulsants
Gabapentin
Phenytoin
Trimethadione
Antipsychotics
Chlorpromazine
Lithium
Phenothiazines

Antirheumatic drugs
Chloroquine
Penicillamine
Cardiovascular drugs
Beta blockers
Bretylium
Procainamide
Propafenone
Quinidine
Verapamil and calcium channel blockers
Glucocorticoids
Corticotropin
Methylprednisolone
Prednisone
Neuromuscular blockers and muscle relaxants
Botulinum toxin
Magnesium sulfate and magnesium salts
Methocarbamol
Ophthalmologic drugs
Betaxolol
Echothiophate
Timolol
Tropicamide
Proparacaine
Other drugs
Anticholinergics
Carnitine
Cholinesterase inhibitors
Deferoxamine
Diuretics
Emetine (Ipecac syrup)
Interferon alpha
Iodinated contrast agents
Narcotics
Oral contraceptives
Oxytocin
Ritonavir and antiretroviral protease inhibitors
Statins
Thyroxine

* Drugs listed here should be used with caution in patients with myasthenia gravis. Aminoglycosides should be used only if absolutely necessary with close monitoring. Please refer to the text for further information.

CAUSAS PREDISPONENTES AL FALLO RESPIRATORIO EN CM

- Debilidad de músculos faciales y/o orofaríngeos
- Debilidad de musculatura inspiratoria
- Debilidad de musculatura espìratoria
- Complicaciones respiratorias agudas propias de la enfermedad

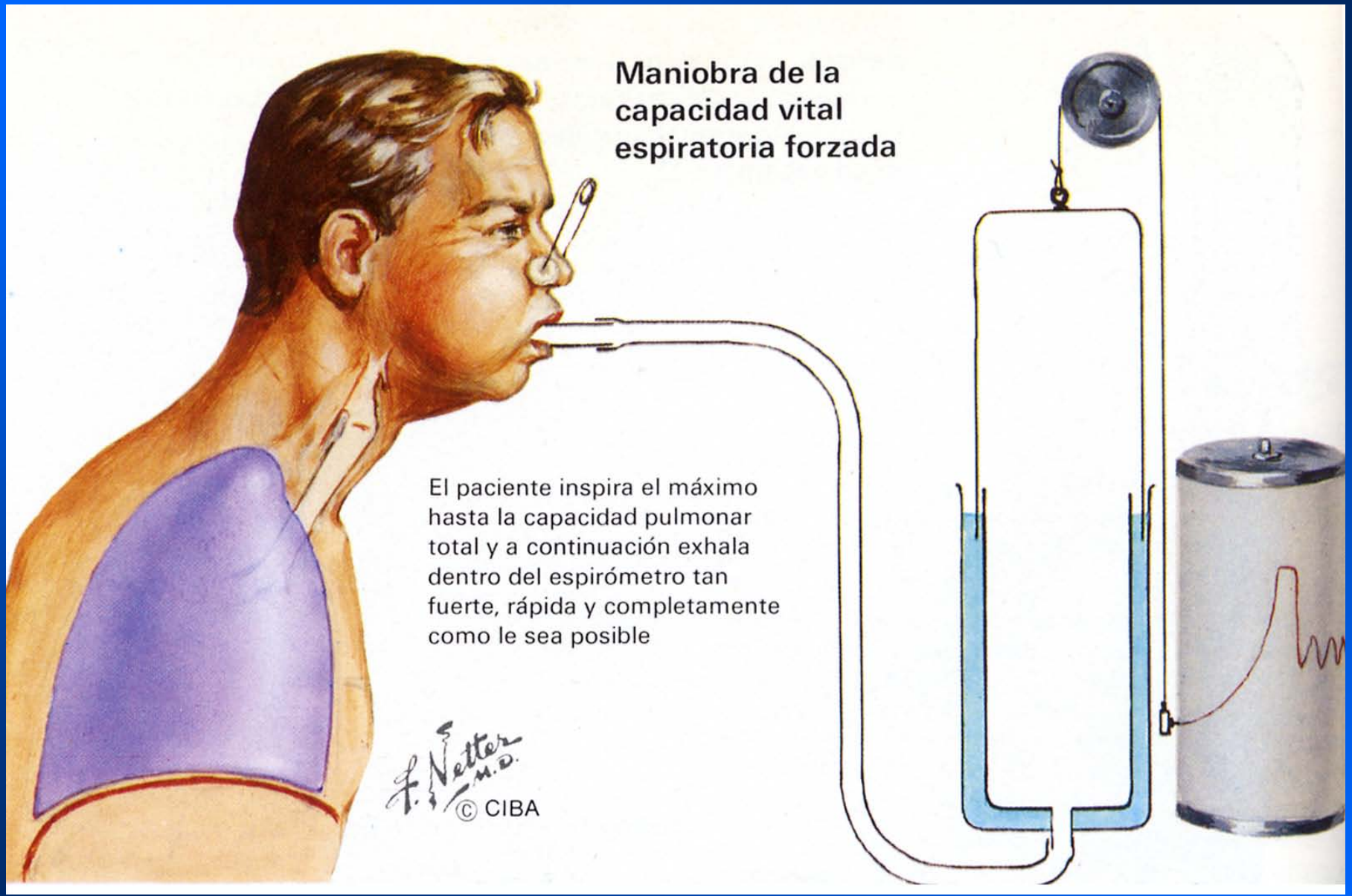
Clinica respiratoria asociada con descenso de la CV

CV	Manifestación
>65 ml-kg	Función respiratoria Normal
30 ml-kg	Tos débil, retención, secreciones
20 ml-kg	Atelectasias
15 ml-kg	Shunt
10 ml-kg	Hipoventilación
5-10 ml-kg	Hipercapnia

Signos de fallo respiratorio y necesidad de IOT

- SIGNOS GENERALES DE ALARMA:
  - Aumento de debilidad generalizada
  - Disfagia
  - Disfonía
  - Disnea de reposo
- SIGNOS SUBJETIVOS
  - Respiración rápida y superficial
  - Tos débil
  - Taquicardia
  - Usos de musculos respiratorios accesorios
  - Respiración paradójica
  - Ortopnea
  - Imposibilidad de contar sin respirar
  - Toser despues de tragar
- SIGNOS OBJETIVOS
  - CVC< 15 ml/kg, PIM< -30; PEM <40


Sibelmed
manómetro 163
presiones máximas pulmonares
cm H2O
O
I
baja
carga
PEM
PIM
sonda


Maniobra de la capacidad vital espiratoria forzada
El paciente inspira el máximo hasta la capacidad pulmonar total y a continuación exhala dentro del espirómetro tan fuerte, rápida y completamente como le sea posible
F. Netter M.D.
© CIBA

Intensive Care Med (1995) 21:663–668

ORIGINAL

P. Rieder
M. Louis
P. Jolliet
J.-C. Chevrolet

The repeated measurement of vital capacity is a poor predictor of the need for mechanical ventilation in myasthenia gravis

Clinical events associated with acute respiratory failure (Δ *Swallowing* abnormal swallowing function: Δ *Corticosteroids*, Δ AntiCE changes in the doses of corticosteroids (or initiation of the treatment), or anticholinesterase drugs within 48 h, +/0 presence or absence of a feature

Patient episodes	Respiratory (precipitating) events			Δ Swallowing	Events associated with treatments (within 48 h)			Others
	Intubation (days)	Infection (chest X-ray)	Atelectases (chest X-ray)		Δ Corticosteroids	Δ AntiCE	Sedatives	
1/1	14	0	0	+	0	+	0	Plasmaphereses
1/2	0	0	0	+	+	+	0	0
1/3	2	0	0	+	0	+	0	Immunoglobulins
1/4	0	0	+	+	+	+	0	0
2	7	+	+	+	+	+	0	Plasmaphereses
3/1	0	0	0	+	0	+	0	Plasmaphereses Cyclophosphamide
3/2	0[a]	+	0	+	0	+	0	Cyclophosphamide
4	2	+	0	0	0	0	+	0
5/1	0	+	0	0	0	+	0	Plasmaphereses
5/2	0	0	0	+	+	+	0	0

[a] Non-invasive (nasal) mechanical ventilation when vital capacity was <650 ml (13 ml/kg BW)

Vital capacities (VC; ml/kg BW) and derived indices: comparison between intubation (MV) and nonintubation (NMV) episodes (means ± SD; Mann-Whitney U-test)

	MV episodes ($n = 4$)	NMV episodes ($n = 6$)	p
ICU admission	38 ±12	26 ±15	0.140
Median	31 ± 6	23 ±13	0.291
Variance	98 ±76	50 ±60	0.142
VIVC[a]	6.3± 3.0	4.3± 3.1	0.291
Nadir VC	21 ± 9	11 ± 5	0.055
% Values<median	4 ± 8	47 ±43	0.085

[a] VIVC, variation index of VC (see "Methods")

PULMONARY FUNCTION TESTS AND BLOOD GASES IN WORSENING MYASTHENIA GRAVIS

MARK J. THIEBEN, MB, BS,[1] DAVID J. BLACKER, MB, BS,[1] PETER Y. LIU, PhD,[2]
C. MICHEL HARPER, Jr, MD,[1] AND EELCO F. M. WIJDICKS, MD[1]

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[2] Department of Internal Medicine, Mayo Clinic, Rochester, Minnesota, USA

Accepted 26 May 2005

MUSCLE & NERVE November 2005

- **42 pacientes que tuvieron 55 ingresos en UVI**
- Pacientes con : CV > 20ml-Kg, PIM >-40cm H_20, PEM>40cm H_20, raramente requirieron VM
- Un descenso del 30% o mas de la PIM predijo un grupo de alto riesgo de necesitar VM
- Hipercapnia fue mas frecuente en pacientes que requirieron VM

DIAGNÓSTICO DIFERENCIAL CM

LOCALIZACIÓN	***ENFERMEDAD***
-Tronco cerebral	Infarto, hemorragia, lesión compresiva
-Médula	Compresión cervical
-Motoneurona	ELA , Poliomelitis
-Raiz y nervios periféricos	GB, Porfiria intermitente aguda
-Unión neuromuscular	Sd miasteniforme, LE, Botulismo, Intox. organofosfolados, veneno araña/serpiente
-Músculo	CIP, miopatía Neuropatía diselectrolitemia

Commonly used therapies for myasthenia gravis

	Time to onset of effect*	Time to maximal effect*
Symptomatic therapy		
Pyridostigmine	10 to 15 minutes	2 hours
Chronic immunotherapies		
Prednisone	2 to 3 weeks	5 to 6 months
Azathioprine	6 to 12 months	1 to 2 years
Mycophenolate mofetil	4 to 12 months	1 year
Cyclosporine	4 to 6 months	8 to 12 months
Rapid immunotherapies		
Plasmapheresis	1 to 7 days	1 to 3 weeks
Intravenous immune globulin	1 to 2 weeks	1 to 3 weeks
Surgery		
Thymectomy	1 to 10 years	1 to 10 years

*Estimated times are rough guidelines based upon clinical experience in myasthenia gravis

HIGH LIGHT CME

IV immunoglobulin in patients with myasthenia gravis

A randomized controlled trial

Lorne Zinman, MD, MSc; Eduardo Ng, MD; and Vera Bril, MD

Neurology 2007

51 pacientes:

- Excluidos si trabajo respiratorio, ingreso en UVI o trasntornos deglutorios
- IG 2g/kg Vs placebo
- QMG score (días 14 y 28)
- Beneficio significativo con IGs
- Nivel de evidencia I

PLASMAFERESIS Y MG

- 1976: Pinching As. Lancet 1976: primer uso
- 1986: INS (USA) :Recomiendan Pf en MG aguda
- 1996: Academia Americana de Neurología: Mantiene uso de PF en MG aguda
- 1997: Gadjos P. Annals Neurology: Mejoría con PF a corto plazo
- 2005: Cochrane library: ???
- Grado de evidencia: ???

Aféresis terapéutica en Miastenia gravis: Estudios controlados

Referencia	Aleatorizado	Contra placebo	Periodo evaluación	Tipo pacientes	Diseño estudio	Número casos	Resultados	Complicaciones	Comentarios
Kornfeld, 1979	No	No	Corto plazo (2 semanas)	Crisis miasténica	UCI general vs UCI + PF (días alternos)	12 (6 + 6)	Mejoría 100% grupo PF vs ninguno en grupo control	No describen	Pocos datos clínicos o del tratamiento asociado
Newsom-Davis, 1979	No	No	Largo plazo (1 año)	Casos crónicos	Pred + Azat vs Pred + Azat + PF	14 (7 + 7)	Situación funcional igual al año	No describen	Todos los casos de PF mejoran tras sesión terapéutica
Gajdos, 1983	Sí	No	Largo plazo (1 año)	Casos crónicos y agudos	Pred + Azat vs Pred + Azat + PF	14 (7 + 7)	Situación funcional igual al año. PF eficaz en crisis miasténica	No describen	Muestra pequeña y heterogénea
Gajdos, 1997	Sí	No	Corto plazo (2 semanas)	Casos crónicos y agudos	PF días alternos vs IGIV 0,4 g /kg/ día, 3 ó 5 días	87 (41 +23 + 23)	Situación funcional igual al año	Con PF: 8/41 Con IGIV: 1/46	Muestra pequeña para detectar diferencias
Yeh, 1999	Sí	No	Corto plazo (2 semanas)	Casos crónicos y agudos	PF diaria vs PF días alternos	30 (15 + 15)	Mayor eficacia pauta diaria ($p < 0,05$)	3% casos (hipotensión)	Único estudio que compara ambas pautas
Qureshi, 1999	No	No	Corto plazo (1 mes)	Crisis miasténica	PF días alternos vs IGIV 0,4 g/kg/ día, 5 días	51 (27 + 24)	Mayor eficacia de PF a la 2ª ($p = 0,002$) y 4ª ($p = 0,04$) semanas	Con PF: 13/27 Con IGIV: 5/24 ($p = 0,07$)	Estudio restrospectivo
Pérez-Nellar, 2001	No	No	Corto plazo (2 semanas)	Casos Pre-timectomía	PF días alternos vs IGIV 0,4 g/kg/ día, 5 días	71 (38 + 33)	Situación funcional igual post-timectomía	No encuentran diferencias significativas	Comparan tratamiento activo con IGIV vs serie retrospectiva de PF

Azat: azatioprina. IGIV: inmunoglobulinas intravenosas. PF: plasmaferesis. Pred: prednisona. UCI: unidad cuidados intensivos. vs: versus.

Aféresis terapéutica en Miastenia gravis: Series de casos no controladas (n ≥ 20 casos)						
Referencia	**Periodo evaluación**	**Tipo pacientes**	**Diseño Estudio**	**Número casos**	**Resultados (% pacientes tratados)**	**Complicaciones**
Behan, 1979	Corto plazo	Casos crónicos	Pred + Azat + PF	21	Mejoría del 100%	No describen
Hawkey, 1981	Largo plazo (1 año)	Casos crónicos	Pred + Azat + PF	20	Mejoría del 100%	No describen
Olarte, 1981	Corto plazo	Casos crónicos	Pred + Azat + PF	21	Mejoría del 81%	Trombopenia (1 caso)
Dau, 1981	Corto plazo	Casos crónicos y agudos	Pred + Azat + PF	60	Mejoría del 73%	No describen
Fornasari, 1985	Corto plazo	Casos crónicos y agudos	Pred + Azat + PF	33	Mejoría del 60%	No describen
Antozzi, 1991	Corto plazo	Casos crónicos y agudos	Pred + Azat + PF	70	Mejoría del 70%	No describen
Shibuya, 1994	Corto plazo	Casos crónicos	Pred + Azat + IADS	20	Mejoría del 55%	Hipotensión (8 casos)
Muñoz-Blanco, 1999	Corto plazo	Casos agudos	Pred ± Azat + IADS	30	Mejoría del 93%	Hipotensión (13,8% casos)
Chiu, 2000	Corto plazo	Casos crónicos y agudos	DF, IADS, PF	94	Mejoría del 85%	Hipotensión (2,3% casos)
Carandina-Maffeis, 2004	Corto plazo	Casos agudos y crónicos	Pred ± Azat + PF	26	Mejoría del 100%	Hipotensión (19% casos)

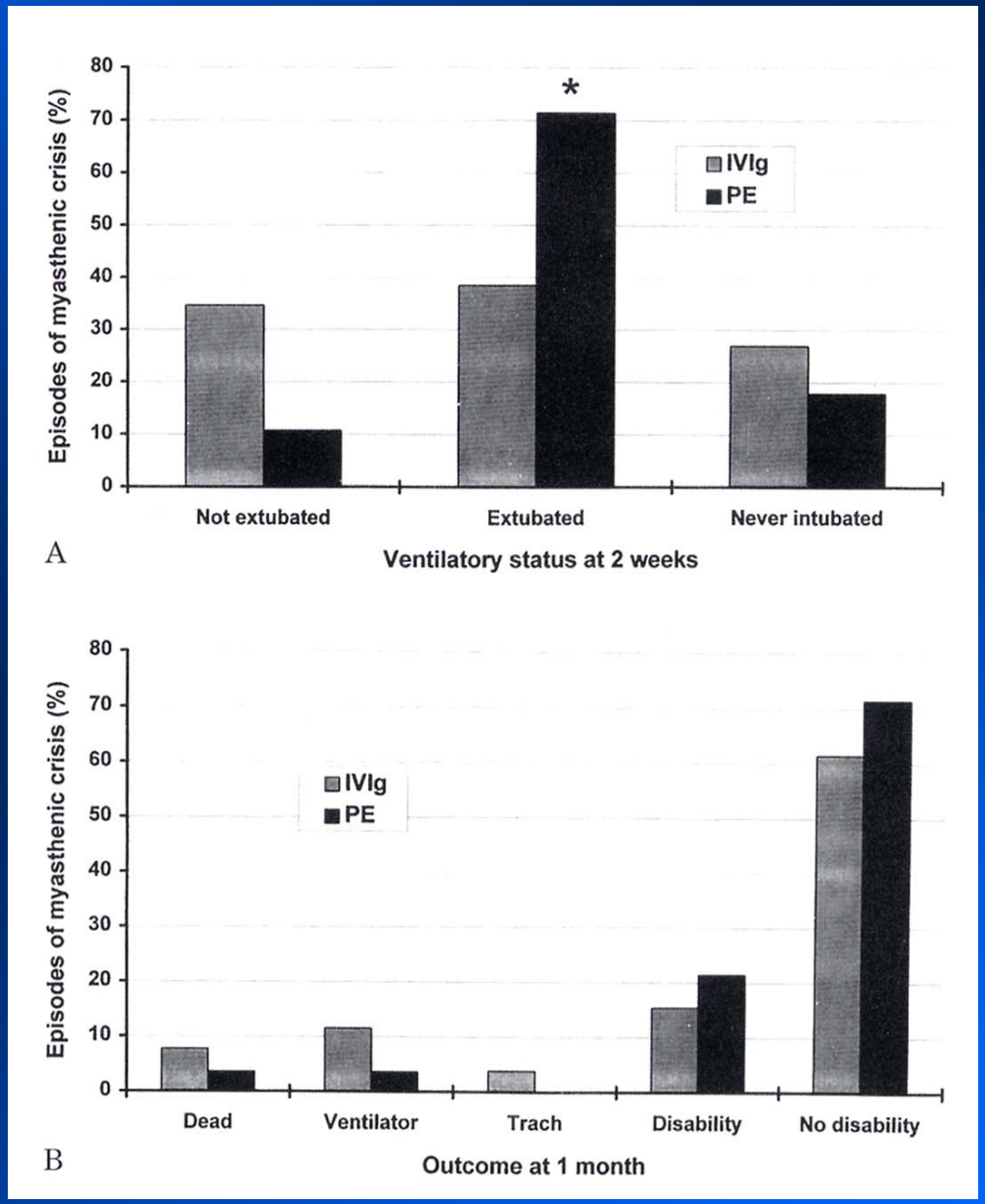
Azat: azatioprina. DF: doble filtración. IADS: inmunoadsorción. PF: plasmaferesis. Pred: prednisona.

Plasma exchange versus intravenous immunoglobulin treatment in myasthenic crisis

A.I. Qureshi, MD

NEUROLOGY 1999;52:629–632

- 54 cm (42 vm)
- PF vs Ig (24 pts vs 28 pts)
- Mejor status ventilatorio a las dos semanas
- Mejor pronostico funcional
- Mas complicaciones con PF



SPECIAL ARTICLE

Evidence-based guideline update: Plasmapheresis in neurologic disorders

Report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology

I. Cortese, MD
V. Chaudhry, MD
Y.T. So, MD, PhD
F. Cantor, MD
D.R. Cornblath, MD
A. Rae-Grant, MD

Neurology® 2011

Recommendation. Because of the lack of randomized controlled studies with masked outcomes, there is insufficient evidence to support or refute the efficacy of plasmapheresis in the treatment of myasthenic crisis (Level U) or MG prethymectomy (Level U).

. . .

Clinical context. Despite the fact that the use of plasmapheresis in myasthenic crisis and MG prethymectomy receives a Level U recommendation, plasmapheresis is used at many medical centers for these indications.

neurocritical care society Neurocrit Care
DOI 10.1007/s12028-009-9274-0

REVIEW

Immunomodulatory Therapies in Neurologic Critical Care

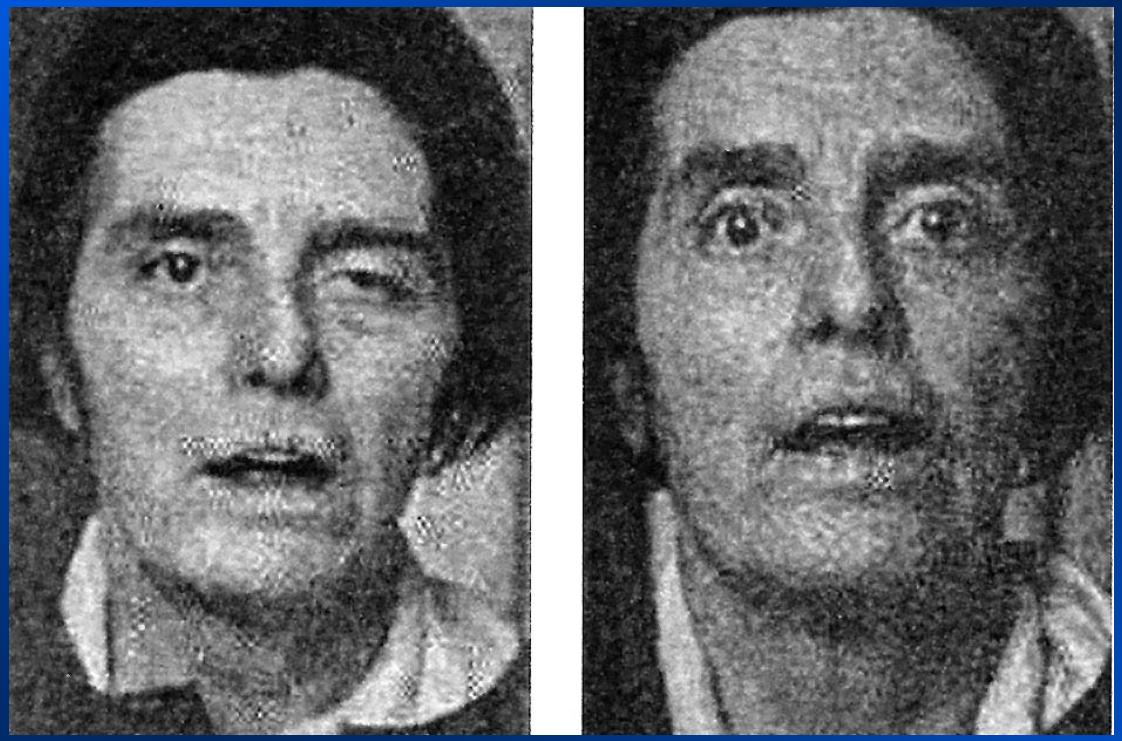
Logan M. McDaneld · Jeremy D. Fields · Dennis N. Bourdette · Anish Bhardwaj

Summary of levels of evidence and recommendations for immunomodulatory therapies in critically ill neurologic patients; AHA classification system [175]

Disease	Corticosteroids	Plasmapheresis	IVIG	Cyclophosphamide
Guillain–Barré syndrome	III, B	I, A	I, A	III, C
Myasthenia gravis	IIb, C	I, B	I, B	III, C
Acute CNS demyelination (ADEM, Malignant MS, etc.)	I, B	I, B	I, C	IIa, C
Bacterial meningitis	I, A	III, C	III, C	III, C
Viral encephalitis	IIb, C	III, C	III, C	III, C
Primary CNS vasculitis	IIb, C	III, C	III, C	IIb, C
Steroid responsive encephalopathy	Ia, B	IIb, C	IIb, C	IIb, C
Paraneoplastic encephalitis	IIb, C	IIb, C	IIb, C	III, C
Status epilepticus	IIb, C	IIb, C	IIb, C	III, C

Tratamiento inmunomodulador CM

	Ig	Pf
•Dosis	400mg/Kg (5 dias)	Un recambio 1-2 días
•Respuesta	Mejoría en 4-5 d. Duración 4-8s	Mejoría en 2 días. Duración 3-4 semanas
•Ventajas	Disponible facilmente	Respuesta mas rápida
•Inconvenientes	Respuesta lenta	Acceso venoso, equipo y personal
•Contraindicaciones	Deficit de IgA	Inestabilidad hemodinamica
•Complicaicones	Meningitis aseptica, aritmias, trombocitopenia	Inestabilidad hemodinamica, hemolisis, aritmias



M. B. Walker; Lancet 1934

ANTICOLINESTERÁSICOS Y CM

- “VACACIONES”
- ABSORCIÓN NO PREDECIBLE
- CRISIS COLÍNÉRGICA
- EFECTOS SECUNDARIOS: ARRITMIAS
- AUSENCIA DE ESTUDIOS

Myasthenia gravis and steroid-induced myopathy of the respiratory muscles

B. Vallet[1], F. Fourrier[1], J.F. Hurtevent[2], M. Parent[3] and C. Chopin[1]

[1]Service de Réanimation Polyvalente, [2]Service d'Explorations Fonctionnelles Neurochirurgicales, and [3]Laboratoire d'Anatomopathologie, Hôpital B, CHRU, Lille, France

Received: 4 November 1991; accepted: 19 June 1992

- Corticoides en CM **NO** son el tratamiento de elección
- Efectos 2rios graves (hiperglucemia, HTA, LAMG, infección)
- Entorno de UCI
- ¿Pulsos?

Therapy of myasthenic crisis

Jörg Berrouschot, MD; Irene Baumann, MD; Petra Kalischewski, MD; Mario Sterker, MD; Dietmar Schneider, MD

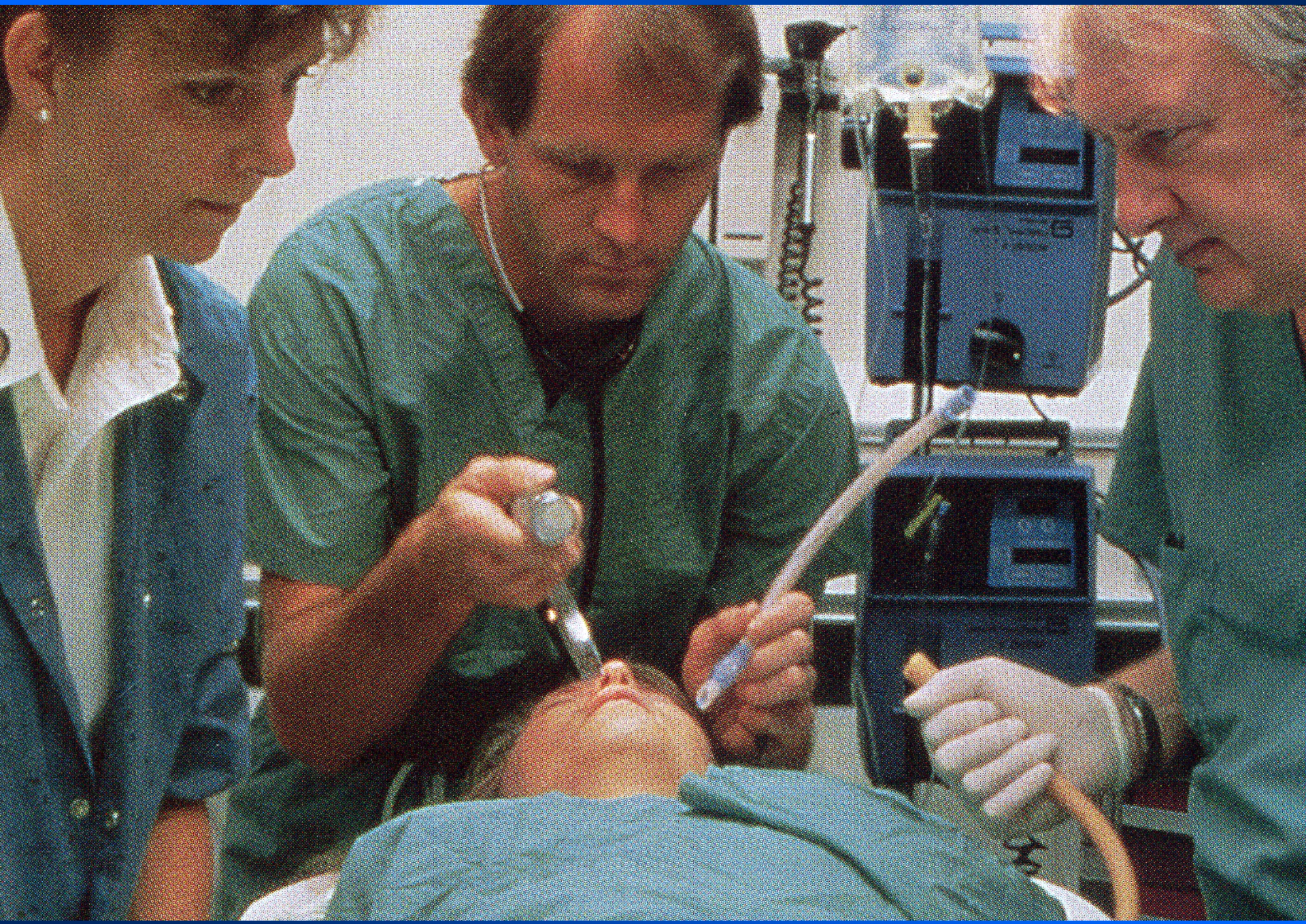
Crit Care Med 1997 Vol. 25, No.7

Comparison of clinical characteristics and the outcome of myasthenic crisis (MC) for three different forms of treatment

	Pyridostigmine (n = 24)	Pyridostigmine + Prednisolone (n = 18)	Plasma Exchange (n = 21)	*p* Value 1–2	1–3	2–3
Age (yr)	39 ± 4[a]	45 ± 4	47 ± 3	NS	NS	NS
Gender	16 F/8 M	11 F/7 M	13 F/8 M	NS	NS	NS
Most common causes	Infect (n = 9)	Myasthenic weakness (n = 7)	Myasthenic weakness (n = 11)	NS	.02	NS
Tracheostomy	6/24	4/18	11/21	NS	NS	NS
Period of ventilation (day)	6 ± 1	7 ± 2	14 ± 3	NS	NS	NS
Outcome—Acute						
2	1	0	0	NS	NS	NS
3	12	12	9	NS	NS	NS
4	9	4	6	NS	NS	NS
5	0	0	2	NS	NS	NS
7	2	2	4	NS	NS	NS
Outcome—3 Months						
1	2	0	0	NS	NS	NS
2	10	8	6	NS	NS	NS
3	10	5	8	NS	NS	NS
4	0	3	2	NS	NS	NS
5	0	0	1	NS	NS	NS
7	2	2	4	NS	NS	NS

1–2, pyridostigmine vs. pyridostigmine + prednisolone; 1–3, pyridostigmine vs. plasma exchange; 2–3, pyridostigmine + prednisolone vs. plasma exchange; outcome 7[b], death.

[a]Mean ± SD; [b]for other outcomes, see Table 1.



Original Article

Myasthenic crisis: A retrospective study

S. Panda, V. Goyal, M. Behari, S. Singh, T. Srivastava
Department of Neurology, All India Institute of Medical Sciences, New Delhi, India.

Neurology India December 2004 Vol 52 Issue 4

Clinical characteristics at onset of MC and response to treatment

Sr. No.	Ppt Fc	Duration from Ppt. to MC	Involved sites	Rx	Duration of ventilation (days)	At discharge- Walking without support	At discharge- Accepting orally	Death
1.	ACI and Strdtapering	5 days	O,B,L,R	PP	16	Yes	Yes	No
2.	ACI and Strdstopped+URI	10 days	O,B,L,R	PP	14	No	No	No
3.	Diarrhea	2 days	O,B,L,R	Nil	2	-	-	Yes
4.	Strd started+ URI	30 days	O,B,L,R	PP+IVIG	12	No	No	No
5.	Nil	-	O,B,L,R	PP	18	No	Yes	No
6.	URI	15 days	O,L,R	PP	10	Yes	Yes	No
7.	ACI tapered	6 mths	O,B,R	IVIG	8	Yes	Yes	No
8.	Nil	-	B,R	IVIG	9	No	Yes	No
9.	Post TM	3 days	O,B,L,R	PP	15	No	Yes	No
10.	Nil	-	O,B,L,R	PP	14		Yes	No
11.	Post RT	18 days	O,B,L,R	PP	32	Yes	No	No
12.	Post TM	1 day	O,B,L,R	Nil	5	Yes	Yes	No

(Strd- steroid; ACI- Acetylcholinestrase inhibitor; IVIG- intravenous immunoglobulin; B-bulbar; L- limb; O- ocular; R- respiratory; MC-Myasthenic crisis; PP-Plasmapharesis, Ppt Fc- Precipitating factor; RT-Radiotherapy; Rx-Treatment; TM-Thymectomy; URI- upper respiratory infection)

Intensive care of the myasthenic patient

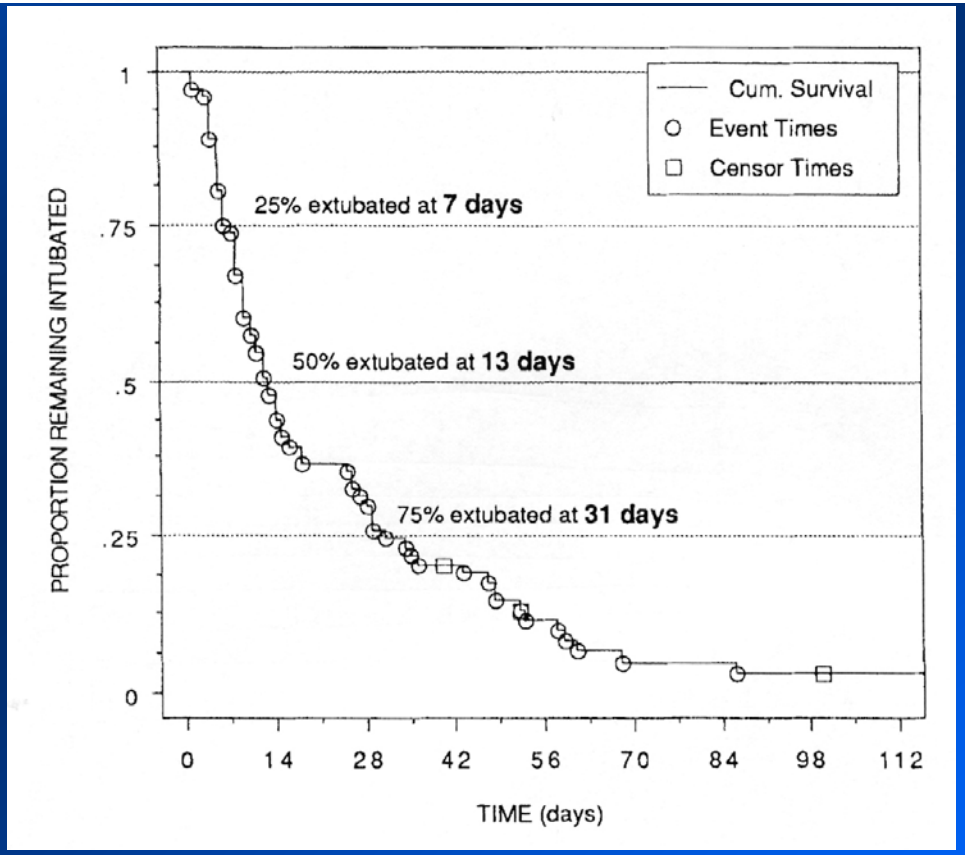
Stephan A. Mayer, MD

NEUROLOGY 1997;48(Suppl 5):S70–S75

*Pulmonary function tests in patients with myasthenic crisis**

	Normal	Criteria for intubation	Criteria for weaning	Criteria for extubation
Vital capacity	>60 mL/kg	≤15 mL/kg	≥10 mL/kg	~25 mL/kg
Negative inspiratory force	>70 cm H_2O	<20 cm H_2O	≥20 cm H_2O	~40 cm H_2O
Positive expiratory force	>100 cm H_2O	<40 cm H_2O	≥40 cm H_2O	~50 cm H_2O

* Data from Thomas et al.,[1] with permission.



VM y CRISIS MIASTÉNICA (CM)

Thomas CE ; Neurology 1997

- 53 pacientes con 73 CM
- Infección pulmonar como causa más frecuente
- Extubación: 25% (7d)
  50% (2 semana)
  75% (31 días)
- IOT prolongada, asociación significativa con

$HCO_3 \geq$ 30 meq/L preIOT
CV<25 ml/kg al 6º día de IOT
Edad >50 años

1 factor: 21 %
2 factores: 40%
3 factores:88%

POSTINTUBATION PULMONARY FUNCTION TEST IN GBS

Lawn N; Muscle and Nerve 2000

- 37 pacientes en VM
- <3 semanas Vs >3 semanas de VM
- PF= CV + PIM+PEM
- PF (d12): PF (d1)>1; VM< 3 semanas (p< 0,0001)
- S 70%; E 100%; VPP 100%

VENTILATORY CARE IN MYASTHENIC GRAVIS

Varelas et Al. Crit Care Med, 2007

- Respiratory intervetion Index: Suspiros, Peep, Aspiraciones, Fisioterapia, cambios posturales y antibióticos

Columbia (1983-1994)

-CM	73
-Atelectasias	40
-Neumonías:	51
-VM (d):	13
-LOS (h):	35
-LOS (UCI):	14

John Hopkings (1990-98))

-CM	24
-Atelectasias	29
-Neumonías:	17
-VM	6
-LOS (h):	17
-LOS (UCI):	11

ORIGINAL CONTRIBUTION

Predictors of Extubation Failure in Myasthenic Crisis

Janaka Seneviratne, MBBS; Jay Mandrekar, PhD; Eelco F. M. Wijdicks, MD; Alejandro A. Rabinstein, MD

ARCH NEUROL/VOL 65 (NO. 7), JULY 2008

CM con IOT (1987-2006)

- **40 pacientes** con **46** episodios de **CM**
- **Fallo extubación**: 46% (varones, CM previas, atelectasia y VM>10d)
- **ReIOT**: **26%** (pH bajo, VCV y necesidad de BIPAP postextubación)
- **Atelectasias** principal factor asociado a fracaso de extubación y reIOT

EXTUBACIÓN EN CM

Rabinstein A, Neurocritical Care 2005

26 CM

- Weaning: T o CPAP
- Fallo extubación: 27%
- Edad: (p=0.05)
- Atelectasia: (p<0.01)
- Neumonía (p= 0.02)

¡Presentaron fracaso de extubación!

FALLO DE EXTUBACIÓN EN PACIENTES CON CM

Rabinstein A. ; Neurocrit care 2005

26 episodios de CM:

- Fallo extubación 27%
- > 60 años
- Atelectasias y/o neumonía asociación signif. con fallo extubación
- Mayor LOS UCI/Hospital


Engström Carestation
VMesp bajo
FR alta
12:55
Adulto
Procedimientos
Mecánica del pulmón
P 0,1 0 09:56
NIF NoApto
Tiempo NIF. 20 s
Capacidad vital ---
Menú anterior
Activa la medicion (cmH2O) de presión de oclusión de vías respiratorias.
Pva 30
CPAP/PSV
Flujo 90
-90
Vol 900
0
-150
cmH2O
Ppico 20
PEEPe 5
Pmedia 10
Pplat ---
Fuga % 0
VMesp l/min 7.8
FR /min 15
VTesp ml 520
FiO2 % 50
Espontánea
VMesp l/min 7.8
FR /min 15
VTesp ml 520
RSBI /min/l 28
ventilación con presión positiva continua en vía resp / presión de soporte
FiO2 % 50
PEEP cmH2O 5
Psoporte cmH2O 15
Compl ml/cmH2O 45
Rva cmH2O/l/s ---
Silenciar Alarmas
Config. Alarmas
Ayuda
Tendencias
Guardar Toma
Config. Sistema
Config. Vent.
Espirometr.
Pantalla Normal

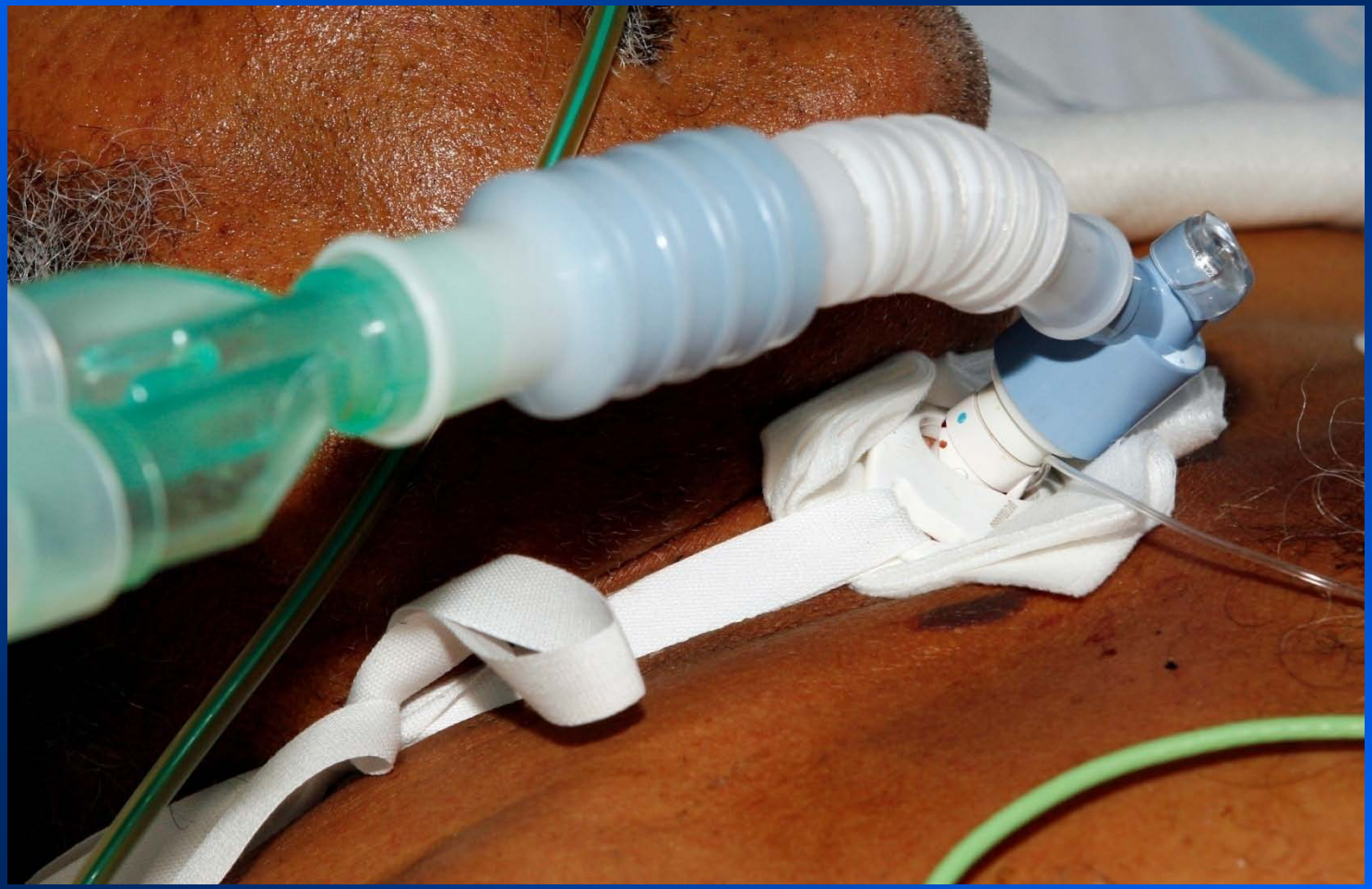

VOLUMEN A/C
MIP/P100
DESCONEX CIRCUITO
Paw (cmH2O)
Flujo (L/min)
COMANDOS MANIOBRA
30.0
sec
Duración
3.0
cmH2O
Sensibilidad
Inicio
cmH2O
MIP
cmH2O
P100
16
rpm
Frecuencia
0.55
L
Volumen
33
L/min
Flujo Máx
0.27
sec
Pausa Insp
5
cmH2O
PEEP
0.3
L/min
Disp por Flujo
50
%
FiO2
Vm Calc
8.80
1:2.0
cmH2O
dPes
joules/L
WOBp
0.0
L
Vm Espont
0
rpm
Frec Espont
b2/min/L
f/Vt
VIASYS

Respiratory Failure in Myasthenia Gravis

by Bryan Ashworth MD MRCP
and A R Hunter MD FRCS
(*Departments of Neurology and of Anæsthesia, University of Manchester and United Manchester Hospitals*)

Proc. Roy. Soc. Med. Volume 64 May 1971

“ After three days, or sometimes sooner, this was replaced by a tracheostomy and cuffed rubber tube”



VENTILACIÓN MECÁNICA NO INVASIVA

- Contrarresta mecanismos involucrados en el fallo del destete.
- Disminuye neumonía asociada a VM.
- Disminuye requerimientos de sedación.
- Permite el habla y la ingesta.
- Requiere colaboración y no secreciones abundantes.


formulatv.com

VMNI y CM

- Imprescindible vía aérea permeable
- Se debe utilizar en pacientes seleccionados y en áreas hopitalarias
- bien monitorizadas
- No usar si hay hipercapnia
- Actualmente no datos suficientes para recomendación sistemática

VMNI y CM

- **Rabinstein A.**

- 11 CM con fallo respiratorio

- Se evitó VM en 7 pacientes

- Fracaso de VMNI cuando pCO2 >50 mms Hg

- CV, Peep, P insp, P exp, NO PREDIJERON FRACASO DE VMNI

BiPAP in acute respiratory failure due to myasthenic crisis may prevent intubation

Alejandro Rabinstein, MD; and Eelco F.M. Wijdicks, MD

NEUROLOGY 2002;59:1647–1649

Blood gases and bedside respiratory function tests before institution of BiPAP ventilation

Episode	pH level	$PaCO_2$, mm Hg	PaO_2, mm Hg	VC, ml/kg	PIMax, cmH_2O	PEMax, cmH_2O	Duration, d	Outcome
1	7.37	43	95	–	–	–	15	Success
2	7.43	41	92	8	−16	+22	2	Success
3	7.35	68	55	–	–	–	<1	Failure
4	7.49	30	94	–	–	–	4	Success
5	7.51	31	105	–	–	–	4	Success
6	7.47	45	100	9	−56	+50	4	Success
7	7.46	52	68	4	−20	+40	<1	Failure
8	7.42	44	89	8	−60	+45	5	Success
9	7.44	41	88	7	−60	+60	12	Success
10	7.45	39	84	5	−10	+10	1	Failure*
11	7.29	67	366	–	–	–	4	Failure

* See text for details.

BiPAP = bilevel positive pressure ventilation; $PaCO_2$ = partial arterial pressure of carbon dioxide; PaO_2 = partial arterial pressure of oxygen; VC = vital capacity; PIMax = maximal inspiratory pressure; PEMax = maximal expiratory pressure.

ORIGINAL CONTRIBUTION

Noninvasive Ventilation in Myasthenic Crisis

Janaka Seneviratne, MBBS; Jay Mandrekar, PhD;
Eelco F. M. Wijdicks, MD; Alejandro A. Rabinstein, MD

ARCH NEUROL/VOL 65 (NO. 1), JAN 2008

Predictor fallo BiPAP:

- pCO2> 45 mms Hg (p =0.4)
- LOS UVI y hospital > con VM (p<0,001)

Predictors of Ventilation Duration Longer Than 7 Days Among 60 Episodes of Myasthenic Crisis

Variable	Odds Ratio (95% Confidence Interval)	*P* Value
History of crisis	3.08 (1.02-9.28)	.05
History of thymoma	3.14 (1.07-9.19)	.04
Initial maximal expiratory pressure[a]	0.96 (0.93-0.99)	.05
Intravenous corticosteroid use	3.97 (1.06-14.85)	.04
Initial endotracheal intubation and mechanical ventilation[a]	6.54 (1.32-32.56)	.02
Atelectasis[a]	8.50 (1.46-49.54)	.02
Pneumonia	3.75 (0.95-14.82)	.06
Initial bilevel positive airway pressure[a]	0.24 (0.08-0.70)	.01

[a] Also statistically significantly associated with ventilation duration when analyzed as a continuous variable.

Clinical End Points in Episodes of Myasthenic Crisis Initially Treated Using BiPAP vs ET-MV[a]

Variable	Initial BiPAP[b] (n=24)	Initial ET-MV (n=36)	*P* Value
Ventilation duration, d	4 (1.5-21)	9 (3-60)	<.001
Atelectasis	27	37	.70
Pneumonia	53	44	.74
Length of stay, d			
Intensive care unit	7 (2-42)	13 (4-60)	.002
Hospital	13 (2-60)	20 (4-123)	.03
Mortality	0	6	.36

Abbreviations: BiPAP, bilevel positive airway pressure; ET-MV, endotracheal intubation and mechanical ventilation.
[a] Data are given as median (range) or as percentages.
[b] Ten patients failed BiPAP trial and required ET-MV.

ORIGINAL CONTRIBUTION

Noninvasive Ventilation in Myasthenic Crisis

Janaka Seneviratne, MBBS; Jay Mandrekar, PhD; Eelco F. M. Wijdicks, MD; Alejandro A. Rabinstein, MD

ARCH NEUROL/VOL 65 (NO. 1), JAN 2008

Comparison of Baseline Demographic and Physiological Variables Among Episodes of Myasthenic Crisis Initially Treated Using Bilevel Positive Airway Pressure (BiPAP) vs Endotracheal Intubation and Mechanical Ventilation (ET-MV)[a]

Baseline Variable	Total (N=60)	BiPAP Success (n=14)	BiPAP Failure (n=10)	ET-MV (n=36)	*P* Value
Age, y	65.5 (17 to 90)	69.5 (17 to 90)	59 (26 to 79)	68 (25 to 90)	.63
Disease duration, y	4 (0.08 to 43)	3 (0.08 to 14)	5 (0.08 to 15)	4 (0.08 to 43)	.74
History					
Thymoma	42	21	56	47	.17
Crisis	43	50	40	41	.82
Lung disease	22	14	33	26	.55
Trigger					
Medication	32	36	20	33	.48
Infection	35	29	60	31	
Surgery	12	14	10	14	
Acetylcholine receptor antibodies	91	100	100	85	.14
Initial values					
pH	7.40 (7.35 to 7.46)	7.44 (7.35 to 7.45)	7.42 (7.28 to 7.53)	7.41 (7.32 to 7.48)	.52
Pco_2, mm Hg	42 (35 to 78)	41 (35 to 56)	39 (35 to 66)	45 (36 to 78)	.24
Bicarbonate, mEq/L	28 (21 to 105)	28 (21 to 77)	25 (21 to 37)	28.5 (21 to 105)	.34
Po_2, mm Hg	84 (29 to 414)	81 (65 to 129)	80 (68 to 414)	95.5 (58 to 414)	.50
Forced vital capacity, mL/kg/s	13.9 (2.5 to 42.2)	13.9 (10.7 to 34.0)	15 (5.2 to 21.0)	13.3 (2.5 to 42.2)	.91
Maximal expiratory pressure, cm of water	−30 (−92 to −10)	−40 (−92 to −16)	−30 (−73 to −10)	−35 (−60 to −10)	.50
Maximal inspiratory pressure, cm of water	40 (10 to 100)	55 (18 to 100)	35 (10 to 98)	35 (10 to 96)	.20
Immunotherapy					
Plasma exchange	67	79	60	64	.54
Intravenous immunoglobulin	10	0	10	14	.34
Corticosteroids	22	14	30	22	.65

[a] Data are given as median (range) or as percentage of patients with documented information.
SI conversion factor: To convert bicarbonate to millimoles per liter, multiply by 1.0.

neurocritical care society Neurocrit Care (2009) 10:35–42
DOI 10.1007/s12028-008-9139-y

ORIGINAL ARTICLE

The Role of Non-invasive Ventilation and Factors Predicting Extubation Outcome in Myasthenic Crisis

Jenn-Yu Wu · Ping-Hung Kuo · Pi-Chuan Fan · Huey-Dong Wu · Fuh-Yuan Shih · Pan-Chyr Yang

Demographics and outcome of patients with myasthenic crisis initially undergoing non-invasive ventilation[a]

Variables	NIV failure ($n = 6$)	NIV success ($n = 8$)	P Value
Age, yrs	69 (59)	50 (61)	0.243
Male, %	1 (16.6%)	1 (12.5%)	0.825
SOFA score[b]	1 (7)	1 (4)	0.488
APACHE II score[b]	9 (15)	6 (5)	0.100
Anti-acetylcholine antibody, nmol/l[b]	14.9 (28.5)	15.9 (11.4)	0.855
Arterial blood gas[b]			
pH	7.33 (0.26)	7.34 (0.16)	0.476
PaO_2/FiO_2, mmHg	408 (218)	410 (233)	0.576
$PaCO_2$, mmHg	66.5 (57.2)	54.0 (78.6)	0.081
HCO_3^-, mmol/l	33.5 (7.6)	27.6 (13.6)	0.027
Outcome			
ICU length of stay, days	18 (21)	2 (9)	0.002
Duration of hospitalization, days	44 (168)	20 (28)	0.005

Definition of abbreviations: NIV = non-invasive

neurocritical care society Neurocrit Care (2009) 10:35–42
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ORIGINAL ARTICLE

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Jenn-Yu Wu · Ping-Hung Kuo · Pi-Chuan Fan · Huey-Dong Wu · Fuh-Yuan Shih · Pan-Chyr Yang

Treatment and outcome in patients with myasthenia crisis requiring invasive mechanical ventilation

	All (n = 33)	Extubation success (n = 20)	Extubation failure (n = 13)	P Value
Therapy				
Steroid, %	31 (93.9)	19 (95.0)	12 (92.3)	0.751
Immunosuppressant, %	9 (27.3)	6 (30.0)	3 (23.1)	0.663
Plasmapheresis (courses)	5.6 ± 3.0	5.5 ± 3.1	5.6 ± 2.6	0.770
Mortality, %	2 (6.1)	0 (0)	2 (15.4)	0.07
Tracheostomy, %	4 (12.1)	0 (0)	4 (30.8)	0.008
Duration of MV, days	24.7 ± 30.5	10.9 ± 4.6	45.9 ± 40.7	<0.001
ICU length of stay, days	25.7 ± 12.8	18.9 ± 10.2	36.2 ± 8.8	<0.001
Duration of hospitalization, days	53.1 ± 42.7	43.2 ± 39.0	68.4 ± 45.1	0.005
Ventilator-associated pneumonia, %	7 (21.2)	1 (5.0)	6 (46.2)	0.005

Definition of abbreviations: ICU = intensive care unit; MV = invasive mechanical ventilation

neurocritical care society Neurocrit Care (2009) 10:35–42
DOI 10.1007/s12028-008-9139-y

ORIGINAL ARTICLE

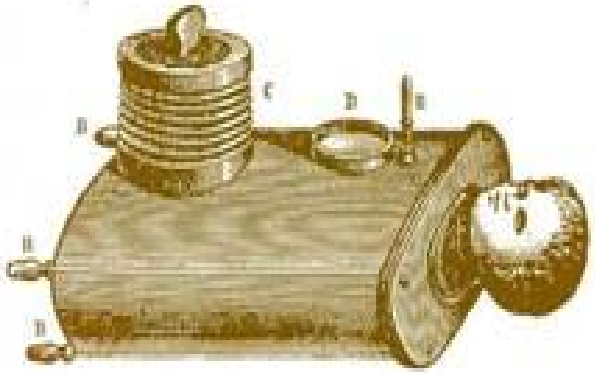
The Role of Non-invasive Ventilation and Factors Predicting Extubation Outcome in Myasthenic Crisis

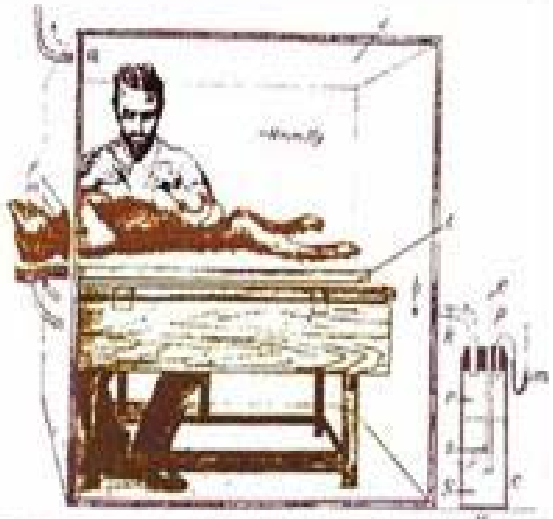
Jenn-Yu Wu · Ping-Hung Kuo · Pi-Chuan Fan · Huey-Dong Wu · Fuh-Yuan Shih · Pan-Chyr Yang

Summary of multivariate logistic regression

Outcome/variable	Odds ratio	95% confidence	*P* value
Extubation success			
RSBI ≤ 105, 1/min ml	2.5	0.5–13.4	0.524
RSBI ≤ 80, 1/min ml	3.25	0.7–16.0	0.140
Vital capacity ≥ 10 ml/kg	1.3	0.2–9.8	0.756
Tidal volume ≥ 5 ml/kg	2.1	0.4–9.8	0.605
Pemax ≥ 40 cmH_2O	37.5	3.6–386.5	<0.001
Duration of mechanical ventilation ≥14 days			
Ventilator-associated pneumonia	40.0	3.4–468.1	<0.001
Intensive care unit length of stay ≥30 days			
Extubation failure	18.9	3.2–112.1	0.001

Definition of abbreviations: RSBI = rapid shallow breathing index; Pemax = maximal expiratory pressure





MENOS ES MAS

Menos es mas

- ARDS Network: NEJM 2000
- Kress : NEJM 2000
- Kollev : CCM 2004
- Gidard : Lancet 2008

- ***“ Ventilación protectora”***
- ***Weaning diario***
- ***Sedation Holiday***
- ***Acortar encamamiento***
- ***Bundle NAVM***

ESTRATEGIA PARA REDUCIR LA DURACIÓN DE LA CM

- IOT PRECOZ
- RETIRADA DE ANTICOLINESTERÁSICOS
- PF PRECOZ
- EVITAR MEDICACIÓN DESENCADENANTE DE MG
- TRATAR INFECCIONES **DOCUMENTADAS** (precoz y adecuadamente)
- INTERRUMPIR SEDACIÓN Y VALORAR WEANING DIARIAMENTE
- TRATAR DISELECTROLITEMIAS
- ADECUADO SOPORTE NUTRICIONAL
- VENTILACIÓN (PROTECTORA)
- TRAQUEOTOMÍA DESPUES DE 2 SEMANAS ???
- VNI??

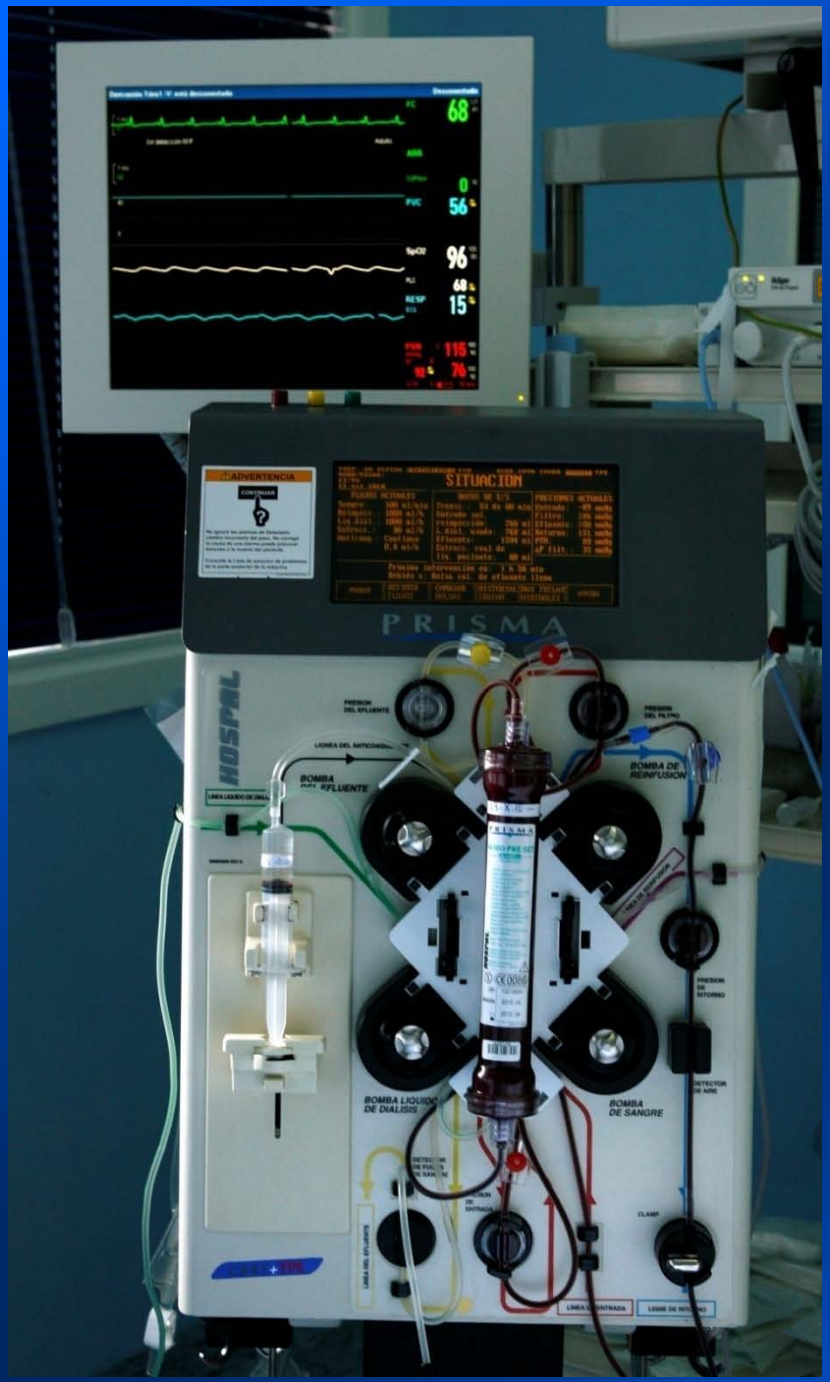
Miastemia Gravis y servicio de medicina intensiva HCUV

Periodo 2004-2011

19 pacientes: 13 timectomias. 4 crisis miastemicas, 2 comorbilidades

Mortalidad: 0

Modalidad terapeutica: PF, Ig, Anticolinesterasicos


PRISMA
HOSPAL
SITUACIÓN
ADVERTENCIA
BOMBA DE EFLUENTE
BOMBA DE REINFUSION
BOMBA LIQUIDO DE DIALISIS
BOMBA DE SANGRE


COBE Spectra
PLANTILLA PARA RH
COBE Spectra

EFECTOS SECUNDARIOS DEL TRATAMIENTO INMUNOMODULADOR

- PLASMAFÉRESIS: coagulopatía
  trombopenia
  diselectrolitemias
  arritmias
  hipotensión
  complicaciones CVC

- IGs: cefalea, fiebre, escalofríos
  meningitis aséptica
  sobrecarga de líquidos
  fallo renal