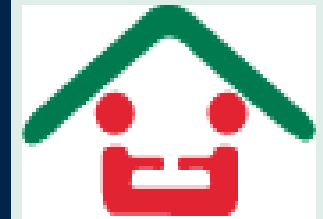


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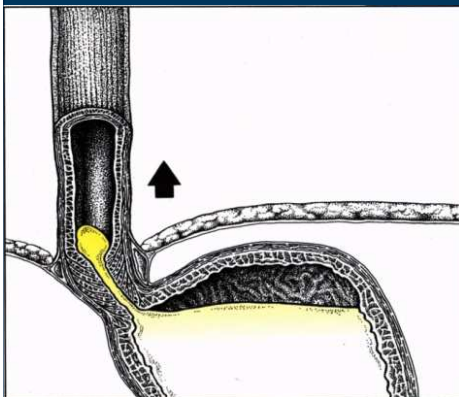


DEPARTAMENTO
DE PEDIATRÍA

6º Congreso Argentino de Neumonología Pediátrica.

Buenos Aires 24 de noviembre, 2012

Reflujo gastroesofágico y asma: ¿actor o espectador?



Dra. Marina Orsi

Deglución: Mecanismo de coordinación neuromuscular donde entran en juego estructuras orales, faringneas, la laringe y el esófago, que permite el pasaje de secreciones endógenas, o de alimento, desde el exterior hasta el estomago, con interrupción del acto respiratorio.

Los Trastornos en la Deglución (TD) son únicos en la infancia y deben diferenciarse de los adultos.

Implica un proceso evolutivo complejo:

- Fisiología
- Estructuras anatómicas
- Conexiones con SNC

Al inicio reflejo, subcortical

Luego voluntario, cortical

Thompson LD et al. 1999
Derkay CS et al. 1998.

Swallowing Disorders: " any defect in the intake or transport of endogenous secretions and nutriments necessary for the maintenance of life ""

Es fundamental el conocimiento de las distintas etapas del desarrollo de la deglución:

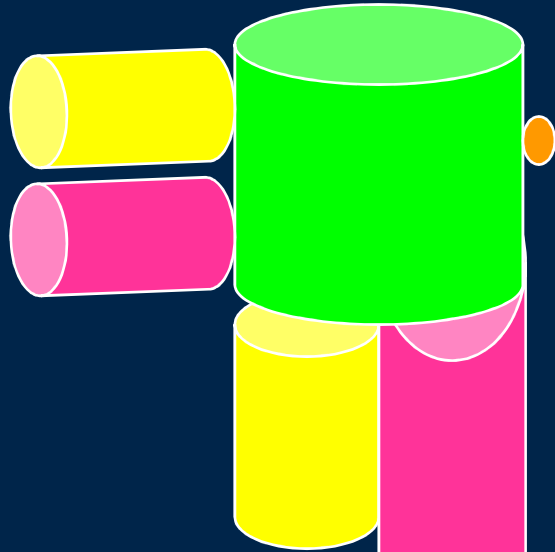
Feto → RN → lactancia → niño → adulto

Encrucijada AD

26 músculos

5 PC

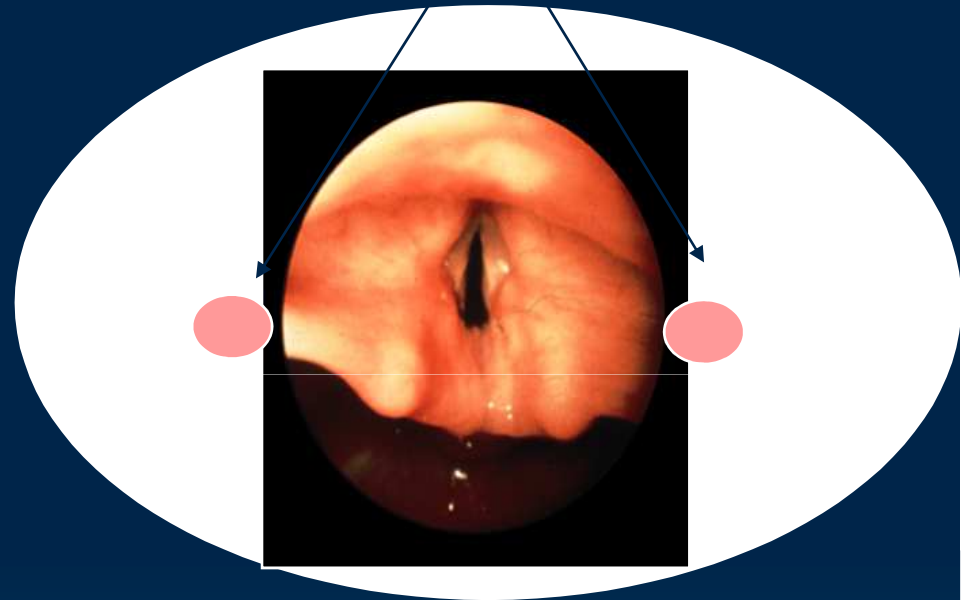
S. Respiratorio



OM



Senos piriformes



Articulación de la palabra

Ventilación oído medio

S. Digestivo

La anatomía de la cavidad bucal cambia durante el desarrollo.

Lactante:

- Boca pequeña
- Lengua ocupa cavidad
- Almohadillas grasas
- Maxilar inf poco desarrollado
- Laringe protegida
- **Succión-deglución-respiración**



Reflejo

Niño mayor:

- Boca grande
- Maxilar inf crece hacia abajo y adelante.
- Desaparecen almohadillas
- Laringe desciende
- Masticación-deglución-respiración**



Voluntario

Función mas compleja del organismo

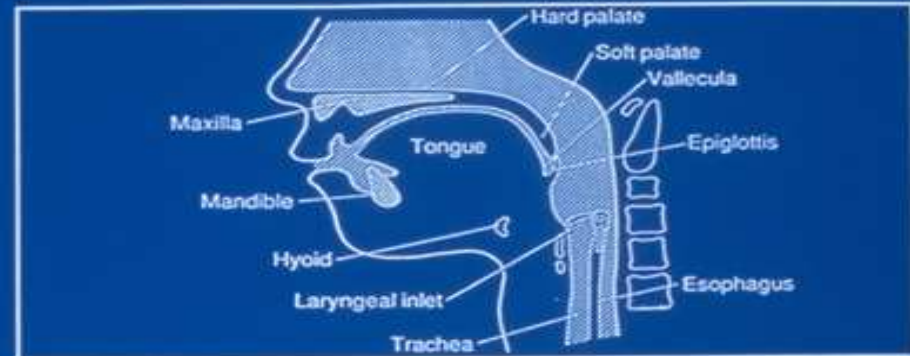


FIGURE 2. Schematic lateral view of the infant upper aerodigestive tract. Structures of the oral cavity and pharynx can be seen, as well as the laryngeal inlet, trachea, and esophagus.



FIGURE 3. Schematic lateral view of the adult upper aerodigestive tract, demonstrating anatomical limitations of nasopharynx, oropharynx, and hypopharynx.

Above schematic views adapted from Arvedson, J. and Brodsky, L. (1993). Pediatric Swallowing and Feeding: Assessment and Management.

1) Fase preparatoria oral: Reflejo búsqueda, prehensión del alimento, cierre de labios.

2) Fase oral: Masticación, formación de bolo, traslado a faringe.

3) Fase faríngea: Elevación velo paladar y laringe, cierre cuerdas vocales, descenso epiglotis

Relajación esfínter ES

Inicio onda peristáltica

4) Fase esofágica

Esencial

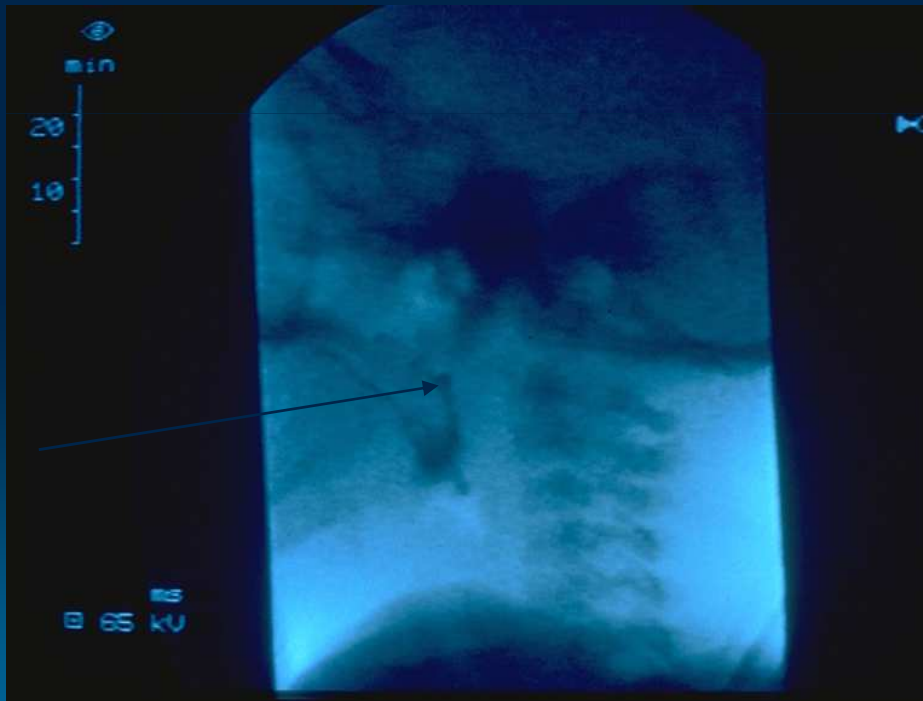


Coordinación:

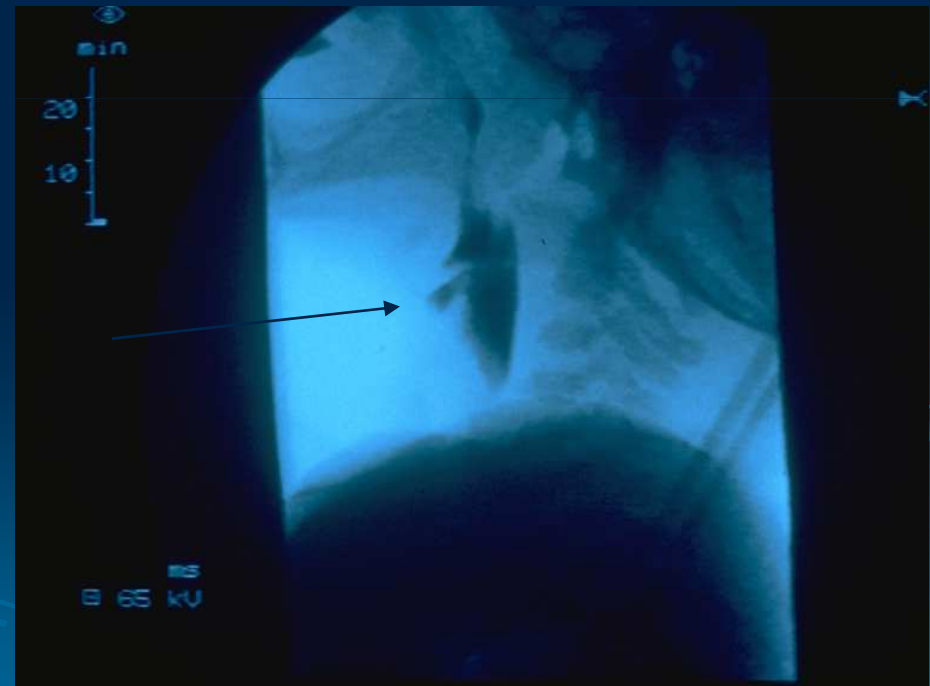
- Succión
- Deglución
- Vía aérea

Estudio dinámico de la deglución

Aporta datos dinámicos acerca de todas las etapas de la deglución, pasaje a vía aérea y posiciones compensatorias.

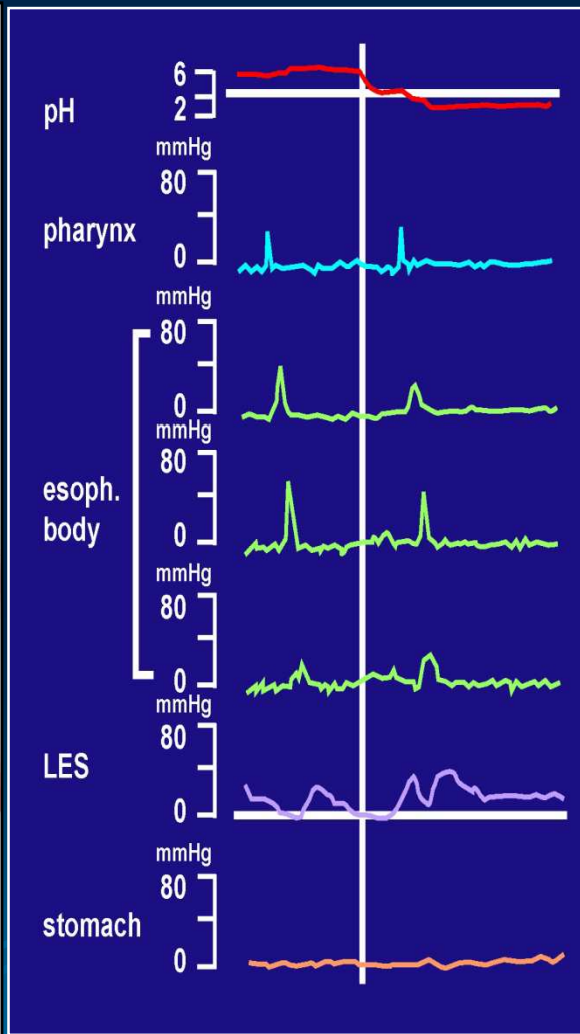
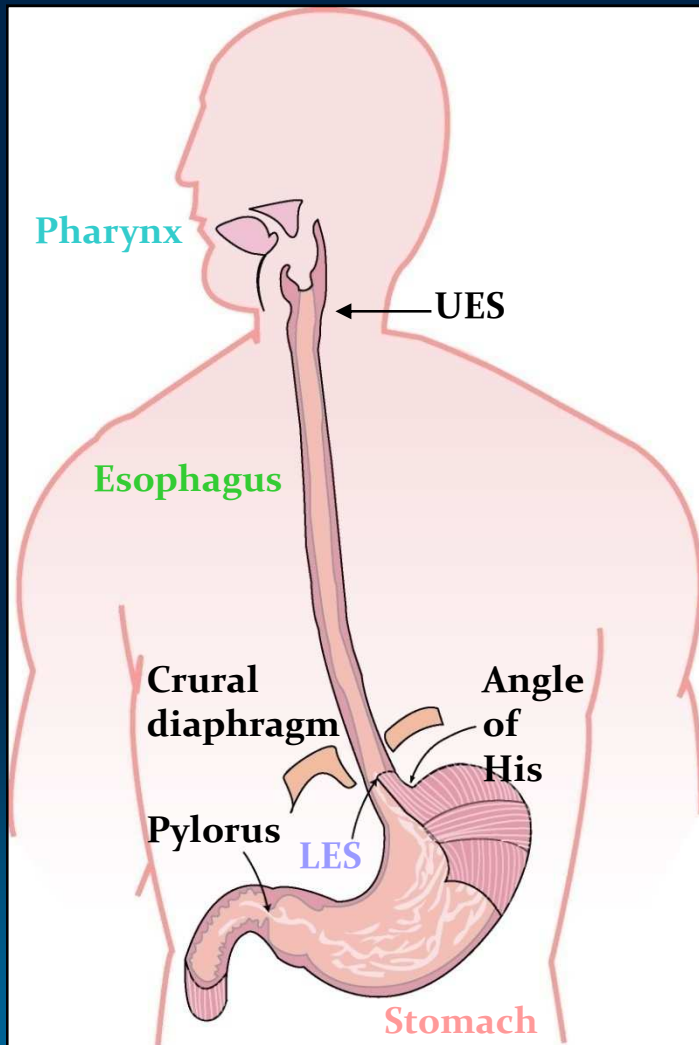


Ascenso a rinofaringe



Penetración a laringe

Relajaciones transitorias del EEI



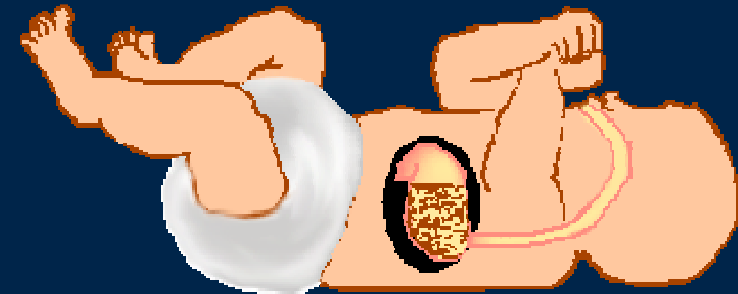
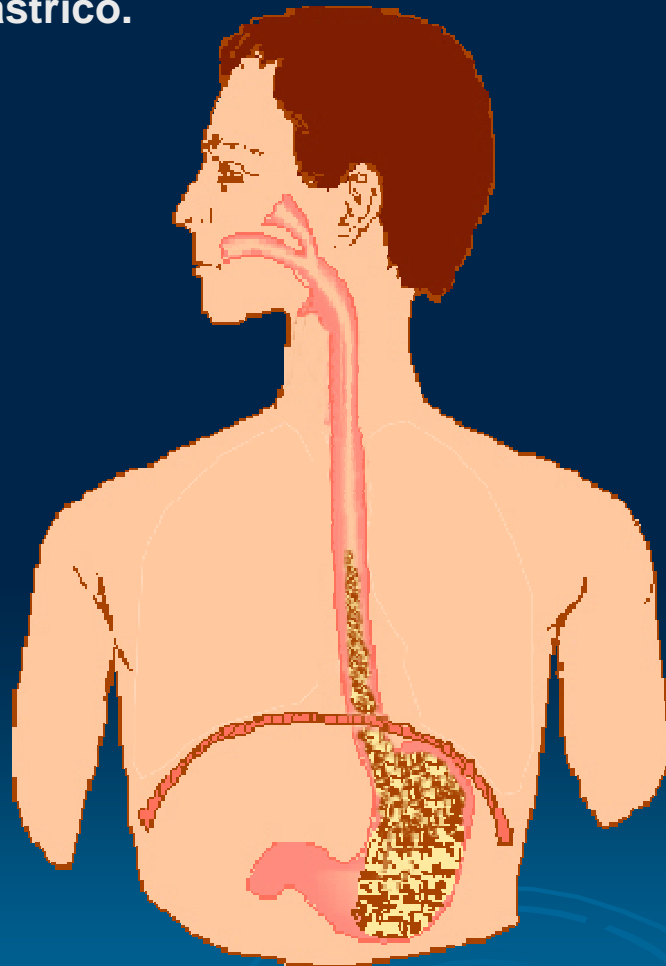
Las RT del EEI son la causa + frecuente de RGE en niños y adultos.

RT se define como disminución abrupta de la P del EEI, no relacionada a deglución o perístasis.

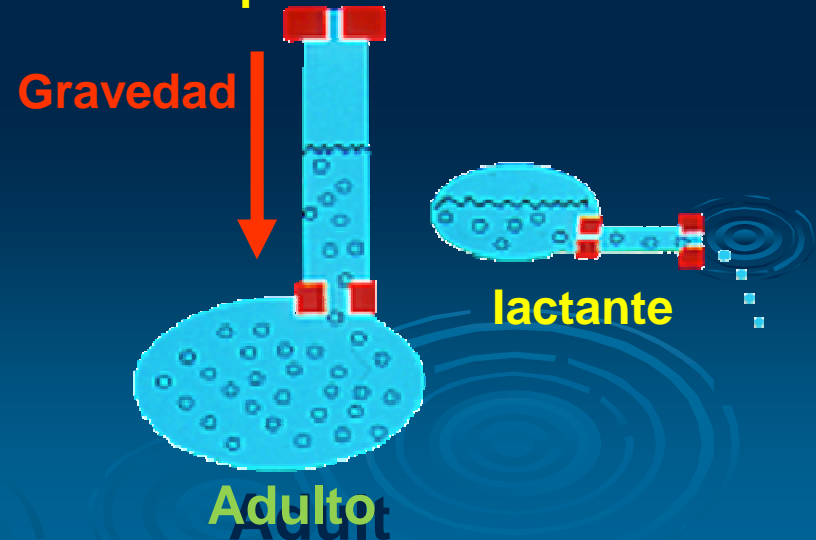
RT ocurren en individuos sanos, pero en el RGE patológico su frecuencia y duración es mayor.

Capacidad Gástrica

- La distensión gástrica sería un potente estímulo para la RT.
- Vaciamiento gástrico.



- Menor longitud
- Menor capacidad



La extensión proximal se relaciona con la intensidad de los síntomas y con el movimiento

Posibles mecanismos involucrados en la enfermedad respiratoria relacionada al RGE

Obstrucción Luminal

Esófago

Arbol Traqueobronquial

Reflujo

Aspiración

Material aspirado

Moco

Edema

Contracción
Músculo liso
Bronquial

QUIMICA

Liberación de
mediadores
inflamatorios

NEURAL

Aferentes v. aérea

Eferentes de
la v. aérea

Aferentes
Esofágicos

OBSTRUCCIÓN de la VIA AEREA

Posibles mecanismos



BRONQUIO: Tres lugares potenciales de obstrucción de la vía aérea.

La luz bronquial puede encontrarse disminuída por material de origen extra o intra-pulmonar.

Por otro lado la lámina propia puede estar engrosada por edema y por último la contracción muscular puede estrechar la luz

Fisiopatología

- Relajaciones transitorias
- Disminución del tono del EEI
- Apertura prolongada del EEI durante la deglución

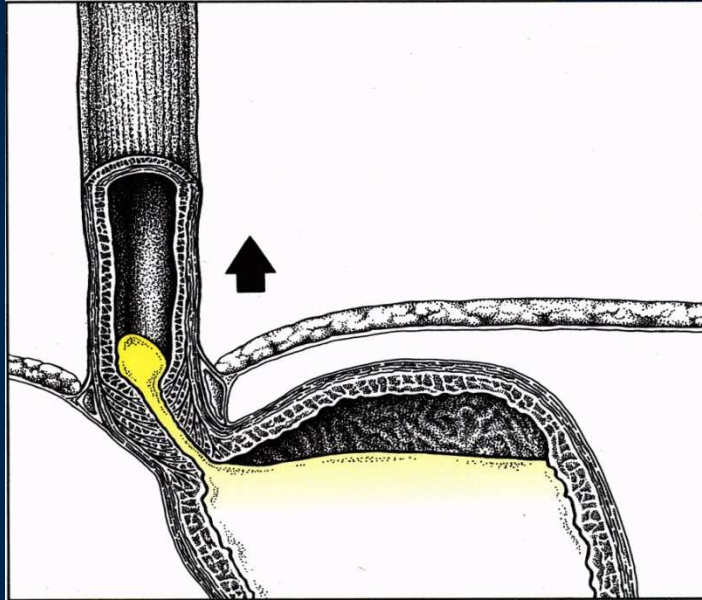


Pérdida de la barrera defensiva



- Actividad esófagica del cuerpo disminuído
- Disminución del clearance ácido

Enfermedad asociada al desarrollo neuromuscular



RGE:

movimiento retrógrado
del contenido gástrico
hacia el esófago.

- **Fisiológico y normal**
- **Asintomático o regurgitación / vómito**
- **Se resuelve espontáneamente**
- **Postprandial**
- **Durante primeros 2 años de vida**

Regurgitador o Vomitador “Feliz” :

Es el lactante que **regurgita y / o vomita** con variable intensidad , **sin otro síntoma acompañante**. Crece bien y está sonriente.

Tiene Reflujo Gastroesofágico **Fisiológico**.


Enfermedad por Reflujo Gastroesofágico.

Es el lactante o niño con síntomas digestivos y / o extradigestivos que se vinculan al **daño tisular producido por la intensidad o frecuencia de los episodios de reflujo.**

Se denomina :

Reflujo Gastroesofágico **Patológico.**

SÍNTOMAS

- Vómitos.
 - Regurgitaciones.
 - Náuseas.
 - Arcadas.
 - Epigastralgia .
 - Pirosis.
 - Hematemesis.
 - Melena.
- 

SÍNTOMAS . RGE “ SILENTE –OCULTO “

- Anemia.
- Irritabilidad.
- Retardo ponderal.
- Sme de Sandifer.
- E .A .A .V.
- Dolor torácico.
- Tos Recurrente / Nocturna
- B.O.R. - Asma
- Neumonías reiteradas.
- Estridor-Laringitis
- Disfonía-tos ronca

RGE Atípico

Síndrome de Sandifer

Paul Sandifer

(1964 , Inglaterra)

- Espasmo de torsión
- Clínica extrapiramidal
- Posturas anómalas



DIAGNÓSTICO

HISTORIA CLÍNICA

- **Edad** al comienzo del cuadro clínico.
- **Síntomas al inicio** y en el **tiempo**.
- **Evolución según tipo de alimentación.**
- Curva de crecimiento (Peso – Talla)
- Asociación con **síntomas ORL** o con
- Síntomas **respiratorios** o con
- Síntomas **neurológicos**

DIAGNÓSTICO

- **Seriada Gastroduodenal bajo radioscopía.**
- **Video-Deglución con S.G.D.**
- **Endoscopía alta con biopsias.**
- **pHmetría de 24 horas.**
- **Manometría Esofágica.**
- **Gamma - cámara.**
- **Impedanciometría Intraluminal Multicanal con phmetria / manomentria de 24 hs.**

**Hernia Hiatal
con RGE** →



Aspiración

20-Jun-03 14:55

H1:511
H2:256
E:12%



7

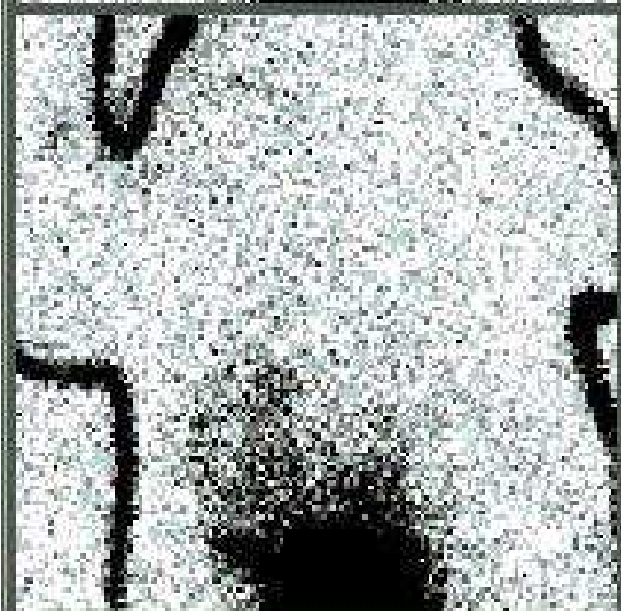
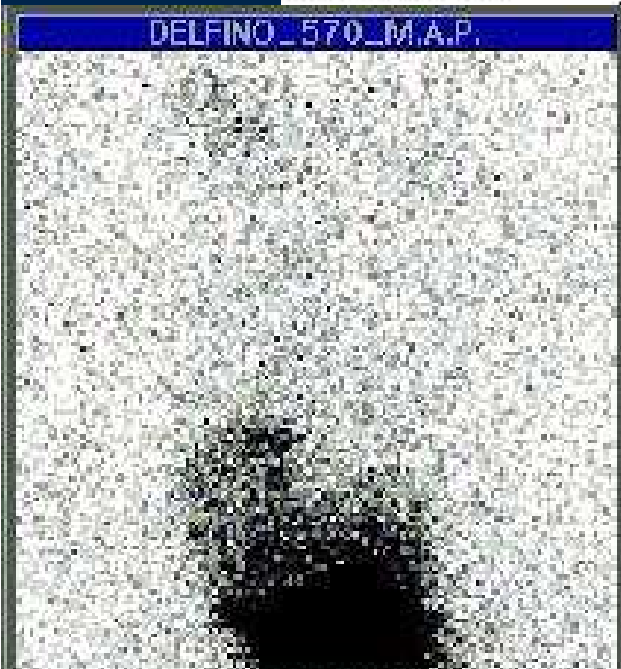
Medi

PERFIL
HOSPITAL ITALIANO

10/09/01

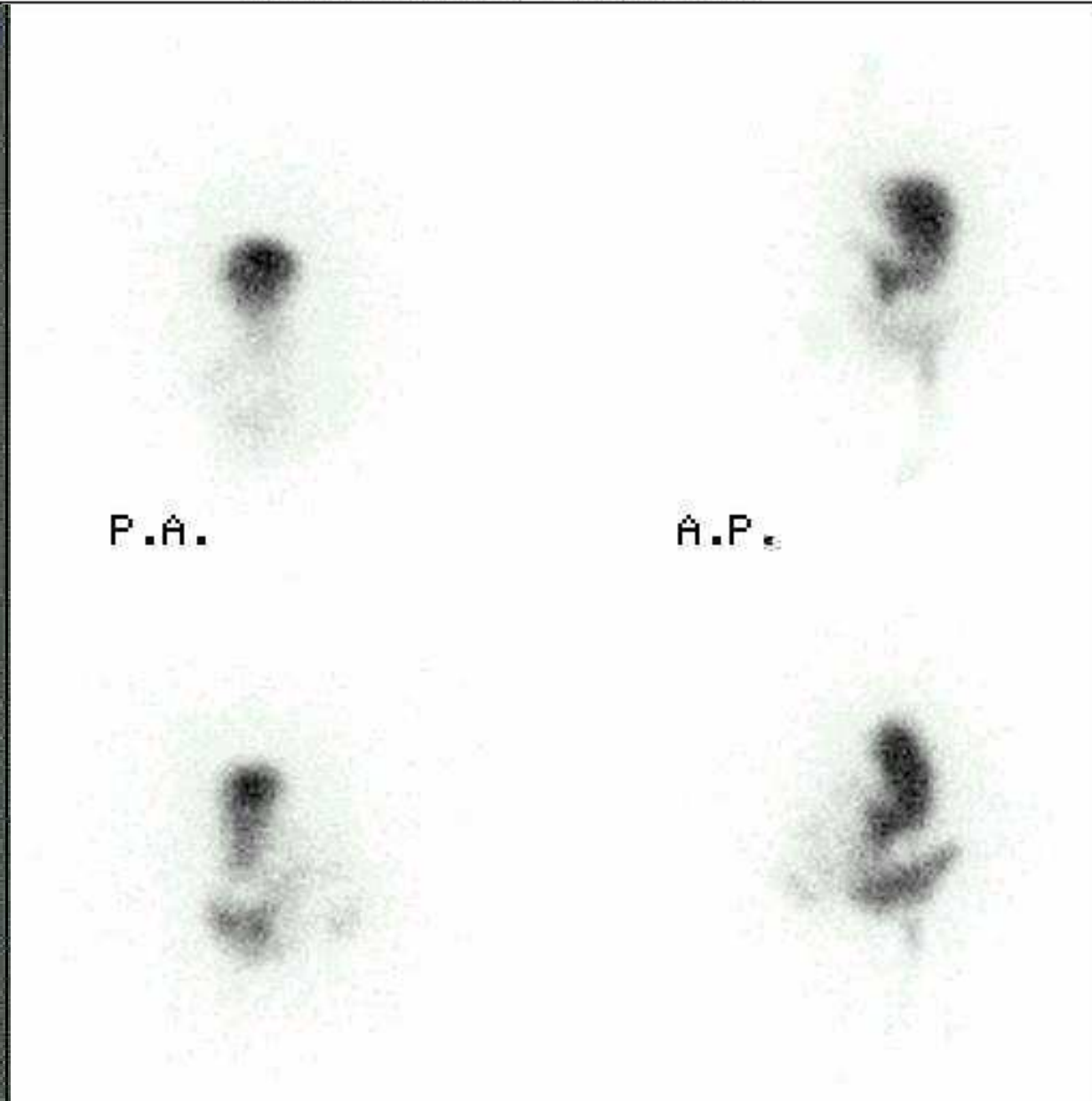
VACIAMIENTO GASTRICO

DELFINO_570_M.A.P.



P.A.

A.P.



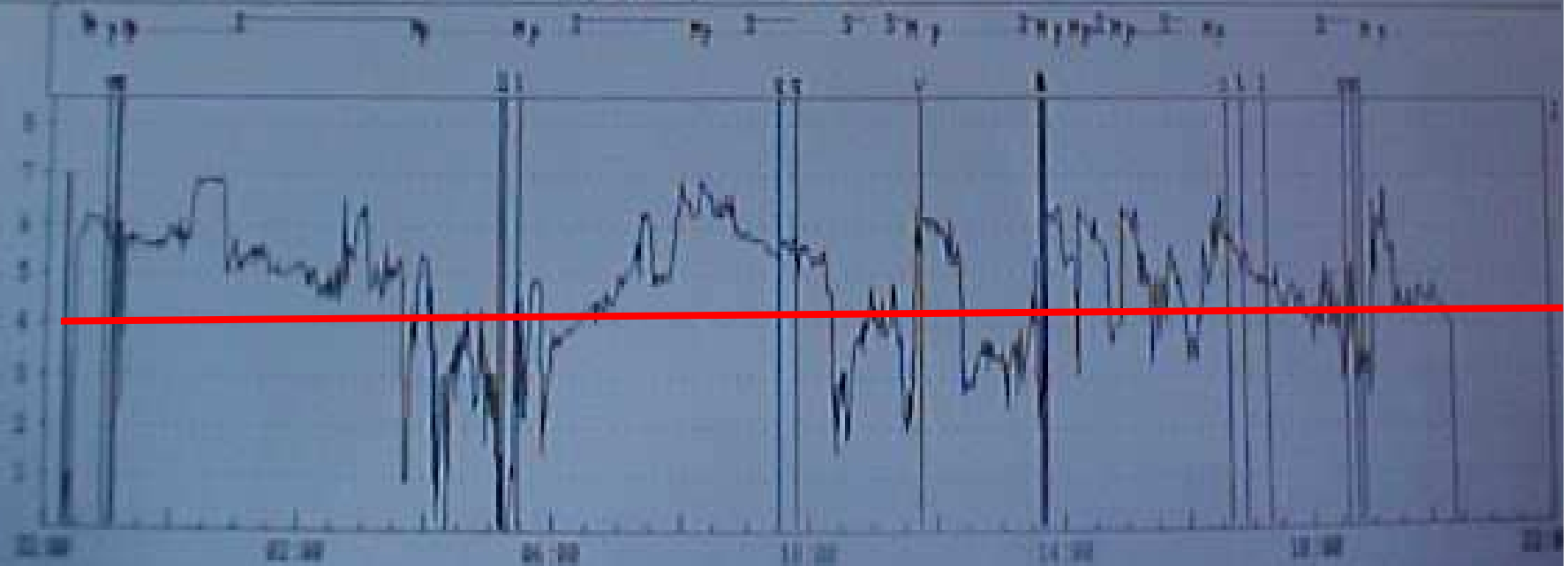


pH-metría patológica

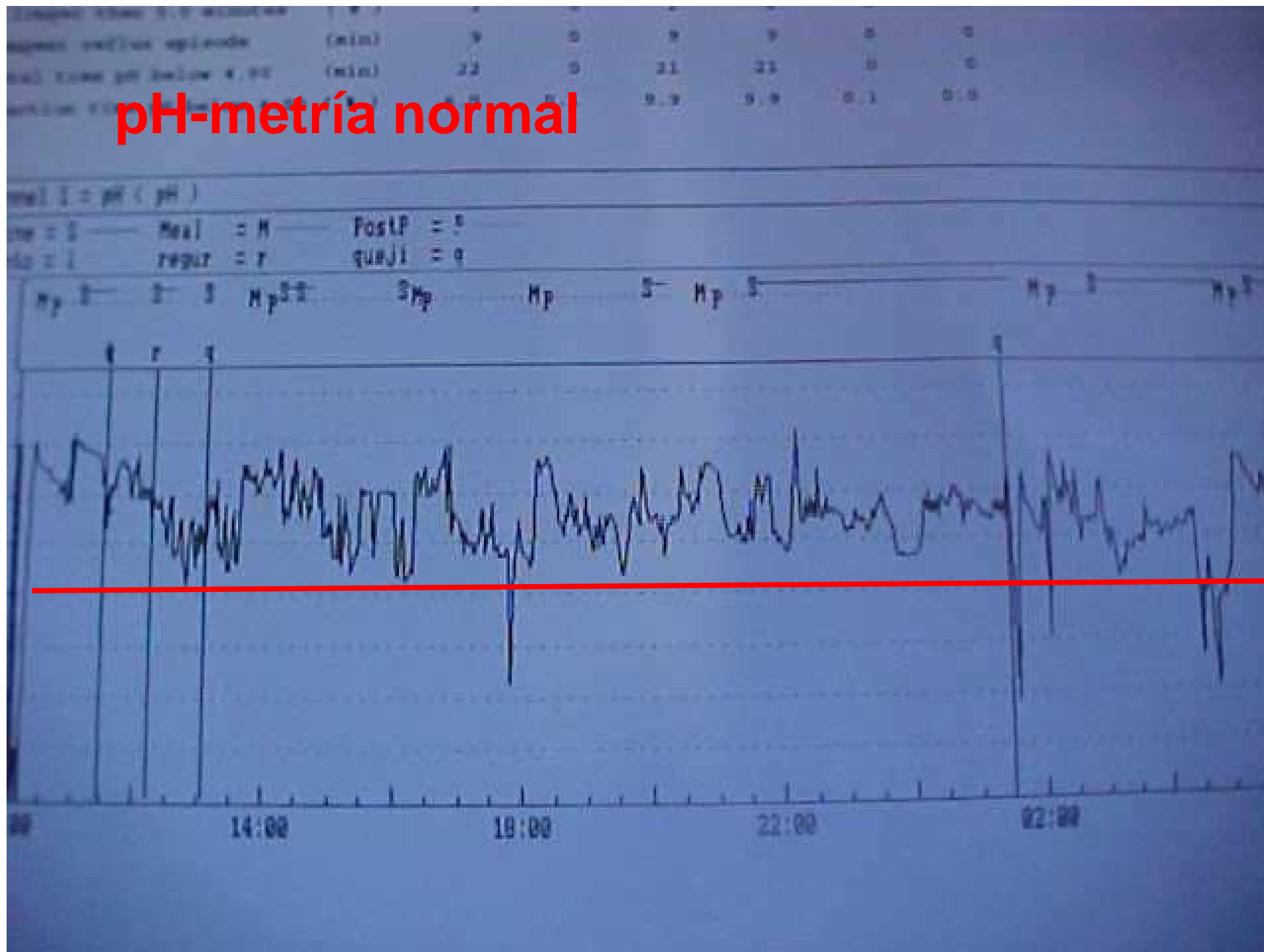
		Real	Post	Preco	Salino	Acido	Neutral
Reserva	(mmHg)	84 (86)	81 (88)	82 (82)	83 (82)	81 (88)	80 (88)
Number of red blood cells	(x 10 ¹²)	5.5	4.4	3.8	4.8	3.1	4.0
Number of white blood cells							
Leucocytes (x 10 ⁹ liter ⁻¹)	(x 10 ⁹)	4	3	4	4	3	0
Lymphocytes (x 10 ⁹ liter ⁻¹)	(x 10 ⁹)	1.1	0	0	0	0	0
Total plasma pH below 7.38	(x 10 ³)	58	23	25	22	33	0
Proteinemia (mmol liter ⁻¹)	(x 10 ³)	17.0	41.0	47.9	47.9	41.0	28.9

Channel 1 = pH (pH)

Range 2.0 — Real = 8 — Post = 7 —
Units = 1 — Ion = 1 — para E = 0 —
gain/10 = 1 — voltage = 0 — slope = 0



pH-metría normal

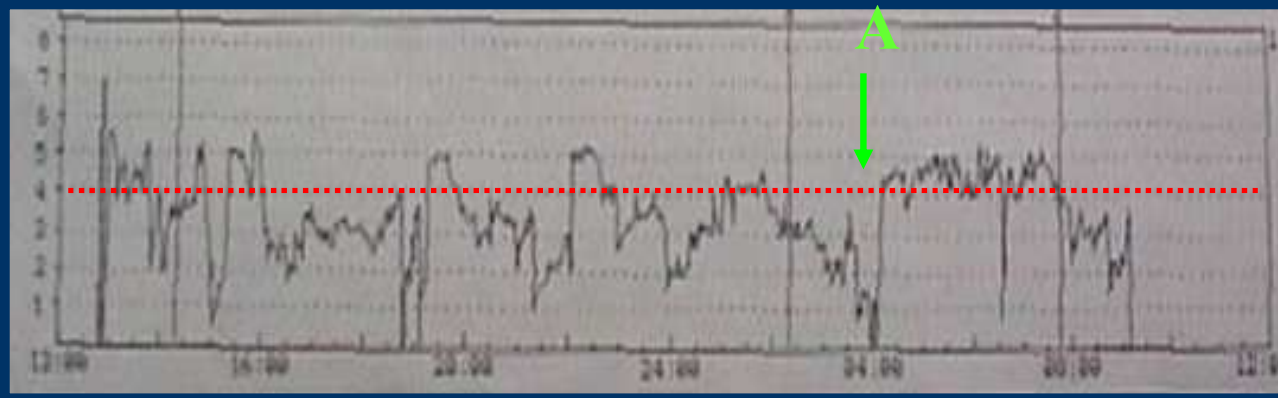


Correlación sintomática apnea - rge



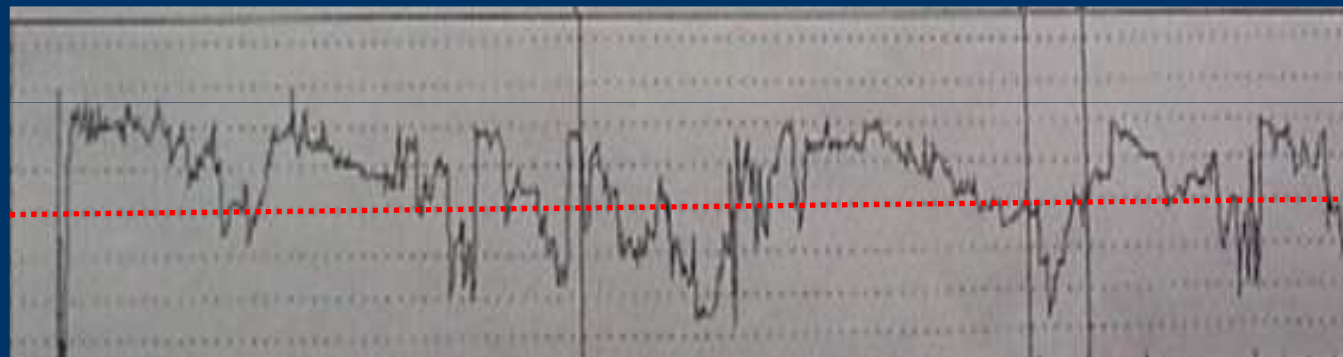
pHmetría en un paciente con EAAV

1^a
pH



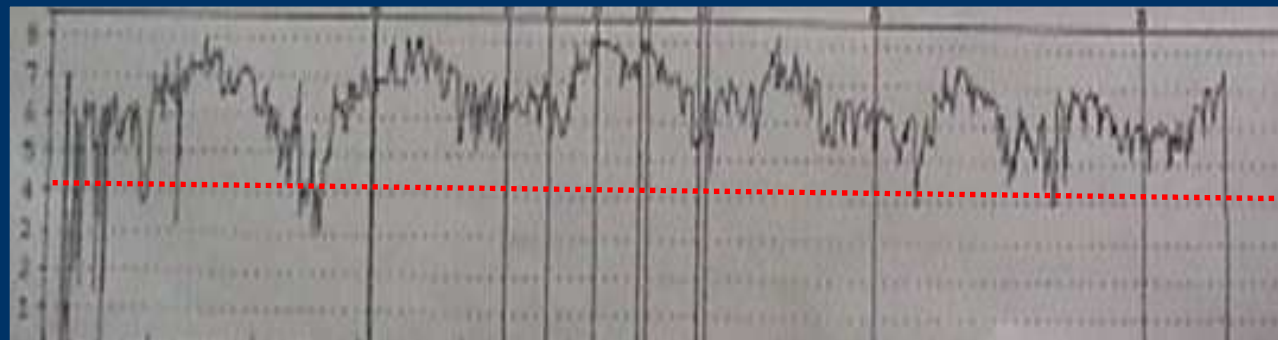
IR:28,2%

2^a
pH



IR:6,9%

3^a
pH



IR:1.8%

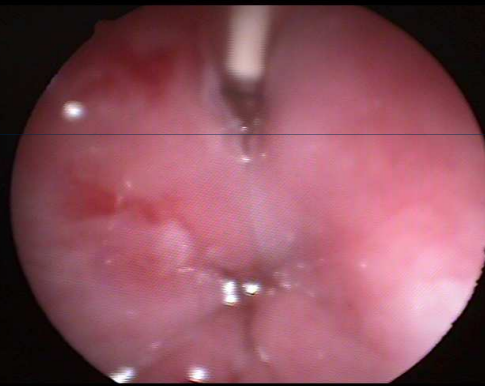
Rol de la **endoscopía** en el RGE patológico

- Para evaluar la presencia o no del daño mucoso y la severidad del mismo.
- Cuando los **síntomas** son importantes y la **pHmetría** es normal.
- Cuando la **clínica** parece sugerir otros diagnósticos ej : esofagitis eosinofílica ; gastritis por Helicobacter Pylori .
- Cuando **los síntomas no ceden con el tratamiento.**
- En el **seguimiento** del RGE patológico persistente.
- Previo a la cirugía del RGE.
- Cuando **se decide dar de alta al paciente.**

**Esófago
Normal**



**Esofagitis
Eosinofílica**



Esofagitis



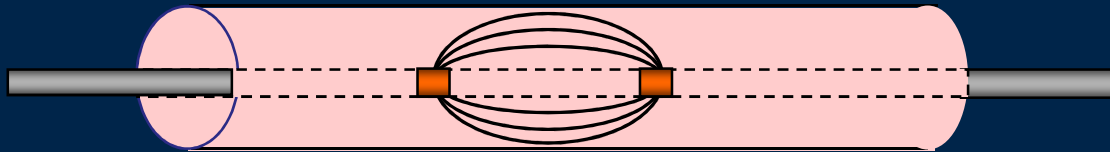
Que es la IMPEDANCIOMETRIA (Z) ?

RESISTENCIA AL FLUJO CORRIENTE

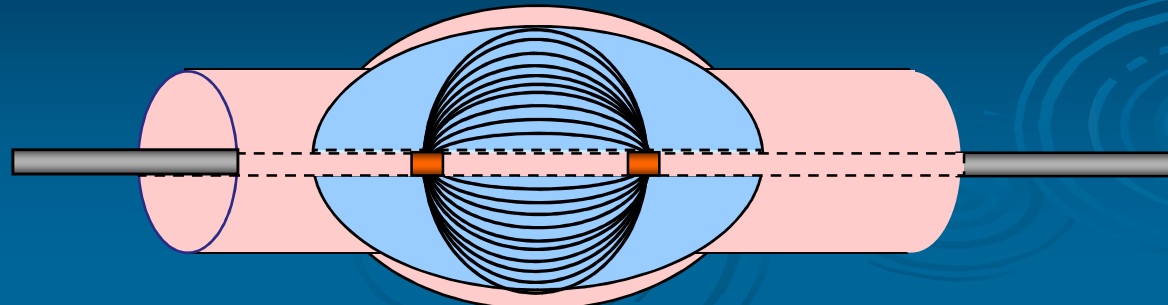
Medición inversa de la conductividad eléctrica de la pared de un órgano o su contenido

POR QUE CAMBIA LA IMPEDANCIOMETRÍA?

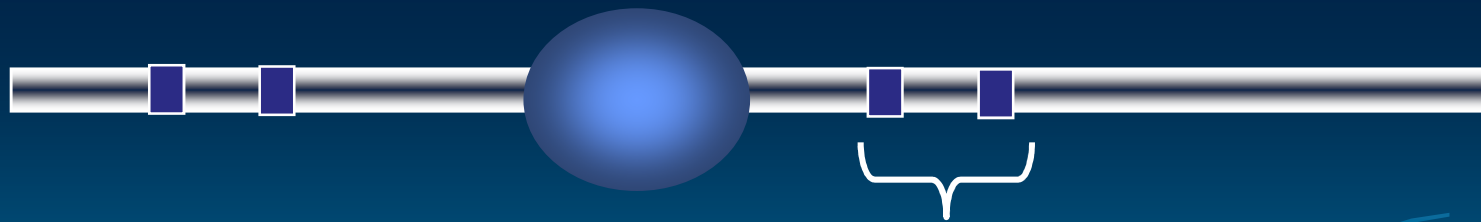
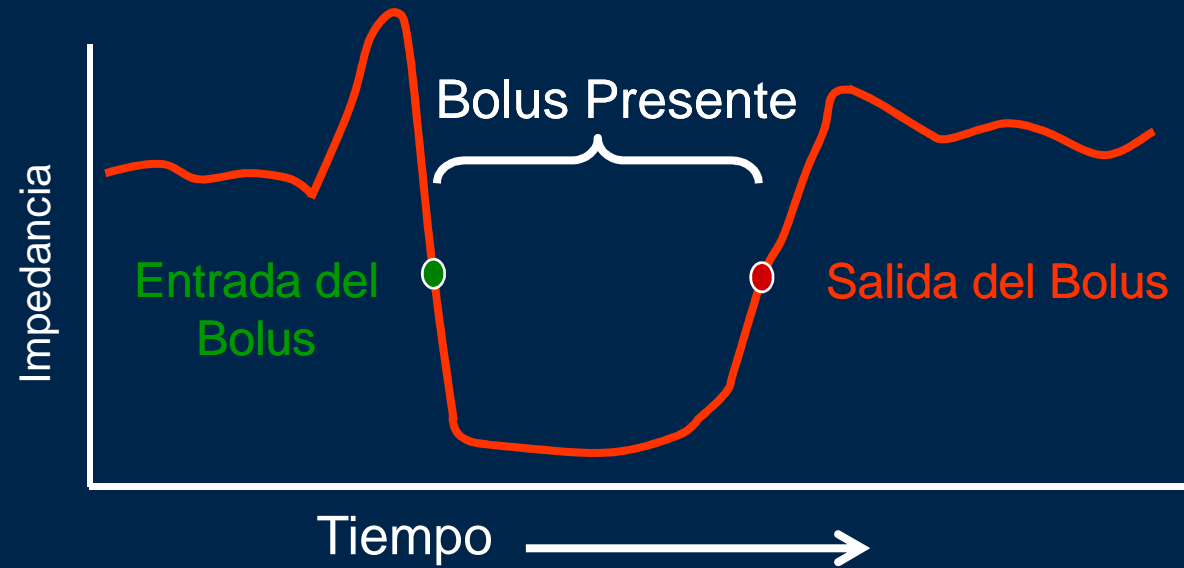
No hay bolo = pocos iones = alta impedancia



Bolo está presente = muchos iones = impedancia baja



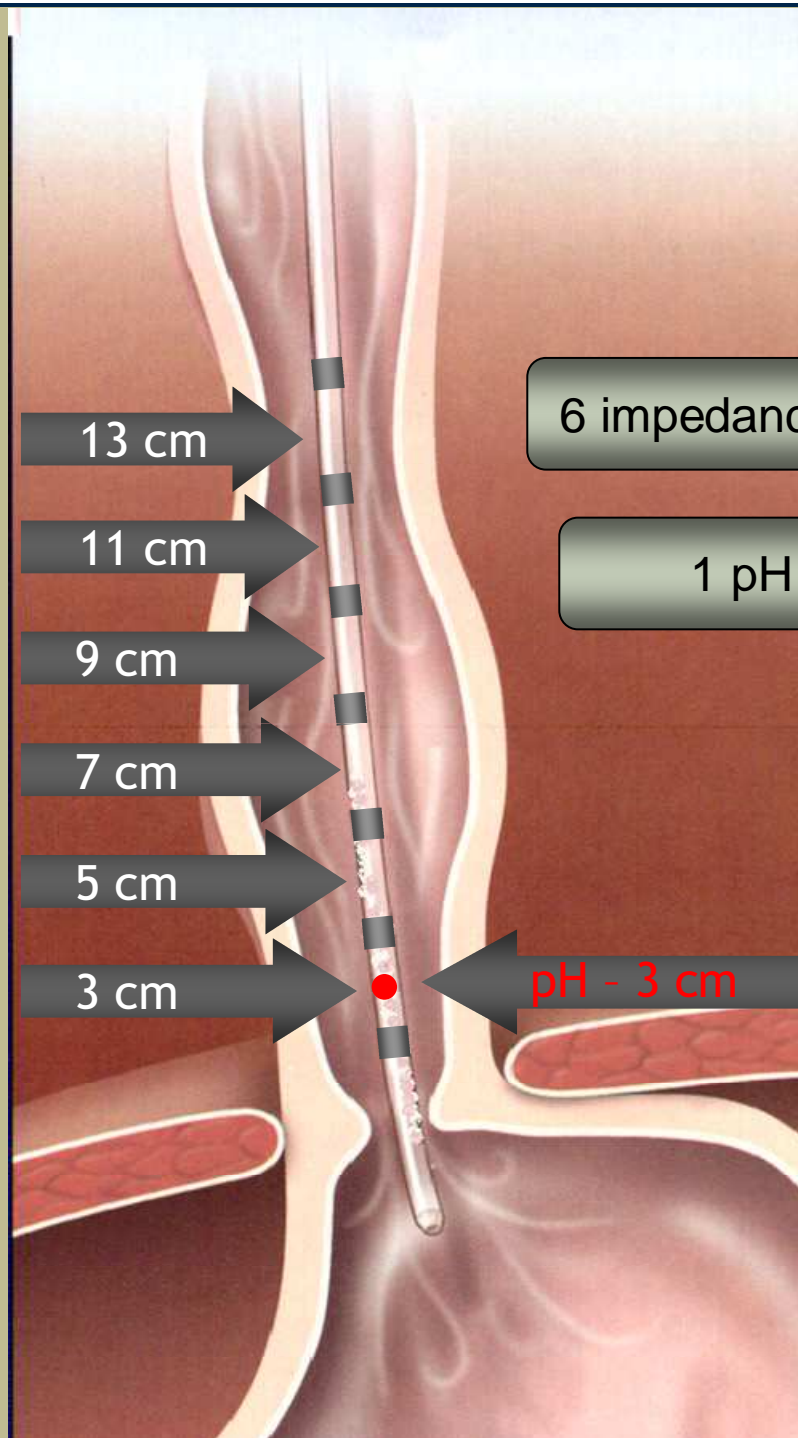
Fundamentos de la impedancia



Impedance Ring Set

Impedance -pH Catheter

Pediatric Model

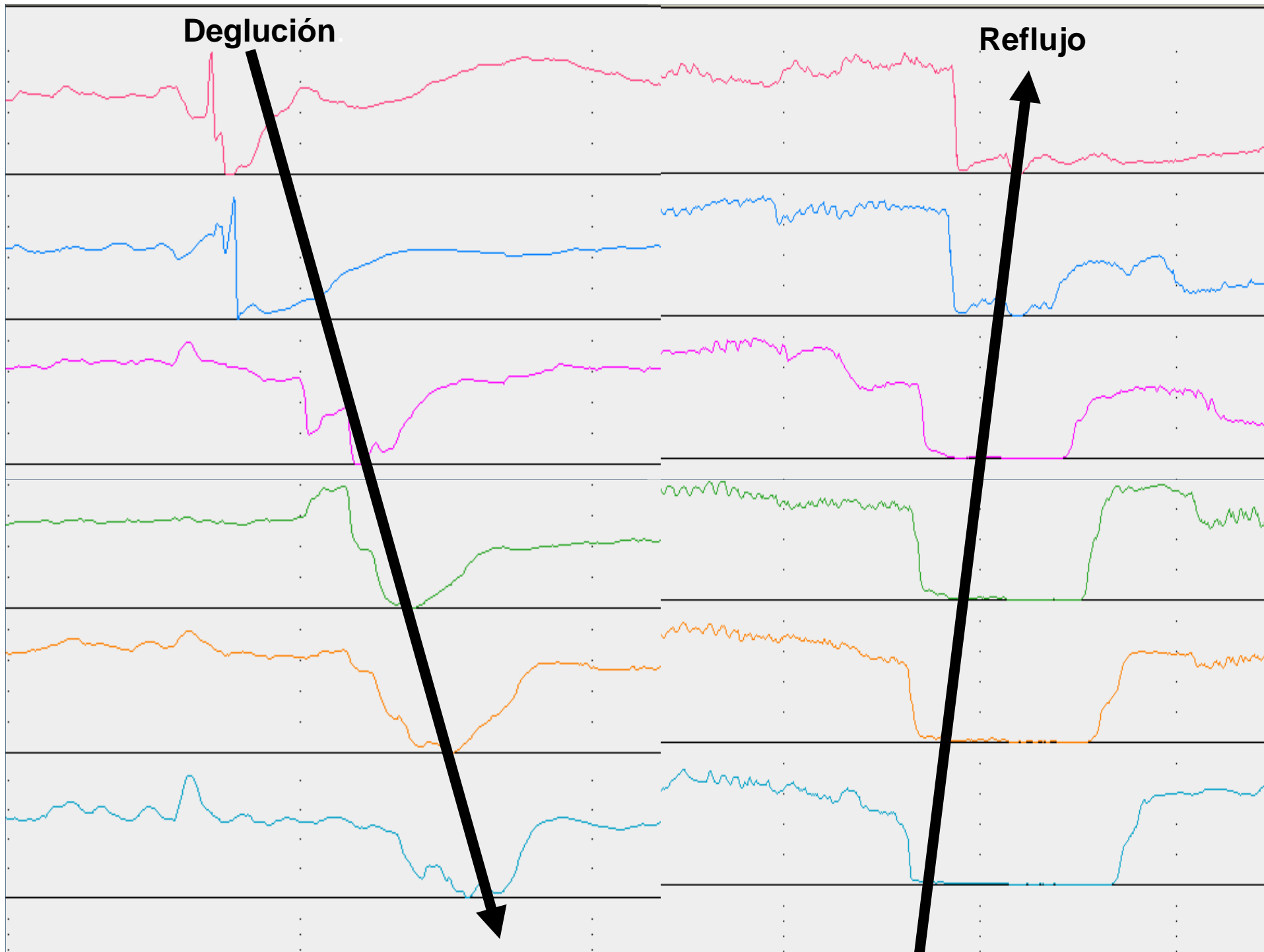


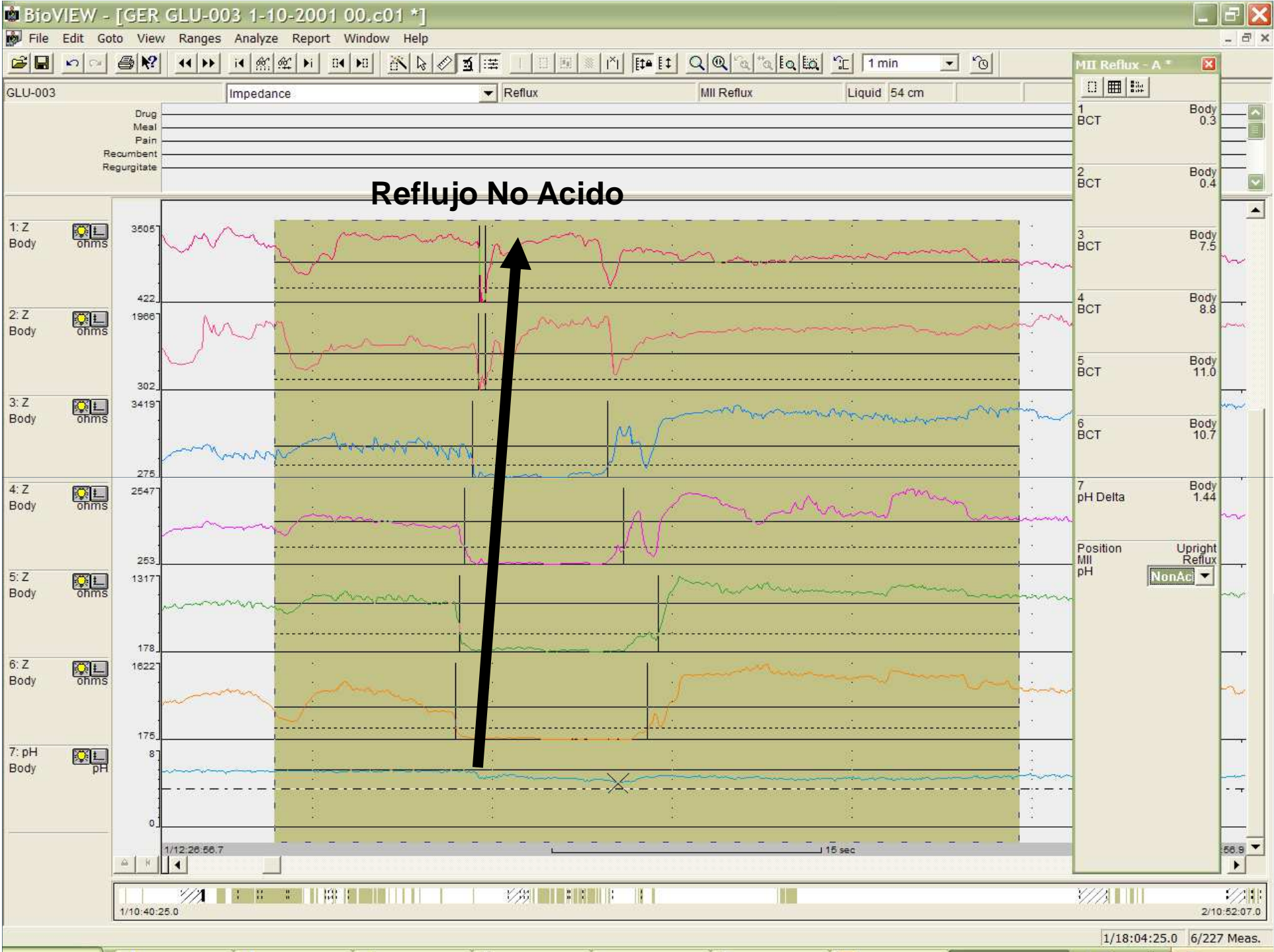
6 impedance channels

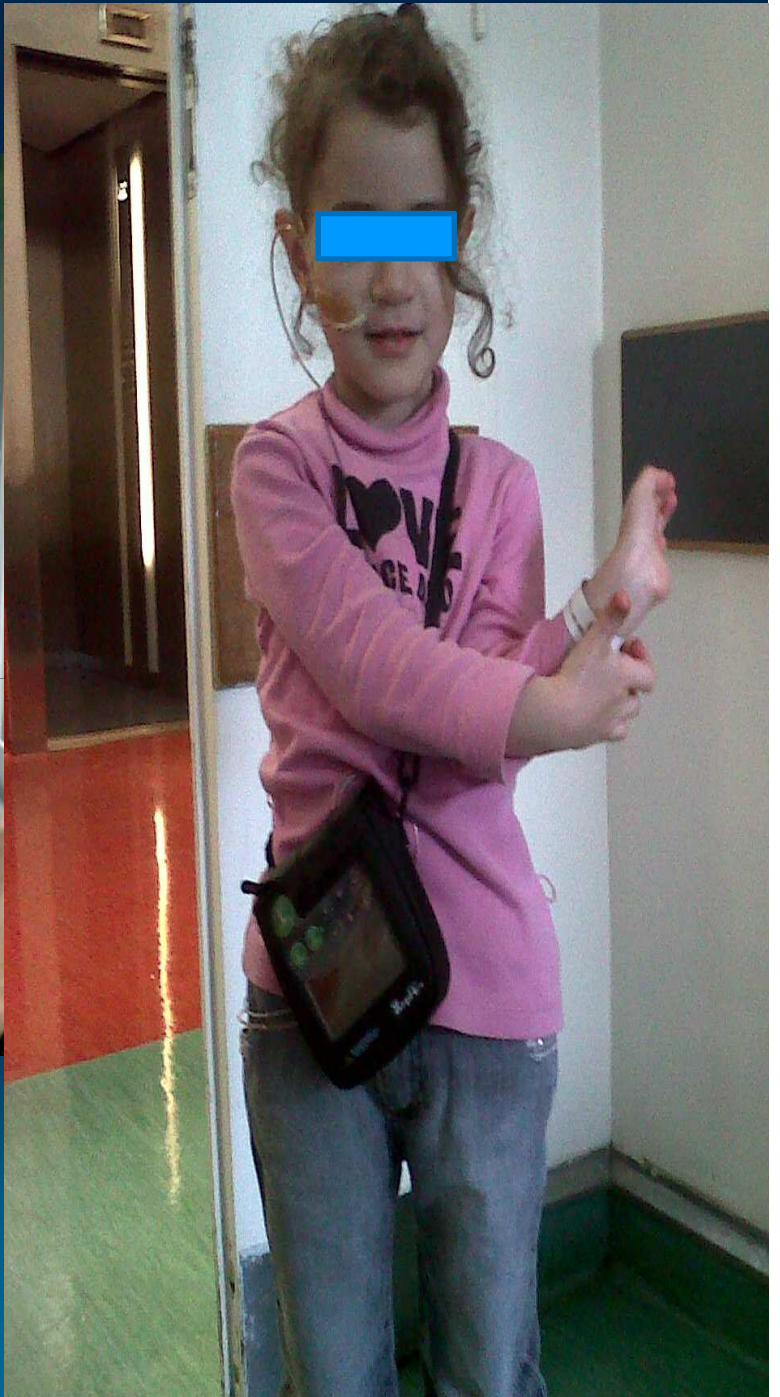
1 pH channel

Deglución

Reflujo







Impedanciometría Intraluminal Multicanal (IIM) con phmetría de 24 hs.

- Detecta RGE ácido y no ácido.
- Puede **establecer diagnóstico** en pacientes con **síntomas refractarios** durante el tratamiento **médico**.
- Permite **evaluarlos** con o sin medicación.
- Correlaciona síntomas con episodios ácidos o no ácidos.
- **Cuantifica el patrón de reflujo** y la **correlación sintomática** también en el período **post-prandial**.
- Es capaz de diagnosticar el reflujo supra-esofágico.
- Puede **monitorear a los lactantes pequeños** con **alimentación muy frecuente**

Pediatric Gastroesophageal Reflux Clinical Practice Guidelines:

Joint Recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN)

Co-Chairs: Yvan Vandenplas and yColin D. Rudolph

Committee Members: zCarlo Di Lorenzo, §Eric Hassall, jjGregory Liptak, Lynnette Mazur, #Judith Sondheimer, Annamaria Staiano, yyMichael Thomson, zzGigi Veereman-Wauters, and §§Tobias G. Wenzl

UZ Brussel Kinderen, Brussels, Belgium, {Division of Pediatric Gastroenterology, Hepatology, and Nutrition, Children's Hospital of Wisconsin, Medical College of Wisconsin, Milwaukee, WI, USA, {Division of Pediatric Gastroenterology, Nationwide Children's Hospital, The Ohio State University, Columbus, OH, USA, §Division of Gastroenterology, Department of Pediatrics, British Columbia Children's Hospital/University of British Columbia, Vancouver, BC, Canada, jj Department of Pediatrics, Upstate Medical University, Syracuse, NY, USA, Department of Pediatrics, University of Texas Health Sciences Center Houston and Shriners Hospital for Children, Houston, TX, USA, #Department of Pediatrics, University of Colorado Health Sciences Center, Denver, CO, USA, Department of Pediatrics, University of Naples "Federico II," Naples, Italy, {{Centre for Paediatric Gastroenterology, Sheffield Children's Hospital, Western Bank, Sheffield, UK, {{Pediatric Gastroenterology & Nutrition, Queen Paola Children's Hospital-ZNA, Antwerp, Belgium, and §§Klinik für Kinder- und Jugendmedizin, Universitätsklinikum der RWTH Aachen, Aachen, Germany

Journal of Pediatric Gastroenterology and Nutrition 49:498–547 # 2009

pHmetría de 24 horas (Guidelines 2009)

This test is a valid quantitative measure of esophageal acid exposure with established normal ranges.

In pH studies performed with antimony electrodes, an RI > 7% is considered abnormal, an RI < 3% is considered normal , and an RI between 3% and 7% is indeterminate.

However, the severity of pathologic acid reflux does not correlate consistently with symptom severity or demonstrable complications.

▪

pHmetría de 24 horas (Guidelines 2009)

Esophageal pH monitoring is **useful for evaluating the efficacy of antisecretory therapy.** It may be useful to correlate symptoms (eg, cough, chest pain) with acid reflux episodes and to select those infants and children with wheezing or respiratory symptoms in whom GER is an aggravating factor.

The **sensitivity, specificity, and clinical utility of pH monitoring for diagnosis and management of possible extraesophageal complications of GER are not well established**

Impedanciometría Intraluminal Multicanal – pHmetría de 24 hs

This test detects acid, weakly acid , and nonacid reflux episodes.

It is superior to pH monitoring alone for evaluation of the temporal relation between symptoms and GER.

The technology is especially useful in the postprandial period or at other times when gastric contents are nonacidic. The relation between weakly acid reflux and symptoms of GERD requires clarification.

Measurement of other parameters such as SI or SAP may be of additional value to prove symptom association with reflux, especially when combined with MII .

Whether combined esophageal pH and impedance monitoring will provide useful measurements that vary directly with disease severity, prognosis, and response to therapy in pediatric patients has yet to be determined.

NON-ACID GASTROESOPHAGEAL REFLUX IN CHILDREN WITH RESPIRATORY SYMPTOMS EVALUATED WITH THE 24 HOUR MULTICHANNEL INTRALUMINAL IMPEDANCE-pH PROBE

Judith Cohen, Marina Orsi, Gabriela Donato, Laureana Olleta, Daniel D'Agostino. *Pediatric Gastroenterology, Hospital Italiano, Buenos Aires, Argentina.*

Background: The ability of the 24 hr Multichannel Intraluminal Impedance-pH to study the number and duration of non acid/acid episodes may help us understand if the variety of clinical presentations are because there is a different behaviour in children with silent gastroesophageal reflux.

Aim: To evaluate with the 24hour Multichannel Intraluminal Impedance-ph probe(MII-pH) the presence of acid or non acid episodes in children with respiratory symptoms and with the classic digestive presentation at different age.

Methods: Since January 2005 to December 2006, a prospective study was conducted in 198 children. Patients were divided

according age in GI <2 yr; GII >2 yr and due to symptoms in Respiratory (R) or Digestive (D). The evaluation was performed during one day with a Sleuth Monitoring Recorder using catheter with 7 impedance sensors and one pH probe at the distal end.

Results: 198 children were evaluated (male 103, female 95); mean age 2.9 years SD ± 3.5, range 0.06–17, median 1.91. The number of NA GER by impedance was significantly increased in GI to GII ($P < 0.001$). No difference was found in the number of acid events with age and clinic presentation. There is statistical difference in Non acid reflux between younger with elder children and in the total number of episodes with MII in the D to R group. Instead there is no statistical difference in the acid behavior between both groups.

Conclusions: A more non-acid pattern of gastroesophageal reflux was seen with the MII-pH in respiratory patients particularly in the smaller ones with no difference in the number of acid events in either group.

Acid/Non-acid Episodes by MII in Digestive and Respiratory Patients at Different Ages

Age	Digestive				Respiratory			
	Acid, N	Med N	Non-Acid, N	Med N	Acid, N	Med N	Non-Acid, N	Med N
< 1.91 years	49	26	49	19	31	25	31	18
> 1.91 years	35	23	35	12	83	18	83	10
Mann-Whitney (P)	0.579		<0.001		0.404		0.002	

EVALUATION OF GASTROESOPHAGEAL REFLUX AND TREATMENT RESPONSE WITH THE 24 HOUR MULTICHANNEL INTRALUMINAL-pH PROBE IN CHILDREN WITH ASTHMA

Gabriela Donato¹, Marina Orsi¹, Judith Cohen Sabban¹, Alejandro Tepper², Viviana Rodriguez², Daniel D Agostino¹. ¹*Pediatric Gastroenterology Unit, Hospital Italiano, Buenos Aires, Argentina;* ²*Respiratory Unit, Children's Hospital "Ricardo Gutierrez", Buenos Aires.*

Background: Children with asthma may have undiagnosed gastroesophageal reflux. The Multichannel Intraluminal Impedance-pH Probe (MII-pH) is a good method to establish correct diagnosis and evaluate response to treatment.

Abstract 161 Table

	Score pH	N acid events	N non-acid events	Symptom index
	X (range)	X (SD)	X (SD)	Cough
Diagnosis (n: 18)	32,6 (2,6–105)	35,11 (19,49)	16,22 (18,24)	38,9 (0–83,3)
PPI (n:15)	4,8 (1–14,1)	21,62 (26)	29,73 (19,88)	30,69 (0–73,57)
Double dose PPI (n: 4)	5,7 (2,9–9)	18,75 (13,88)	50,5 (43,2)	36,6 (0–93,33)

Aim: To study with the MII-pH the presence of acid (A)/non acid (NA) GER in group of severe asthmatic children and monitor response to proton pump inhibitors (PPI).

Material and Methods: Since May 2005 to April 2007, 44 children (6–14 yr) with persistent asthma (inadequate symptom response to at least 4 months treatment with fluticasone) were evaluated. The MII-pH was performed one day. If the study was abnormal children were given PPI at dose 1,2mg/kg/d b.i.d. maximum dose of 40 mg/d. After 2 months on PPI treatment, a second MII-pH was done and if this one was still pathologic the medication was increased to double dose with a maximum of 60mg/day and after other 8 weeks the third monitoring was repeated. Functional tests were performed at diagnosis and after GER was controlled.

Results: 18/44 (40%) GER in asthmatic children. On PPI the pH score improved, the number of A episodes decreased but NA events increased. Although no change was seen in pulmonary function, score according to number of days without asthma, nocturnal symptoms and the need of beta2 or steroids showed definite improvement.

Conclusions: GER was observed in 40% children with severe asthma. Most patients presented clinical improvement on conventional or double dose of PPI treatment. They reduced the number of days without symptoms and the requirements of asthma medication although no difference in FEV function was seen. Those with persistent or increased NA reflux with no response after increasing PPI need another therapeutic approach.

Evaluation of gastroesophageal reflux and treatment response with the 24 hour Multichannel Intraluminal-pH probe in children with asthma



Donato G; Orsi M; Cohen J, Teper A, Rodriguez V, DAgostino D.

Pediatric Gastroenterology Unit Hospital Italiano; Respiratory Unit Children's Hospital "Ricardo Gutierrez" Buenos Aires

Children with asthma may have undiagnosed gastroesophageal (GER) reflux that may be "silent". The 24 hour Multichannel Intraluminal Impedance-ph monitoring is a good method to establish a correct diagnosis and to evaluate response to treatment .

Aim :

To study with the 24 hour IMM-pH monitoring the presence of acid / non acid GER in a group of moderate to severe asthmatic children and monitor response to proton pump inhibitors (PPI)

Material - Methods:

Since May 2005 to April 2007, 44 children :

6 to 14 years of age (mean 9.4 yrs) from the Respiratory Unit at the Children's Hospital "Ricardo Gutierrez" with severe / persistent asthma (inadequate symptom response to at least of 4 months treatment with fluticasone and with long action beta 2) were evaluated..

The 24 hr IMM-pH monitoring was performed one day with a Sandhill Sleuth Monitoring Recorder with 7 impedance sensors and one pH probe.

If the study was abnormal children were given omeprazole (PPI) at a dose 1,2 mg / kg /d bid maximum dose of 40 mg /day .

After 2 months on PPI treatment , a second 24 hr IMM ph monitoring was done and if this one was still pathologic the medication was increased to a double dose with a maximum of 60 mg / day and after other 8 weeks the third monitoring was repeated . Functional tests were performed at diagnosis and after GER was effectively controlled

Results: 18 / 44 (40.1%) : GER in asthmatic children

	score pH	N° Acid Events	N° Non Acid Events	Symptom Index Cough
	X (range)	X ;SD	X ;SD	
Diagnosis N:18	32.6(2.6-105)	35.1;19.49	16.2;18	38.9
PPI N:15	4.8 (1-14)	21.62; 26	29.73;19.8	30.69
DoublePPI N: 4	5.7 (2.9-9)	18.75; 13.88	50.5;43.2	36.6

Results:



- On PPI the pH score improved, the number of acid episodes decreased but the non acid events increased
- Although no change was seen in pulmonary function, the clinical score according to: n° of days without asthma, nocturnal symptoms and the need of beta2 or oral steroids showed definite improvement

Conclusions:



- Gastroesophageal reflux was observed in 40.1% children with moderate to severe asthma.
- Most patients presented clinical improvement on conventional or double dose of PPI treatment.
- They reduced the number of days without symptoms and the requirements of asthma medication although no difference in FEV function was seen.
- Those patients with persistent or increased non acid reflux with no response after increasing the PPI dose may need another therapeutic approach

Objetivo en el manejo de la ERGE en niños según las Guías NASPGHAN*

“mejorar o resolver los síntomas presentes y las complicaciones del reflujo gastroesofágico, con intervenciones que tengan pocos o ningún efecto adverso y con reanudación funcional.”

* North American Society for Pediatric Gastroenterology, Hepatology and Nutrition

Rudolph CD et al. J Pediatr Gastroenterol Nutr 2001;32 Suppl 2:S1–31

TRATAMIENTO

Lactante Vomitador.

- Espesamiento de la alimentación: casera o en base a fórmulas “AR”.
- Cuidar el volumen en cada toma.
- Posición prona postprandial a 30°.

Si no responde a éstos cambios (2 a 3 semanas) es posible intentar una serie de tratamiento y valorar la respuesta al mismo.

El iceberg del RGE

Alternativas
Terapéuticas

Tratamiento
quirúrgico

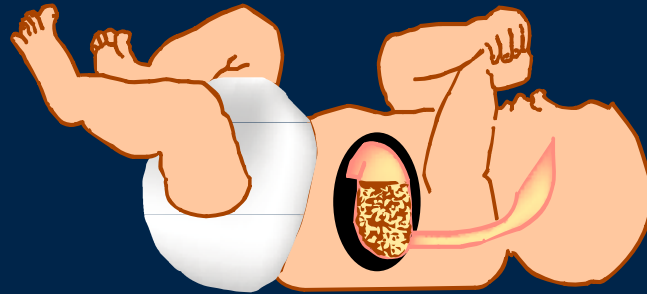


La mayoría de los lactantes y niños mejoran con cambio de hábitos y dieta. Los más afectados requieren medicación y algunos pocos deberían ser intervenidos quirúrgicamente

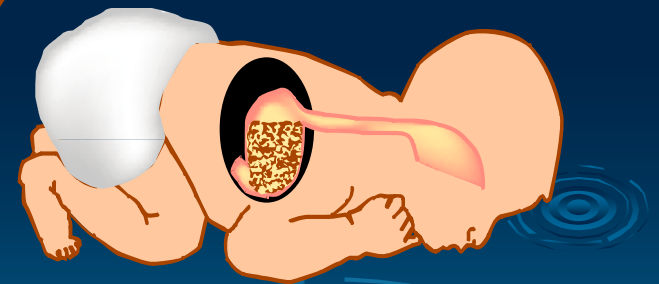
Posición Prona y RGE



Sentado



Supino



Prono



The effect of thickened-feed interventions on gastroesophageal reflux in infants: systematic review and meta-analysis of randomized, controlled trials.

Horvath A et al. Pediatrics. 2008;122:e1268

- 14 estudios aleatorios, fórmula espesada vs. rutina:
- Aumento significativo del % de bbs sin regurgitación
- Disminución del número diario de episodios de regurgitación y/o vómitos
- Mayor aumento diario de peso.
- Sin efectos indeseados

Effects of thickened feeding on gastroesophageal reflux in infants: a placebo-controlled crossover study using intraluminal impedance.

Wenzl TG et al. Pediatrics. 2003;111:e355

- Thickened feeding has a significant effect on the reduction of regurgitation frequency and amount in otherwise healthy infants.
- This effect is caused by a reduction in the number of nonacid (pH >4) GER episodes, but also because of a
- decrease of mean reflux height reached in the esophagus.

Objetivo en el manejo de la ERGE en niños según las Guías NASPGHAN*

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Tratamiento Médico.

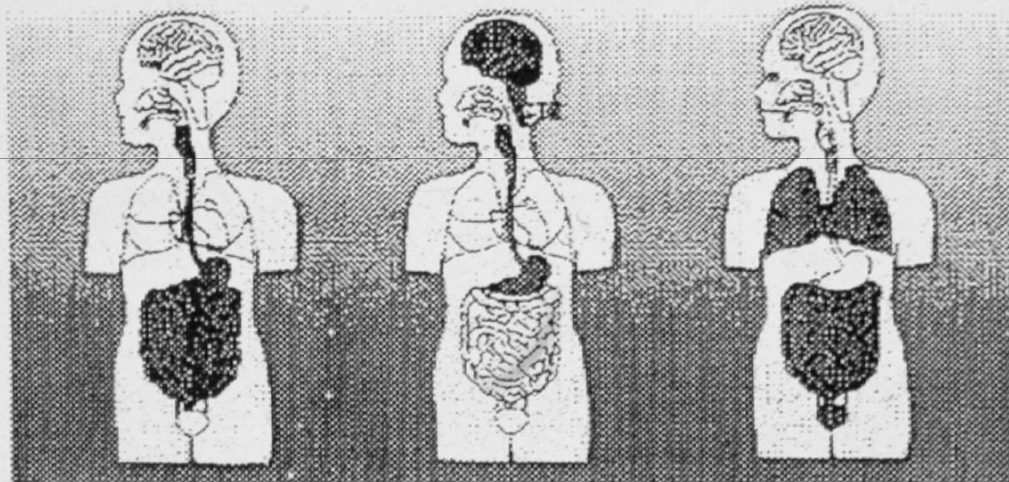
- Proquinéticos :
- Metoclopramida: pasa la barrera hematoencefálica, la dosis terapéutica y la dosis tóxica son muy cercanas ,lo que facilita las intoxicaciones.
- Cisapride : 0.1mg-0.2mg / kg /dosis cada 6 hs. a 8 hs , con una dosis máxima de 0.8mg/ kg / día. Por el riesgo de prolongación del QT- QTc se recomienda realizar ECG previo y suspenderlo ante asociaciones medicamentosas o metabólicas de riesgo.
- Domperidona :0,3 mg / kg / día en 3 dosis diarias. Mismo efecto sobre el QT-QTc y no está aceptado por FDA y existen pocos estudios en Pediatría.
- Baclofeno : ????????

Domperidona

- **4 estudios aleatorios-controlados**
- Clara 1979 : 0.3 mg/Kg/dosis y luego duplicado. Efectos solo en > 5 años
- De Loore 1979. Alguna mejoría pero diferencias en edades: Dom (9 m), Metoclopramida y Placebo (6 m)
-
- Bines (1992 0.6) Diferencias de edades. Niños mayores (mínimo 5 m). Mal estudio
-
- Carroccio 1994 0.3): ninguna mejoría
- **Prolongación el QTc**

Mecanismos y sitio de acción de los proquinéticos

Mechanisms and Sites of Action of Prokinetic Agents



Cisapride

Serotonergic Agonist

Metoclopramide

Dopamine
Antagonist

Bethanechol

Cholinergic Agonist

Las guías NASPGHAN reconocen a los IBP como el tratamiento más efectivo en niños con ERGE

“los IBP, son la terapia medicamentosa supresora del ácido más efectiva,

superior a H₂RAs en el rescate de los síntomas y en la curación de la esofagitis[†]”

†No todos los IBP están actualmente aprobados para ser usados en Pediatría

La clave es el control efectivo del ácido

- La frecuencia de los síntomas por reflujo está directamente relacionado al tiempo en que el pH esófagico es <4 en un período de 24 hs.

Joelsson B, Johnsson F. Gut 1989;30:1523–5

- La cicatrización de la esofagitis por reflujo está relacionada al tiempo durante el cual el pH intragástrico se mantiene > 4 .

Bell NJ et al. Digestion 1992;51 Suppl 1:50–67

El control efectivo del pH intragástrico y por lo tanto intraesofágico, es necesario para la cicatrización de la esofagitis por reflujo y resolver síntomas

Tratamiento Médico.

ANTIÁCIDOS: El objetivo es disminuir el pH gástrico y así cambiar la calidad del material refluido, mejorar el clearance y favorecer el aumento de la Presión del EEI.

- **Ranitidina**: (jarabe) :5 - 10 mg / kg / día oral cada 12 hs.
- **Omeprazol** : (polvo p/diluir):0,7 - 2,4 mg/ kg/día c / 12 hs.
- **Esomeprazol**:(polvo para diluir): 0,6 - 2mg/kg/d 1 a 2 t /d
- **Lanzoprazol** :(granulado p/ diluir) :0,5 - 1,5mg /kg/ d 1 t/d

Uso de Inhibidores de Bomba de protones en niños

Journal of Pediatric Gastroenterology and Nutrition

49:498–547 # 2009 by European Society for Pediatric Gastroenterology, Hepatology, and Nutrition and North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition

- PPIs currently approved for use in children in
- North America are omeprazole, lansoprazole, and esomeprazole.
- At this moment, in Europe, only omeprazole and esomeprazole are approved.
- No PPI has been approved for use in infants younger than 1 year of age.
- Most studies of PPIs in children are open-label and uncontrolled.
- In children, as in adults, PPIs are highly efficacious for the treatment of symptoms due to GERD and the healing of erosive disease.
- PPIs have greater efficacy than H2RAs.
- Children 1 to 10 years of age appear to require a higher dose per kilogram for some PPIs than adolescents and adults.
- Young children require higher per kilogram doses to attain the same acid blocking effect or area under the curve (304–306). This may not apply to all of the PPIs(307).
- There are few pharmacokinetic data for PPIs in infants, but studies indicate that infants younger than 6 months may have a lower per-kilogram dose requirement than older children and adolescents (308,309).

Uso de Inhibidores de Bomba de protones en niños

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PPIs inhibit acid secretion by blocking Na^+/K^+ -ATPase, the final common pathway of parietal cell acid secretion, often called the proton pump.

Studies in adults have shown that **PPIs produce higher and faster healing rates for erosive esophagitis than H2RAs**, which in turn are better than placebo (122).

The superior efficacy of PPIs is largely because of their ability to maintain intragastric pH at or above 4 for longer periods **and to inhibit meal-induced acid secretion**, a characteristic not shared by H2RAs. In contrast with H2RAs, the effect of PPIs does not diminish with chronic use.

The potent suppression of acid secretion by PPIs also results **in decrease of 24-hour intragastric volumes, thereby facilitating gastric emptying and decreasing volume reflux.**

- Despite their efficacy in the management of acid related disorders, PPIs have limitations as a consequence of their pharmacologic characteristics.
- They must be taken once per day before breakfast **and must be protected from gastric acid by enteric coatings.** **Bioavailability of PPIs is decreased if they are not taken before meals.**
- However, taking the medications before meals effectively delays absorption and onset of their antisecretory effect. Most available PPIs are therefore regarded as “delayed release” preparations.
- **Achievement of maximal acid suppressant effect can take up to 4 days.**

Tratamiento de Prueba con IBP ???????

An uncontrolled trial of esomeprazole therapy in **adolescents** with heartburn, epigastric pain, and acid regurgitation showed **complete resolution of symptoms in 30% to 43% by 1 week, but the responders increased to 65% following 8 weeks of treatment**.

Another uncontrolled treatment trial of **pantoprazole in children ages 5 to 11 years** reported greater symptom improvement at 1 week with one 40-mg dose compared with one 10-mg or 20-mg dose (64). After 8 weeks all of the treatment groups improved.

Similar improvement in symptoms over time has been observed in adults with erosive esophagitis (198,199).

One study of infants with symptoms suggestive of GERD who were treated empirically with a PPI showed no efficacy over placebo

Guías NASPGHAN- ESPGHAN 2009 (JPGN oct 2009)

The 2-week “PPI test” lacks adequate specificity and sensitivity for use in clinical practice.

In an older child or adolescent with symptoms suggesting GERD, an empiric PPI trial is justified for up to 4 weeks.

Improvement following treatment does not confirm a diagnosis of GERD because symptoms may improve spontaneously or respond by a placebo effect.

There is no evidence to support an empiric trial of pharmacologic treatment in infants and young children as a diagnostic test of GERD.

Tratamiento Quirúrgico

RGE que **no responde a tratamiento médico** .

Riesgo de **complicaciones severas** ej : Estenosis péptica -
Esófago de Barrett.

Episodios con **riesgo de vida** para el paciente.

Persistencia de **esofagitis severa a pesar del tratamiento médico**.

En niños con daño neurológico que requieran una **gastrostomía** y demuestren ERGE al recuperar **buen estado nutricional** .


Cirugía Antireflujo.

- Operación de Nissen.
- Operación de Thal.
- Operación de Boix Ochoa.

Hoy en día se puede realizar en forma **convencional** o por **vía laparoscópica** inclusive ya existe una serie pediátrica publicada con técnica endoscópica.

Para establecer cual es el abordaje mas conveniente en cada caso, todavía falta tiempo , que permita comparar las diferentes series.

Las ventajas de cada técnica depende entre otras cosas del entrenamiento del equipo quirúrgico



***“ caminante no hay camino
se hace camino al andar “
A Machado .***



¡ Gracias , por su atención !