Esophageal motility in Infants with Congenital Diaphragmatic Hernia

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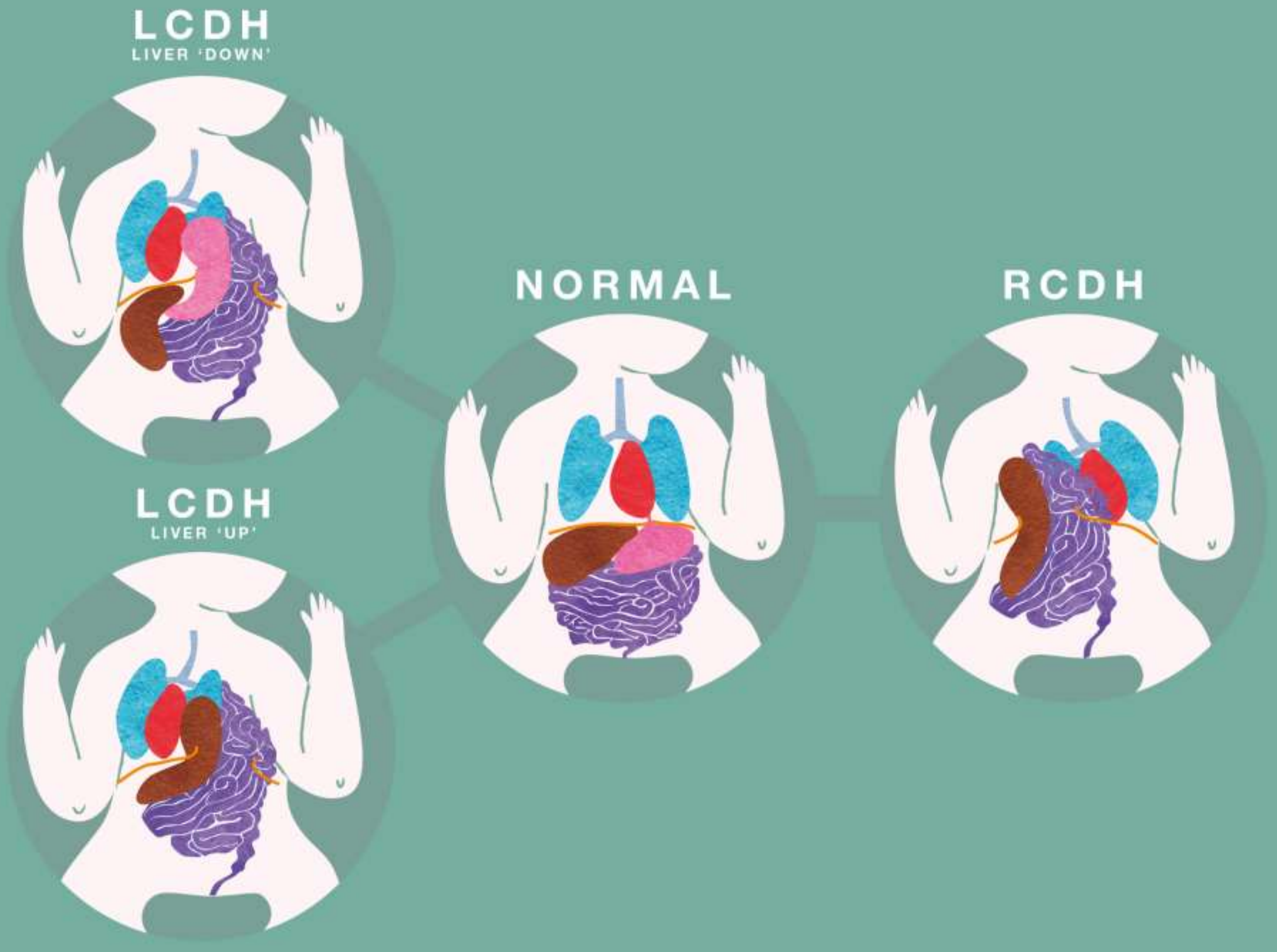
Congenital Diaphragmatic Hernia

1/2000-3000 live births

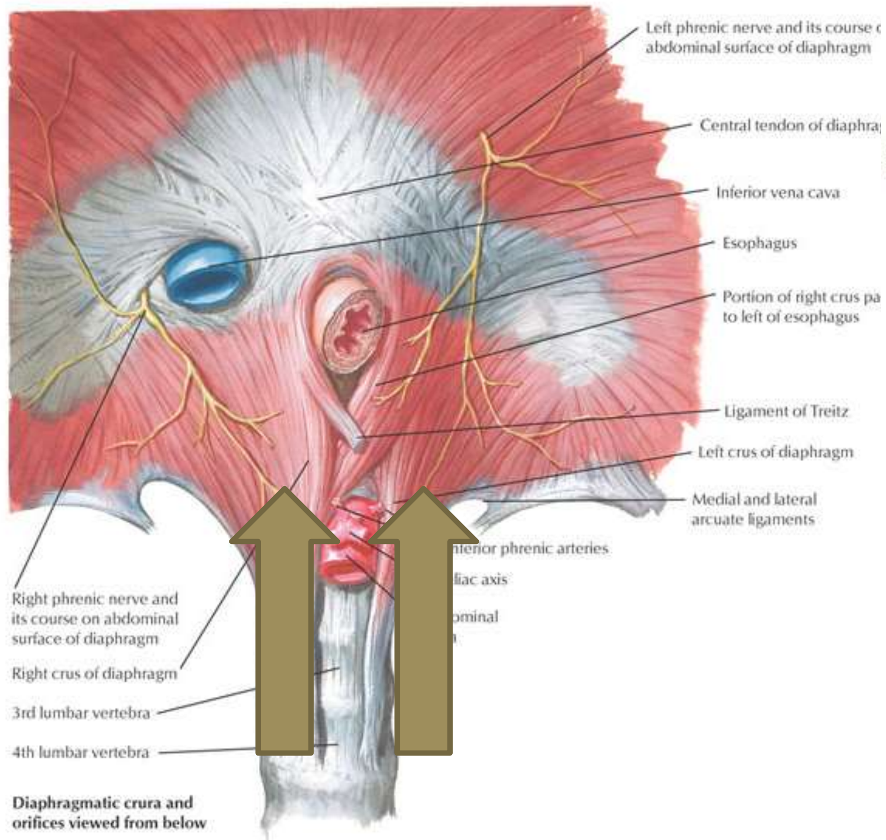
Defective formation of the diaphragm

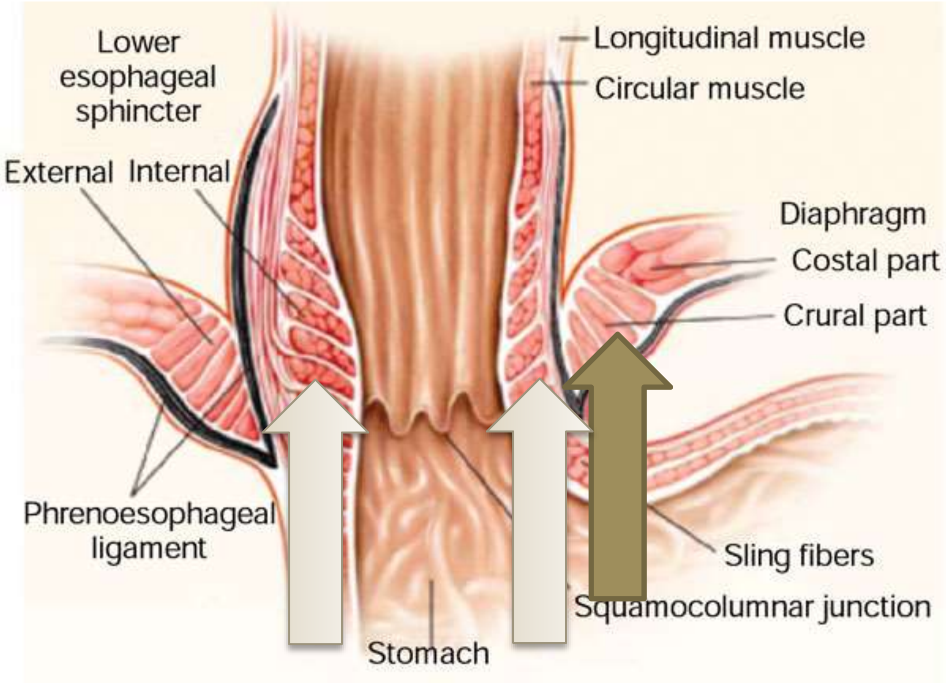
Isolated 40%

Slavotinek Eur J Medical Genetics 2014


LCDH
LIVER 'DOWN'
LCDH
LIVER 'UP'
NORMAL
RCDH

Esophago-gastric junction: Diaphragmatic crurae and LES





Lower esophageal sphincter Intrinsic sphinter = smooth muscle	Crural diaphragm Extrinsic sphincter = striated muscle

GI Motility online (May 2006)

Mortality and Morbidity

SUCCESS COMES WITH
A COST.

Long term morbidity

Respiratory problems

- oxygen need
- insuffiency
- infections
- pulmonary hypertension

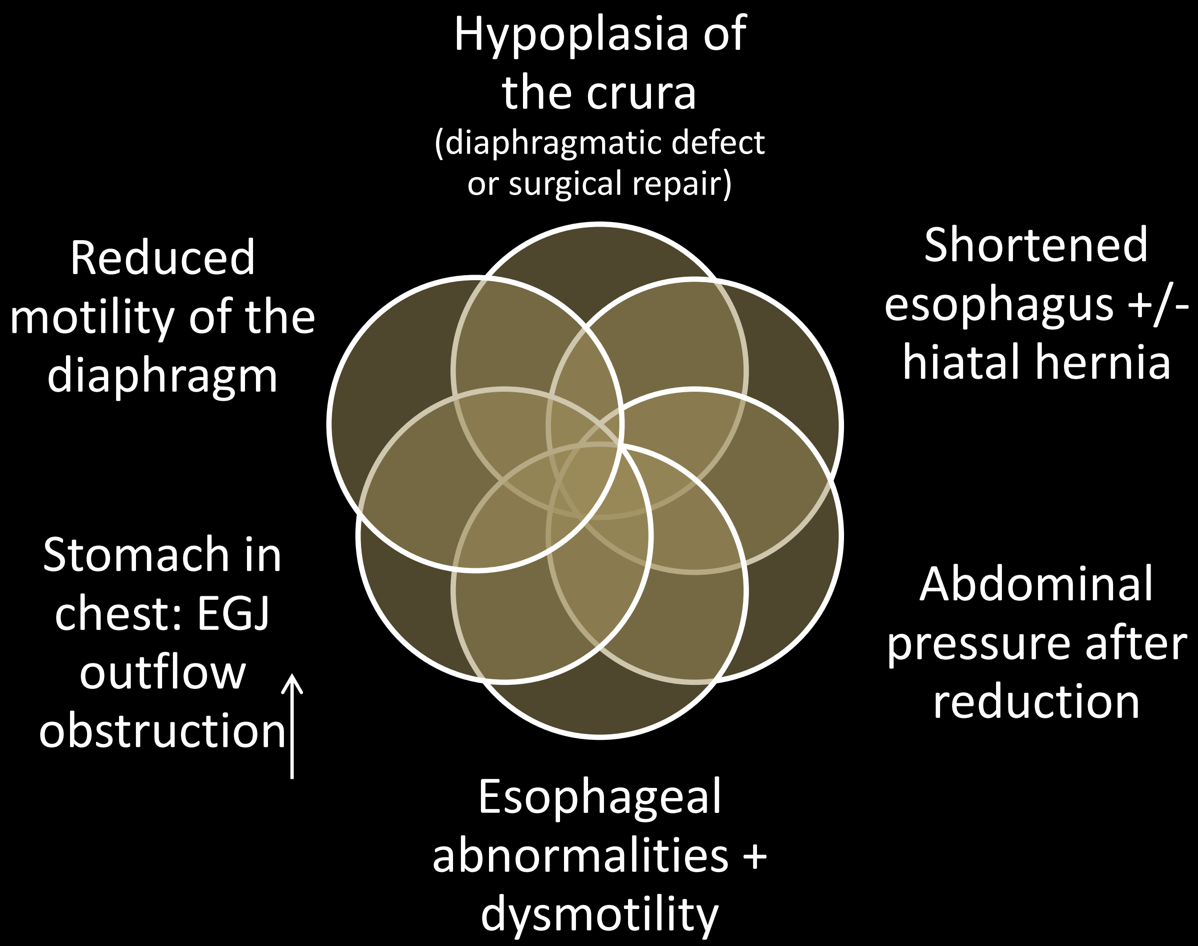
Survival ?

Gastro-intestinal problems

- GERD
- growth failure
- feeding difficulties
- tube feeding

Cortes J Pediatr Surg 2005
Muratore J Pediatr Surg 2001
Fasching Eur J Pediatr Surg 2000

Pathophysiology of motility disorders and GER



Stolar The American journal of surgery 1990
Fasching Eur J Pediatr Surg 2000
Schmittenbecker Z Kinderchir 1990
Nagaya J Pediatr Surg 1994
Sigalet J Pediatr Surg 1994
Stolar Semin Pediatr Surg 1996

GER evidence

pH impedance studies

- more GER in CDH + patch
- more “dysmotility” (bolus flow) in CDH + patch
- more “dysmotility” in distal esophagus: esophagitis?

? Outflow obstruction

Di Pace J Pediatr Surg 2011
Caruso Ped Surg Int 2013

Lacking evidence on esophageal motility

1 study with low resolution manometry (Arena Pediatr Int 2008)

Some degree of foregut dysmotility

No High Resolution Manometry studies on CDH


208

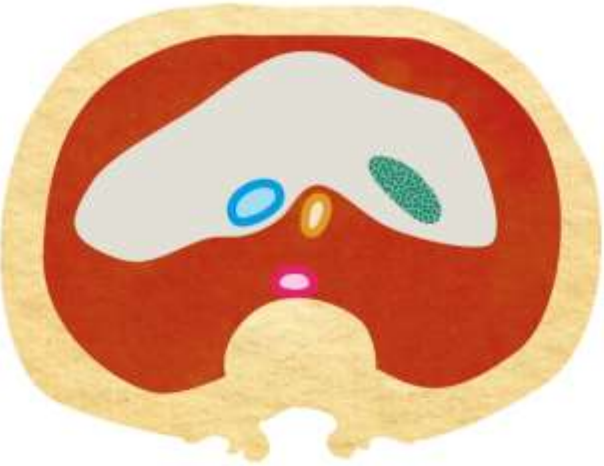

Aim to the study

- To characterize esophageal motility in isolated CDH

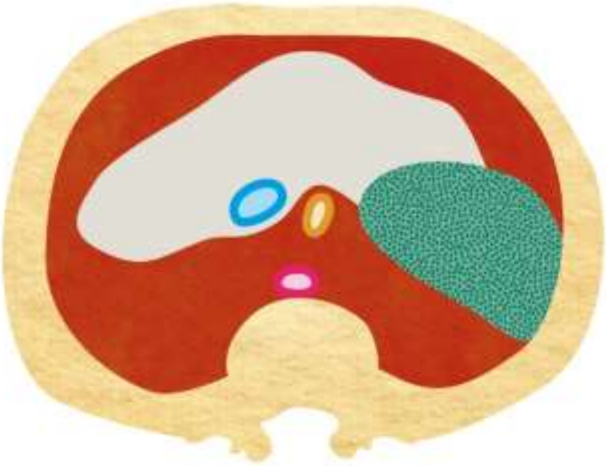
- To investigate EGJ function during neonatal period

Patients

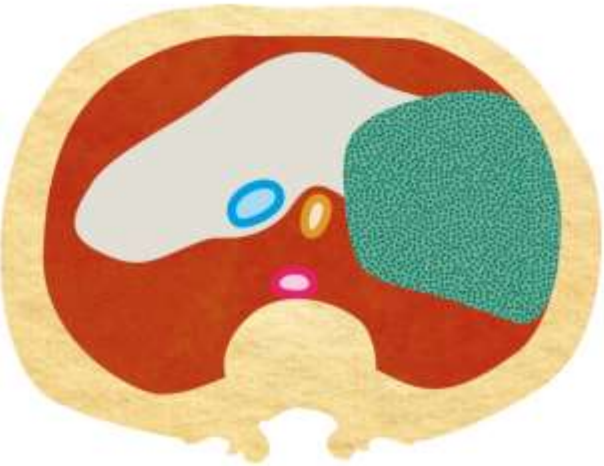
- 12 postoperative infants born with isolated CDH (9 male)
- Left-sided diaphragmatic defect 11/12
- FETO 4/11
- Patch repair 9/12



DEFECT A
0/1 PATCH REPAIR



DEFECT B
3/6 PATCH REPAIR



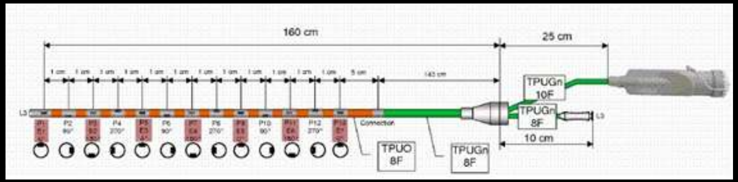
DEFECT C
5/5 PATCH REPAIR

DEFECT D

Methods

High Resolution solid state Manometry + Impedance

Transnasal placement of catheter in stomach



Catheters (Unisensor USA, Portsmouth, NH, USA) :

13 pressure, 6 impedance, 8Fr

36 pressure, 16 impedance, 10Fr

Data acquiring system Solar GI (MMS, The Netherlands)

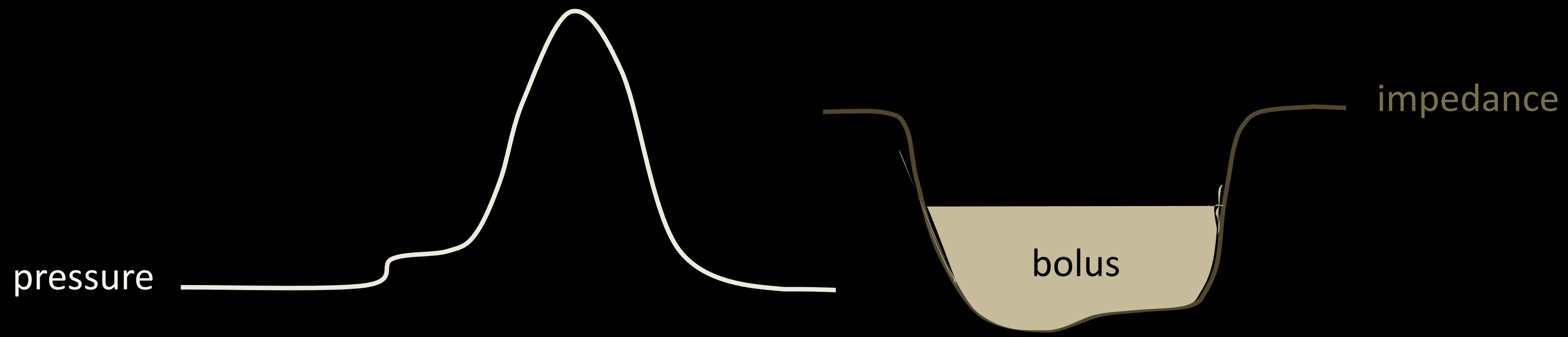
Regular feeding routine, in a semi-reclined position

Timing: neonatal, 6 months, 12 months

Pressure Flow Analysis

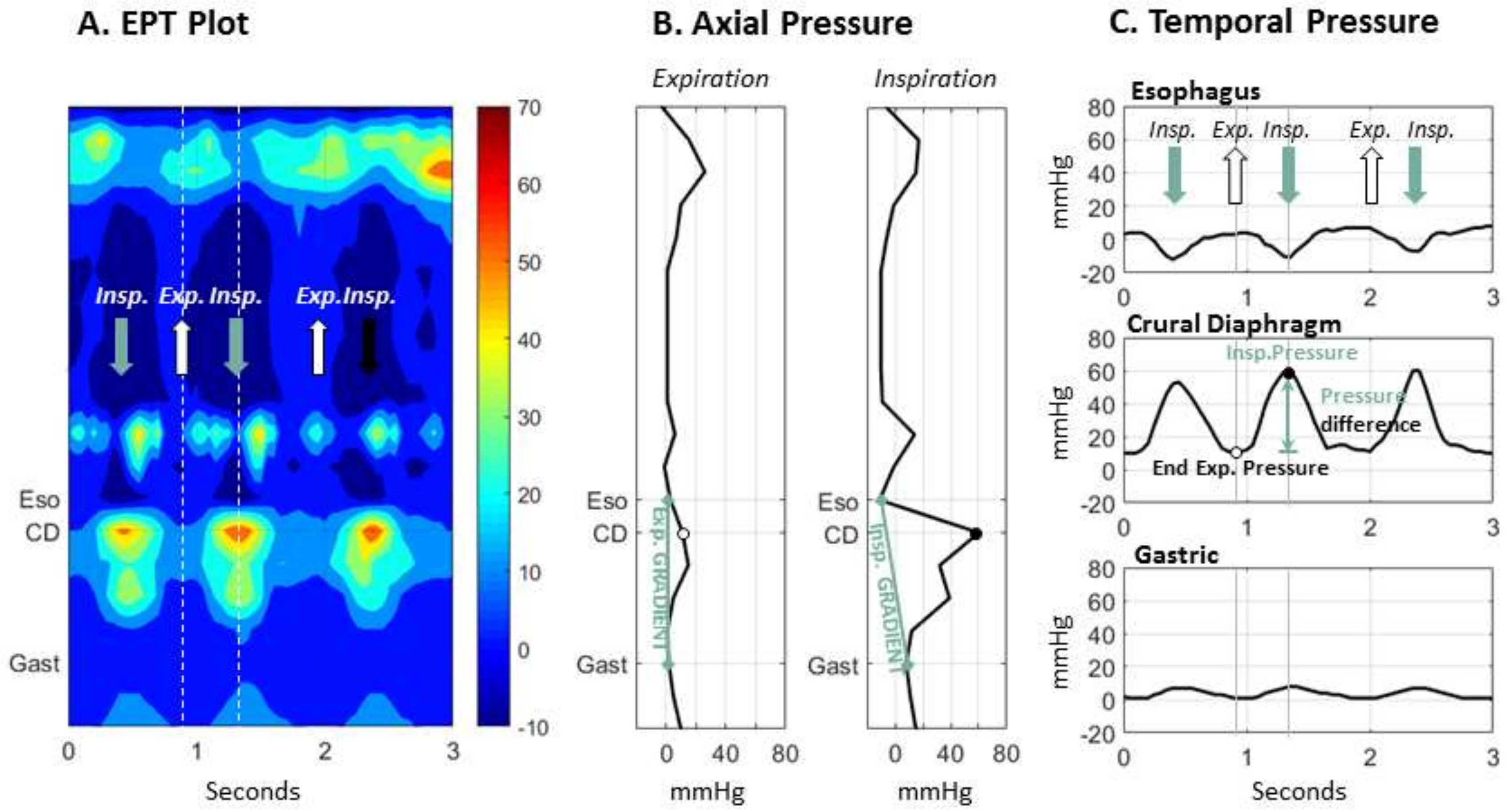
Automated Impedance Manometry (AIM)

- Combining High Resolution Manometry and Impedance measurements (HRMI)
- Integrated analysis of bolus flow and pressure with AIM software©
  - automatic analysis algorithm
  - objective
  - parameters on motility + bolus flow + interaction



using AIM*plot* software (T. Omari)

Evaluation of EGJ function:
Line pressure plots in esophagus, LES, stomach

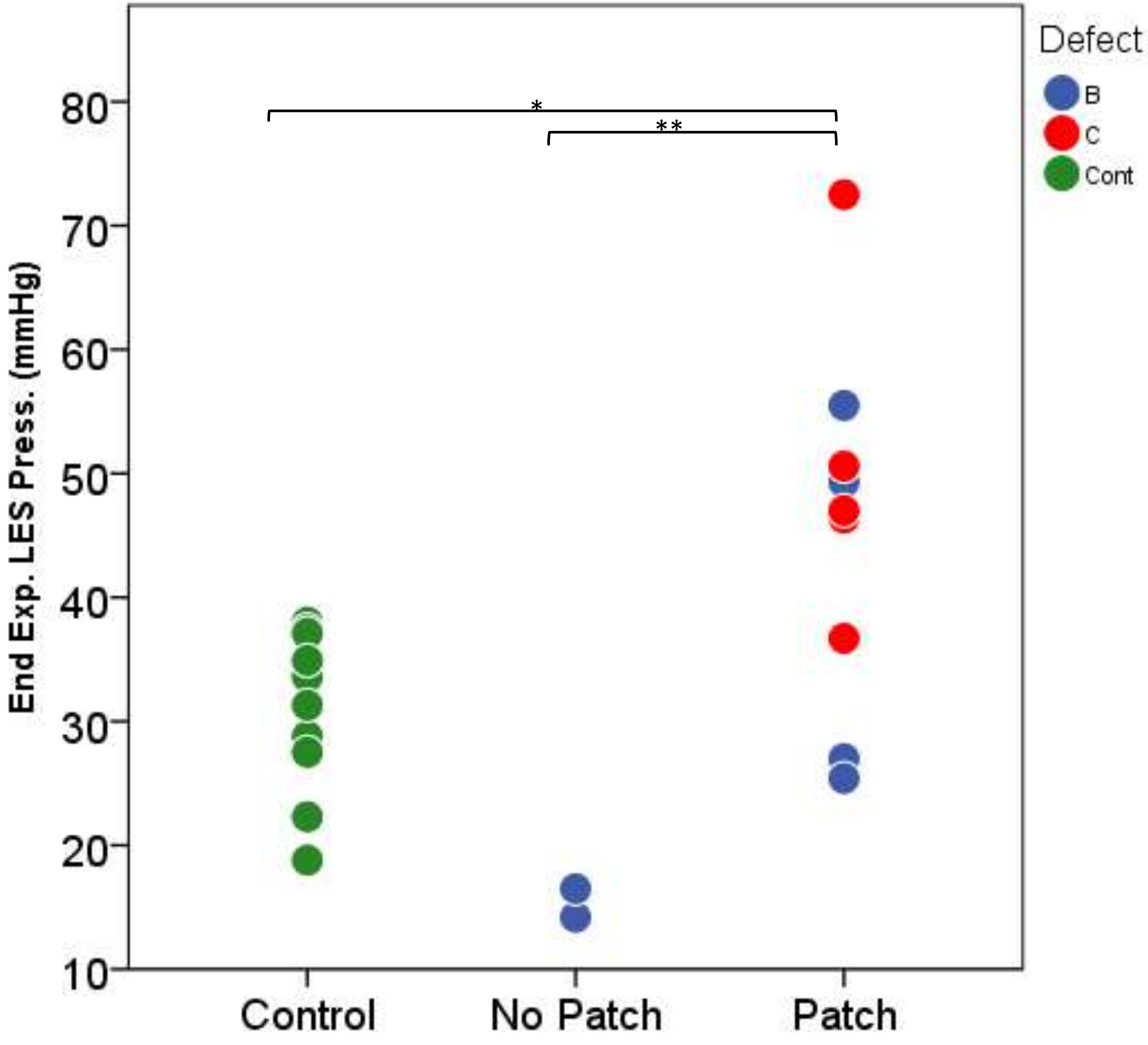


Pressure flow analysis

- Flow resistance at EGJ CDH > non-CDH
- Flow resistance at EGJ CDH with patch > CDH no patch

- Vigor of esophageal contractility and flow resistance did not change during first year

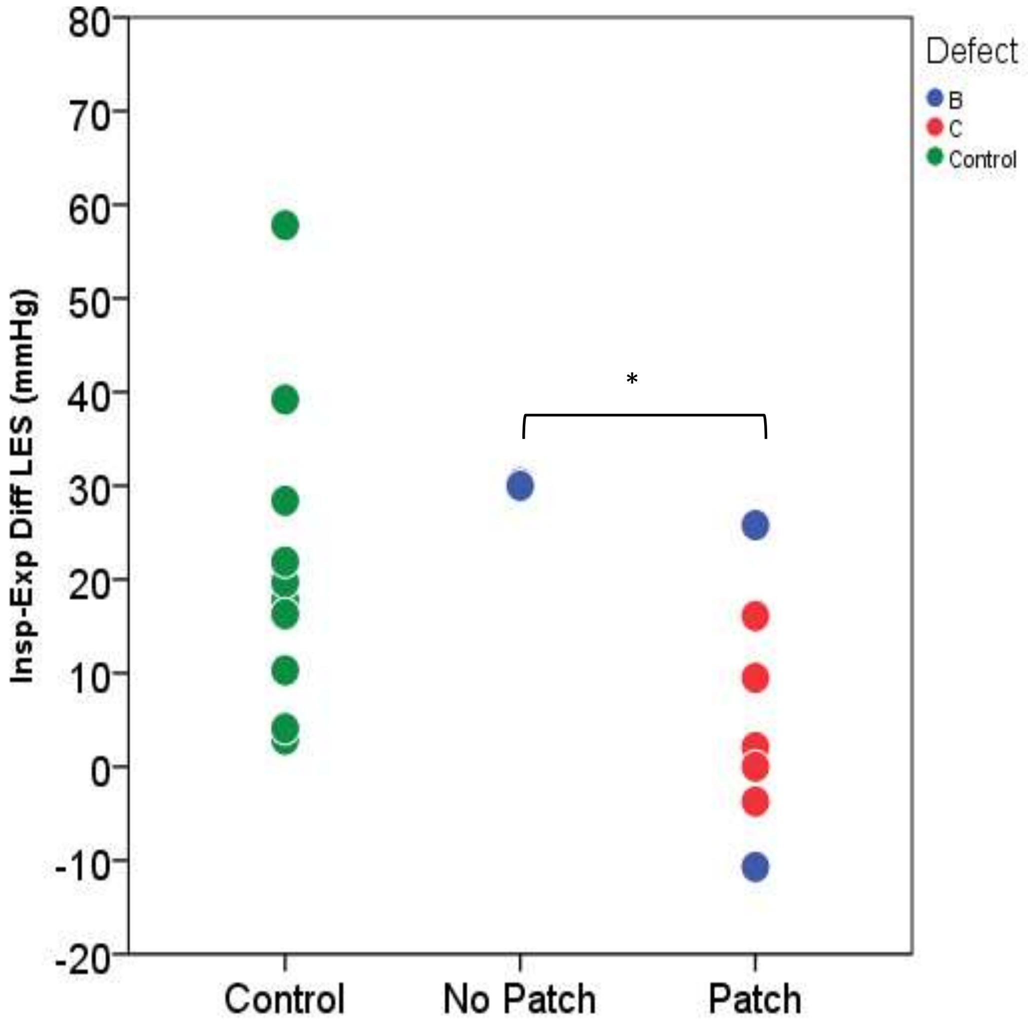
End-expiratory pressure at Lower Esophageal Sphincter



↑ barrier function in CDH with patch

* p=0,05 posthoc analysis Kruskal-Wallis test
** p<0,01 posthoc analysis Kruskal-Wallis test

Difference Inspiration-Expiration Pressure at LES



↓ crural activity of diaphragm in CDH with patch

* p<0,05 posthoc analysis Kruskal-Wallis test

Conclusion

- Pressure Flow Analysis demonstrates increased flow resistance in CDH patients, especially in those with a patch
- Neonatal EGJ barrier function is increased in patients with patch repair suggesting a protective role for GER
- Decreased crural activity in patients with patch repair (surgical technique)

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KU LEUVEN

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