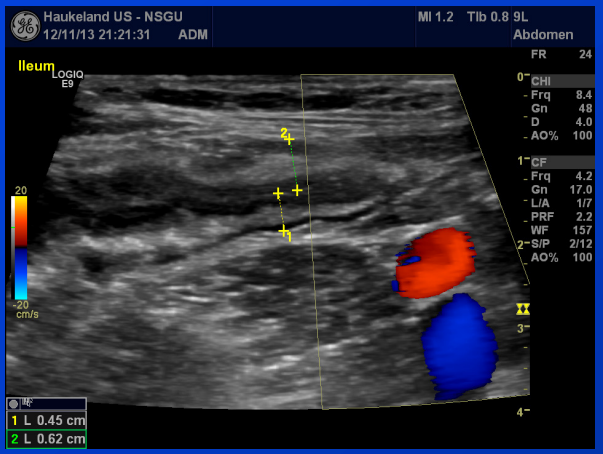
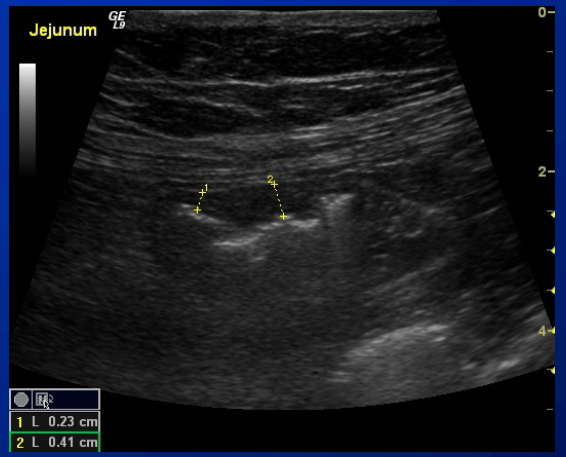
Nasjonalt Senter for
Gastroenterologisk Ultrasonografi

National Centre for Ultrasound in Gastroenterology
Haukeland University Hospital, Bergen, Norway

Ultralyd av GI-traktus (GIUS)



Odd Helge Gilja, MD, PhD
Professor
Department of Medicine
Haukeland University Hospital
Bergen, Norway



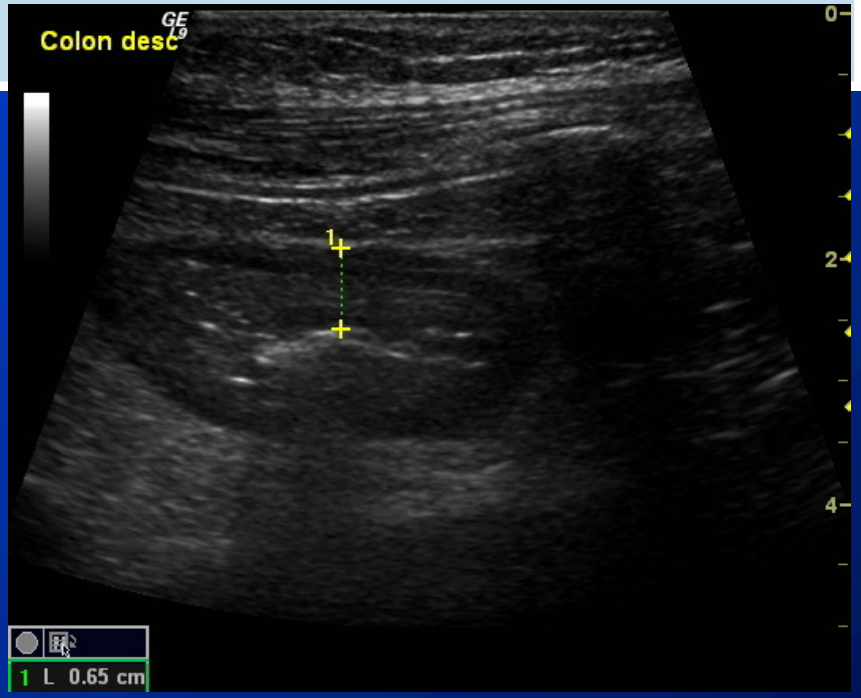
GIUS – EFSUMB guidelines on Gastro-Intestinal Ultrasound

- Task Force Group of over 20 experts from Europe
- Started at UEG Week October 2014
- 7 guideline/position papers are published / in progress:
  - 1. Methodology and examination technique (published EJU 2016)
  - 2. IBD (Published – EJU 2018)
  - 3. Perineal and transrectal US (Published- UIO - 2019)
  - 4. Acute appendicitis and diverticulitis (Published EJU 2019)
  - 5. Misch./ Coeliac / Upper GI (Published Med Ultrason -2019)
  - 6. Intestinal Emergencies (Published EJU 2020)
  - 7. Functional Disorders (Published UIO 2021)

New EFSUMB Guidelines on GIUS

Recommendations:

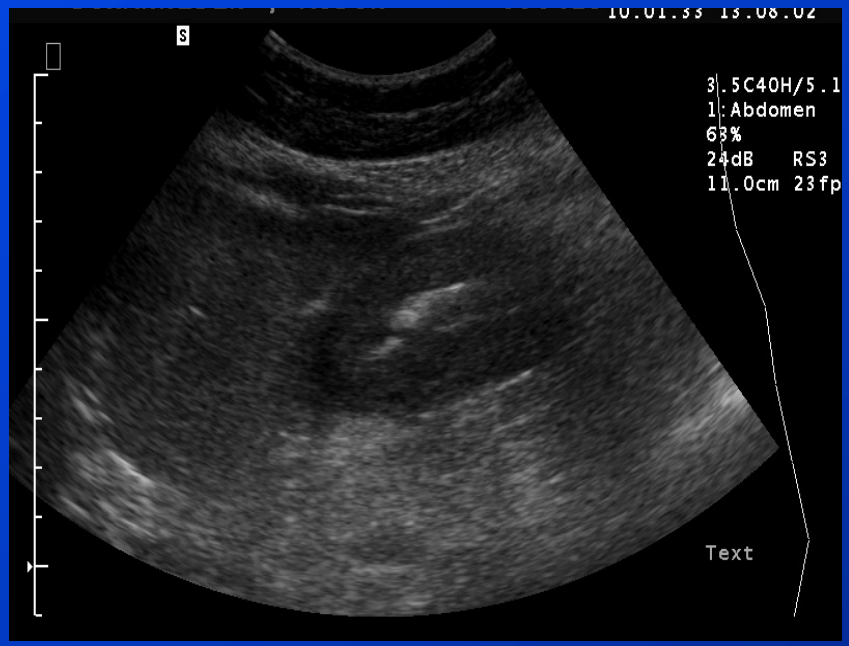
1. For a complete examination of the bowel both a low and high resolution probe are needed, LoE 5, GoR C, Strong consensus 13/13
2. A probe with a frequency above 5 MHz should be used when measuring wall thickness, LoE 4, GoR B, Strong consensus 13/13



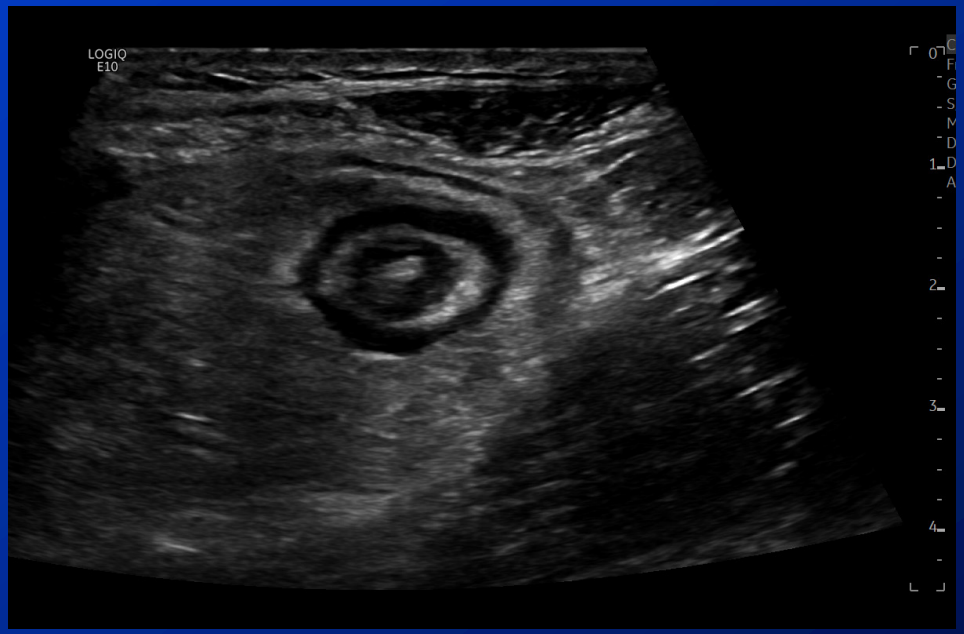
Be aware of red flags

Signs of severe pathology

Pseudo-Kidney Sign

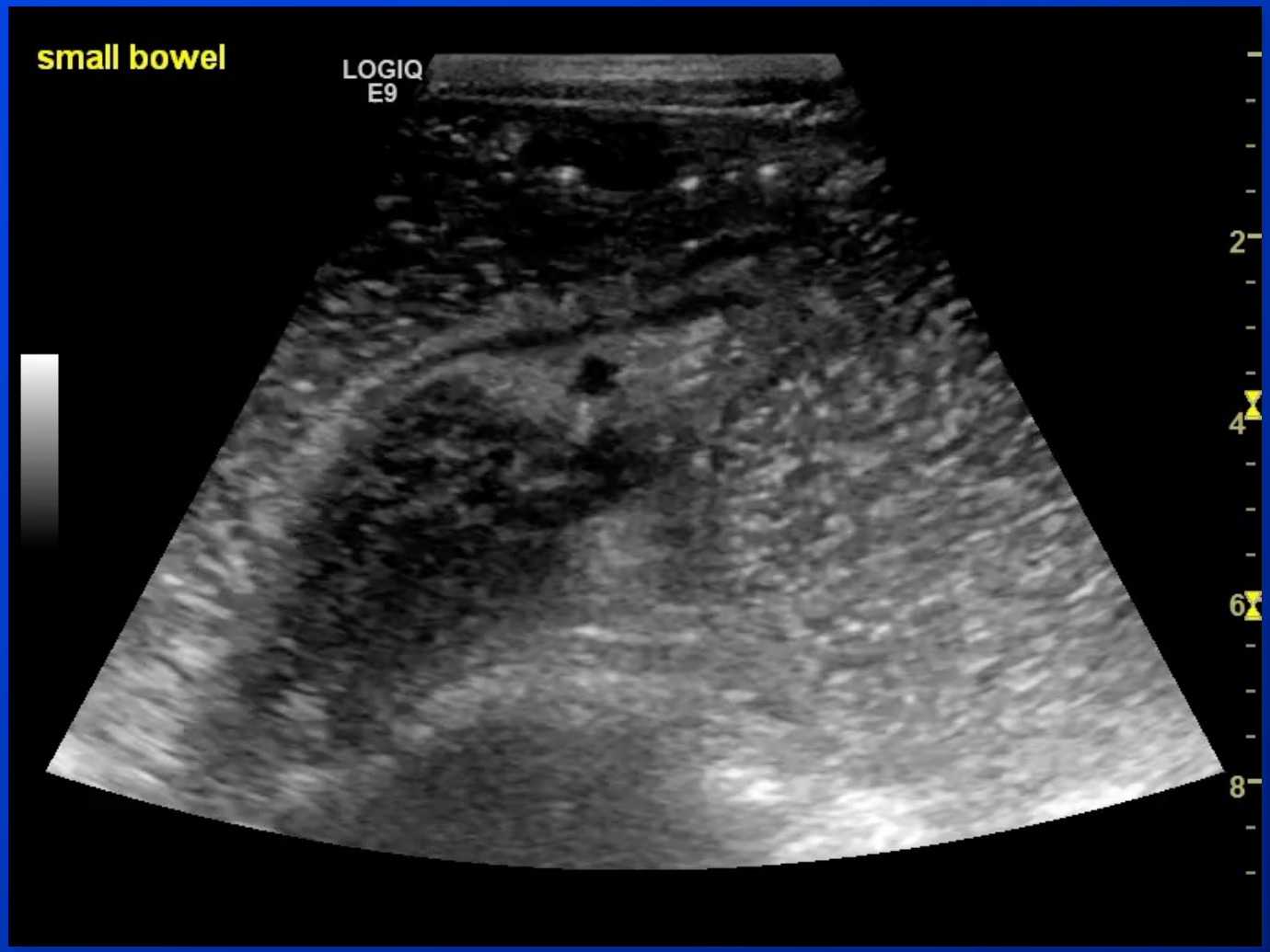


Target Lesion



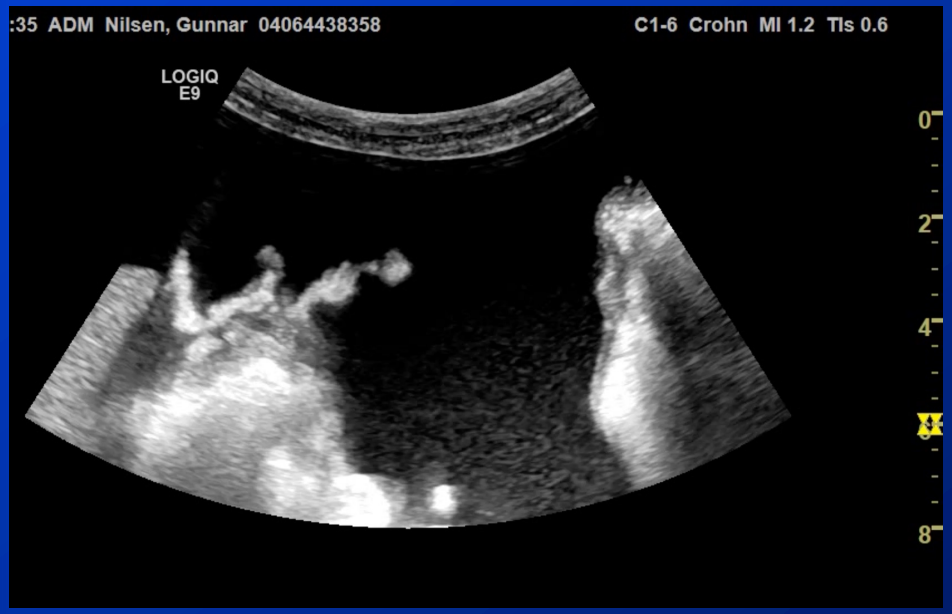
Red flag

Dilated (>2,5 cm) small intestine



Red flag

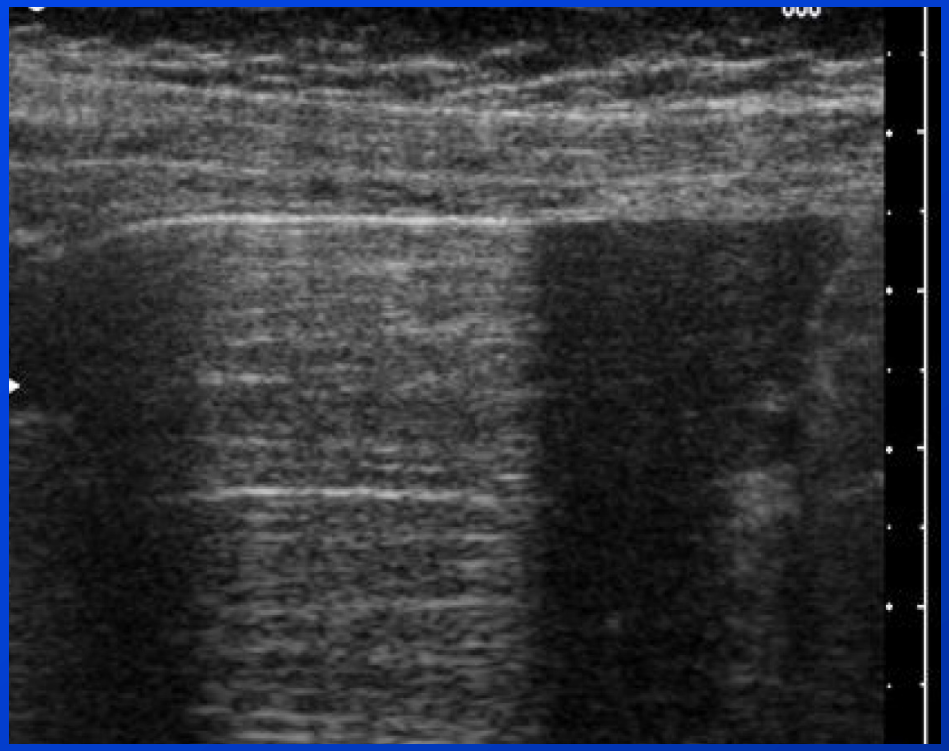
Free fluid



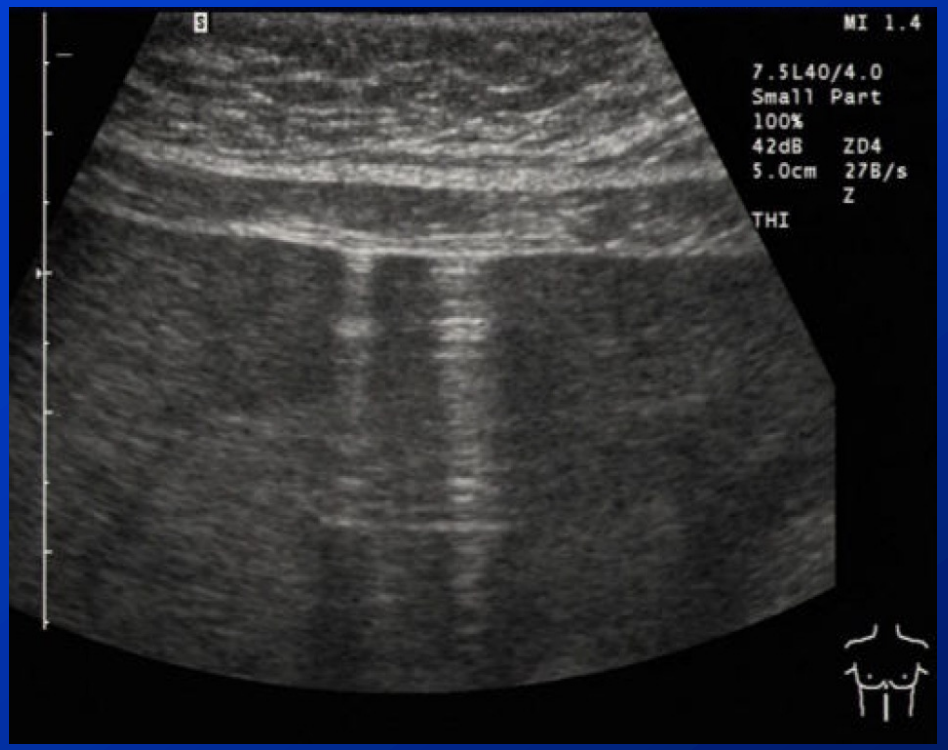
Morrison´s pouch

Red flag

Free gas



Reverberations (A-lines)



Comet tail articfact (B-lines)

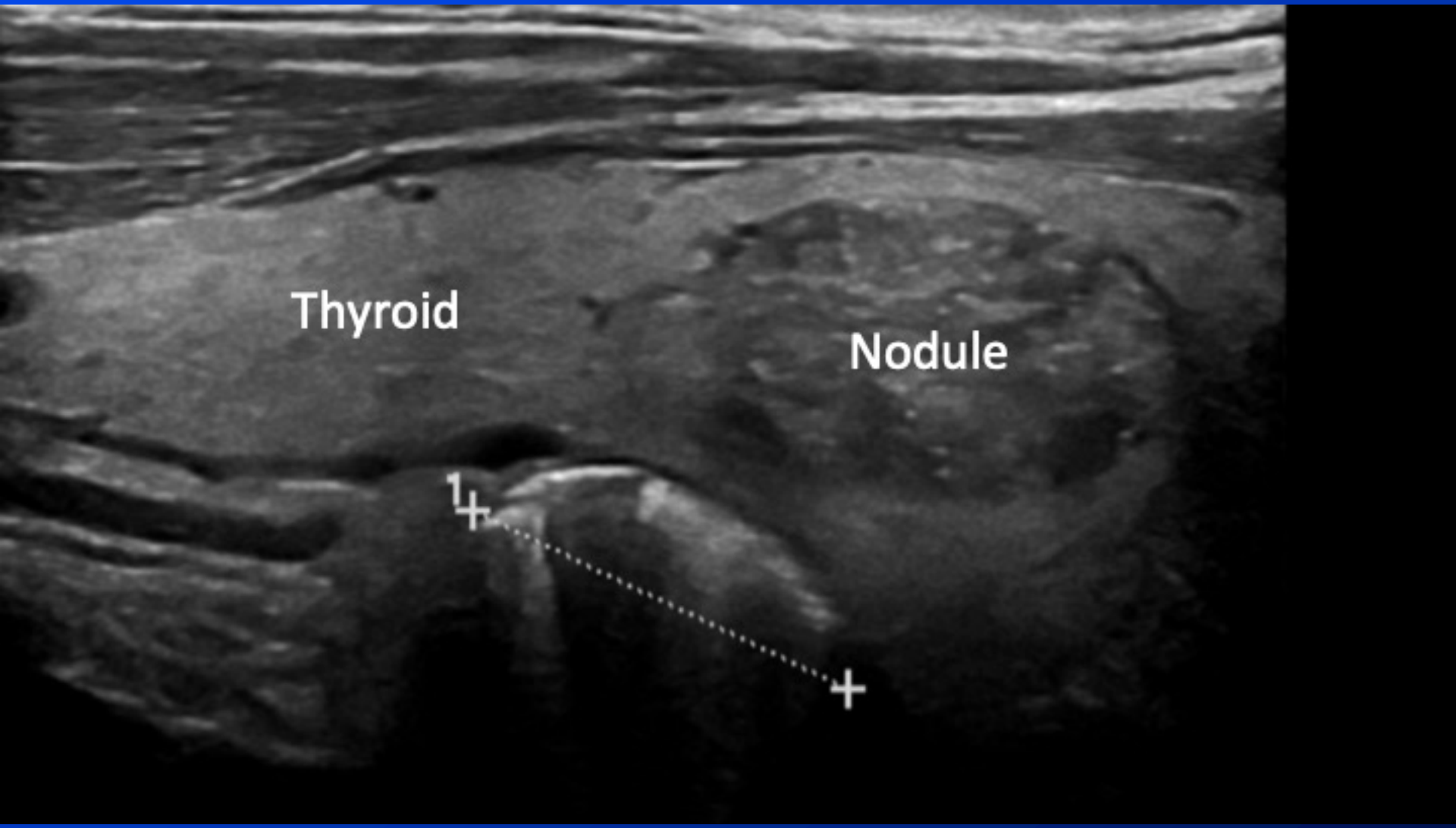
Ultrasound of the GI Tract
A journey from above

- Oesophagus
- Ventriculus
- Duodenum
- Jejunum
- Ileum
- Colon
- Rectum

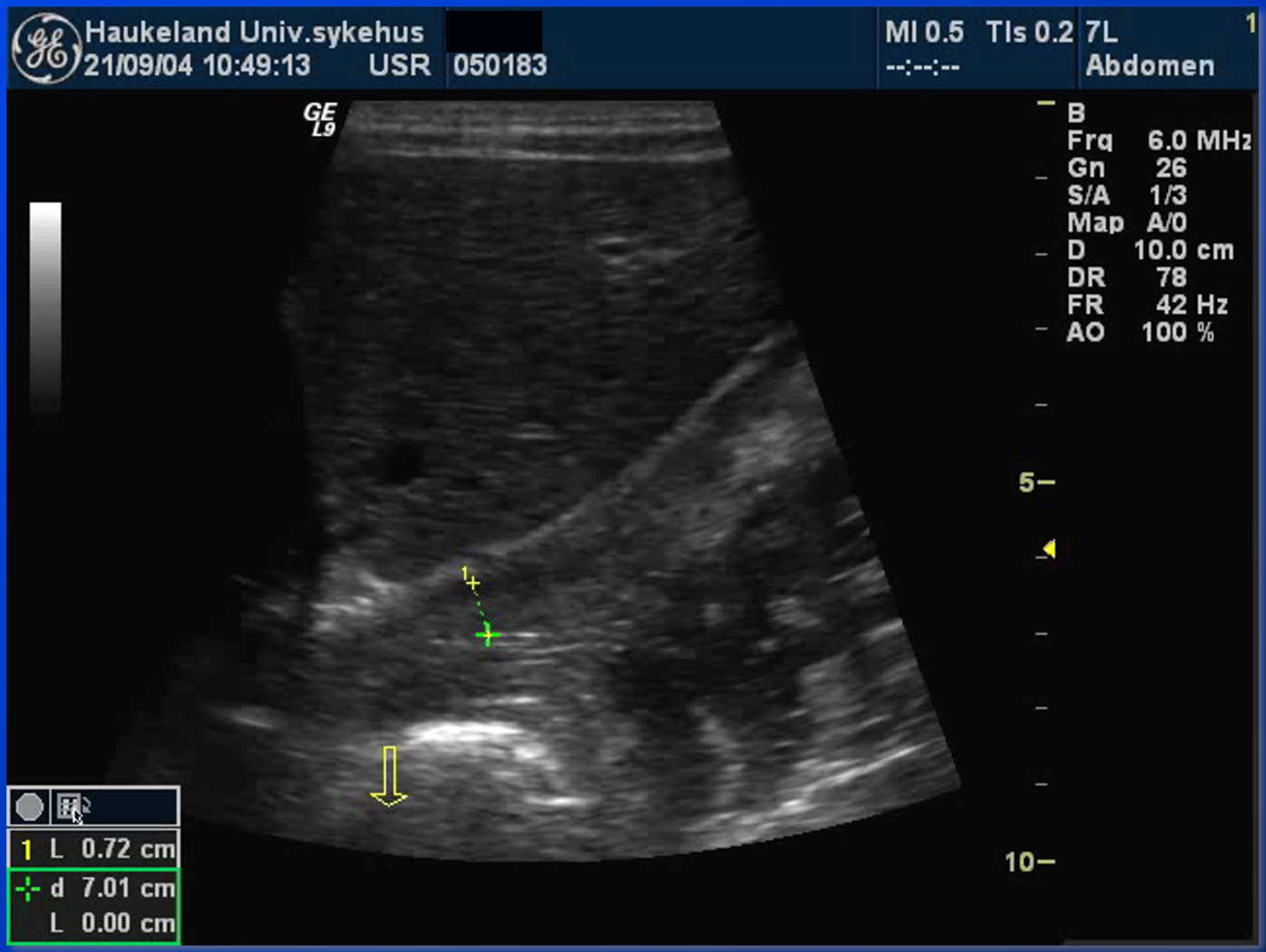
Lake Chamo


Taking a last breath before
going down the GI tract
Photo: OH Gilja

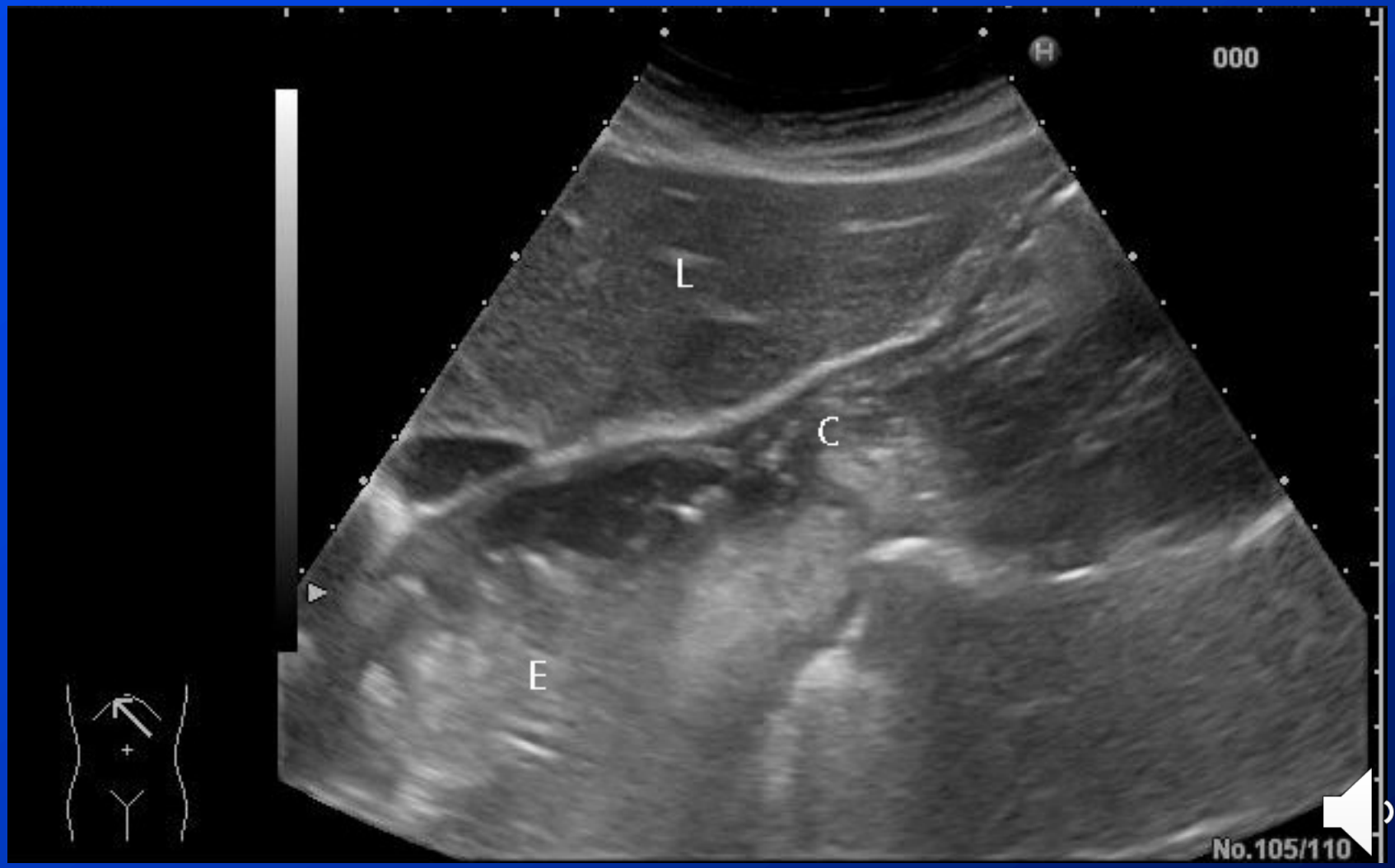
Zenker´s diverticula



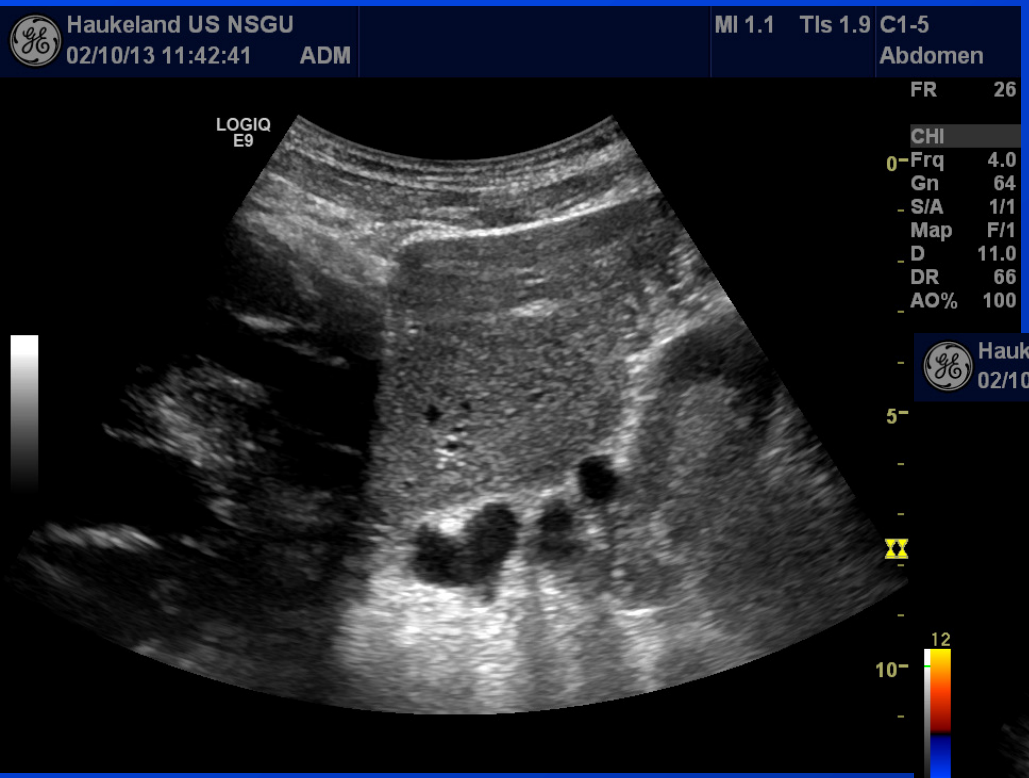
Stricture of the Esophagus in Crohn´s disease

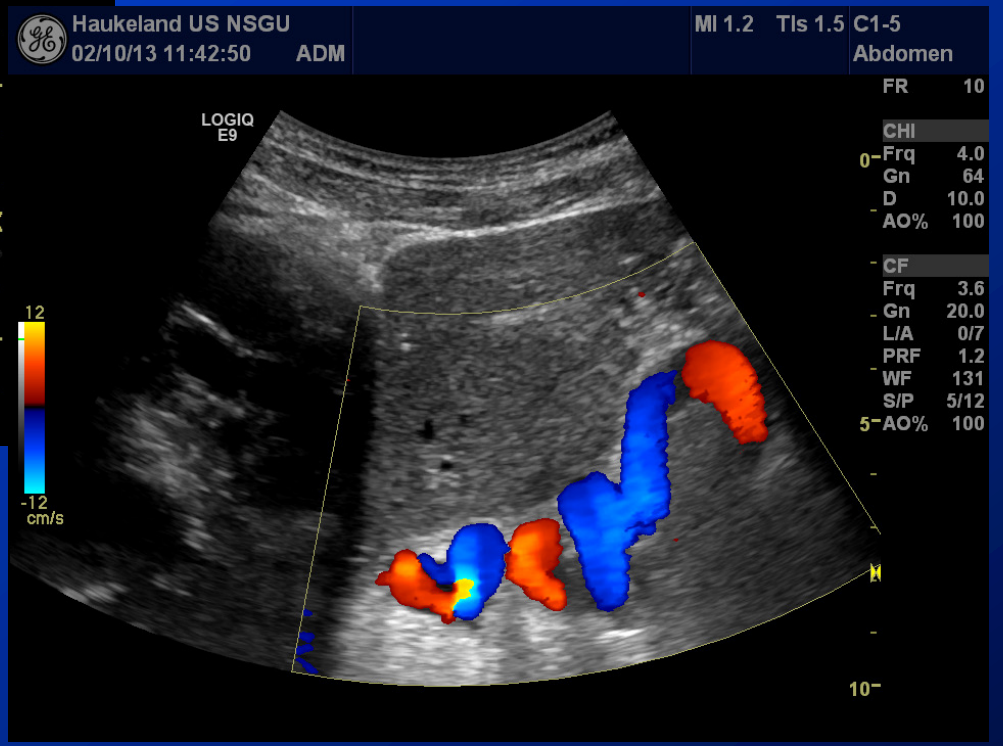


Achalasia of the Esophagus



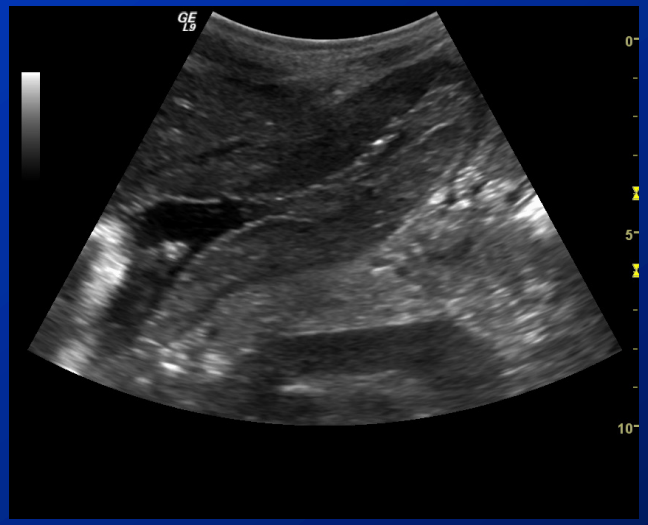
Esophageal and Gastric Varices





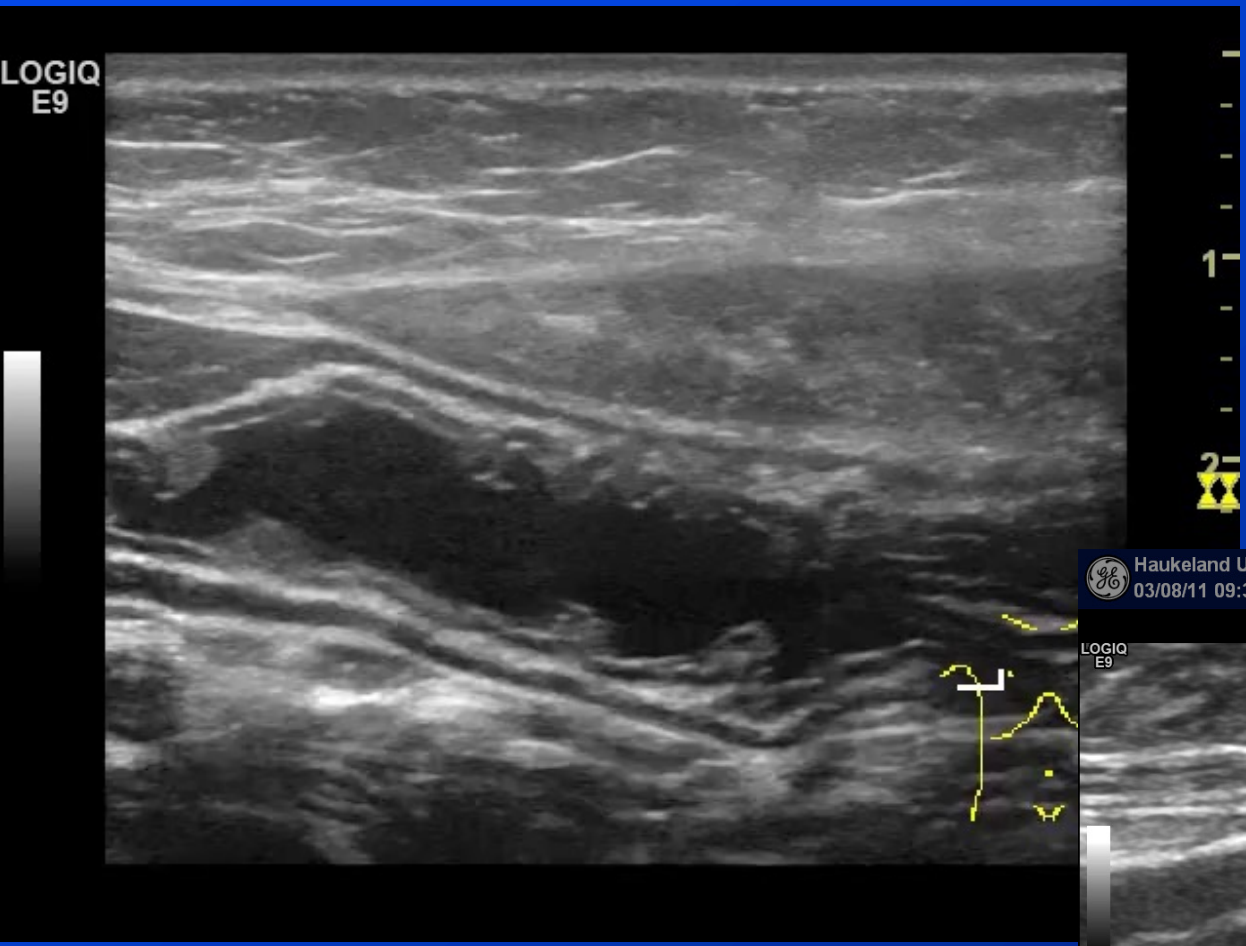
Ultrasound of the Stomach Indications:

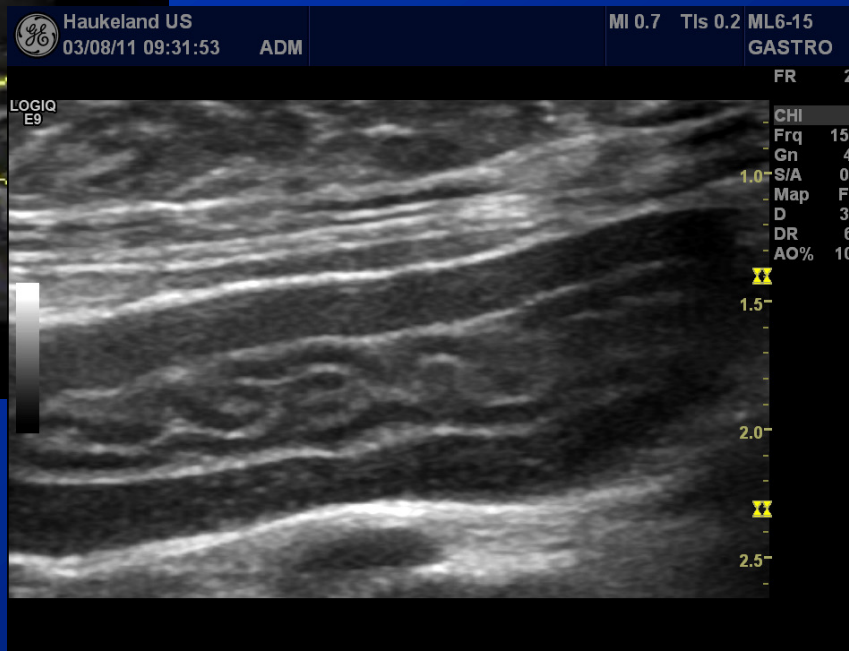
- Pain in the upper abdomen
- Unclear findings on CT
- Ulcers – Complications
- Polyps
- Portal HT gastropathy
- Giant folds
- Menetriers disease
- Submucosal tumors
  - GIST
- Linitis plastica
- Functional US
- EUS



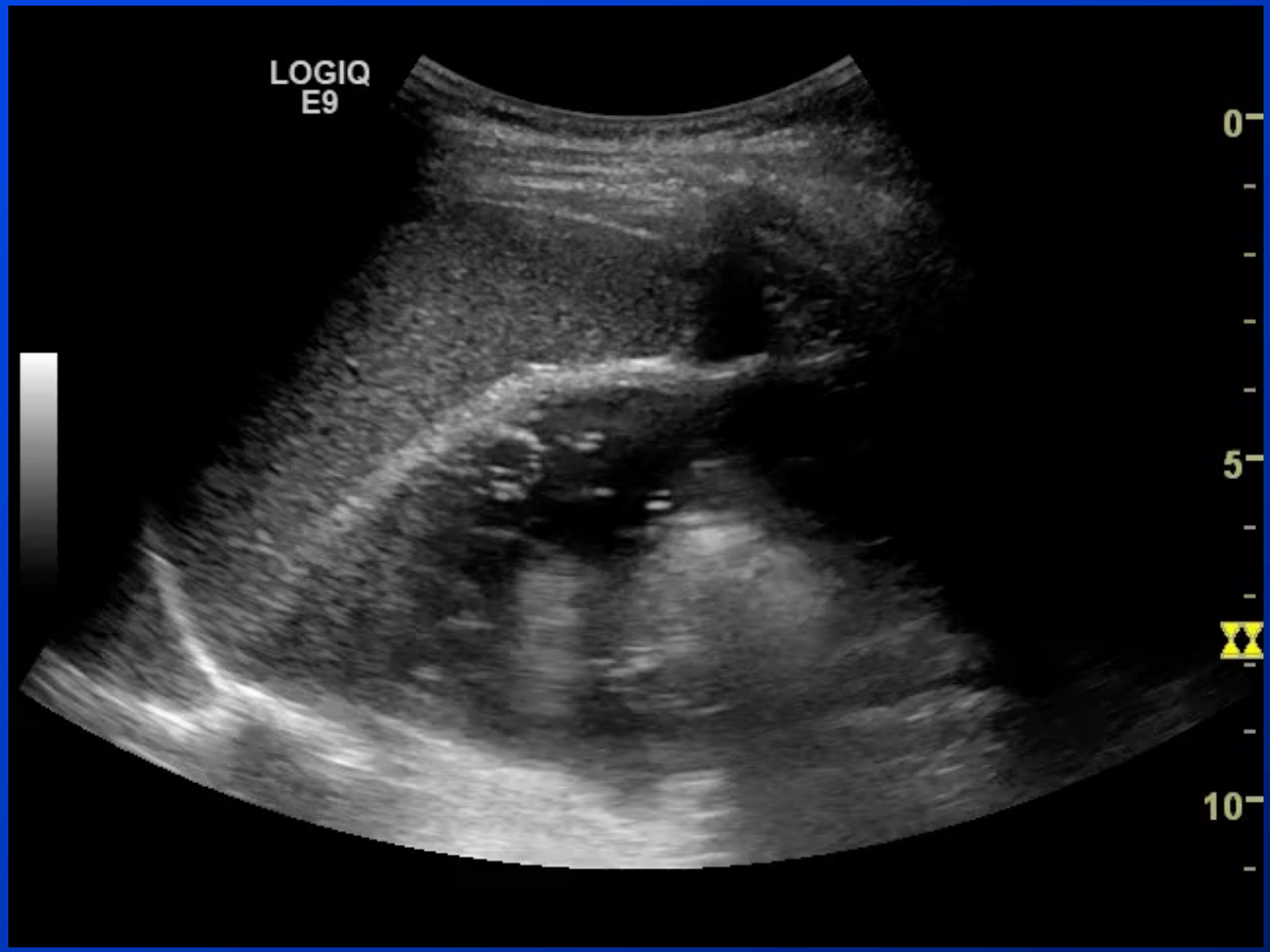
The 2-compartment model
Proximal and distal stomach

Folds of the gastric body

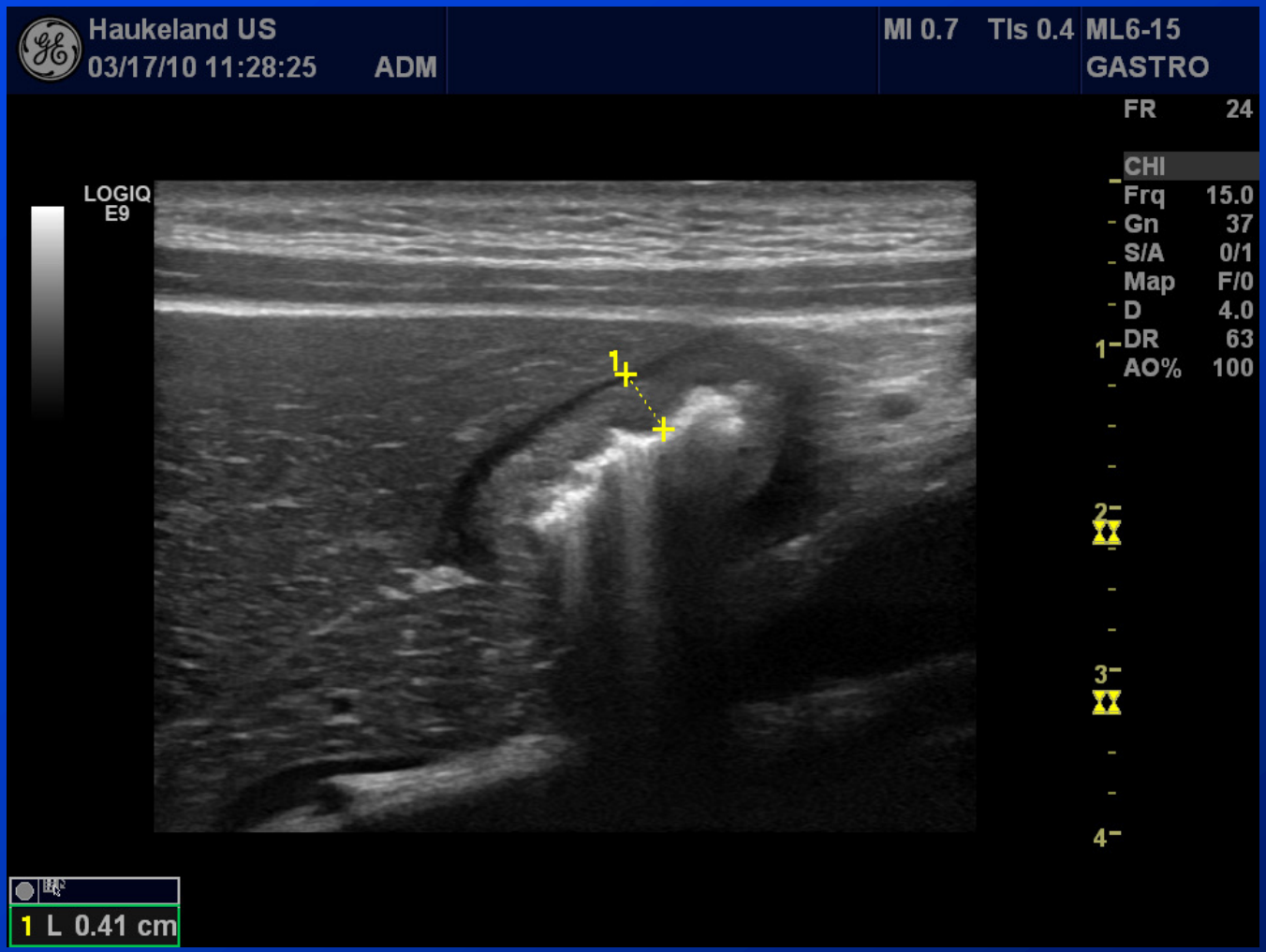




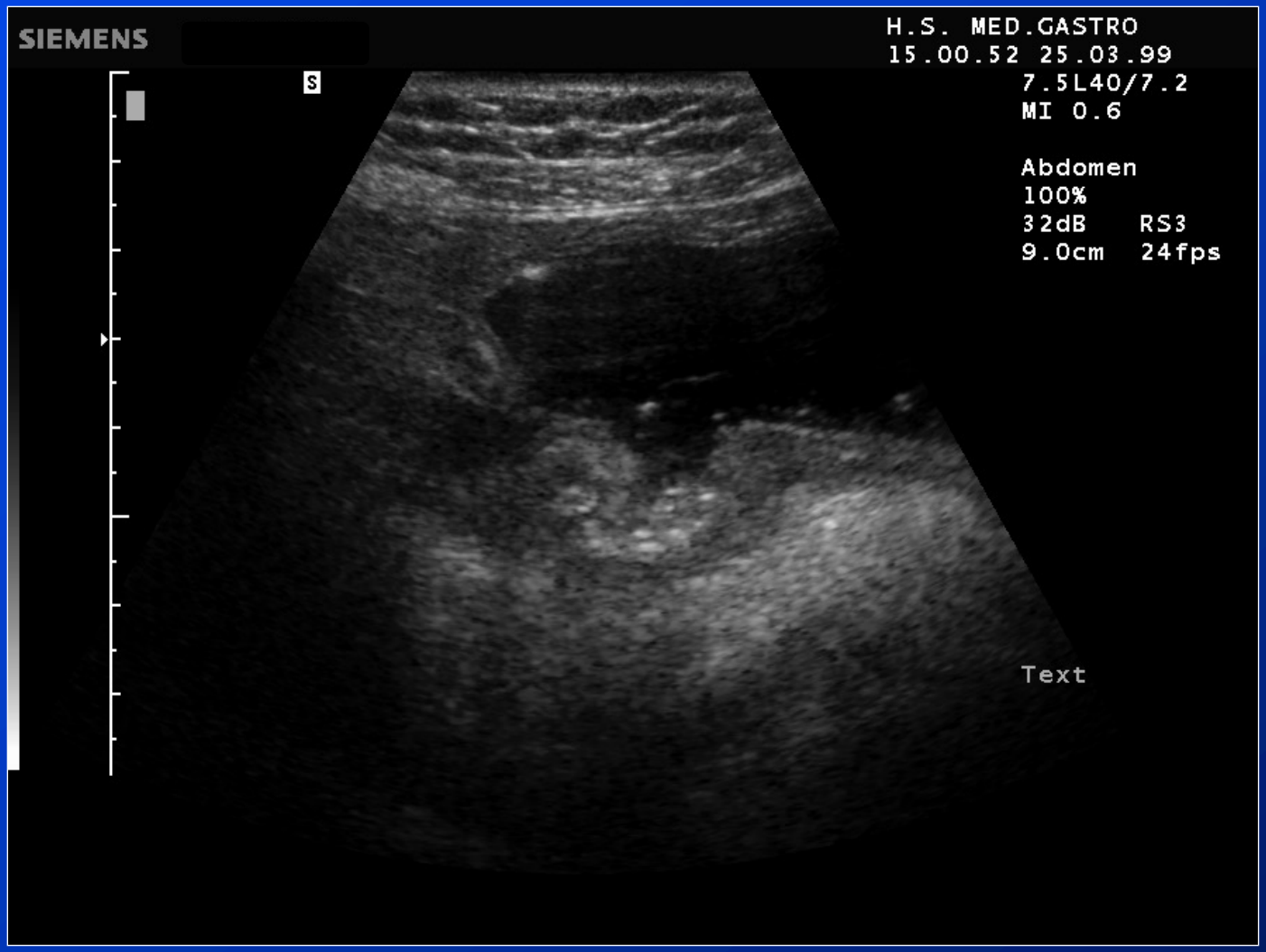
Poximal Stomach view through the spleen



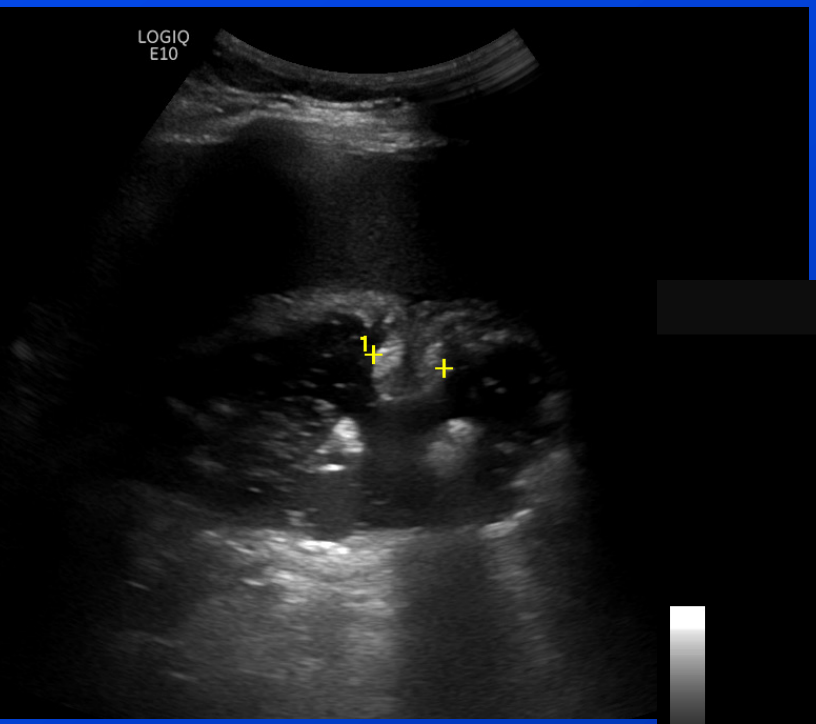
Helicobacter P. gastritis

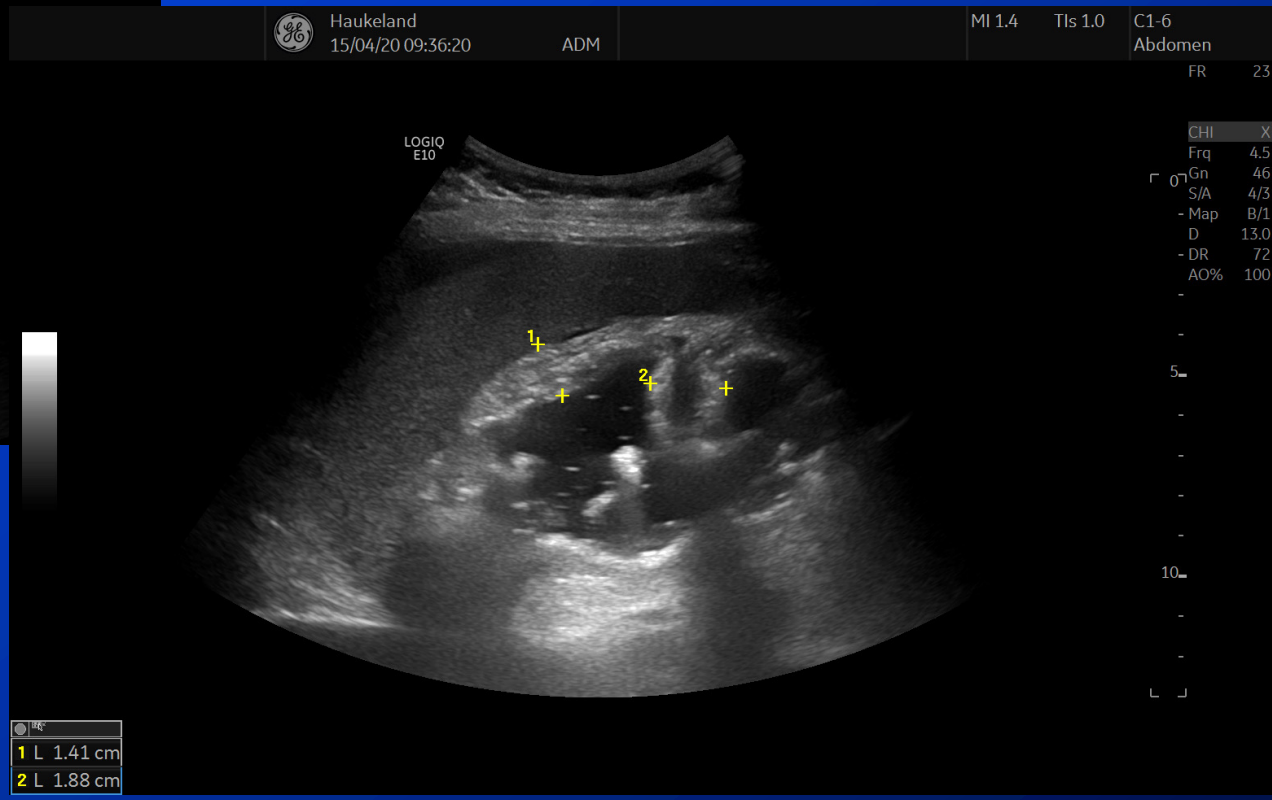


Gastric Ulcer

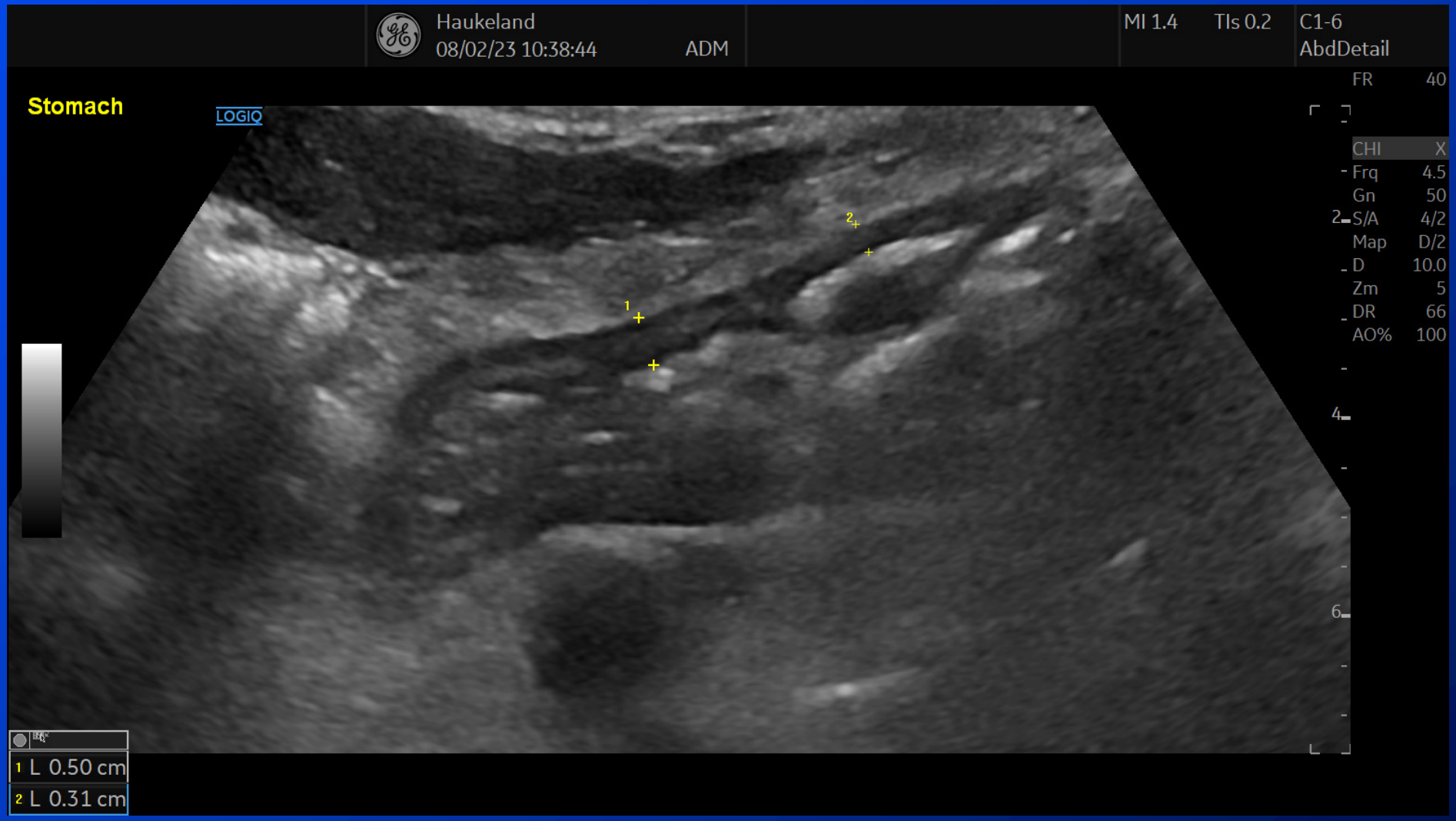


Portal hypertension: Gastric varices

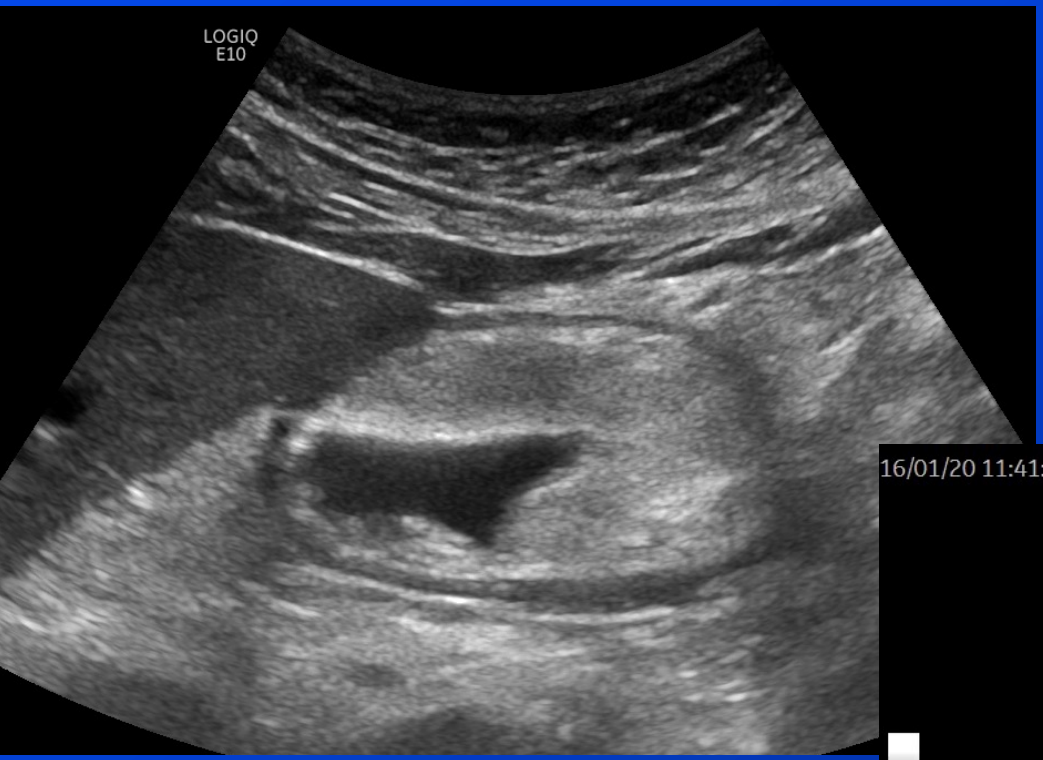




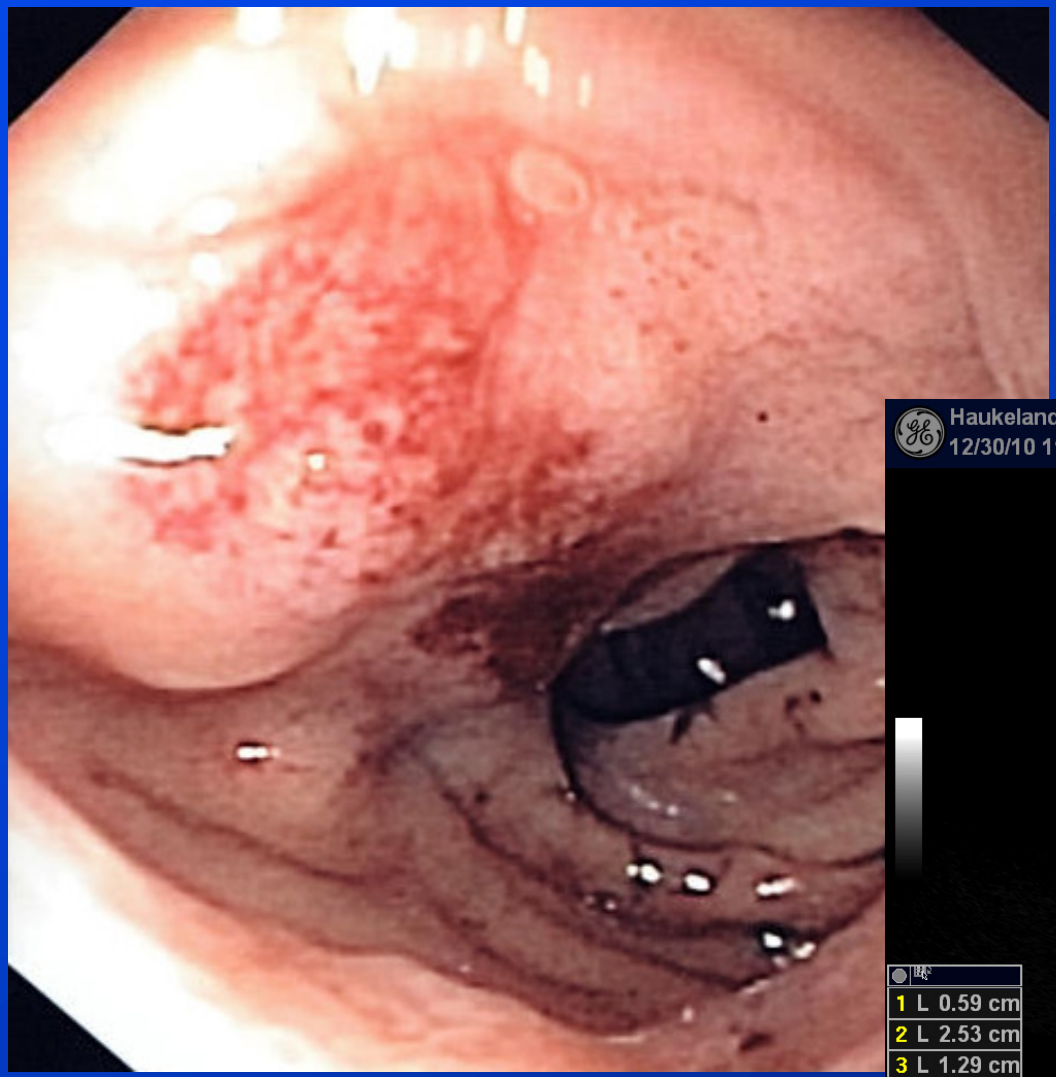
HT gastropathy due to cirrhosis

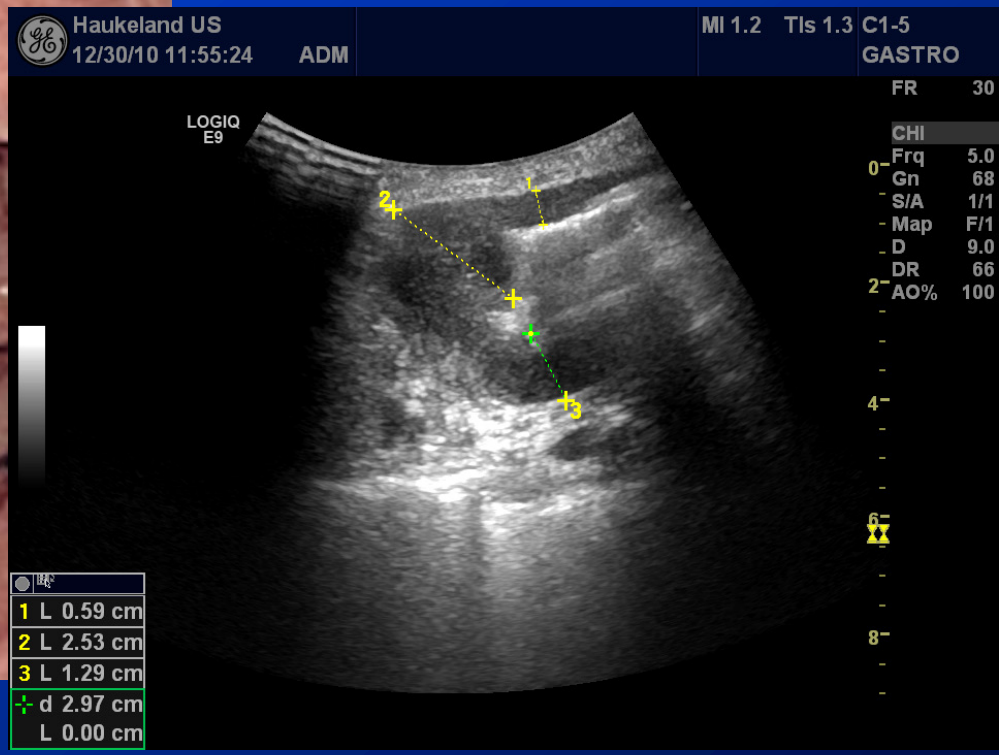


Menetriers Disease

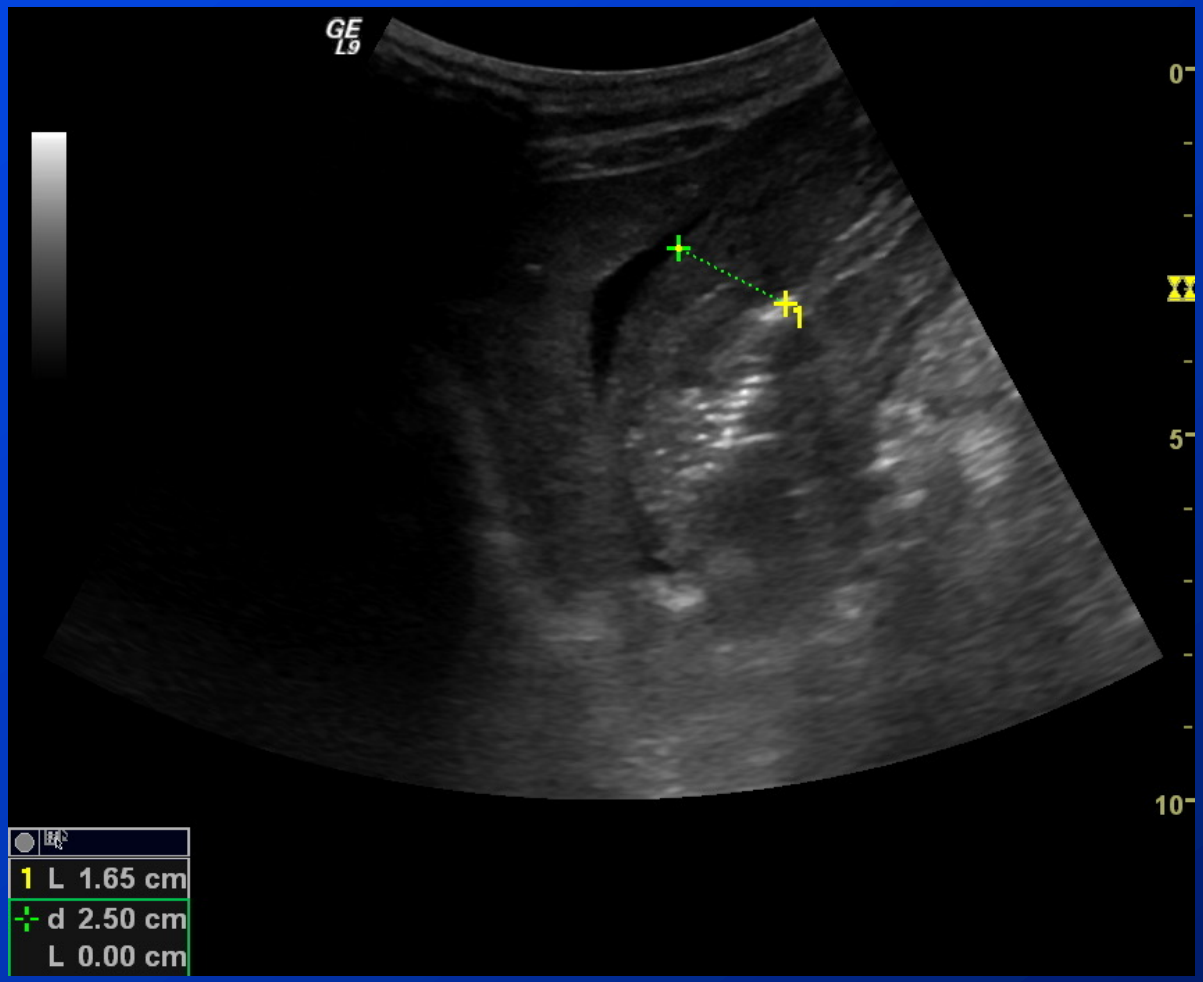


Cancer of the Antrum

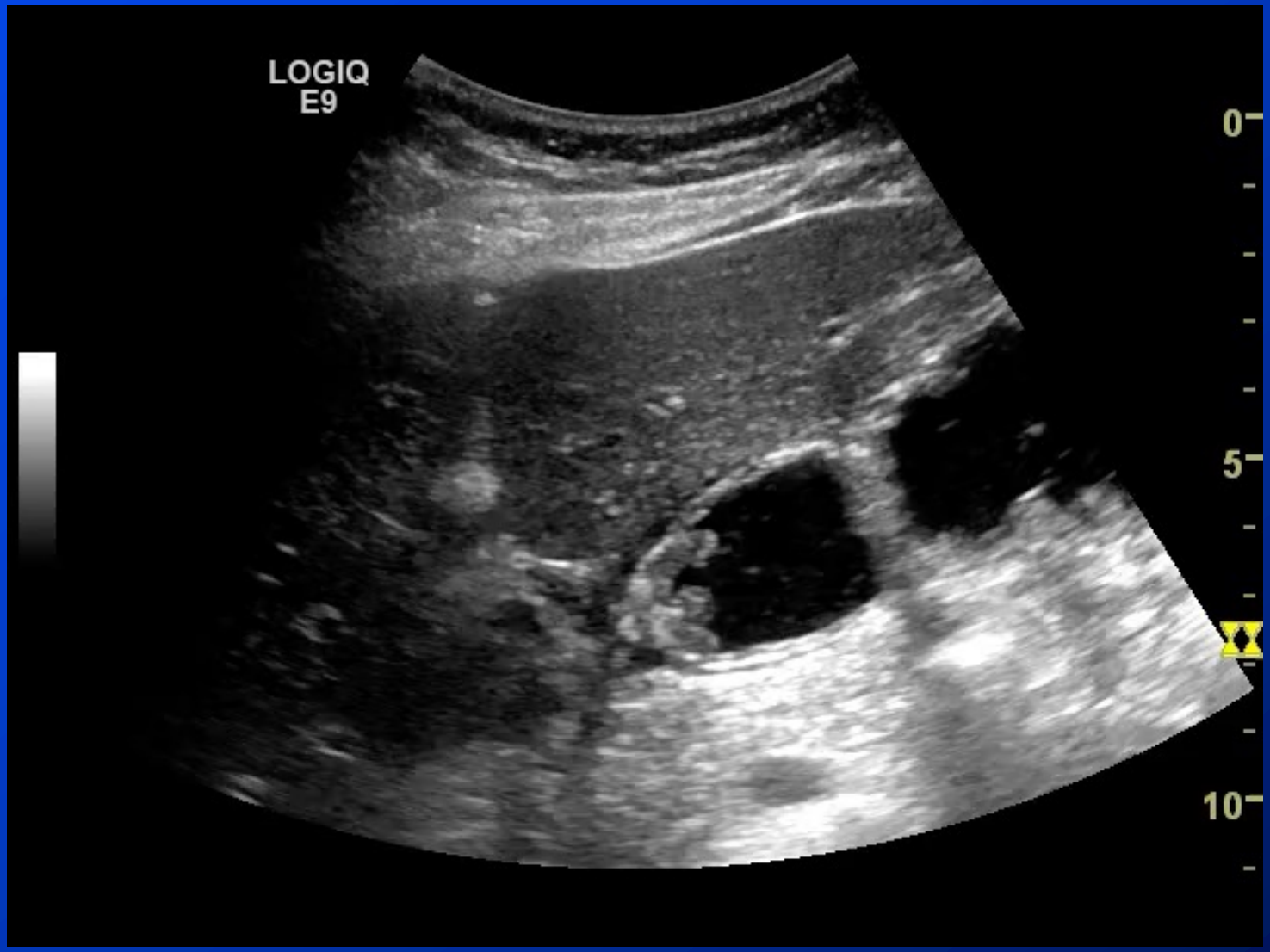




Case: A 67 year female with epigastric pain, weightloss and anorexia

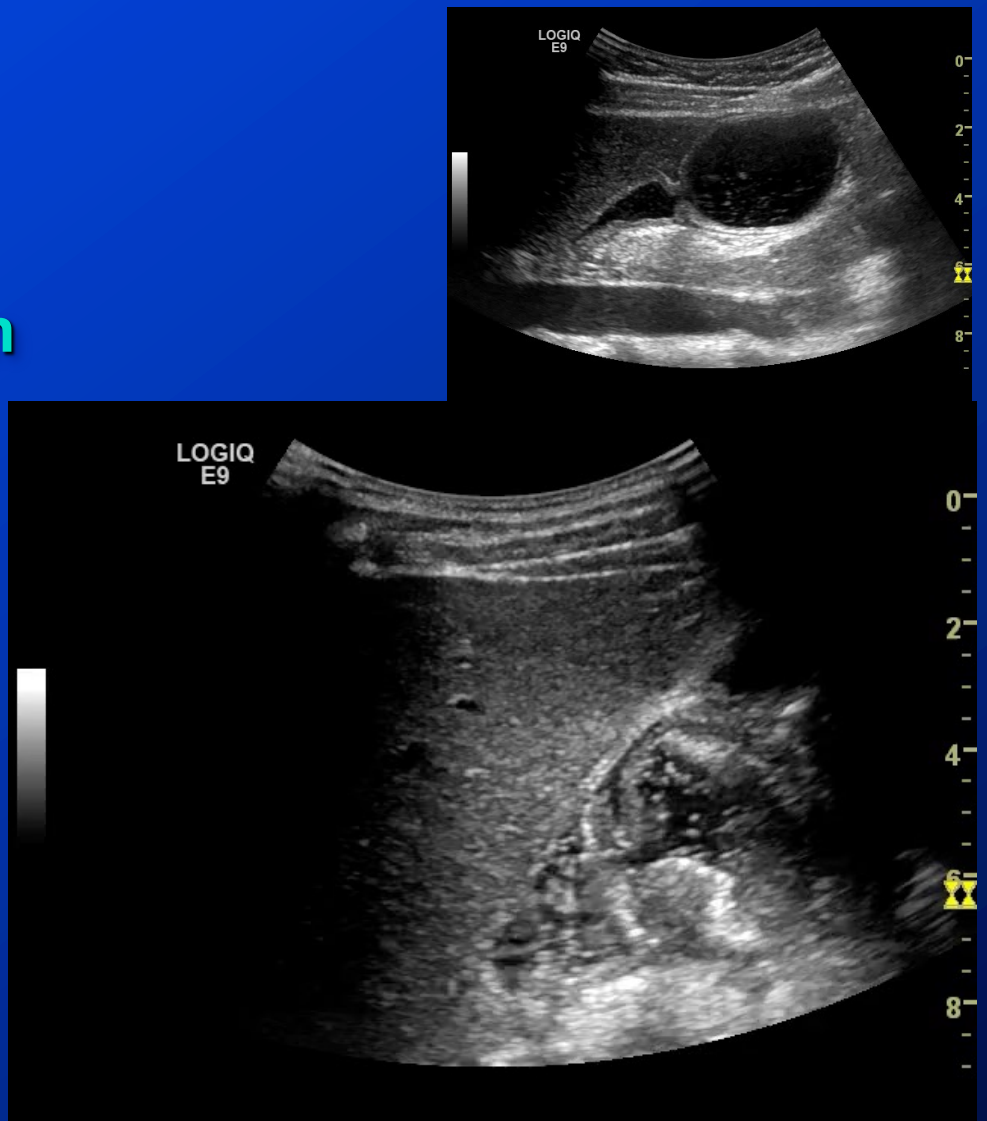


Gastric contractility

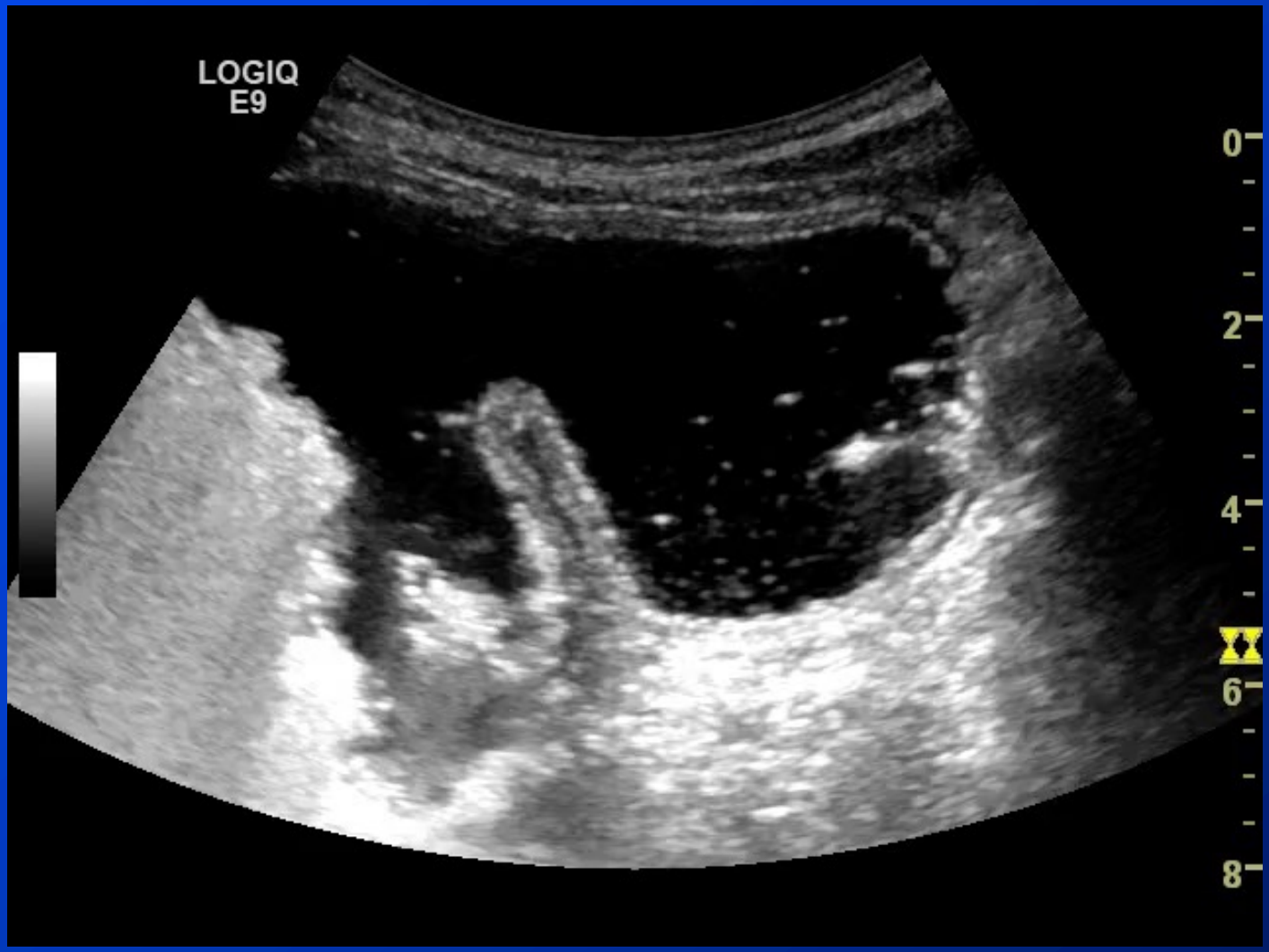


The Role of Ultrasound in FGID

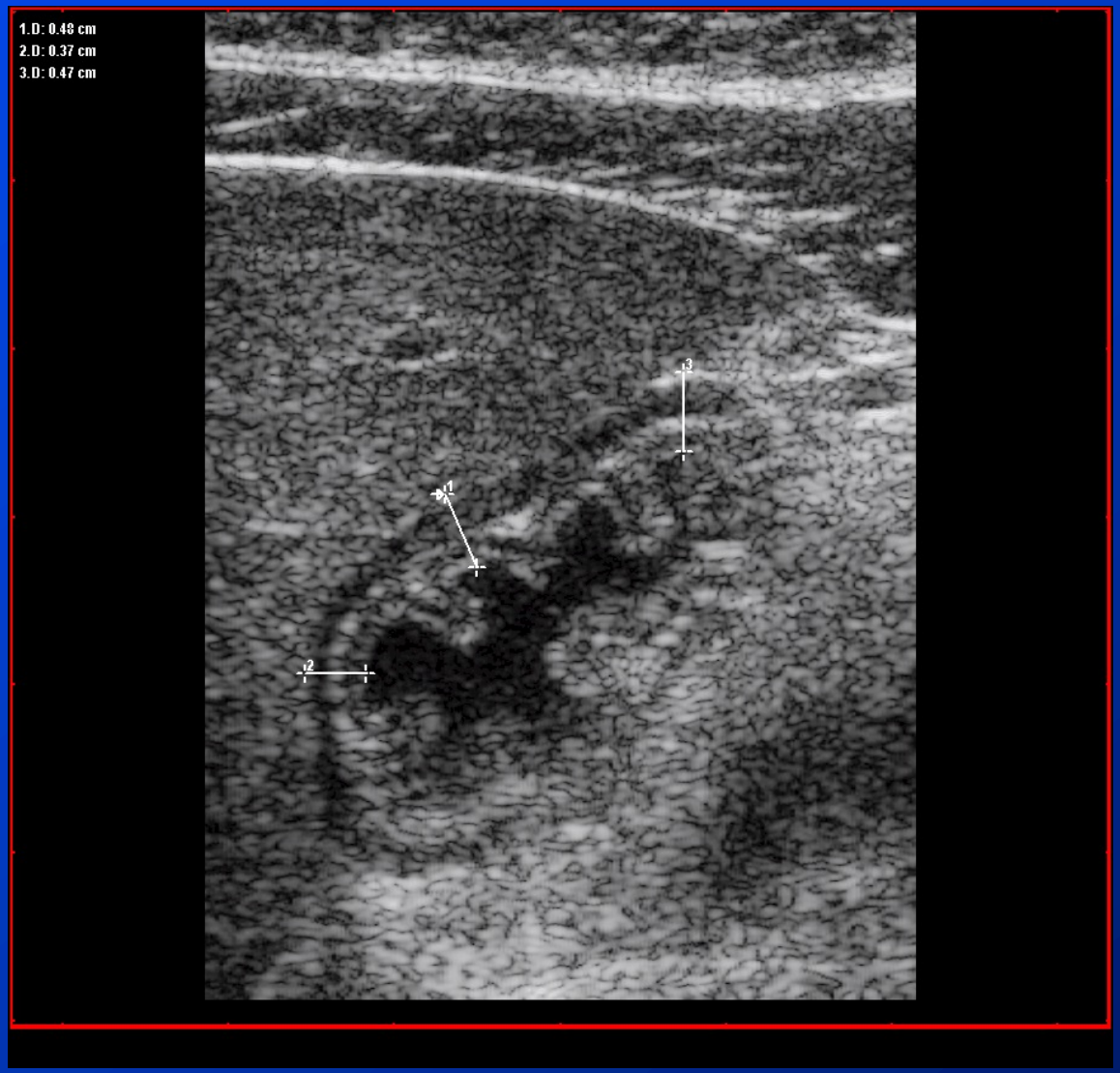
- Rule out organic diseases
- **Detect disturbances in motility**
- **Disclose pathophysiological abnormalities**
- Provide hints for therapy
- Guide further work-up



The mixer of the gastric body



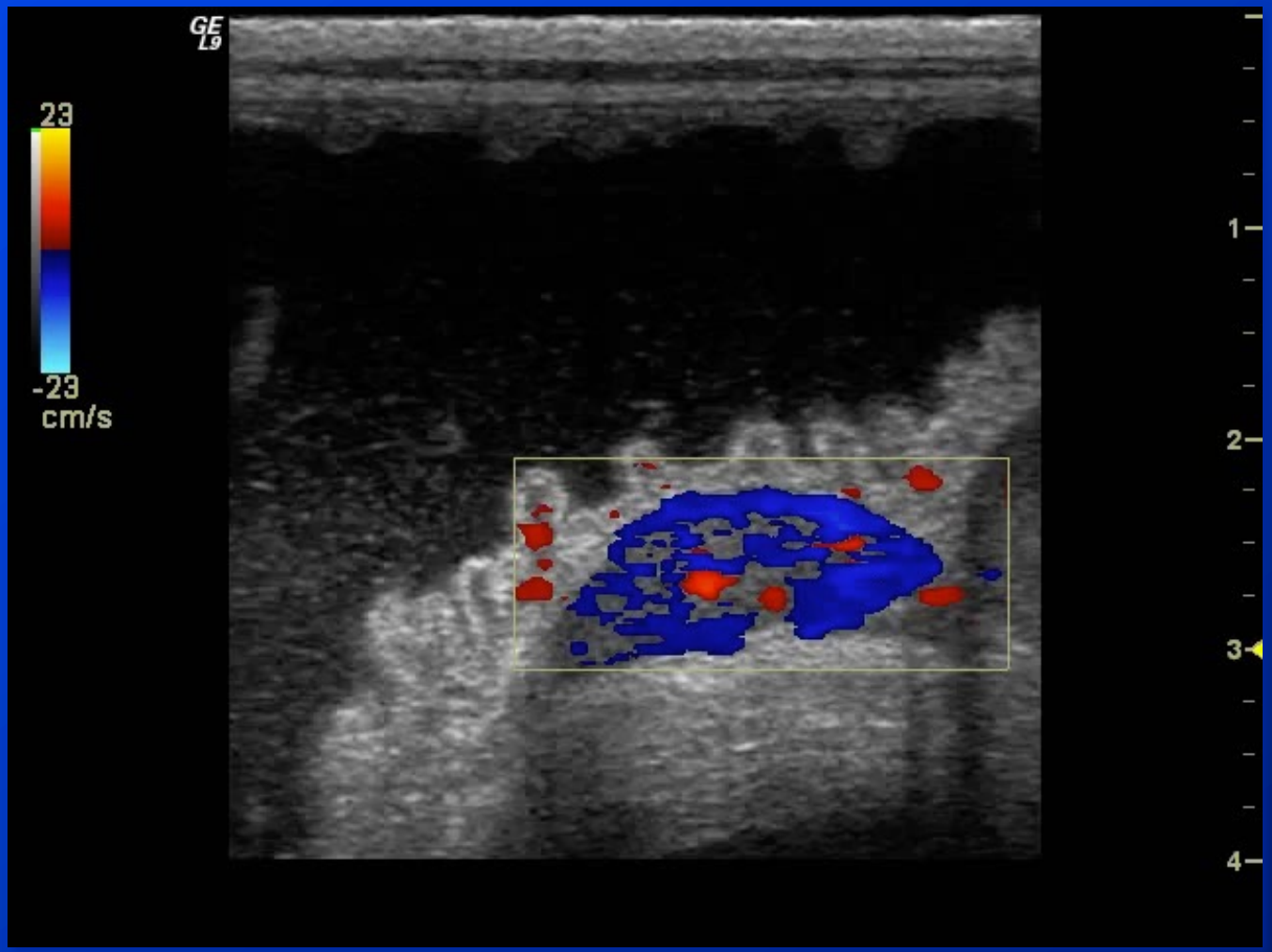
Duodenal Wall Thickening



Female, 45 years, symptoms for 20 years, Coeliac disease

Duodenal Ulcer

Jejunum with Valvula Conniventes



14 MHz linear Scanning

”Waschmaschinen-phenomen”

Ultrasound Signs in Celiac Disease

- Increased fluid in small intestine: 11/11
- Moderately dilated small intestine: 8/11
- Thickening of small-bowel wall: 7/11
- Increased peristalsis: 8/11
- Enlarged mesenteric lymph nodes: 9/11
- Dilated superior mesenteric artery: 7/11
- Free fluid in the abdominal cavity: 5/11
- Liver steatosis: 6/11

Rettenbacher et al., Radiology 1999;211:389-94

Meckel´s diverticulitis

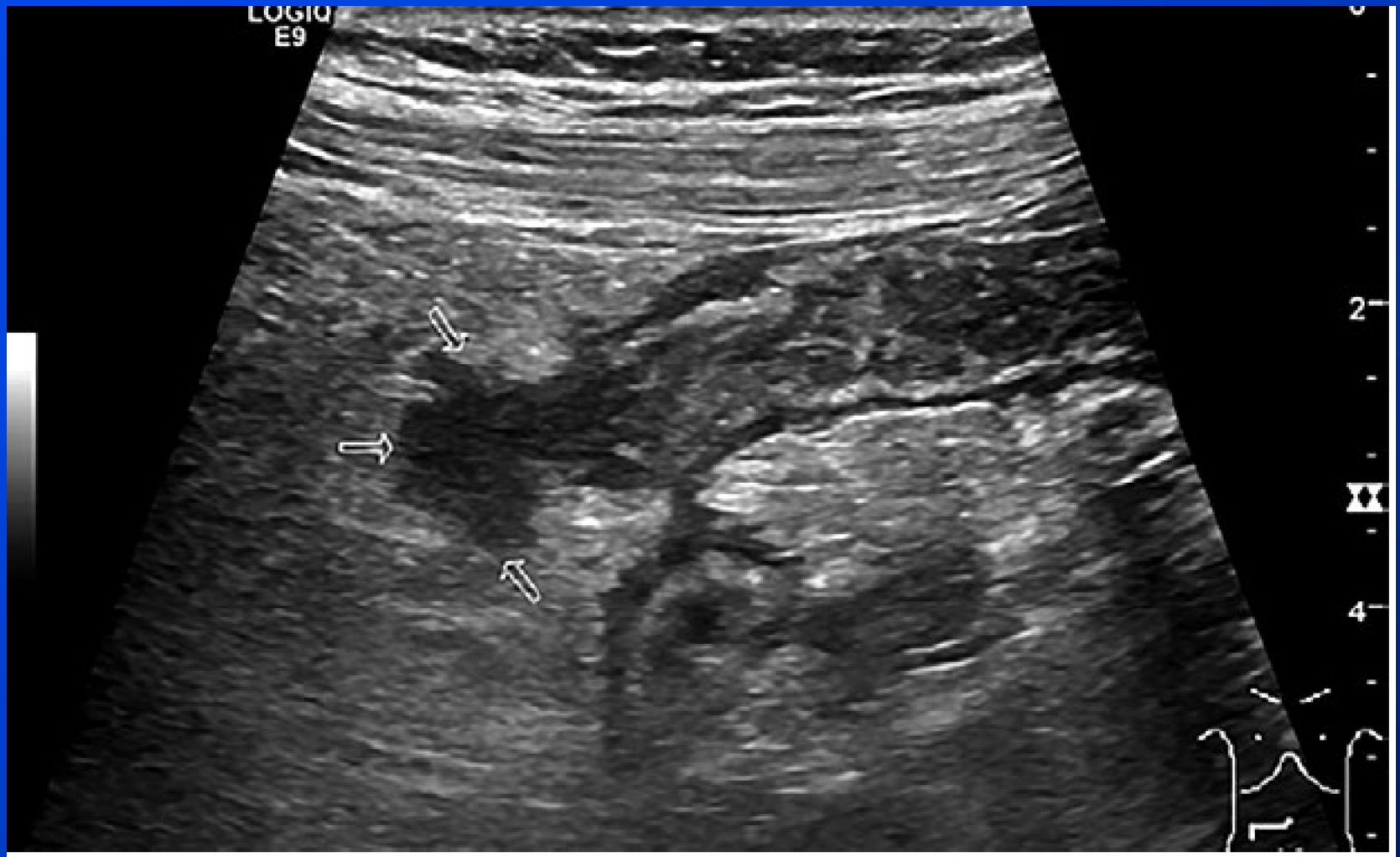


Fig 5. Inflamed Meckel`s diverticulum (arrows) with adjacent hyperechoic fatty tissue.

No 6: GIUS of Intestinal Emergencies

Published online: 2020-04-20

Guidelines & Recommendations

Gastrointestinal Ultrasound (GIUS) in Intestinal Emergencies – An EFSUMB Position Paper

Gastrointestinaler Ultraschall (GIUS) bei intestinalen Notfällen Ein EFSUMB-Positionspapier

Authors
Alois Hollerweger[1], Giovanni Maconi[2], Tomas Ripolles[3], Kim Nylund[4], Antony Higginson[5], Carla Serra[6], Christoph F. Dietrich[7], Klaus Dirks[8], Odd Helge Gilja[9]

24 statements with Consensus levels of agreement

STATEMENT 3

The level of large or small bowel obstruction can be assessed by GIUS by identifying the transition point between dilated proximal bowel and collapsed distal bowel.

Consensus levels of agreement: A+ 16/16

STATEMENT 4

The cause of bowel occlusion may be detected by GIUS at the transition point.

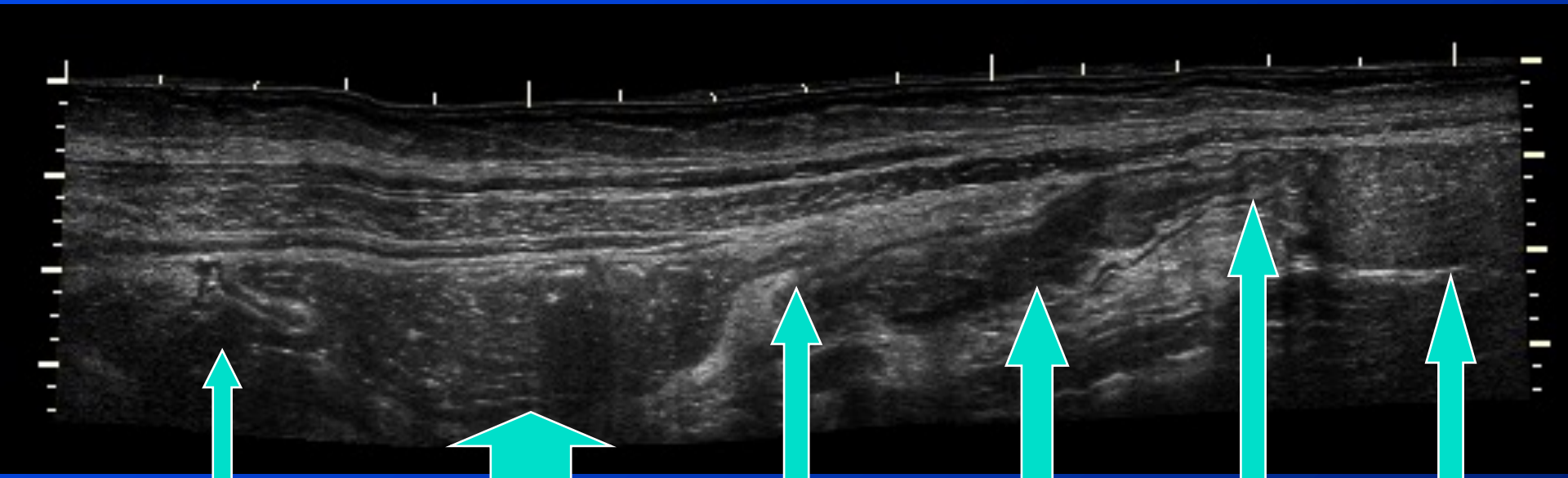
Consensus levels of agreement: A+ 13/15; A– 2/15

STATEMENT 5

Adhesions to the parietal peritoneum can be diagnosed by detecting the loss of normal visceral sliding in the course of respiratory movements. Deep adhesions are frequently undetectable.

Consensus levels of agreement: A+ 14/16; A– 1/16; I 1/16

The cause of obstruction

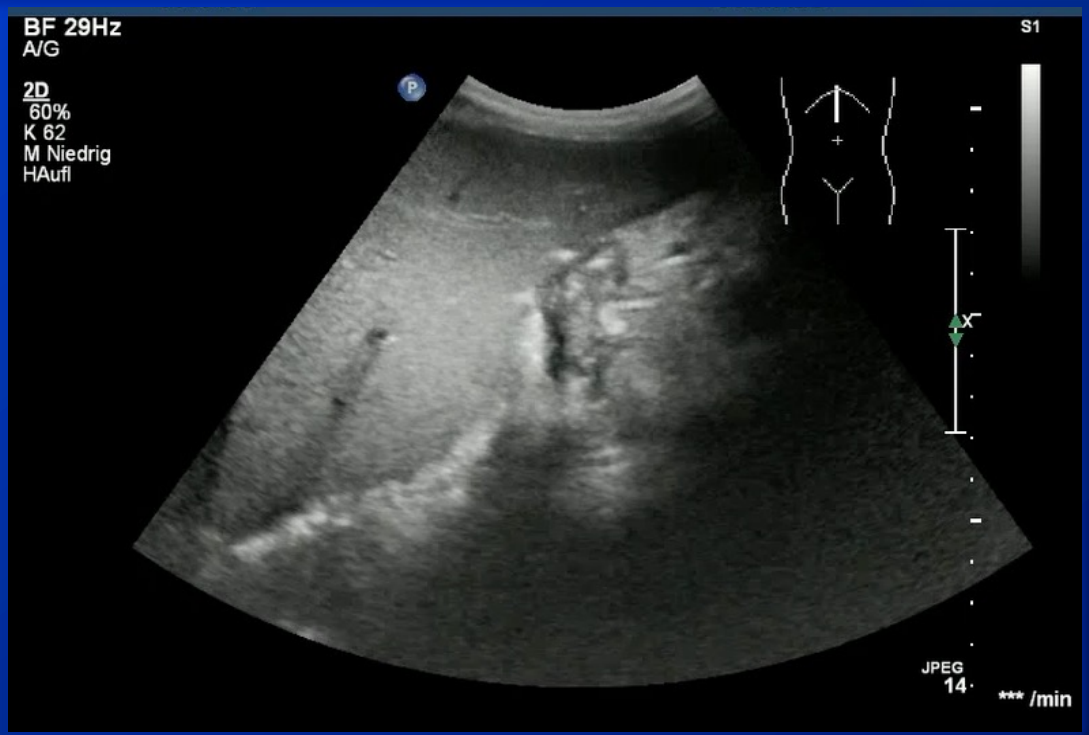


Acute GI perforation

STATEMENT 11

A hyperechoic line or hyperechoic foci with reverberation artifacts between the anterior surface of the liver and the abdominal wall are characteristic for pneumoperitoneum.

Consensus levels of agreement: A+ 16/16



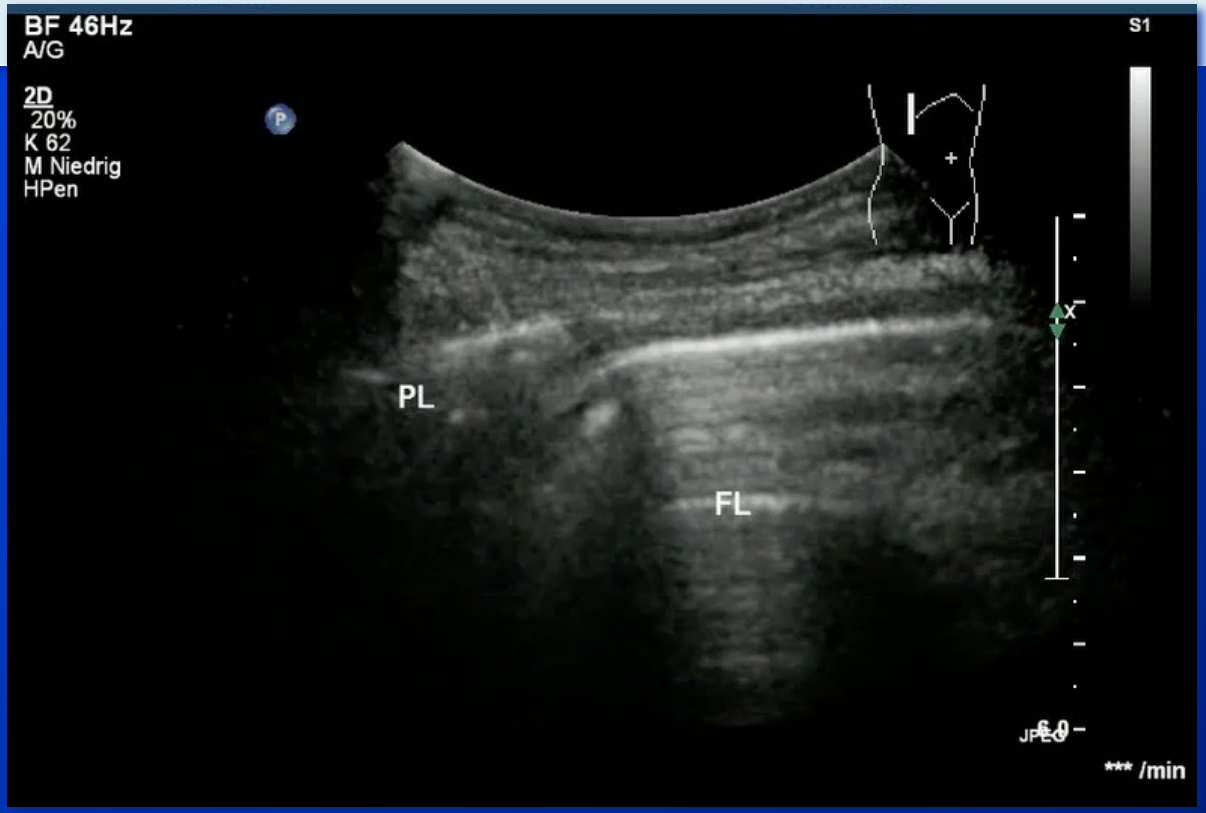
Courtesy: M. Wustner

Acute GI perforation

STATEMENT 12

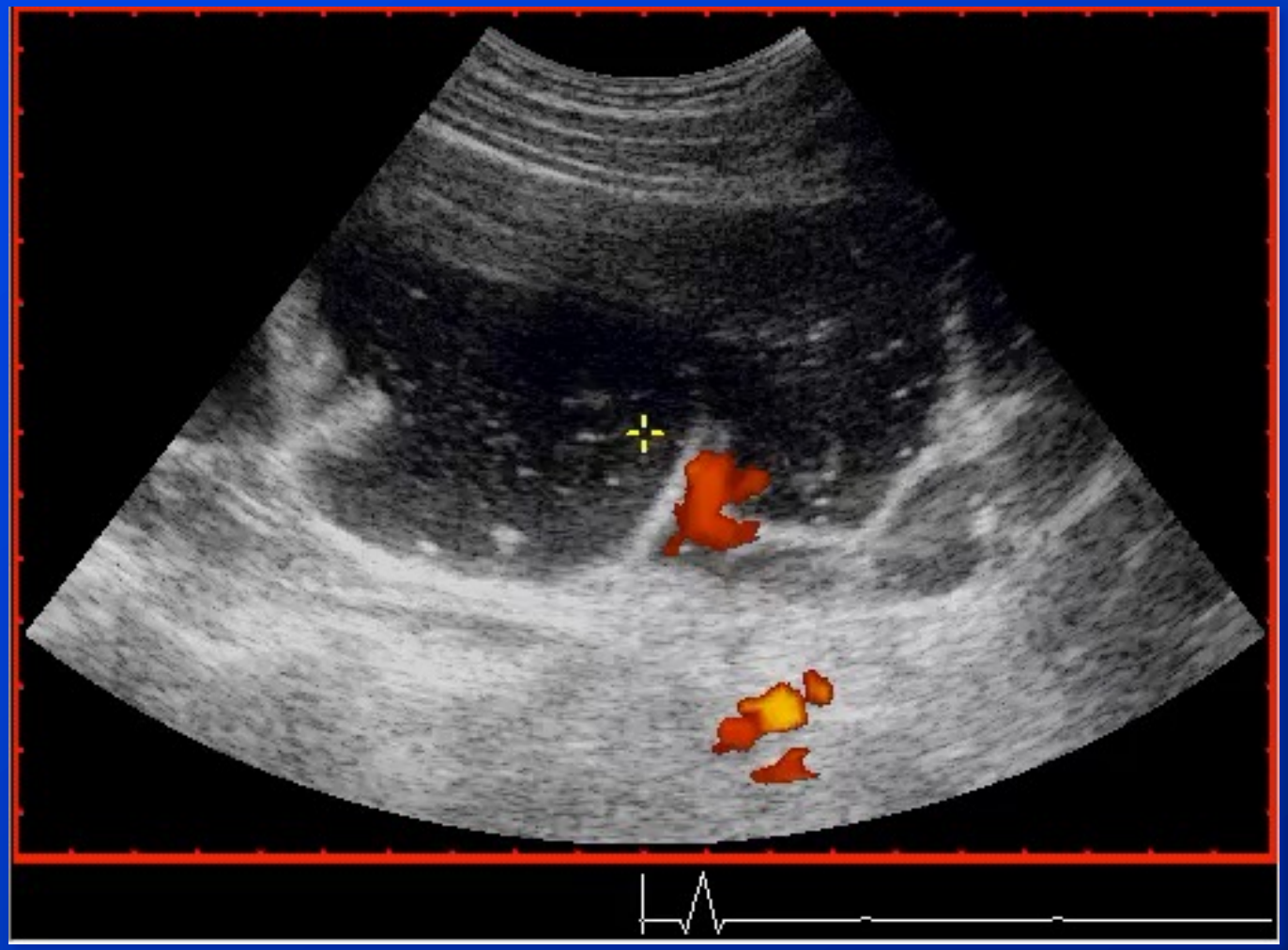
The movement of gas by different maneuvers is a typical sign of free gas in the abdominal cavity.

Consensus levels of agreement: A+ 16/16



Courtesy: M. Wustner

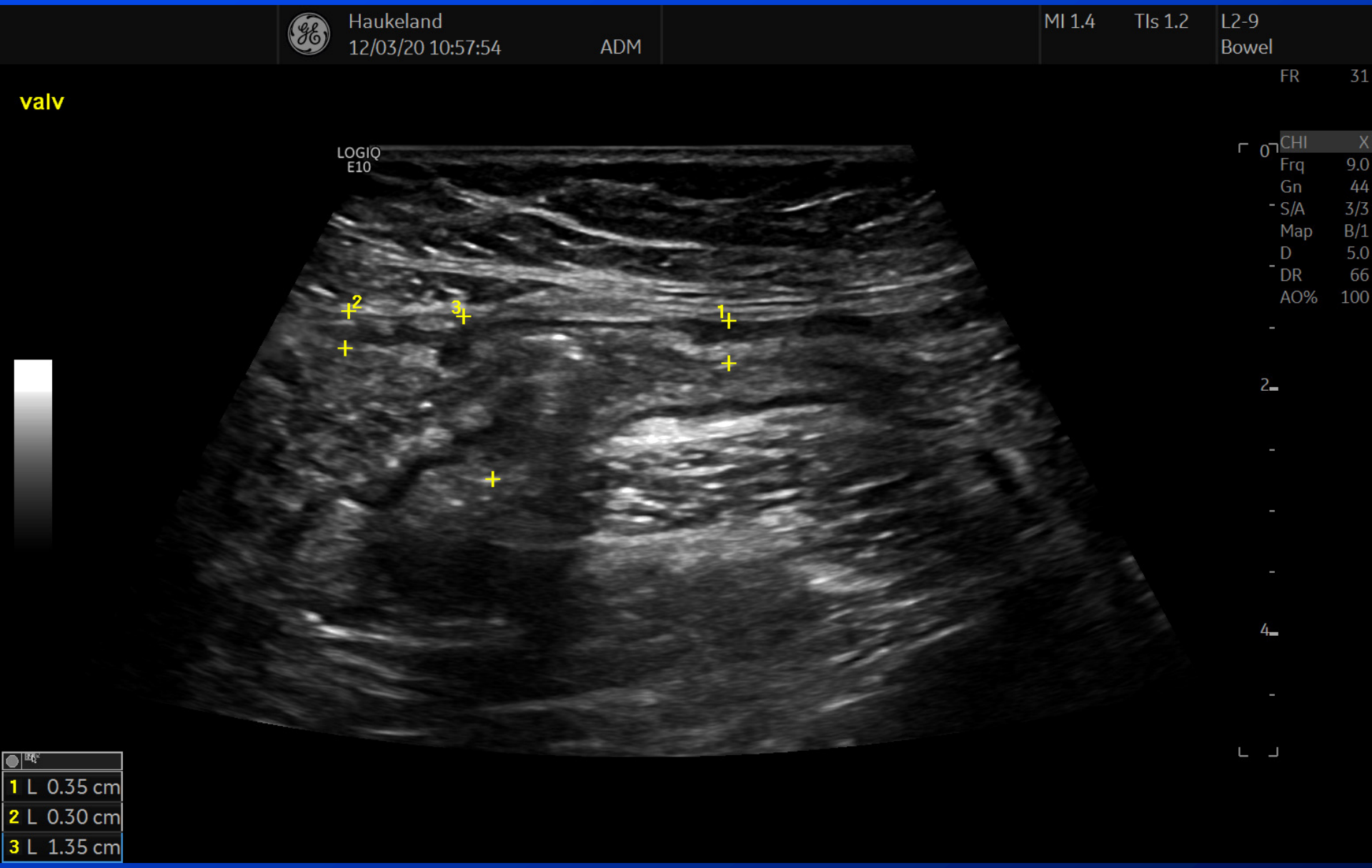
Color Doppler of the *v. Bauhini*



Flow across Valvula Bauhini

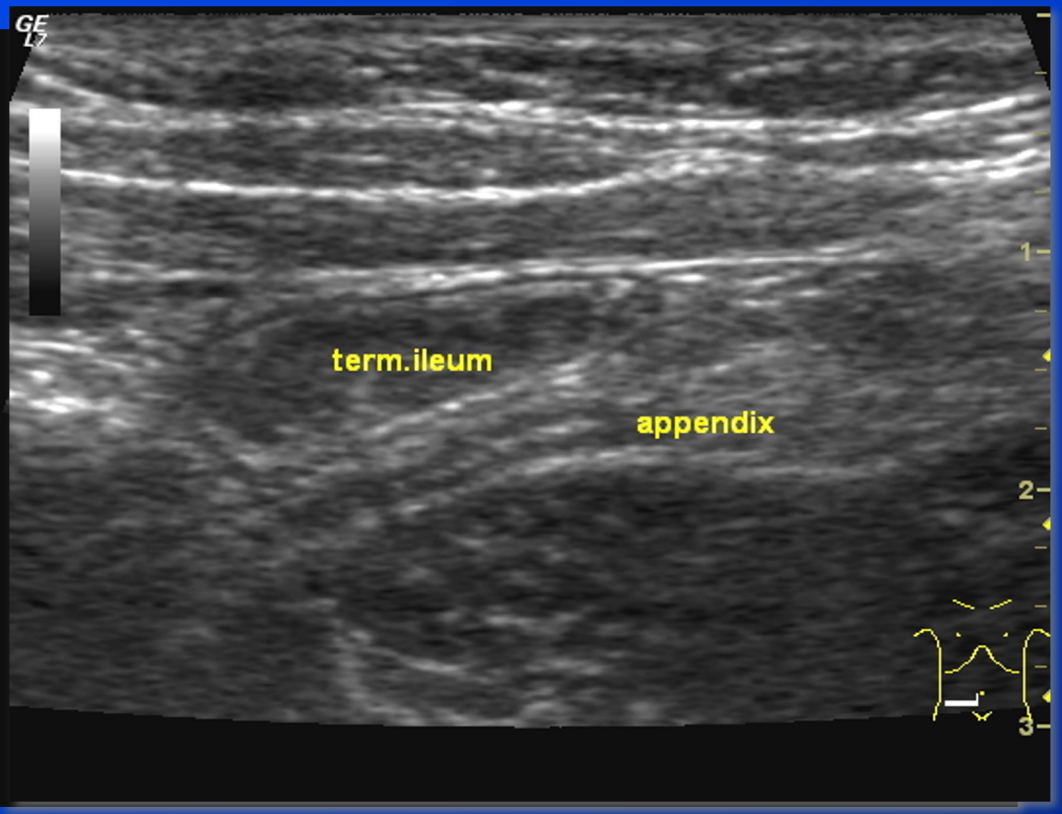
Sonoanatomy – Right Fossa il.

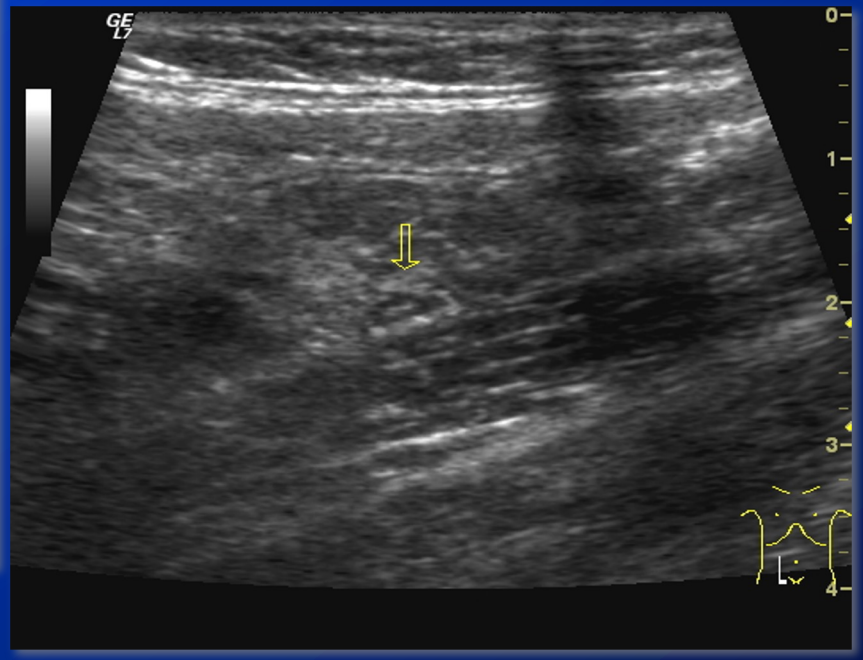
Coecum – v. Bauhini - ileum



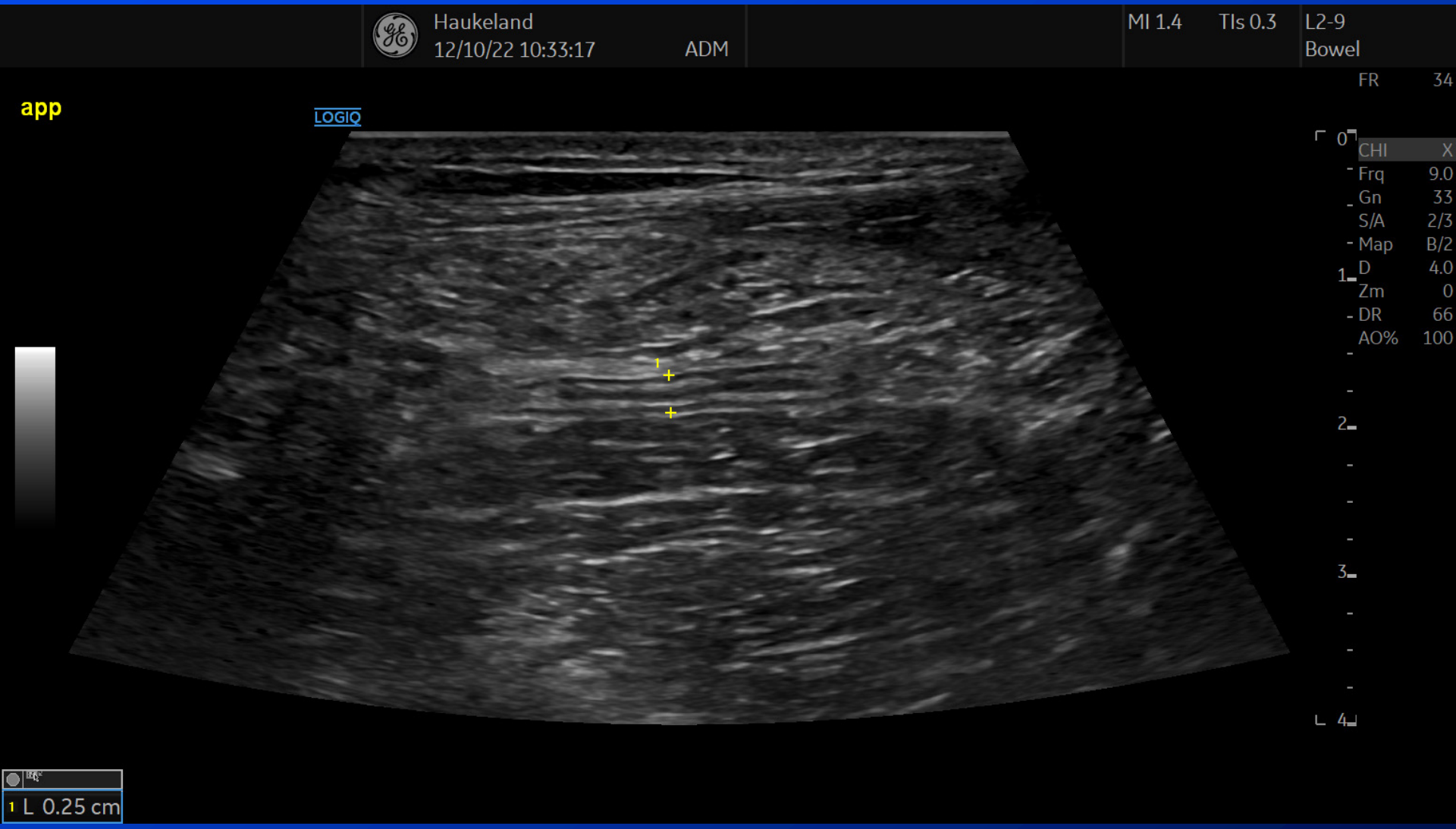
Valvula Bauhini

The Appendix





The normal appendix



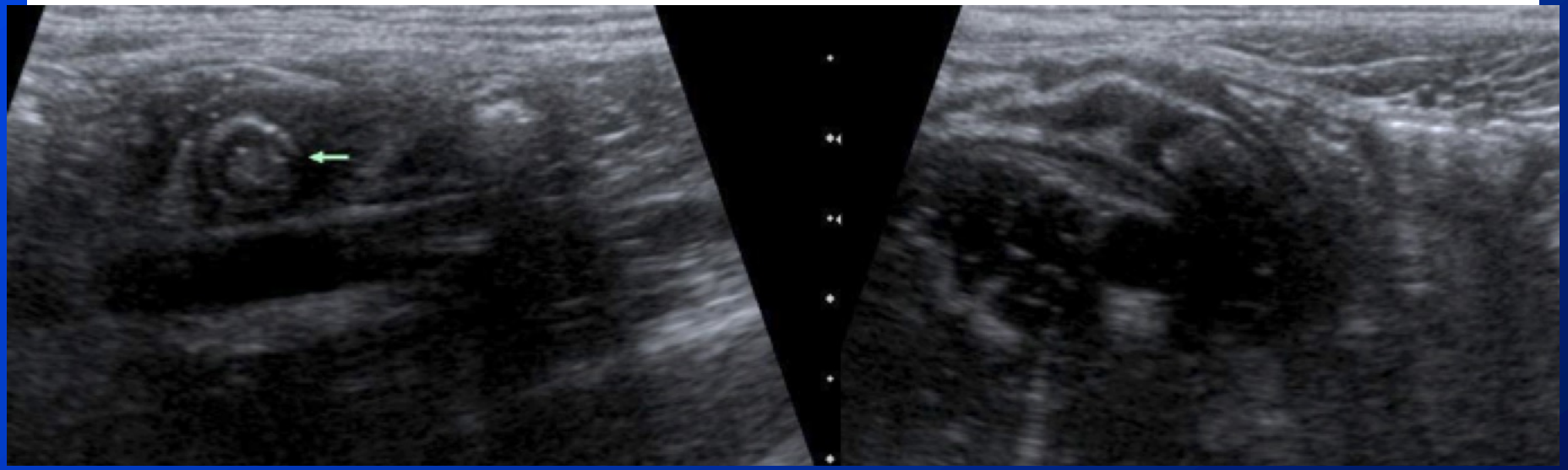
Appendix with fecalith

Acute appendicitis

STATEMENT 10

In any case of suspected appendicitis, an "ultrasound first" strategy should be used in both children and adults.

Consensus levels of agreement: A+ 18/18



Dirks K et al. EFSUMB Position Paper… Ultraschall in Med 2019; 40

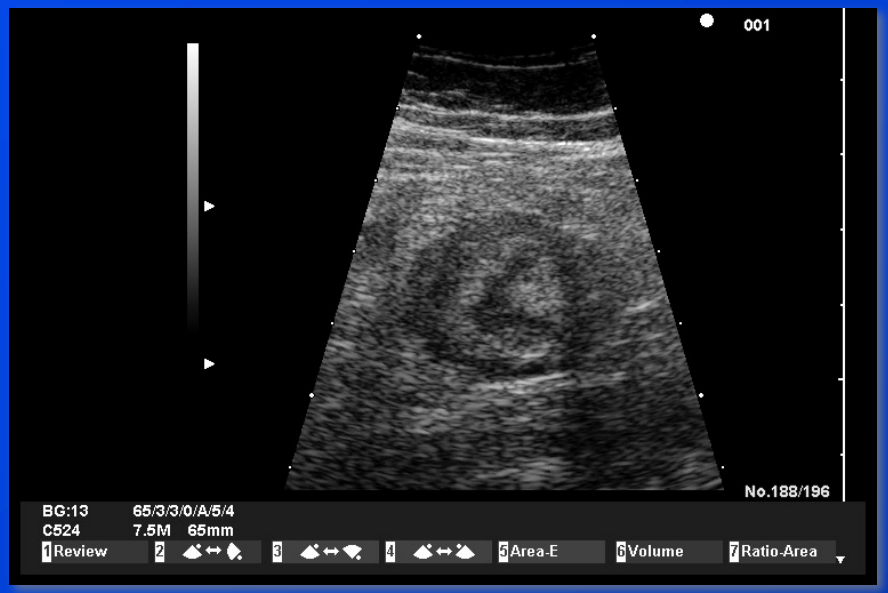
Ultrasound for Appendicitis

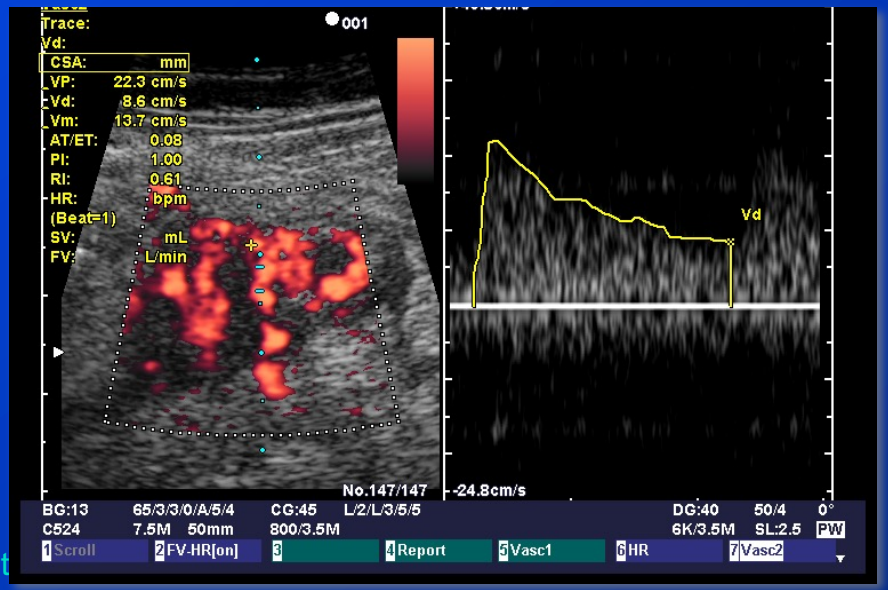
- Very safe! No radiation, no contrast required
- Immediate access
- Sensitivity and Specificity:
  - Adult - Sensitivity – 74-83%, Specificity – 93-97%
  - Pediatrics – Sensitivity -88%, Specificity – 94%
- Variables: Body habitus, Location, Skill
- Challenge: To detect it !

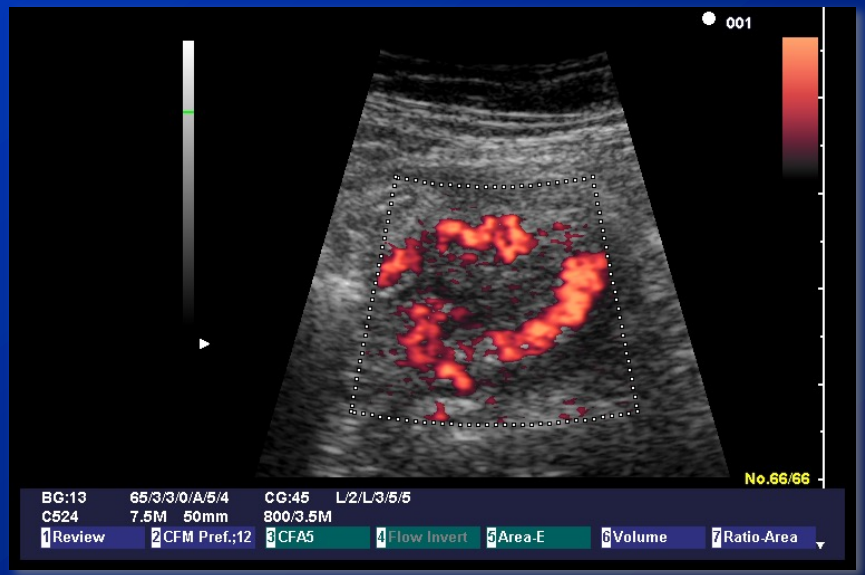
US Criteria for Appendicitis

- Distended appendix > 6 mm
- Presence of fecalith
- Periappendiceal oedema and/or infiltrate
- Doppler: Increased vascularity
- Local pain upon transducer palpation
- (Low resistive index)

Appendicitis

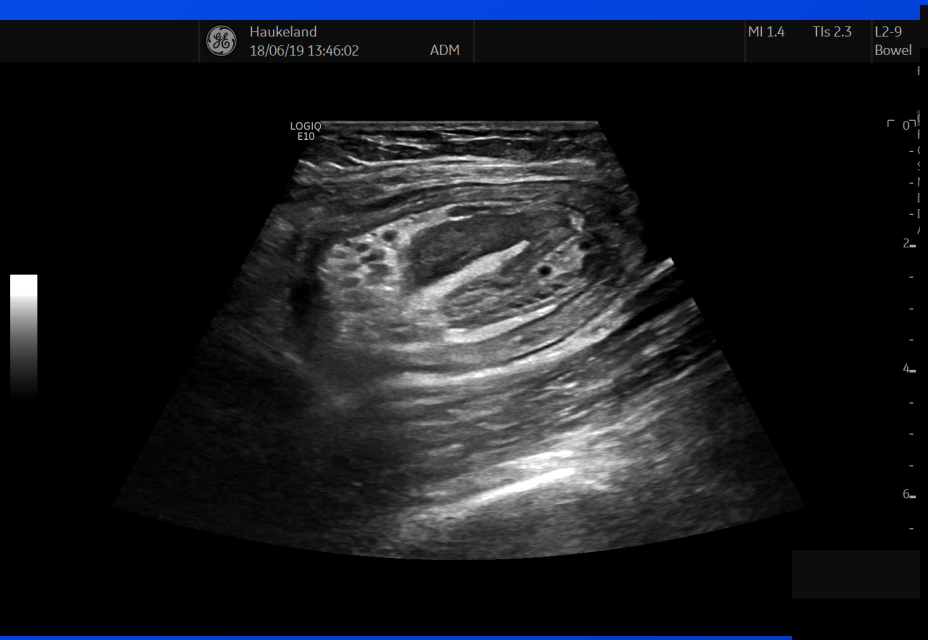




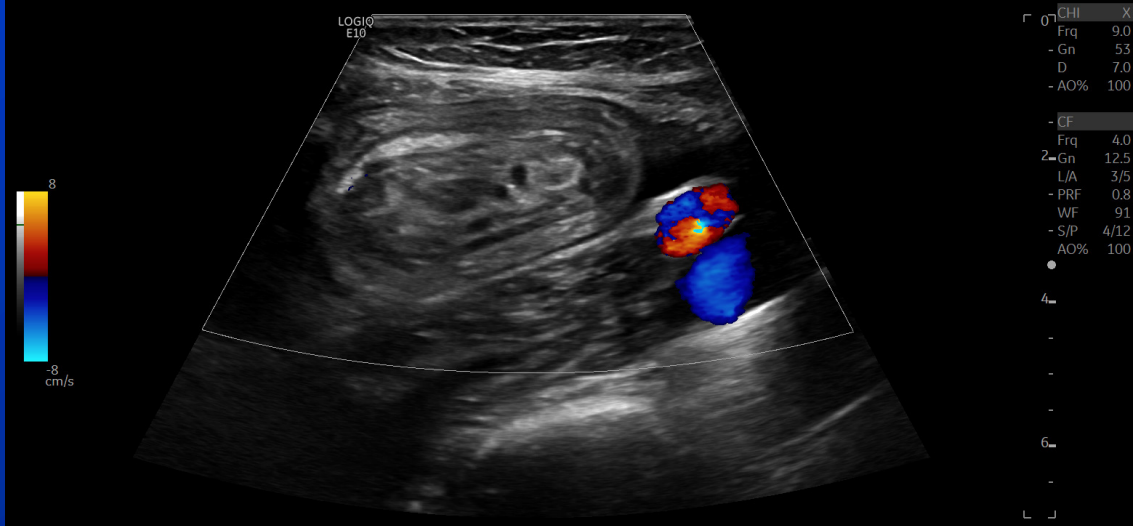


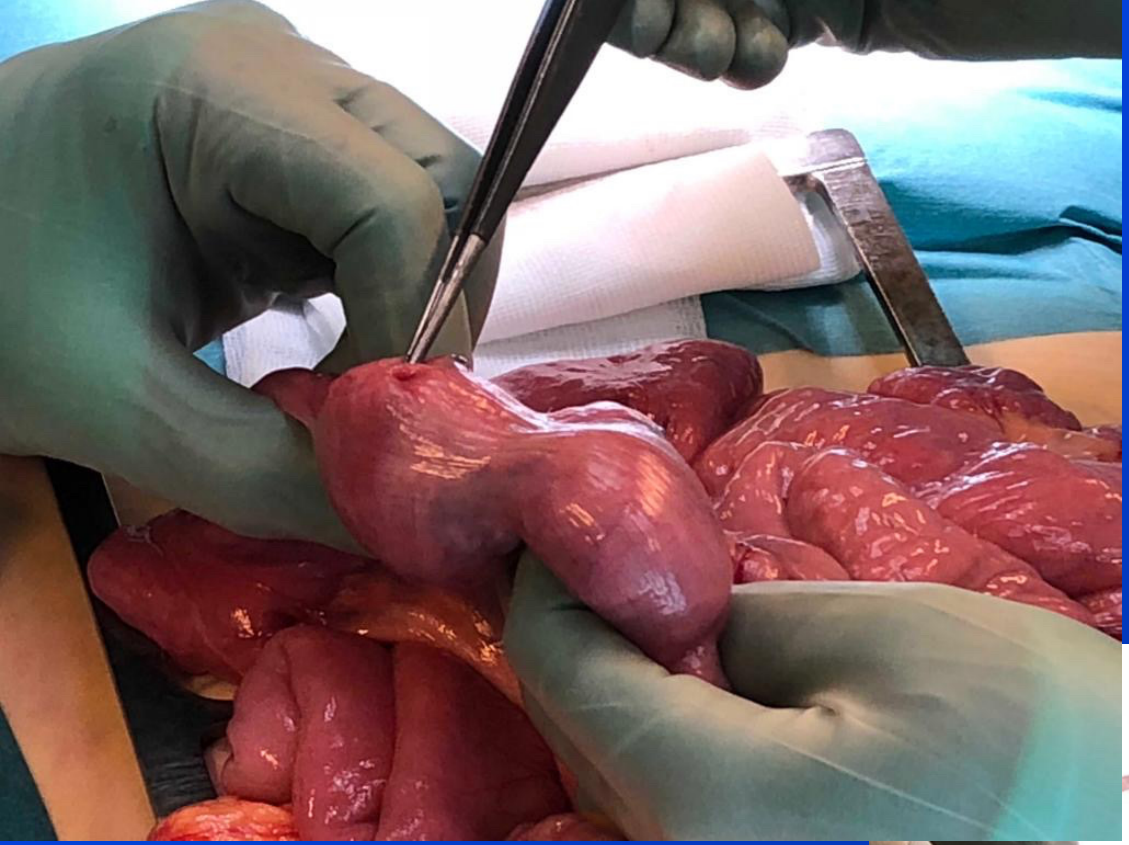
Nat

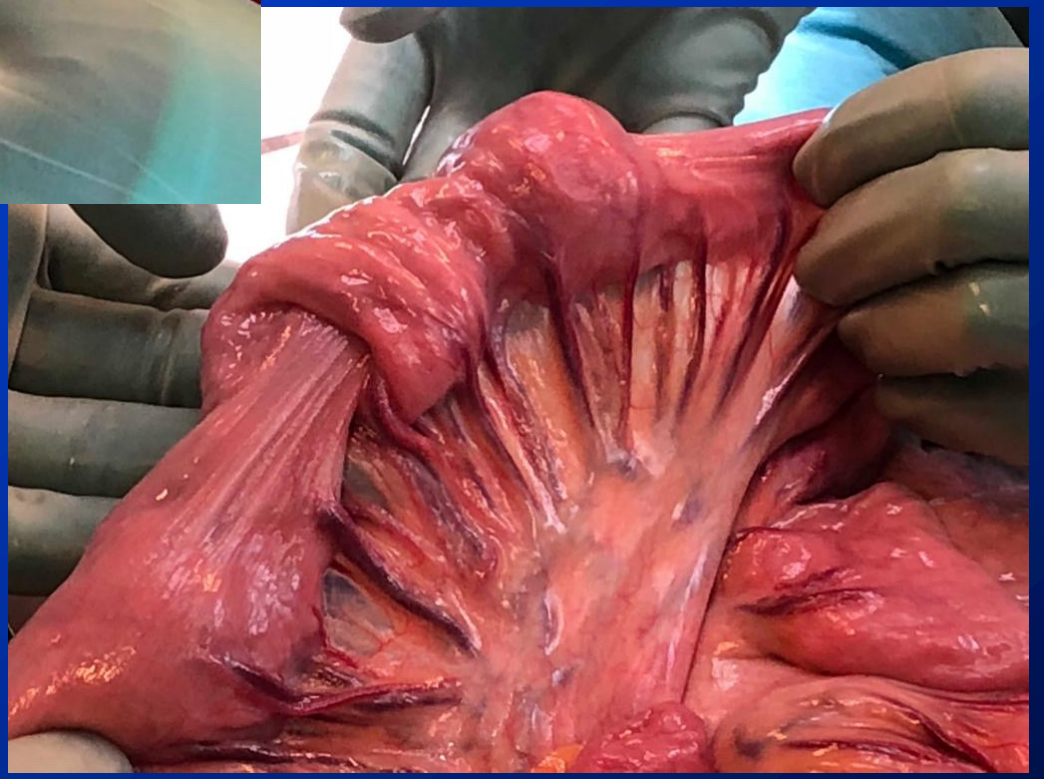
Invagination



«The onion sign»







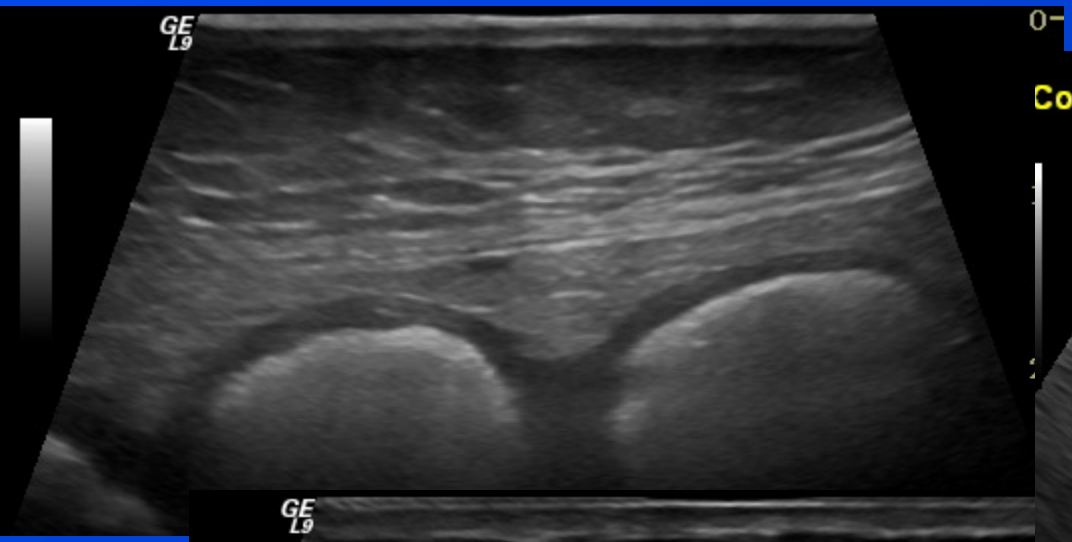
Hydrotheraphy of Invaginasjon

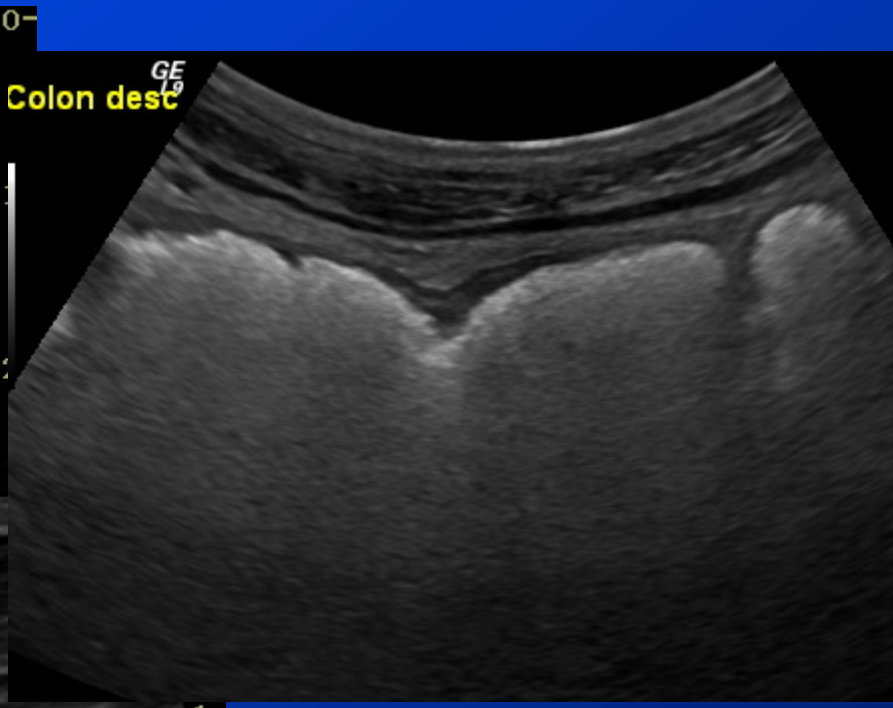
Video: Dr. Reiher

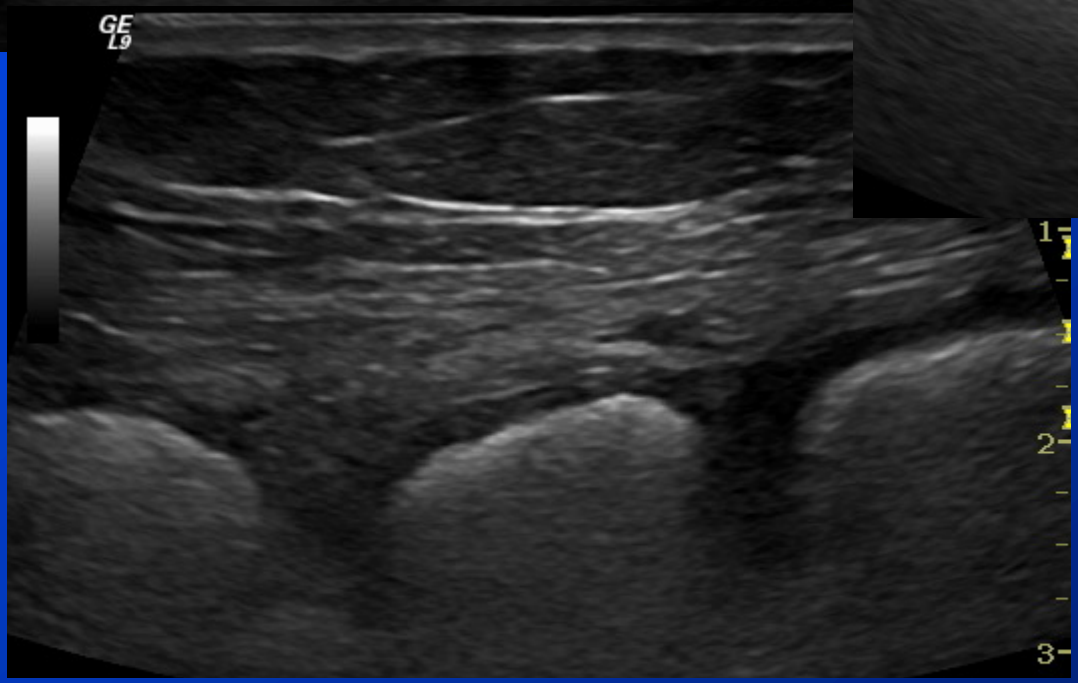
Ultrasound of the GI Tract Agenda

- Esophagus
- Ventriculus
- Duodenum
- Jejunum
- Ileum
- **Colon / Rectum**

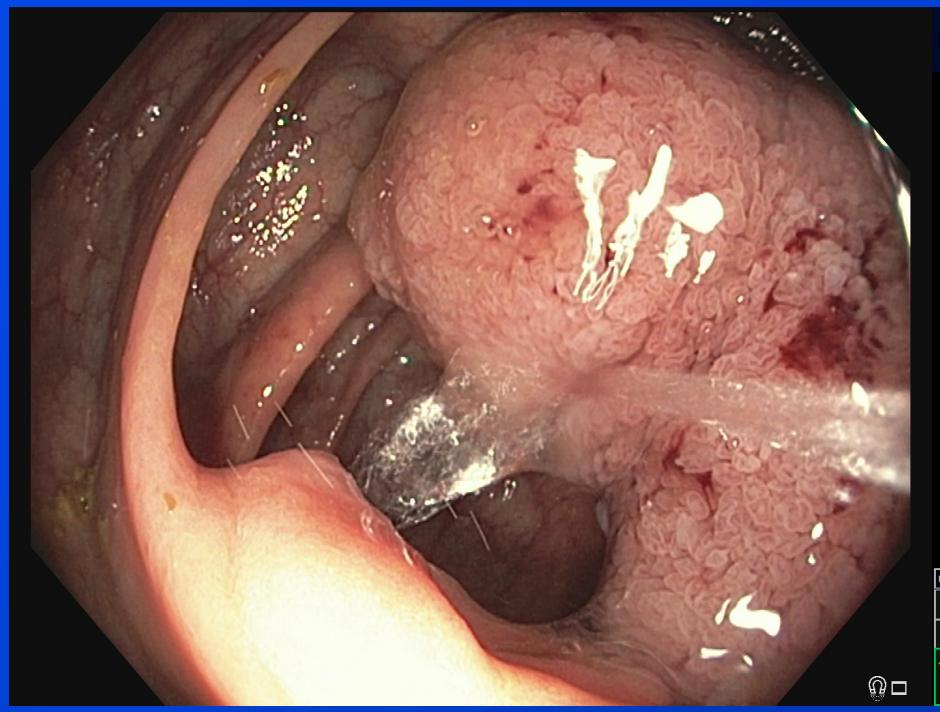
Wall Layers of Normal Colon

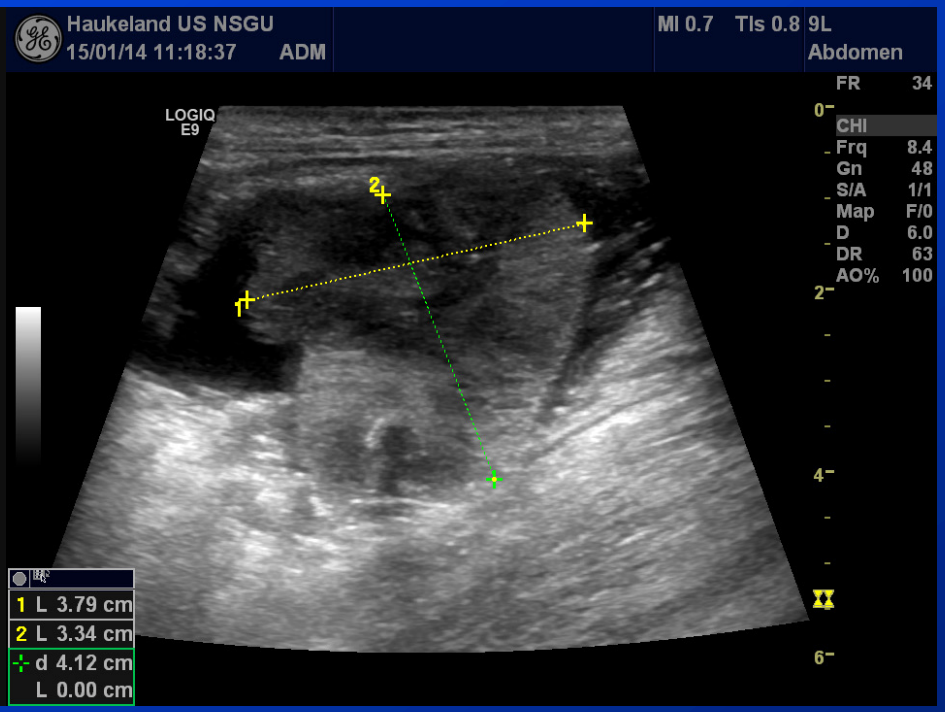


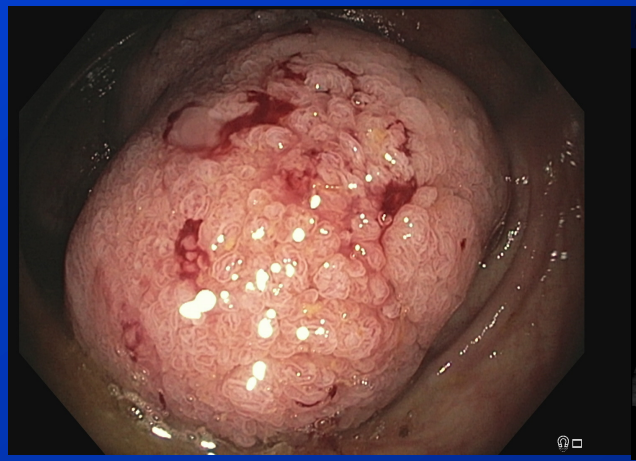


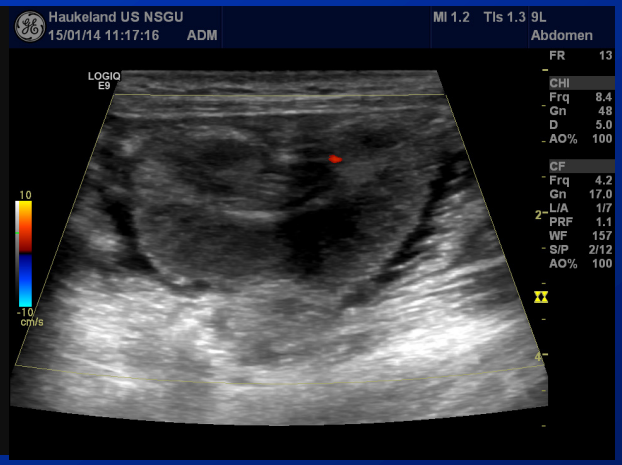


Large Polyp in Coecum

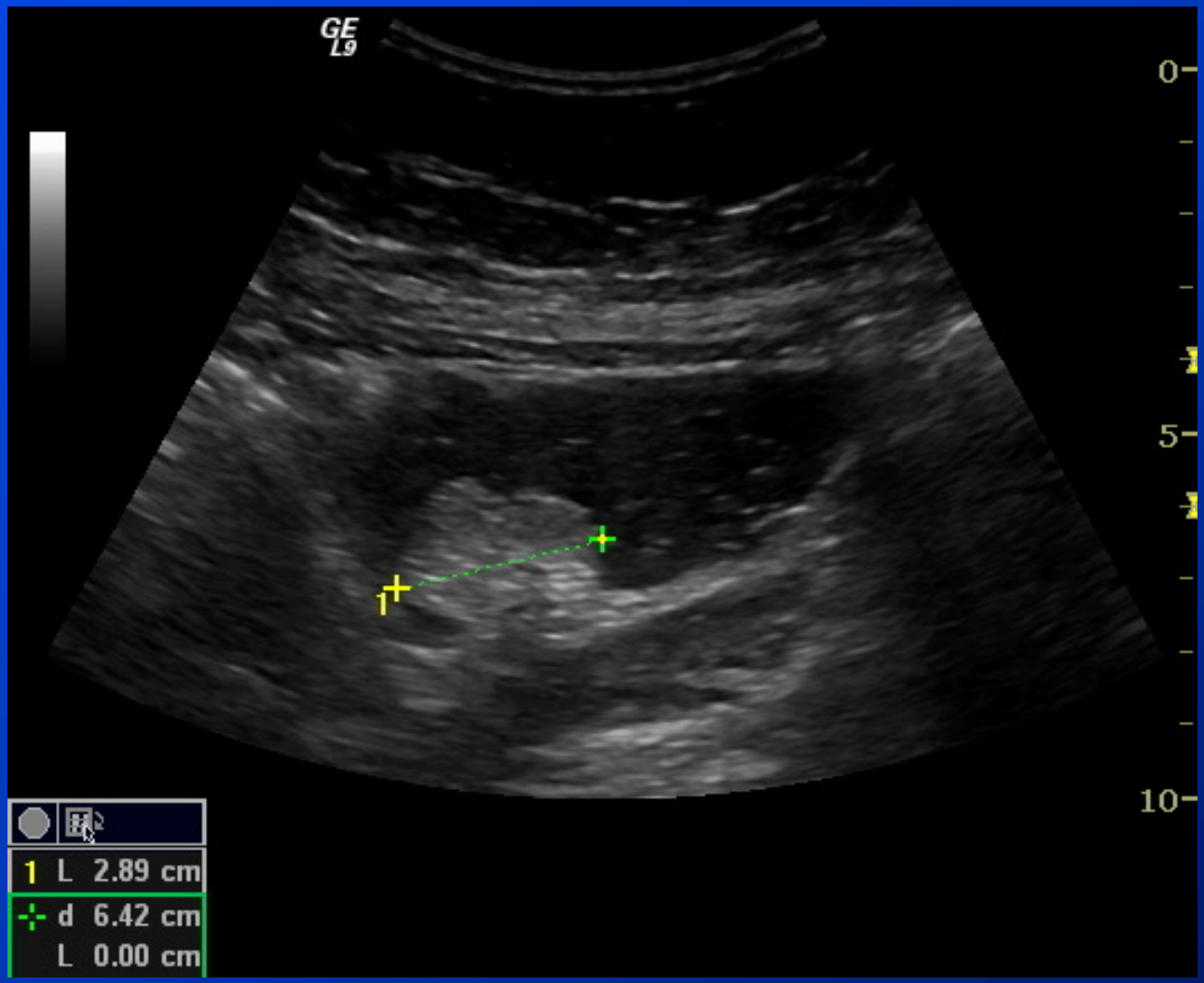




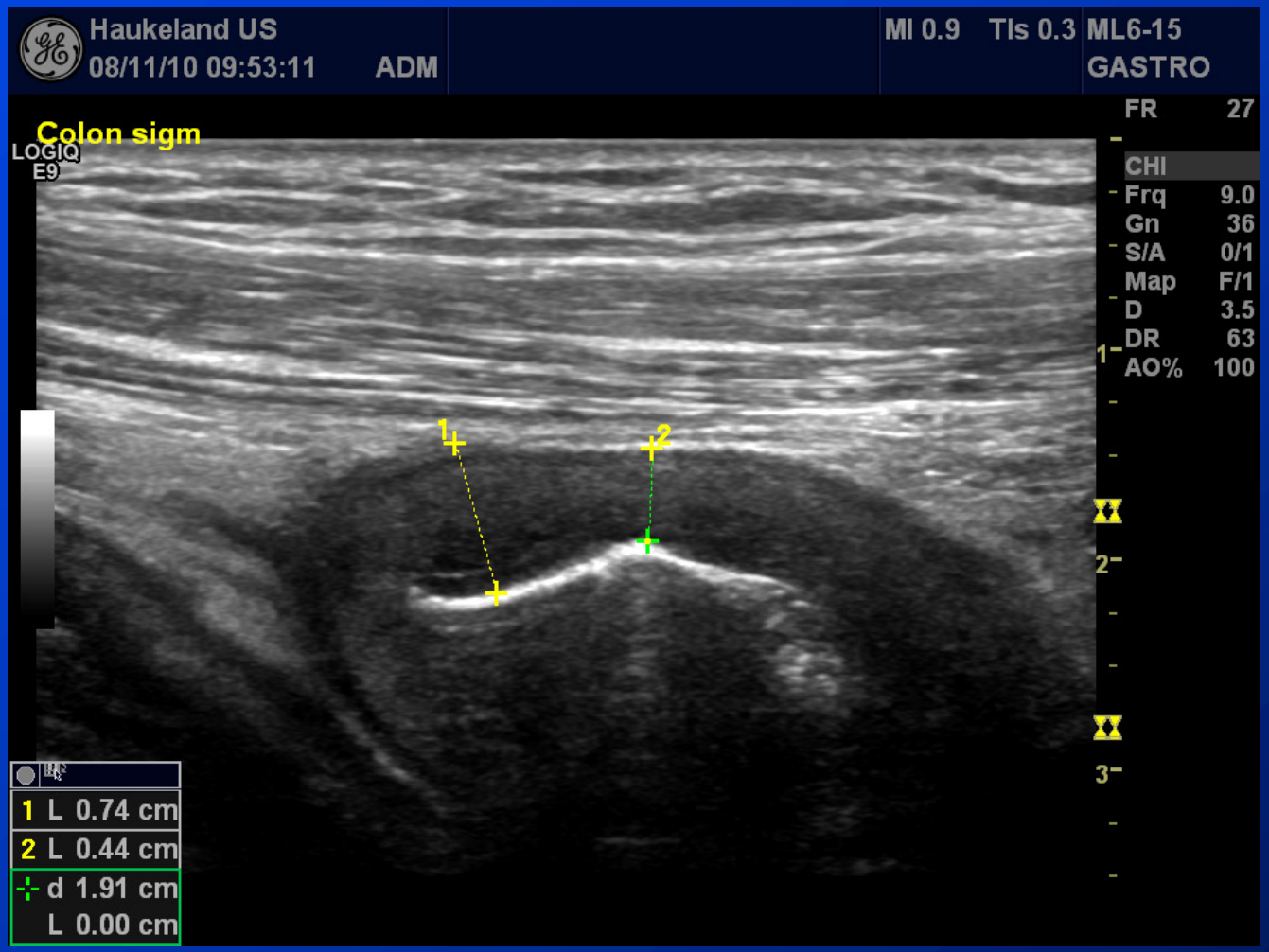


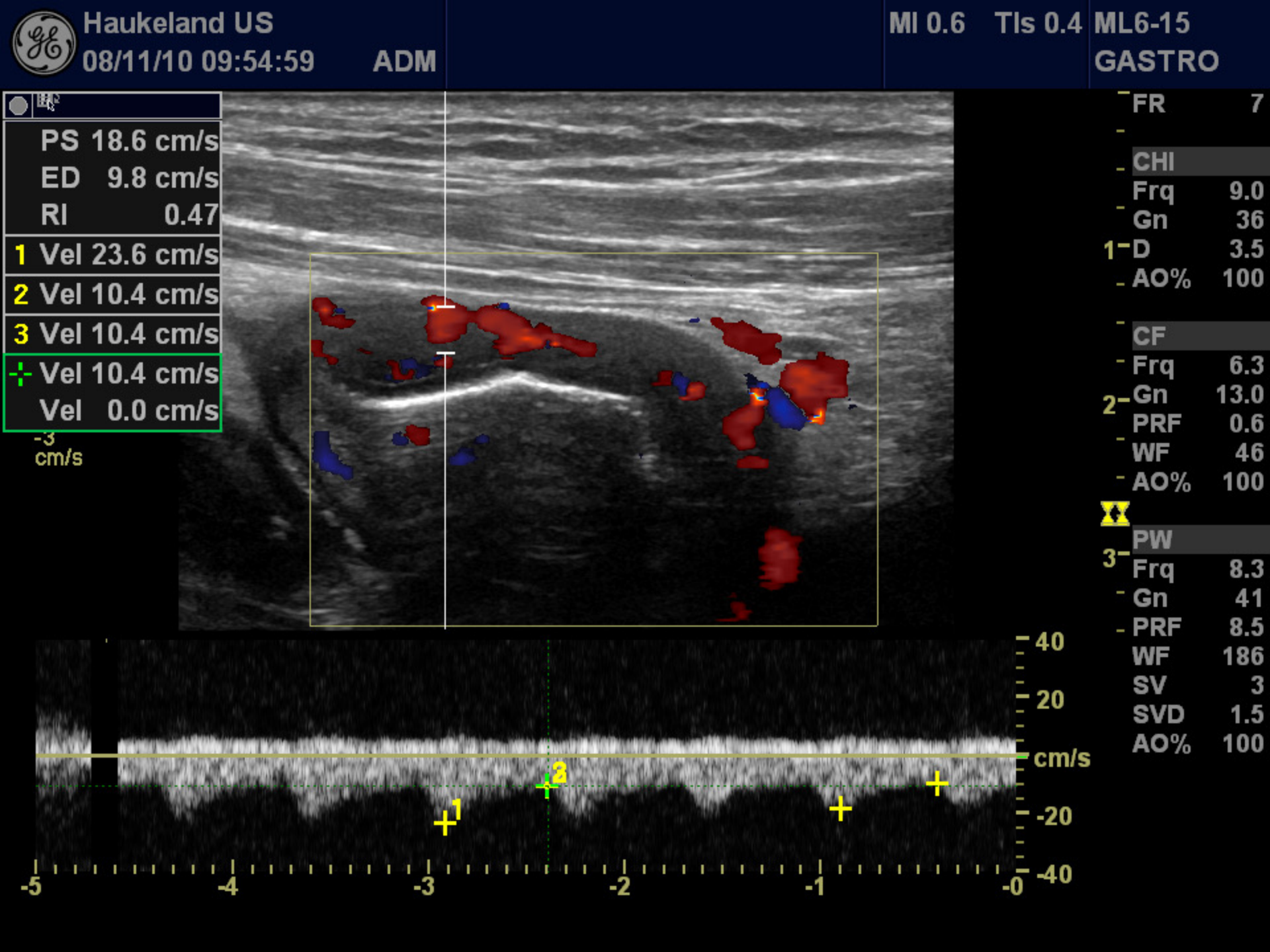


Tumor of the Coecum



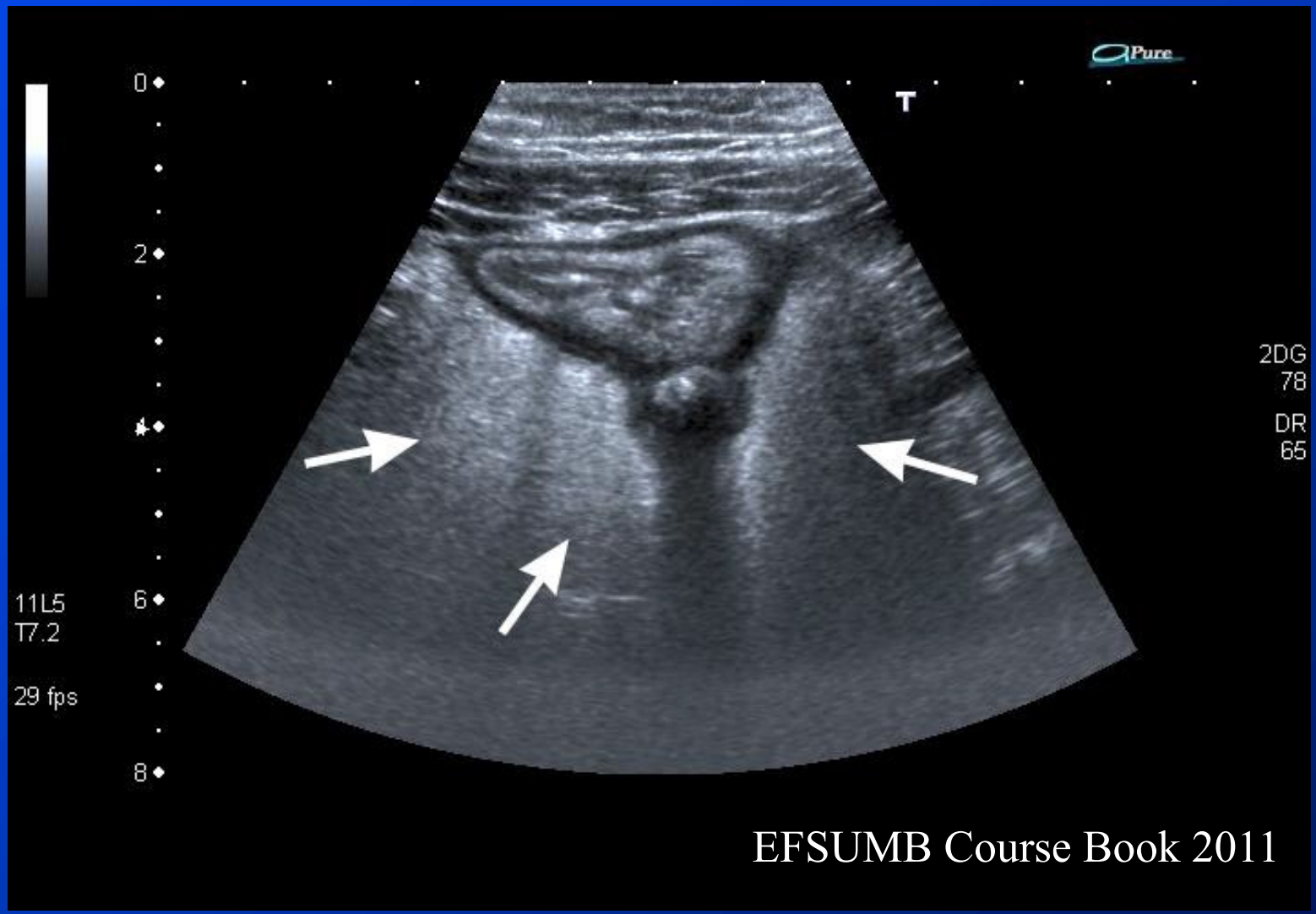
Sigmoiditis




Haukeland US
08/11/10 09:54:59
ADM
MI 0.6
TIs 0.4
ML6-15
GASTRO
PS 18.6 cm/s
ED 9.8 cm/s
RI 0.47
1 Vel 23.6 cm/s
2 Vel 10.4 cm/s
3 Vel 10.4 cm/s
Vel 10.4 cm/s
Vel 0.0 cm/s
-3
cm/s
FR 7
CHI
Frq 9.0
Gn 36
D 3.5
AO% 100
CF
Frq 6.3
Gn 13.0
PRF 0.6
WF 46
AO% 100
PW
Frq 8.3
Gn 41
PRF 8.5
WF 186
SV 3
SVD 1.5
AO% 100
40
20
cm/s
-20
-40
-5
-4
-3
-2
-1
-0
1
2

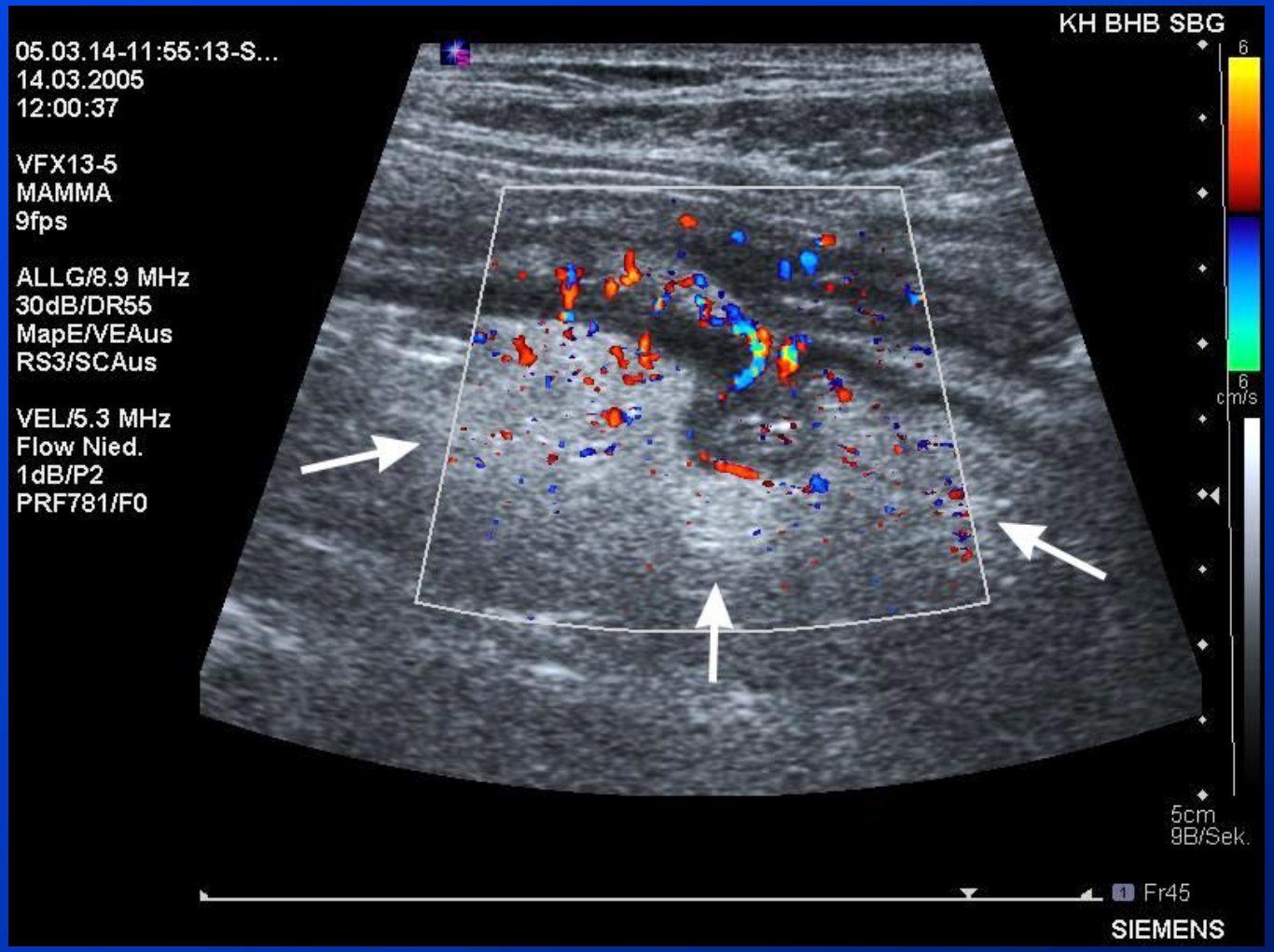
Diverticulum in the Colon

Diverticulitis



EFSUMB Course Book 2011

Diverticulitis of the Sigmoid Colon



EFSUMB Course Book 2011

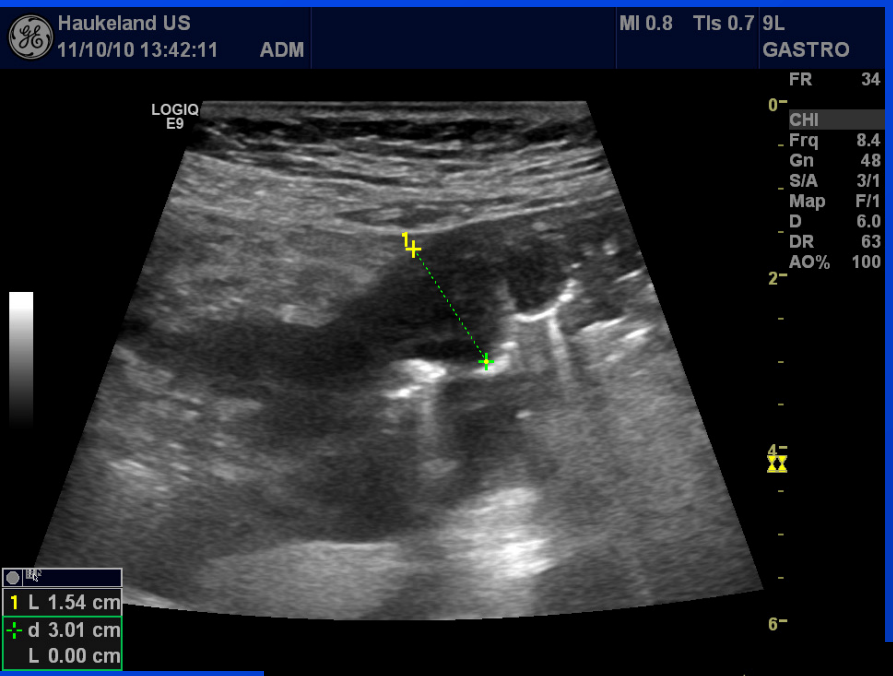
How good is US for Diverticular disease?

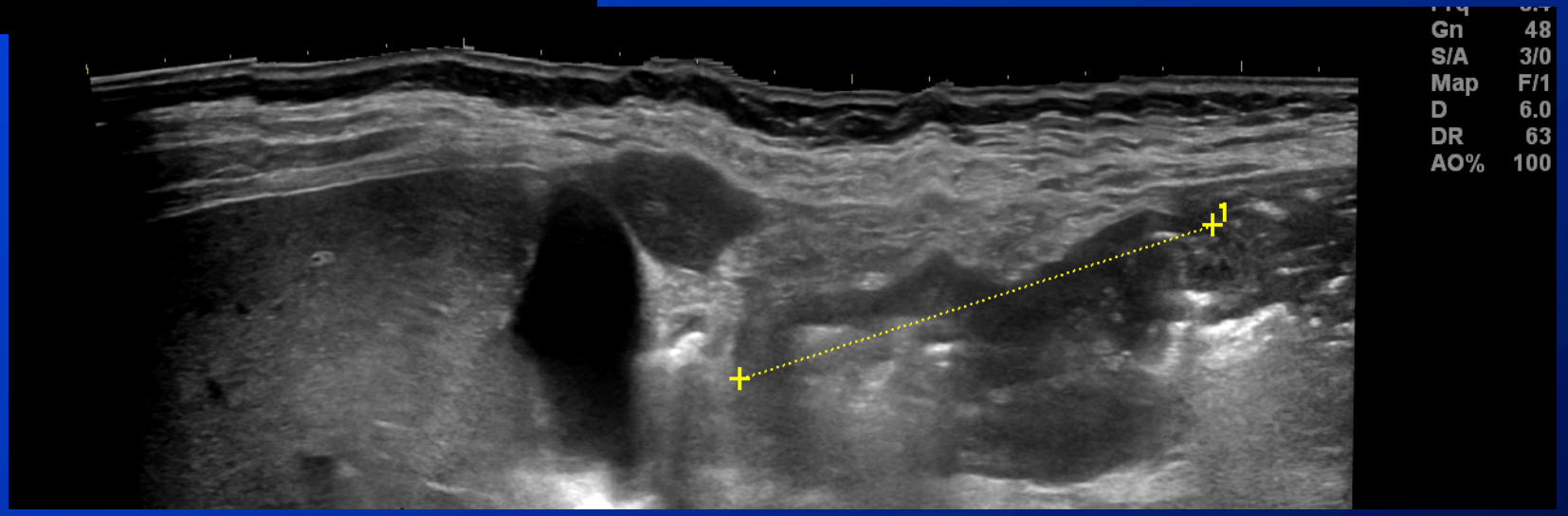
▶ **Table 3** Comparison between GIUS, CT and MRI in two metanalyses [142, 144].

method	summary sensitivity	summary specificity	metanalysis
US	92 %	90 %	Lameris 2008
	90 %	90 %	Andeweg 2014
CT	94 %	99 %	Lameris 2008
	95 %	96 %	Andeweg 2014
MRI	–	–	Lameris 2008
	98 %	70 – 78 %	Andeweg 2014

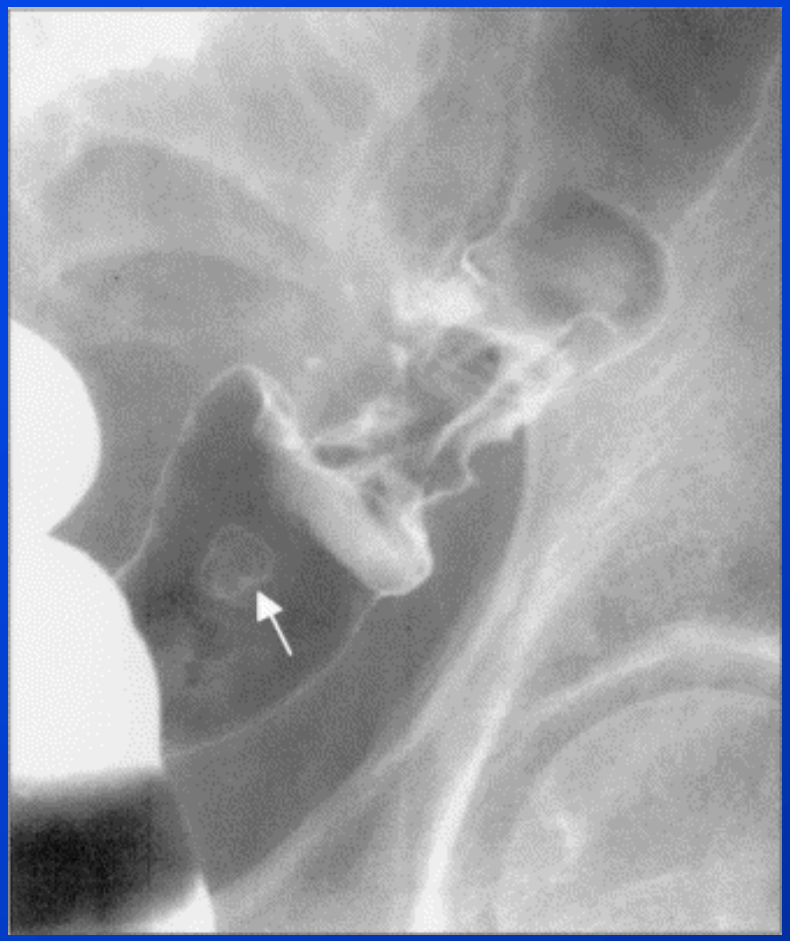
Dirks K et al. EFSUMB Position Paper… Ultraschall in Med 2019; 40

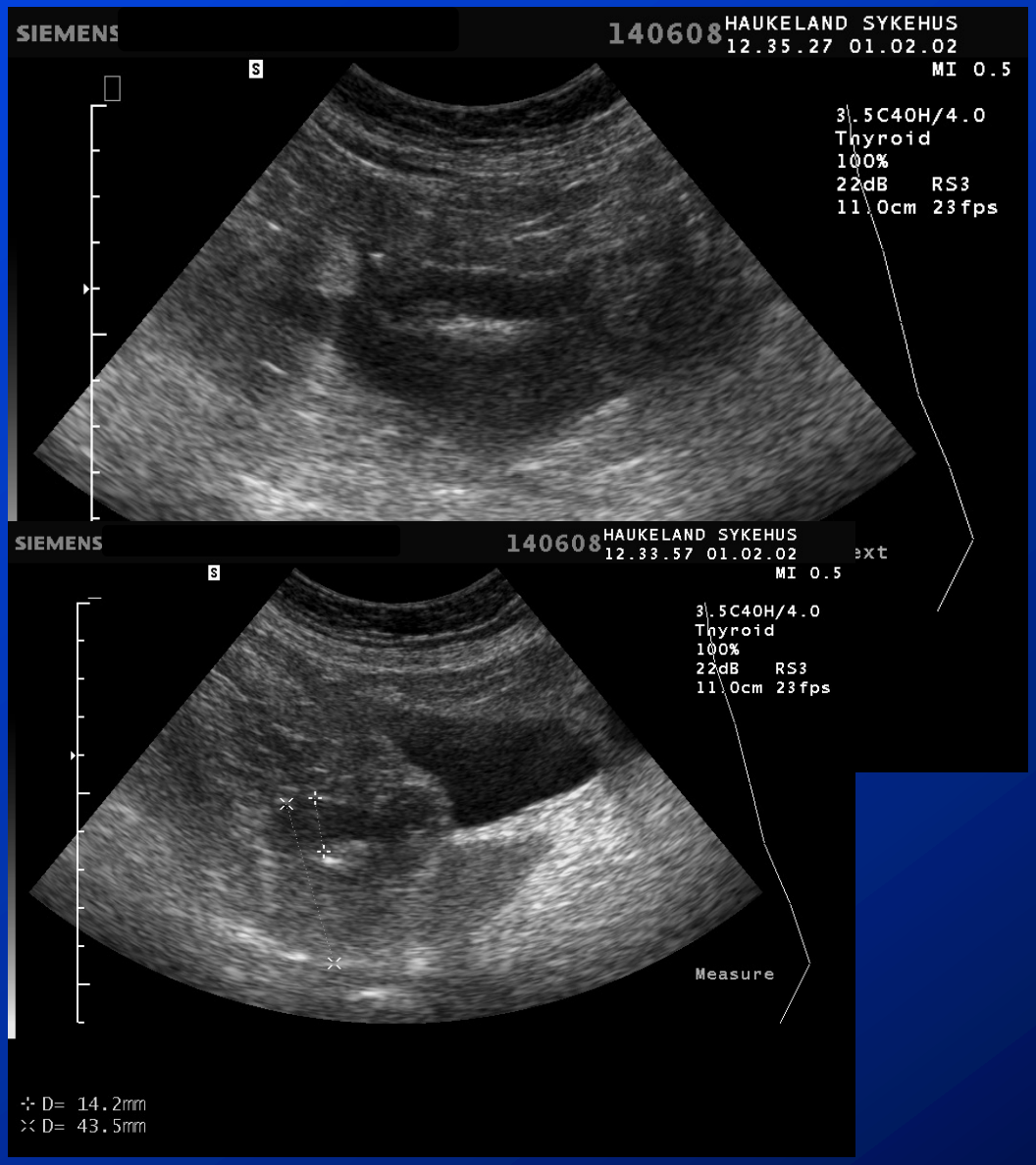
Ca. Coli at the right flexure





Ca. Coli Sigmoidei





Summary

- Useful to detect and follow-up GI diseases of the small intestine and colon
- ”Pseudo-kidney” or target lesions indicate severe pathology
- Motility and focal lesions can be visualised in the small intestine
- Wall-thickness of the GI-tract are predictive of disease activity in IBD and surgical relapse
- Complications of IBD can be imaged and characterized with US

Learn more about GIUS

Euroson-School

Gastrointestinal Ultrasound - GIUS

18. - 20. September 2025

Berlin - Hotel Aquino

organized by European Federation Ultrasound in Medicine and Biology (EFSUMB)

Brandenburg Institute for Clinical Ultrasound (BICUS)

and Campus ACADEMY

EUROSON-SCHOOL

BICUS

MHB MEDIZINISCHE HOCHSCHULE BRANDENBURG

There is only one danger using ultrasound: Incompetence