



Nasjonalt Senter for Gastroenterologisk Ultrasonografi

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

Ultralyd av øvre GI-traktus

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Impact of Dyspepsia



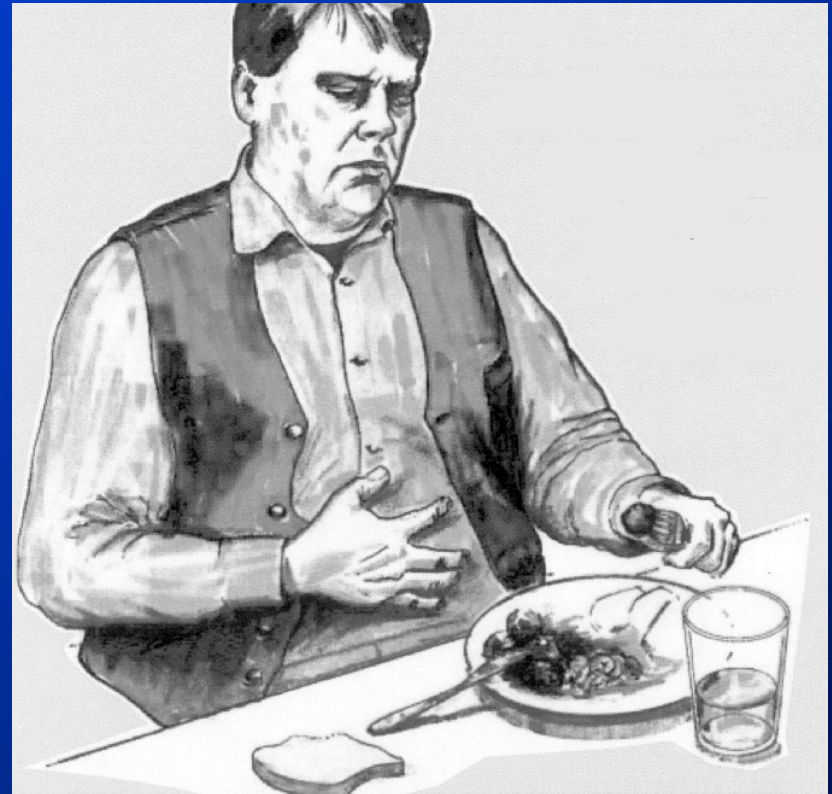
- Dyspepsia is the ruin of most things; empires, expeditions and everything else.

• Thomas de Quincey, 1822.



Dyspeptic symptoms

- **Major symptoms:**
 - epigastric pain or discomfort
 - nausea
 - bloating
 - postprandial fullness
 - early satiety
- **Minor symptoms:**
 - belching
 - regurgitation
 - vomiting
 - heartburn
 - anorexia





Case: Female - 50 years

- Previous diseases: in good health until her symptoms started 2.5 years prior to UMAT.
- Symptoms:
 - Pain in the upper abdomen, not colicky
 - Prevented by eating smaller meals
 - Intolerance to smoked and salty food
 - Fatigue
 - Problems keeping her weight up



Primary physician referred to gastroscopy

- Normal mucosa in EVD
- Duodenal bx: Normal
- Urease rapid test: positiv
 - A tripple cure was provided
 - However, no improvement



Primary physician referred to ultrasound of LPG (Dept of Radiol.)

- Normal lever og pancreas
- Galleblære:





Diagnostic Work-up

- New upper endoscopy with bx: Normal
- Plain abdominal X-ray
- Barium follow-through
- Colonic barium enema with double contrast
- A CT-scan of the abdomen
- Exercise ECG test
- 24 hrs pH-metry
- Stationary manometry
- Small bowel enema with intubation



Ultrasound Duplex Doppler

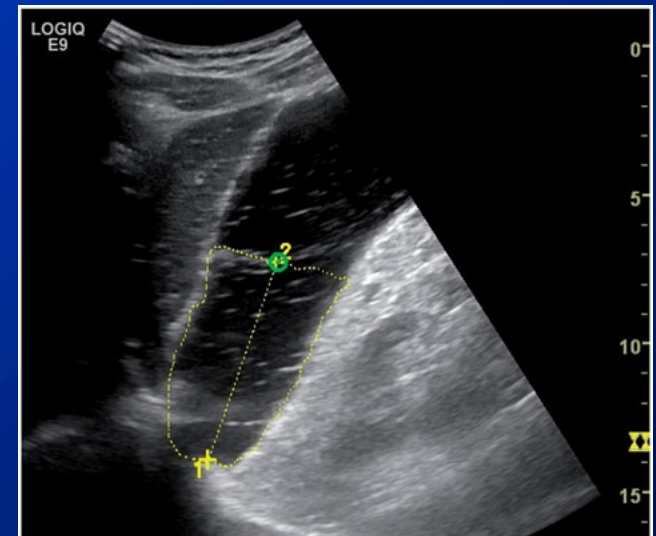
- 2,5 years after the first consultation she was again admitted to the Medical Ward because of problems in gaining weight and postprandial dyspepsia
- Duplex-Doppler examination of the mesenteric arteries: normal velocities in the coeliac trunk and the superior mesenteric artery and no signs of thrombo-occlusive disease that could indicate intestinal claudication.



The Ultrasound Meal Accommodation Test

A Clinical Stress Test

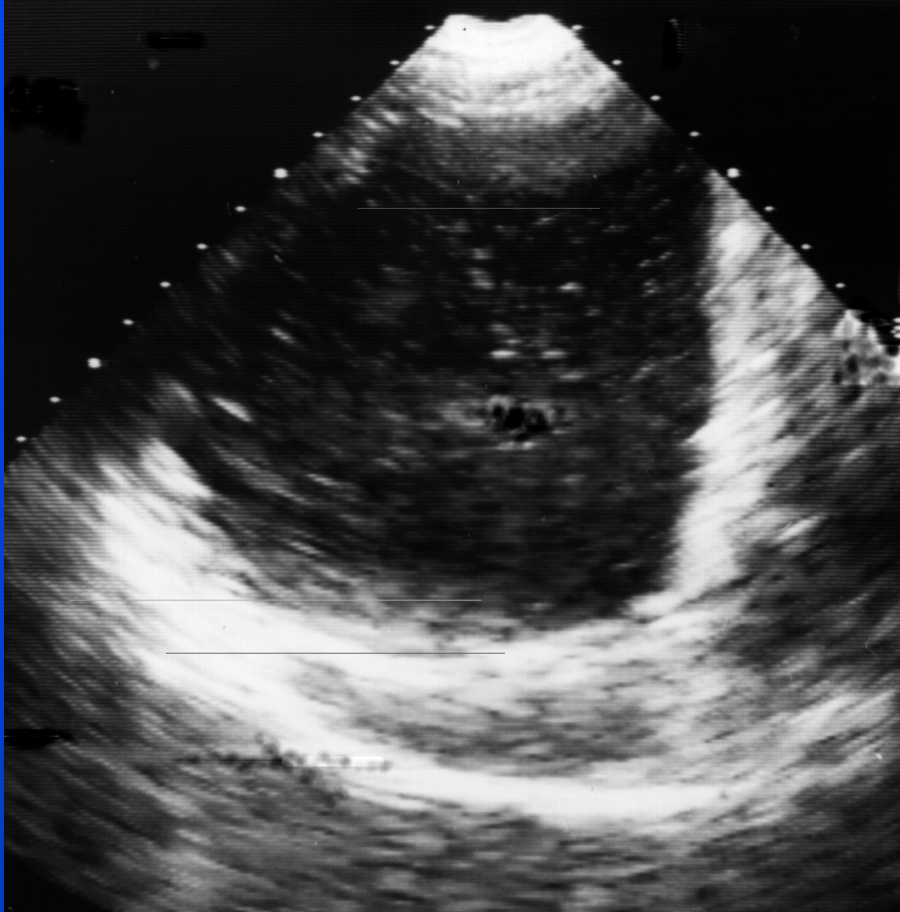
- **Test Meal**
 - 500 ml in 4 min
- **Ultrasound scanning**
 - Distal and proximal stomach
 - 2D and 3D ultrasound
- **Morphometry**
- **Evaluation of Symptoms**
 - Before and after meal
- **Psychological assessment**



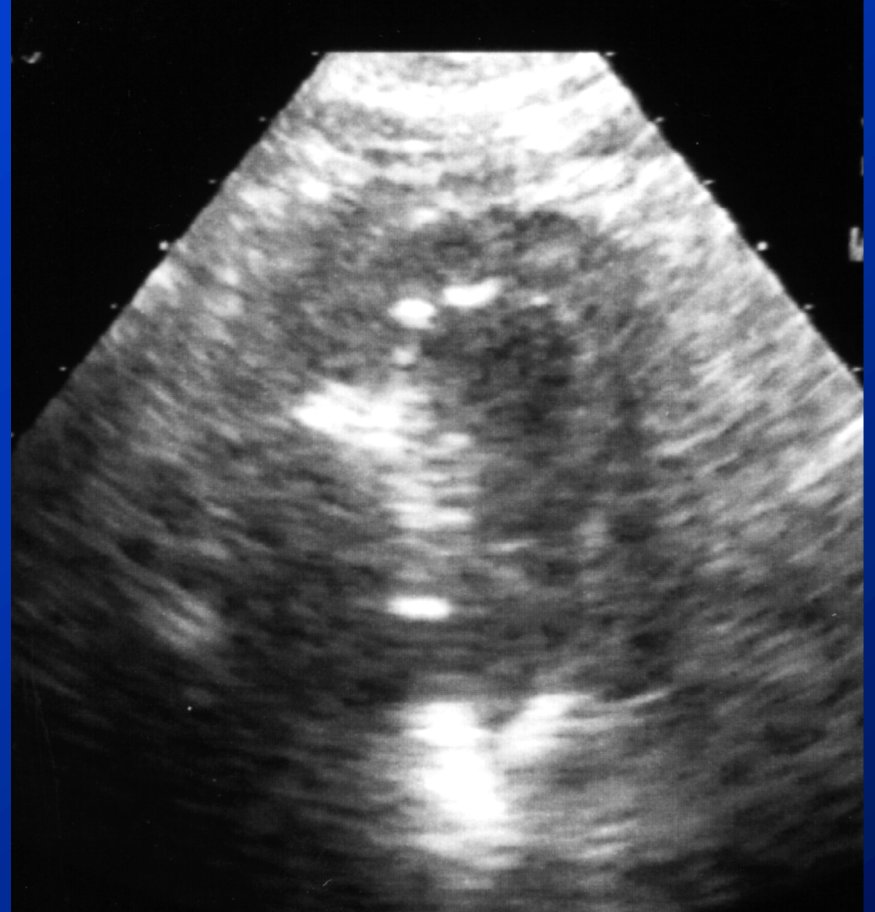


Transabdominal ultrasonography

UMAT - 500 ml meat soup



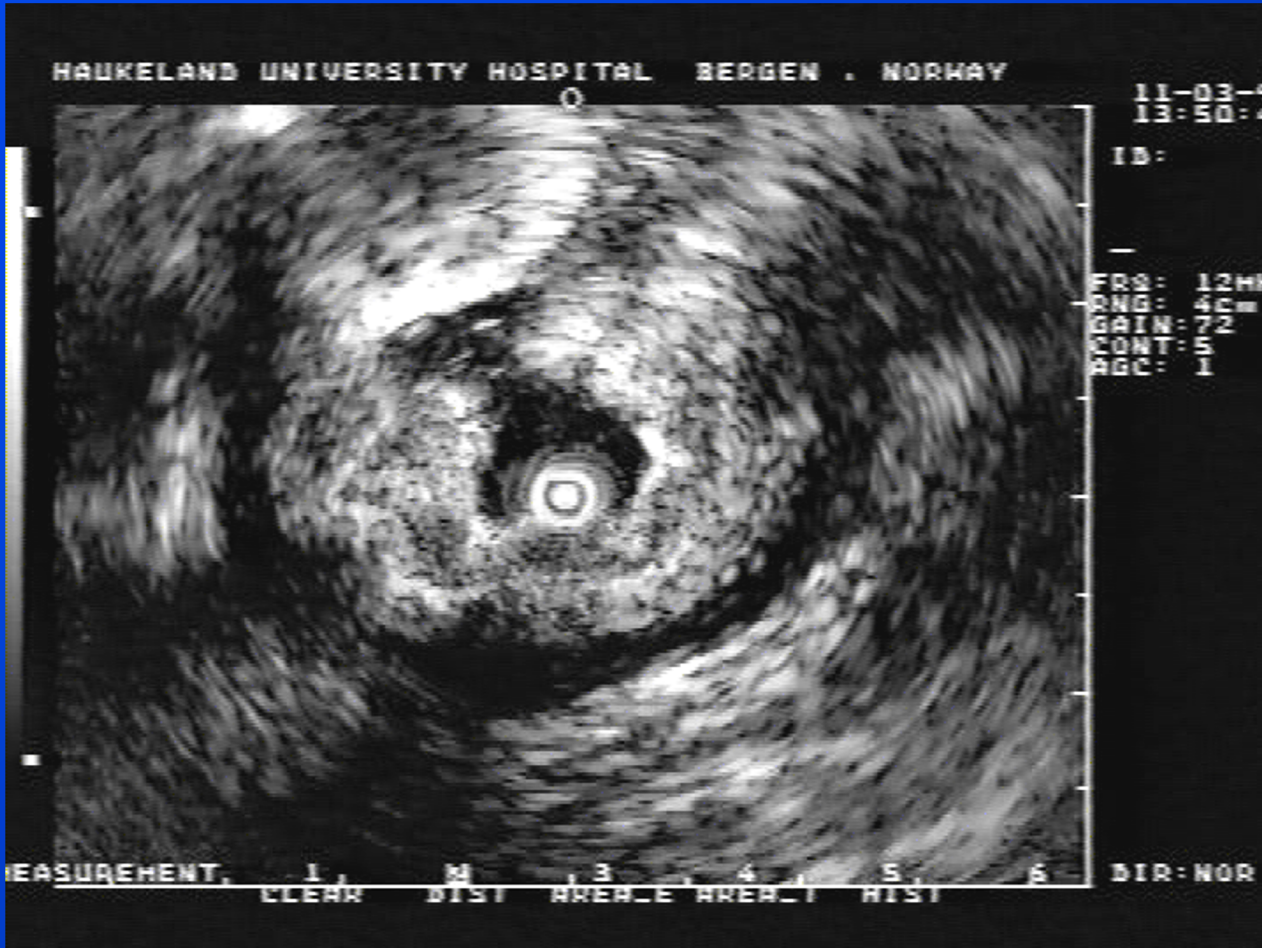
Normal view



Patient with dyspepsia



EUS image of the gastric wall



- 12 MHz transducer
- Wall-thickness: 12 mm
- 5 layers of the wall could be identified
- In some areas, submucosa was hypoechoic
- Peri-gastric lymph-nodes were observed.



End of story...

- The biopsy: Adenocarcinoma
- Diagnosis: linitis plastica involving the proximal stomach
- Tx plan: Gastrectomy
- However, a pre-operative laparoscopy revealed peritoneal carcinomatosis
- Tx: Palliative care
- The patient died three months later.



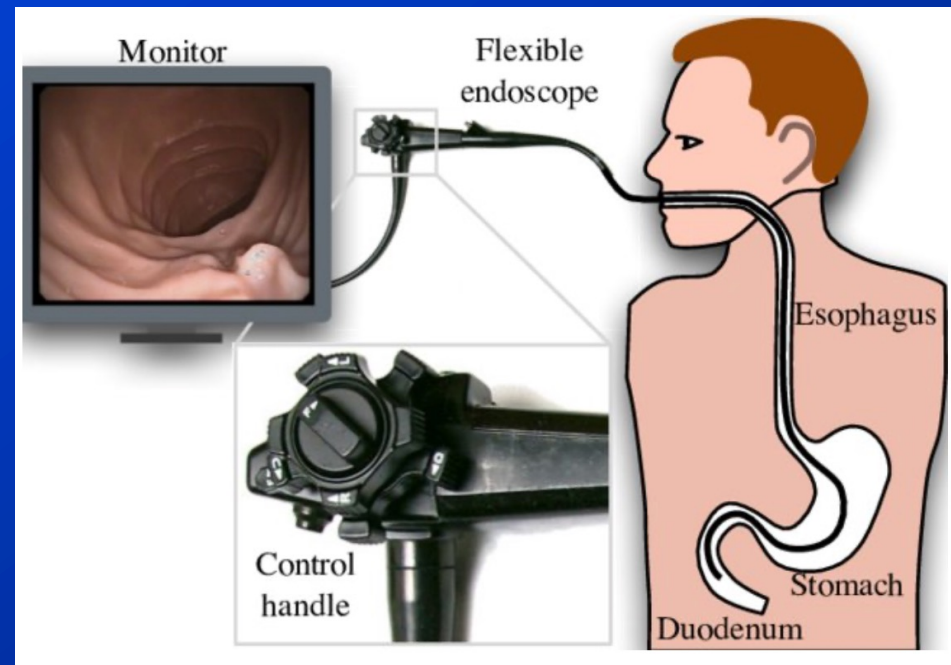
Learning points

- Impaired accommodation of the proximal stomach is most frequently seen in a functional disorder, but an organic disease should be kept in mind, in particular in patients above 45 years
- The Ultrasound Meal Accommodation Test (UMAT) is a cheap and non-invasive way to assess accommodation of the proximal stomach
- Use big biopsy-forceps in the stomach in cases where malignancy is suspected
- Endoscopy has limitations
- Ultrasound is more than “US LPG”



Upper endoscopy

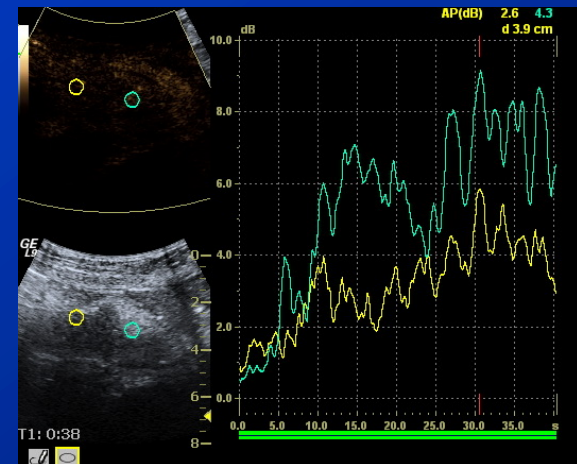
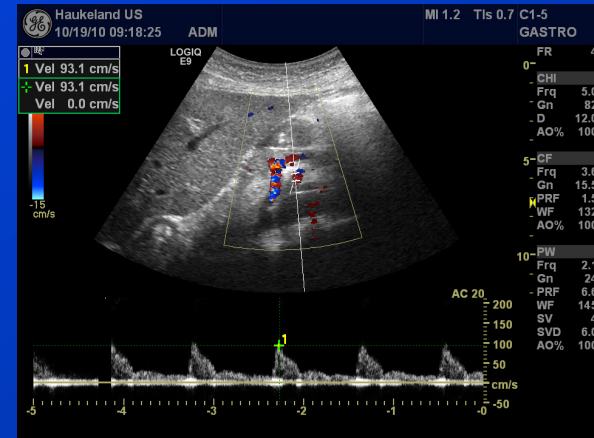
- Important limitations:
 - Invasive procedure
 - Resource demanding
 - Surface imaging only
 - Biopsy
 - Deep enough ?
 - Representative ?
 - Risk of sampling error





Ultrasound is more than an image

- A-mode
- M-Mode
- B-mode
- Doppler
 - Continuous
 - Pulsed
 - Color
 - Power / Angio
 - Tissue Doppler
 - Strain Rate Imaging
- Functional ultrasound
- 3D and 4D ultrasound
- Elastography
- Harmonic imaging
- Contrast-enhanced ultrasound (CEUS)
- Guiding of interventions
- Ultrasound therapy - sonoporation



A versatile
Ultrasound Toolbox !



GIUS – EFSUMB guidelines on Gastro-Intestinal Ultrasound

- Task Force Group of over 20 experts from Europe
- Started at UEG Week in October 2014
- 7 guideline/position paper publications:
 - 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)



Ultrasound Scanning of the Proximal Stomach





Be aware !

Signs of severe pathology

Pseudo-Kidney Sign



Target Lesion



Lake Chamo, Ethiopia

Taking a last breath before
going down the upper GI tract



Photo: OH Gilja

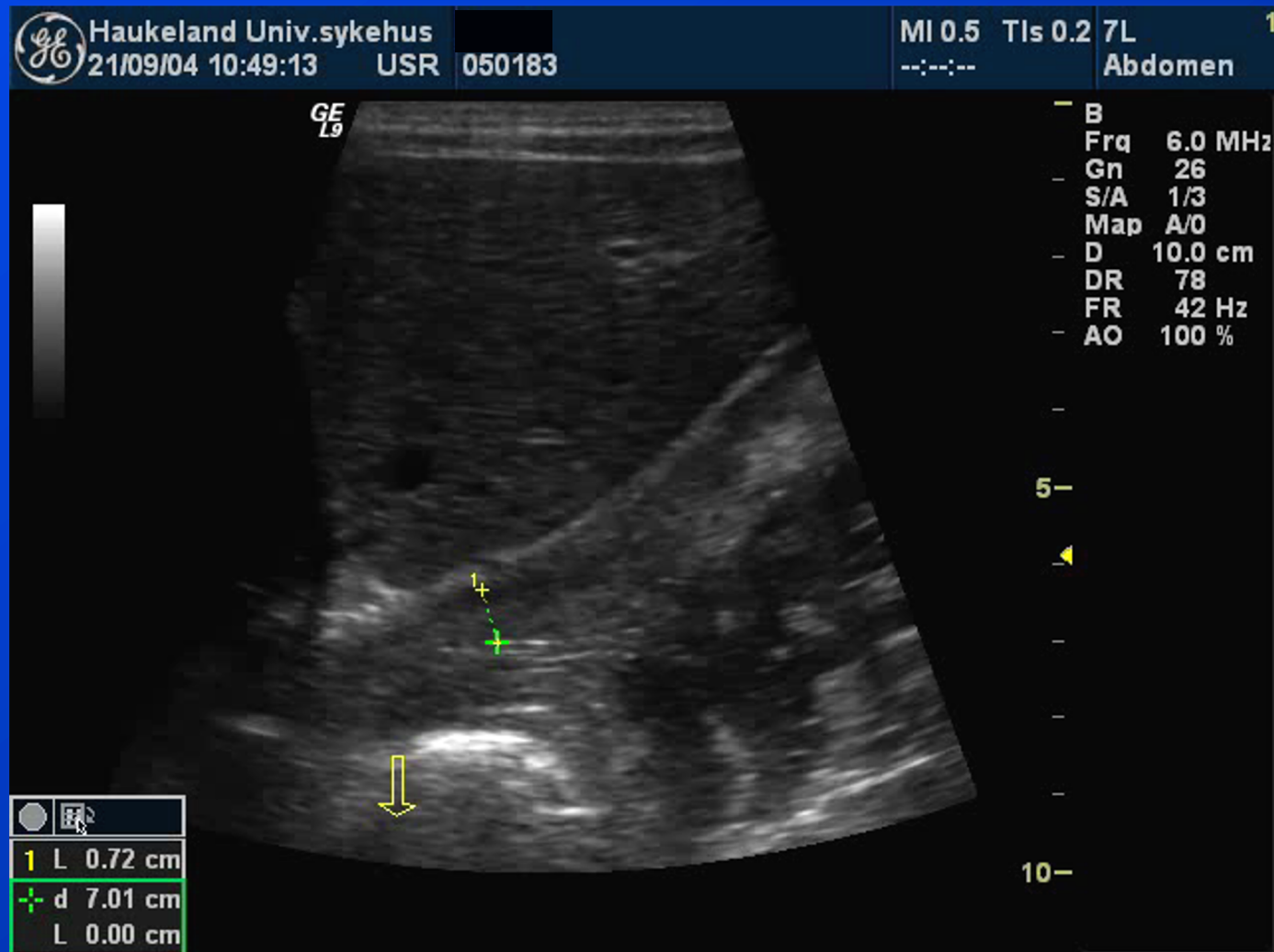


Ultrasound of the esophagus and upper stomach



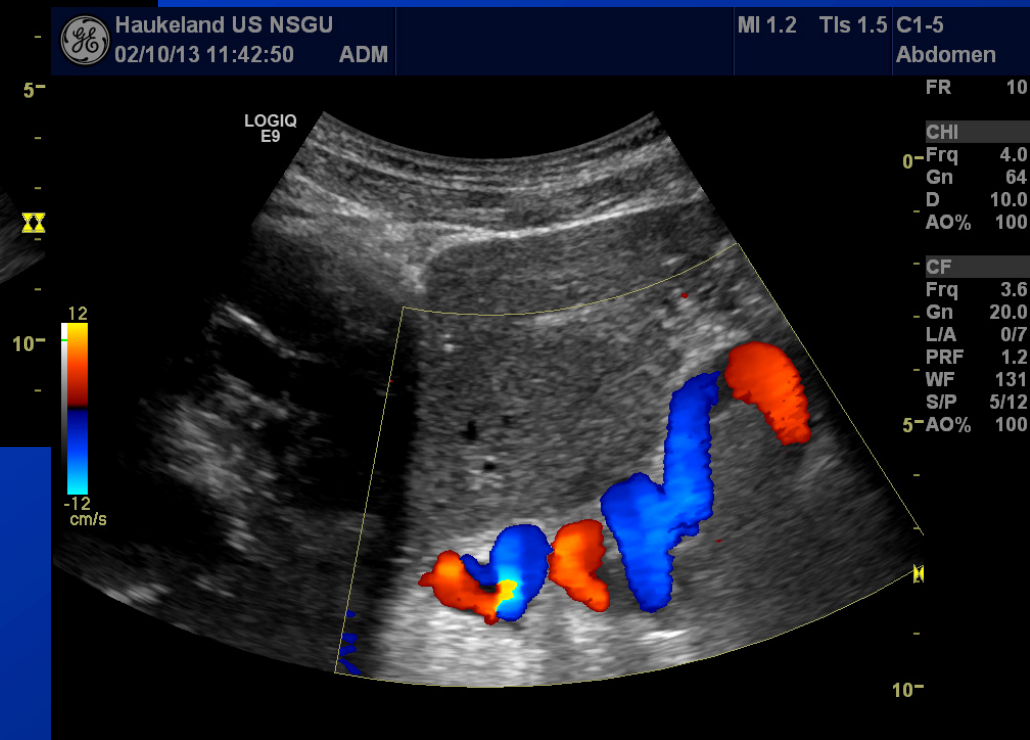
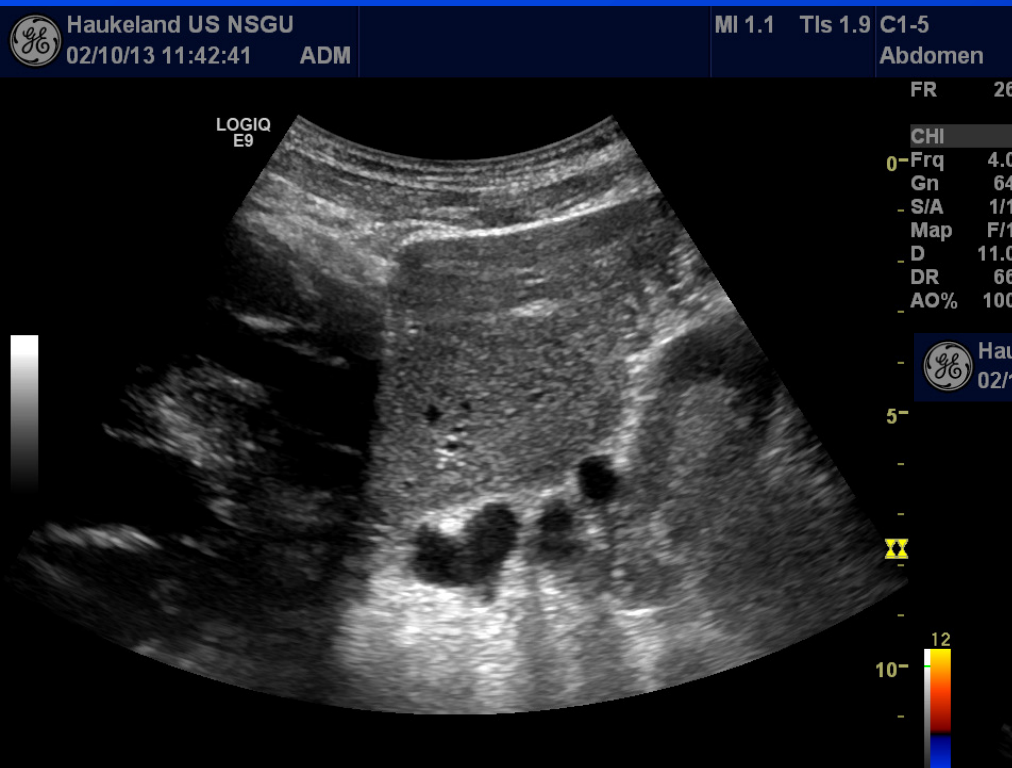


Stricture of the Esophagus in Crohn's disease



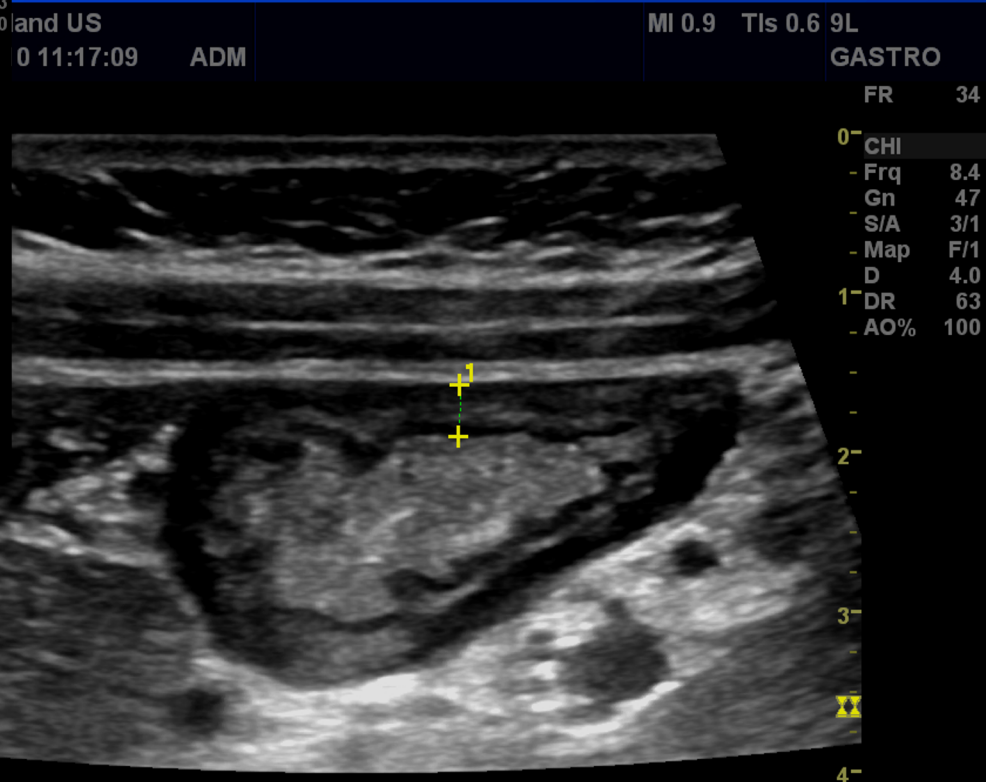


Esophageal and Gastric Varices





Gastric body and Antrum



1 L 0.32 cm

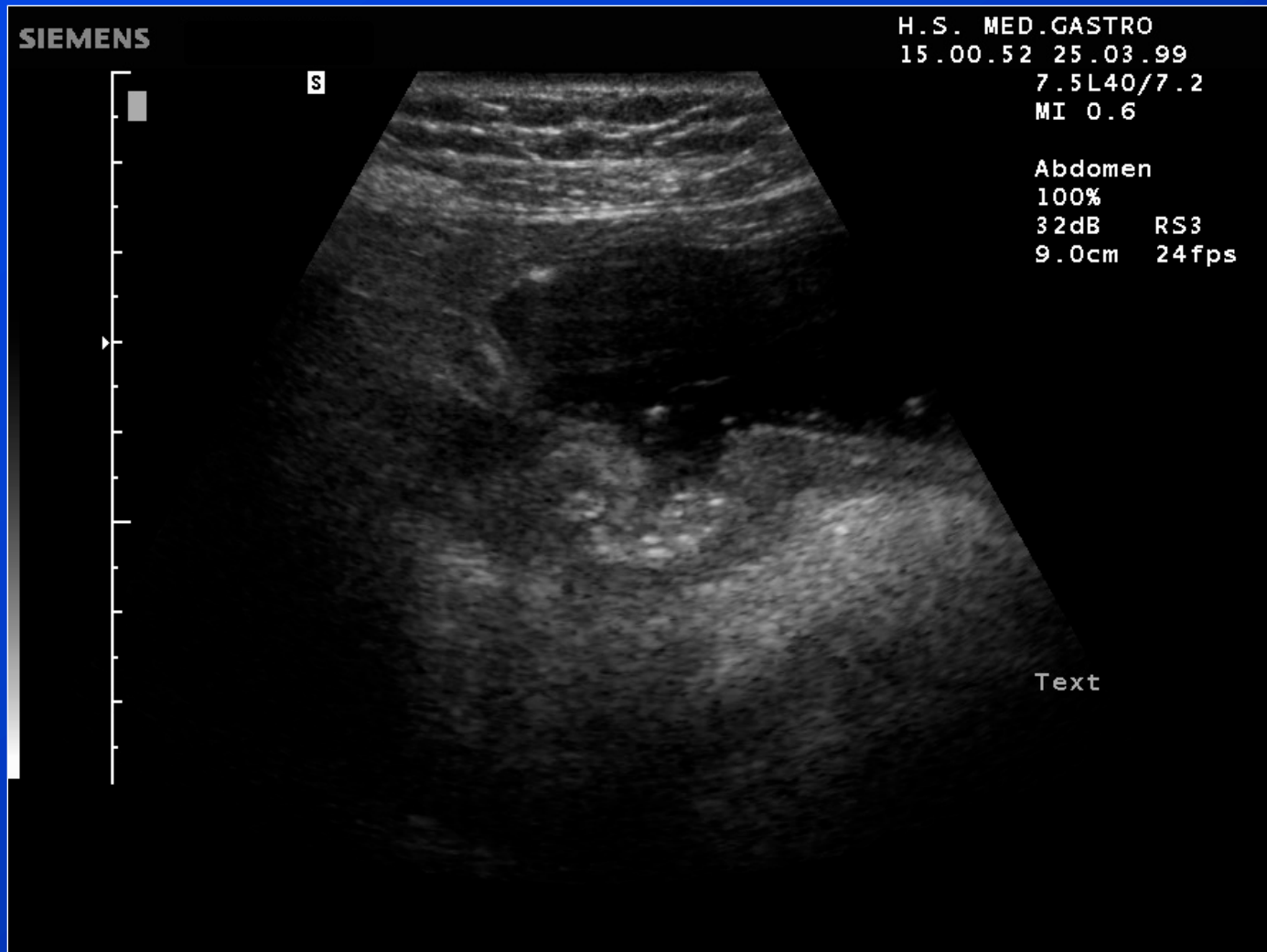


Gastric Wall-layers



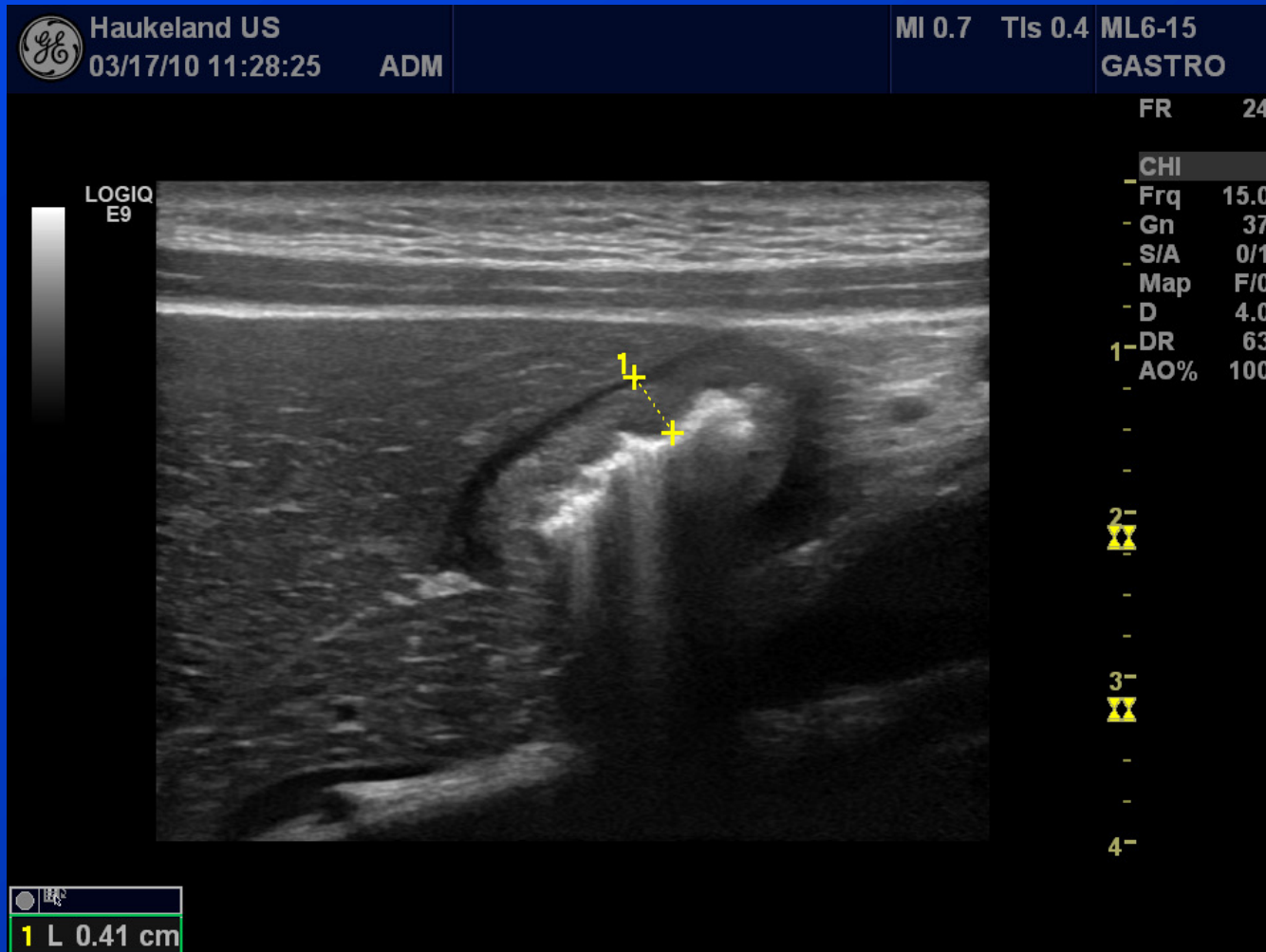


Gastric Ulcer



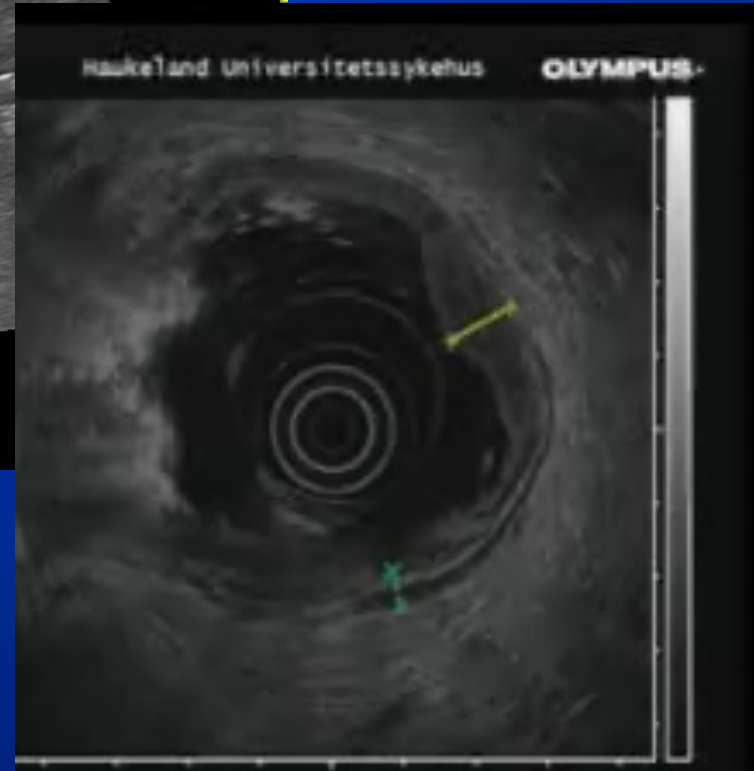
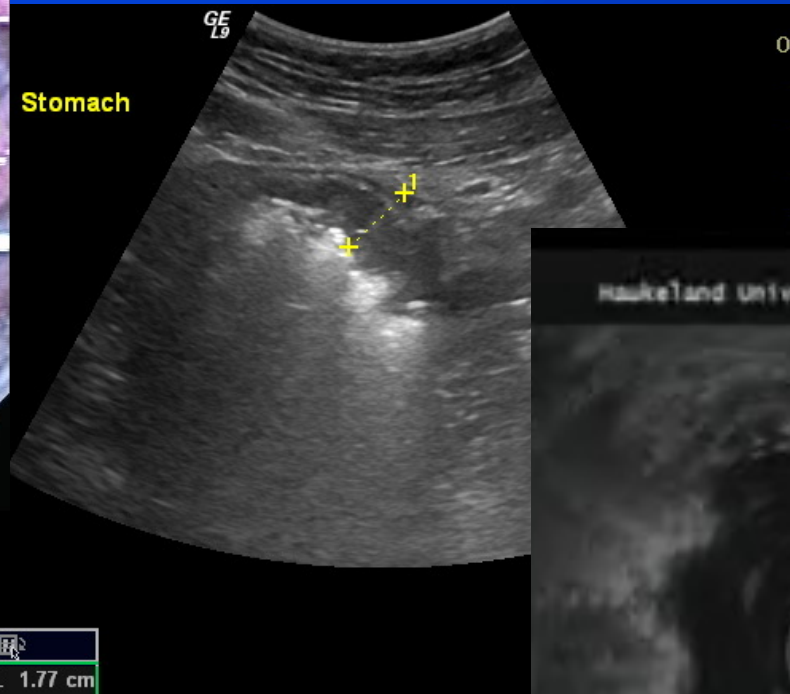
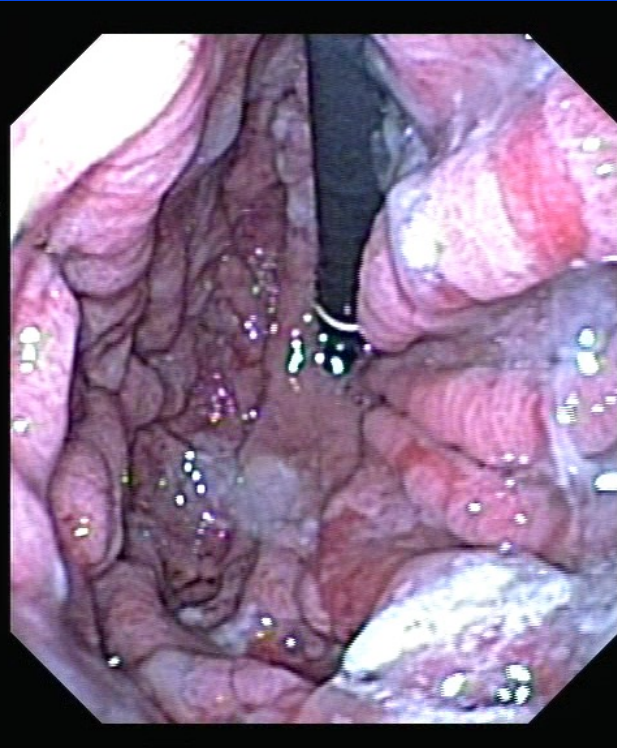


H.P. Gastritis





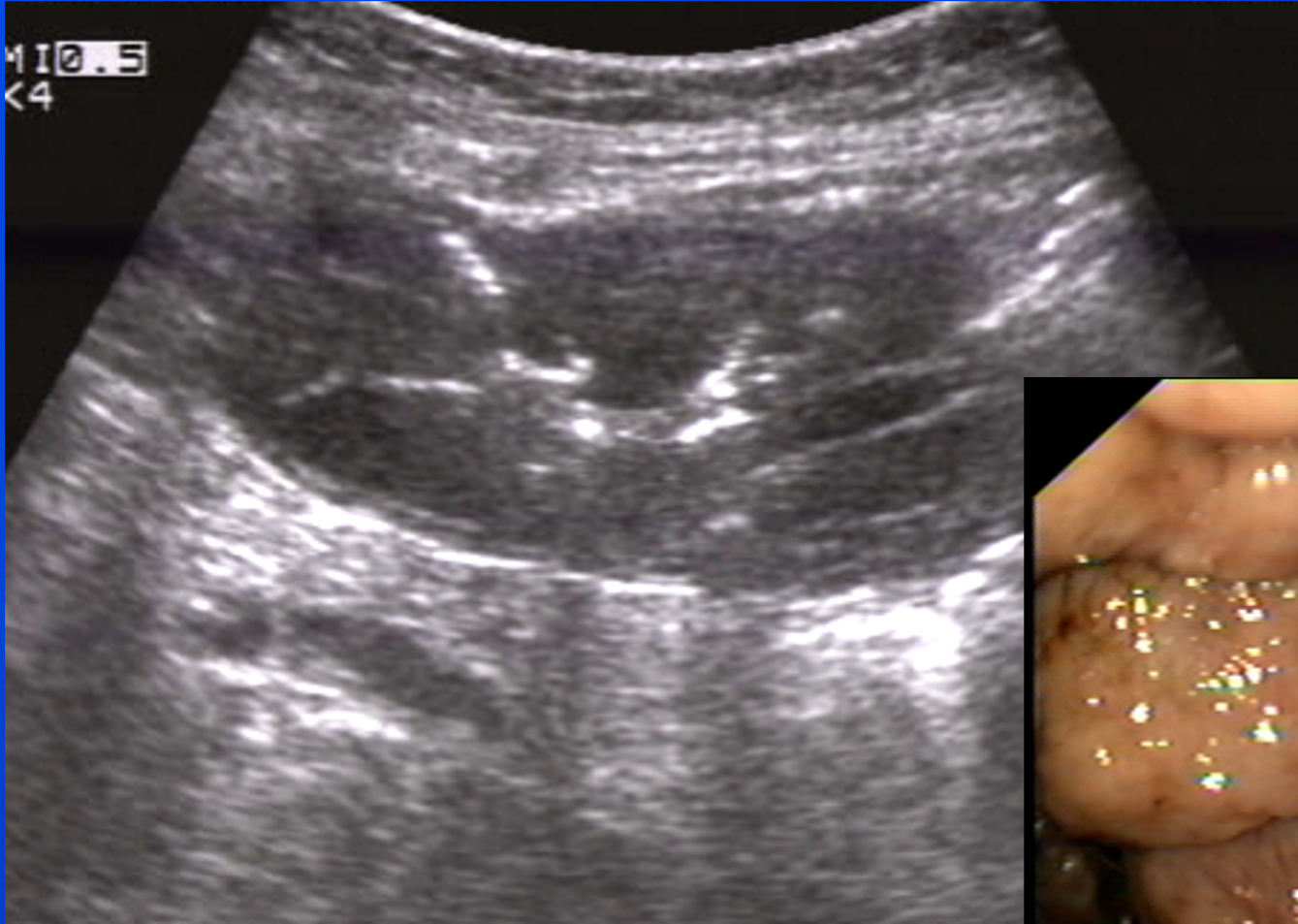
Menetriers Disease



CMV positive



Giant folds in NH-Lymphoma

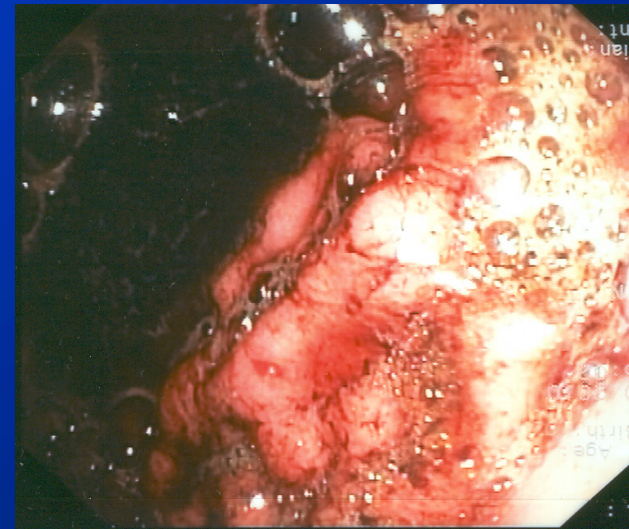
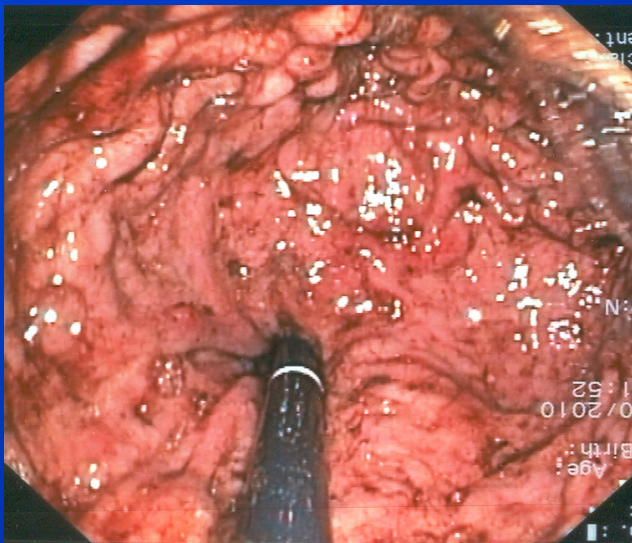
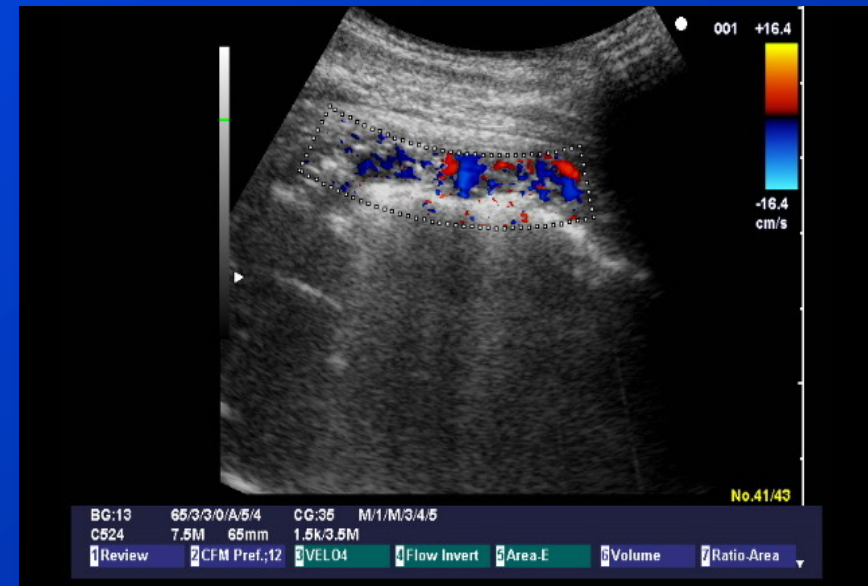
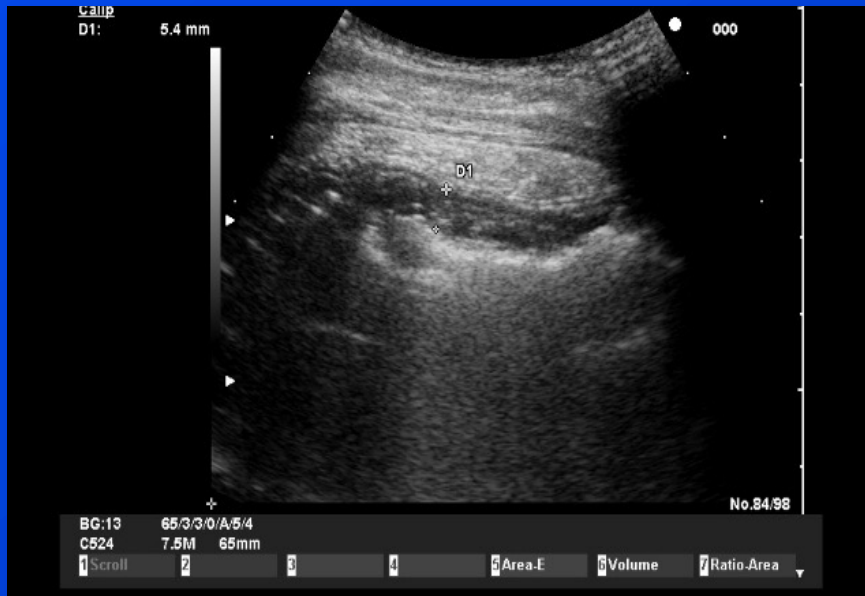


Courtesy: H. Lutz



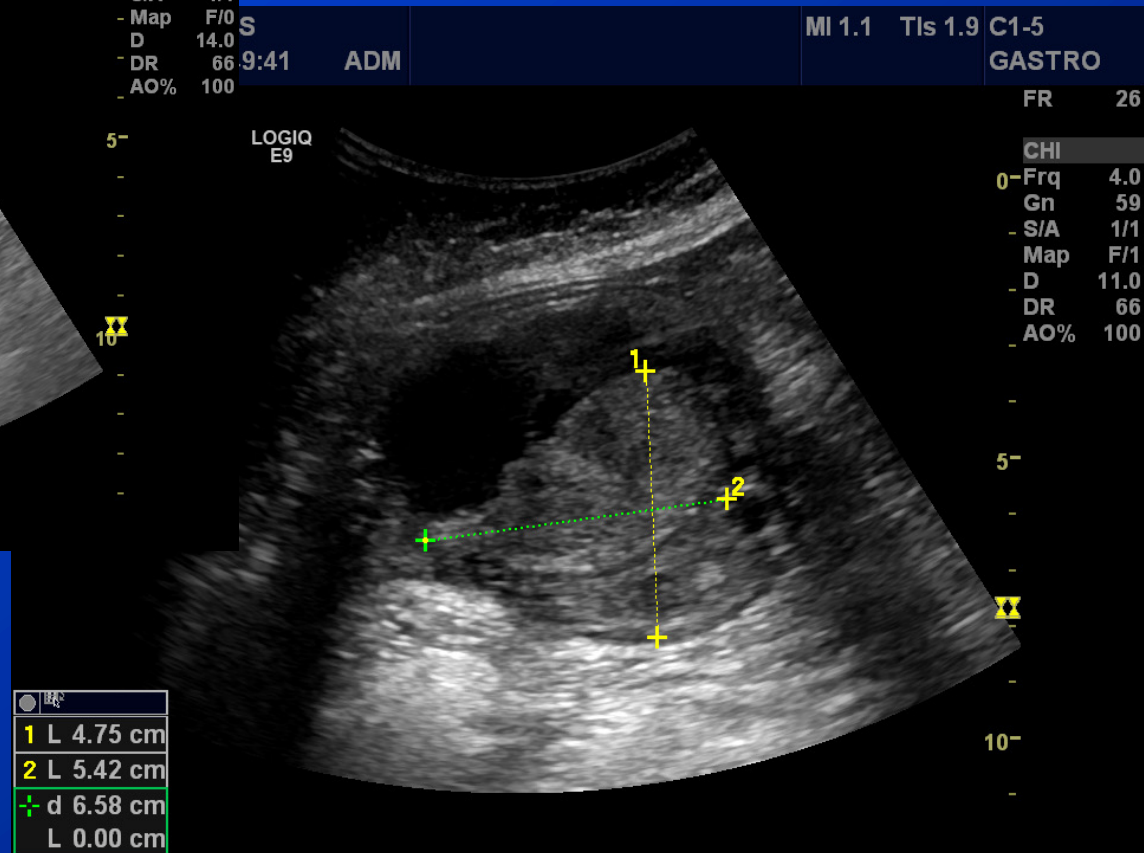
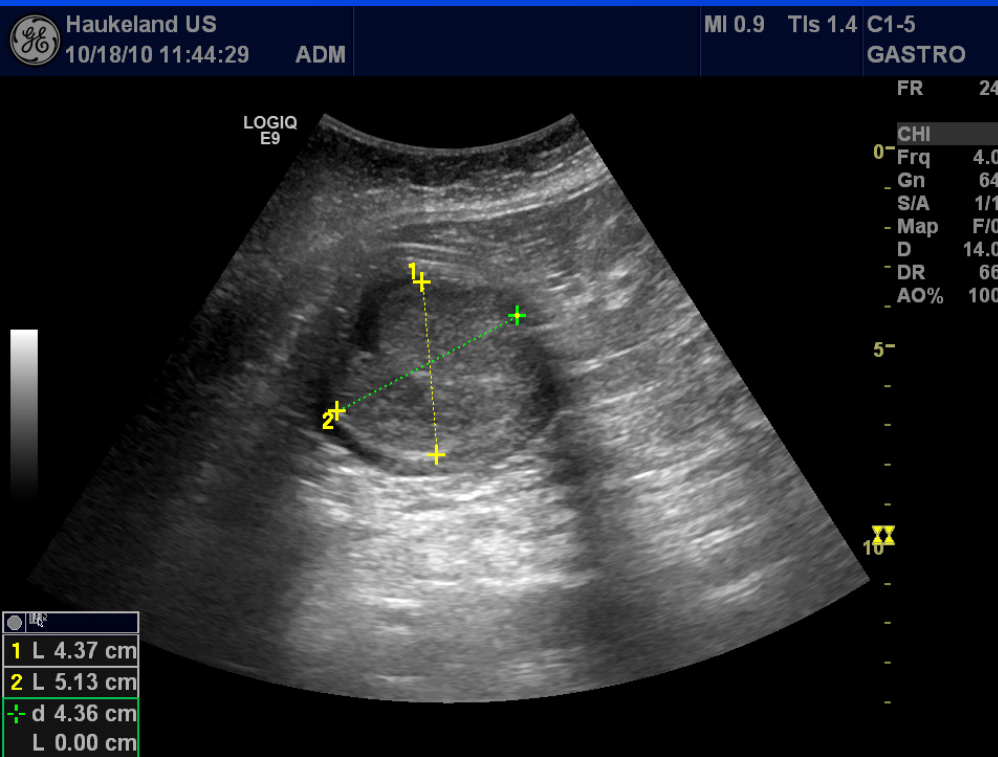


Portal hypertensive Gastropathy



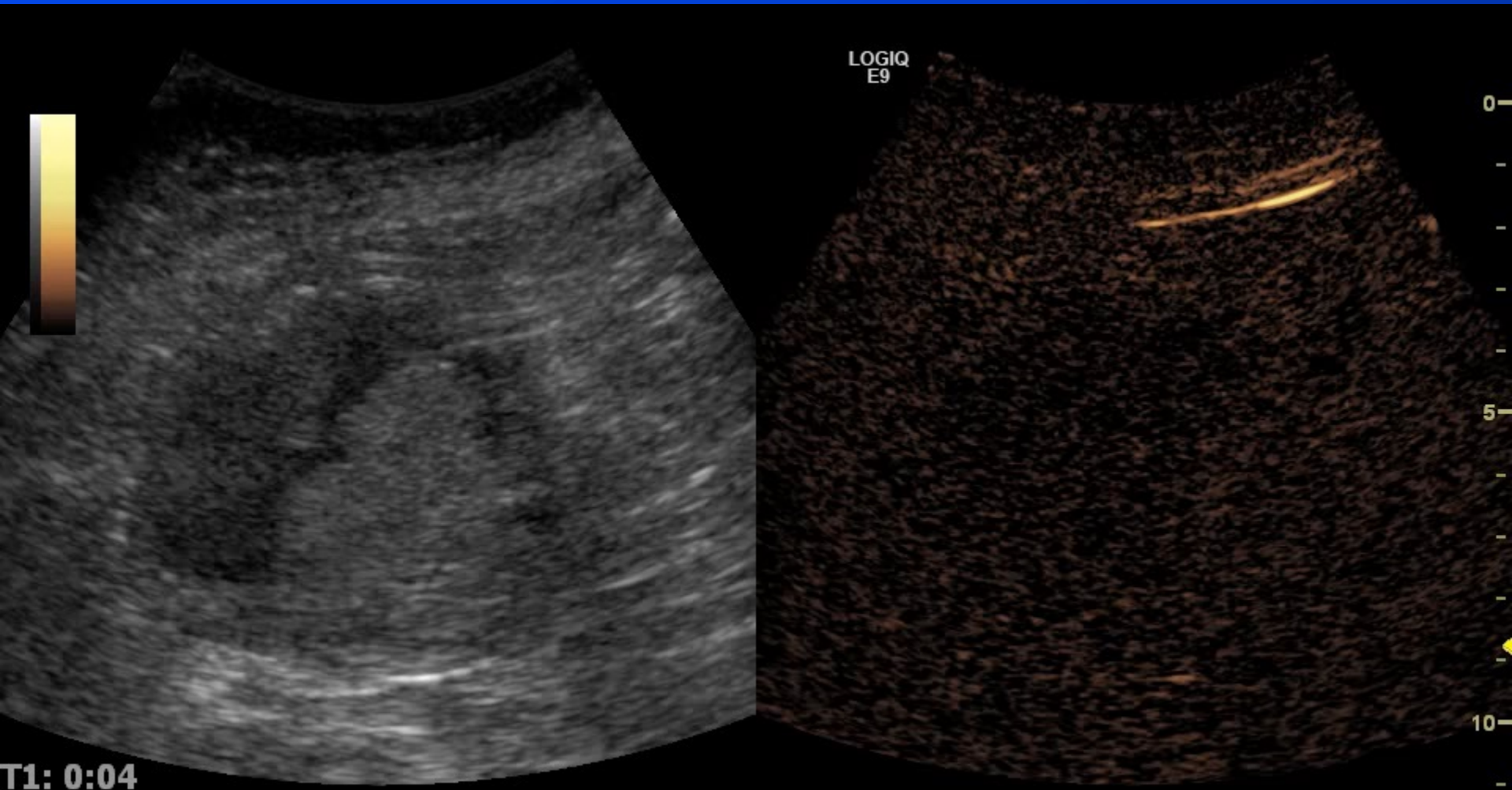


GIST of the Stomach



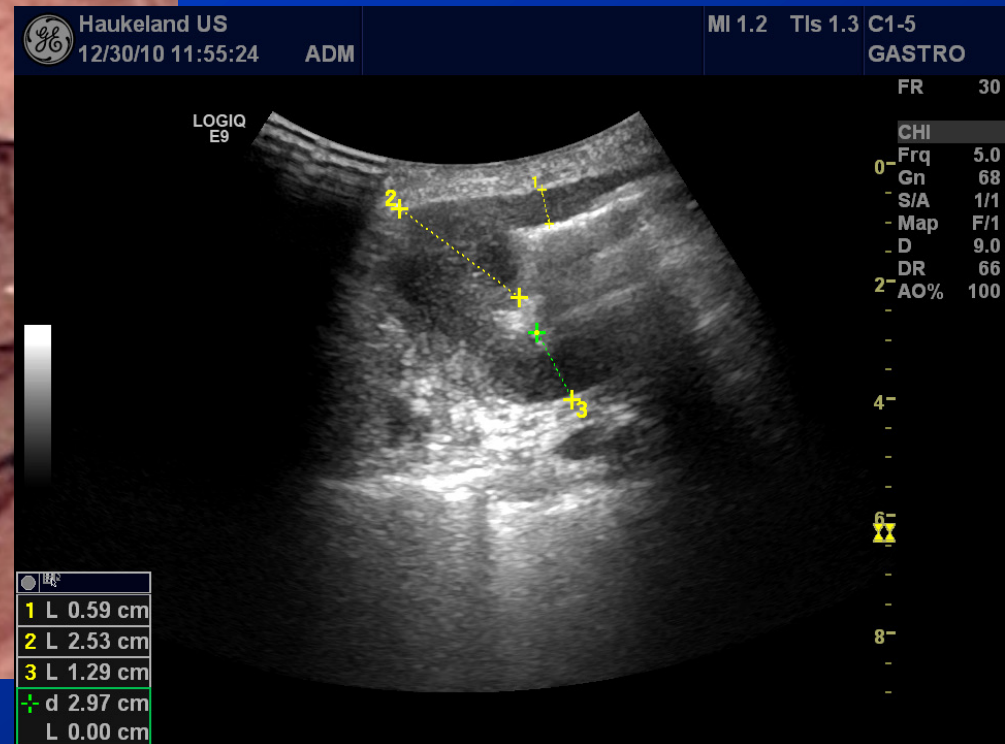
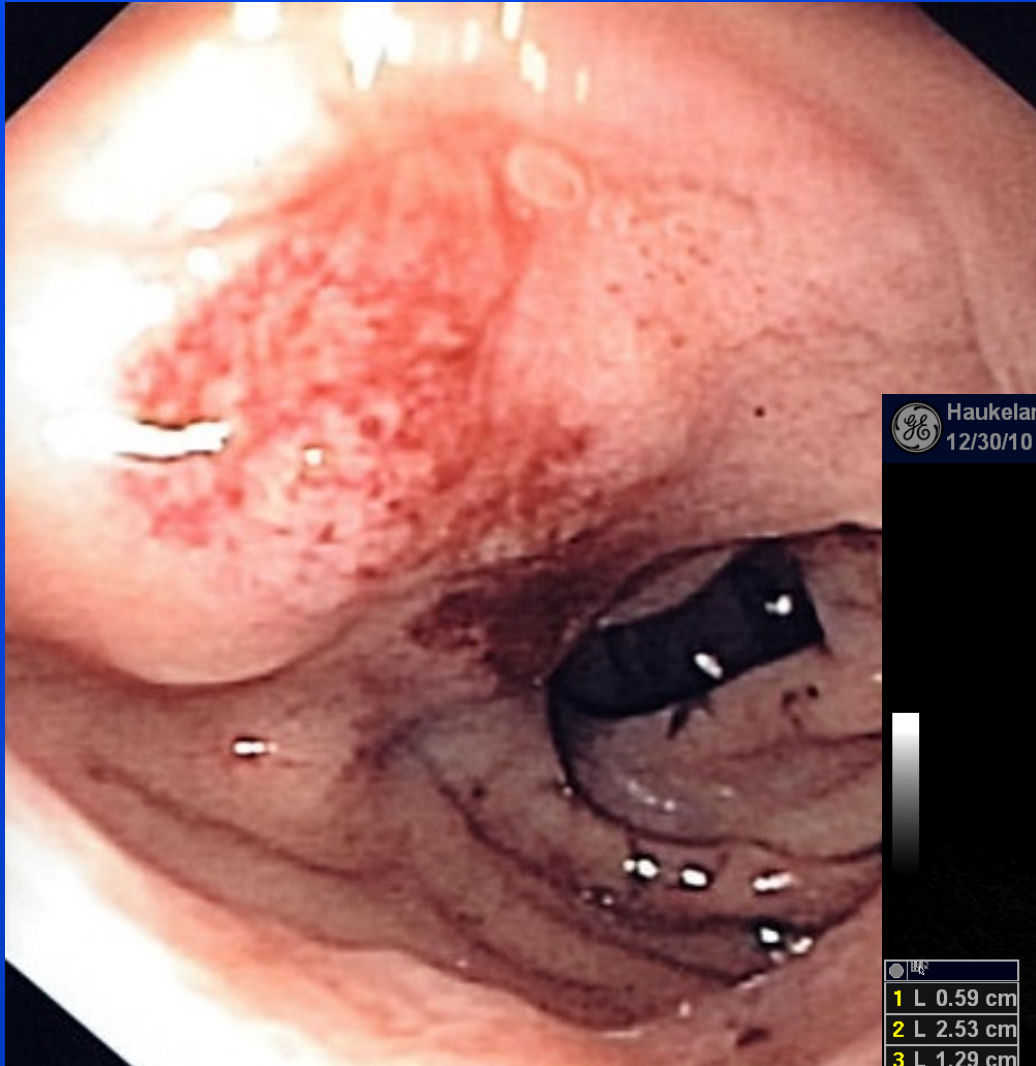


CEUS in GIST of the stomach



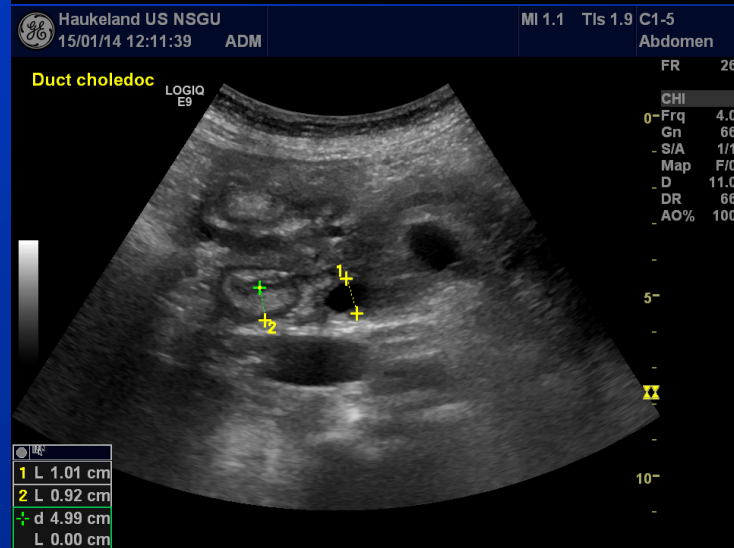
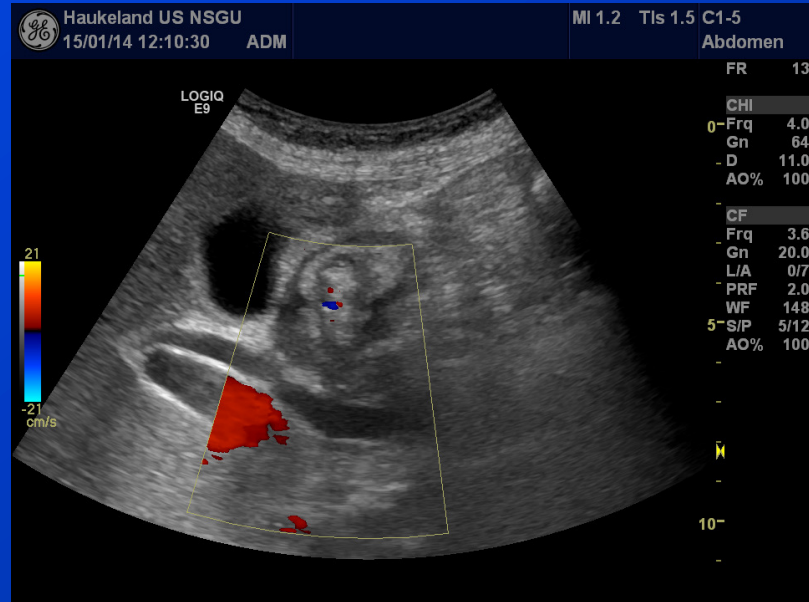
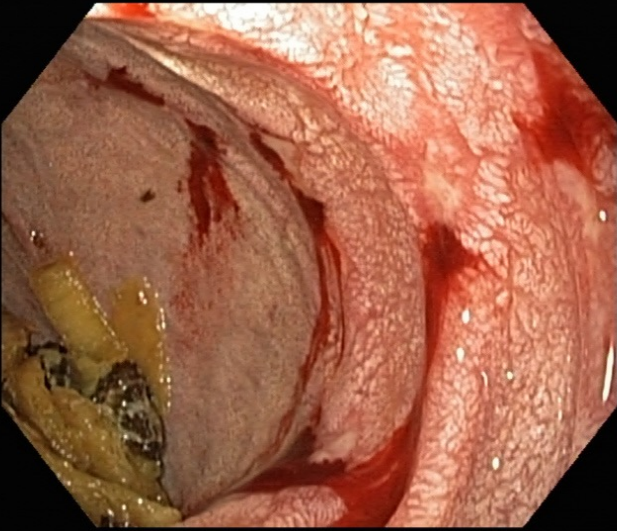
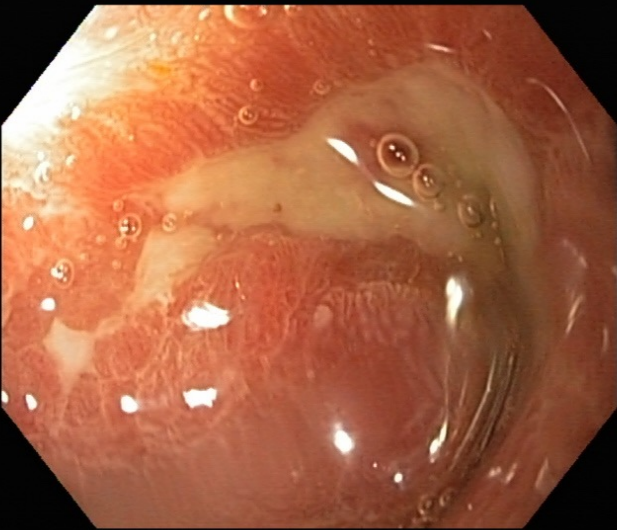


Malignant ulceration of the Antrum





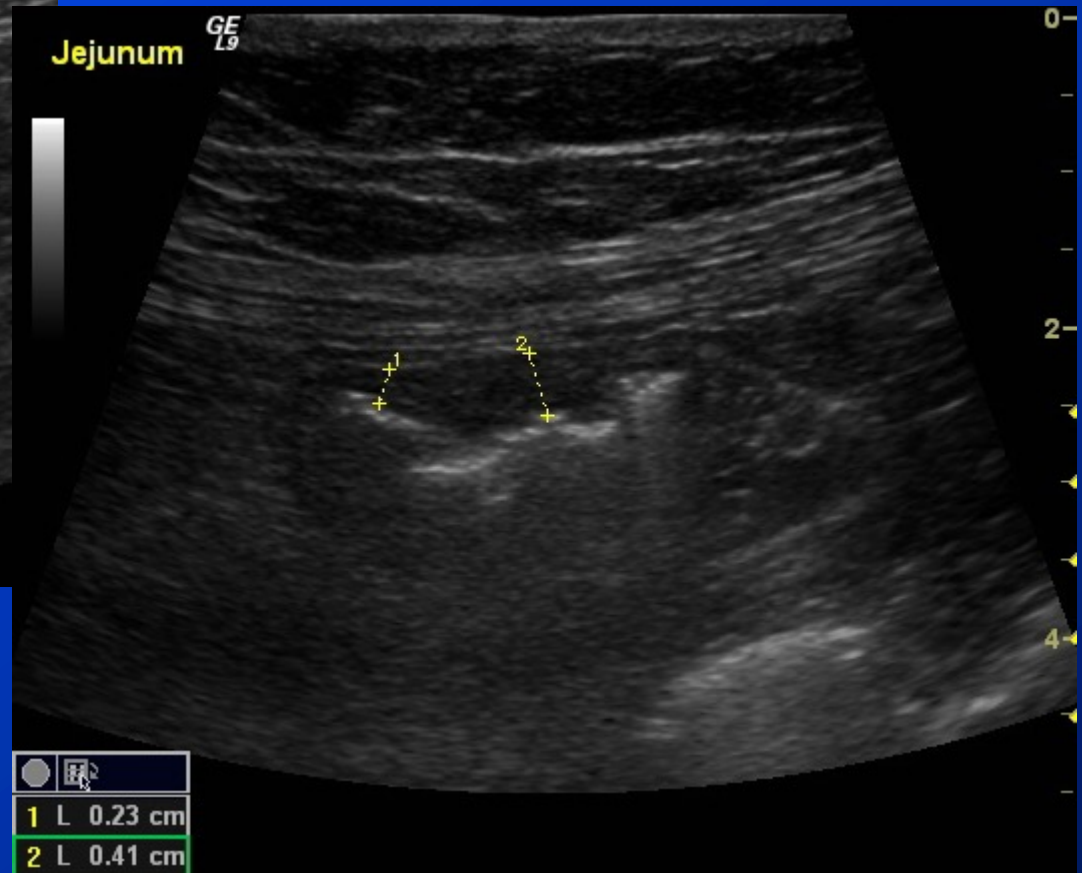
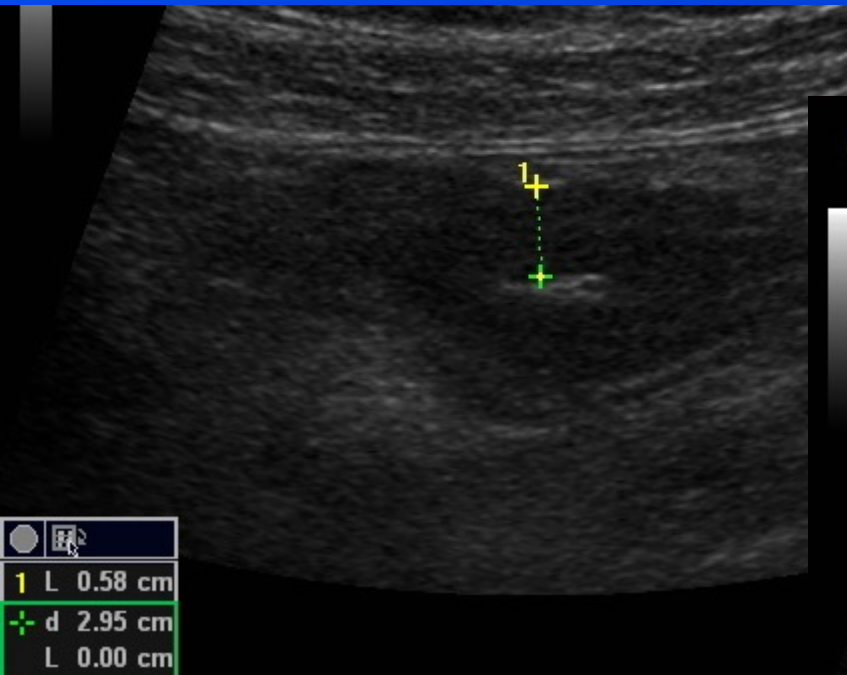
Crohn in the Duodenum





Crohn only of the Jejunum

Ultrasound makes the difference



A 45 year old female with oedema, malabsorption and epigastric pain
Normal upper and lower endoscopy and MRI of small intestine

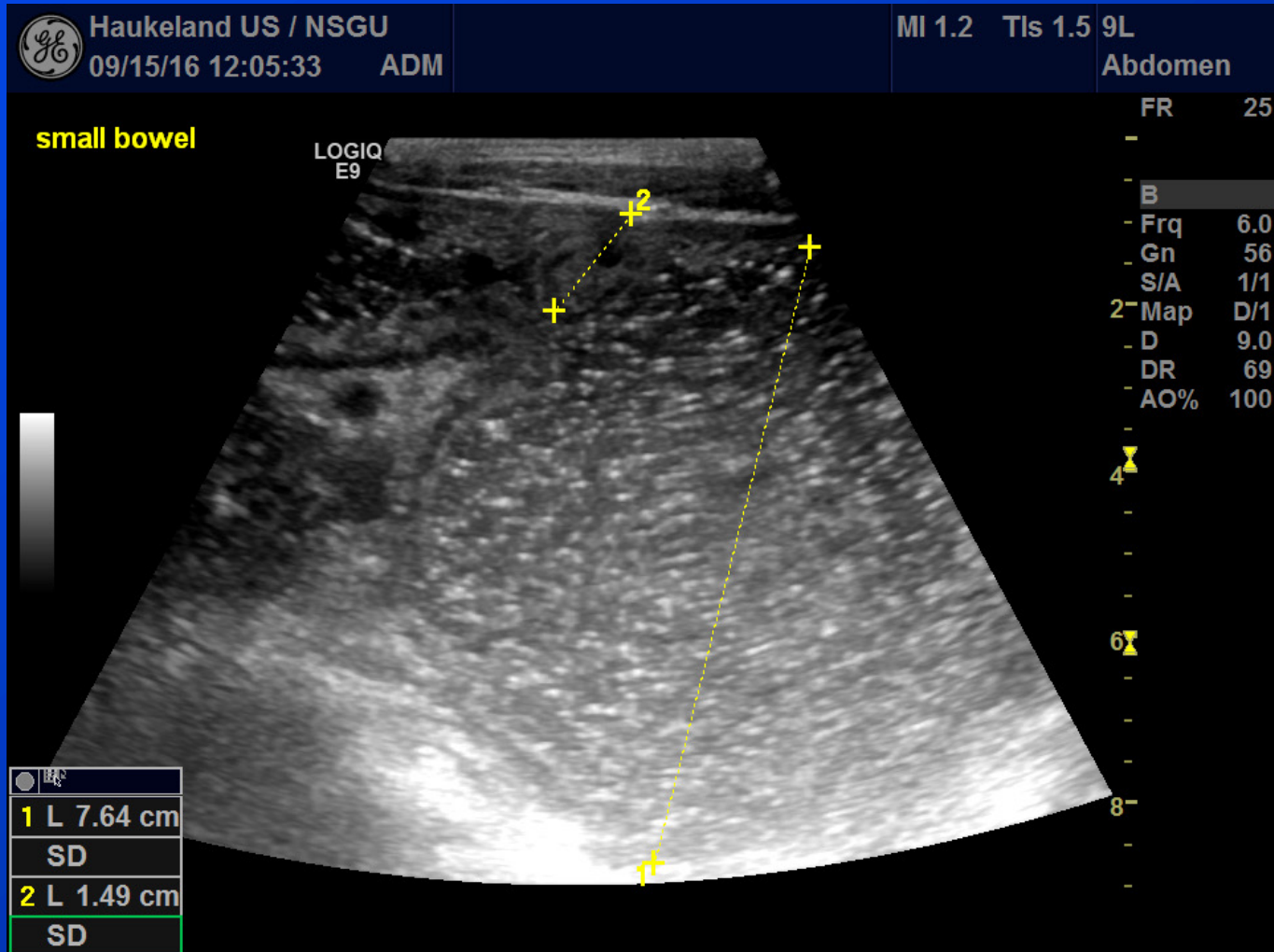


"Waschmaschinen-phenomen" (Washing Machine Phenomenon)



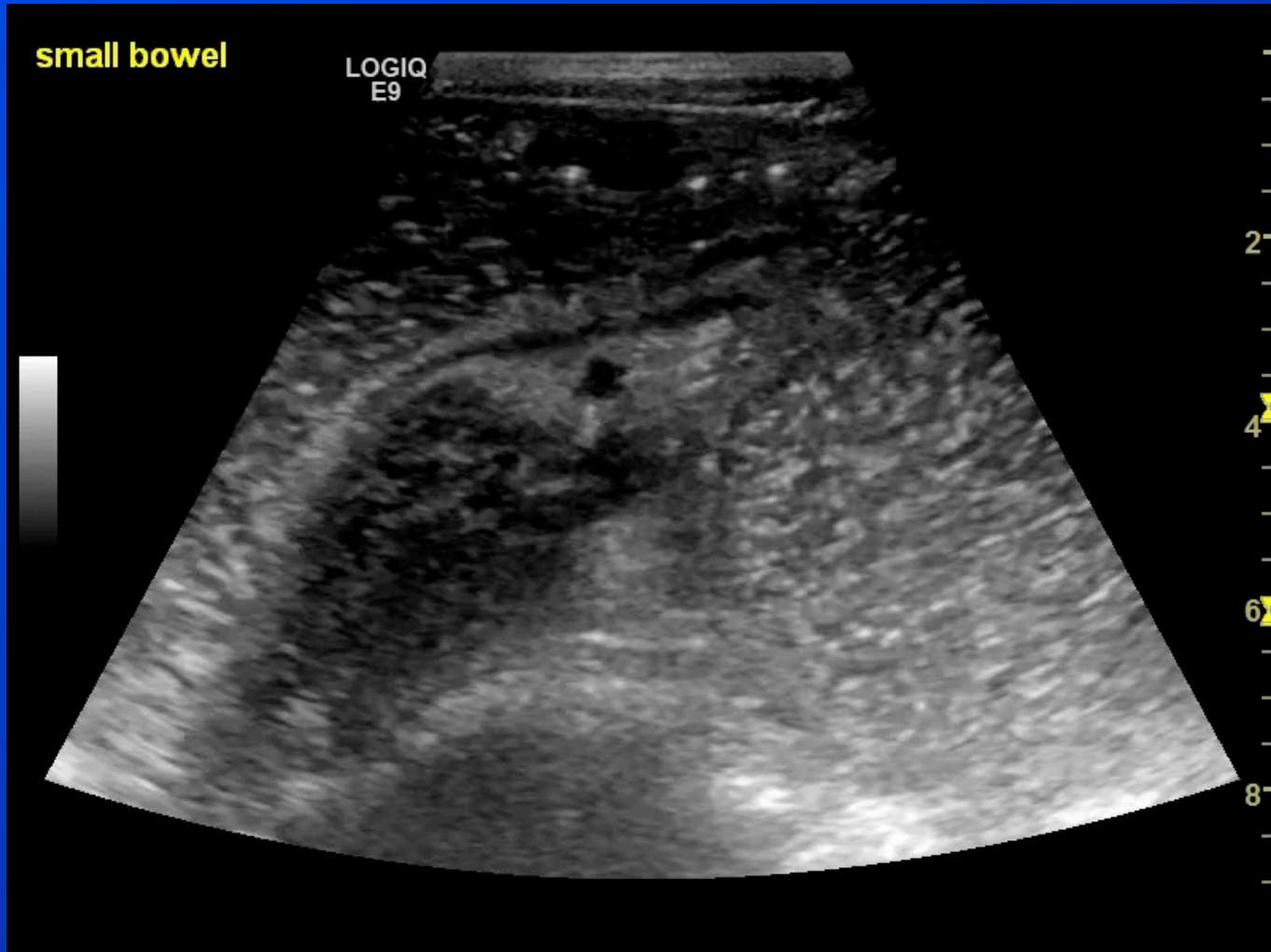


Male, 17 years with abdominal pain and diarrhea





Stenosis with prestenotic dilatation in small intestine



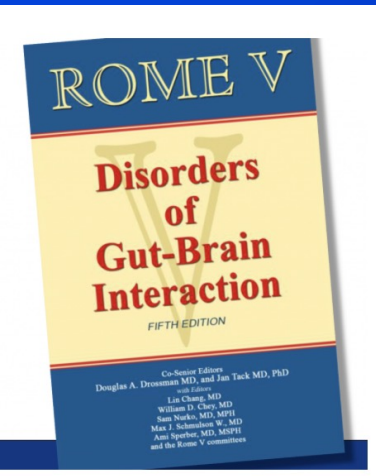


Rome Classification

8 major groups



Rome IV Volumes I&II



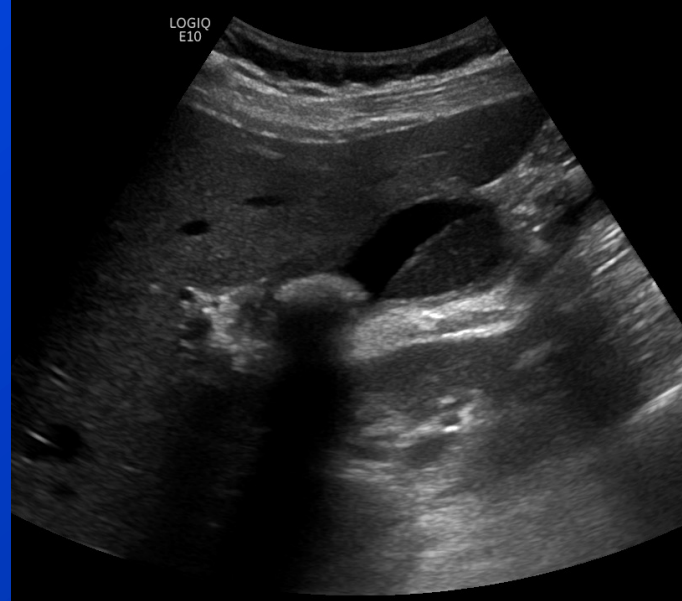
2026

- A. Functional Esophageal Disorders
- B. Functional Gastroduodenal Disorders
- C. Functional Bowel Disorders
- D. Functional Abdominal Pain Syndrome
- E. Functional Gallbladder and Sphincter of Oddi Disorders
- F. Functional Anorectal Disorders
- G. Childhood Functional GI Disorders: Infant/Toddler
- H. Childhood Functional GI Disorders: Child/Adolescent



The Role of Ultrasound in FGID

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

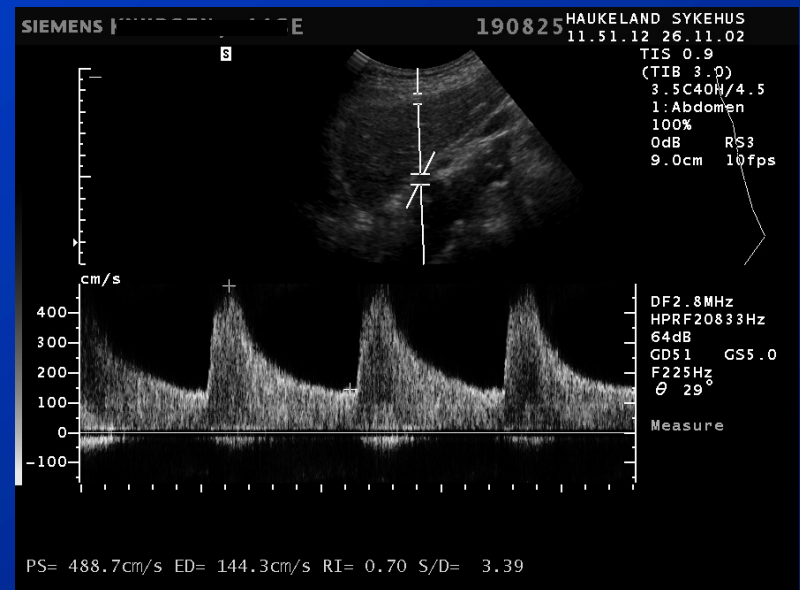




Organic Diseases mimicking FD

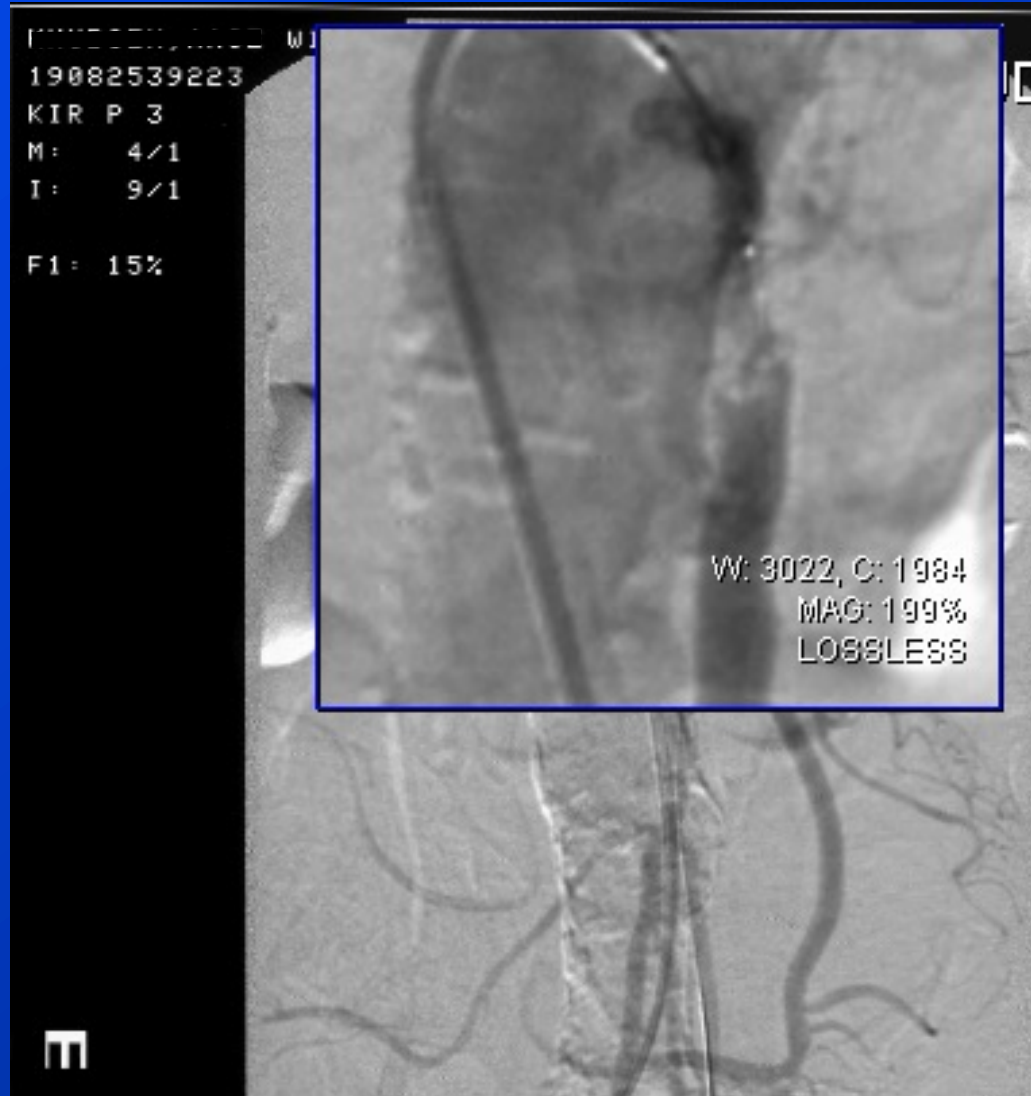
«If in Doubt – Sound it out !»

- Gastritis (H.P.)
- Linitis Plastica (adenocarcinoma)
- Ulcerations (large)
- Mb. Crohn
- Biliary Tract Stones
- Chronic Pancreatitis
- Mesenterial Ischemia
- ...





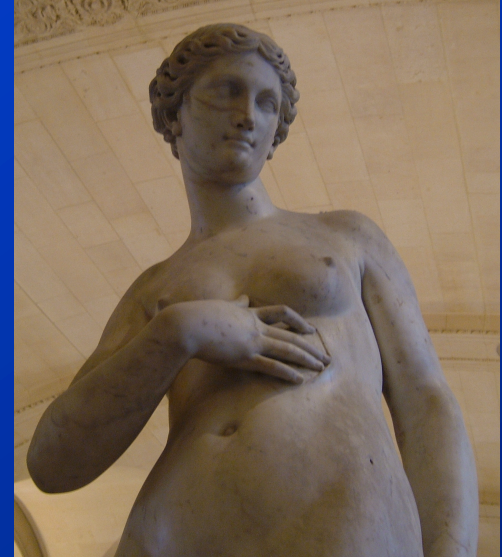
Treatment of stenosis in the coeliac trunc: Angiographic balloon dilatation





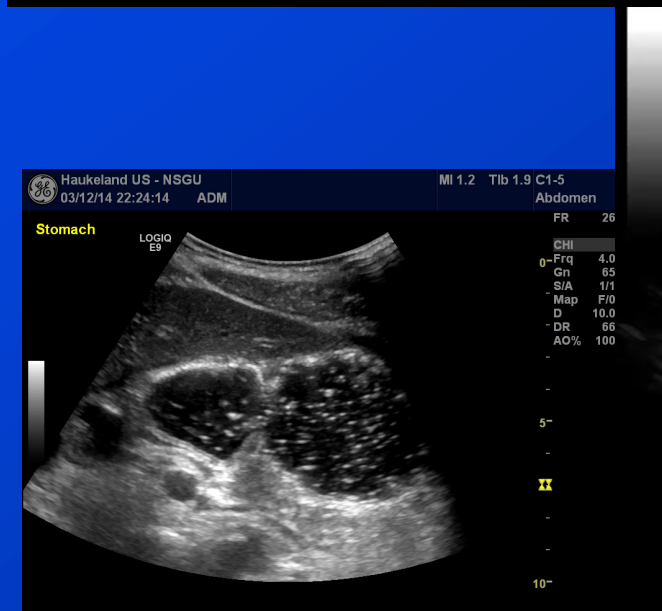
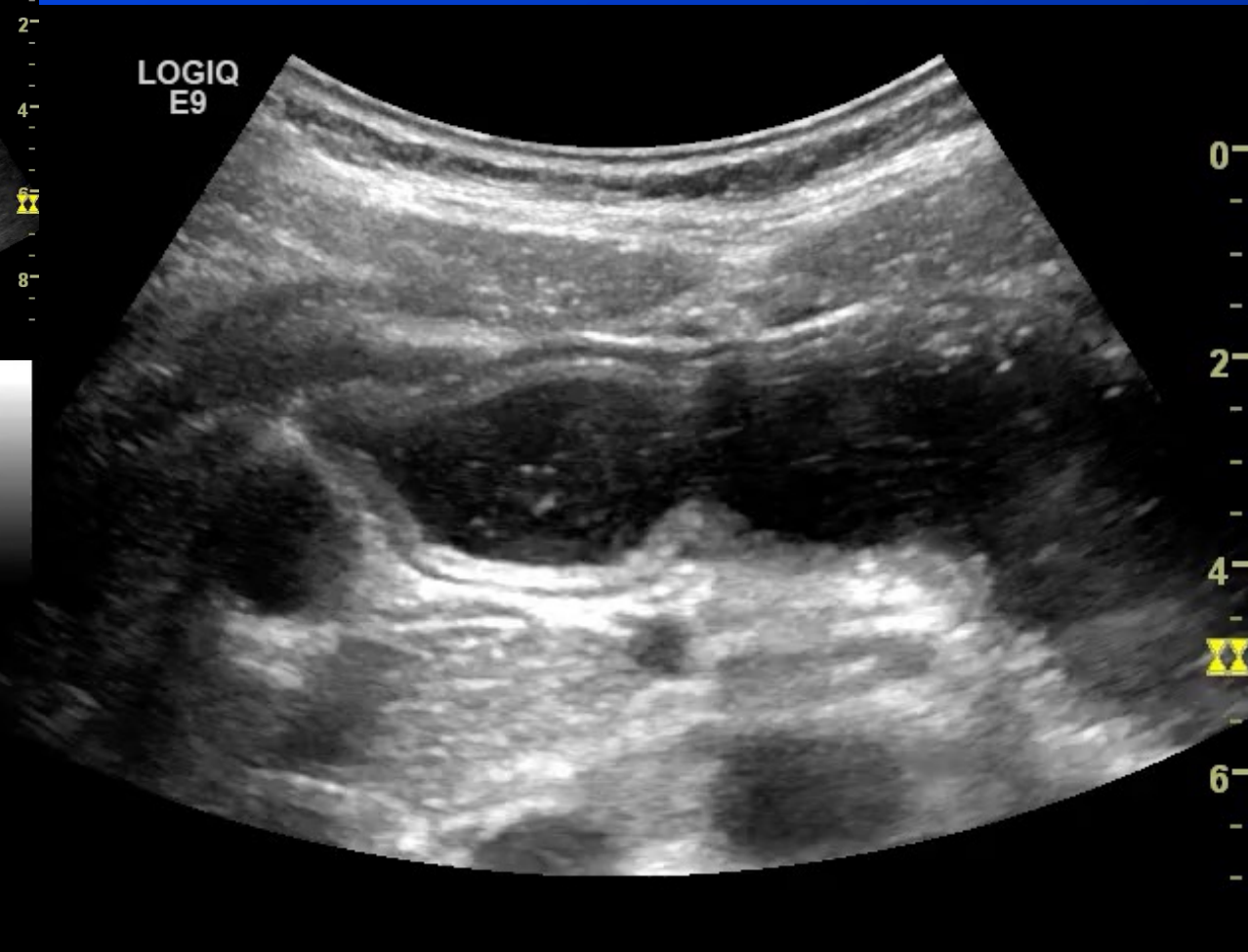
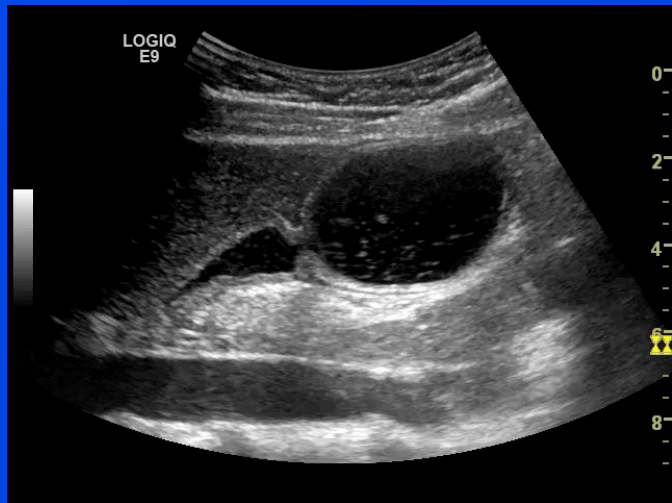
Ultrasound can be used to study different aspects of gastric motility

- Visualize contractions
- Study gastric emptying
- Measure transpyloric flow
- Evaluate meal accommodation
- Assess intragastric distribution of meals
- Estimate strain in the gastric wall



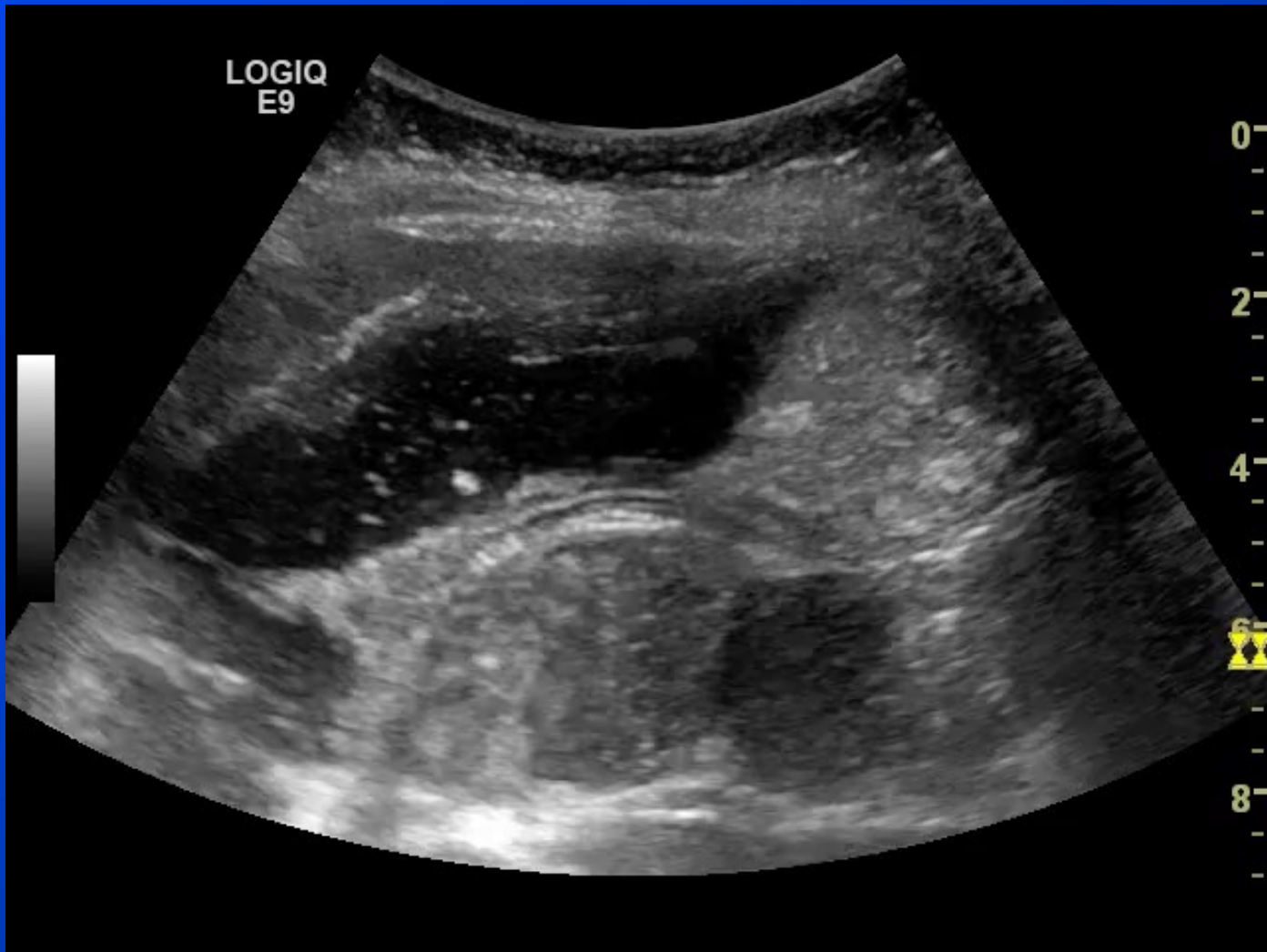


Gastric contractility





Solid vs. Liquid Gastric Content



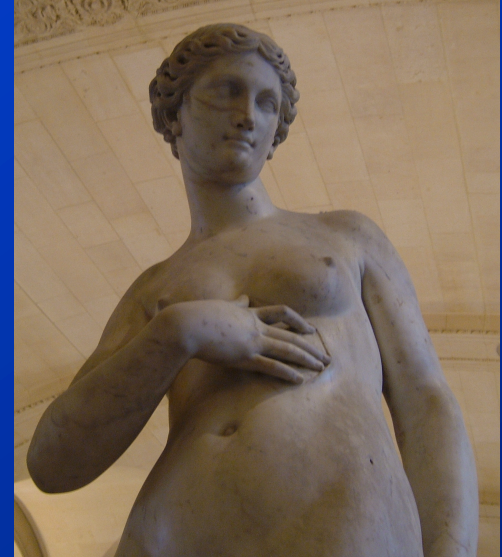
Gastric retention ?

Gastroparesis?



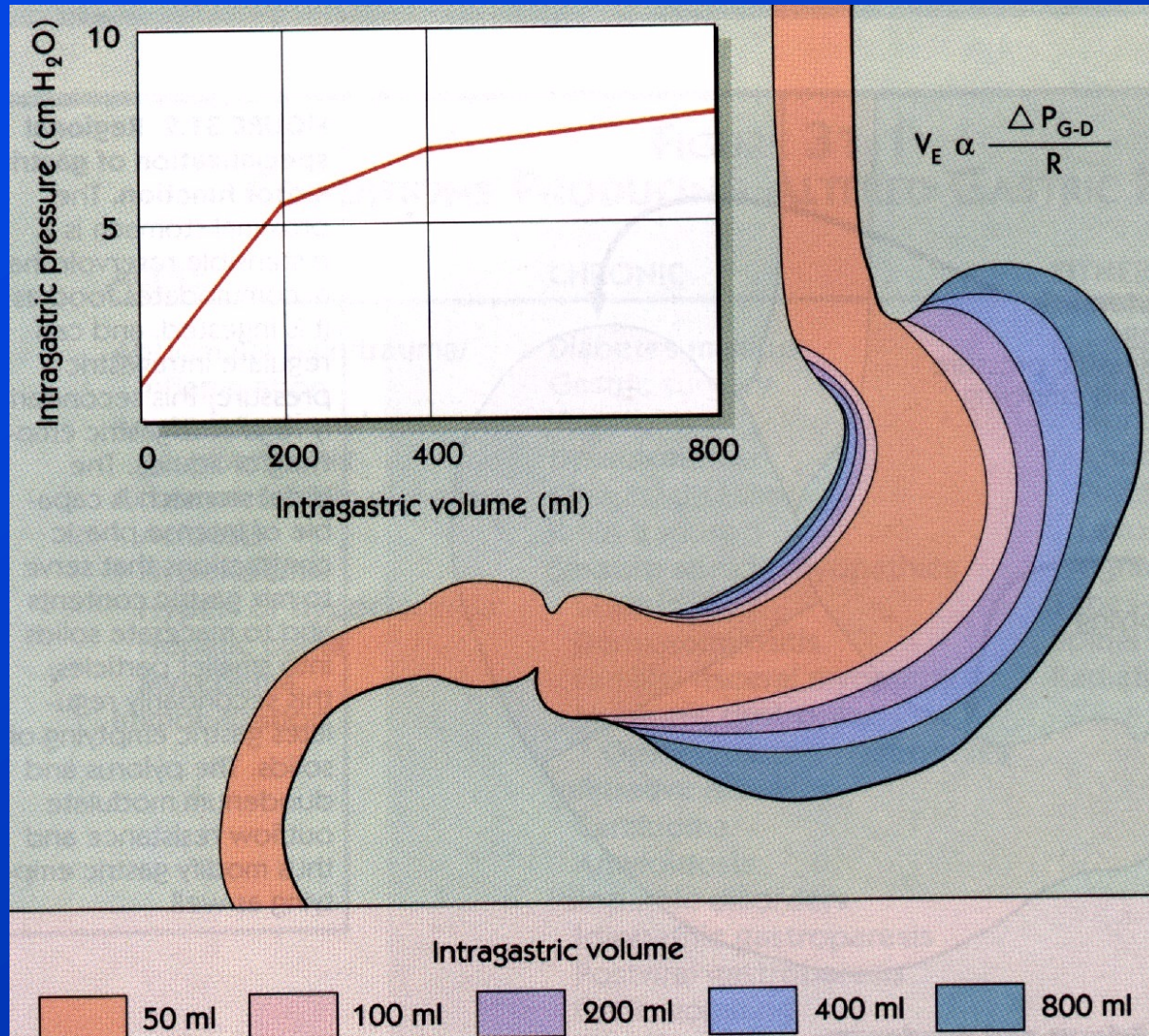
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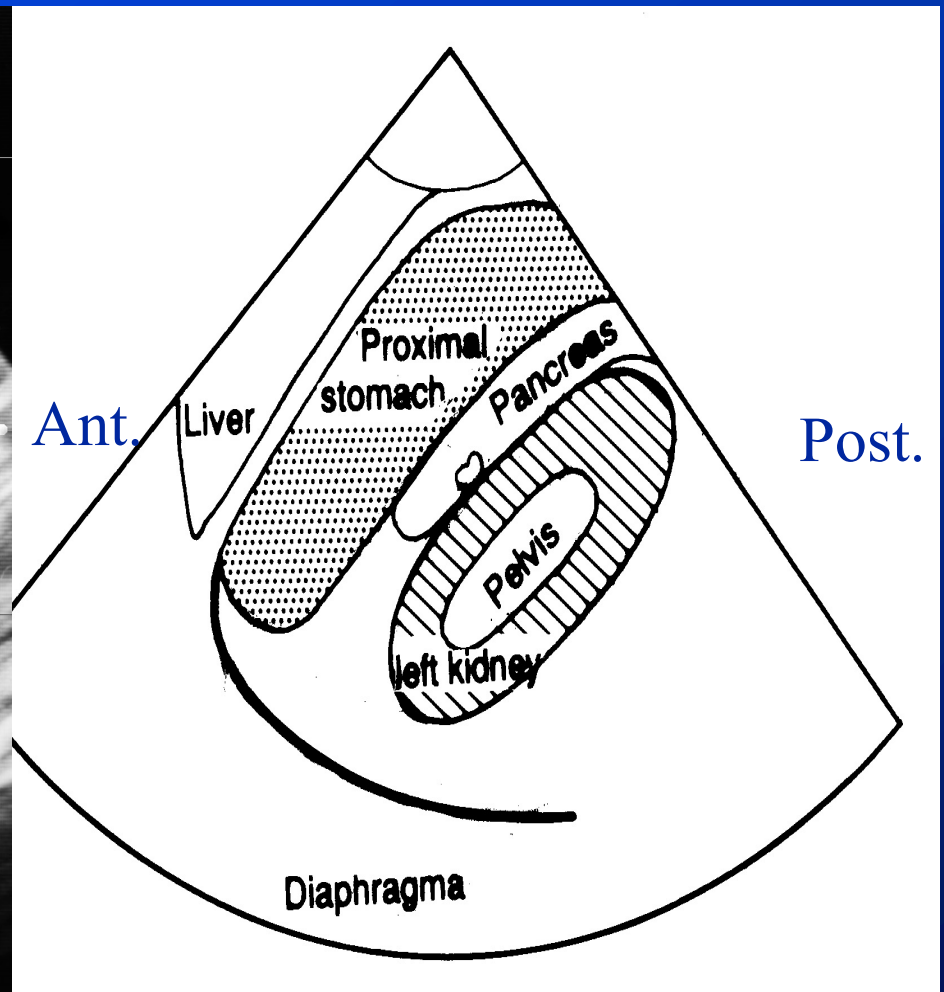
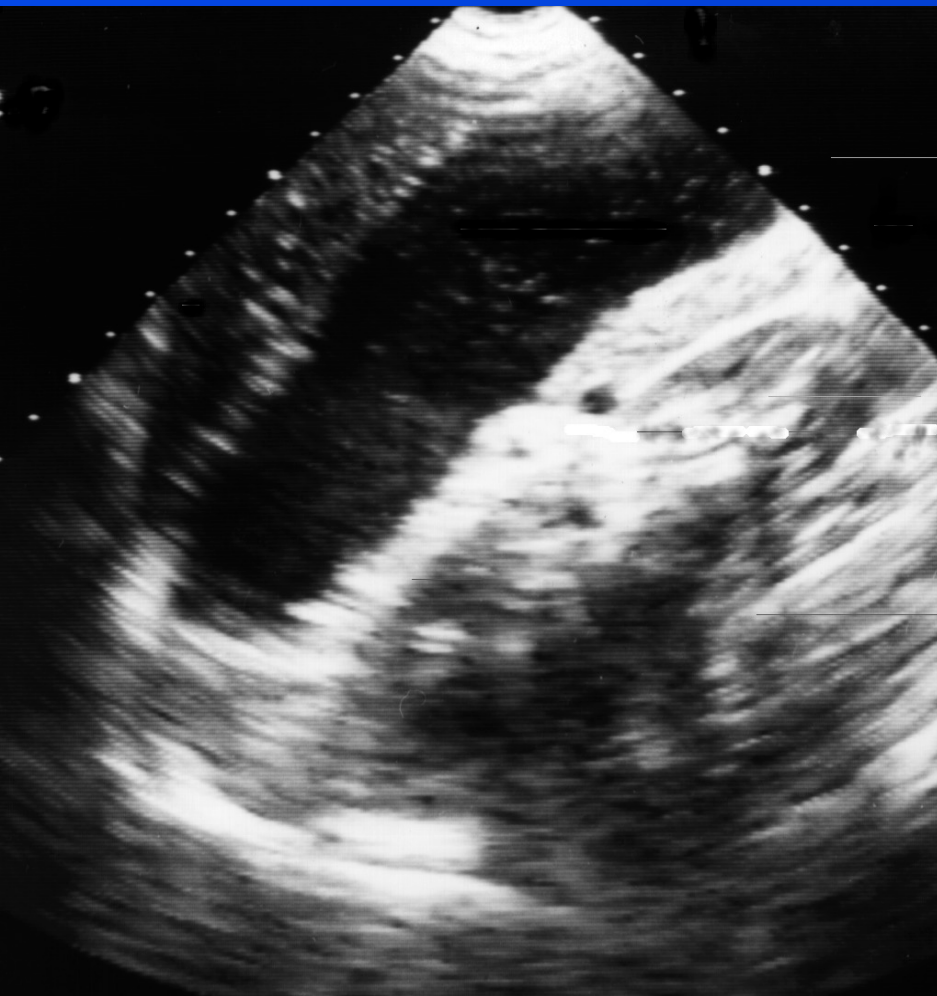


The Accommodation Reflex





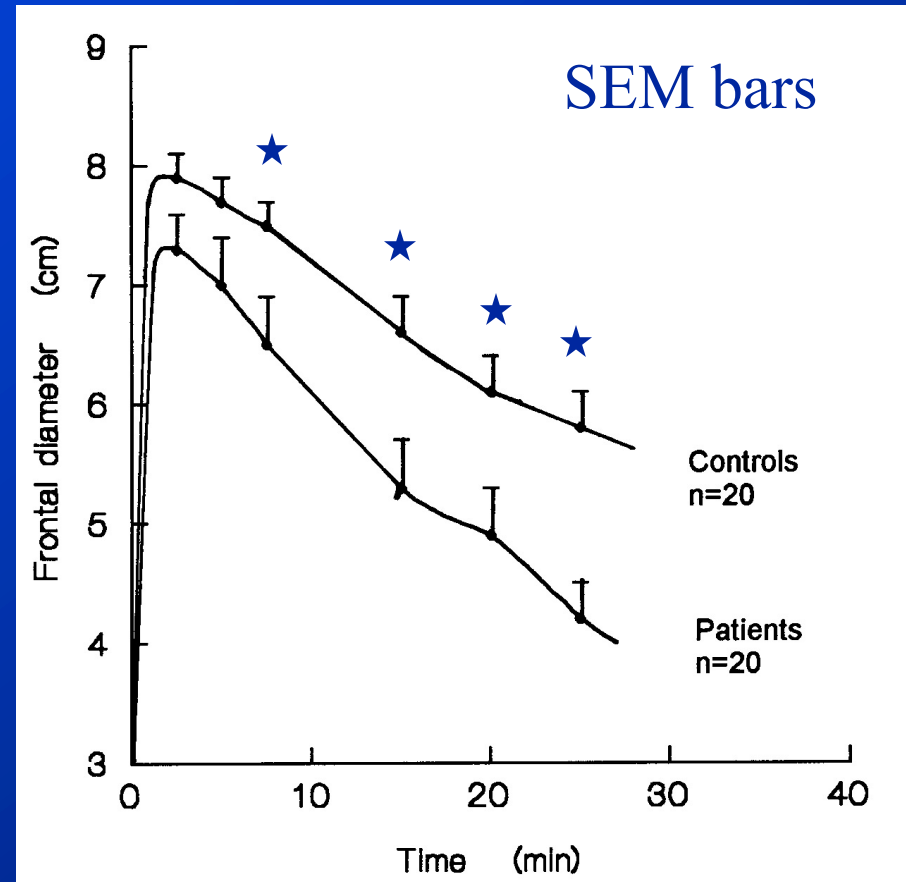
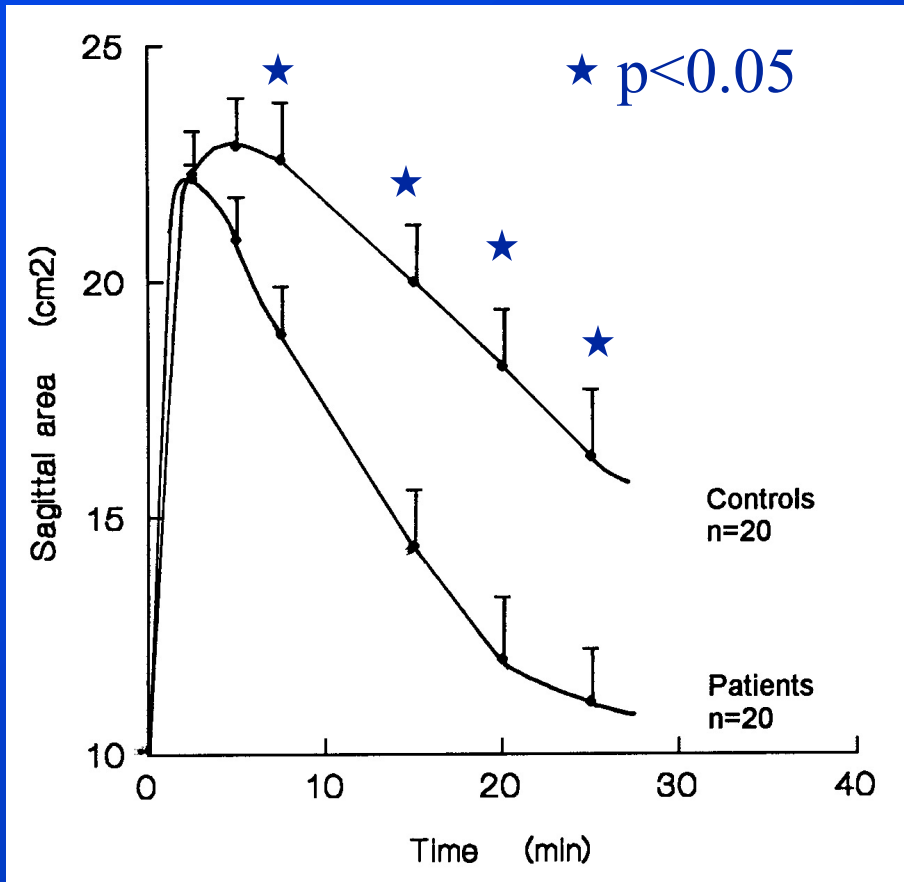
Sagittal section



Gilja et al., J Ultrasound Med 1995;14(2):81-89



Size of the proximal stomach in functional dyspepsia

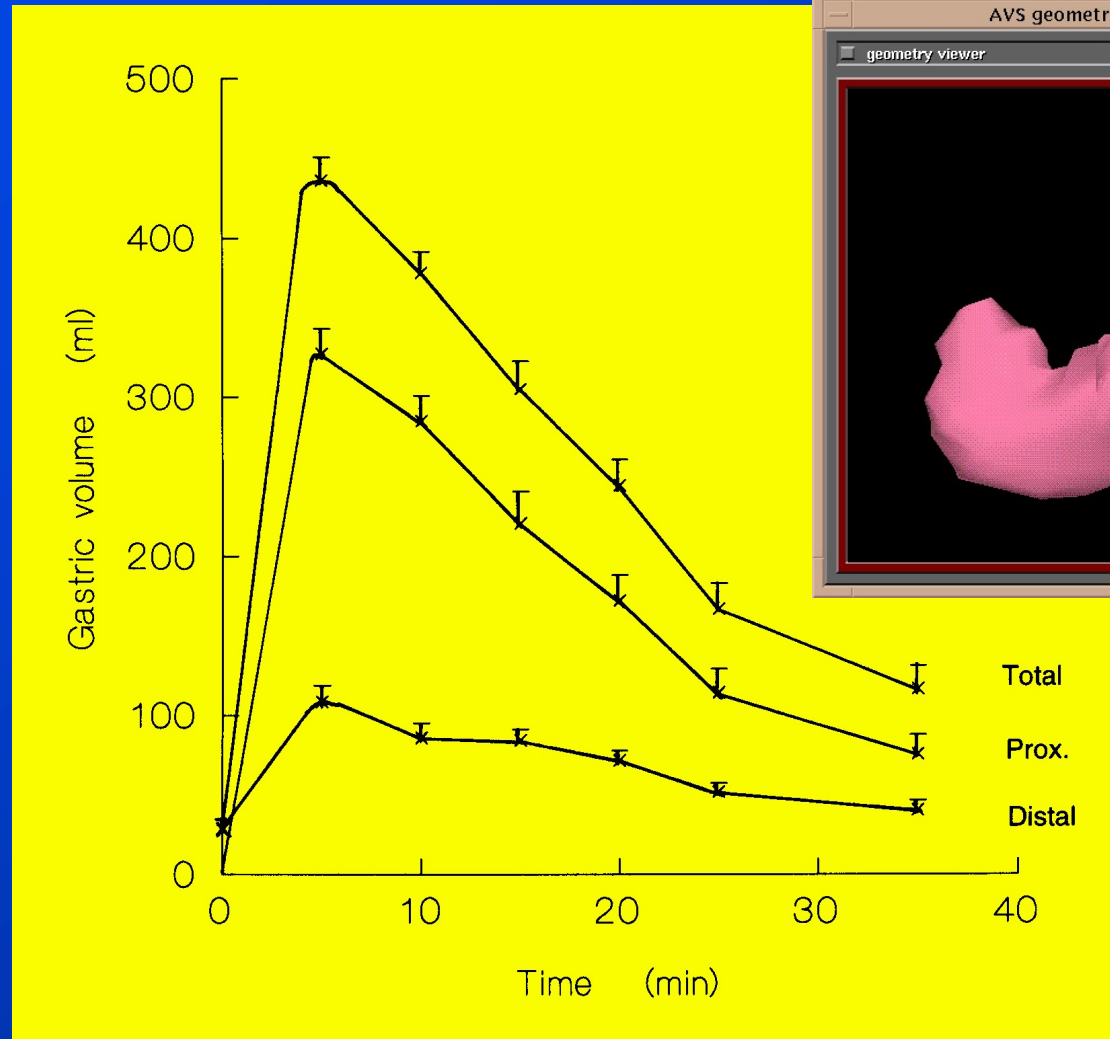


Gilja OH et al, Dig Dis Sci 1996;41:689-696



3D-US and Intragastric Distribution

- 16 healthy subjects
- T-50=22.1 min
SD=3.8 min



SEM bars are denoted

Gilja OH et al., Gastroenterology 1997;113:38-49



UMAT in 509 patients



Taylor & Francis
Taylor & Francis Group

SCANDINAVIAN JOURNAL OF GASTROENTEROLOGY, 2016
<http://dx.doi.org/10.3109/00365521.2016.1153138>

ORIGINAL ARTICLE

The ultrasound meal accommodation test in 509 patients with functional gastrointestinal disorders

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ABSTRACT

Aim The Ultrasound Meal Accommodation Test (UMAT) is a clinical test used to assess gastric accommodation, gastric emptying, and visceral sensitivity. It has been used as a clinical tool at Haukeland University Hospital, Bergen for more than 20 years. **Material and methods** Five-hundred and nine patients were retrospectively evaluated, 71% females, and 51% were referred from other hospitals or specialists. The aim was to explore the usefulness of UMAT in patients with suspected functional GI disorders (FGID). **Results** One hundred and sixty patients were diagnosed with functional dyspepsia (FD), and 154 patients were diagnosed with irritable bowel syndrome (IBS). The overlap between IBS and FD was 41%. In 36% of FD patients, ultrasound assessment showed impaired gastric accommodation. Of 262 patients filling out all required fields for the FD diagnosis (ROMA II and III), 198 (74%) met the criteria for FD, but only 91 (34%) were later diagnosed with FD by an experienced clinician. **Conclusions** By combining ultrasonography, the symptom response to a standardized meal, and psychological assessment, the UMAT is useful in diagnosis and management of patients with FGID.

ARTICLE HISTORY

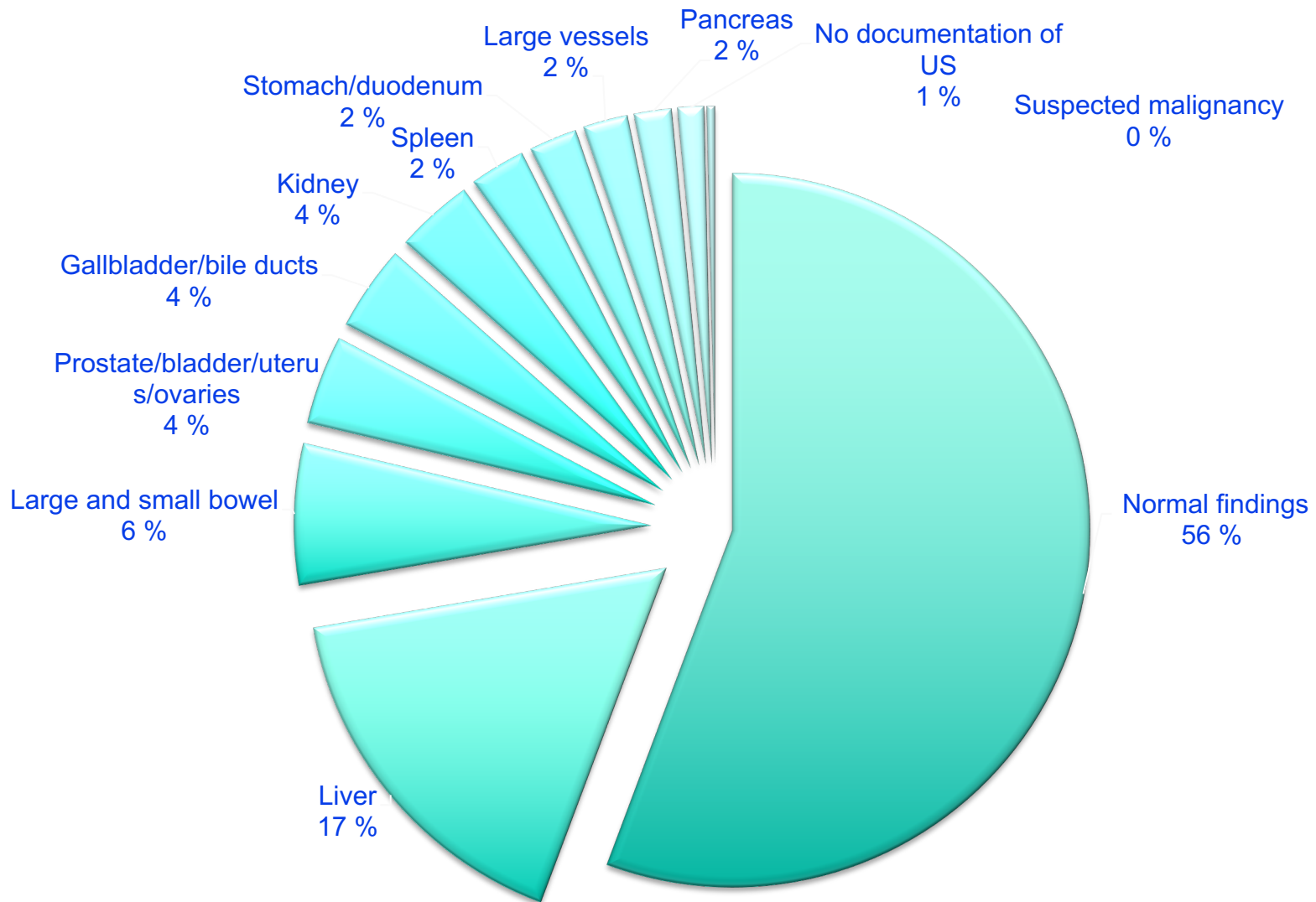
Received 15 September 2015
Revised 2 February 2016
Accepted 6 February 2016
Published online 2 March 2016

KEYWORDS

FGID; functional dyspepsia; gastric accommodation; gastric emptying; irritable bowel syndrome; ultrasound; visceral sensitivity



Ultrasound Findings at UMAT



Steinsvik, Hausken, Gilja, Scand J Gastroenterol 2016



Conclusions

- Ultrasound can contribute in the management of patients with dyspepsia
- Ultrasound can diagnose and rule out many diseases of the upper GI tract
- In FGID, ultrasound can be used to:
 - Visualize contractions
 - Study gastric emptying
 - Measure transpyloric flow
 - Evaluate meal accommodation
 - Assess intragastric distribution of meals
 - Estimate strain in the gastric wall
- Meal provocation testing (UMAT) is valuable in a clinical setting



Et bilde sier mer enn 1000 ord



Induksjon av dyspepsi