ULTRASOUND
PROGRAM

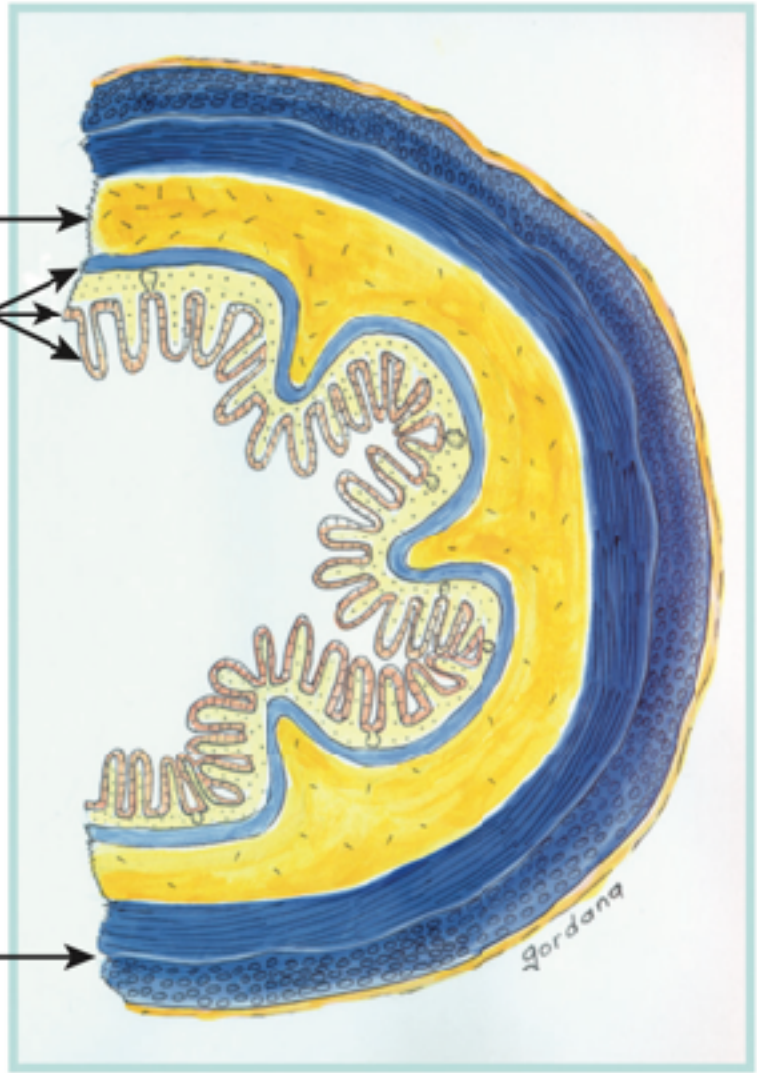
急診醫師
需要知道的
腸道超音波

陳國智
西園急診

ULTRASOUND PROGRAM

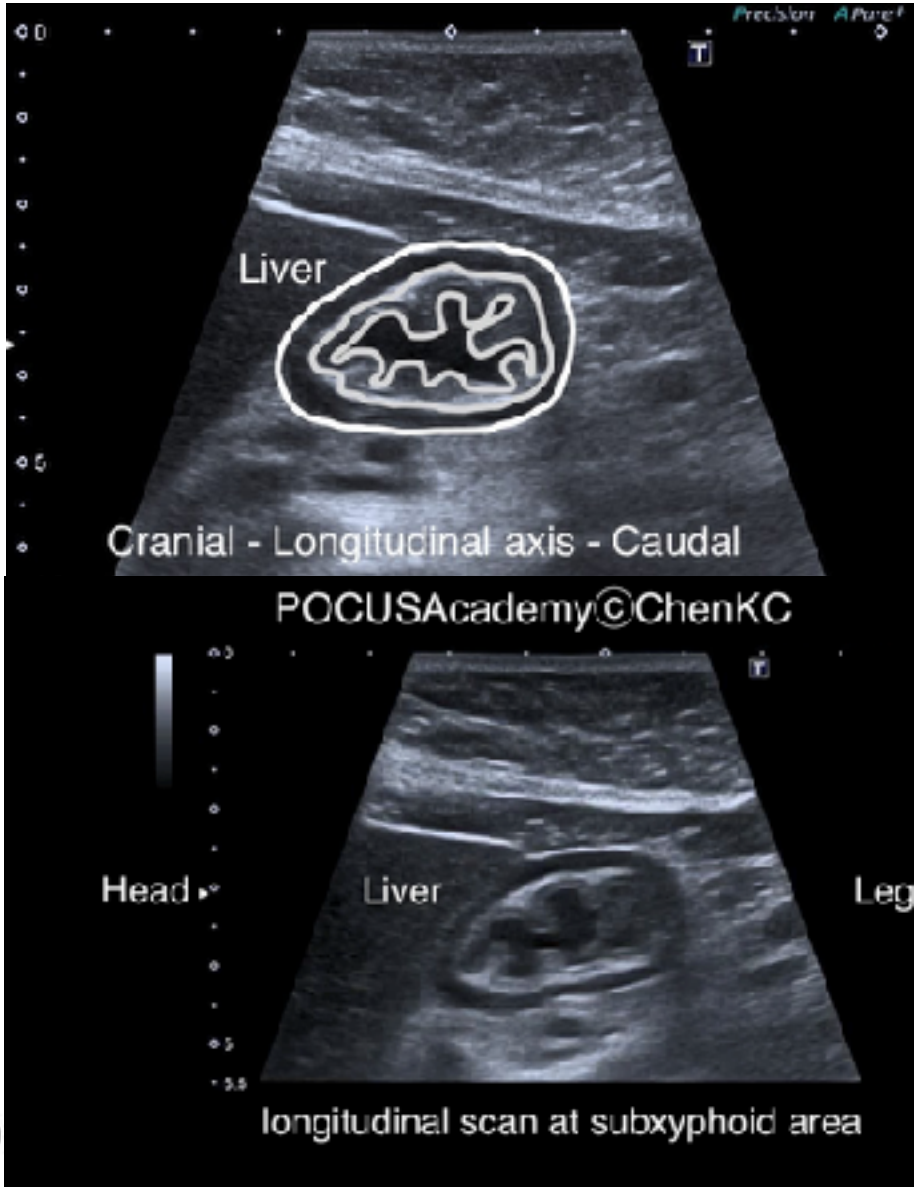
超音波下胃腸道結構有幾層？

1. 1
2. 2
3. 3
4. 4
5. 5

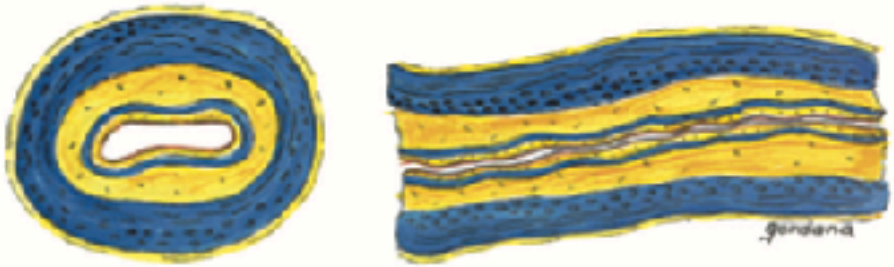


胃腸道結構有５層

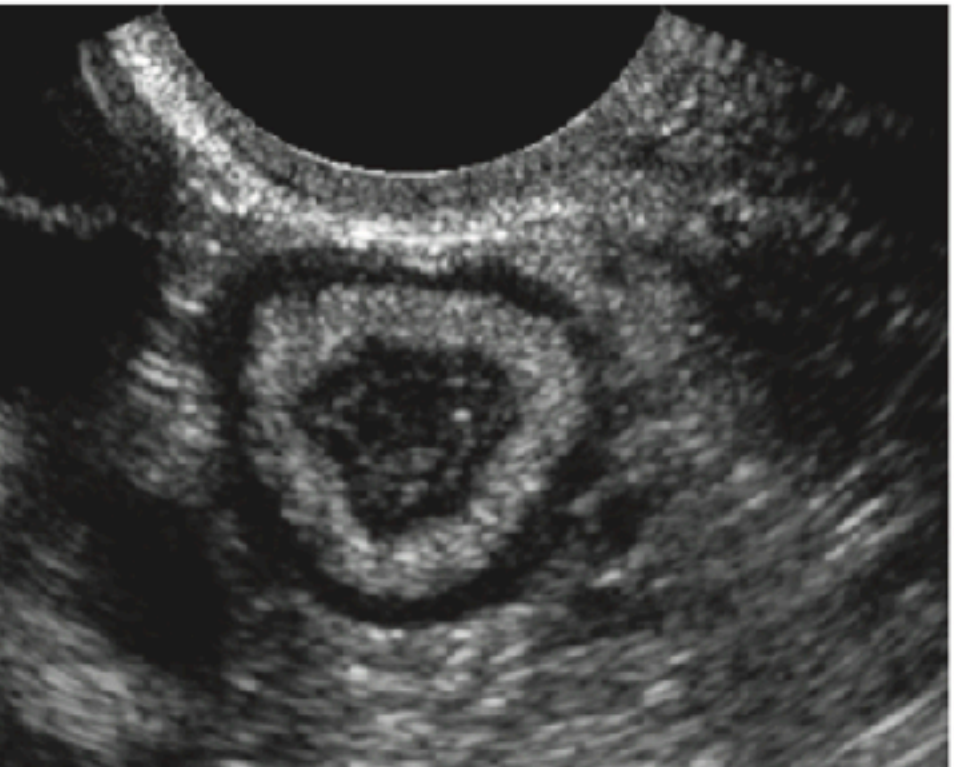
1. 白－Mucosa
2. 黑－Muscularis mucosa
3. 白－Submucosa
4. **黑－Muscularis propria**
5. 白－Serosa

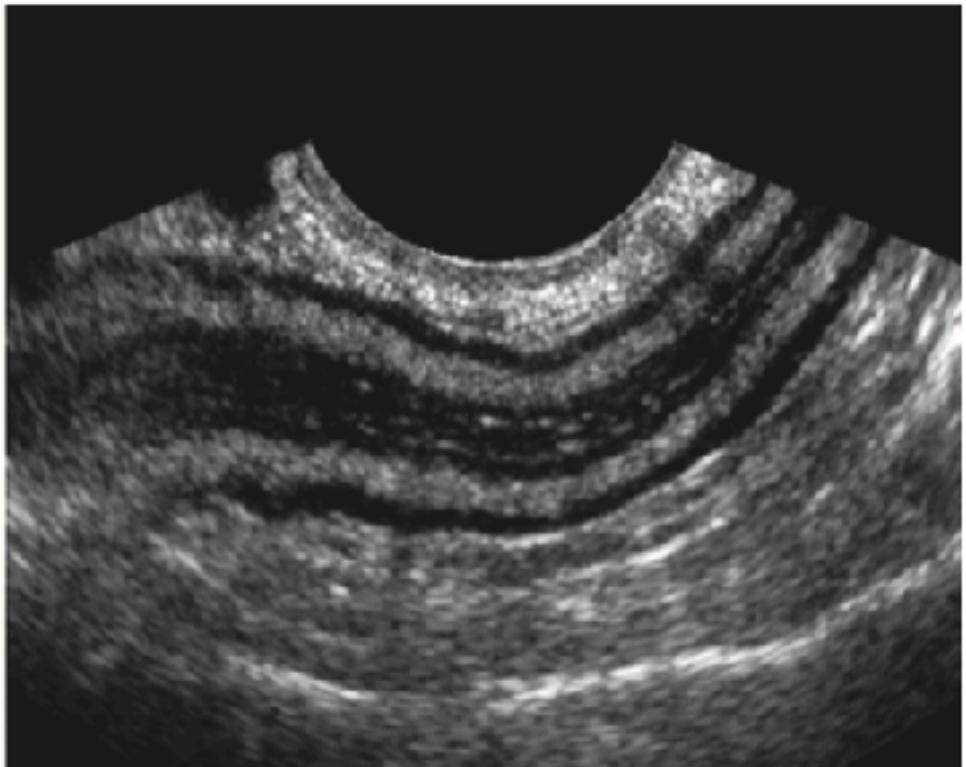


Crohn disease



發炎時結構
分層更明顯





ULTRASOUND
PROGRAM

胃腸道掃描的敘述，何者正確？

1. 成人掃描以線形探頭為主要工具
2. 急診掃描得禁食6小時才能得到最佳影像
3. 正常胃腸壁的厚度小於5mm
4. 掃描時以肚臍為中心開始

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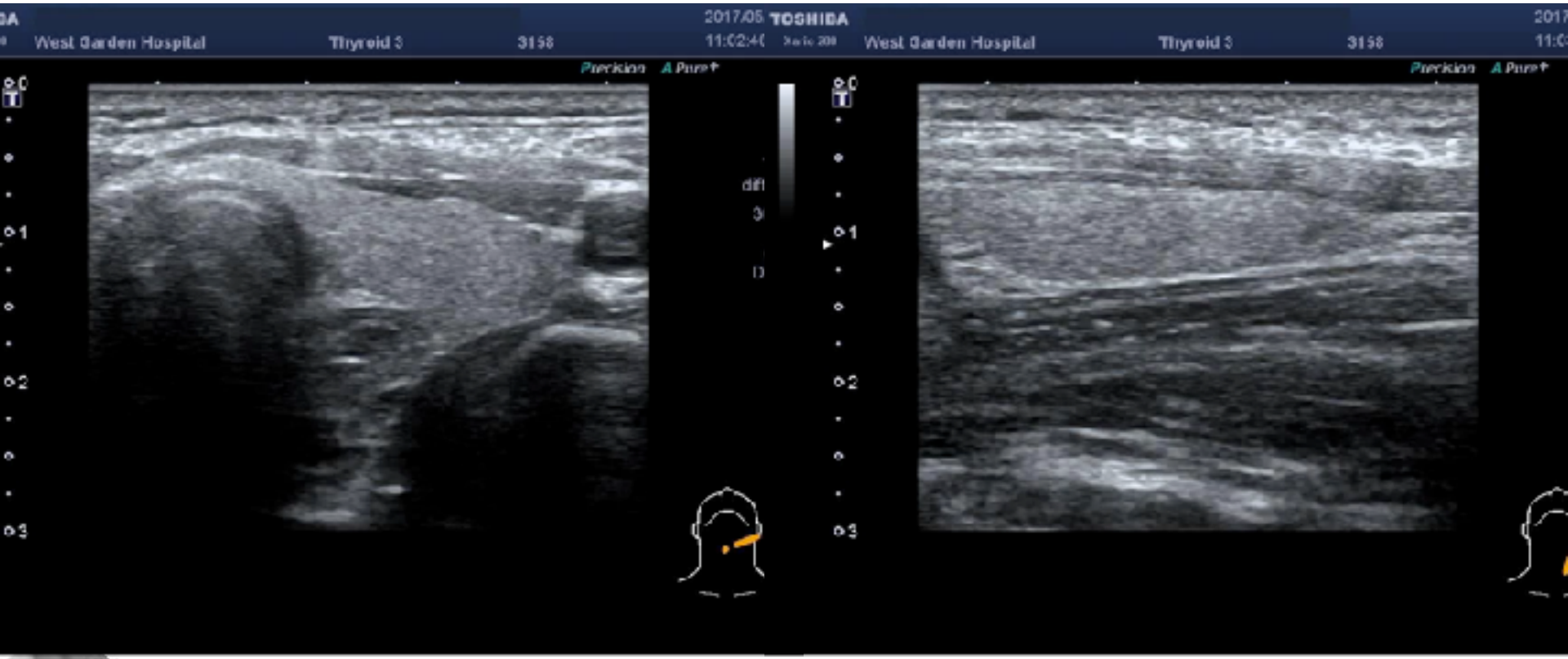
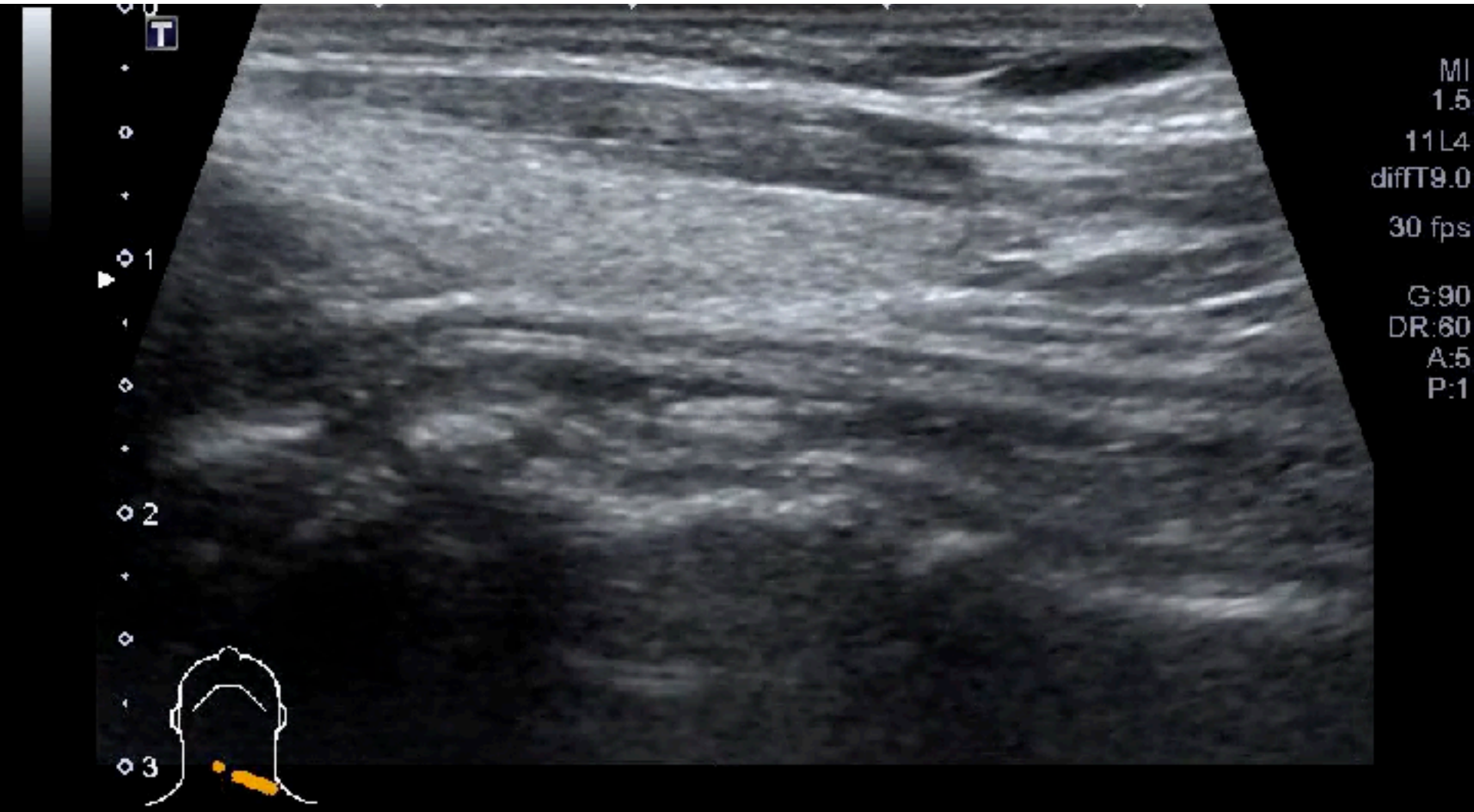
PROGRAM

GI tract recognition



Cervical esophagus

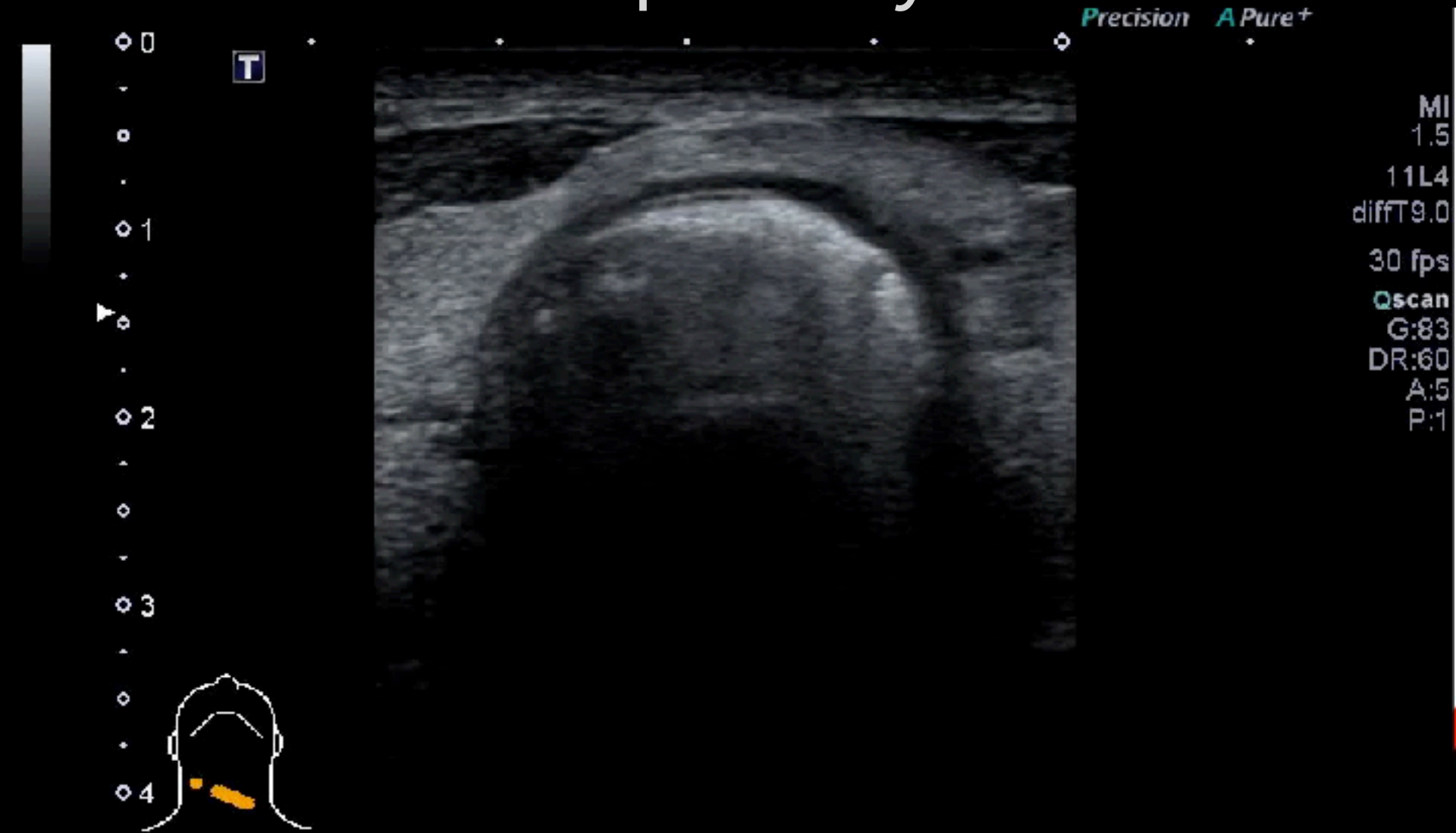
影片中做了什麼動作？



吞嚥/Valsalva/呼吸/蠕動/**加壓**

ETT & NG confirmation

68M，Respiratory failure



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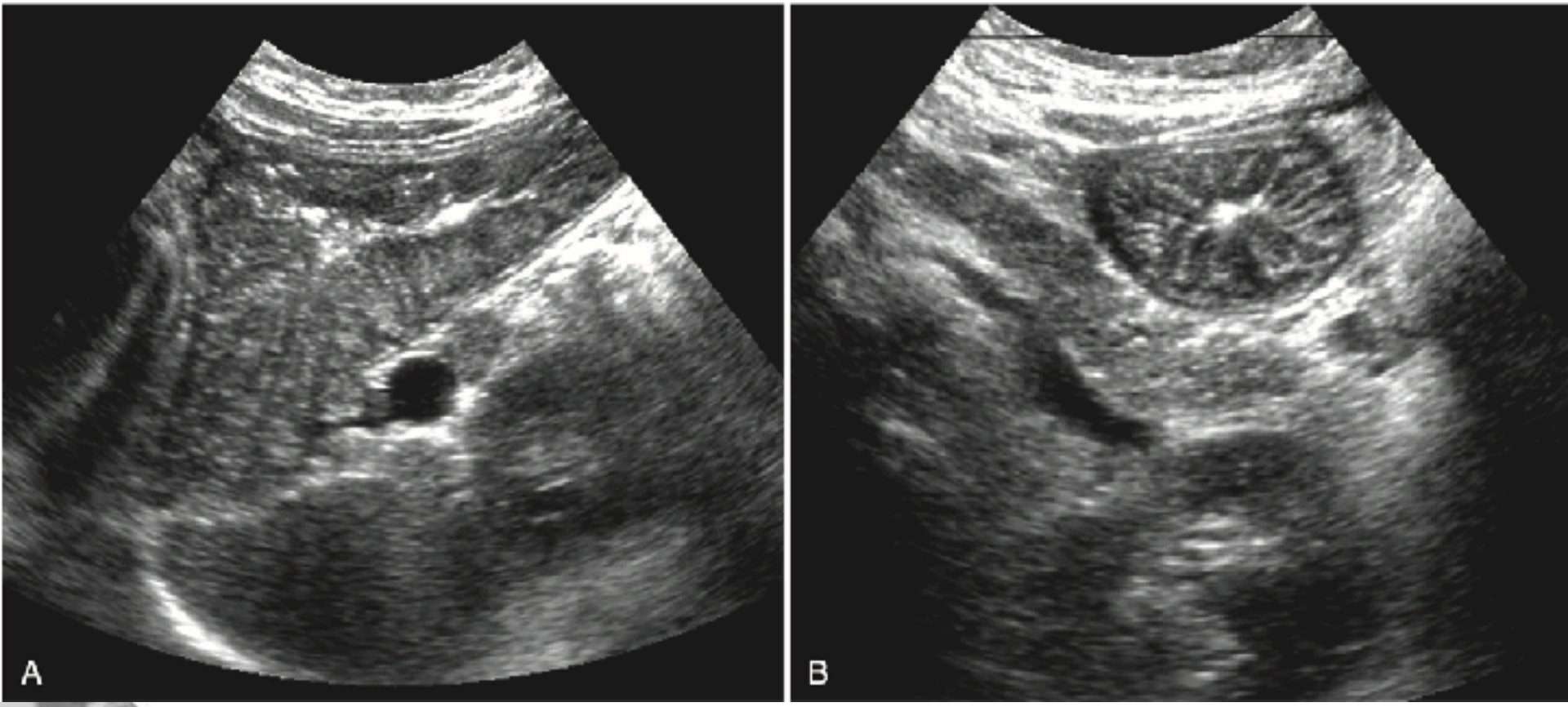
PROGRAM

GI tract recognition



Gastric rugae

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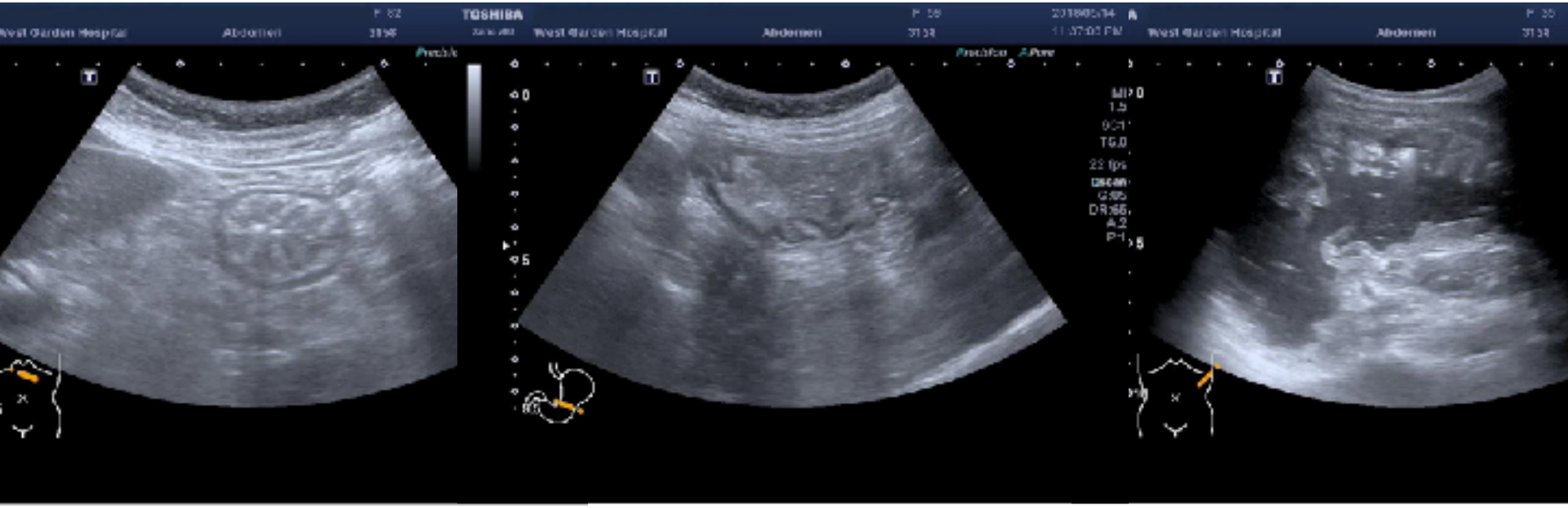
Gastric rugae



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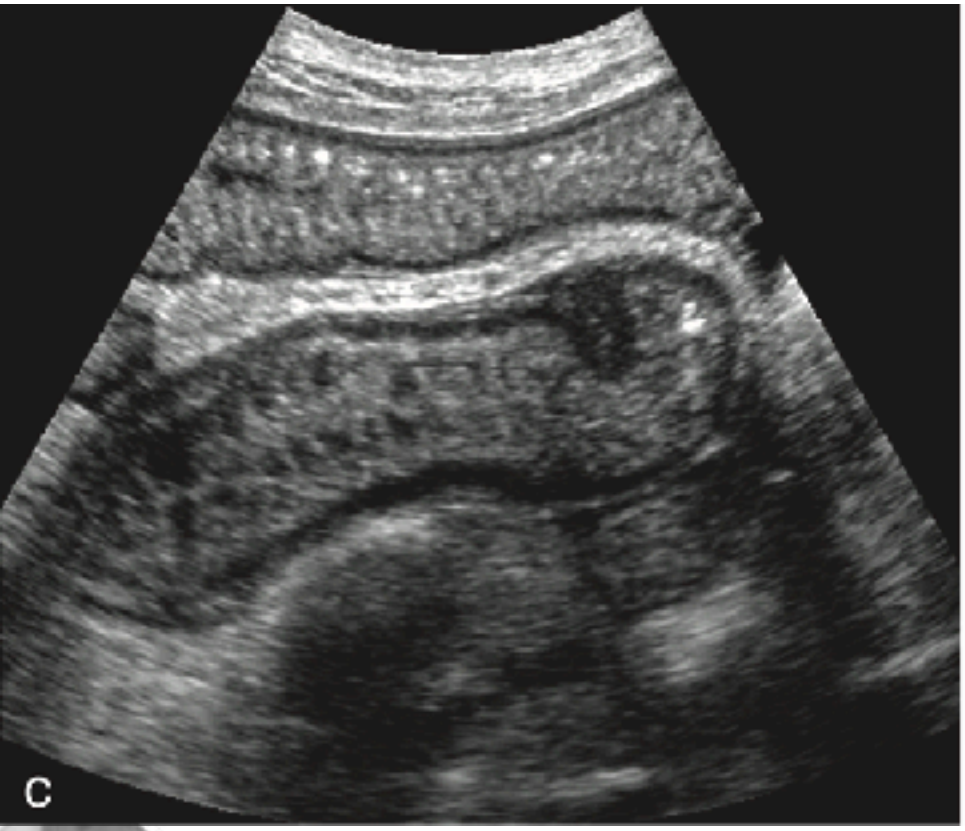
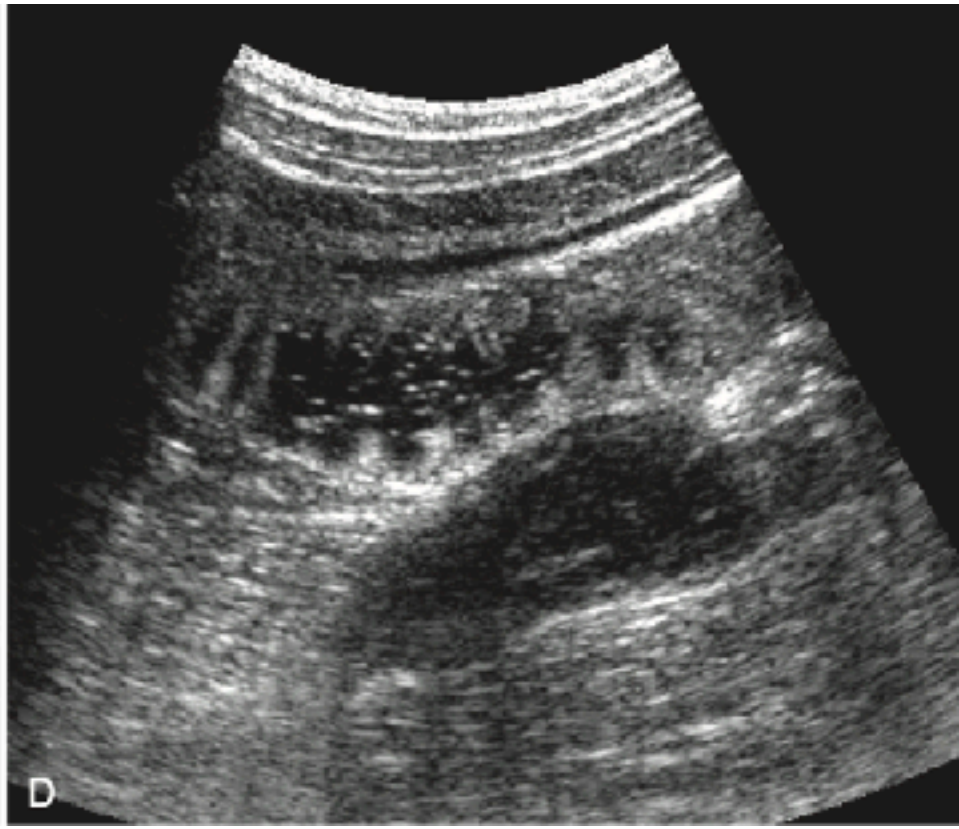
GI tract recognition





Valvulae conniventes (plicae circulates)

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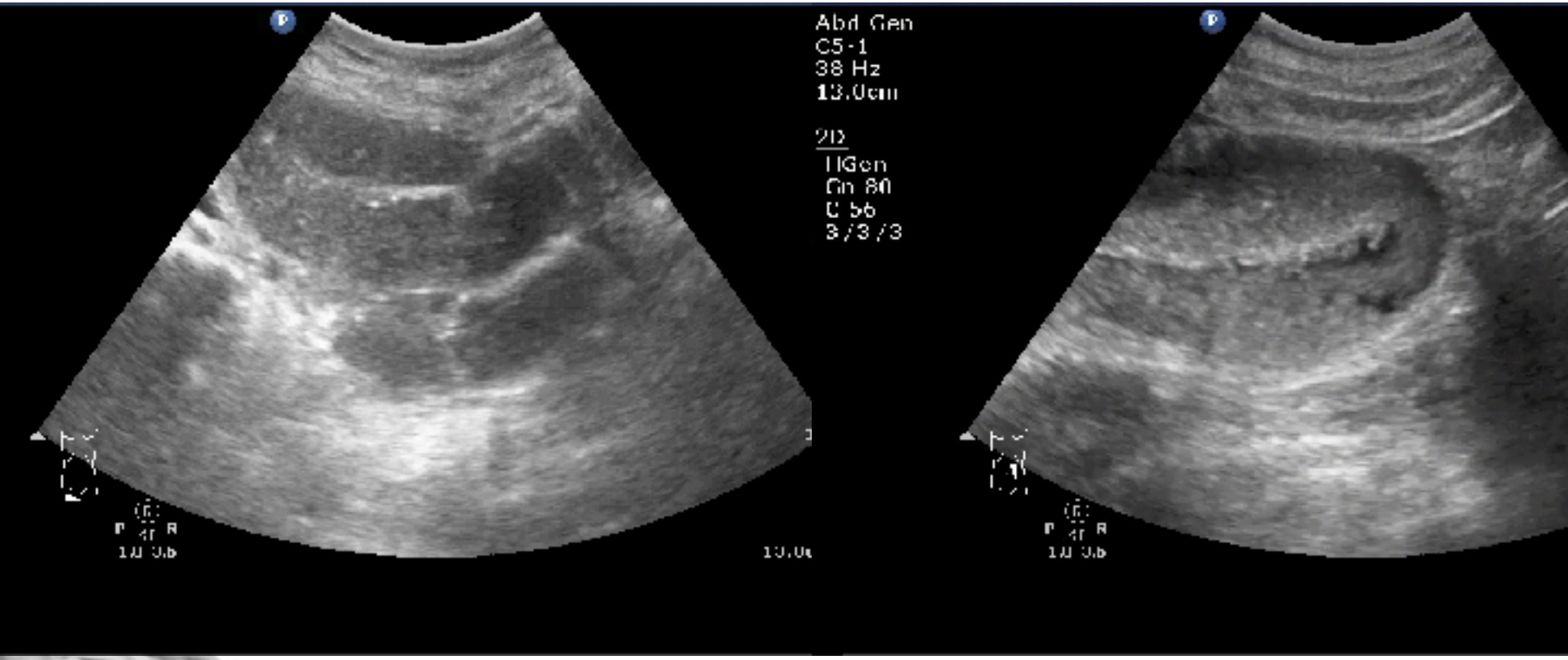
Valvulae conniventes (Small bowel)



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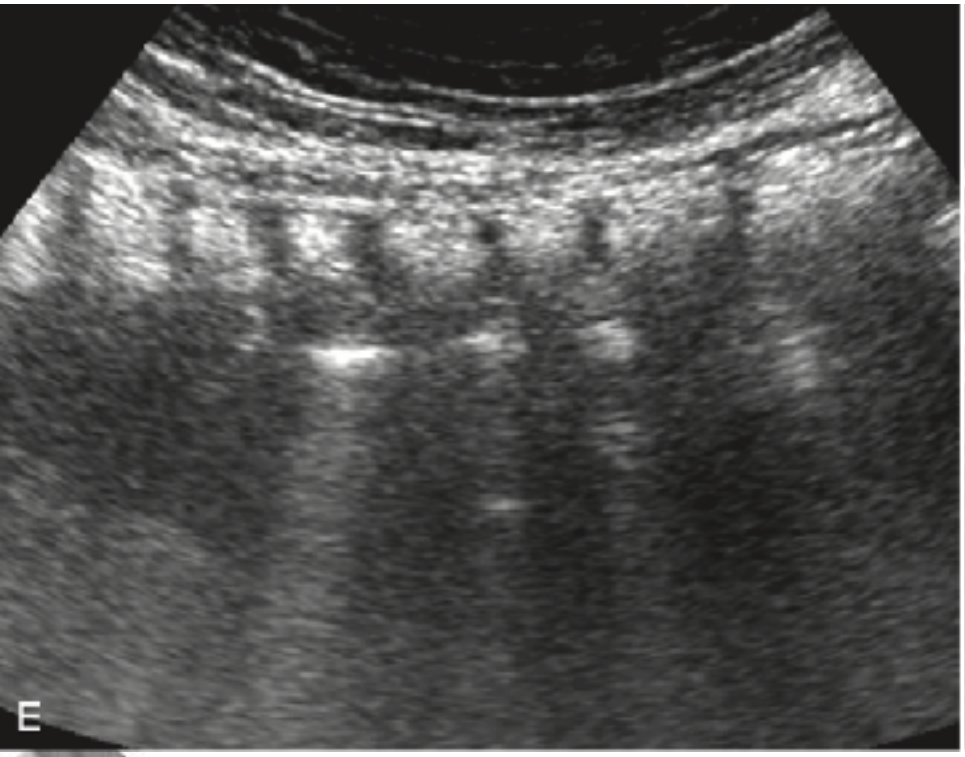
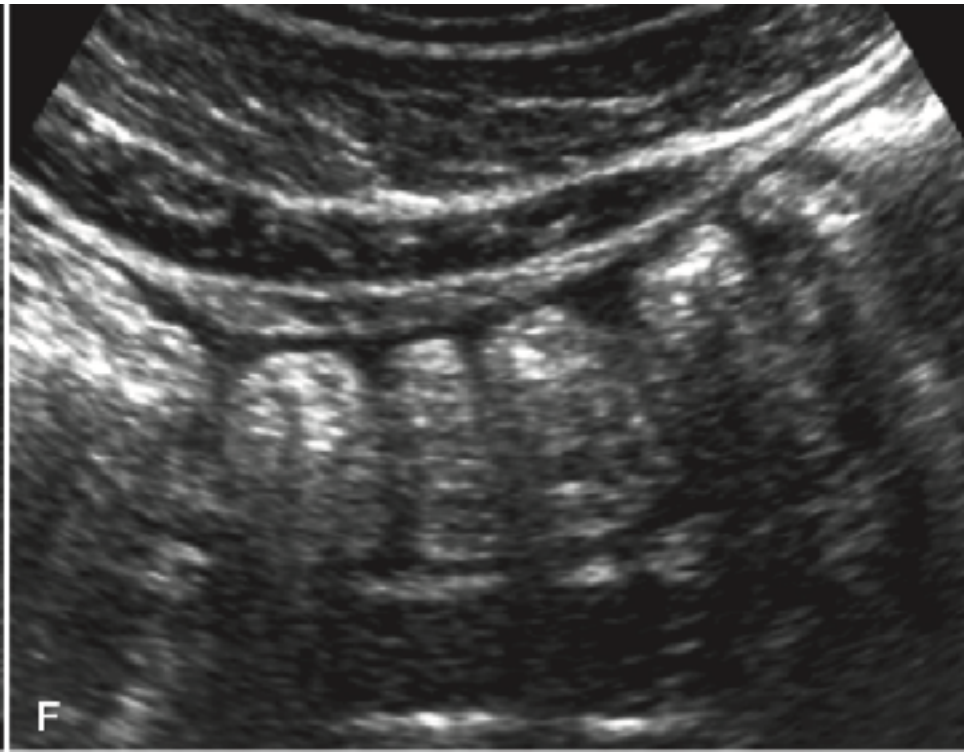
GI tract recognition

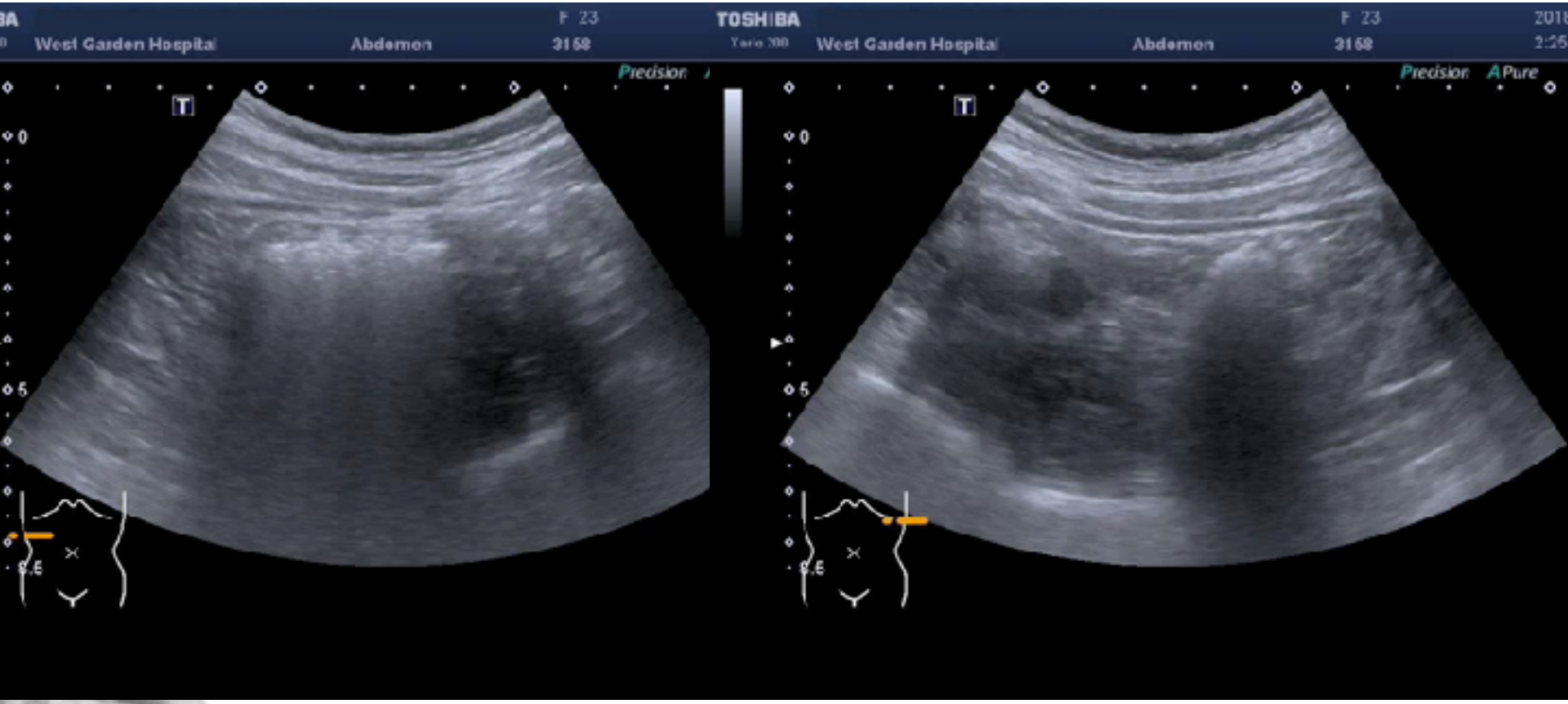




Colonic haustrations

ULTRASOUND
PROGRAM

Colonic haustrations



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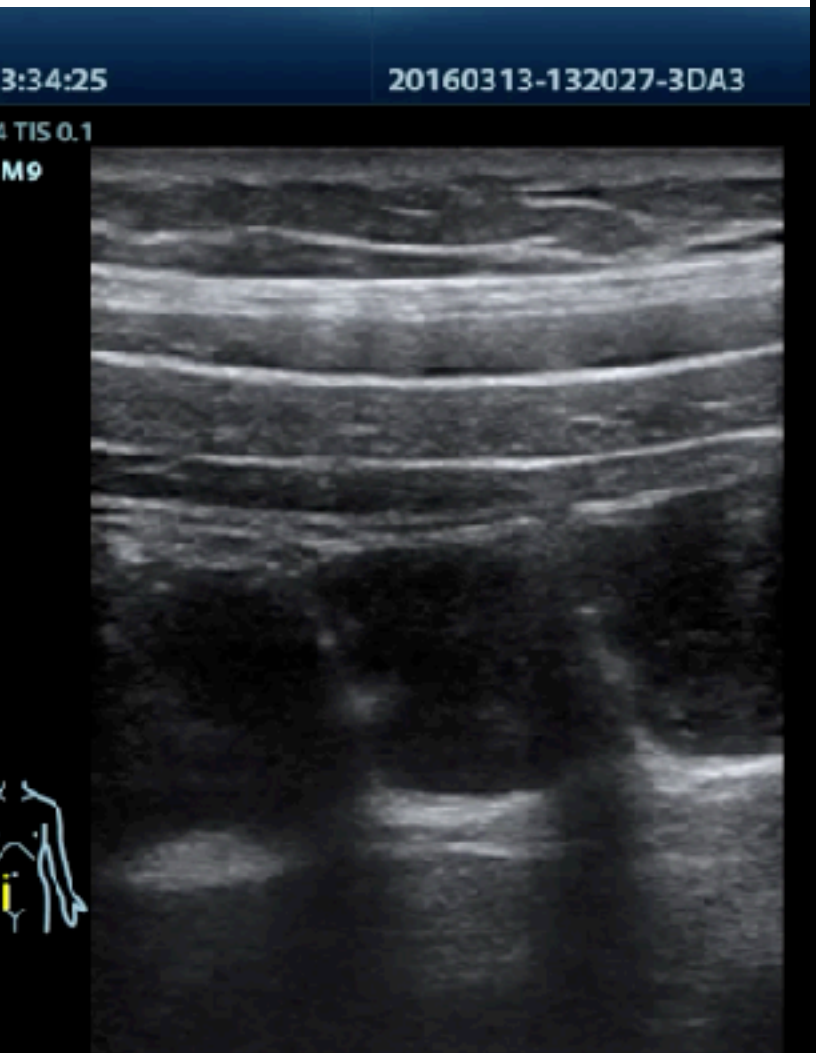
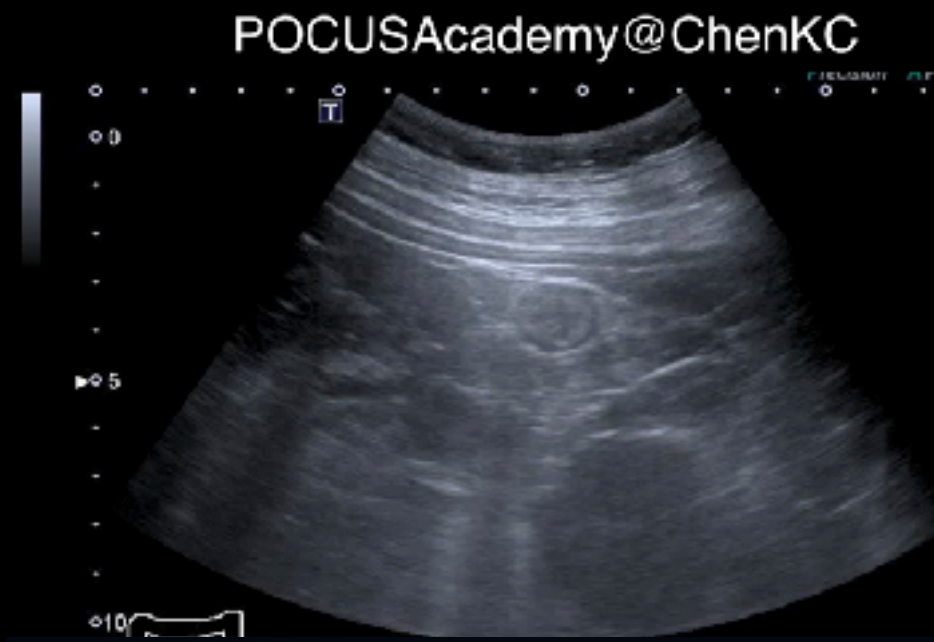
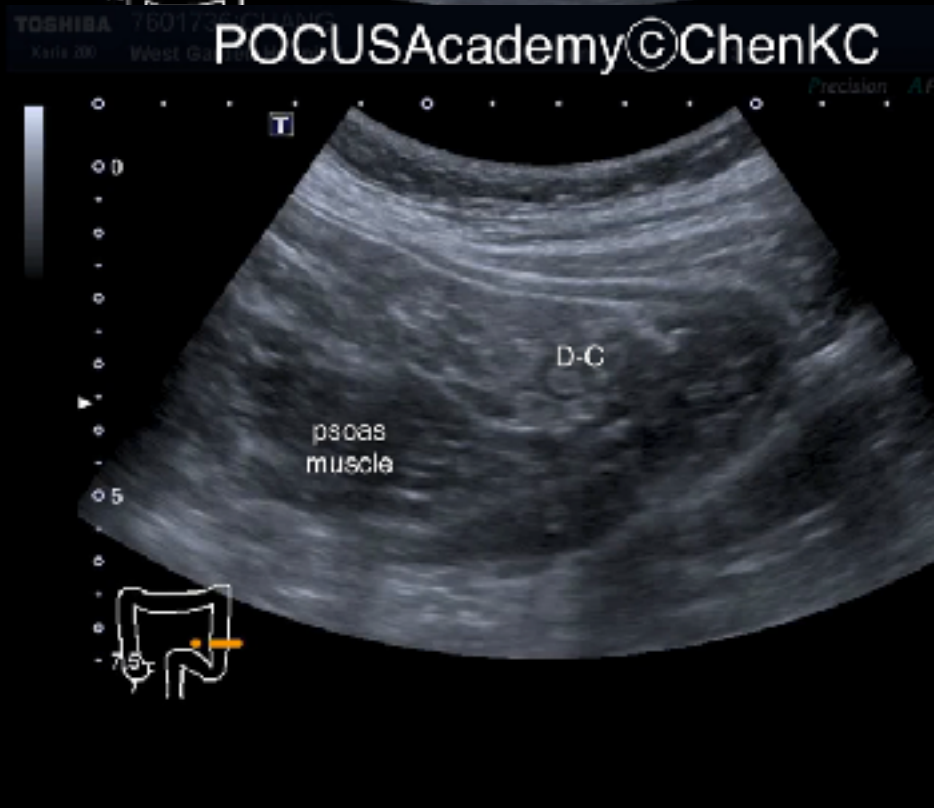
PROGRAM

Colon







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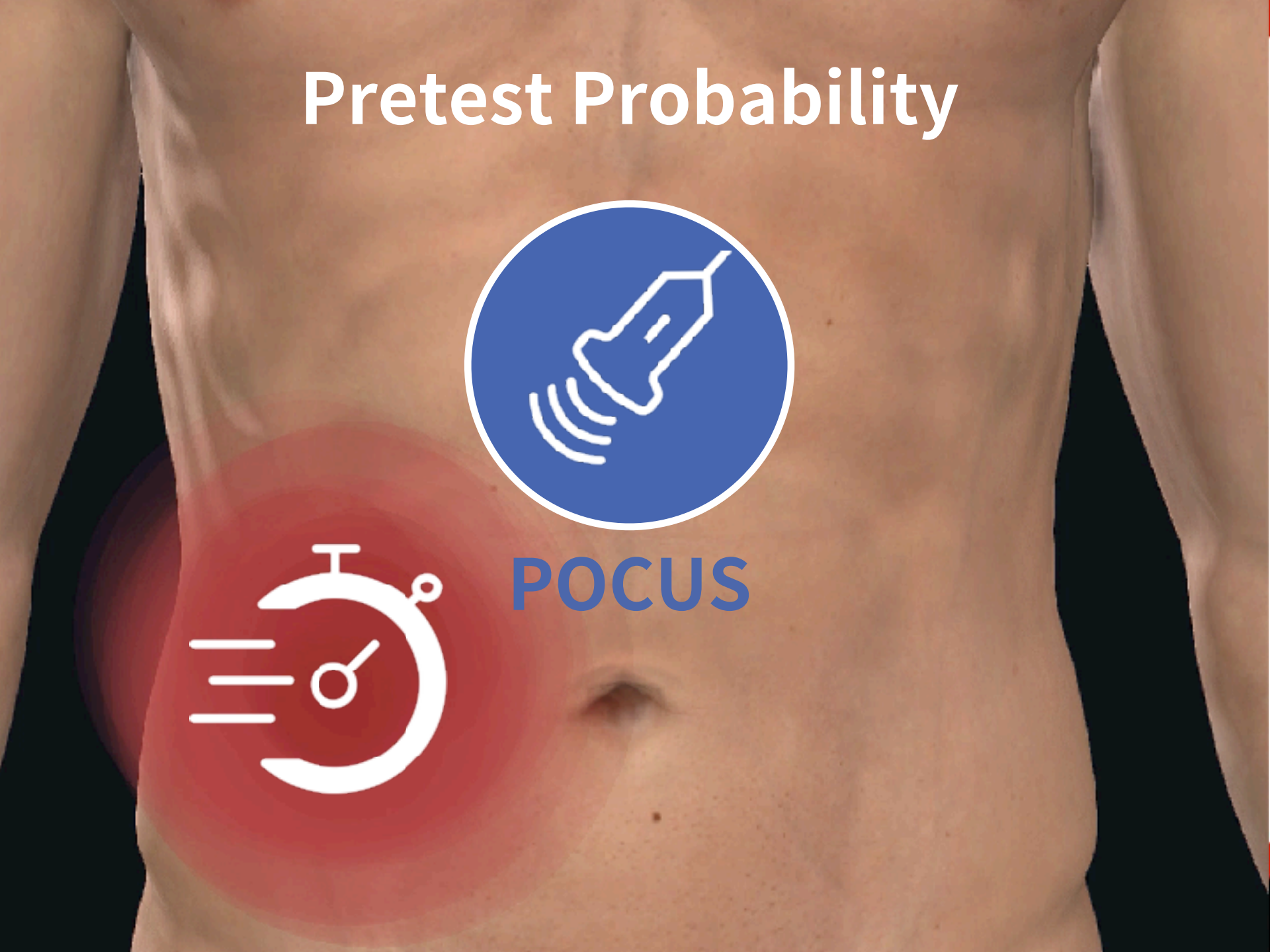
Pretest Probability



POCUS

ULTRASOUND
PROGRAM

探頭選擇：先腹後線

急診POCUS不用NPO
系統性掃描之後再聚焦

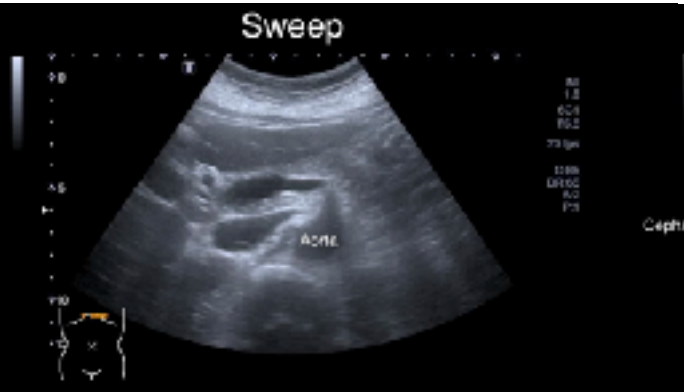
ULTRASOUND
PROGRAM

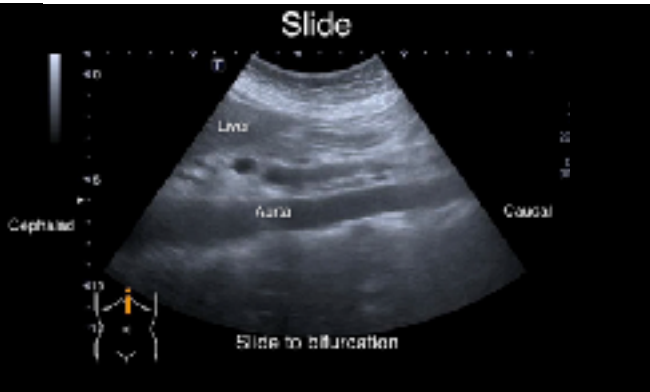
操控 6 大技巧

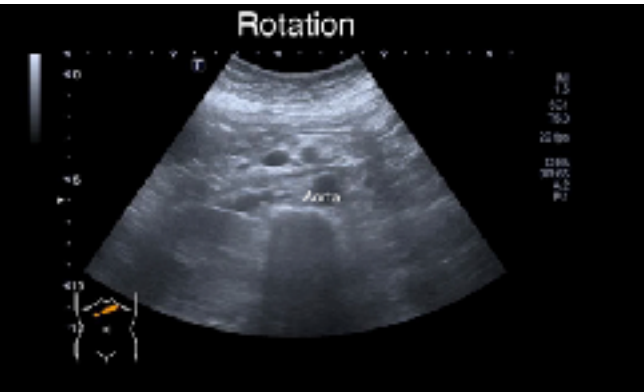
X 短軸

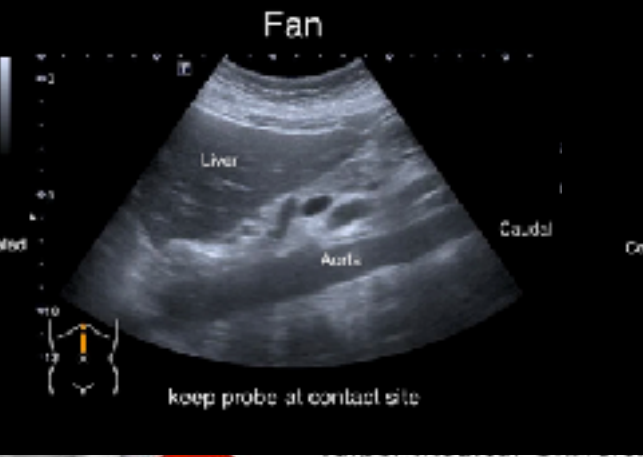
Y 長軸

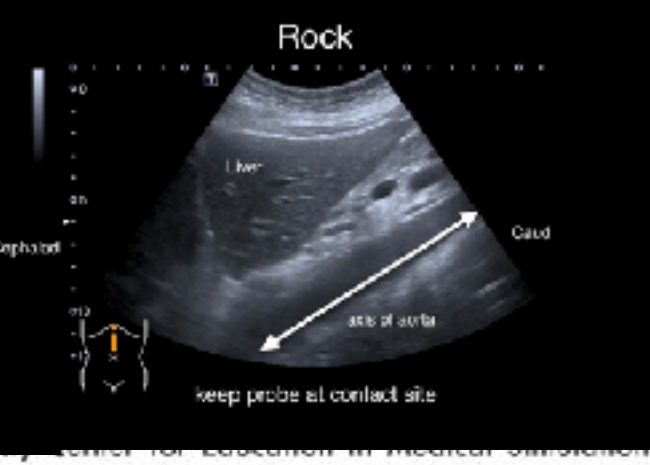
Z 軸心

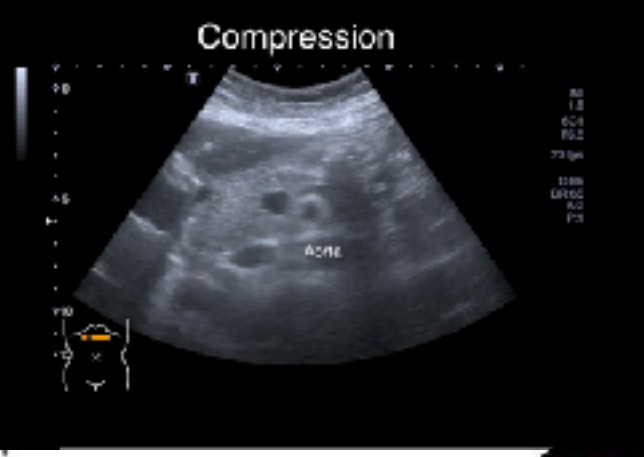












ULTRASOUND PROGRAM

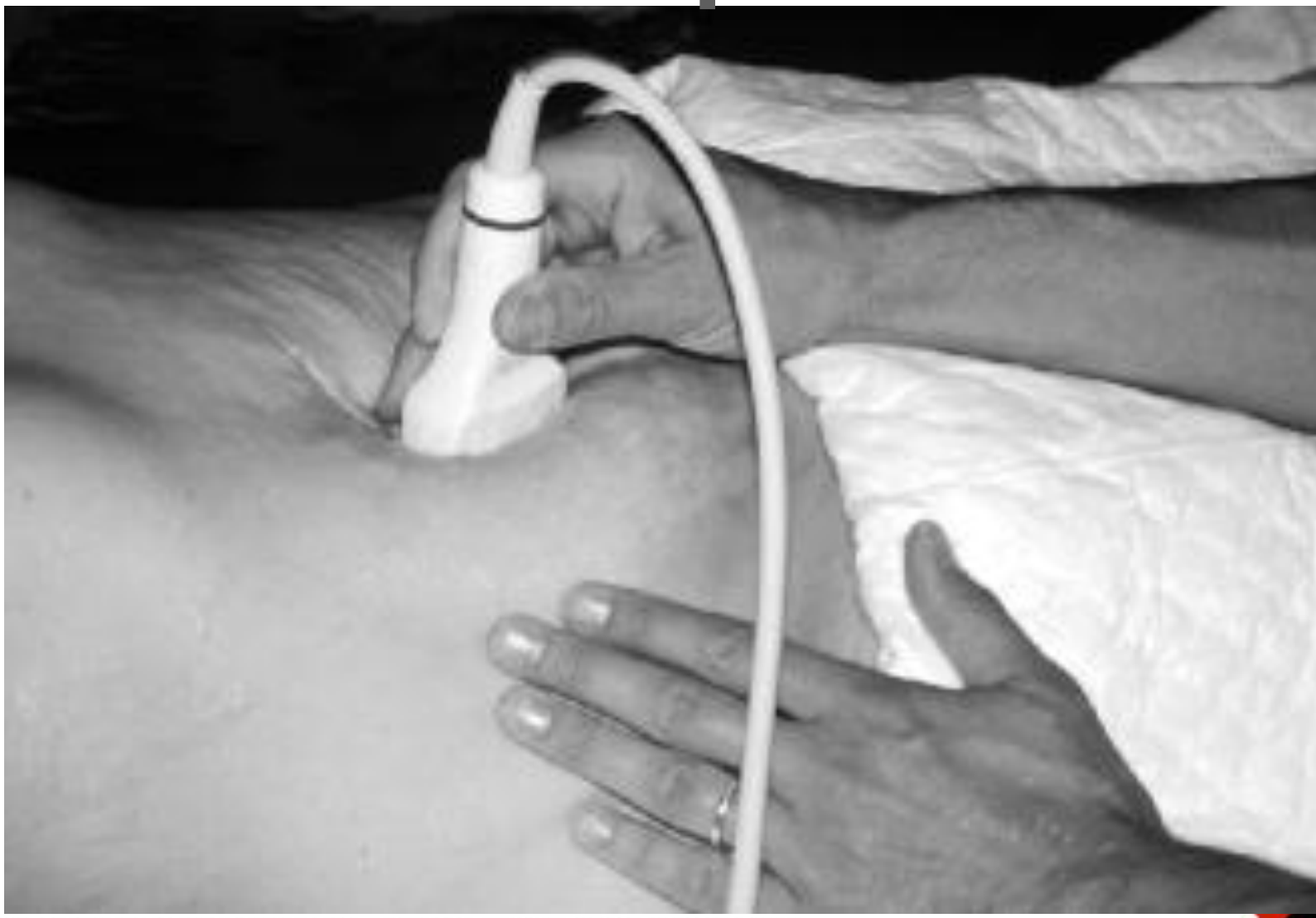
操控 6 大技巧

X 短軸	Y 長軸	Z 軸心
Sweep 掃	Slide 滑	Rotate 轉
Fan/Tilt 傾	Rock 搖	Compress 壓

ULTRASOUND
PROGRAM

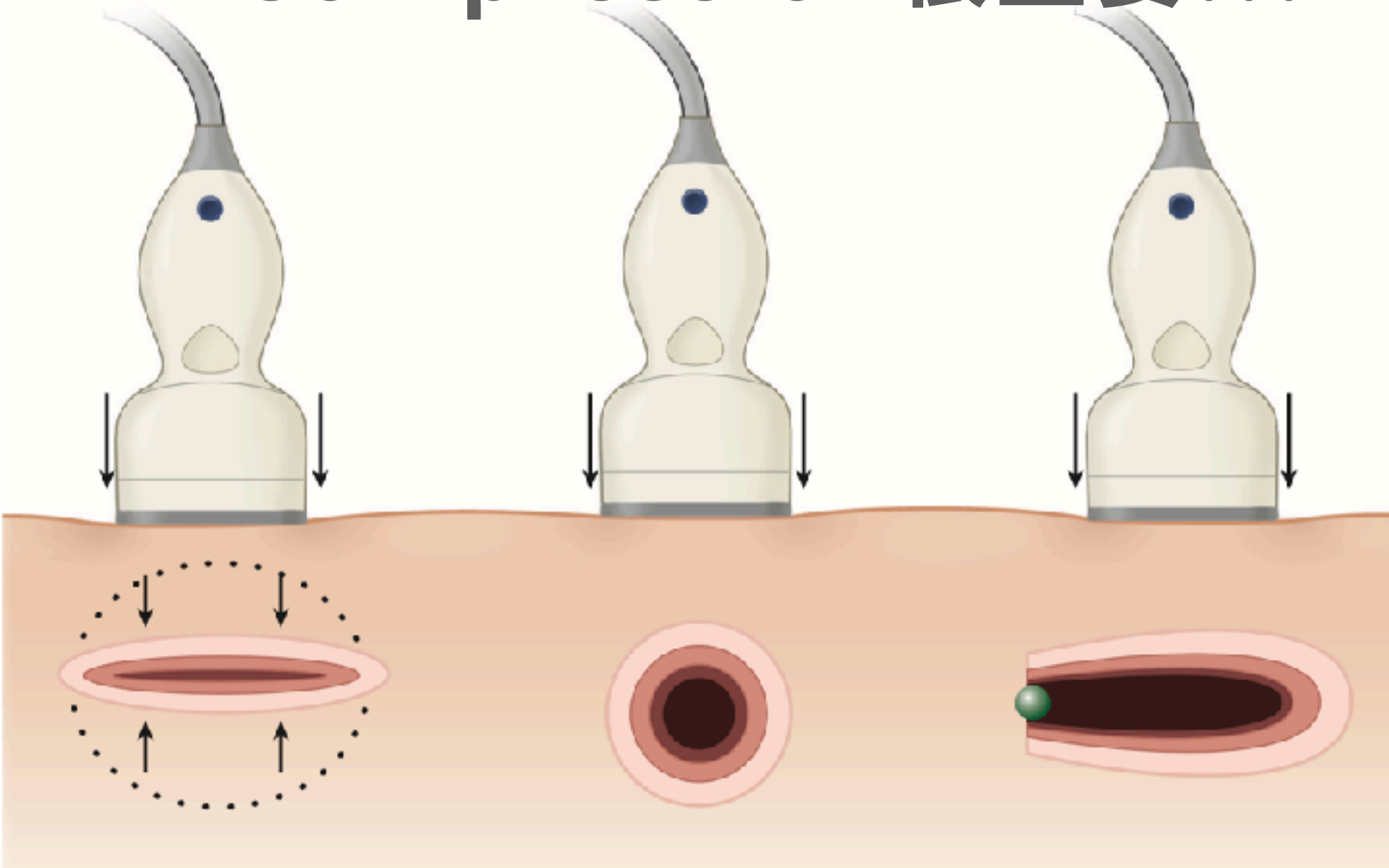
Graded compression

溫柔
穩定
施壓
停留
觀察



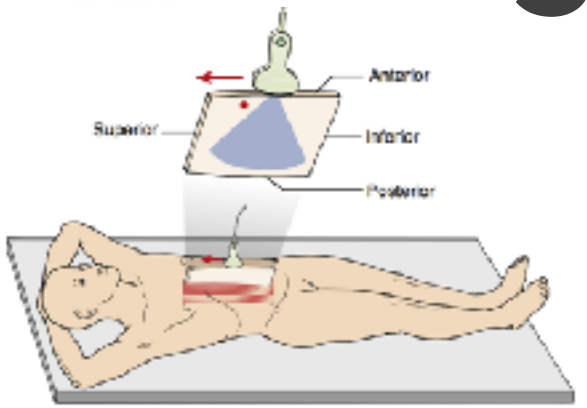
Taipei Medical University Center for Education in Medical Simulation

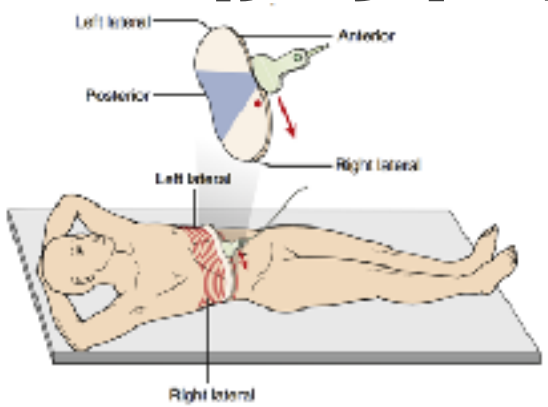
Compression很重要!!!

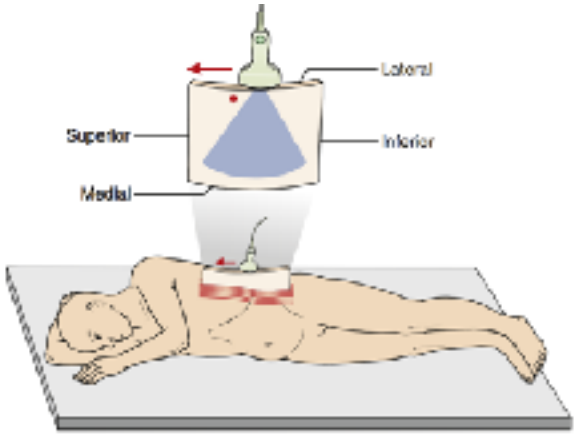


ULTRASOUND PROGRAM

3D 立體掃描



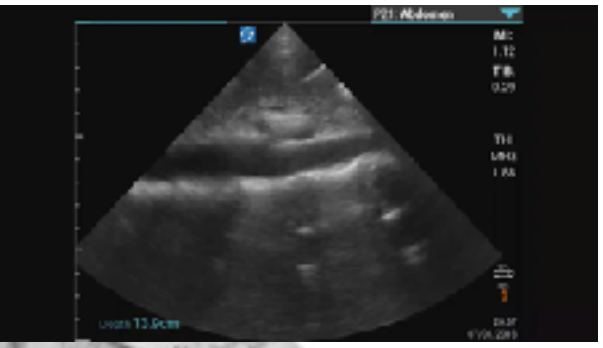


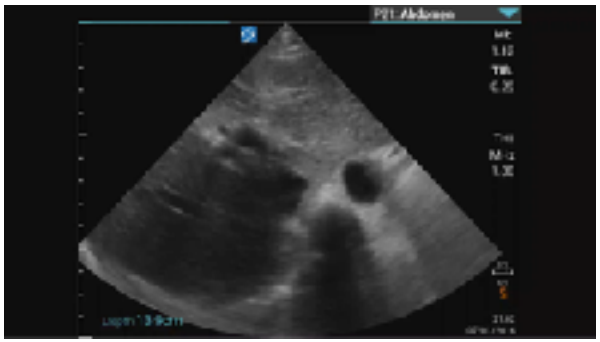


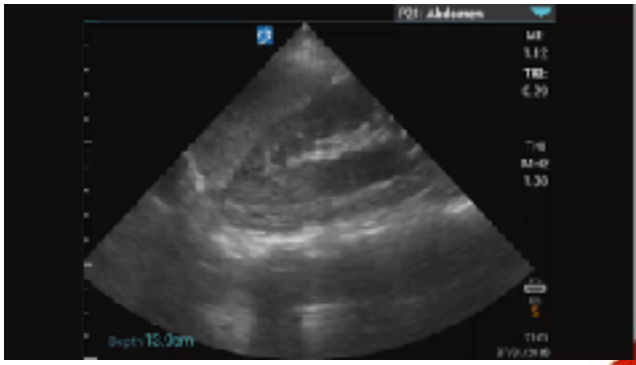
Sagittal 縱

Transverse 橫

Coronal 側



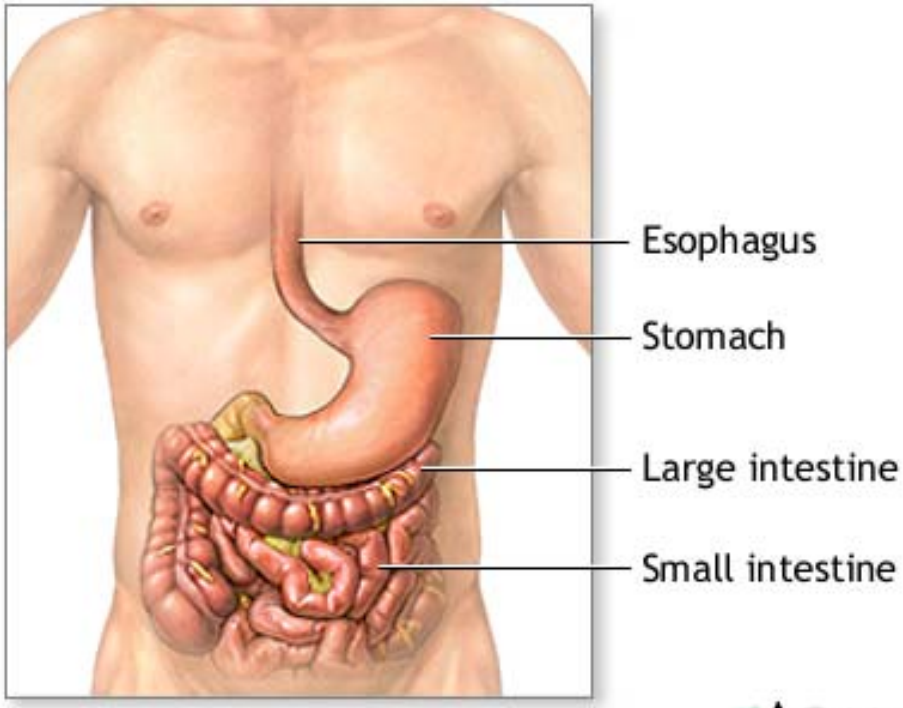


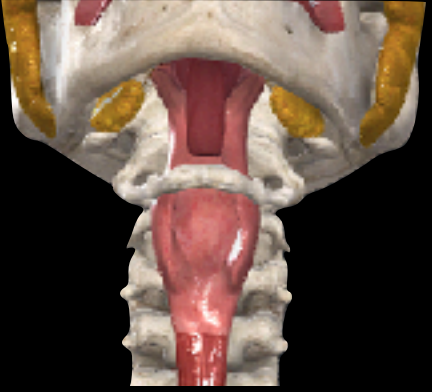


ULTRASOUND PROGRAM

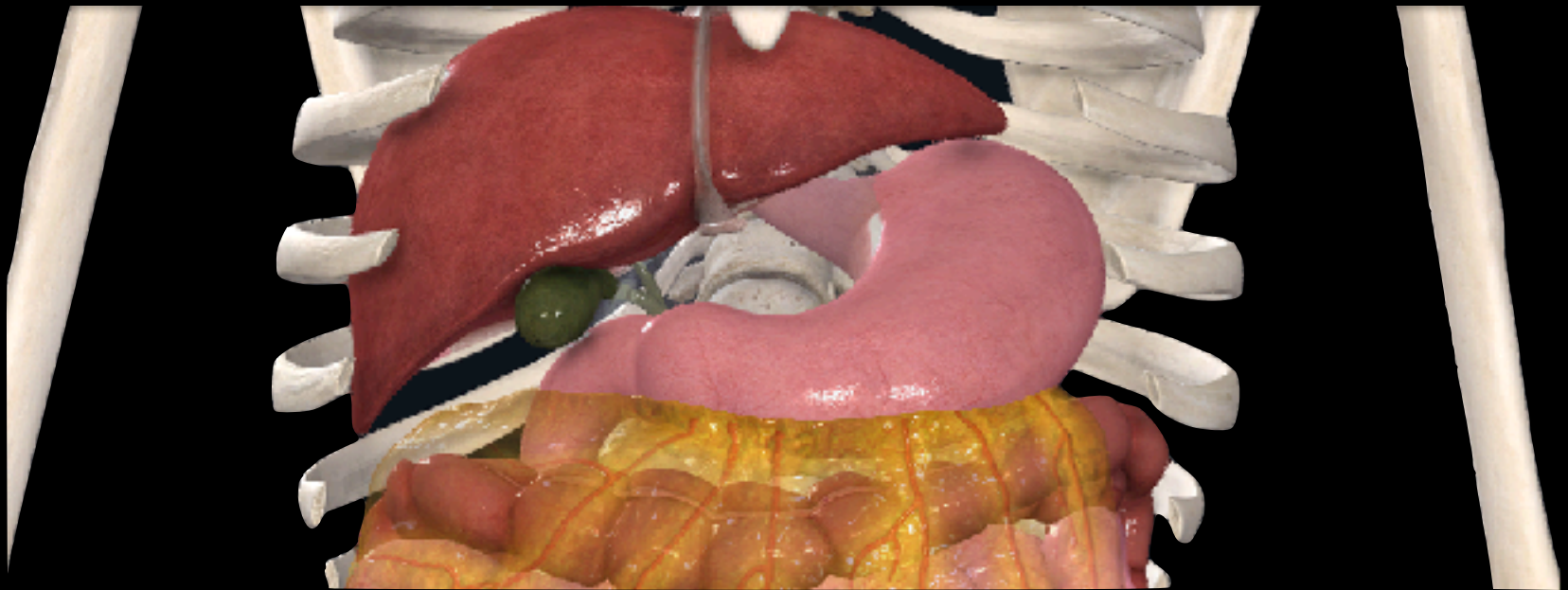
請問解剖學上腸道的”固定”處，不包含下列何處？

1. 食道胃交界
2. 升結腸
3. 橫結腸
4. 降結腸
5. 直腸



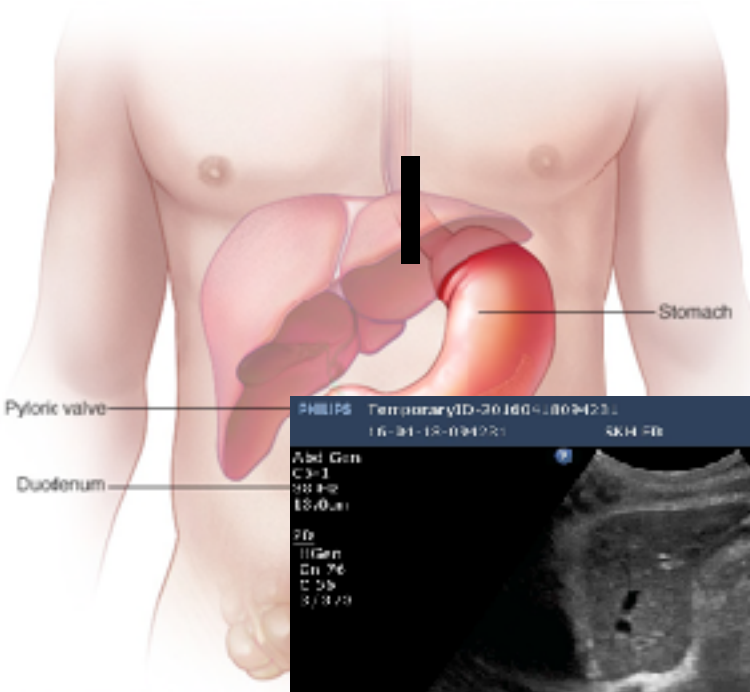


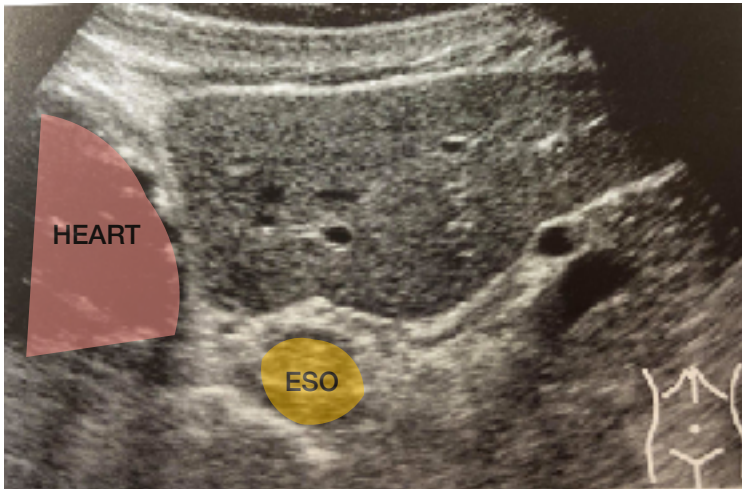
嘿嘿！你看不到我

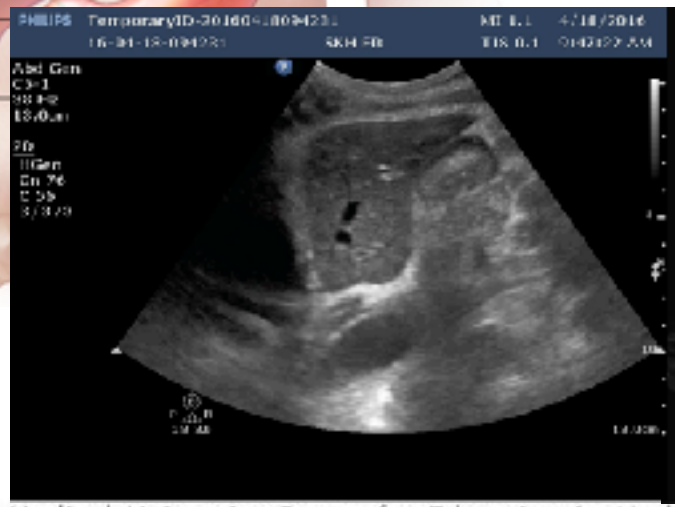


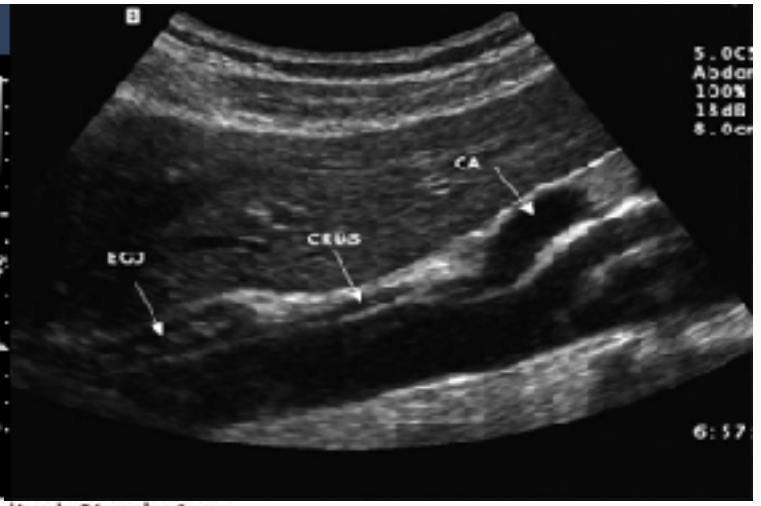
ULTRASOUND PROGRAM

EG junction



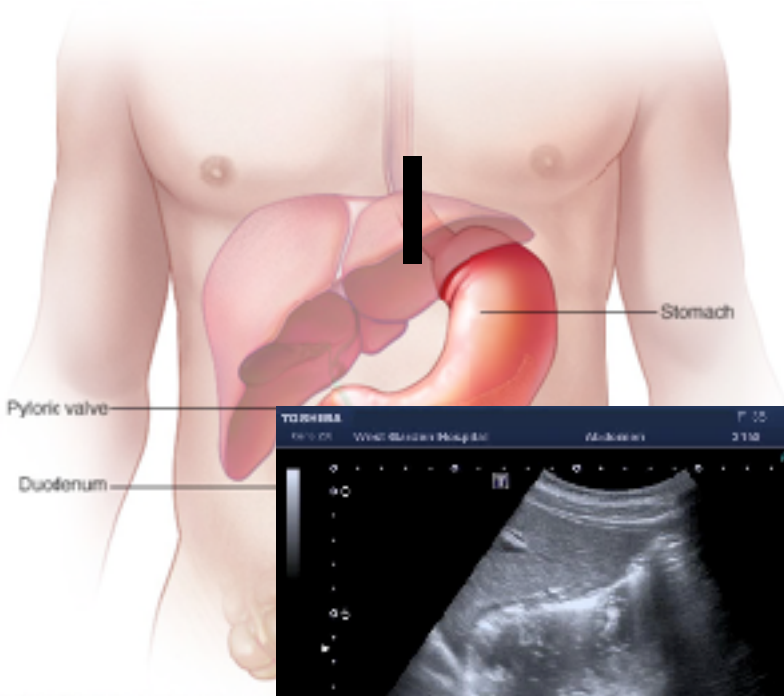


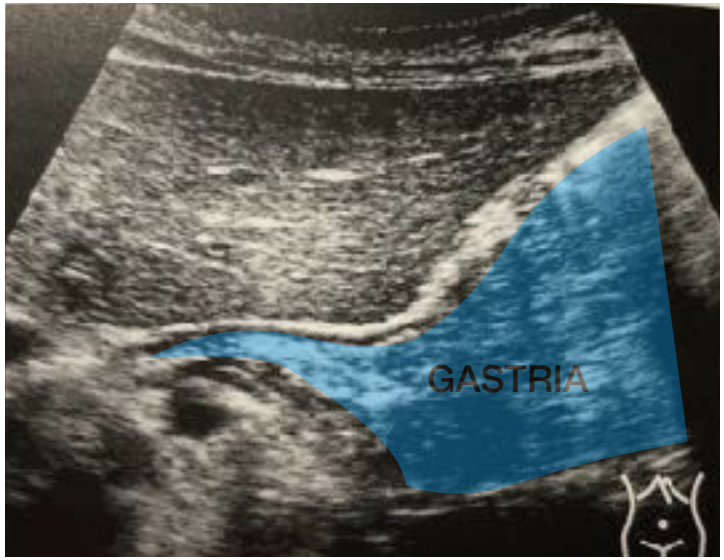


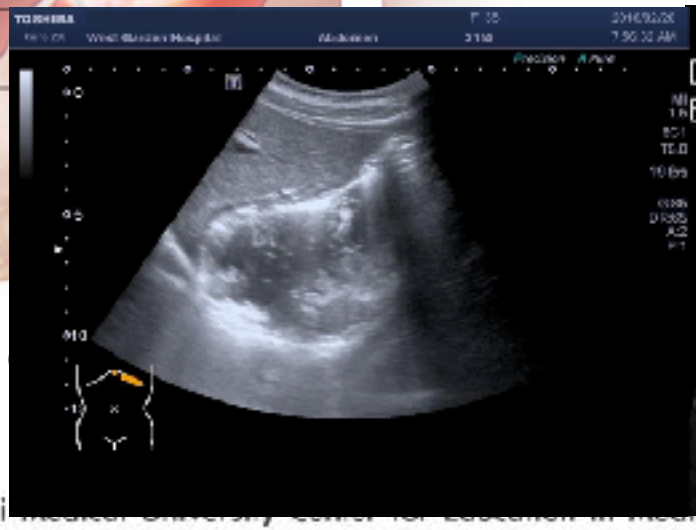


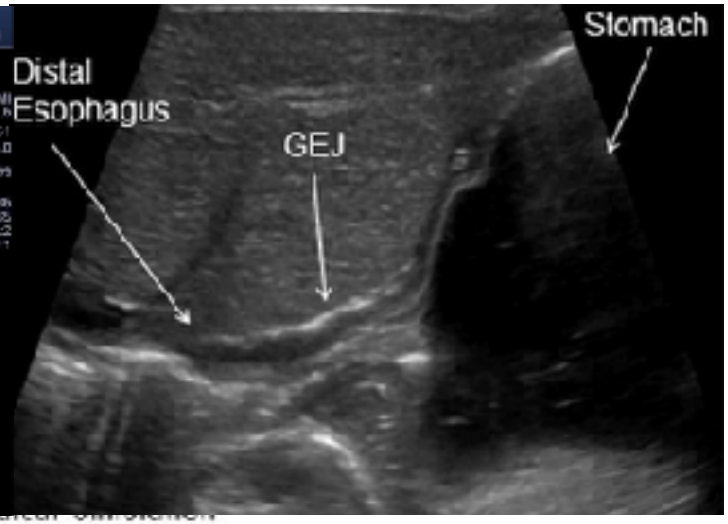
ULTRASOUND PROGRAM

EG junction



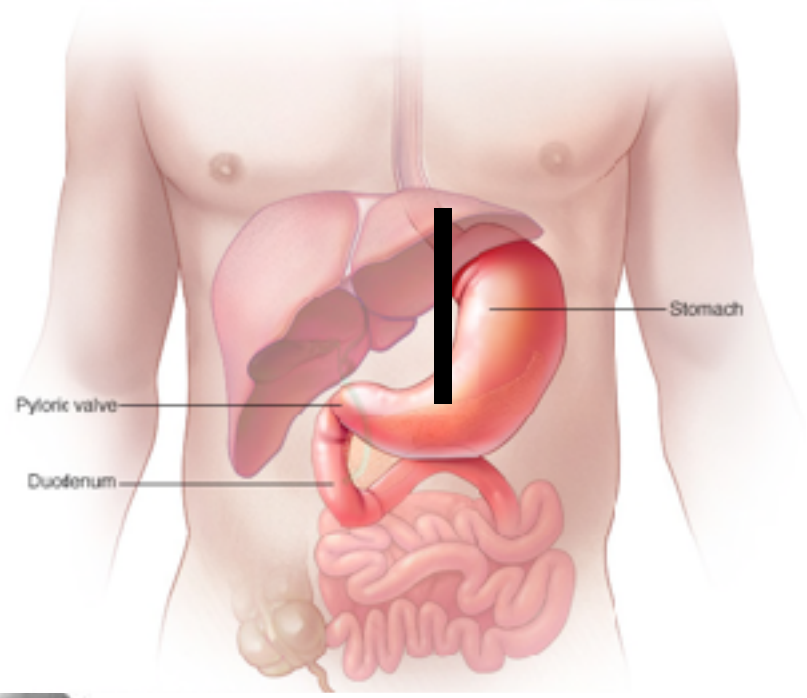


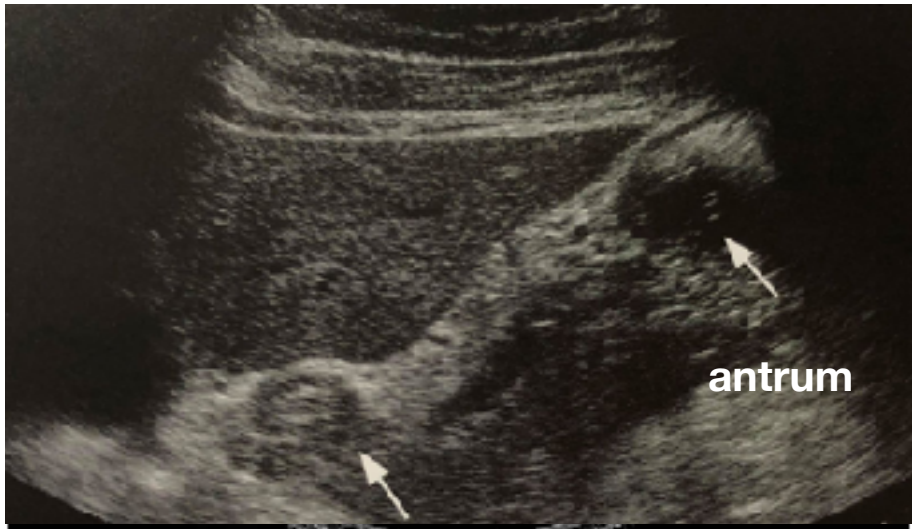


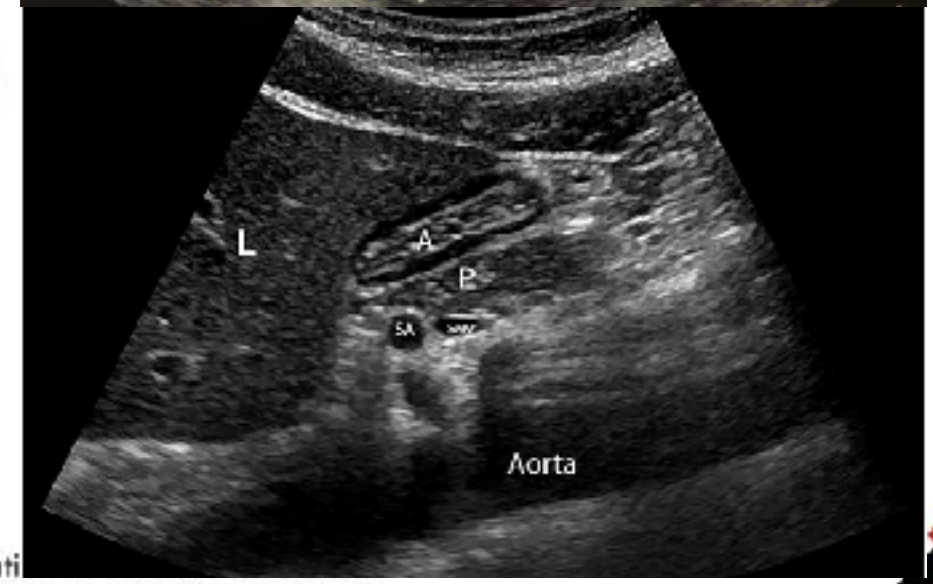


ULTRASOUND PROGRAM

Stomach

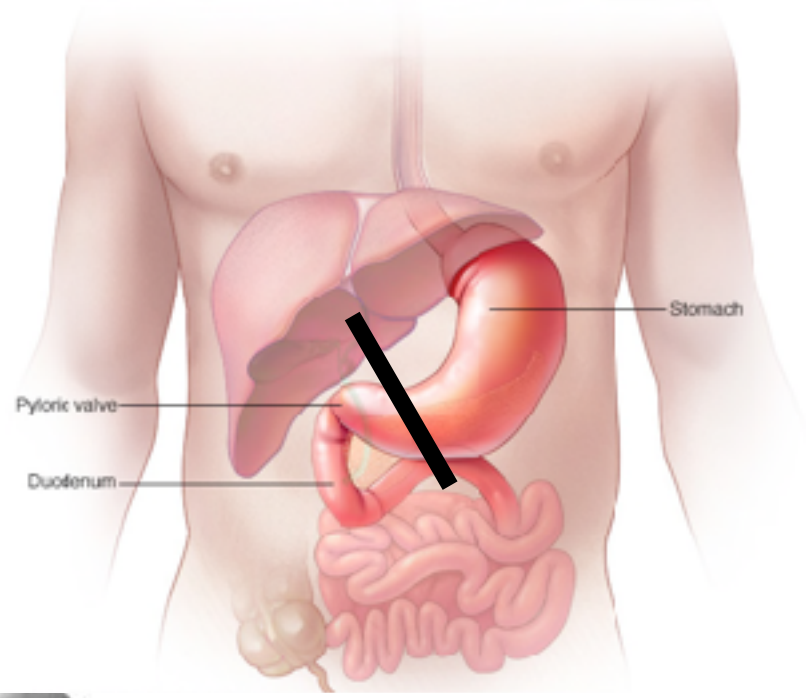


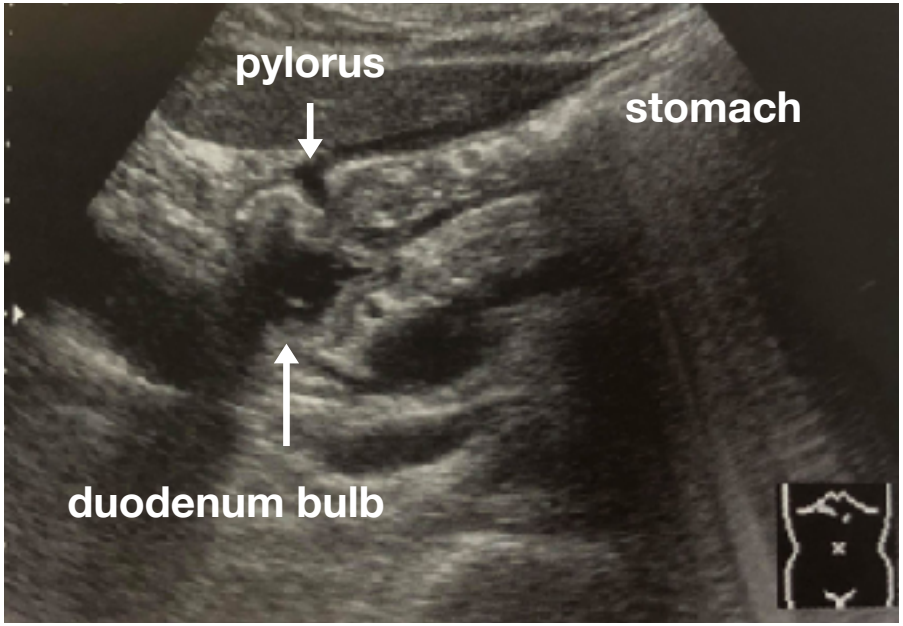




ULTRASOUND PROGRAM

Pylorus

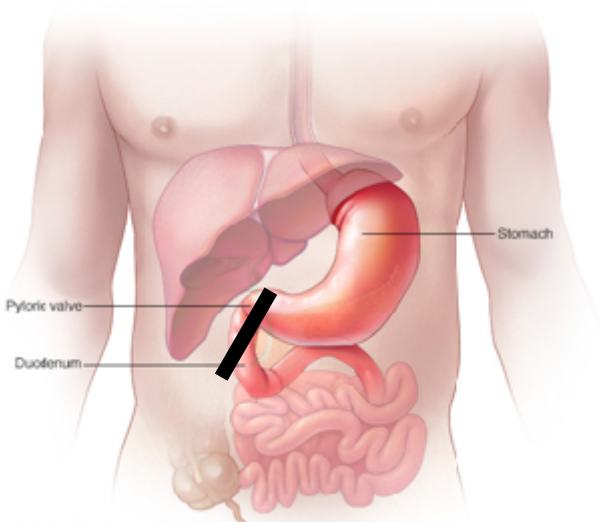


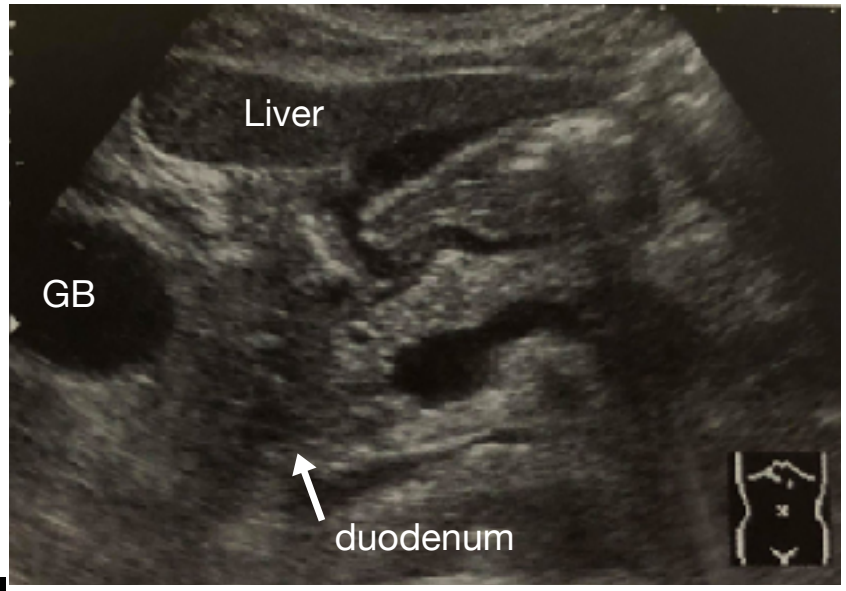


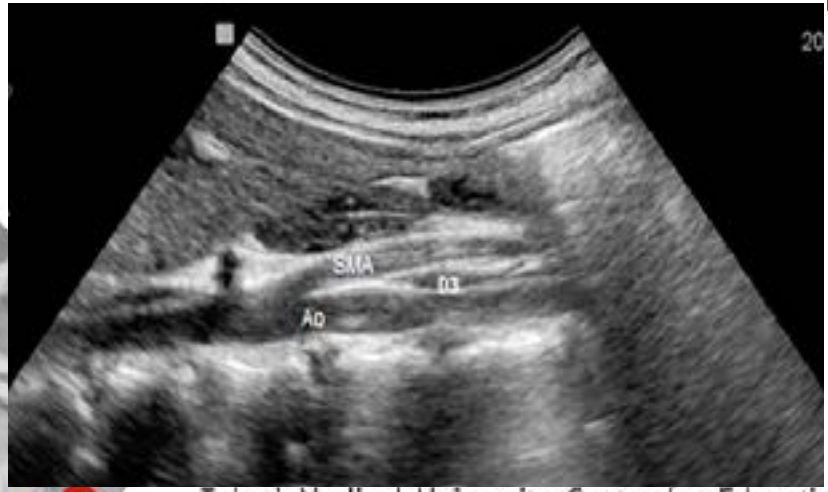
Muscular propria relative thicken
HYPOECHOIC
= pylorus

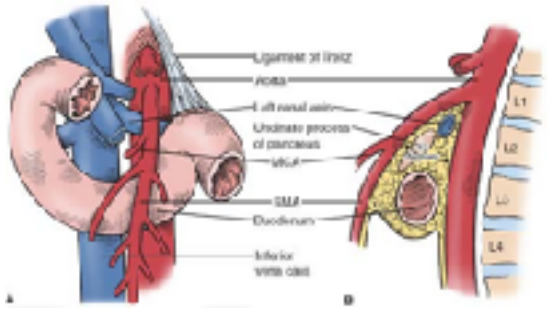
ULTRASOUND PROGRAM

Duodenum



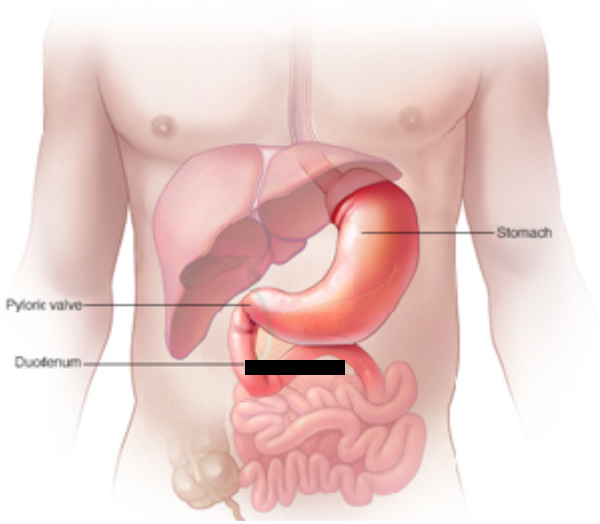


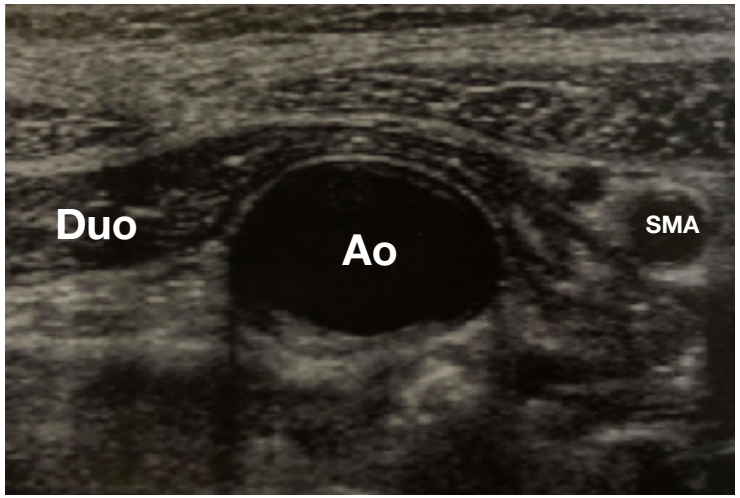


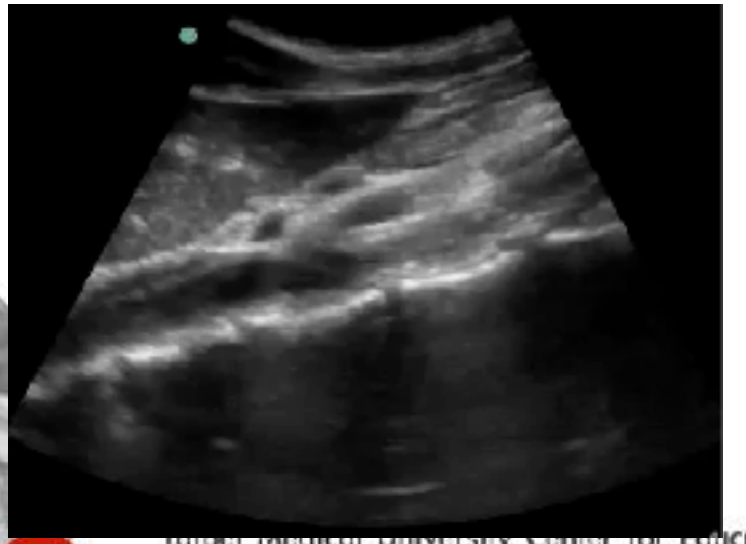


ULTRASOUND PROGRAM

Duodenum

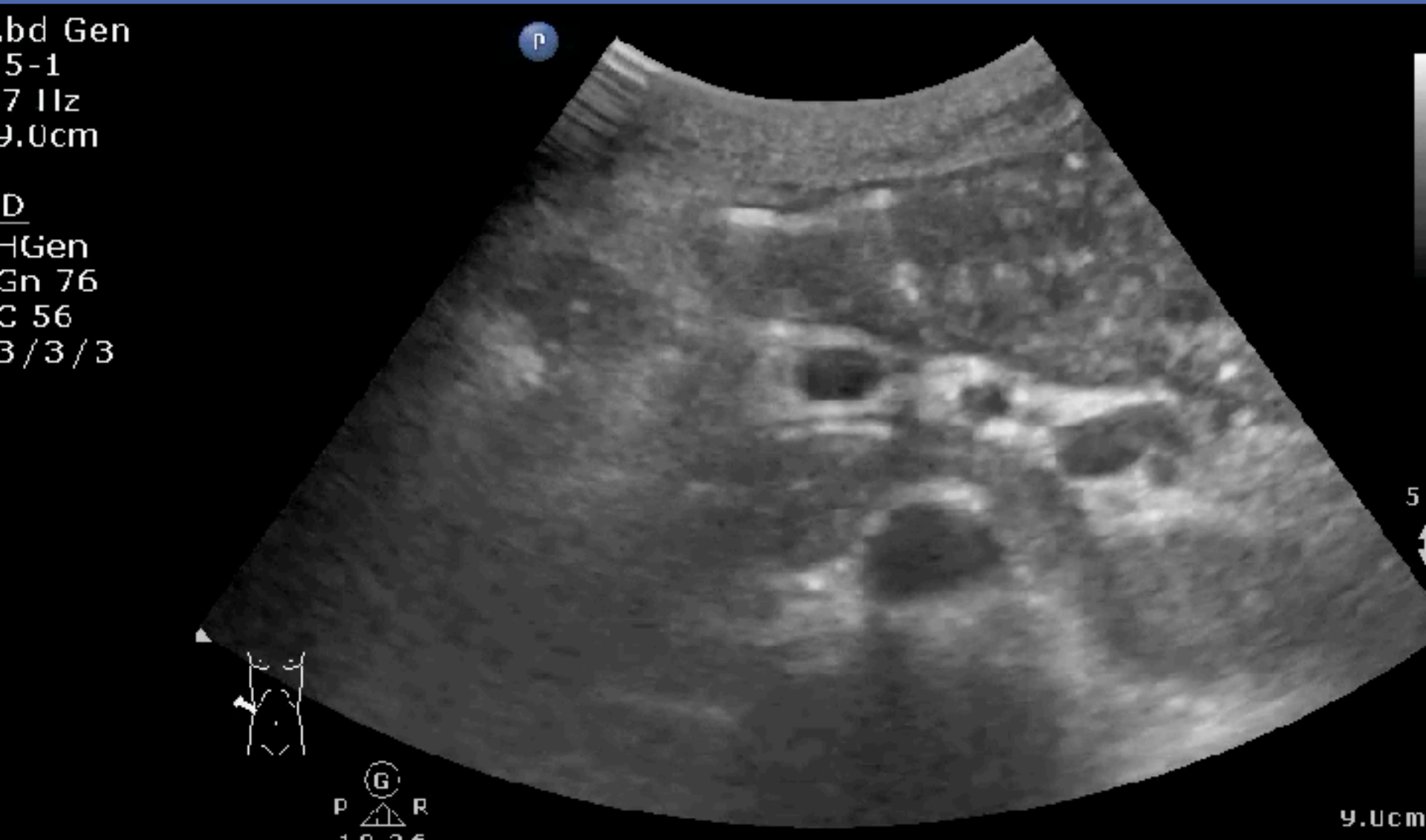






Aortomesenteric angle
Normal 25° to 60°
SMA syndrome 6° to 15°

Stomach & Duodenum

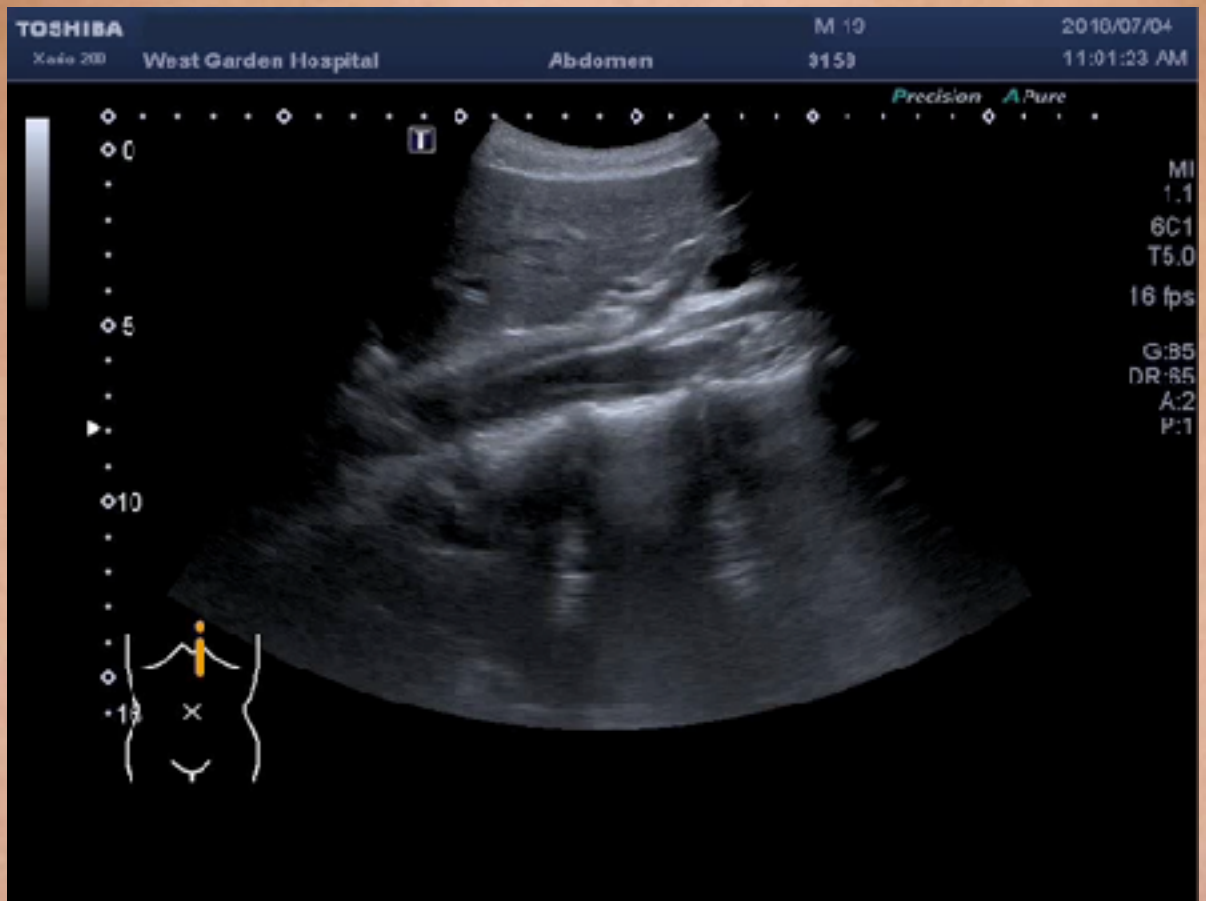


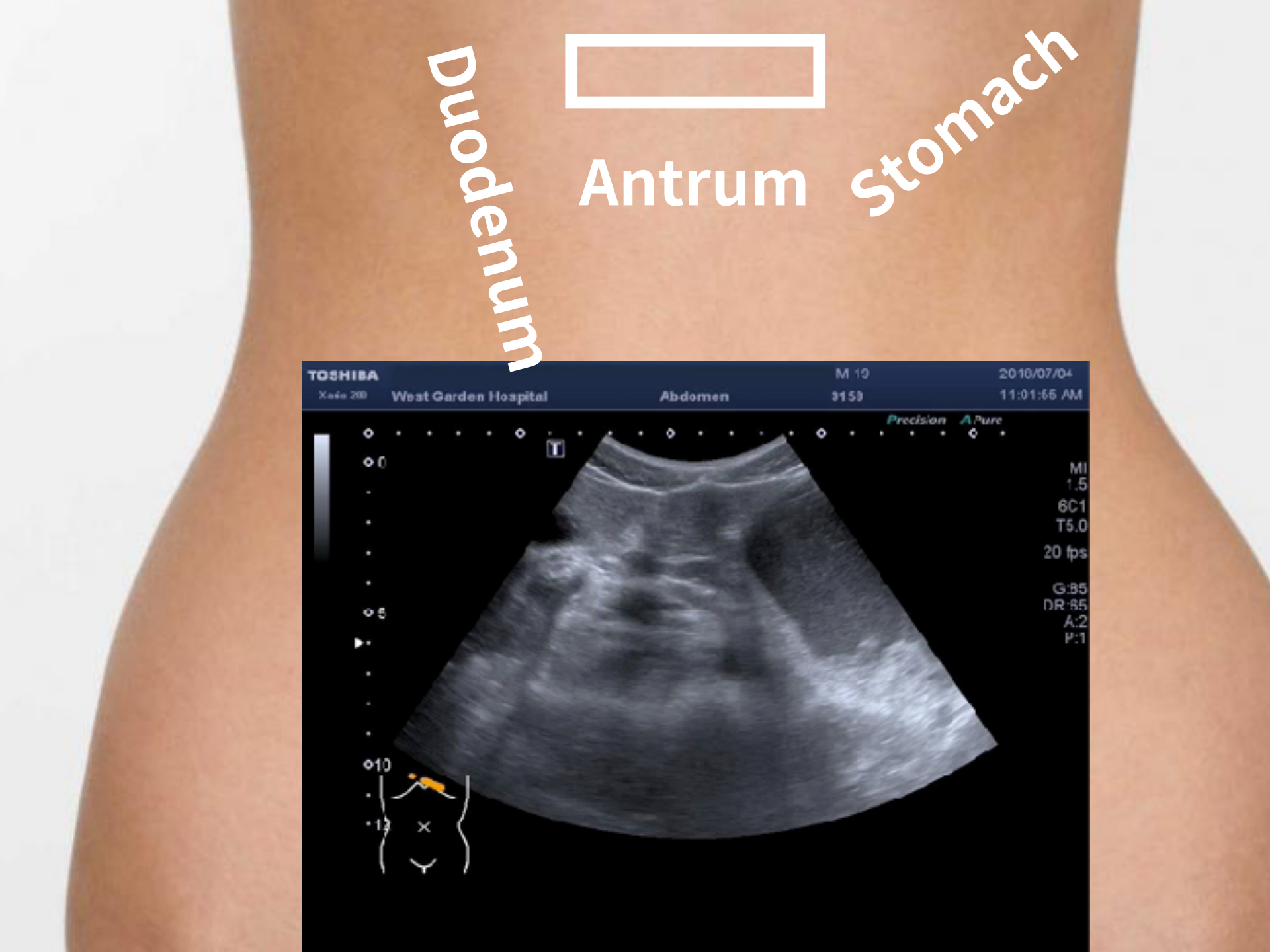
M/19, 上腹痛 & 持續嘔吐

EC junction

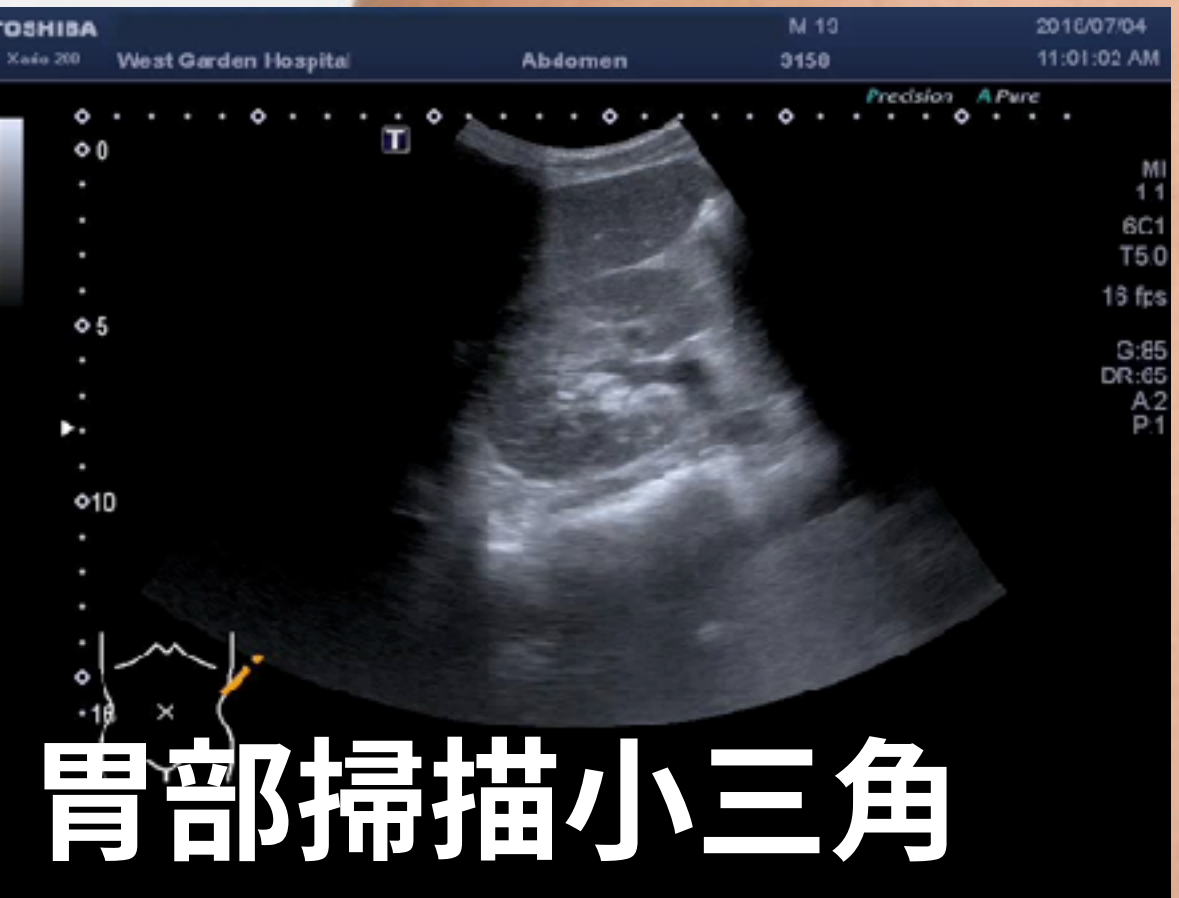
Stomach

Antrum




Duodenum
Antrum
Stomach
TOSHIBA
Xario 200
West Garden Hospital
Abdomen
M 10
3153
2010/07/04
11:01:55 AM
Precision
A Pure
MI
1.5
6C1
T5.0
20 fps
G:B5
DR:55
A:2
P:1

Gastric outlet obstruction



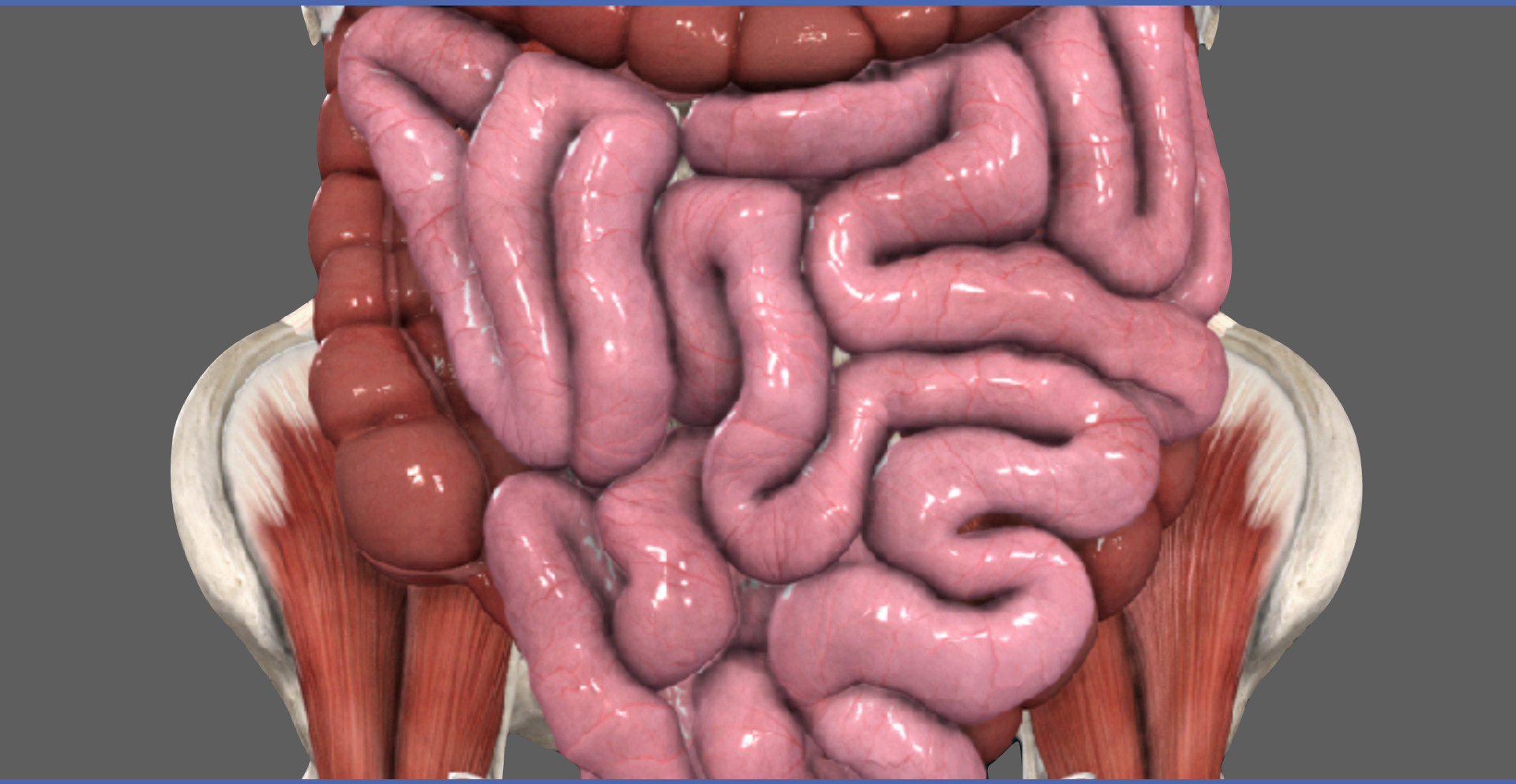
Stomach
Spleen

Antrum

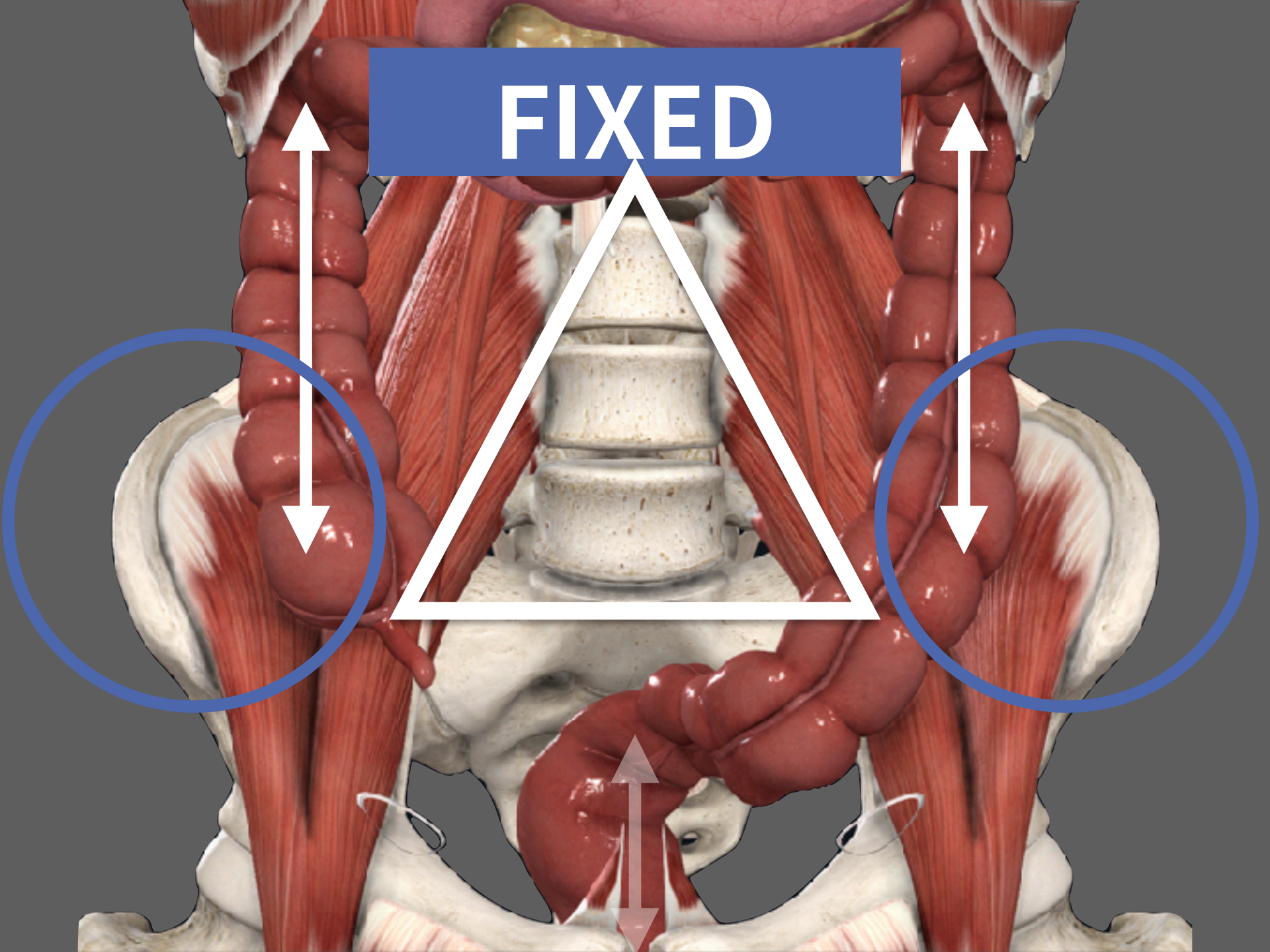
胃部掃描小三角

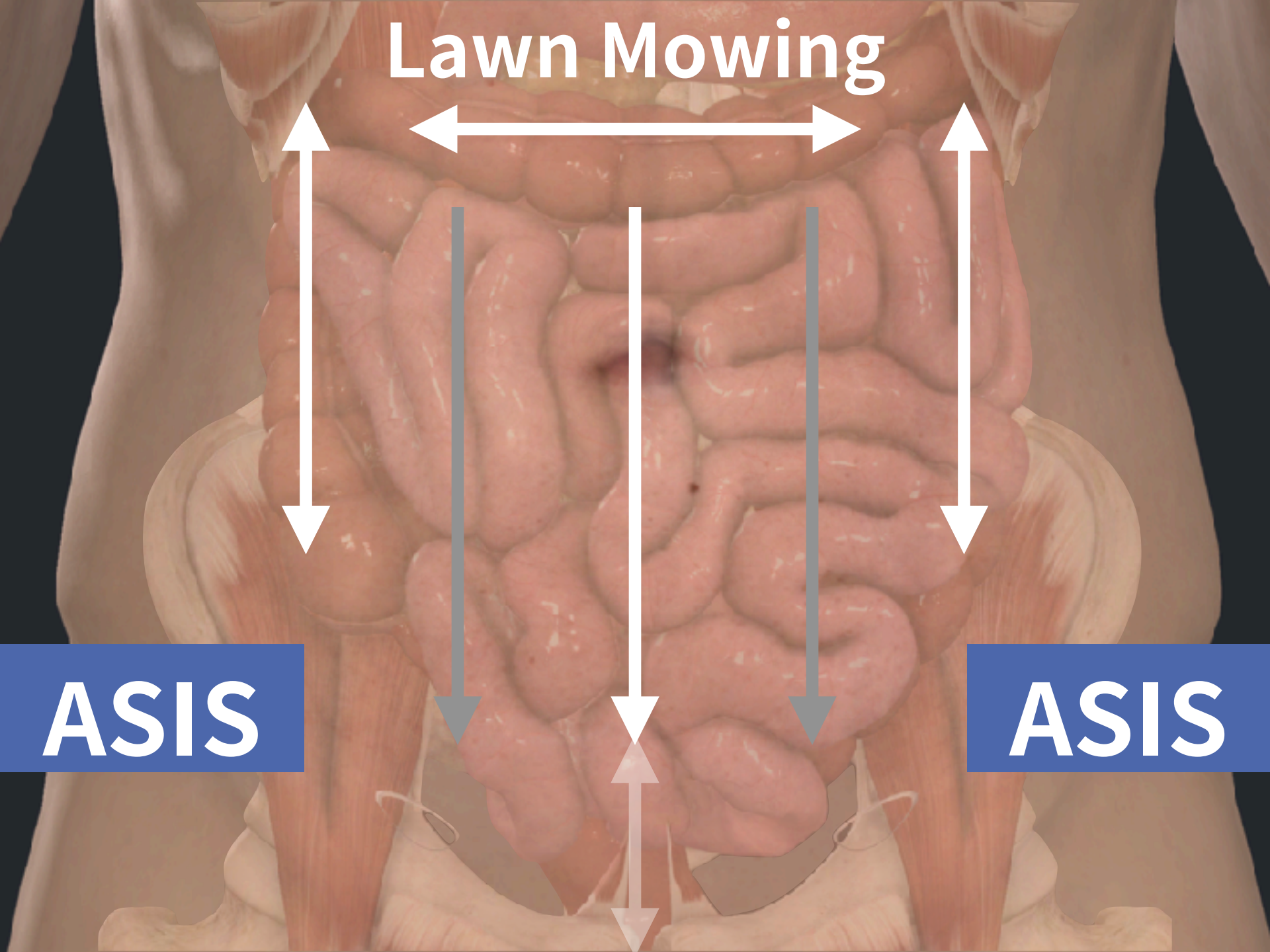

Where to start ?

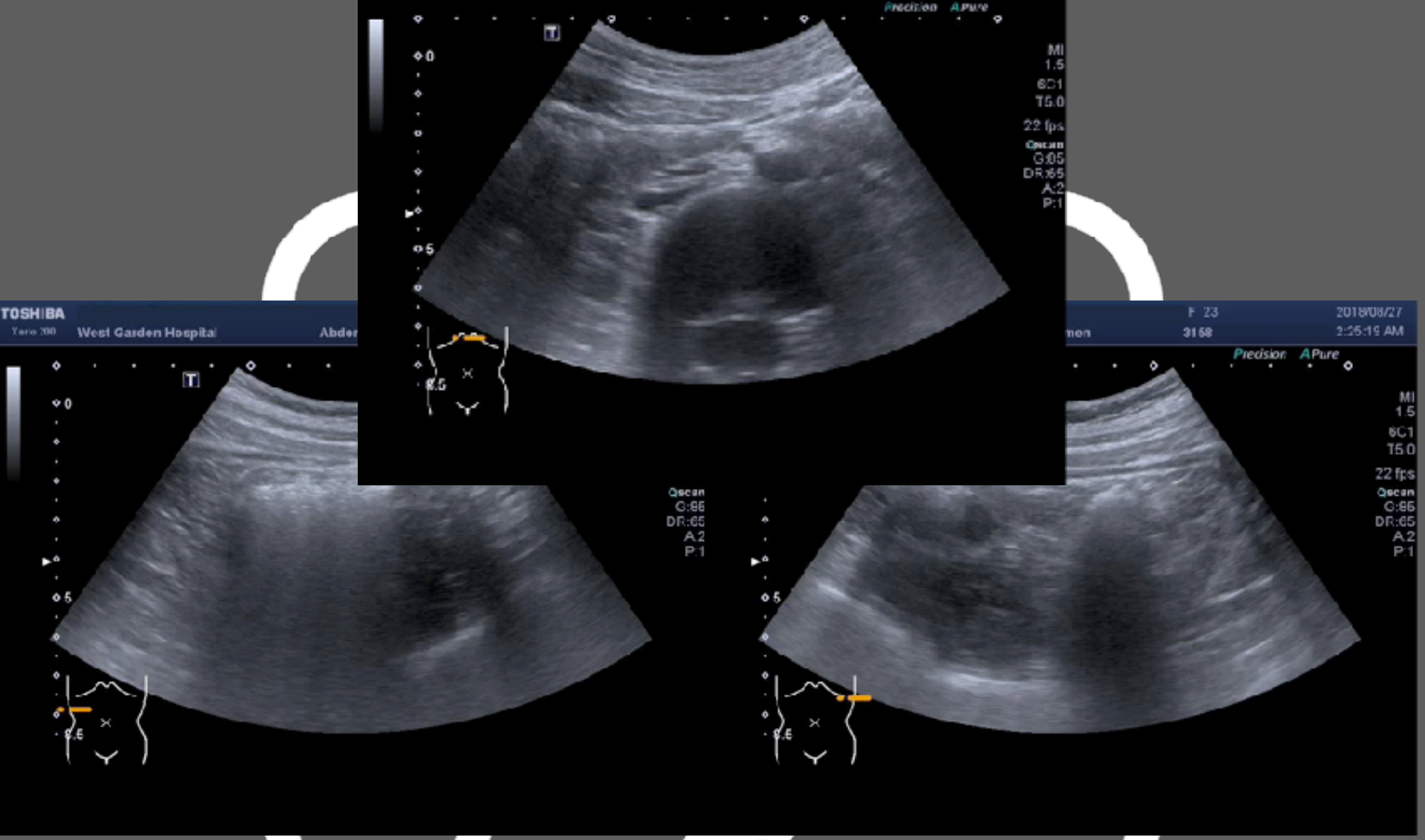
Small bowel first ?



Colon first ?


FIXED


Lawn Mowing
ASIS
ASIS


TOSHIBA
Xario 200
West Garden Hospital
Precision
APure
MI
1.5
6C1
T5.0
22 fps
Qscan
G:65
DR:65
A:2
P:1

ULTRASOUND PROGRAM

下列有關超音波在胃腸道病變掃描時的描述，何者正確？

1. 用超音波探頭壓迫時會變形
2. 腸胃道壁分層消失
3. 腸胃道壁一般不會增厚
4. 病灶附近不會有其他變化(如LN, fat, ascites)

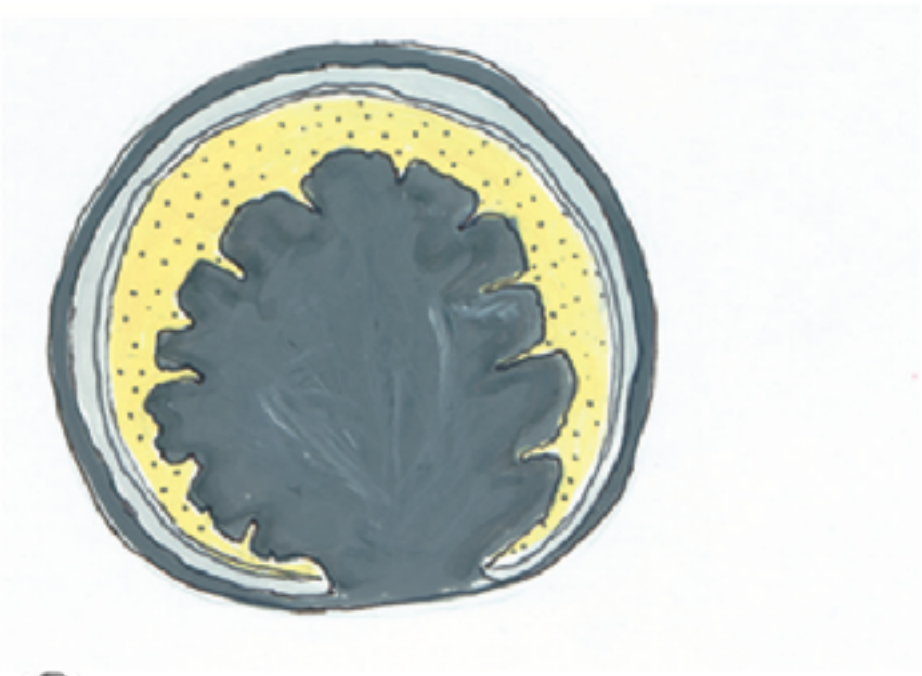
ULTRASOUND PROGRAM

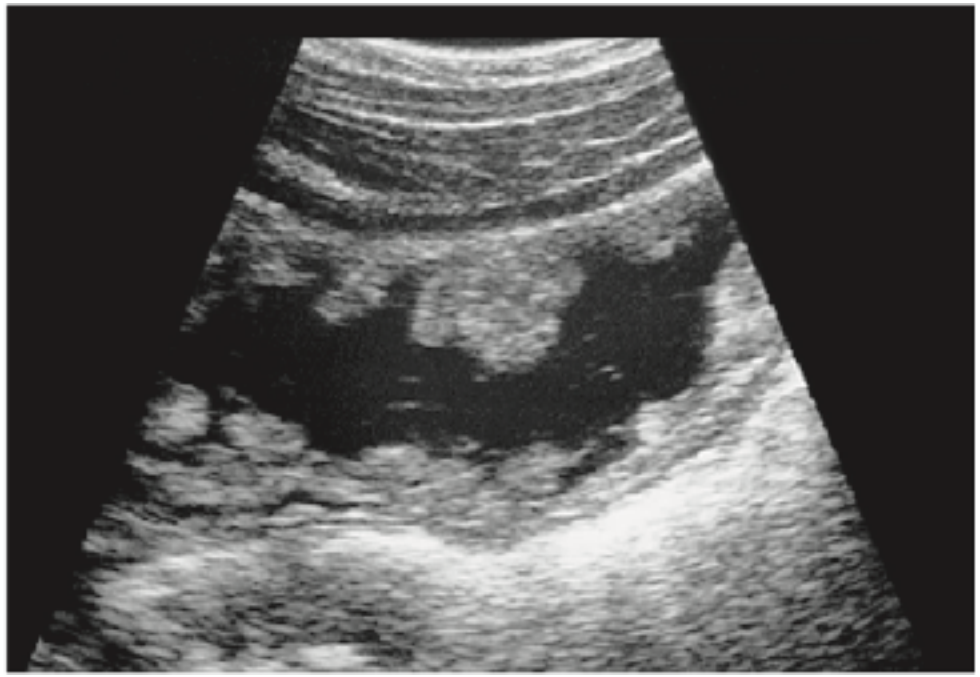
GI US Principles

1. 腸胃道壁增厚 (>5mm/1cm 胃)
2. 腸道漲大（3cm & 5cm)
3. 腸胃道壁分層消失
4. 蠕動減少
5. 用超音波探頭壓迫時不變形
6. 病灶通道內容物減少
7. 病灶附近其他變化(LN, Fat, Ascites)

ULTRASOUND
PROGRAM

Pathology recognition

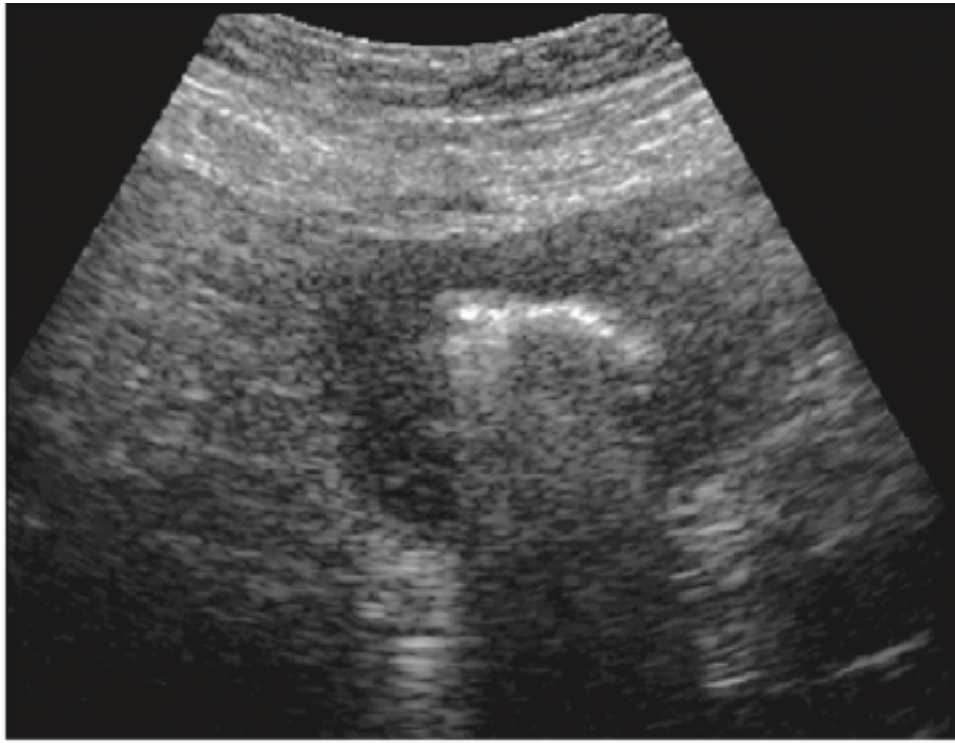




Intraluminal mass
壁厚/不規則

ULTRASOUND
PROGRAM

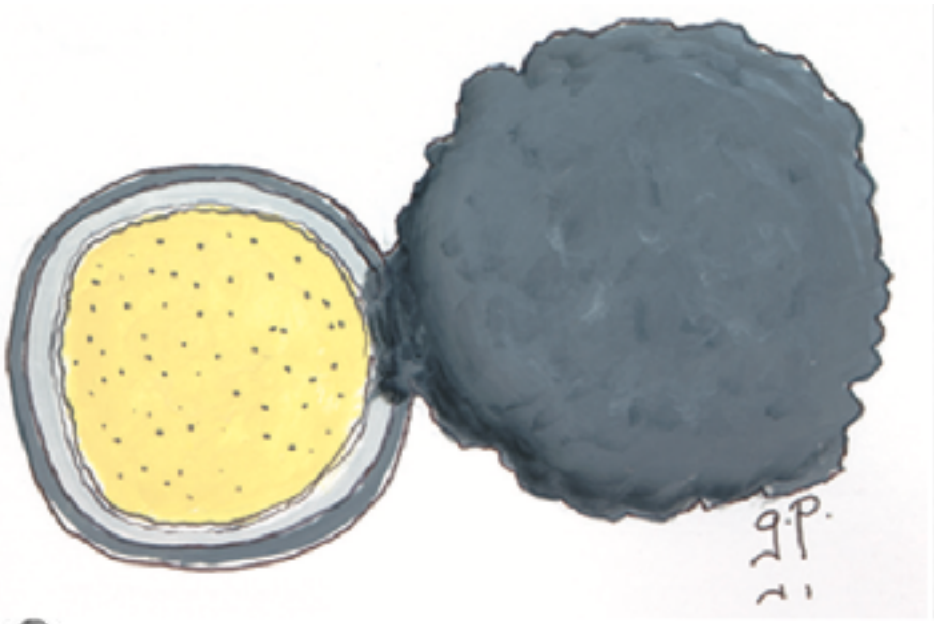
Pathology recognition

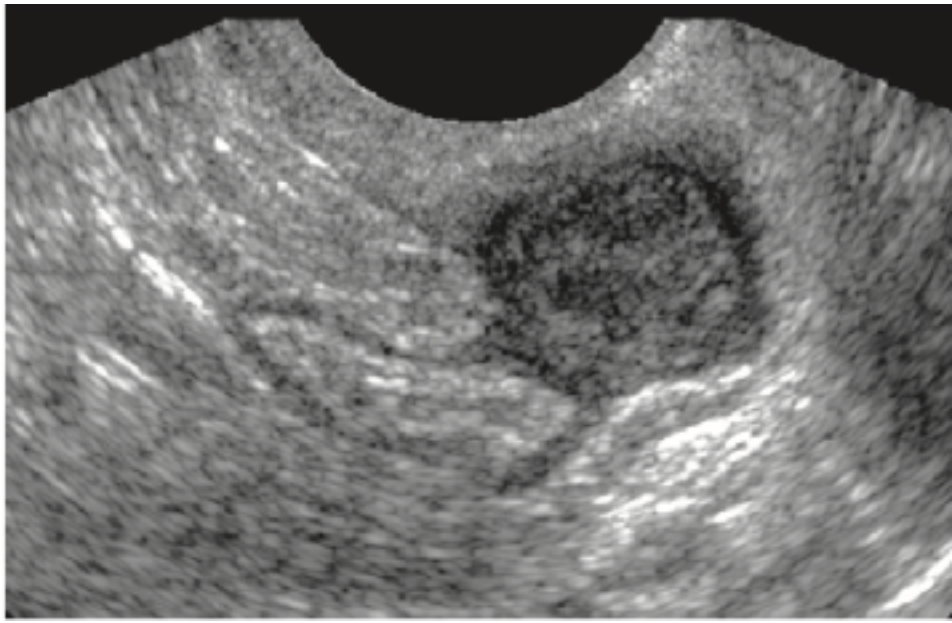


Pseudokidney sign
(Carcinoma)（壁厚/分層消失）

ULTRASOUND
PROGRAM

Pathology recognition

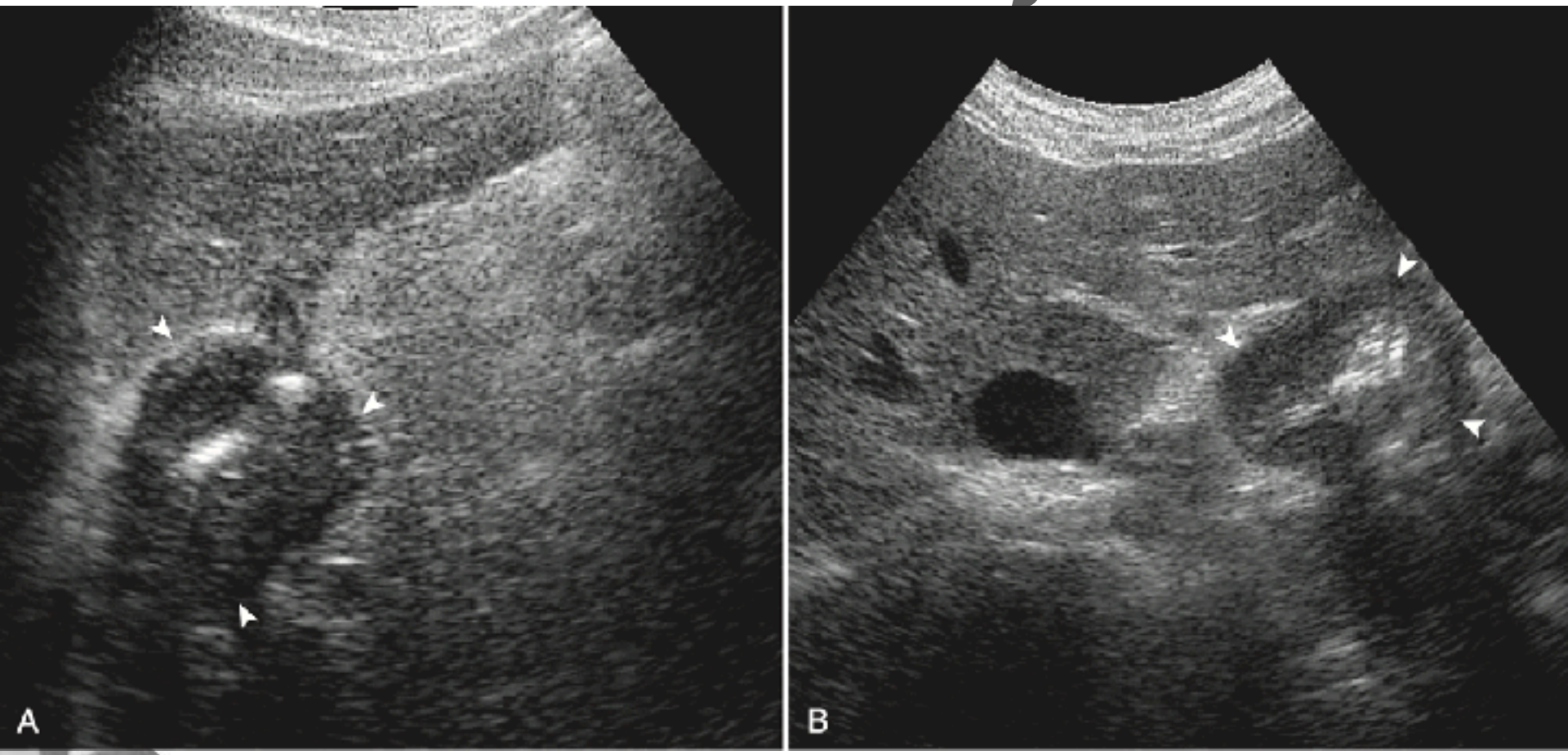




Exophytic mass (serosa seed)

ULTRASOUND
PROGRAM

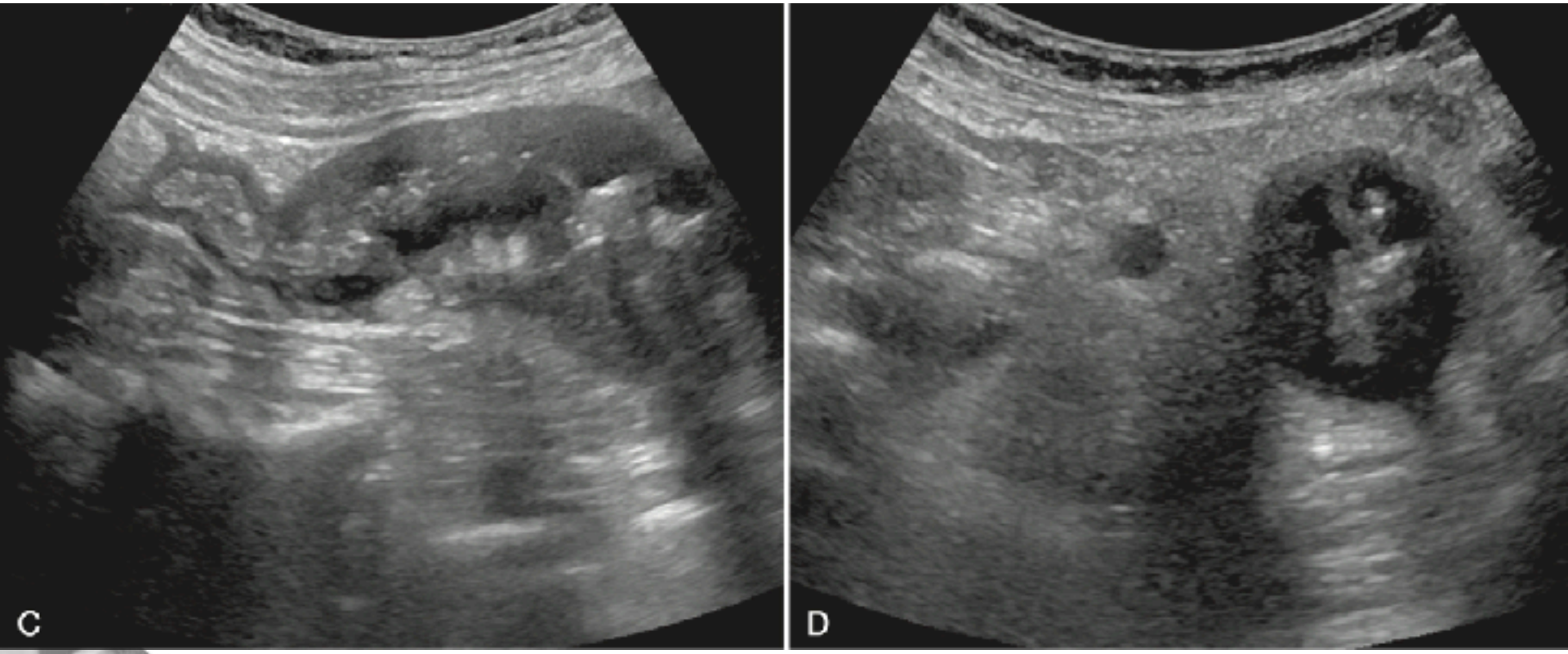
Cancer at EC junction



腸壁增厚/分層消失/脂肪變亮

ULTRASOUND
PROGRAM

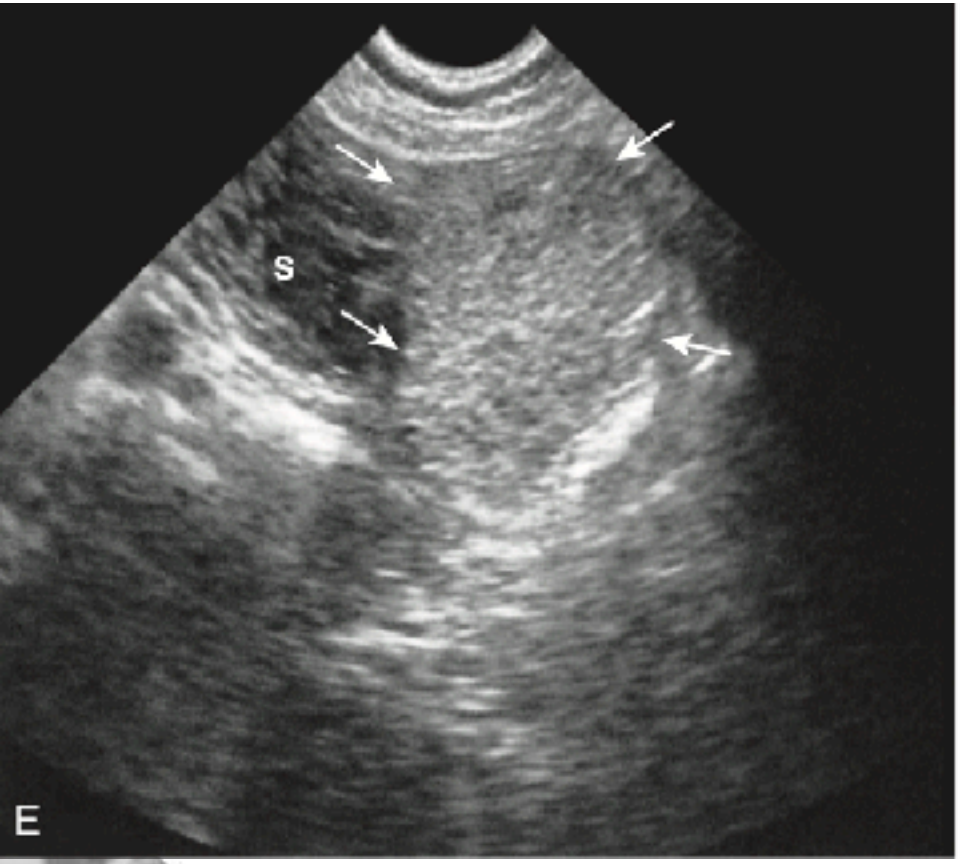
D colon cancer

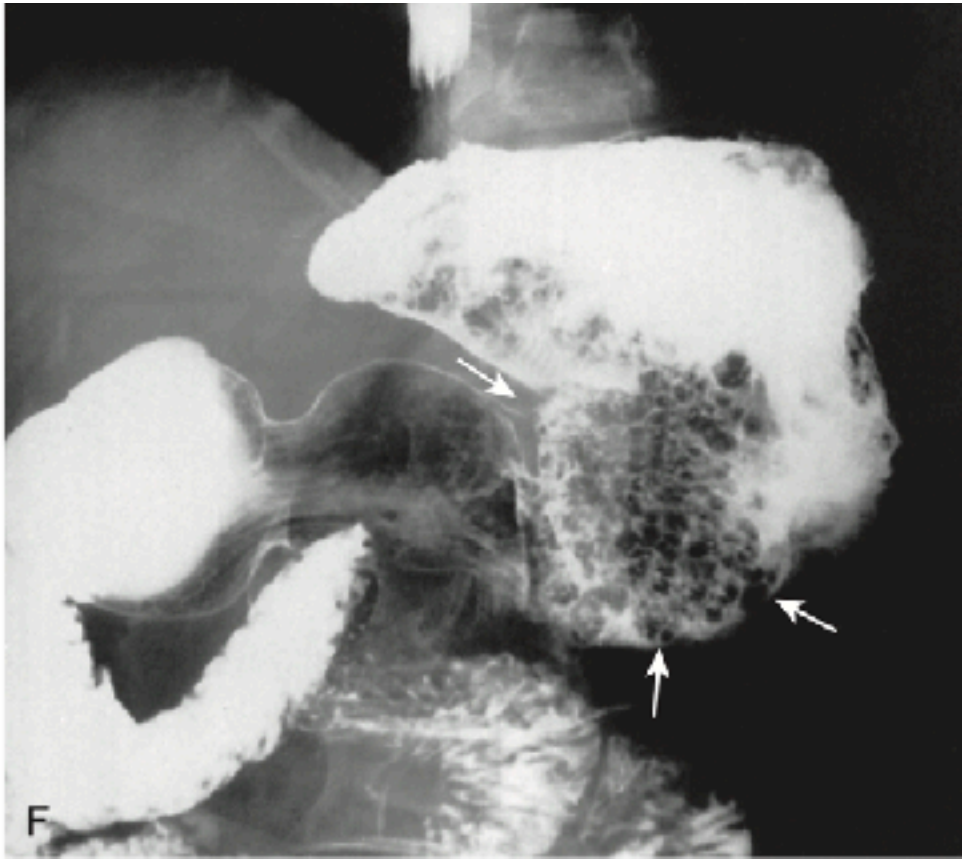


厚度/分層/LN/Fat (apple core)

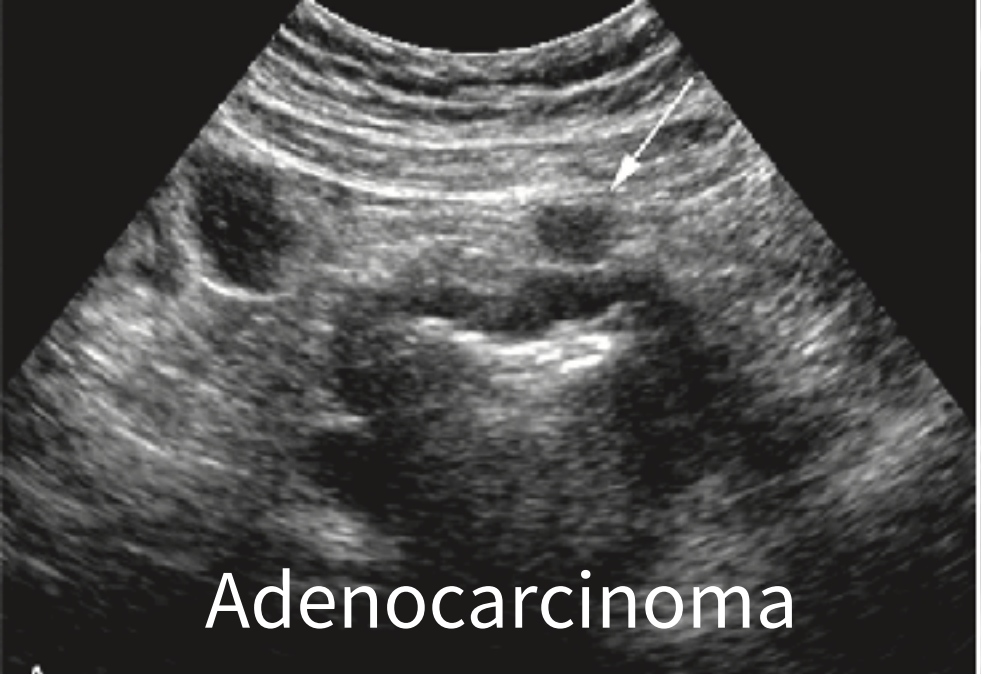
ULTRASOUND
PROGRAM

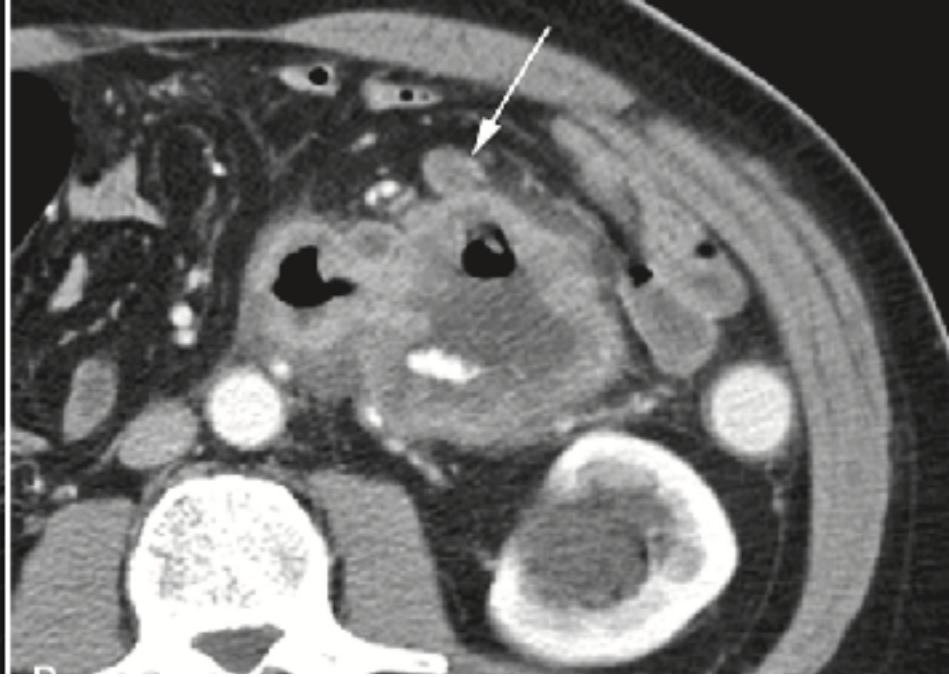
Stomach tumor



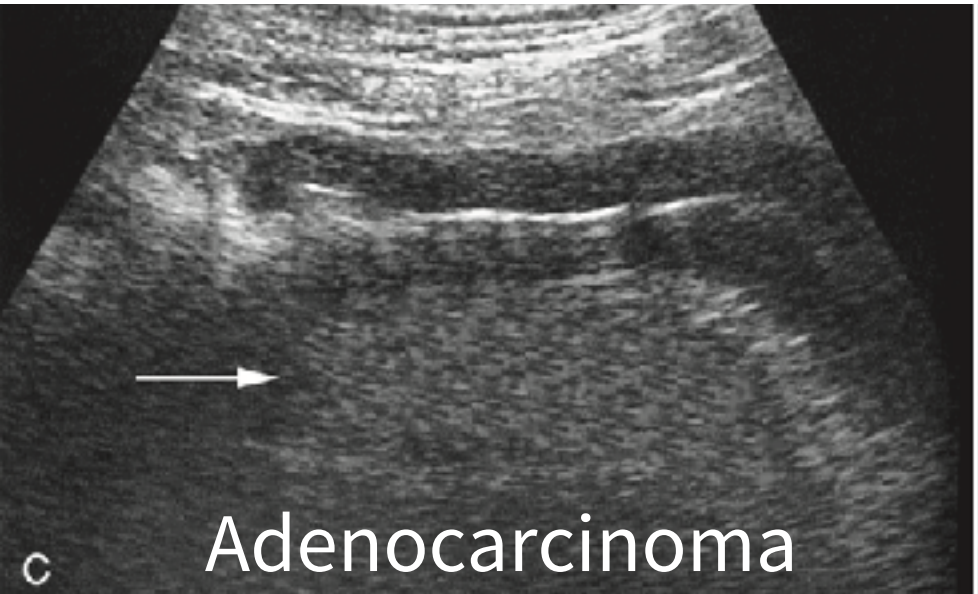


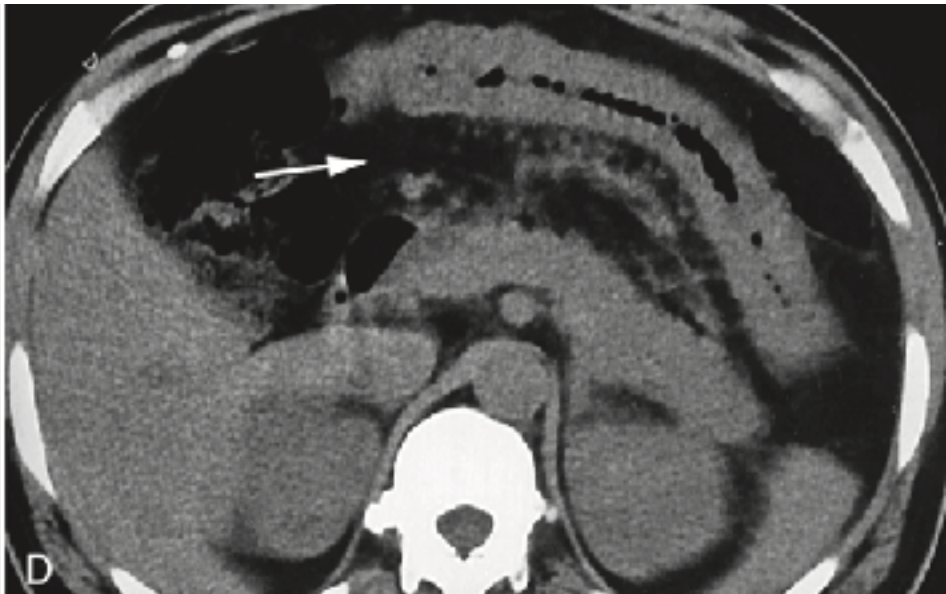
腸壁不對稱增厚/分層消失

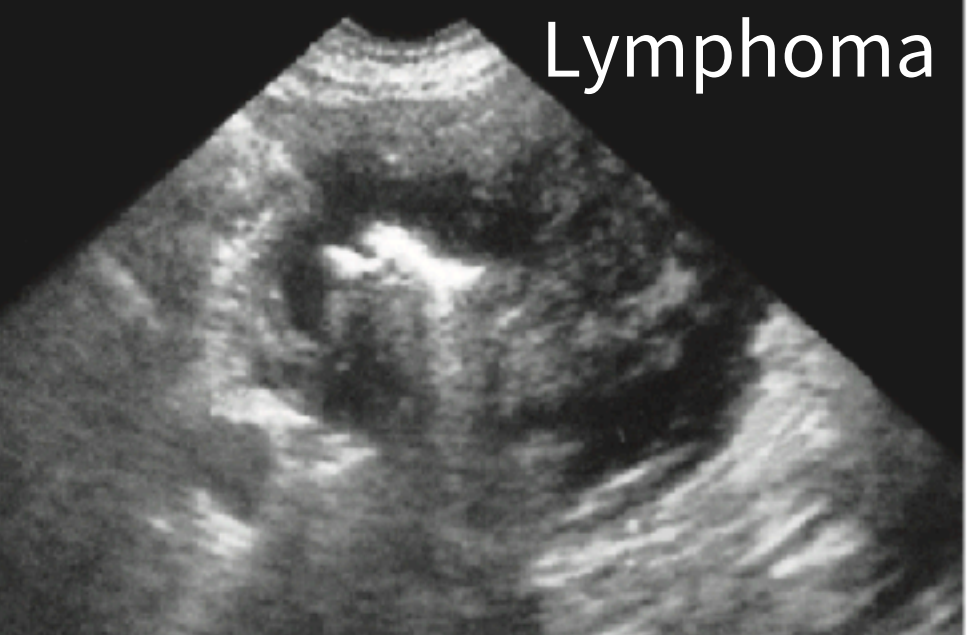


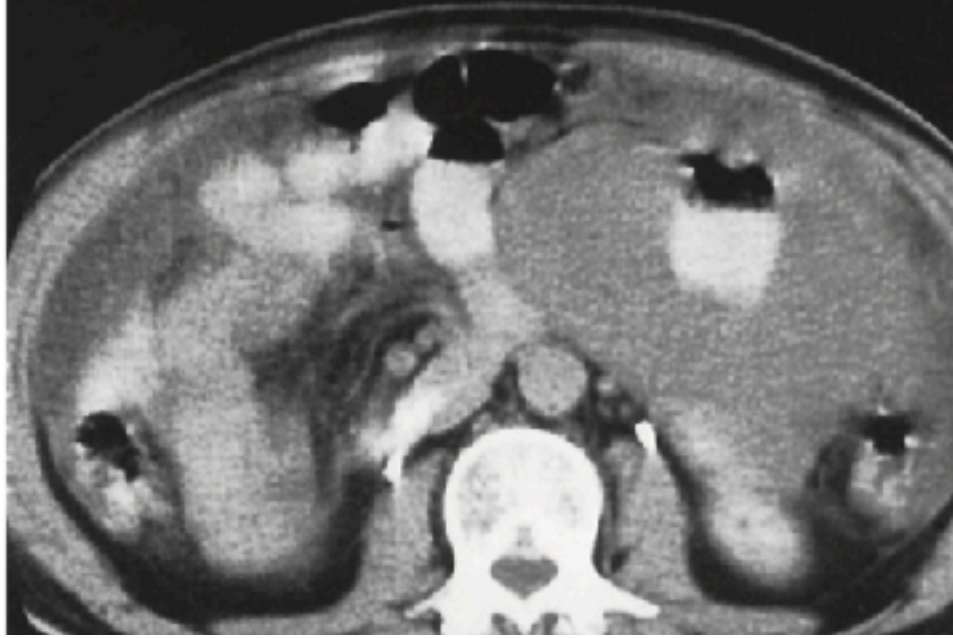


Echo & CT的形態比較

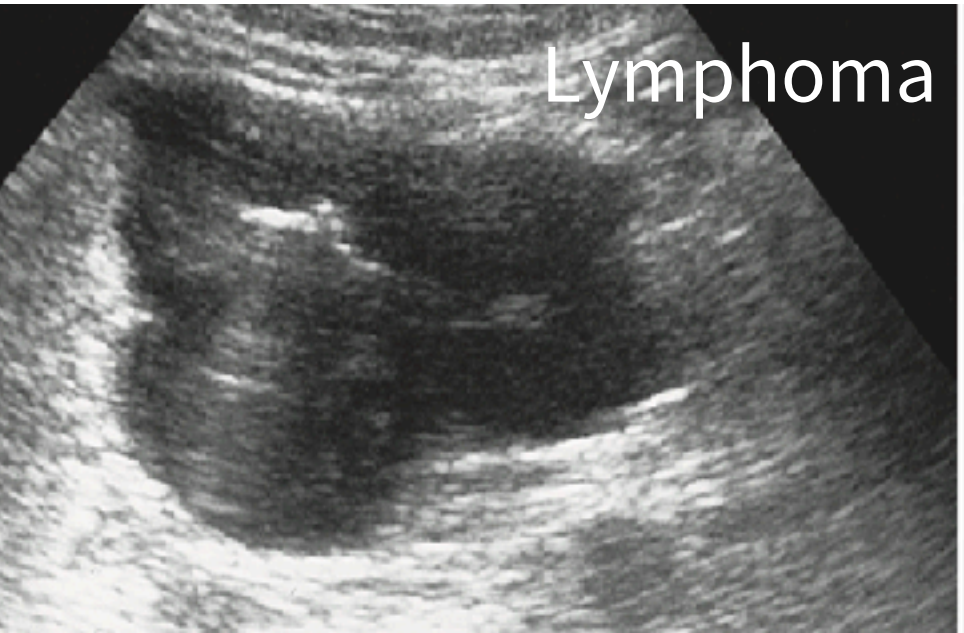


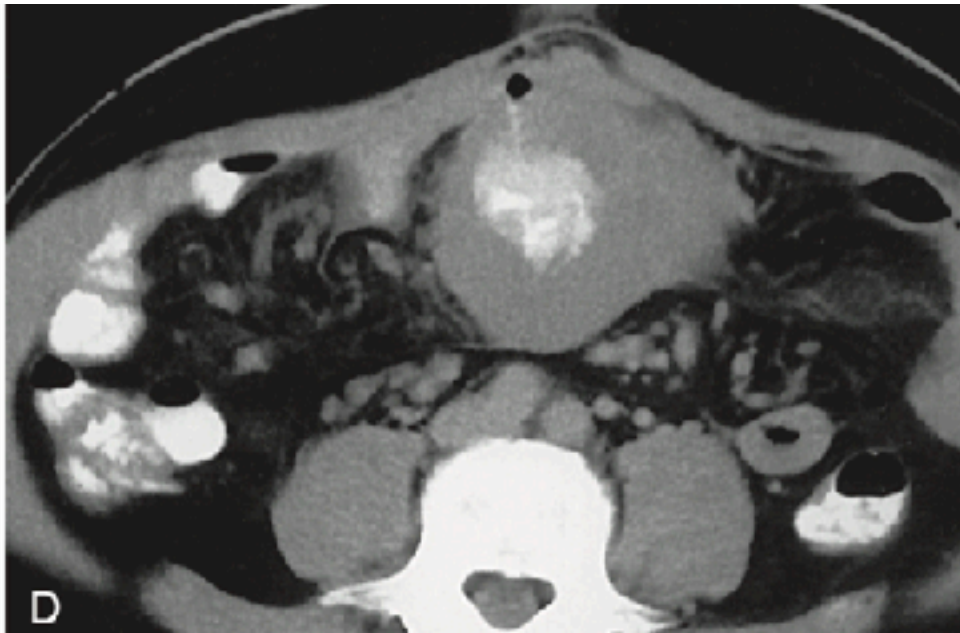






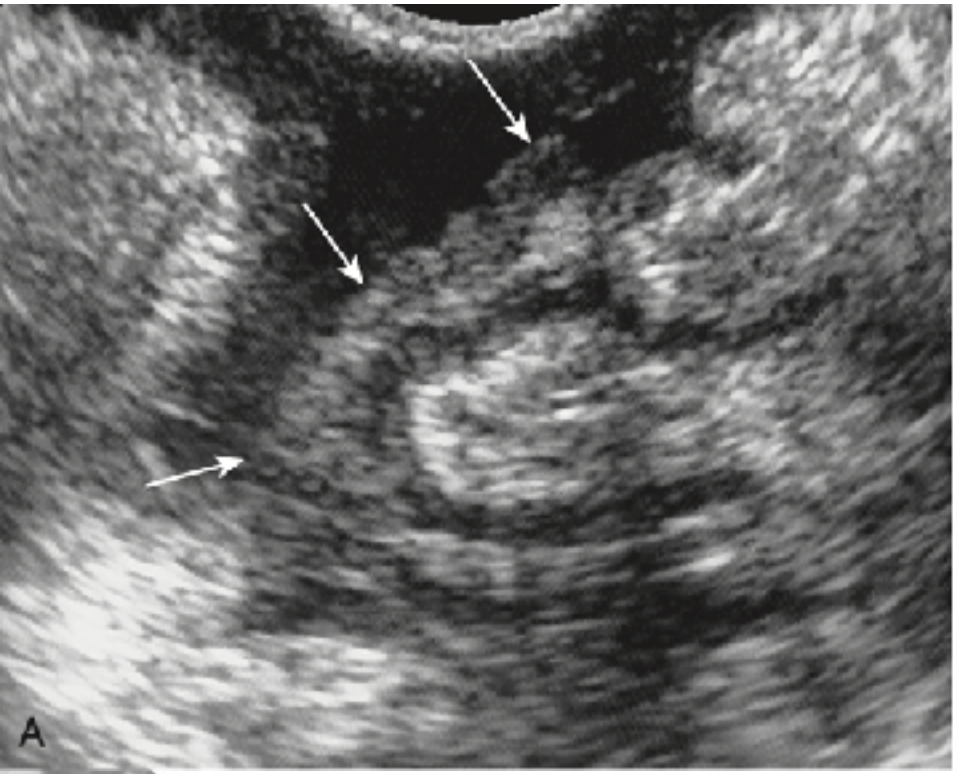
Echo & CT的形態比較

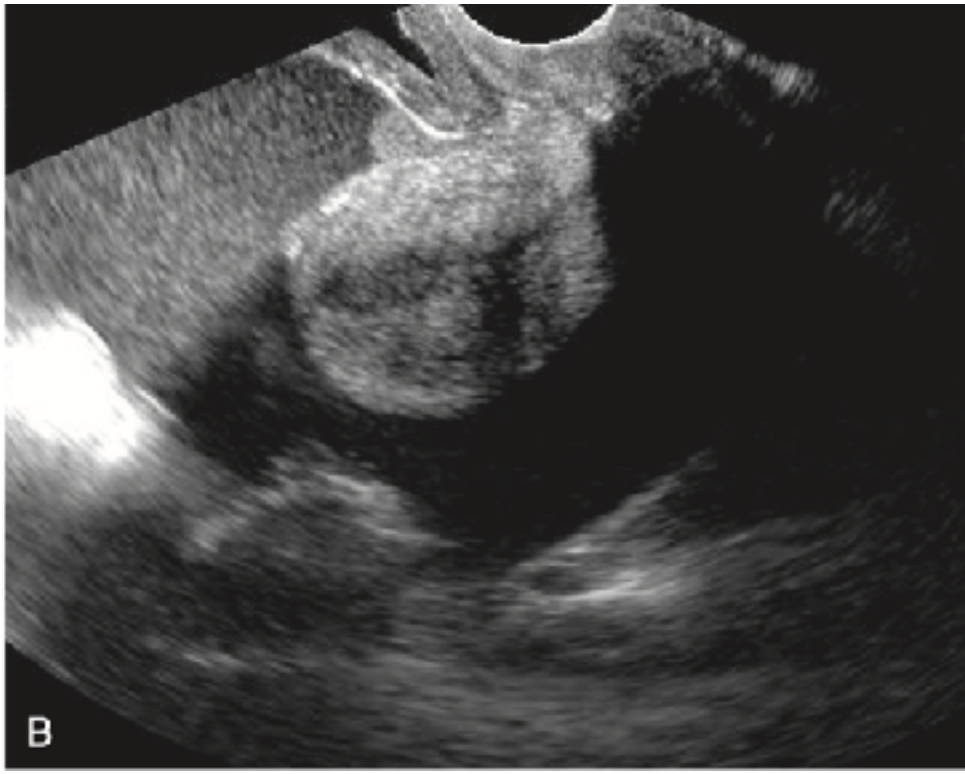




ULTRASOUND
PROGRAM

Peritoneal seeding





Crohn Disease on Sonography

CLASSIC FEATURES

Gut wall thickening
Inflammatory fat
Mesenteric lymphadenopathy
Hyperemia

COMPLICATIONS

Strictures
Mechanical bowel obstruction
Perforation
Inflammatory masses
Fistulas
Appendicitis

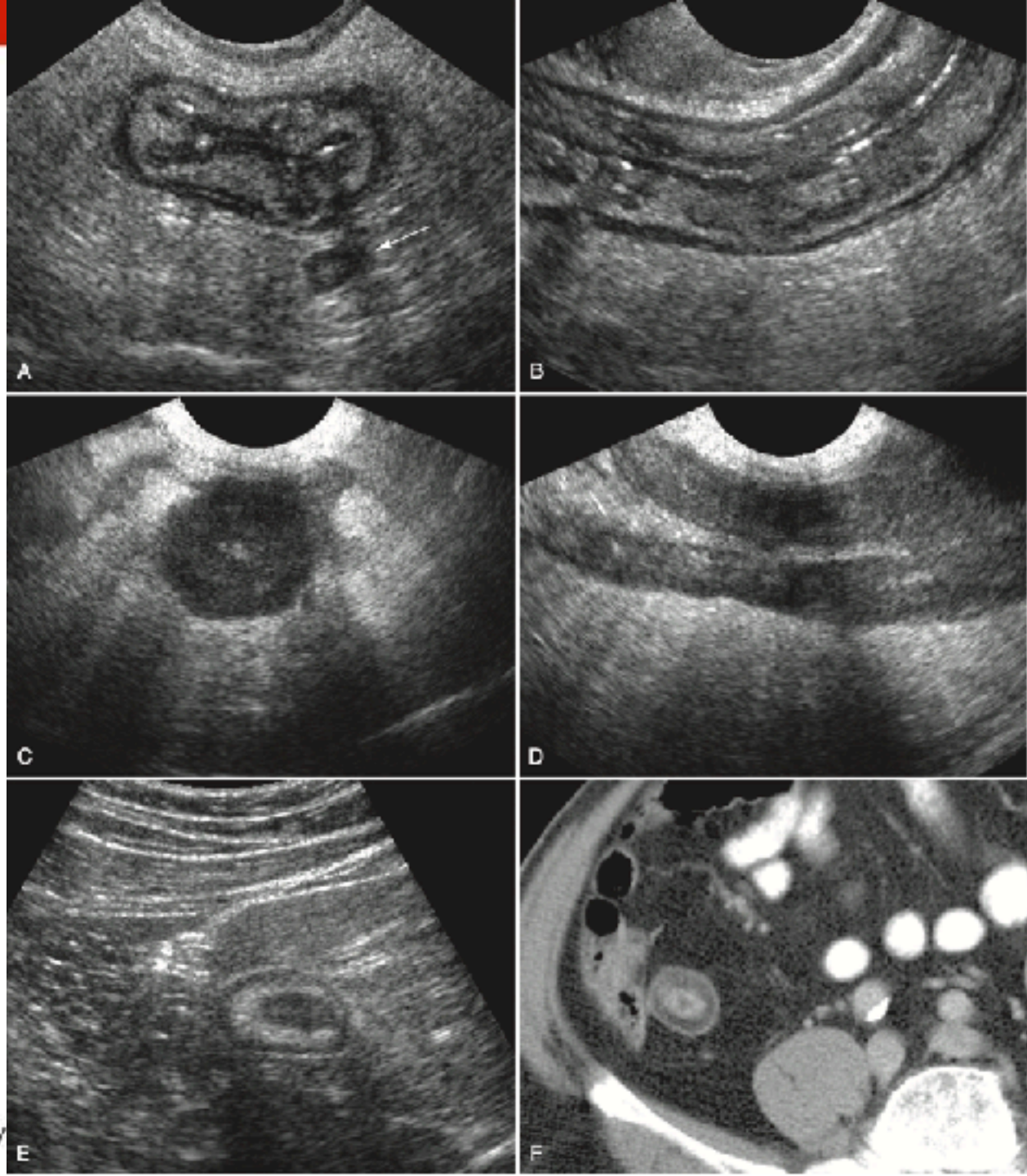
TABLE 8.2 Ultrasound Global Assessment Showing Crohn Disease Activity Scores on Gray-Scale Ultrasound and Color Doppler Imaging

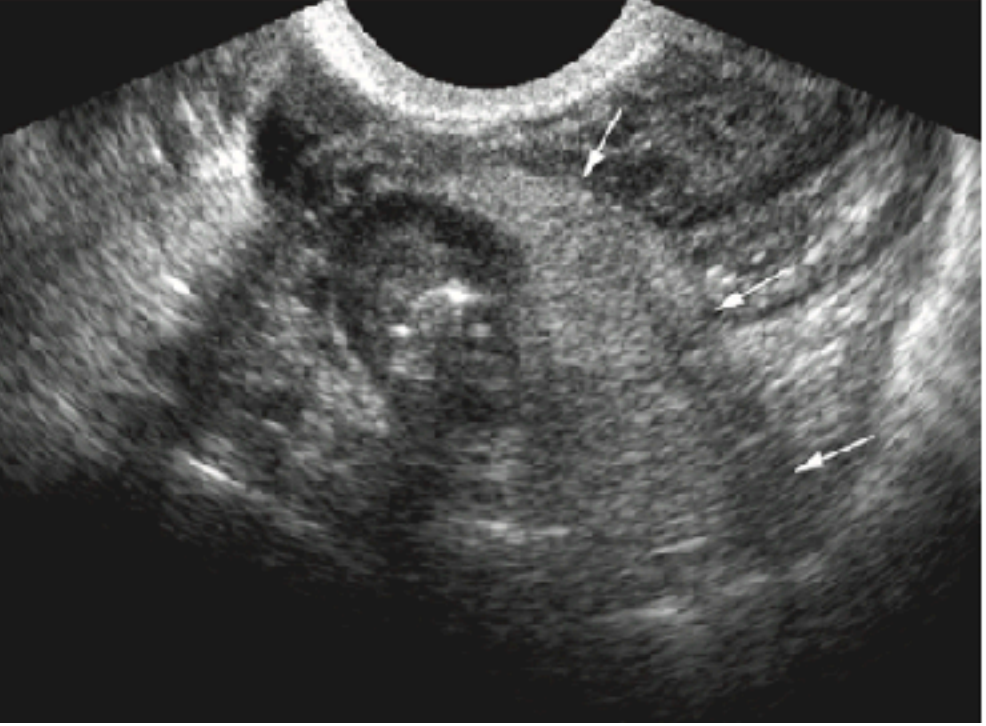
Gray-Scale Ultrasound Features of Activity	Classification			
	INACTIVE	MILD	MODERATE	SEVERE
Wall thickness (mm)	<4.0	4.0-6.0	6.1-8.0	>8.1
Inflammatory fat	• Absent • Perienteric region resembles normal mesenteric fat	• Masslike • Slightly echogenic • Of less area than the bowel on axial view	• Masslike • More echogenic • Equal area to the bowel on axial view	• Masslike • Significantly echogenic • Of greater area than the bowel on axial view
Color Doppler imaging (CDI) Mural blood flow	• Absent	• Small regions of color without the vessel	• Medium-length segments of color vessels in the bowel wall	• Circumferential or continuous depiction of vessels in the bowel wall with or without mesenteric vessels
Ultrasound global assessment	• No signs of active disease	• Mild wall thickness • Minimal inflammatory fat • Present but not minimal signal on CDI • Wall layer preservation	• Moderate wall thickness • Moderate inflammatory fat • Moderate signal on CDI • ± Wall layer preservation[a]	• Moderate to severely thickened bowel wall • Abundant inflammatory fat • Long continuous mural blood vessels on CDI • ± Wall layer preservation[a] • Spiculation of serosal border[a]

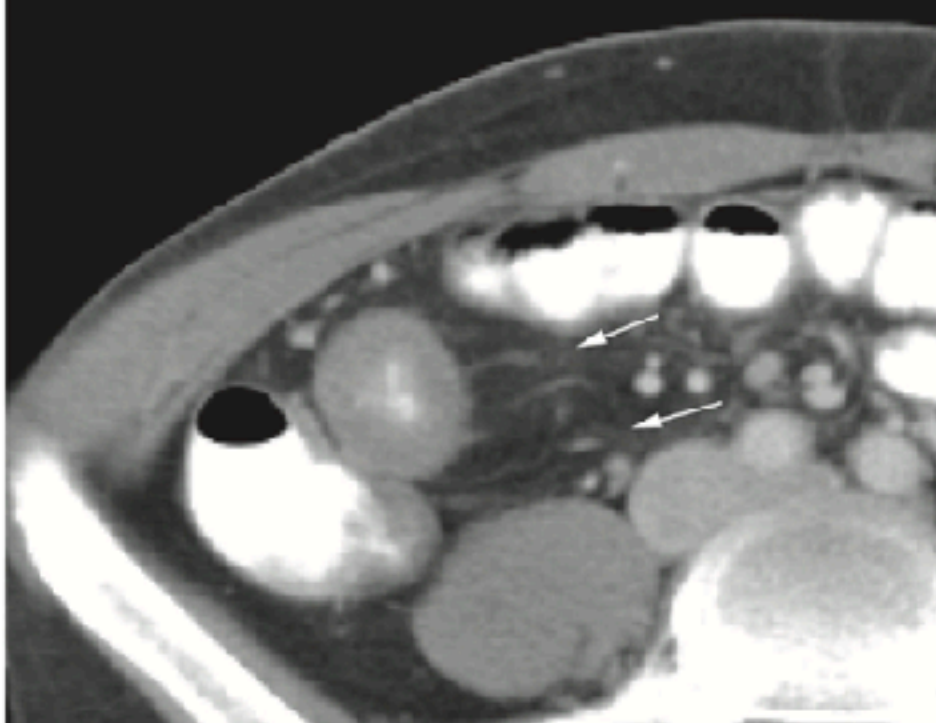
ULTRASOUND
PROGRAM

腸壁厚度
腸壁分層
週邊脂肪
淋巴腫大

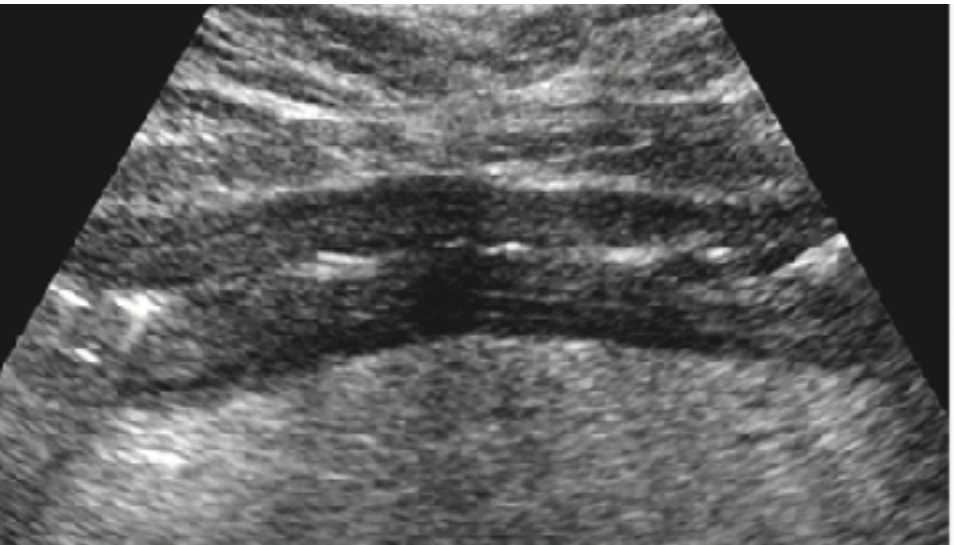
Taipei Medical University

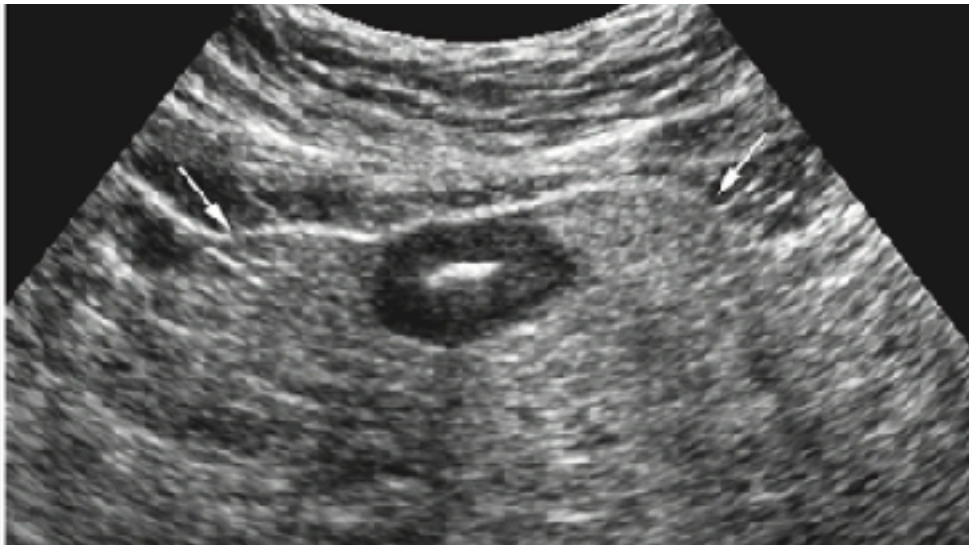






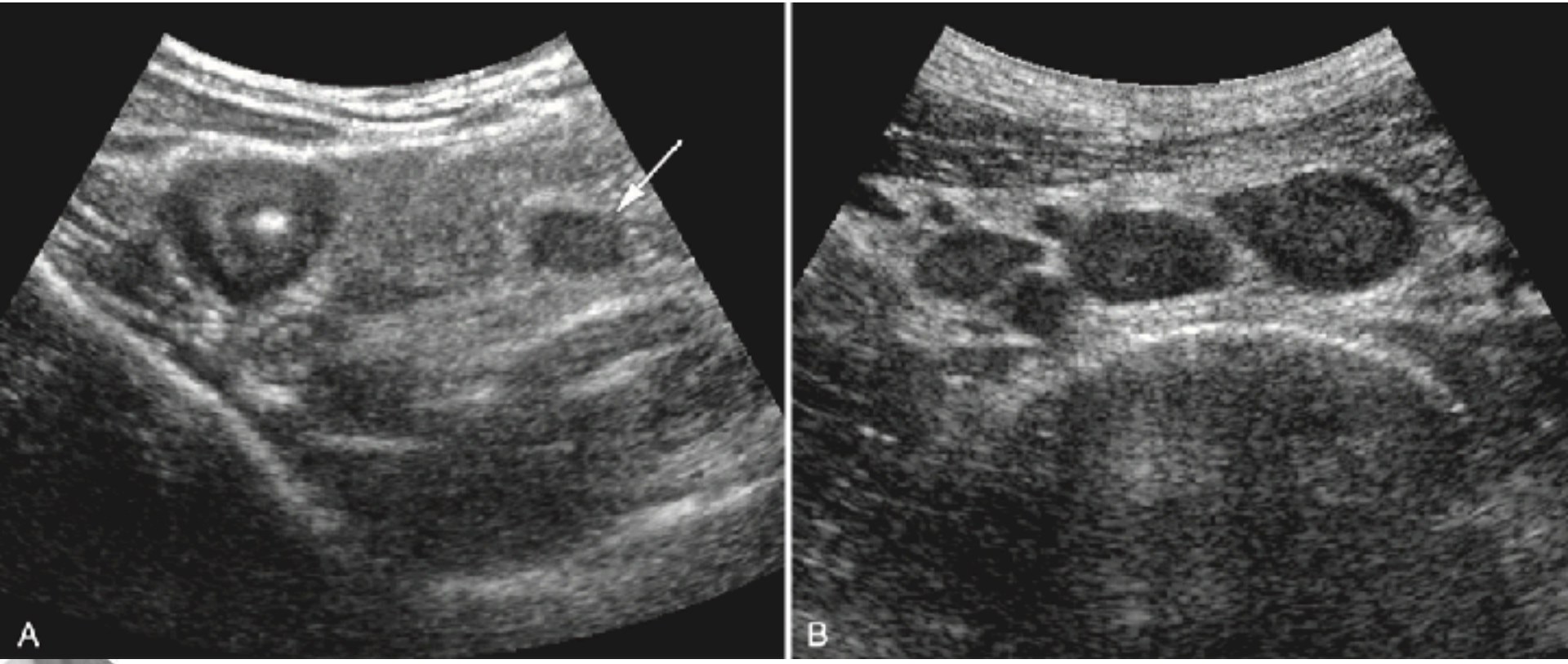
發炎的脂肪是高亮度的





ULTRASOUND
PROGRAM

Crohn disease



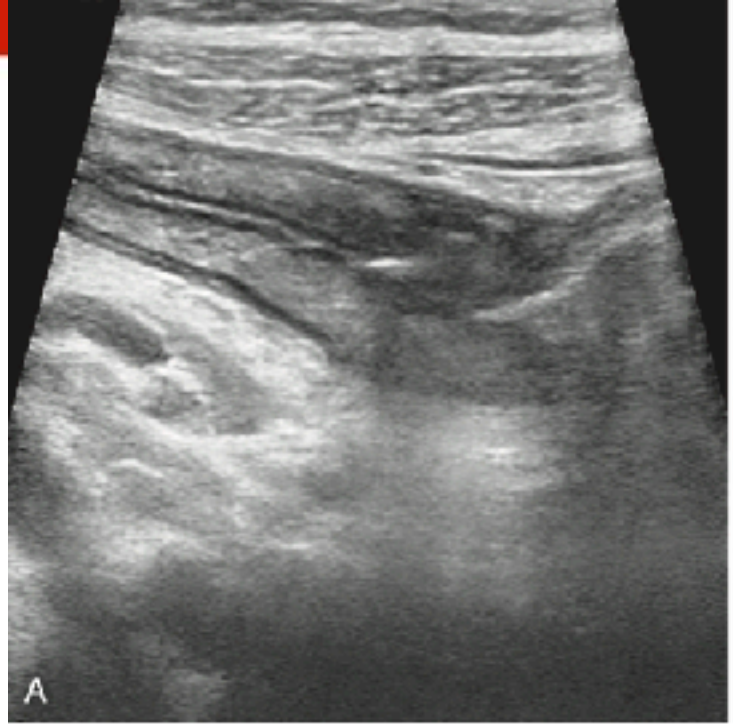
腸子腫 / 脂肪亮 / 淋巴大

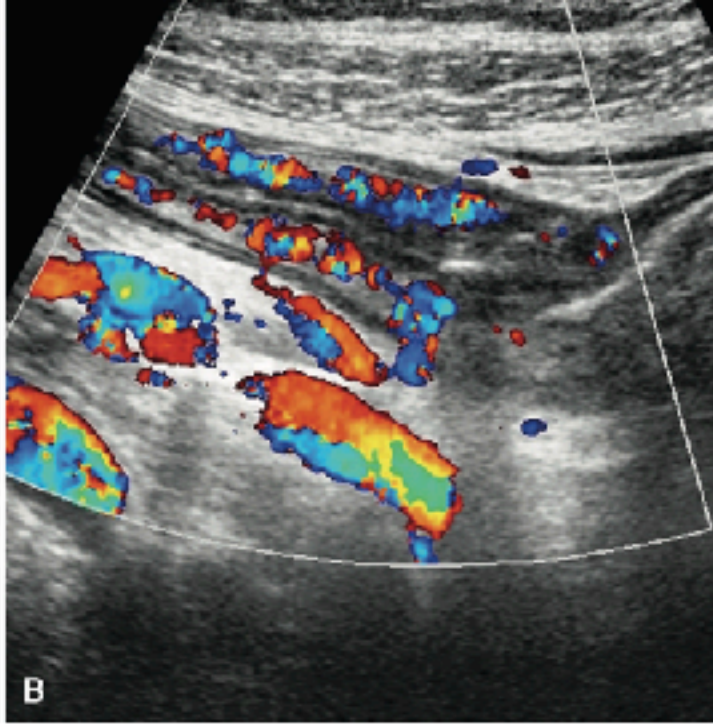
ULTRASOUND
PROGRAM

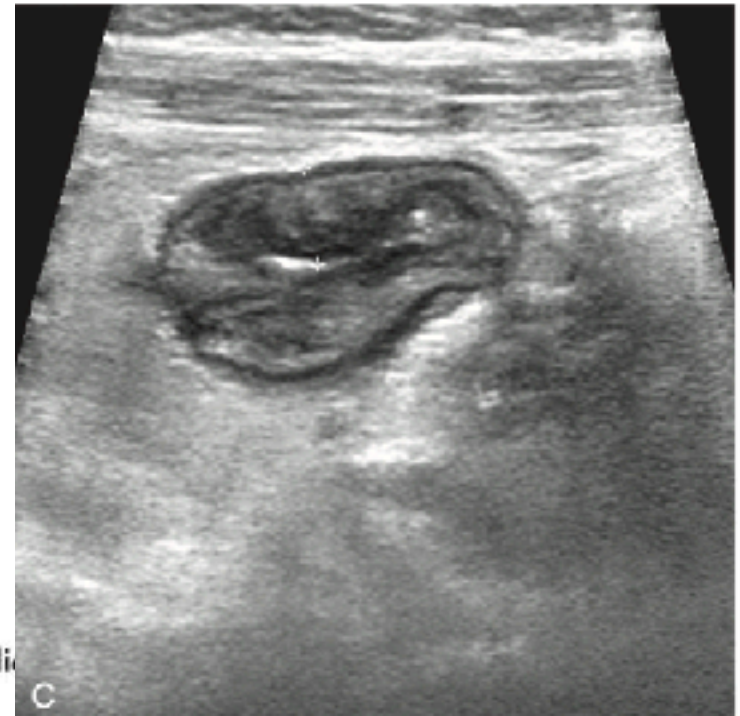
Active Crohn Disease

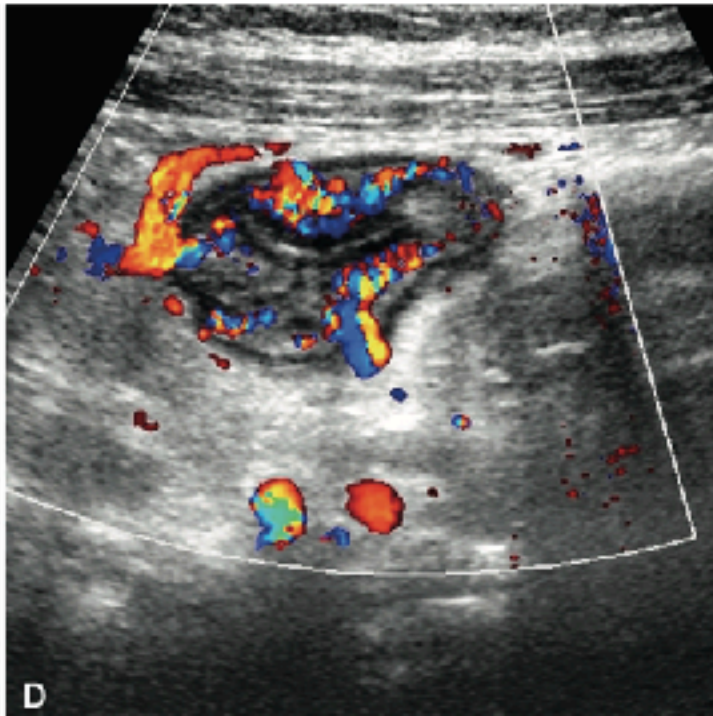
可以考慮
都卜勒

Taipei Medi





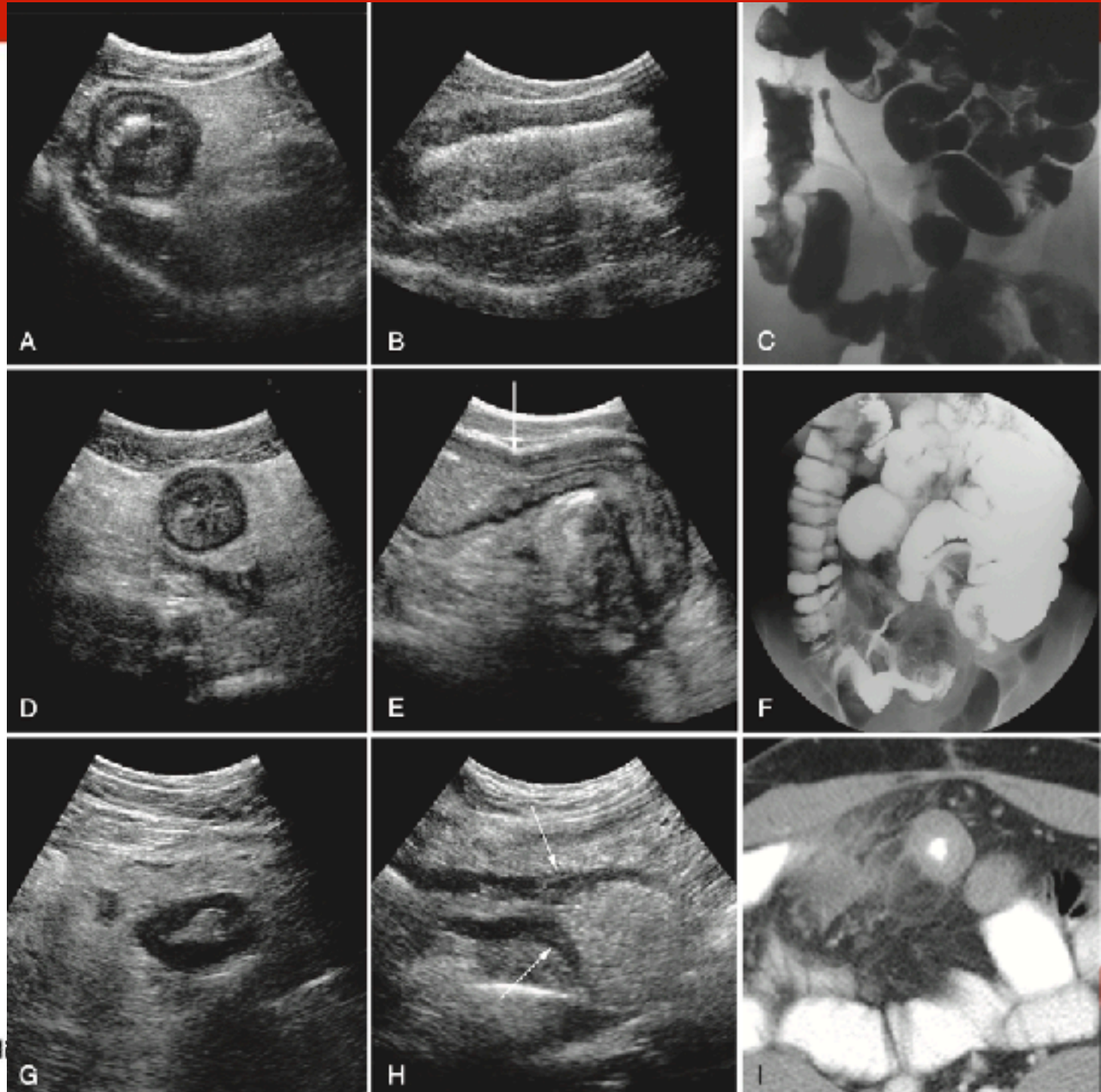




ULTRASOUND
PROGRAM

Crohn Disease With Stricture

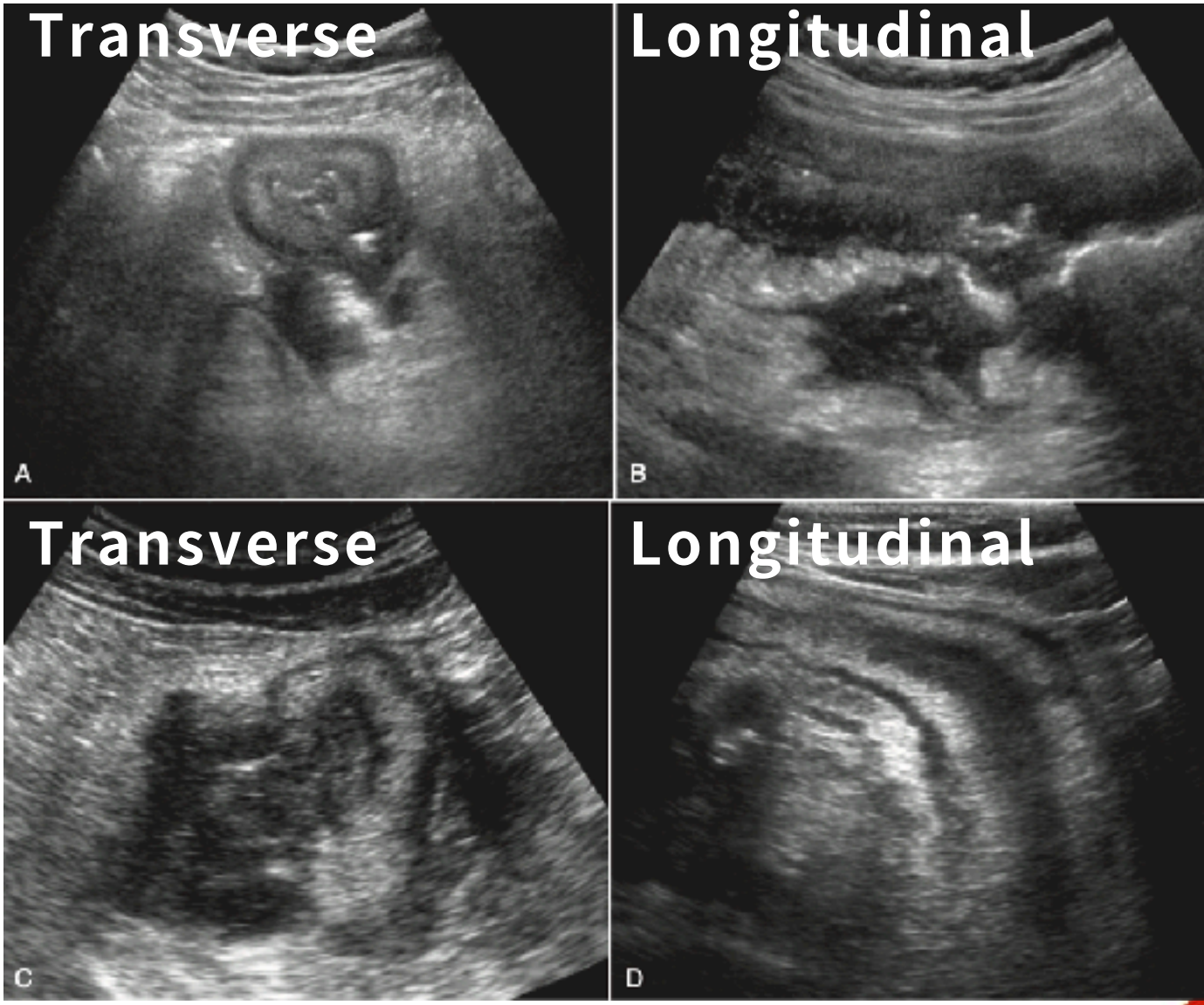
Taipei Medi



ULTRASOUND
PROGRAM

Crohn Disease

With Perforation Phlegmon



Acute Abdomen: Sonographic Approach

形態辨識

GAS
Intraluminal
Extraluminal
- Intraperitoneal
- Retroperitoneal
- Gut wall
- Gallbladder/biliary ducts
- Portal veins

FLUID
Intraluminal
- Normal caliber gut
- Dilated gut

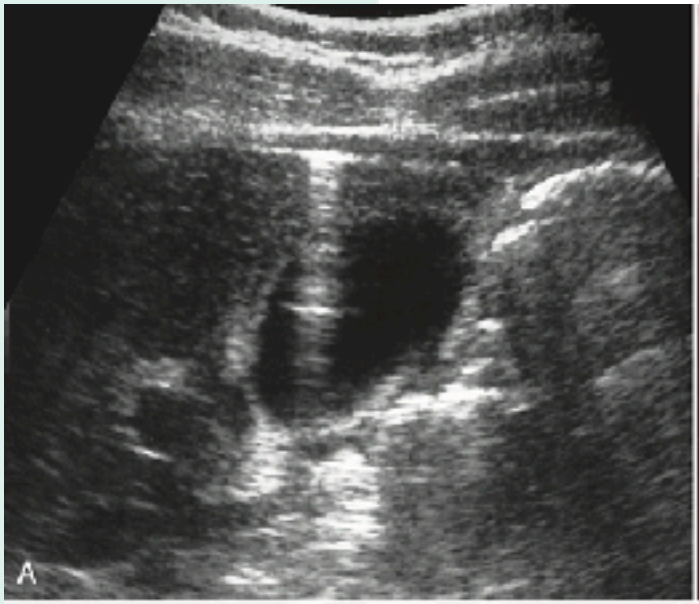
Extraluminal
- Free
- Loculated

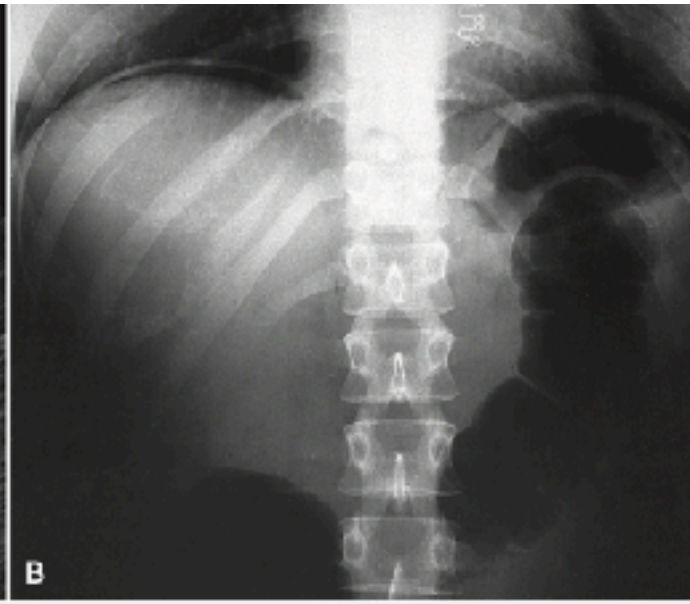
MASSES
Neoplastic
Inflammatory

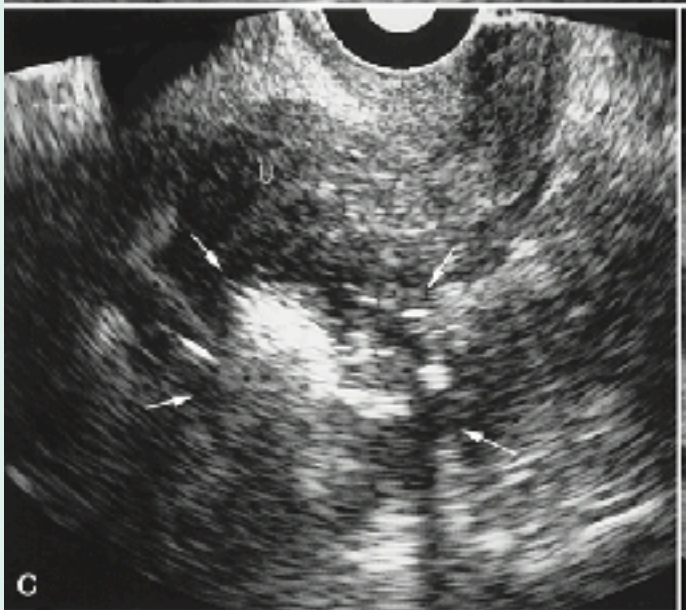
Perienteric Soft Tissues
Inflamed fat
Lymph nodes

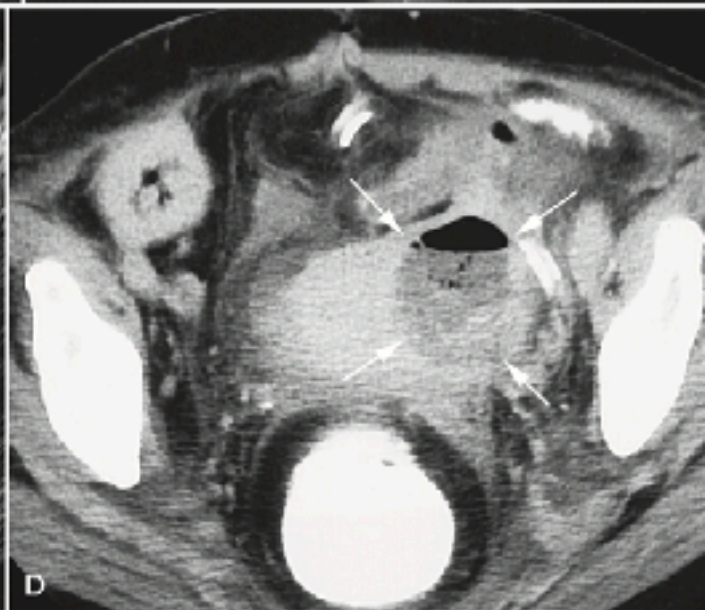
Gut
Wall
Caliber
Peristalsis

Clinical Interaction
Palpable mass
Maximal tenderness
Sonographic Murphy sign
Sonographic McBurney sign









Acute Abdomen: Sonographic Approach

GAS
Intraluminal
Extraluminal
- Intraperitoneal
- Retroperitoneal
- Gut wall
- Gallbladder/biliary ducts
- Portal veins

FLUID
Intraluminal
- Normal caliber gut
- Dilated gut

Extraluminal
- Free
- Loculated

MASSES
Neoplastic
Inflammatory

Perienteric Soft Tissues
Inflamed fat
Lymph nodes

Gut
Wall
Caliber
Peristalsis

Clinical Interaction
Palpable mass
Maximal tenderness
Sonographic Murphy sign
Sonographic McBurney sign

水 氣 腸 脂

水往下流

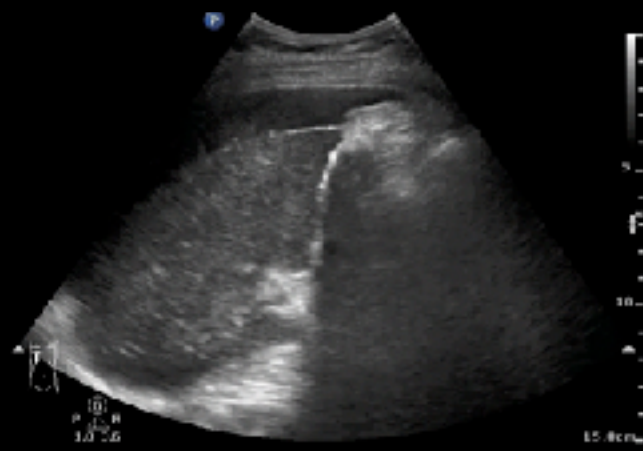
氣往上飄

確認結構

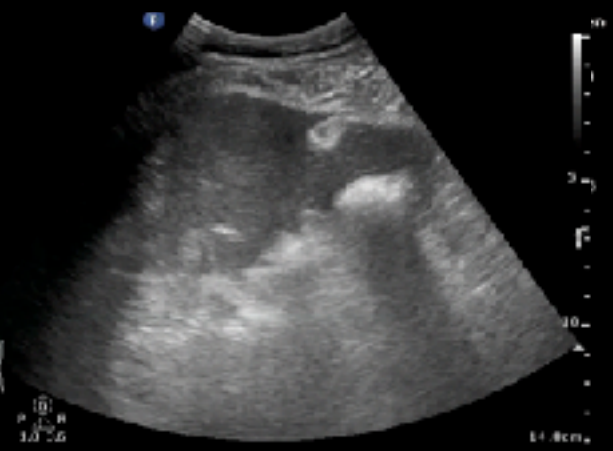
最亮配角

Dirty ascites: 水往下流

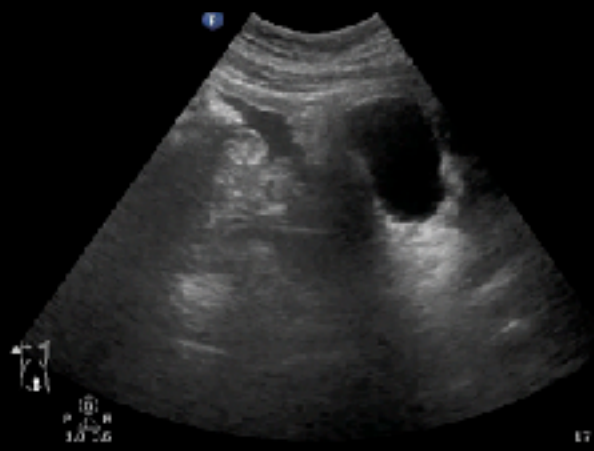
Around liver



Paracolic gutter



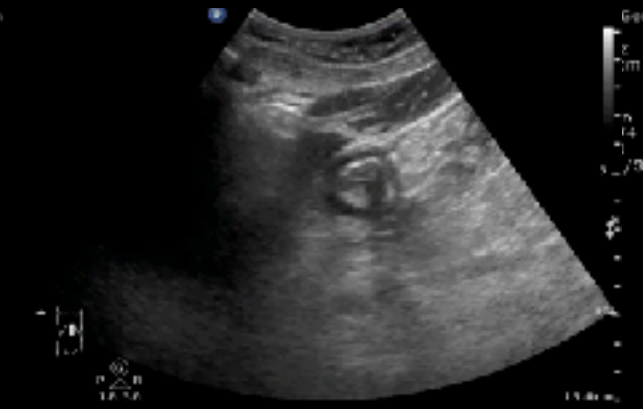
Pelvis



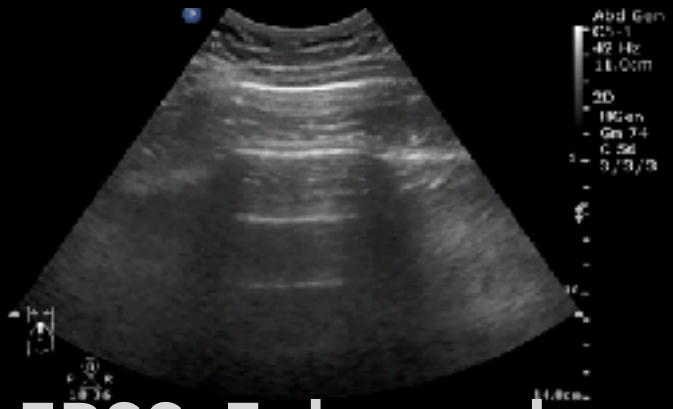
FAST倒三角是最基本的

Free air: 往上找

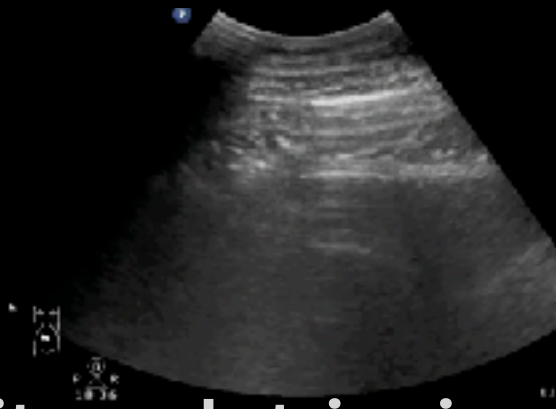
Liver surface



Curtain sign

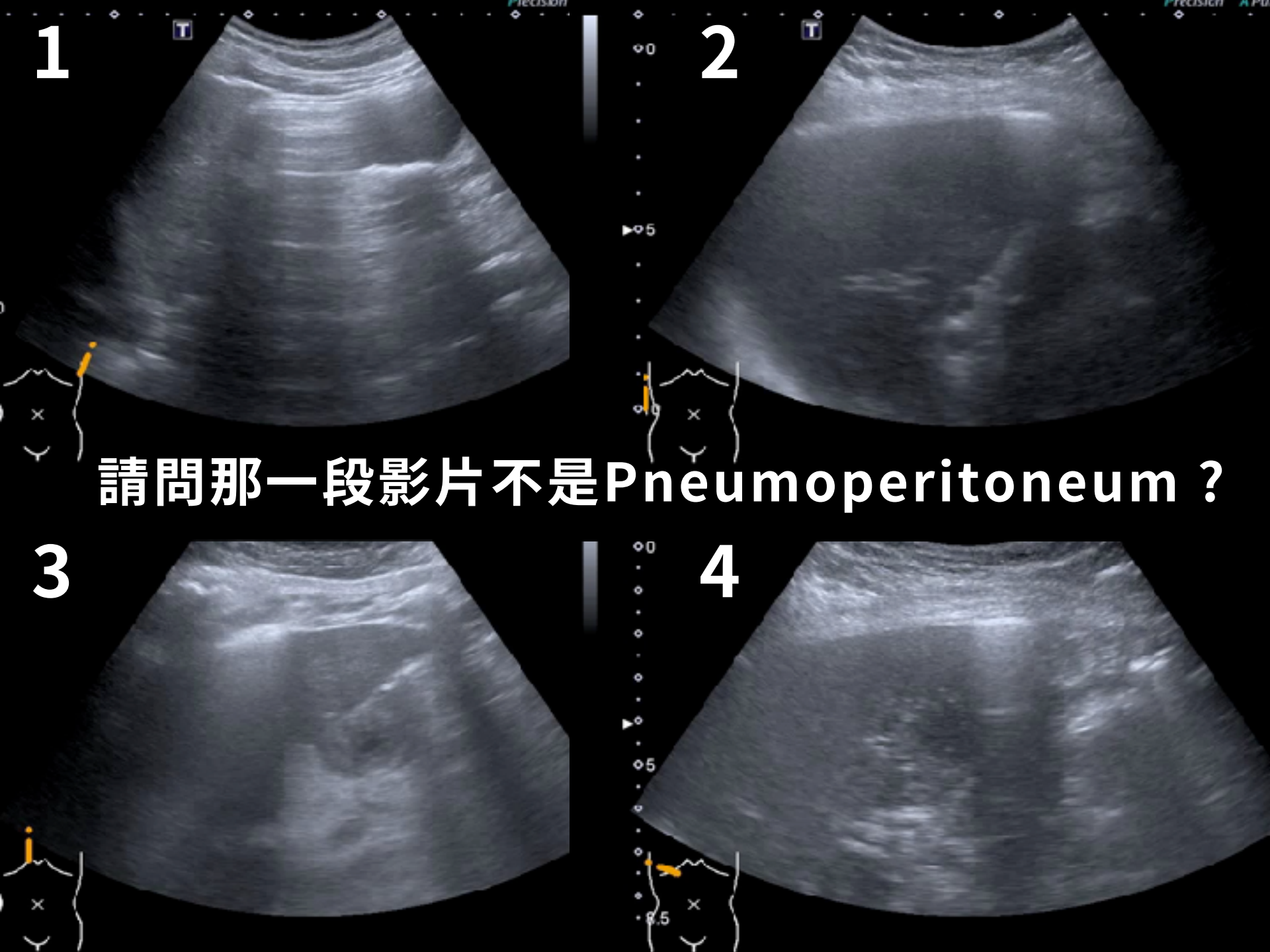


EPSS



EPSS: Enhanced peritoneal strip sign

游離氣存在界面變亮
跟肺部的氣胸一個樣
不要忘了可以壓一壓


1
2
3
4
請問那一段影片不是Pneumoperitoneum ?

Nazerian et al. Crit Ultrasound J (2015) 7:15
DOI 10.1186/s13089-015-0032-6

Critical Ultrasound Journal
a SpringerOpen Journal

ORIGINAL ARTICLE Open Access

Accuracy of abdominal ultrasound for the diagnosis of pneumoperitoneum in patients with acute abdominal pain: a pilot study 2 scan fast: 剣突下和右上腹

Peiman Nazerian[1*], Camilla Tozzetti[1], Simone Vanni[1], Maurizio Bartolucci[2], Simona Gualtieri[1], Federica Trausi[1], Marco Vittorini[1], Elisabetta Catini[1], Gian Alfonso Cibinel[3] and Stefano Grifoni[1]

Table 2 Diagnostic performance of abdominal ultrasonography and abdominal radiography for the diagnosis of pneumoperitoneum based on senior revision

	Sensitivity (95 % CI)	Specificity (95 % CI)	PPV (95 % CI)	NPV (95 % CI)	+LR (95 % CI)	−LR (95 % CI)
US exam[a]	95.5 (86.3–99.2)	81.8 (72.6–85.5)	84.0 (75.9–87.3)	94.7 (84.1–99.0)	5.25 (3.15–6.85)	0.05 (0.01–0.18)
2 scan-fast US[b]	93.2 (83.6–98.1)	81.8 (72.3–86.7)	83.7 (75.1–88.1)	92.3 (81.5–97.8)	5.12 (3.01–7.38)	0.08 (0.02–0.22)
X-ray[c]	72.2 (54.8–85.7)	92.5 (79.5–98.3)	89.6 (72.6–97.6)	78.7 (64.3–89.2)	9.63 (3.18–29.13)	0.30 (0.18–0.51)

US ultrasound, *PPV* positive predictive value, *NPV* negative predictive value, *+LR* positive likelihood ratio, *−LR* negative likelihood ratio, *95 % CI* confidence interval

[a] One scan positive among those obtained with convex or linear probe

[b] One scan positive among right hypochondrium and epigastrium scans with convex probe

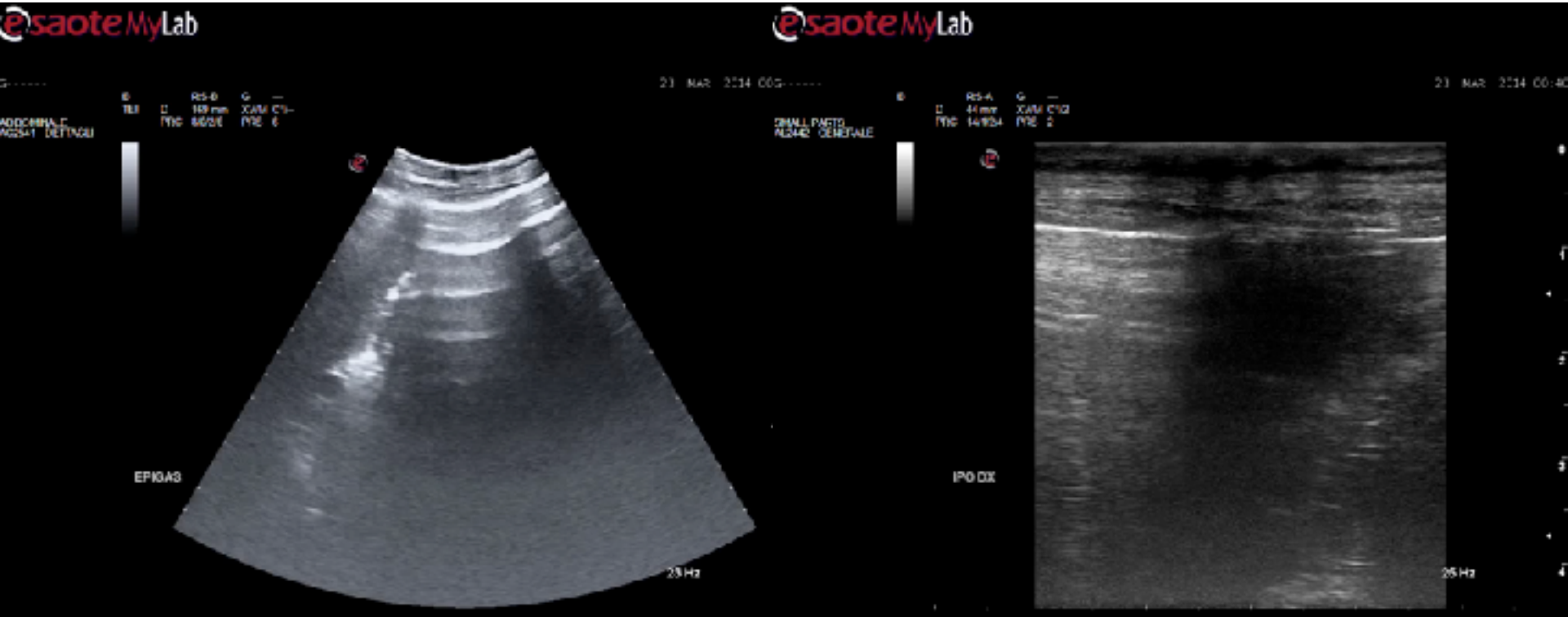
[c] Considering 19 patients with available abdominal radiography

ORIGINAL ARTICLE Open Access

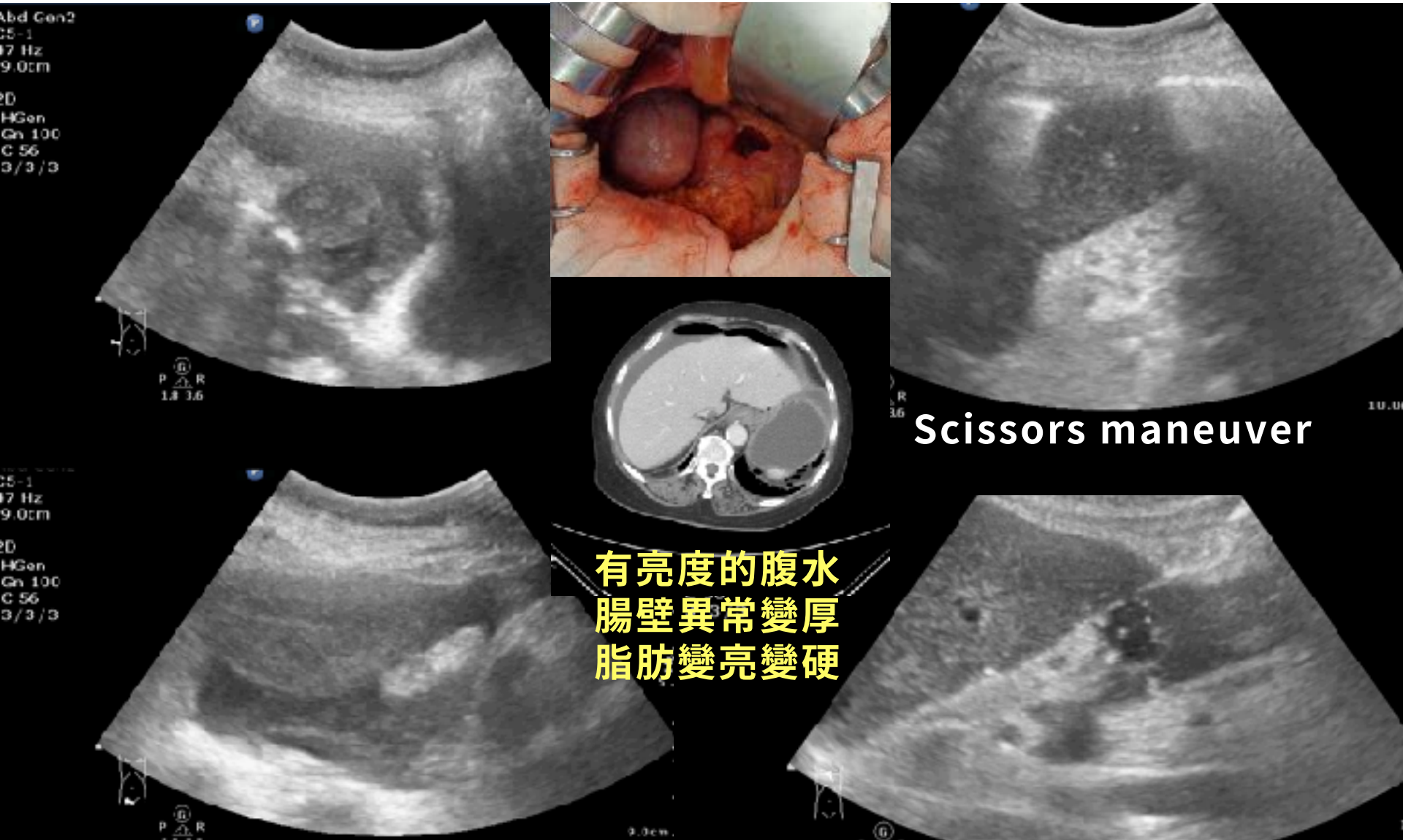
Accuracy of abdominal ultrasound for the diagnosis of pneumoperitoneum in patients with acute abdominal pain: a pilot study

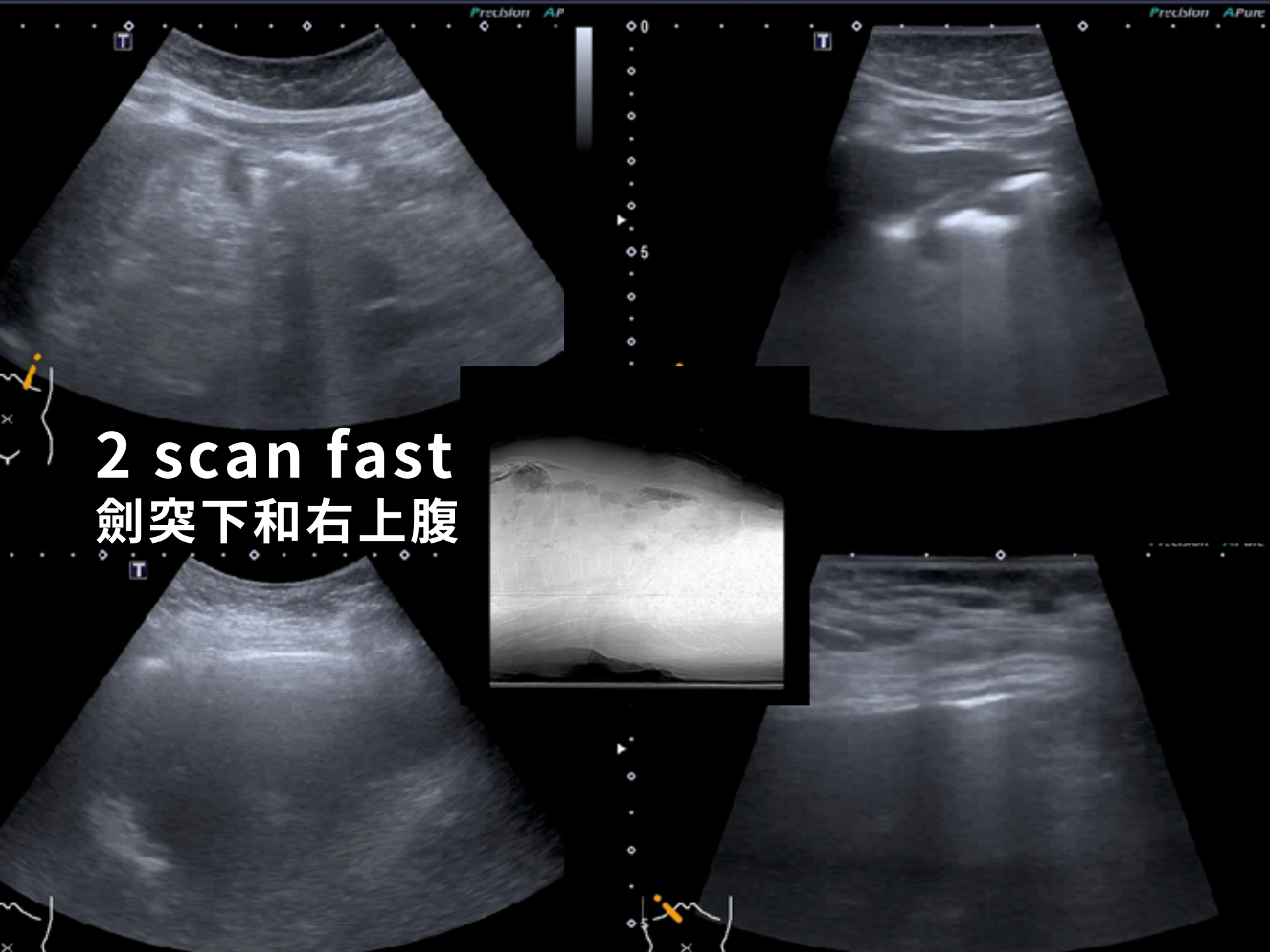
2 scan fast: 劍突下和右上腹

Peiman Nazerian[1*], Camilla Tozzetti[1], Simone Vanni[1], Maurizio Bartolucci[2], Simona Gualtieri[1], Federica Trausi[1], Marco Vittorini[1], Elisabetta Catini[1], Gian Alfonso Cibinel[3] and Stefano Grifoni[1]



80F, diffuse abdominal pain




2 scan fast
剣突下和右上腹

Ultrasound in Med. & Biol., Vol. 42, No. 12, pp. 2732–2742, 2016

0301-5629/$ - see front matter

http://dx.doi.org/10.1016/j.ultrasmedbio.2016.08.026

● *Review*

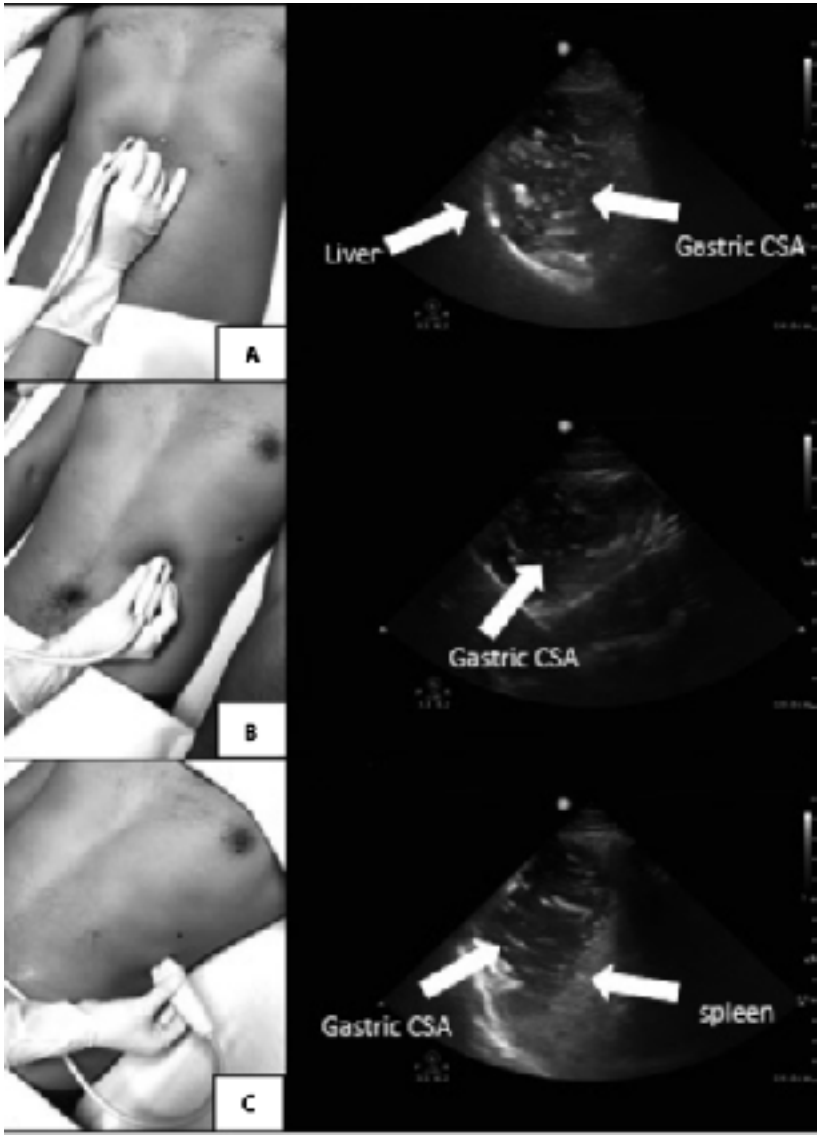
WFUMB POSITION PAPER. LEARNING GASTROINTESTINAL ULTRASOUND: THEORY AND PRACTICE

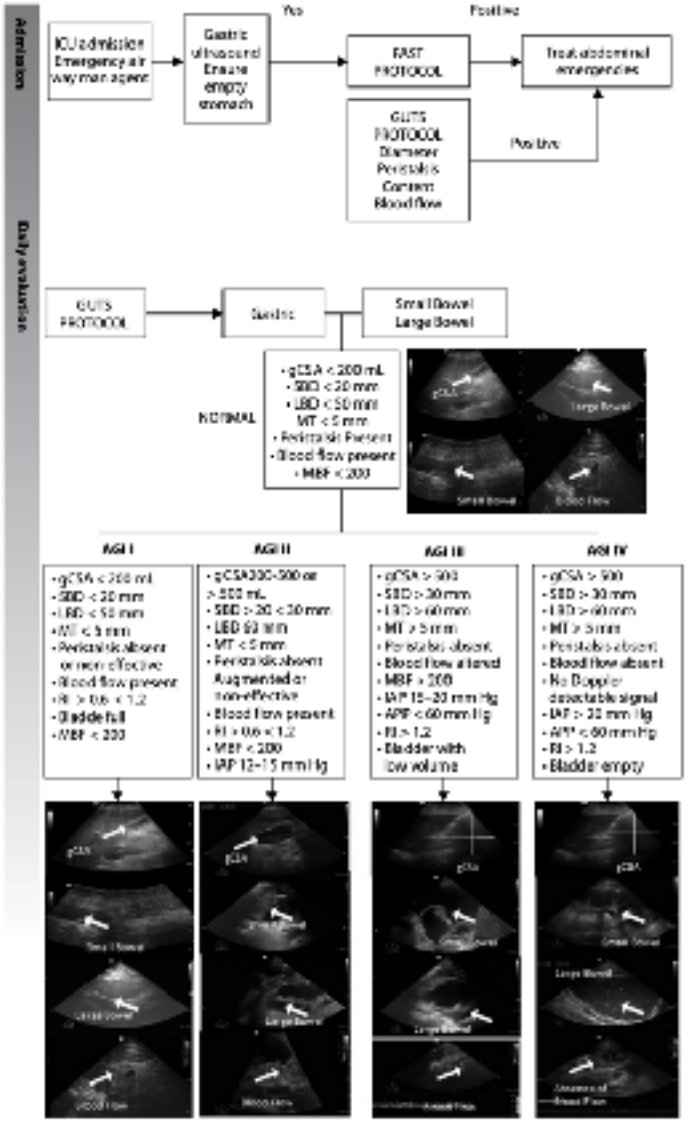
NATHAN S. S. ATKINSON,* ROBERT V. BRYANT,†‡ YI DONG,§ CHRISTIAN MAASER,‖ TORSTEN KUCHARZIK,¶ GIOVANNI MACONI,# ANIL K. ASTHANA,** MICHAEL BLAIVAS,†† ADRIAN GOUDIE,‡‡ ODD HELGE GILJA,§§‖‖ CHRISTIAN NOLSØE,¶¶ DIETER NÜRNBERG,## and CHRISTOPH F. DIETRICH***

Point-of-care gastrointestinal and urinary tract sonography in daily evaluation of gastrointestinal dysfunction in critically ill patients (GUTS Protocol)

Angel Augusto Perez-Calatayud[1,2], Raul Carrillo-Esper[2,5], Eduardo Daniel Anica-Malagon[3], Jesus Carlos Briones-Garduño[2,3], Emilio Arch-Tirado[4], Robert Wise[6], Manu L.N.G. Malbrain[7,8]

Point-of-care gastrointestinal and urinary tract sonography in daily evaluation of gastrointestinal dysfunction in critically ill patients (GUTS Protocol)





ULTRASOUND PROGRAM

Guidelines & Recommendations

Thieme

EFSUMB Recommendations and Guidelines for Gastrointestinal Ultrasound

Part 1: Examination Techniques and Normal Findings (Short version)

EFSUMB-Empfehlungen und Leitlinien des Gastrointestinalen Ultraschalls

腸道超音波的基本功

Nylund K et al. Ultraschall in Med 2017; 38: 273–284

Journal of Medical Ultrasound (2015) 23, 161–163

Available online at www.sciencedirect.com

ScienceDirect

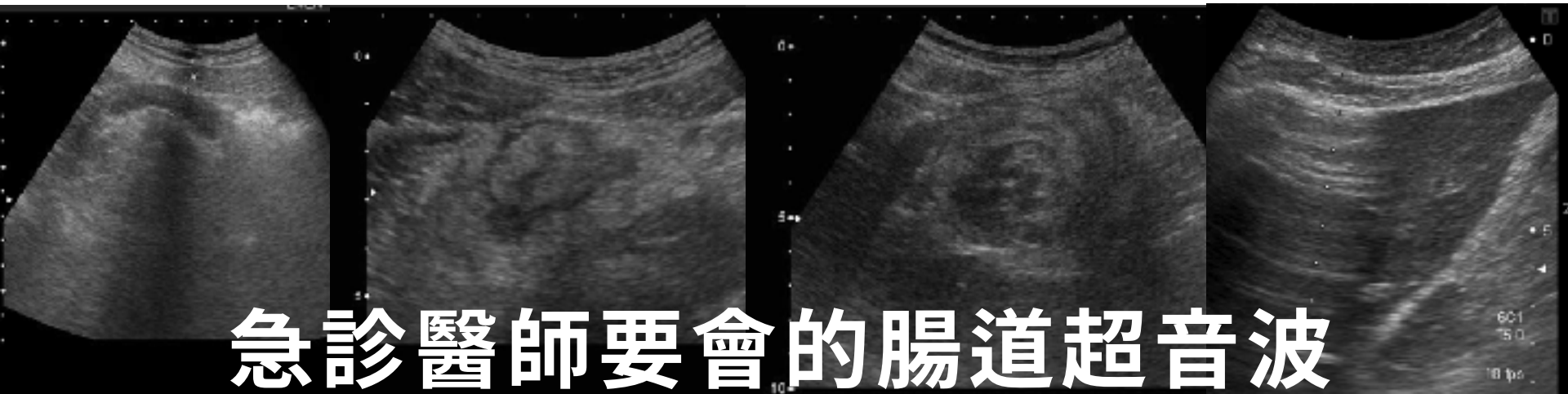
journal homepage: www.jmu-online.com

EDUCATIONAL FORUM

Application of Gastrointestinal Tract Ultrasound in Emergency and Critical Medicine

CME Credits

Jen-Tang Sun [1], Wan-Ching Lien [2], Hsiu-Po Wang [3*]



急診醫師要會的腸道超音波

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

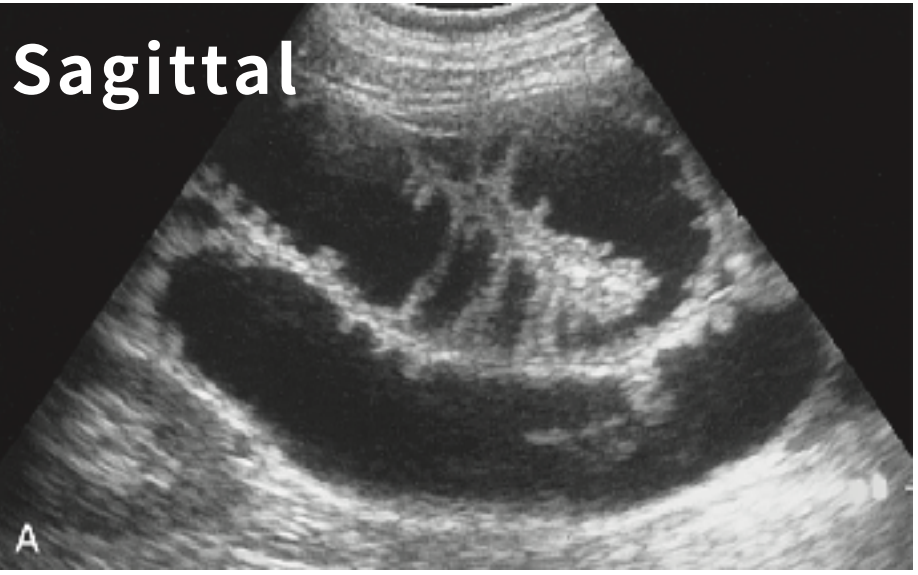
Gastrointestinaler Ultraschall (GIUS) bei intestinalen Notfällen – Ein EFSUMB-Positionspapier

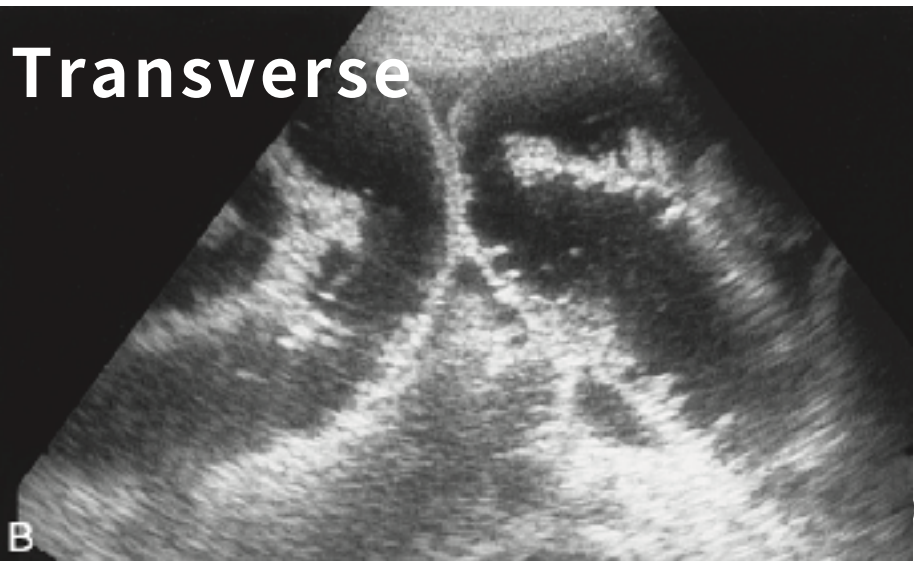
Authors
Alois Hollerweger[1], Giovanni Maconi[2], Tomas Ripolles[3], Kim Nylund[4], Antony Higginson[5], Carla Serra[6], Christoph F. Dietrich[7], Klaus Dirks[8], Odd Helge Gilja[9]

SBO
Pneumoperitoneum
Ischemic colitis

Hollerwegr A et al. Ultraschall in Med 2020

Bowel obstruction

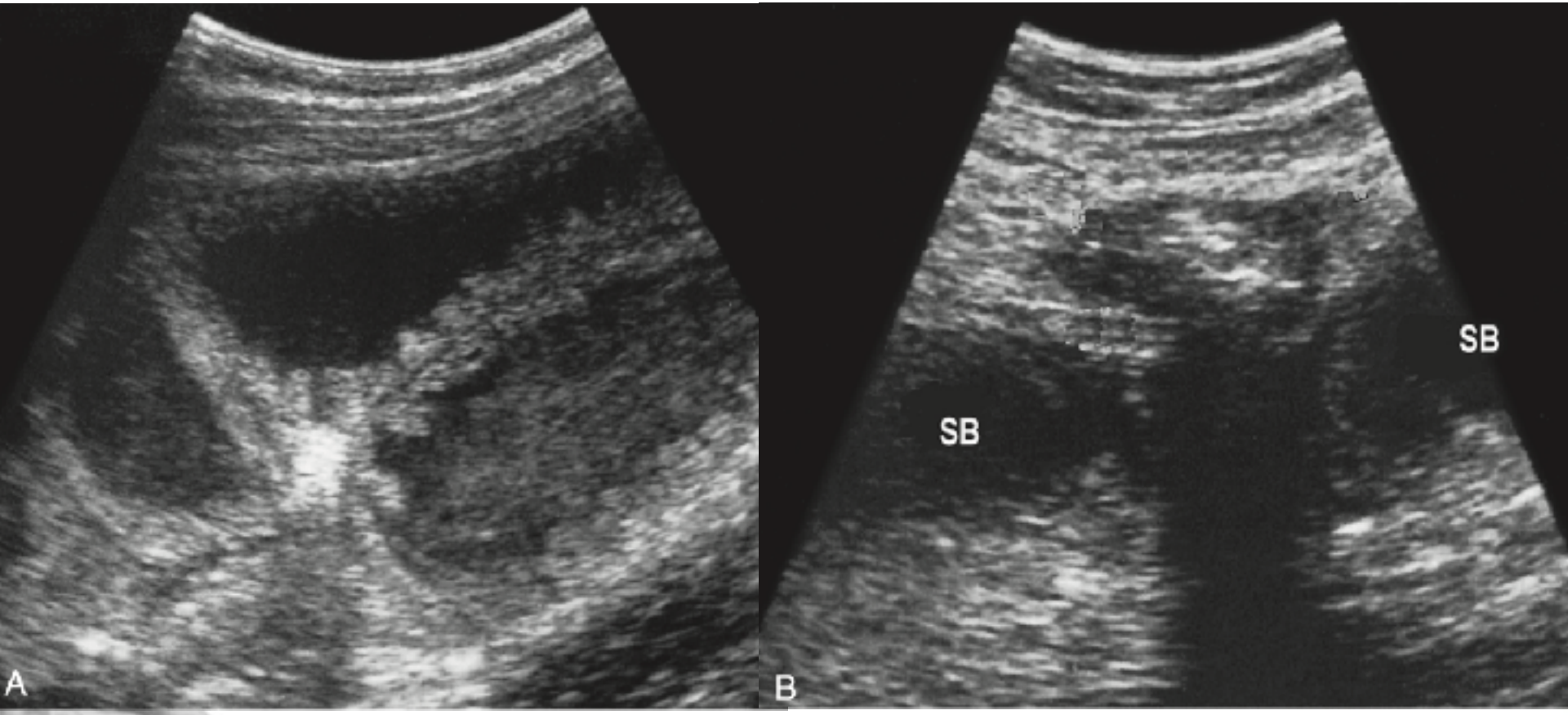




腸道直徑(3cm/5cm)
腸內容物(水/氣)
腸蠕動性
腸壁變化
腸道周遭
阻塞位置
阻塞原因

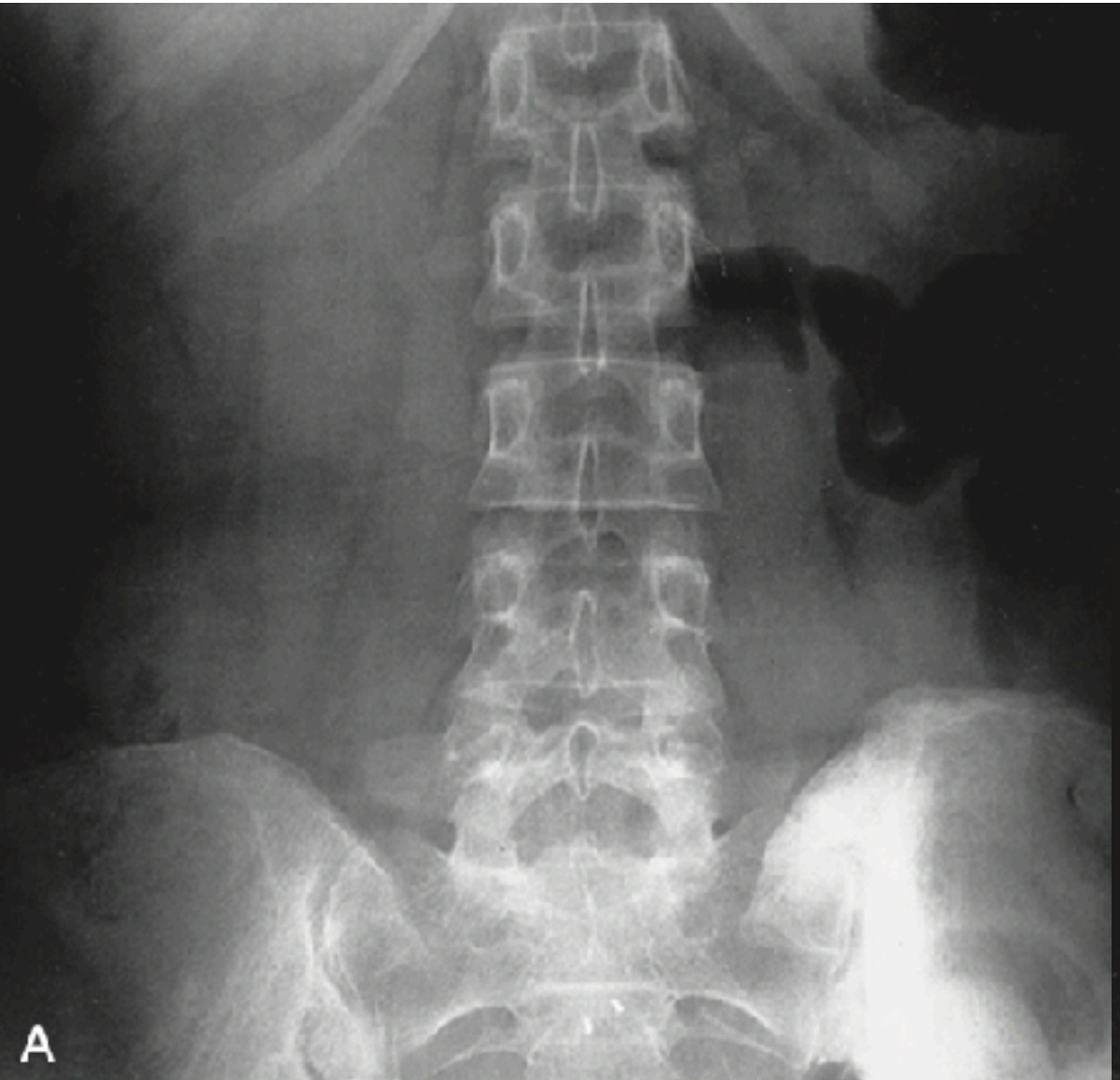
ULTRASOUND
PROGRAM

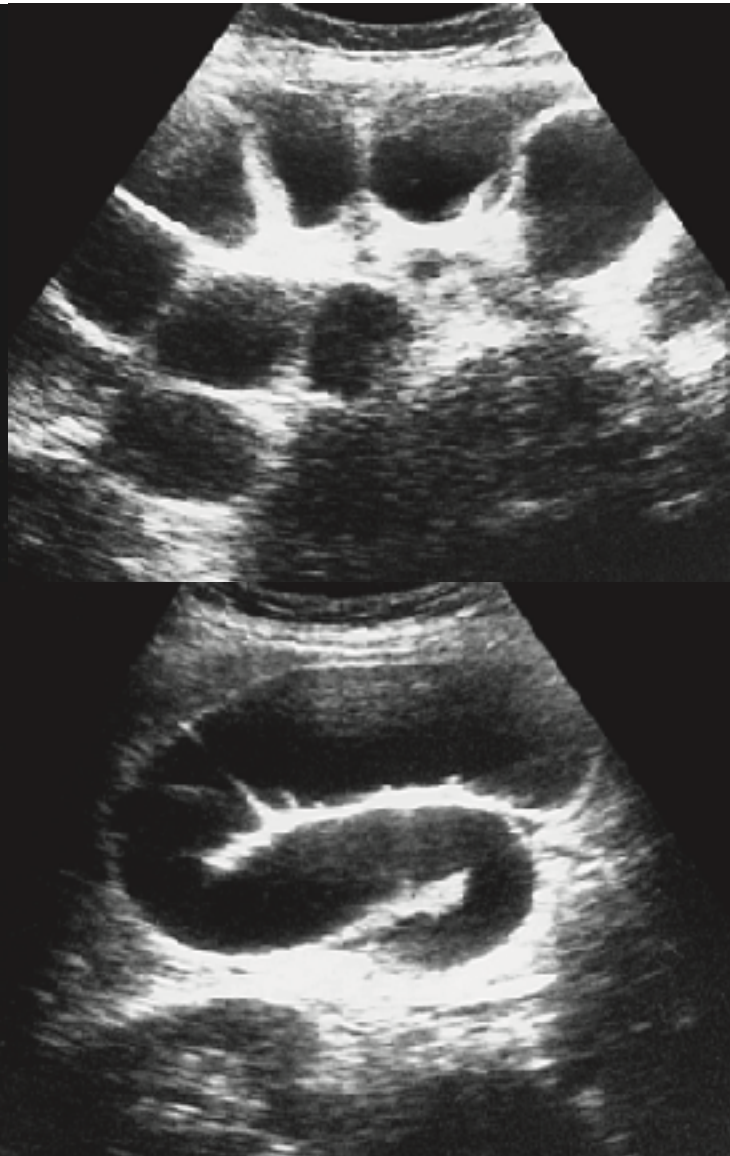
Ventral hernia & SBO



ULTRASOUND
PROGRAM

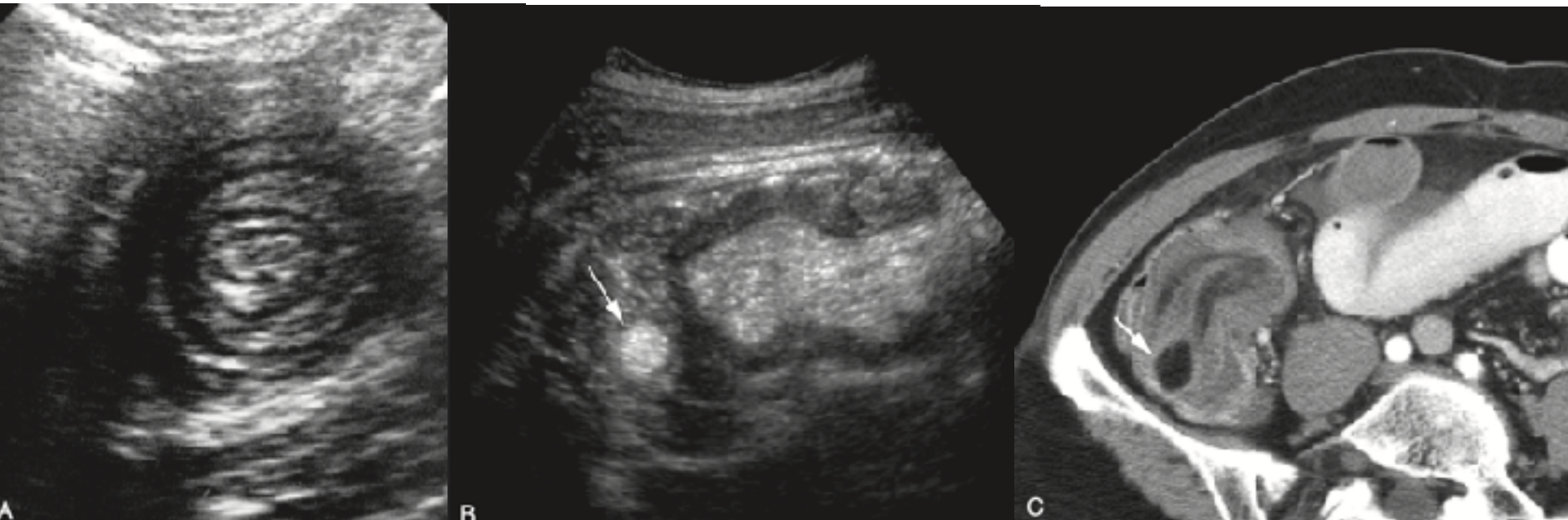
Close loop obstruction



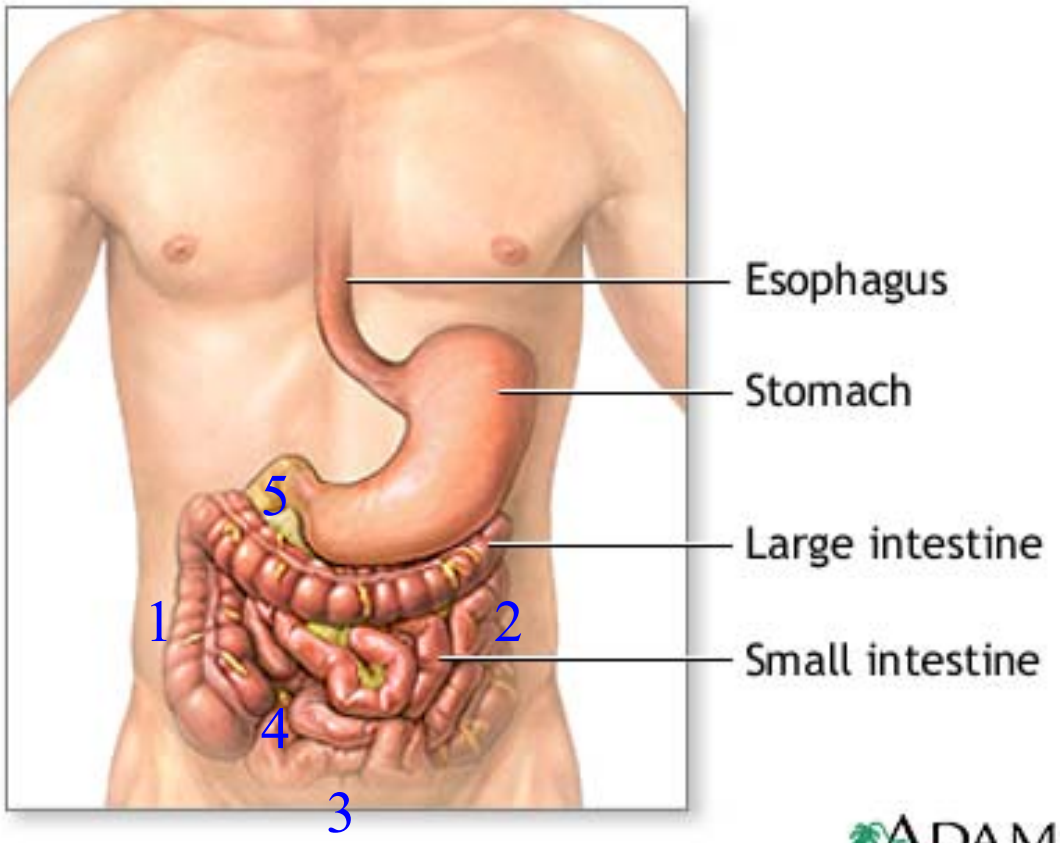


Intussusception

兒童：RUQ
成人：Leading lesion



Bisection Approximation Method for GI obstruction

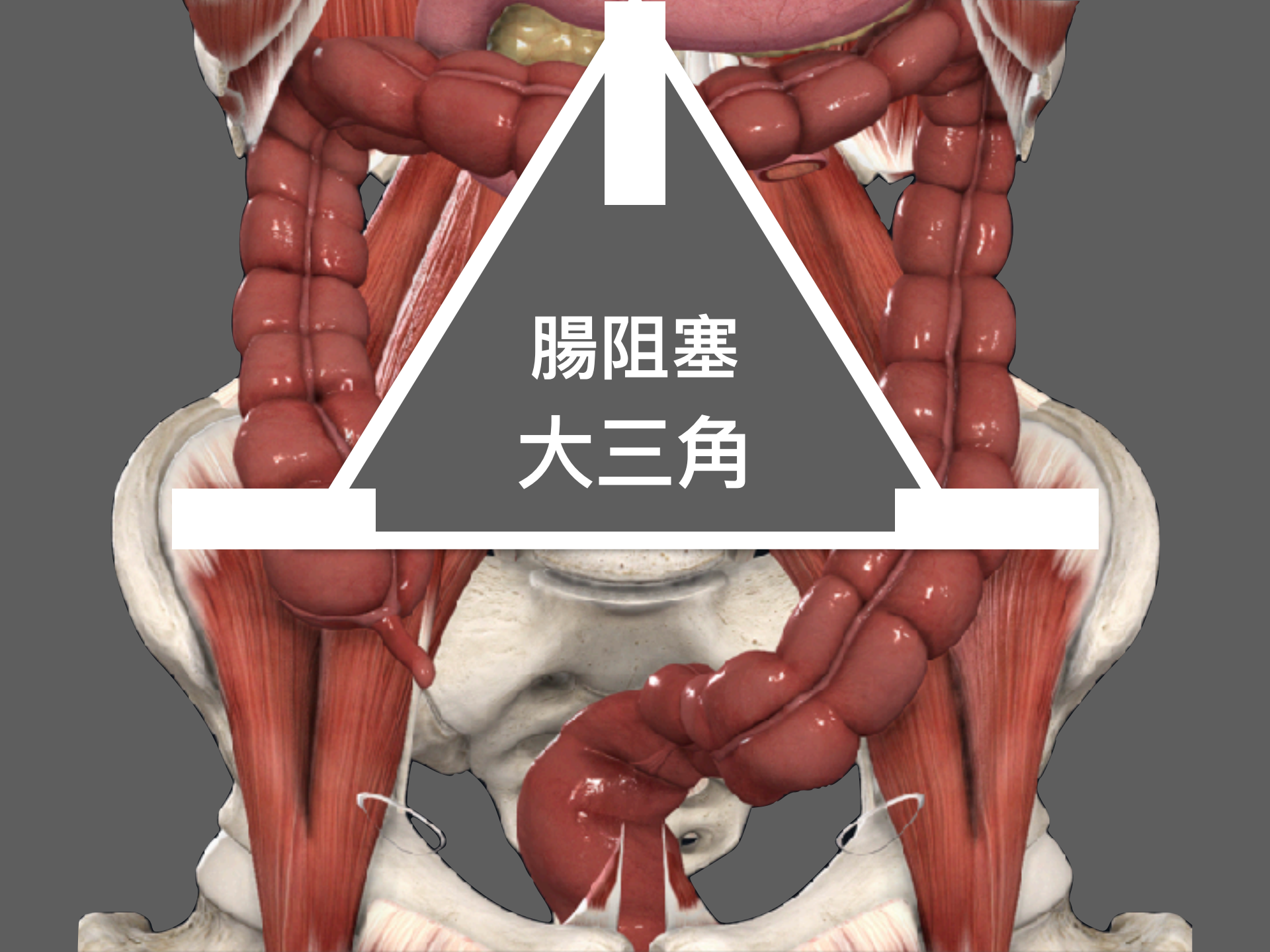


Wang HP, et al. Hepatogastroenterology. 2006;53:547-51.

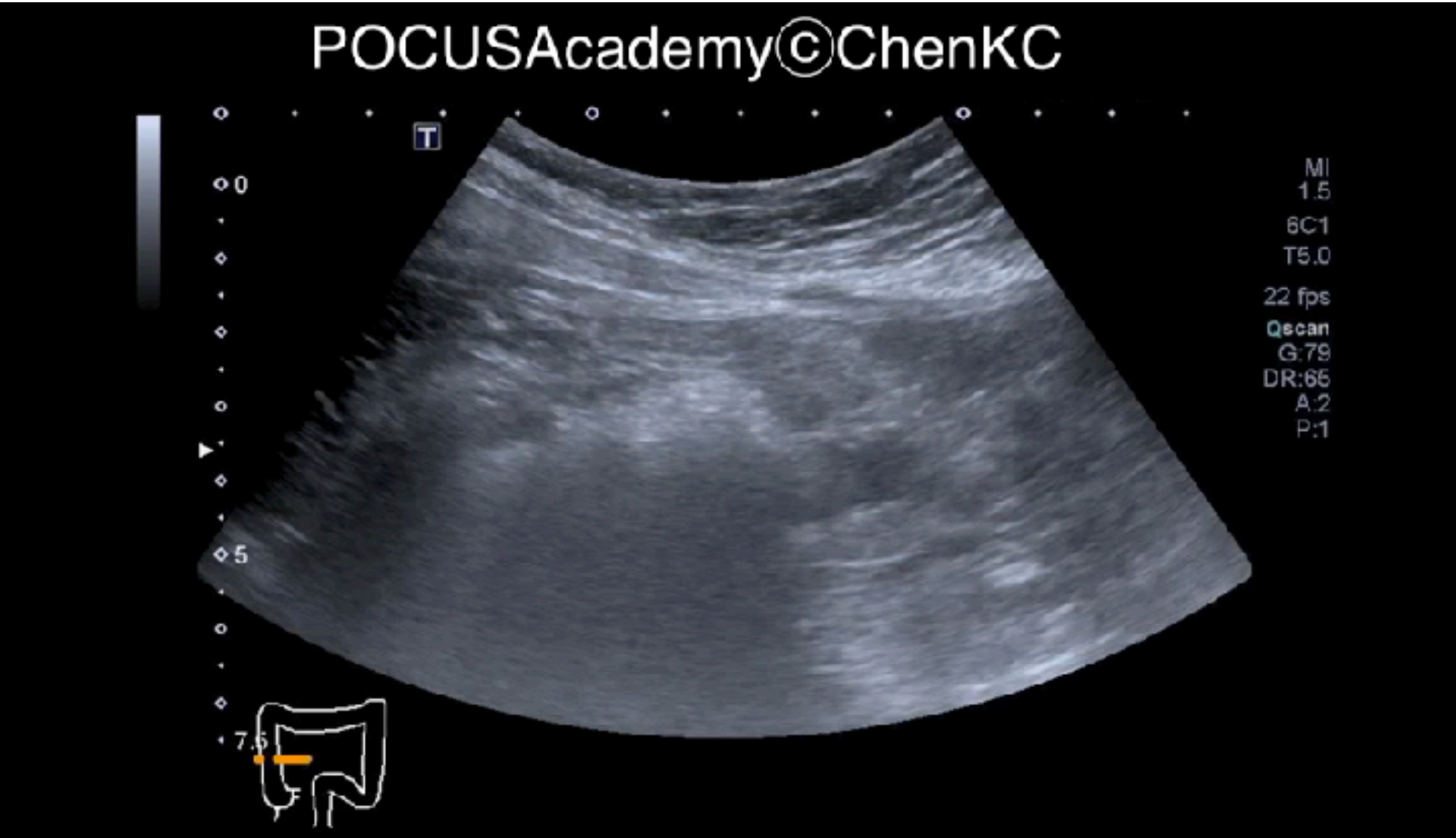
ULTRASOUND PROGRAM

Bisection Approximation Method for GI obstruction

Location of US examination (From 1 – 5)					Possible lesion site
1. A-C	2. D-C	3. Rectum	4. IC region	5. Gastric outlet or duodenum	
Dilated	Collapsed				From 1-2
Dilated	Dilated	Collapsed			From 2-3
Collapsed	-	-	Dilated		From 1-4
Collapsed	-	-	Collapsed	Dilated	From 4-5
Collapsed	-	-	Collapsed	Collapsed	Above 5


腸阻塞
大三角

Bisection Approximation Method for GI obstruction



TAKE-HOME MESSAGE

For trained operators, ultrasonography possesses sensitivity and specificity comparable to that of abdominal computed tomography (CT) for the diagnosis of small bowel obstruction.

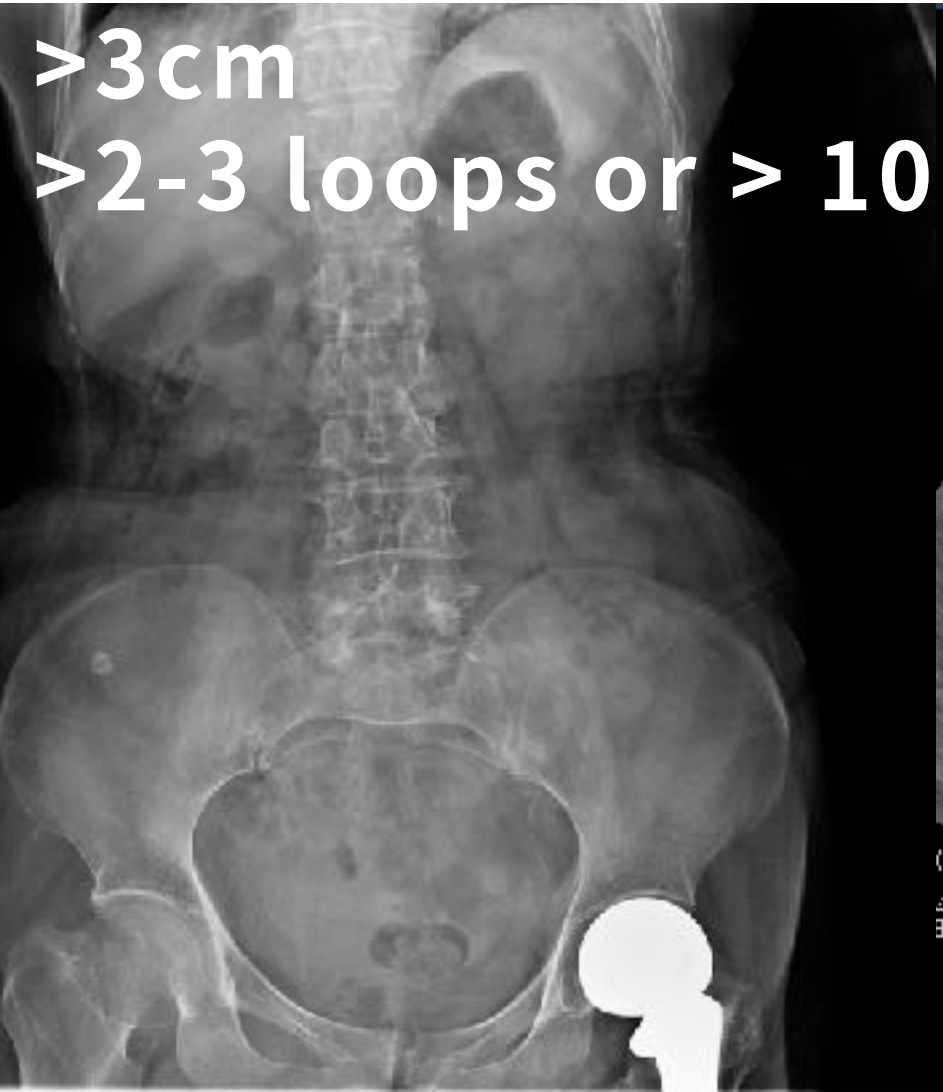
US for SBO diagnosis LR + >20起跳

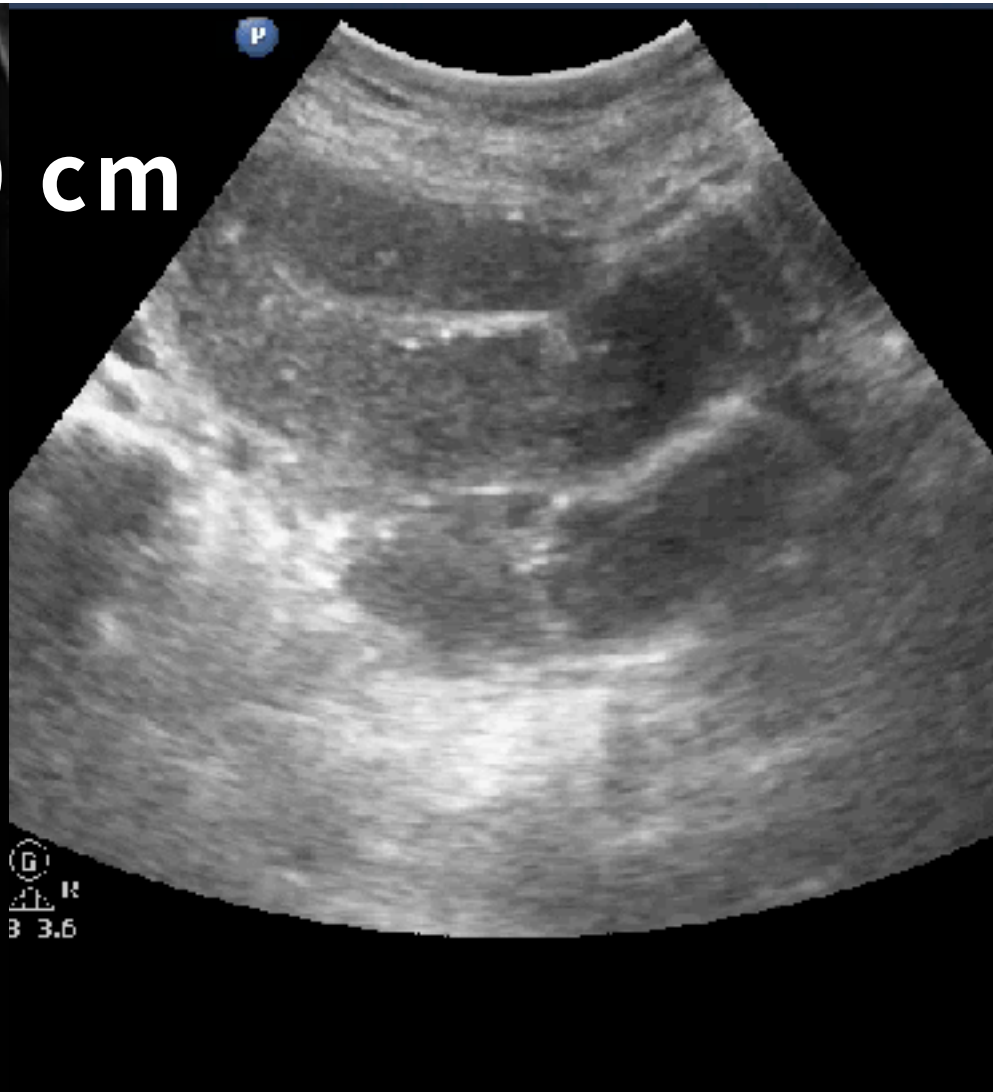
Ultrasonographic Diagnosis of SBO	Specificity (95% CI)	Sensitivity (95% CI)	+LR (95% CI)	–LR (95% CI)	SROC AUC (95% CI)
Overall	0.97 (0.88–0.99)	0.92 (0.89–0.95)	27.5 (7.7–98.4)	0.08 (0.06–0.11)	0.96 (0.94–0.97)
ED	0.96 (0.86–0.99)	0.93 (0.89–0.95)	21.1 (6.5–68.9)	0.08 (0.05–0.12)	0.96 (0.94–0.97)
Non-ED	0.99 (0.60–1.00)	0.92 (0.85–0.96)	70.8 (1.5–3279.7)	0.08 (0.05–0.15)	0.96 (0.94–0.98)

CI, Confidence interval; *+LR*, positive likelihood ratio; *–LR*, negative likelihood ratio; *SBO*, small bowel obstruction; *SROC*, summary receiver operating characteristic; *AUC*, area under the curve.

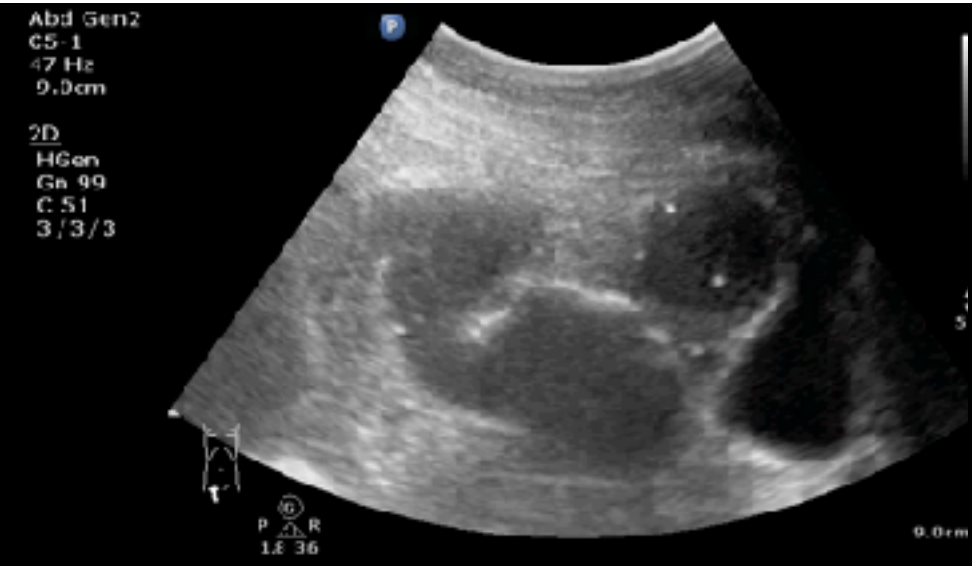
Cottlieb M, et al. AJEM 2017

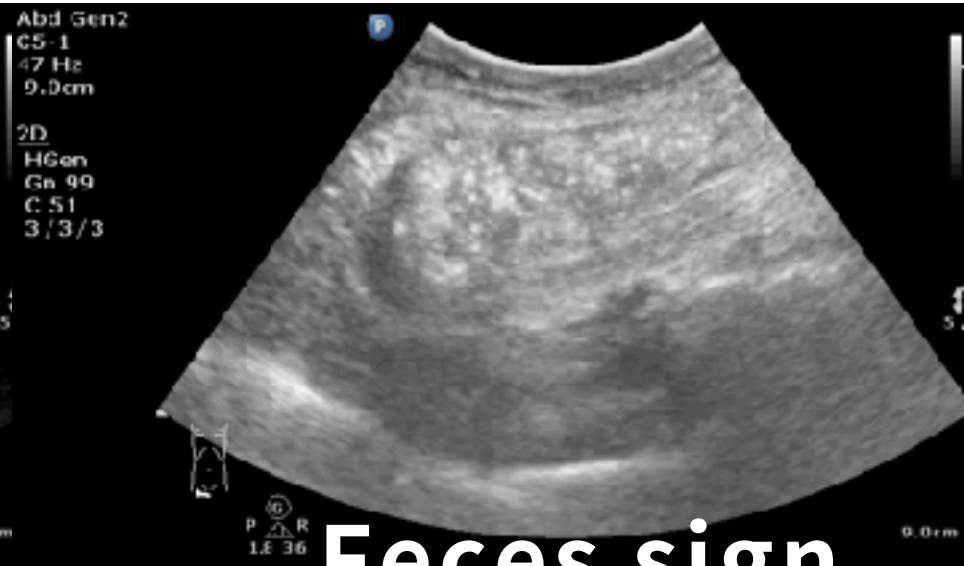
88F, diffuse abdominal pain



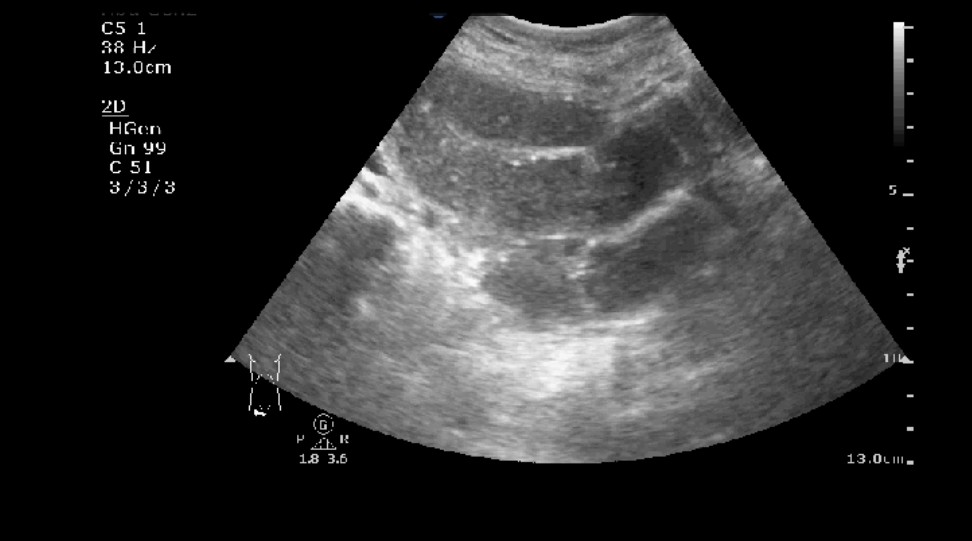


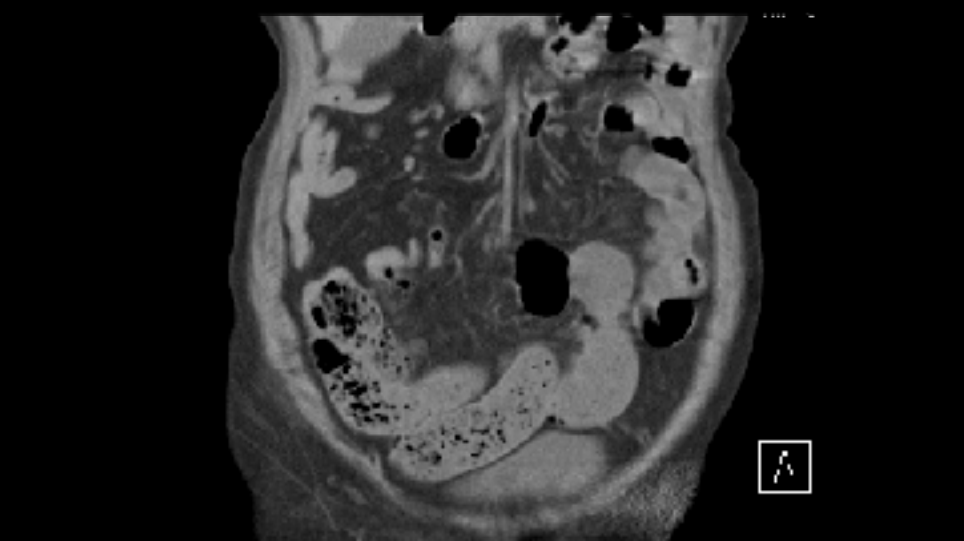
88F, diffuse abdominal pain



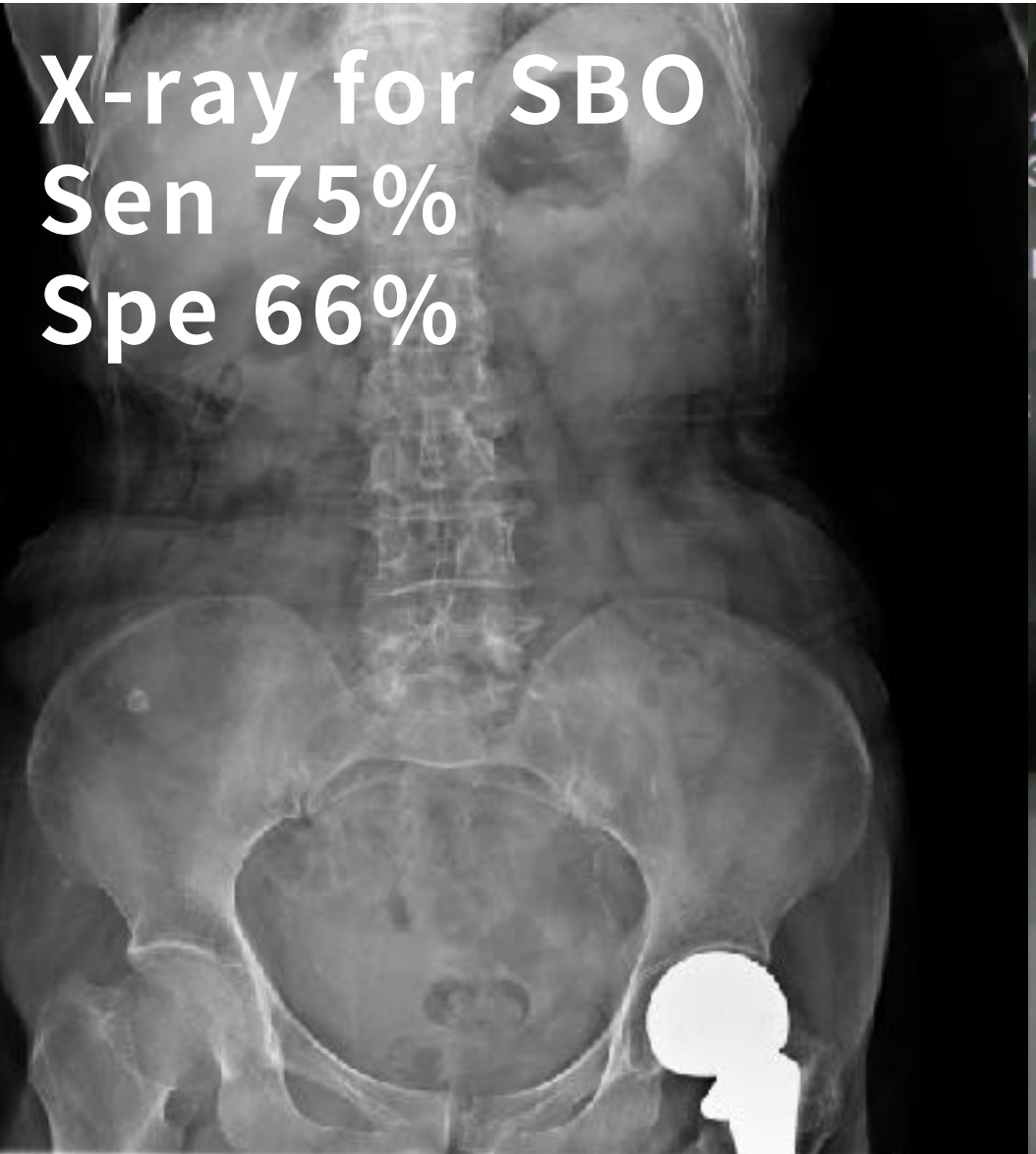


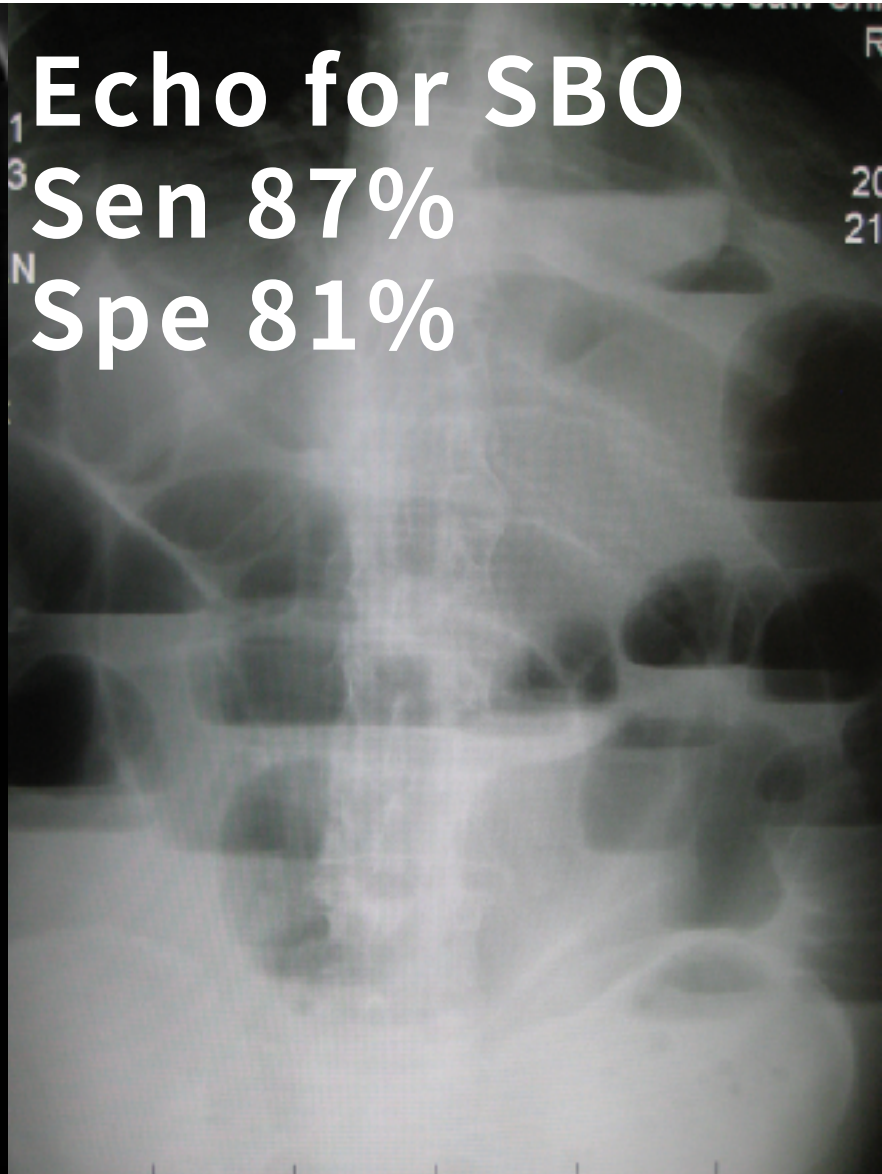
Feces sign





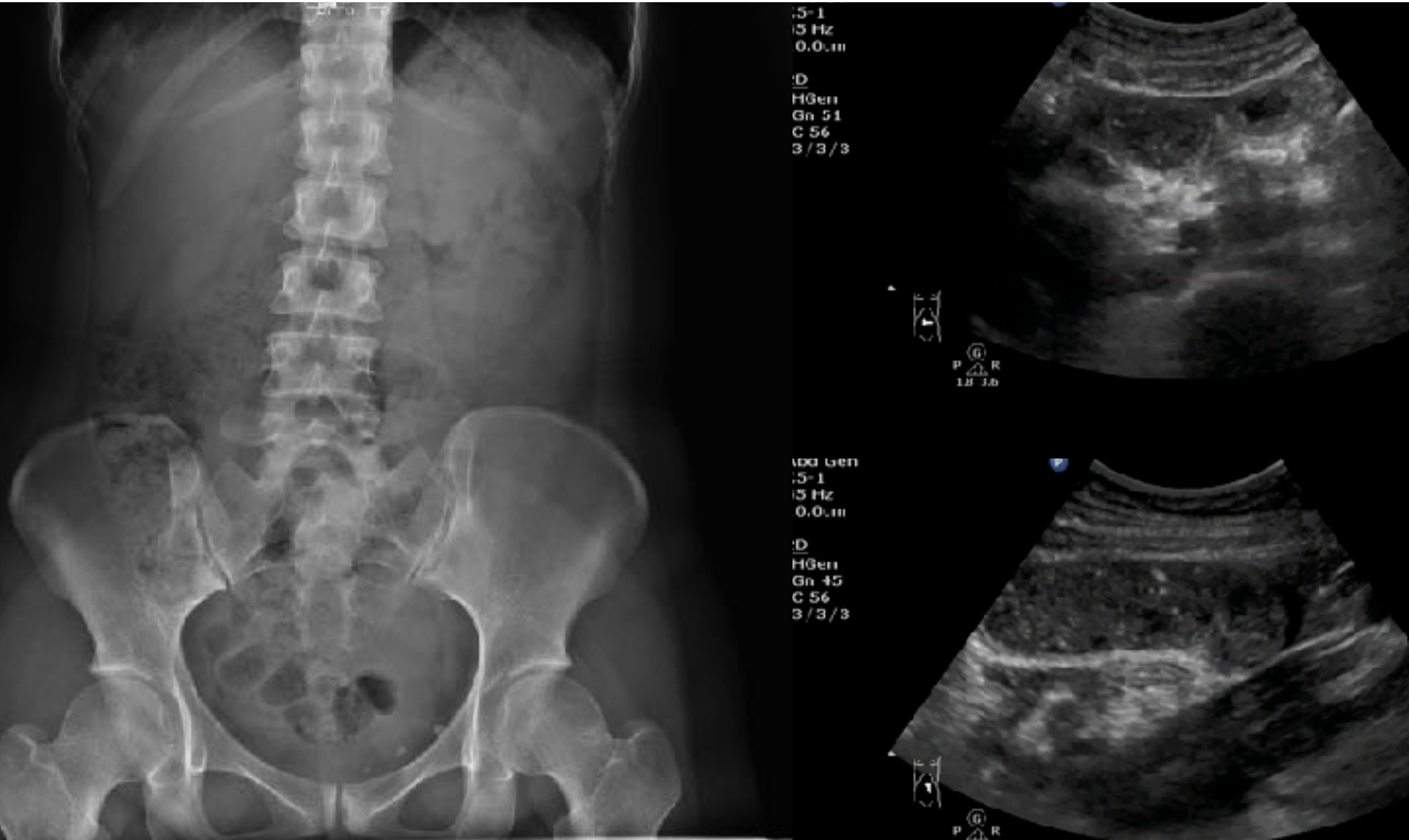
X光要開【對】的條件才有用啊



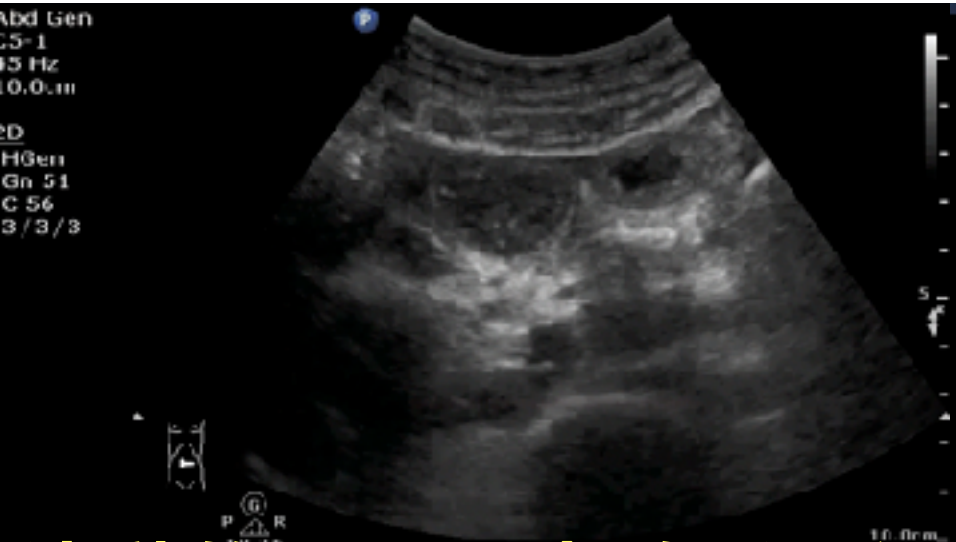


ULTRASOUND
PROGRAM

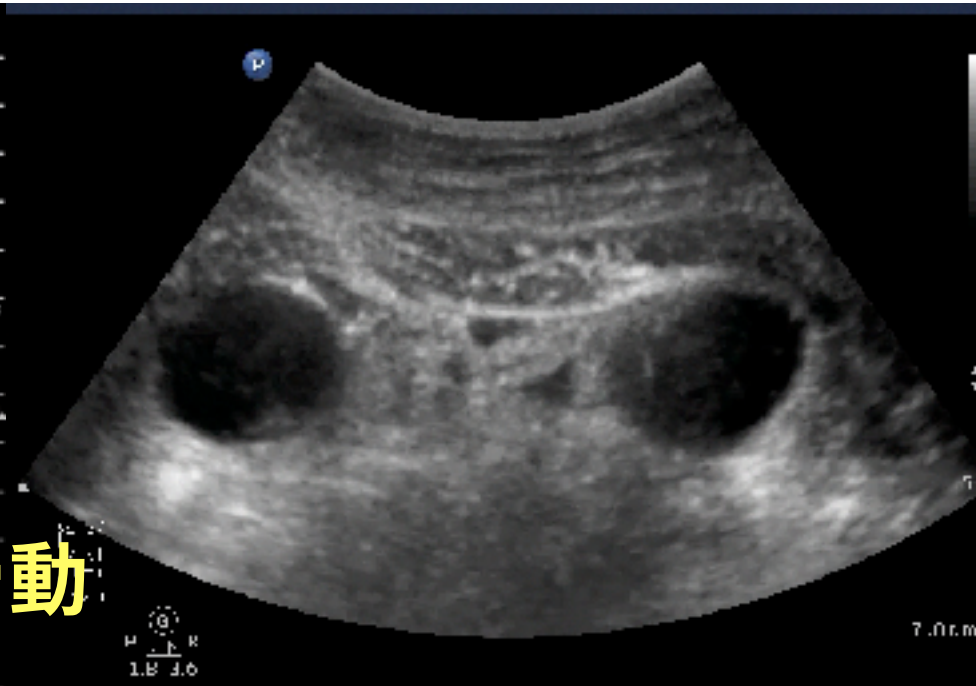
F/31, ABD pain & vomiting for 2Ds

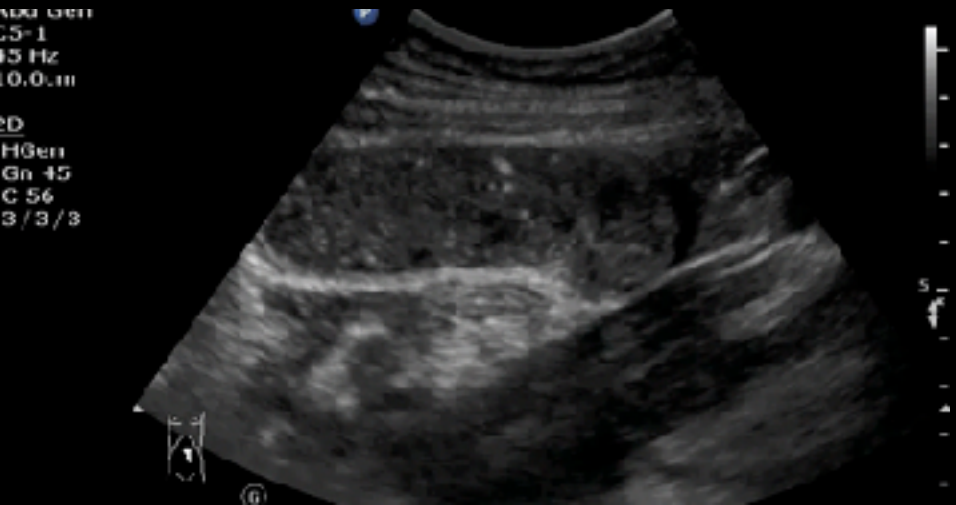


Adhesion ileus



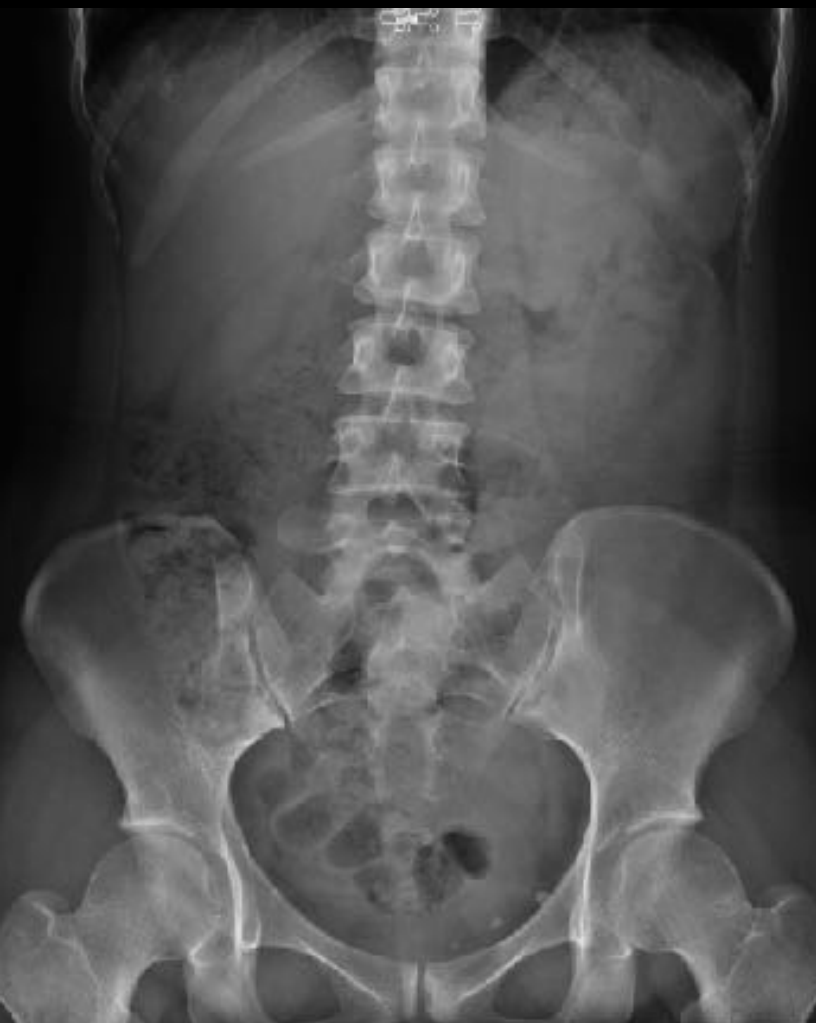
沾黏的腸子不會隨呼吸滑動



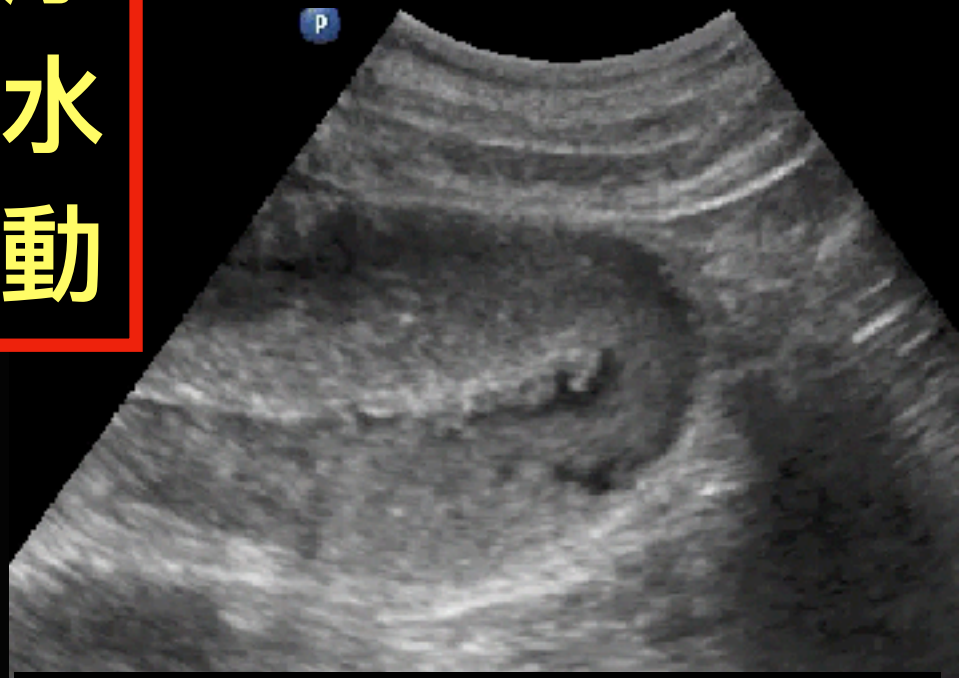


Keyboard sign
Tanga sign腸間液體
Adhesion band

POCUS is useful for gasless ileus



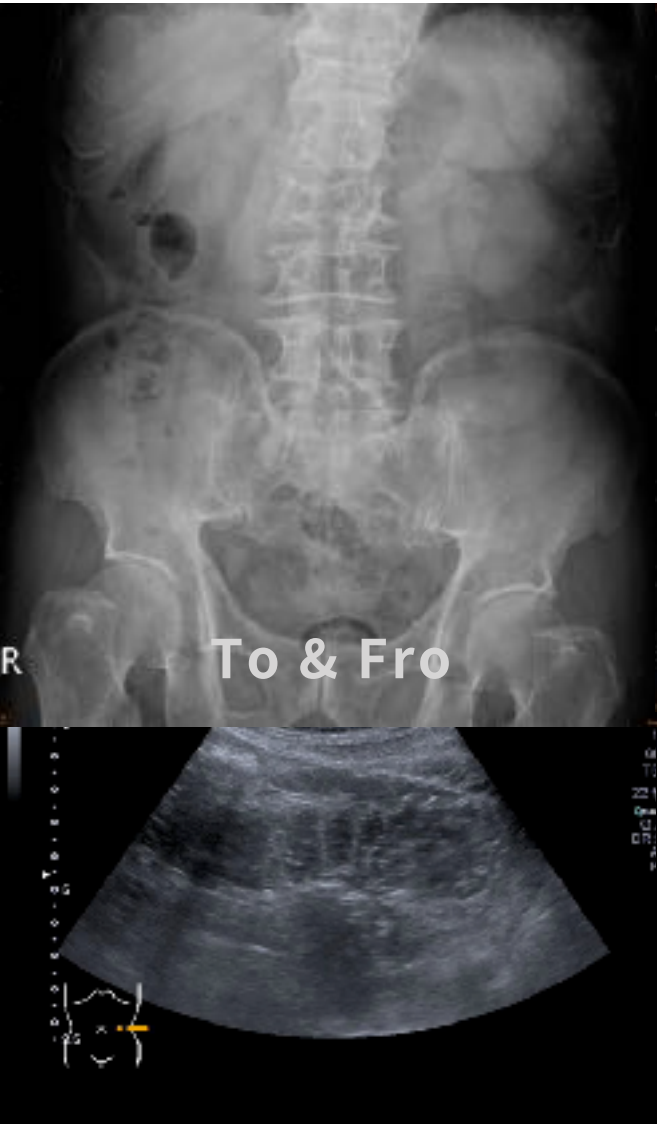
壁厚
腹水
蠕動

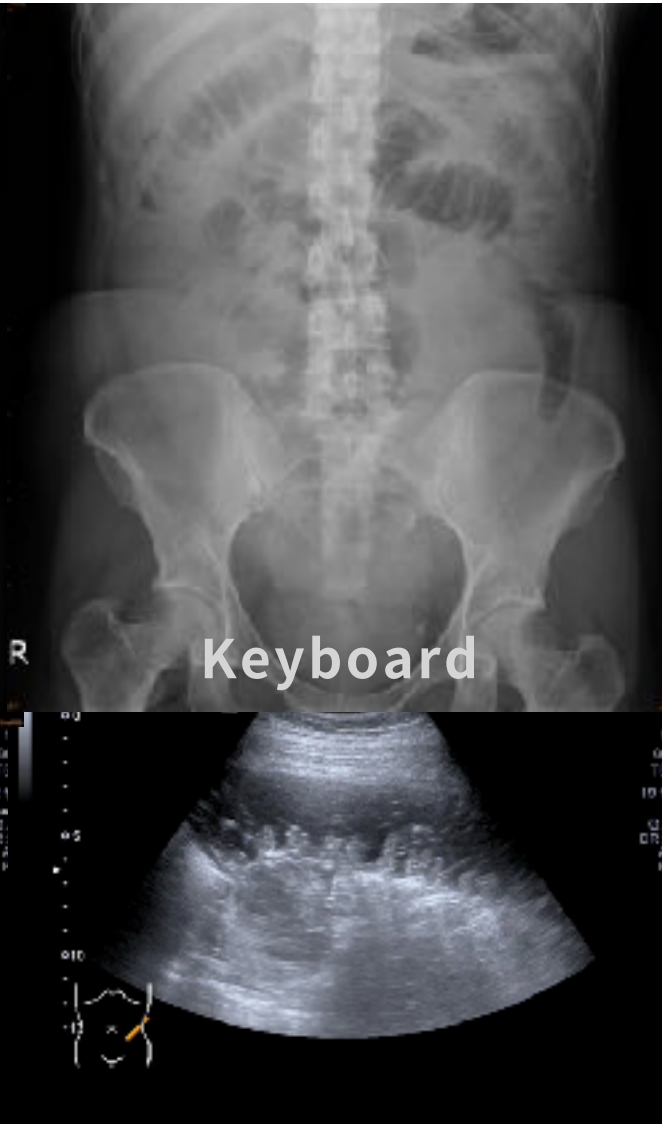


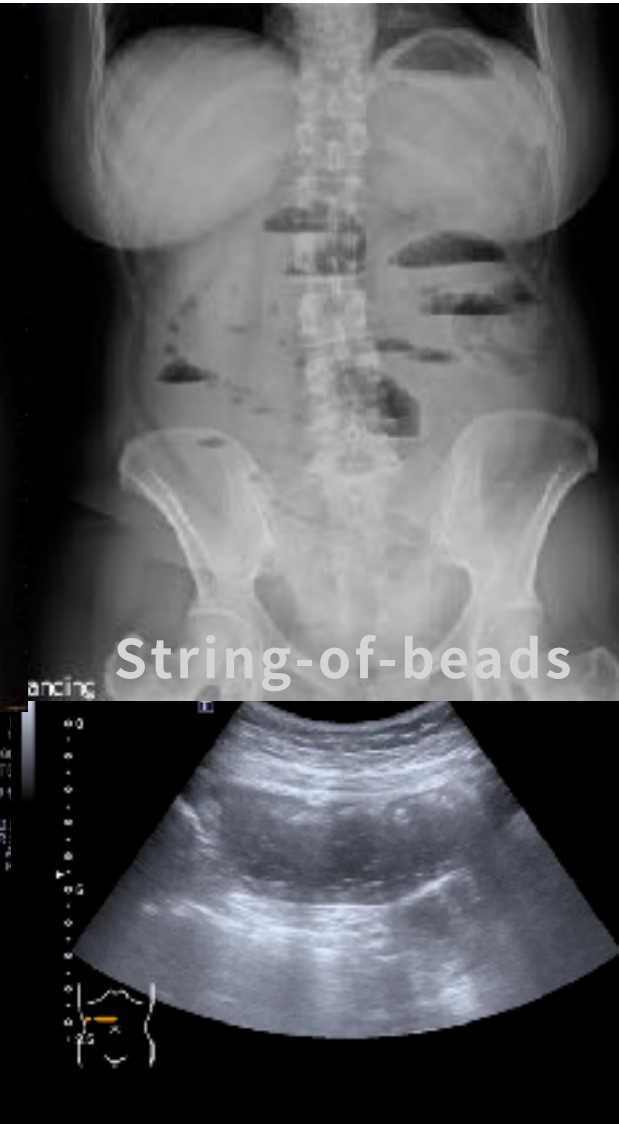
To-and-fro movement
Keyboard sign
Tanga sign

ULTRASOUND PROGRAM

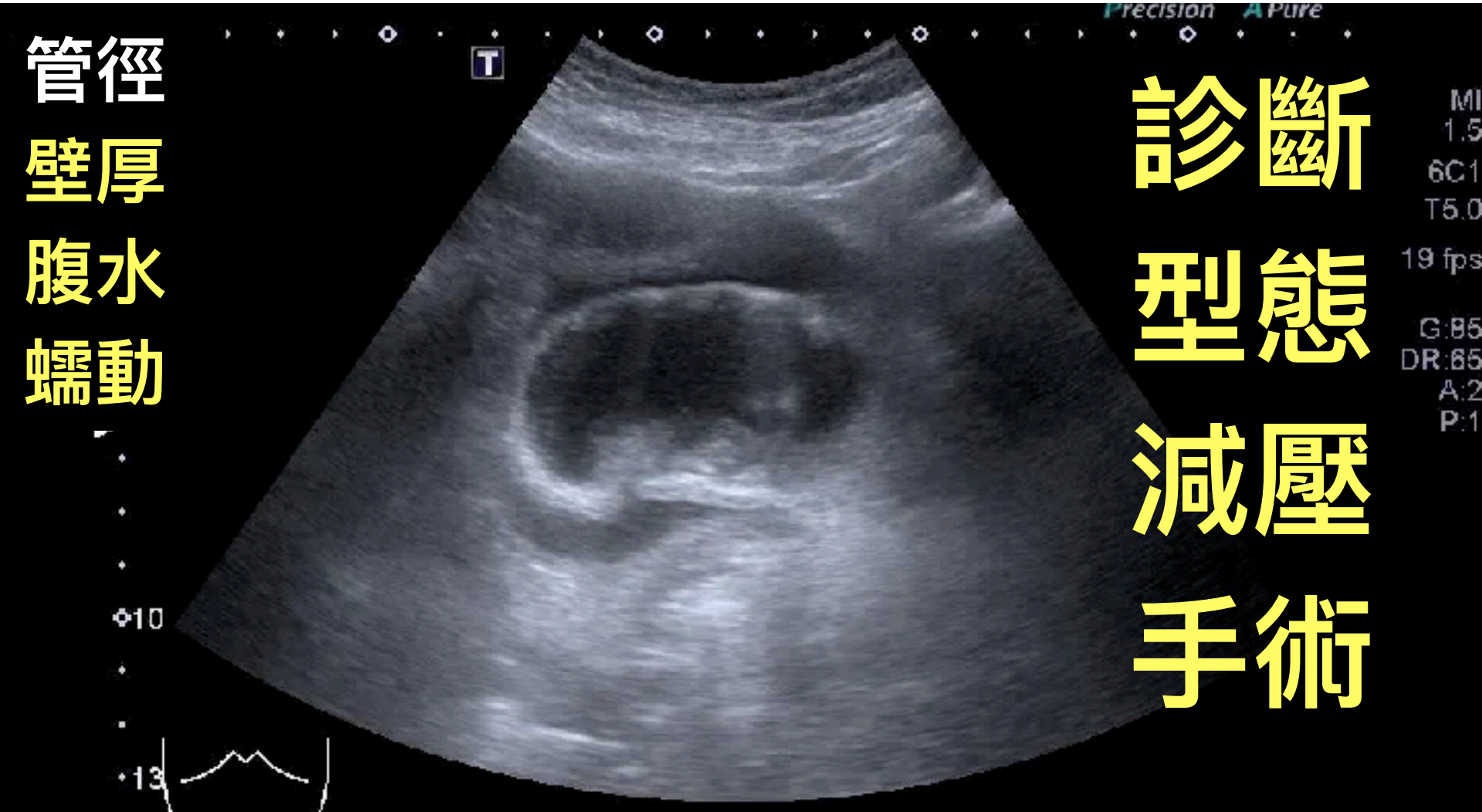
SBO







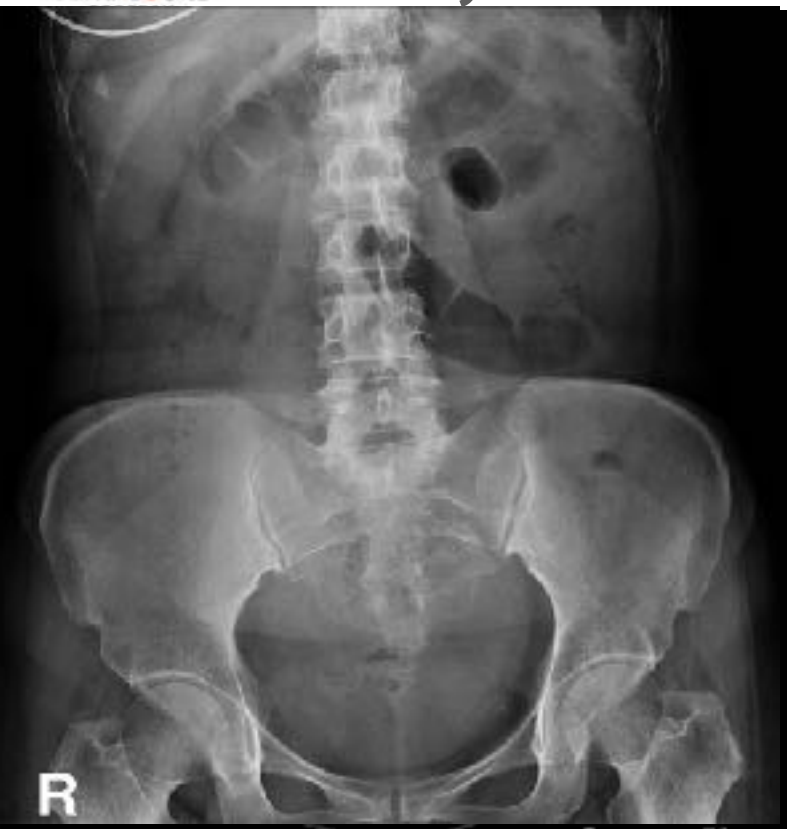
超音波在SBO時的好處

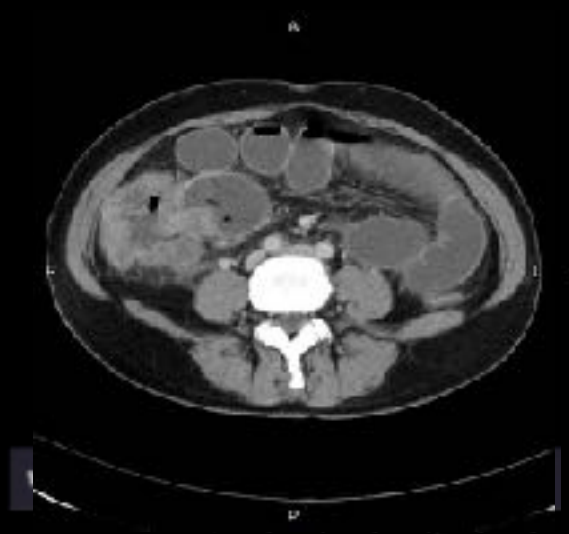


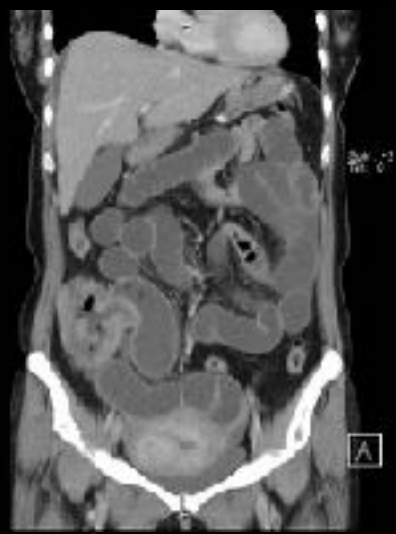
ULTRASOUND

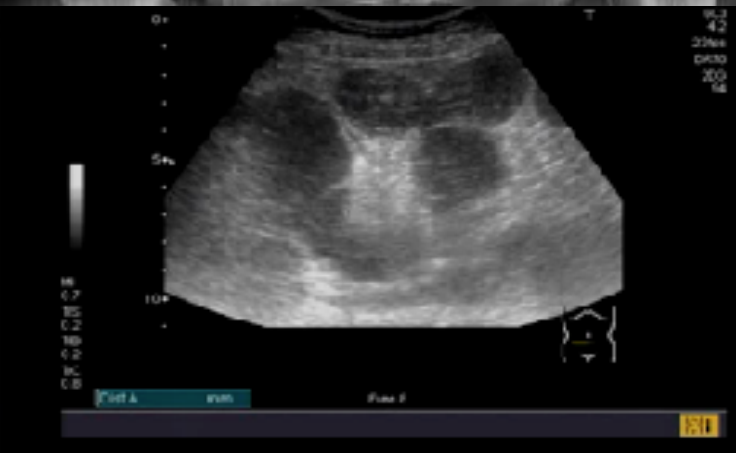
51F, abdominal pain & vomiting

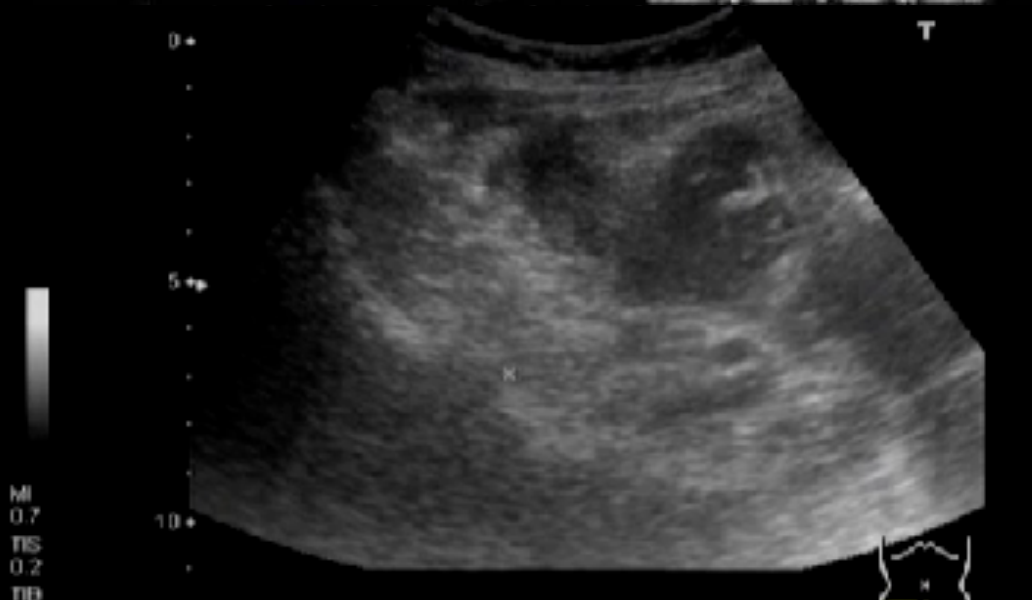
Cecal cancer



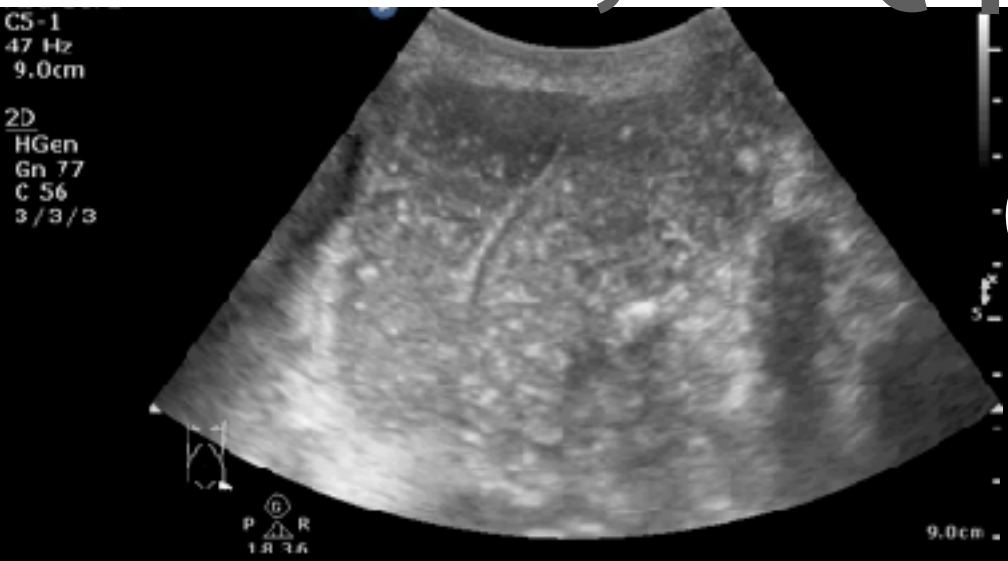


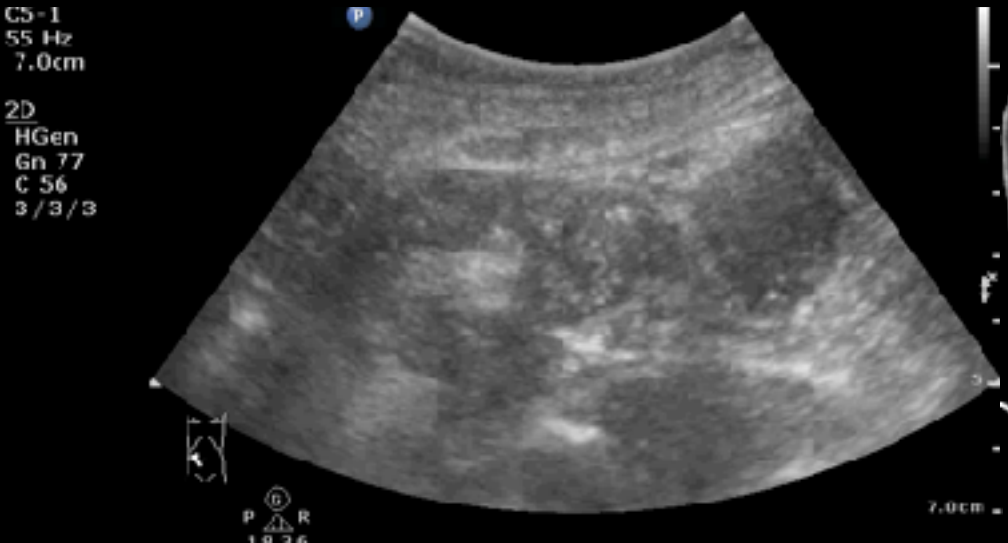




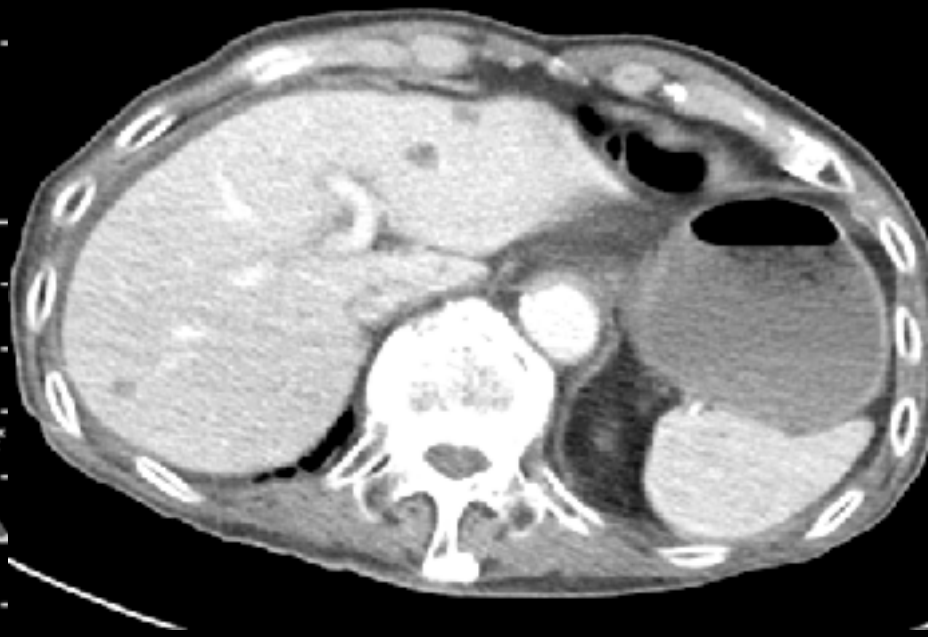


90M, RLQ pain * 2days





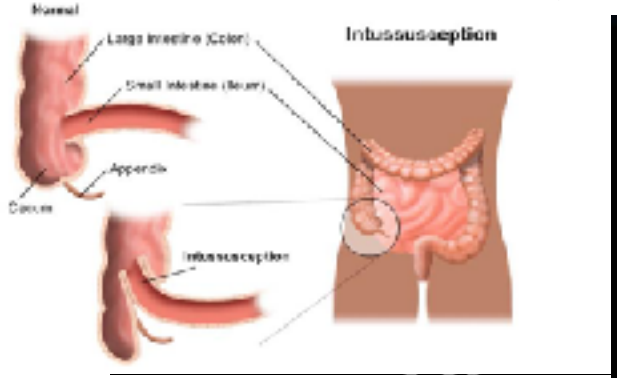
Cecal cancer (BAM)

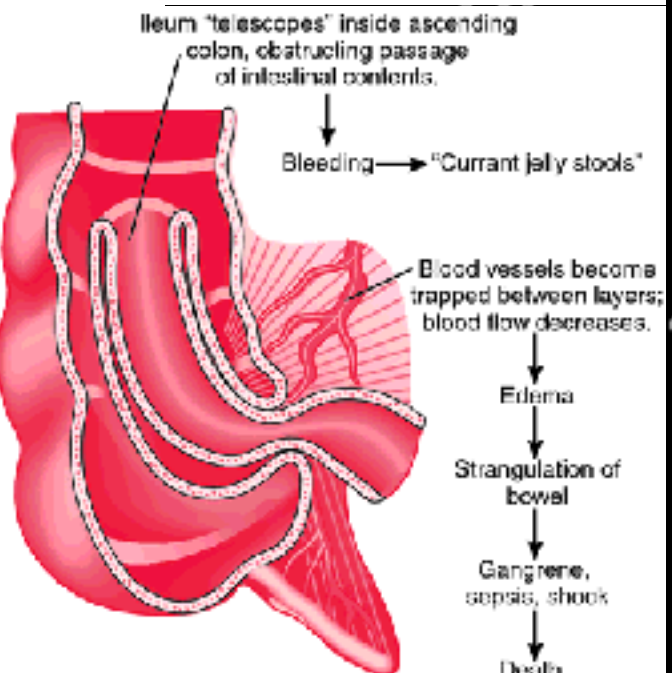


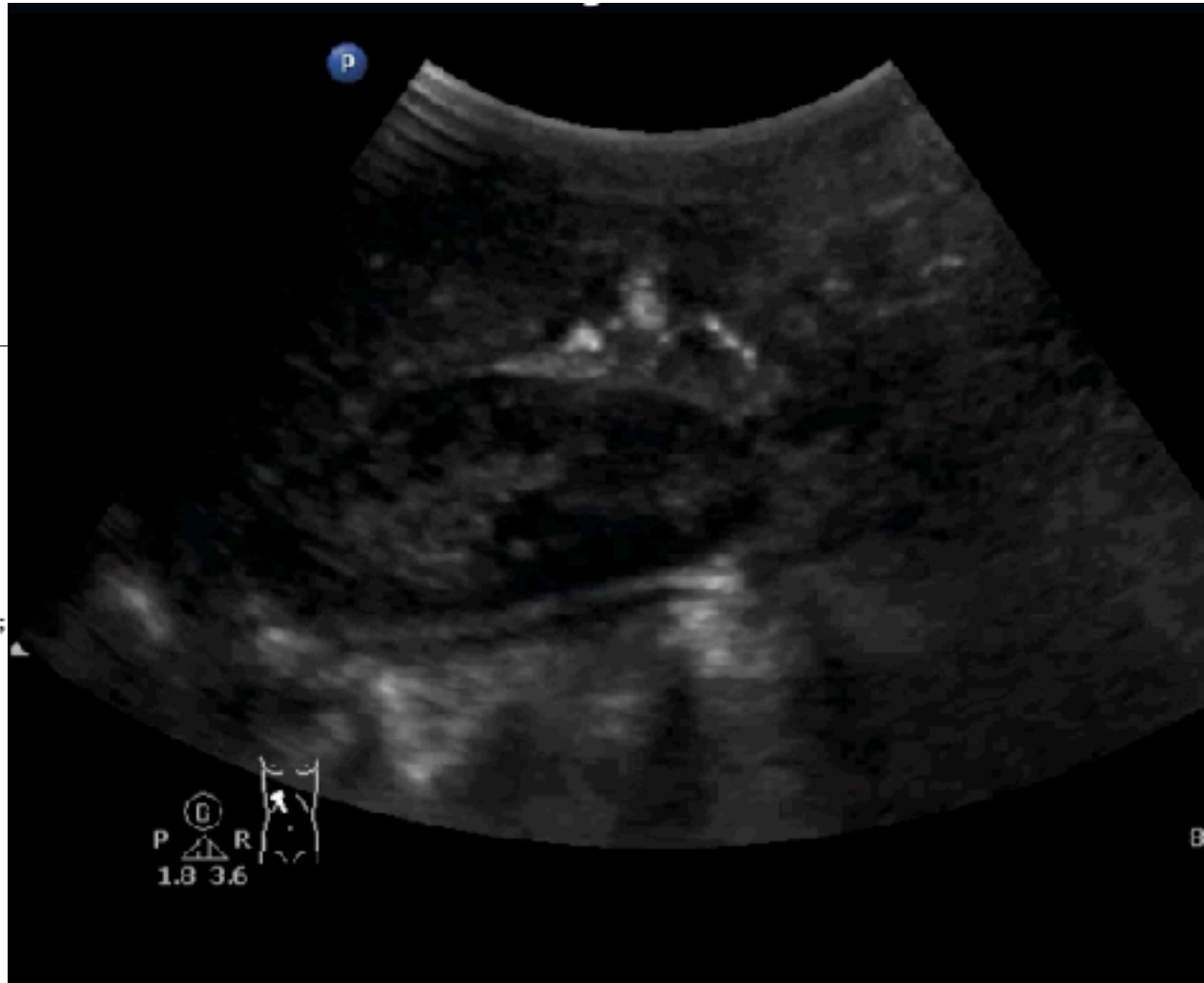
ULTRASOUND PROGRAM

Intussusception

小孩優先找右上腹



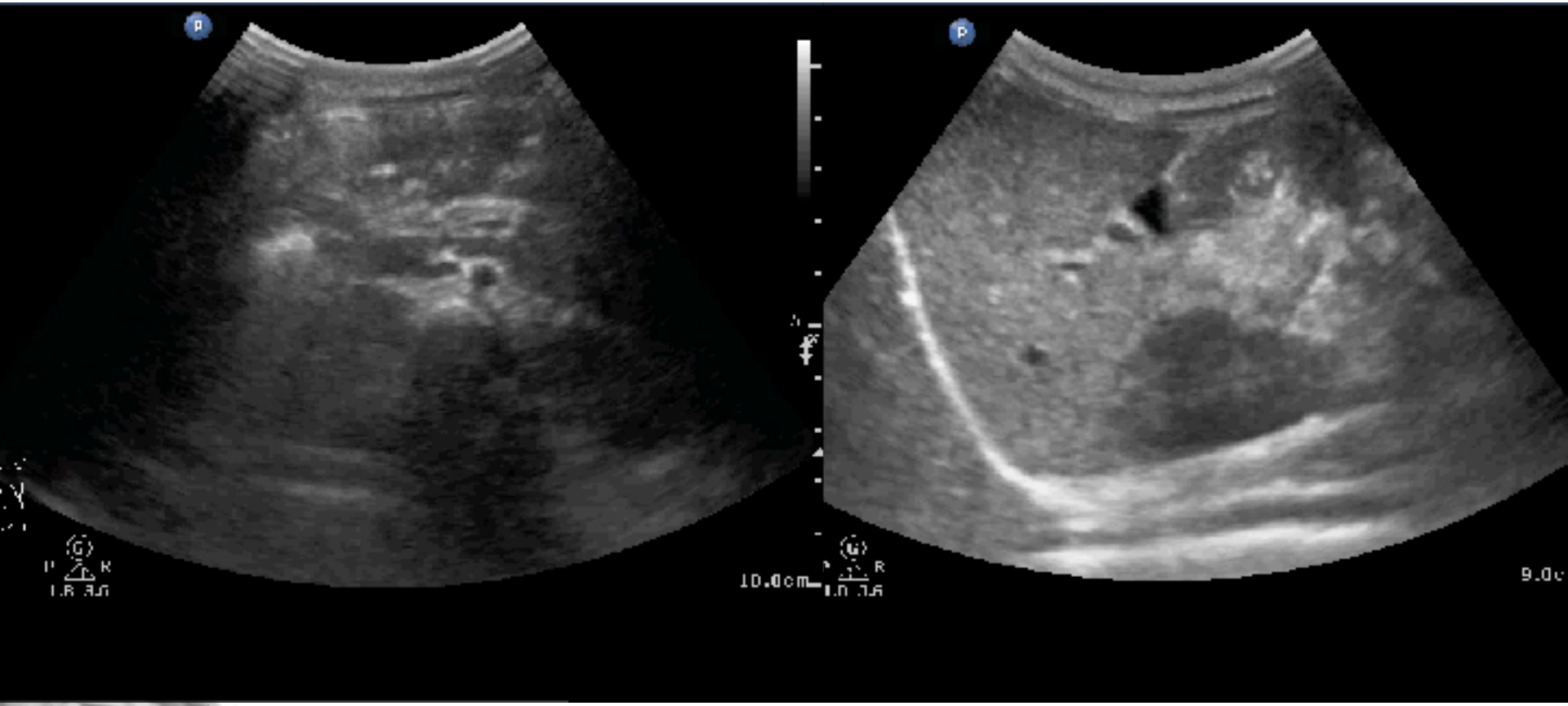




ULTRASOUND
PROGRAM

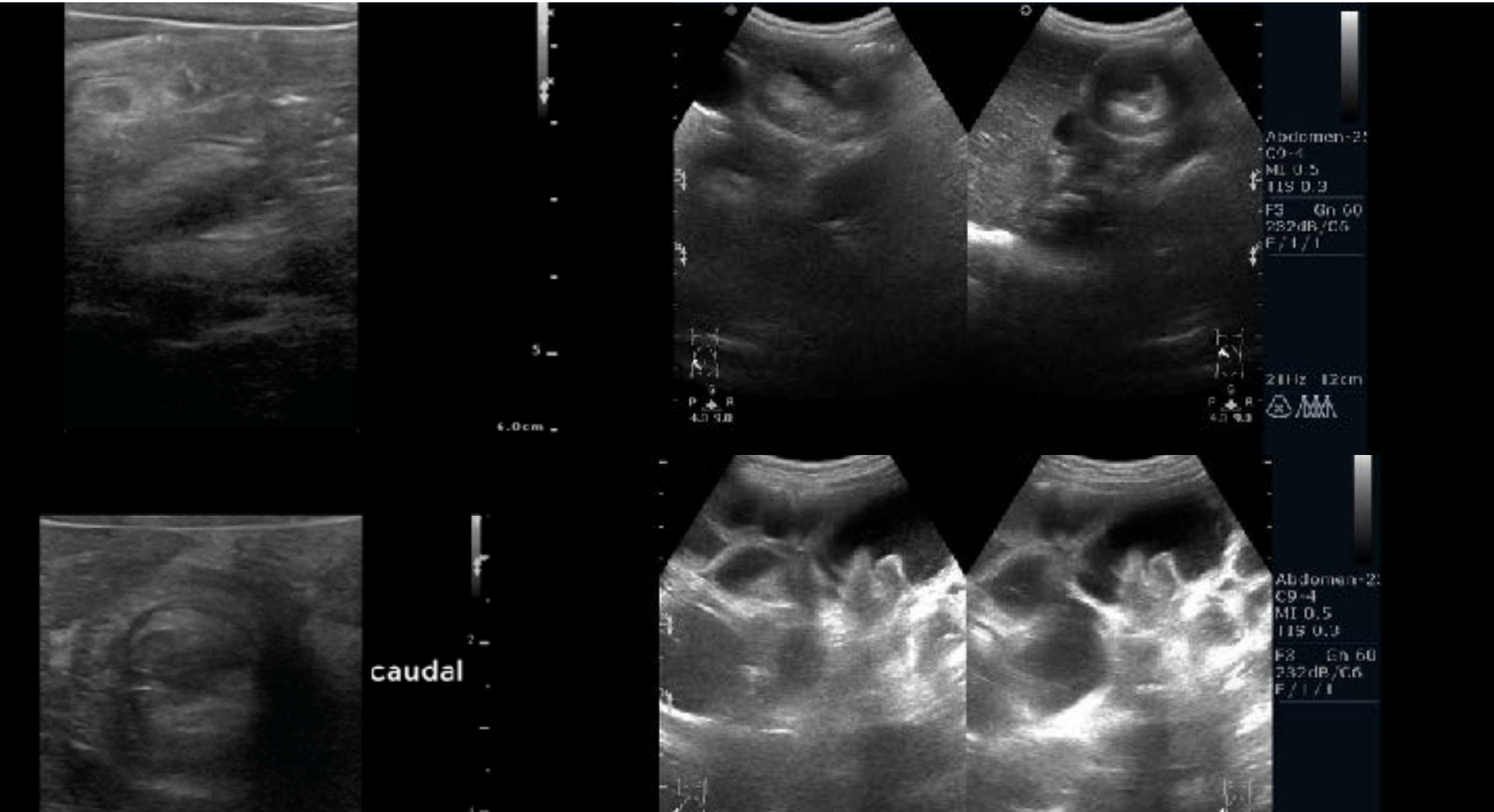
7個月大男童，間歇性溢奶

間歇性或周期性都要小心



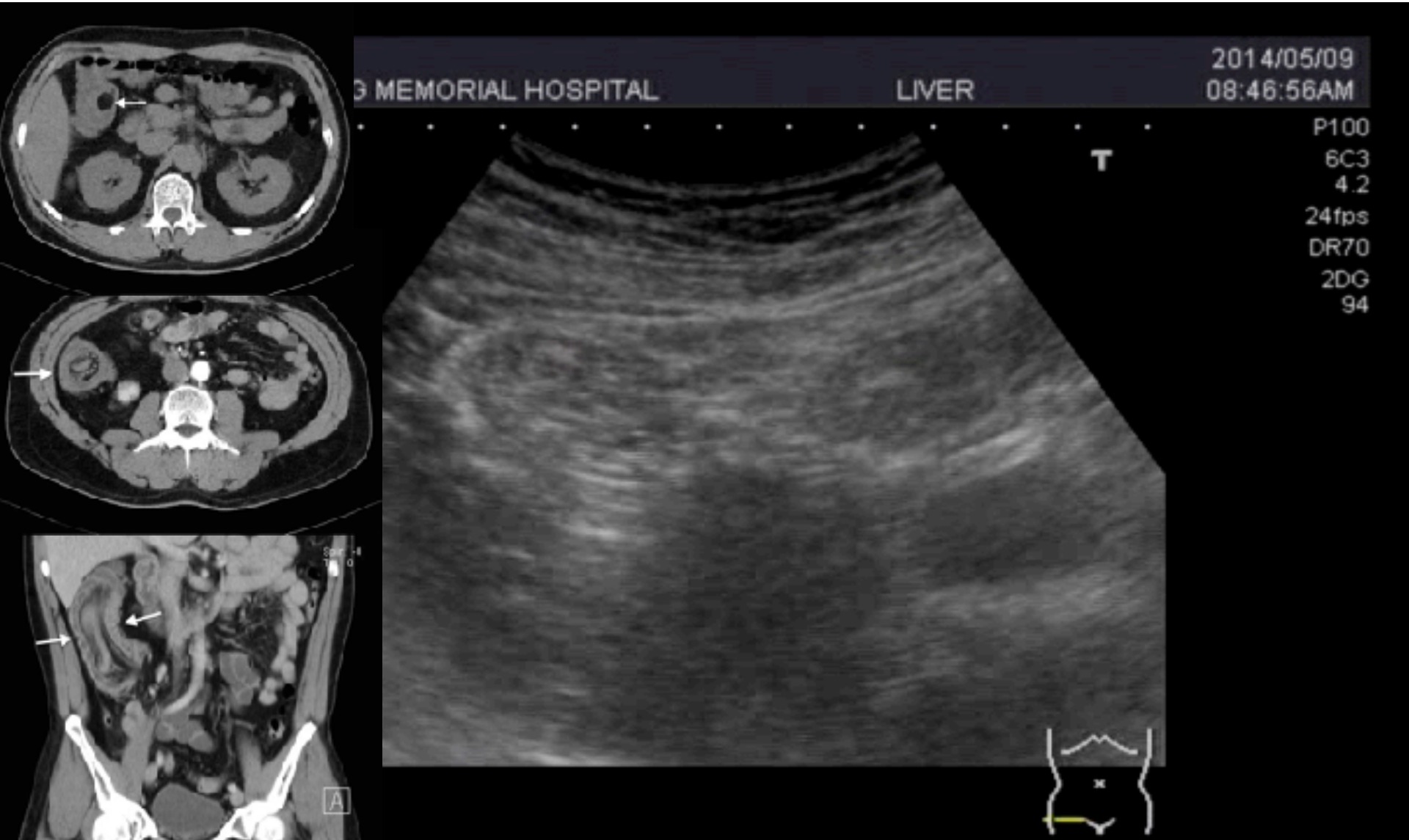
ULTRASOUND
PROGRAM

Leading point
Guide reduction



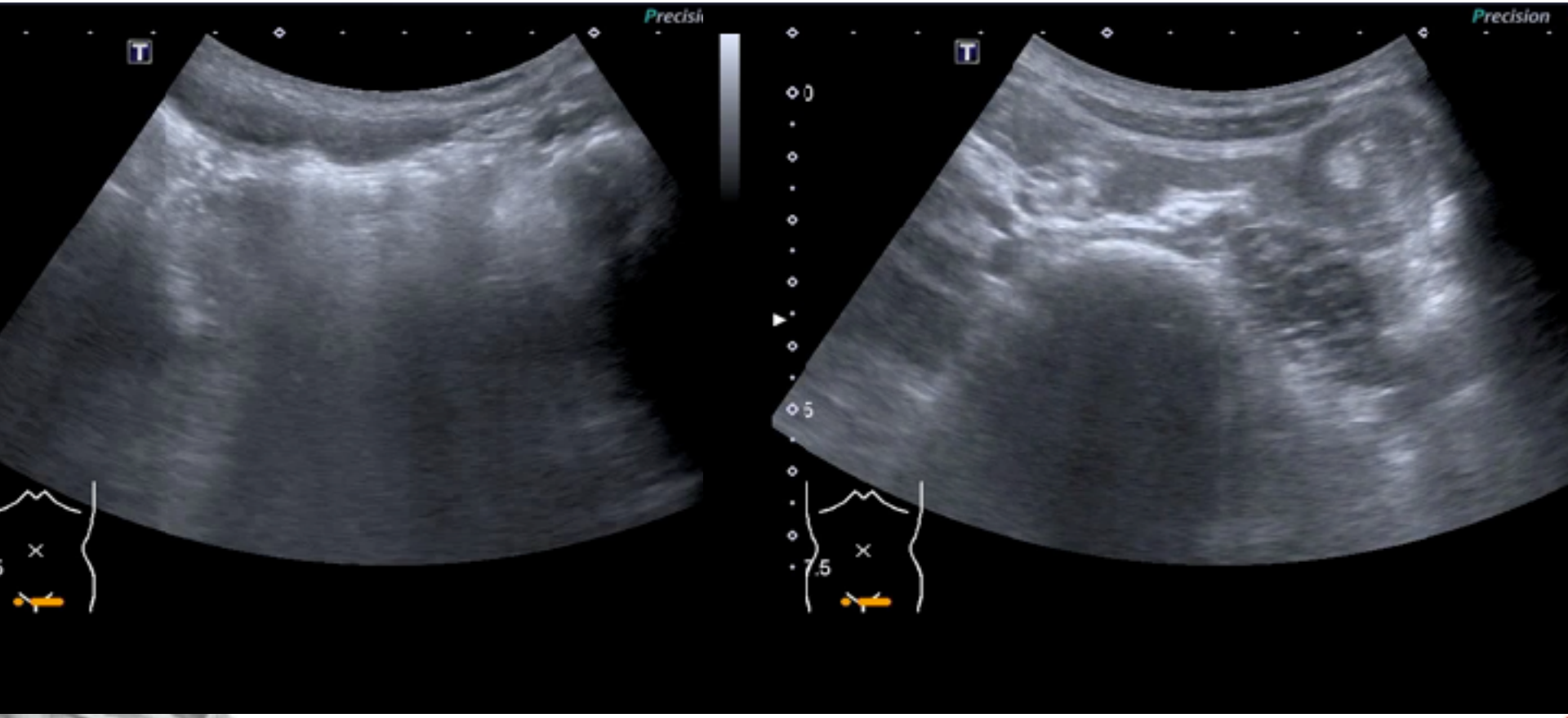
ULTRASOUND
PROGRAM

51M, ABD pain and tarry stool



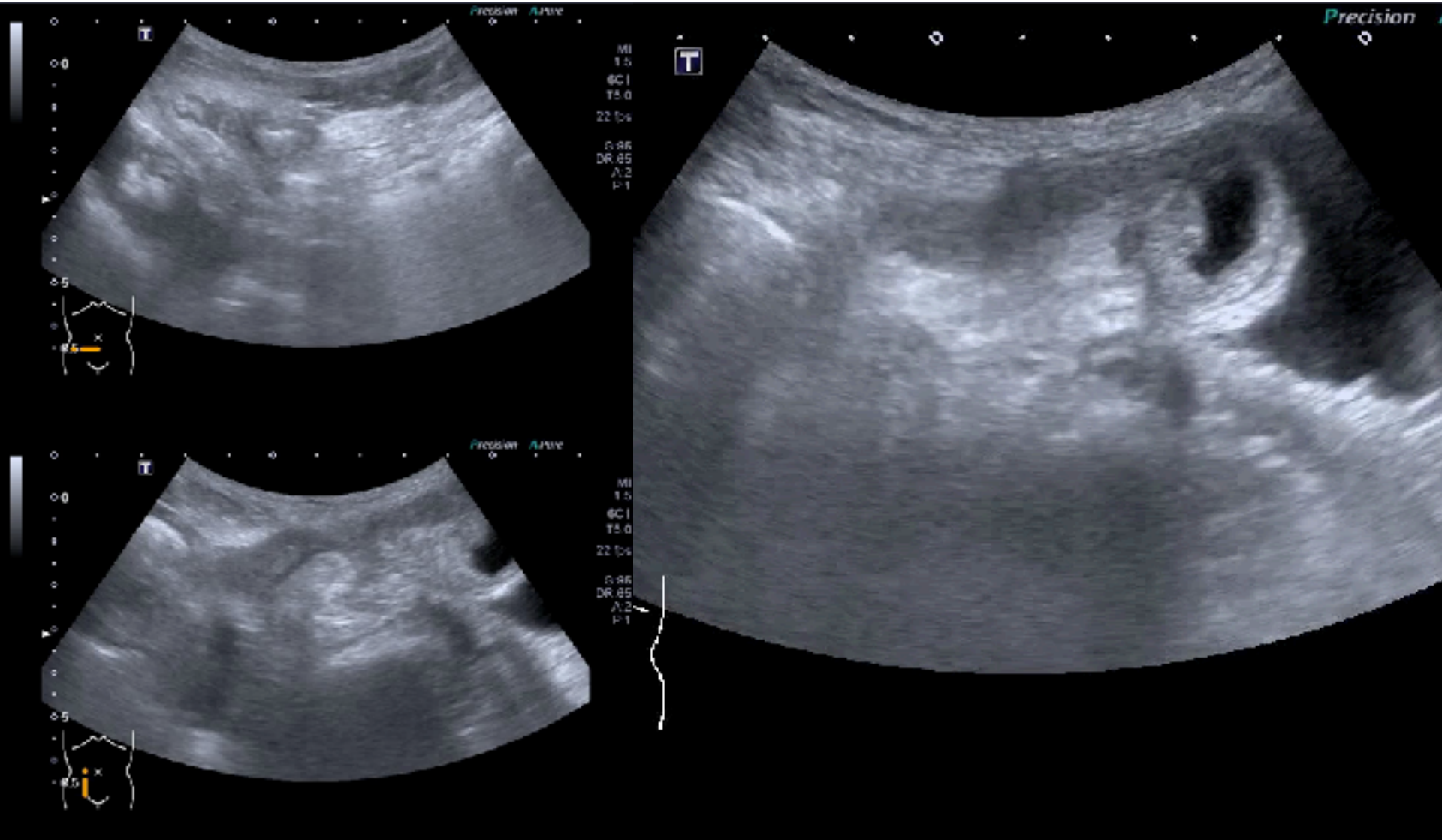
7F，腹痛，一天未解便

Spontaneous reduction



66M, right inguinal painful swelling

診斷 & 協助擬定復位路徑



Thieme

EFSUMB Position Paper: Recommendations for Gastrointestinal Ultrasound (GIUS) in Acute Appendicitis and Diverticulitis

EFSUMB-Positionspapier: Empfehlungen für den gastrointestinalen Ultraschall (GIUS) bei akuter Appendizitis und Divertikulitis

Prevalence of appendicitis in Western country: 7-8%
Useful technique: **Graded Compression**

3 major goals of US

1. **Exclusion of alternative disease**
2. **Confirmation of typical appendicitis**
3. **Ruling out by providing a normal appendix**

Thieme

EFSUMB Position Paper: Recommendations for Gastrointestinal Ultrasound (GIUS) in Acute Appendicitis and Diverticulitis

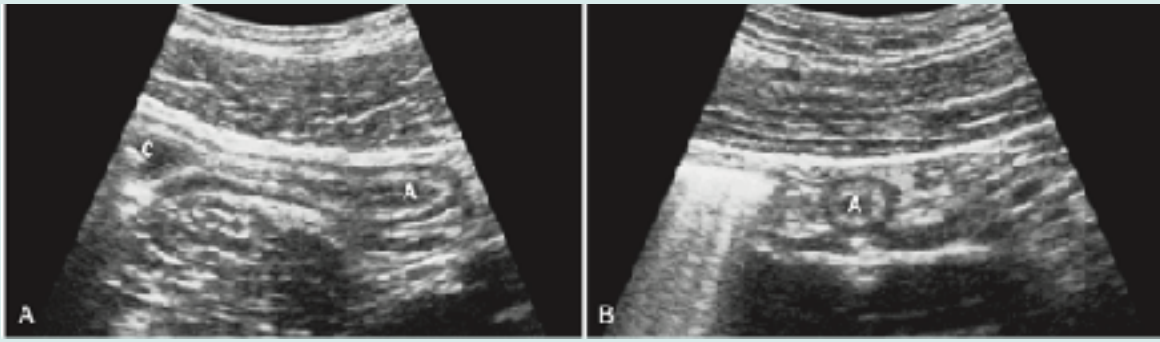
EFSUMB-Positionspapier: Empfehlungen für den gastrointestinalen Ultraschall (GIUS) bei akuter Appendizitis und Divertikulitis

3 most important criteria in the conformation of acute appendicitis

1. Max. diameter of appendix > 6 mm
2. Maximal pain over the appendix
3. Hyperechoic periappendiceal tissue

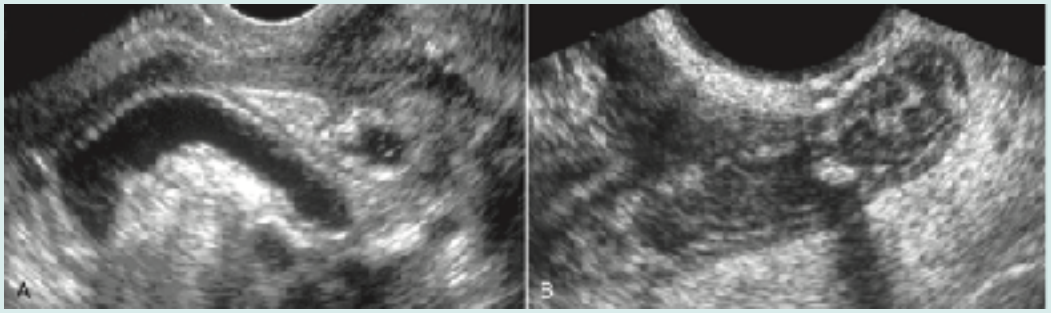
Acute Appendicitis: Sonographic Diagnosis

IDENTIFY APPENDIX



Blind ended
Noncompressible
Aperistaltic tube
Gut signature
Arising from base of cecum (typically appendix is caudal to the base of the cecum but it may also be retrocecal and retroileal)
Diameter greater than 6 mm (some use 7 mm for greater specificity)

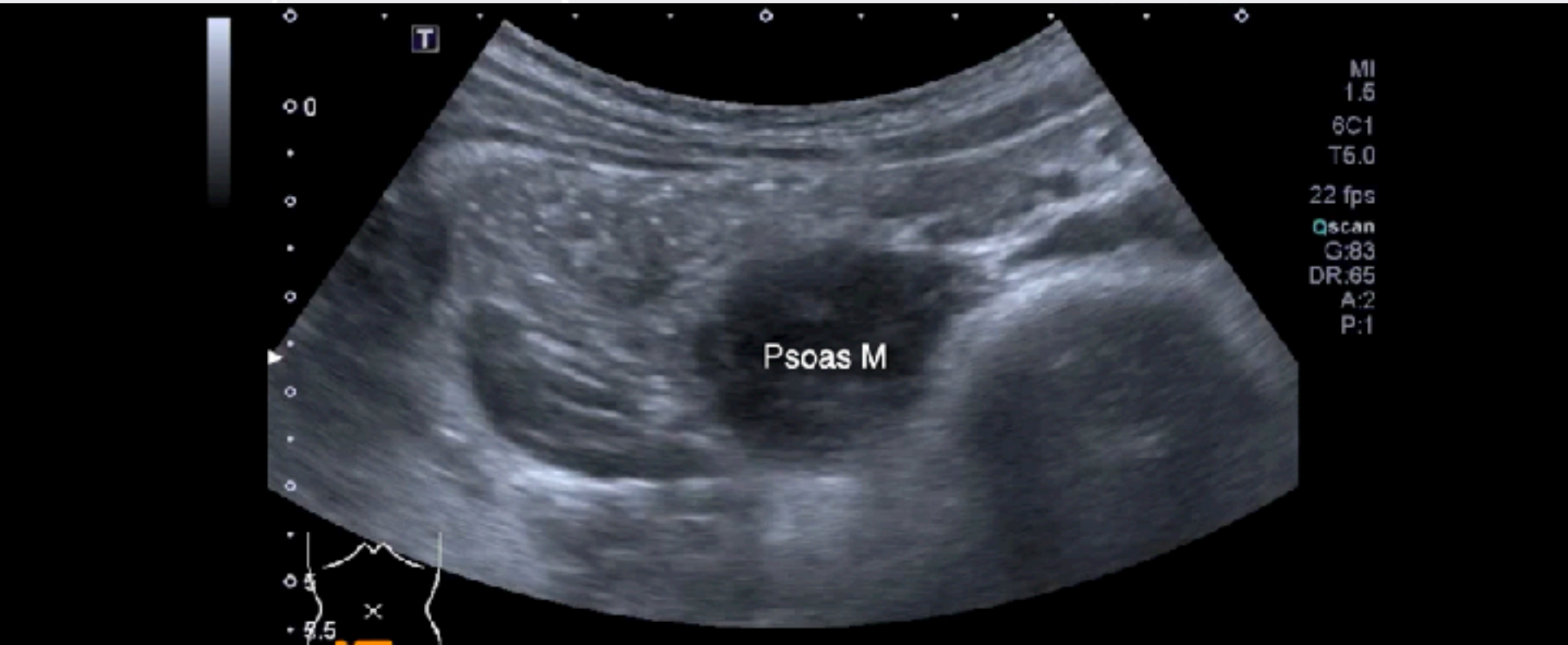
SUPPORTIVE FEATURES



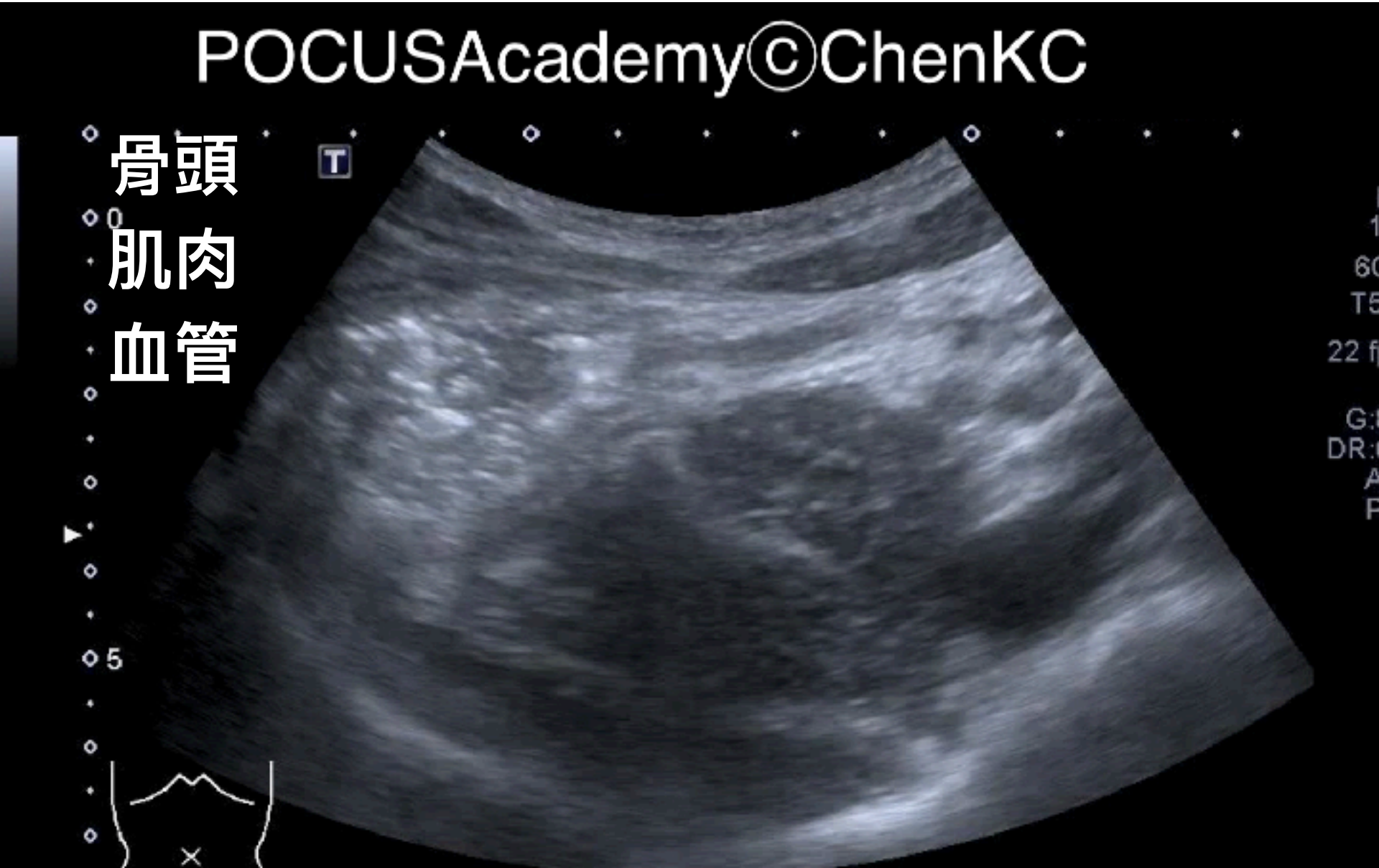
Inflamed perienteric fat
Pericecal collections
Appendicolith

► **Table 1** Based on clinical assessment, laboratory results, and possibly scoring results, three scenarios are common in the daily routine.

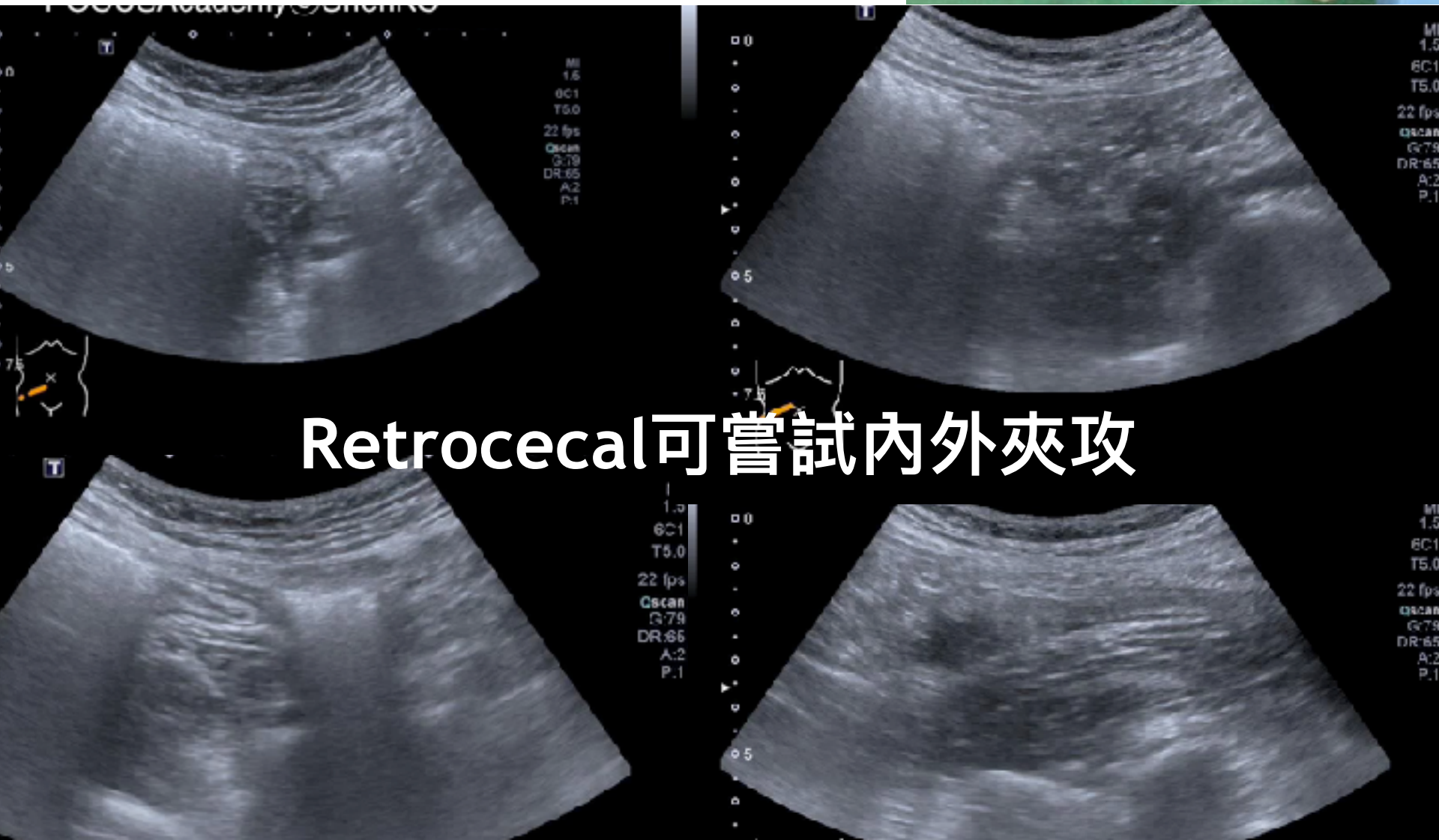
risk of appendicitis	Alvarado or AIR points	impact of sonography
low	0 – 4	visualization of the normal appendix in its full length definitively rules out appendicitis
		complete ultrasound is helpful in finding an alternative diagnosis
intermediate	5 – 8	validation of an inflamed appendix confirms the need for surgery
		if the diagnosis remains unclear, complementary CT, MRI or serial ultrasound performed by an experienced operator may be helpful
high	> 8	confirmation of acute appendicitis
		diagnosis of complications, e.g. abscess



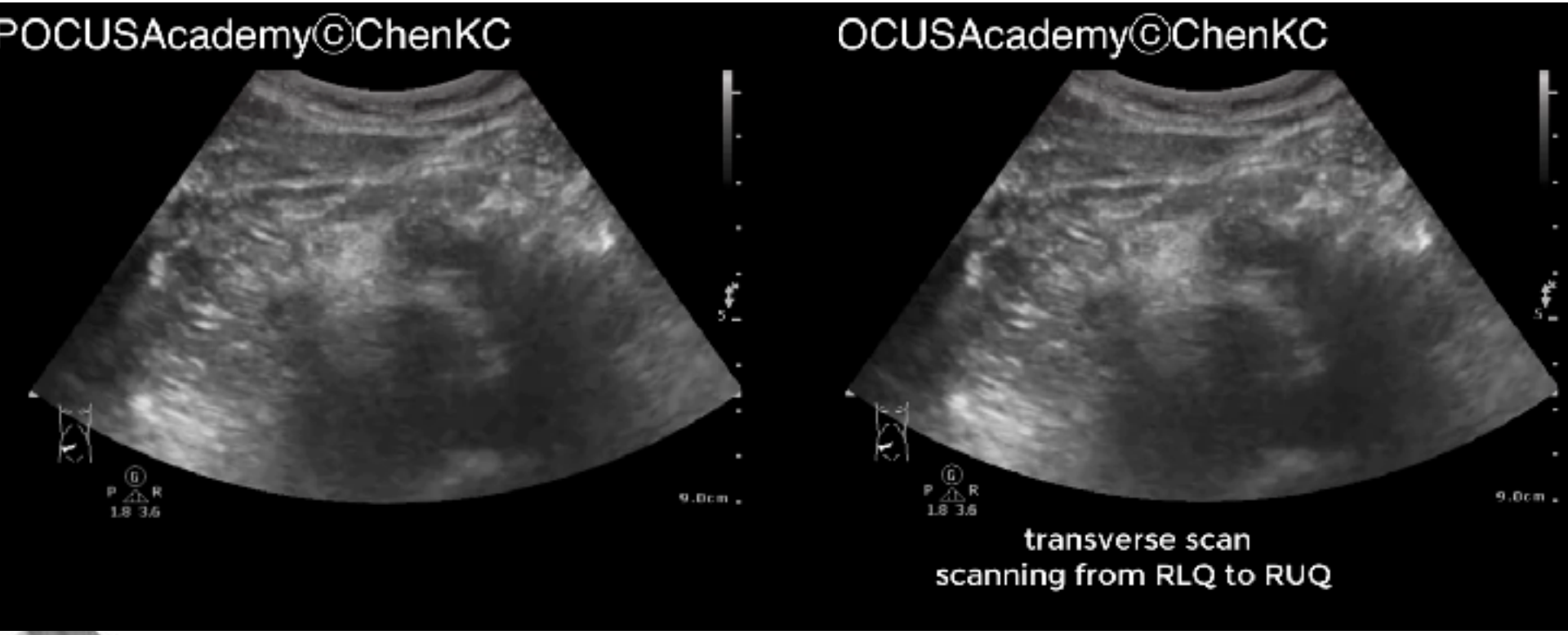
Landmarks first



46M，上腹痛４小時，上腹和右下腹壓痛



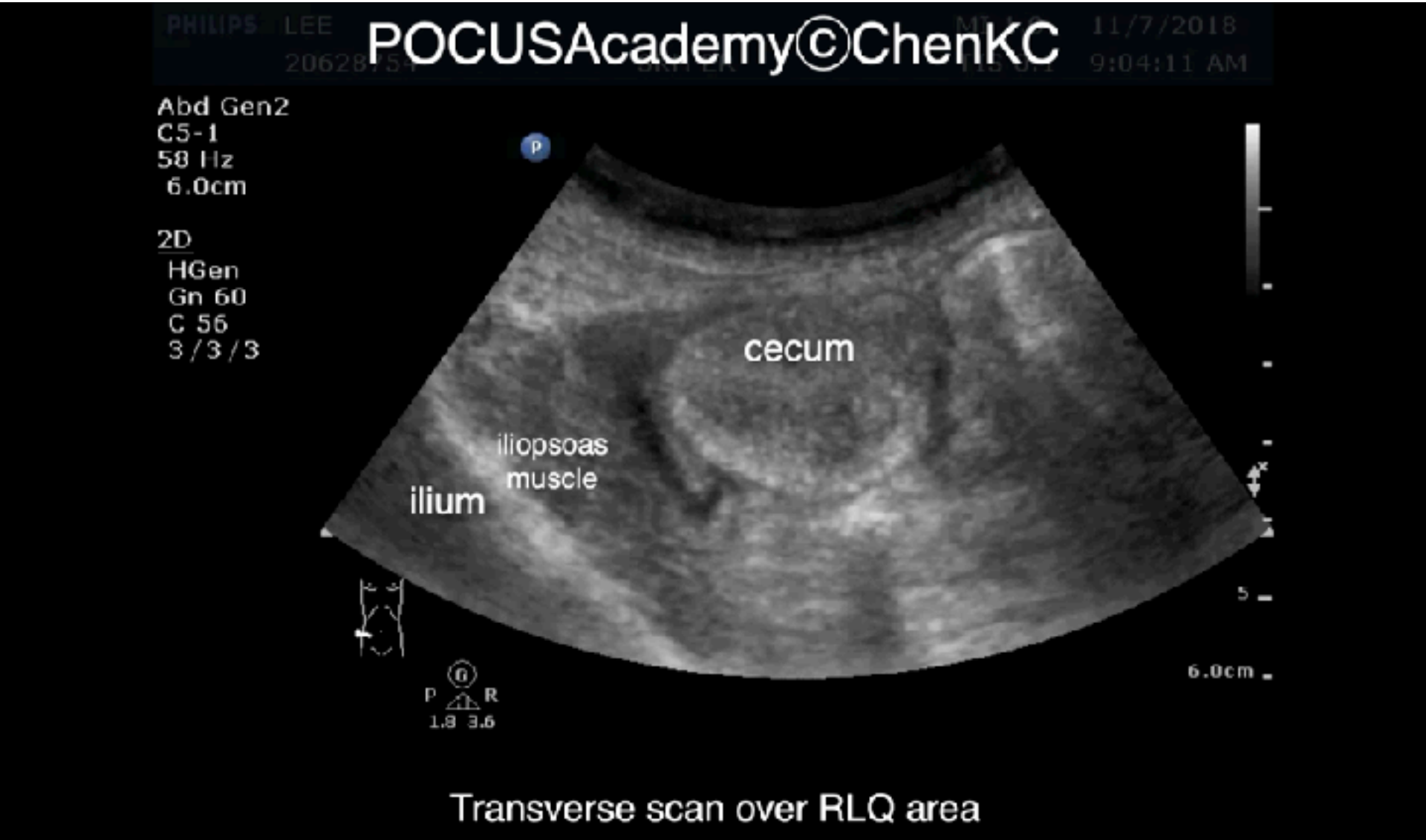
Retrocecal appendicitis



Retrocecal可嘗試內外夾攻

這個Appendix會轉彎

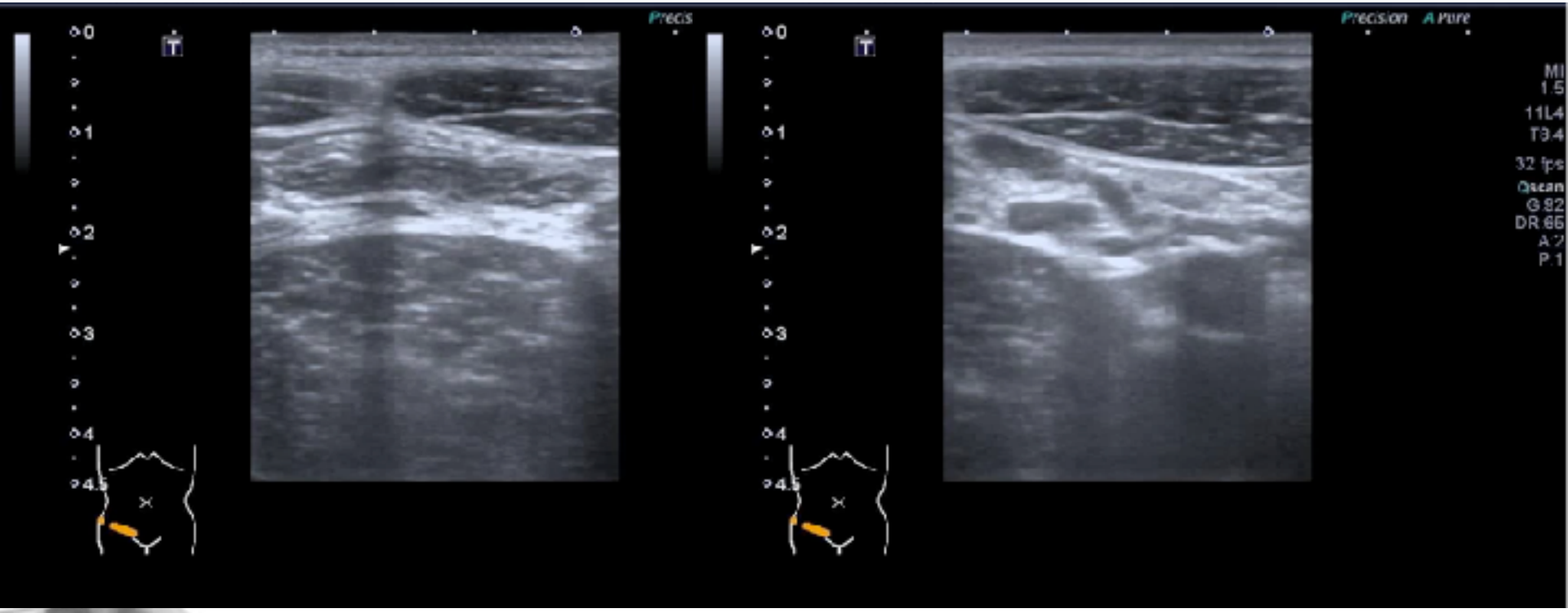
CT怎麼看，探頭就怎麼動，最後才花式



ULTRASOUND PROGRAM

15M，RLQ tenderness

Mesenteric adenitis

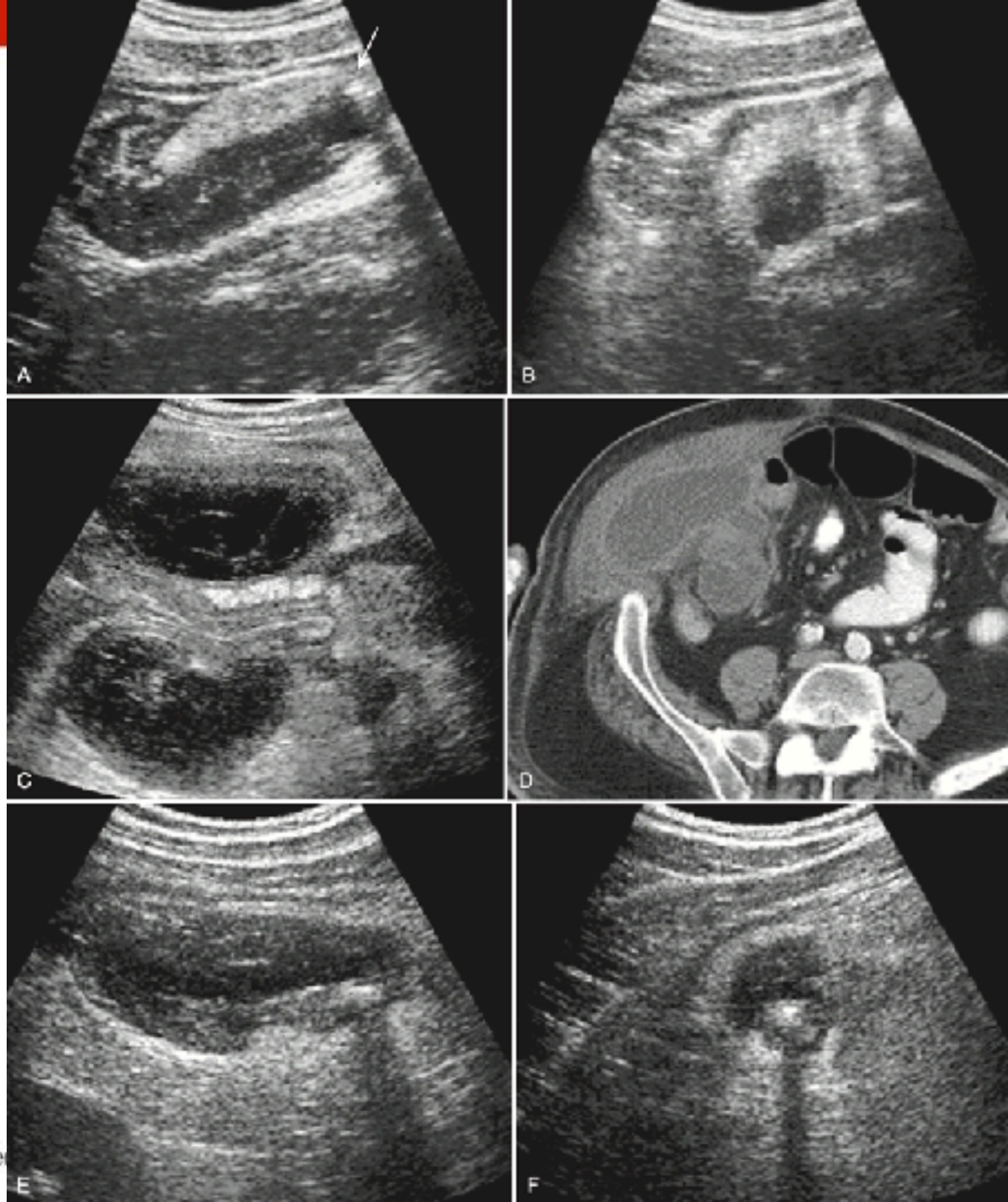


經驗：正常闌尾的直徑約鄰近小腸的1/2-1/3

ULTRASOUND
PROGRAM

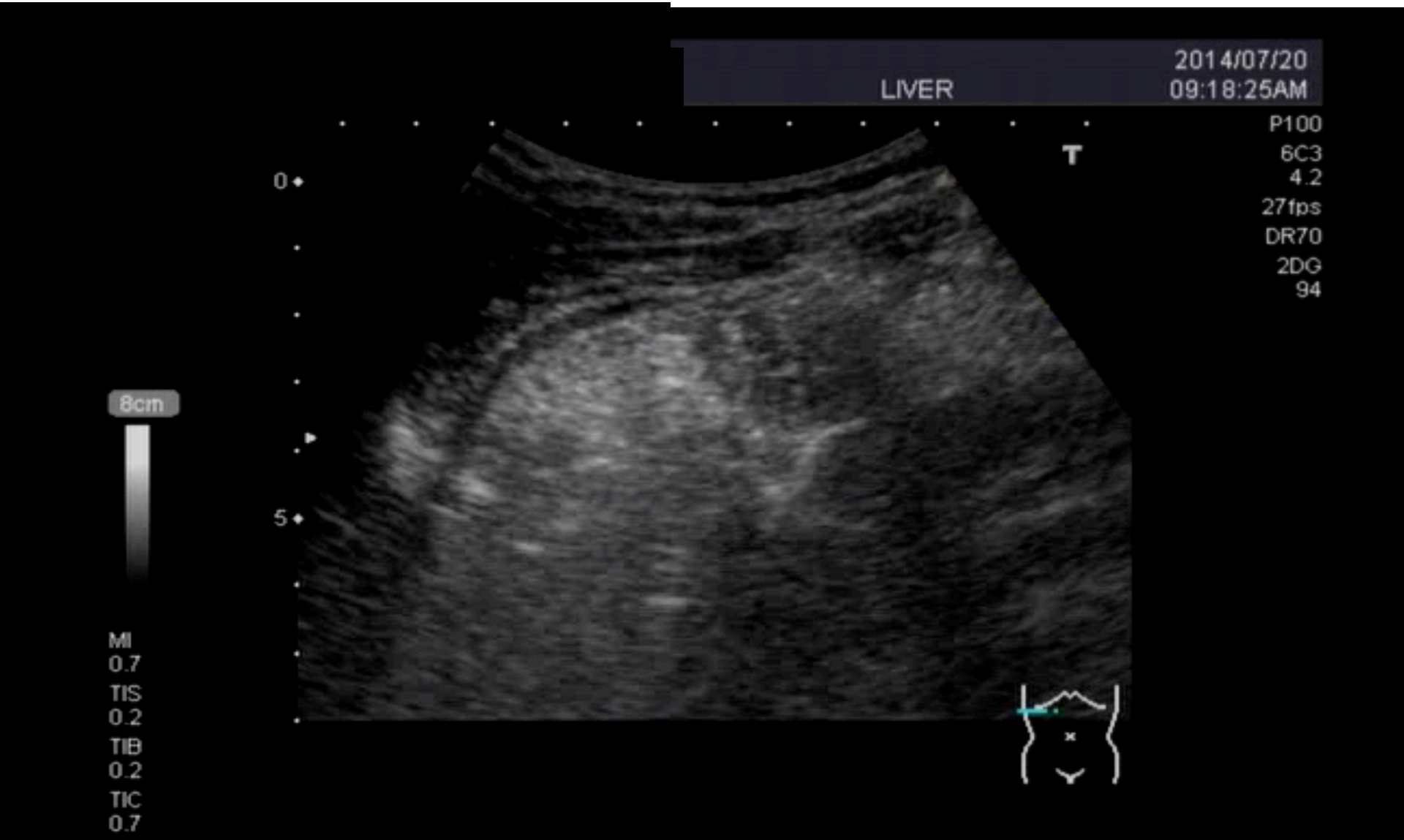
破裂的闌尾

局部的水/膿
發炎脂肪更明顯
腸壁分層消失



ULTRASOUND
PROGRAM

25M, RLQ pain for 4 days

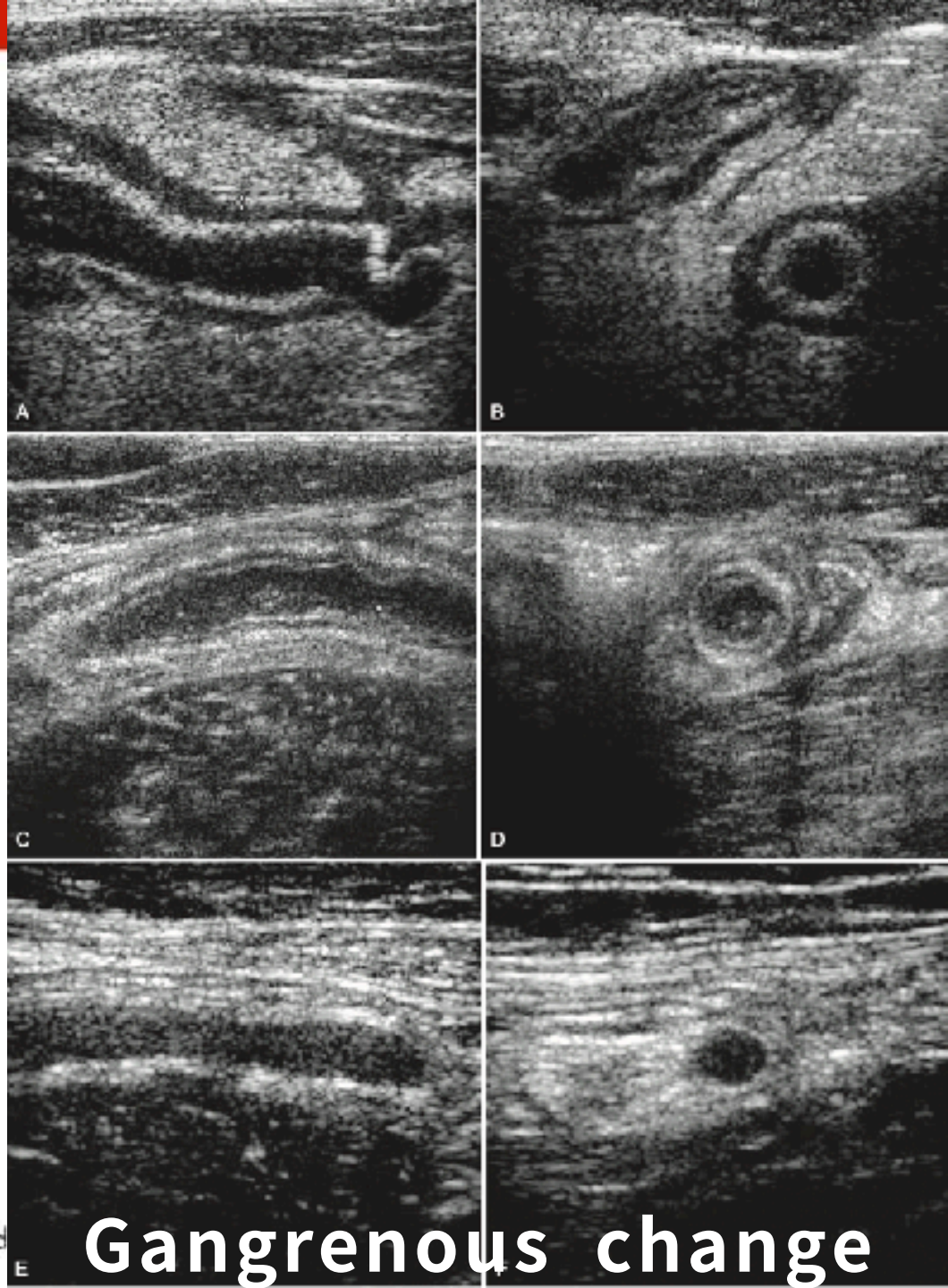


ULTRASOUND
PROGRAM

Acute Appendicitis

直接証據
間接間據

Rupture
Retrocecal
Pelvic
Pregnant
Normal



Thieme

EFSUMB Position Paper: Recommendations for Gastrointestinal Ultrasound (GIUS) in Acute Appendicitis and Diverticulitis

EFSUMB-Positionspapier: Empfehlungen für den gastrointestinalen Ultraschall (GIUS) bei akuter Appendizitis und Divertikulitis

Graded compression at the point of maximum tenderness pointed out by the patient

3 diagnostic criteria of acute diverticulitis

1. Short segmental colonic wall thickening (>5mm)
2. Demonstration of the inflamed diverticulum in the wall-thickened area (Dome sign)
3. Pericolic tissue changes (non-compressible, hyperechoic)

▶ **Table 2** Classification of Diverticular Disease (CDD) 2014.

type 0	asymptomatic diverticulosis
type 1	acute uncomplicated diverticulitis ▪ 1a: without phlegmonous reaction ▪ 1b: phlegmonous reaction (colon/surroundings)
type 2	acute complicated diverticulitis ▪ 2a Microabscess (< 1 cm) ▪ 2b Macroabscess ▪ 2c Free perforation
type 3	chronic diverticular disease
type 4	diverticular bleeding

At least 500 GIUS experience

▶ **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

Sonography of Diverticulitis

GUT

Segmental concentric thickening of wall
- Hypoechoic reflecting muscular hypertrophy

INFLAMED DIVERTICULA

Echogenic foci within or beyond gut wall

Intramural sinus tracts
- High-amplitude linear echoes within gut wall
- Acoustic shadowing or ring-down artifact

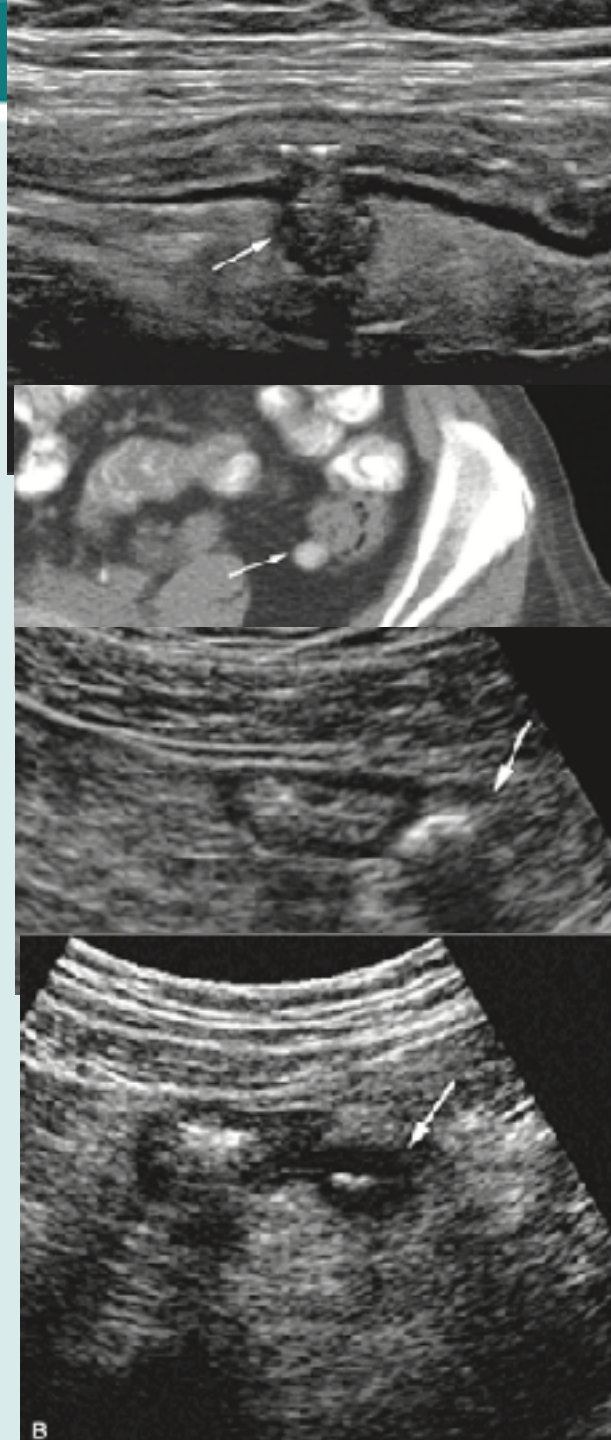
PERIENTERIC SOFT TISSUE

Inflammation of pericolonic fat
- Hyperechoic mass effect

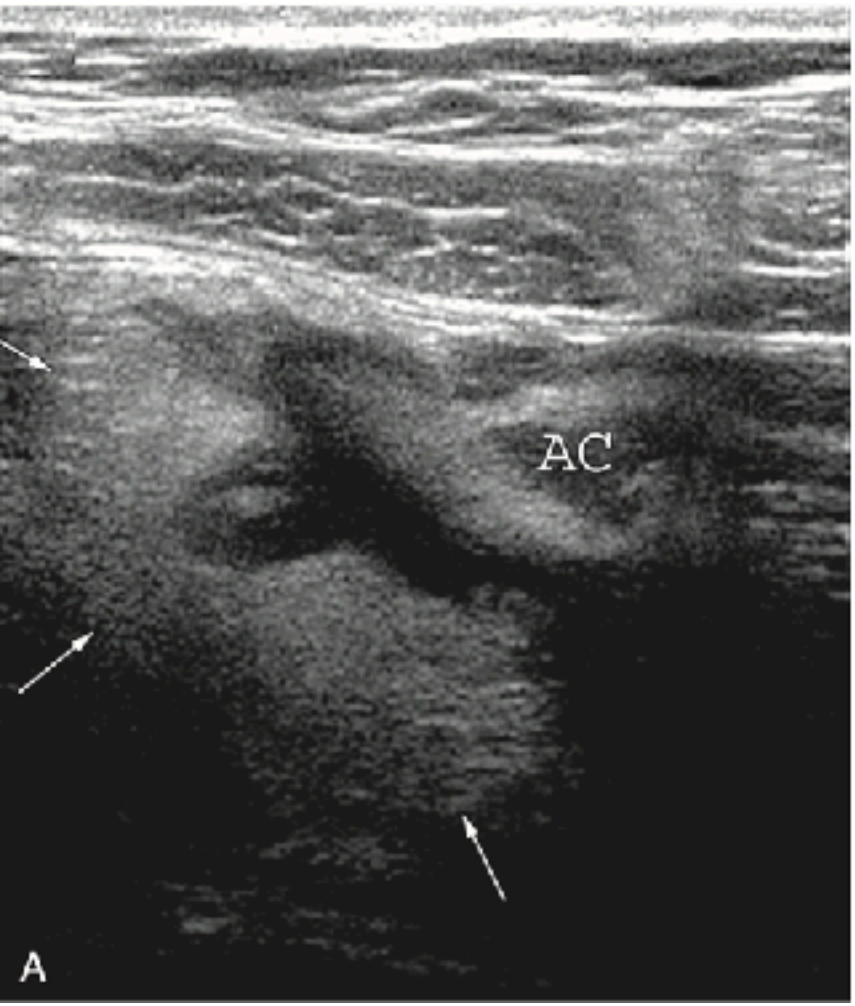
Thickening of the mesentery

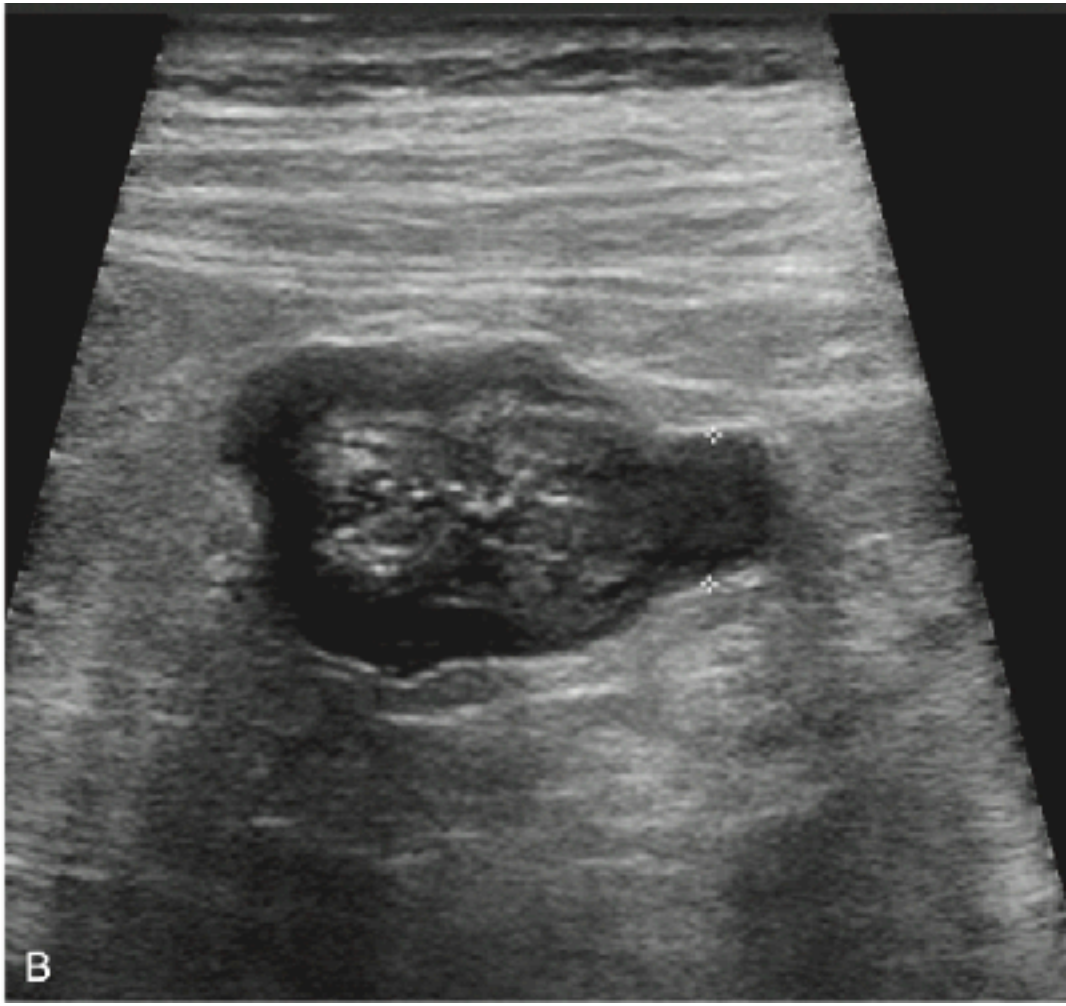
Abscess formation
- Loculated fluid collection
- Often with gas component

Fistulas
- Linear tracts from gut to bladder, vagina, or adjacent loops
- Hypoechoic or hyperechoic



Acute diverticulitis

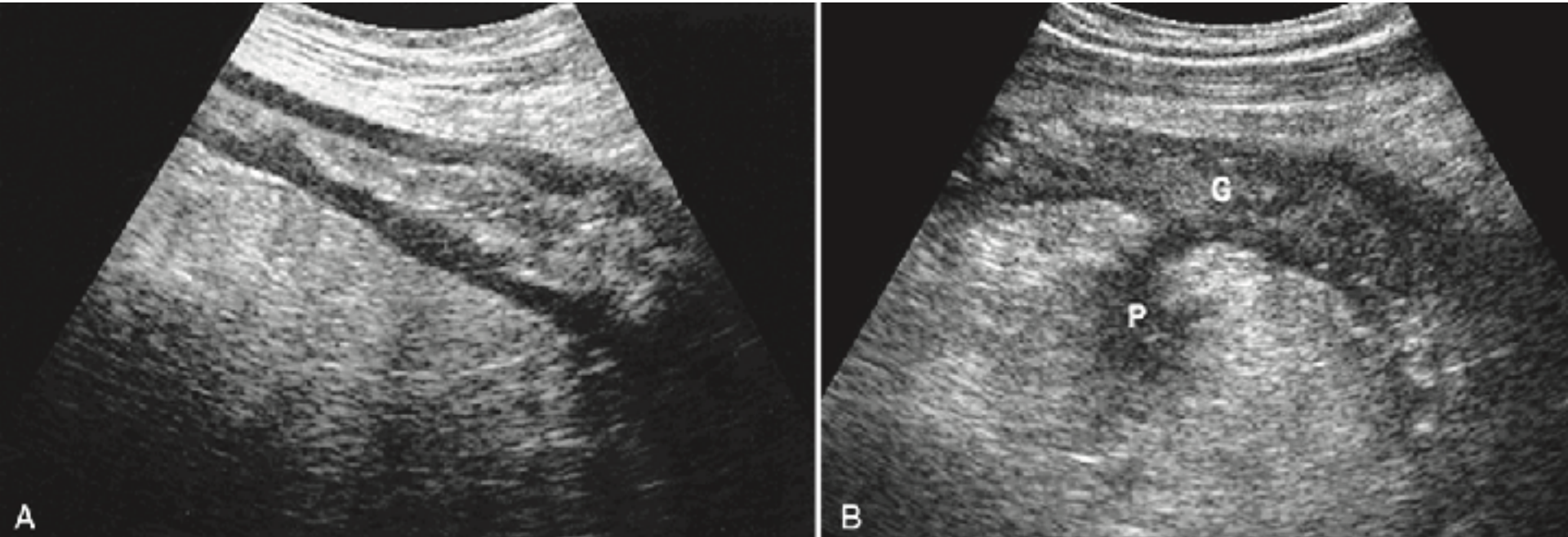




腸子 / Sac / 脂肪

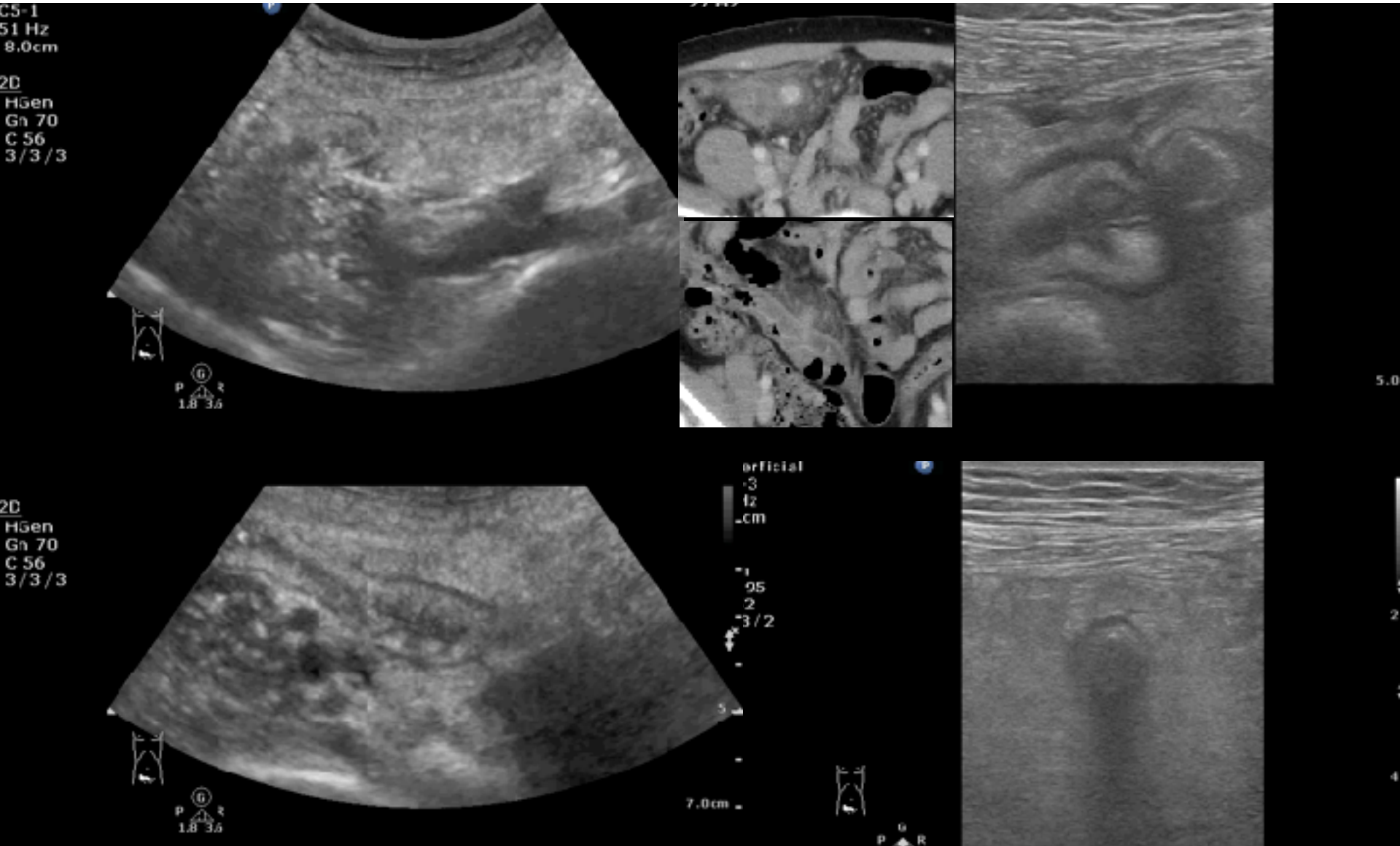
Acute diverticulitis

腸壁變厚
Dome sign
脂肪發炎（變亮）



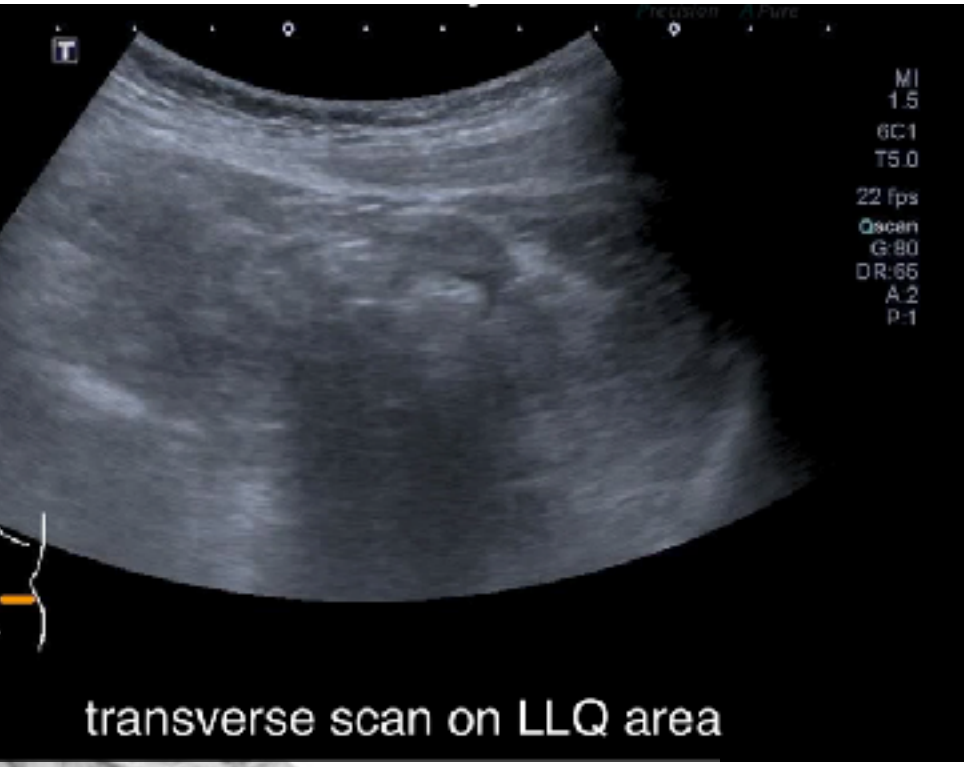
50F, RLQ pain & guarding

Terminal ileum diverticulitis



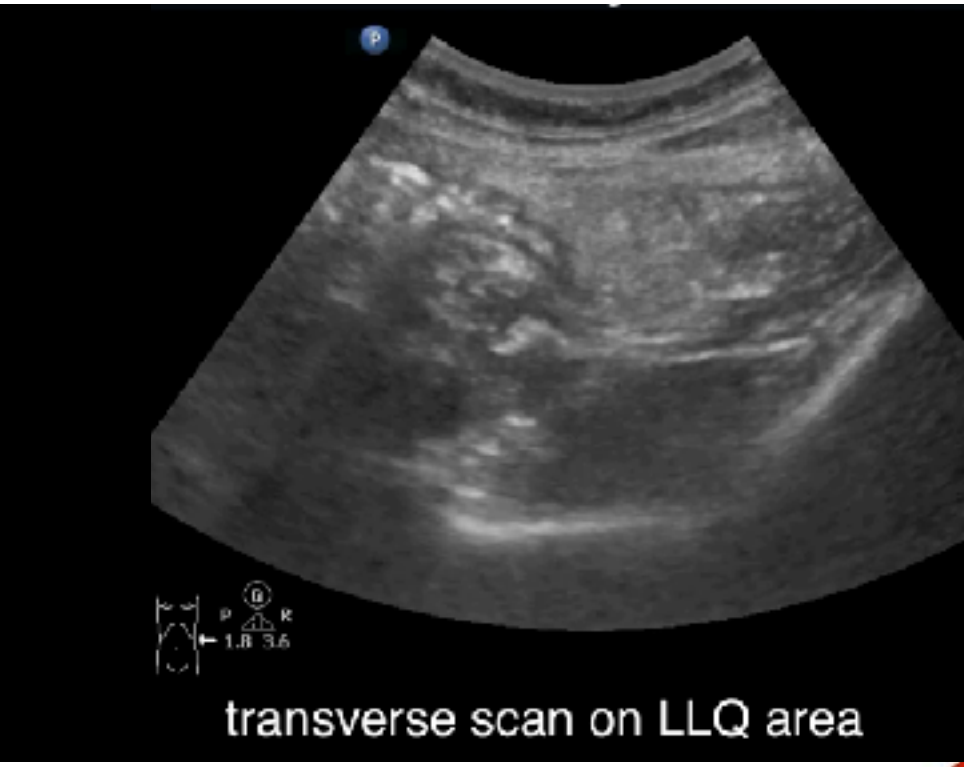
左下腹痛患者

Diverticulitis



transverse scan on LLQ area

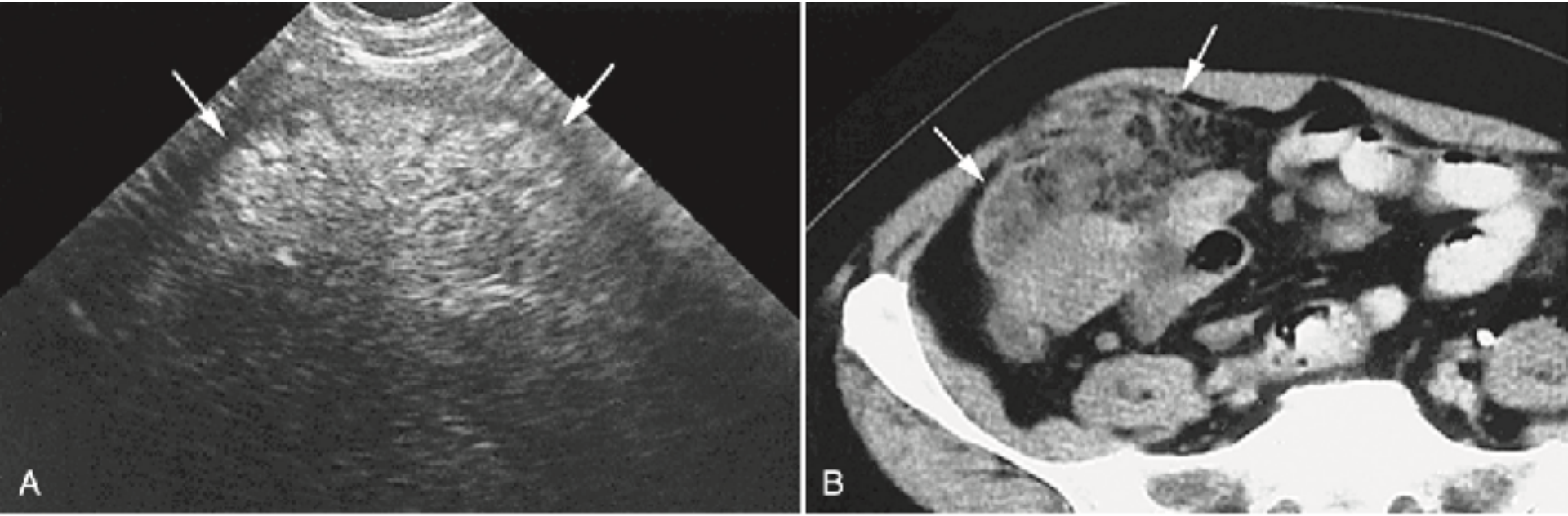
Epiploic appendagitis



transverse scan on LLQ area

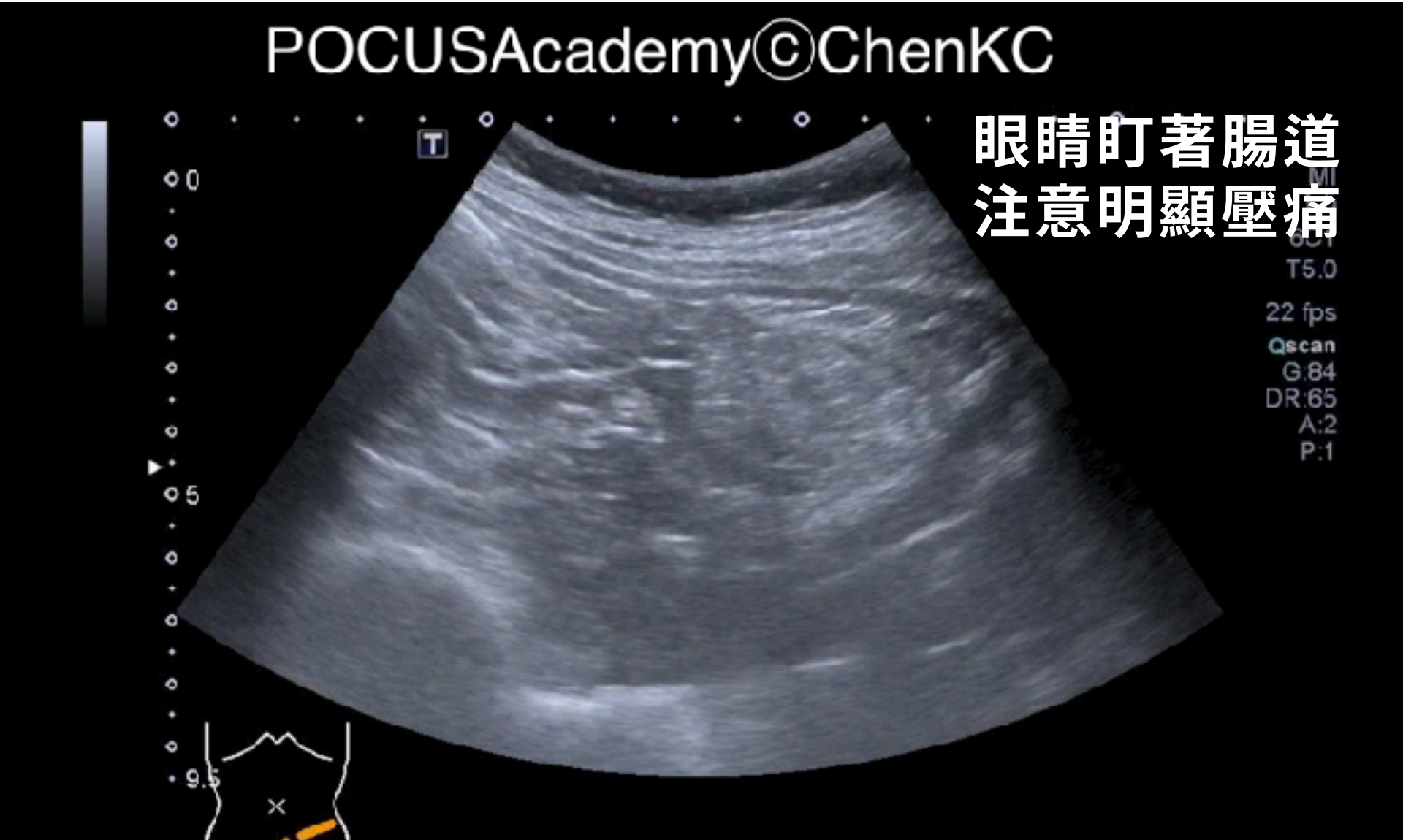
ULTRASOUND
PROGRAM

Omental infarction

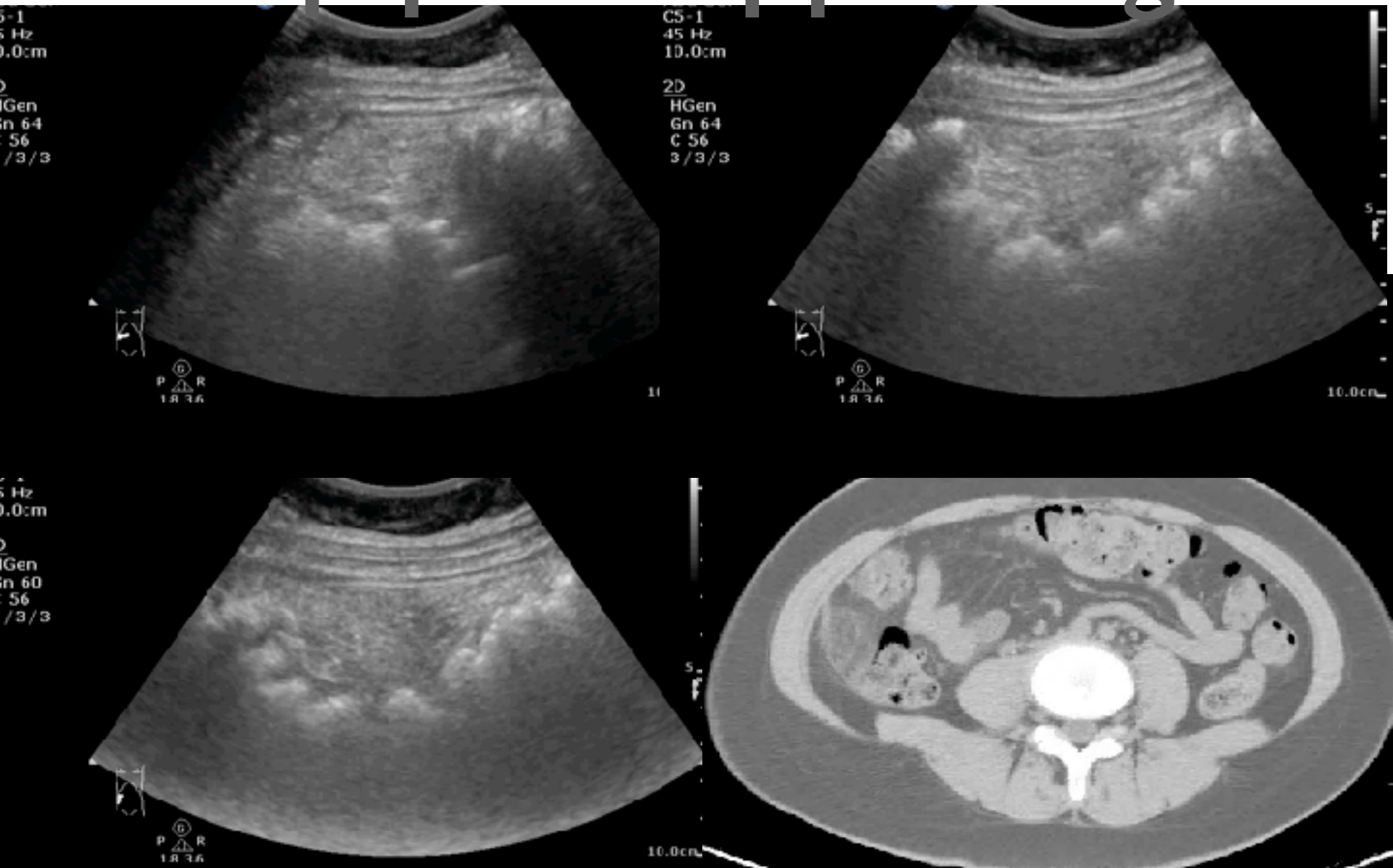


Echogenic fat
No gut abnormality

Epiploic appendagitis

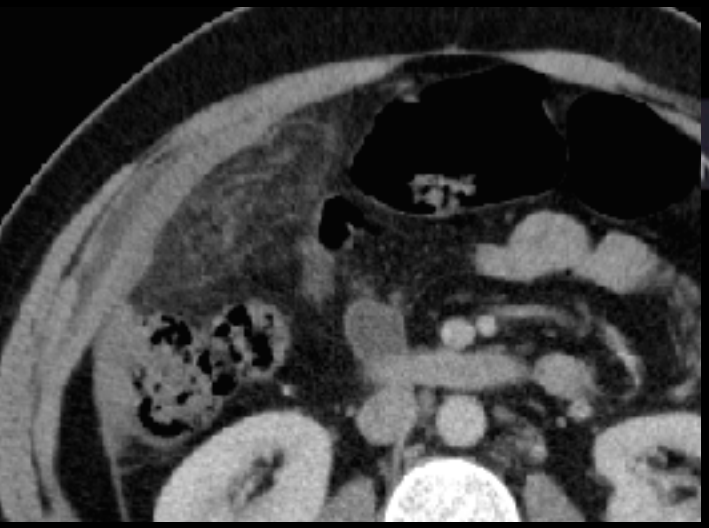


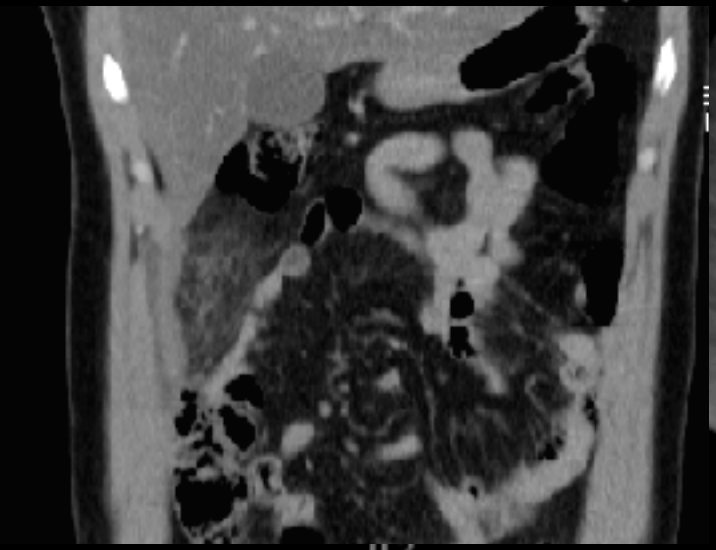
Epiploic appendagitis



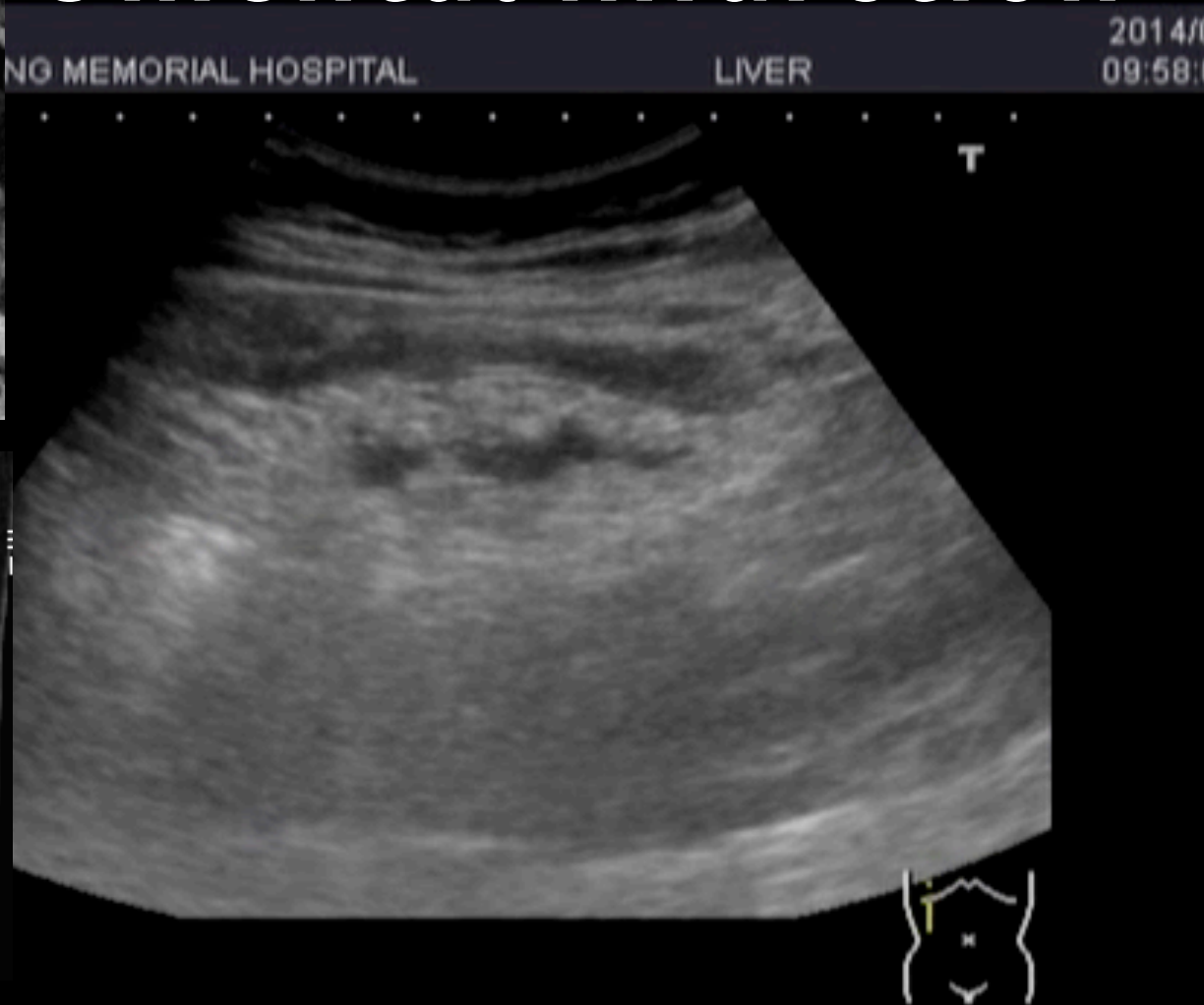
ULTRASOUND
PROGRAM

28M with RUQ pain

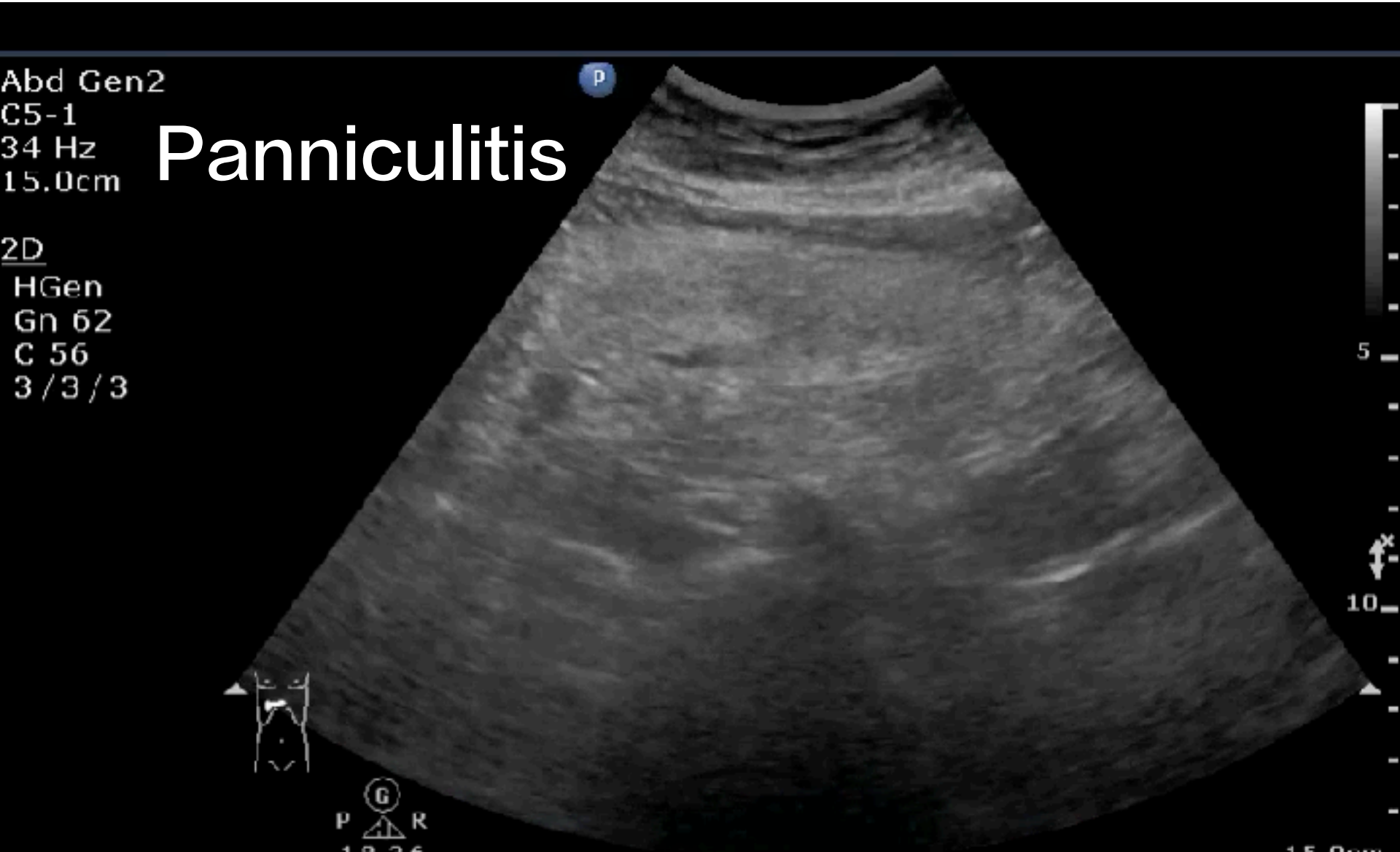




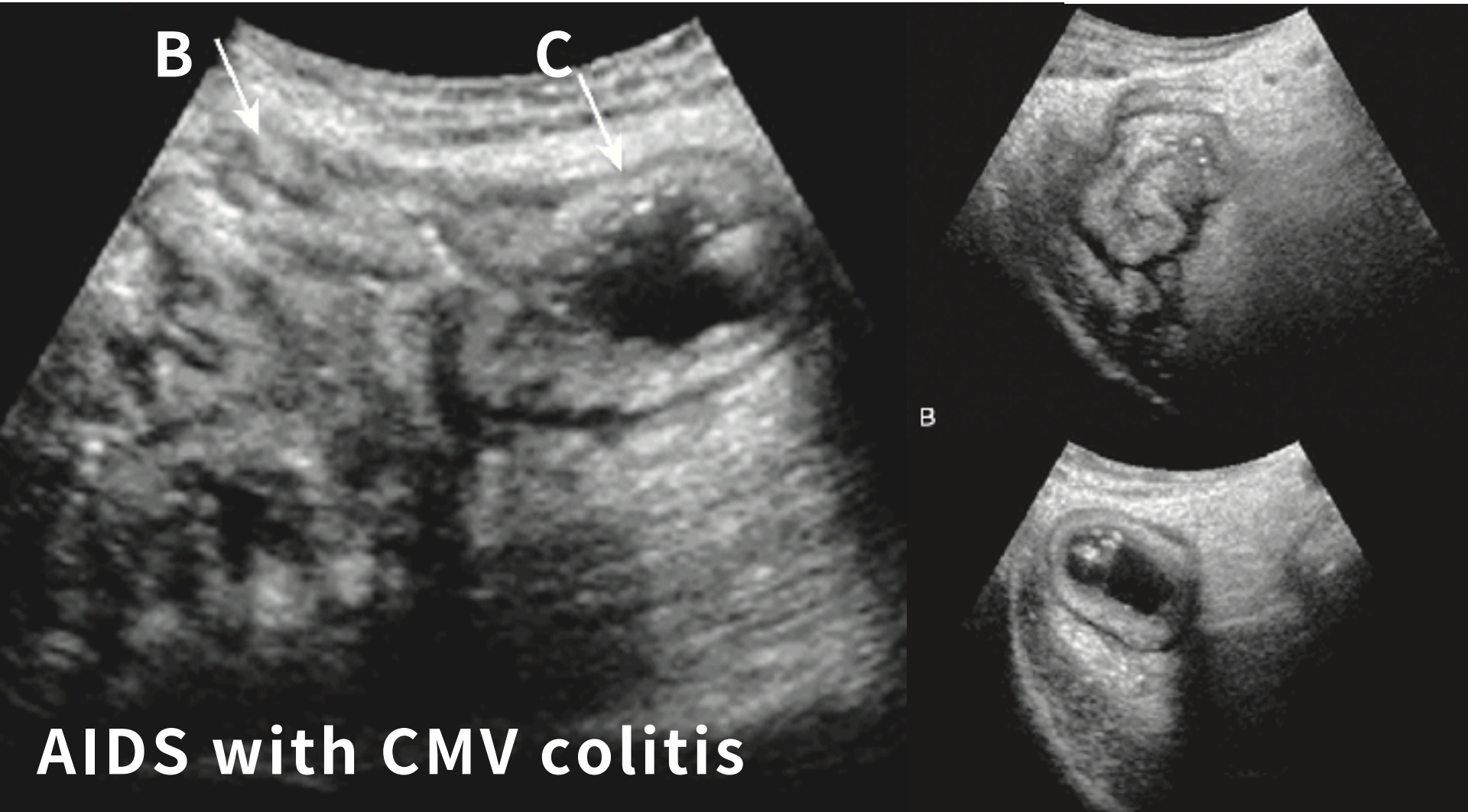
Omental infarction



肚臍附近疼痛(重點在脂肪)



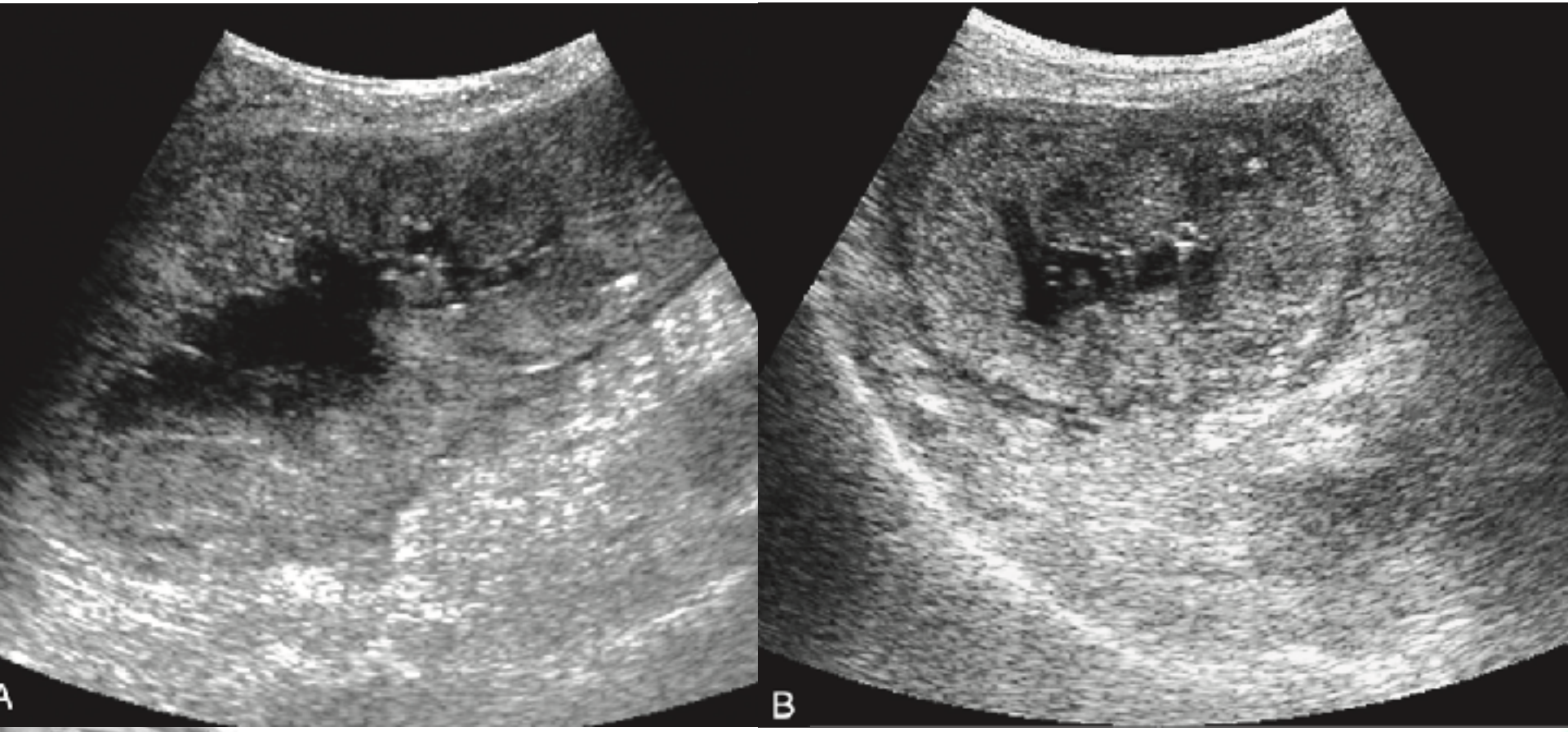
Acute typhlitis
(Neutropenic enterocolitis)



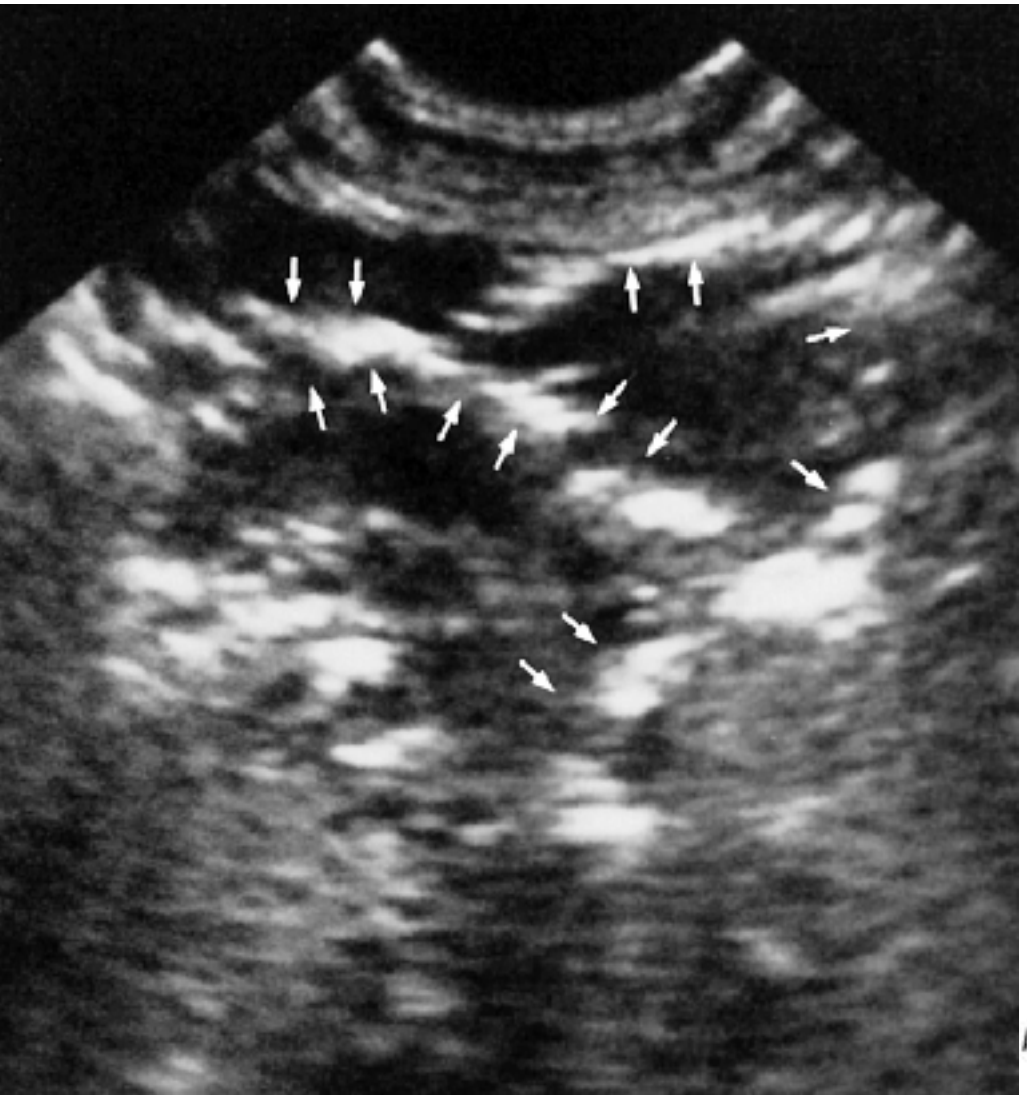
AIDS with CMV colitis

ULTRASOUND
PROGRAM

Pseudomembrane colitis



Pneumatosis intestinal



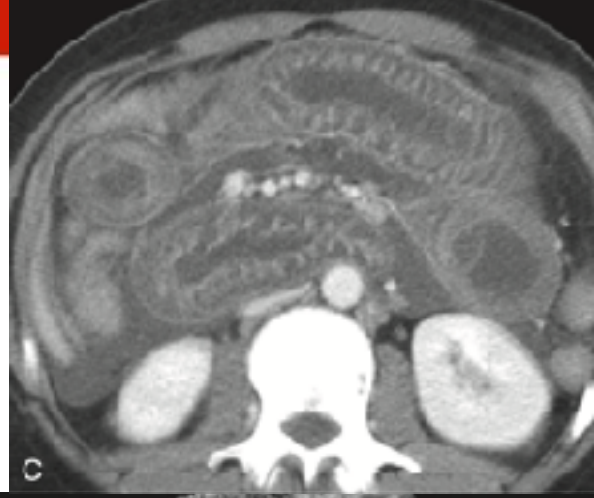
腸壁的空氣
Circle sign

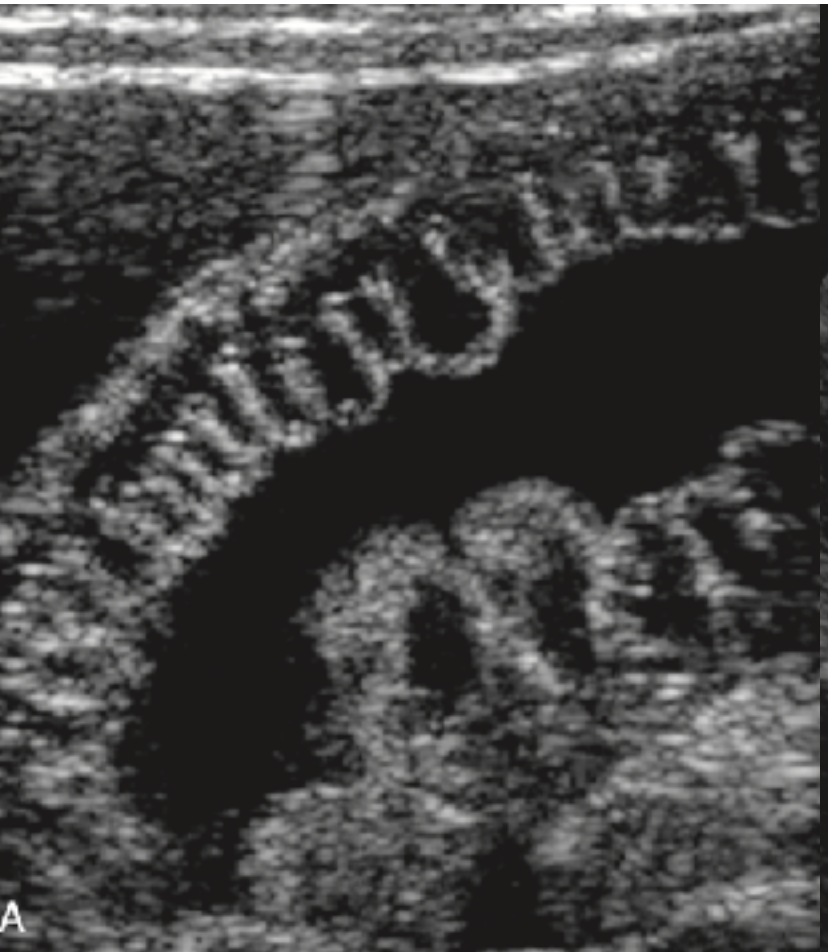
肝內的空氣
HPVG

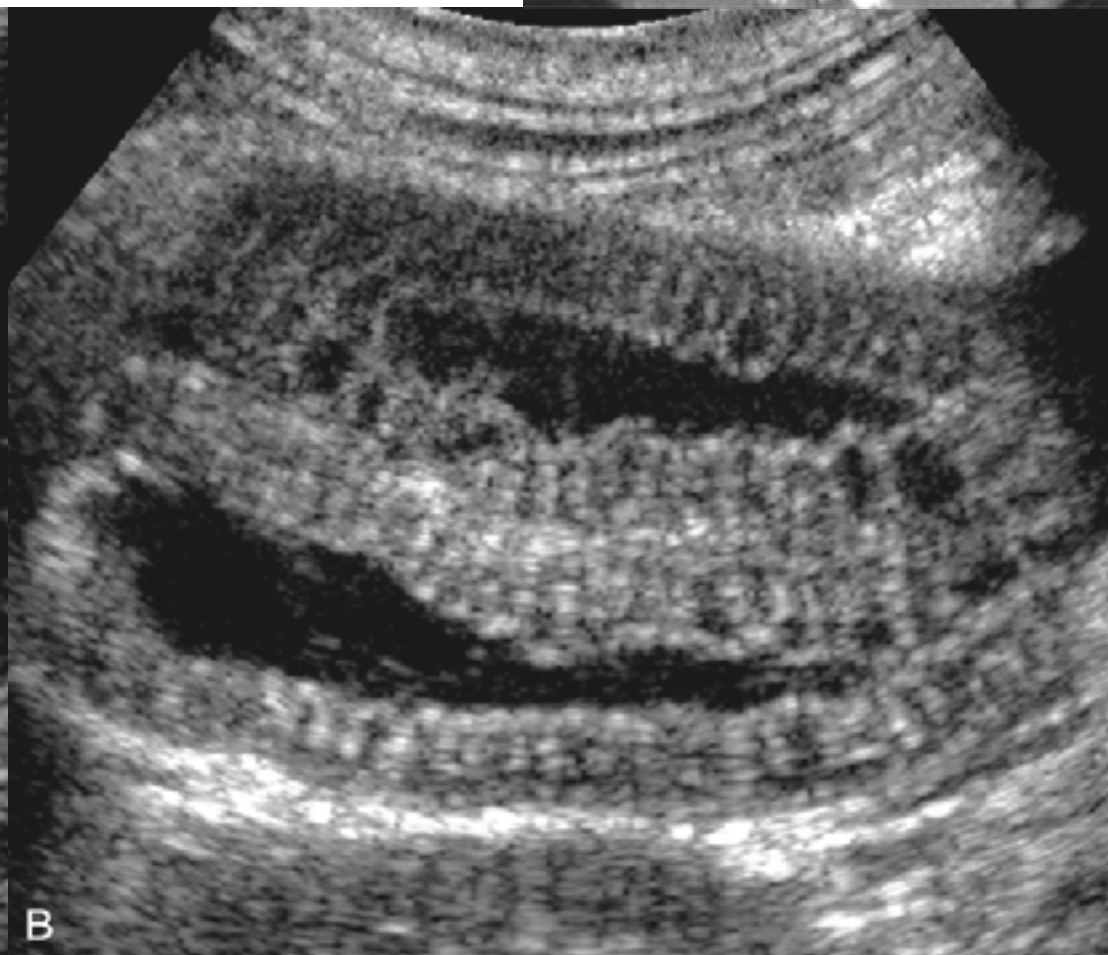
ULTRASOUND PROGRAM

Vasculitis

柱狀的腸壁

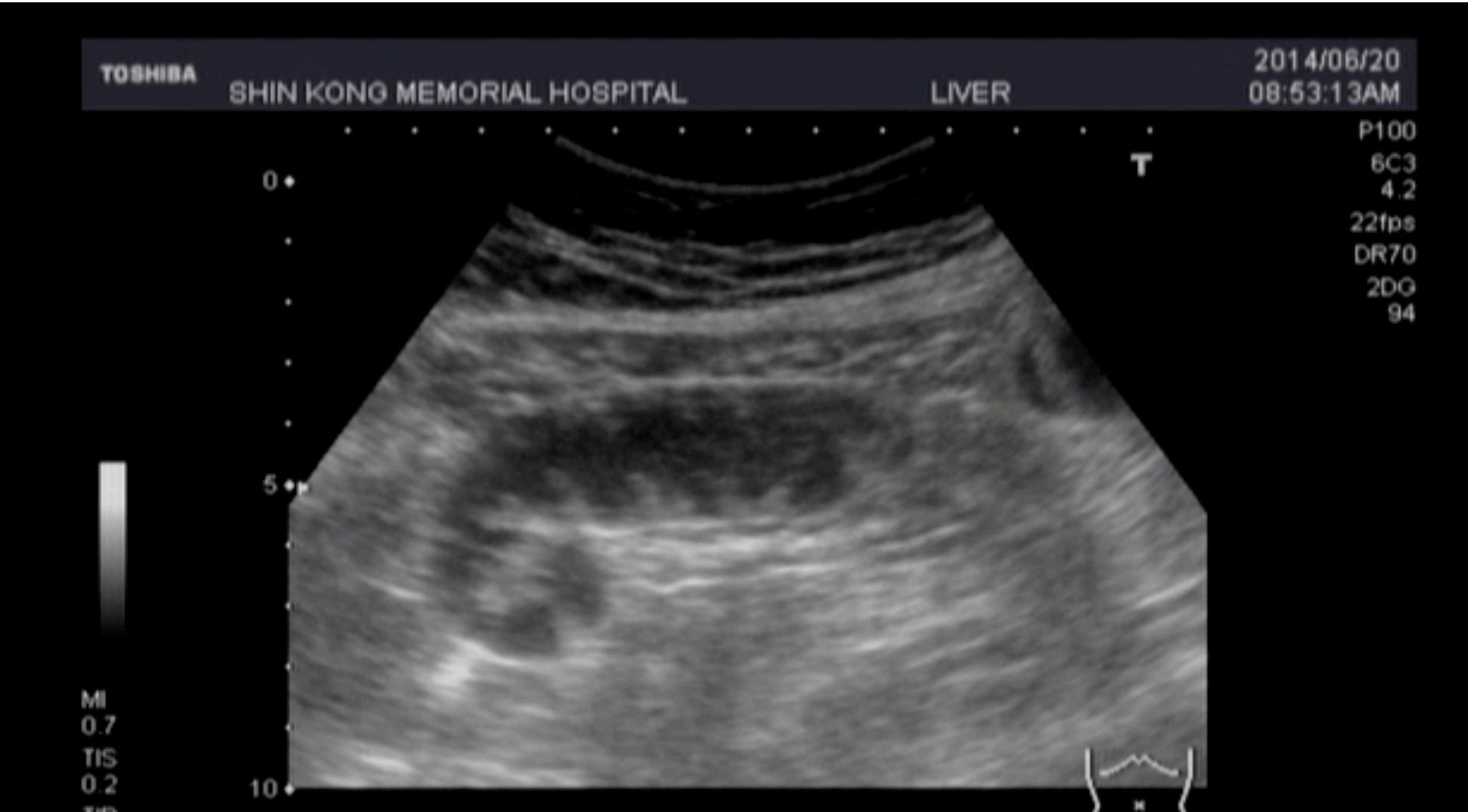






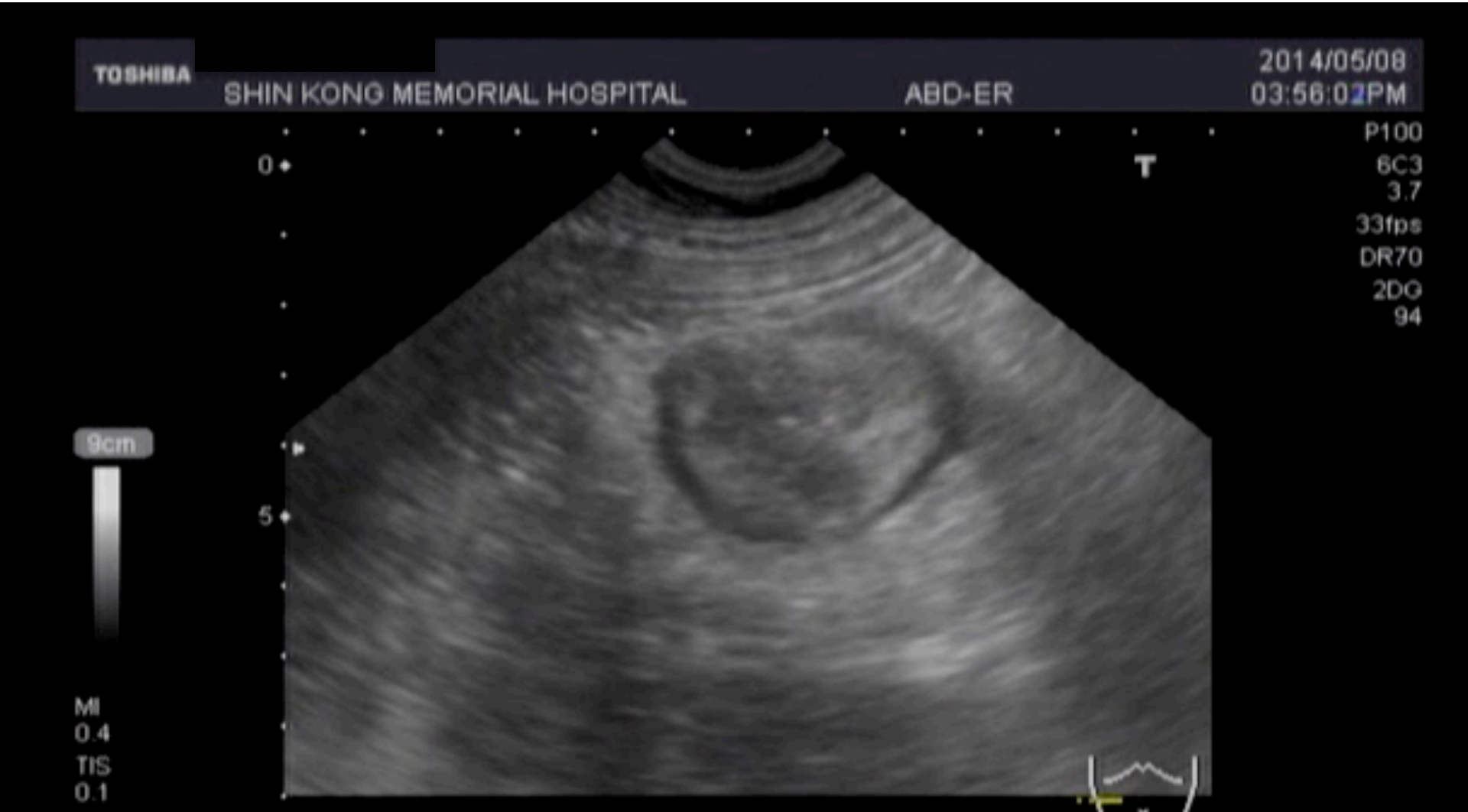
73F with abdominal pain

Enteritis



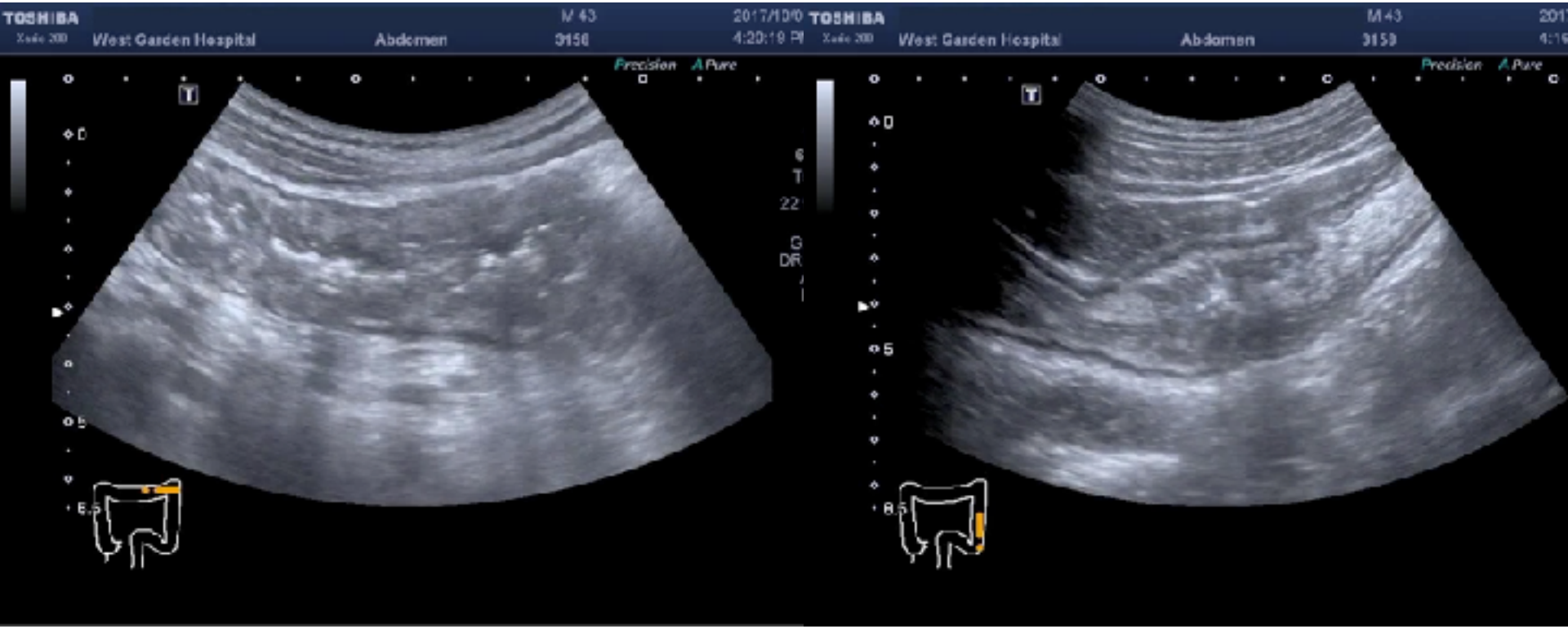
73M, fever, diarrhea and band 20%

Infectious colitis

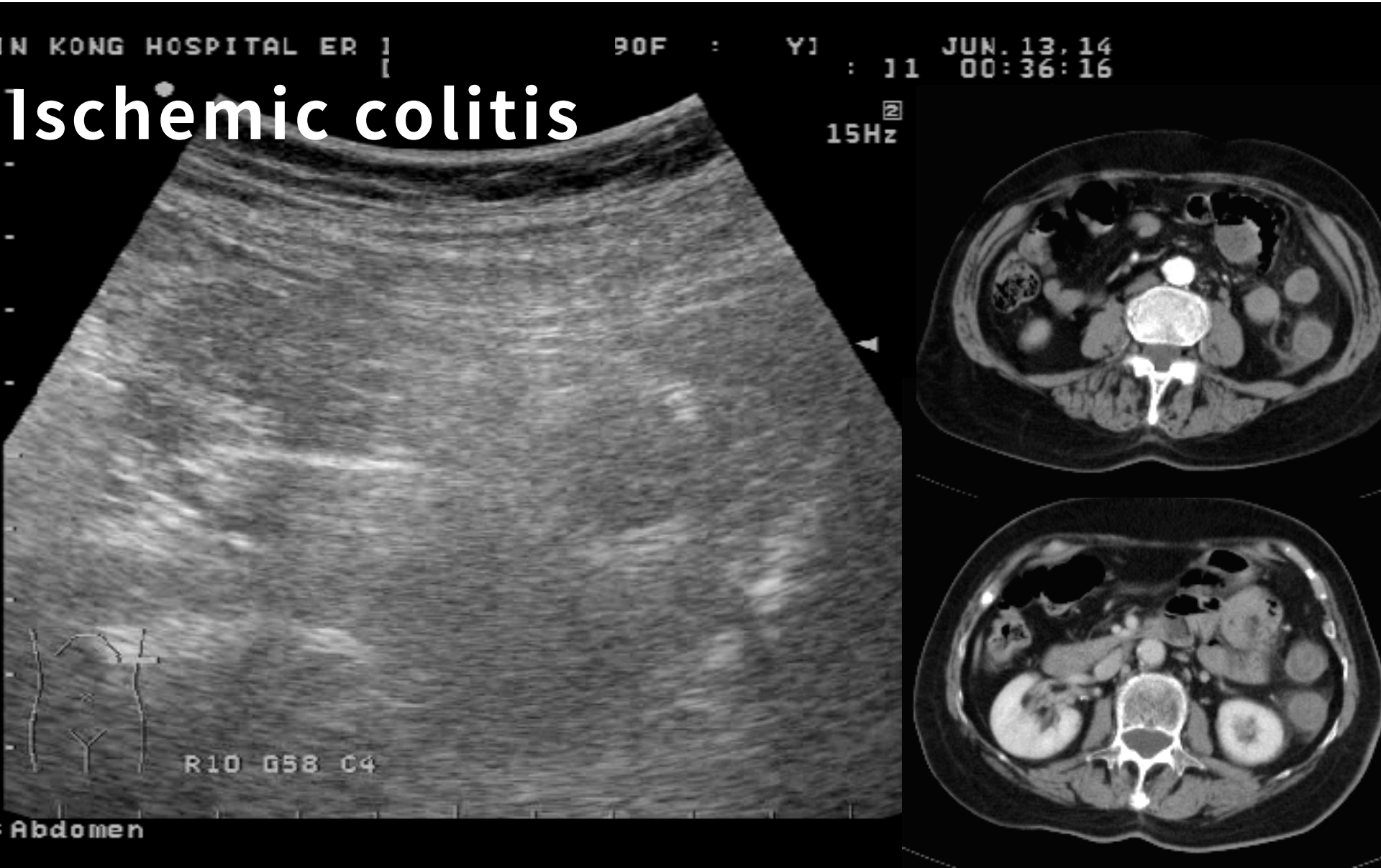


43M, fever & diarrhea

Infectious colitis

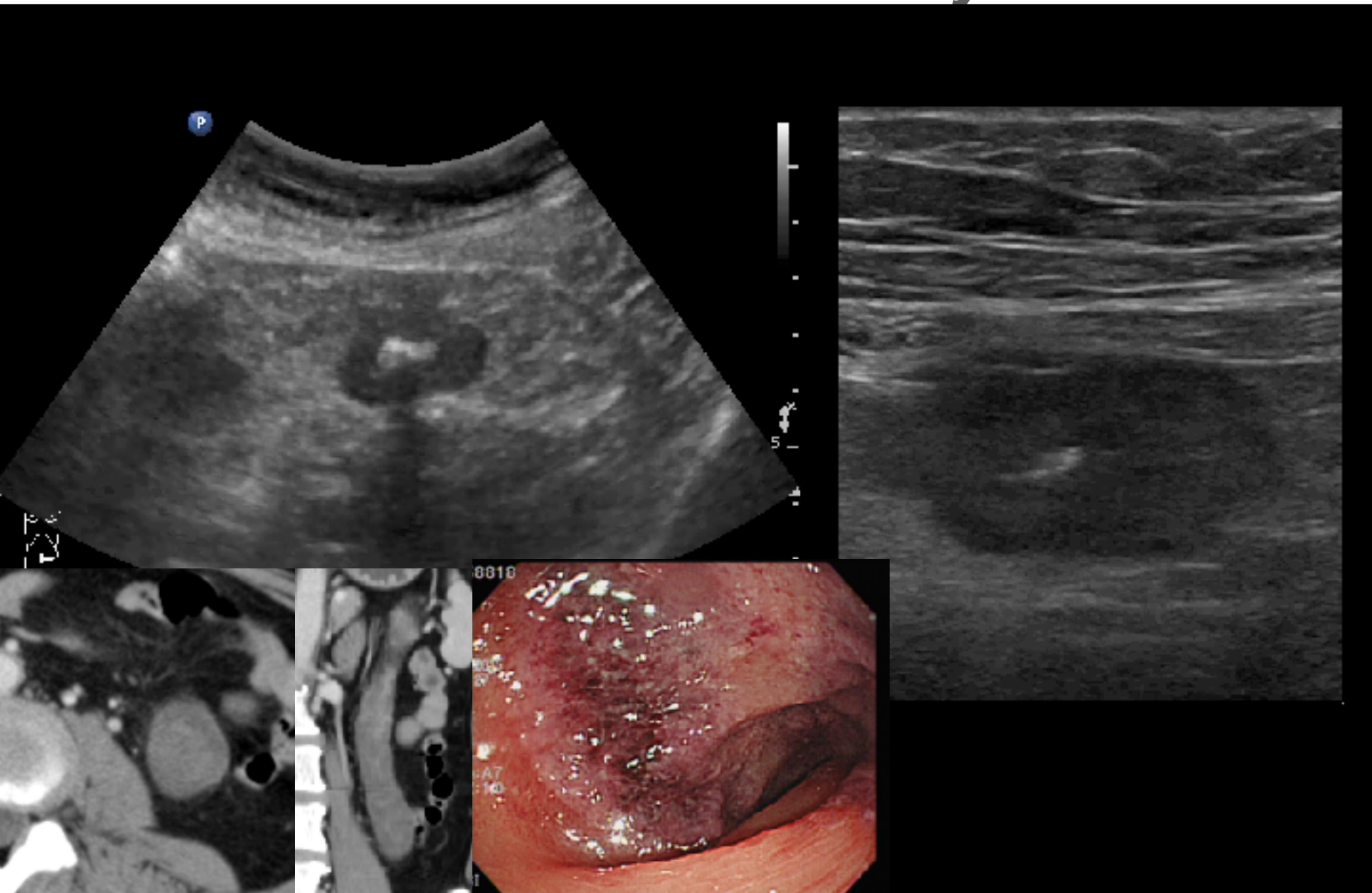


90F, L ABD pain & bloody stool

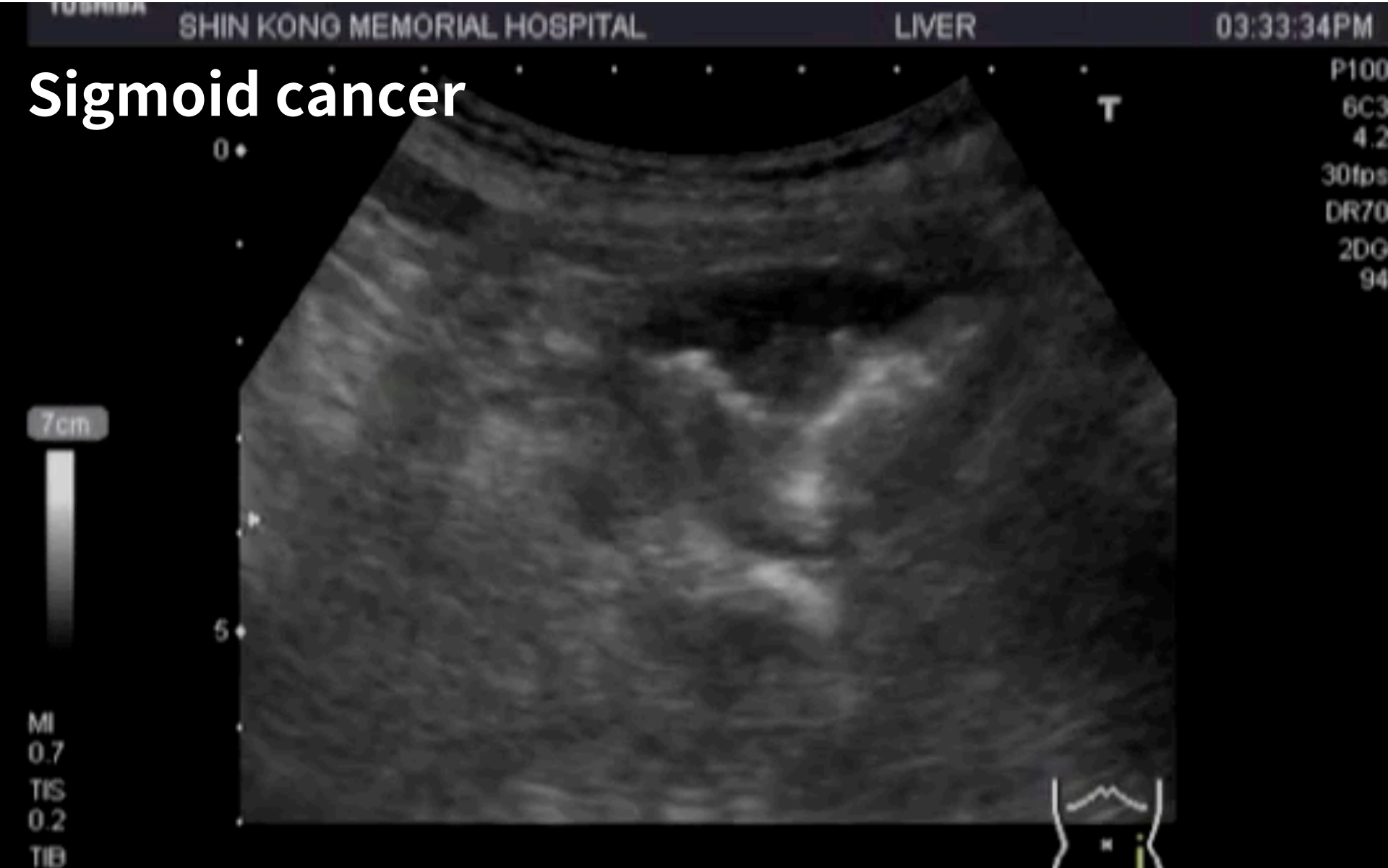


Ischemic colitis

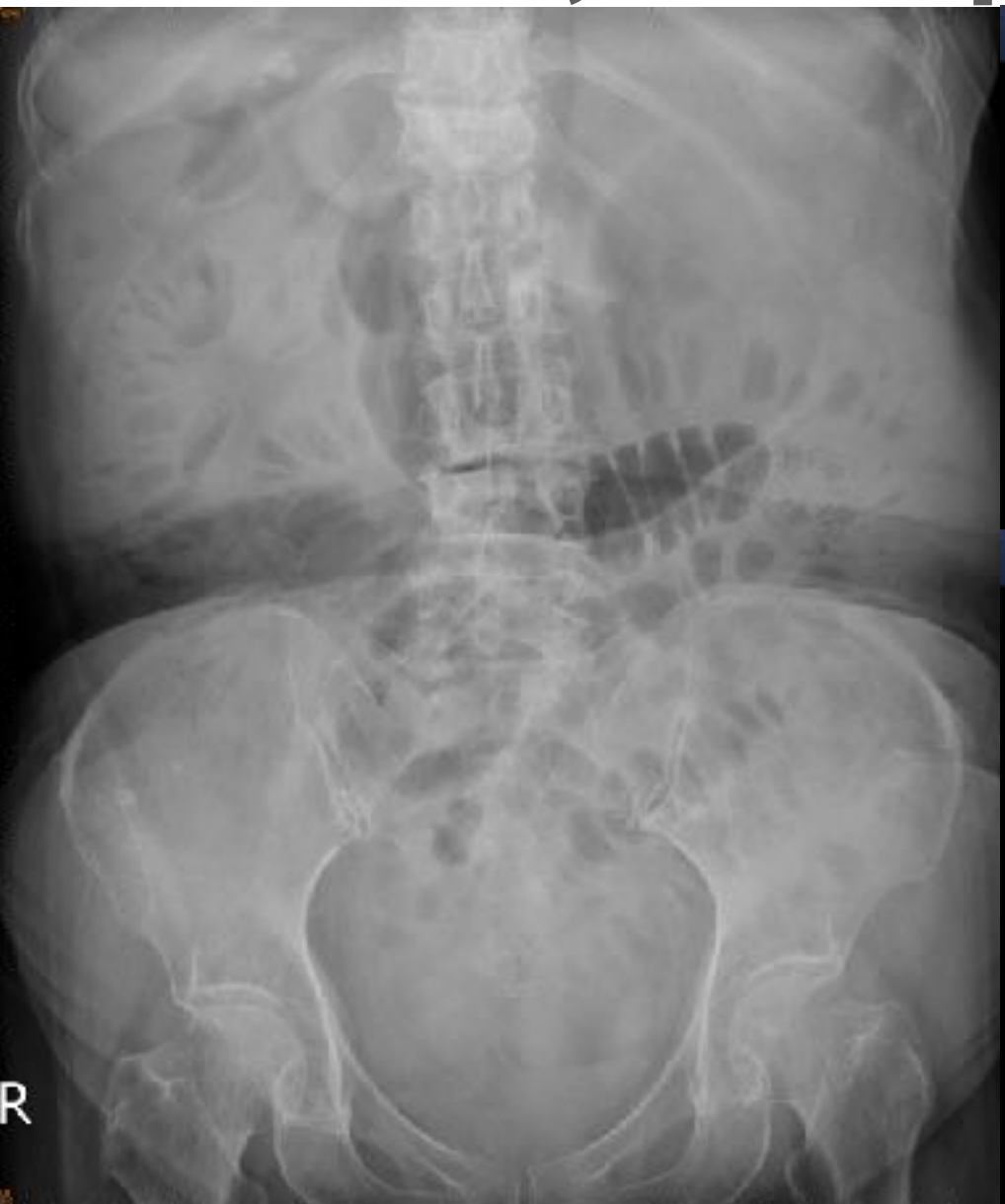
Old man with bloody stool

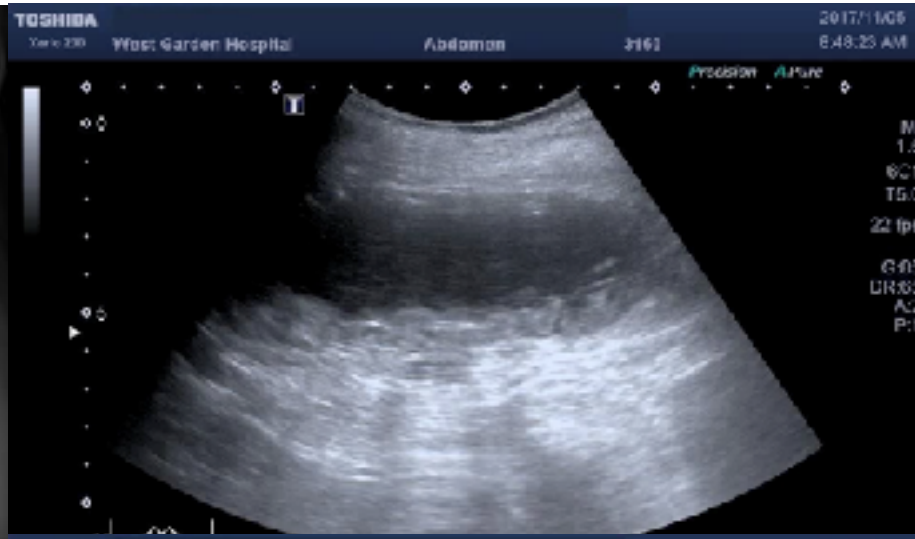


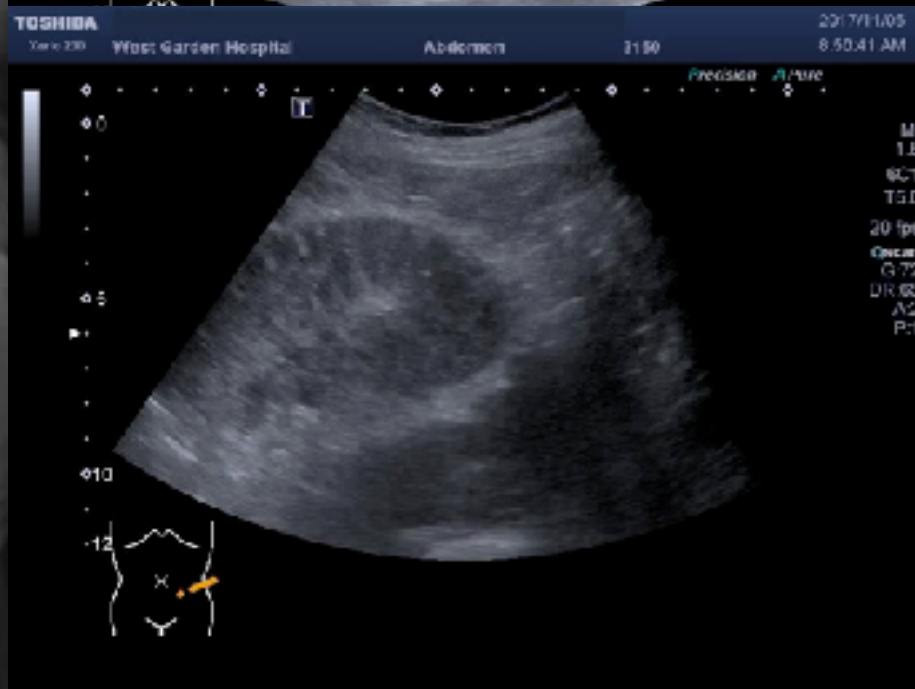
Ischemic colitis ?



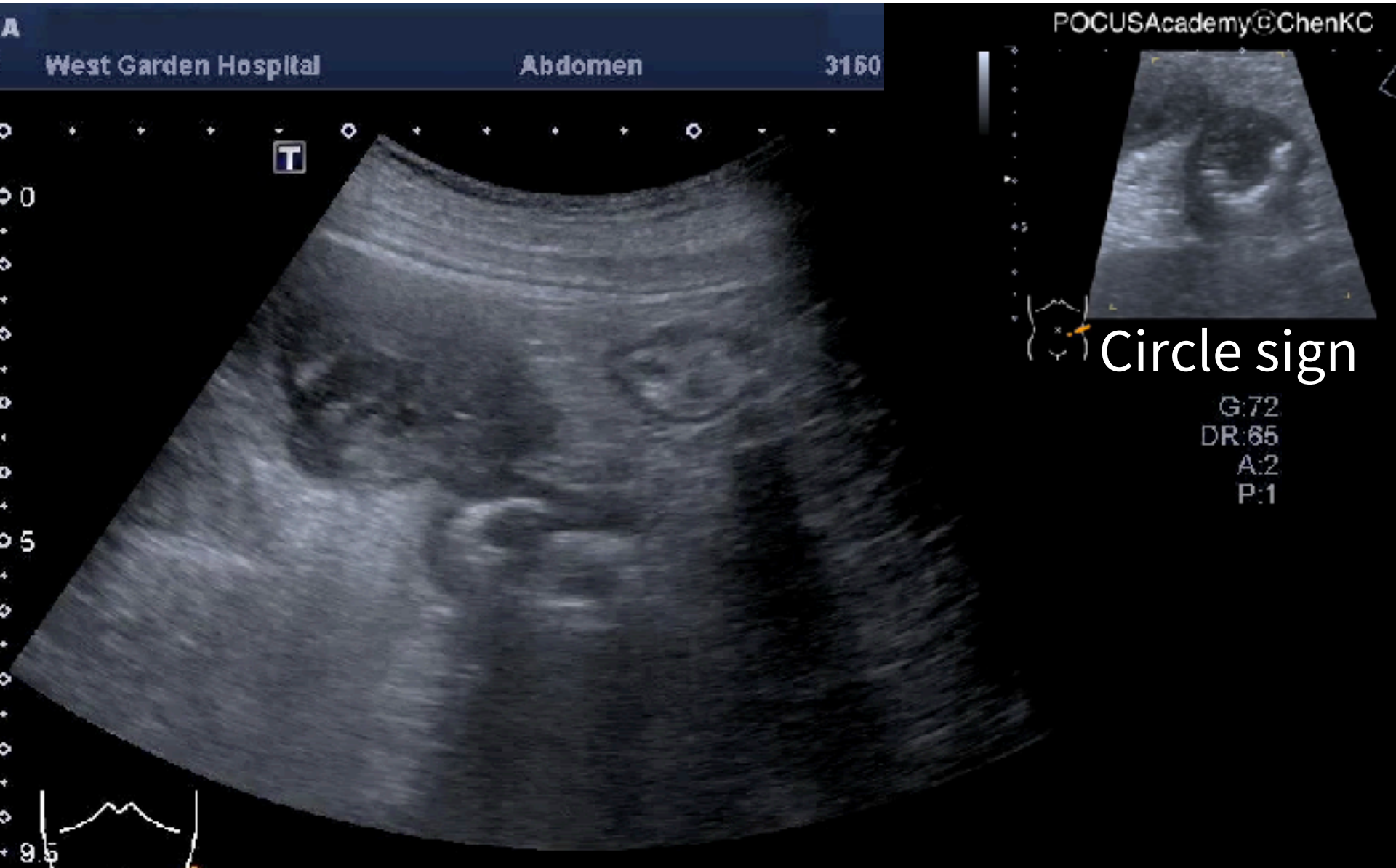
73F, ABD pain

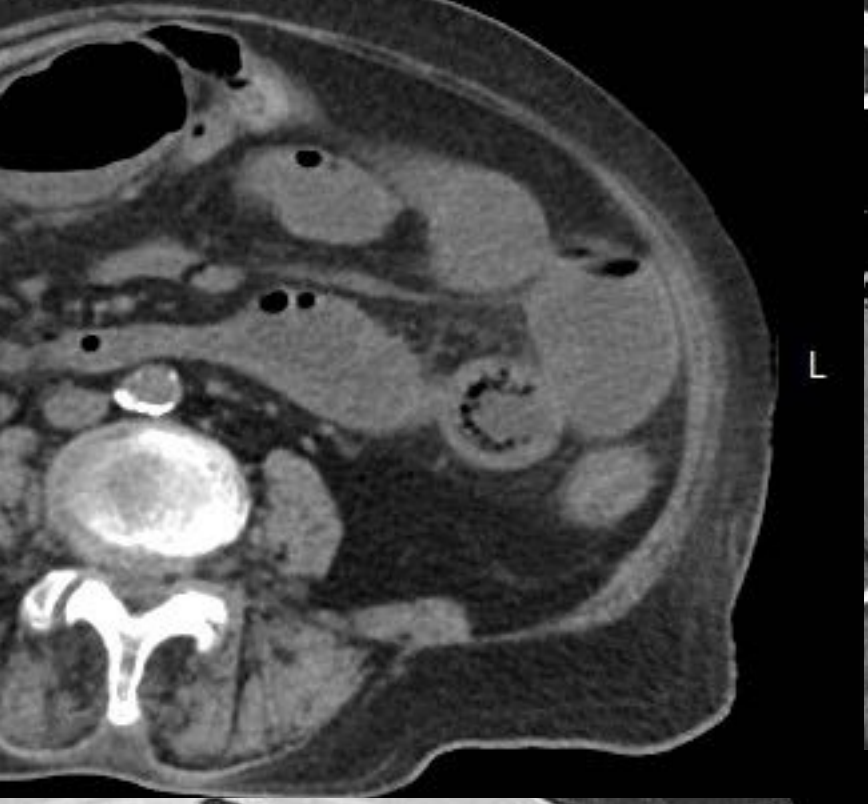


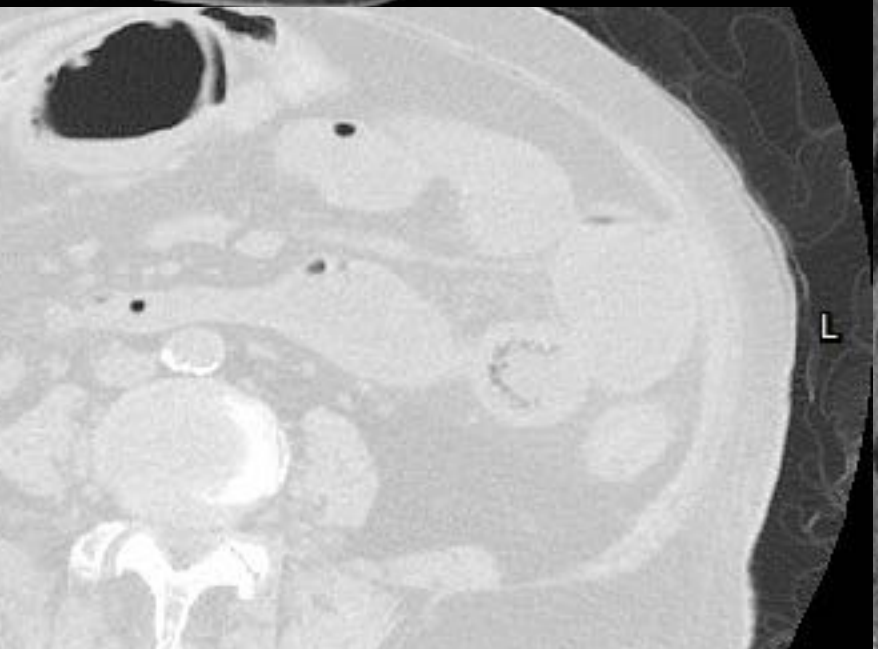

TOSHIBA
West Garden Hospital
Abdomen

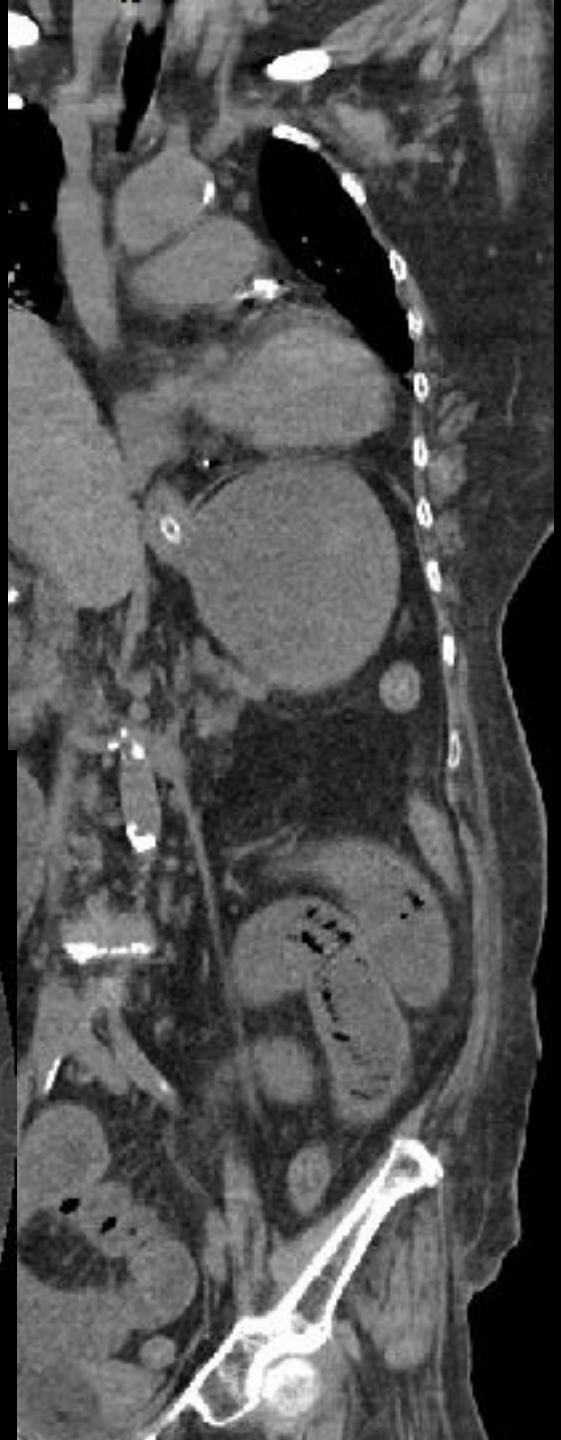

TOSHIBA
West Garden Hospital
Abdomen

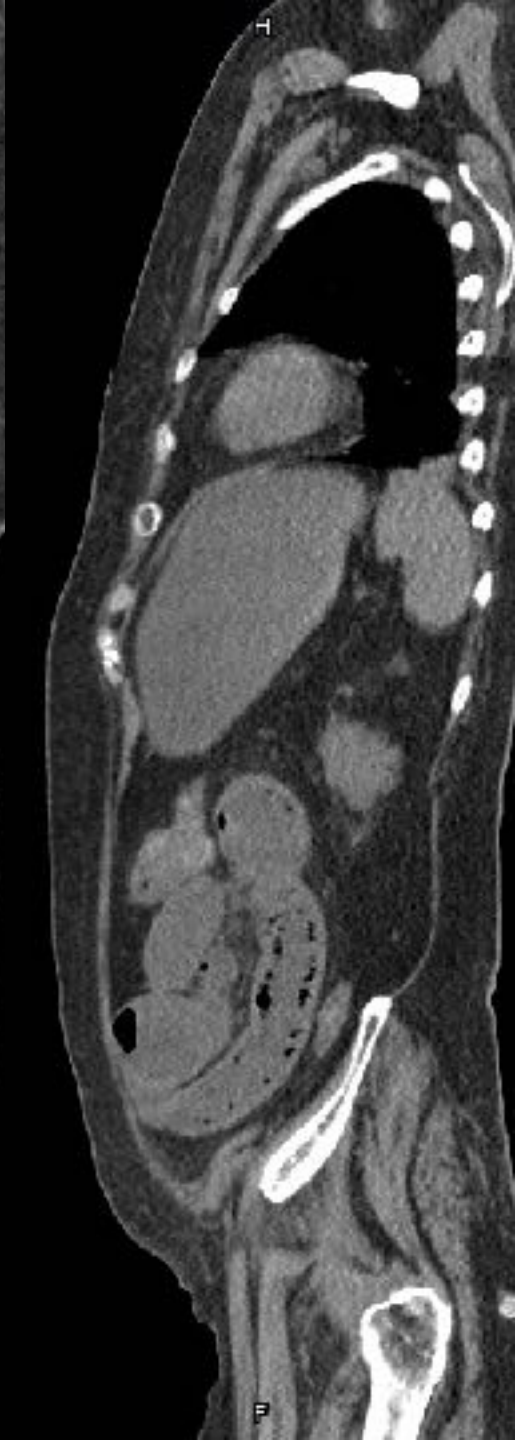
73F, ABD pain


West Garden Hospital
Abdomen
3160
POCUSAcademy©ChenKC
Circle sign
G:72
DR:65
A:2
P:1

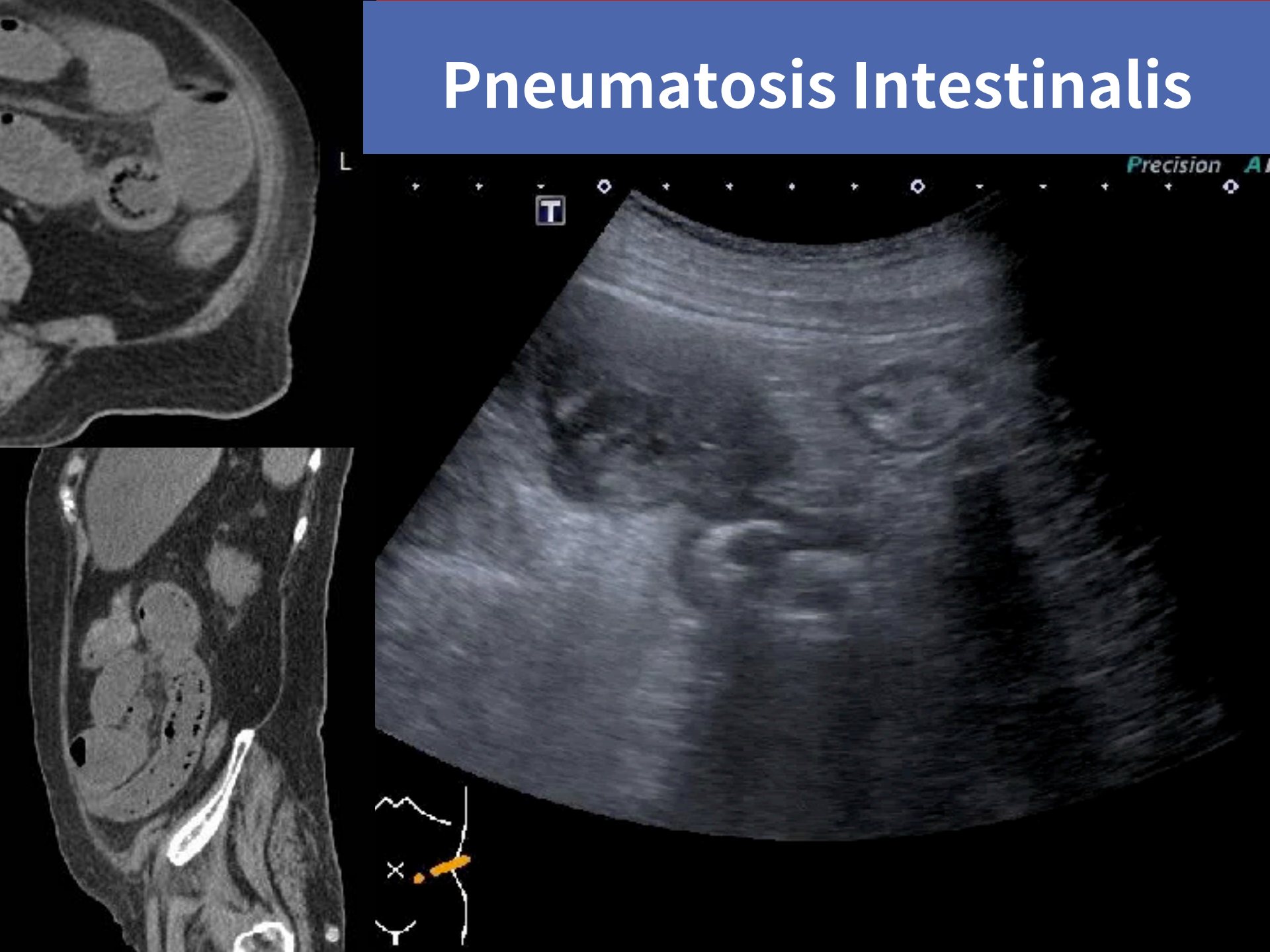

L


L



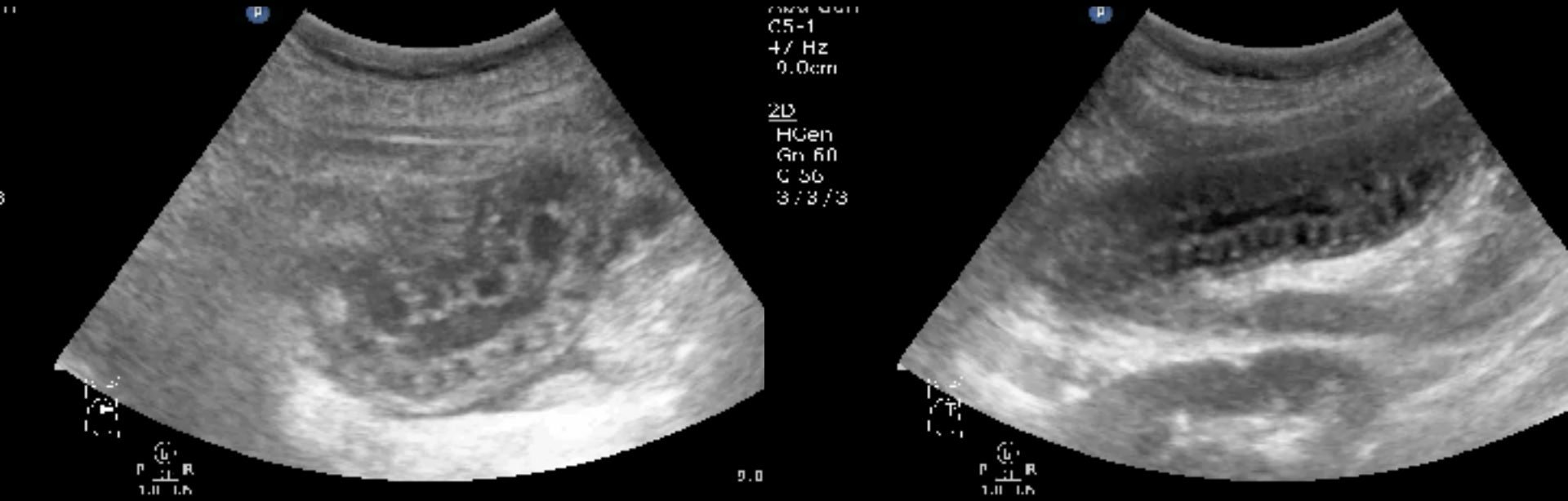

H
F

Pneumatosis Intestinalis

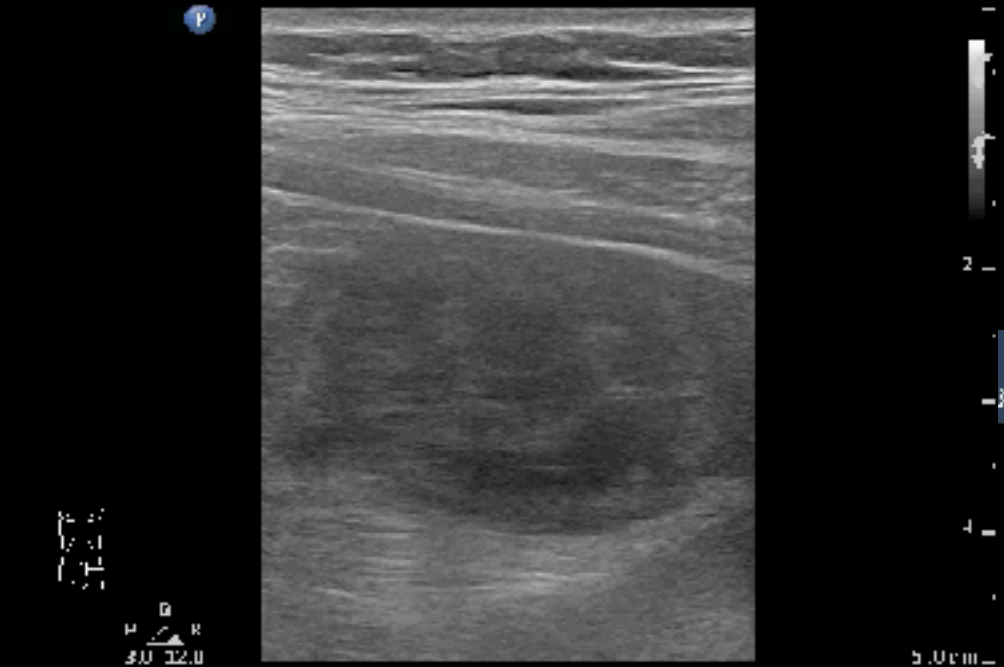


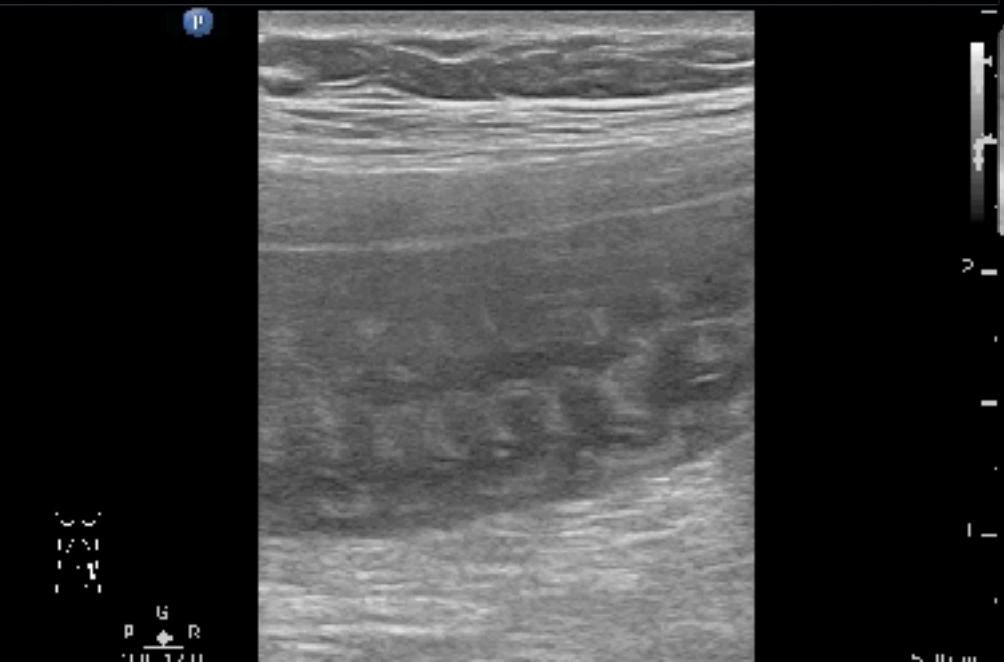
年輕女性，腹痛發燒

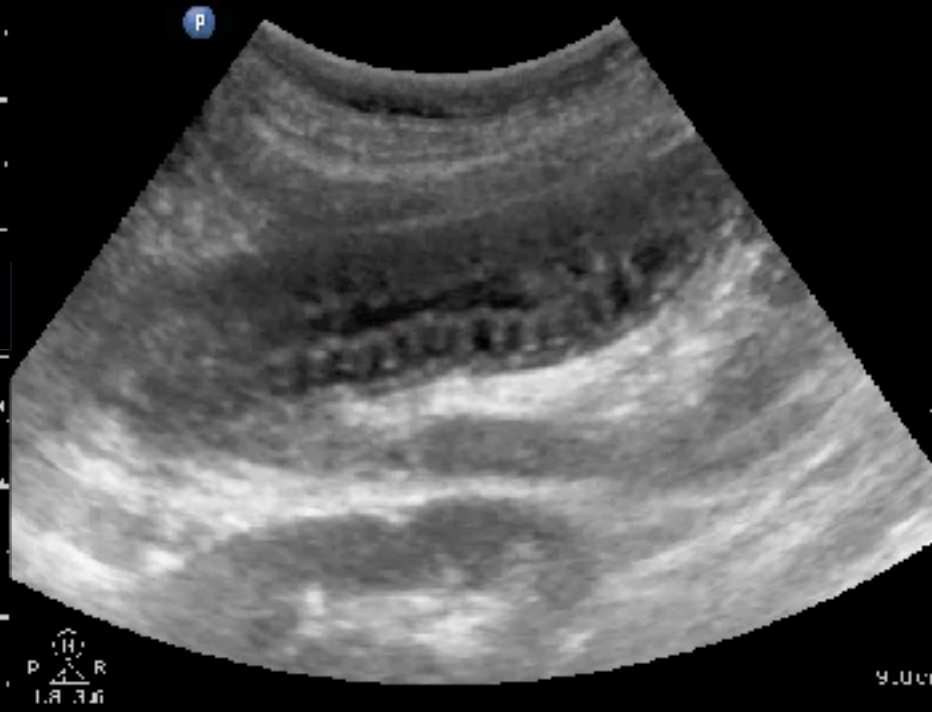
最可能合併什麼疾病?



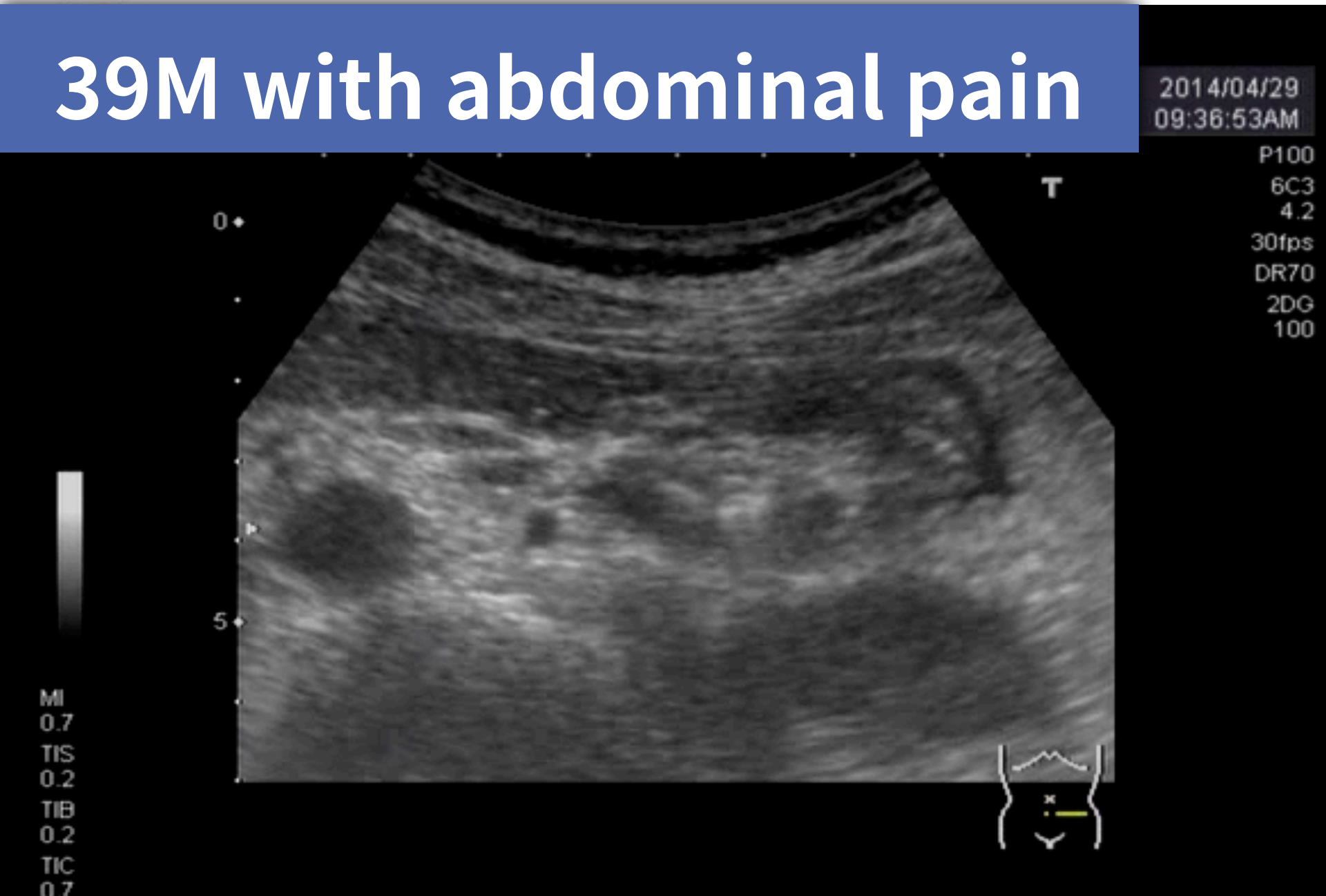
Lupus Vasculitis



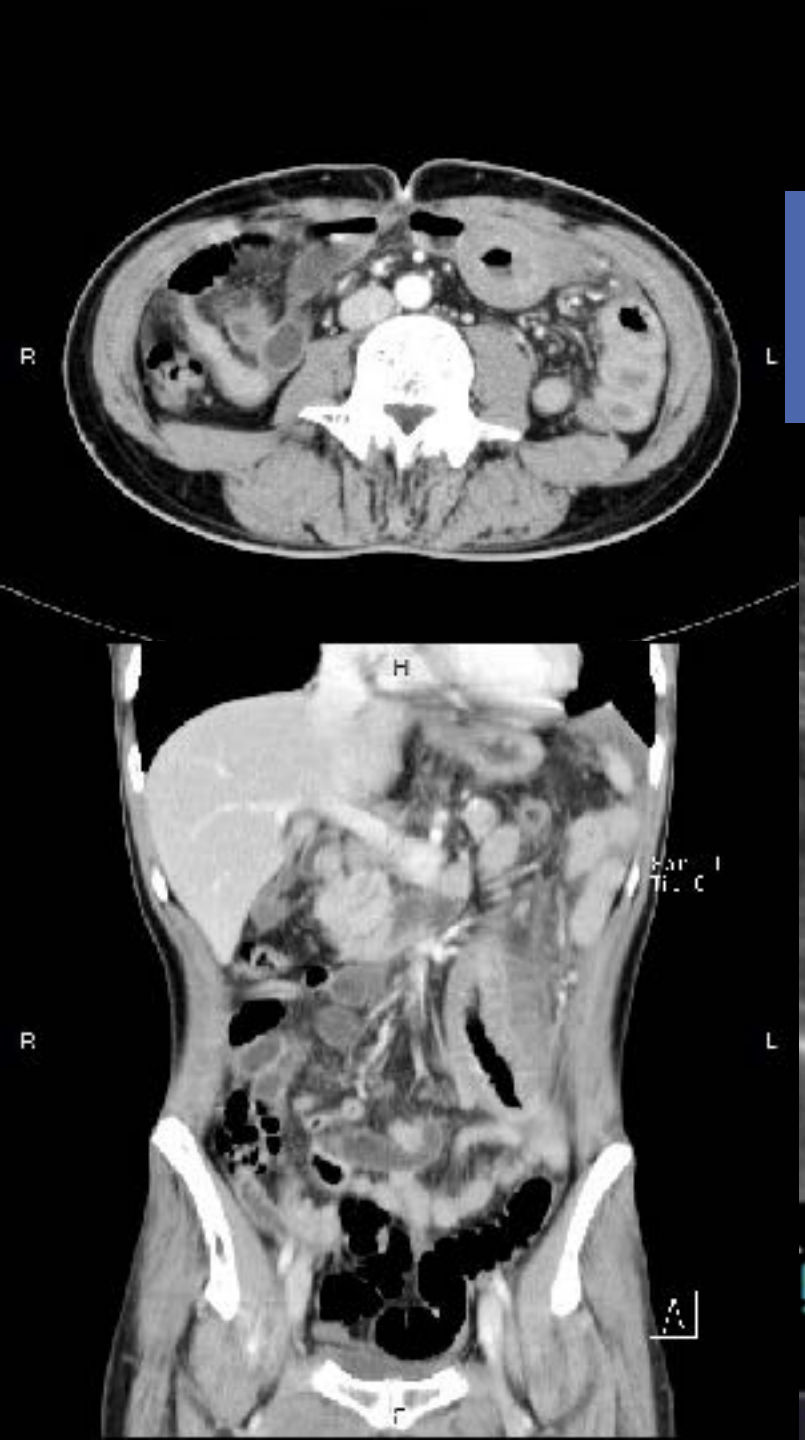


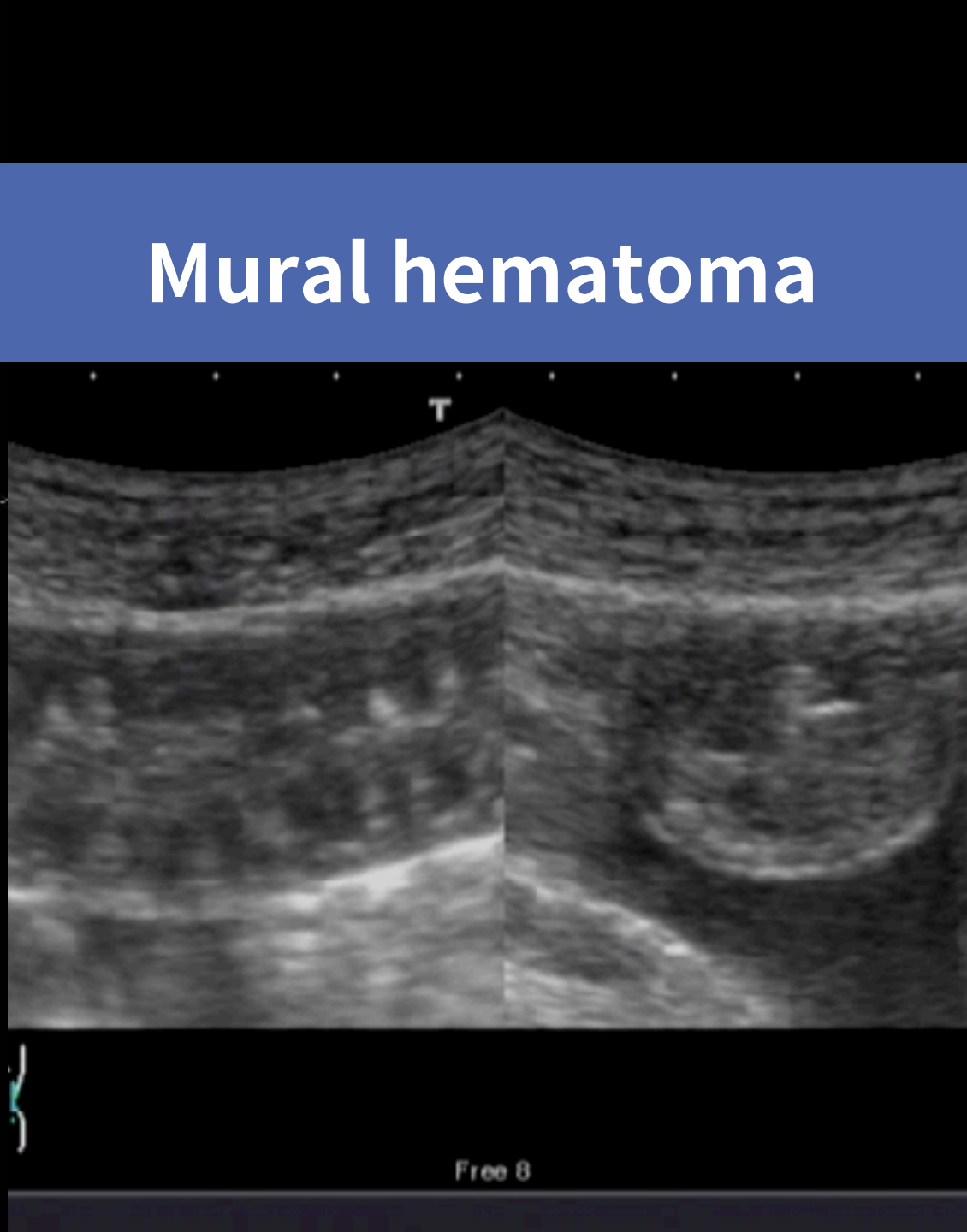


39M with abdominal pain



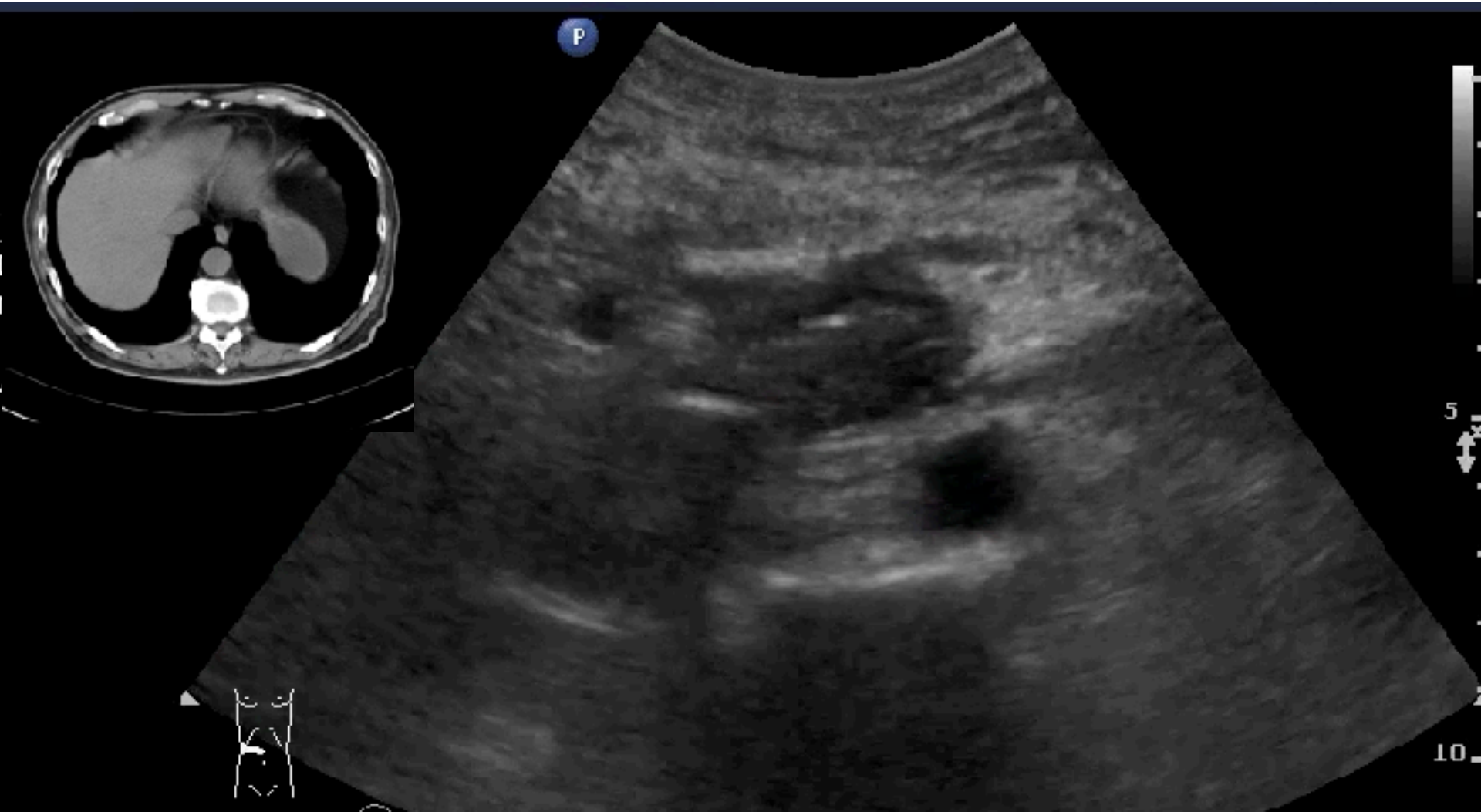
Mural hematoma



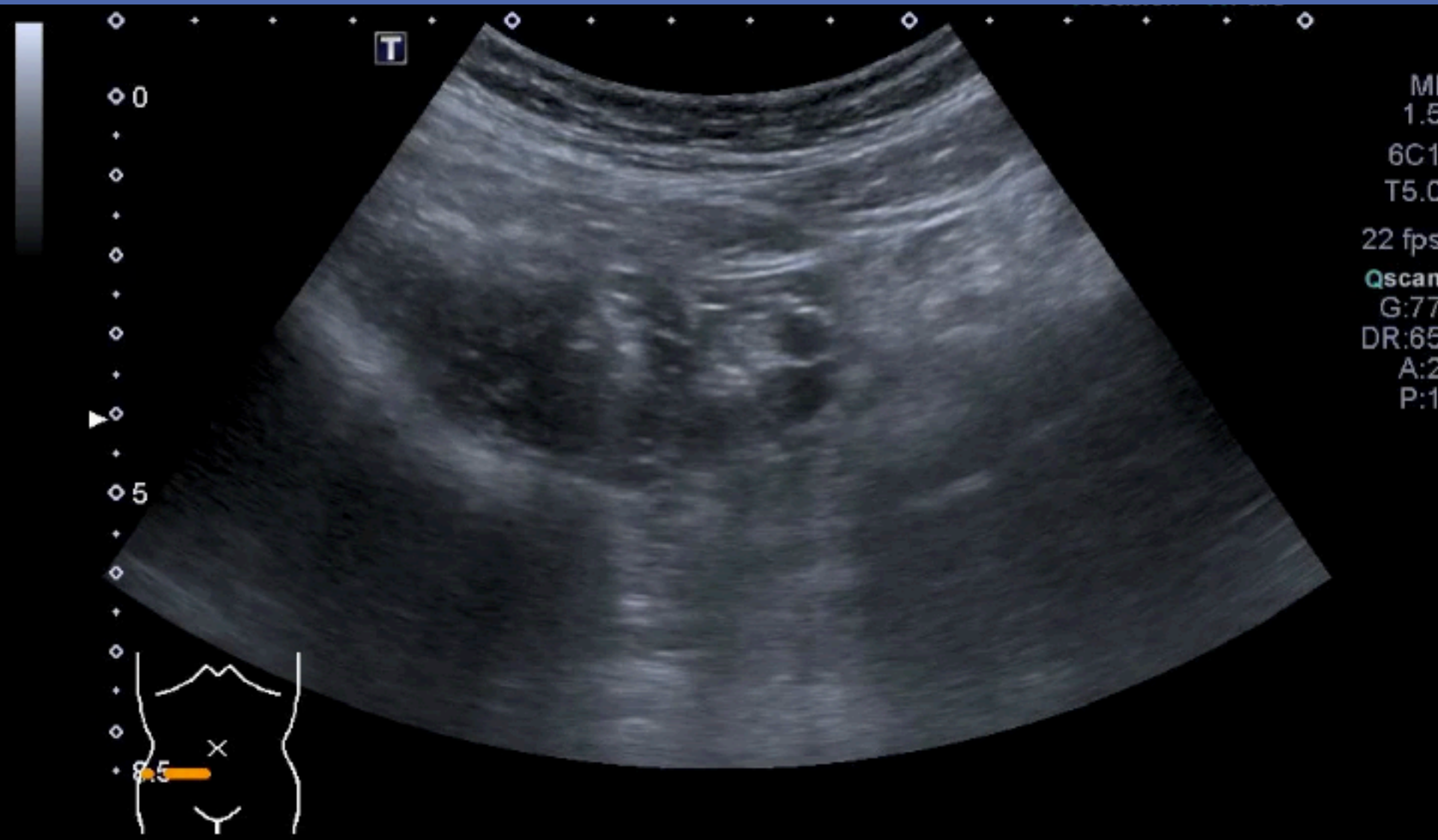


63M, Epigastralgia

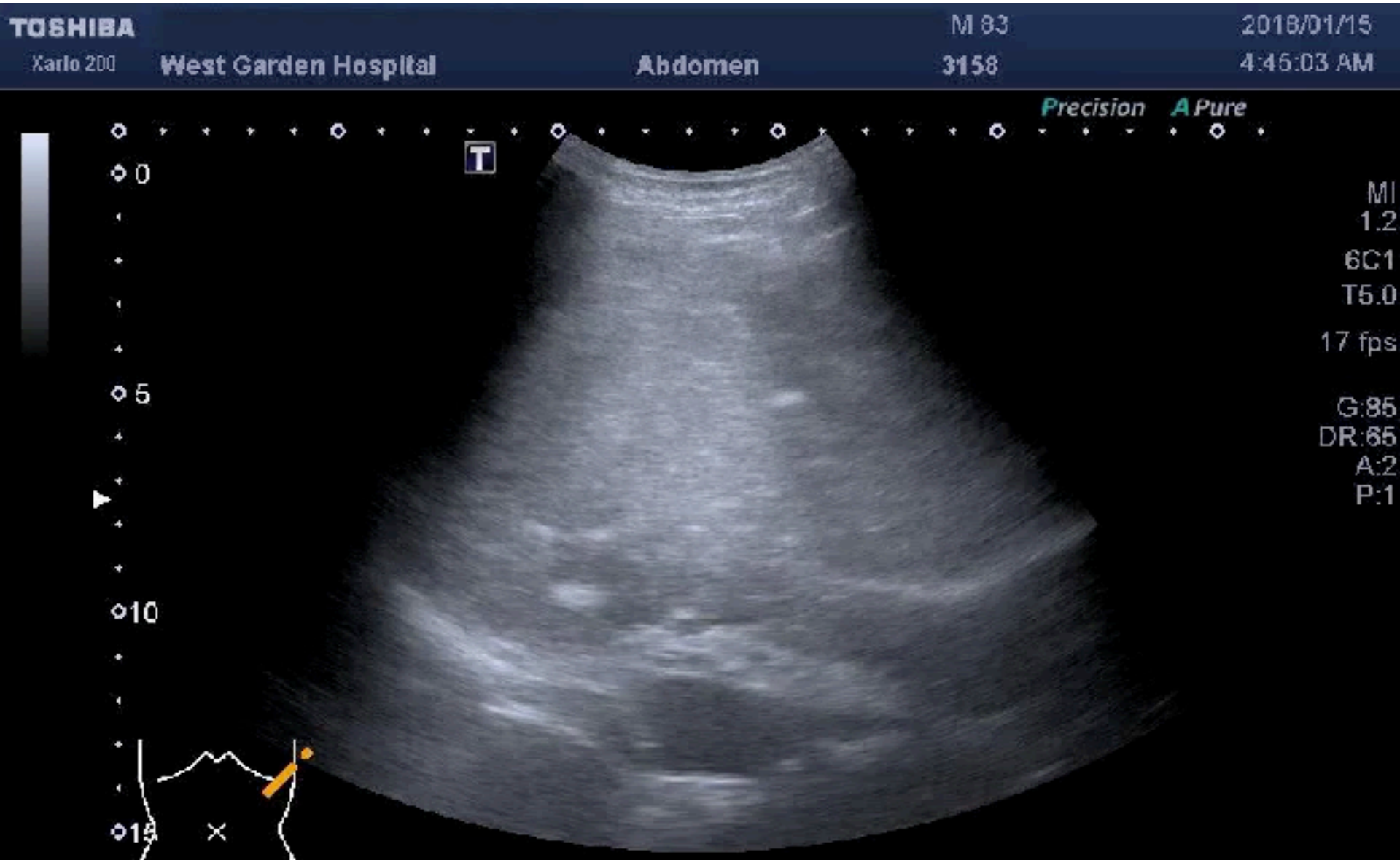
Duodenal adenocarcinoma



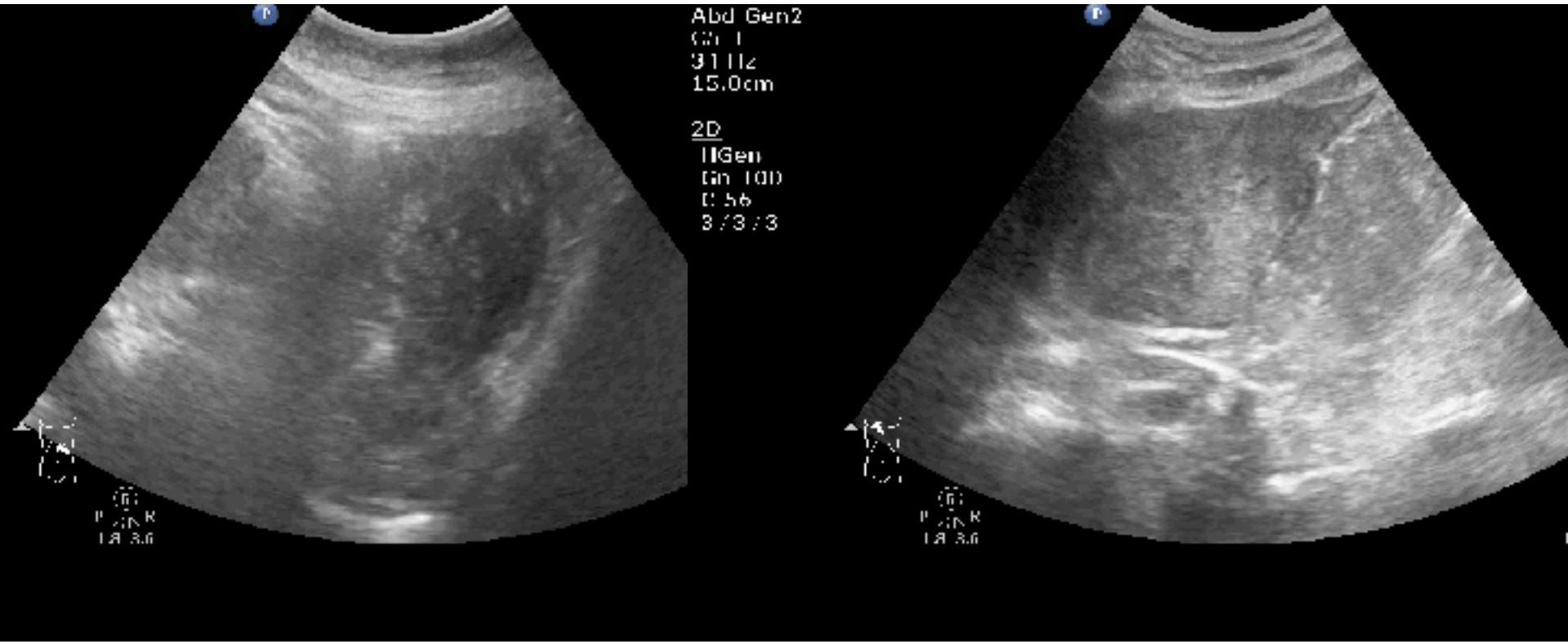
右下腹痛，描述異常＋你的診斷



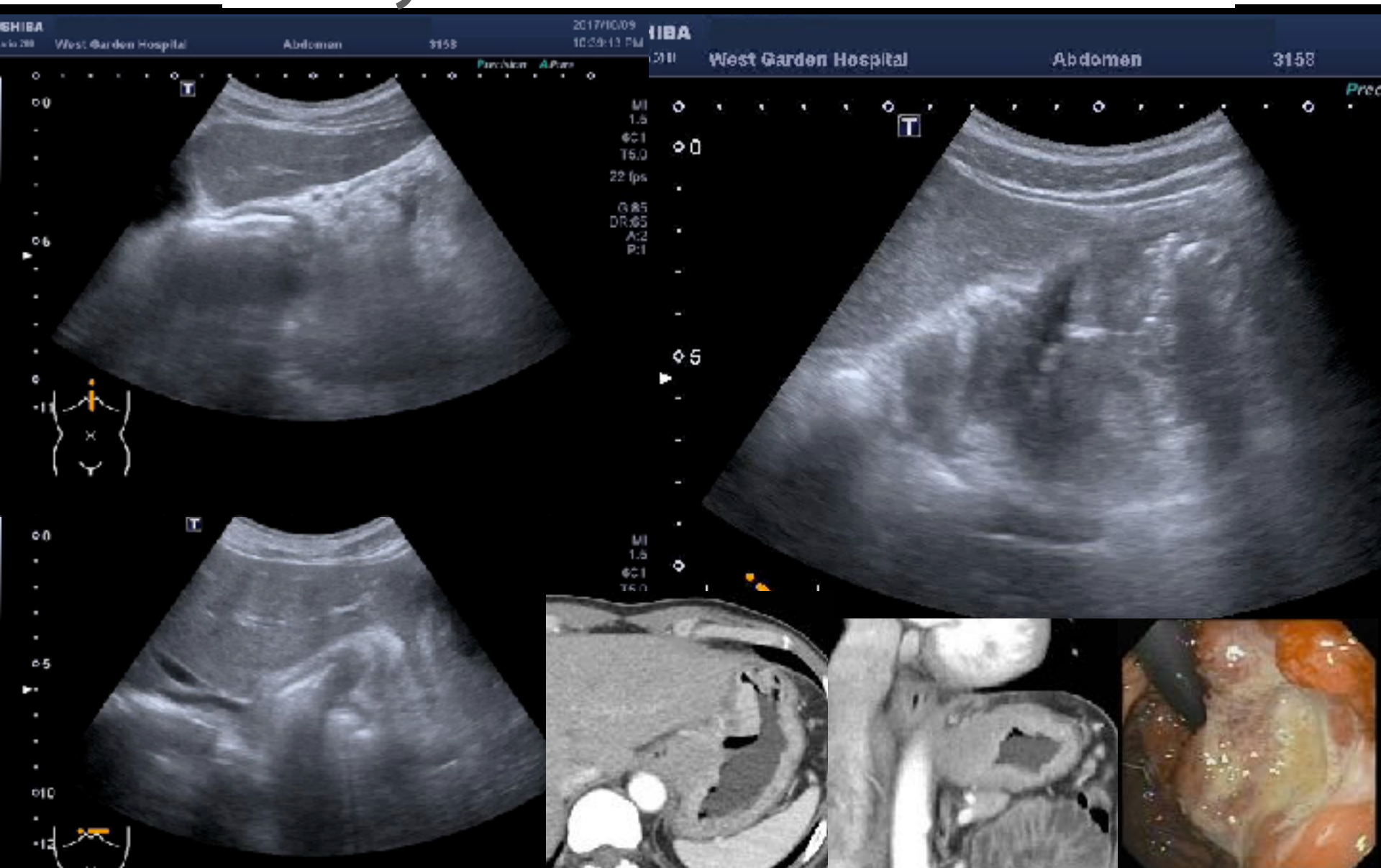
83M, 上腹痛，怎麼了？


TOSHIBA
Xario 200
West Garden Hospital
Abdomen
M 83
3158
2018/01/15
4:46:03 AM
Precision
A Pure
0
5
10
15
MI
1.2
6C1
T5.0
17 fps
G:85
DR:65
A:2
P:1

GI bleeding:NG放置與減壓

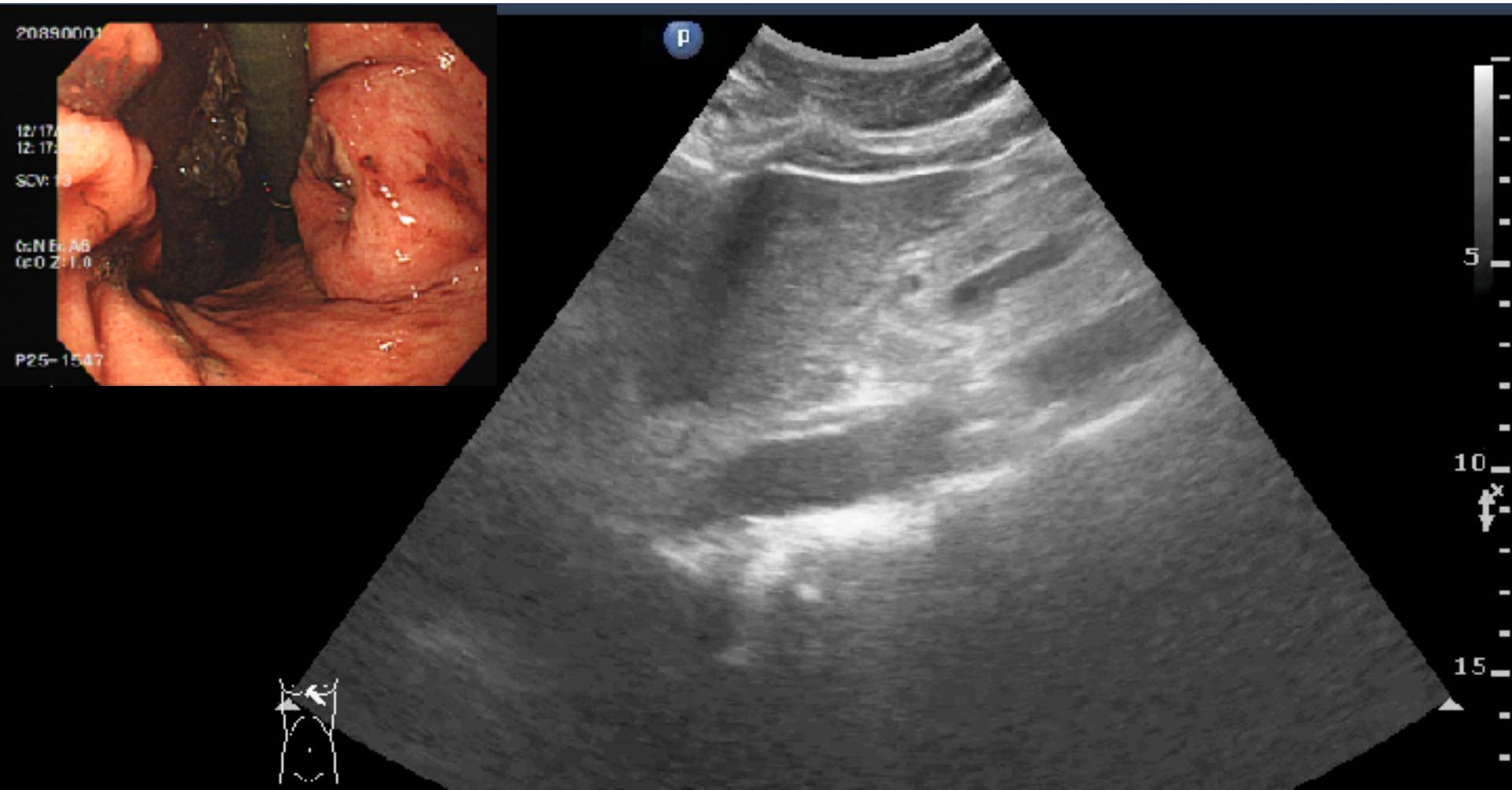


49M, 上腹脹好幾週

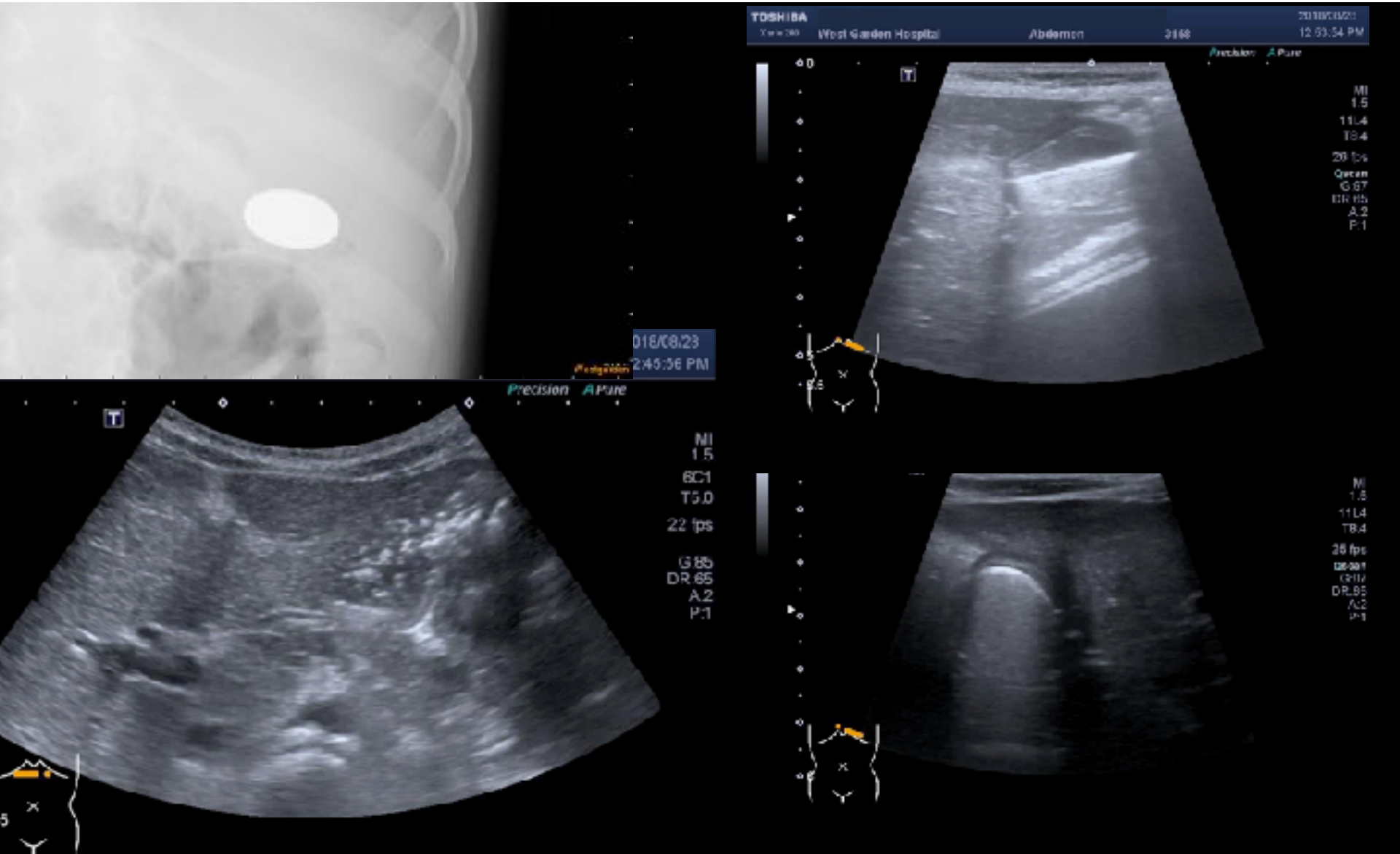


74F, vomit fresh blood

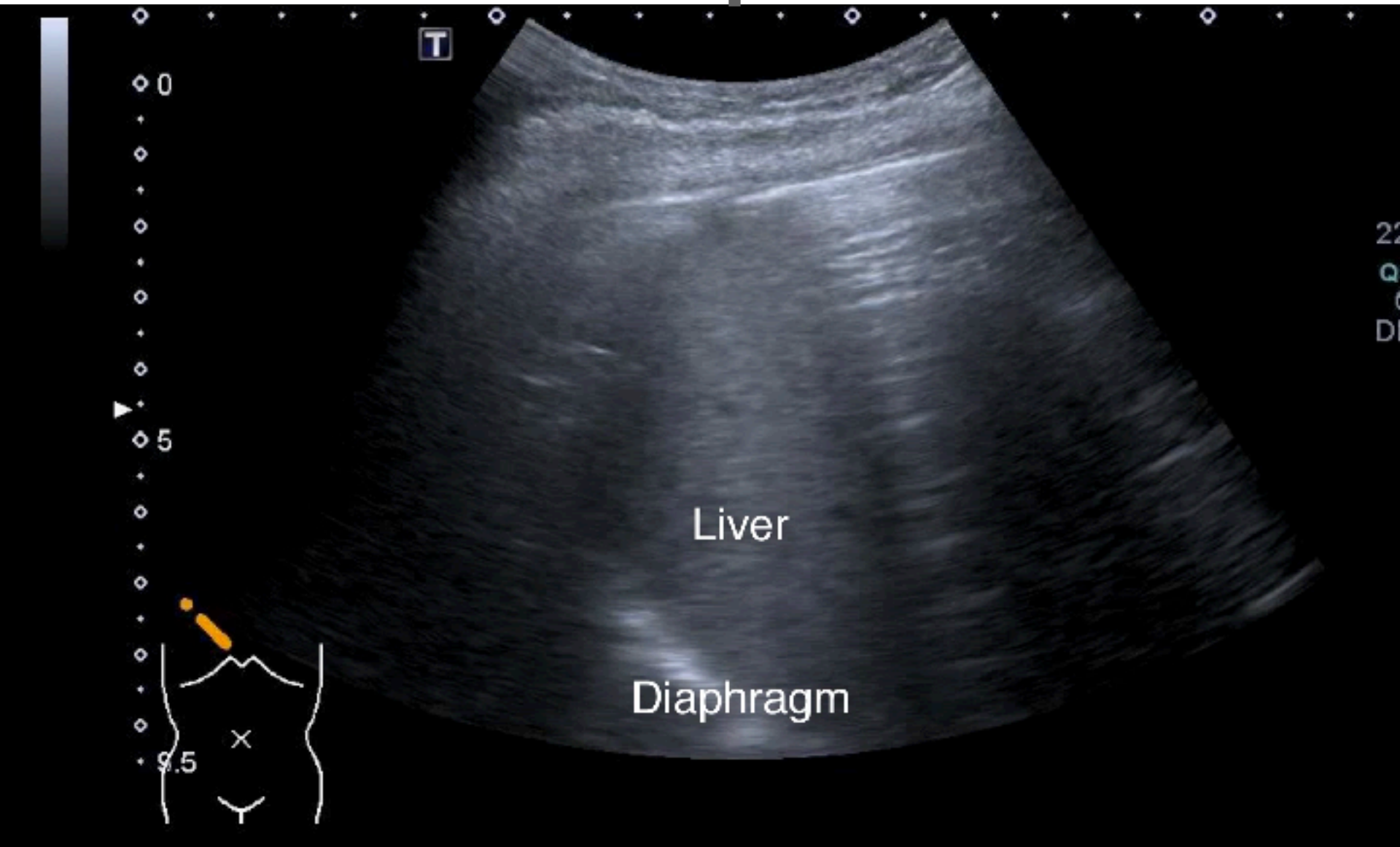
Shock management & Bleeder survey



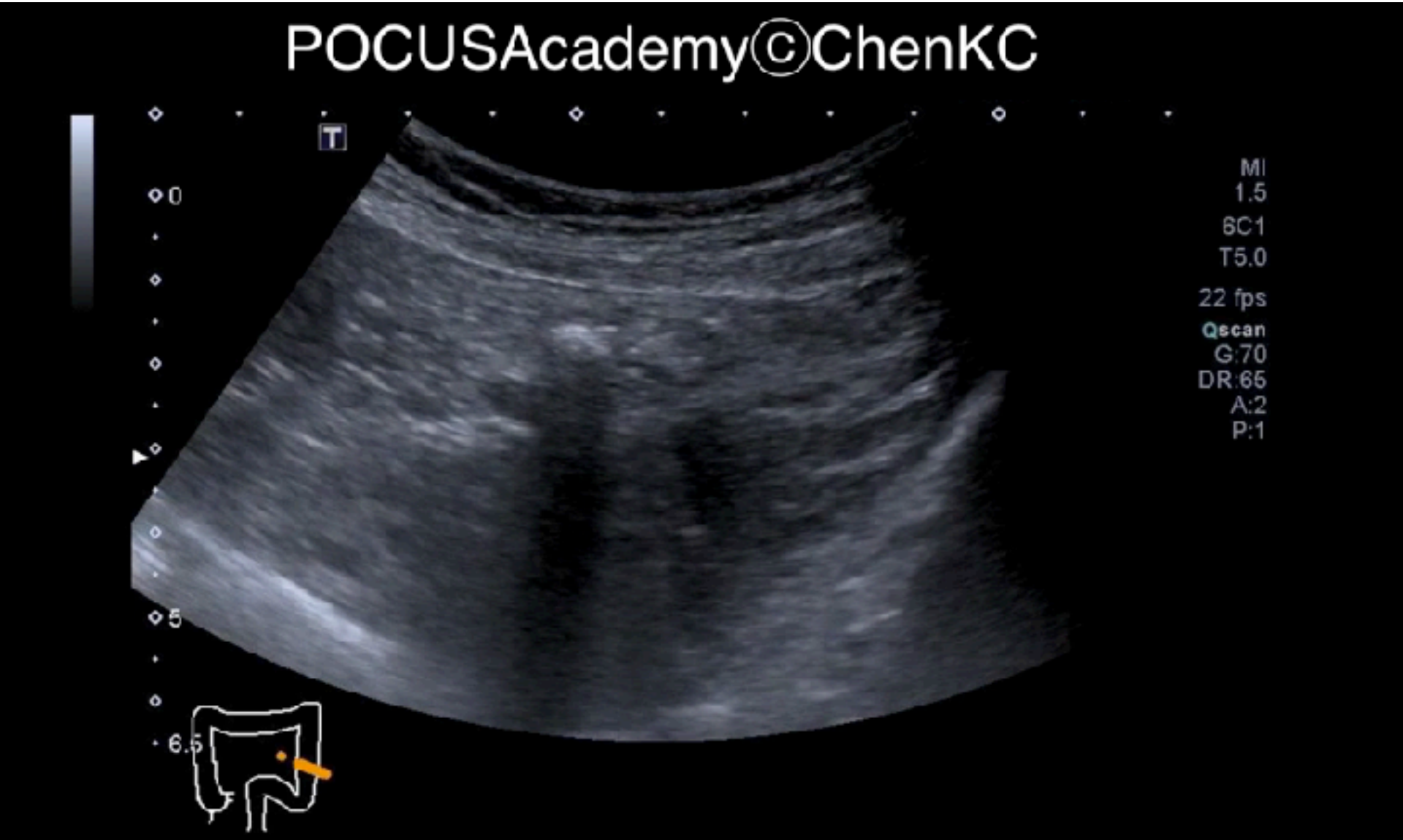
2F, 吞下硬幣


TOSHIBA
West Garden Hospital
Abdomen
Precision
A Pure
MI
TIS
6C1
T5.0
22 fps
G 85
DR 65
A 2
P 1

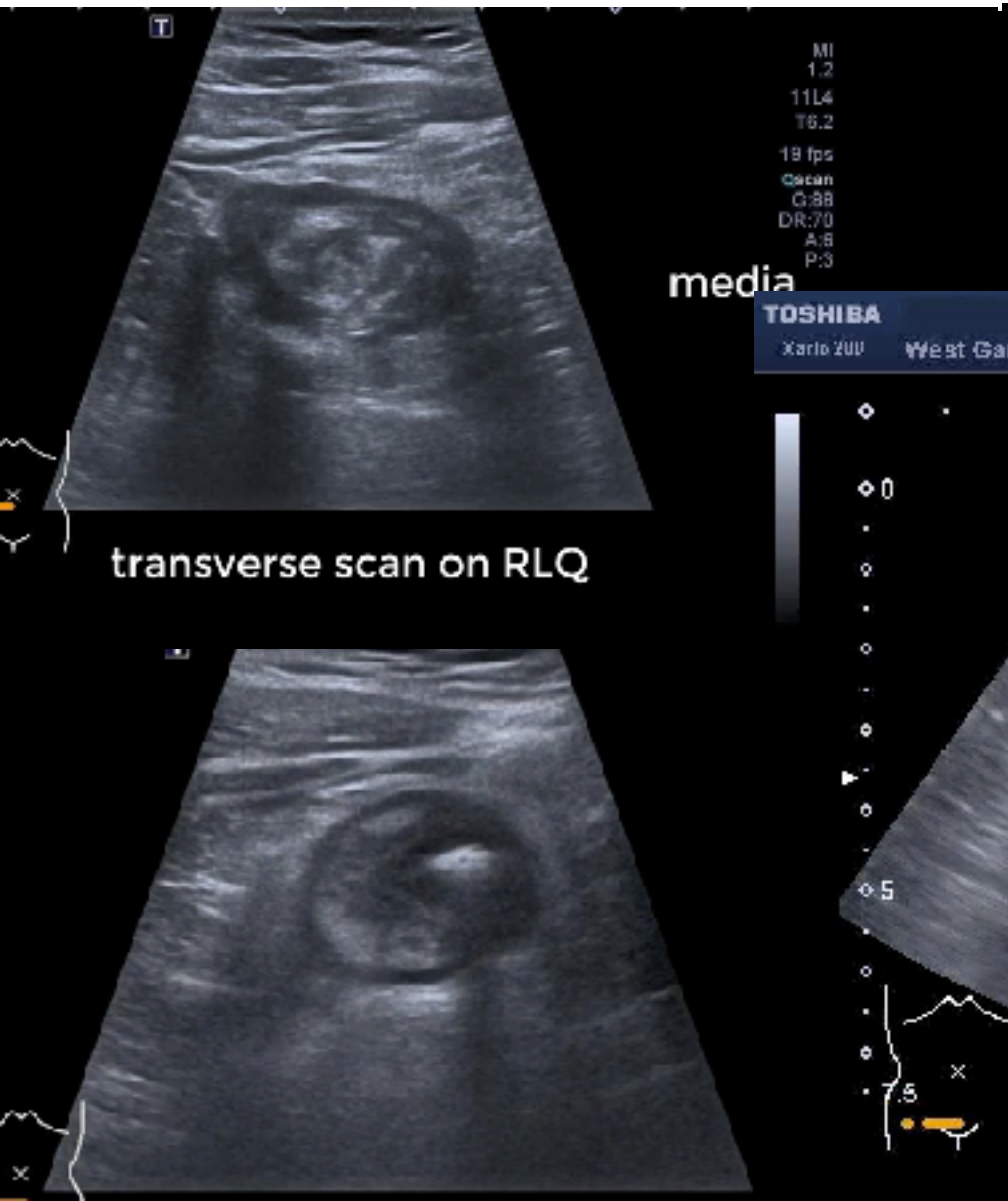
有沒有Pneumoperitoneum？



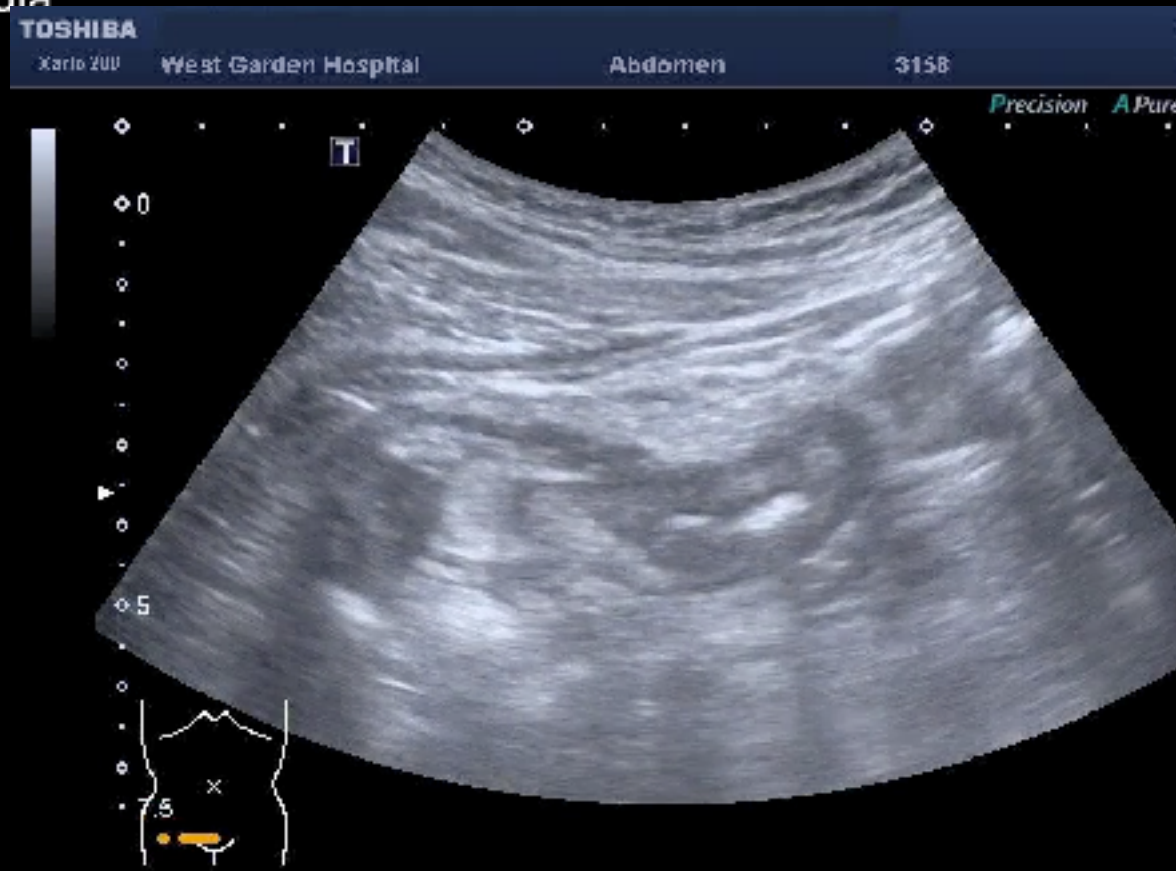
有沒有Diverticulitis ?



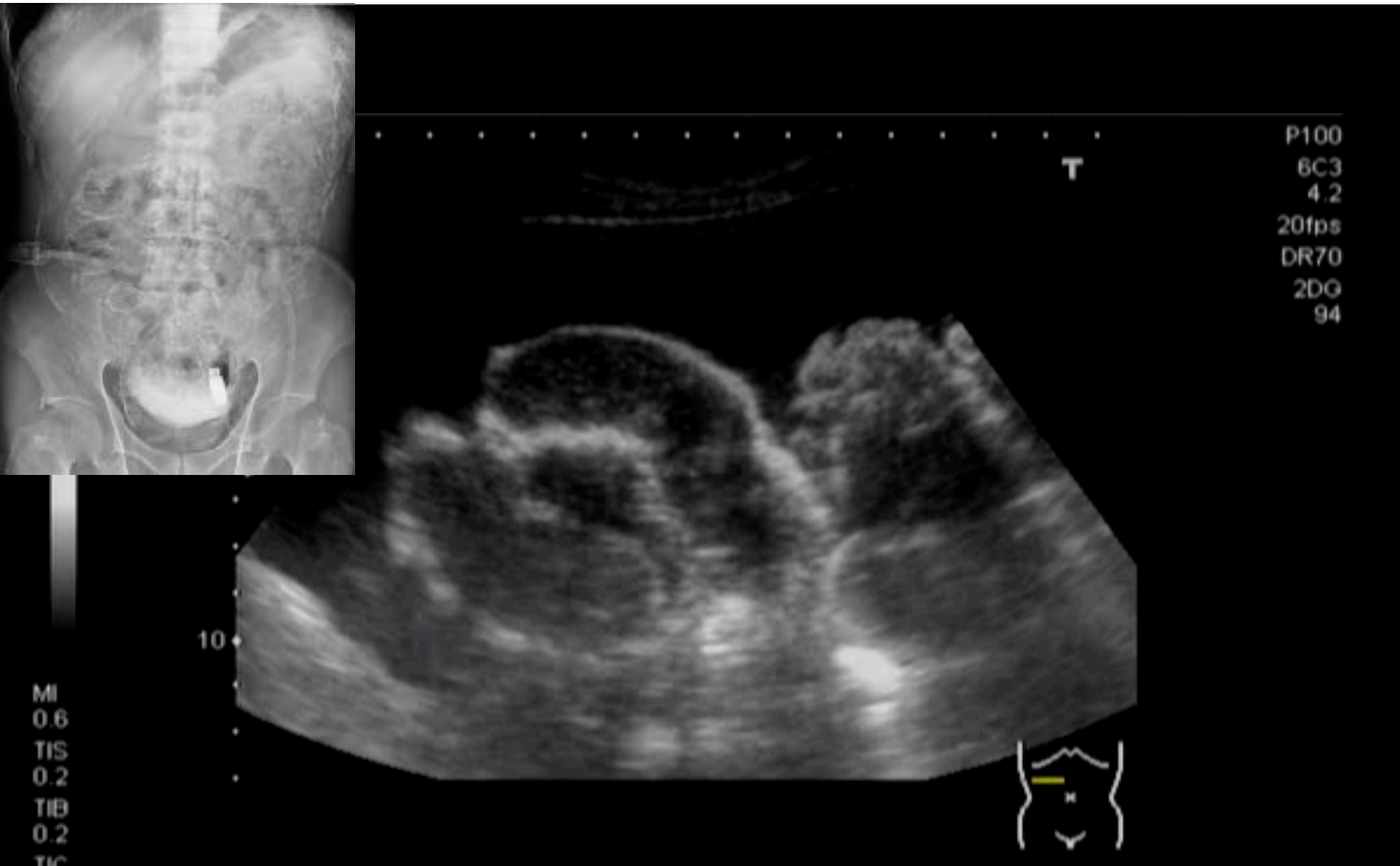
RLQ pain



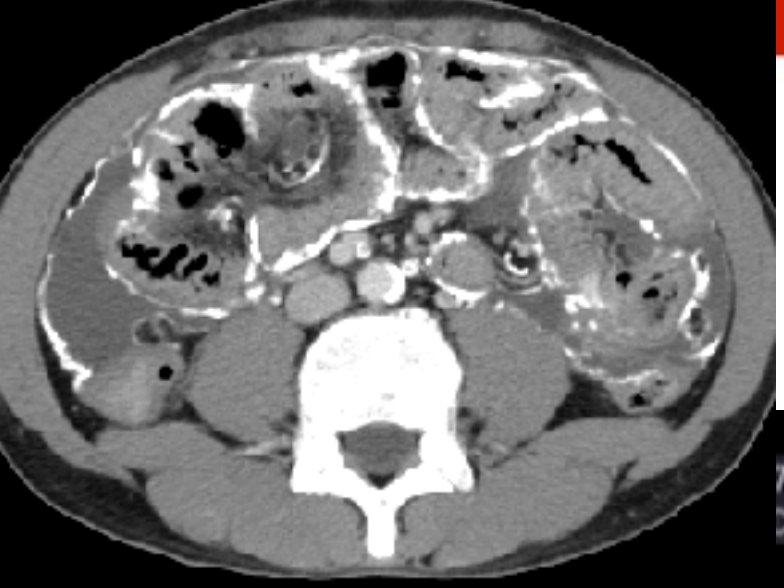
Terminal ileitis
Diverticulosis

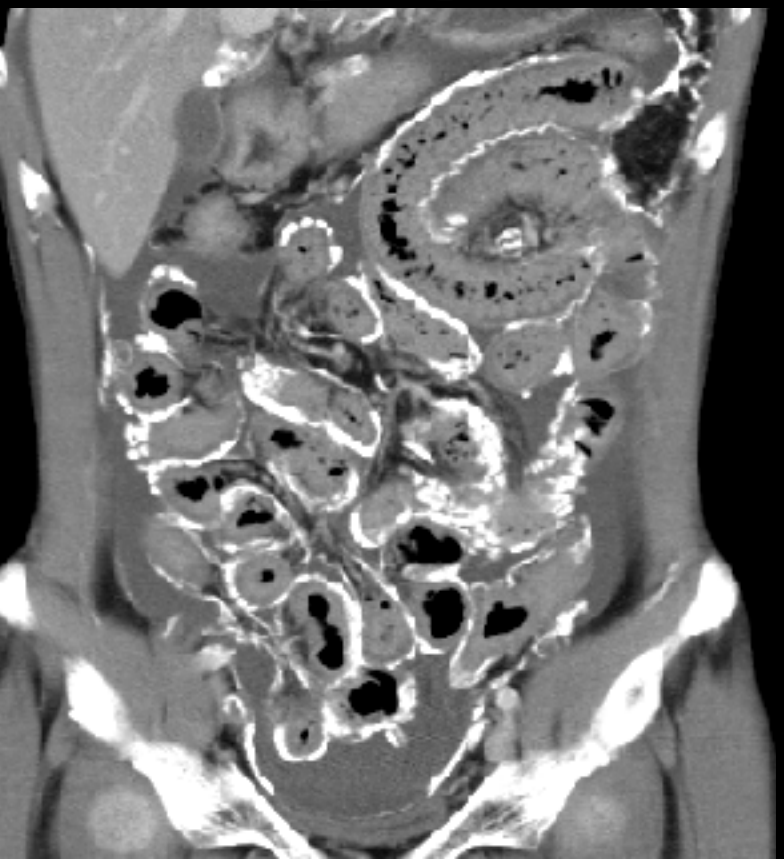


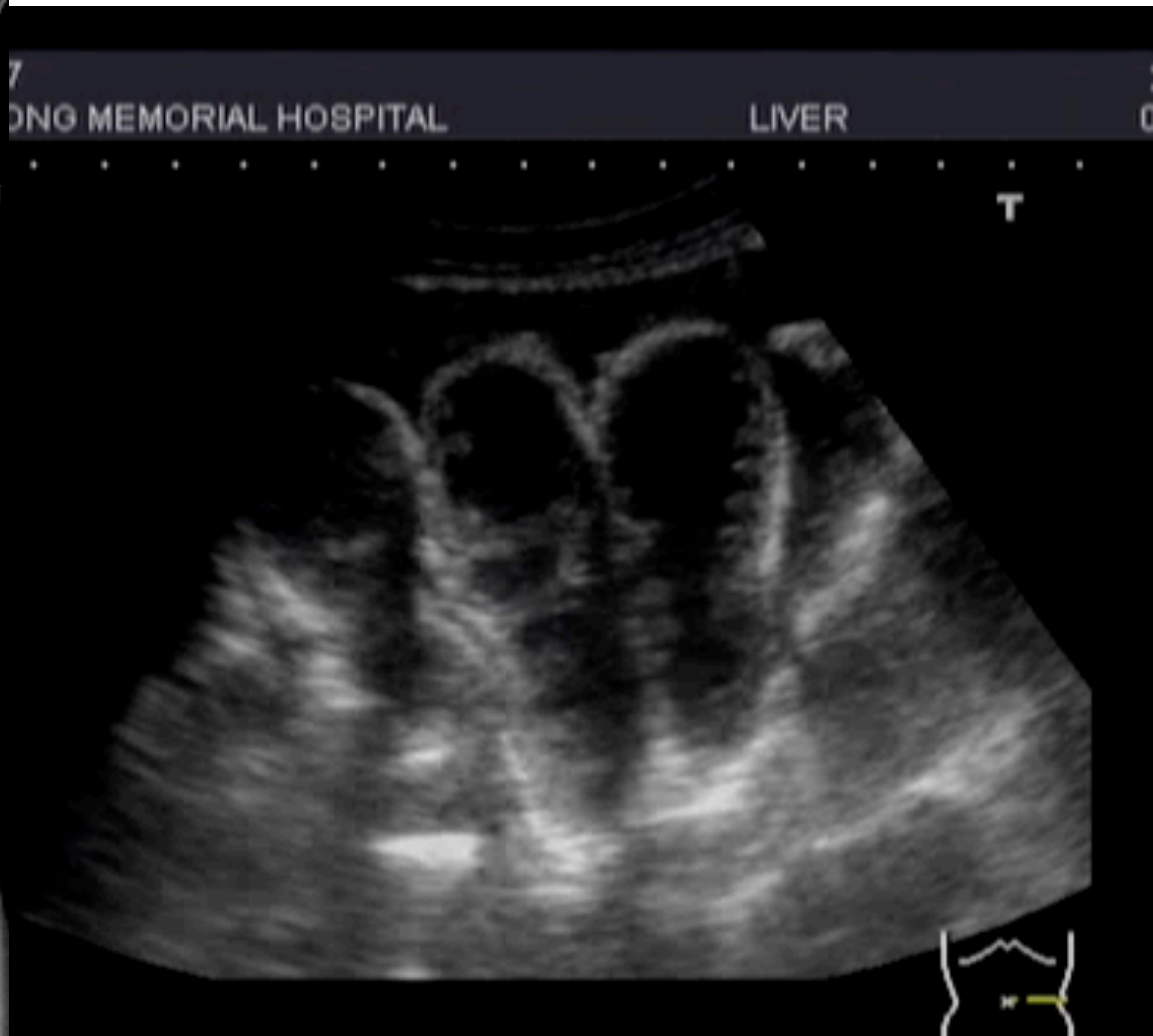
腹痛最可能的原因?



Encapsulating Peritoneal Sclerosis







Take Home Message

水氣腸脂

1. 腸胃道壁增厚 (>5mm/1cm 胃)
2. 腸道漲大（3cm & 5cm)
3. 腸胃道壁分層消失
4. 蠕動減少
5. 用超音波探頭壓迫時不變形
6. 病灶通道內容物減少
7. 病灶附近其他變化(LN, Fat, Ascites)