



BASIC ABDOMINAL POCUS

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POCUSacademy.com

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台灣急診醫學通訊 Taiwan Emergency Medicine Bulletin



「台灣急診醫學通訊」是一本以實踐為基礎，藉由循證廣泛的臨床實驗與知識最新的資訊及專業觀點，提供讀者們各種臨床診斷、處置、照護作業的解決方案，提升急診教育訓練廣度與深度之雜誌。目前主要出版焦點包括各種臨床議題、超音波、影像學、心電圖、診斷學、師資培育、災難、公共衛生、醫學新知、醫師福祉等等專欄。希望藉由這個平台，讓一群具有專業和理念的作者們可以與急診醫學會員、相關領域專科醫師、住院醫師、專科護理師、護理師、救護技術員及醫學生等夥伴，分享關鍵的知識與訊息。

"Taiwan Emergency Medicine Bulletin" is a Continuing Medical Education (CME) magazine grounded in evidence-based practice. It offers solutions for clinical diagnosis, management, and procedures through the latest information and professional perspectives in emergency medicine. The primary publication focuses currently include various clinical issues, ultrasound, radiology, electrocardiograms, diagnostics, faculty development, disaster medicine, public health, medical innovations, physician well-being, and other specialized columns. This platform aims to enable a group of professional and like-minded authors to share crucial knowledge and information with members of the Taiwan Society of Emergency Medicine, as well as related specialists, resident physicians, nurse practitioners, nurses, emergency medical technicians, and medical students.

超音波專欄 Ultrasound



陳國智醫師
Kuo-Chih Chen, MD.

Image



林秋梅醫師
Chiu-Mei Liu, MD, PhD.

心電圖專欄 ECG



王宗倫醫師
Tsong-Luen Wang, MD, PhD.



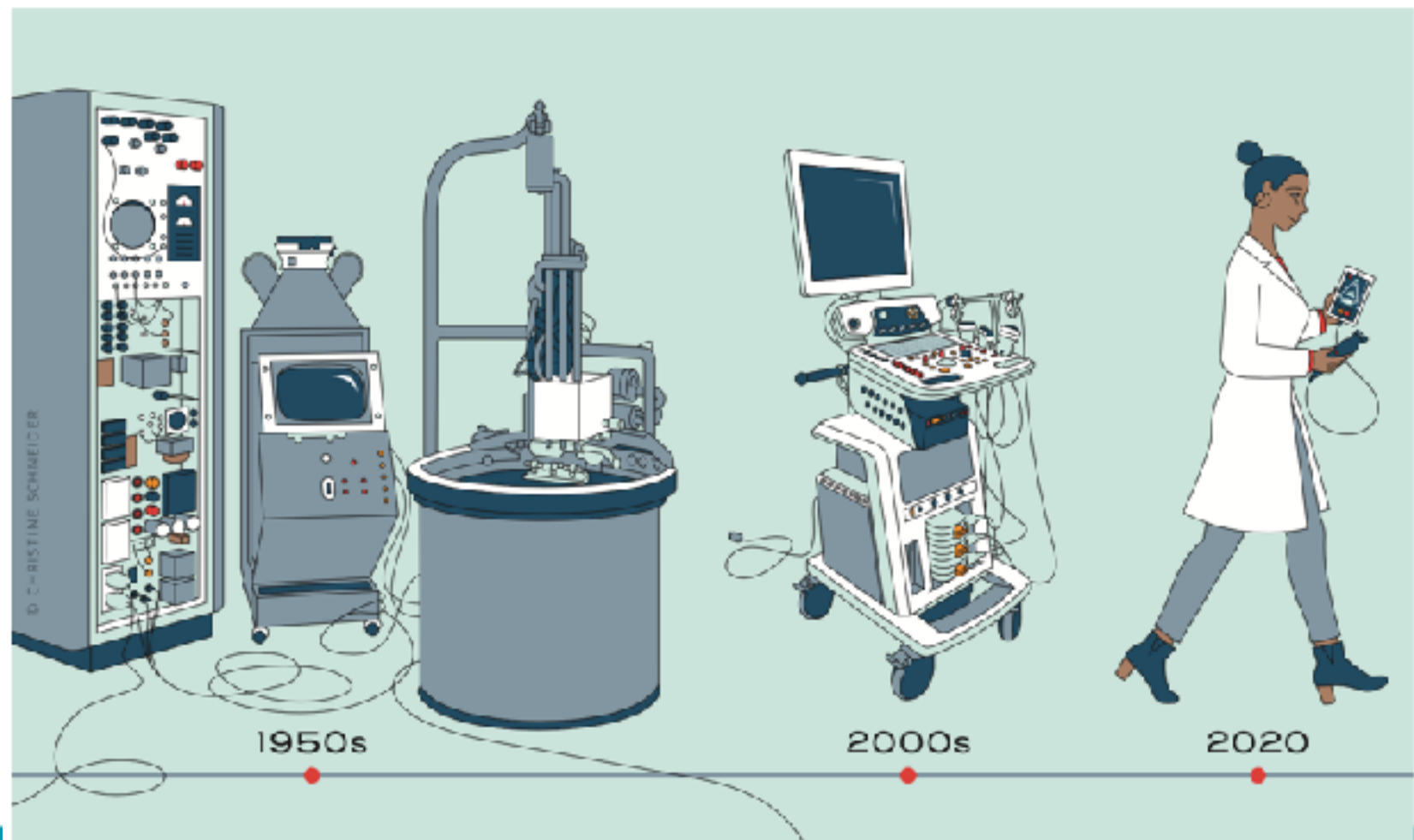
黃英傑醫師
Ying-Chieh Huang, MD, MS.

Conflict of Interest





Point-of-Care Ultrasound: A Practical Guide for Primary Care



Point-of-Care Ultrasonography

Michael J. Arnold, MD, and Christopher E. Jonas, DO

Uniformed Services University of the Health Sciences, Bethesda, Maryland

Rachel E. Carter, MD, Naval Hospital Jacksonville, Jacksonville, Florida

Point-of-care ultrasonography (POCUS) is performed by a physician in the emergency department and is standard practice in obstetric, emergency, and musculoskeletal medicine. When compared to CT, POCUS is equivalent in screening for abdominal aortic aneurysm and as accurate in diagnosing pneumonia and detecting acute decompensation of liver disease. POCUS has high accuracy for diagnosing deep vein thrombosis and is equivalent to computed tomography for identifying

The hands-on, "sink-or-swim" approach of POCUS advancement skills, fosters

“The ‘telling’ nature of the physical diagnosis stimulates communication, and satisfaction.”

of a
can a
diagno
effusion

ography benefit of Institute of others offer h

for credentialing. (*Am Fam Physician*. 2020;101(5):275-285. Copyright © 2020 American Academy of Family Physicians.)



居家POCUS應用

胸腔

泌尿

IVC



台灣在宅醫療學會
Taiwan Society of Home Health Care





診
斷

監
測

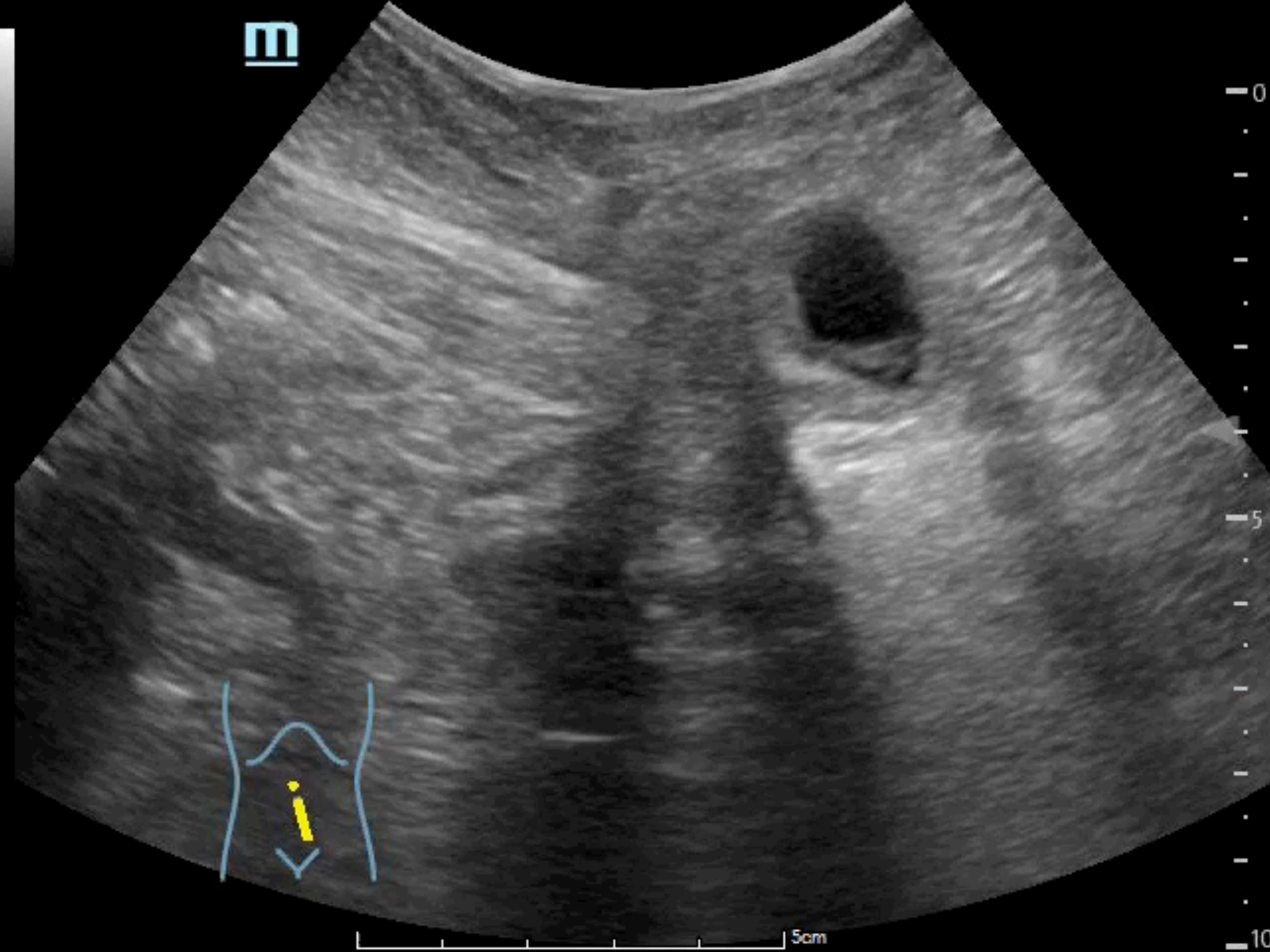


介
入

POINT OF CARE ULTRASOUND

Provider - Probe - Patient

~ 存在於臨床需求之所在 ~



5cm

0

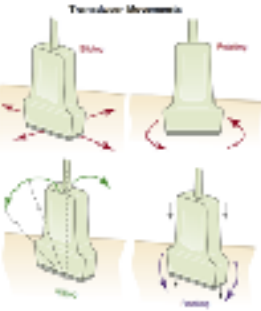
5

10



最不可漏掉的診斷

~ 你/妳和患者臨床需求所在 ~



探頭掃描 6 大技巧



X

掃

Sweep

Y

滑

Slide

Z

轉

Rotate

傾

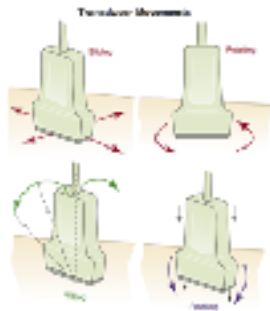
Fan/ tilt

搖

Rock

壓

Compress



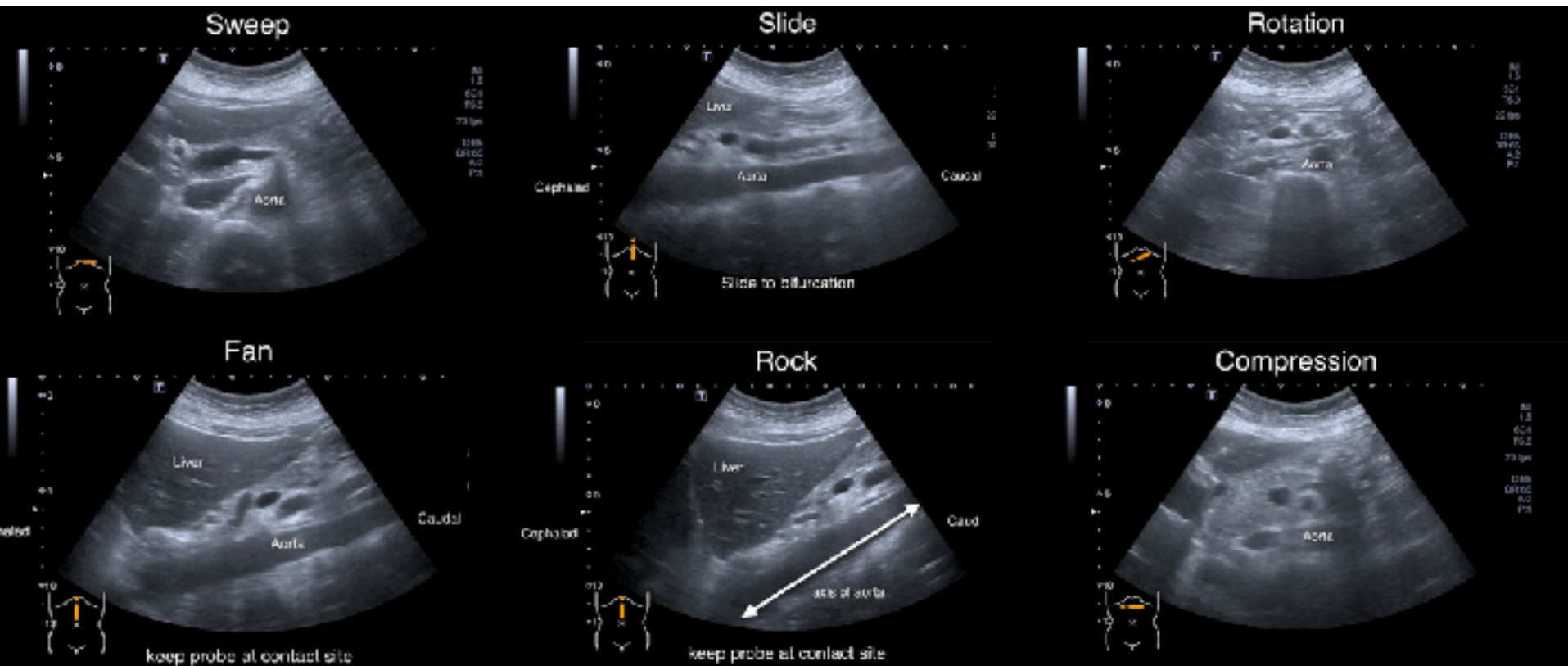
探頭掃描 6 大技巧



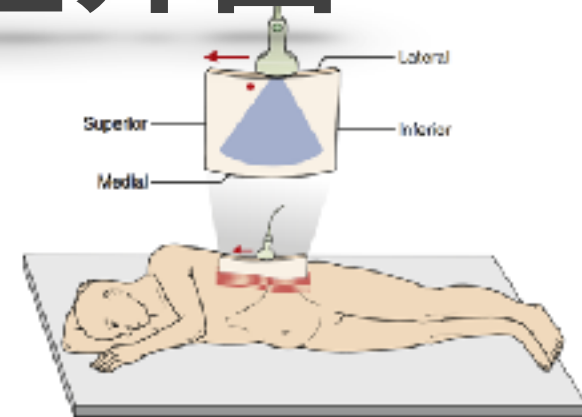
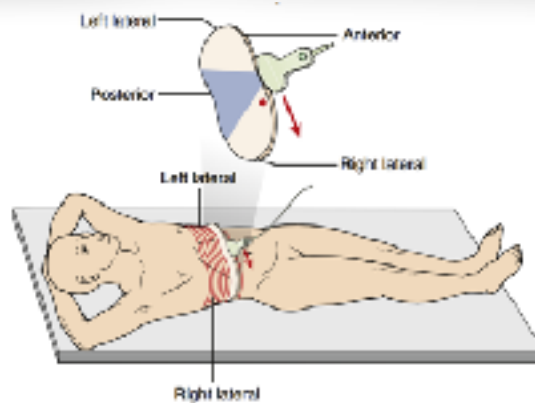
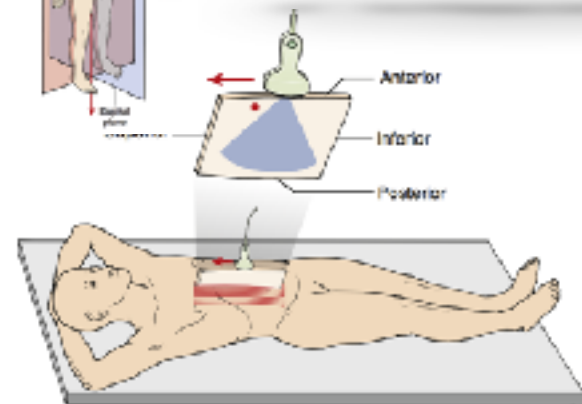
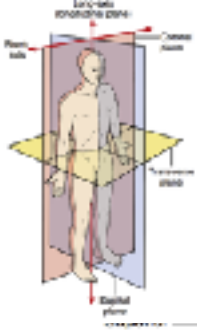
X

Y

Z



共通語言: 3D立體介面



Sagittal 縱

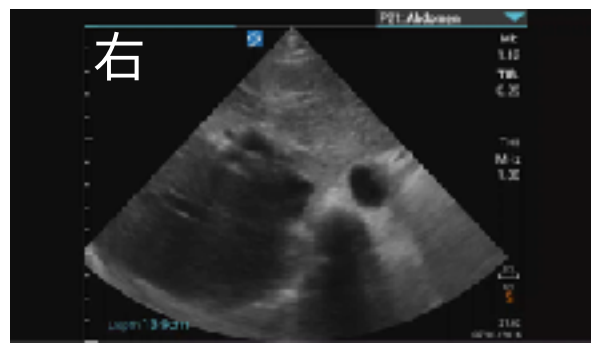
Transverse 橫

Coronal 側

頭



右



頭



掃描前用手指碰觸探頭表面確認方向

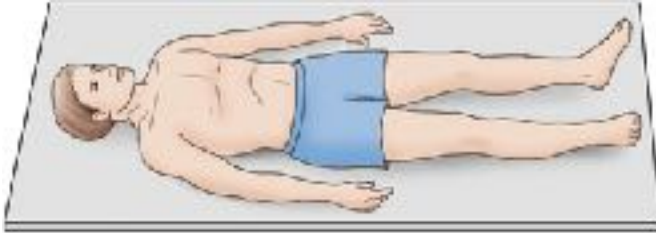
探頭選擇：腹為主／線為輔



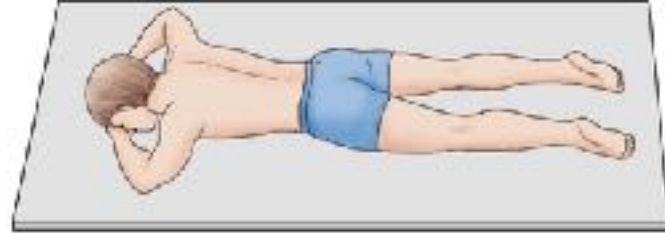
急診POCUS不用NPO

NPO的好處？

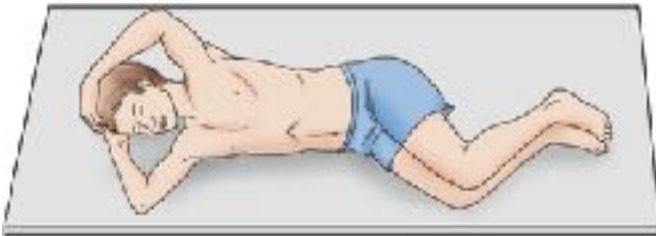
系統性掃描之後再聚焦



Supine



Prone



Right lateral decubitus



Left lateral decubitus



Right posterior oblique



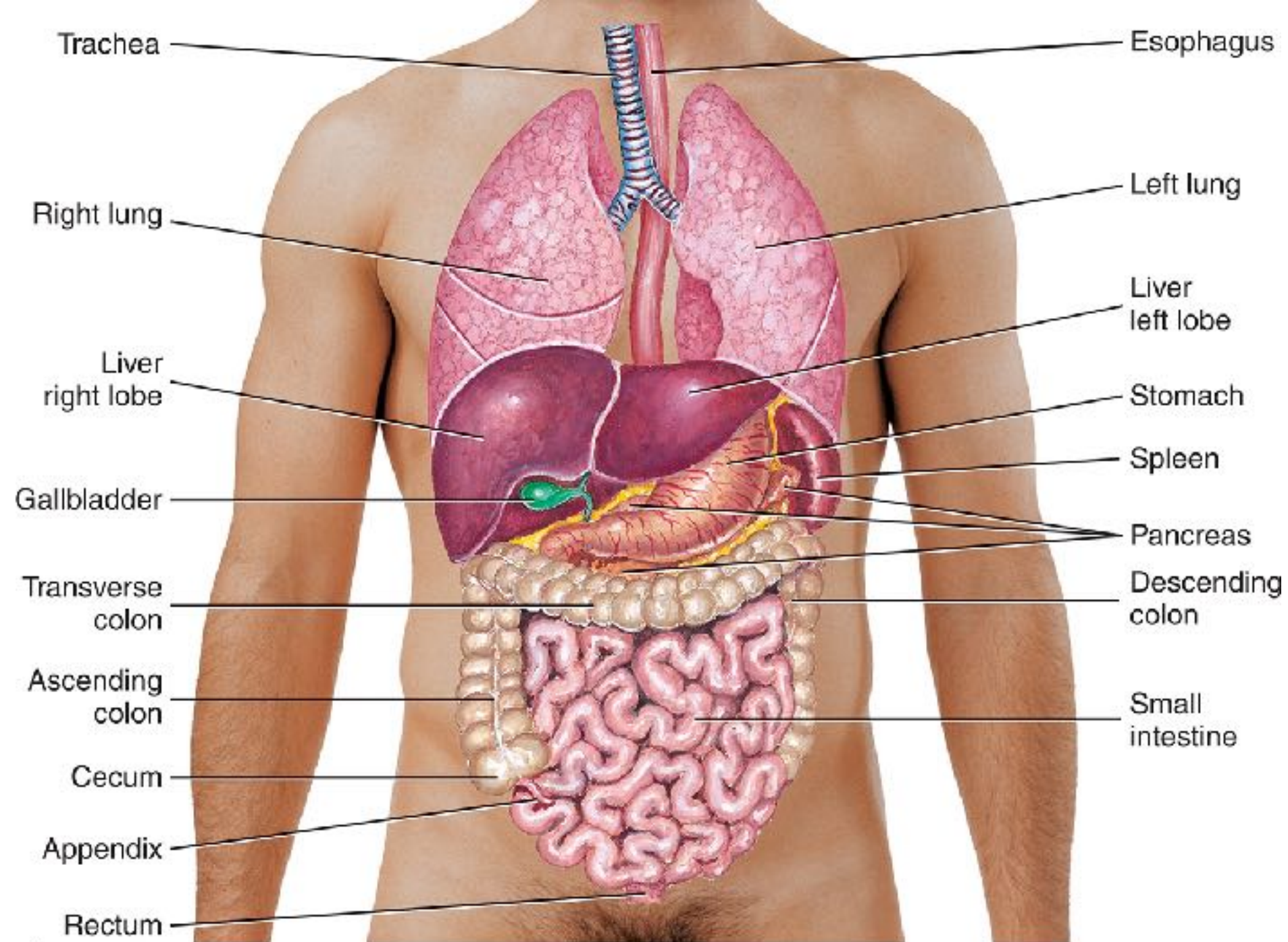
Left posterior oblique

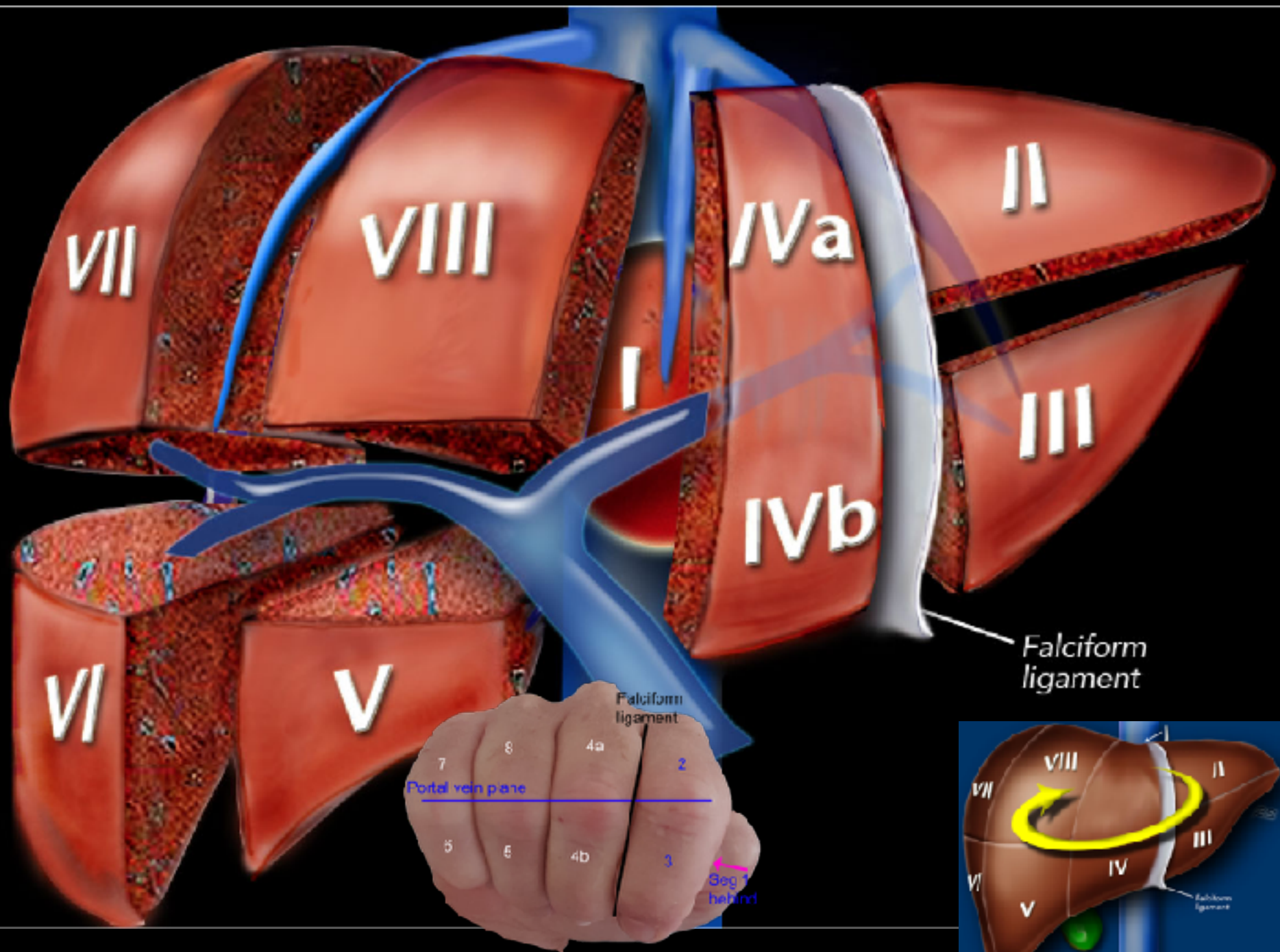


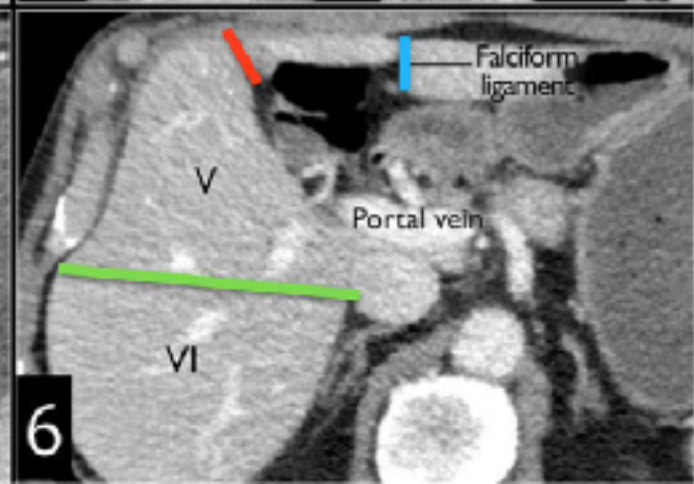
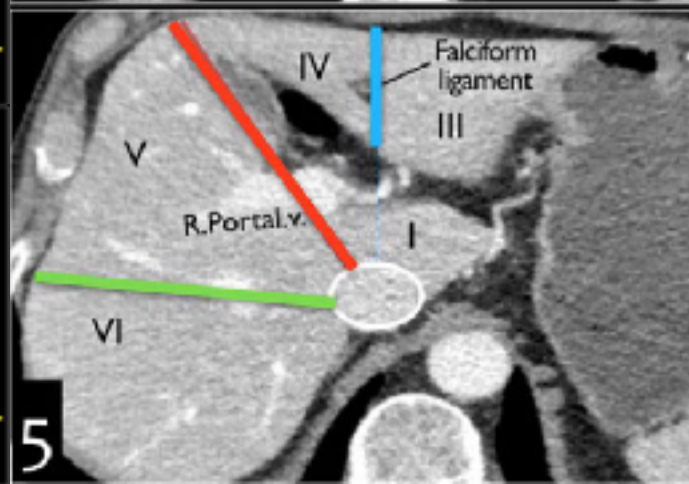
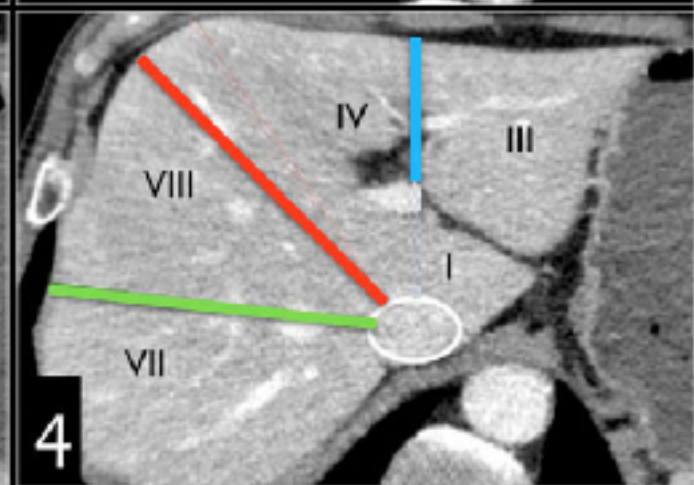
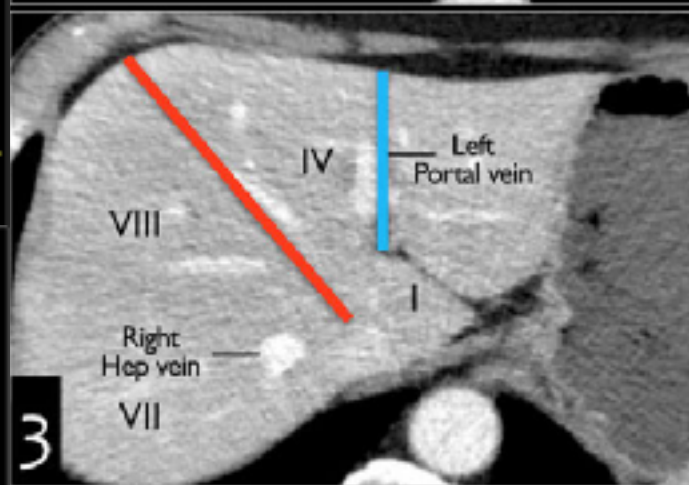
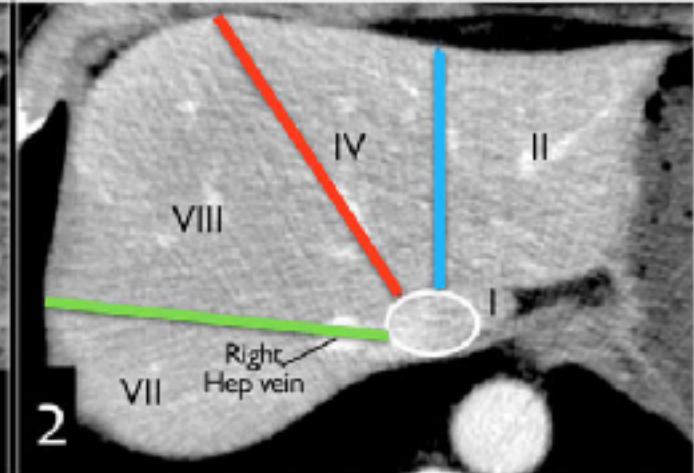
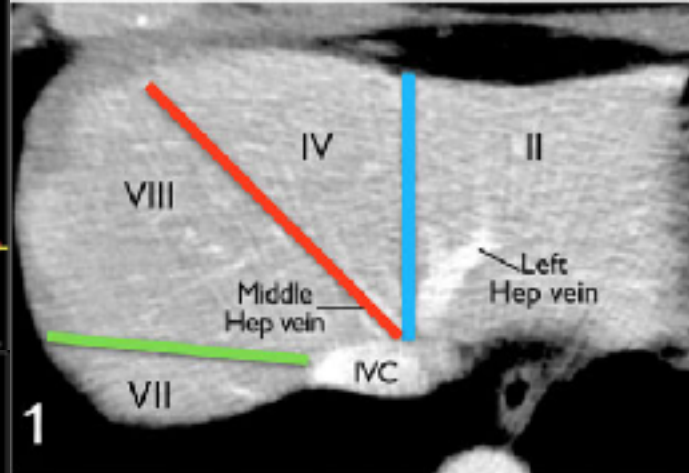
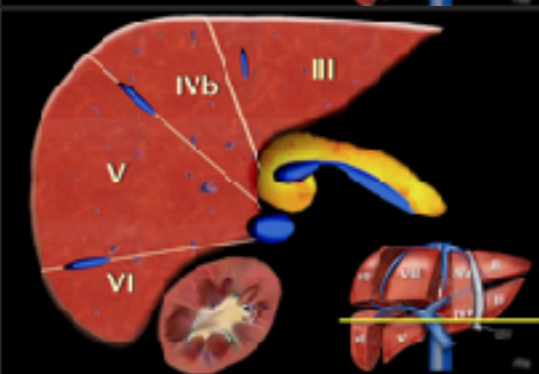
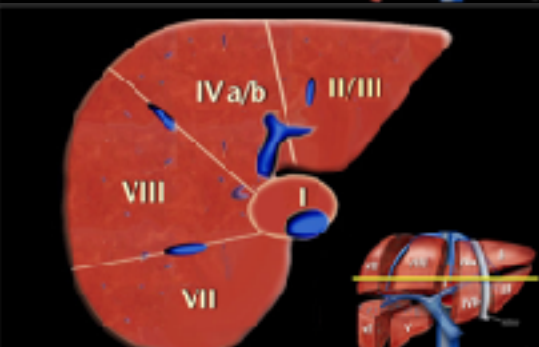
Sitting semi-erect

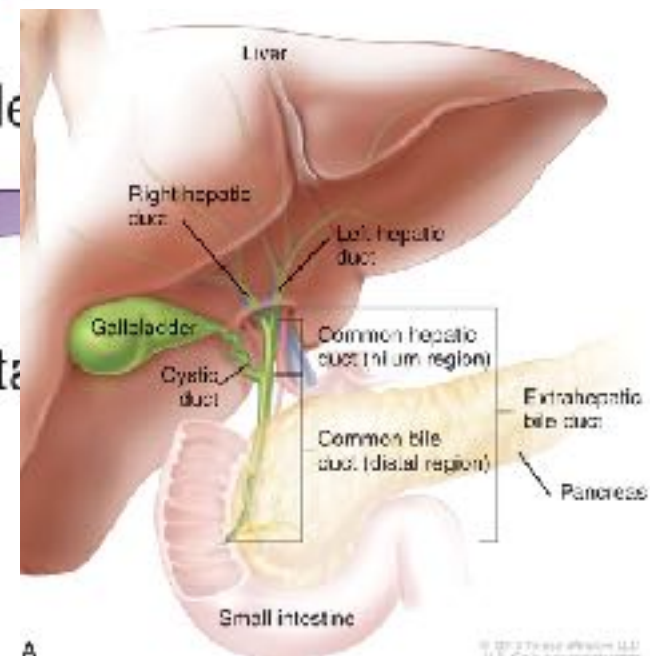
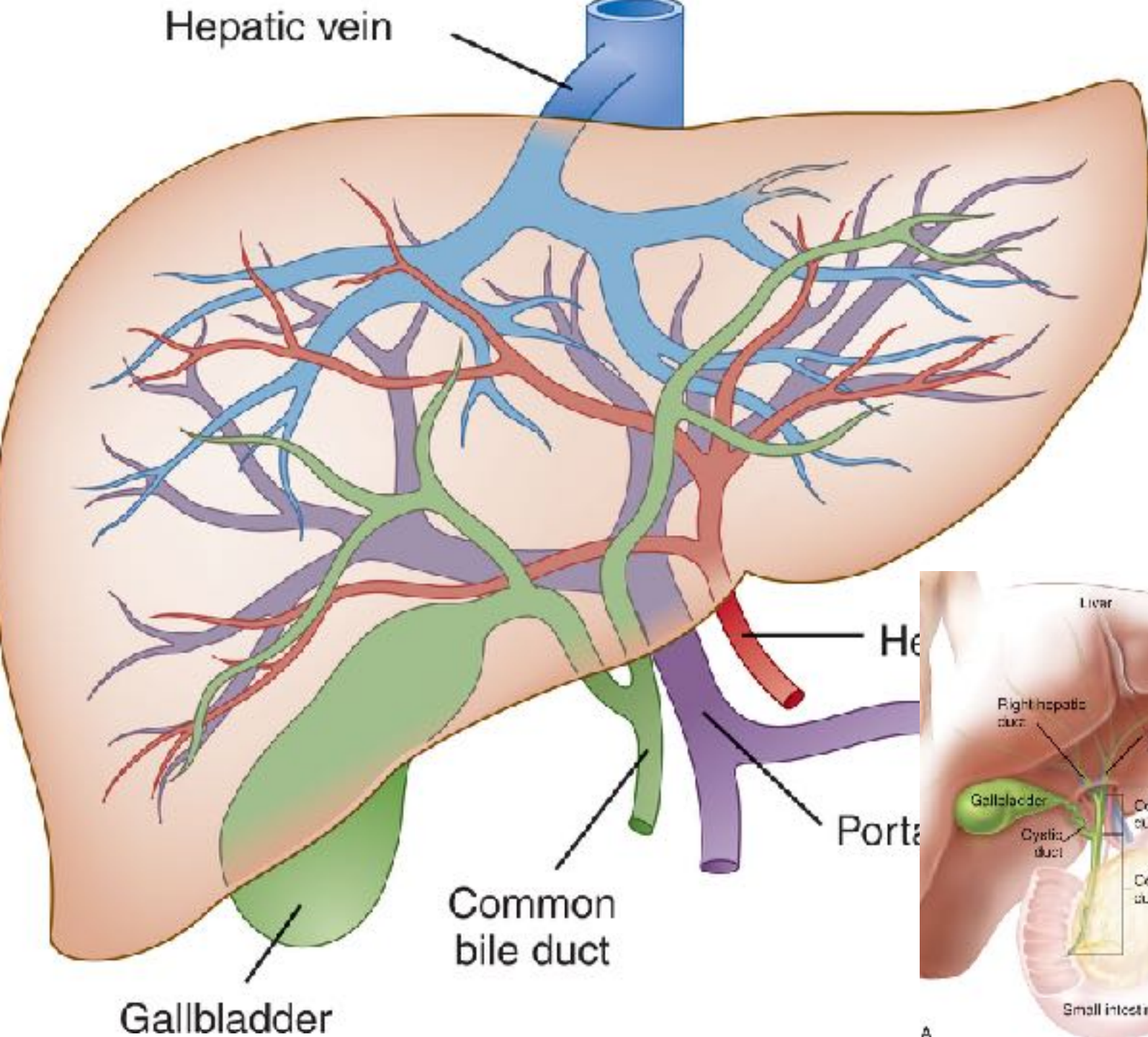


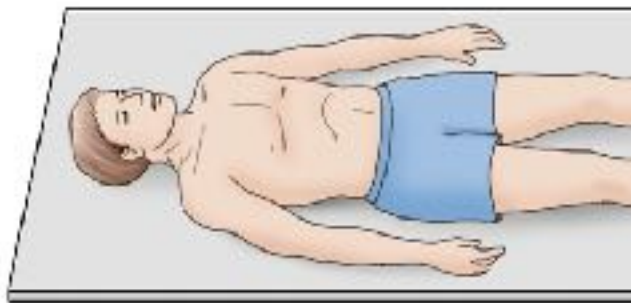
Sitting erect





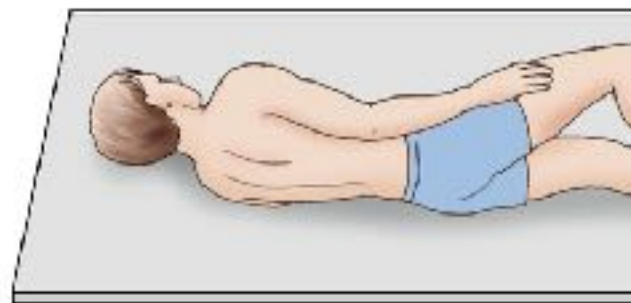






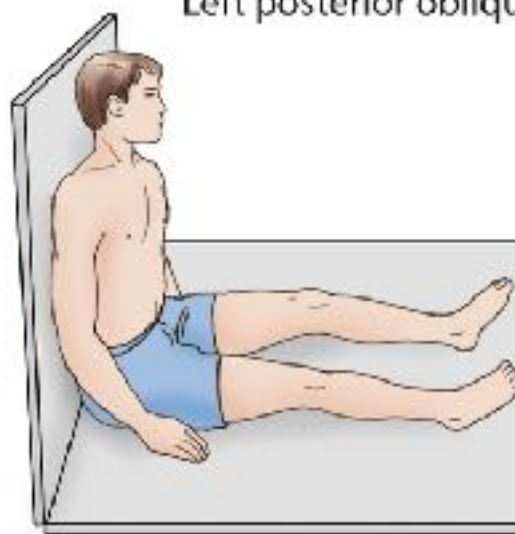
Supine

A



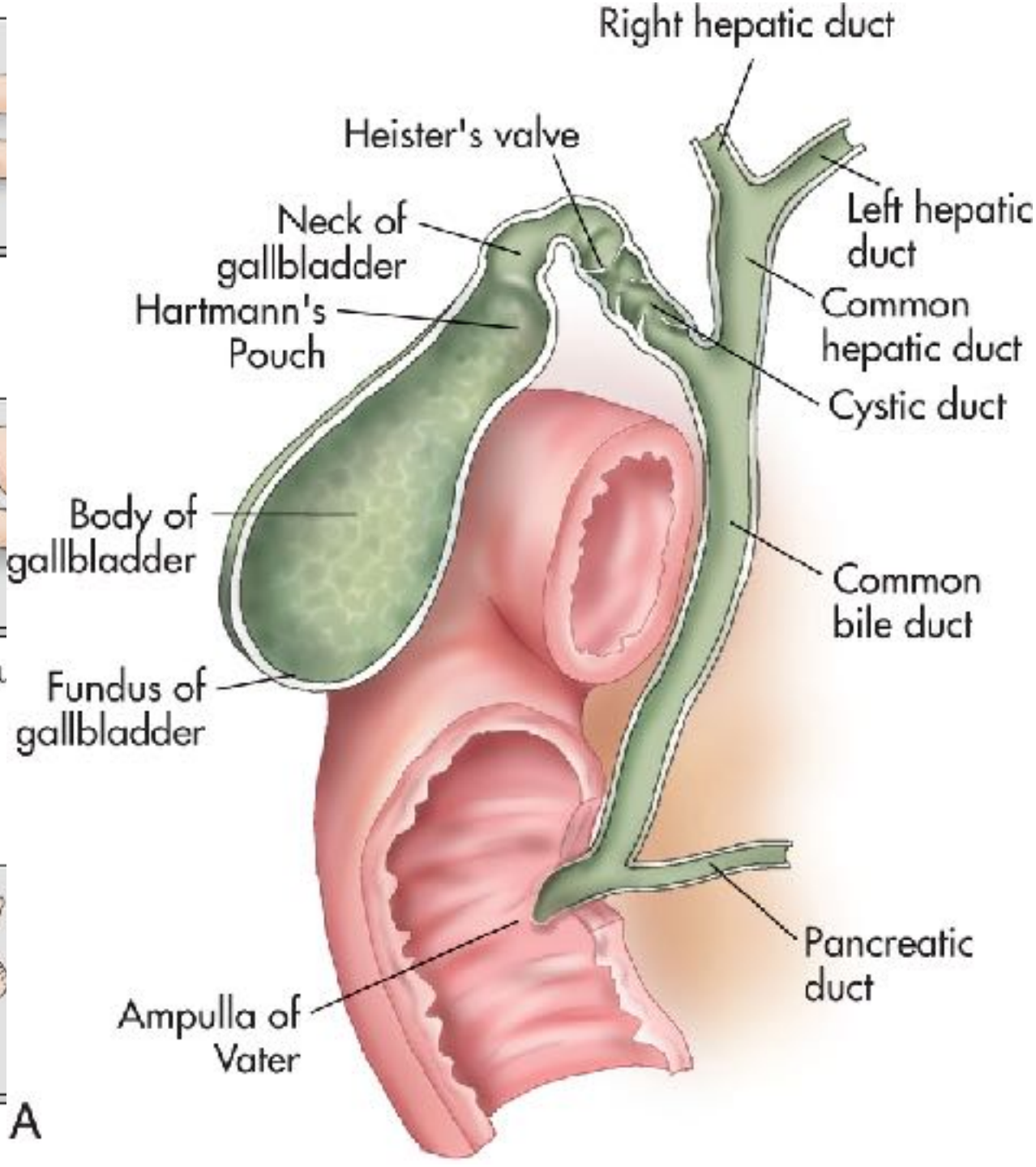
Left posterior oblique

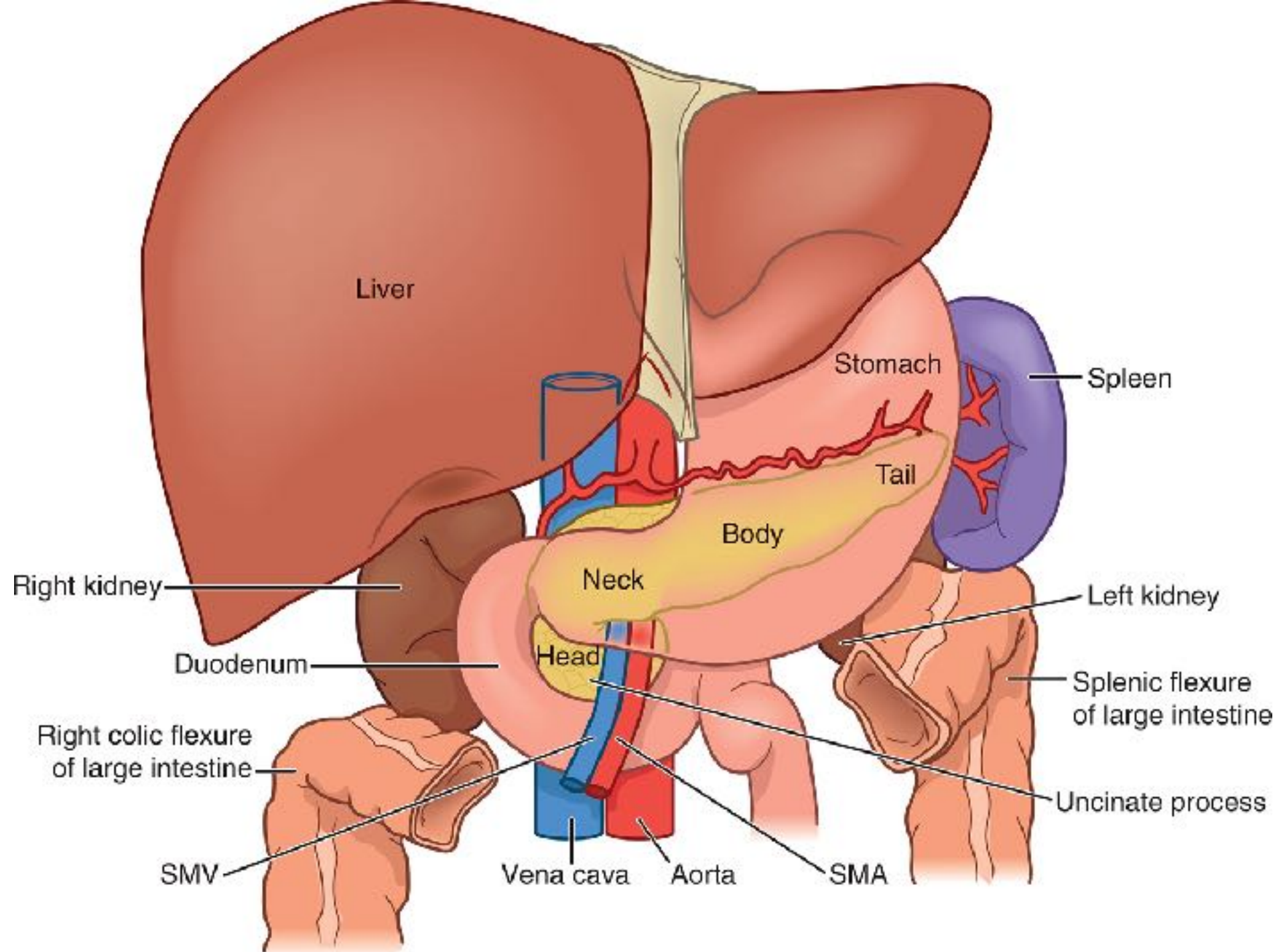
B

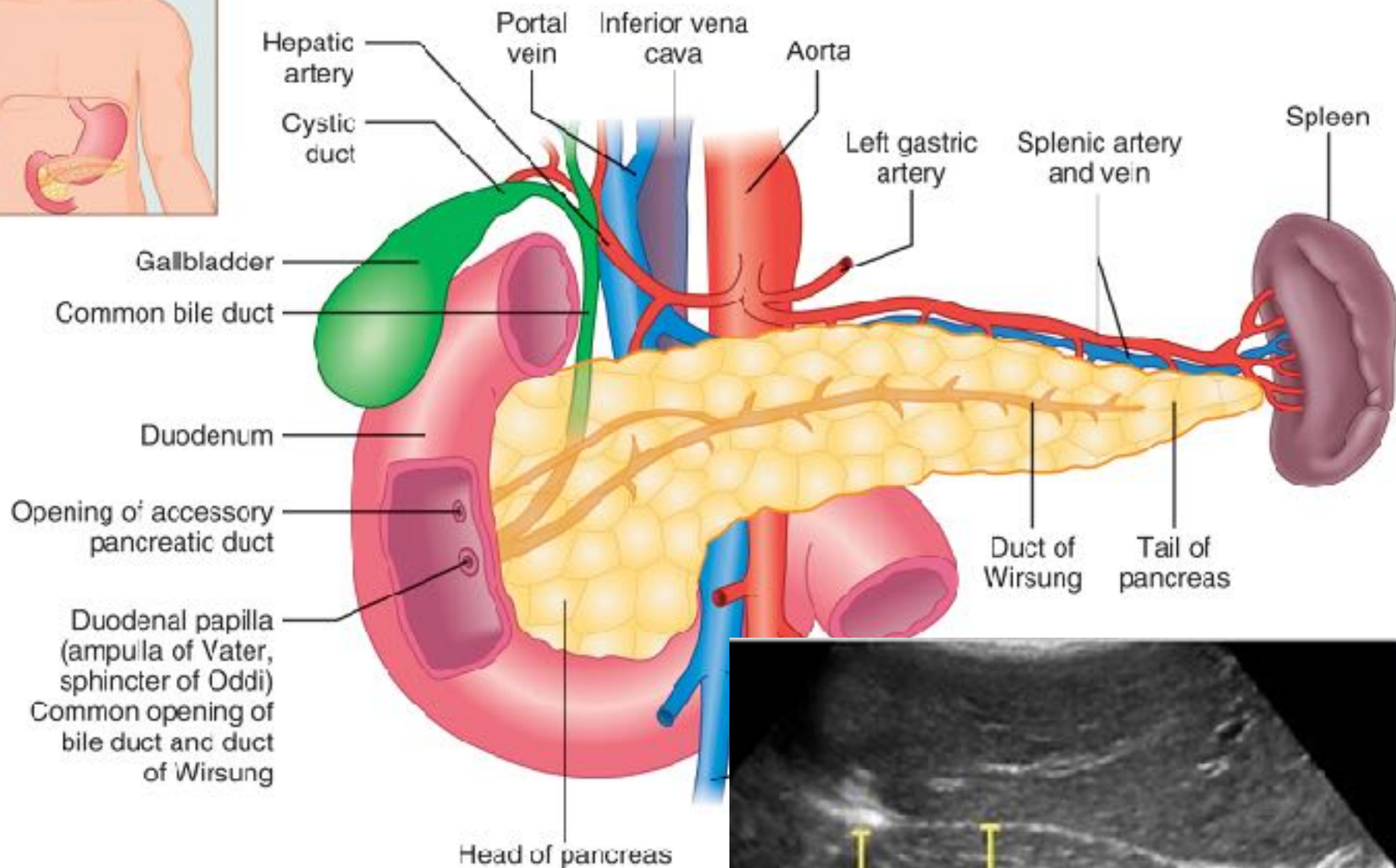


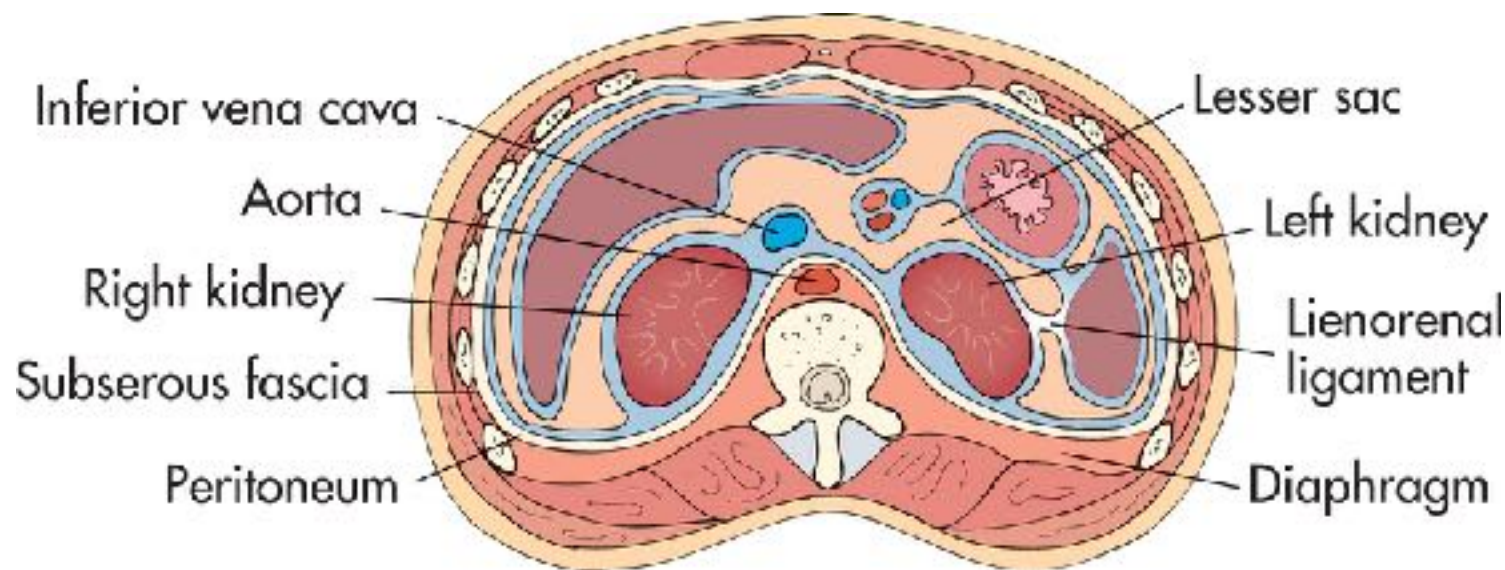
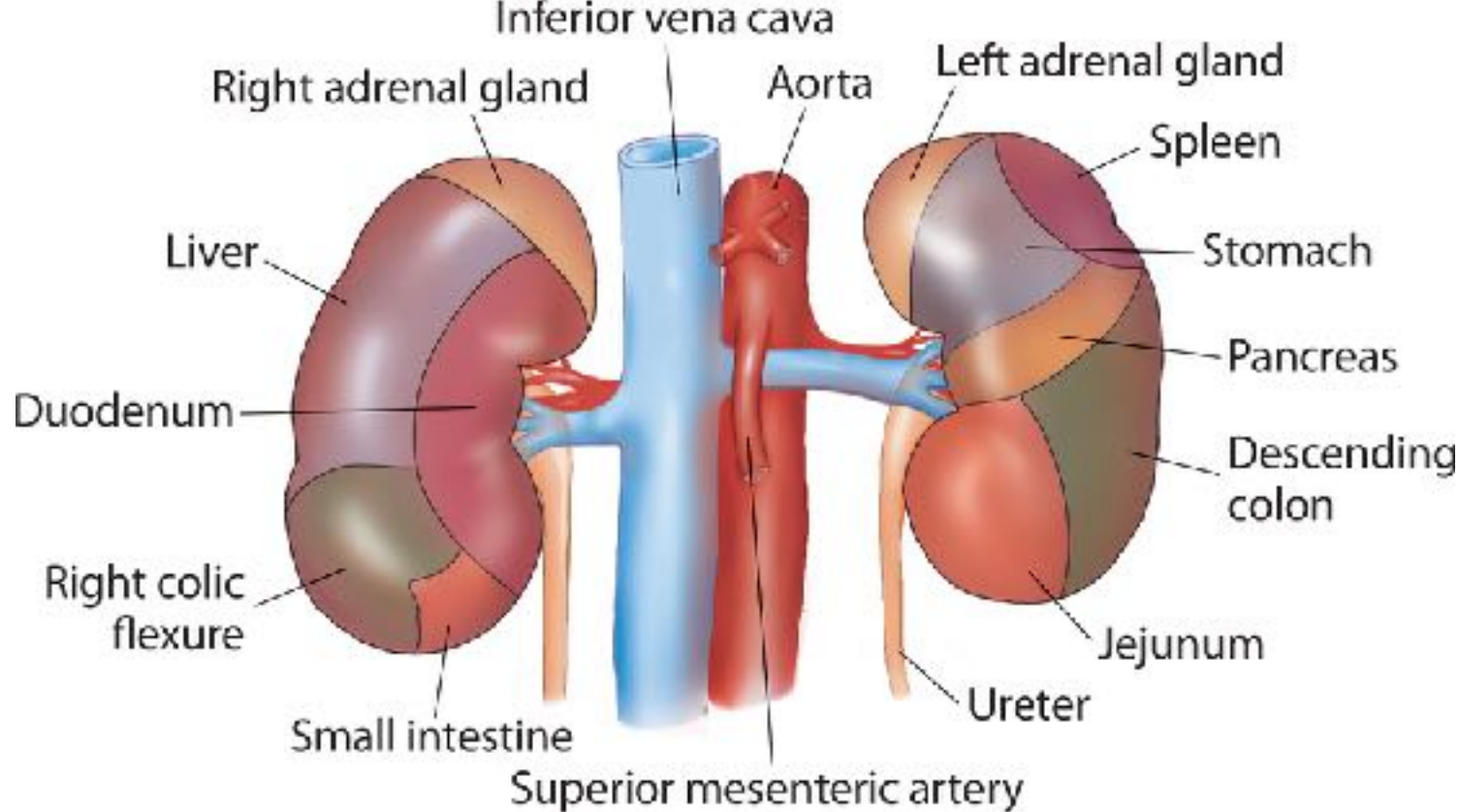
Sitting erect

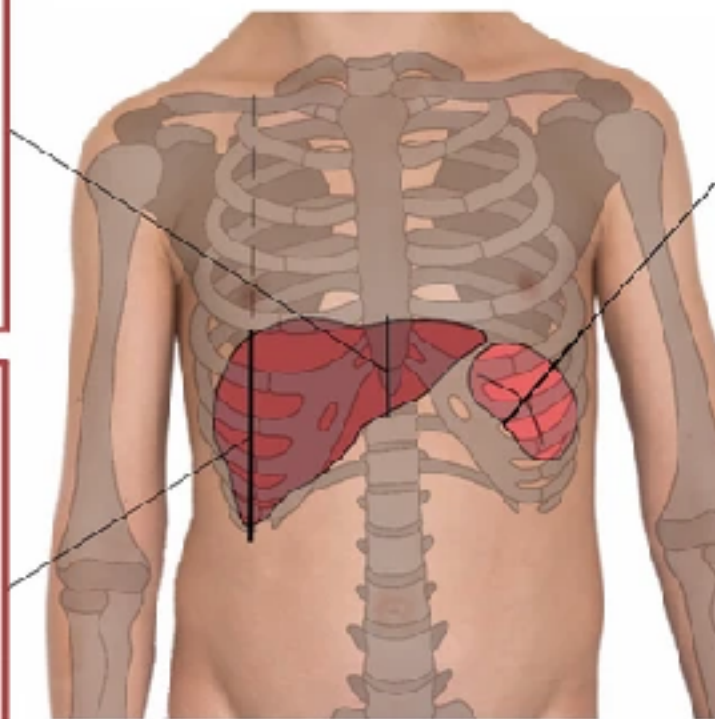
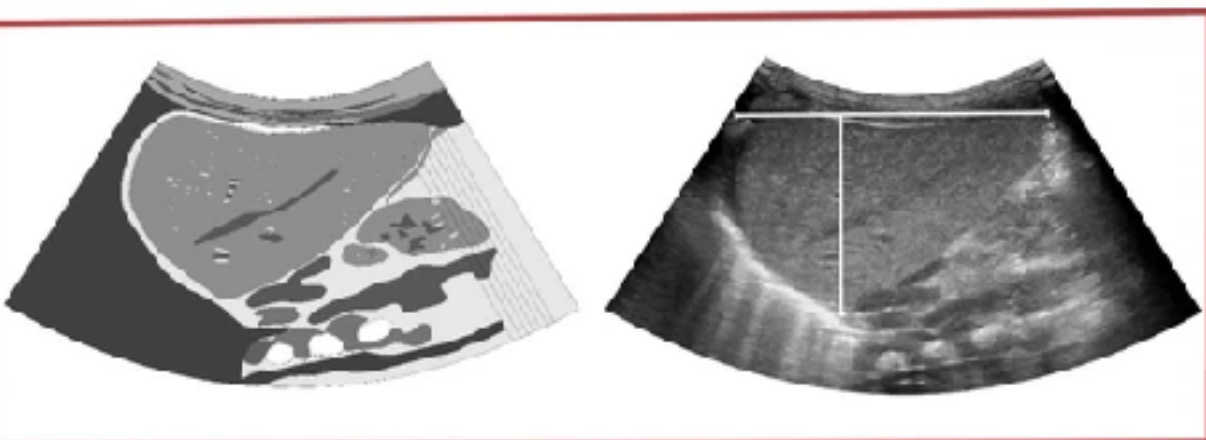
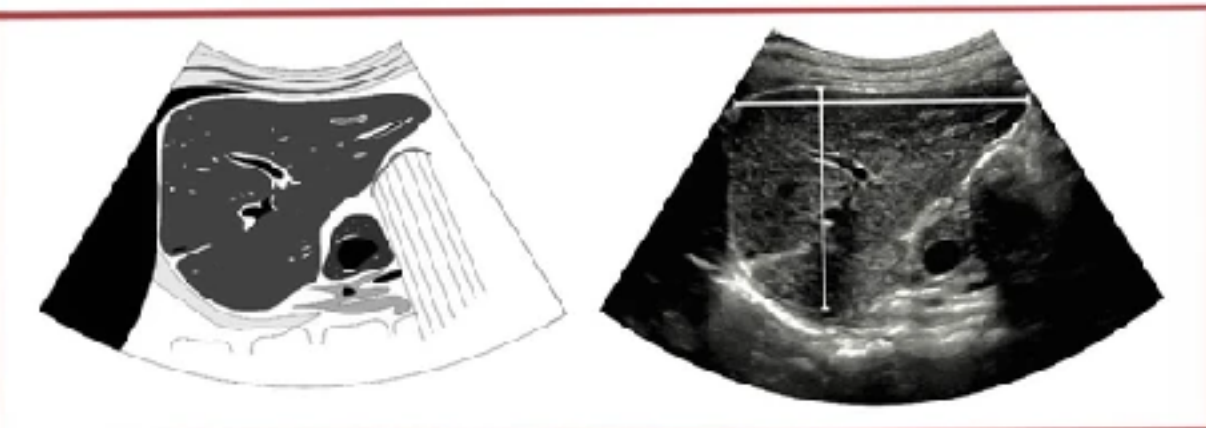
C

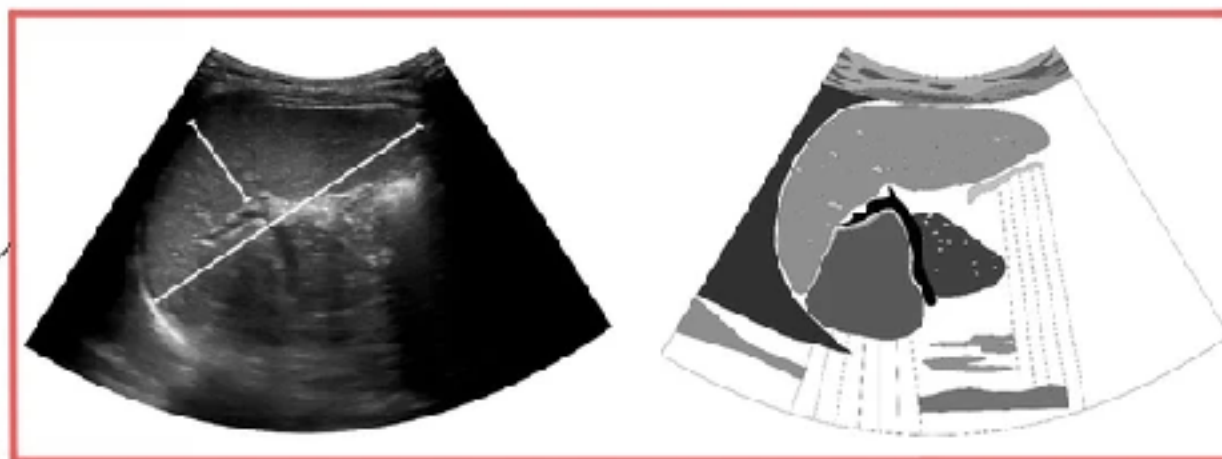
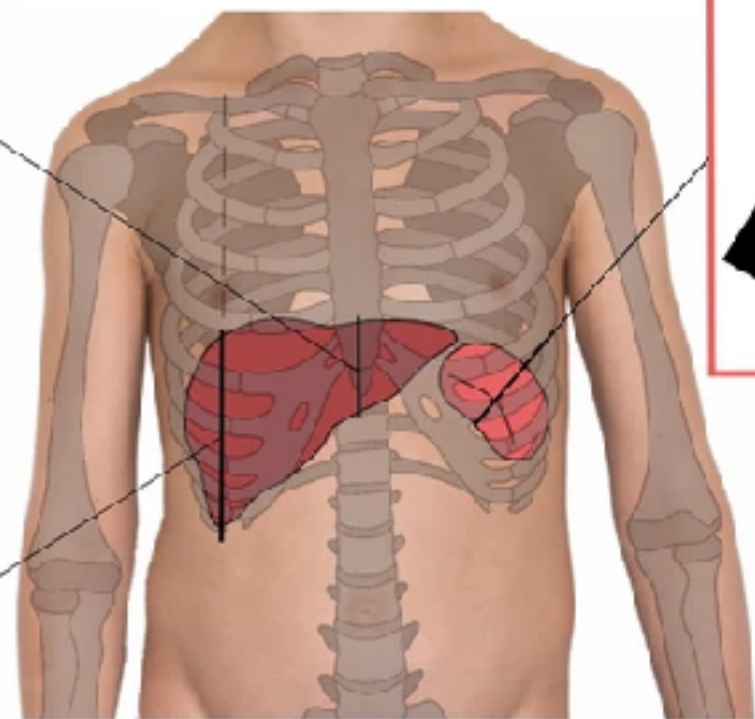




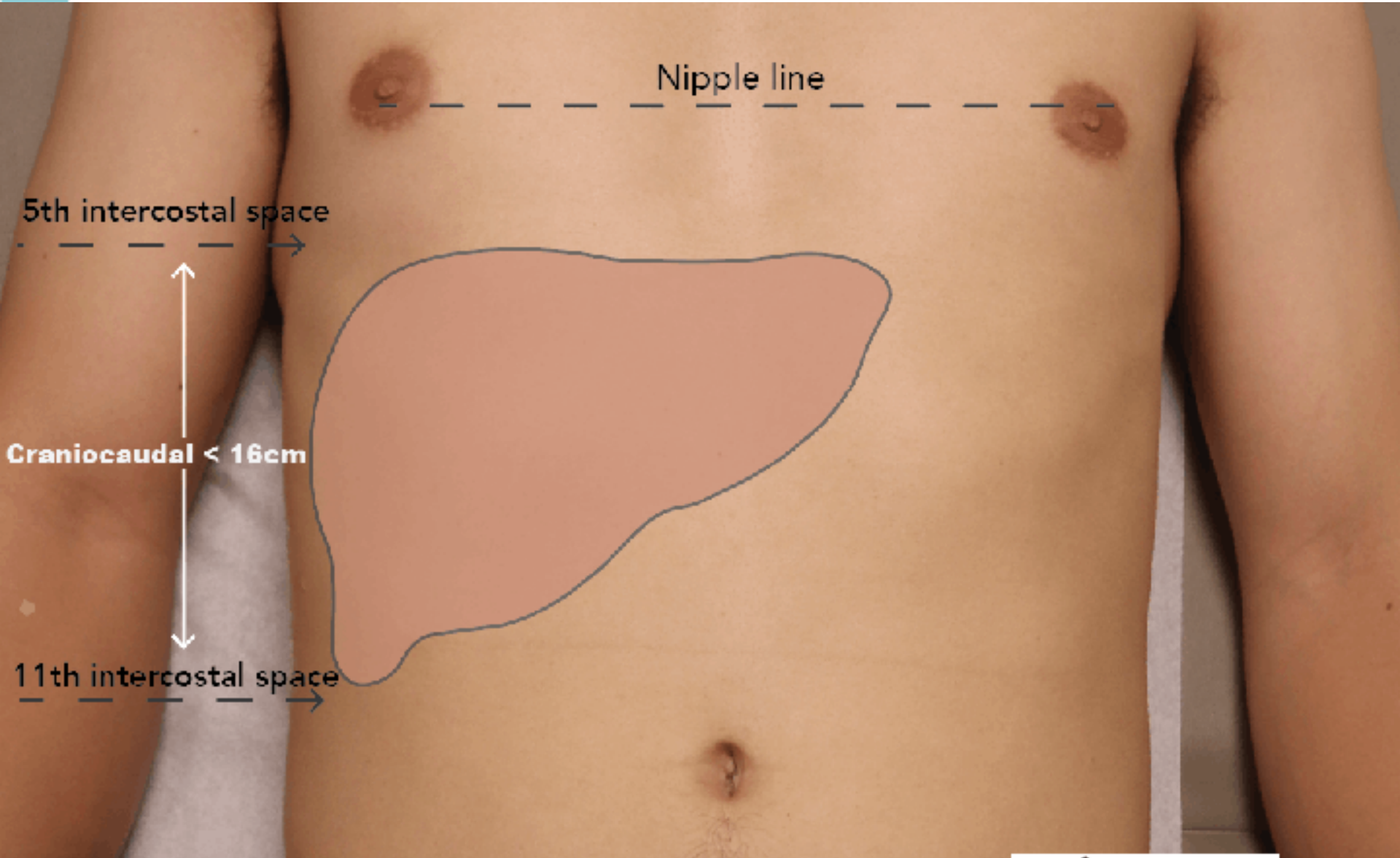






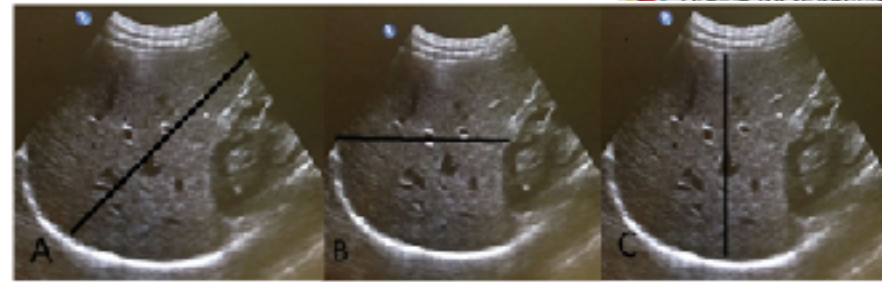


Liver



SONOGRAPHY

Liver: 13 ~ 16 cm
(Mid-clavicle line)



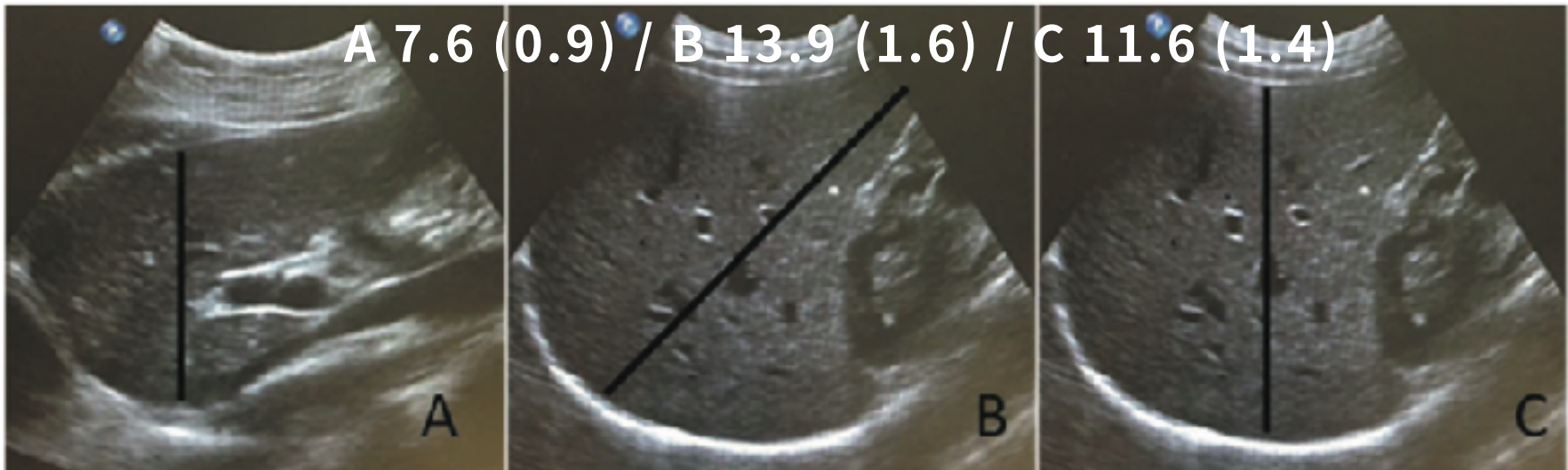
ORIGINAL ARTICLE

Ultrasound in the assessment of hepatomegaly: A simple technique to determine an enlarged liver using reliable and valid measurements

Jessie T Childs¹, Adrian J Esterman^{2,3}, Kerry A Thoirs¹, Richard C Turner⁴

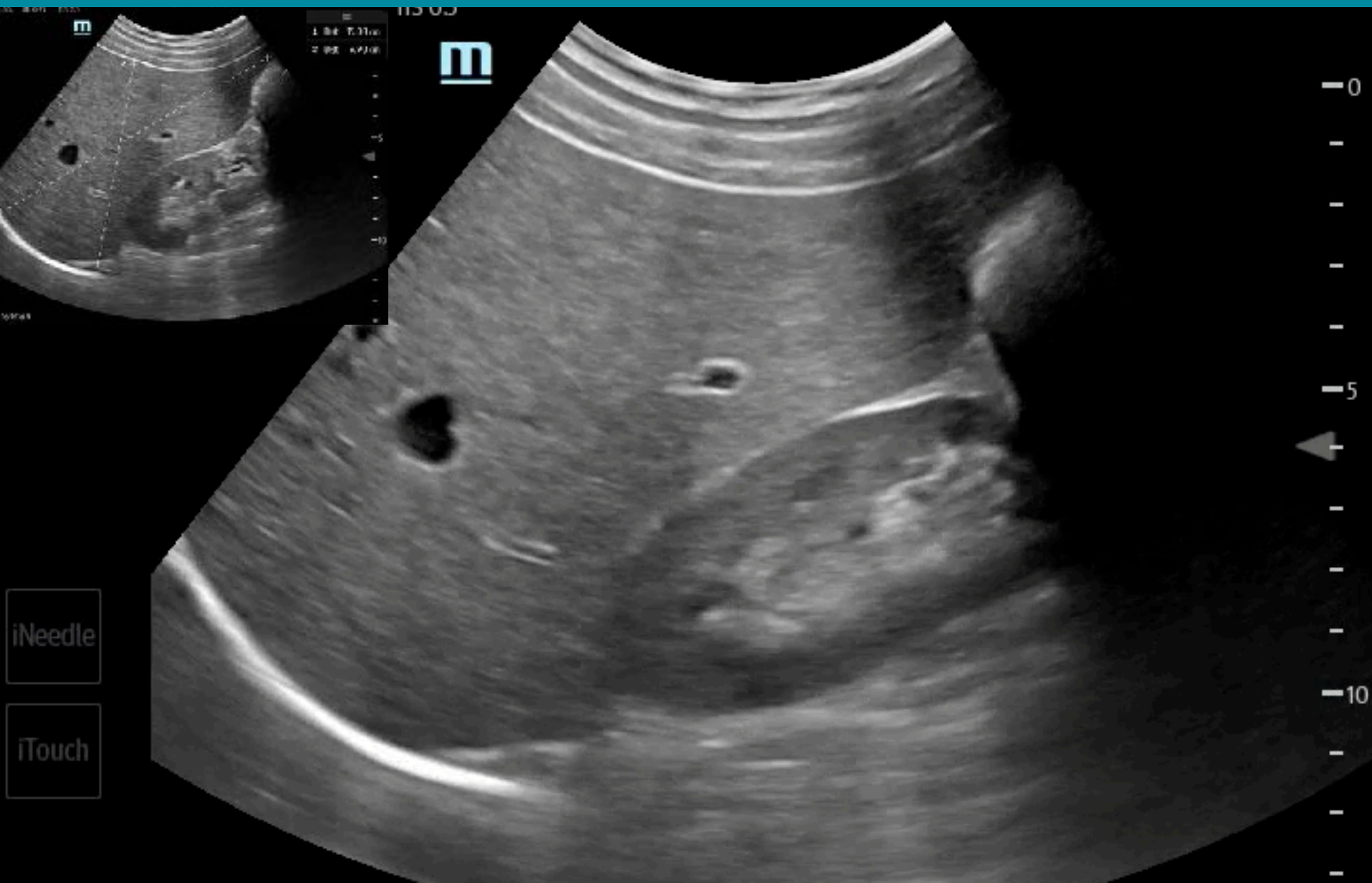
¹ International Centre of Allied Health Research, University of South Australia, Adelaide, Australia

² University of South Australia, Adelaide, Australia

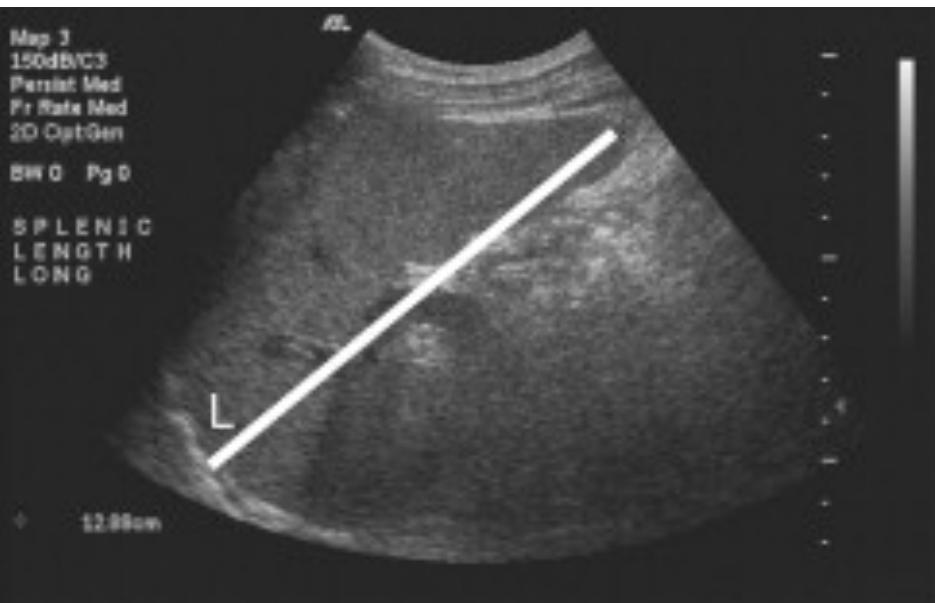


Liver volume (cm^3) = $343.71 + [0.84 \times ABC]$,
where ABC is the product of the three linear measurements $A \times B \times C$.
Reference range = $1062\text{--}2223 \text{ cm}^3$

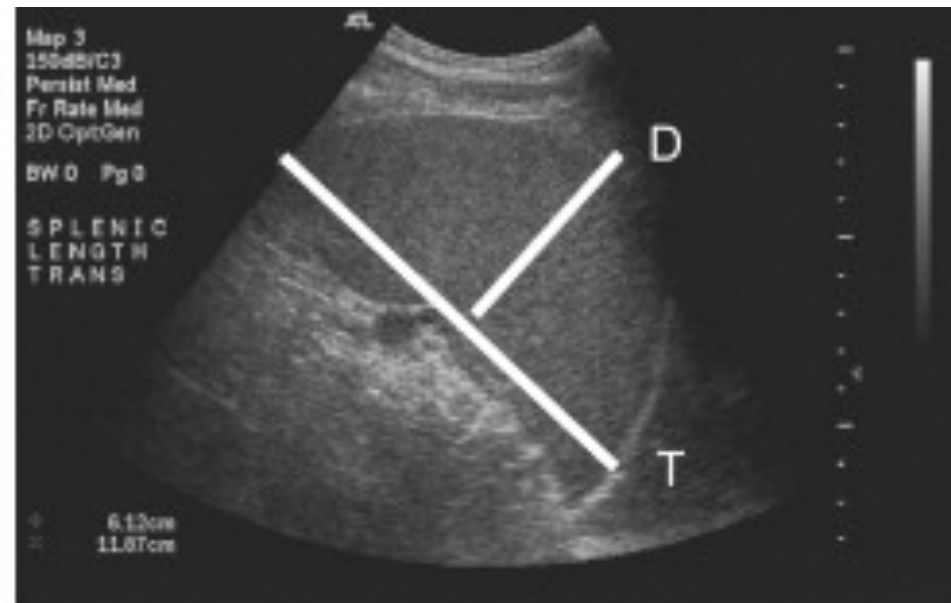
Liver (mid-clavicle line)



Spleen : 12 (L) / 7(T) / 4 (D)

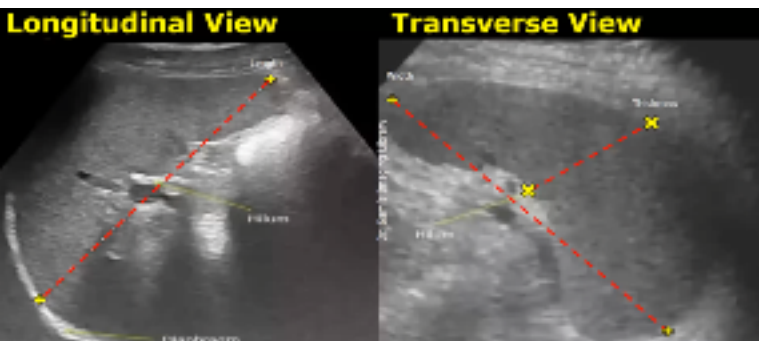


Longitudinal diameter (L) is the greatest dimension of the spleen on a longitudinal image through the hilum



Transverse diameter (T) is the greatest dimension on a transverse image through the hilum

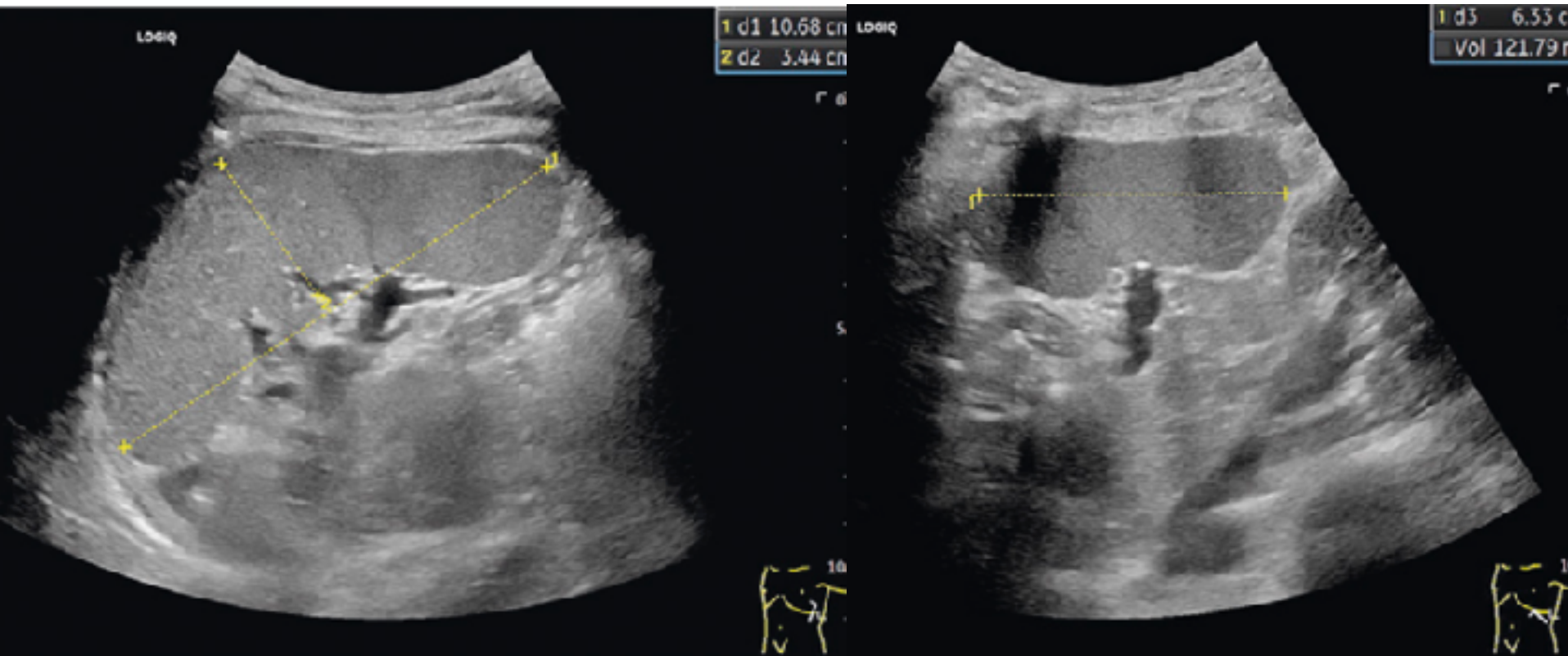
Diagonal diameter (D; thickness) measured in transverse image through the hilum as the distance from the hilum to the outer convex surface, approximately perpendicular to the transverse diameter



Ultrasound of the spleen – an update on measurements, reference values, and influencing factors. A systematic review.

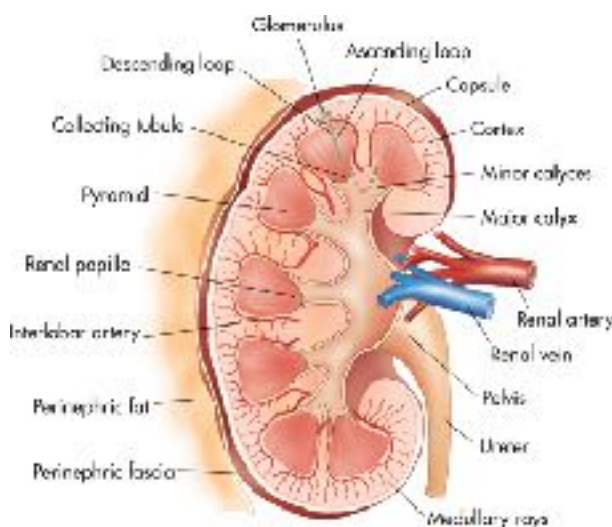
Claudia Lucius¹, Jennifer Meier², Anna Gschmack³, Constantinos Zervides⁴, Christian Jenssen^{5,6}, Yi Dong⁷, Ole Graumann⁸, Marieke Petry⁹, Christoph F Dietrich⁹

Splenomegaly : $L > 13\text{cm}$



Spleen





RKL 10.62 ± 0.69 cm

LKL 10.76 ± 0.70 cm

RKW 4.78 ± 0.75 cm

LKW 5.10 ± 0.64 cm

RESEARCH ARTICLE

Reference ranges for ultrasonographic renal dimensions as functions of age and body indices: A retrospective observational study in Taiwan

Hsuan-An Su¹, Han-Ying Hsieh², Chien-Te Lee³, Shang-Chih Liao³, Chi-Hsiang Chu⁴, Chien-Hsing Wu^{3*}

1 Department of Medical Education, Kaohsiung Chang Gung Memorial Hospital, Kaohsiung, Taiwan, **2** Department of Pediatrics, Tung's MetroHarbor Hospital, Taichung, Taiwan, **3** Division of Nephrology, Department of Internal Medicine, Kaohsiung Chang Gung Memorial Hospital, Kaohsiung, Taiwan, **4** Clinical Trial Center, Kaohsiung Chang Gung Memorial Hospital, Kaohsiung, Taiwan

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Abstract

An ethnicity-based reference range for normal renal size is fundamental for ultrasonographic assessment. Herein, we aimed to establish a Chinese renal reference by a large sample size, as well as to elucidate the relationship of renal dimension to age and body indices, with the aid of a comprehensive literature review. Records of 3707 healthy cases were obtained from health evaluation centers of Kaohsiung and Linkuo Chang Gung Memorial Hospitals. As a result, the mean right renal length was 10.62 ± 0.69 cm, left renal length 10.76 ± 0.70 cm, right renal width 4.78 ± 0.75 cm, and left renal width 5.10 ± 0.64 cm. Renal size was well-correlated curvilinearly to age, while linearly to body height, body weight, and body mass index. Renal size increases and then decreases with aging, and significant variations of renal size exist among different ethnicities. Our work provides a reliable reference range for renal size in the Chinese population, and valid relationships between renal dimensions and other parameters.

OPEN ACCESS

Citation: Su H-A, Hsieh H-Y, Lee C-T, Liao S-C, Chu C-H, Wu C-H (2019) Reference ranges for ultrasonographic renal dimensions as functions of age and body indices: A retrospective observational study in Taiwan. PLoS ONE 14(11): e0224785. <https://doi.org/10.1371/journal.pone.0224785>

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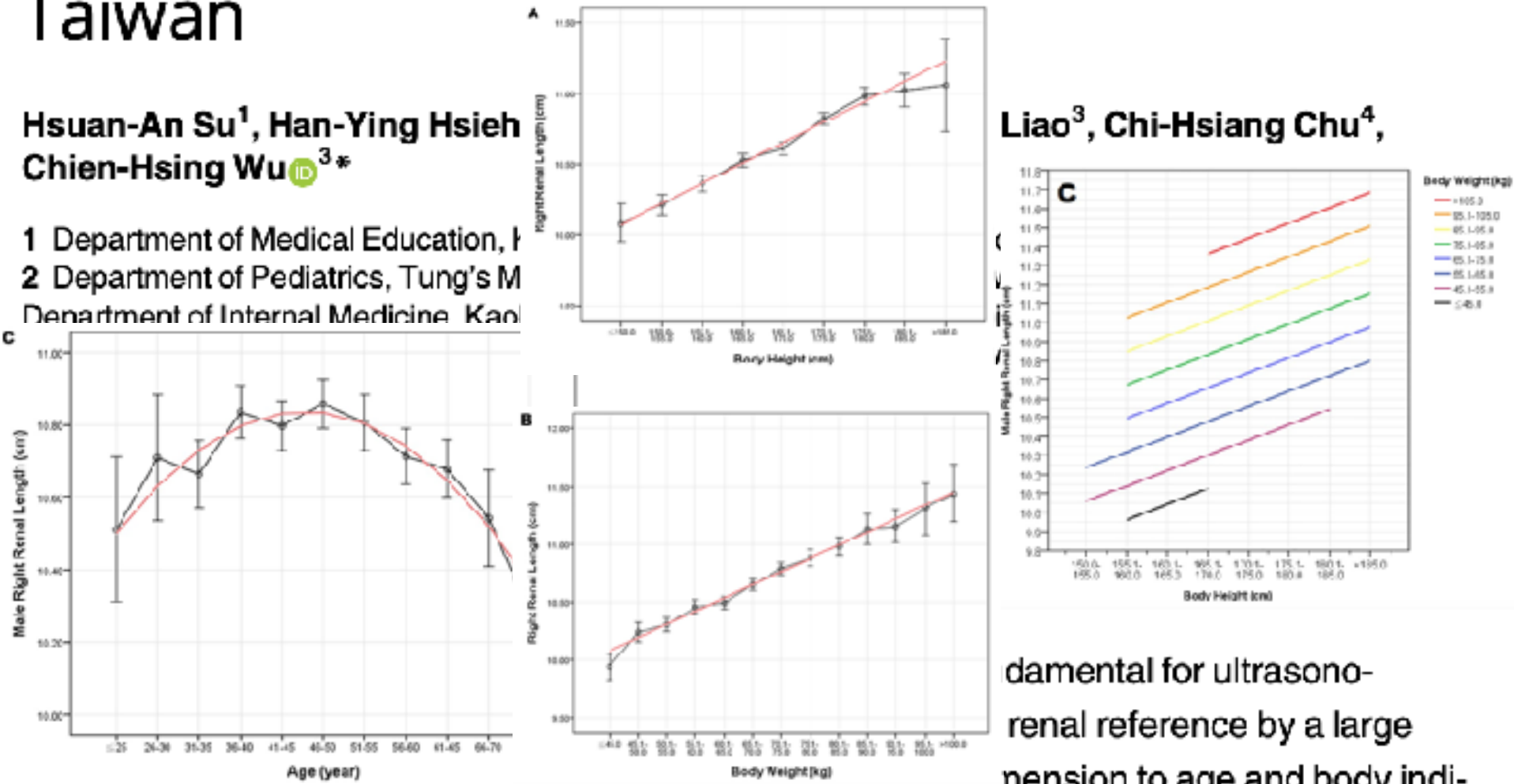
Published: November 7, 2019

Reference ranges for ultrasonographic renal dimensions as functions of age and body indices: A retrospective observational study in Taiwan

Hsuan-An Su¹, Han-Ying Hsieh
Chien-Hsing Wu^{3*}

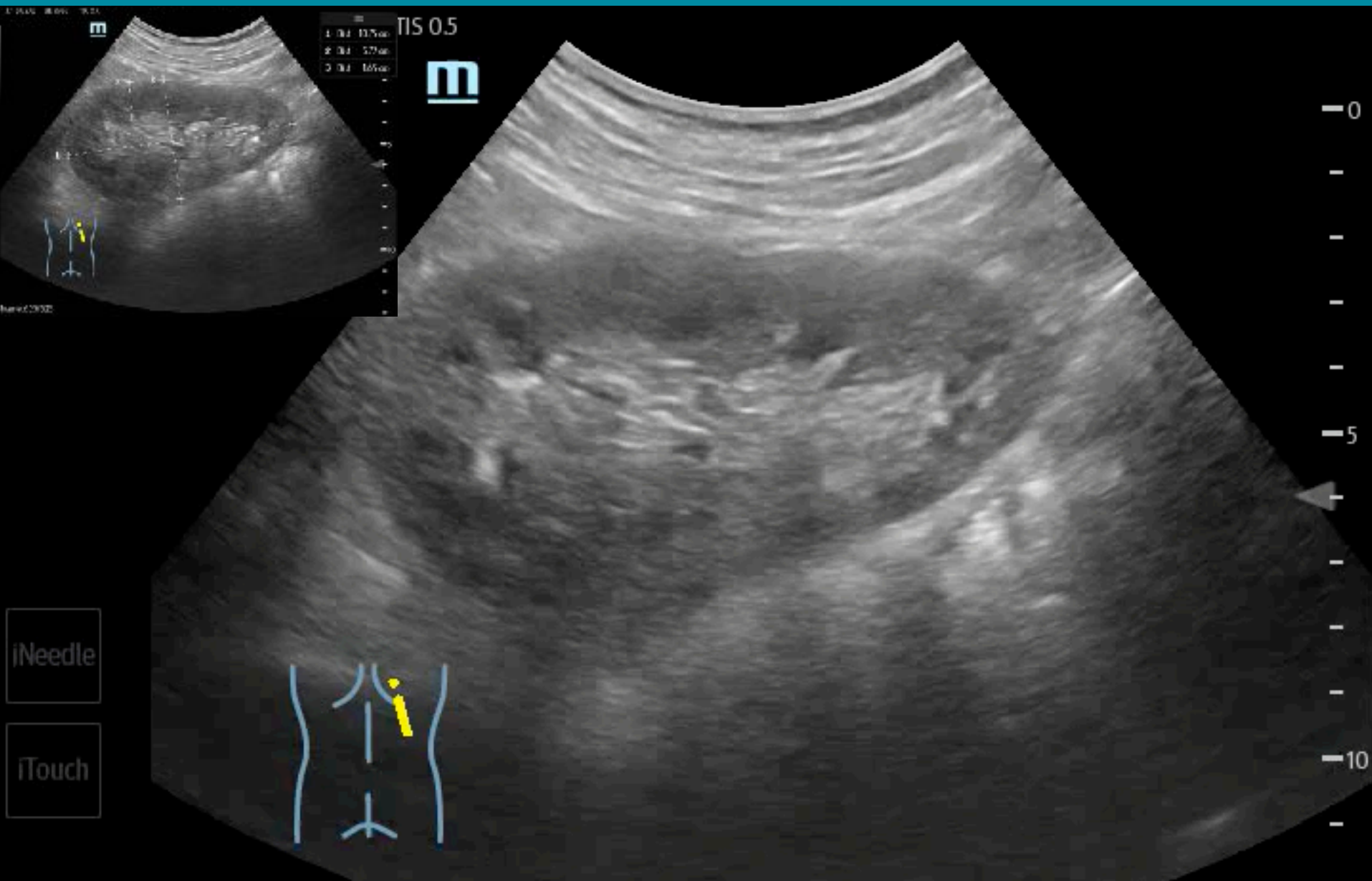
¹ Department of Medical Education, ² Department of Pediatrics, Tung's Medical College
³ Department of Internal Medicine, Kaohsiung Medical University

Liao³, Chi-Hsiang Chu⁴,

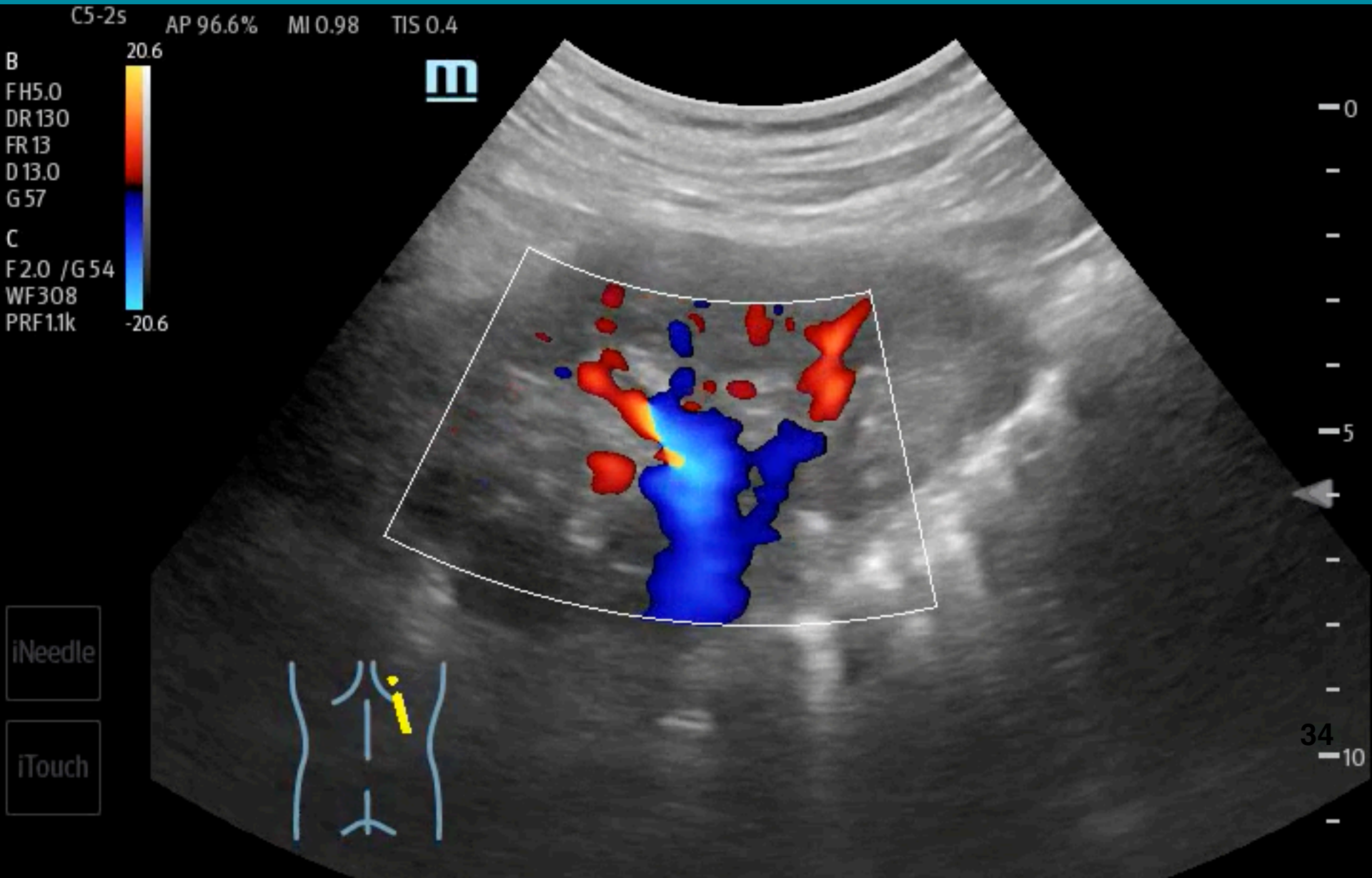


fundamental for ultrasono-
renal reference by a large
population to age and body indi-

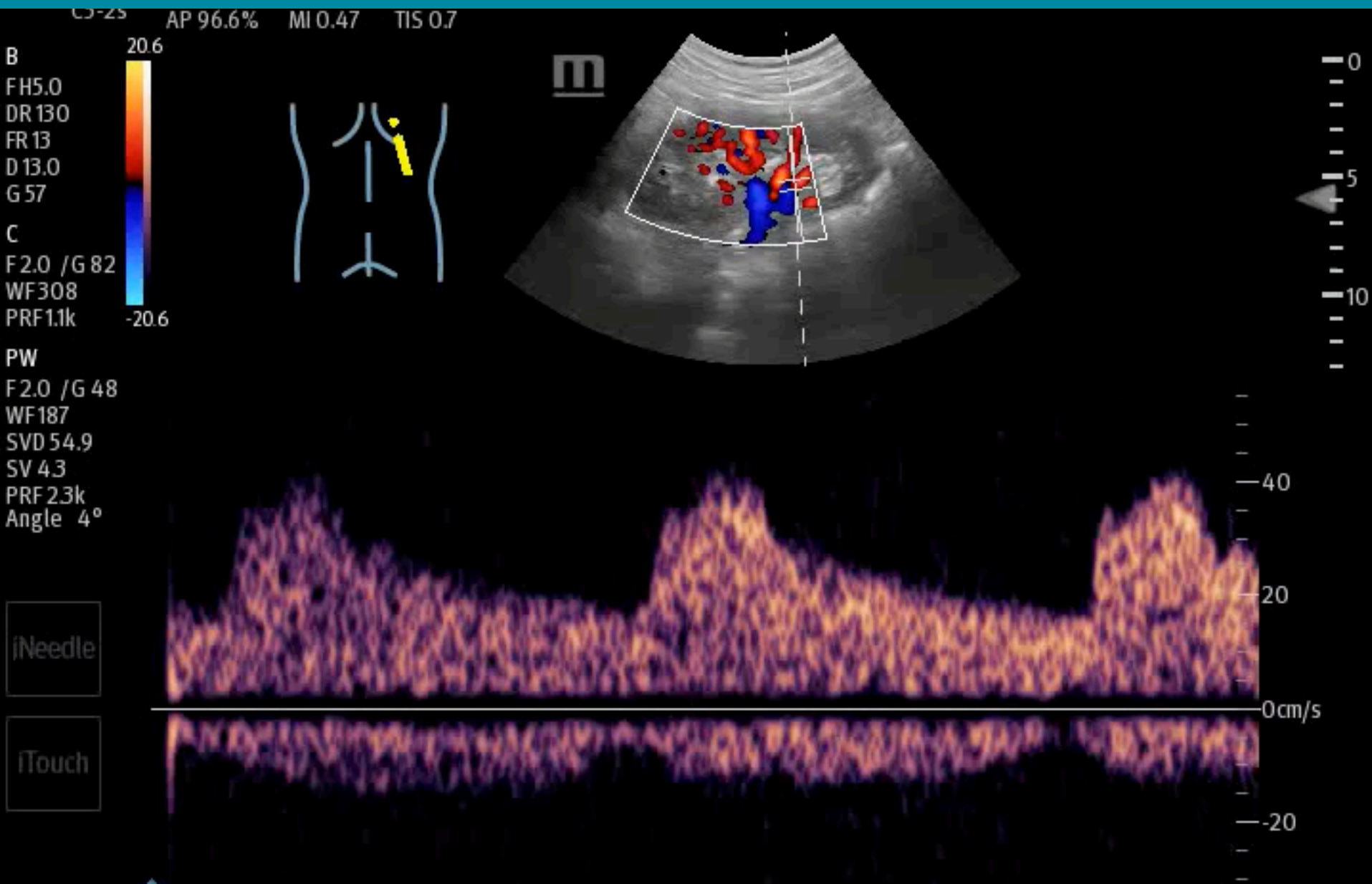
Kidney



Kidney



Kidney



Pancreatic ultrasound: An update of measurements, reference values, and variations of the pancreas

OPEN
ACCESS

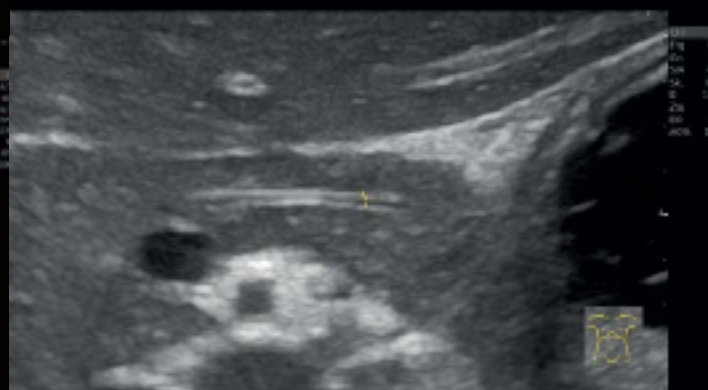


Authors

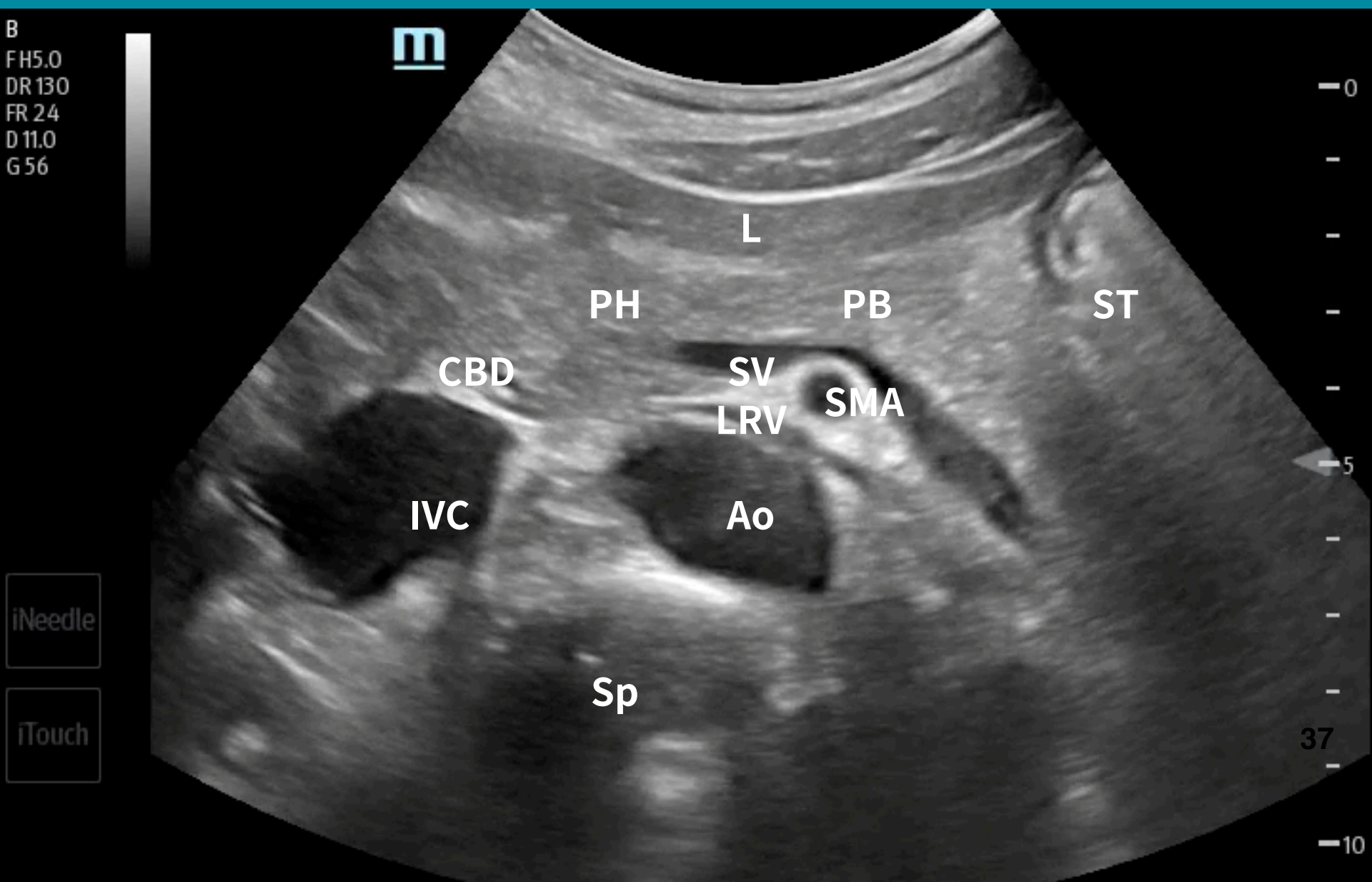
Jennifer Meier¹, Claudia Lucius², Kathleen Möller³, Christian Jenssen⁴, Constantinos Zervides⁵, Anna Maria Gschmack⁶, Yi Dong⁷, David Srivastava⁸, Christoph F. Dietrich¹



H: 49 ± 10 mm (CC)
H: 34 ± 08 mm (RL)
H: 23 ± 05 mm (AP)
B: 10-20 mm (AP)
T: 20-35 mm (AP)
Duct (B) < 2mm



Pancreas

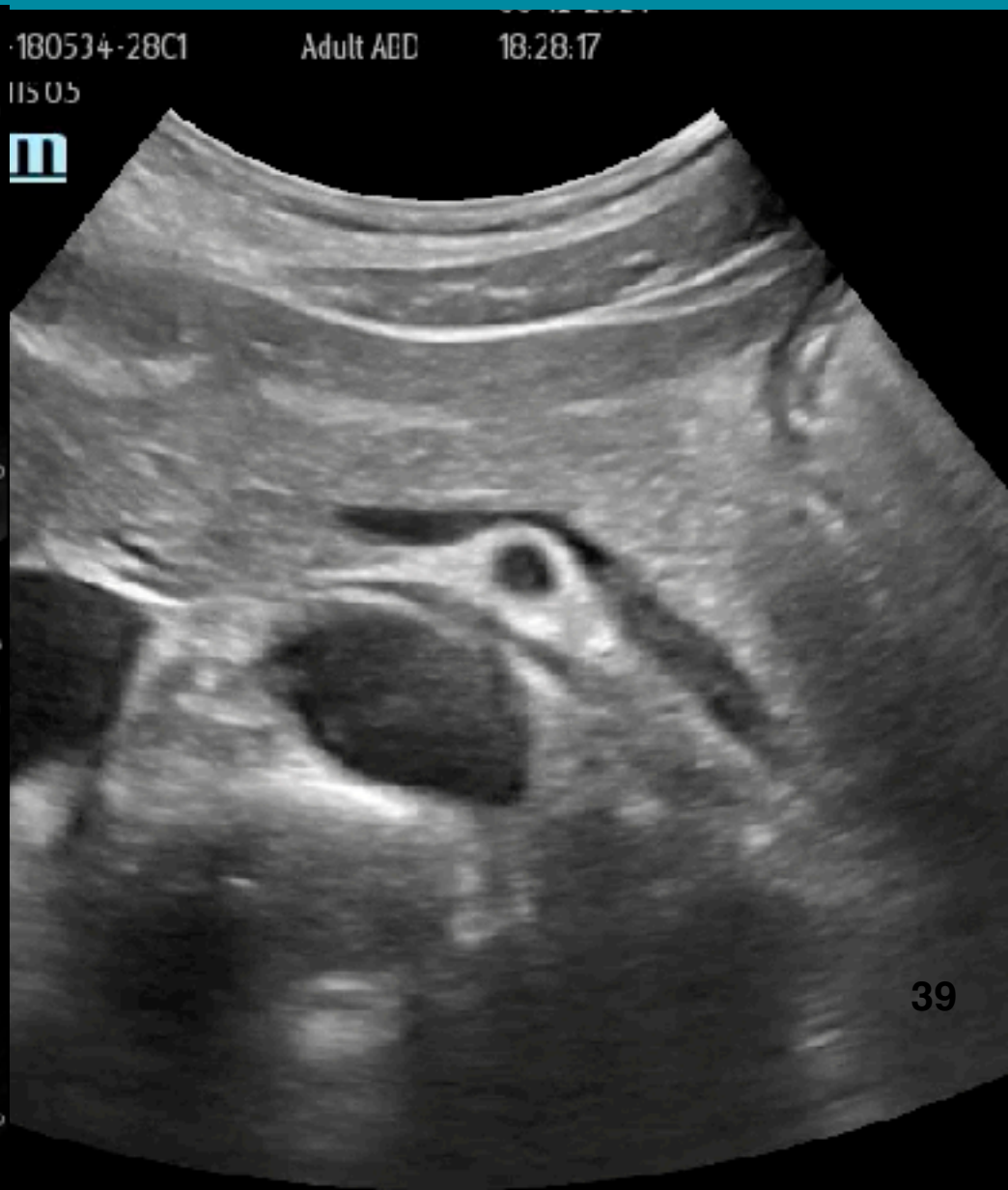


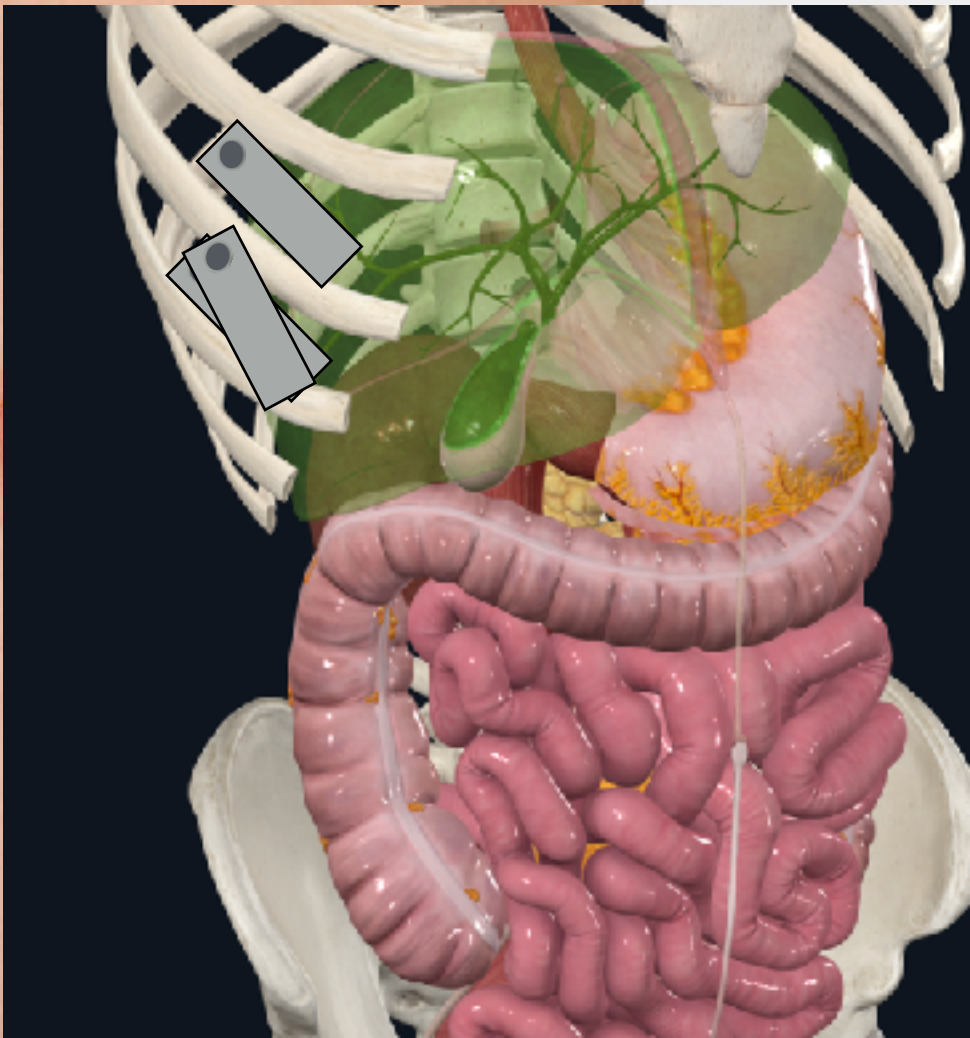
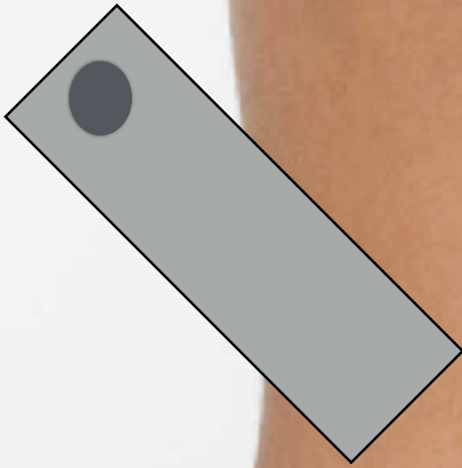
Pancreas



Echogenecity

Pancreas > Spleen > Liver > Renal cortex





劍突---腋前線
肋間擺位微調

15:00:44

Diaphragm

0041-28C1

0.5

 10_{max}

15.

16.0cm.

— 0

-5

—

—10

1000

1

iNeedle

Diaphragm

Liver

Right kidney

肋間掃描避開肋軟骨陰影

Hepatic vein

Mickey mouse sign

Portal triad:

Portal vein

Biliary tree

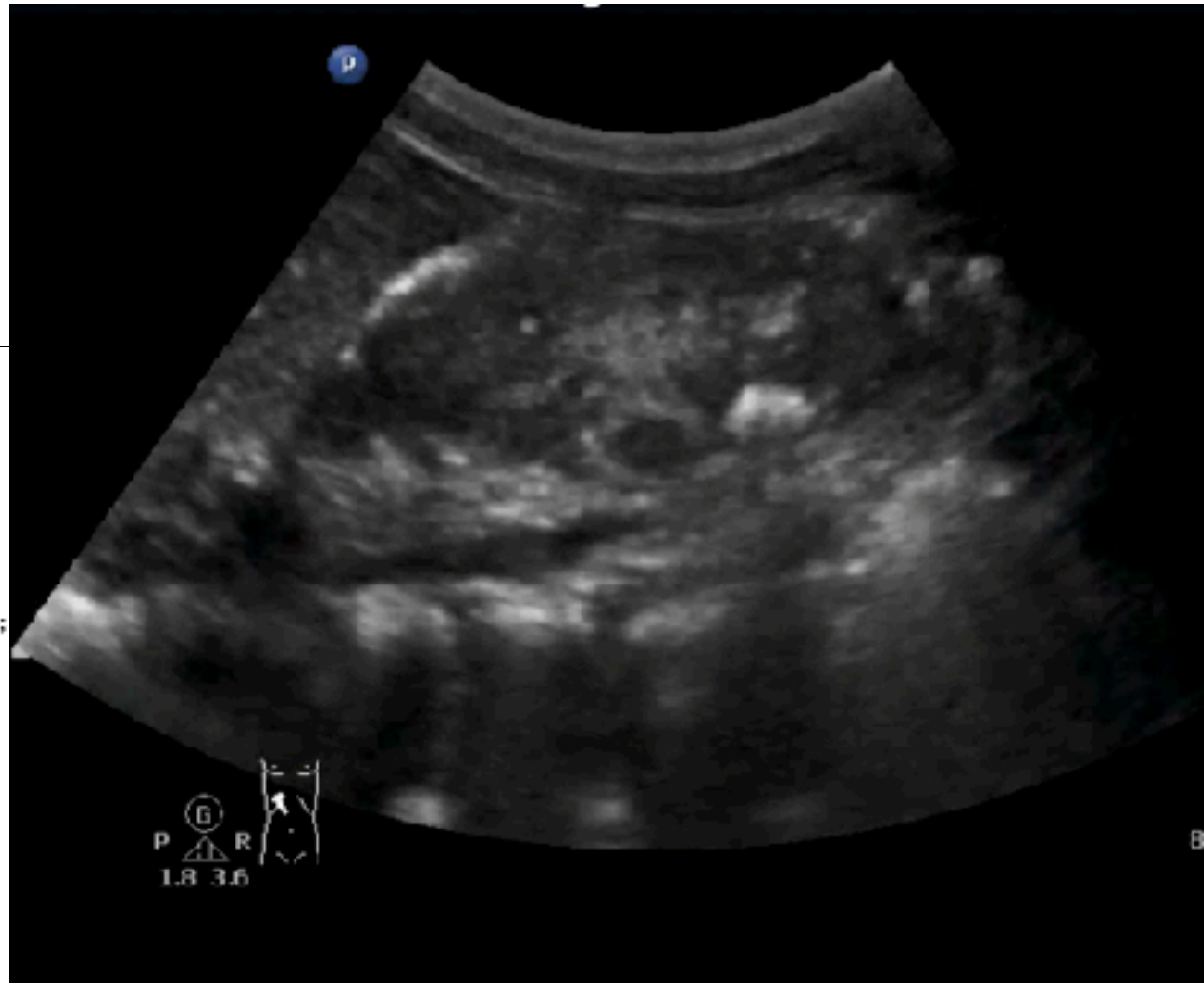
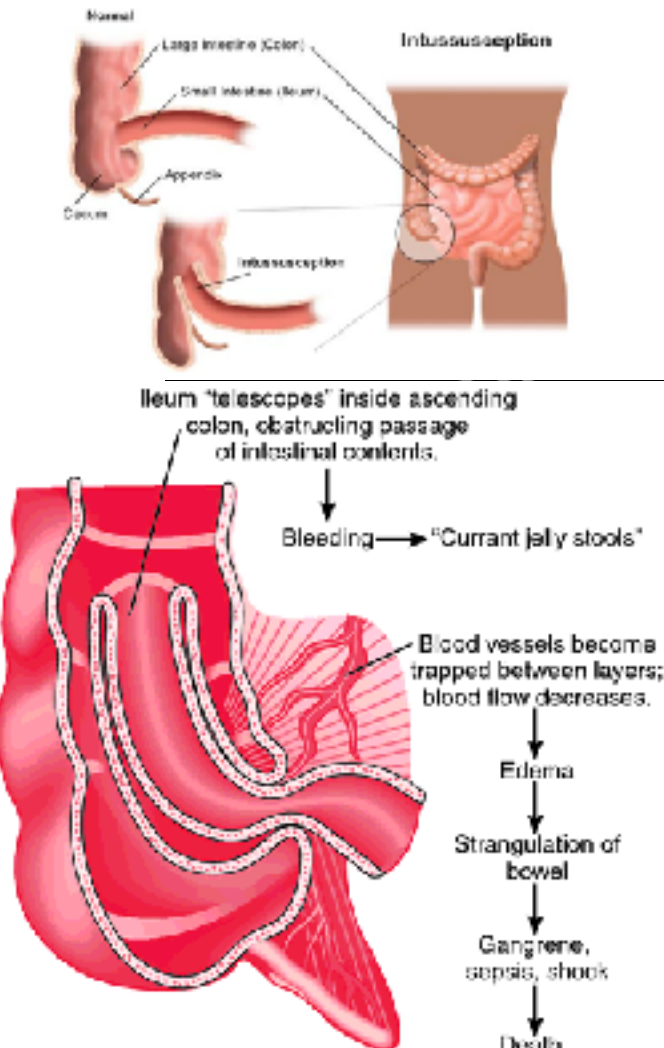
Hepatic artery

P G R
1.8 3.6

11.0cm

Intussusception

小孩優先找右上腹





肋間掃描避開肋軟骨陰影
再些許轉動至腎臟長軸

iNeedle

Right kidney
Psoas muscle



C5-1s

AP 96.6%

MI 130

TIS 0.5

B

FH6.0

DR 130

FR 18

D 16.0

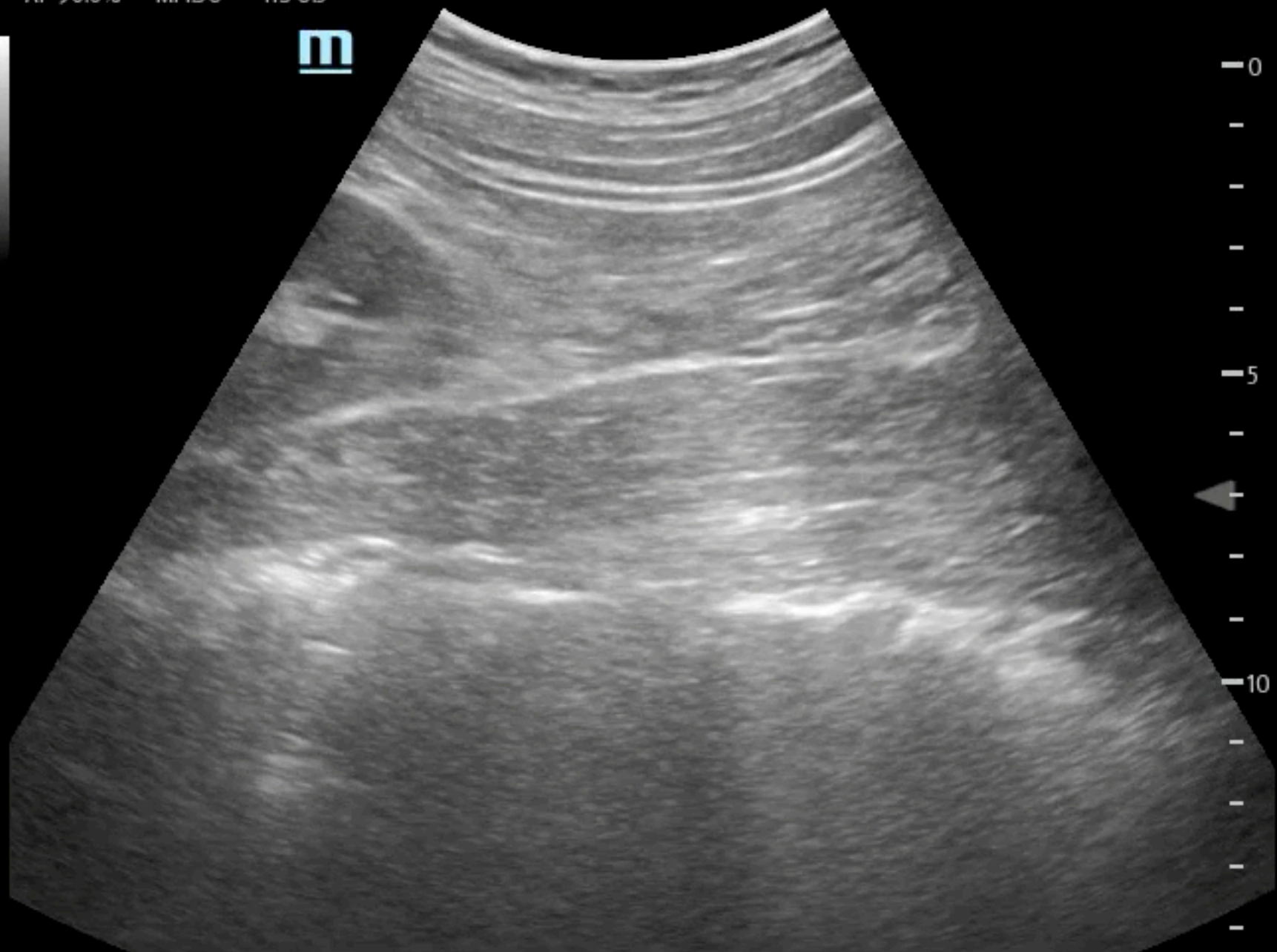
G 71

Z 1.10



iNeedle

iTouch



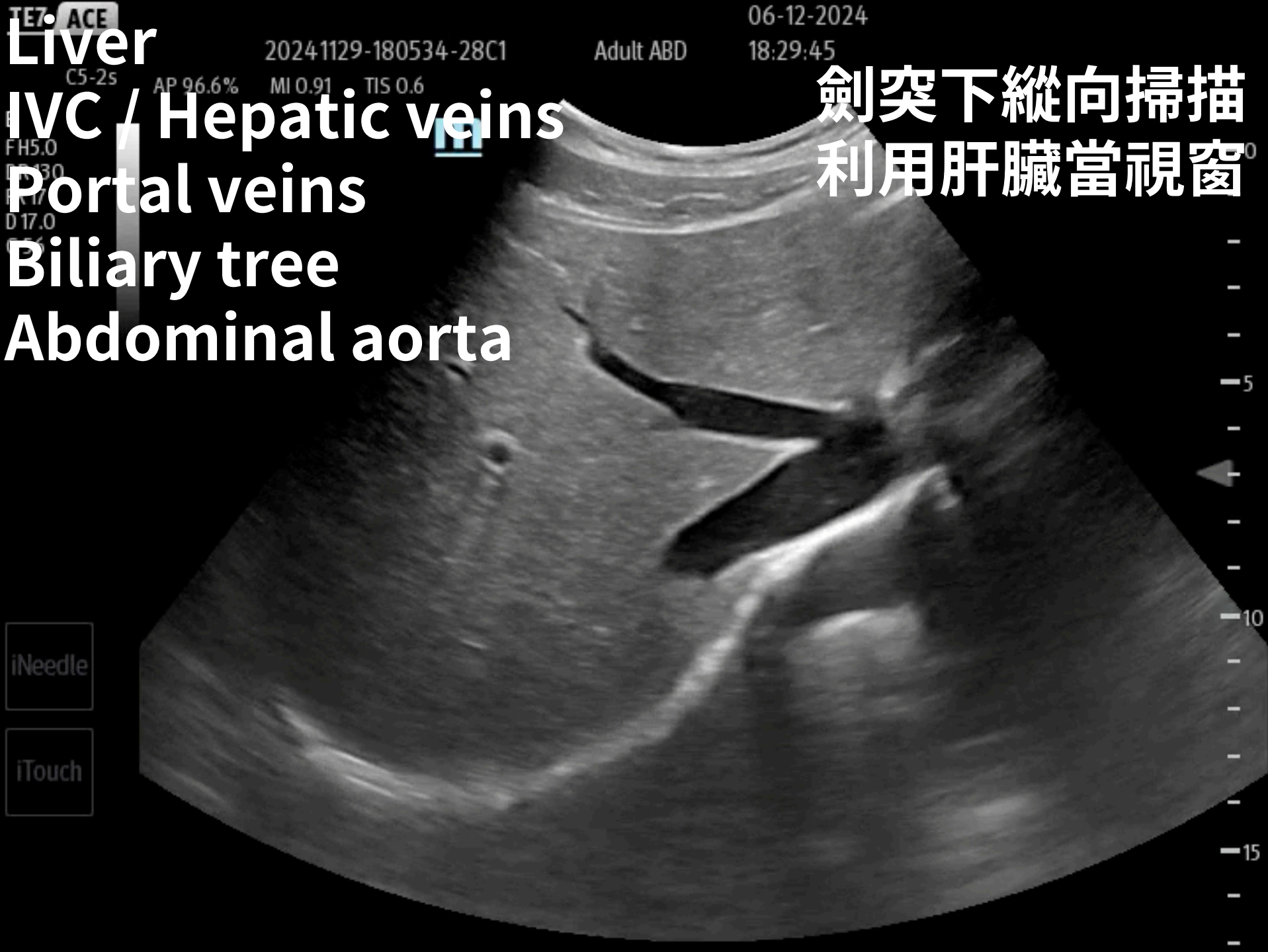
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10

劍突下 利用肝的視窗







TE7 ACE

20230324-150041-28C1

Diaphragm

24-03-2023

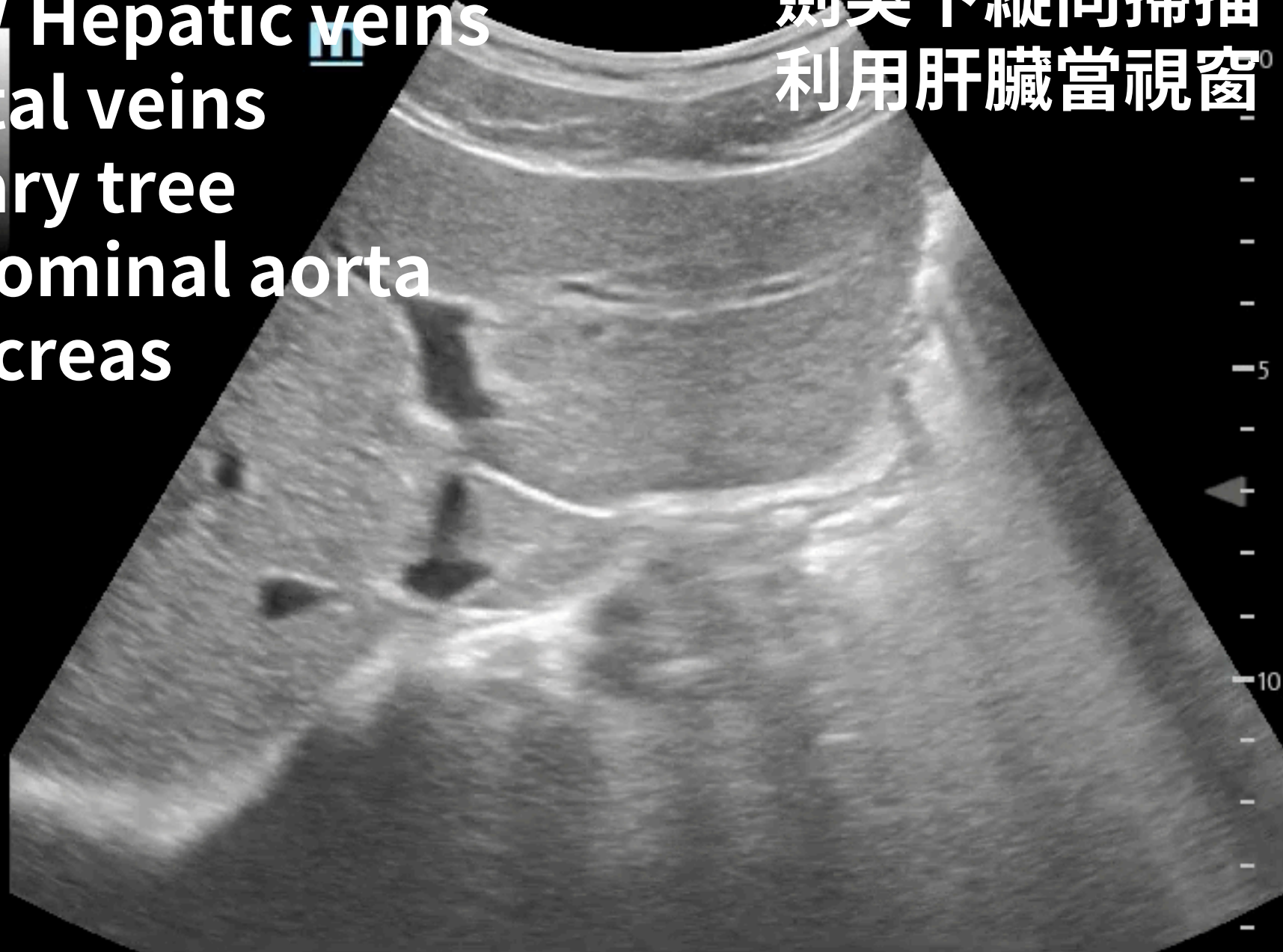
15:02:36

Liver
IVC / Hepatic veins
Portal veins
Biliary tree
Abdominal aorta
Pancreas

劍突下縱向掃描
利用肝臟當視窗

iNeedle

iTouch

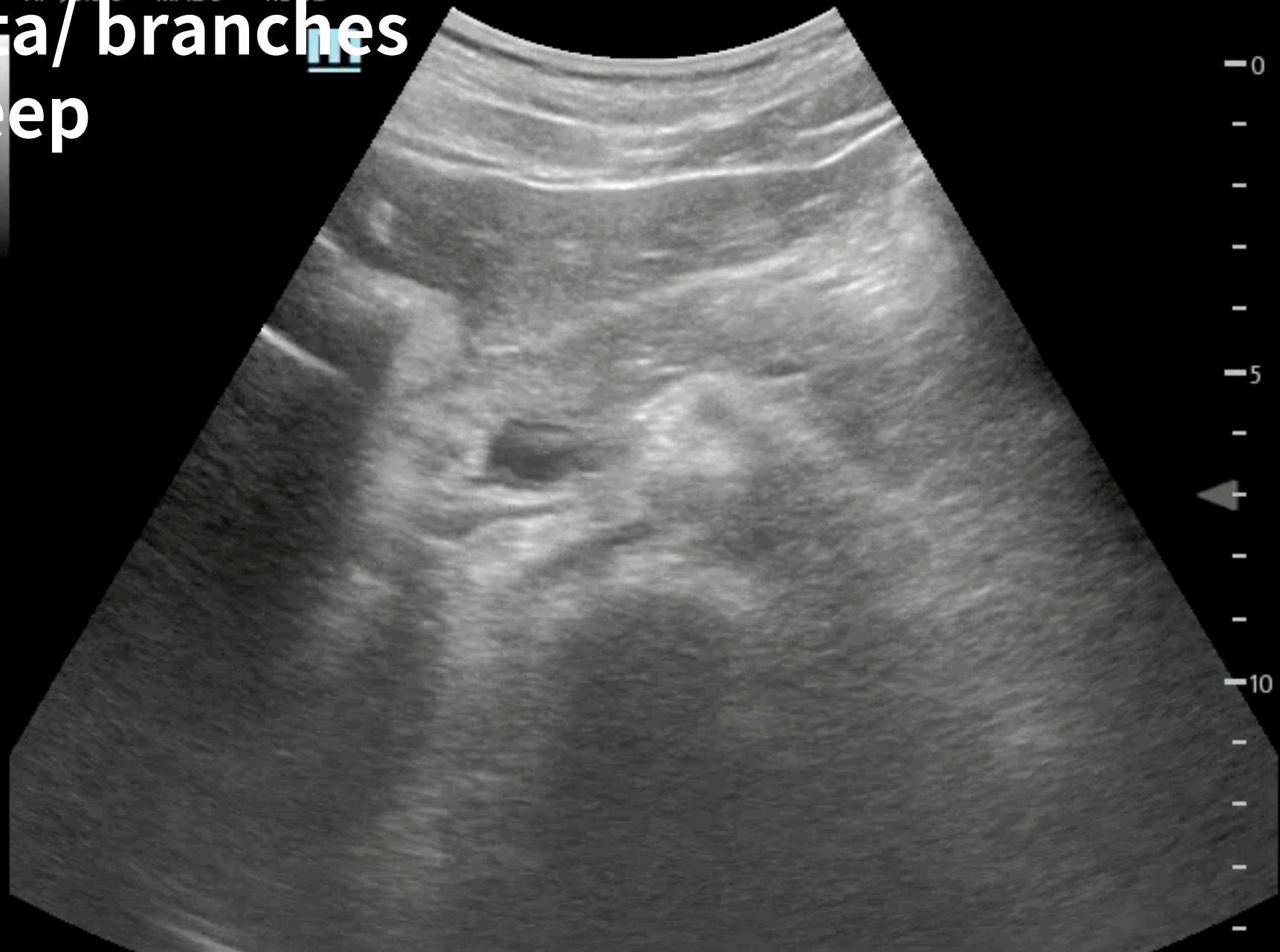


Aorta/branches Sweep

B
FH6.0
DP130
FR3
D16.0
G81
Z1.10

iNeedle

iTouch





TE7 ACE
20241129-180534-28C1
C5-25 AP 96.6% MI 1.00 TIS 0.5

Adult ABD

06-12-2024
18:29:18

Diaphragm
Liver

EC junction

Abdominal aorta

Pancreas

Antrum

劍突下縱向掃描
利用肝臟當視窗

iNeedle

iTouch



C5-1s

AP 96.6%

MI130

TIS 0.5

B

FH6.0

DR130

FR18

D16.0

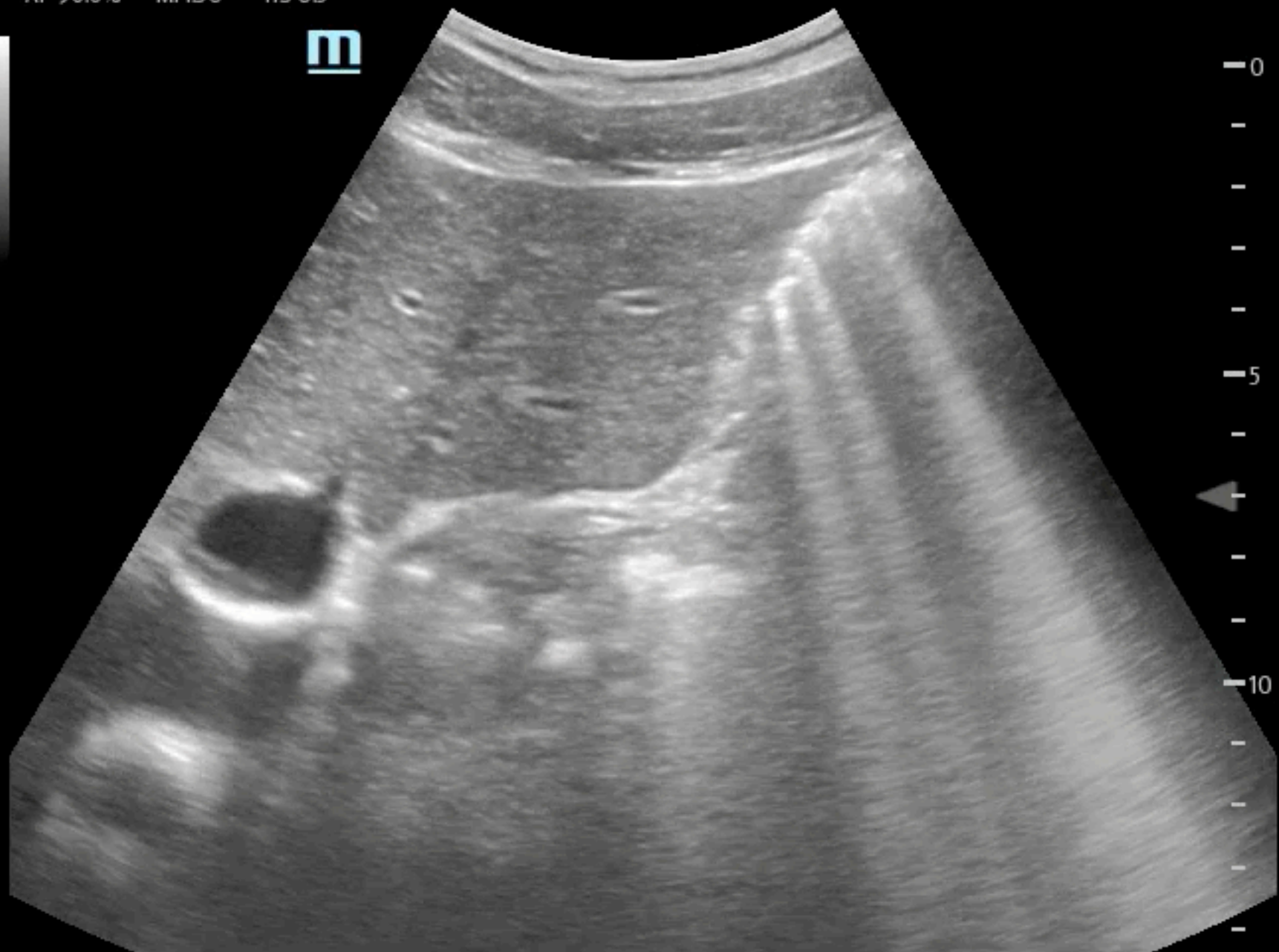
G81

Z1.10



iNeedle

iTouch



C5-2s

AP 96.6%

MI 1.04

TIS 0.5

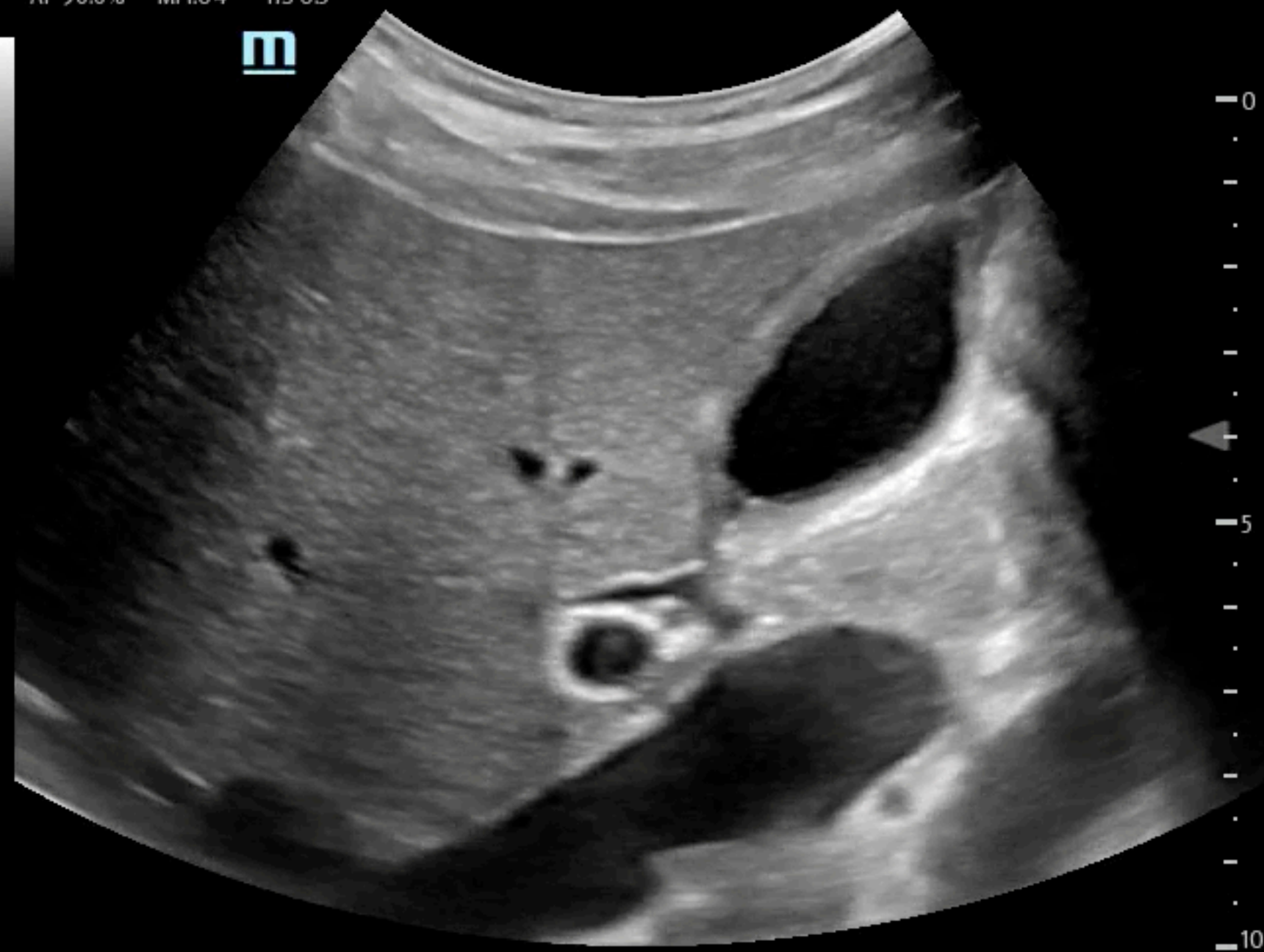
B

FH5.0
DR 130
FR 26
D 10.0
G 56



iNeedle

iTouch



0

5

10

C5-2s

AP 96.6%

MI 1.00

TIS 0.5

B
FH5.0
DR 130
FR 24
D 11.0
G 56



iNeedle

iTouch



C5-2s

AP 96.6%

MI 1.00

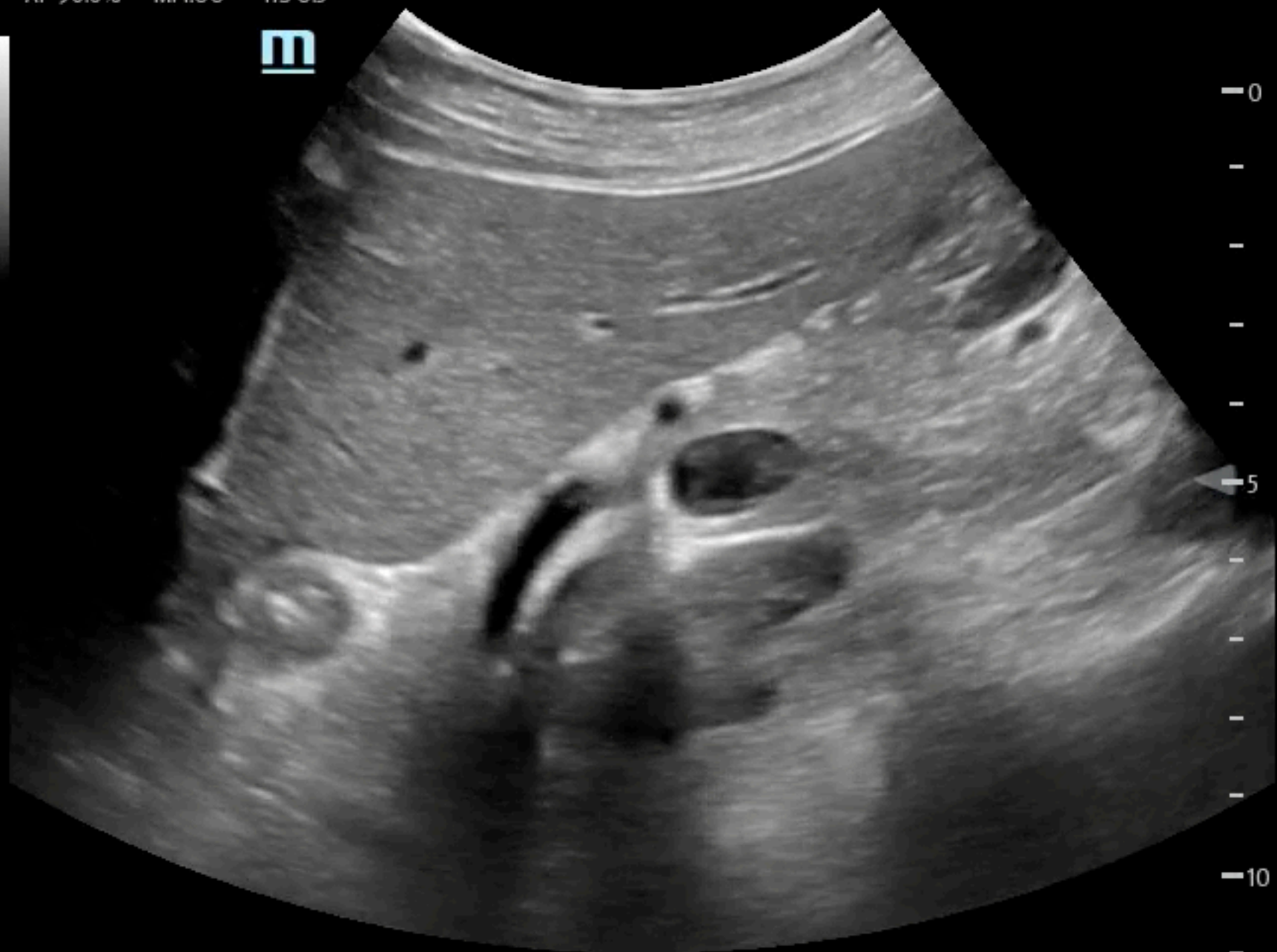
TIS 0.5

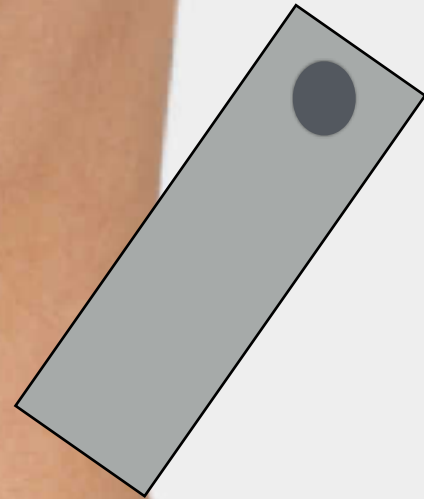
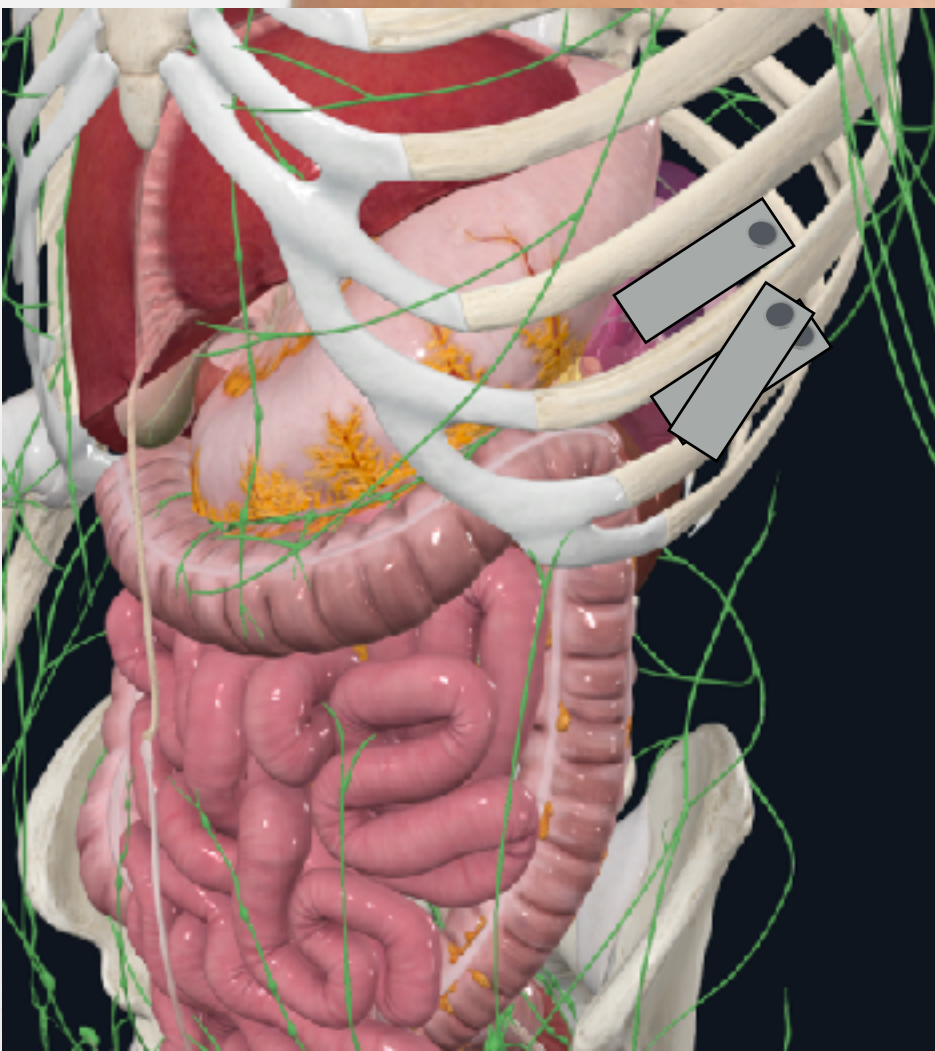
B
FH5.0
DR 130
FR 24
D 11.0
G 56



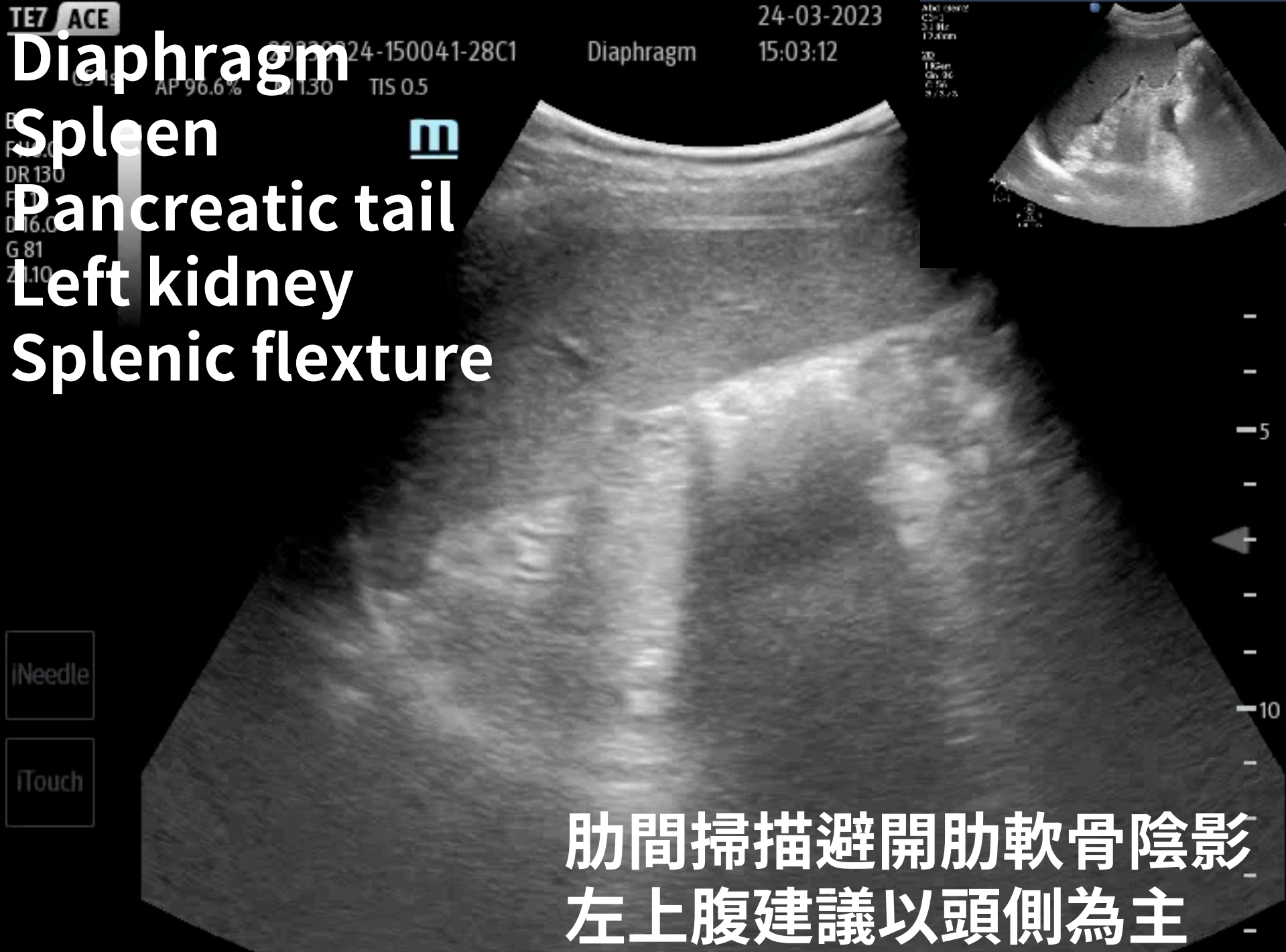
iNeedle

iTouch





劍突---腋後線
平行肋間微調



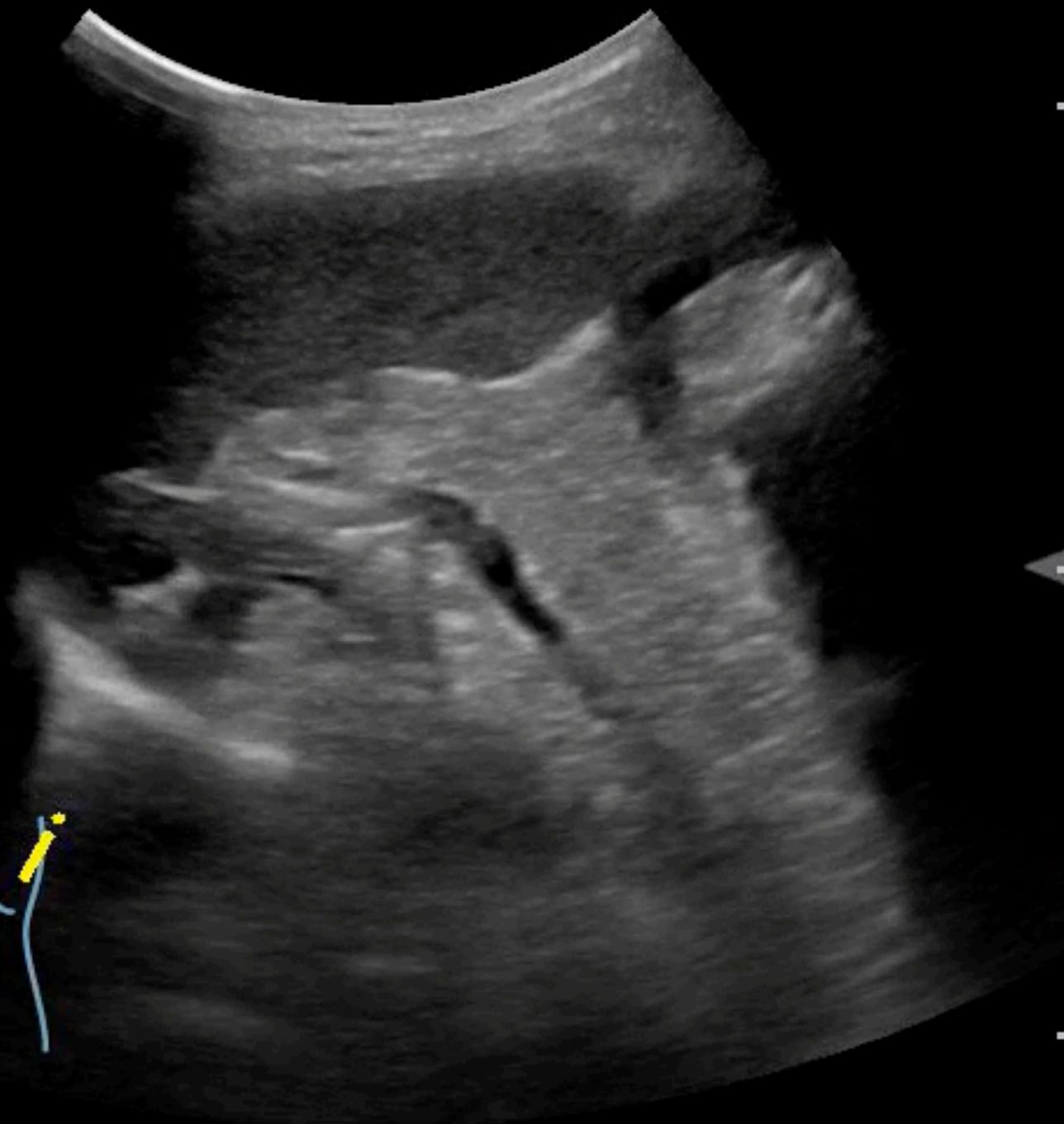
C5-2s AP 96.6% MI 1.00 TIS 0.5



1.0
30
24
0
0

needle

ouch



C5-2s

AP 96.6%

MI 0.95

TIS 0.5

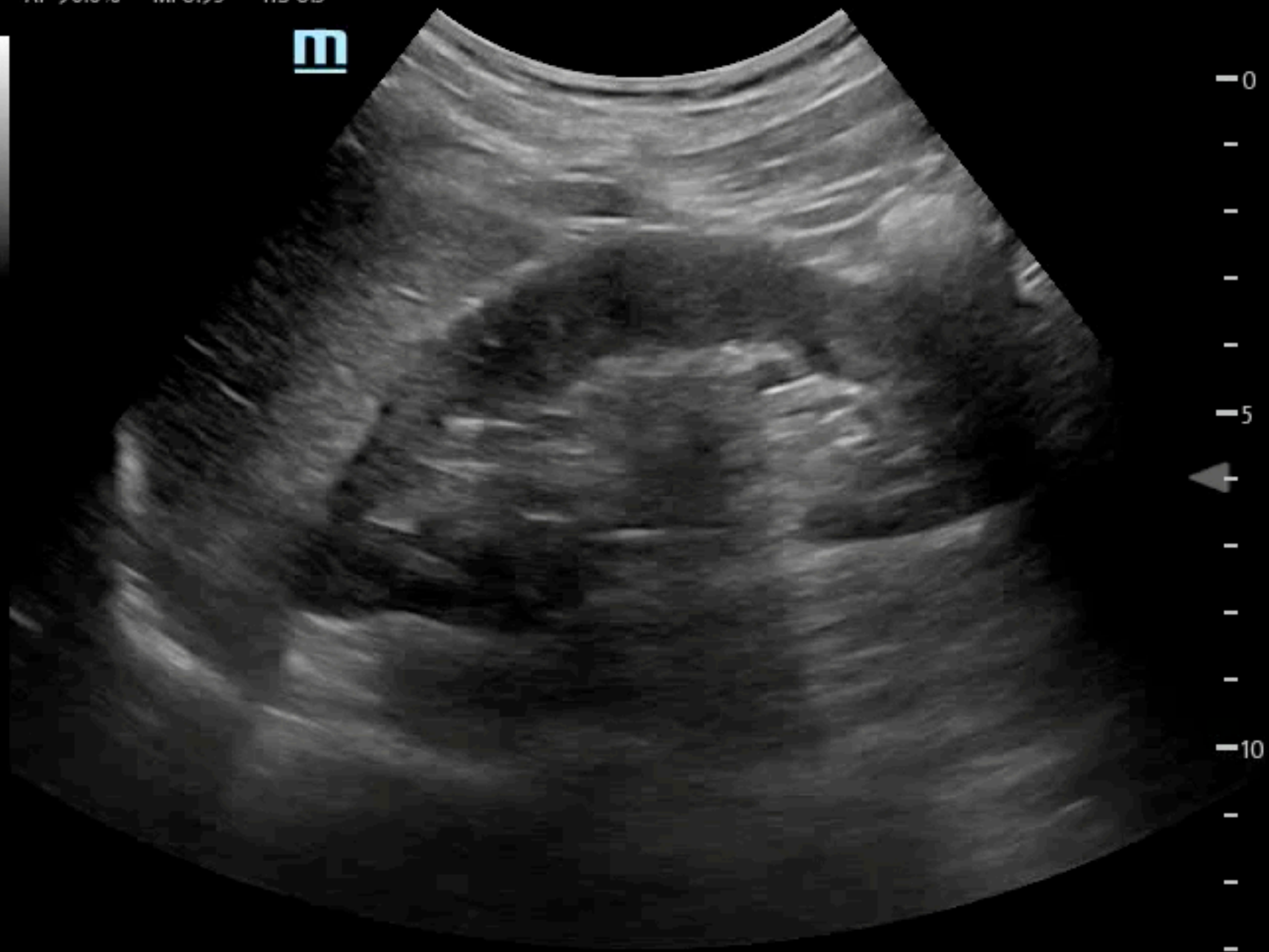
B

FH5.0
DR 130
FR 21
D 13.0
G 40

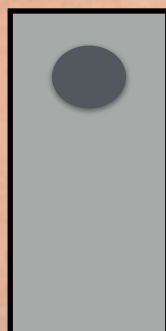


iNeedle

iTouch

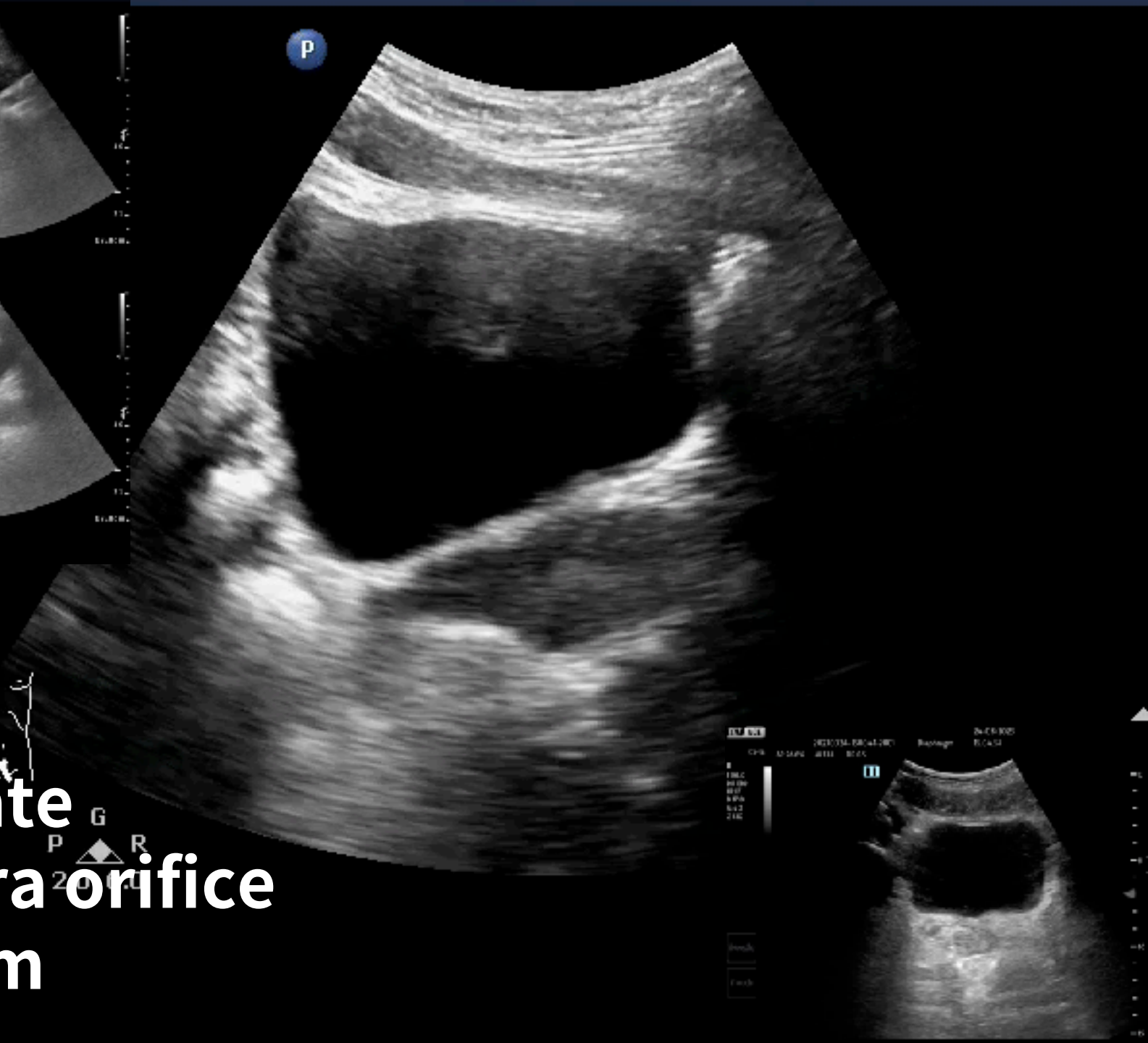


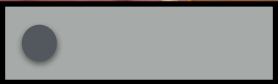
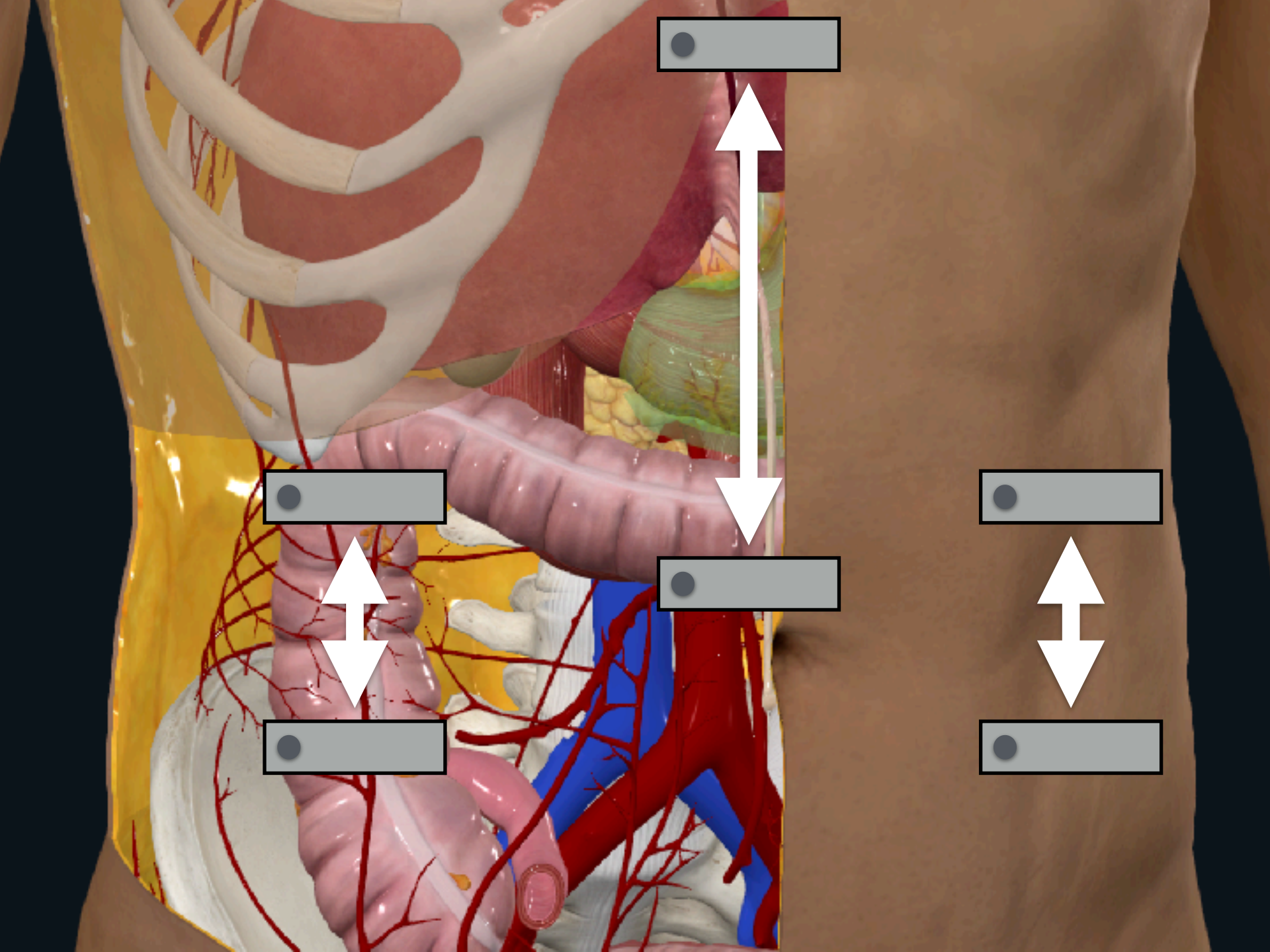
恥骨聯合上 先縱-後橫





The diagram illustrates the anatomical relationship between the prostate, urethra, and rectum. The prostate is shown as a central gland. The urethra is depicted as a tube passing through the prostate. The rectum is shown as a large, sac-like structure to the right of the prostate. The urethra orifice is indicated by a small circle on the right side of the prostate, near the rectum. Labels include 'UB' (Urethra orifice), 'Prostate', 'Urethra orifice', and 'Rectum'. A small inset shows a cross-section of the prostate with a triangle indicating the location of the urethra orifice. A scale bar indicates 20 cm.





C5-1s

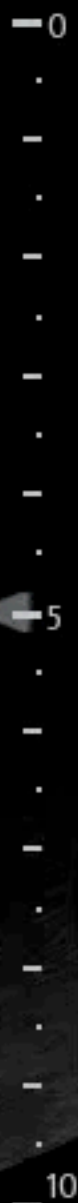
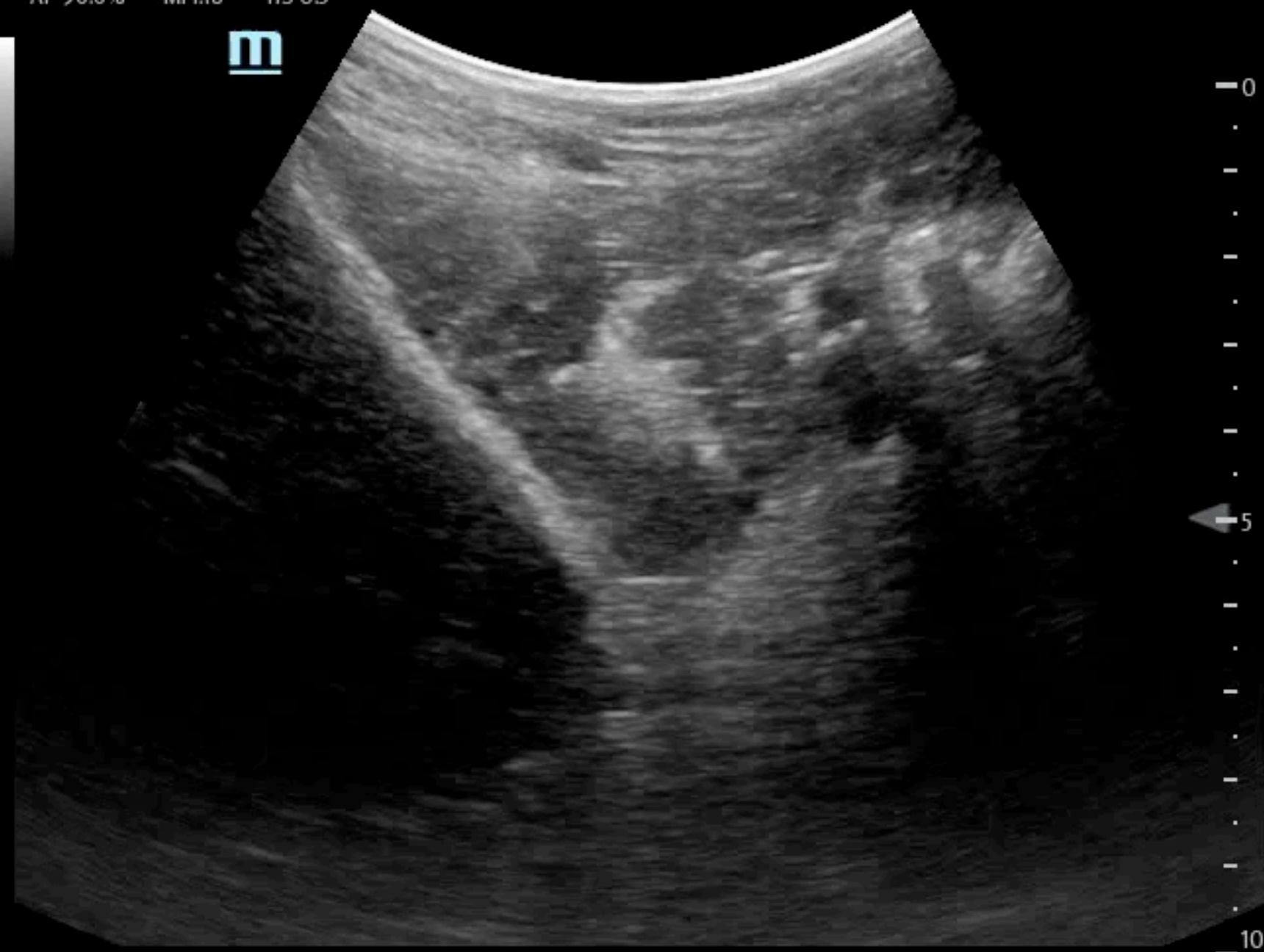
AP 96.6%

MI 1.18

TIS 0.5

B

FH6.0
DR 130
FR 24
D 11.0
G 81
Z 1.10



iNeedle

iTouch

C5-1s

AP 96.6%

MI 1.18

TIS 0.5

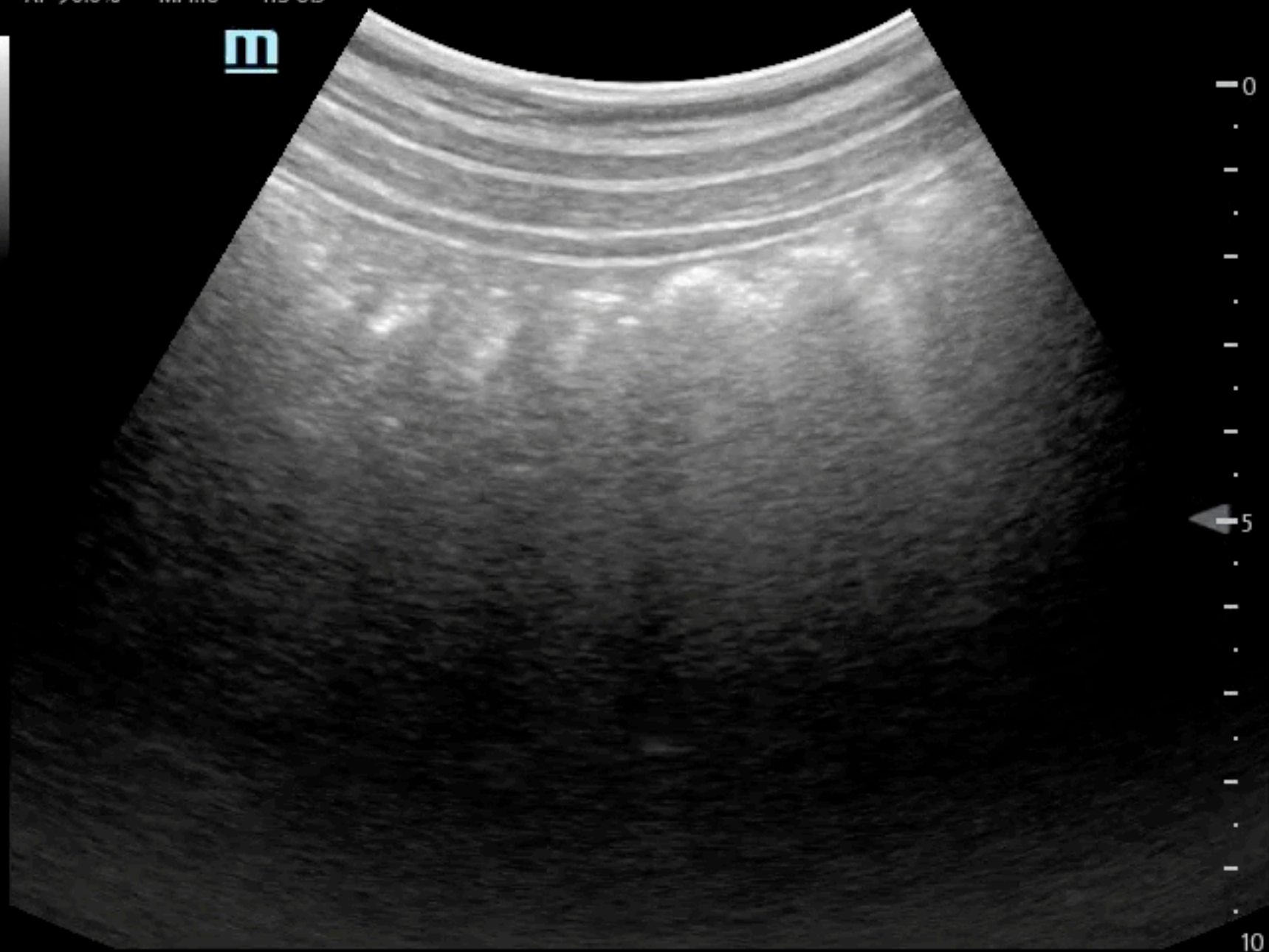
B

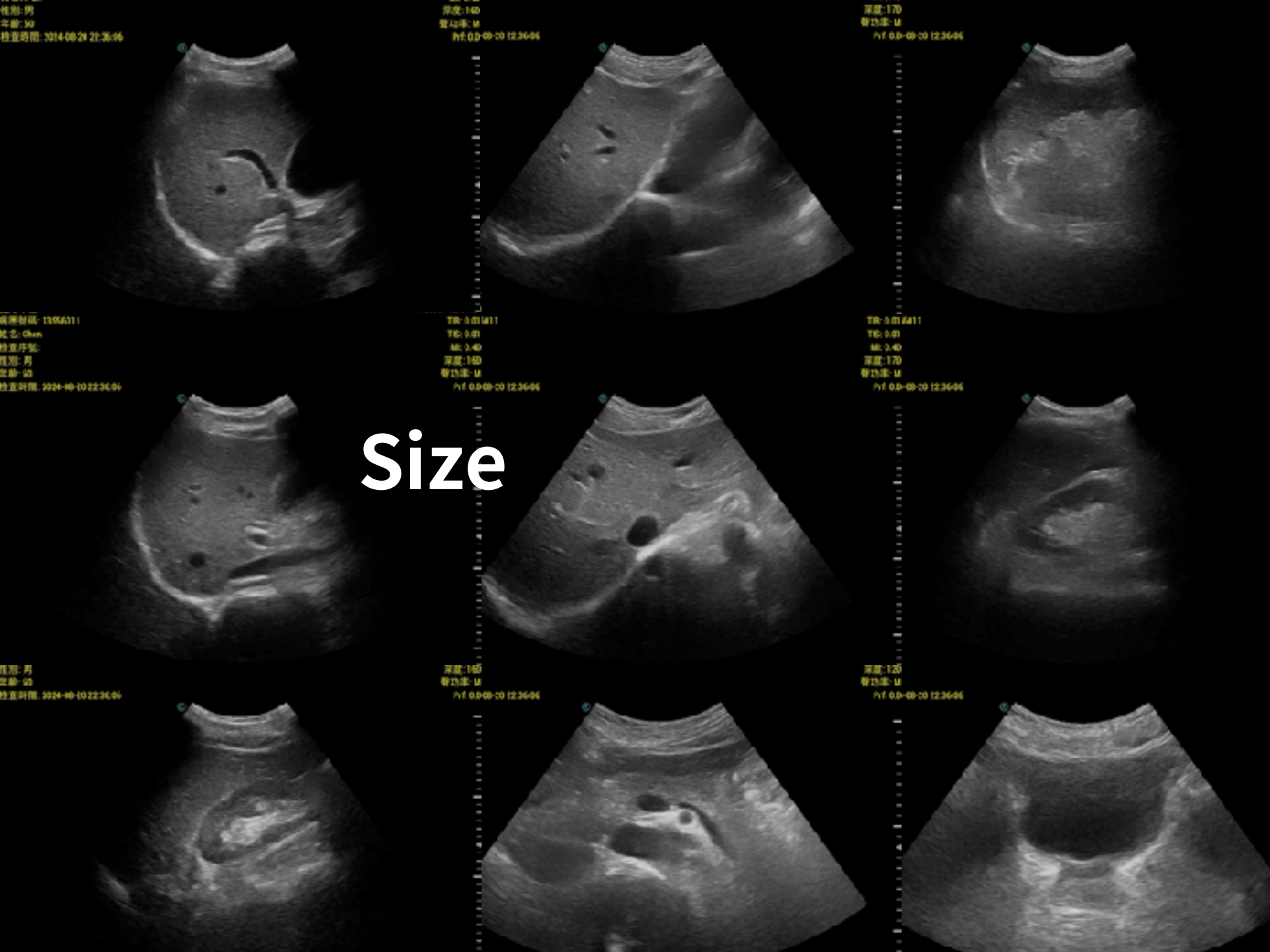
FH6.0
DR 130
FR 24
D 11.0
G 81
Z 1.10



iNeedle

iTouch





S_{ize}

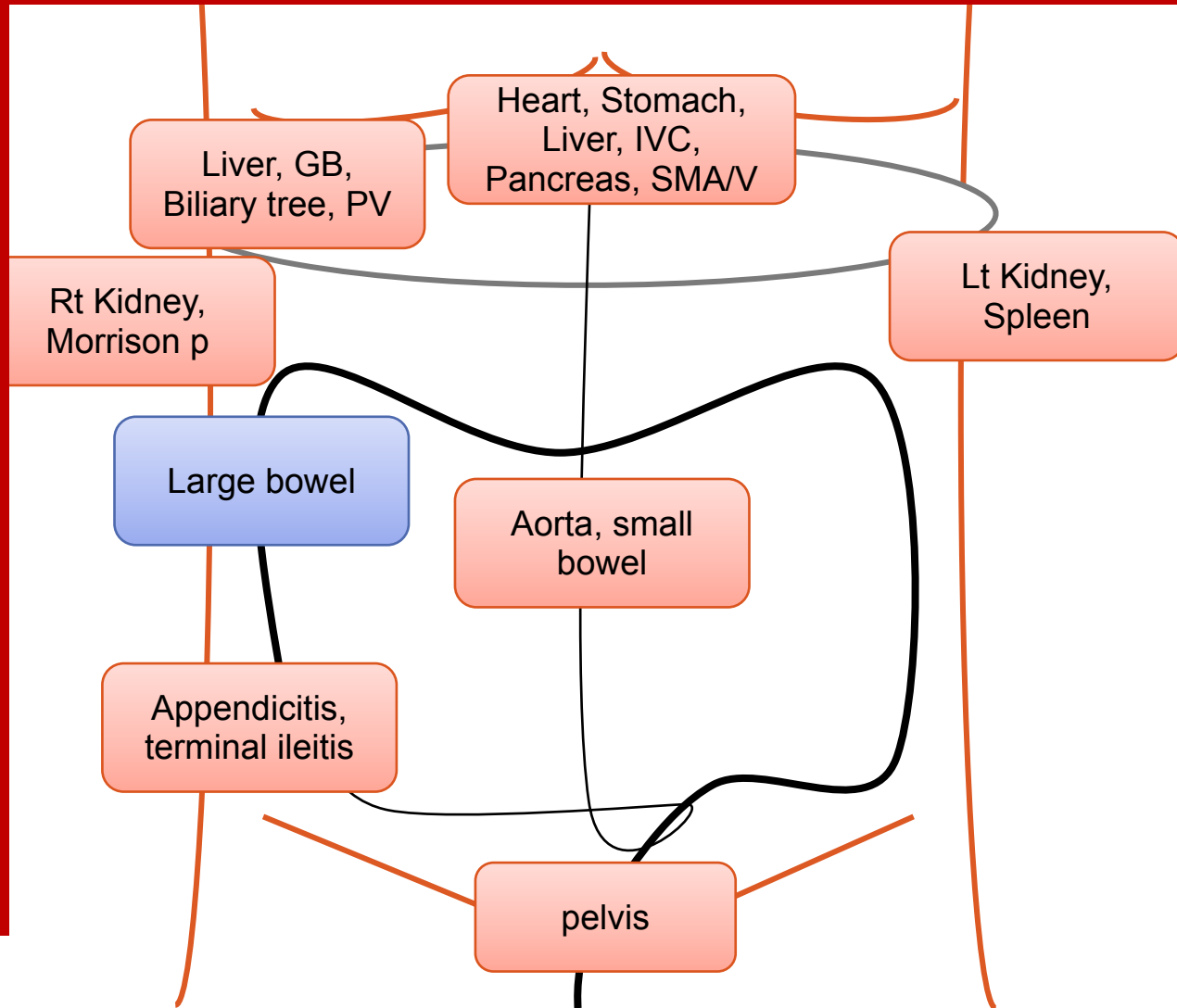
A_{ir}

F_{luid}

E_{cho-genicity}

R<sub>egional
lesion</sub>

Throw the SAFER Lasso!



Focused Assessment

Size

Air (free / trapped)

Fluid (free / trapped)

Echogenicity

Regional lesion

Normal / Abnormal

Y / N

Y / N

Homo / Hetero

Y / N

Focused Assessment

Size

Air (free / trapped)

Fluid (free / trapped)

Echogenicity

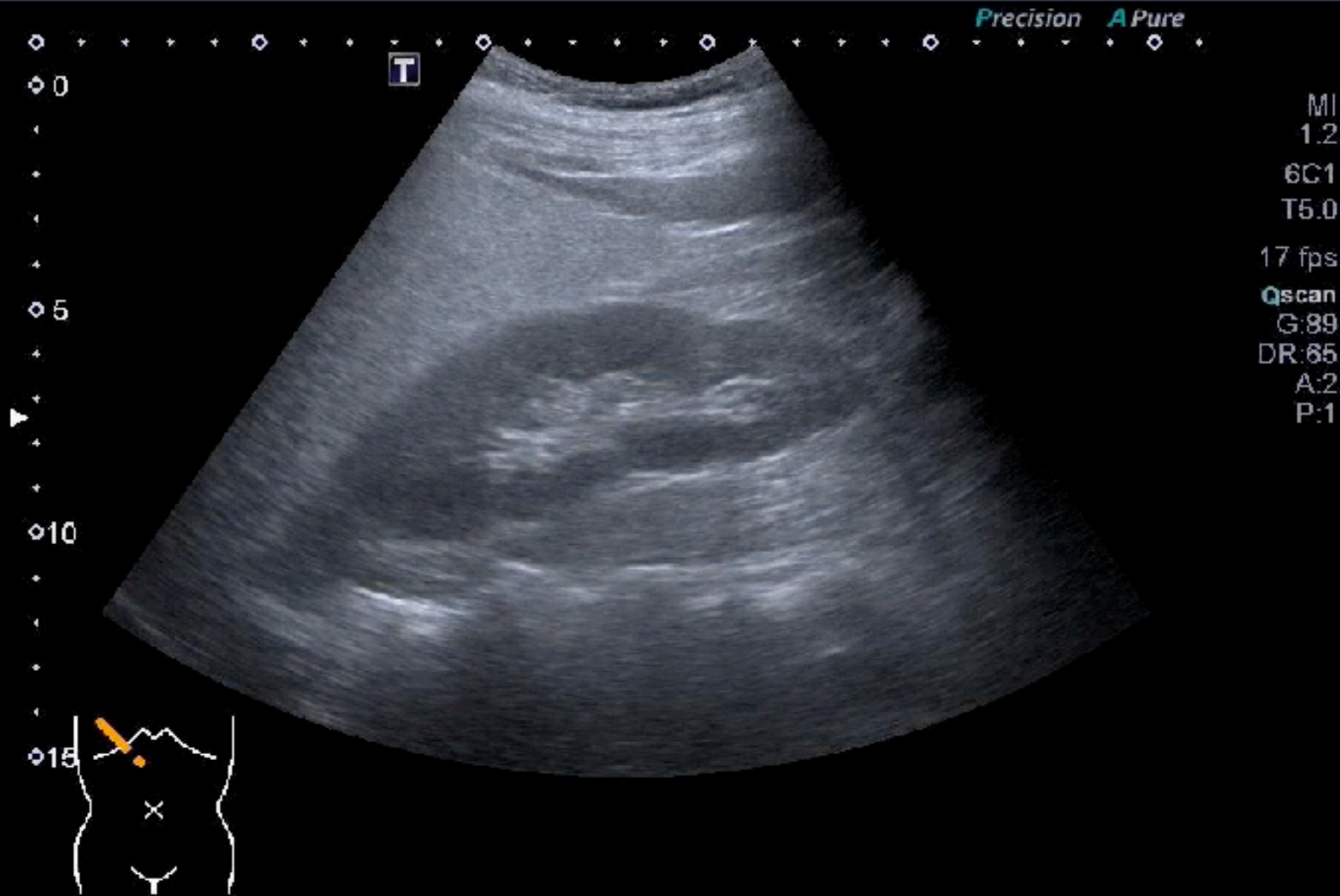
Regional lesion

Within / Surrounding

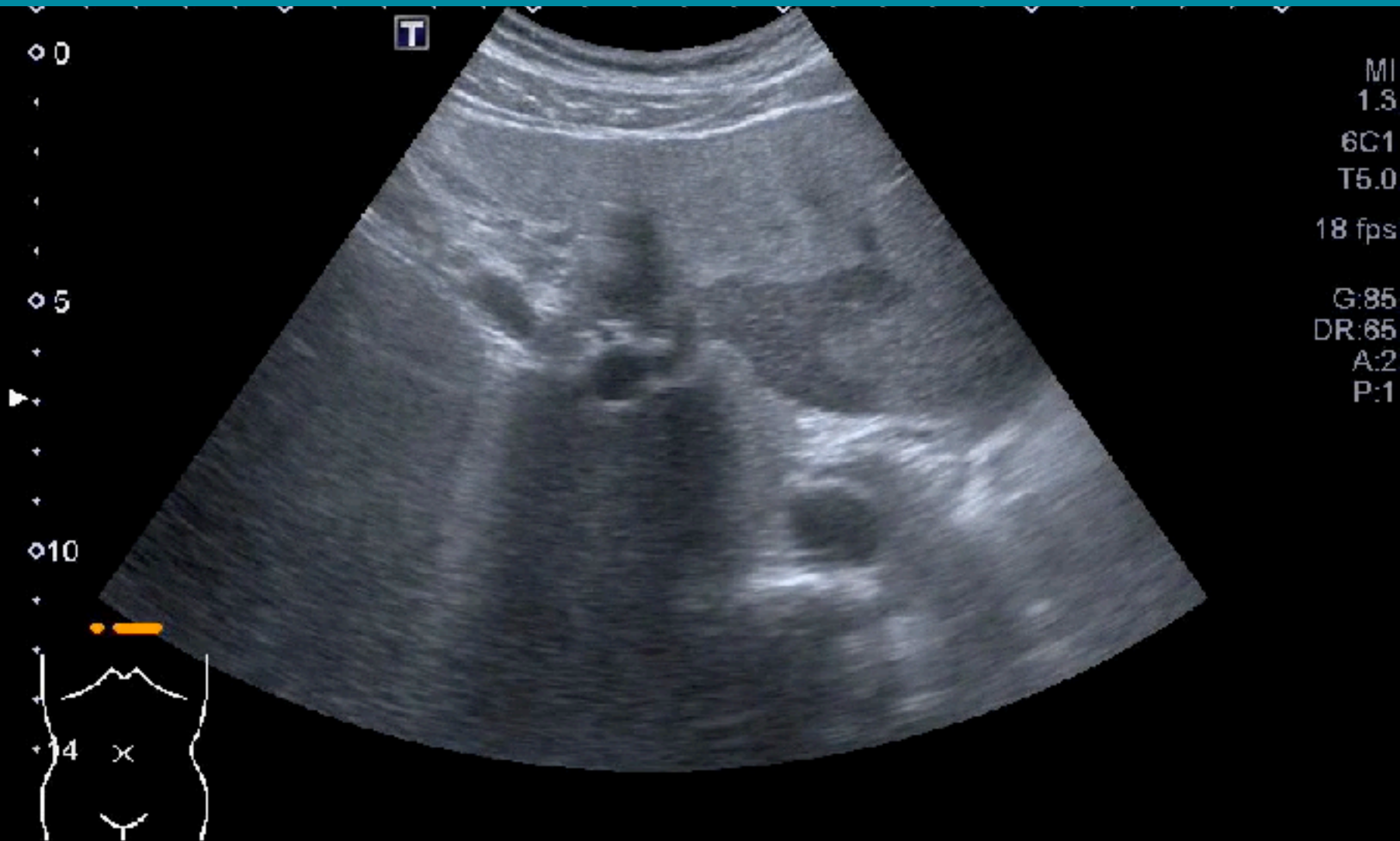
Within / Surrounding

Stones . Mass . Shape

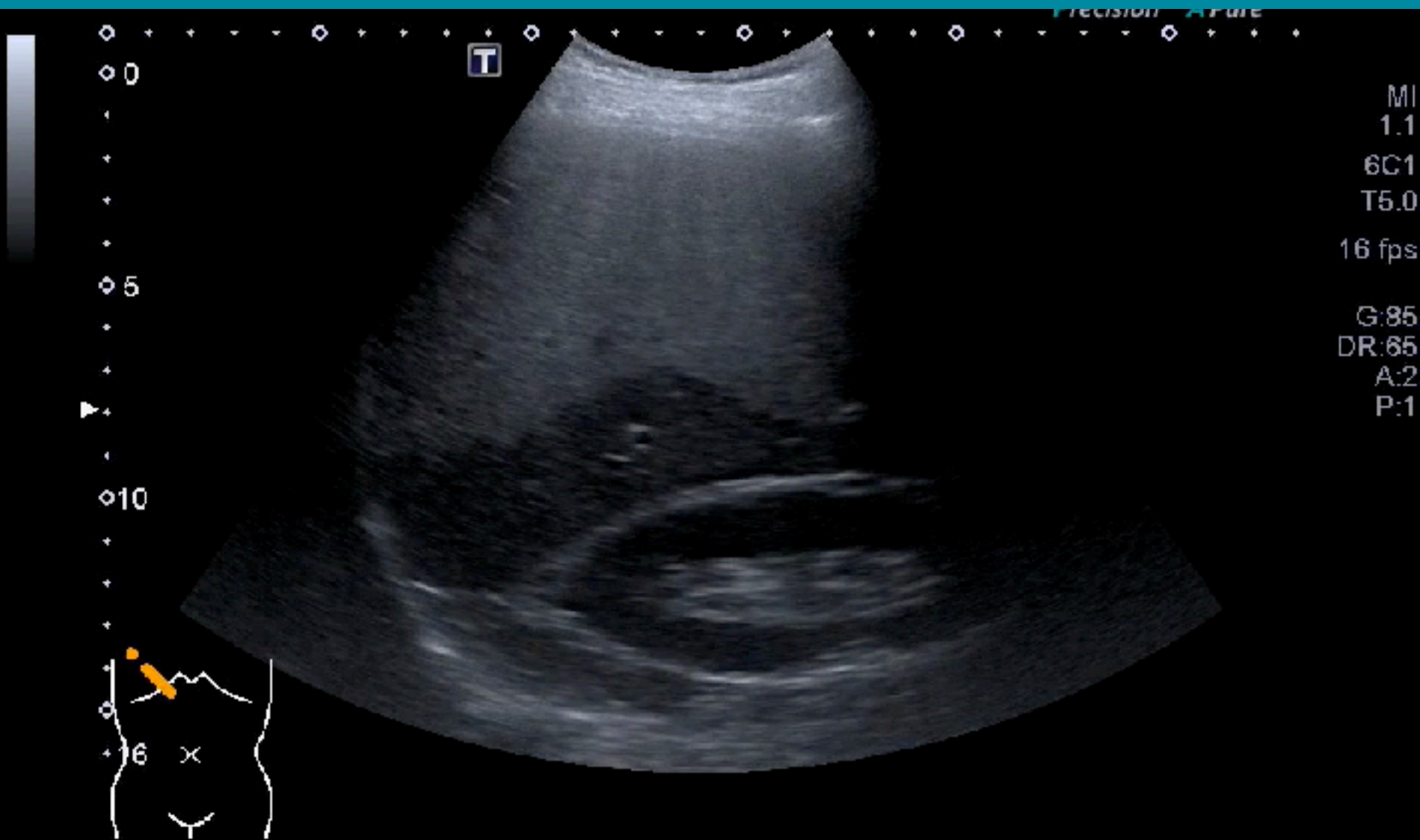
Fatty liver



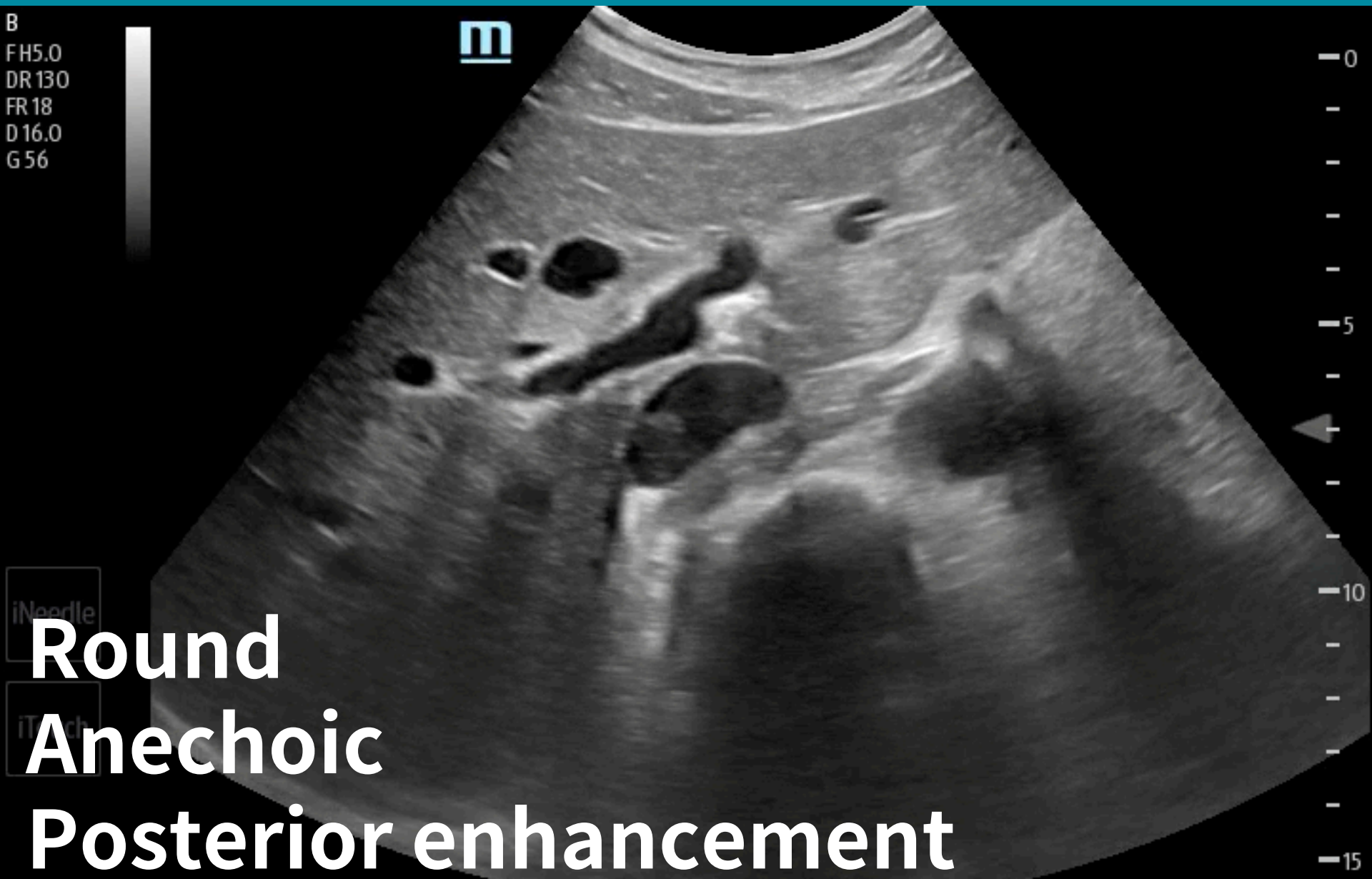
Fatty liver - focal sparing



Fatty liver - focal sparing



Cyst - liver

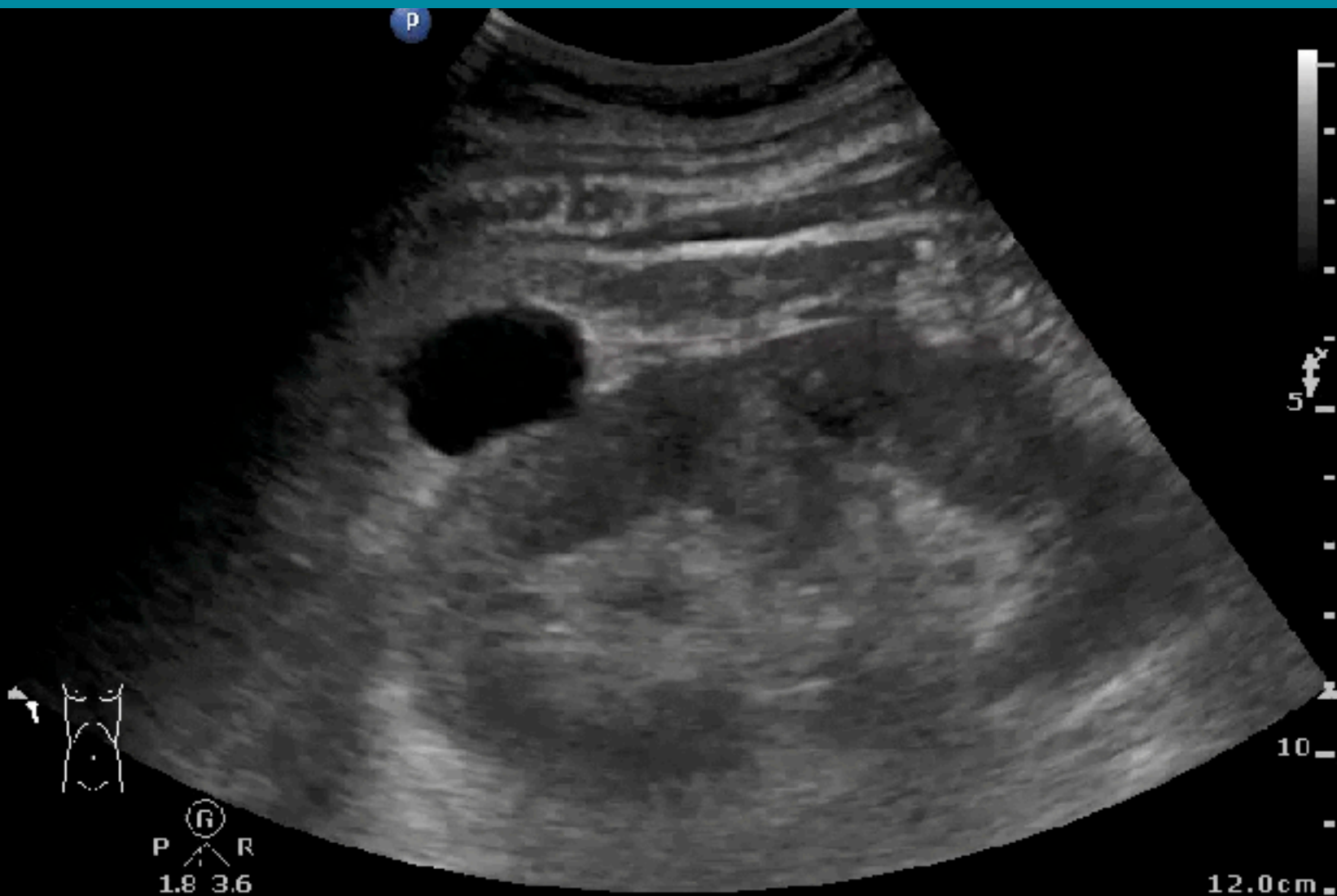


Cyst - renal

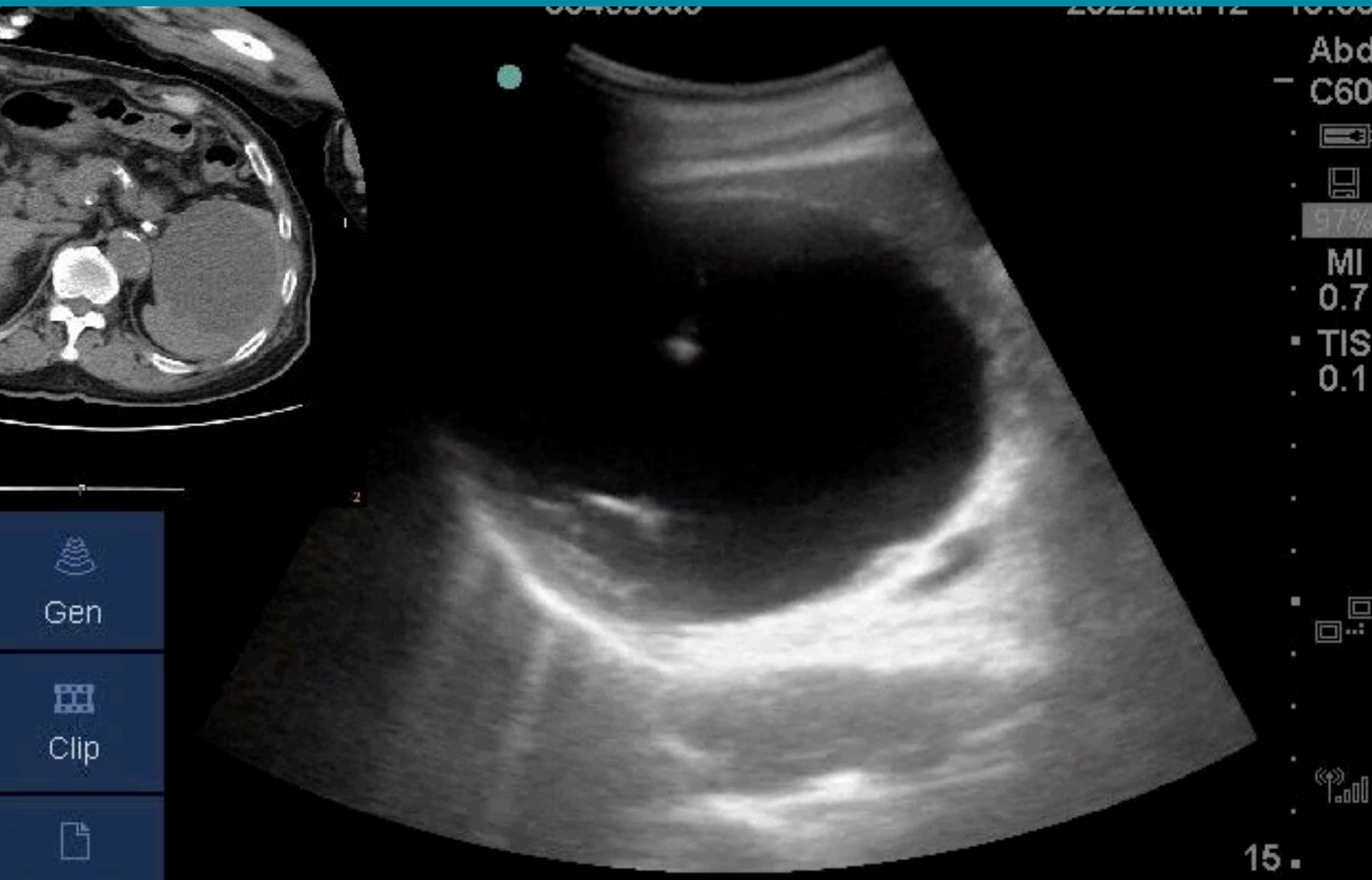
Abd Gen
C5-1
39 Hz
12.0cm

2D

HGen
Gn 60
C. 56
3/3/3



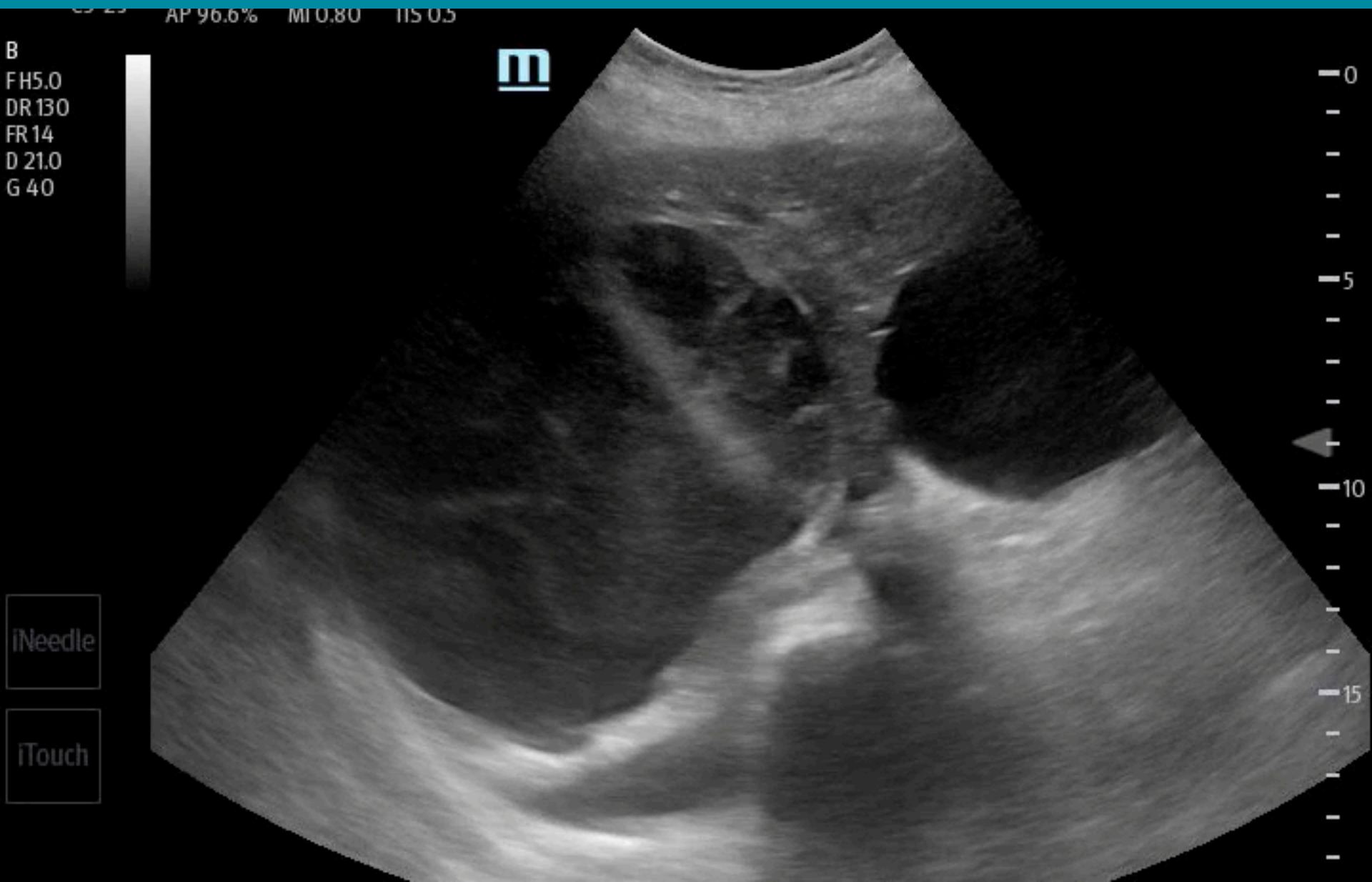
Cyst - splenic



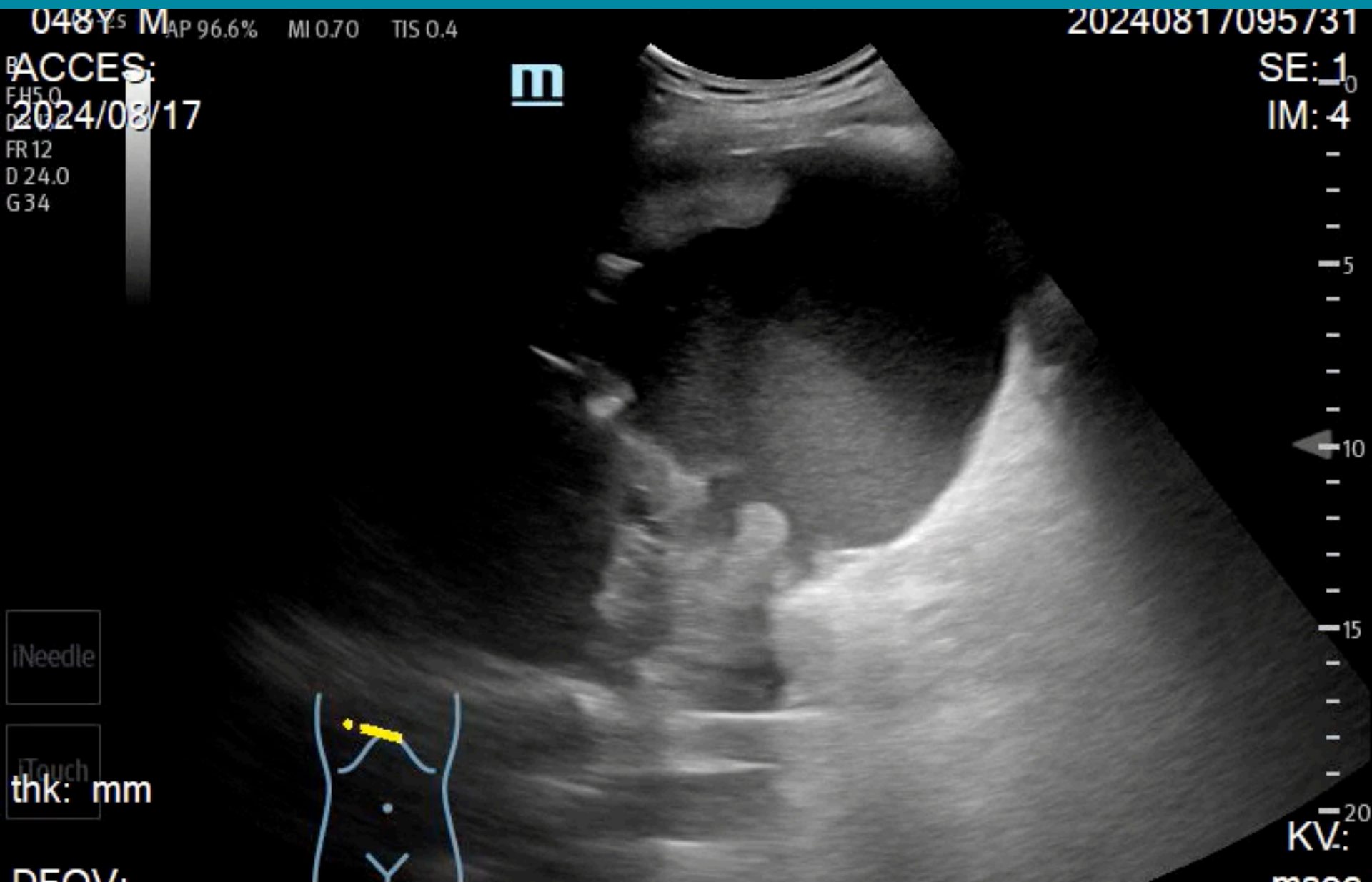
Cyst - pancreatic



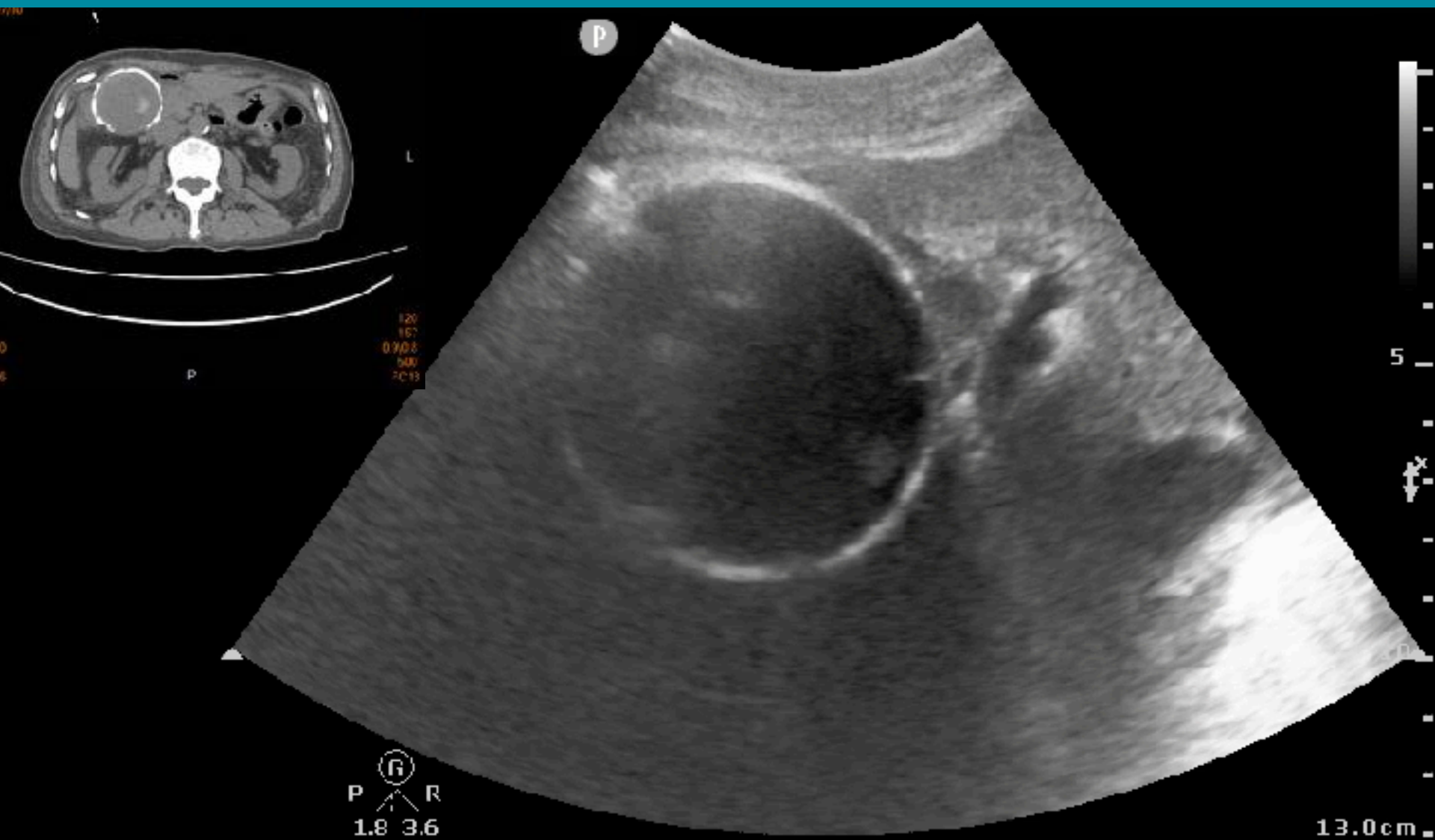
Cyst - complicated



Cyst - complicated



Cyst - calcified / hemorrhage

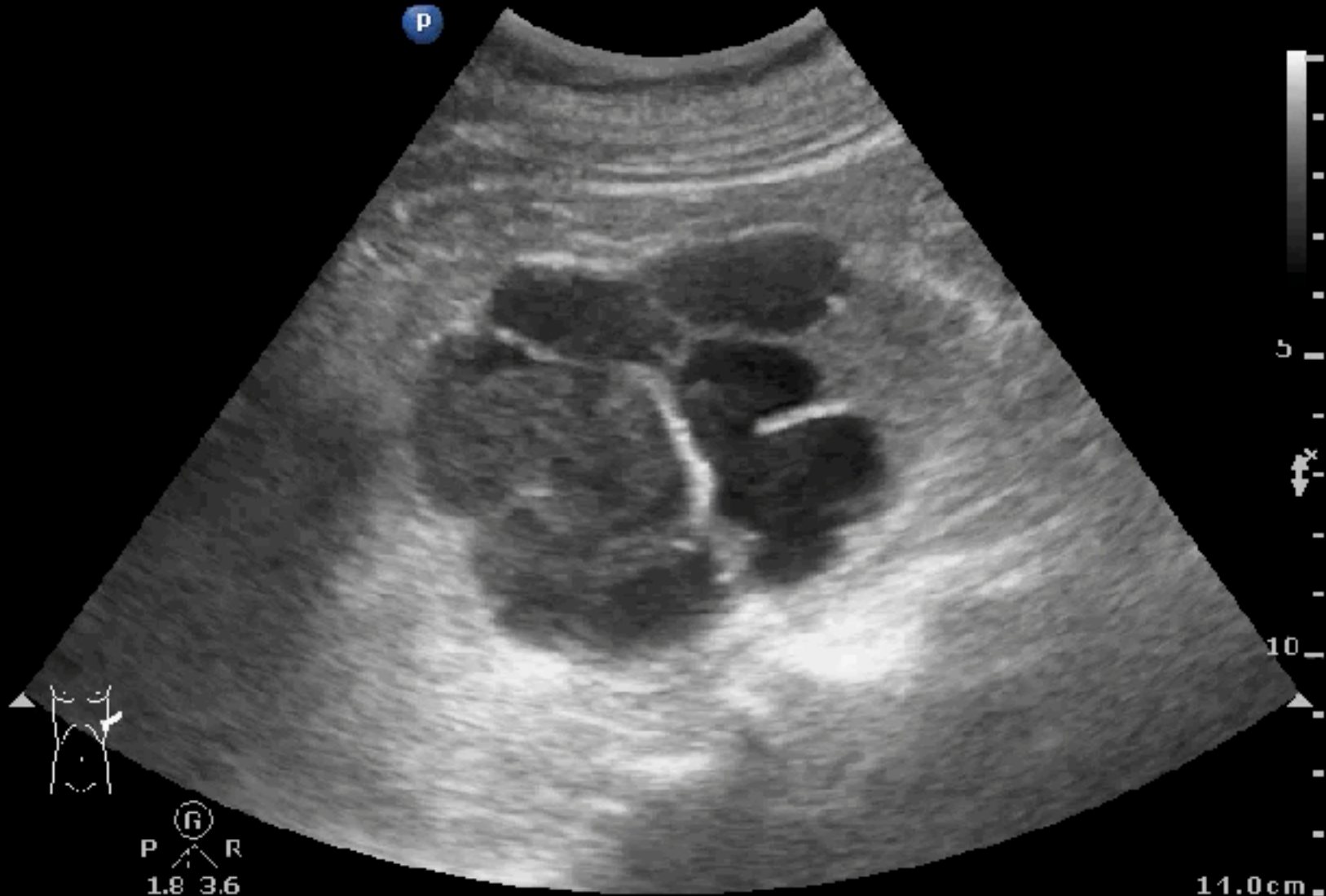


Cyst - hemorrhage

Abd Gen
C5-1
36 Hz
14.0cm

2D

HGen
Gn 80
C. 56
3/3/3

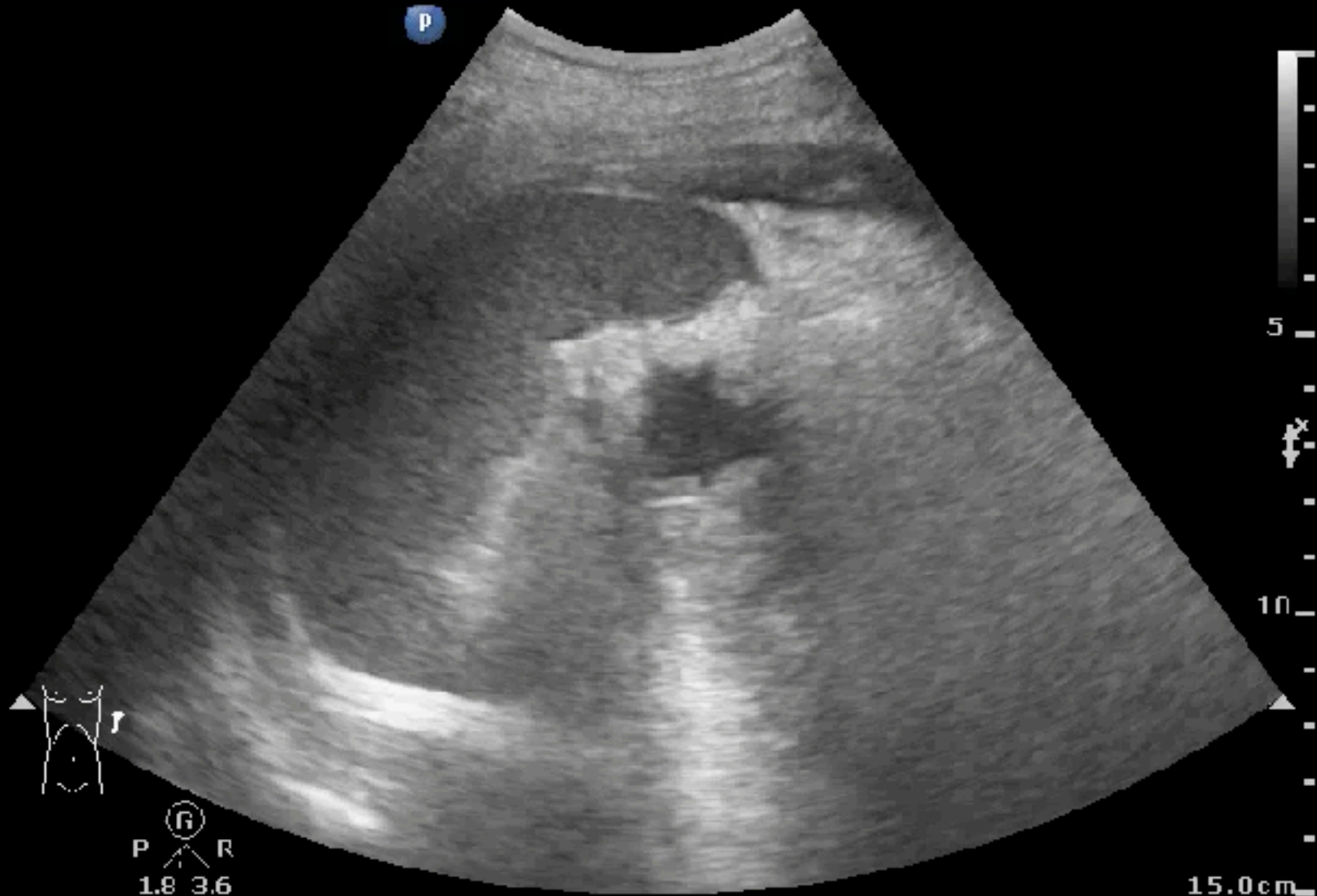


Cyst - pancreatic

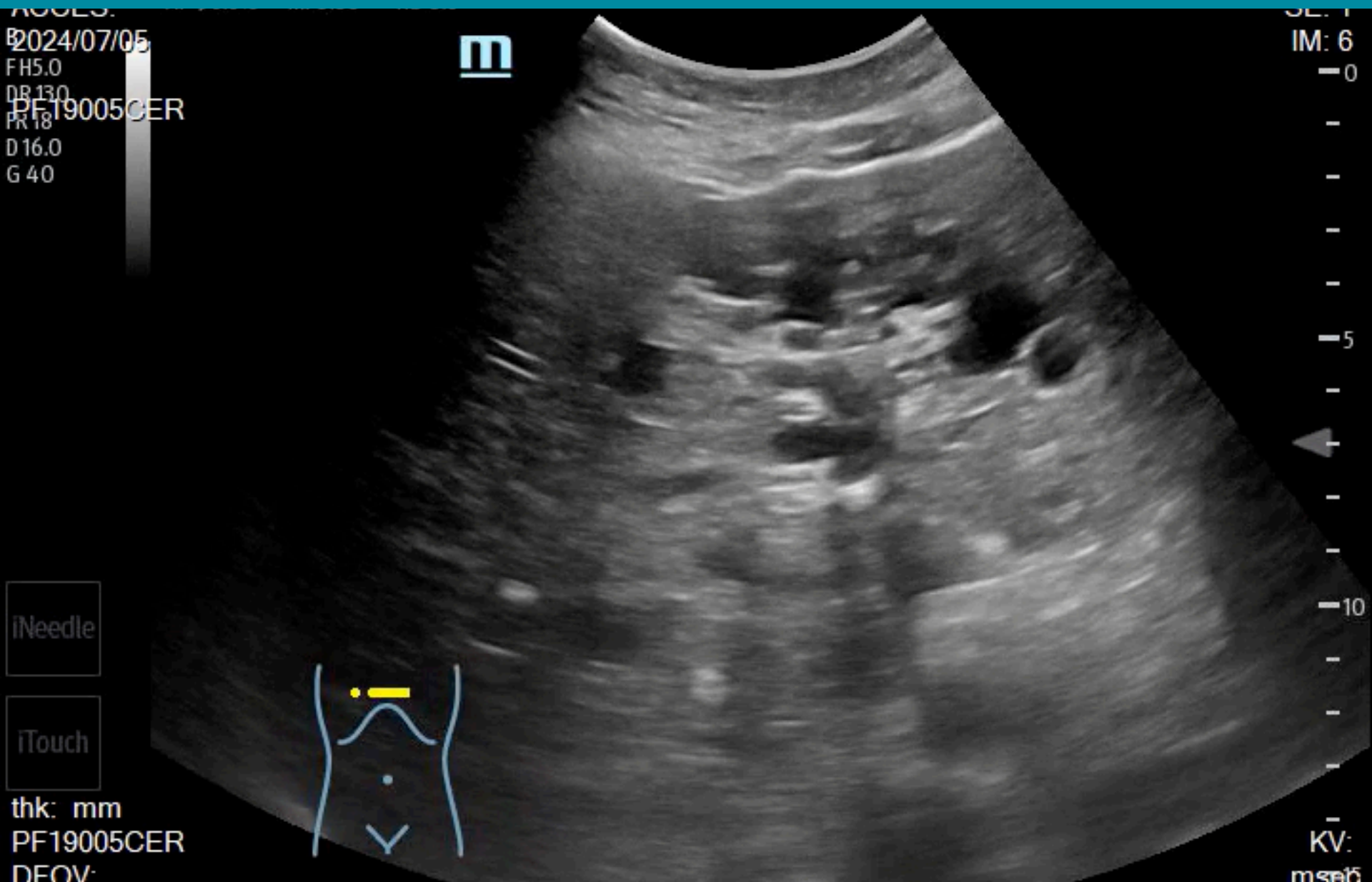
Abd Gen
C5-1
34 Hz
15.0cm

2D

HGen
Gn 93
C. 56
3/3/3



Polycystic liver disease



Polycystic kidney disease

2024/07/05
FH5.0
DB 13.0
PF19005CER
PR 20
D 14.0
G 48



IM: 11

0

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-

-

-

-

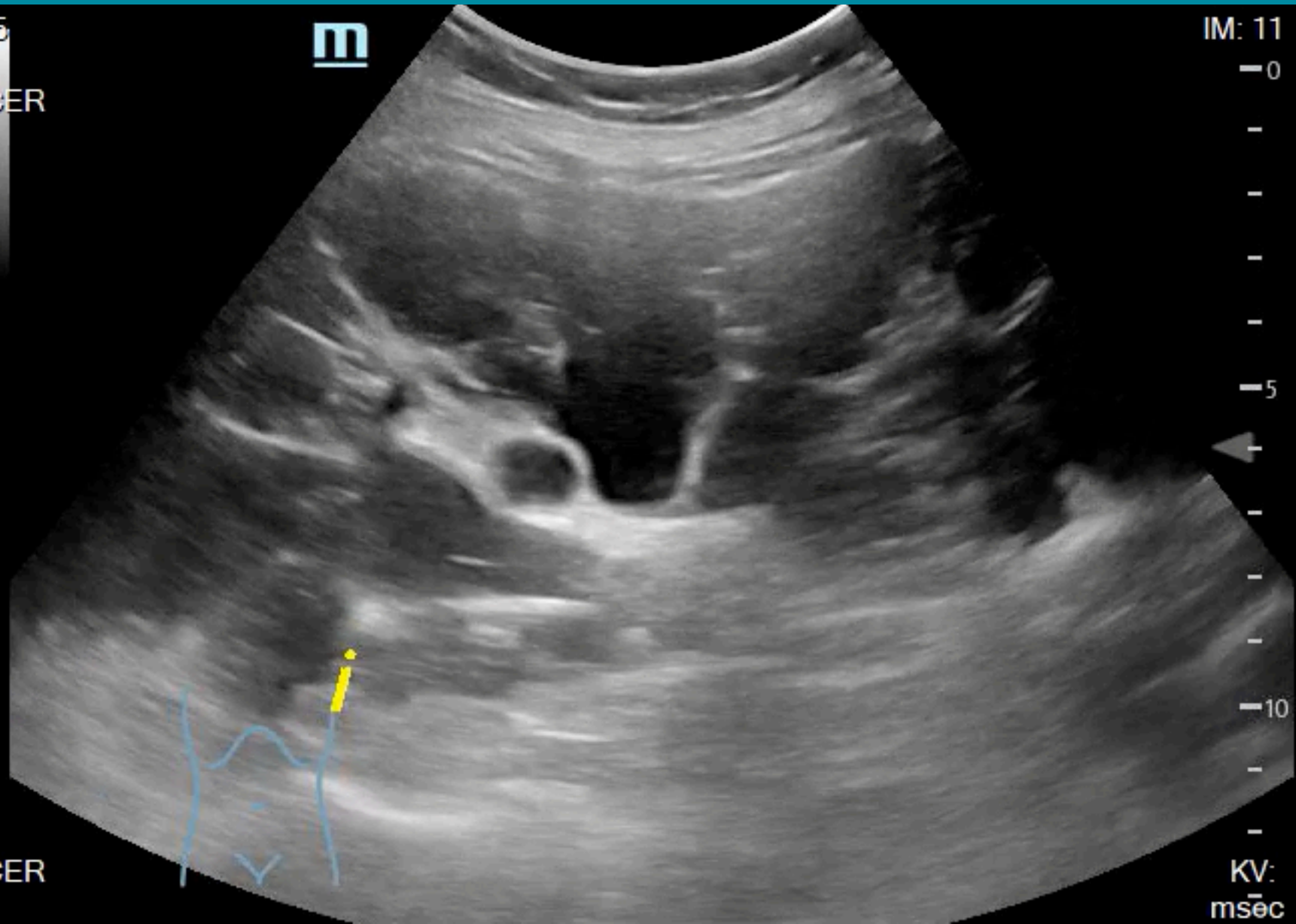
-

KV:
msec

iNeedle

iTouch

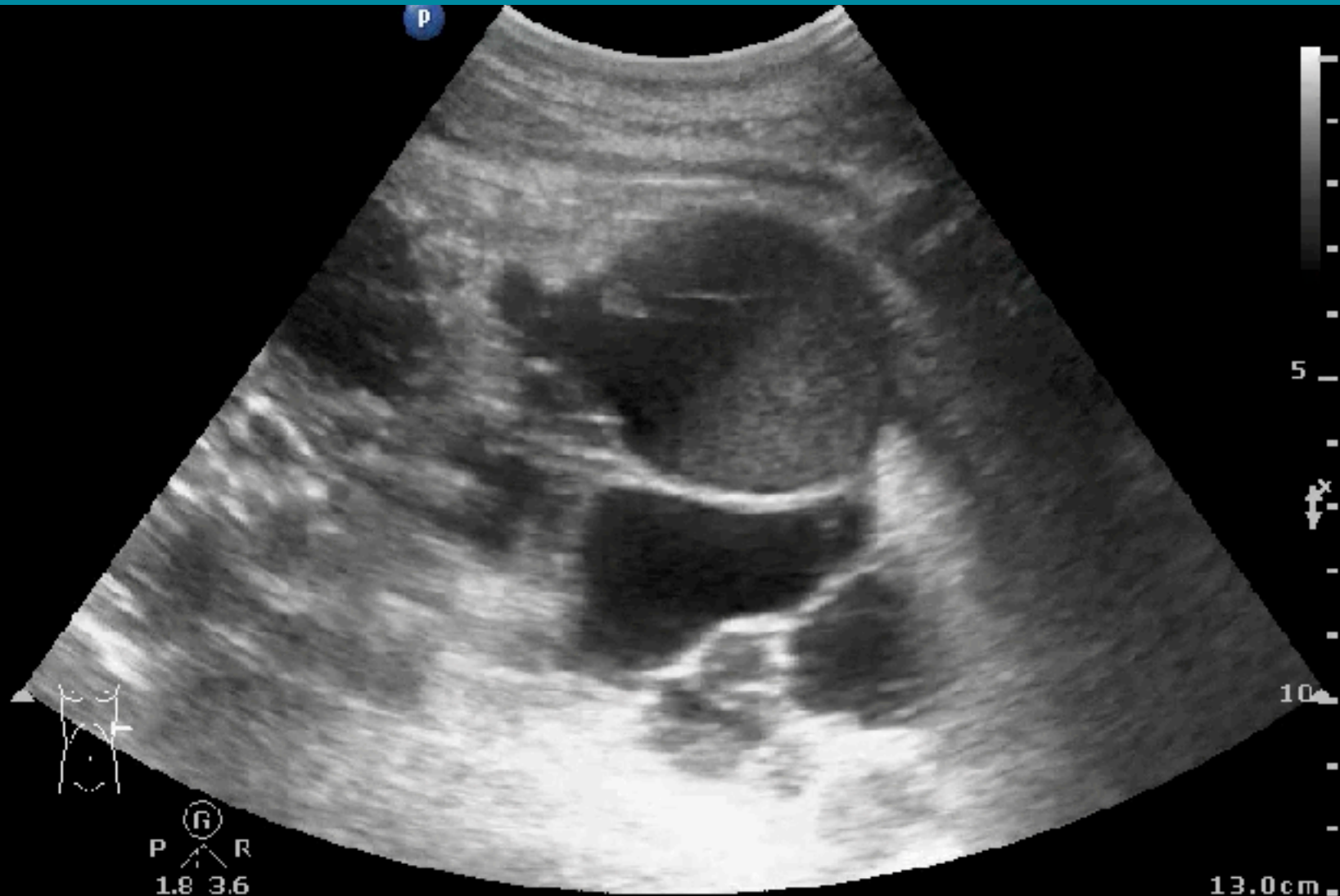
thk: mm
PF19005CER
DFOV:



PCKD - hemorrhage

Abd Gen
C5-1
38 Hz
13.0cm

2D
HGen
Gn 100
C. 56
3/3/3



P R
1.8 3.6

13.0cm

Abscess - liver

2024/09/15
FH5.0
DR 130
FR 17
D 17.0
G 59

m

IM: 4
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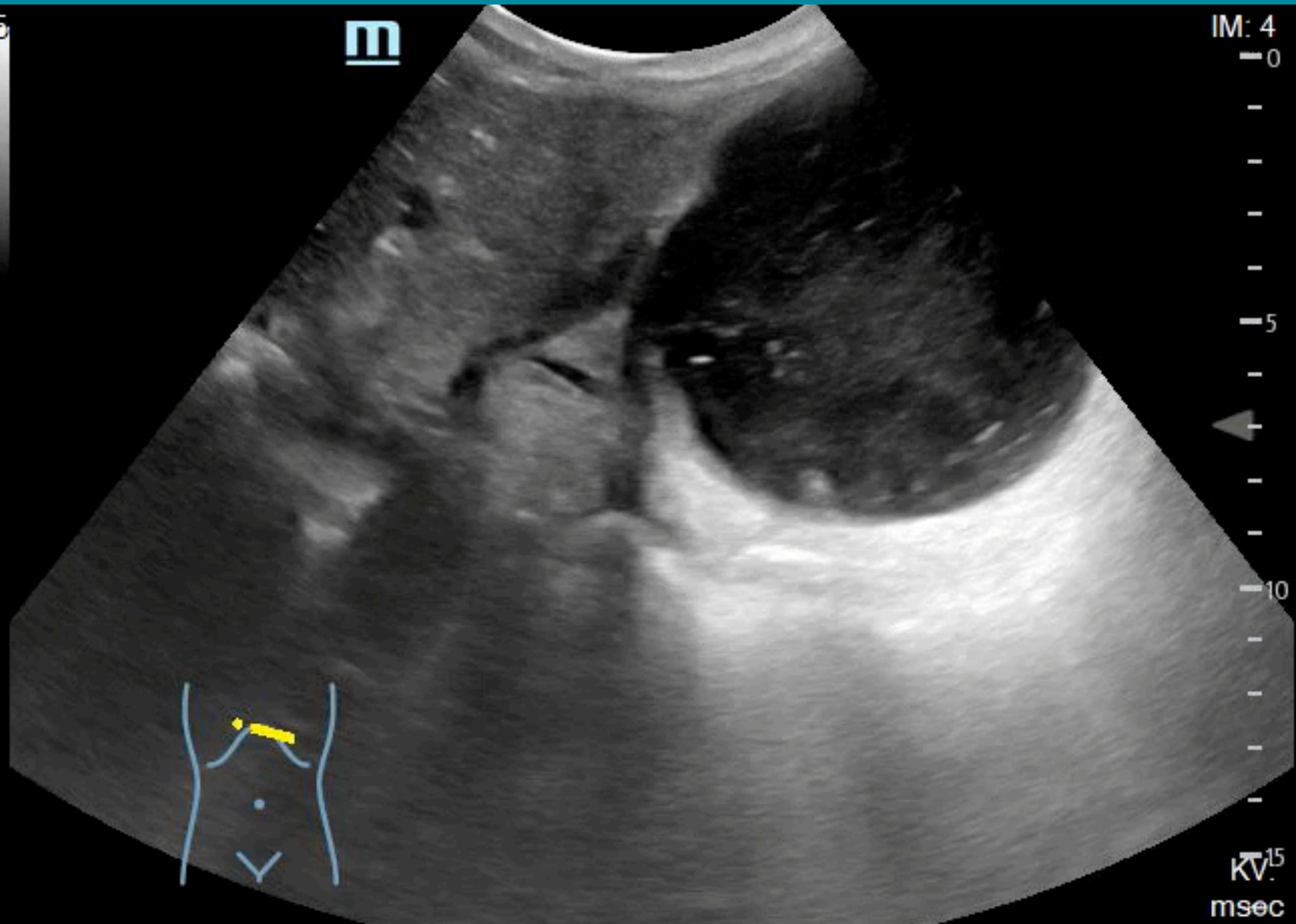
iNeedle

iTouch

thk: mm

DFOV:

KV¹⁵
msec



Abscess - renal

2024/09/15
FH5.0
DR 130
FR 18
D16.0
G74



IM: 11
-0

-
-
-
-
-
-
-5

-
-
-
-
-10

-
-
-

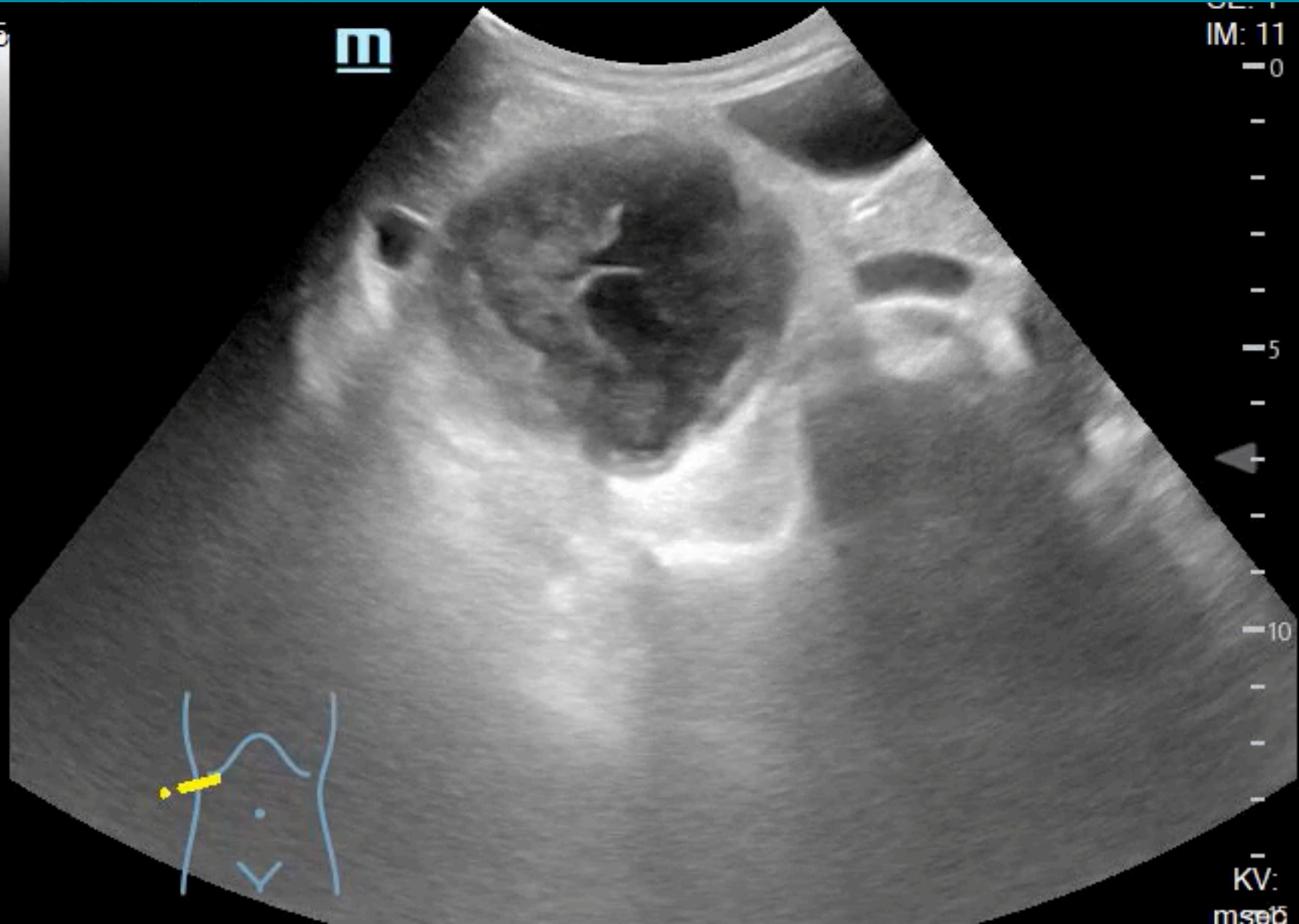
KV:
msep5

iNeedle

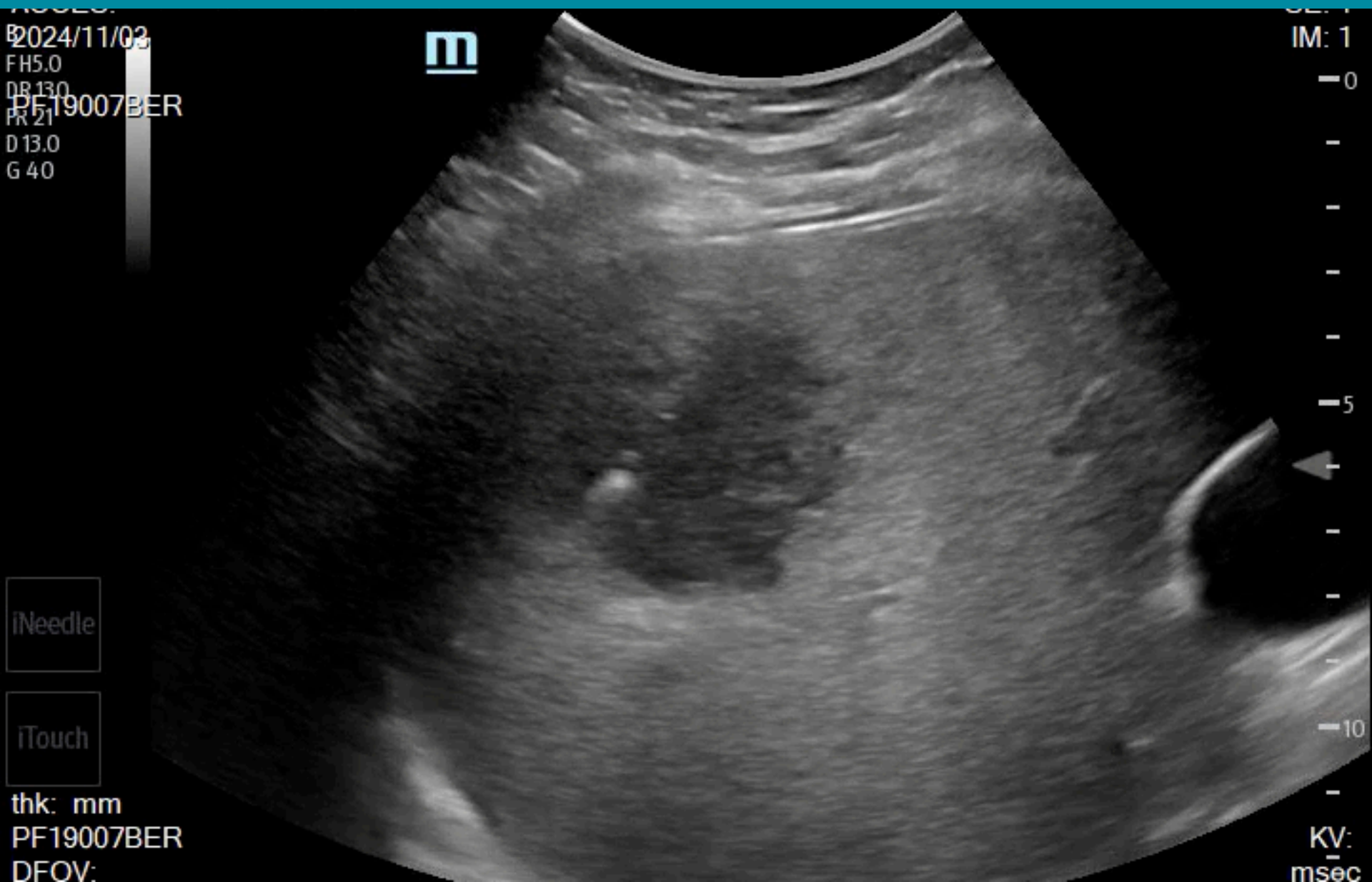
iTouch

thk: mm

DEOV



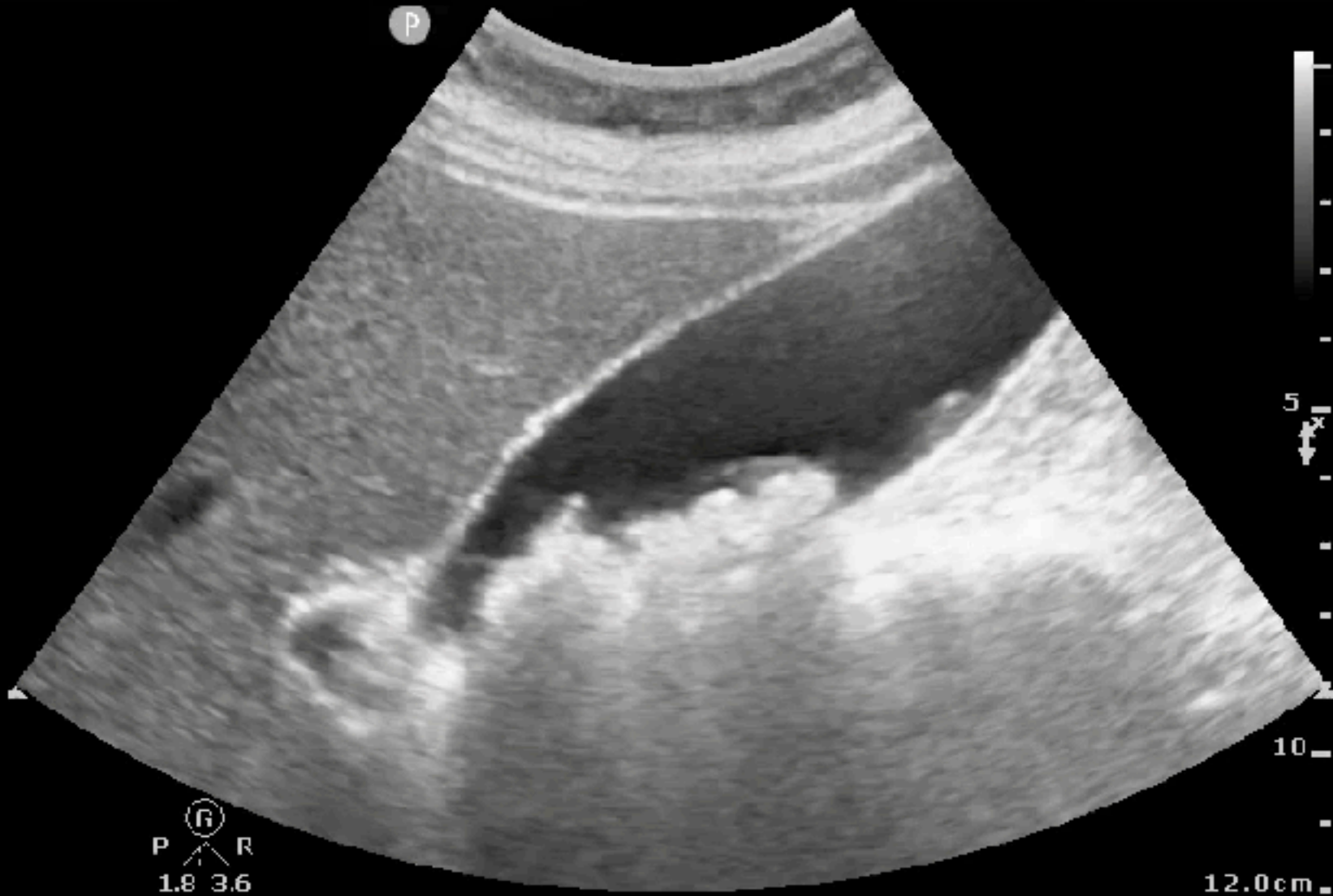
Abscess - liver



Stones - GB

Abd Gen
C5-1
39 Hz
12.0cm

2D
HGen
Gn 100
C. 56
3/3/3



Stones - cystic duct

2024/11/27
FH5.0
DR 130
FR 18
D16.0
G 35

m

IM: 12
-0

-
-
-
-
-5

-
-
-10

-
-
-

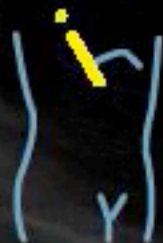
KV:
m

iNeedle

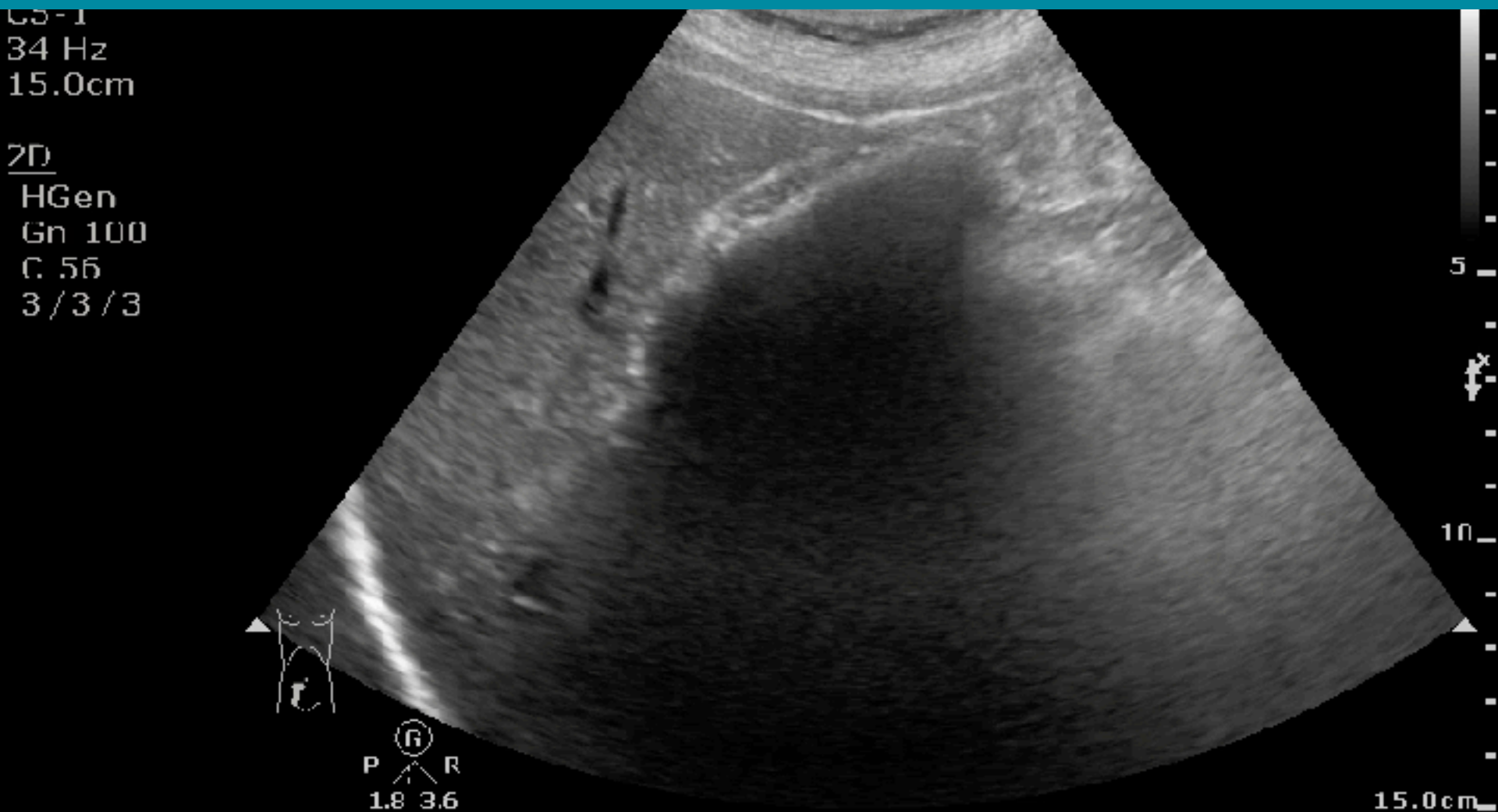
iTouch

thk: mm

DEOV



Stone - GB (WES sign)



Stones - CBD

ACCESS:
FH5.0
2024/08/17
FR 20
D14.0
G 40



SE: 1
IM: 4

iNeedle

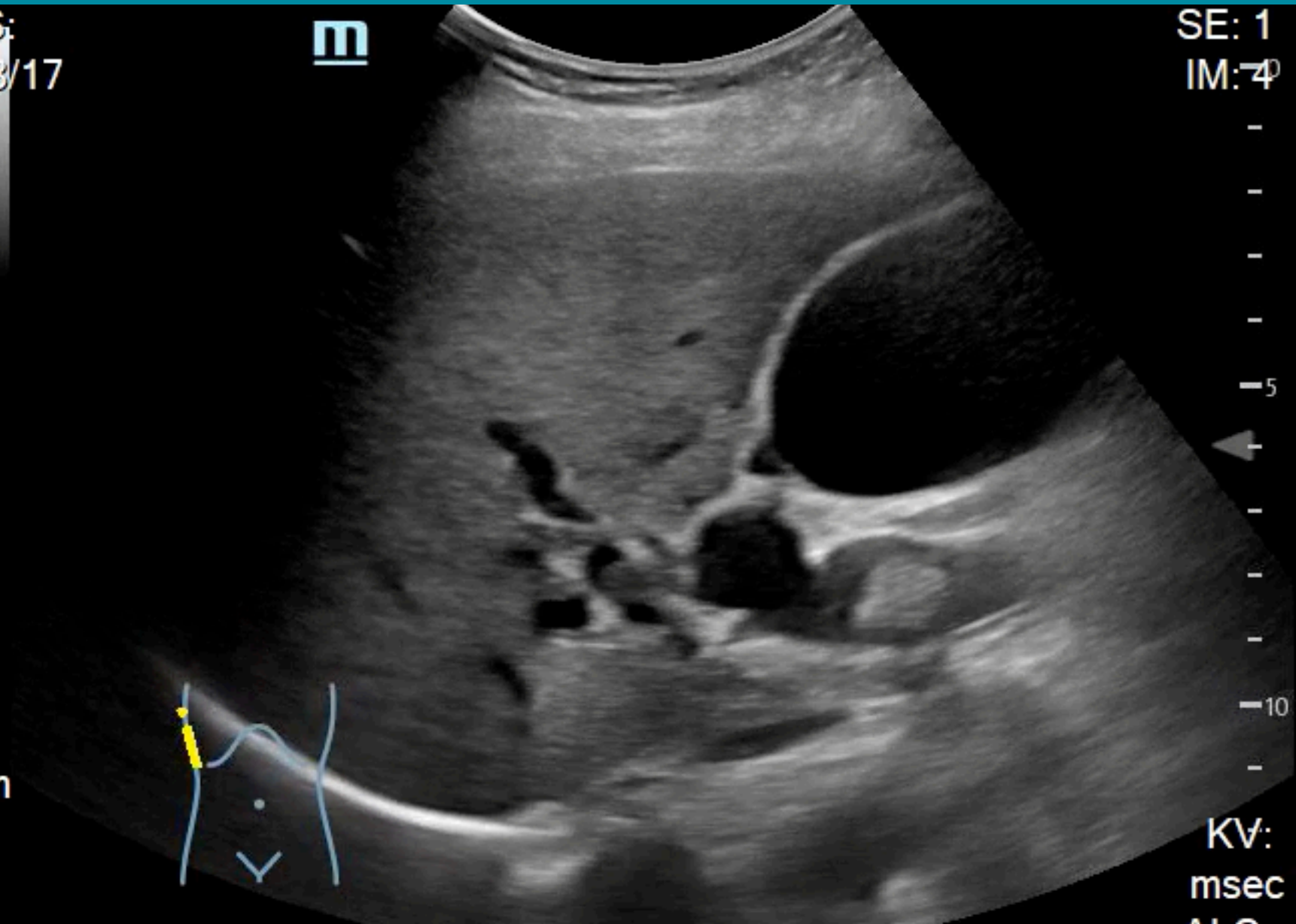
iTouch

thk: mm

DFOV:

-
-
-
-
-5
-
-
-10
-

KV:
msec
ALQ



Stones - CBD

ACCESS:
FH5.0
2024/08/17
FR 20
D14.0
G 40

m

SE: 1
IM: 7

-
-
-
-
-5
-
-
-
-10
-

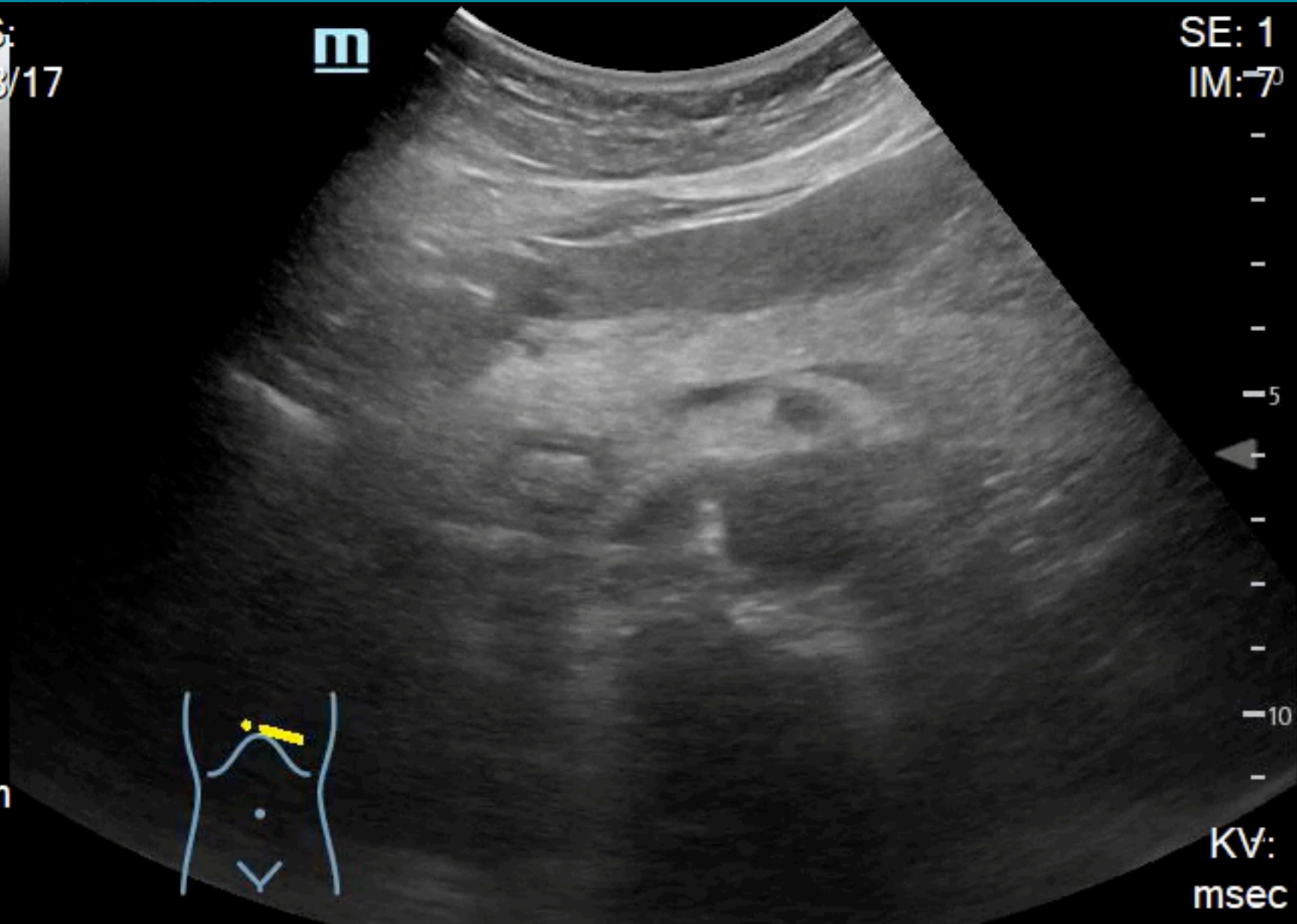
KV:
msec

iNeedle

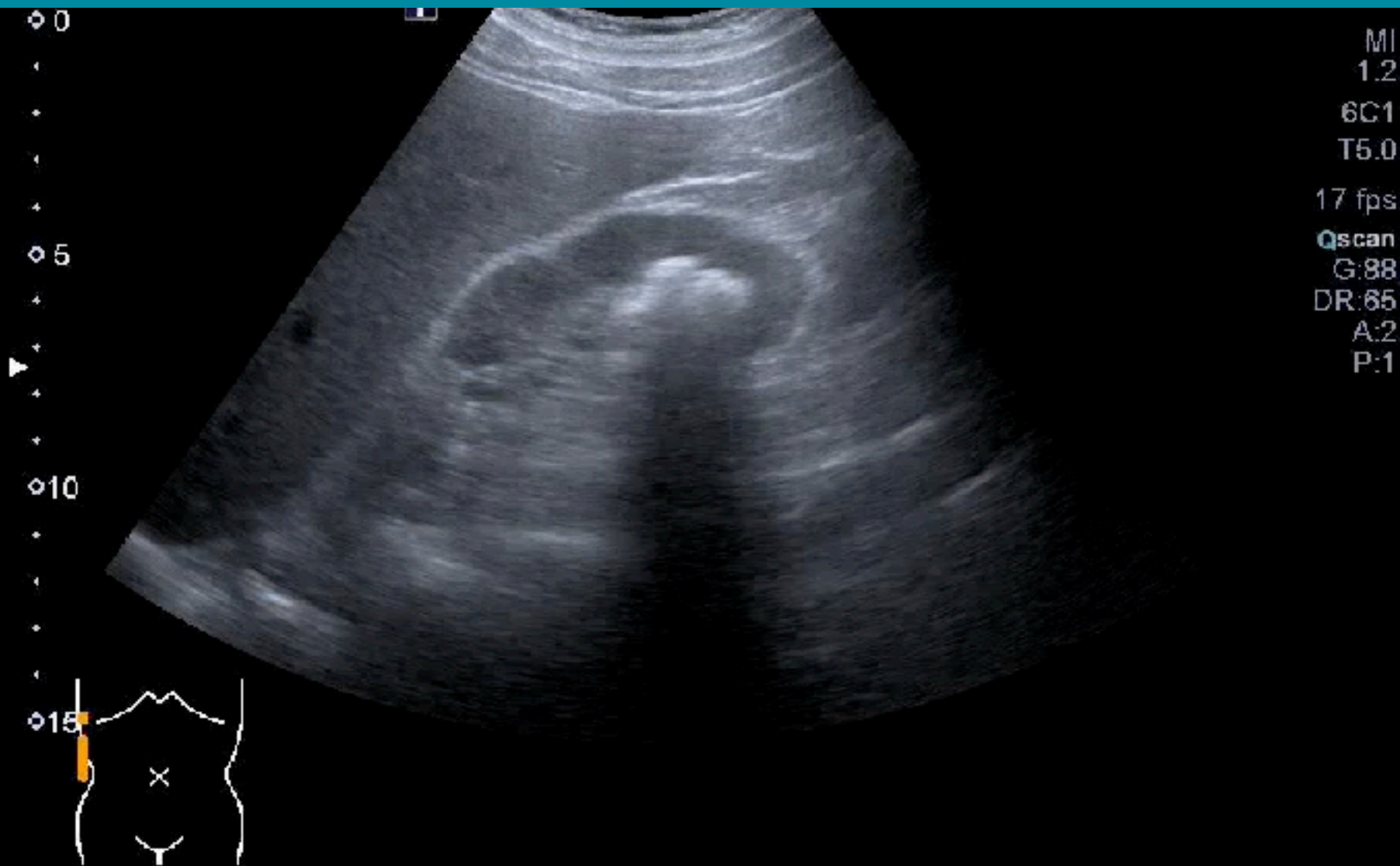
iTouch

thk: mm

DFOV:



Stone - renal

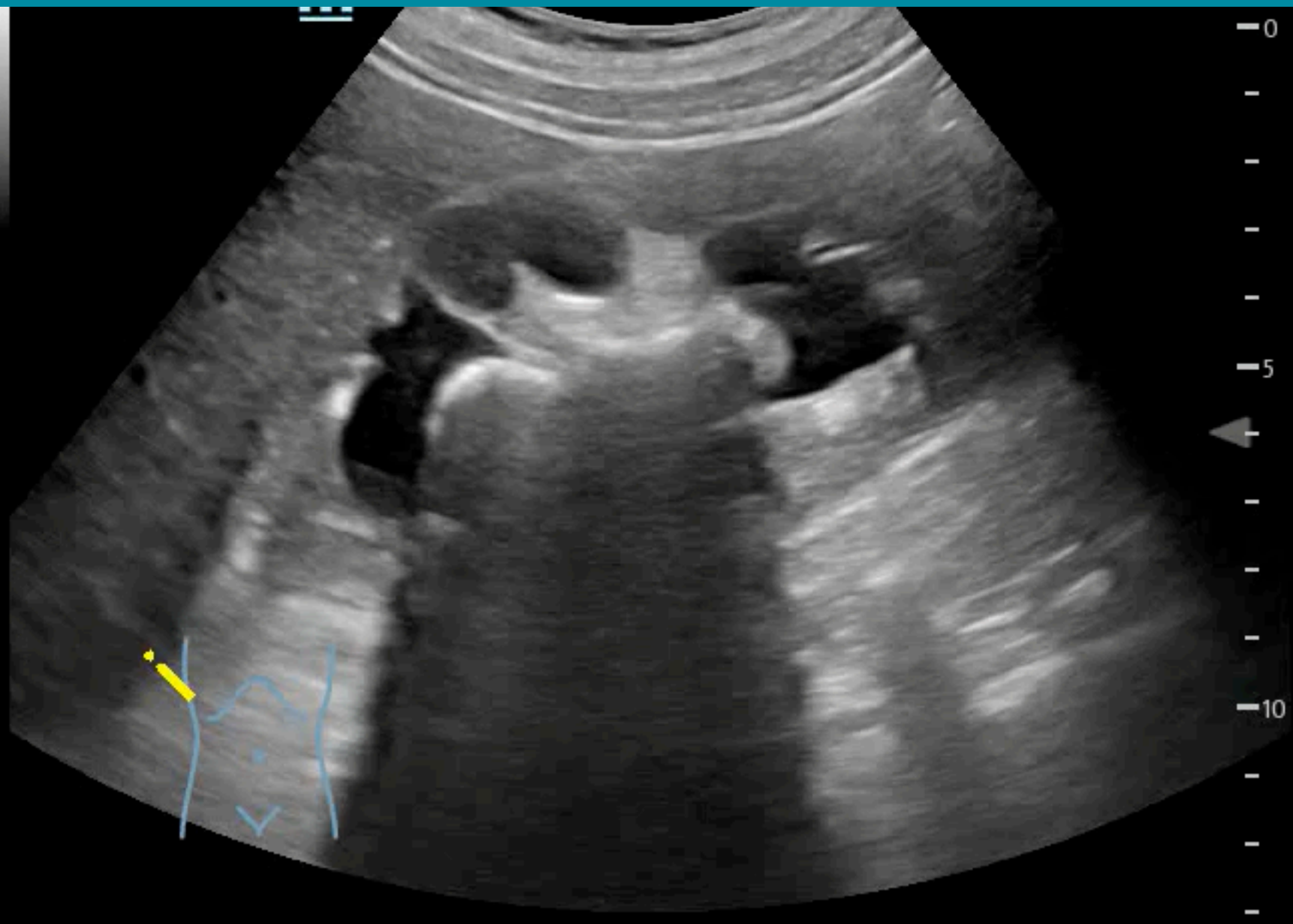


Stone - Staghorn stone

FH5.0
DR 130
FR 21
D 13.0
G 40

iNeedle

iTouch



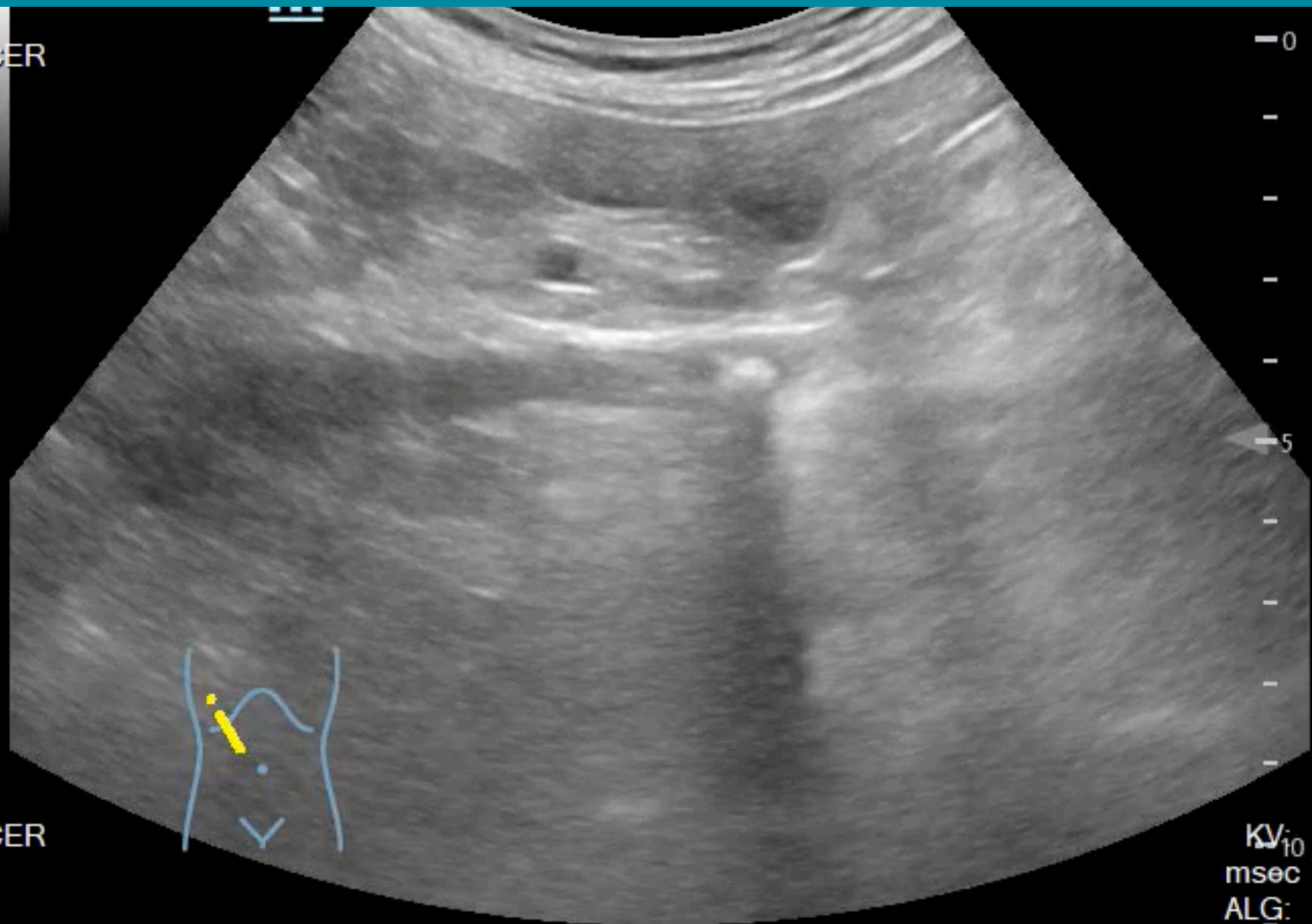
Stones - ureter

FH5.0
DB 13.0
PF19005CER
PR 24
D 11.0
G 59

iNeedle

iTouch

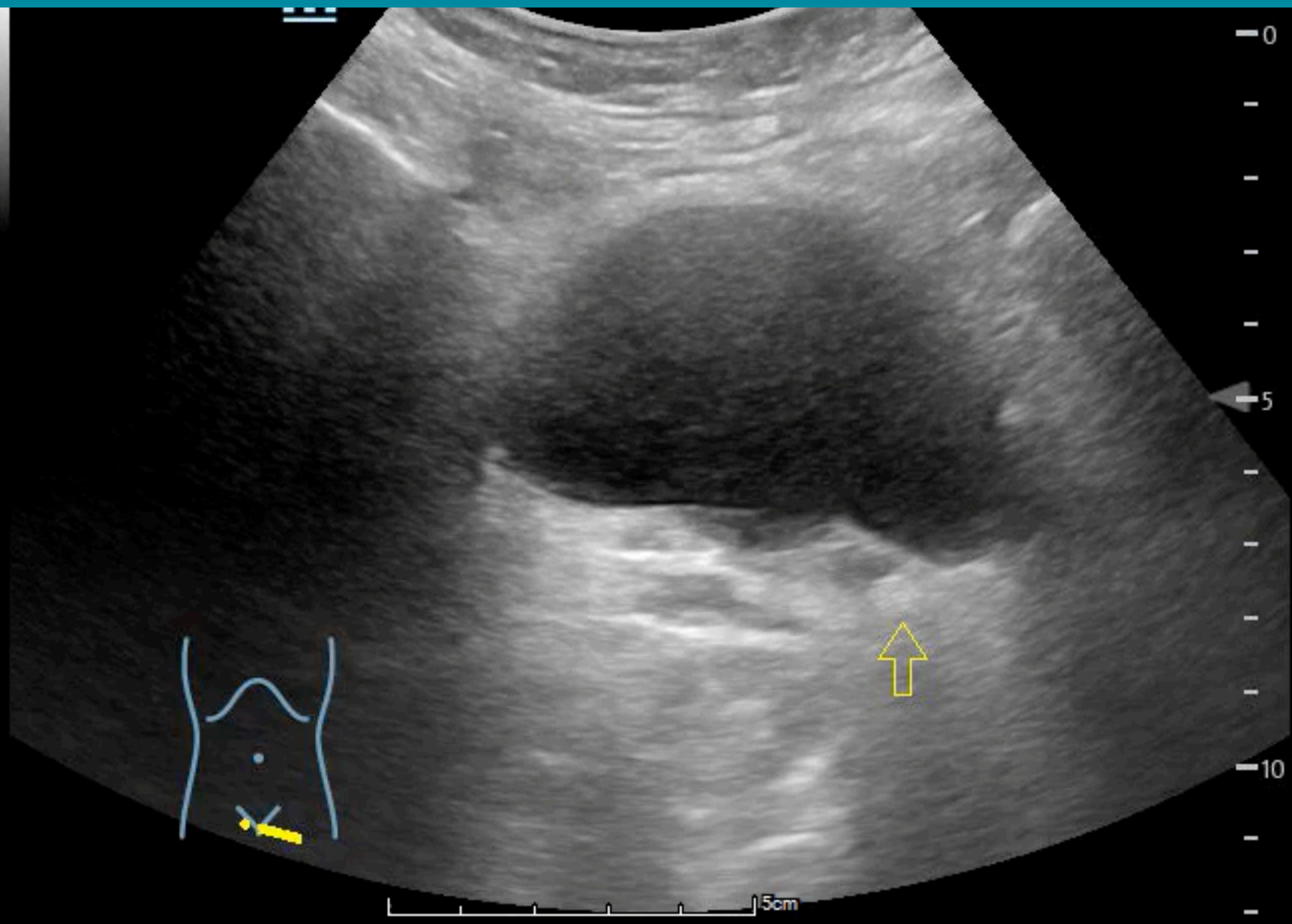
thk: mm
PF19005CER
DFOV:



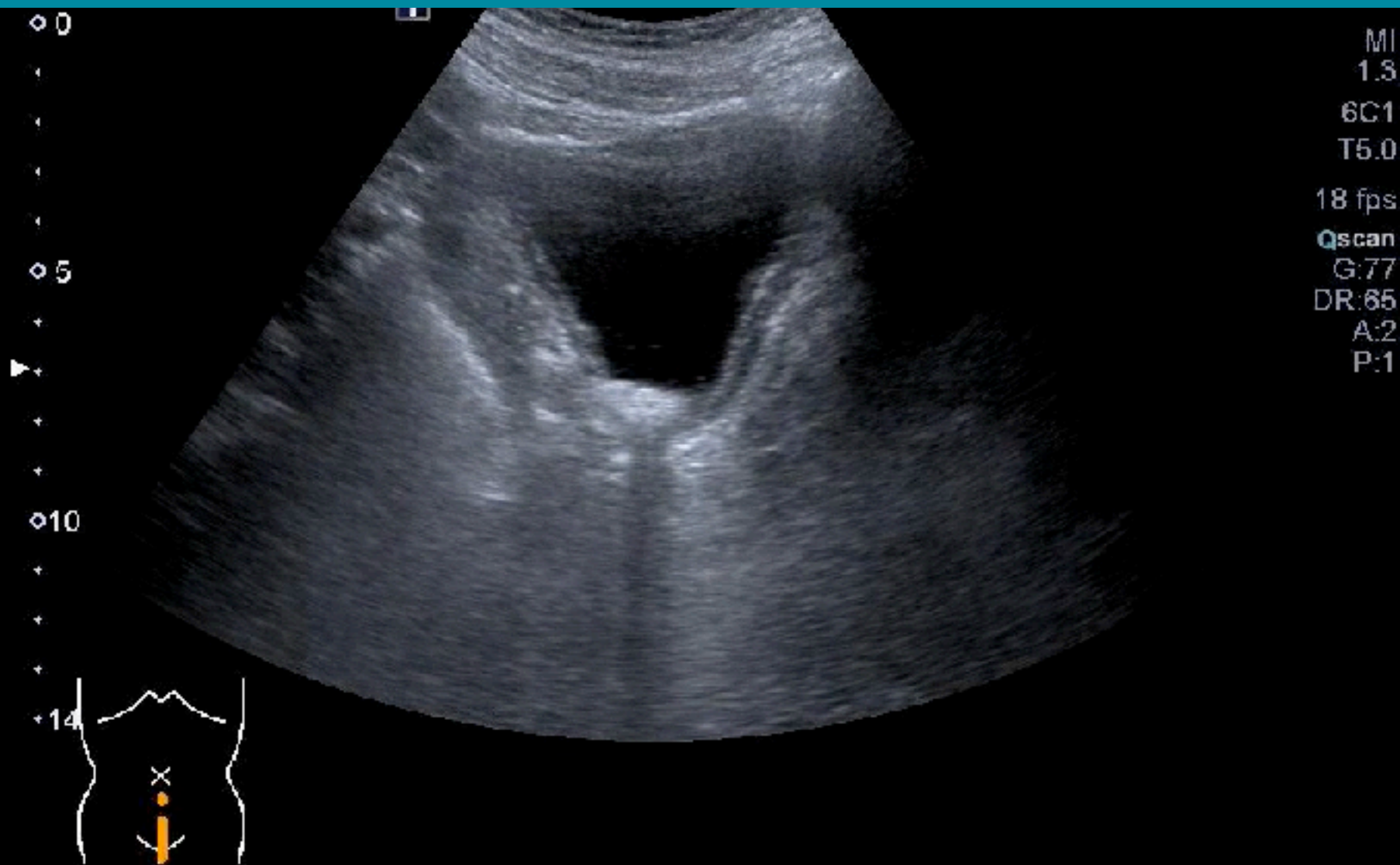
KV: 10
msec
ALG:

Stones - UVJ

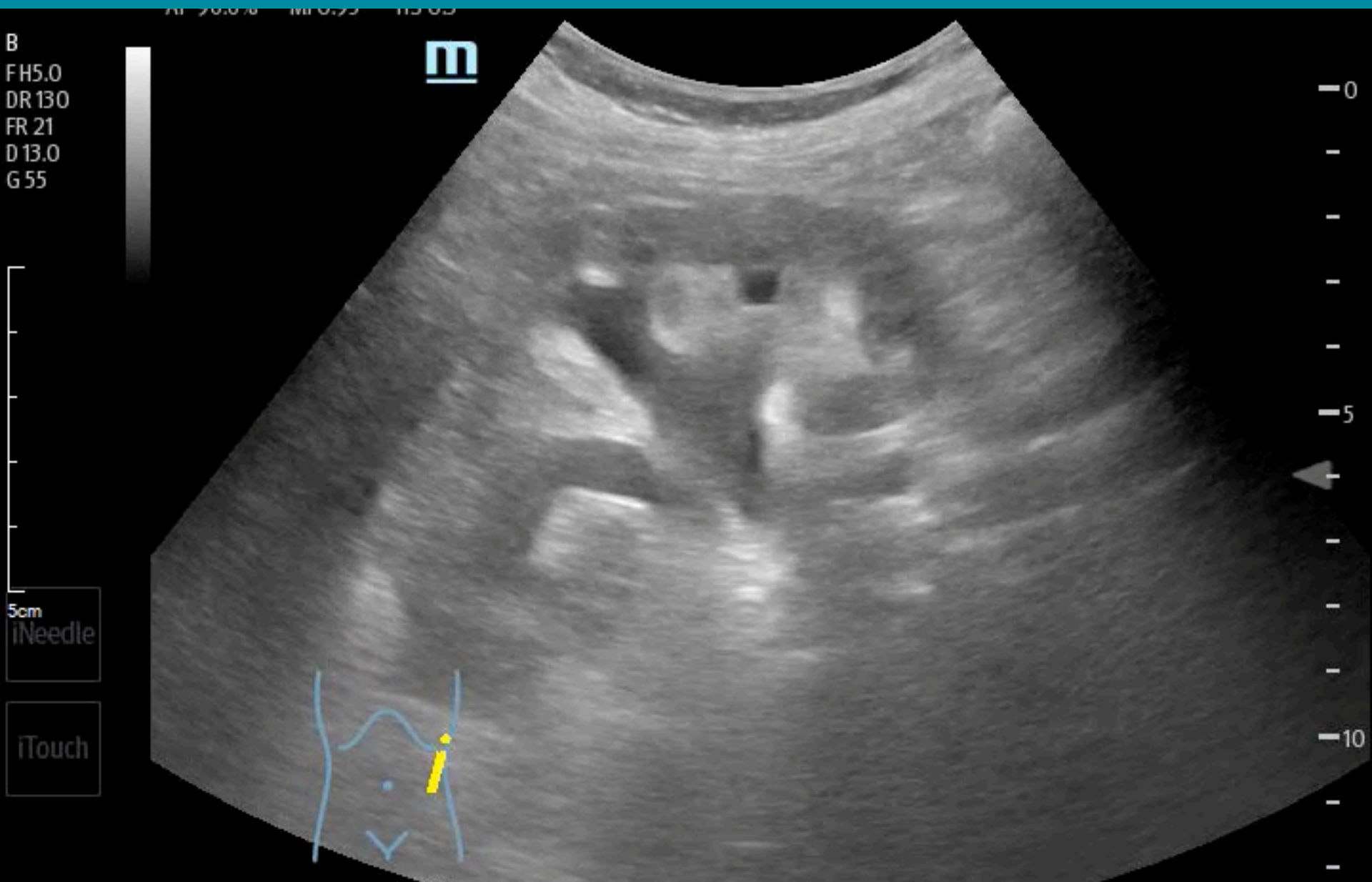
FH5.0
DR 130
FR 22
D 12.0
G 55



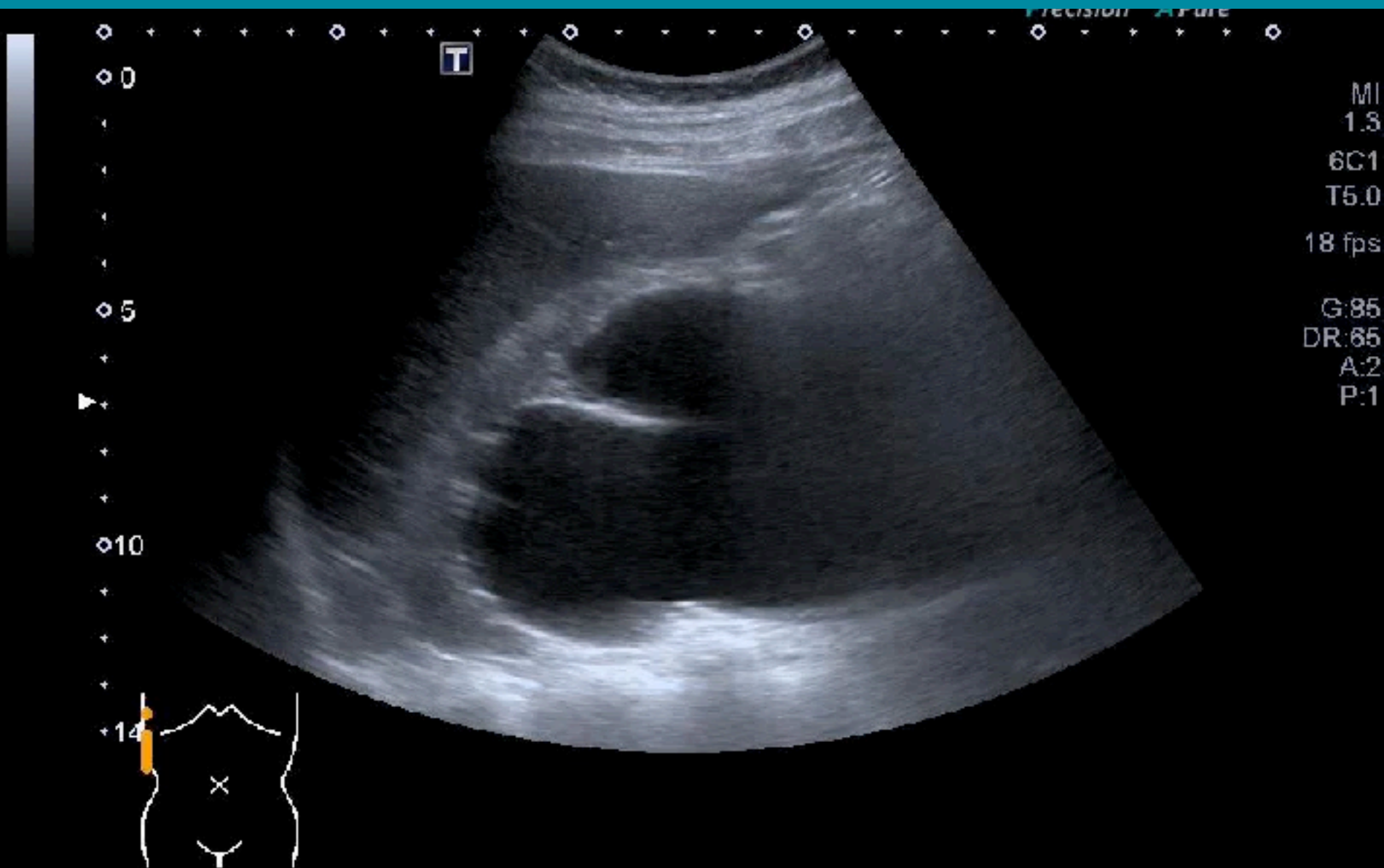
Stone - bladder



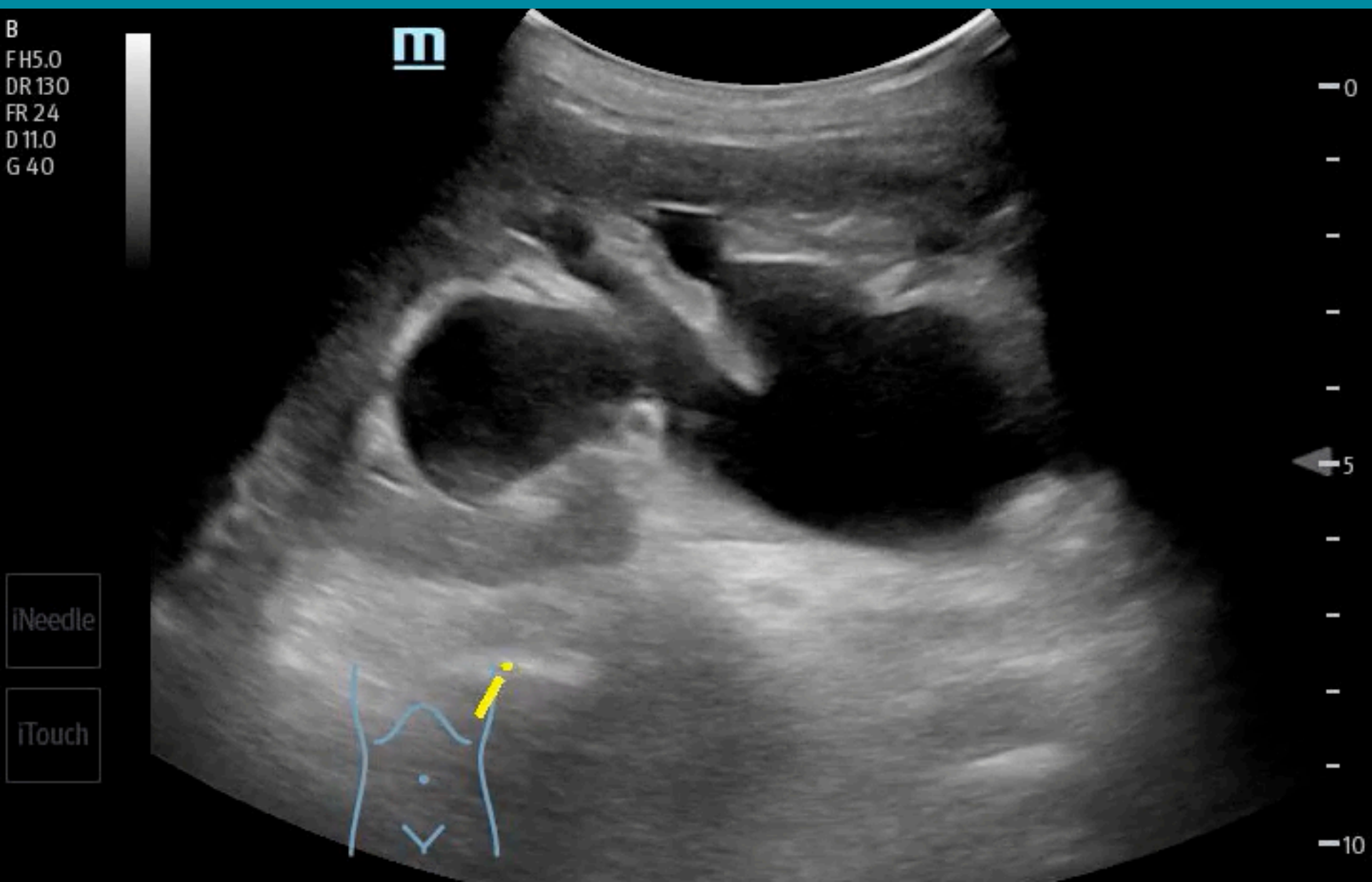
Obstruction - renal



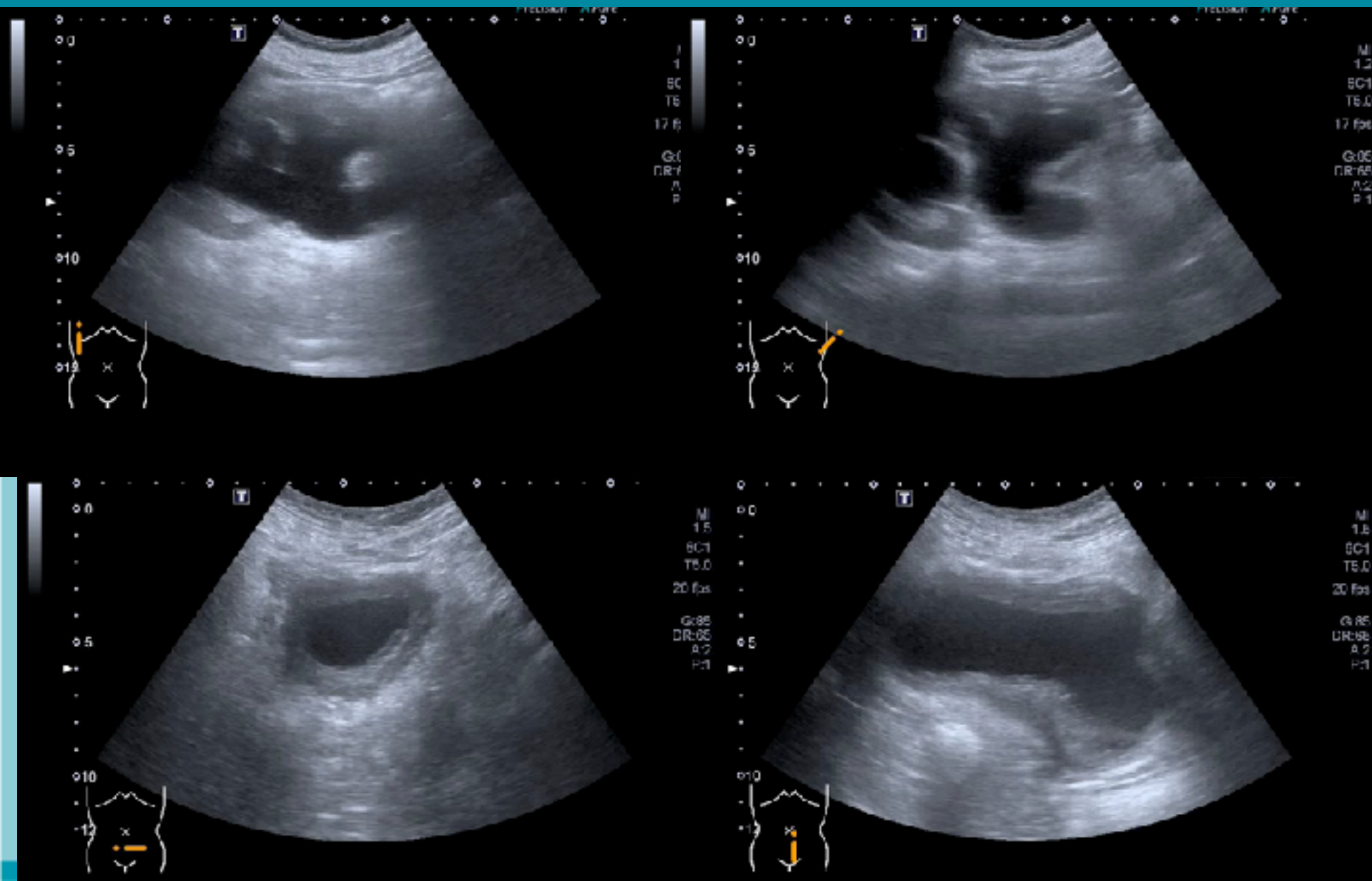
Obstruction - renal



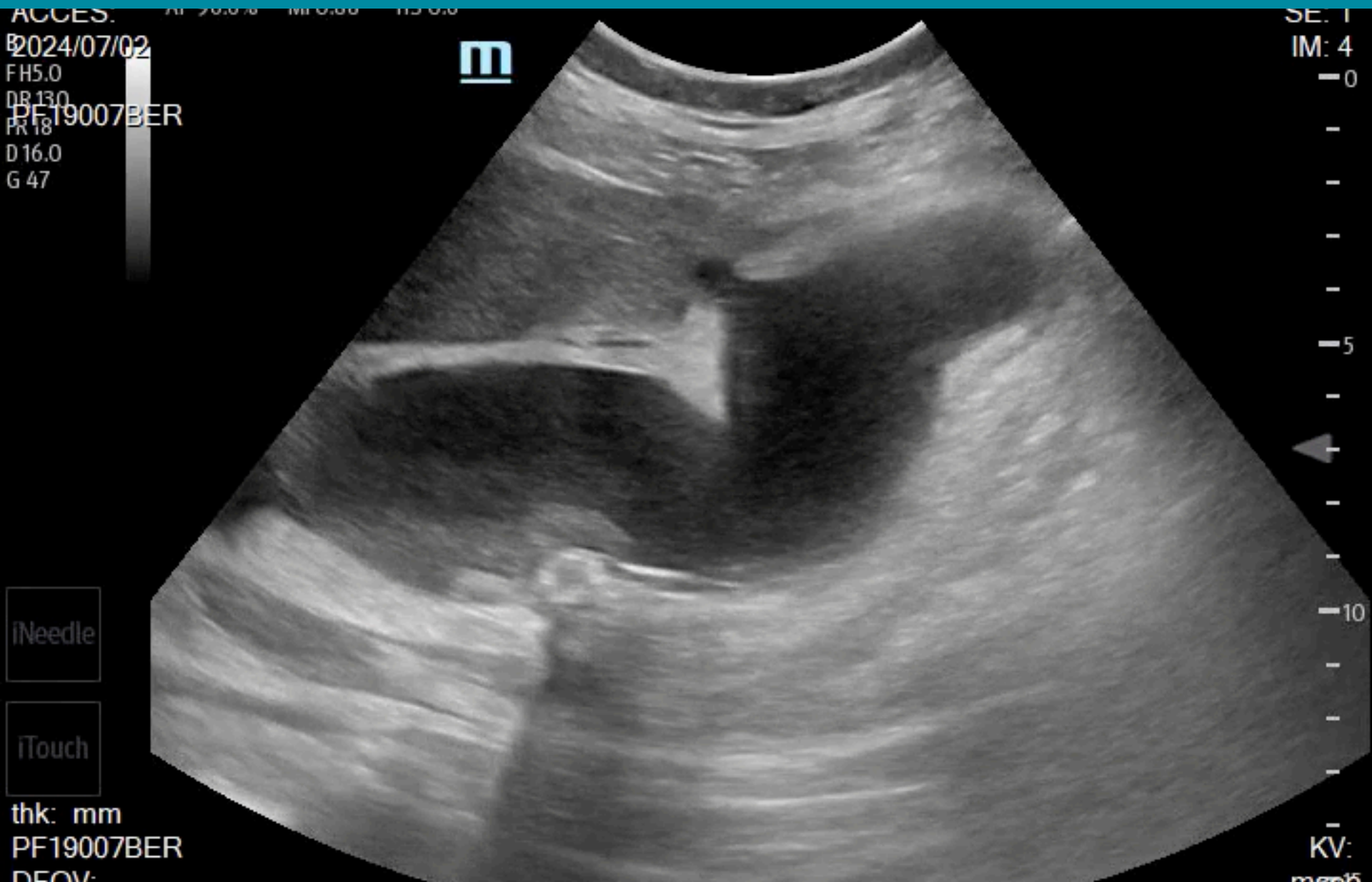
Obstruction - renal



Obstruction - postrenal



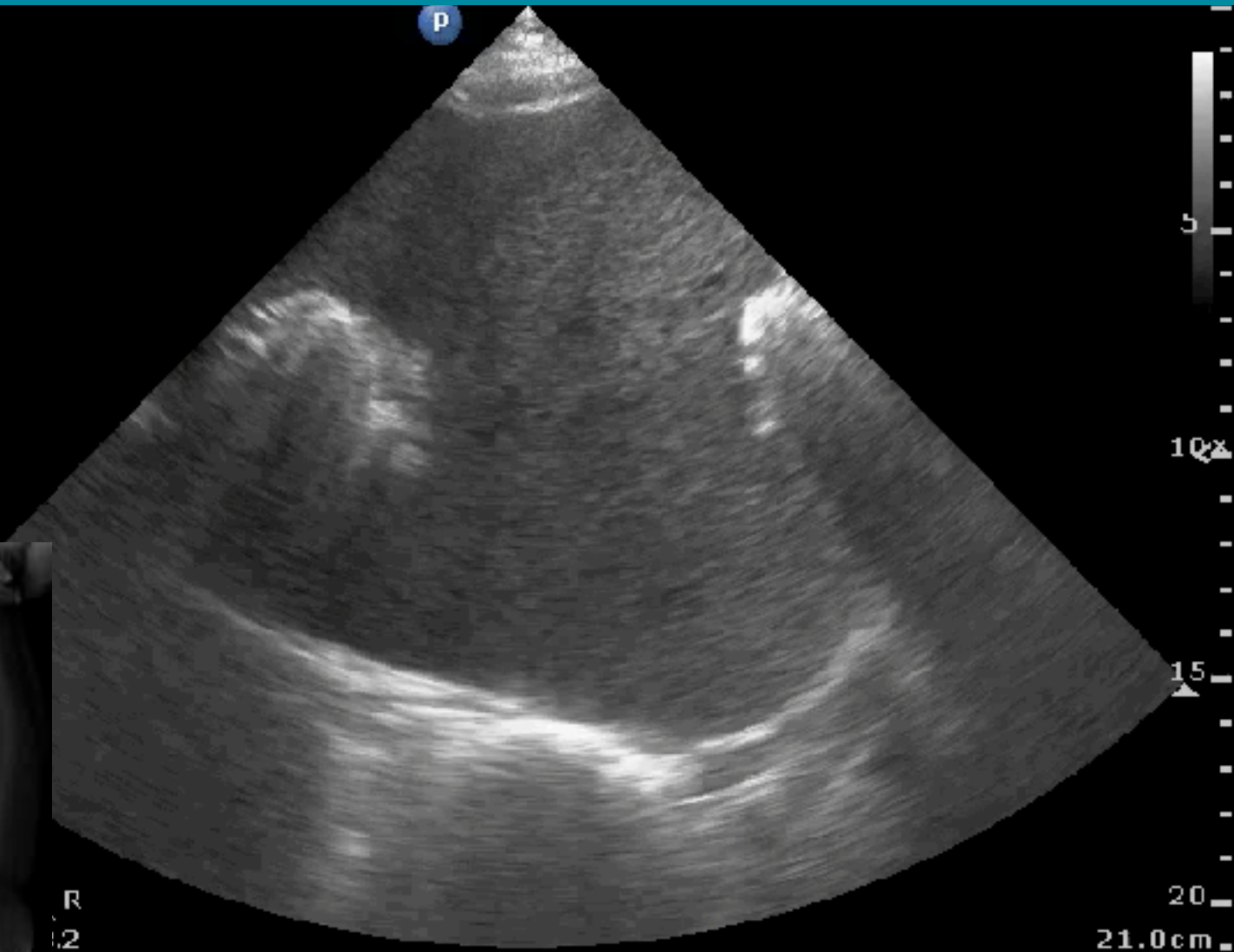
Obstruction - GB



Air - liver

Abd Gen
S5-1
17 Hz
21.0cm

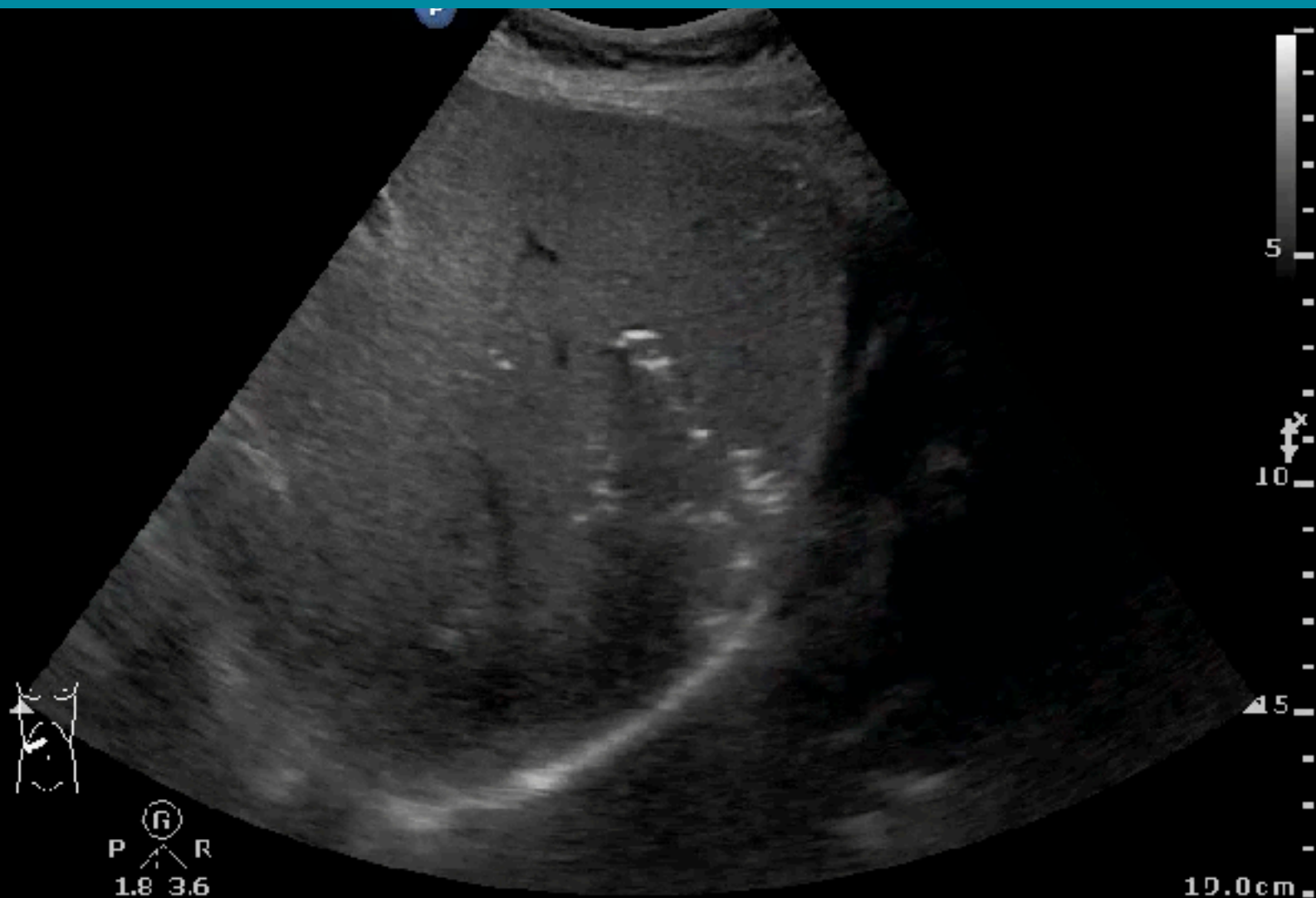
2D
HGen
Gn 70
C. 56
3/3/4



Air - liver vessels

Abd Gen
C5-1
29 Hz
19.0cm

2D
HGen
Gn 60
C. 56
3/3/3



Air - HPVG

ACCES: AP 90.0% MI 0.88 HS 0.0

2024/12/05

FH5.0

DR 130

PF19005CER

PR 18

D 16.0

G 55



SE: 1

IM: 1

-0

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-

-

-

-5

-

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-

-

-10

-

-

-

-

KV: 15

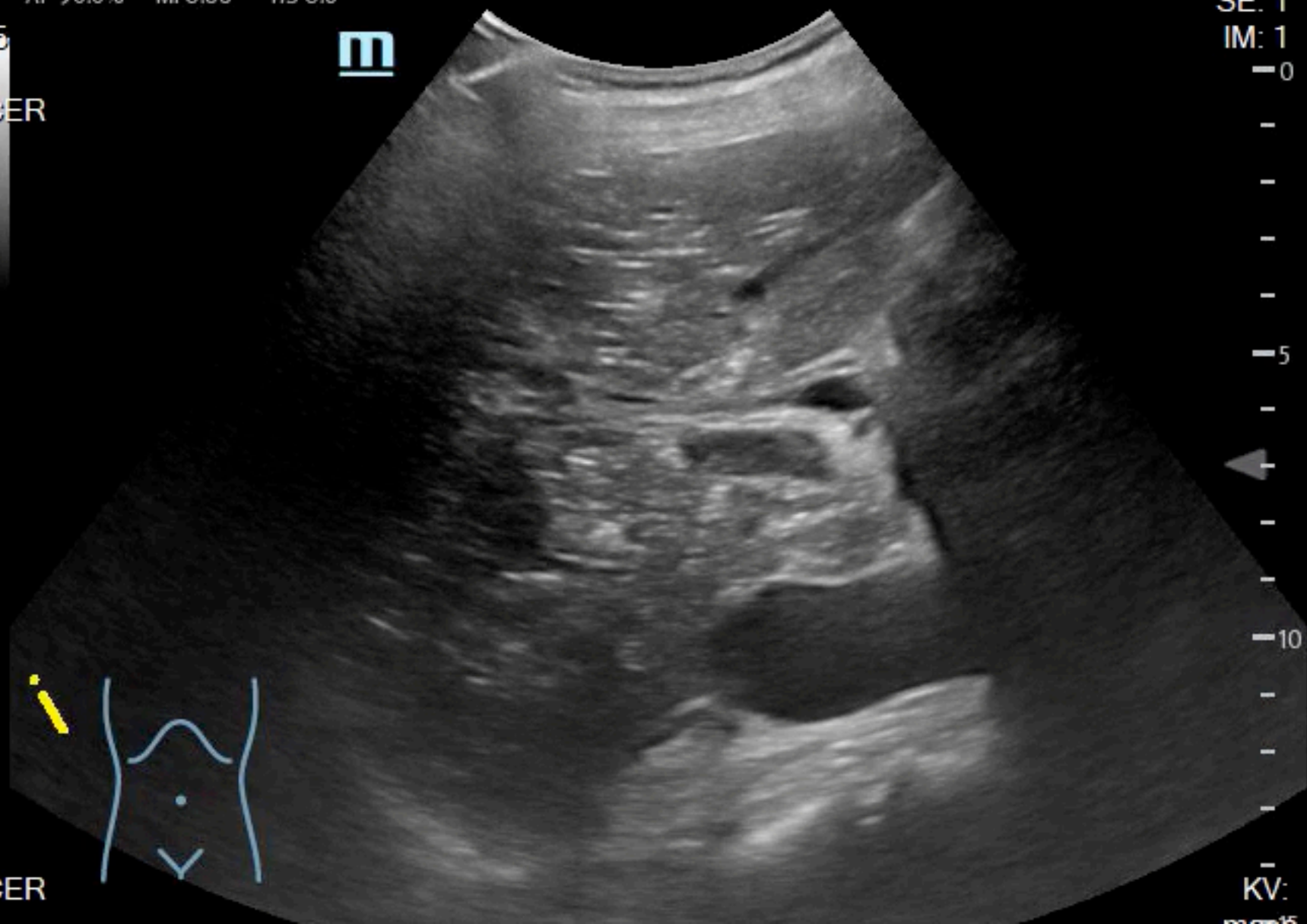
iNeedle

iTouch

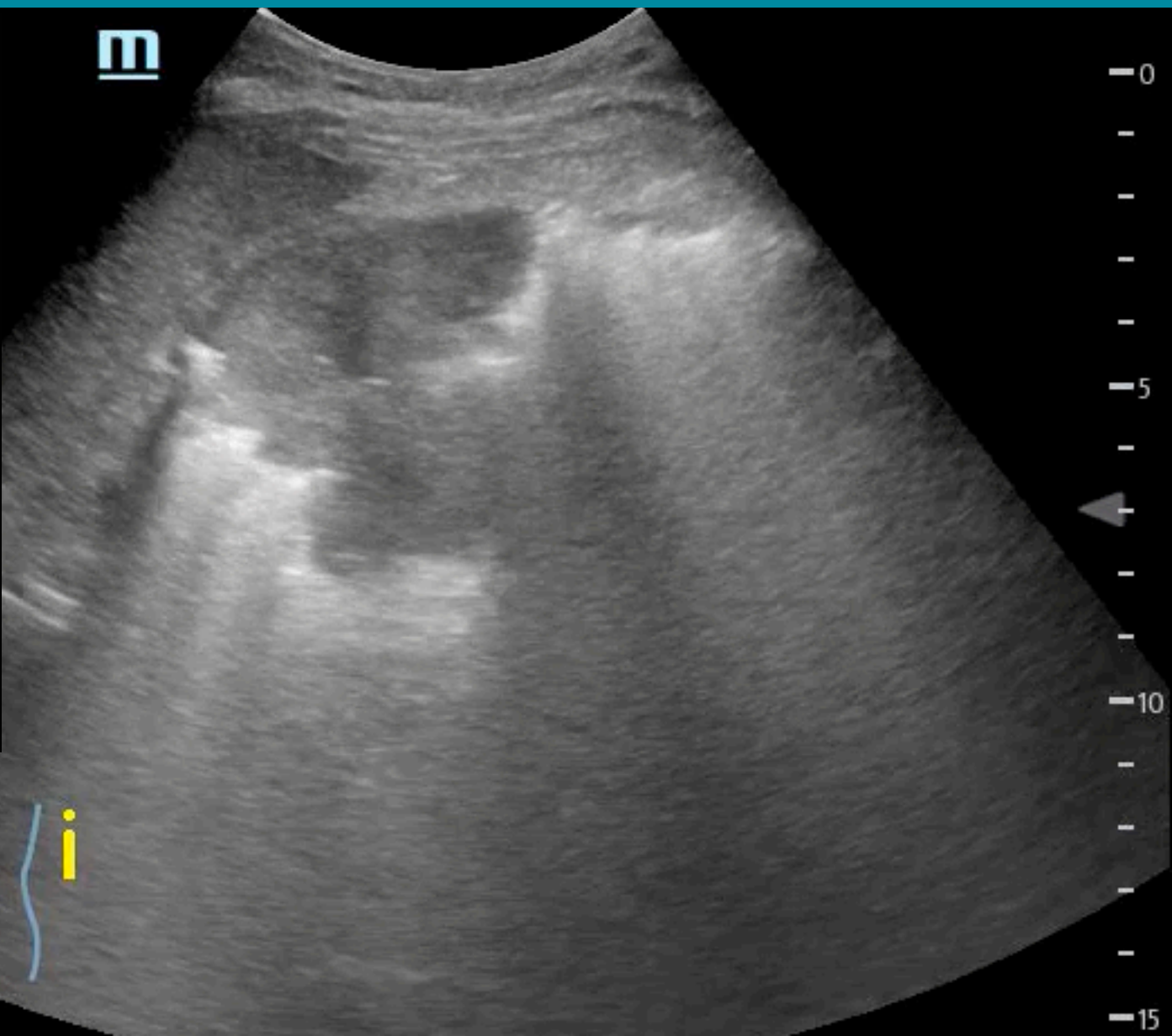
thk: mm

PF19005CER

DEOV:



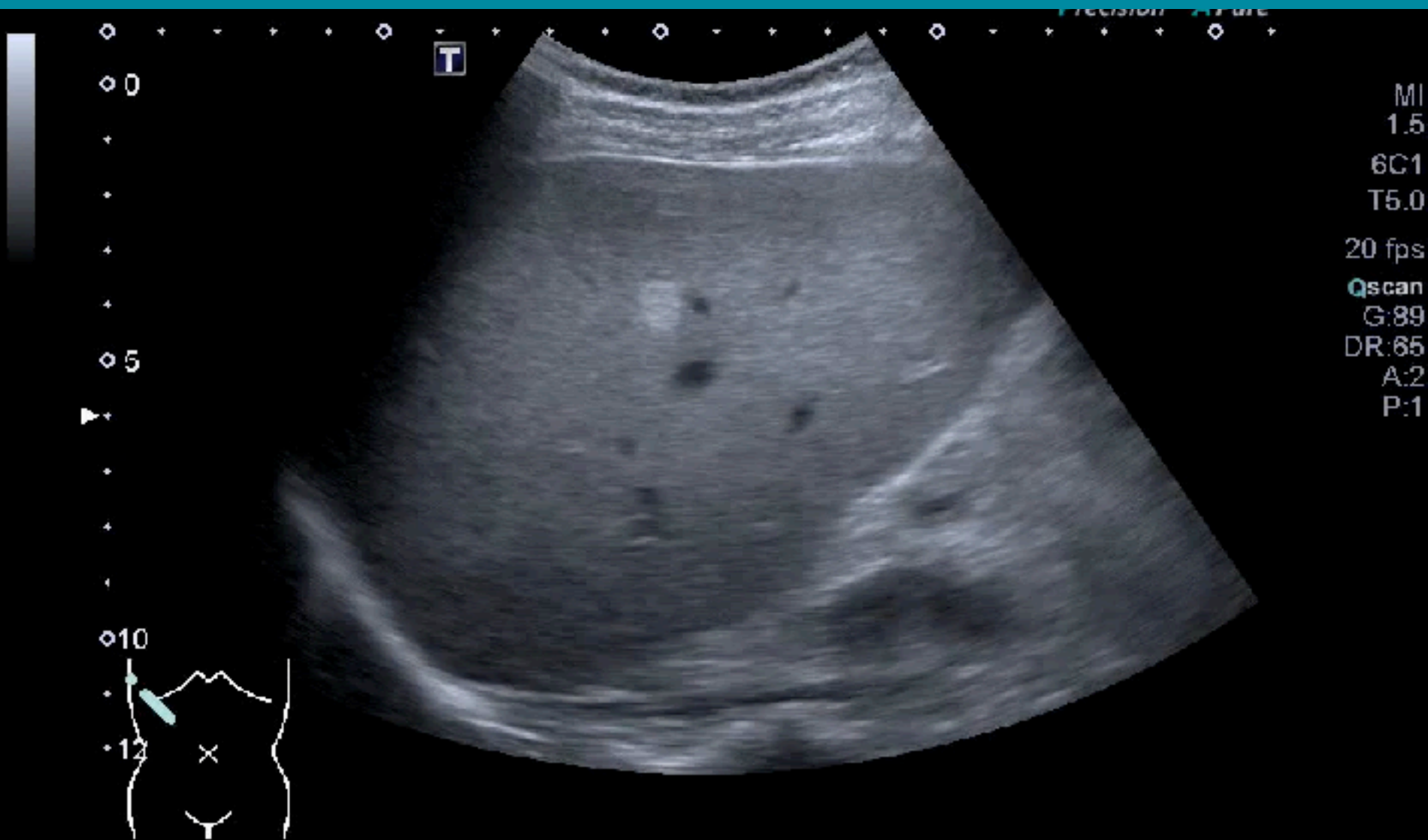
Air - kidney



Splenomegaly



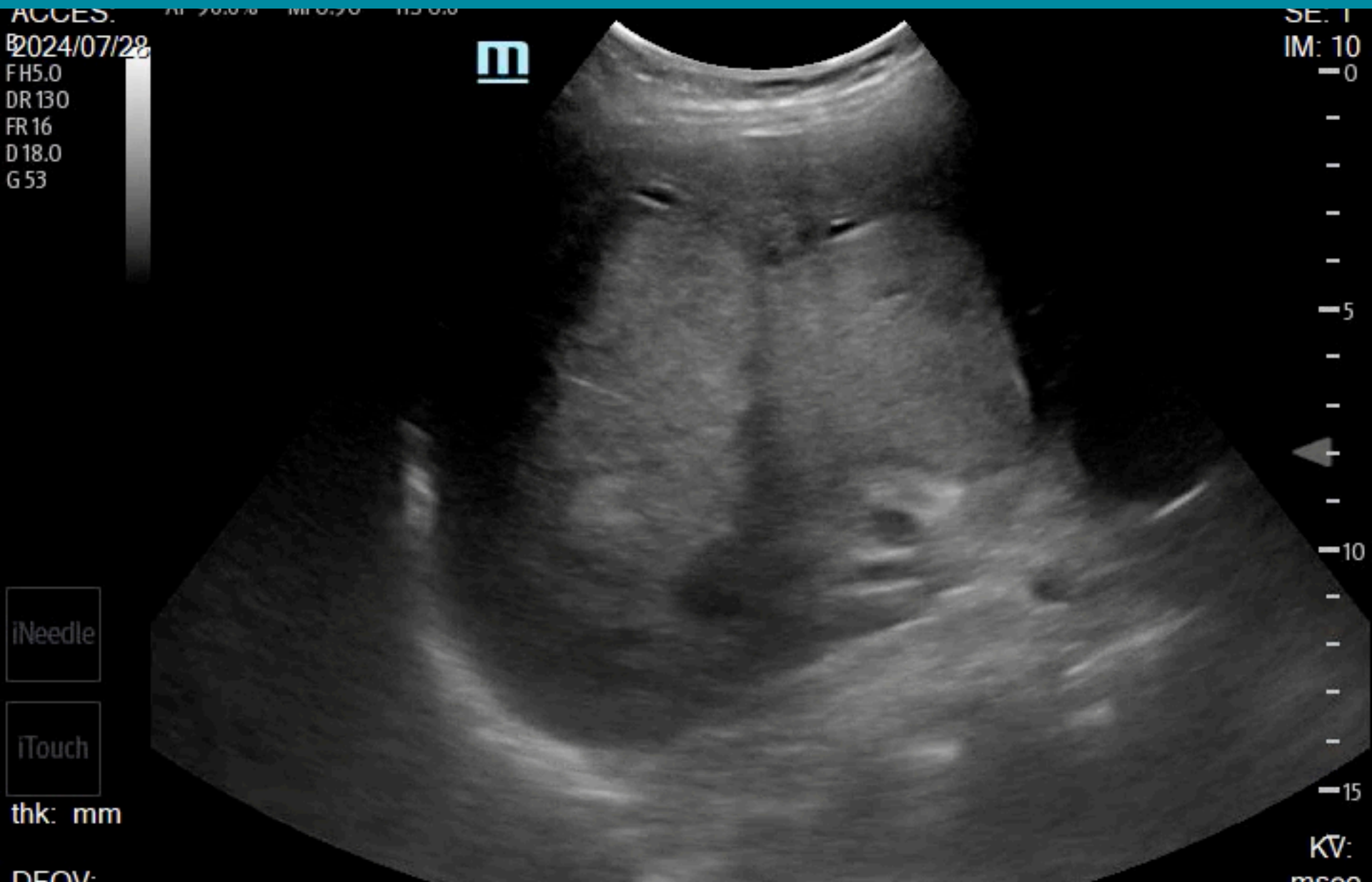
Mass - hemangioma



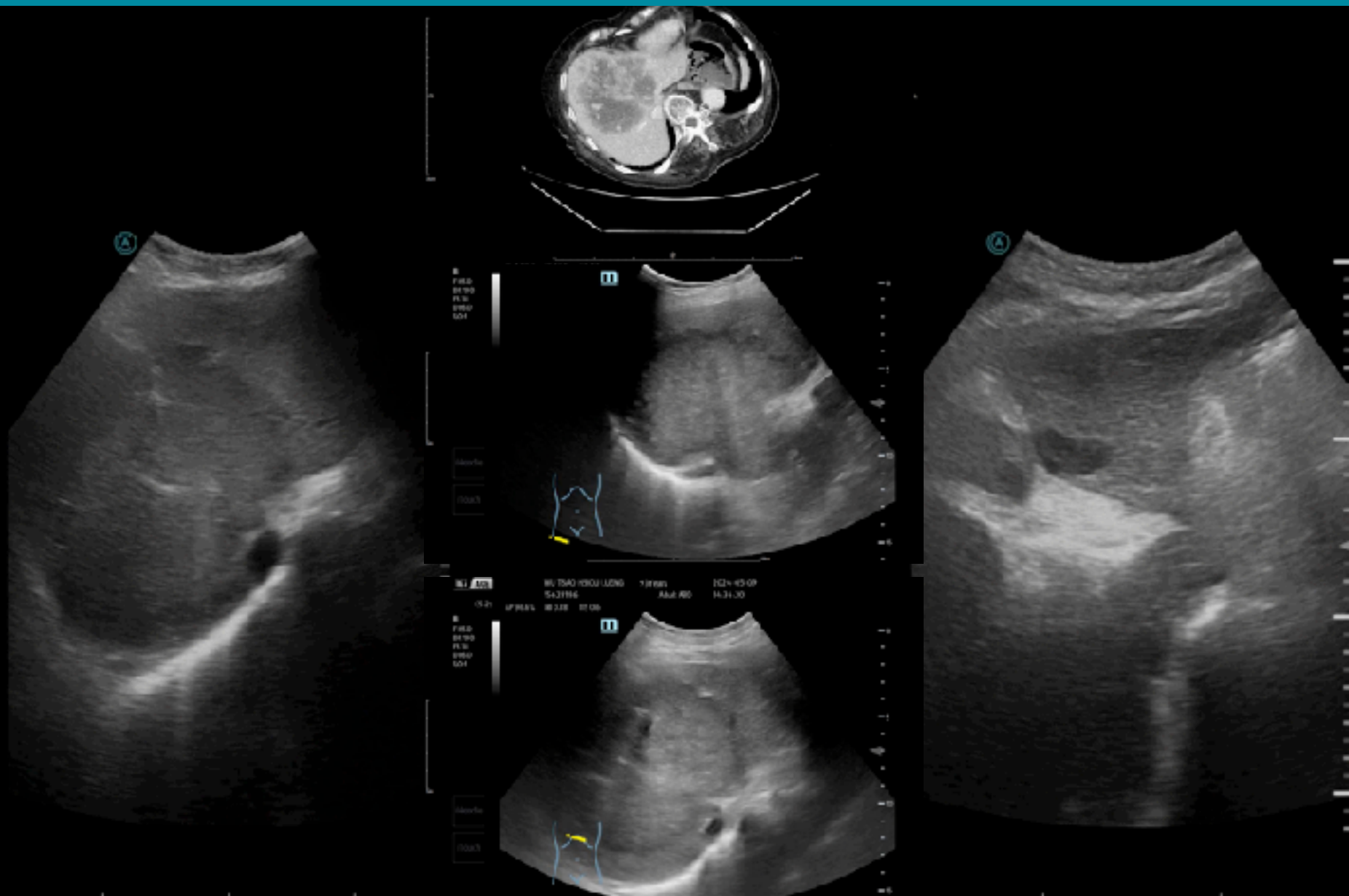
Mass - hemangioma



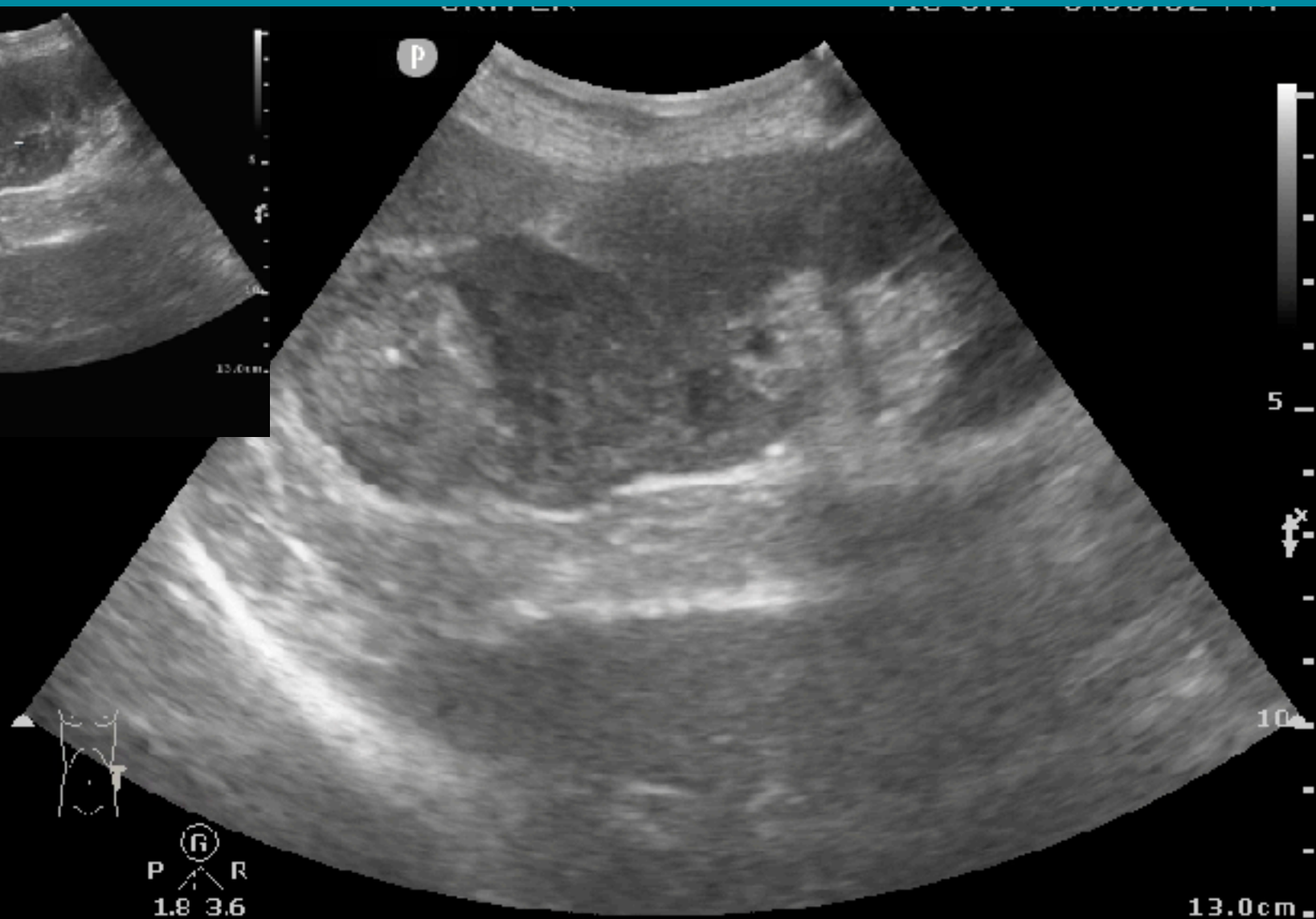
Mass - liver tumor



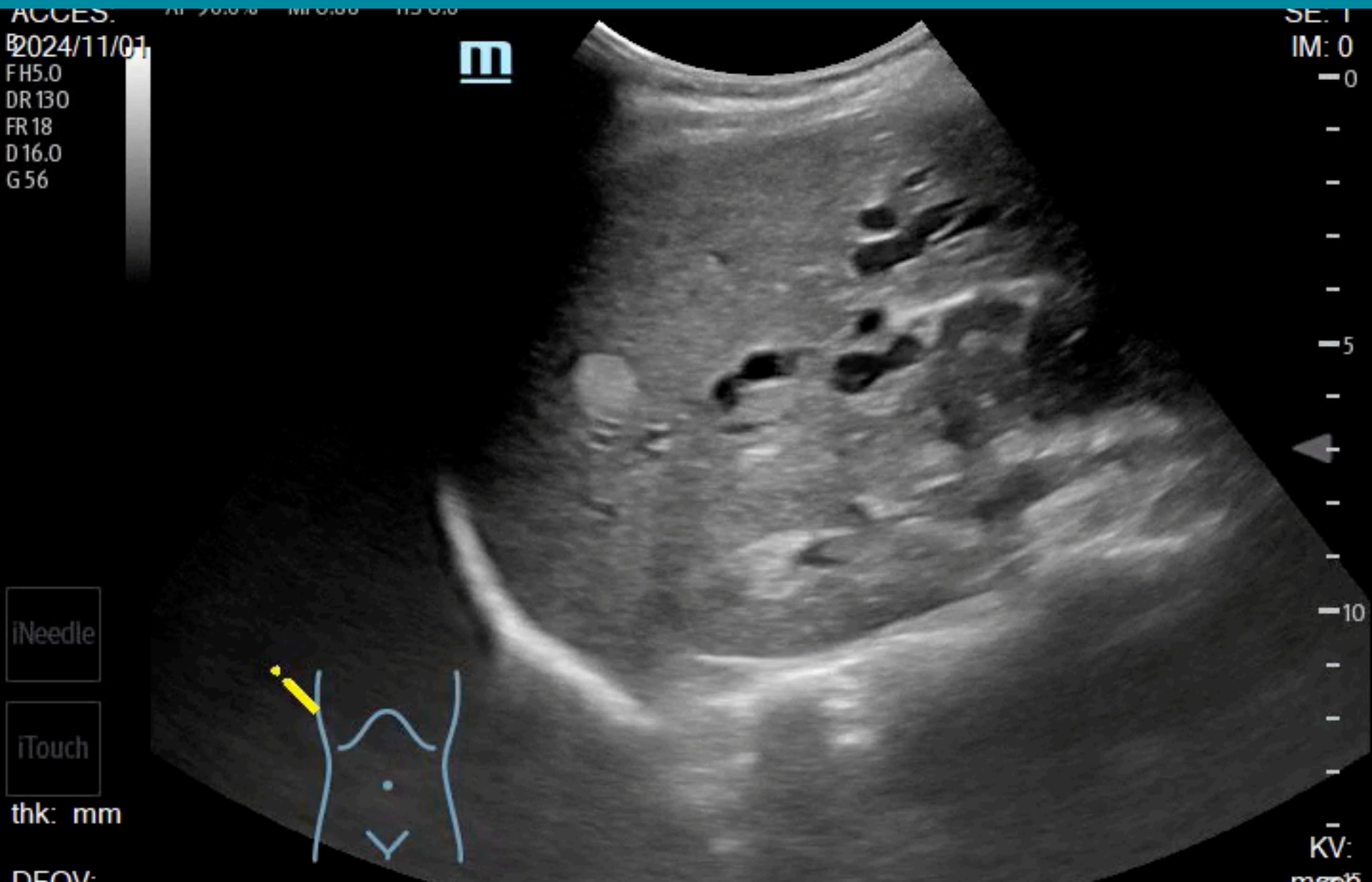
Mass - liver tumor



Mass - renal tumor



Biliary dilatation



Biliary dilatation

2024/11/01
FH5.0
DR 130
FR 18
D 16.0
G 56



IM: 6
—0

—5

—10

114

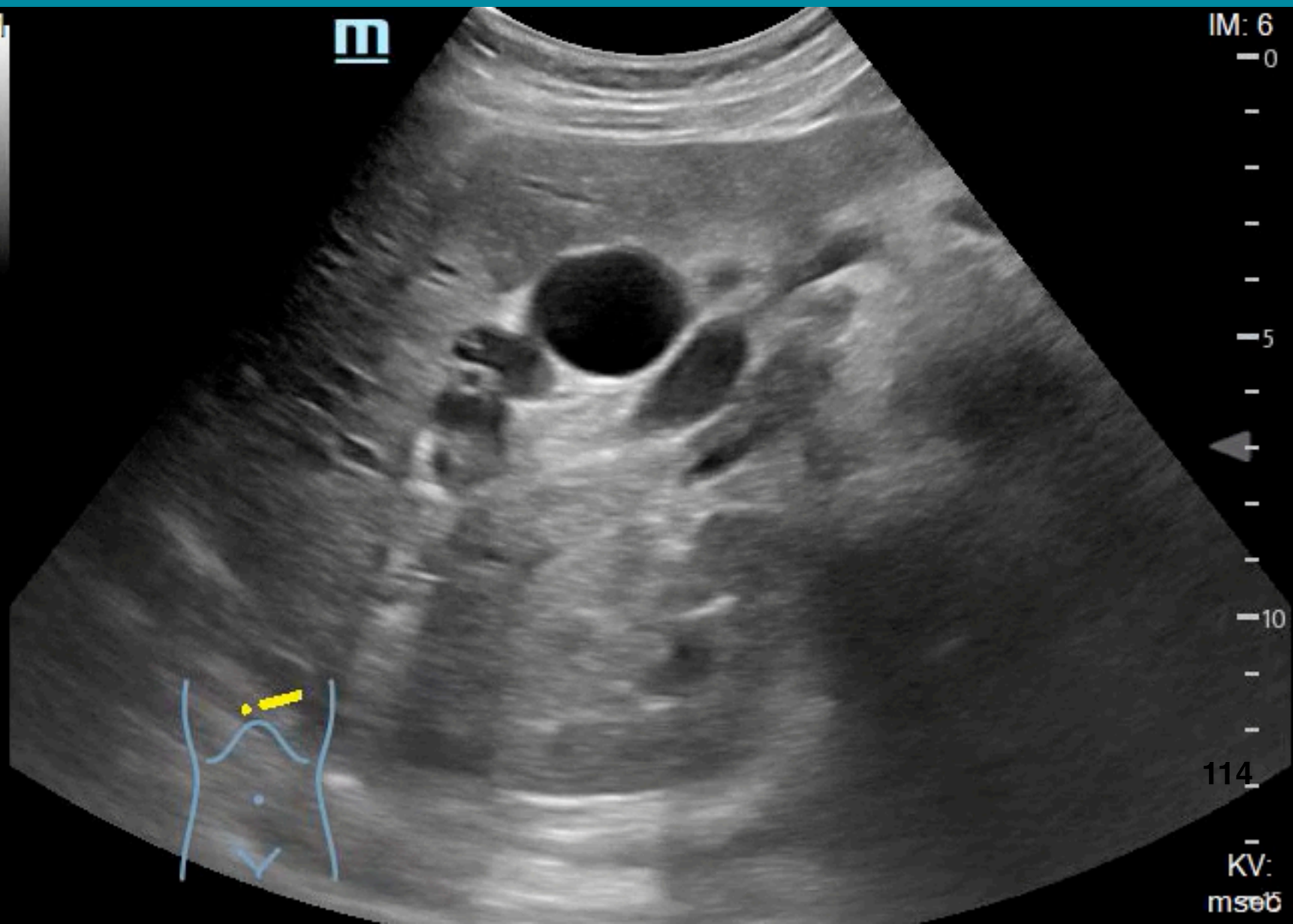
KV:
msec

iNeedle

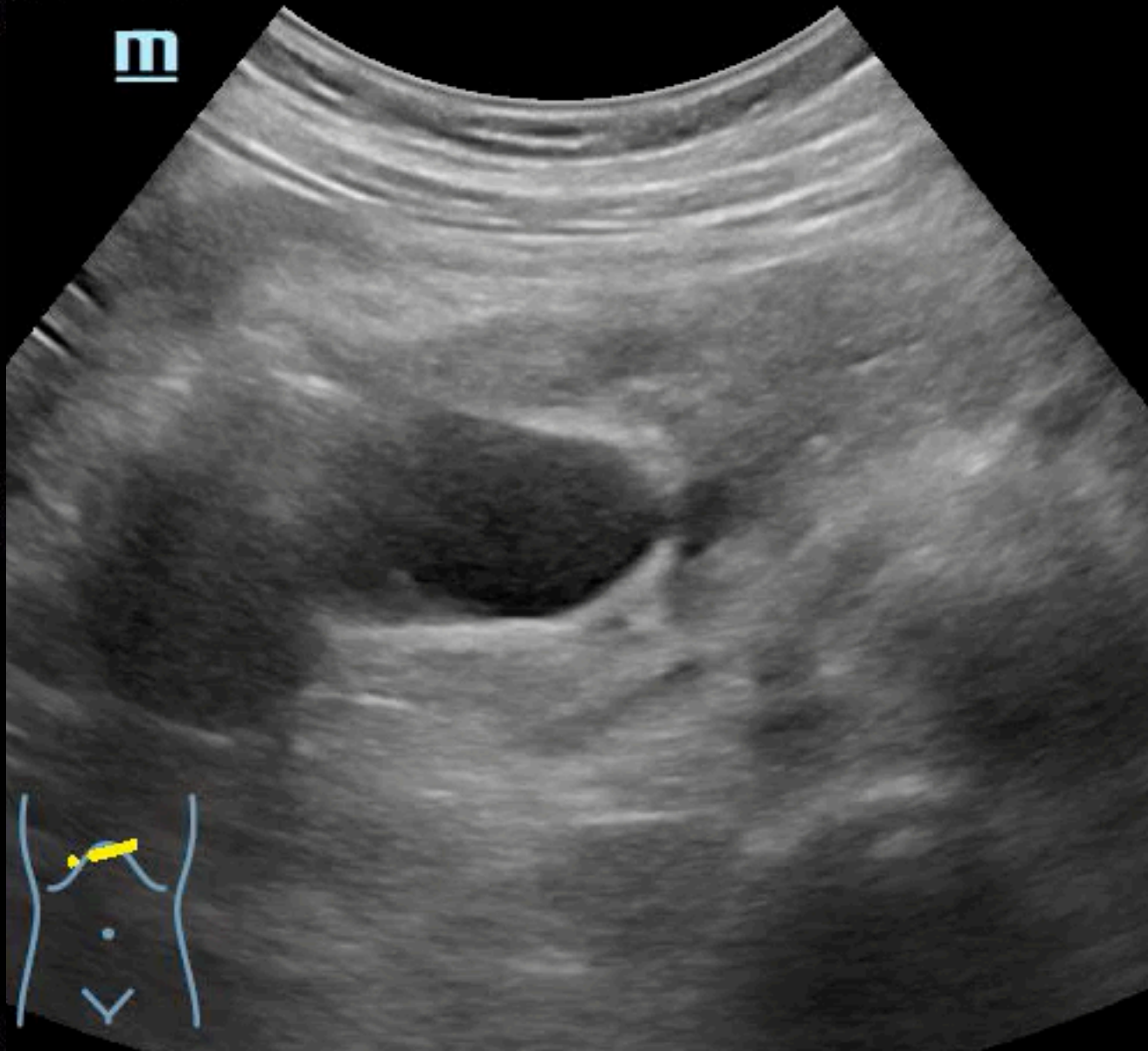
iTouch

thk: mm

DFOV:



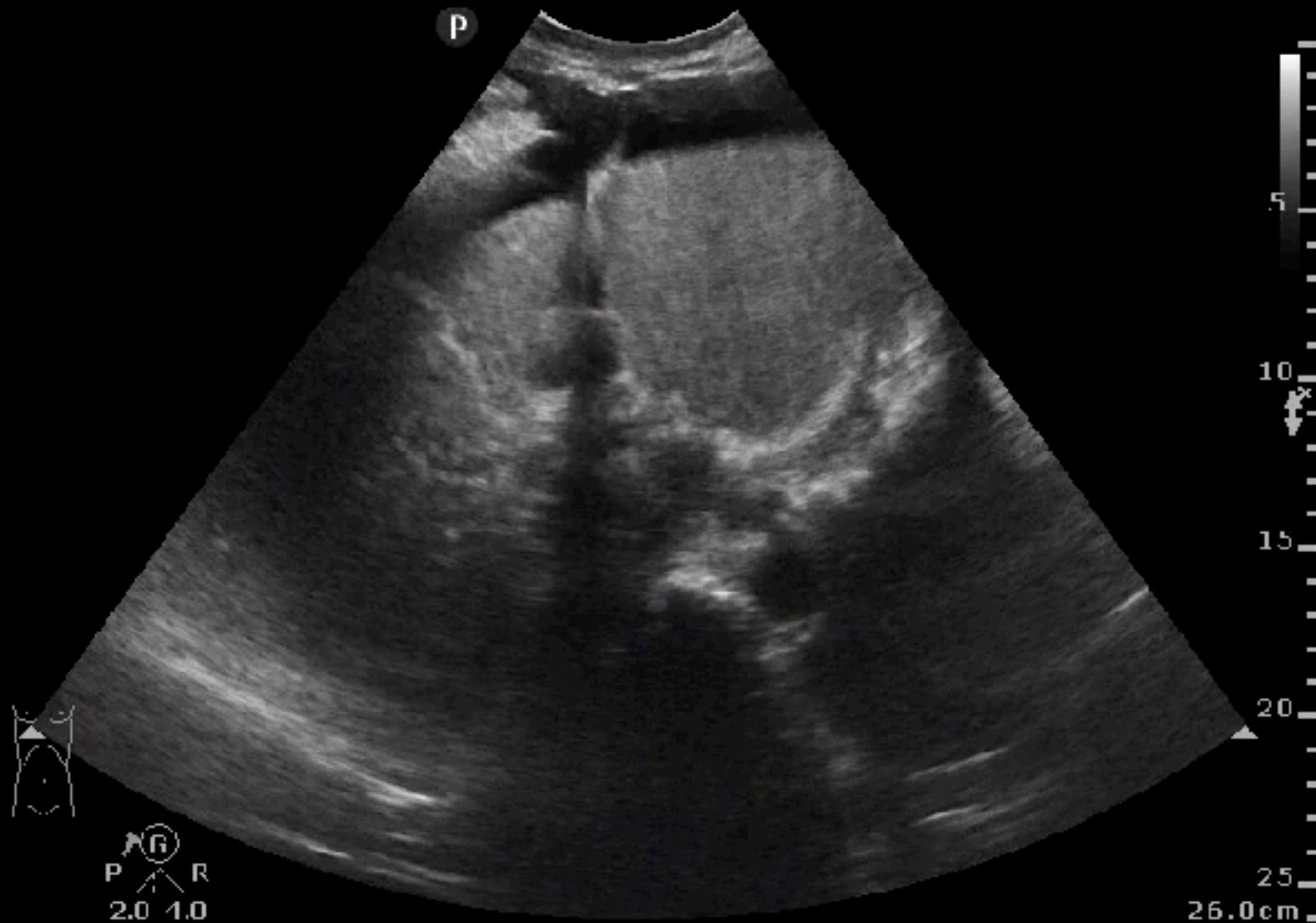
Pancreatic head tumor



Cirrhosis

ABD
C6-2
19Hz
26.0cm

2D
HGen
Gn 100
56
1/3/3



Cirrhosis - hemoperitoneum

