



衛生福利部雙和醫院
(委託臺北醫學大學興建經營)
Taipei Medical University · Shuang Ho Hospital,
Ministry of Health and Welfare



US-guided emergent procedures

經超音波導引之緊急臨床處置之應用

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陳國智 醫師



台灣疼痛醫學會專科醫師
急診超音波臨床評核醫師
醫用超音波學會指導醫師
WINFOCUS director / instructor
Certified Interventional Pain Sonologist

急診 / 重症 / 介入 / 急性疼痛

經歷

新光急診超音波訓練中心主任
西園醫院急診醫學科主任
急診醫學會超音波委員會主委
台灣疼痛醫學會大體模擬手術講師
急救加護醫學會重症超音波負責人

Resuscitative
急救復甦

Diagnostic
臨床診斷

Procedural
Guidance
處置導引

Symptom- or
Sign-Based
症狀導引

Therapeutic
輔助治療



Core Applications (2023 ACEP Emergency Ultrasound Guidelines)
15項急診超音波核心應用

陳國智醫師

Aorta

DVT

Trauma

Thoracic/Airway

Cardia/HD assessment

Procedural Guidance

US-guided NB

Testicular

Ocular

Skin & Soft tissue

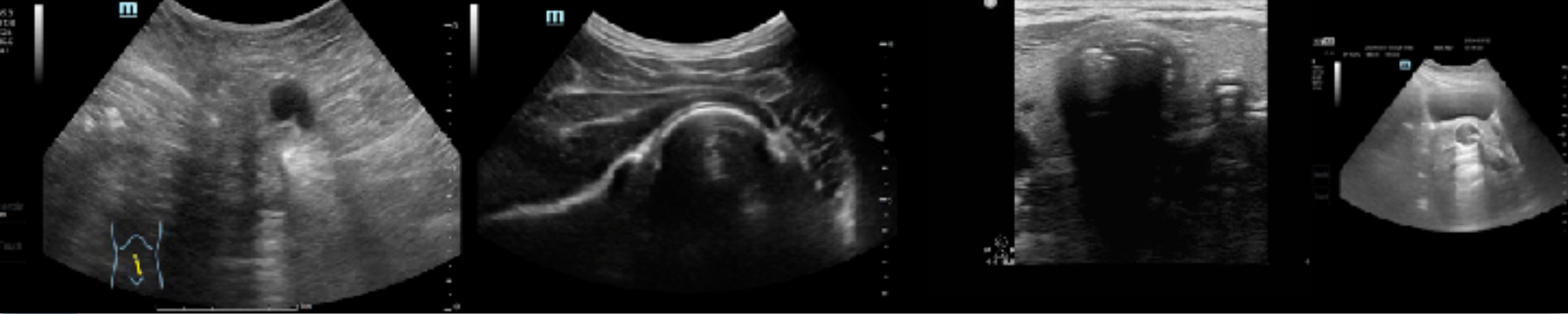
Hepatobiliary

Urinary tract

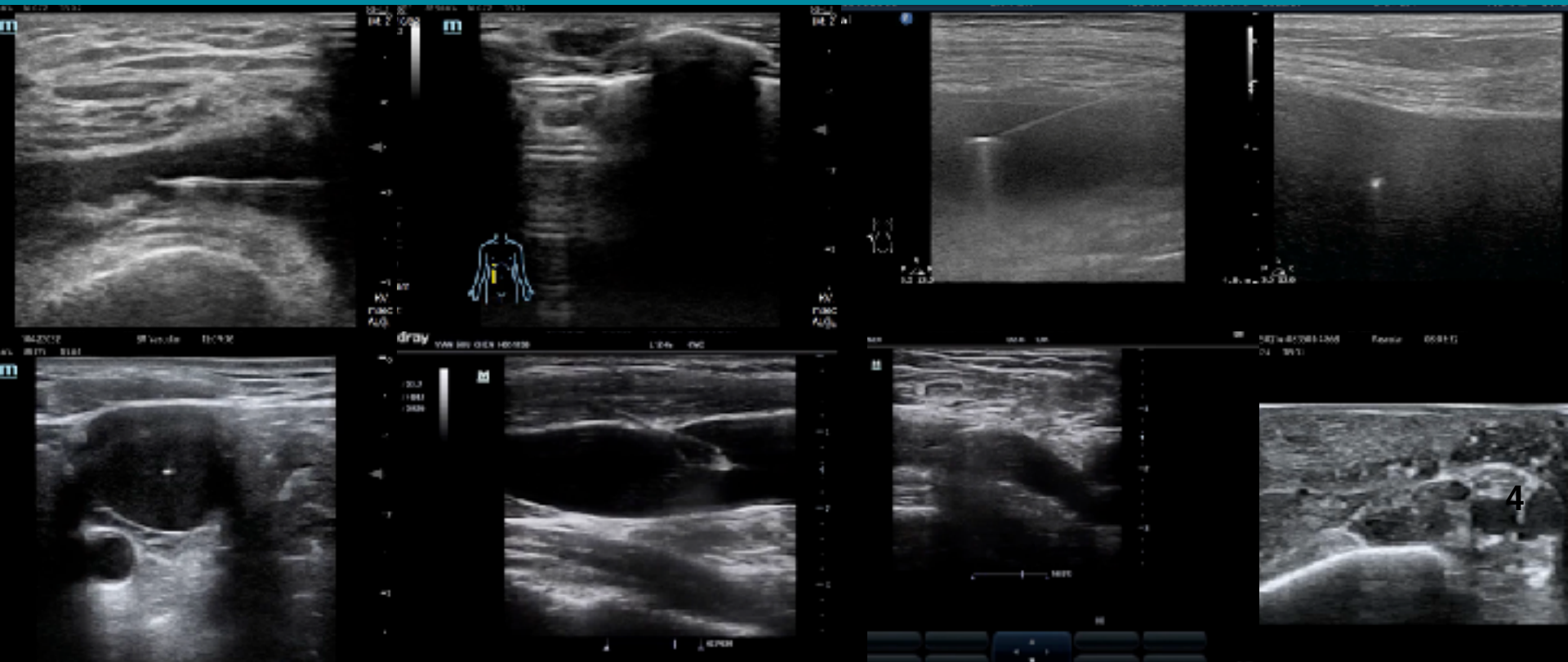
Pregnancy

Bowel

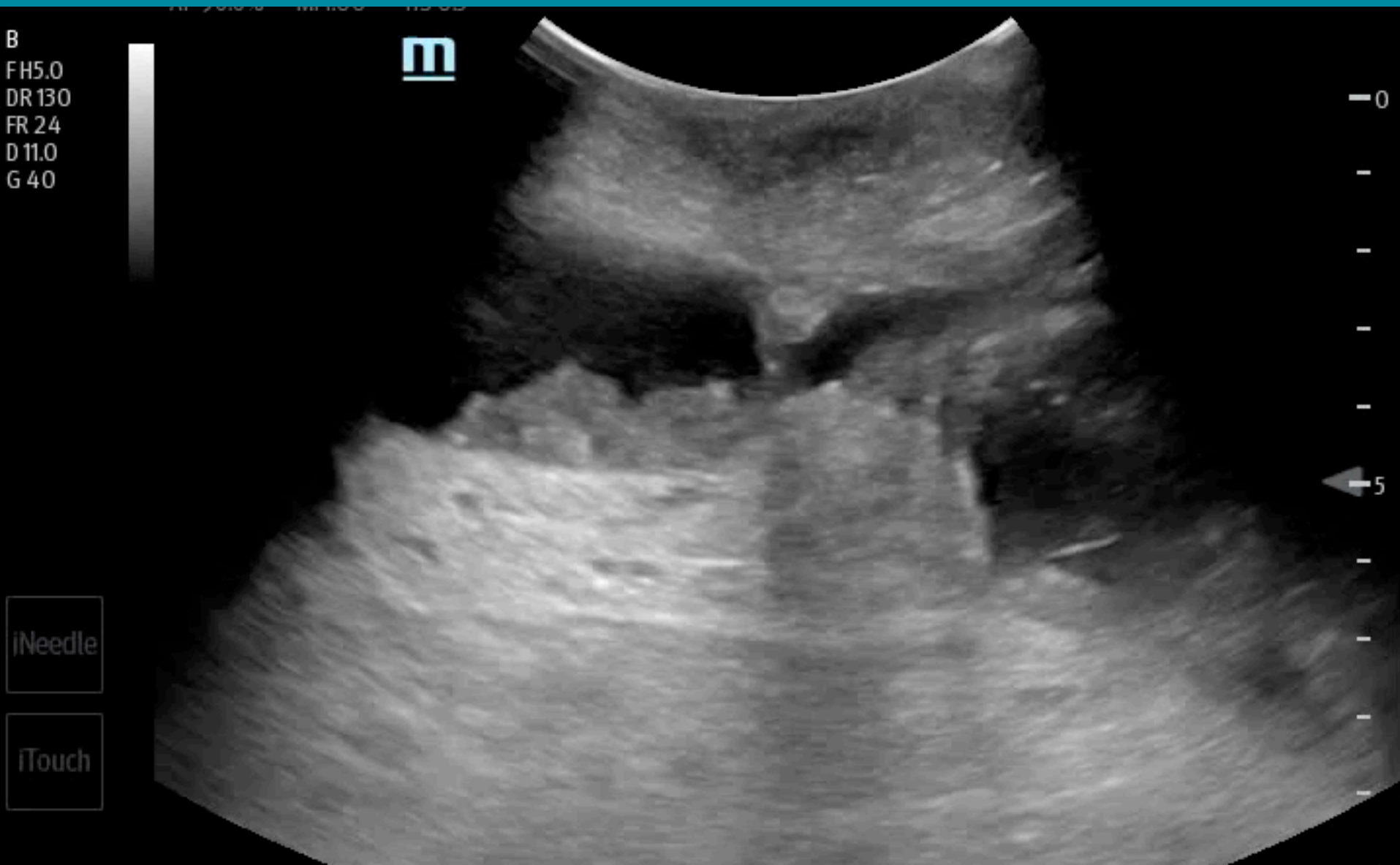
MSK



POCUS - Basic Procedures



Ultrasound guided hernia reduction

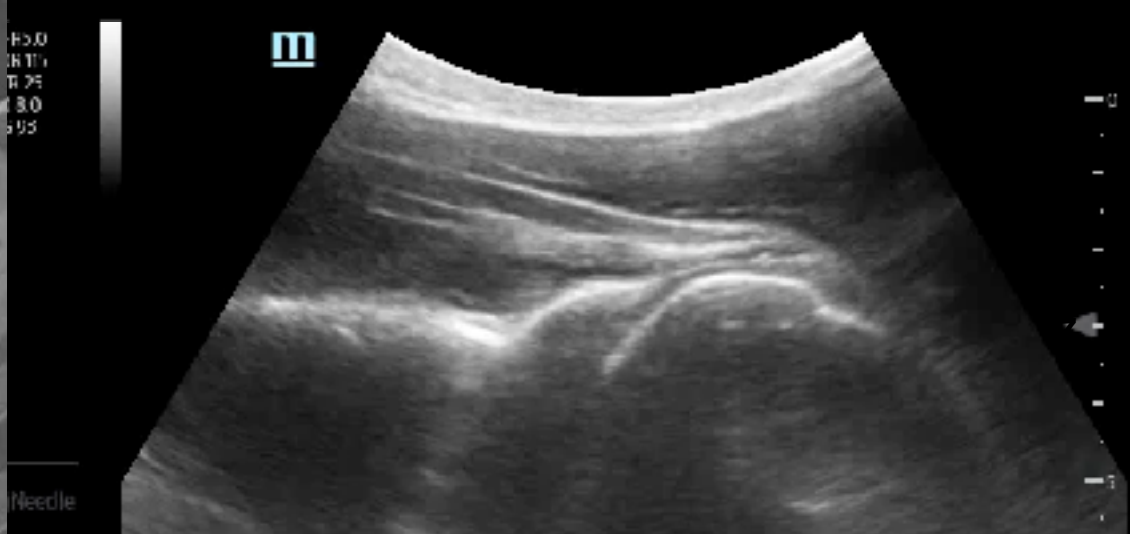


US-guided hernia reduction



Both views
Find tract
Push along the axis

26M, 打排球，右肩痛





TRACHEAL INTUBATION

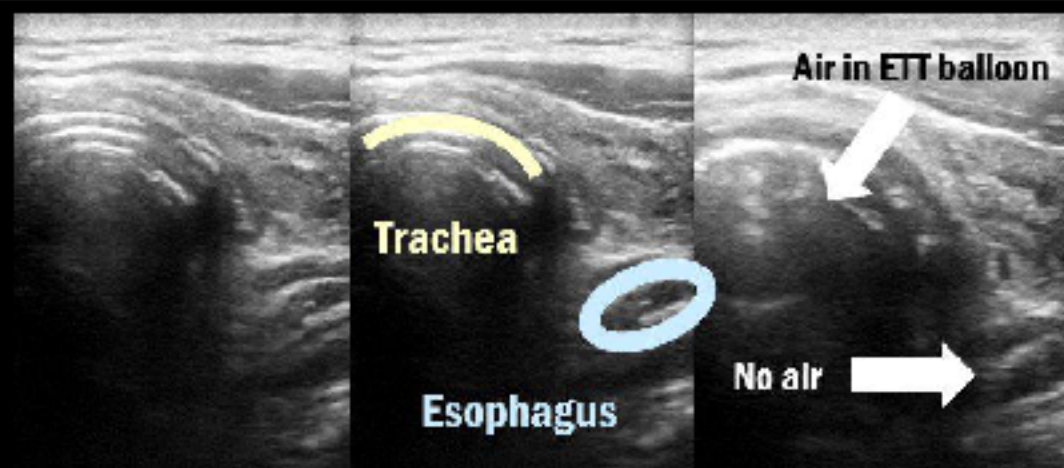
Question:

Is POCUS accurate for confirming endotracheal intubation in the emergency department?

Study:

Prospective observational convenience sample. Patients undergoing intubation received tracheal rapid US exam (TRUE) directly after tube placement to determine tracheal vs esophageal. Compared to quantitative waveform capnography.

n = 100



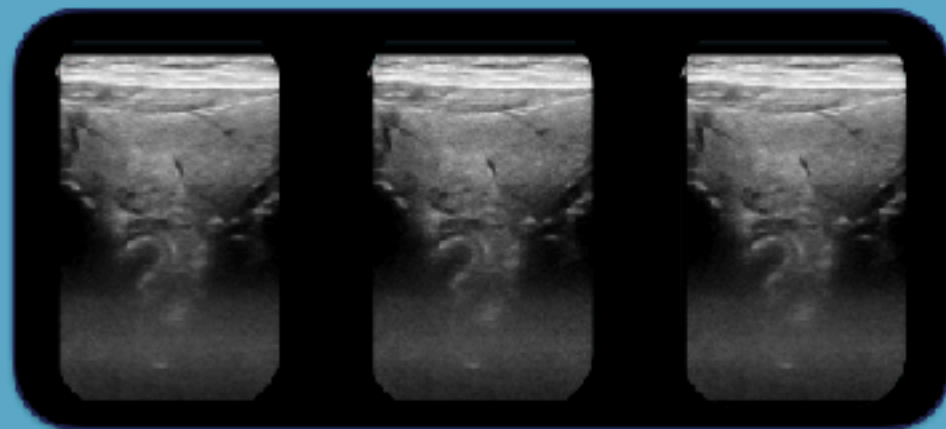
Results

	Sens (%)	Spec (%)
TRUE	98.9	100



1
3
4

NASOGASTRIC TUBE PLACEMENT



Question:

Does POCUS guidance during NG tube insertion improve accuracy or reduce complications compared to conventional methods?

Methods:

Prospective, open-label, randomized controlled trial. Primary outcome compared accuracy of POCUS of esophagus at cricoid to CXR for NG tube confirmation.

n = 118

Results

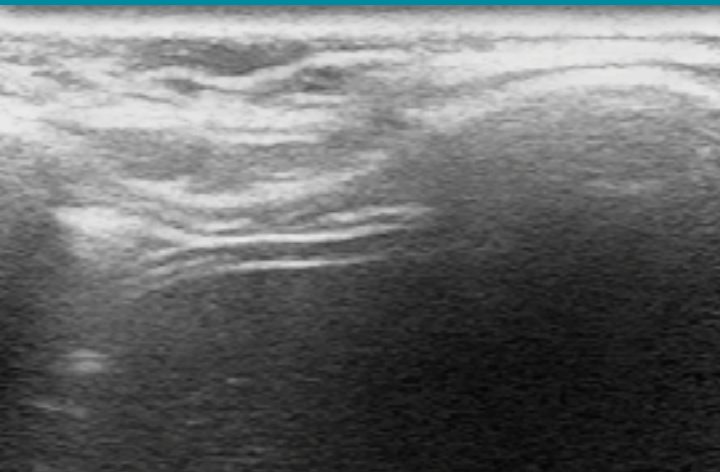
	POCUS	Control
Accuracy	94.3%	86%
Attempts	1.19	1.8
Insertion time	4.3 min	228 min

Esophagus was seen in 96.8% of the POCUS group and 87% were on the left.

30F, MG crisis

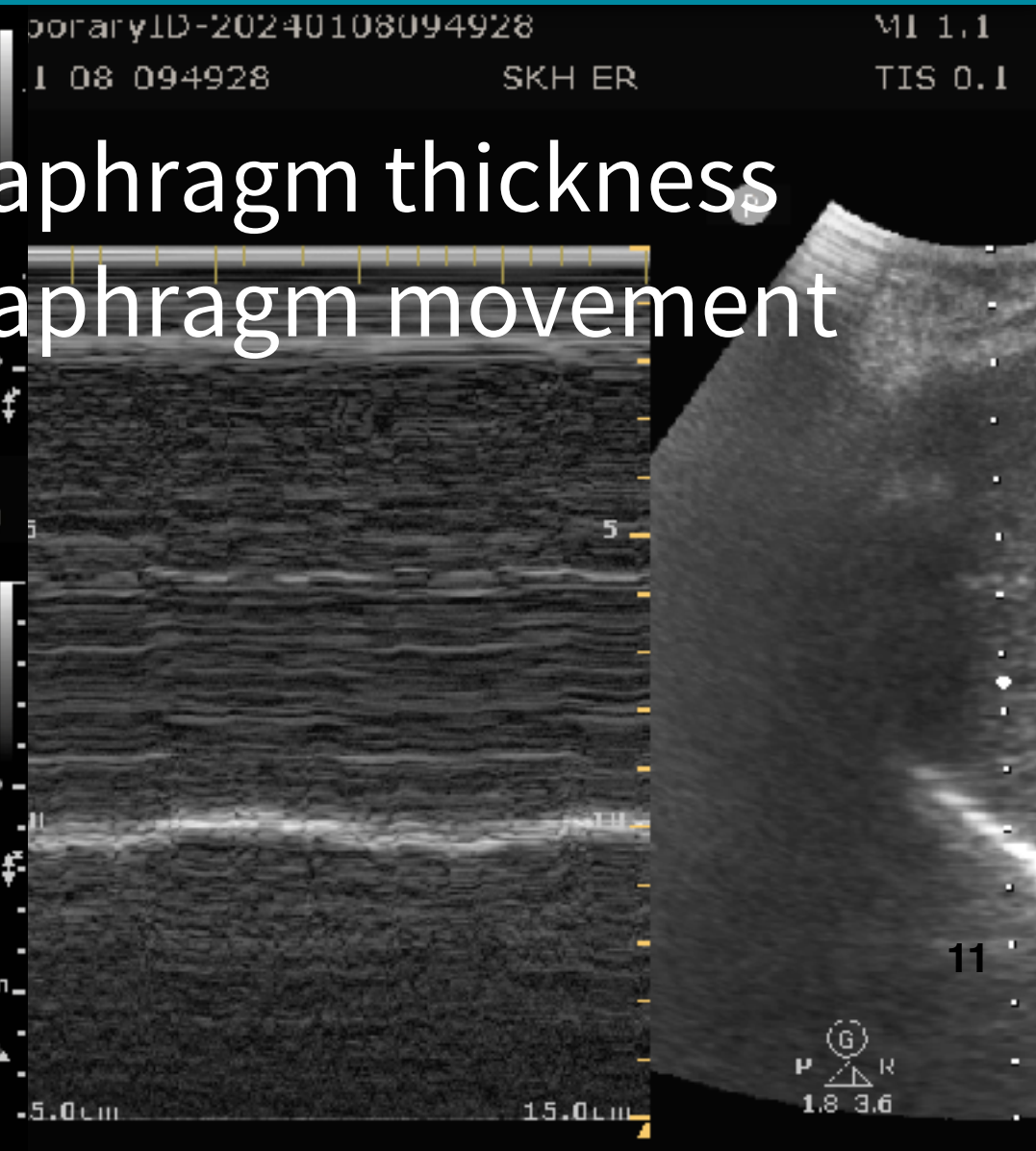
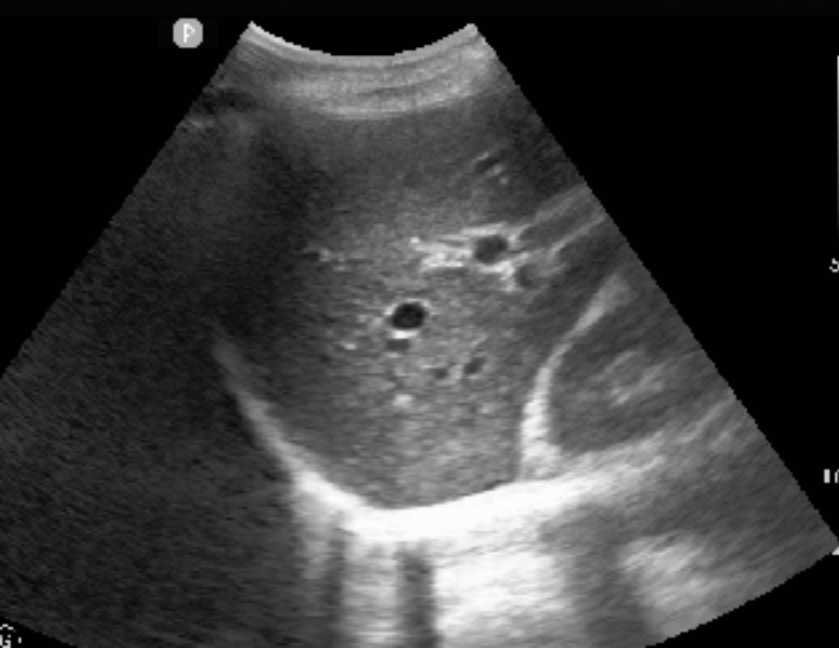


Diaphragm POCUS



Diaphragm thickness
Diaphragm movement

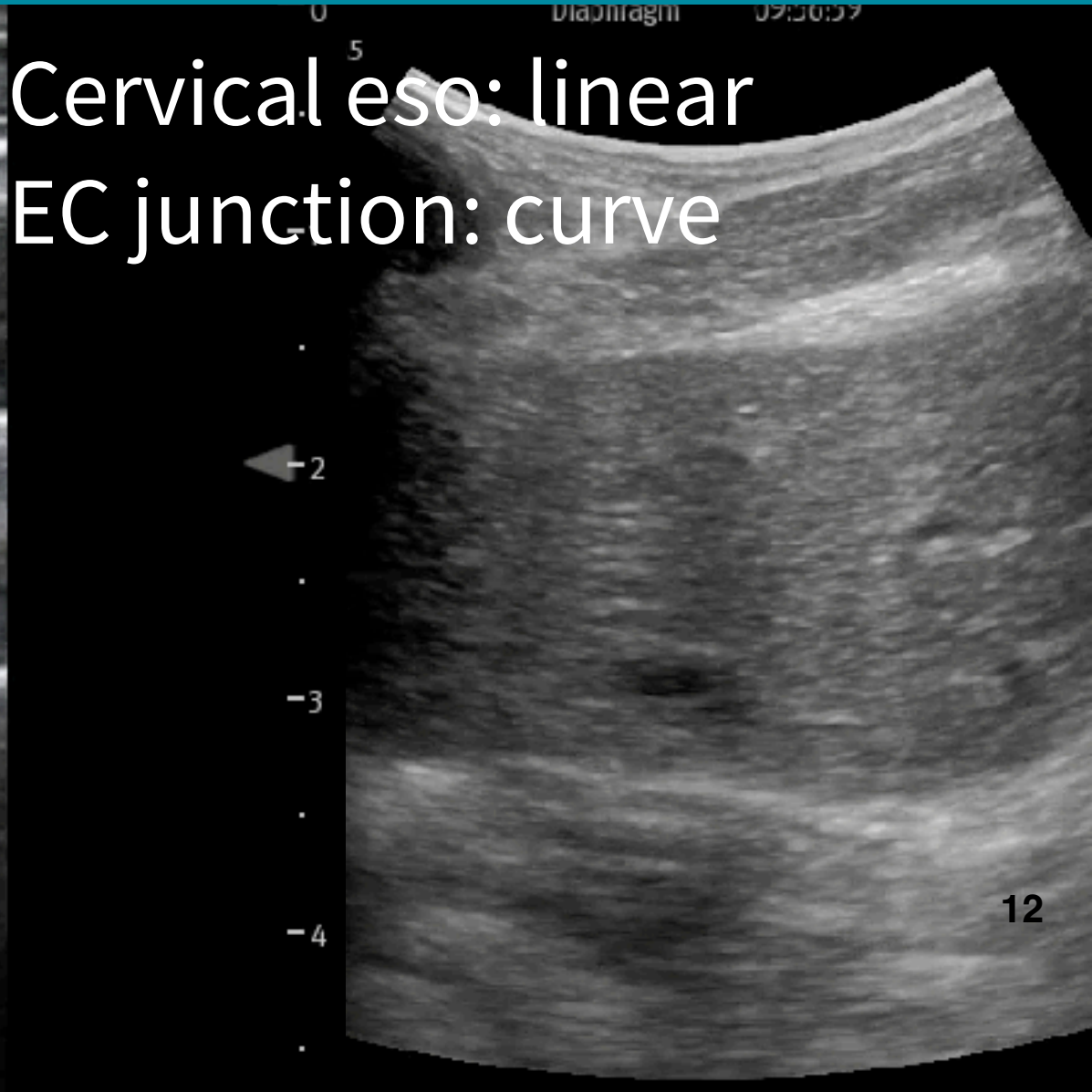
20240108094928 MI 1.1 1/8/2024
4928 SKH ER TIS 0.1 9:50:29 AM



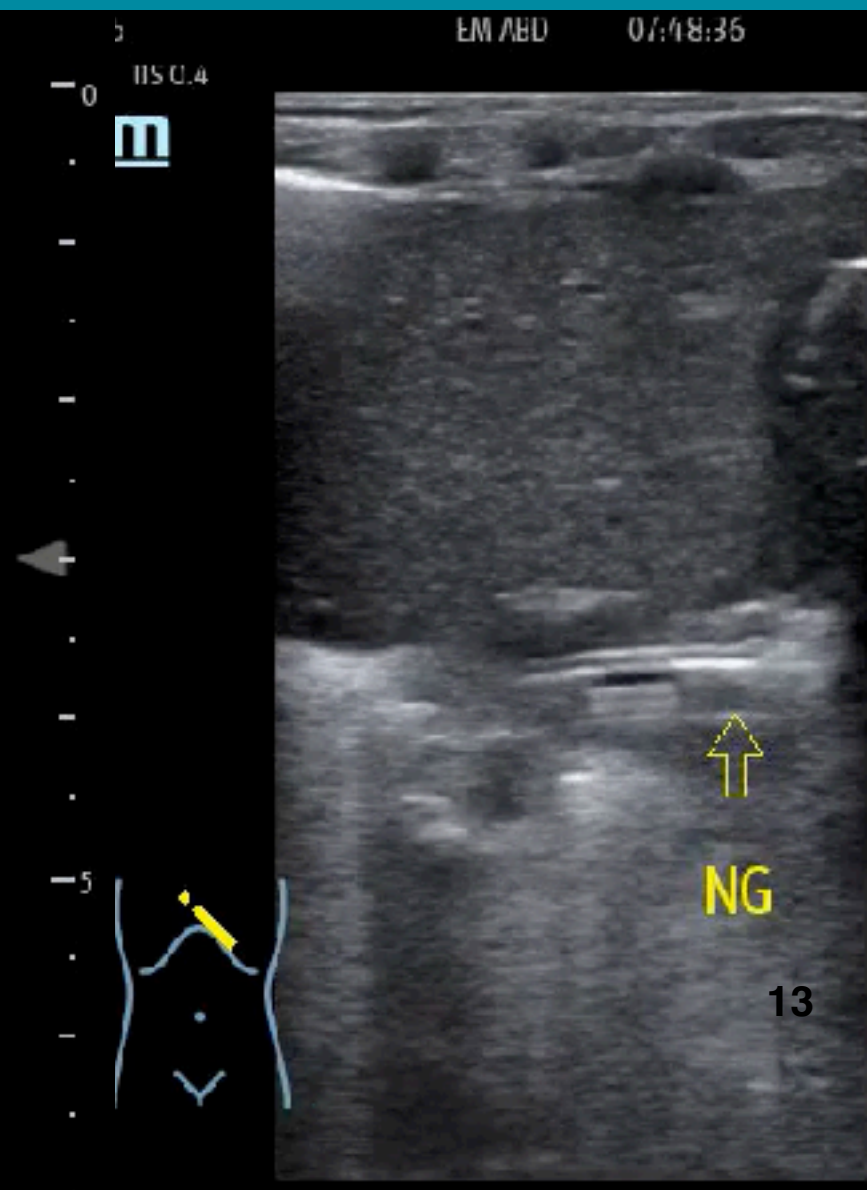
NG confirmation



Cervical esophagus: linear
EC junction: curve



2 month boy , NG Dislodged



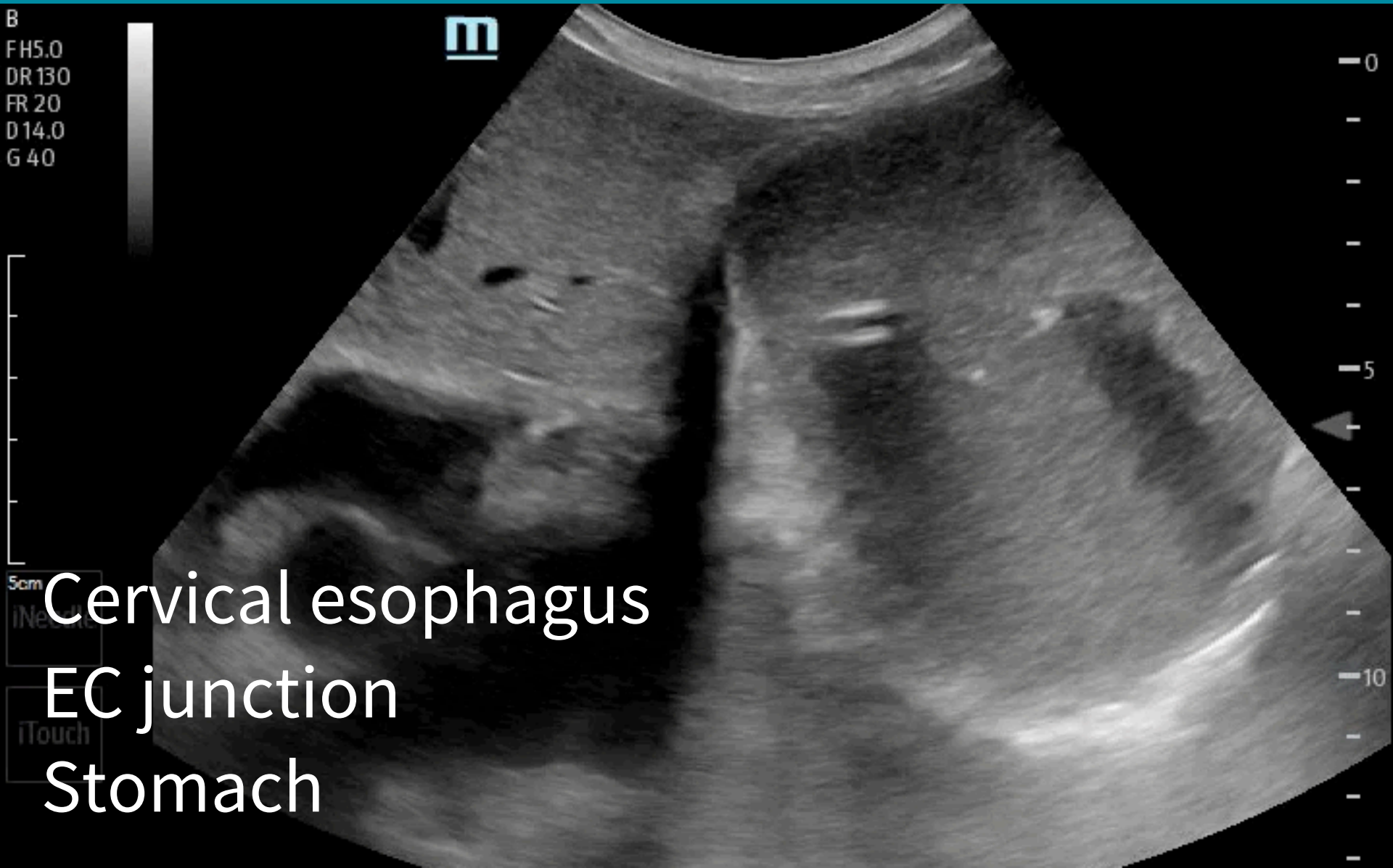
2 month boy , NG dislodged 2 days later



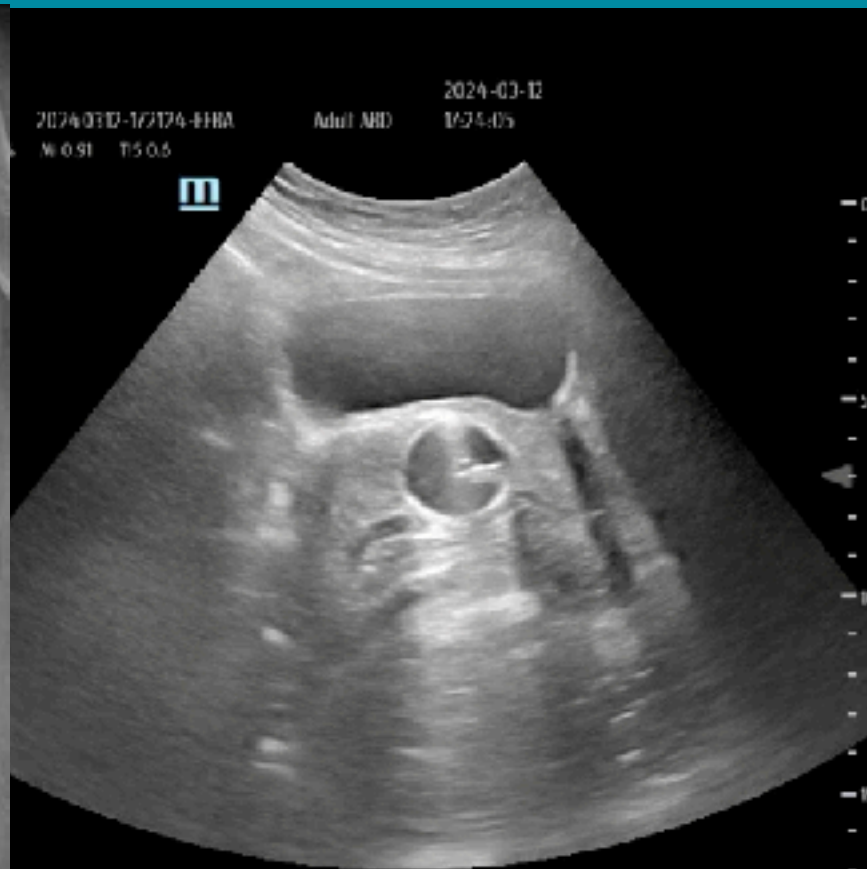
Auscultation
X-ray
POCUS



NG tube



62F, PN with septic shock. Foley position ?



41M, No urine output

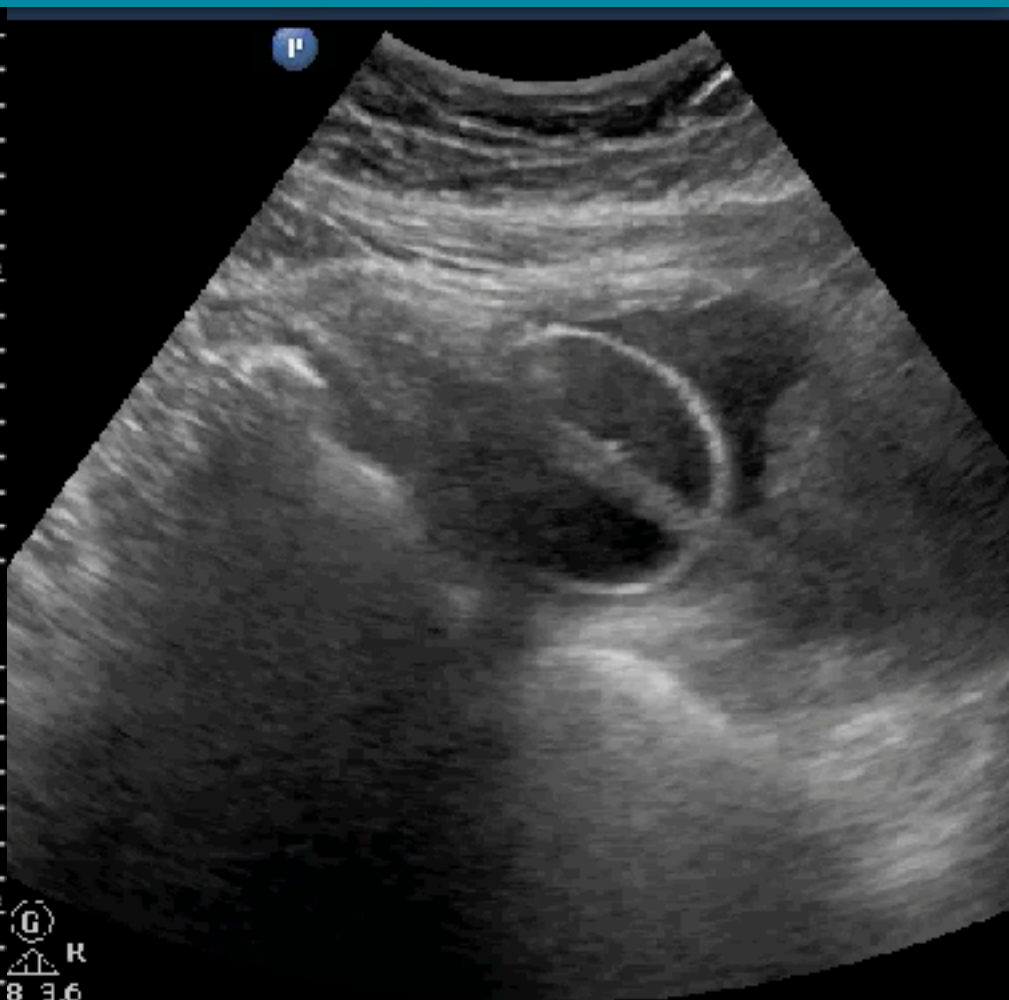
Gen2

m

n

8

/3



探頭先走
要往回看
緊盯針尖



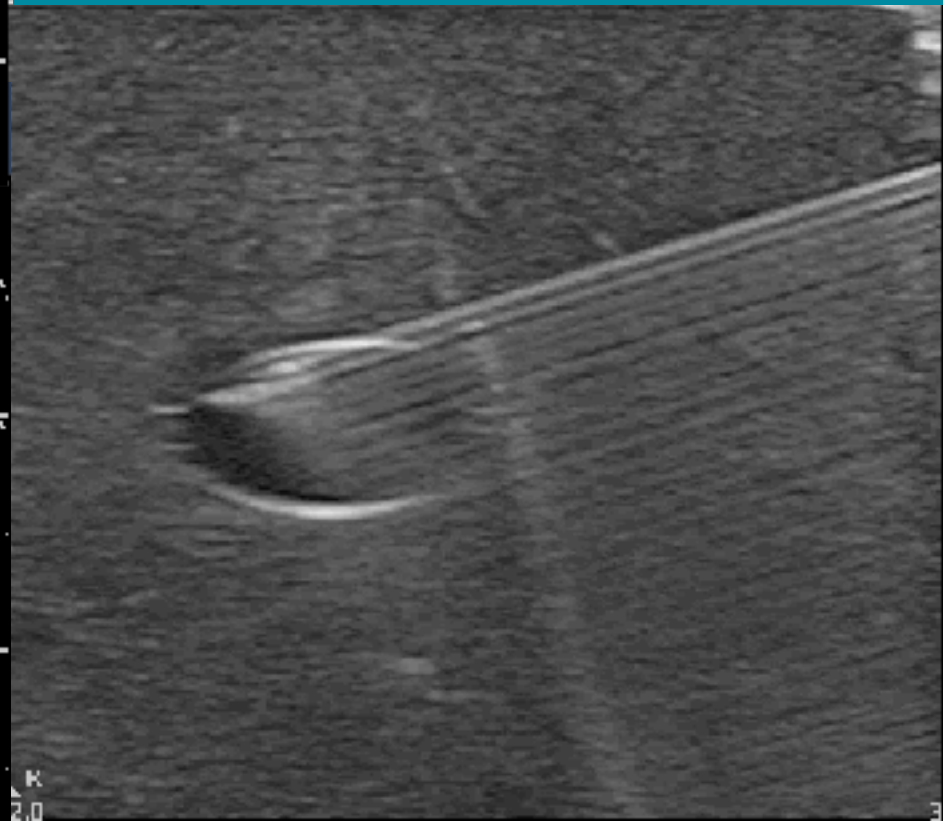
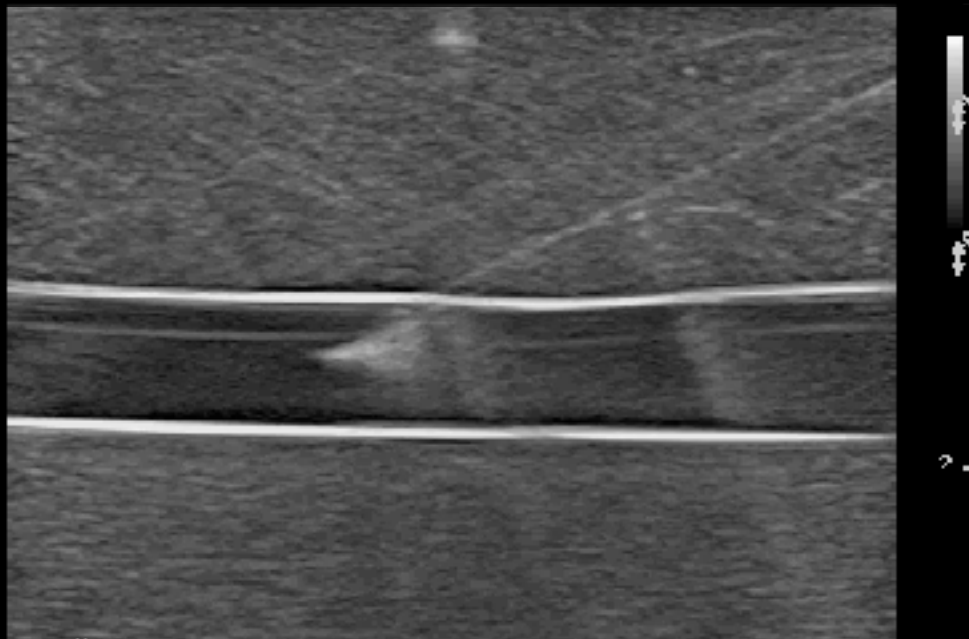
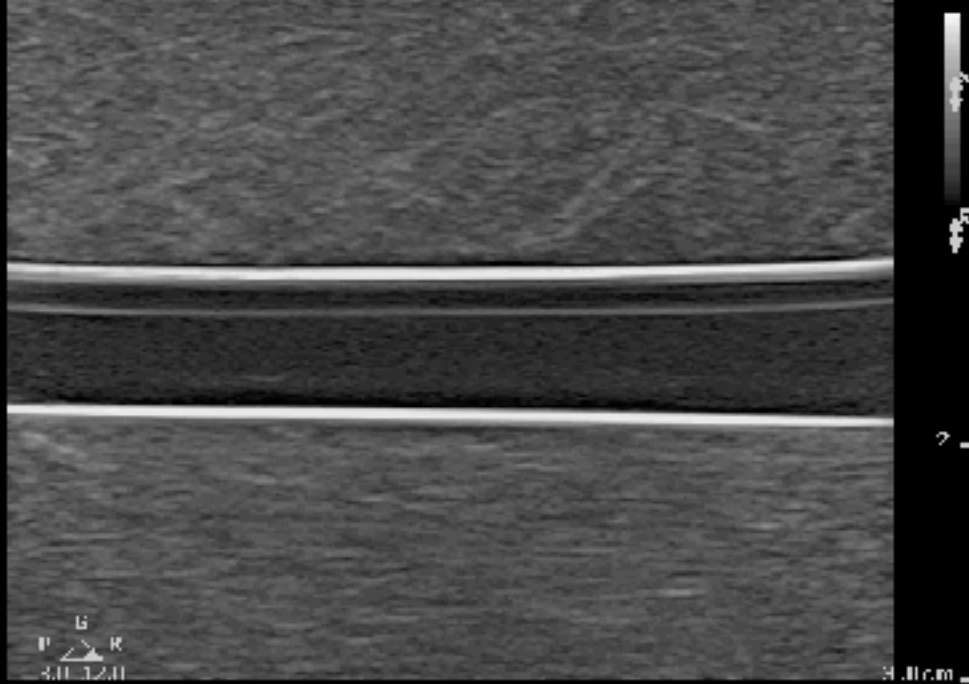
探頭要正
目標不動
淺淺入針

MASTER NEEDLING

Off-plane

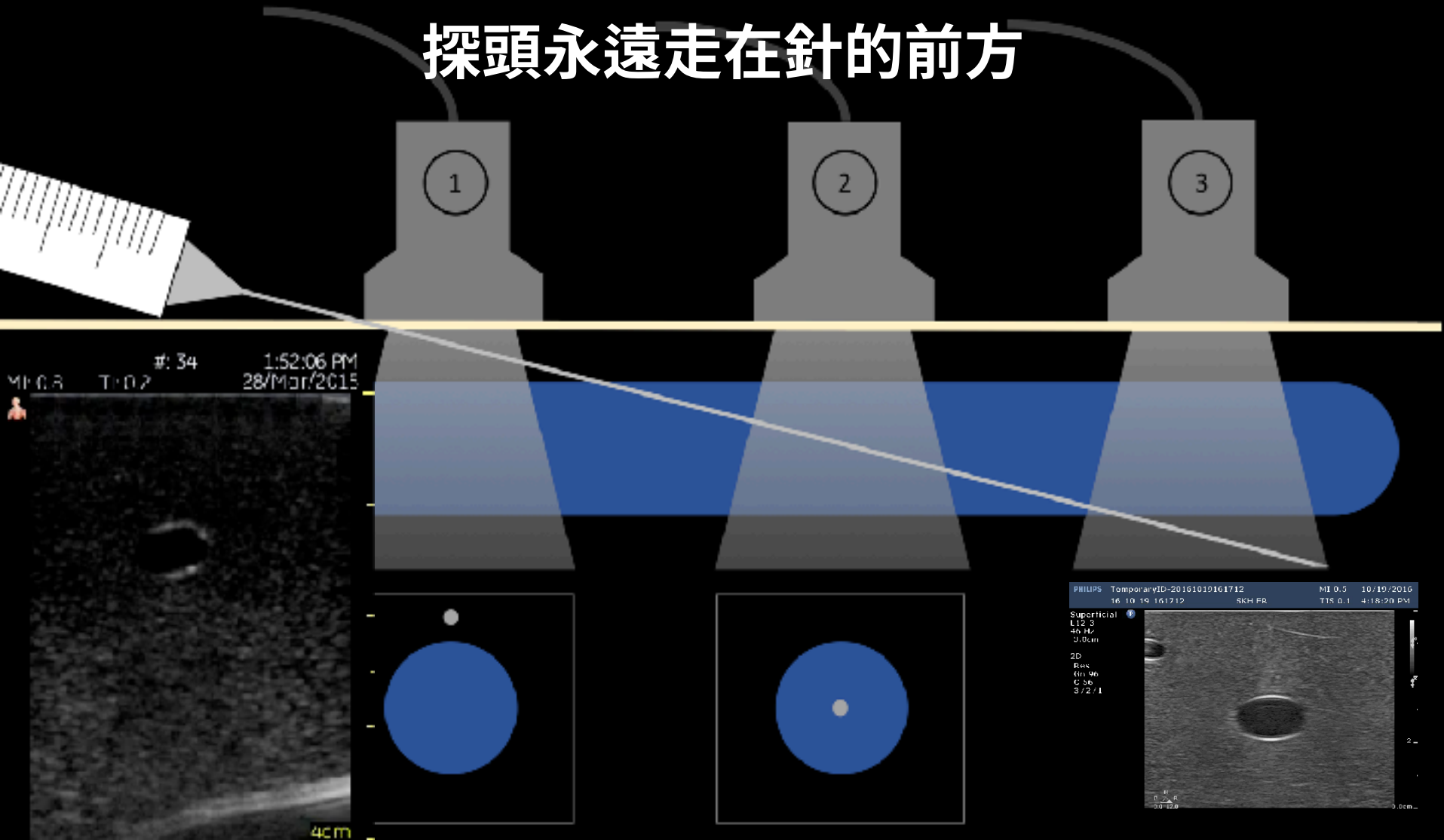
In-plane

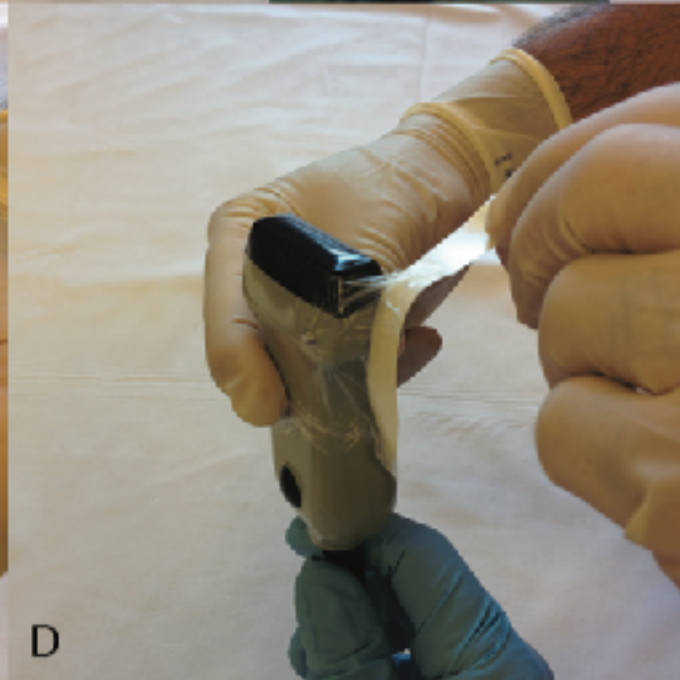
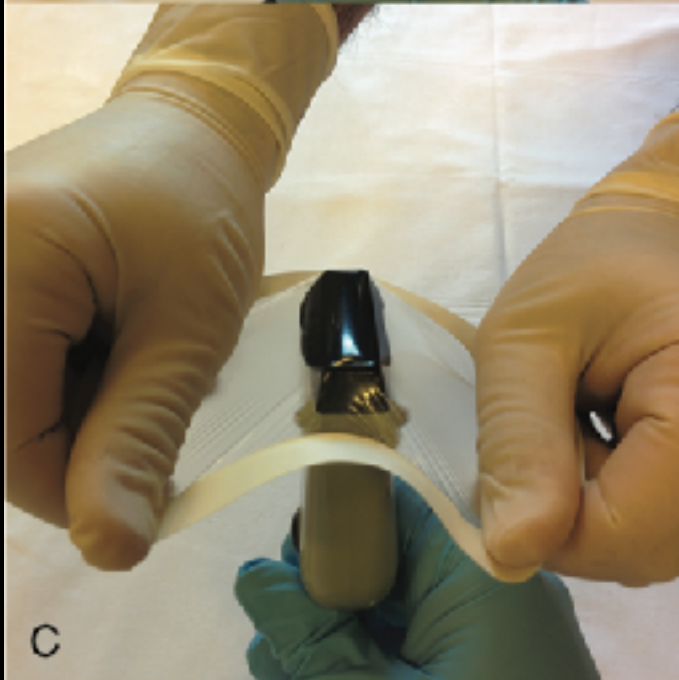
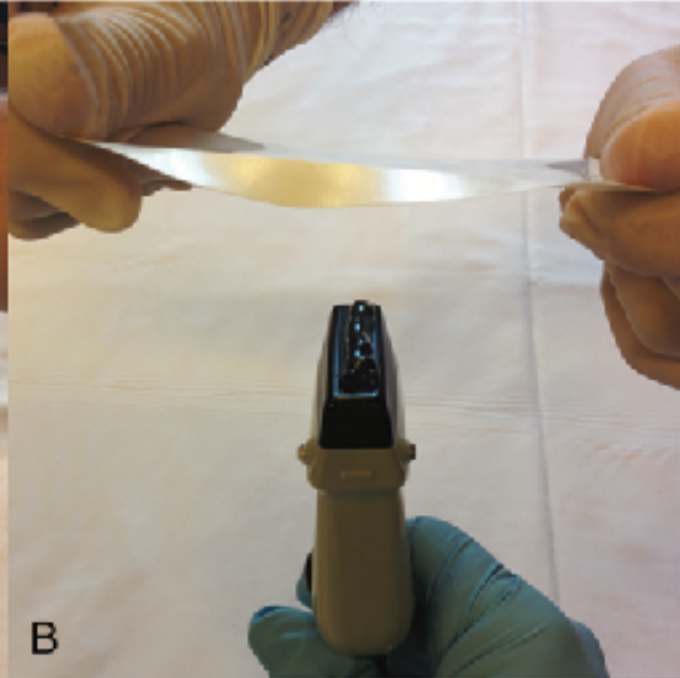
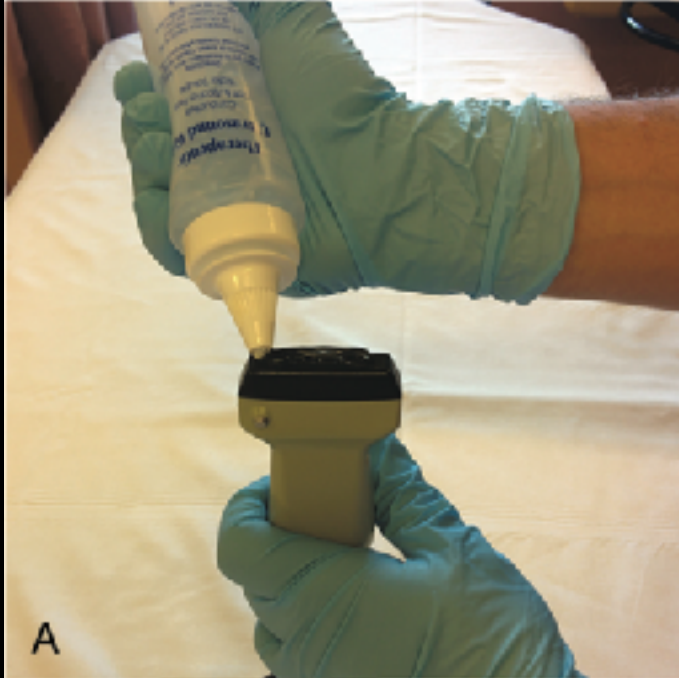
NEEDLE OPTIMIZATION 探頭要垂直針身



OFF-PLANE首重針尖

探頭永遠走在針的前方



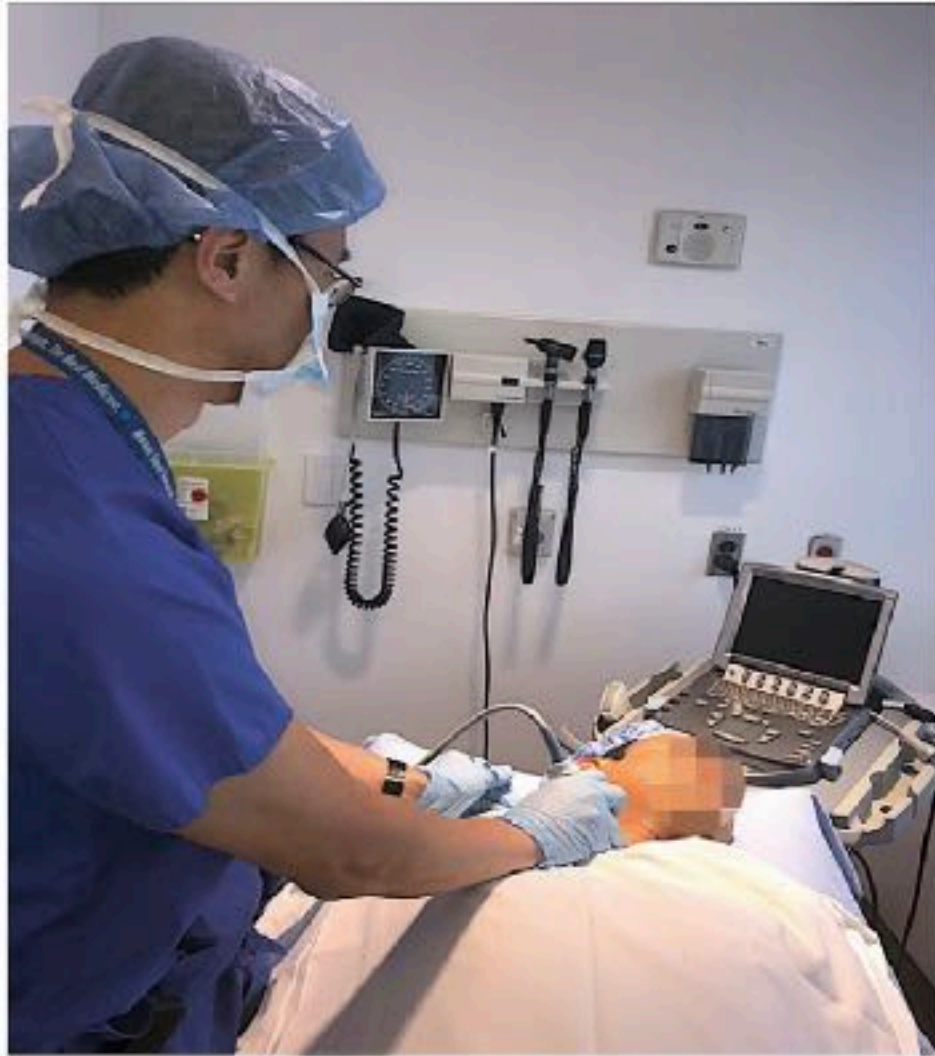


Ergonomics

US for interventional pain management



Incorrect



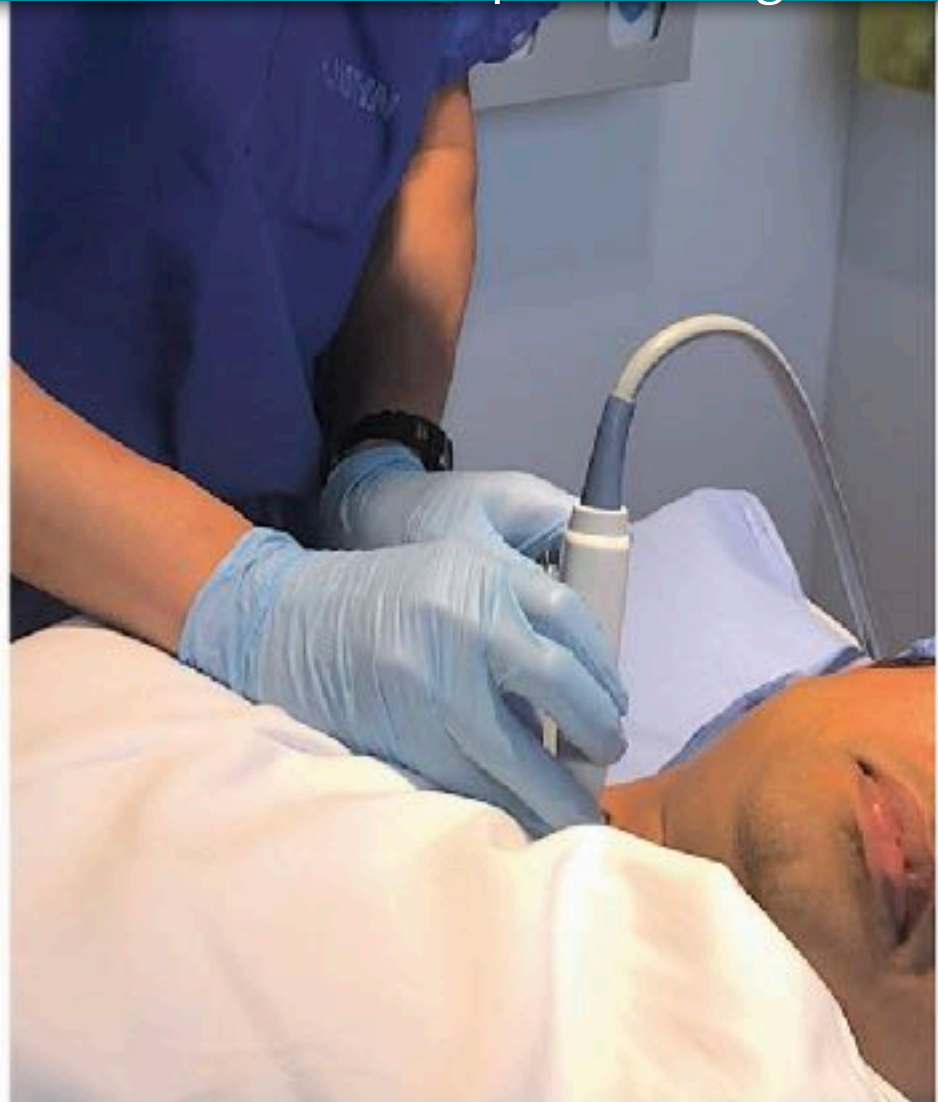
Correct

Stable hands

US for interventional pain management



Incorrect



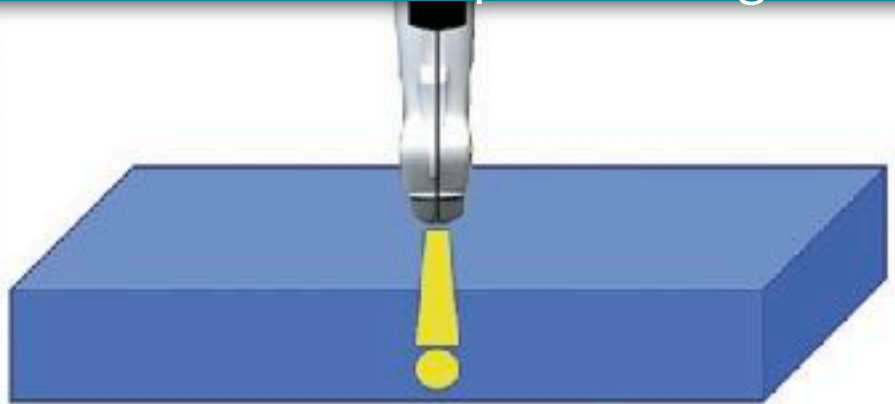
Correct

超重要的雷區 !!

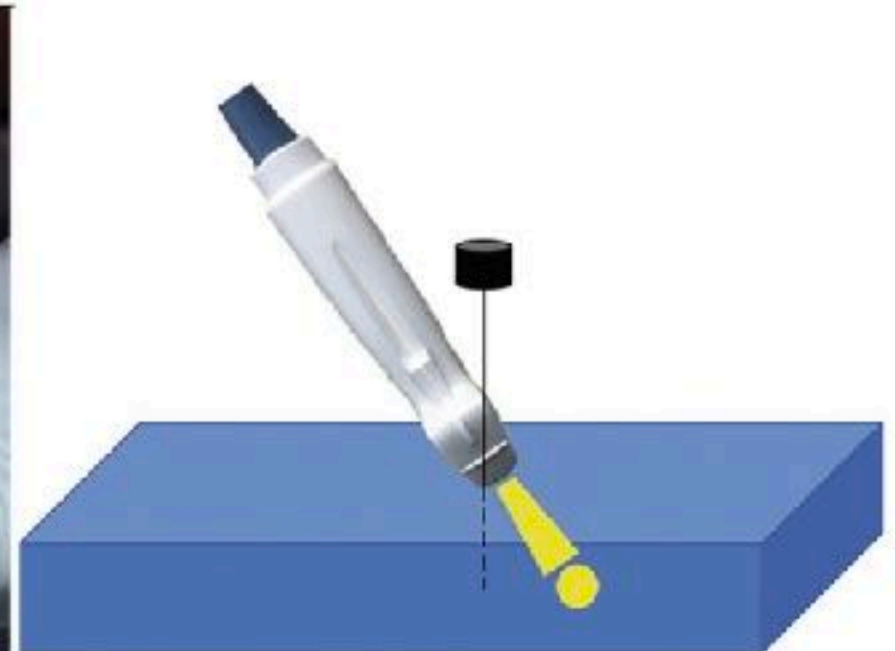
US for interventional pain management



Correct



Incorrect

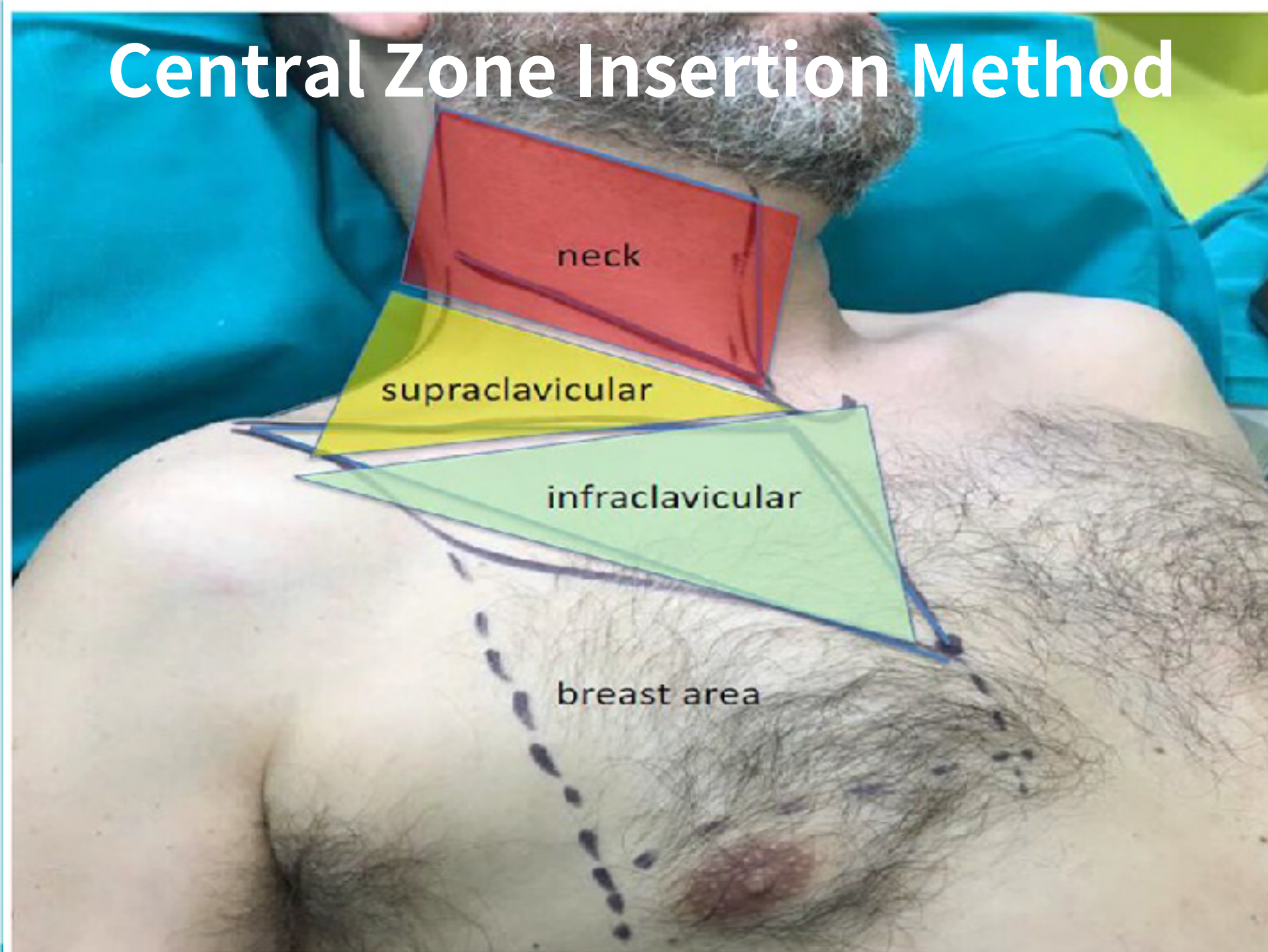


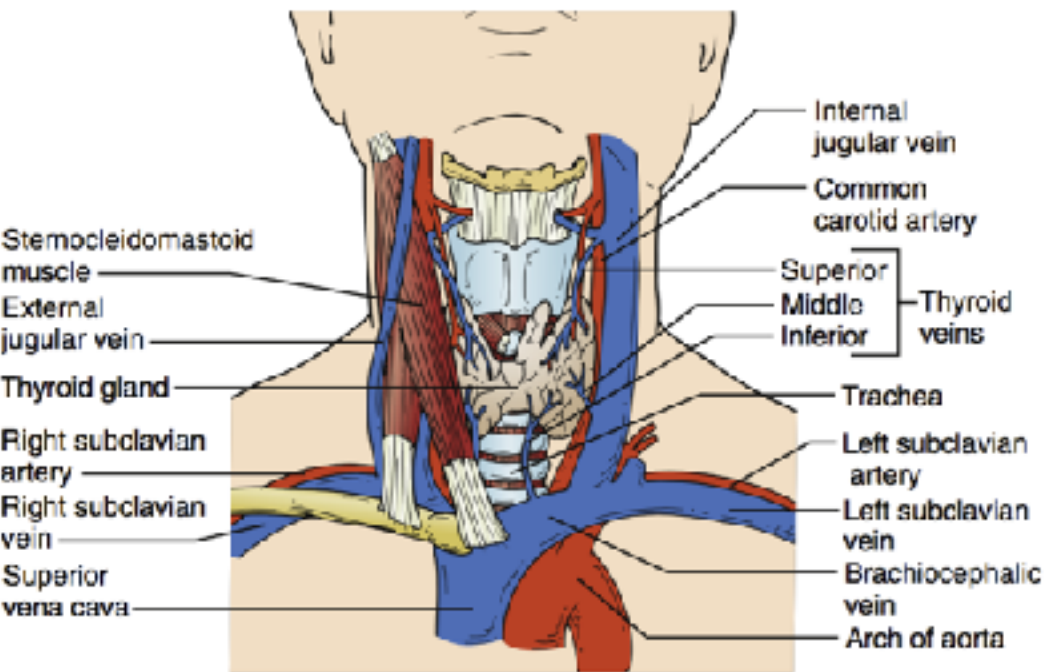
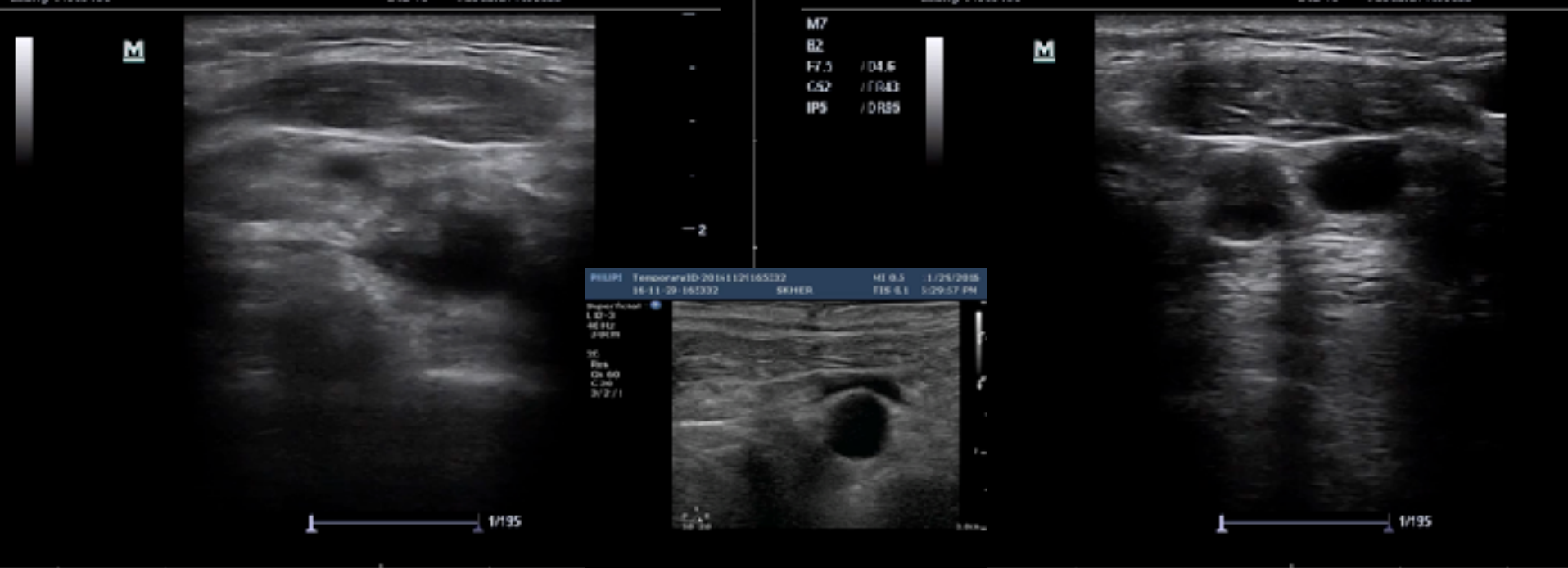


US-guided CVC



Central Zone Insertion Method





Size
Shape
Depth
Compressibility
Proximity to CCA
Distal anastomosis with SCV
Respiratory variation

Rapid Central Vein Assessment (RaCeVA): A systematic, standardized approach for ultrasound assessment before central venous catheterization

Timothy R Spencer¹ and Mauro Pittiruti²

7 Steps

The Journal of Vascular Access
1–11

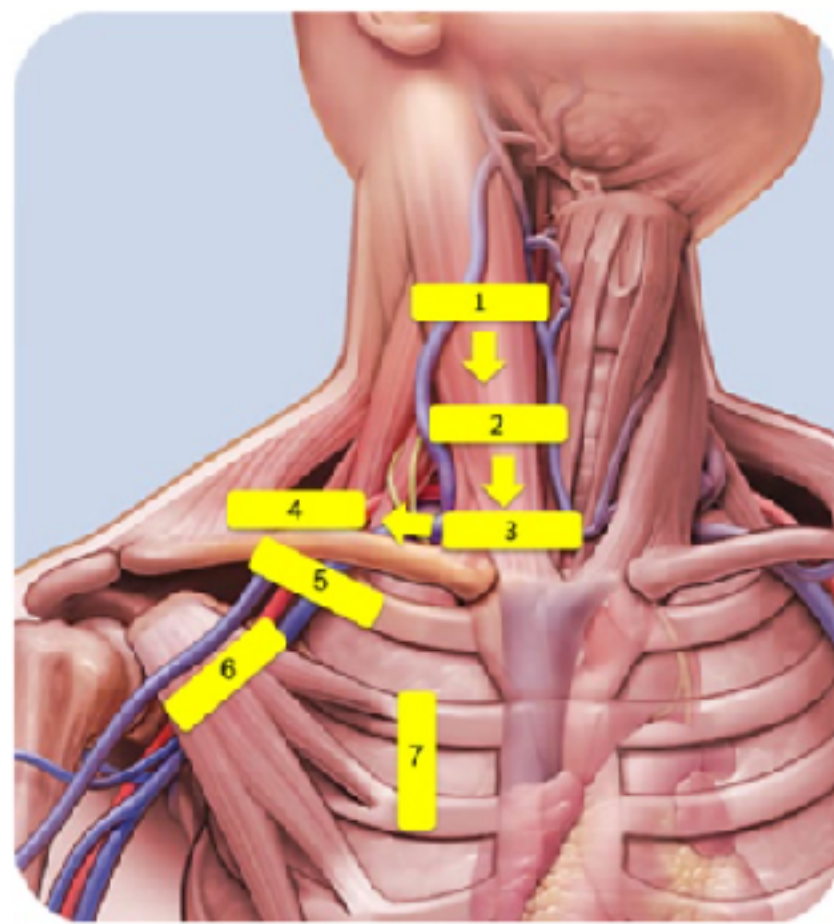
© The Author(s) 2018

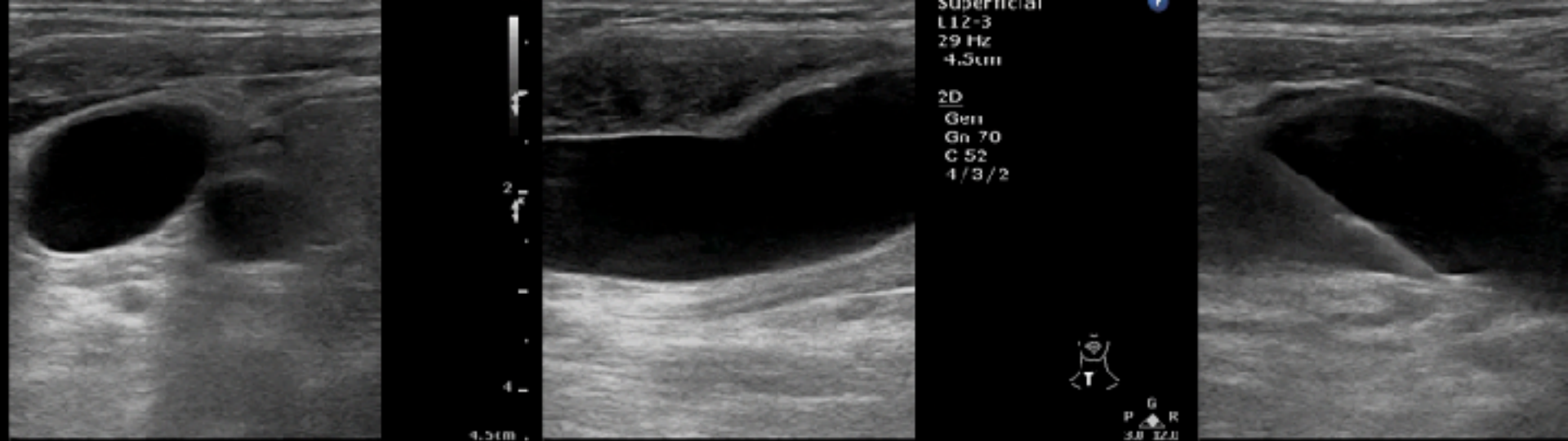
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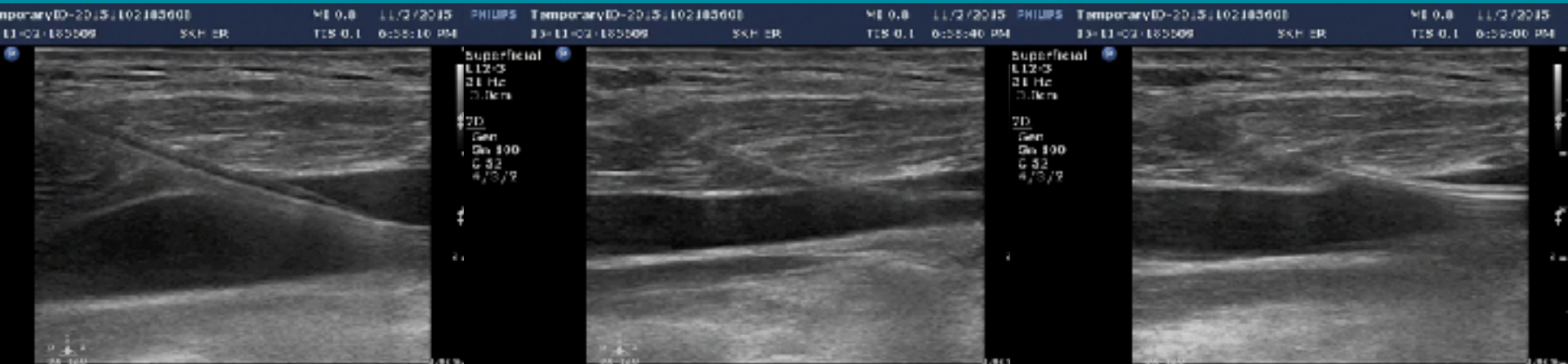
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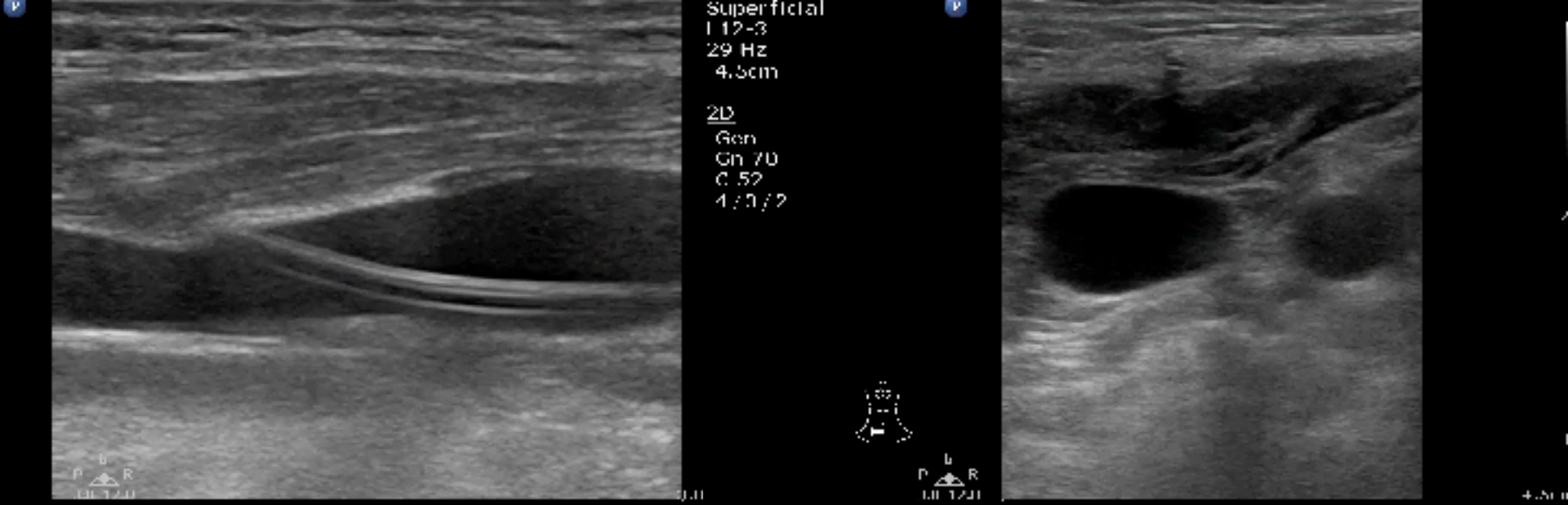
journals.sagepub.com/home/jva



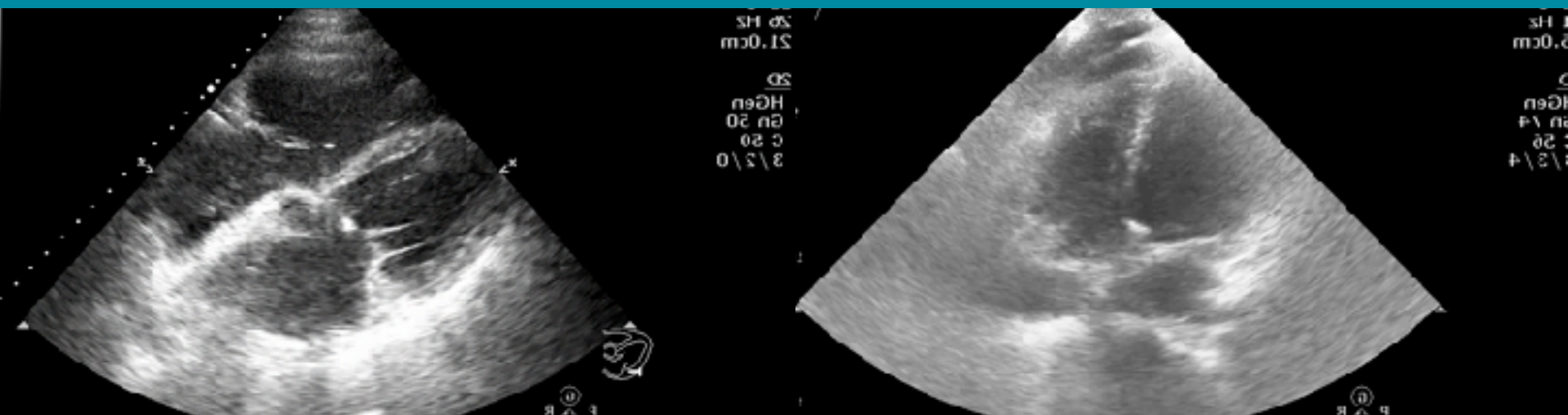


US-GUIDED CVC STEPS



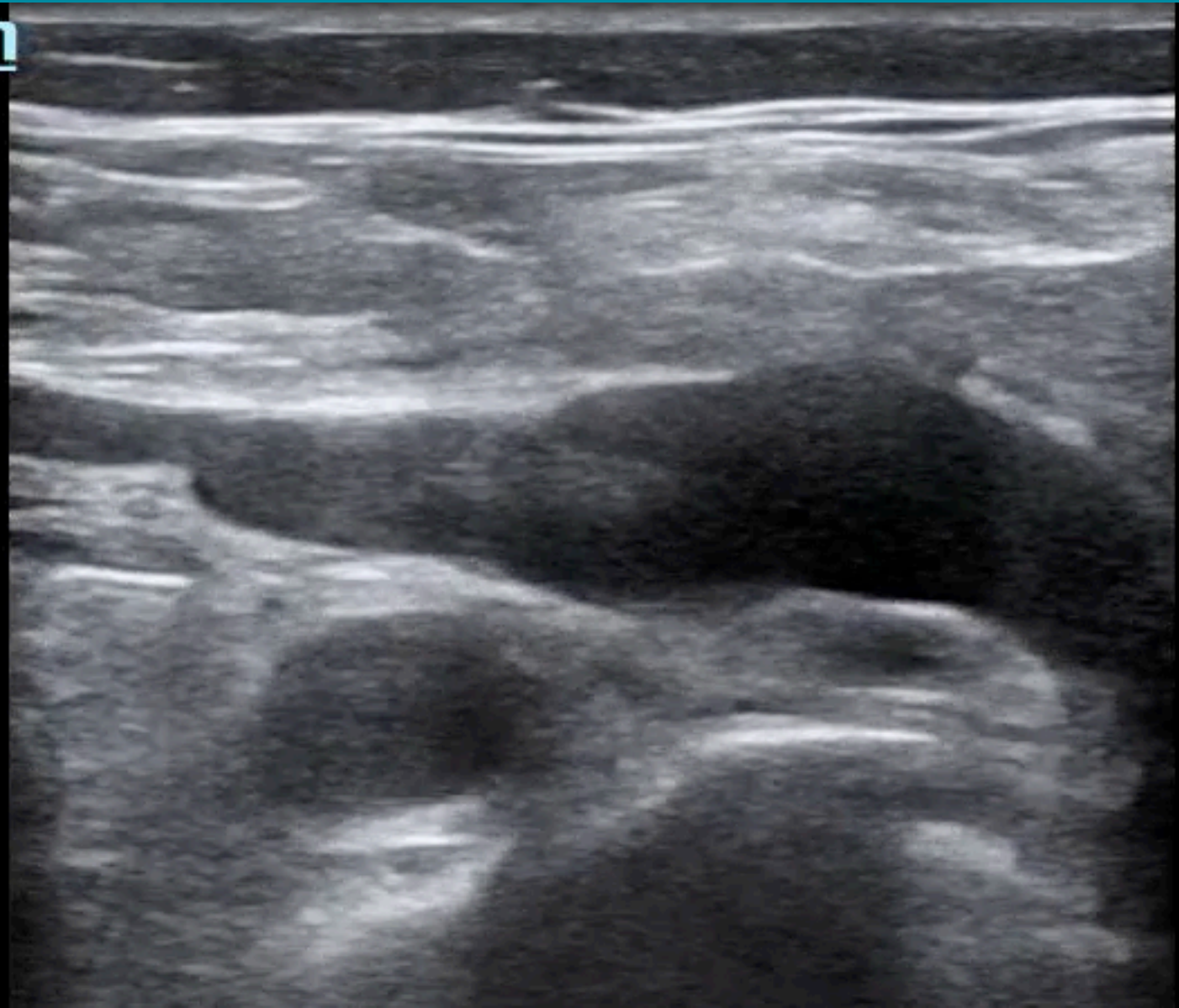


CVC CONFIRMATION



65F, Urosepsis, shock, status epilepticus

2024/09/14
FH10.0
DR 95
PF19005CER
PR 51
D3.5
G50



IM: 0

-1

-2

-3

KV:

max

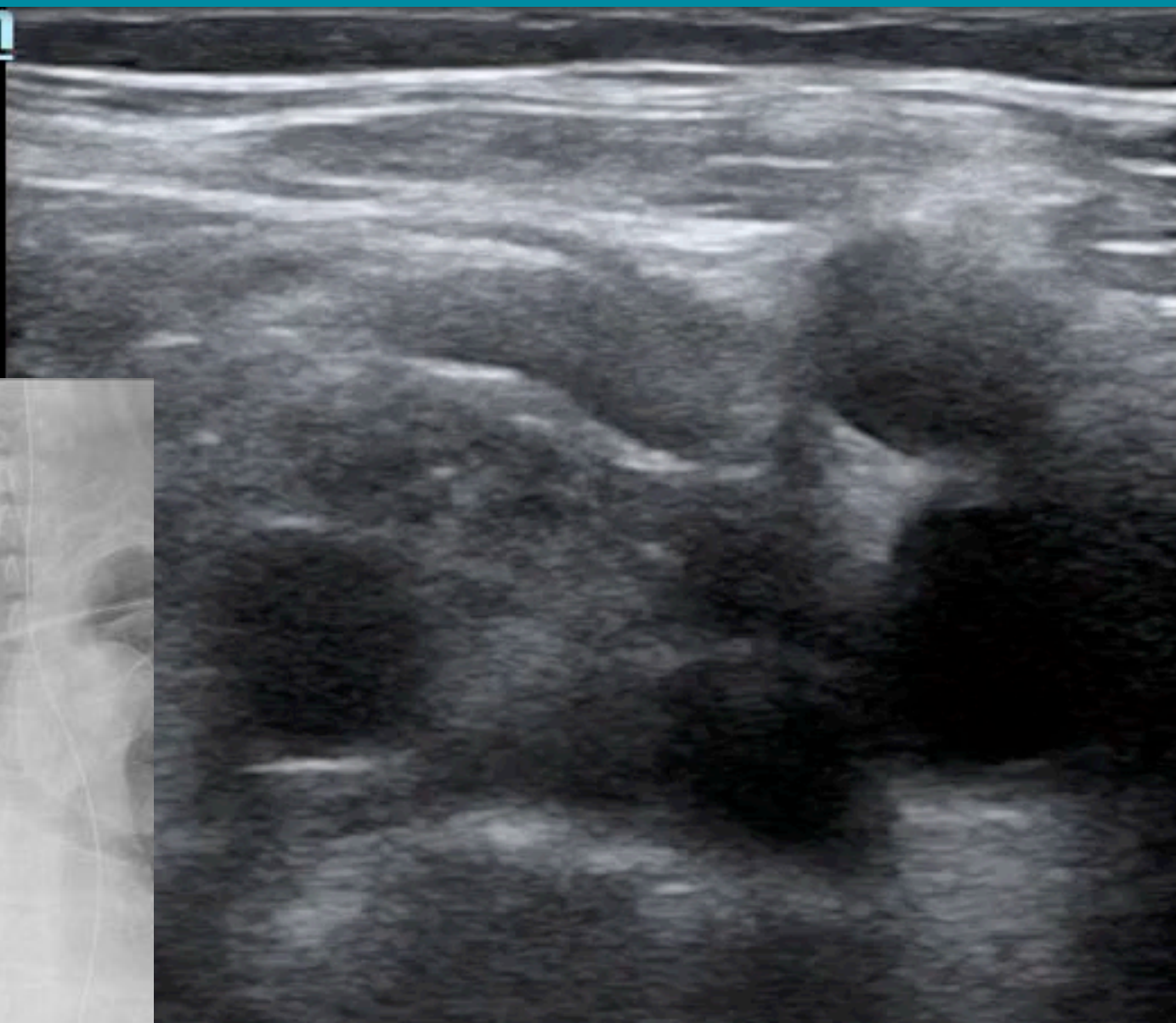
iNeedle

iTouch

thk: mm
PF19005CER
DEOV:

Supraclavicular CVC - SA / IP approach

2024/09/14
FH10.0
DR 95
DE19005CER
PR 51
D3.5
G50



IM: 1

-1

-2

-3

KV:
msec

76M, PN, Urosepsis, Shock, ESRD on HD



Axillary CVC

DB 95
PF19007BER
PR 51
D3.5
G50

iNeedle

iTouch

thk: mm
PF19007BER
DFOV:



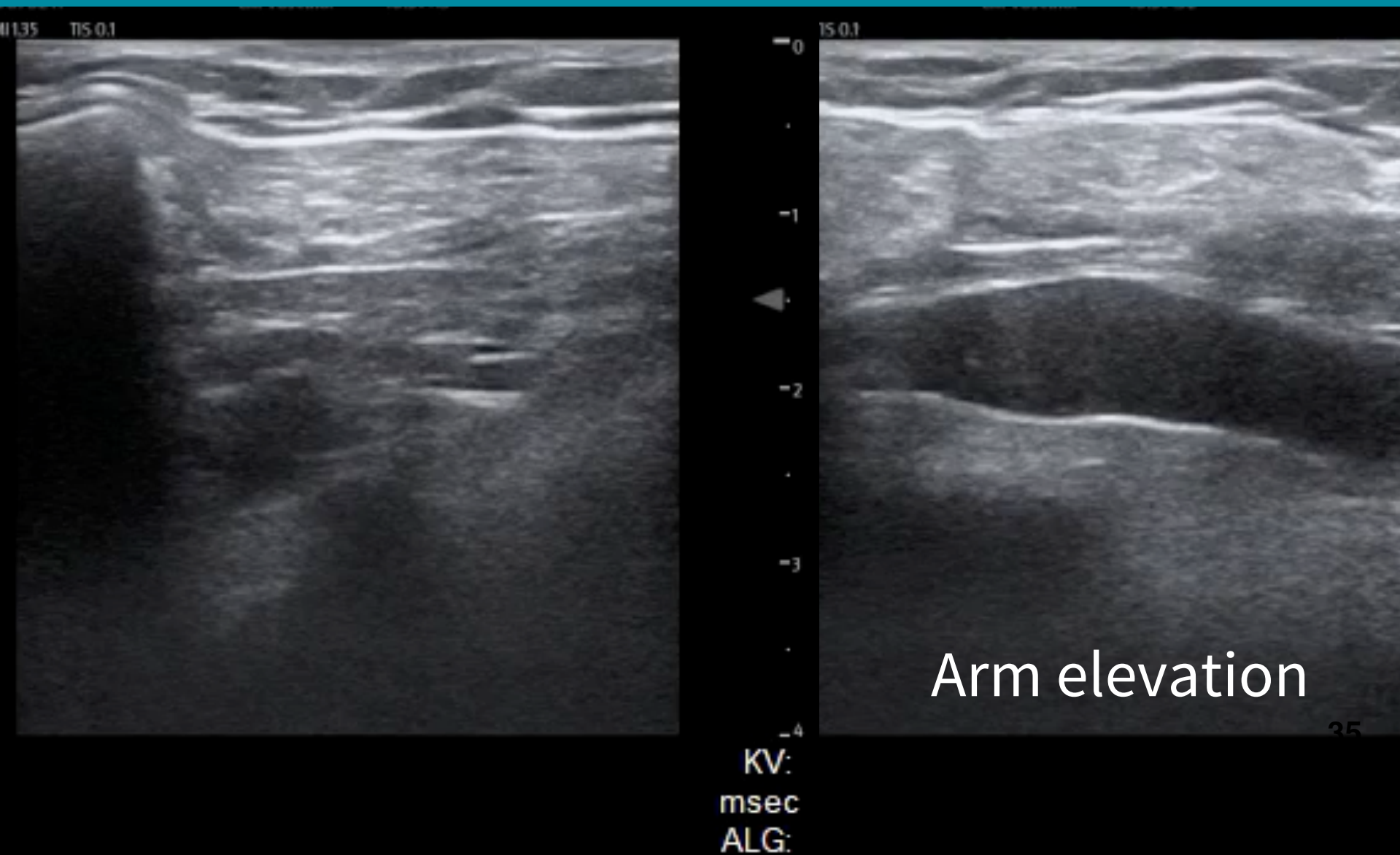
-1

-2

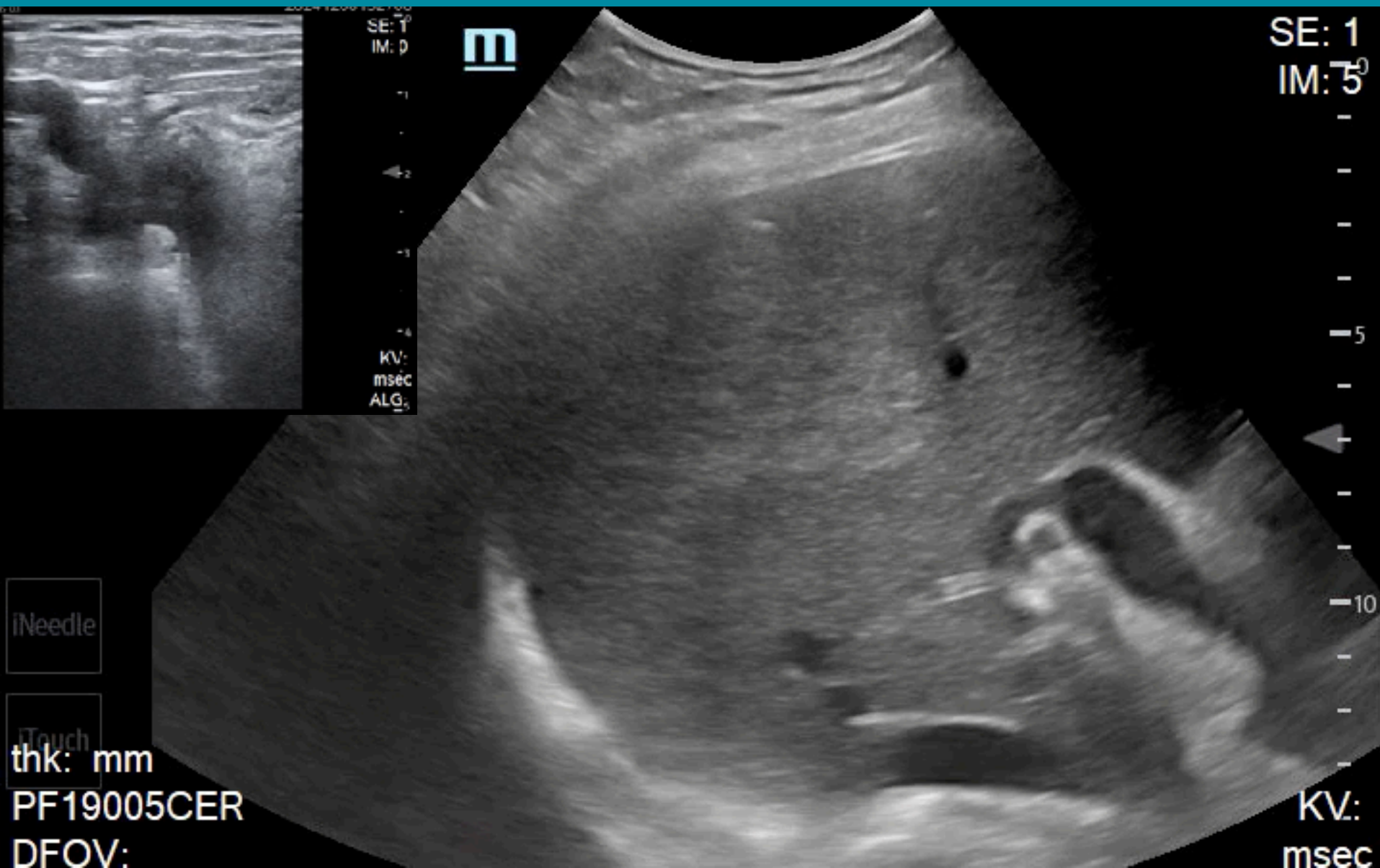
-3

KV:
msec
ALG:

79F, Septic shock, HHS, acidosis

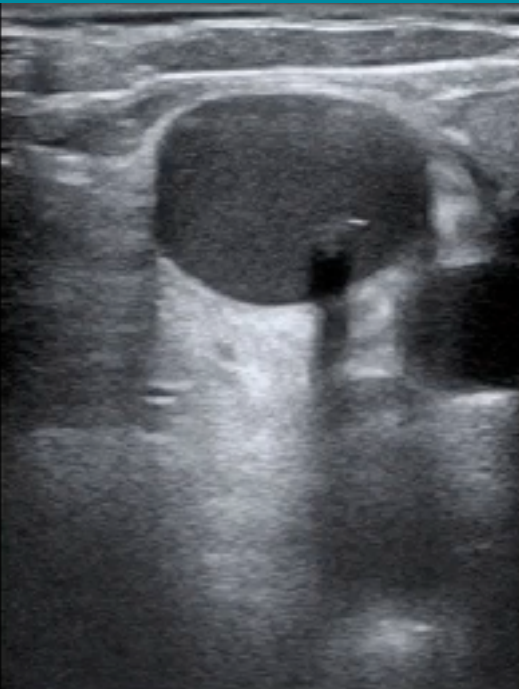


82F, Liver abscess, shock & MOF

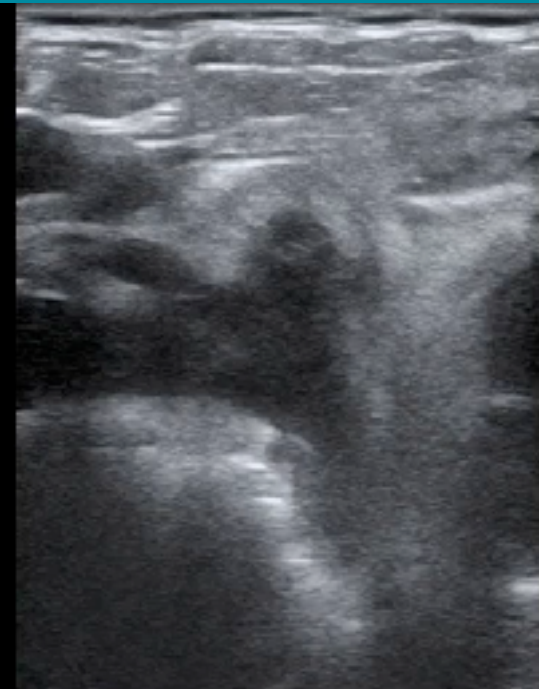


Redirect CVC (IJV to brachiocephalic vein)

CCES:
024/12/08



SE: 1°
IM: 1 08

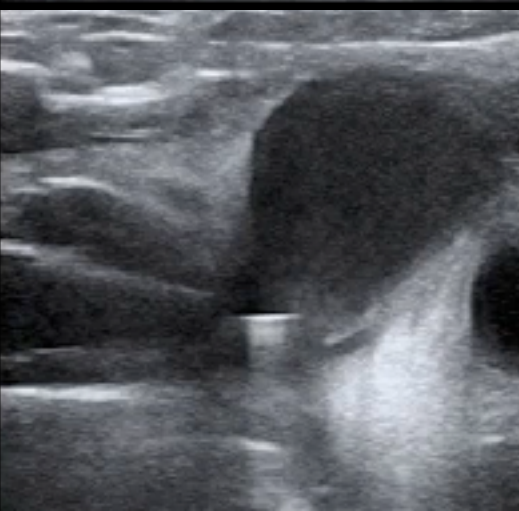


SE: 1°
IM: 3

needle
k: mm

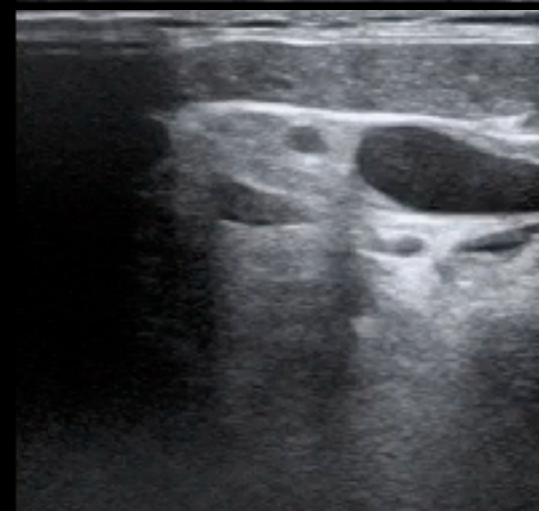
FOV:

024/12/08



KV:
msec
ALG:

IM: 2 08



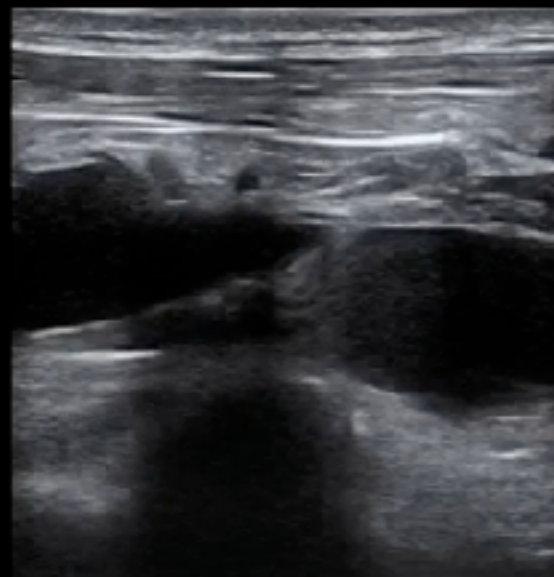
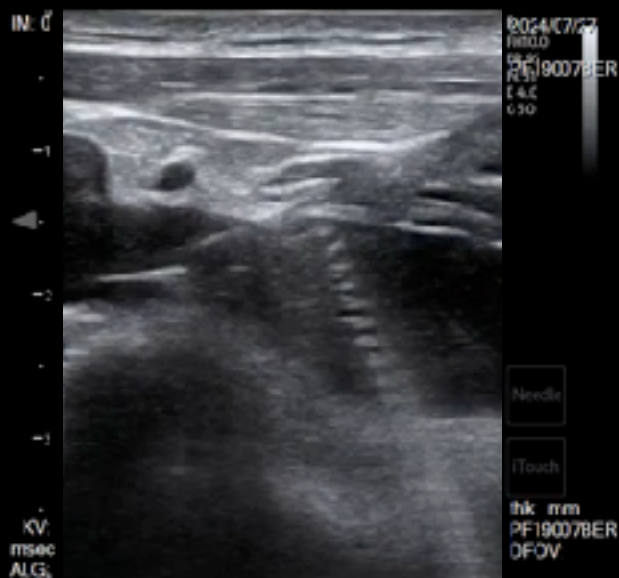
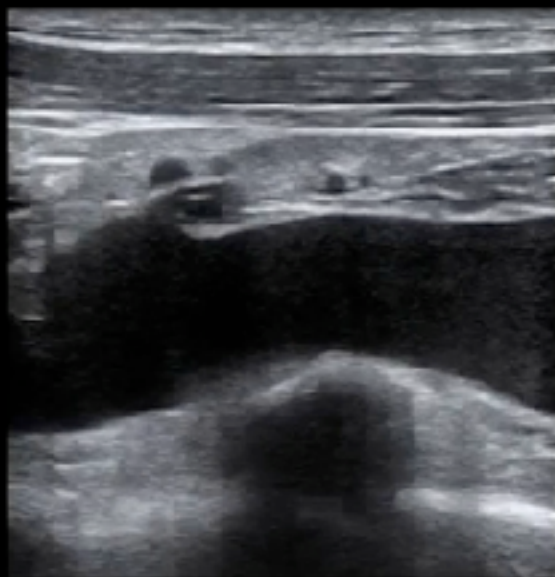
KV:
msec
ALG:

SE: 1°
IM: 5

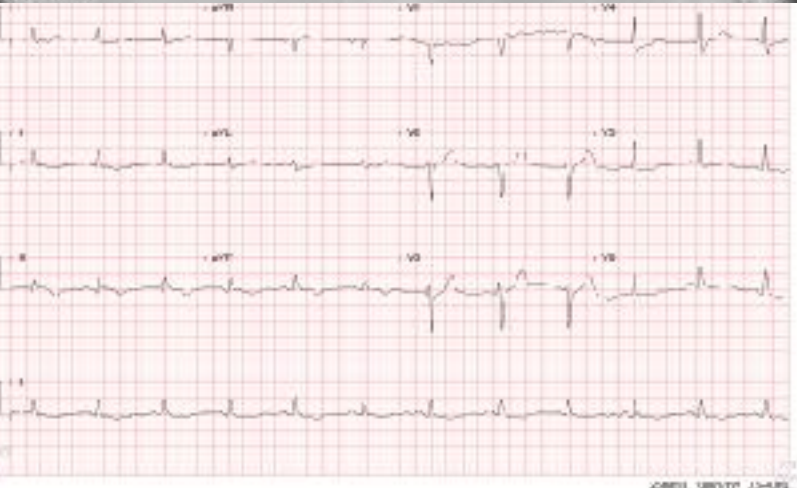
合適血管

熟練運針

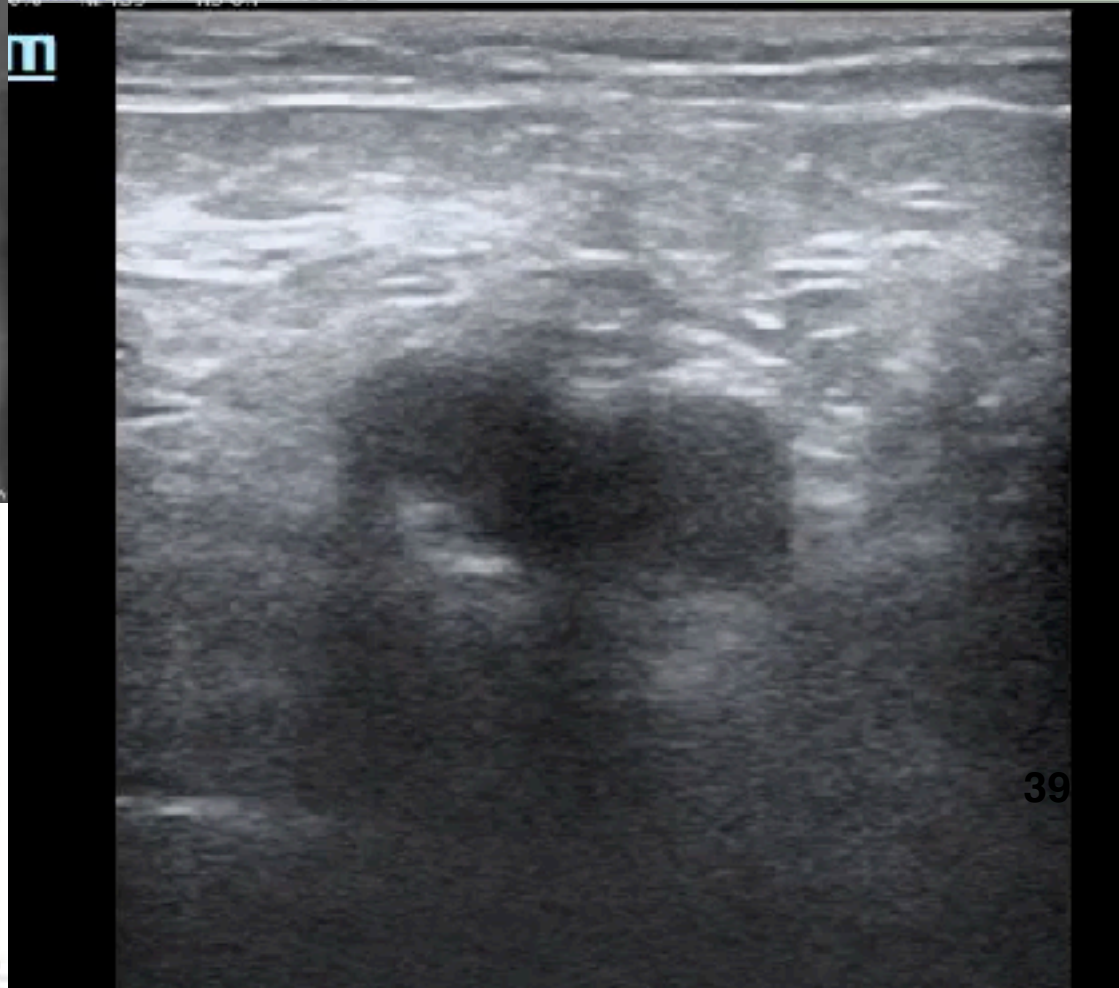
確認導線



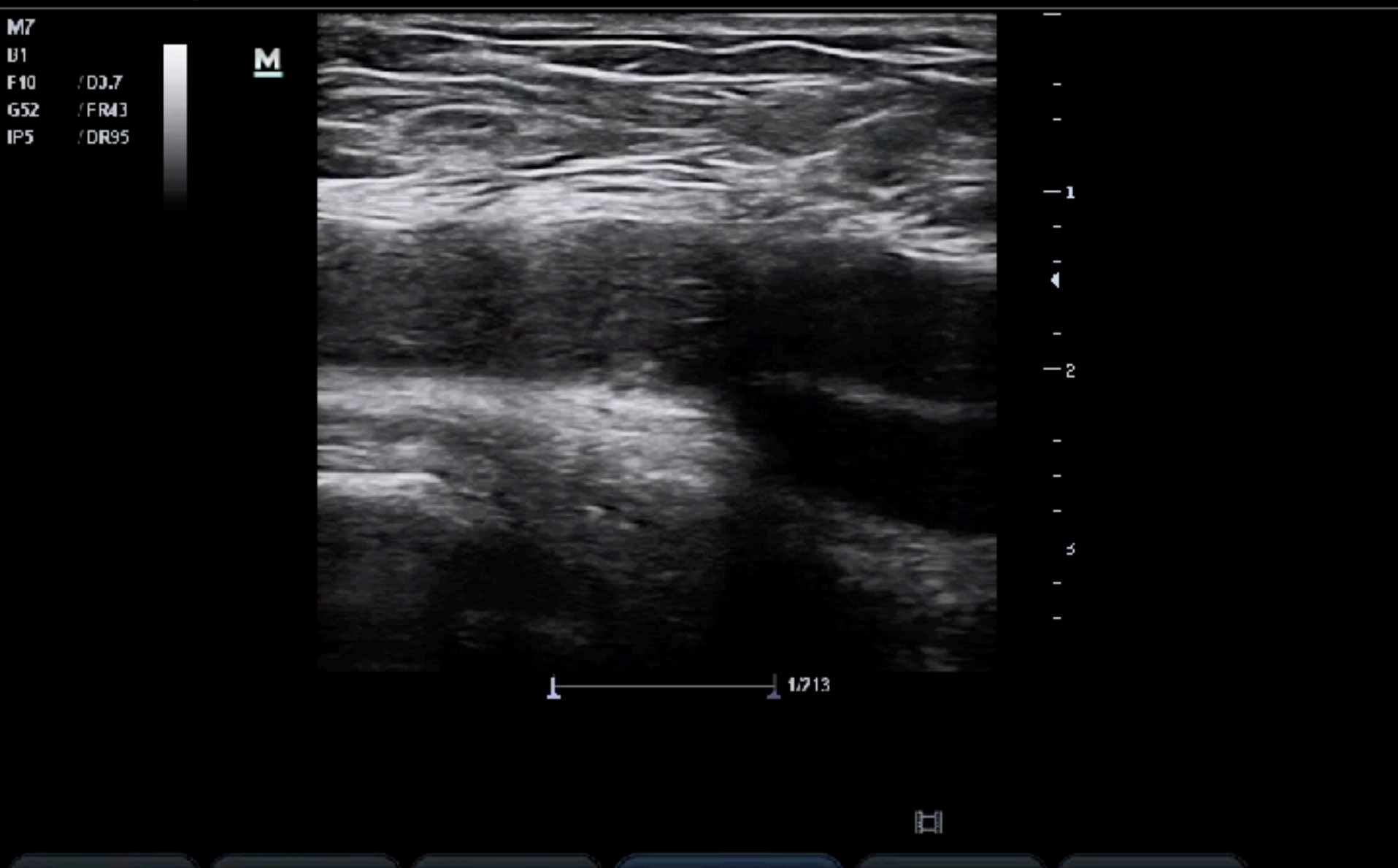
85F, uremic syndrome & metabolic acidosis (DL)

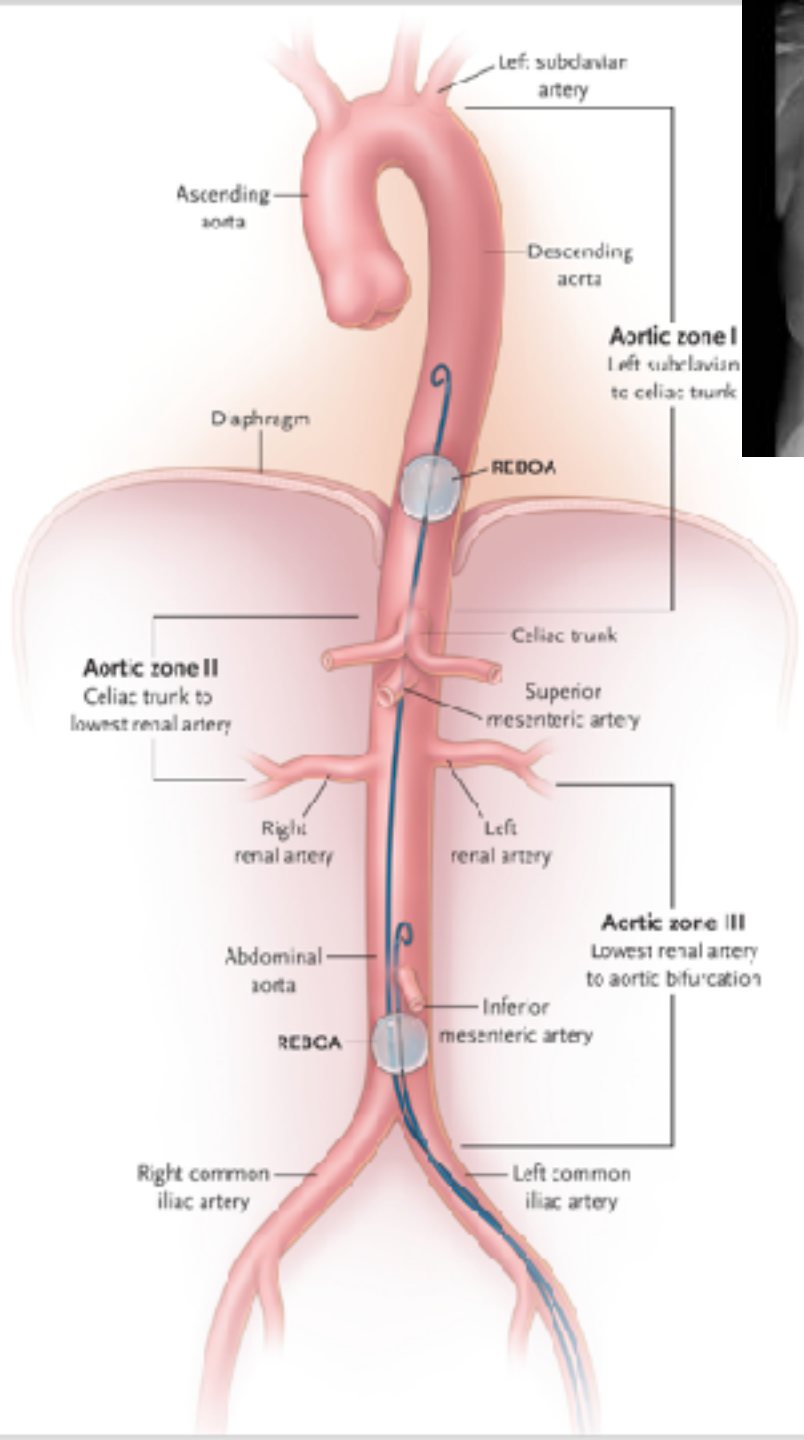


Urea N 10.0	Creatinine 7.8	BUN 2.1	Na 137	K 5.9	Cl 108	COHb 15.6	Lactate 12.9
Hemolysis 14	Blood grouping O+	Blood grouping O+	RBC 2.18	Hgb 7.6	HCT 22.7	MCV 104.1	
MECH 24.9	MEHC 22.5	RDW-CV 15.2	WBC 21.42	Neutrophil 91.0	Lymphocyte 0.5	Monocyte 5.5	
Leukopenia 0.0	Basophil 0.0	CD4 12.59	Platelet 170	PT 20.6	PT INR 1.59	MNPT 11.2	APTT 42.5
Troponin I 19404.1	BNP 12107.8	Blood gas pH 7.132	pCO2 20.6	pO2 45.3	SpO2 5.9	CO2Hb 65.0	
SO2 55.6	COHb 0.0	MeHb 0.8	HCD3 6.7	ABE -20.5	Glucose Random 249	Glucose Type Positive	Glucose
24389	Irregular antibody Screen Negative	血清前體蛋白 1.6	other 已過期	已過期	24093		
CRP 6.2	Ca 8.1	P 4.3	GPT(ALT) 42	Cholesterol 132	TG 46	HDL 44	LDL 75
Uric acid 4.1	HbA1C 7.0	Glucose AC 55	Albumin 4.5	Recheck 已王製			



Trauma OHCA with ROSC / Femoral A line





09:20:55 AP 92.0% MI 0.0 TIS 0.7

C5 2s Adult ABD



PIV: Basilic & Cephalic V



Landmark: humerus & brachial aretery

D-20170705165331

MI 1.1 7/5/2017

55331

SKH ER

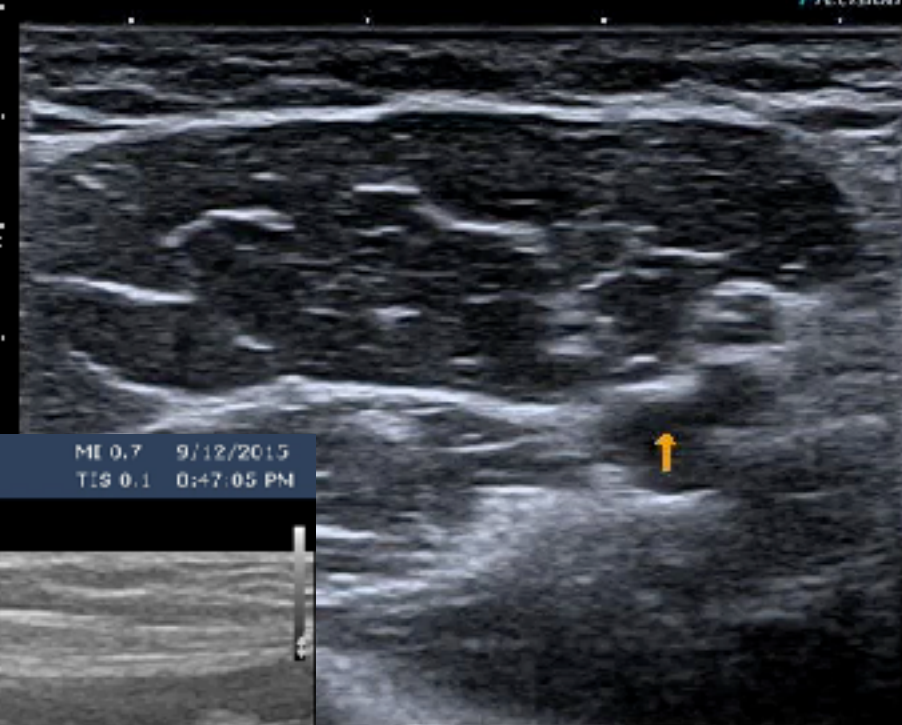
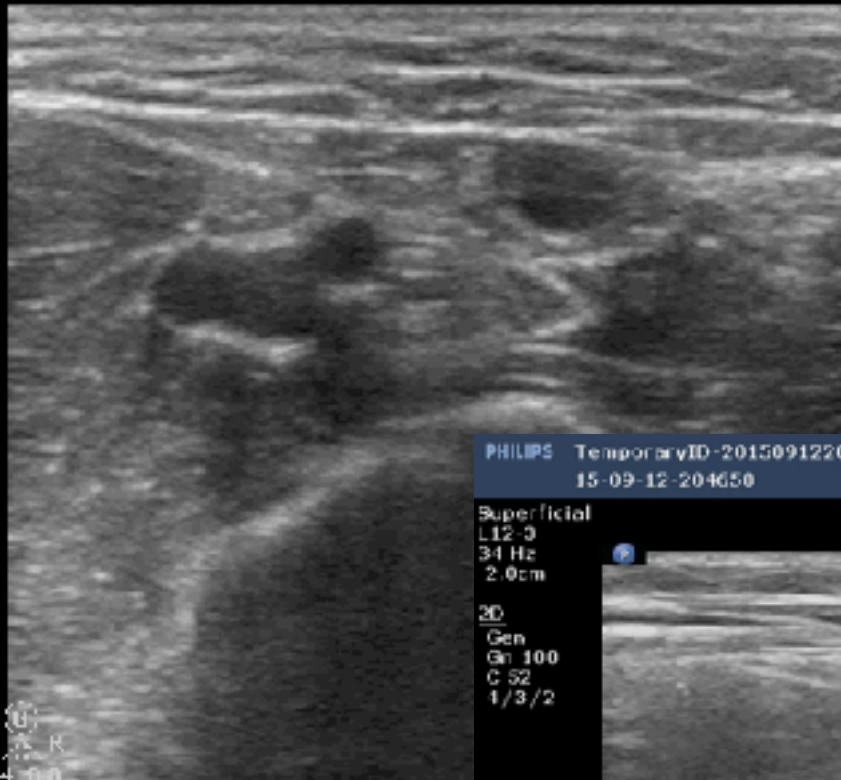
TIS 0.1 5:29:12 PM

Garden Hospital

MSK 3

3085

Precision



PHILIPS TemporaryID-20150912204658

MI 0.7 9/12/2015

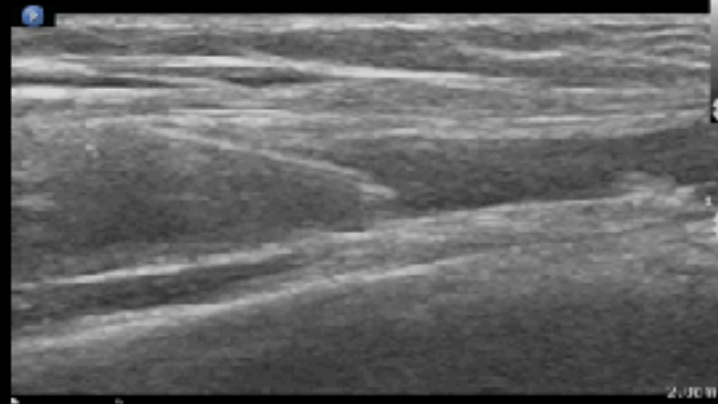
15-09-12-204650

SKH ER

TIS 0.1 0:47:05 PM

Superficial
L12-0
34 Hz
2.0cm

2D
Gen
Gn 100
C 52
1/3/2



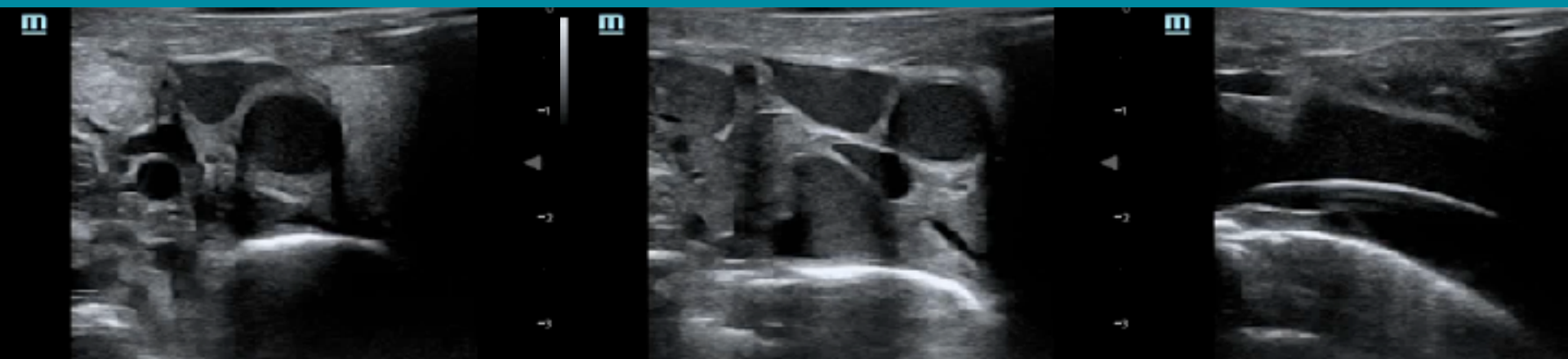


US-guided PICC

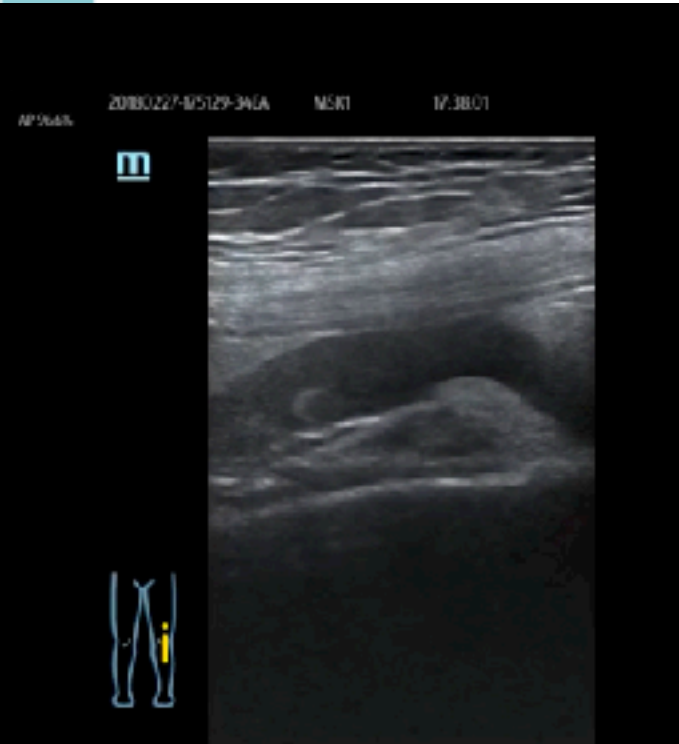




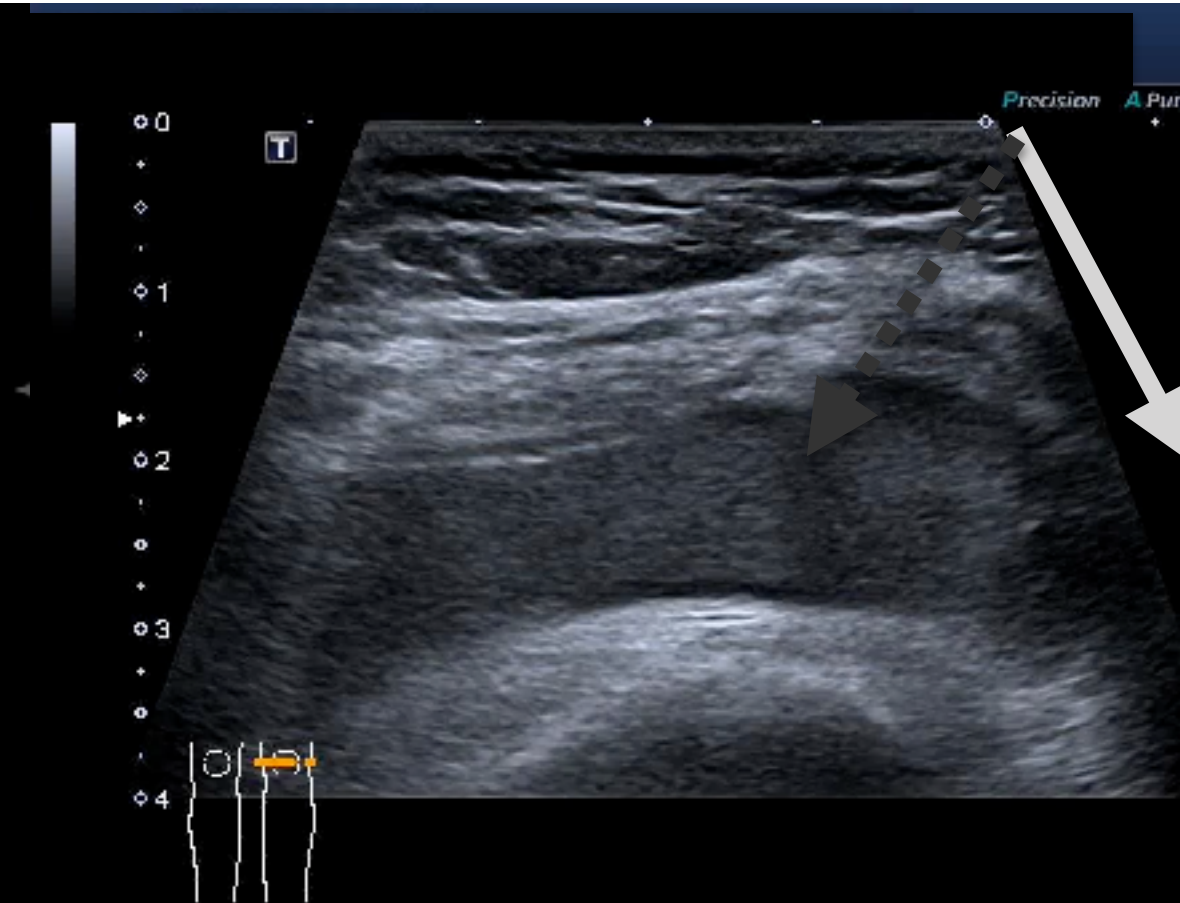
US-guided PICC



Joint effusion & aspiration



膝關節縱向掃描



Suprapatellar / lat to med



Spinal process

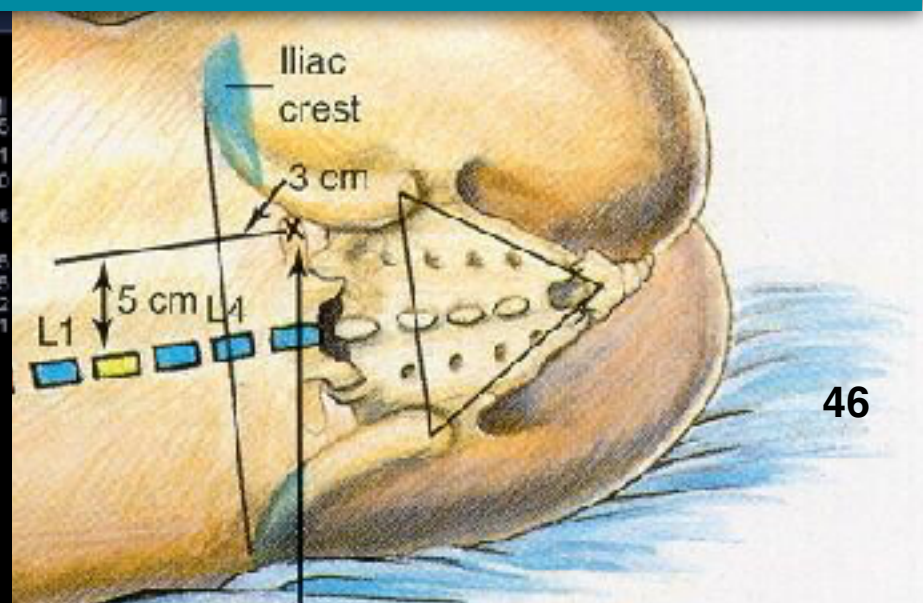


Lamina

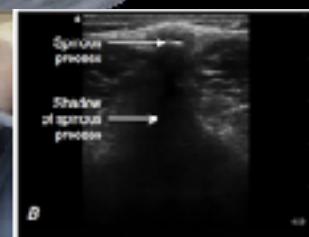
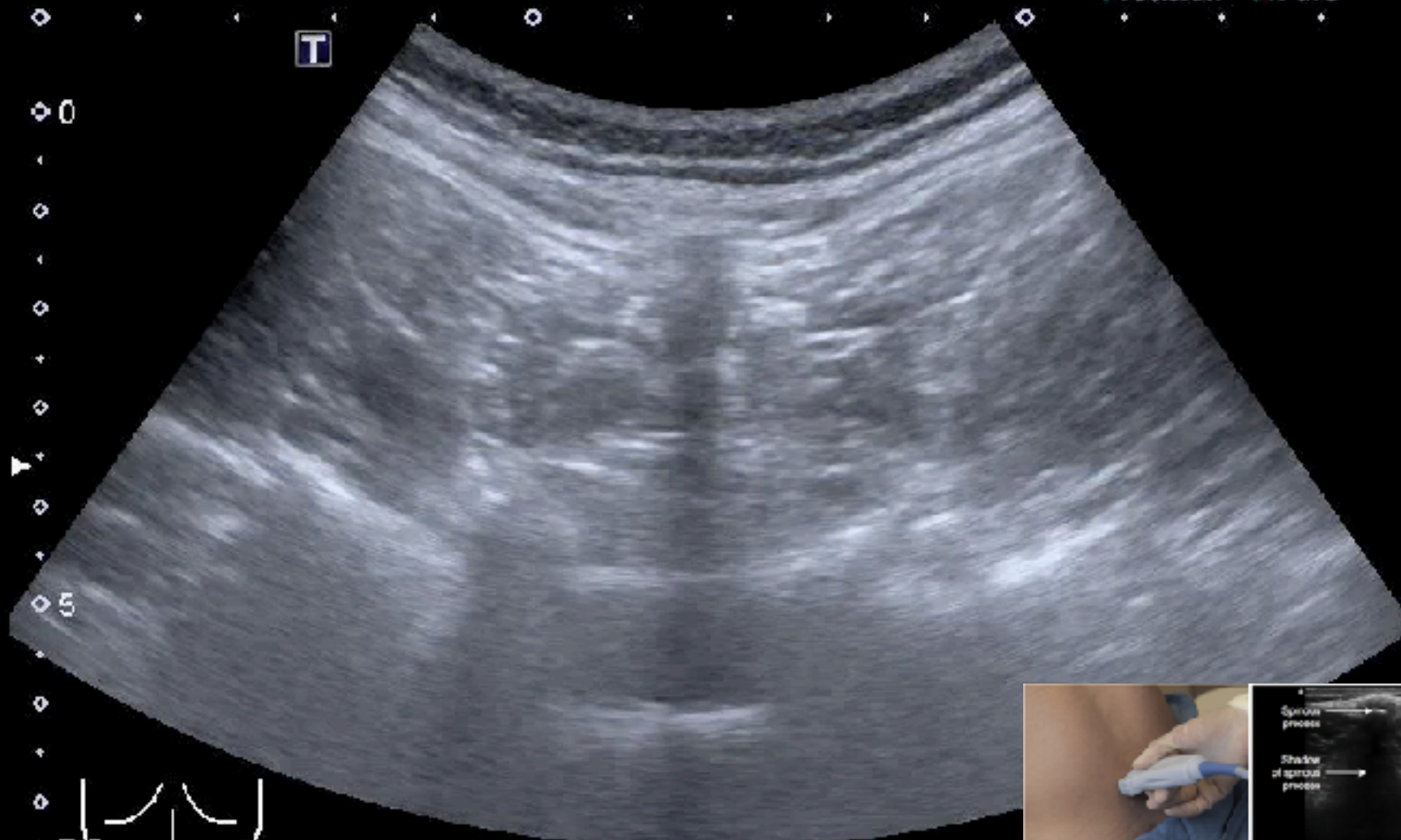


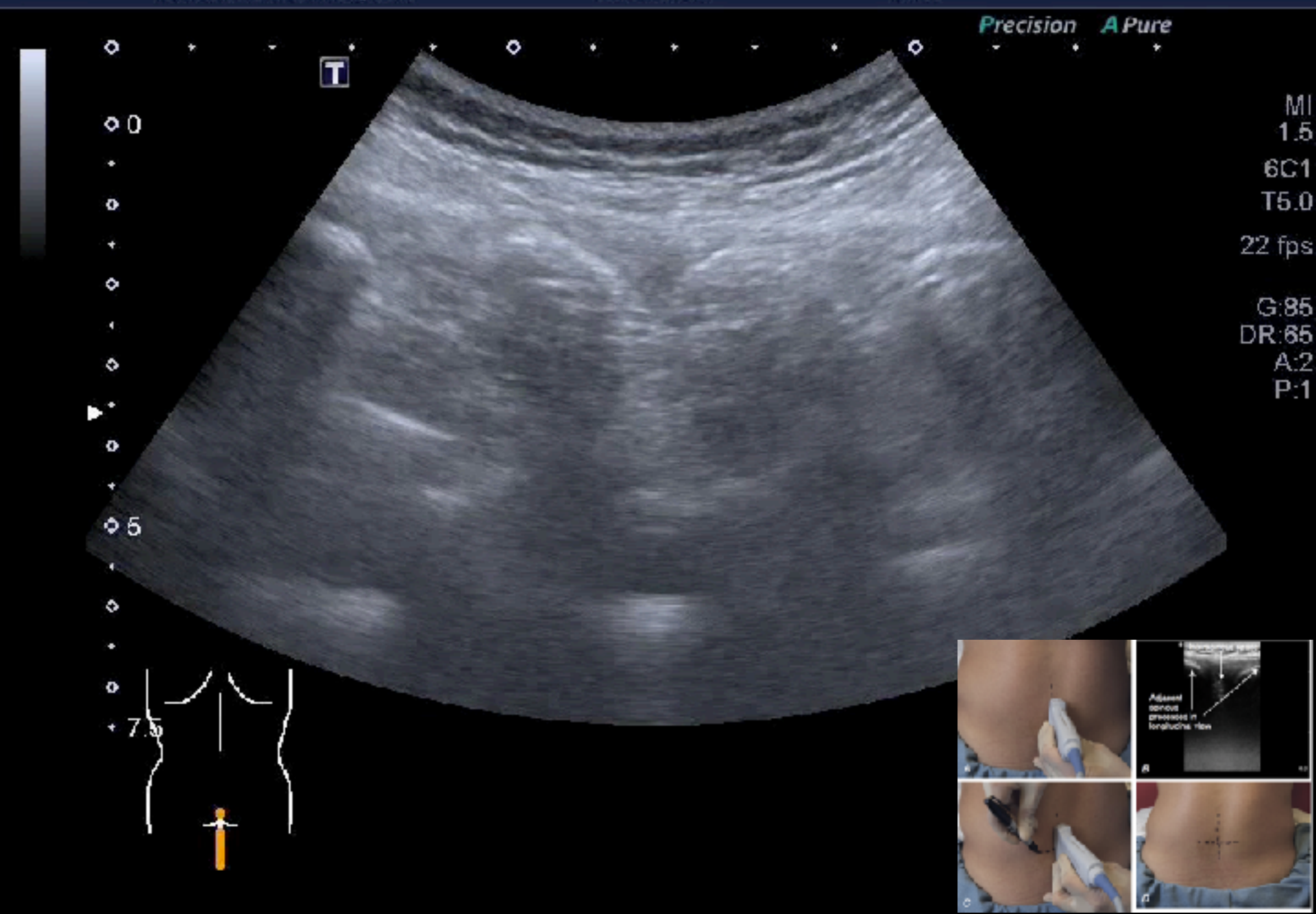
Transverse process

Lumbar puncture



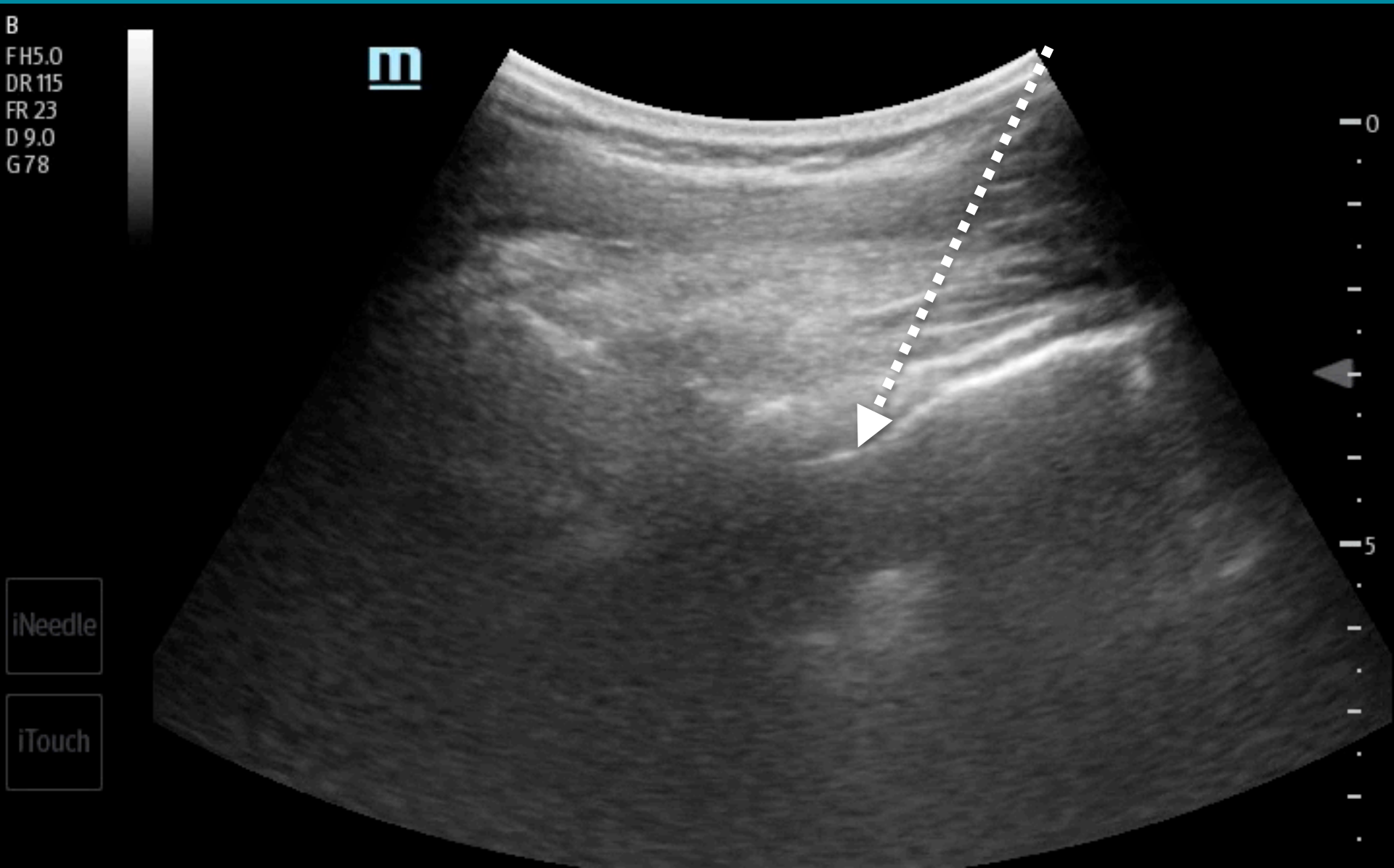
Precision A Pure





71M, Suspect CNS infection

Failed CSF attempts



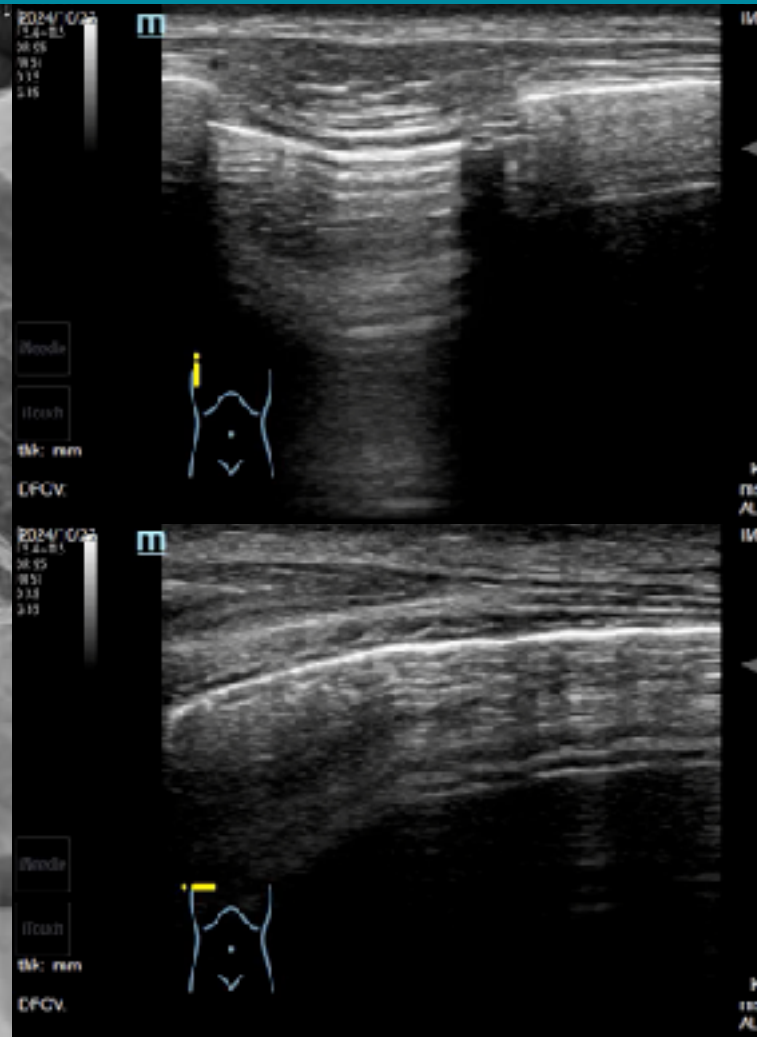
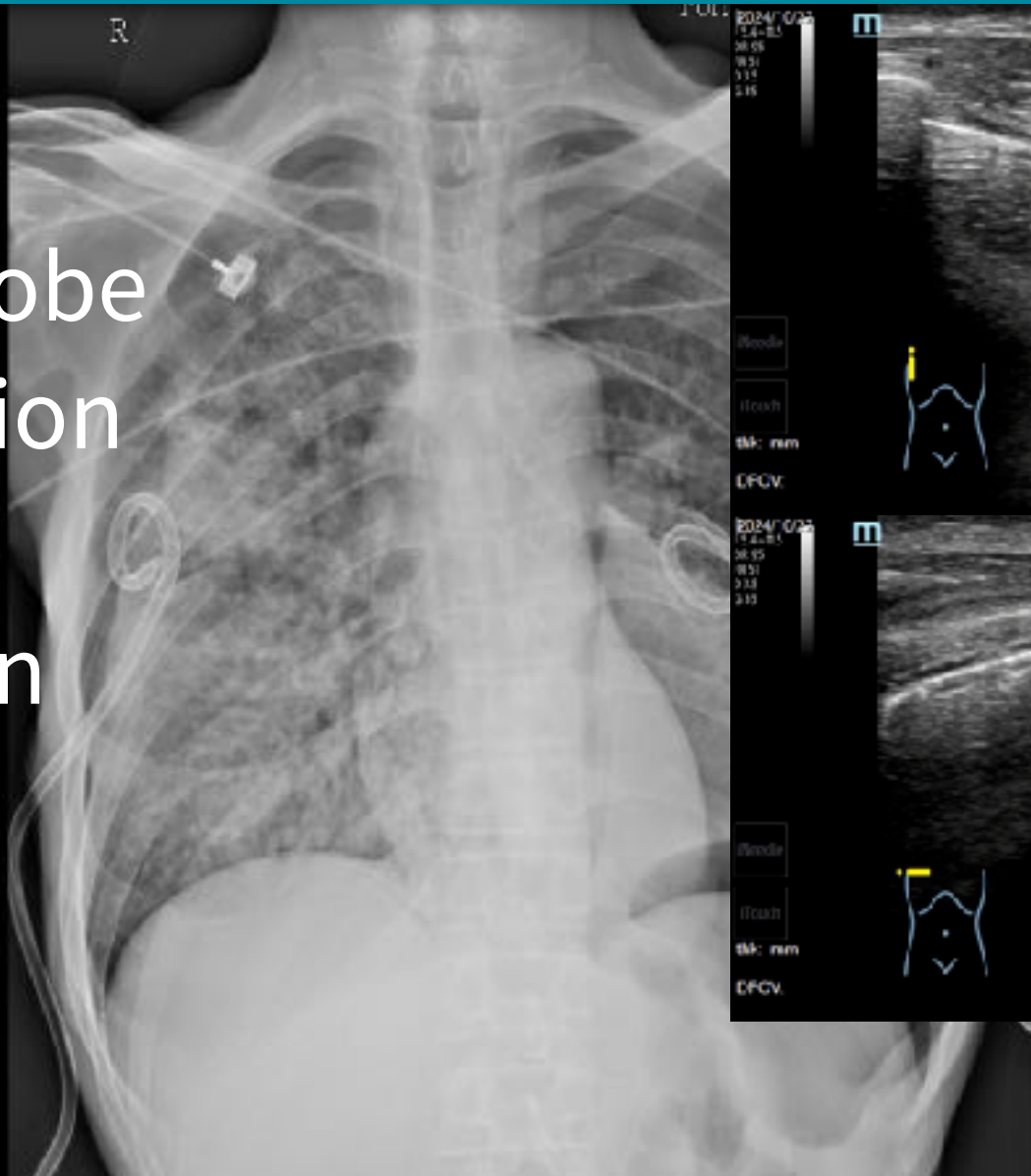
59M, productive cough & SOB for 1wk



Post pigtail drainage

PID:
ACC:
2024/10/22
10:24:25

Linear probe
Localization
Depth
Expansion



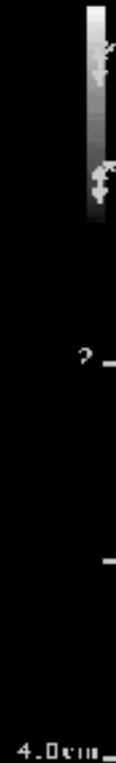
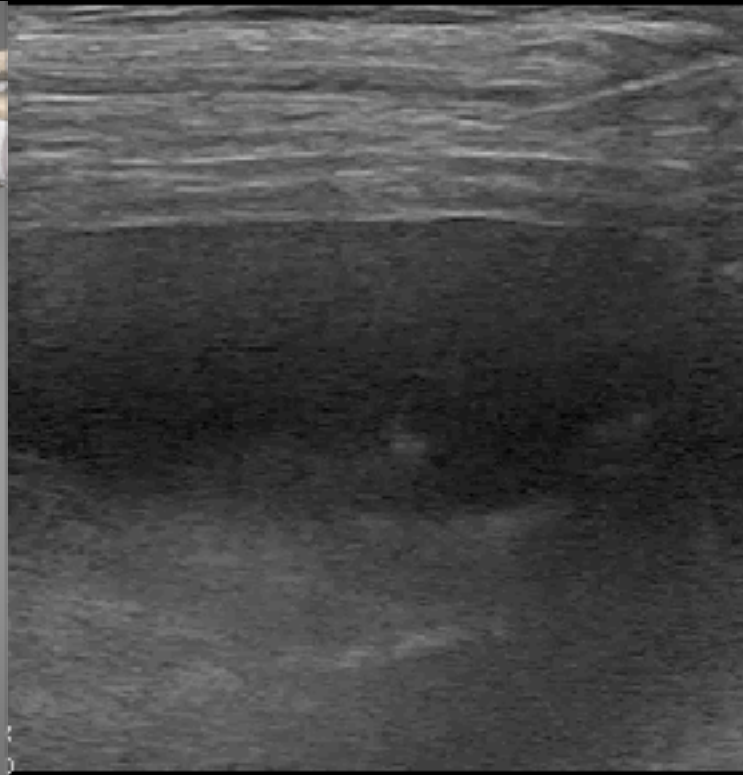
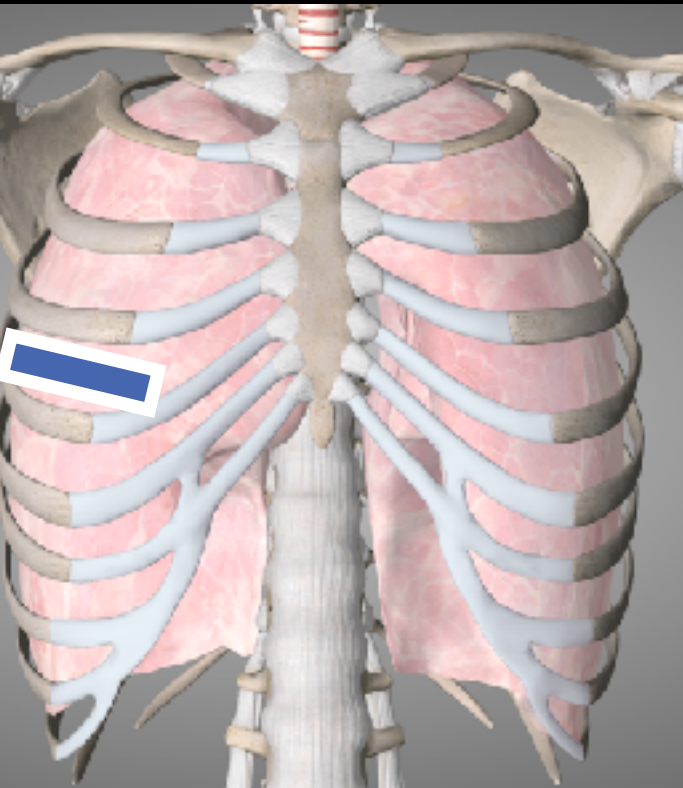
KV: 80

AP

In-plane drainage



SKH-EUTC©ChenKC



Catheter insertion

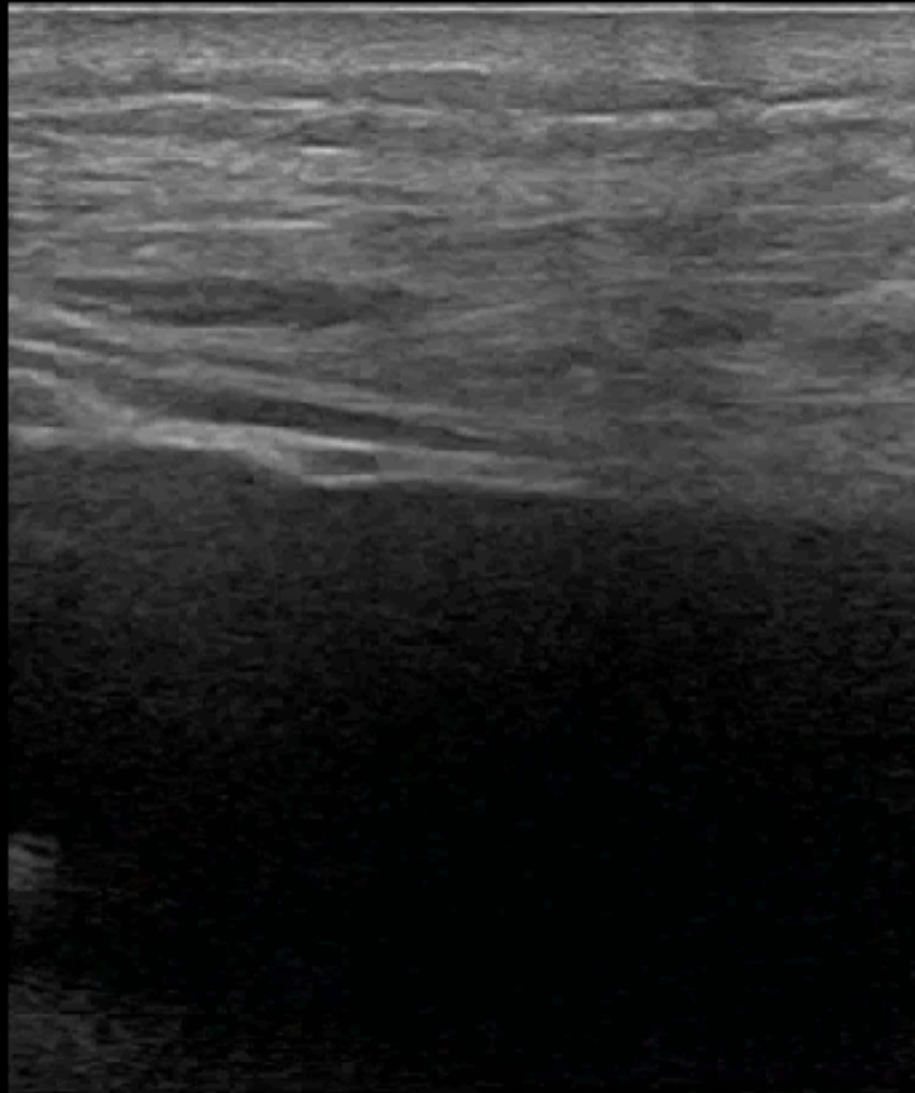
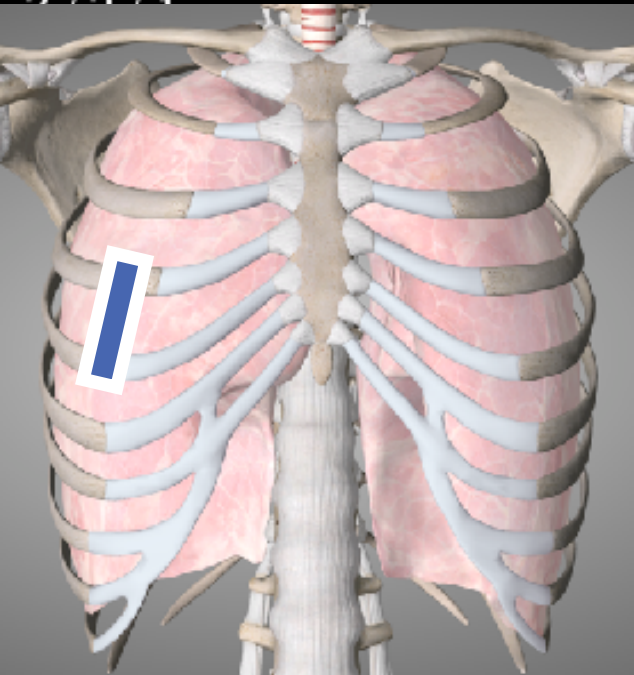
Off-plane drainage



Superficial
L12-3
43 Hz
4.5cm

P

2D
Res
Gn 100
C 56
2/2/1



4.5cm

61M, Cirrhosis & massive ascites

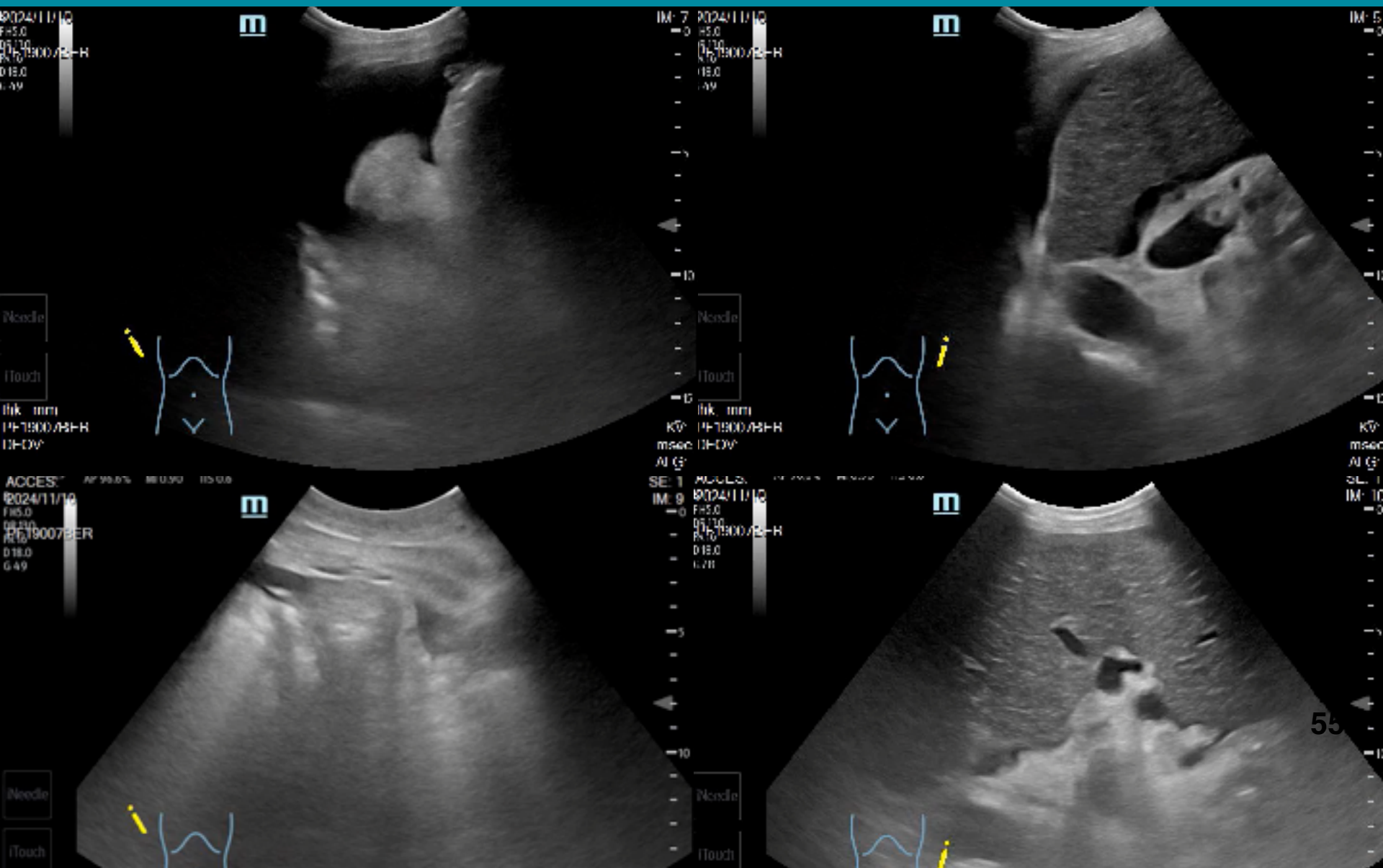
Find best location

Avoid bowel & vessels

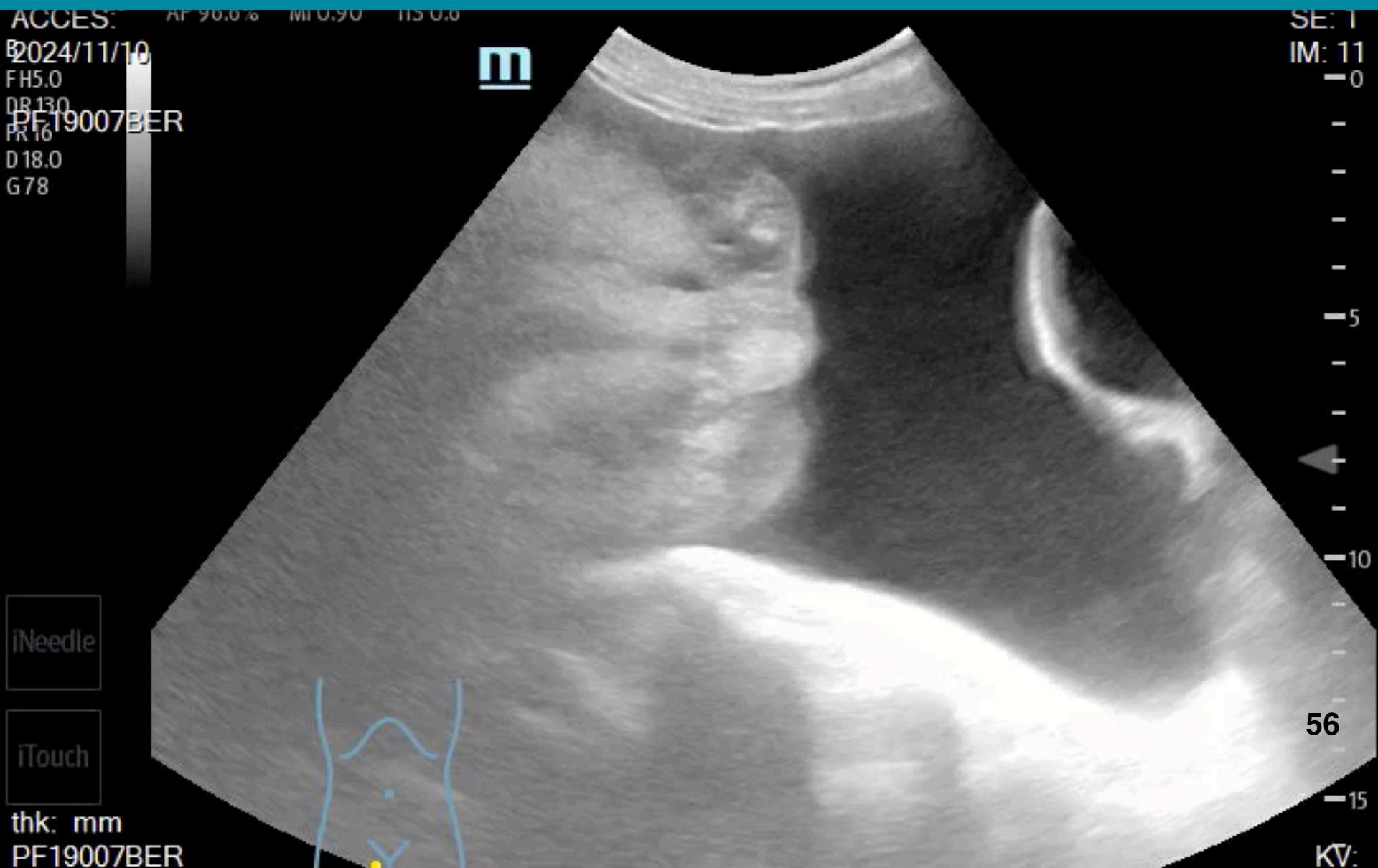


寬廣的空間適合【定位】更是絕佳的【安全精進區】

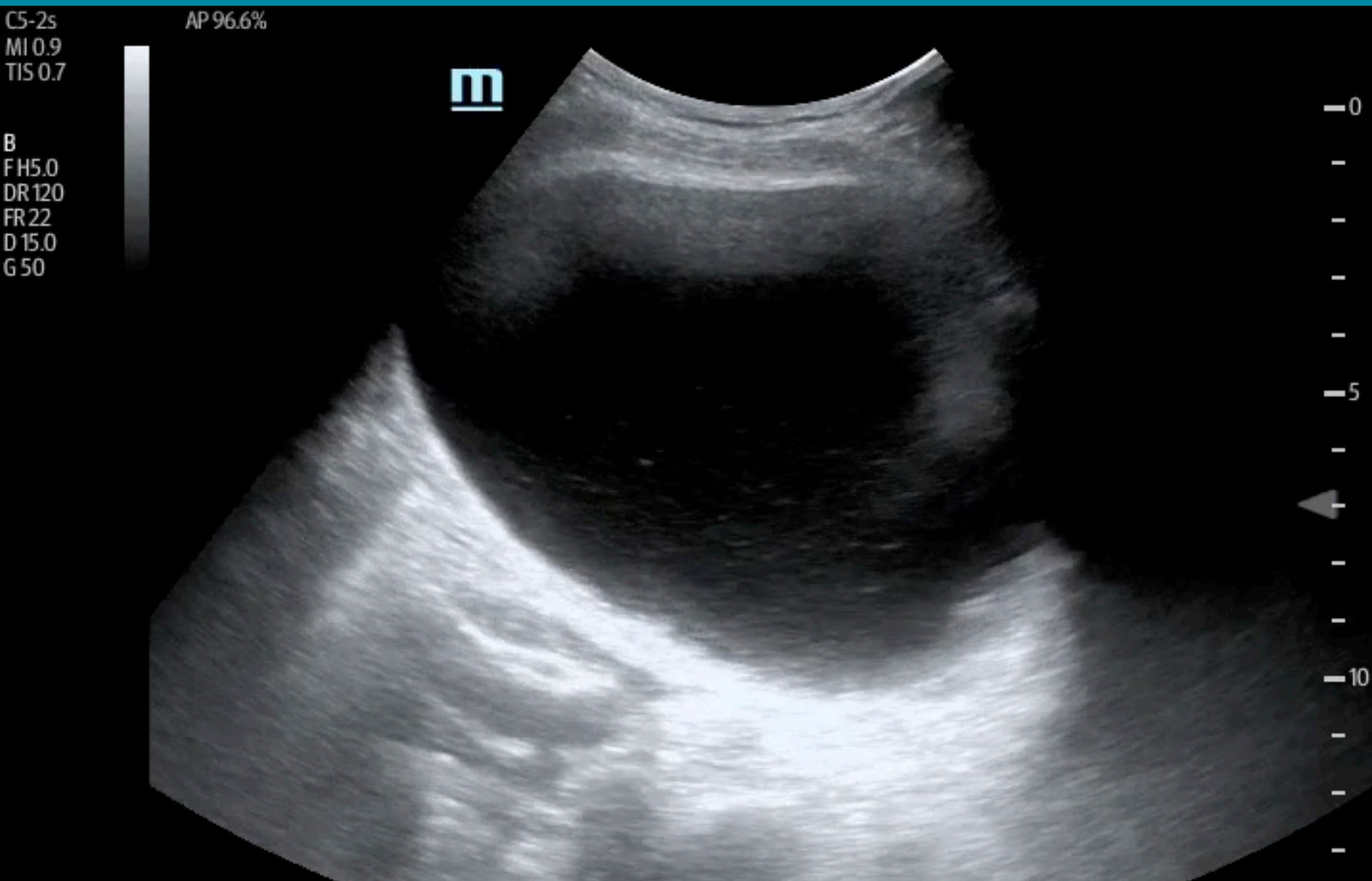
72M, cirrhosis, difficult paracentesis



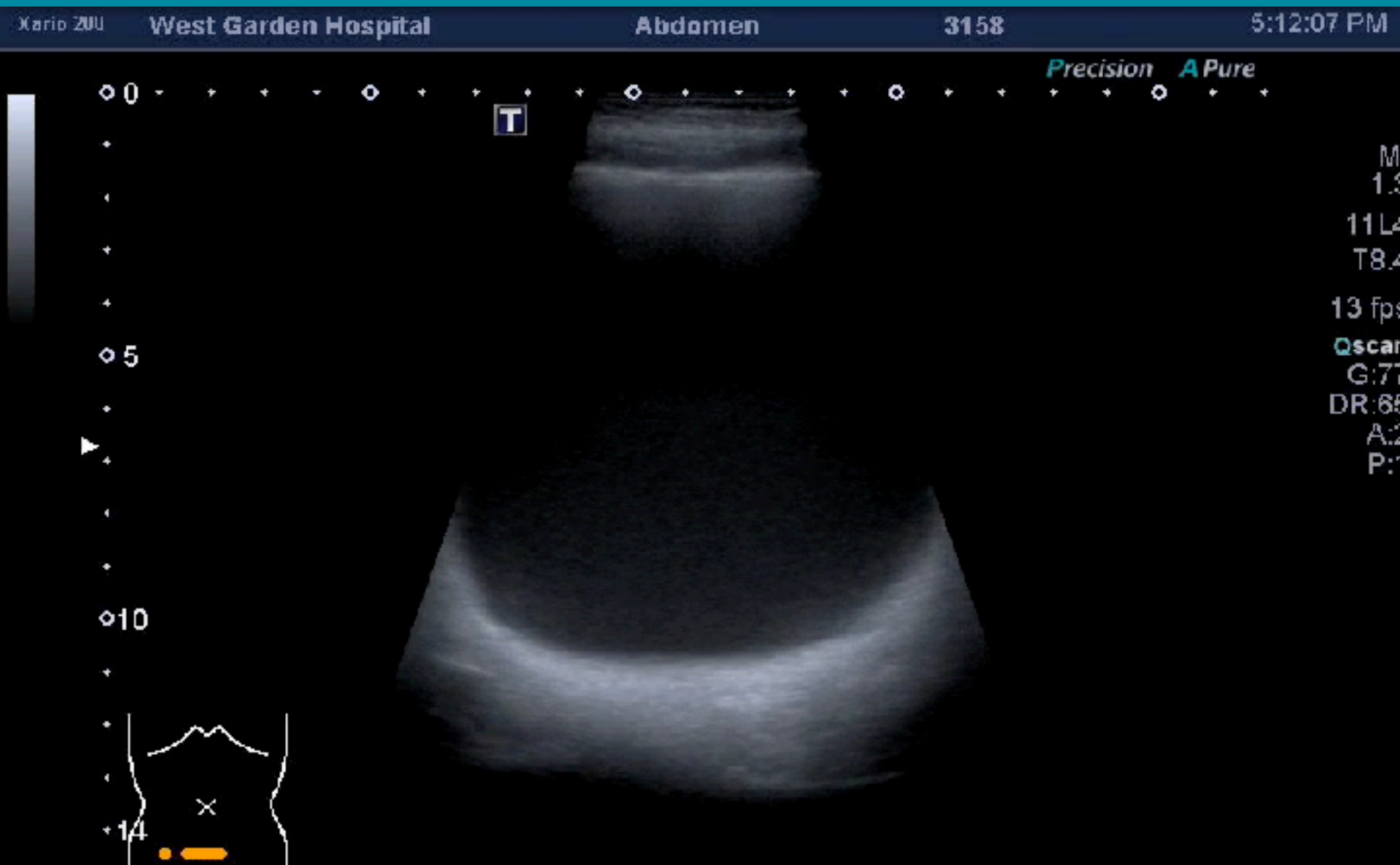
Suprapubic paracentesis 2000ml



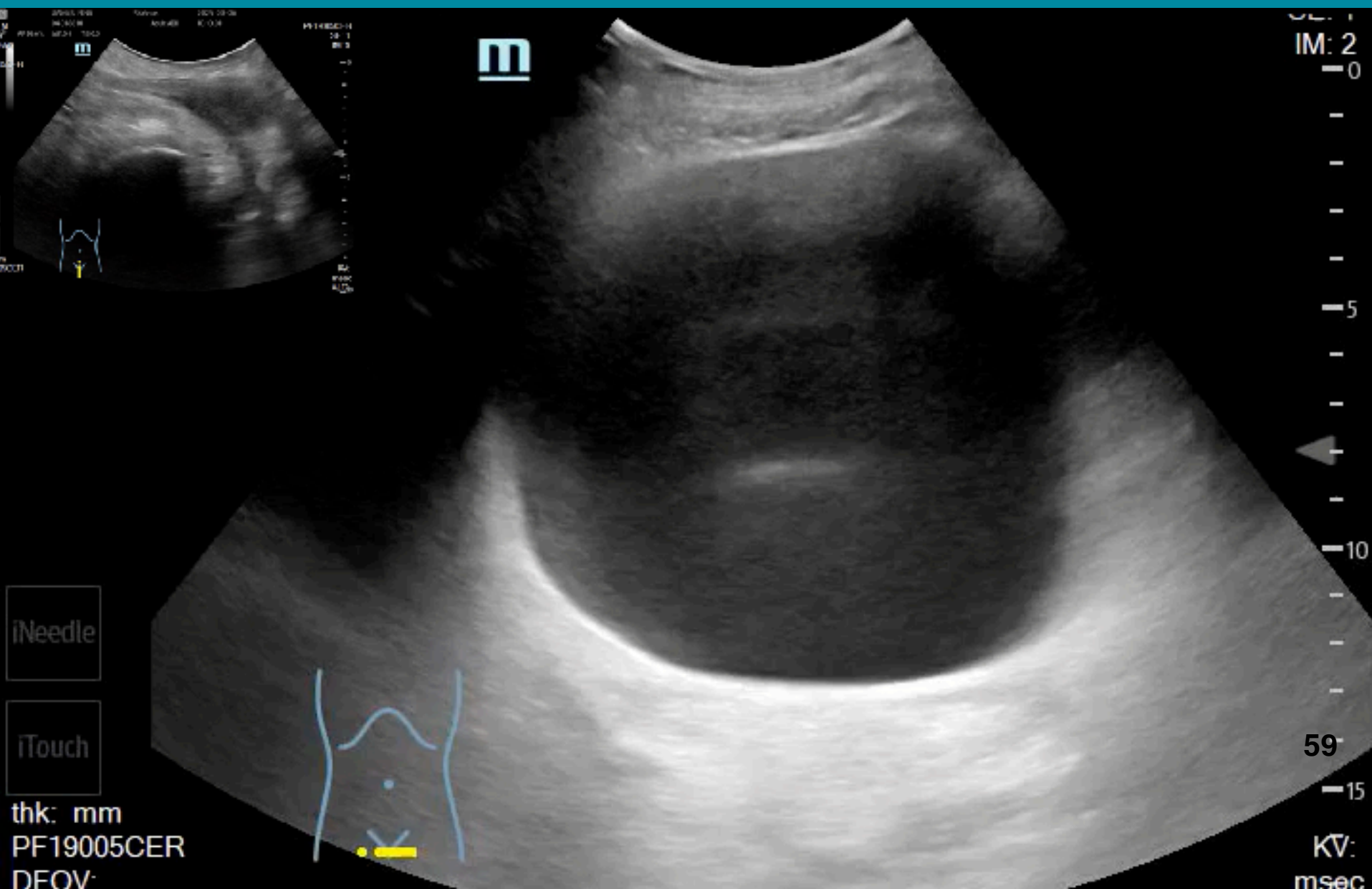
66M, AUR due to urethral stone obstruction



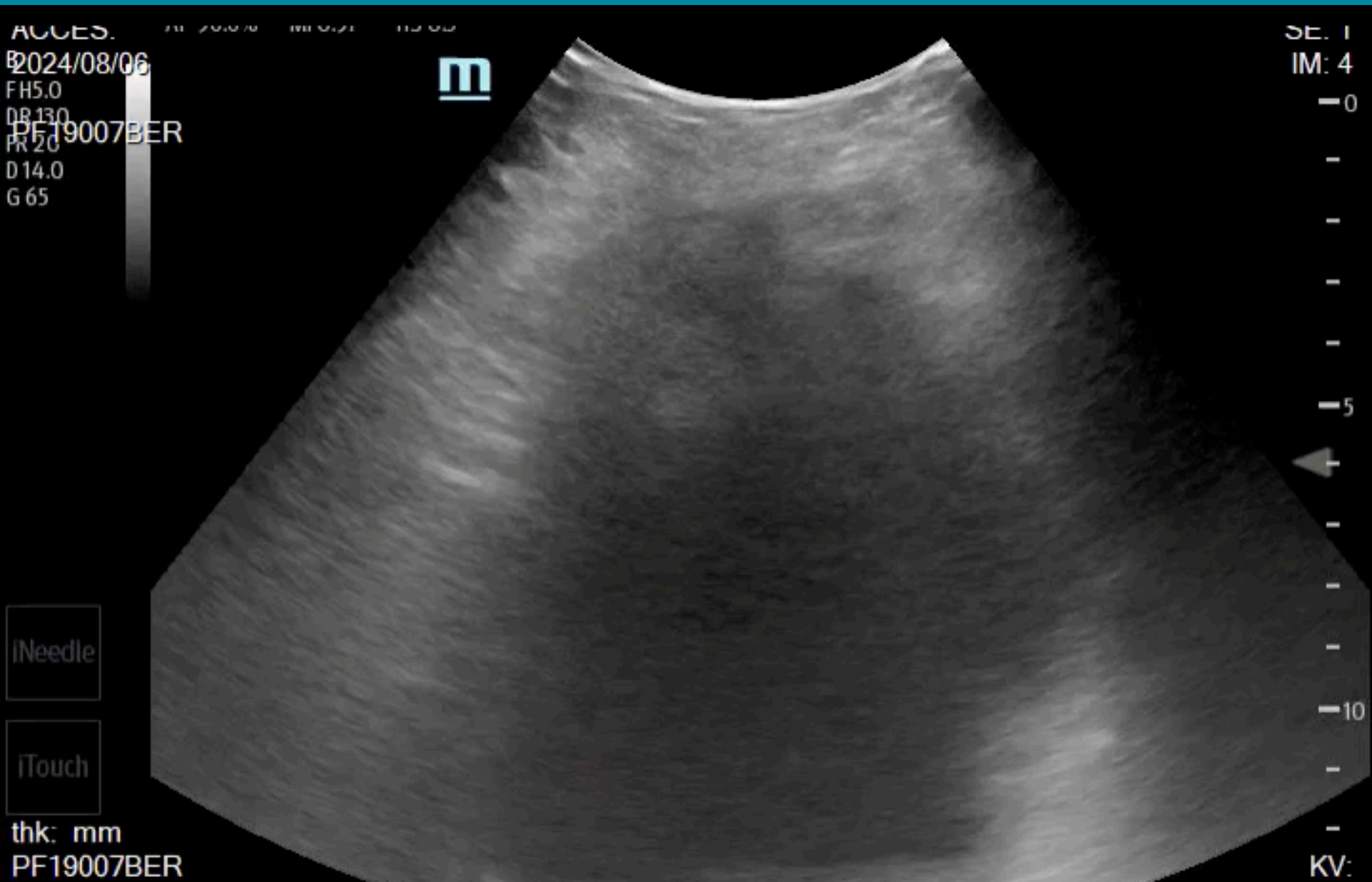
76M, AUR & urethral stricture



56M, SZ, fever & unable to void , 尿管卡住

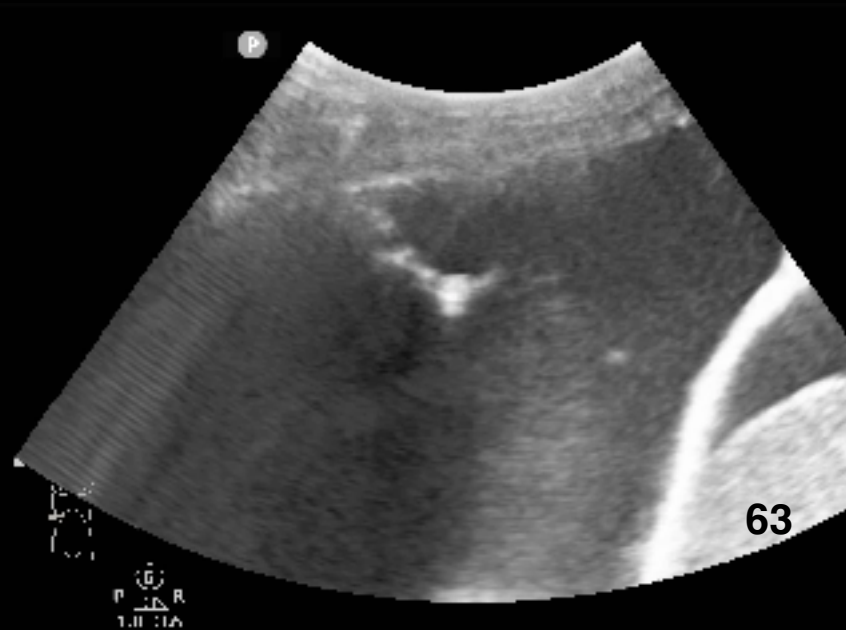
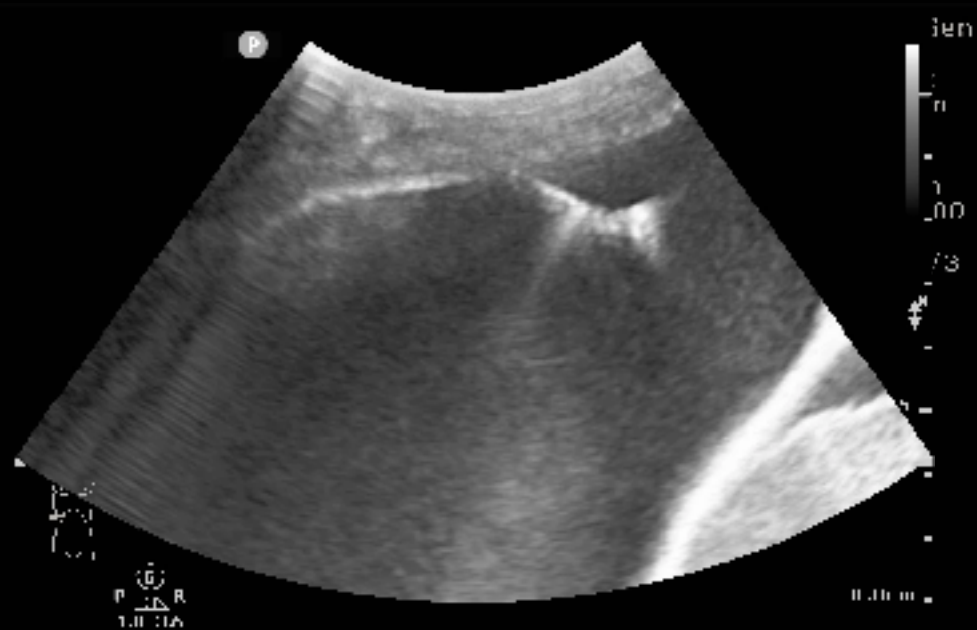
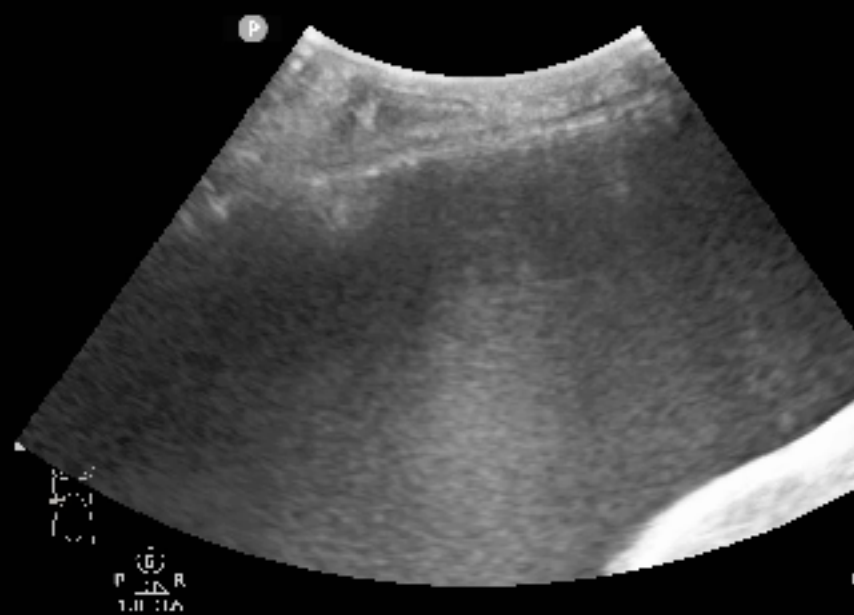


Suprapubic drainage (8Fr pigtail)



53M, Massive PLE





Pigtail with guidewire for massive PLE

Rescue plane

Informed consent

Coagulation profiles

Monitor

Pre-scan

Positioning

Preparation

Pain control / PSA

Guiding needle

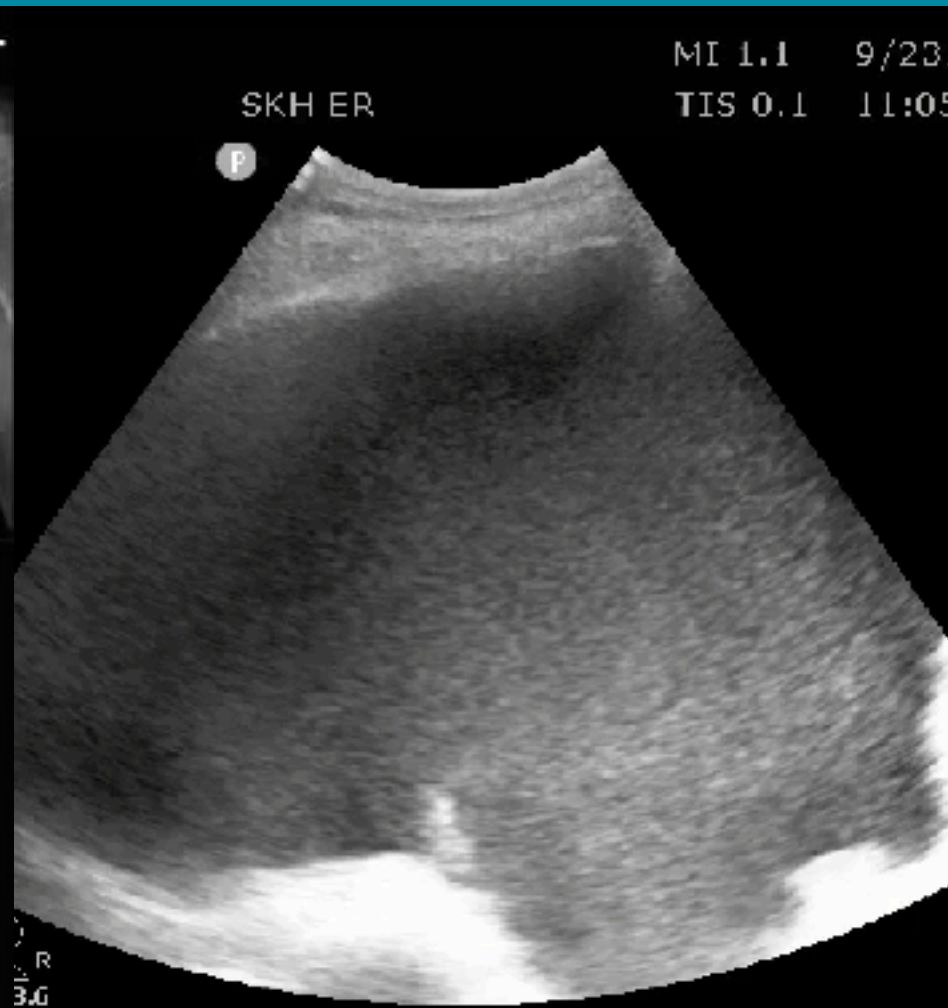
Guidewire

Cut (11# blade)

Dilator

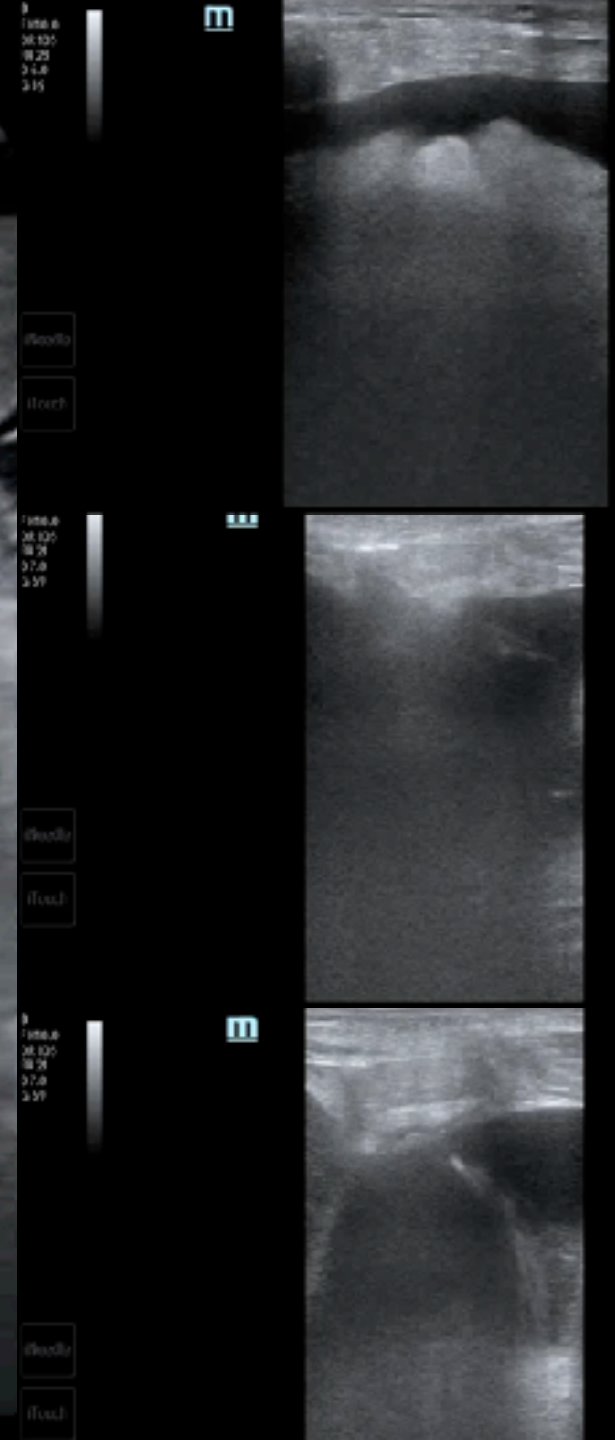
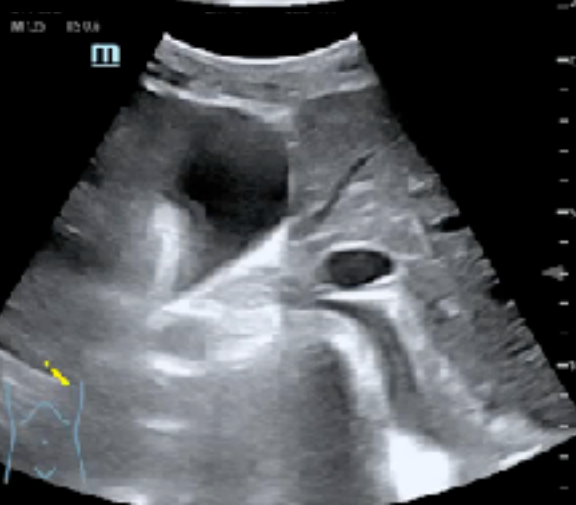
Pigtail

Confirmation



85M, AMS with shock, 外院轉入





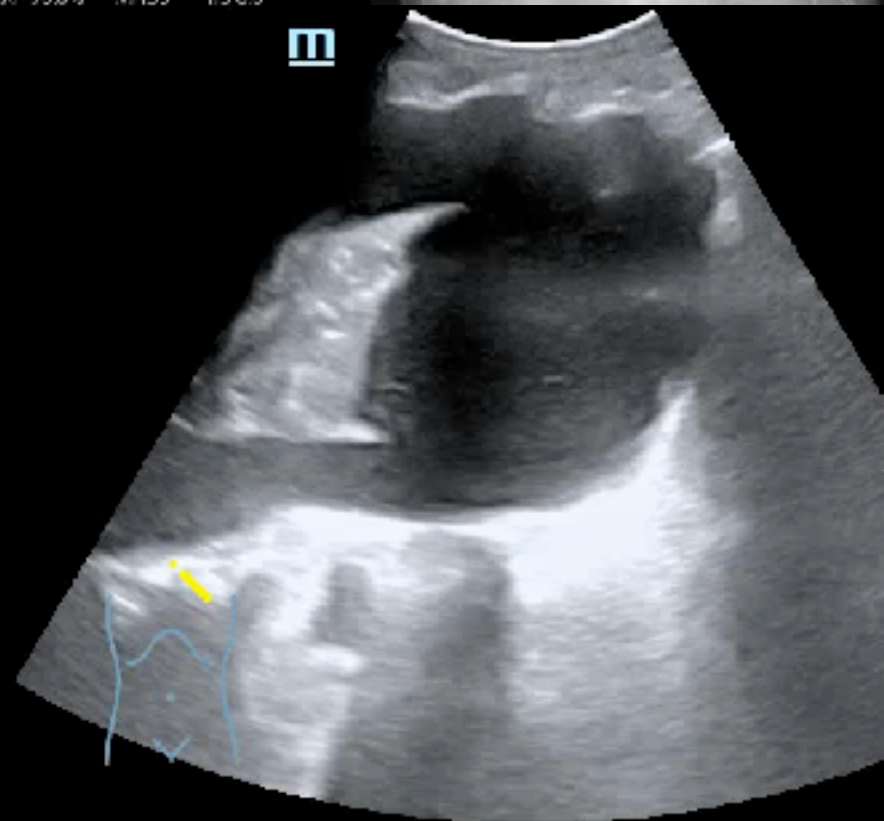
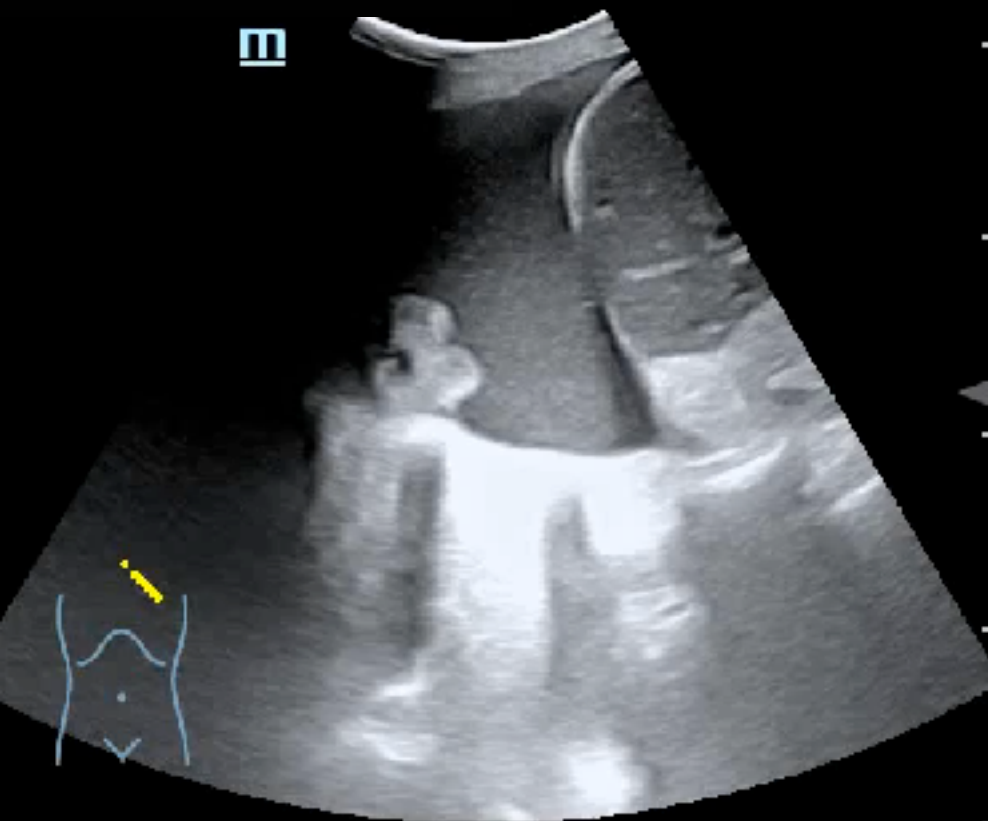


18 04 2023
23 23 58



1552

AP 95.6% M 133 T 50.6



11
5
10
15
20



個案

62F

Hx of breast cancer

4天前於急診進行
Pleural effusion
tapping 600 ml

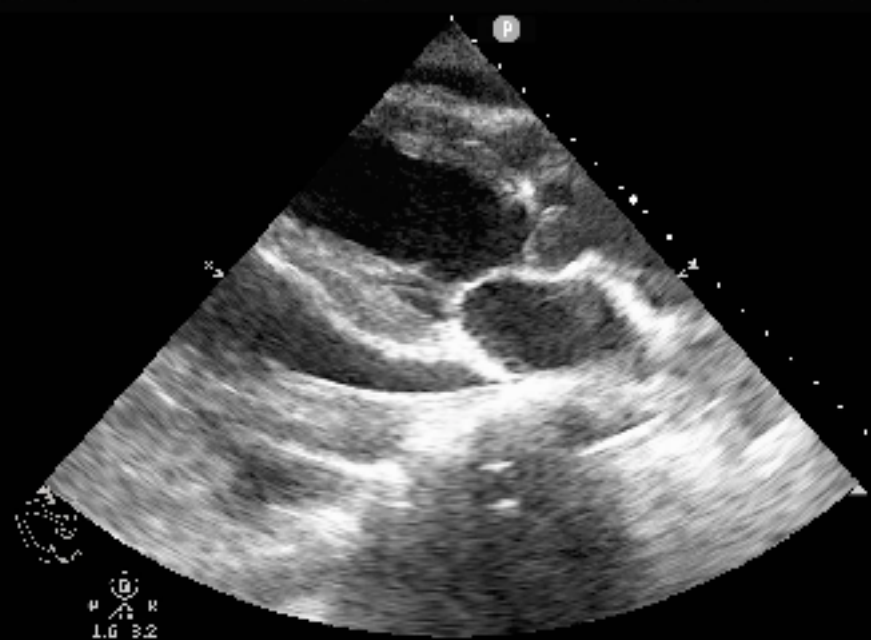
主訴:
呼吸困難 &
心博過速

4天前

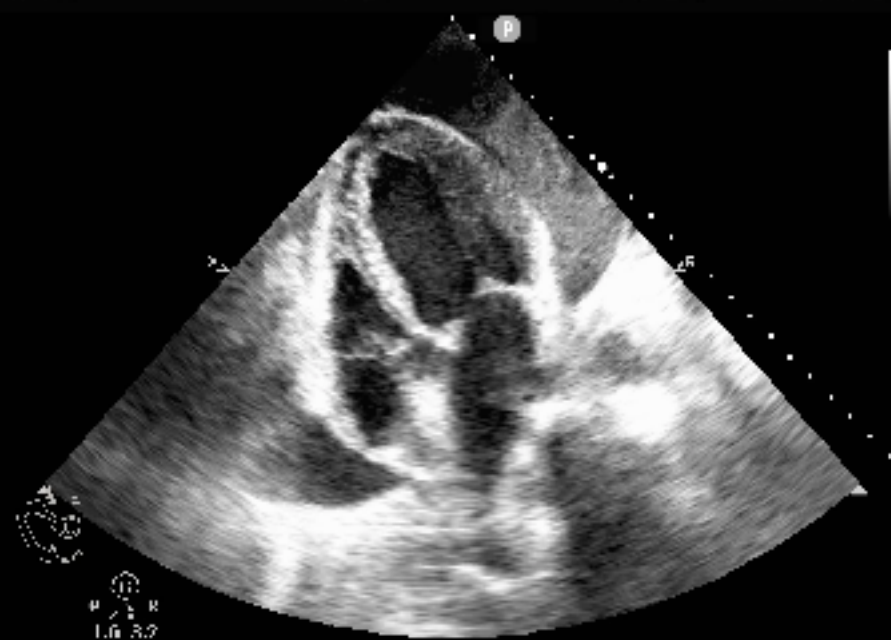
就診日



cho



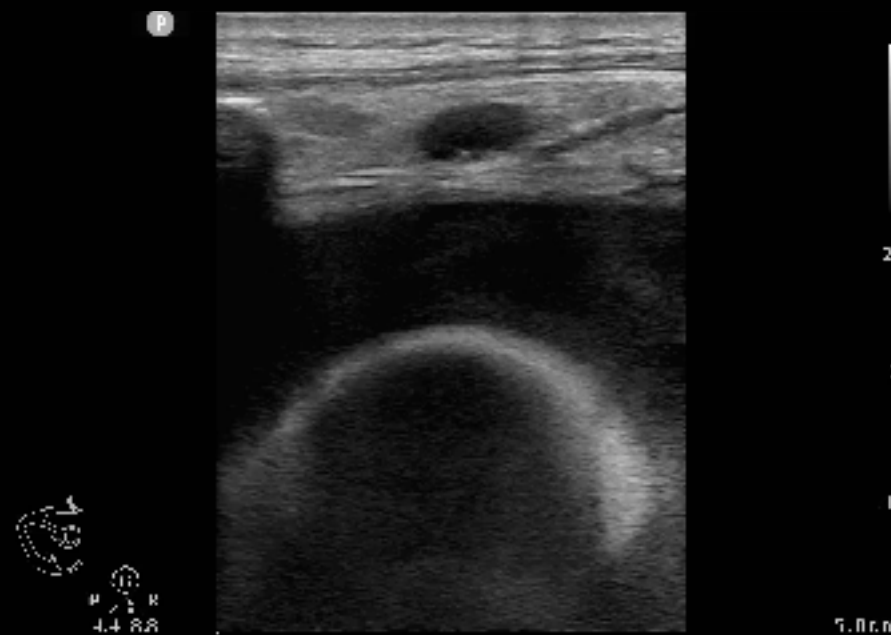
0



cho



0



5.0 cm

Step-by-step drainage

20187856

SKH ER

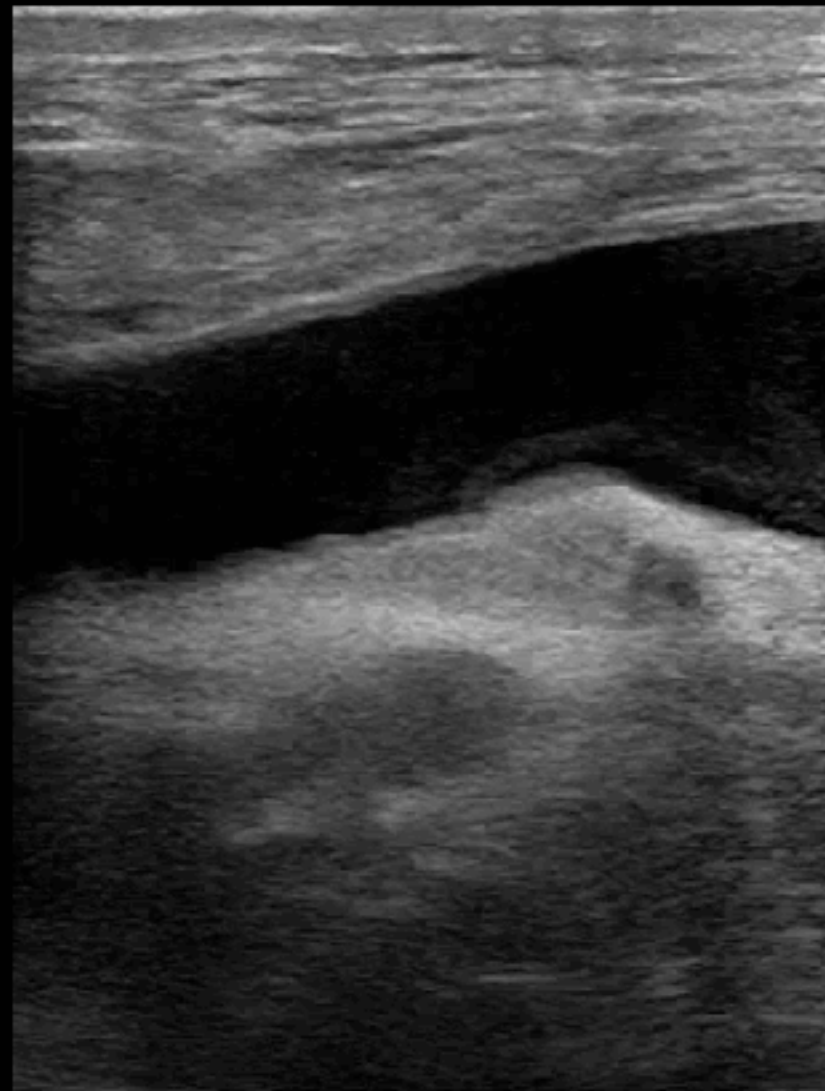
TIS 0.2 3:54:32 PM

Arterial
L12-3
34 Hz
5.0cm

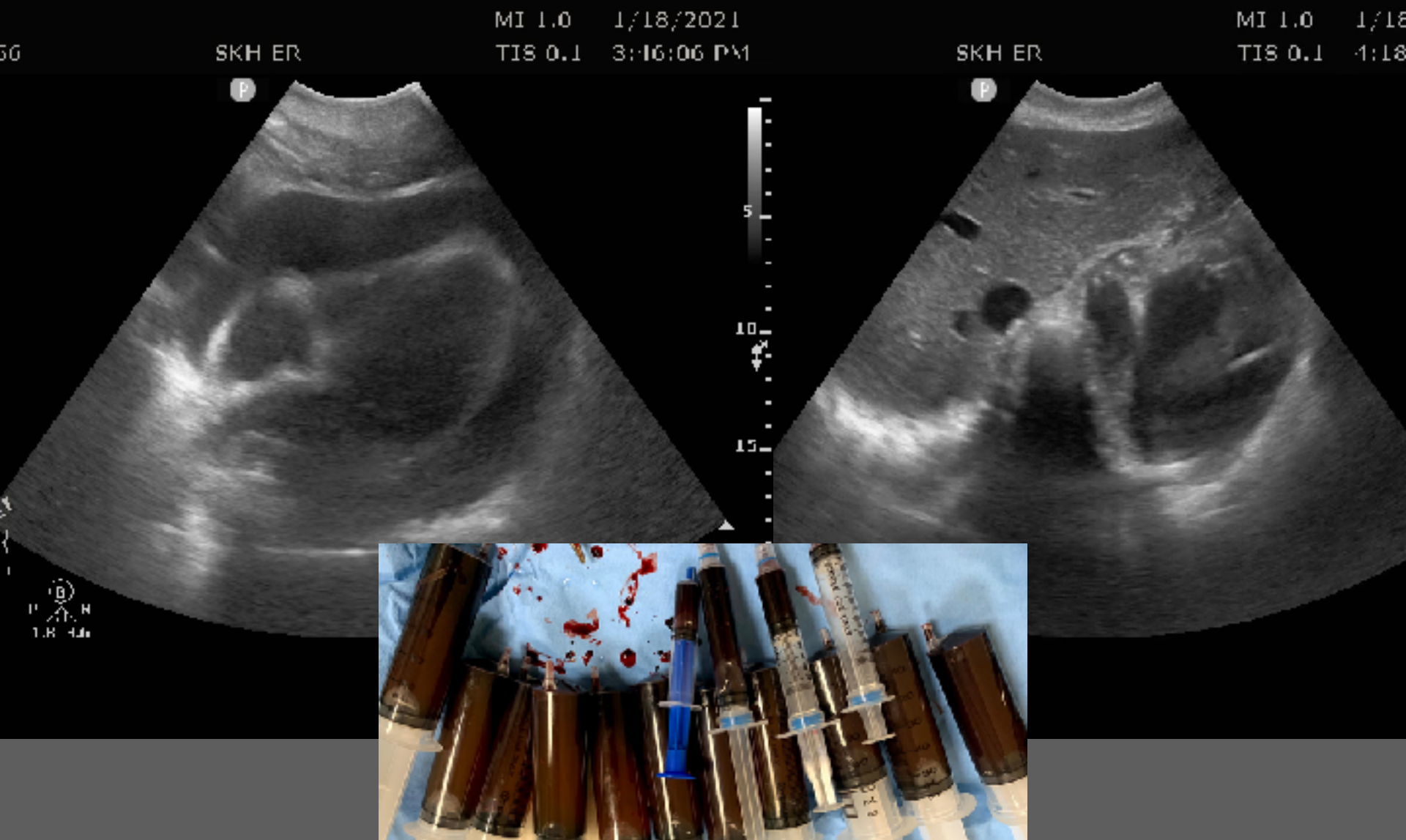
2D
HGen
Gn 66
C. 41
3/3/2



P R
1.1 8.8



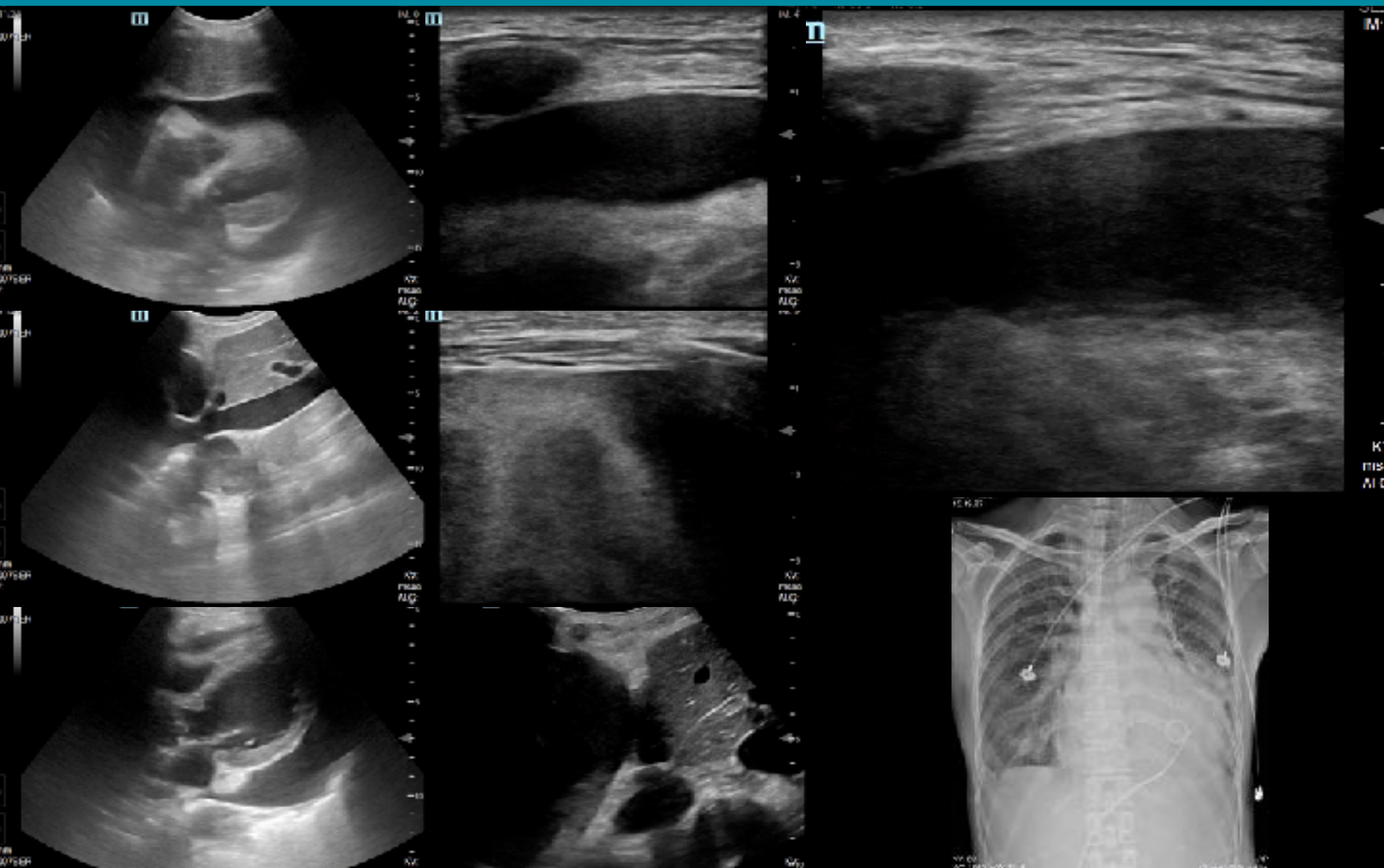
Monitor after drainage



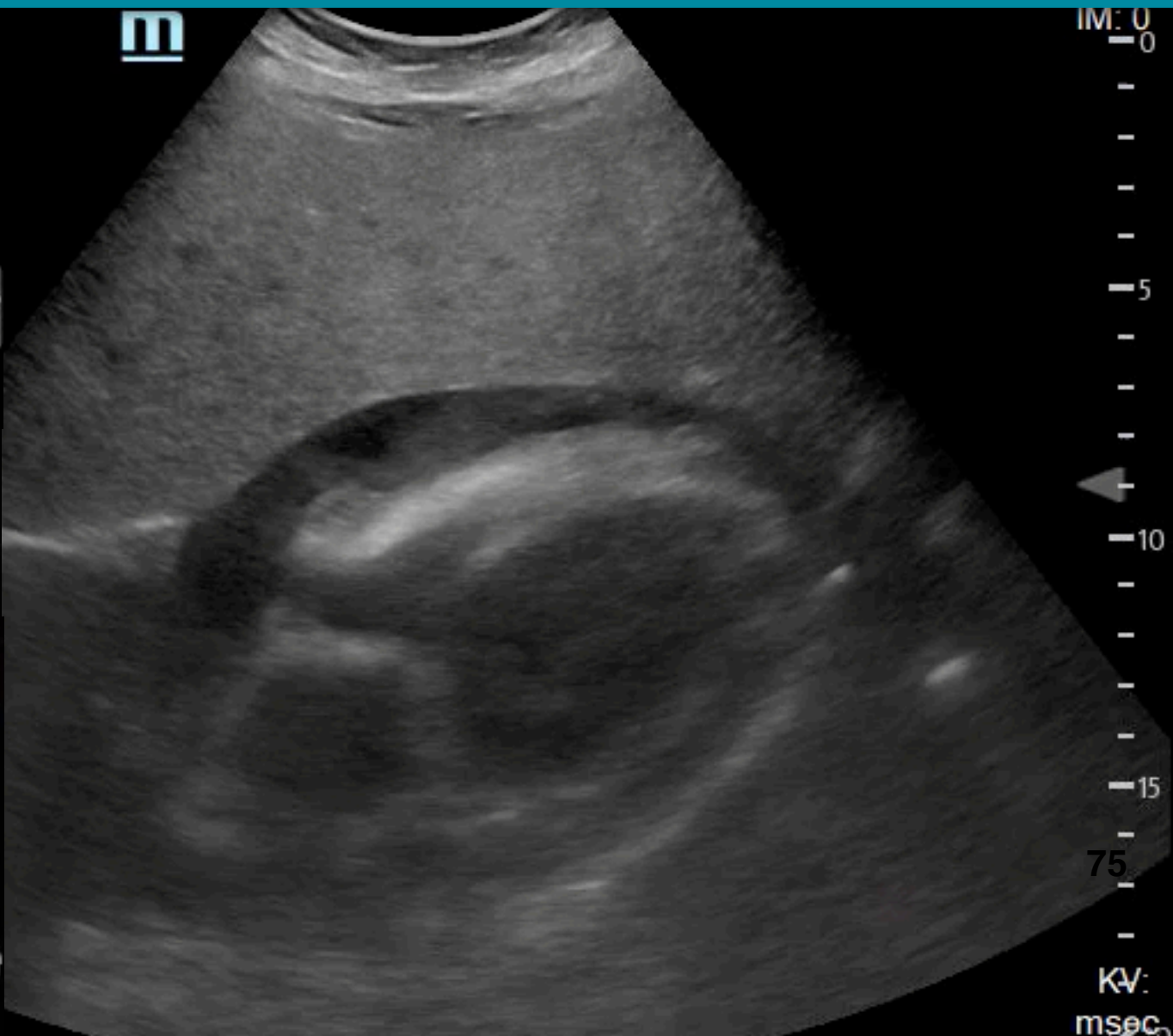
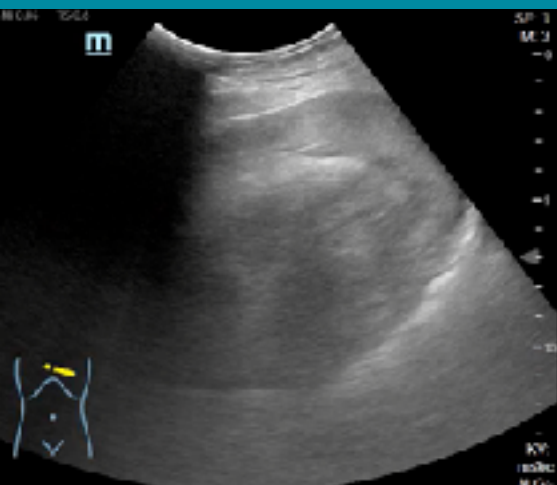
64F, SOB 2wks, referred from OPD due to L PLE



Pigtail drainage - subcostal approach



64M, 頭暈後倒地, GCS 3, BP 78/52 mmHg



14Fr pigtail with stylet (parasternal approach)

2024/11/27
FH10.0
DR 95
FR 21
D7.0
G 40

m



IM: 0

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-

.

-



-

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-

.

-5

.

-

KV:

ma:

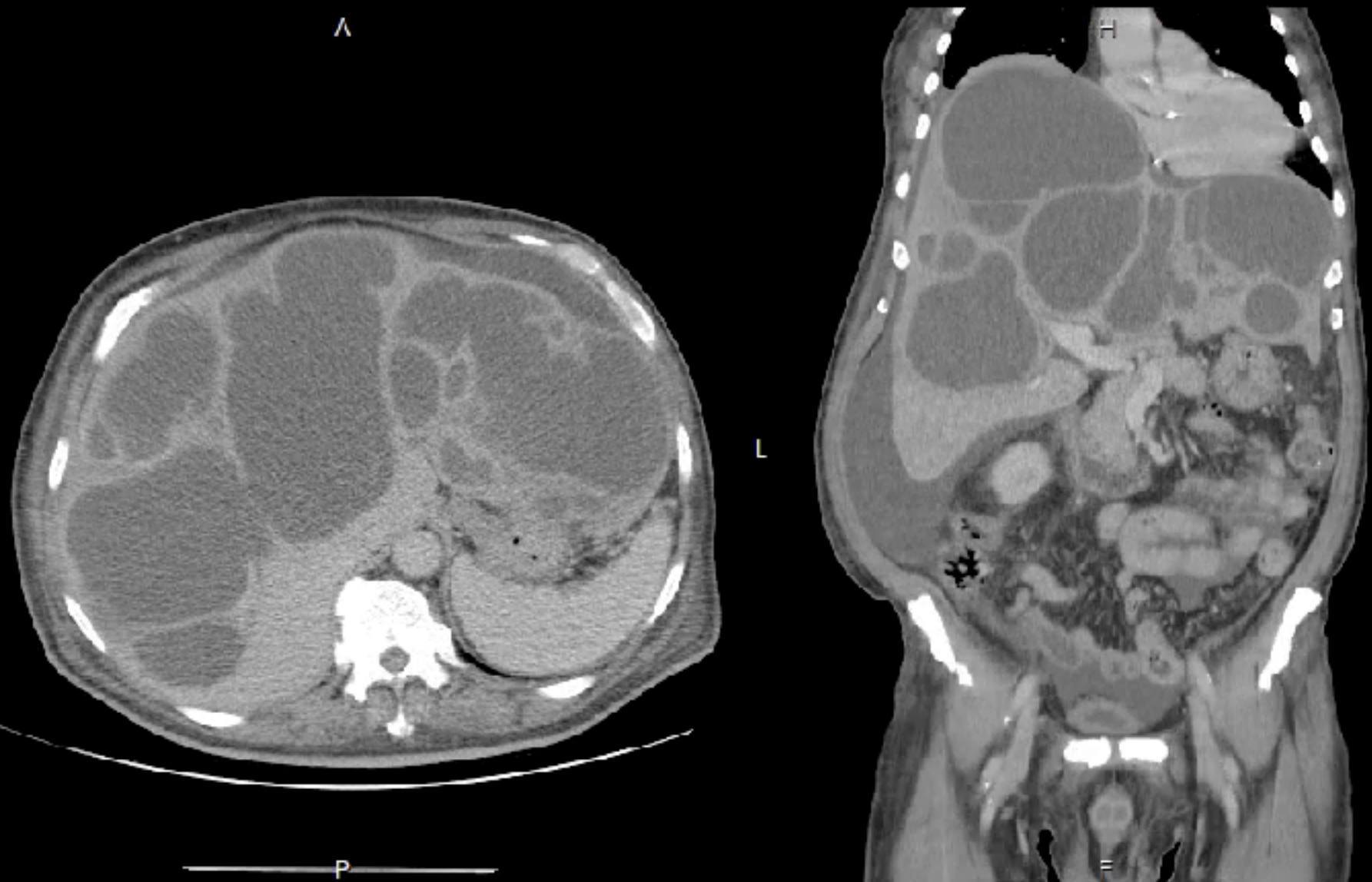
iNeedle

iTouch

thk: mm

DEOV:

64M, right abdominal pain

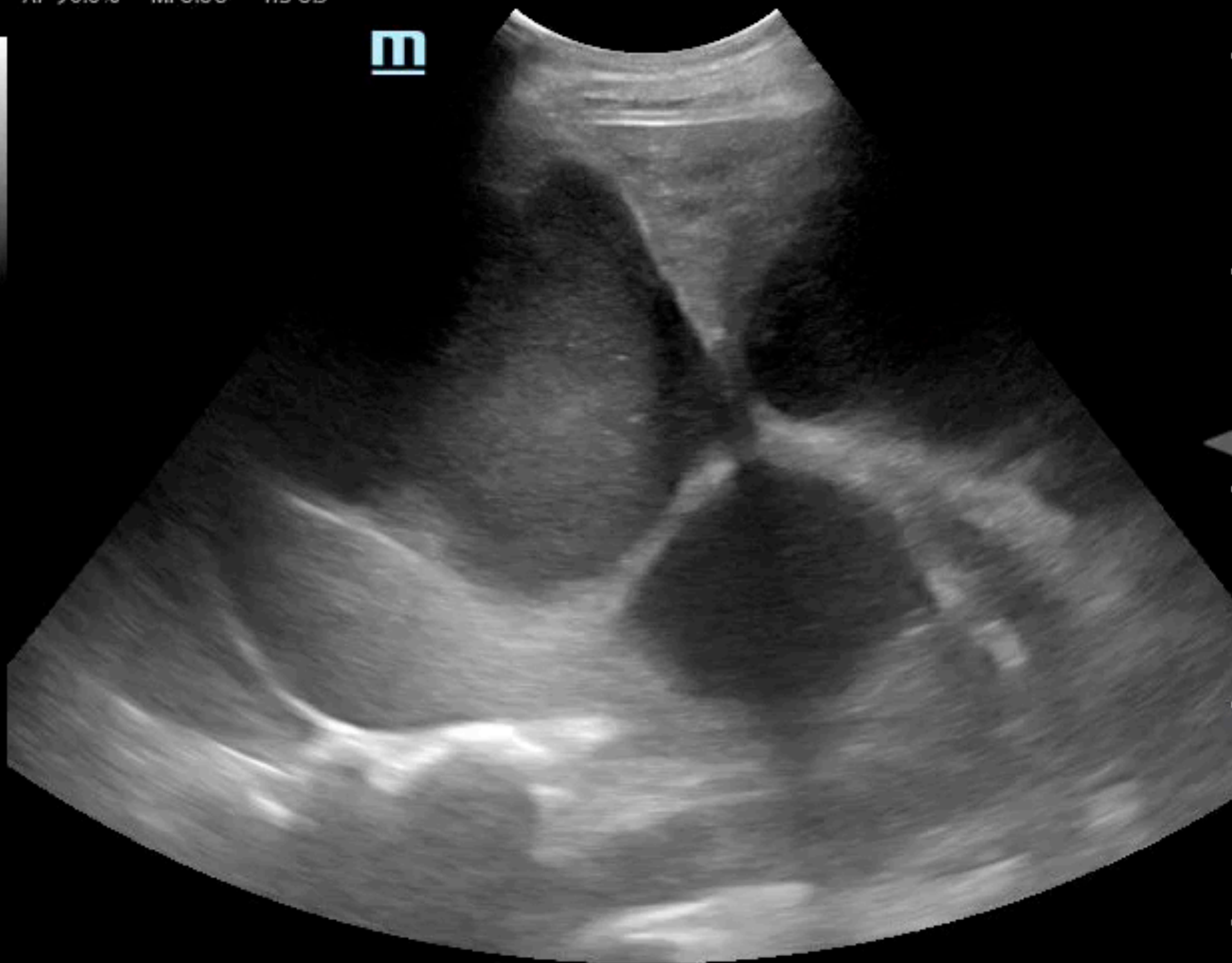




0
0
0

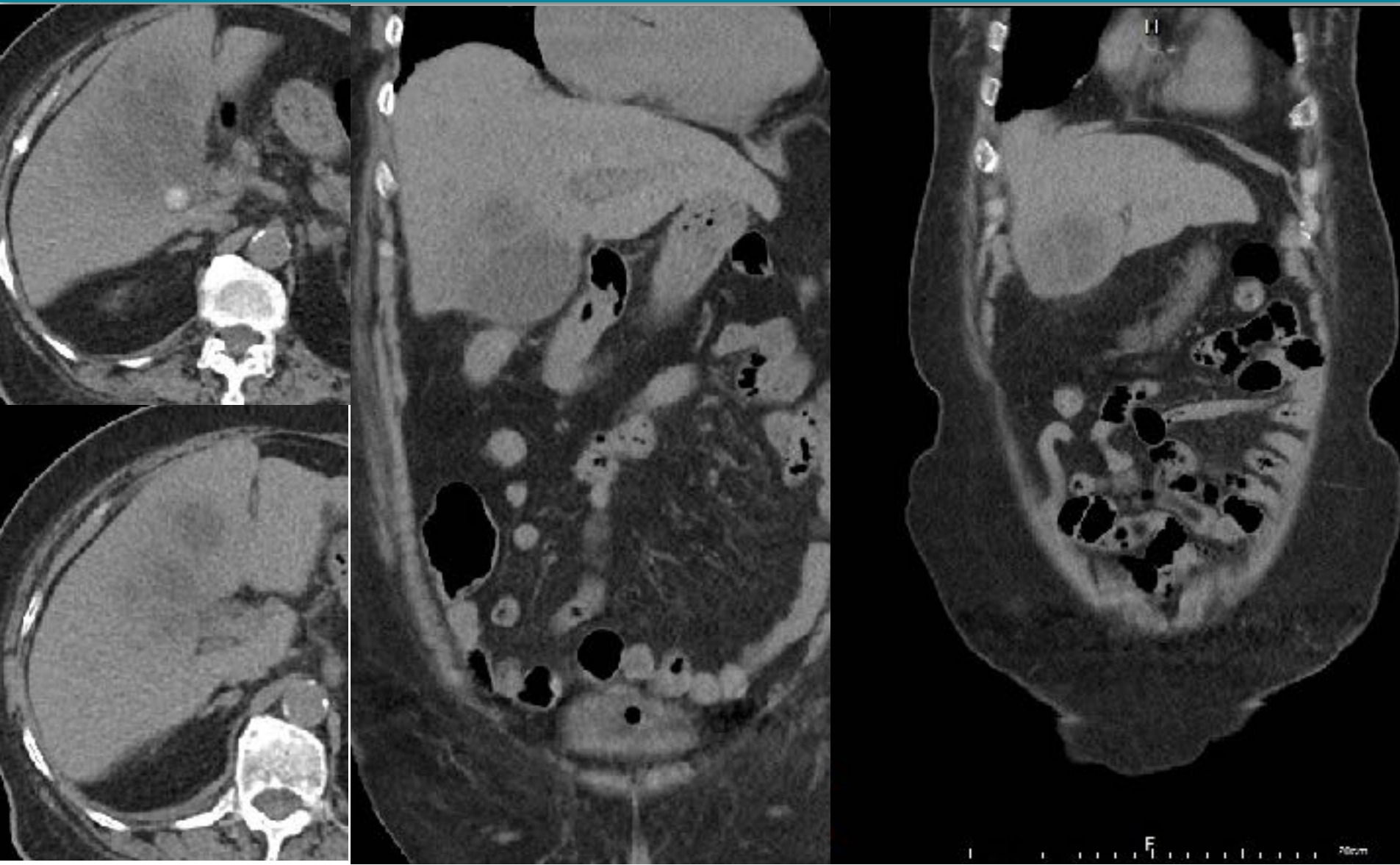
edle

uch





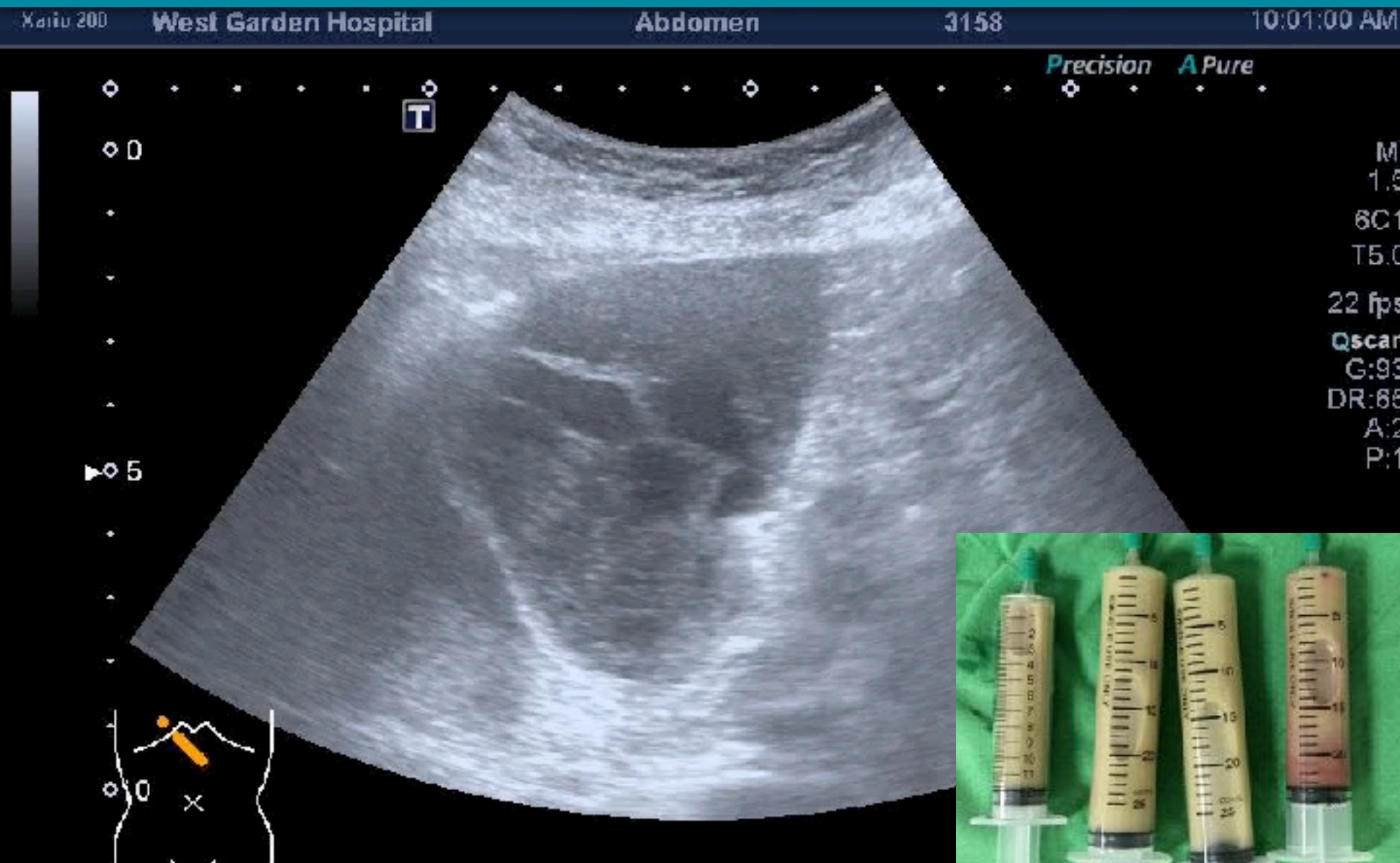
94F, right abdominal pain with fever



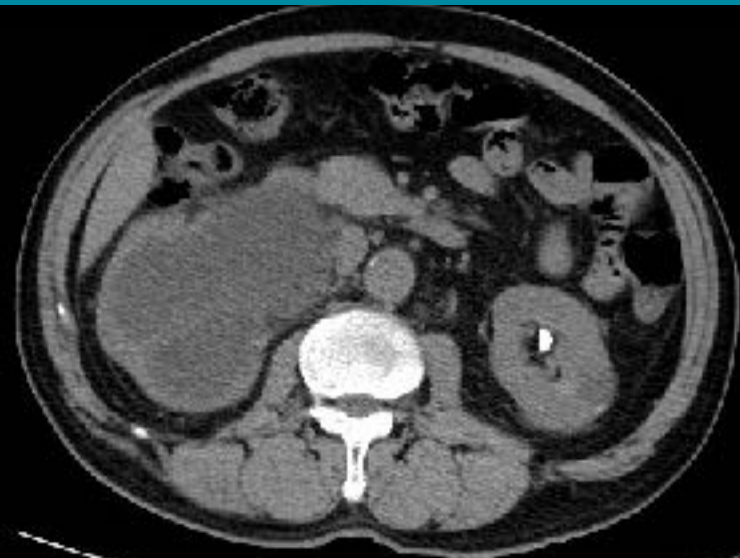
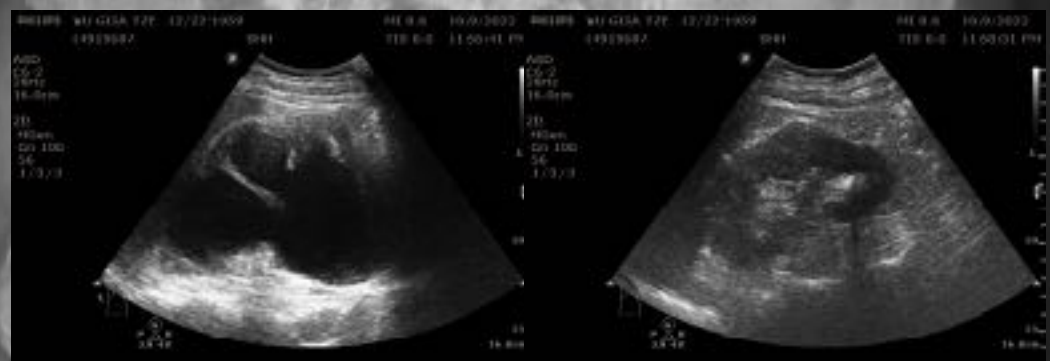
GB empyema with rupture



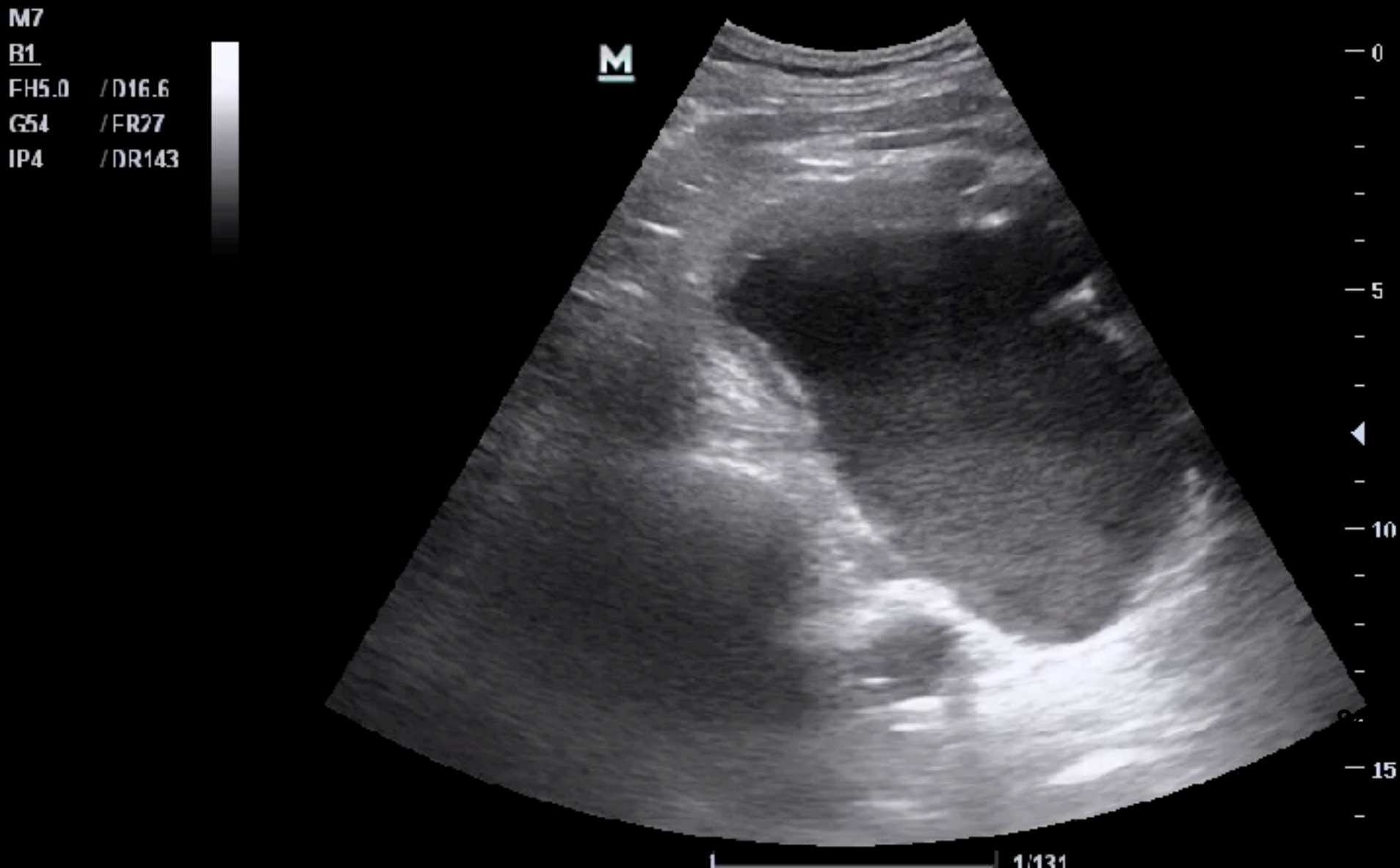
GB empyema with rupture

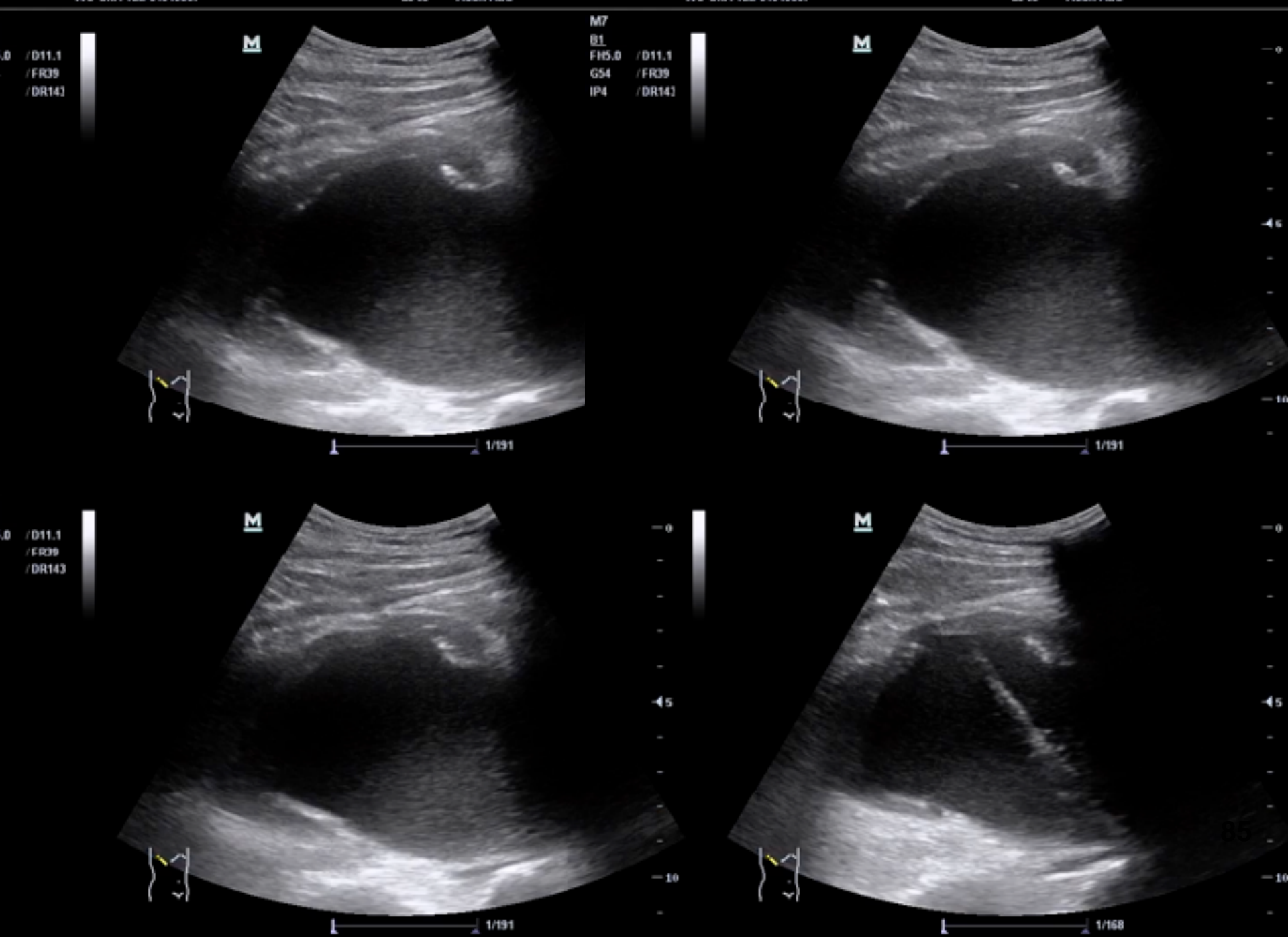


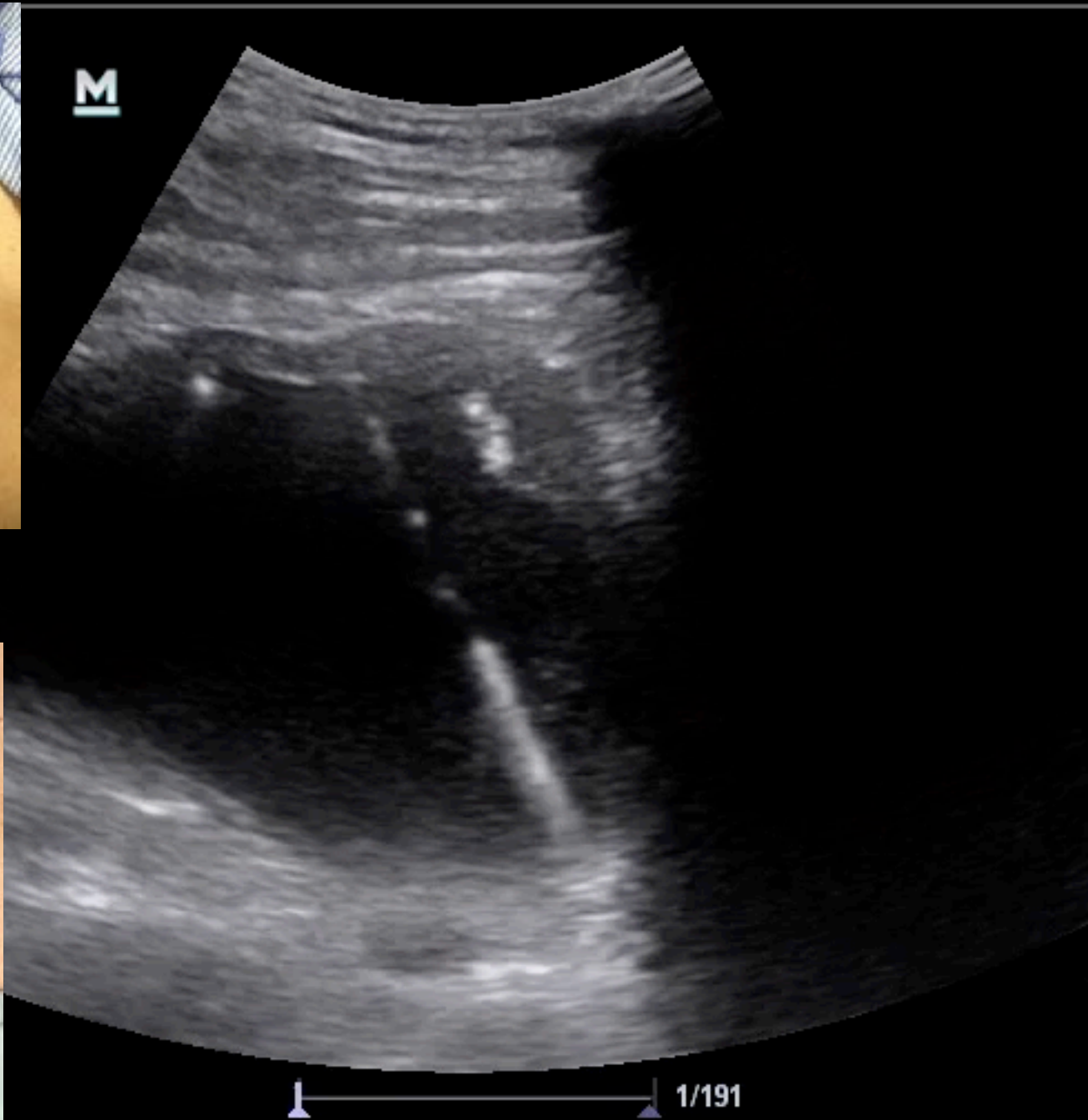
62M，腹痛



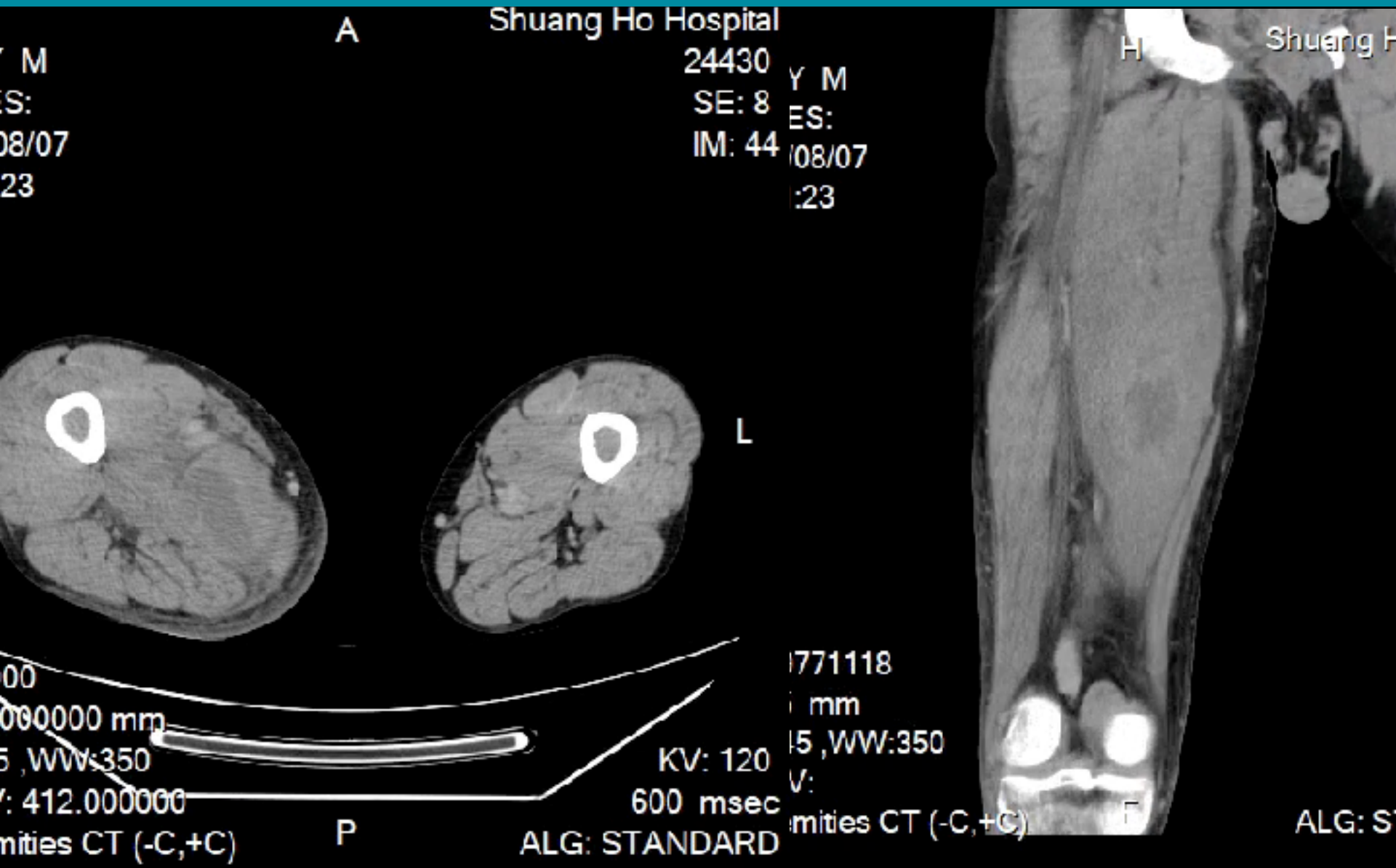
PCN for severe pyonephrosis



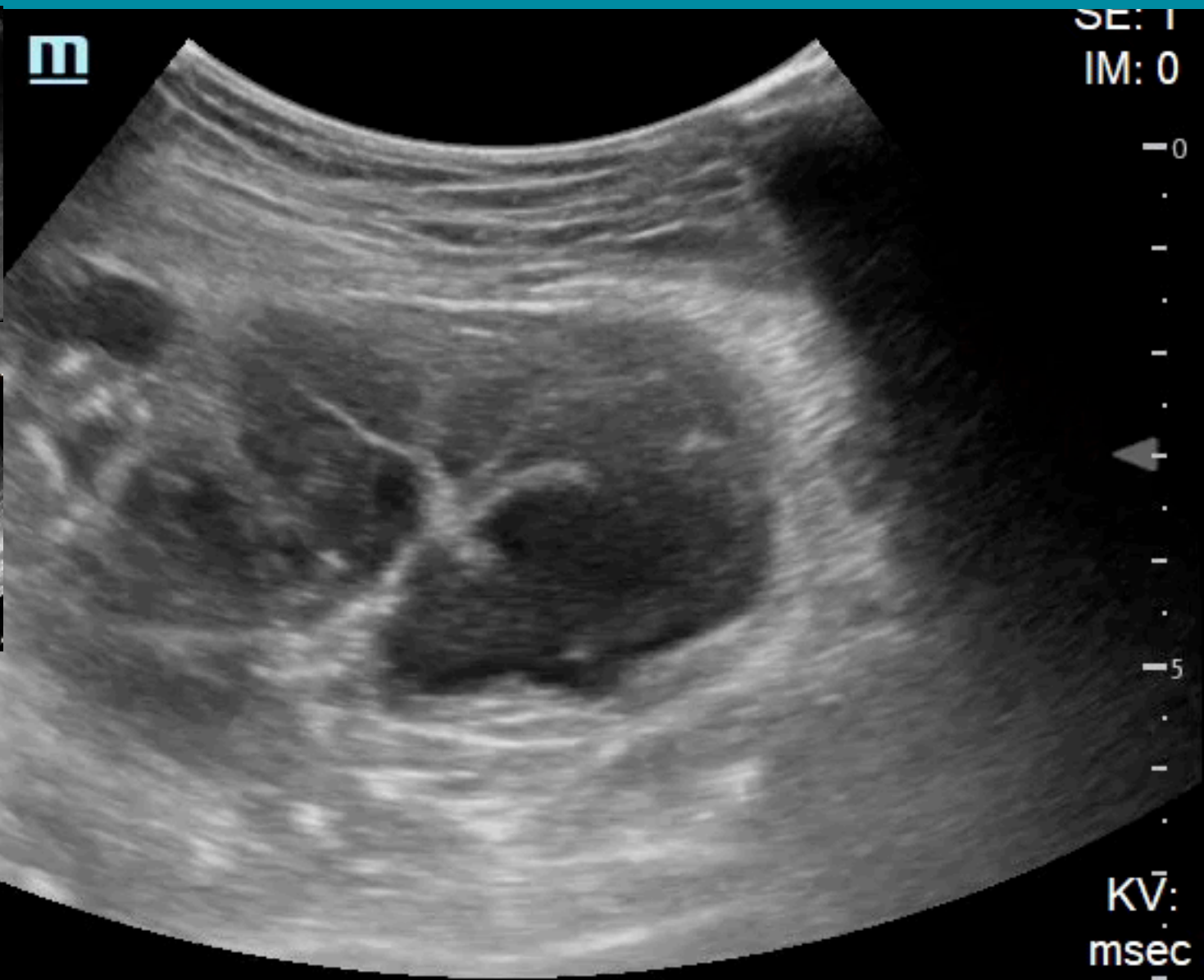




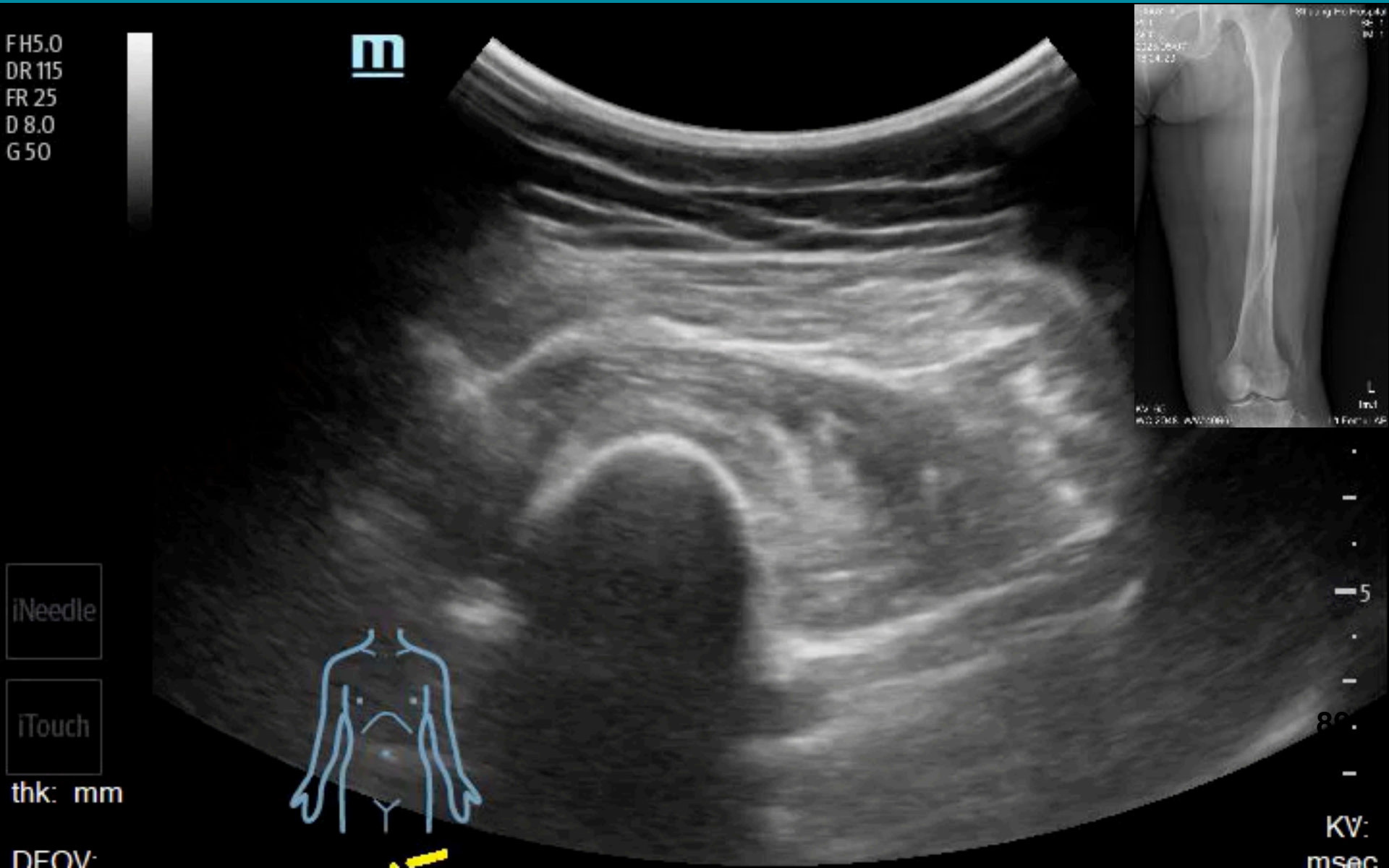
Adductor muscle pyomyositis & abscess formation



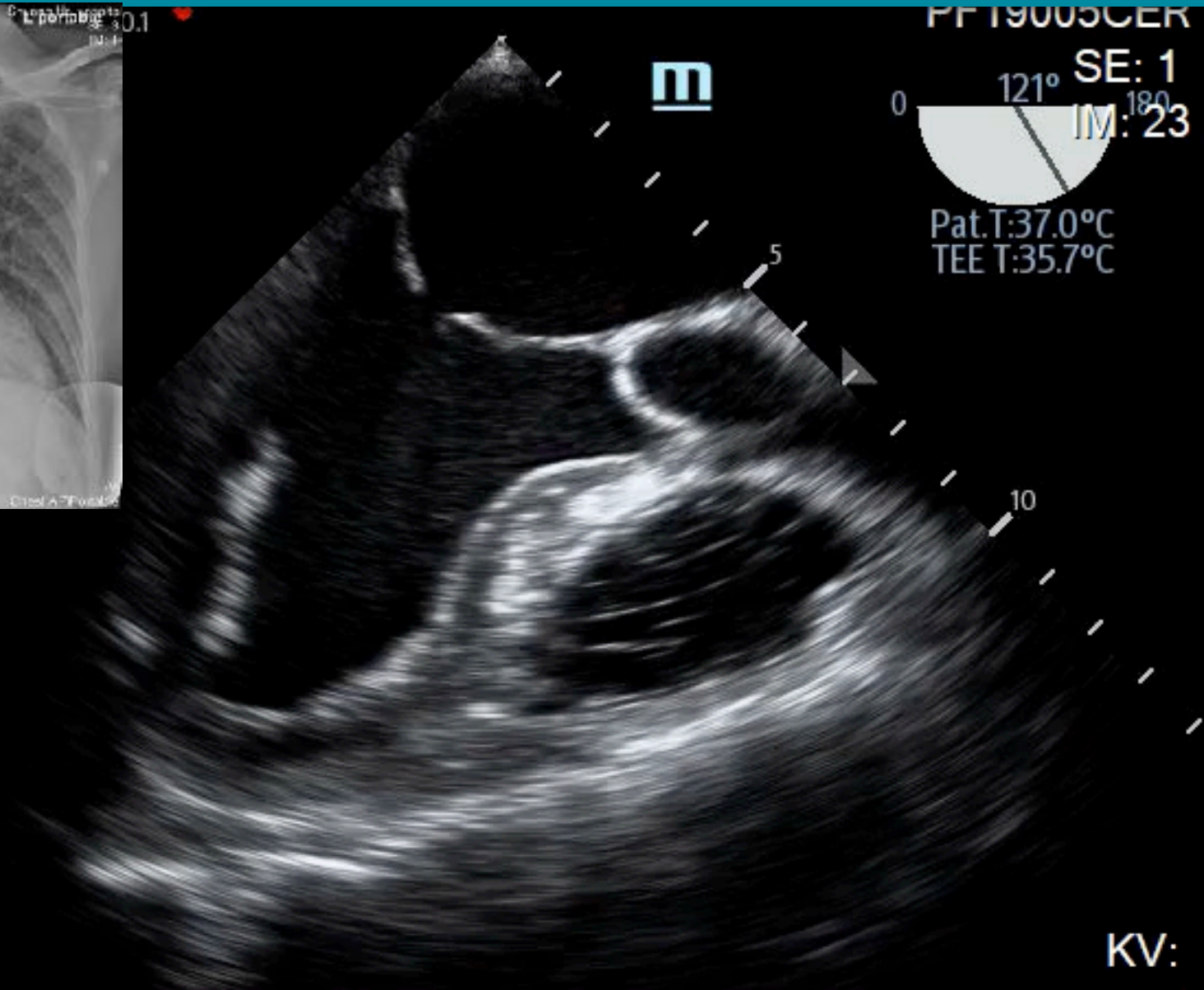
UG-pigtail drainage



66F, slipped at home, left knee painful swelling



73M, AMS, Dyspnea, BP 70/39 > IHCA



thk: n

thk: mm
PF19005CER

KV:

VF with DC shock

ACCES:

F33~7.2
2024/09/08

FR 28

D 15.0

PF19005CER

m

SE: 1
120° IM: 26
0 180

Pat.T:37.0°C
TEE T:36.2°C

iNeedle

thk: mm

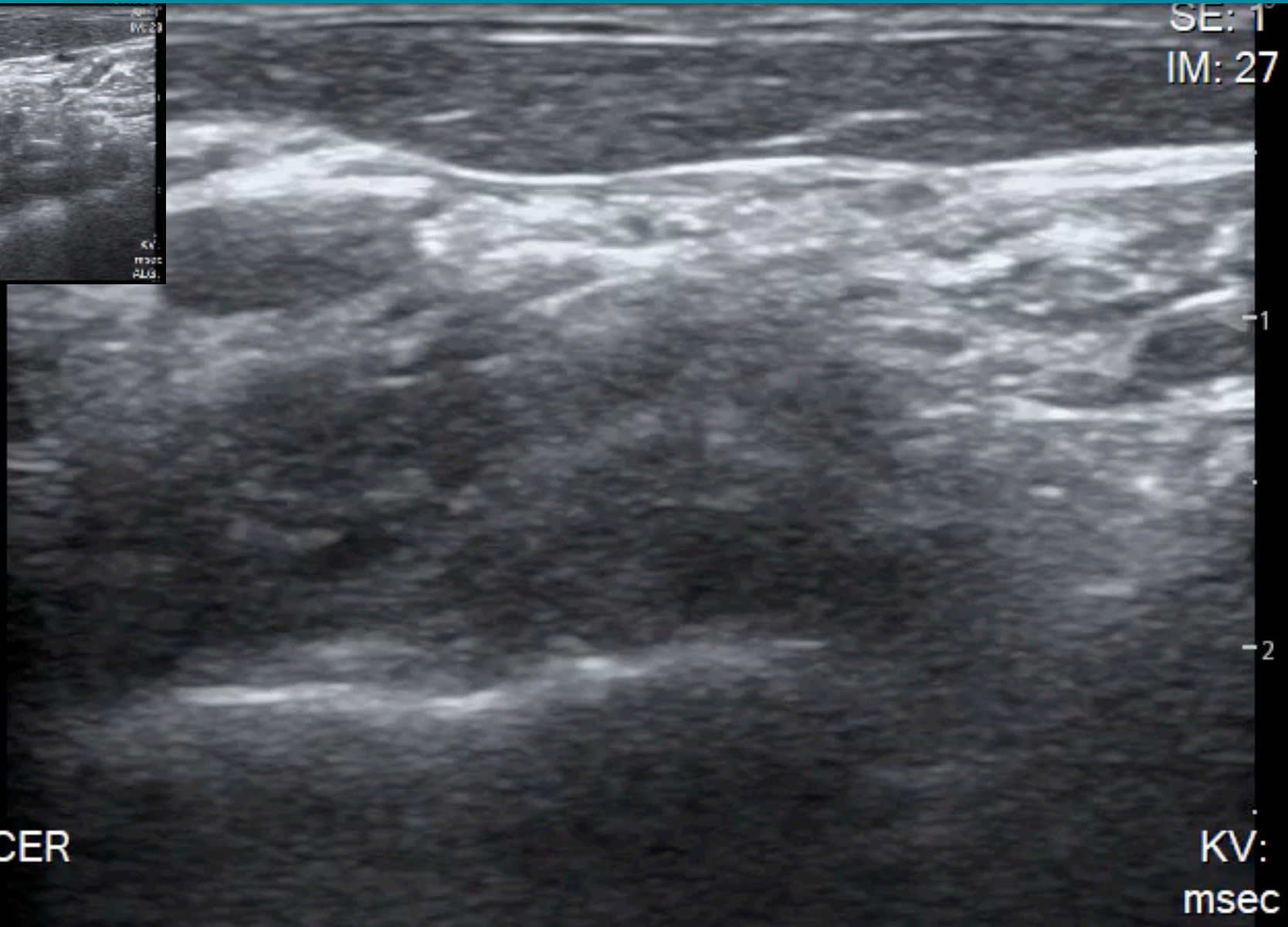
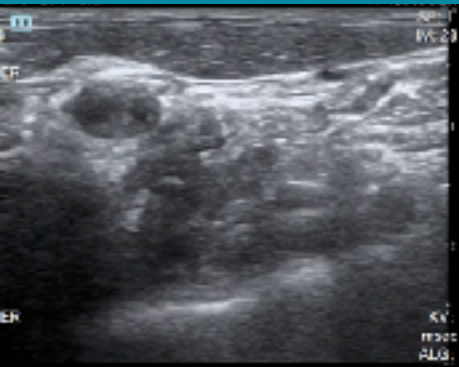
PF19005CER

DFOV:

KV:

msec

Stellate ganglion block during CPR



iNeedle

Touch

thk: mm

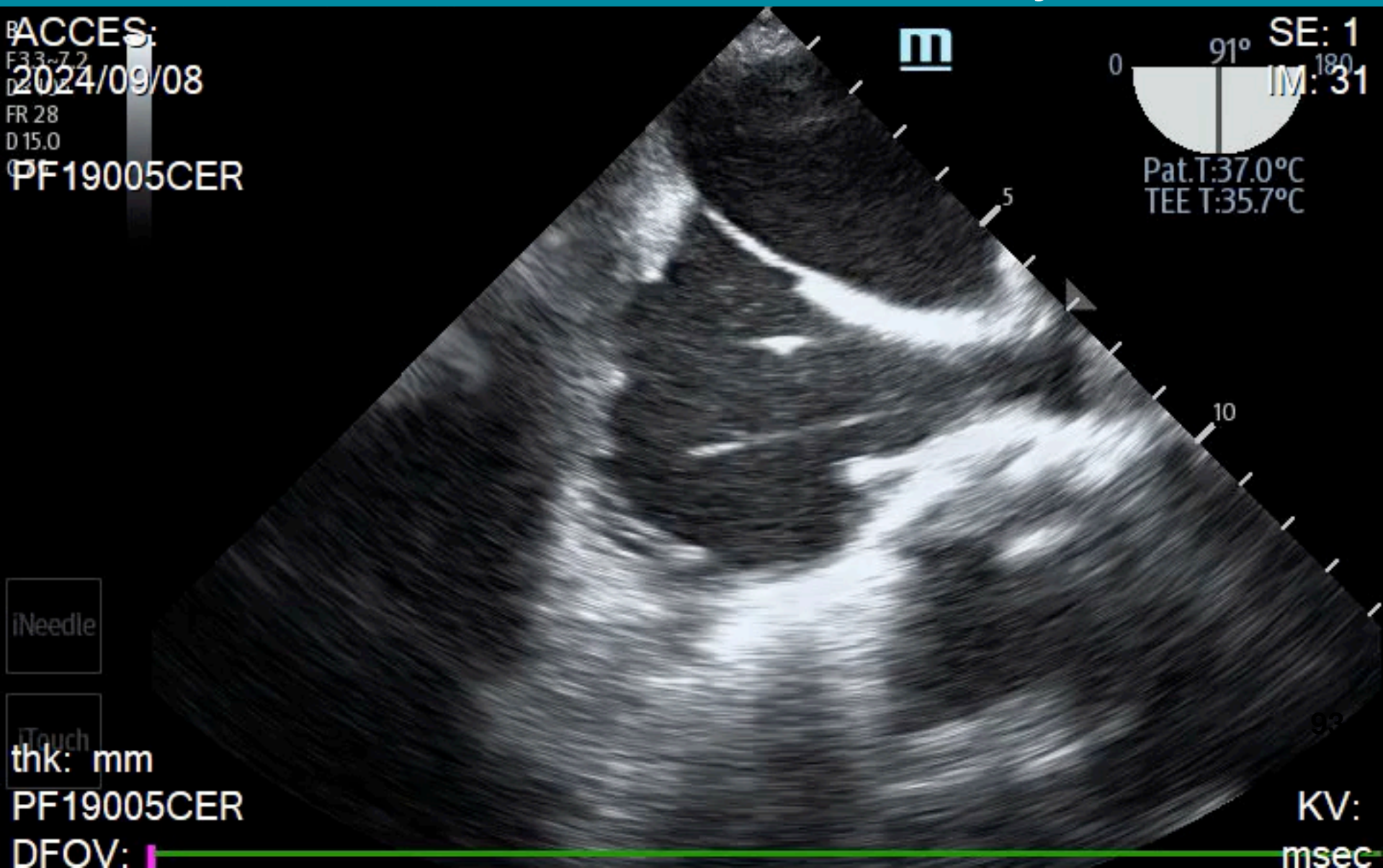
PF19005CER

DFOV:

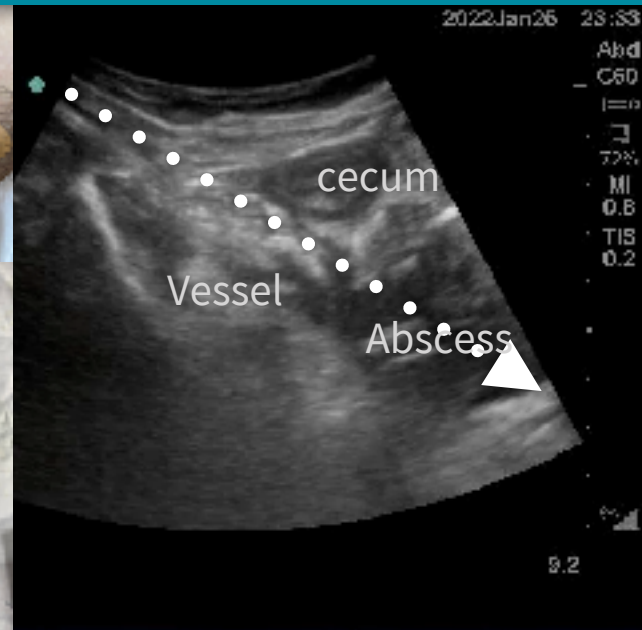
KV:
msec

PCPS -bicaval view

PCI to left main; CPC1 (18 days)



Practice makes perfect needling !!



Guiding needle



Guidewire



Pigtail



Pigtail in abscess



After drainage

超音波看得到的地方，沒有理由到不了！！

