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

Utilization of Echocardiography in AMI patients at ER

2022 台灣心肌梗塞學院

TAMIS Academy【二十四序曲】

When AMI meet Echocardiography

陳國智醫師

雙和醫院 急診醫學科

陳國智 醫師

醫用超音波學會指導醫師
WINFOCUS director / instructor
急救加護醫學會重症超音波負責人

急診 / 重症 / 介入 / 急性疼痛

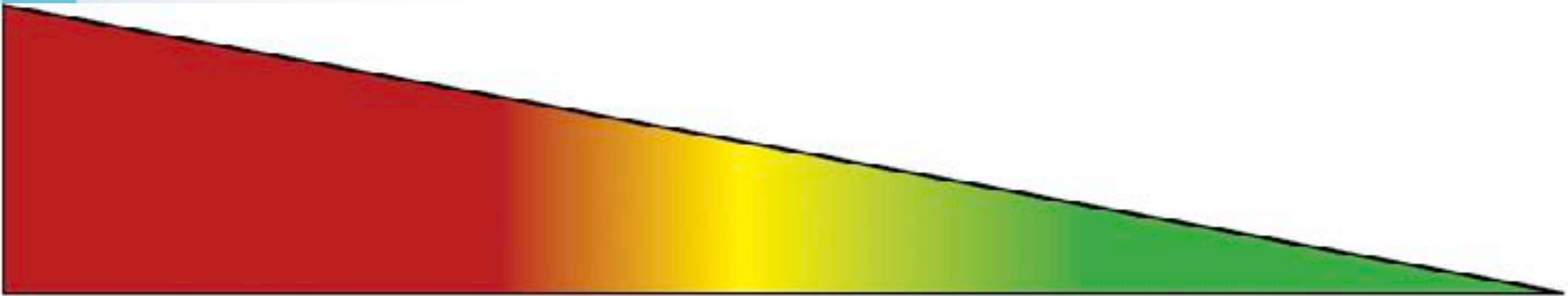
經歷
新光急診超音波訓練中心主任
西園醫院急診醫學科主任
急診醫學會超音波委員會主委
台灣疼痛醫學會大體模擬手術講師

2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Chest Pain Guideline

Top 10 Take Home Message

J Am Coll Cardiol. 2021 Nov, 78 (22) e187—e285

症狀 EKG hs-Trop



- Central
- Pressure
- Squeezing
- Gripping
- Heaviness
- Tightness
- Exertional/stress-related
- Retrosternal

- Left-sided
- Dull
- Aching

- Stabbing

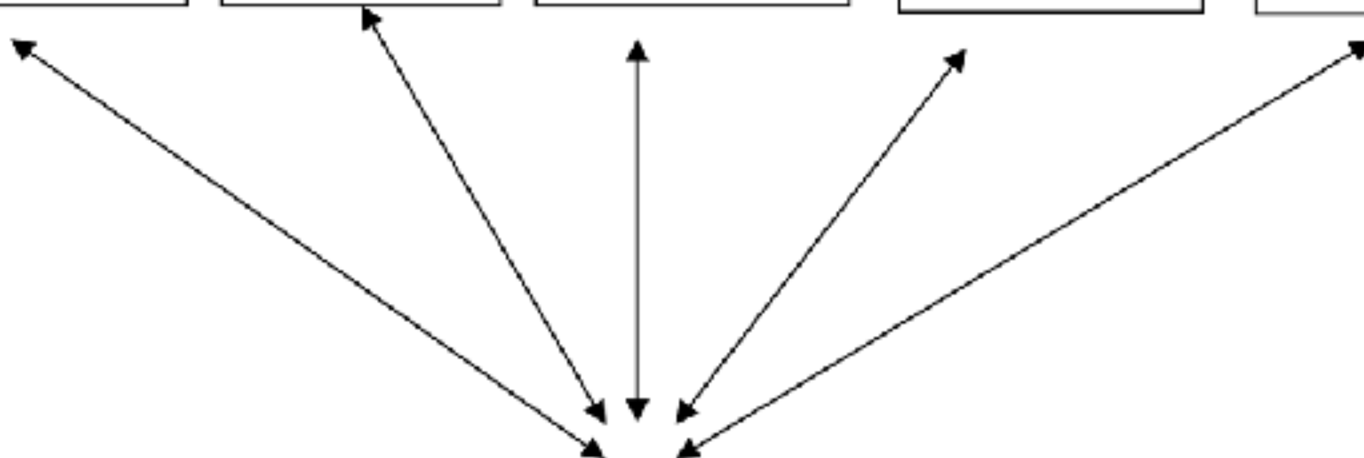
- Right-sided
- Tearing
- Ripping
- Burning

- Sharp
- Fleeting
- Shifting
- Pleuritic
- Positional

High ⟷ **Low**

Probability of Ischemia

J Am Coll Cardiol. 2021 Nov, 78 (22) e187–e285



2016 ACEP Policy

Core Applications

- Trauma
- Intrauterine Pregnancy
- AAA
- Cardiac/HD Assessment
- Biliary
- Urinary Tract
- DVT
- Soft-tissue/Musculoskeletal
- Thoracic/Airway
- Ocular
- Bowel
- Procedural Guidance

Effusion
Activity
Contractility
Volume

ASE practice guideline 2020

J Am Soc Echocardiogr. 2020 Apr;33(4):409–422.e4.

Table 1 Definitions of cardiac ultrasound categories

	UAPE	Cardiac POCUS	CCE	Limited echo	Comprehensive echo
Diagnostic expectations	"Routine" performance of a single imaging protocol to augment bedside examination	Focused exams with specific imaging protocols based upon suspicion of a specific disease (e.g., rule out tamponade)	Focused on a collection of specific views/findings pertinent to the care of the critically ill (e.g., cardiac output, fluid responsive)	Focused on previously delineated findings as a follow-up exam; limited imaging protocol applied to answer a specific question	Comprehensive, all findings, quantification; increasingly use advanced techniques
Application frequency	Frequent, daily, multiple physicians	Usually once, per disease, but more frequently if change in clinical status	On admission or change in clinical status, potentially frequently	As follow up to comprehensive echo; potentially multiple times over weeks to months	Once (per admission, change in clinical status)
Interpretation of findings	Presence or absence of ultrasound "signs" indicative of cardiac abnormality	Findings related to the diagnosis sought in protocol	Primary and incidental findings recorded in views	All findings, primary and incidental, recorded in limited views	All findings, primary and incidental recorded in comprehensive imaging
Quantification	Usually Absent	Optional	Typically	Typically	Mandatory
Indication	Physical exam	Clinical suspicion	Medical necessity	Medical necessity	Medical necessity
Documentation	Images not recorded (except for QA), findings reported in physical exam	Image archiving and formal reporting controversial	Images archived, formal report	Images archived on PACS, formal report	Images archived on PACS, formal report
Teaching required	Introductory and modest (weeks)	Modest (weeks to months)	Advanced (months)	Advanced (years)	Advanced (years)
Notes	Used "in the manner and intent" of cardiac physical examination	Similar to UAPE, but disease specific	Imaging protocols specific to issues in the critically ill; comparison to available prior studies as indicated	Reading all findings increases training burden. Comparison to available prior studies is standard practice. Must be able to convert to comprehensive at bedside	Completely evaluates all findings, regardless of referral question or incidental nature. Comparison to available prior studies is standard practice.

CCE, critical care echocardiography; *PACS*, Picture Archival and Communication System; *POCUS*, point of card ultrasound; *UAPE*, ultrasound assisted physical examination.
Adapted from: Kimura BJ. Point-of-care cardiac ultrasound techniques in the physical examination: better at the bedside. Heart 2017;103:987-994. https://doi.org/10.1136/heartjnl-2016-309915.

	UAPE	Cardiac POCUS	CCE
Diagnostic expectations	"Routine" performance of a single imaging protocol to augment bedside examination	Focused exams with specific imaging protocols based upon suspicion of a specific disease (e.g., rule out tamponade)	Focused on a collection of specific views/findings pertinent to the care of the critically ill (e.g., cardiac output, fluid responsive)
Application frequency	Frequent, daily, multiple physicians	Usually once, per disease, but more frequently if change in clinical status	On admission or change in clinical status, potentially frequently
Interpretation of findings	Presence or absence of ultrasound "signs" indicative of cardiac abnormality	Findings related to the diagnosis sought in protocol	Primary and incidental findings recorded in views
Quantification	Usually Absent	Optional	Typically
Indication	Physical exam	Clinical suspicion	Medical necessity
Documentation	Images not recorded (except for QA), findings reported in physical exam	Image archiving and formal reporting controversial	Images archived, formal report
Teaching required	Introductory and modest (weeks)	Modest (weeks to months)	Advanced (months)
Notes	Used "in the manner and intent" of cardiac physical examination	Similar to UAPE, but disease specific	Imaging protocols specific to issues in the critically ill; comparison to available prior studies as indicated

急診心超三部曲

理學檢查
UAPE

快速判定
Cardiac POCUS

進階測量
CCE

UAPE-Quick check

C Nerve
C6-2
22 Hz
13.0cm

2D
Gen
Gn 60
C 53
2 / 3 / 2

Base

Apex

LV

P R
2.0 6.0

5
10
13.0cm

UAPE-Quick check

Adult Echo
S4-1
77 Hz
15.0cm

2D
HGen
Gn 100
55
3/2/0
50 mm/s

Leg

Liver

Head

IVC

Diameter (1-2cm) / Variation (50%)

P R
1.7 3.4

53
BPM

Cardiac POCUS

PSLA

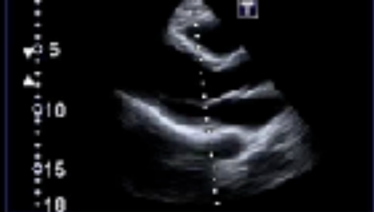
S4C

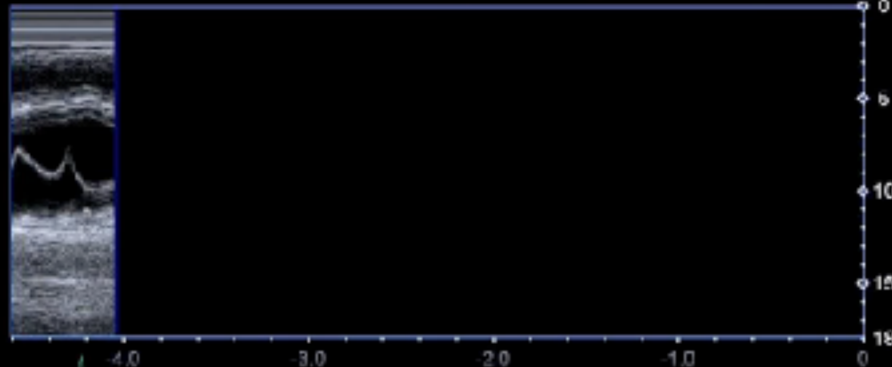
PSSA

A4C

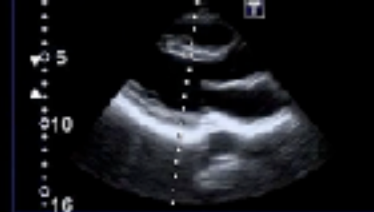
SKH-EUTC@ChenKC

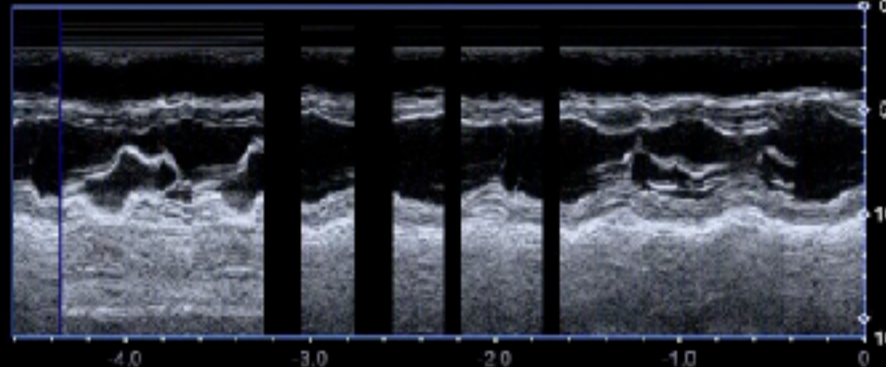
EPSS





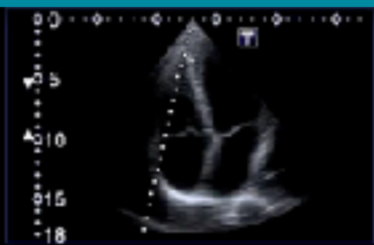
FS

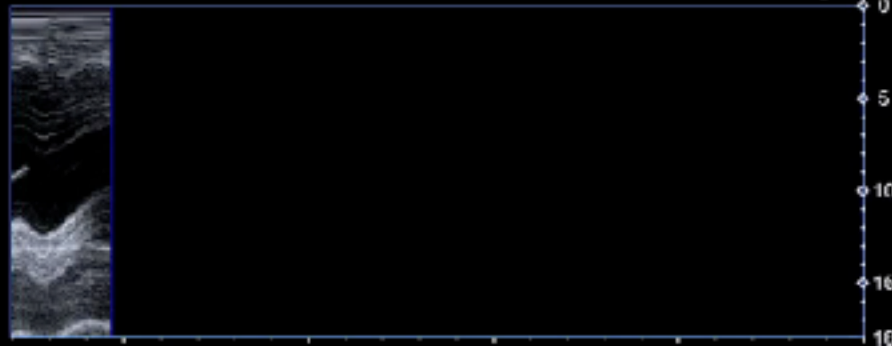




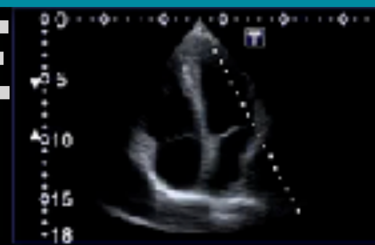
Cardiac POCUS - CCE

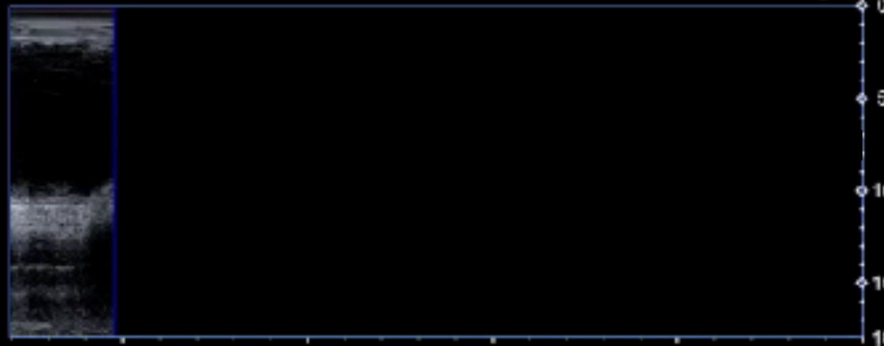
TAPSE



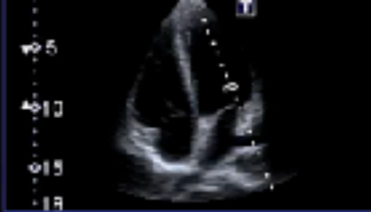


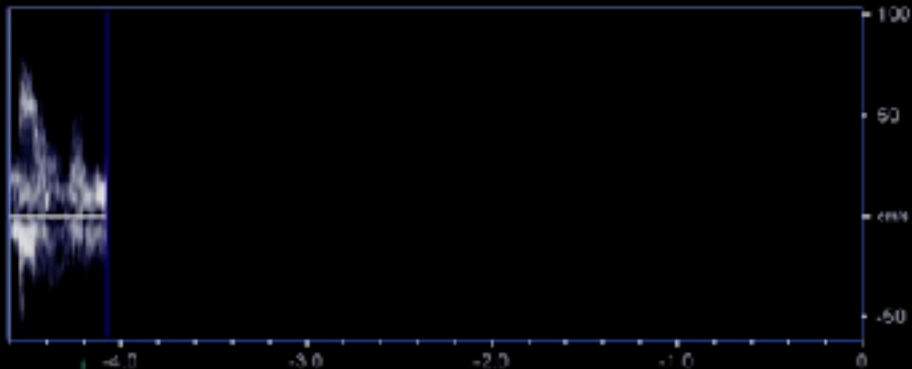
MAPSE



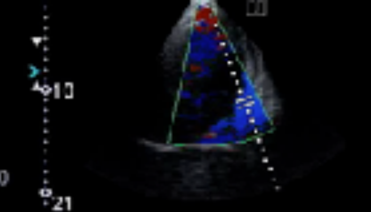


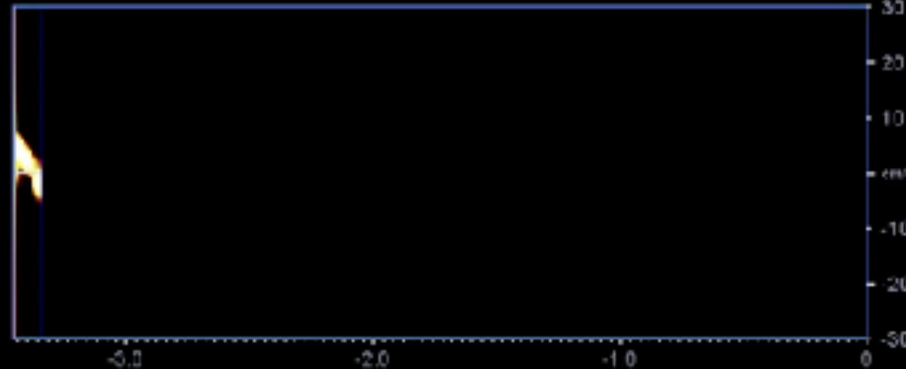
E/A





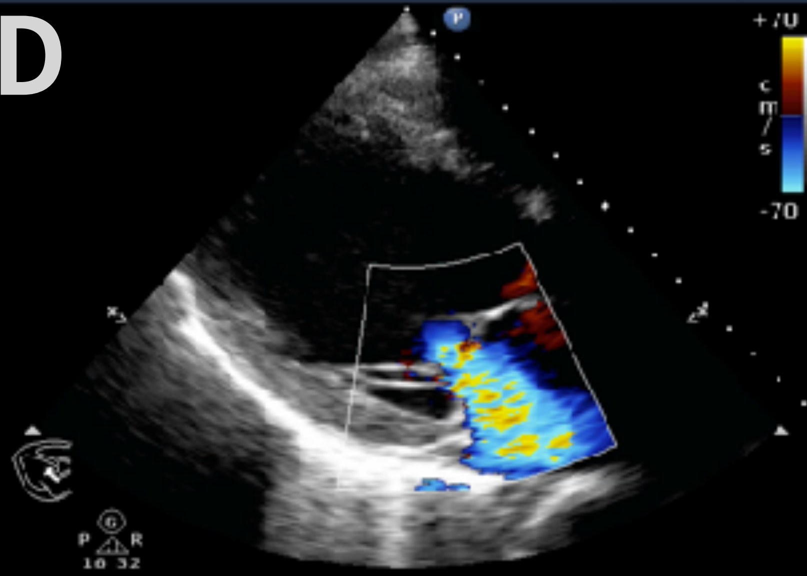
TDI



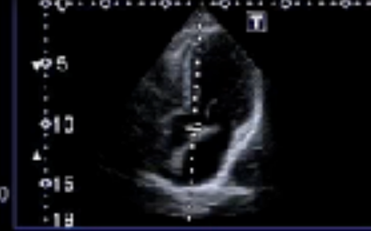


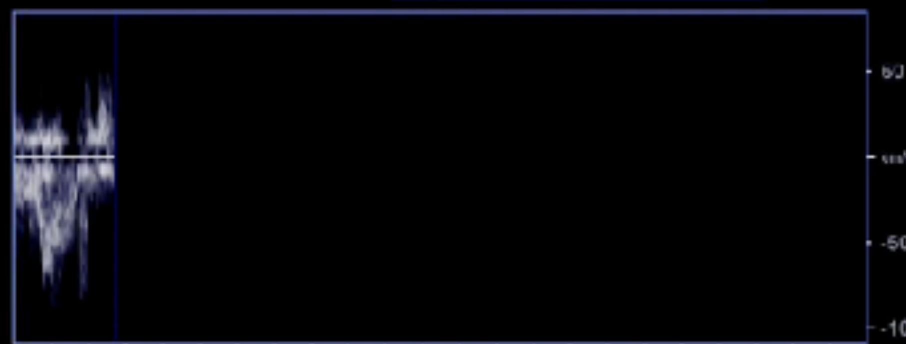
CCE

CD



VTI





個案

EMT代訴現場有頭暈、
四肢無力後跌倒，
致左眉上撕裂傷(3cm)
同事協助call 119送入，
到院下救護車時無生命徵象

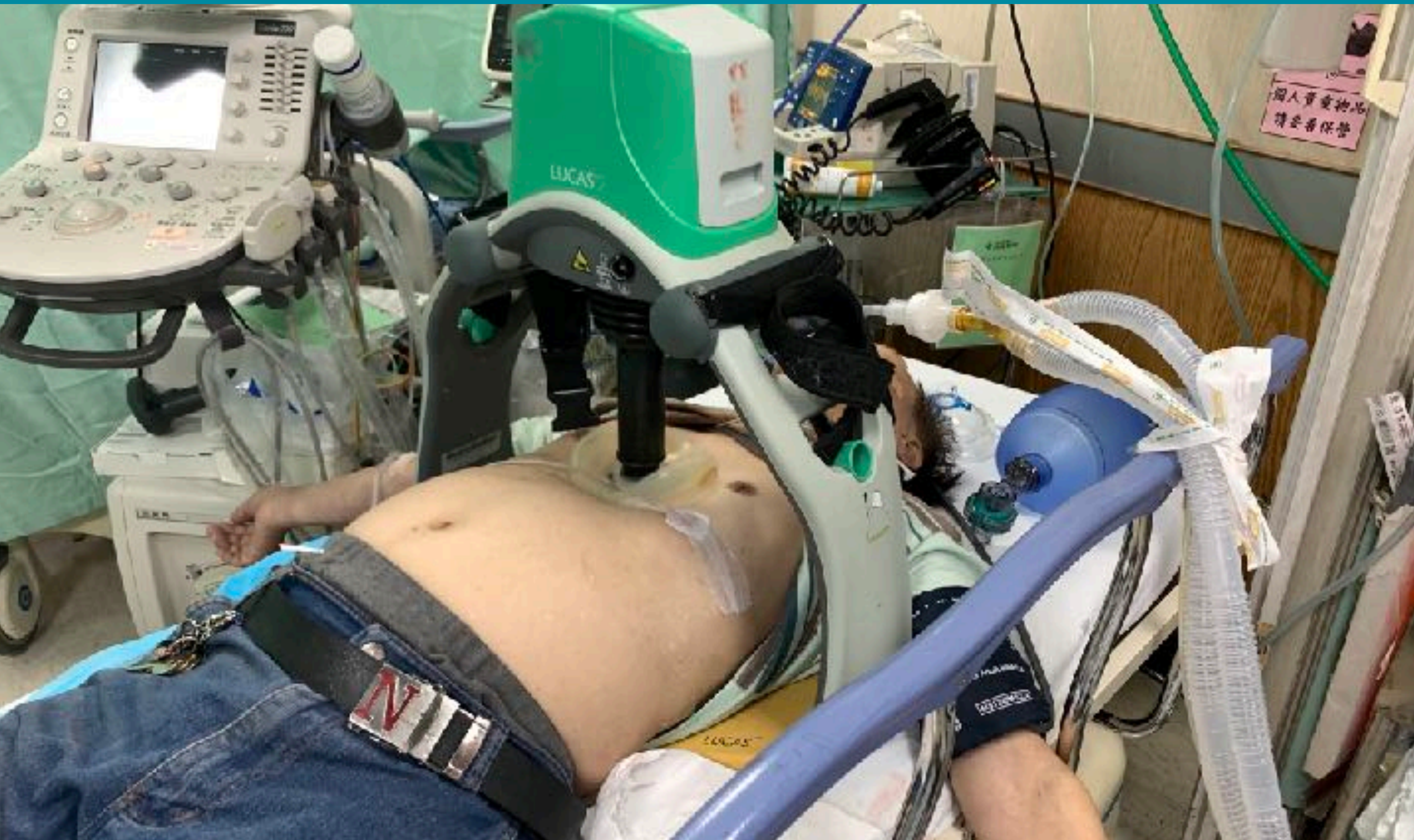
【Monitor】

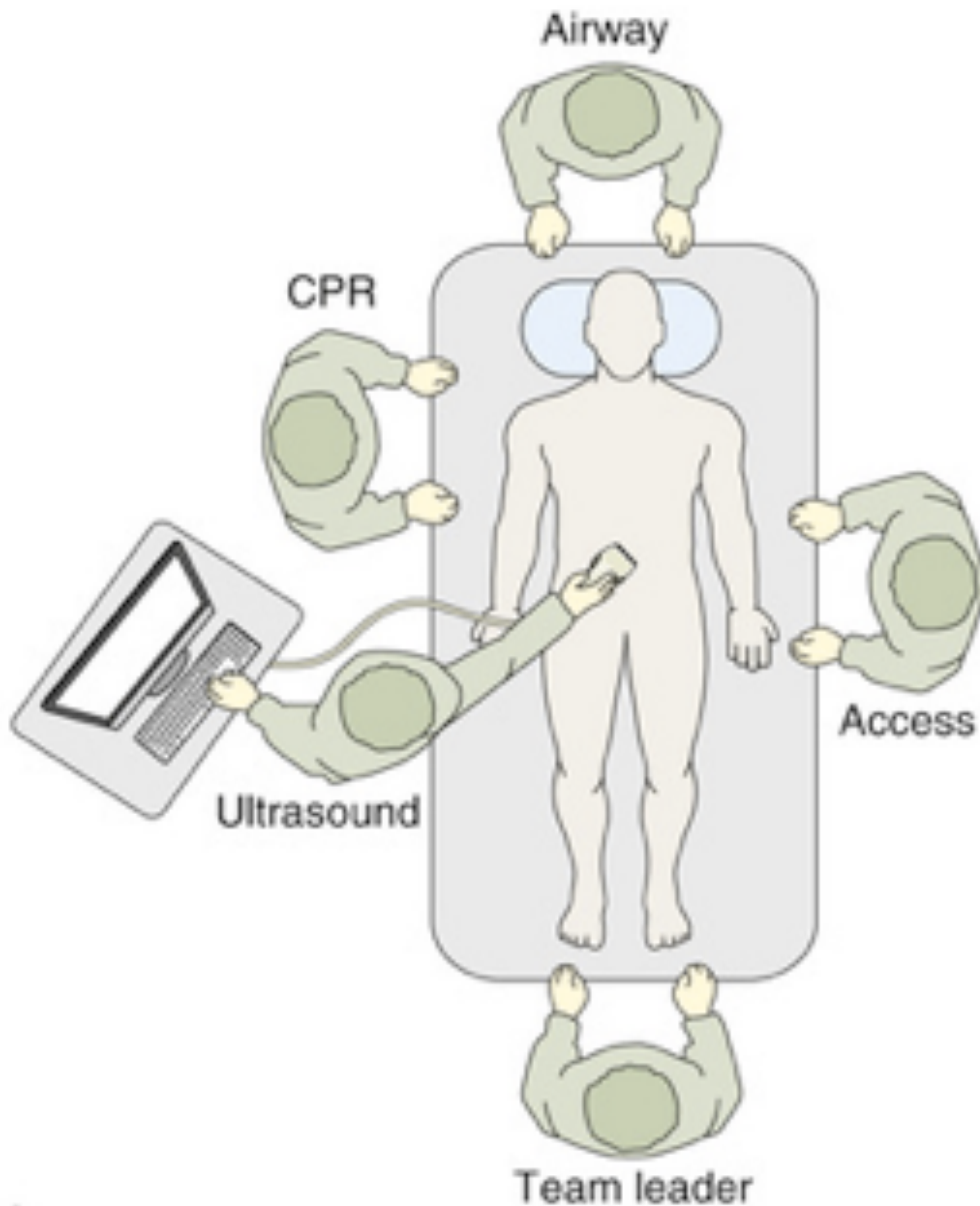
Asystole ==>

Wide QRS (PEA)==>

VF (DC shock *2)

Role of POCUS ?





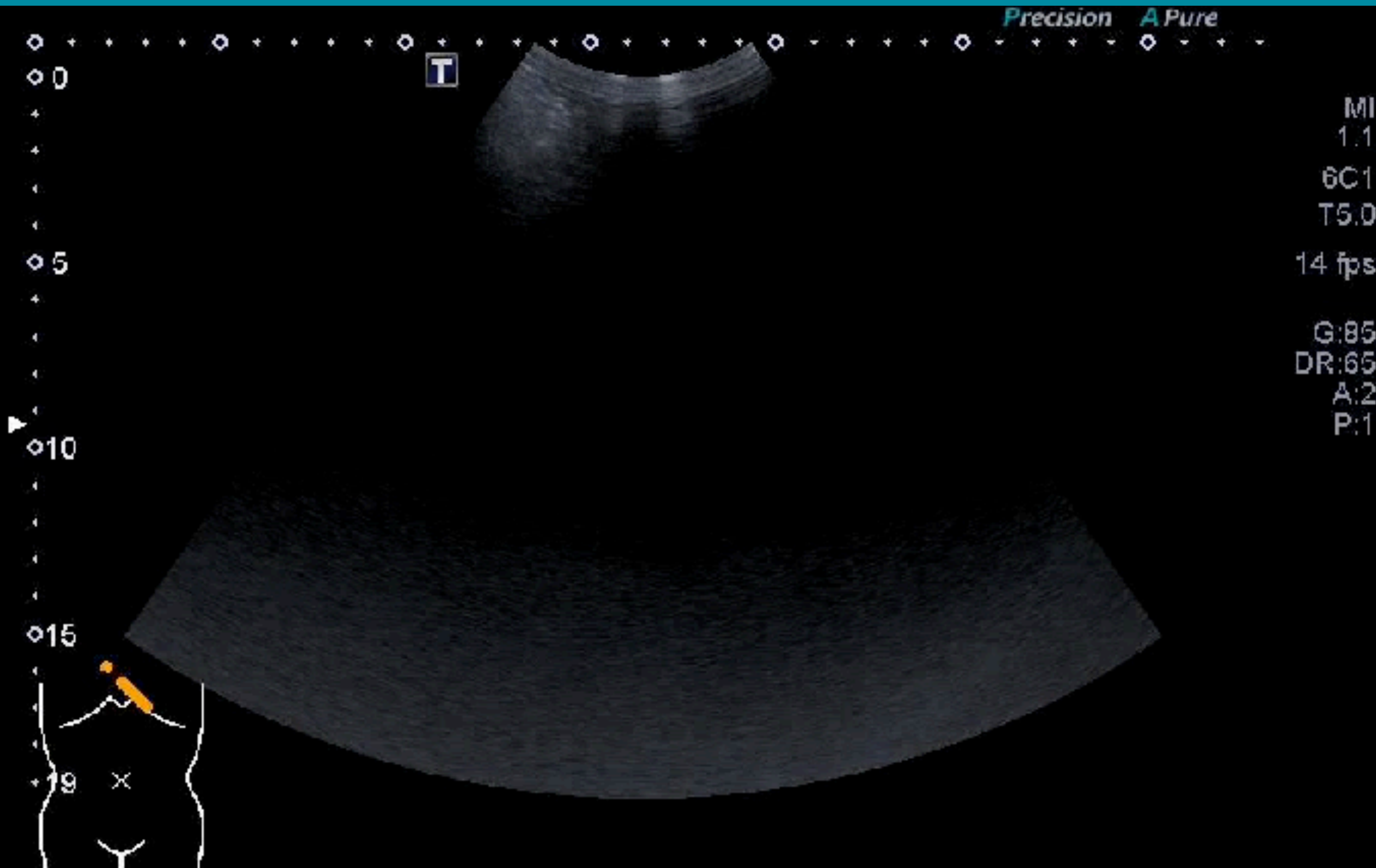
ER人力

醫 1

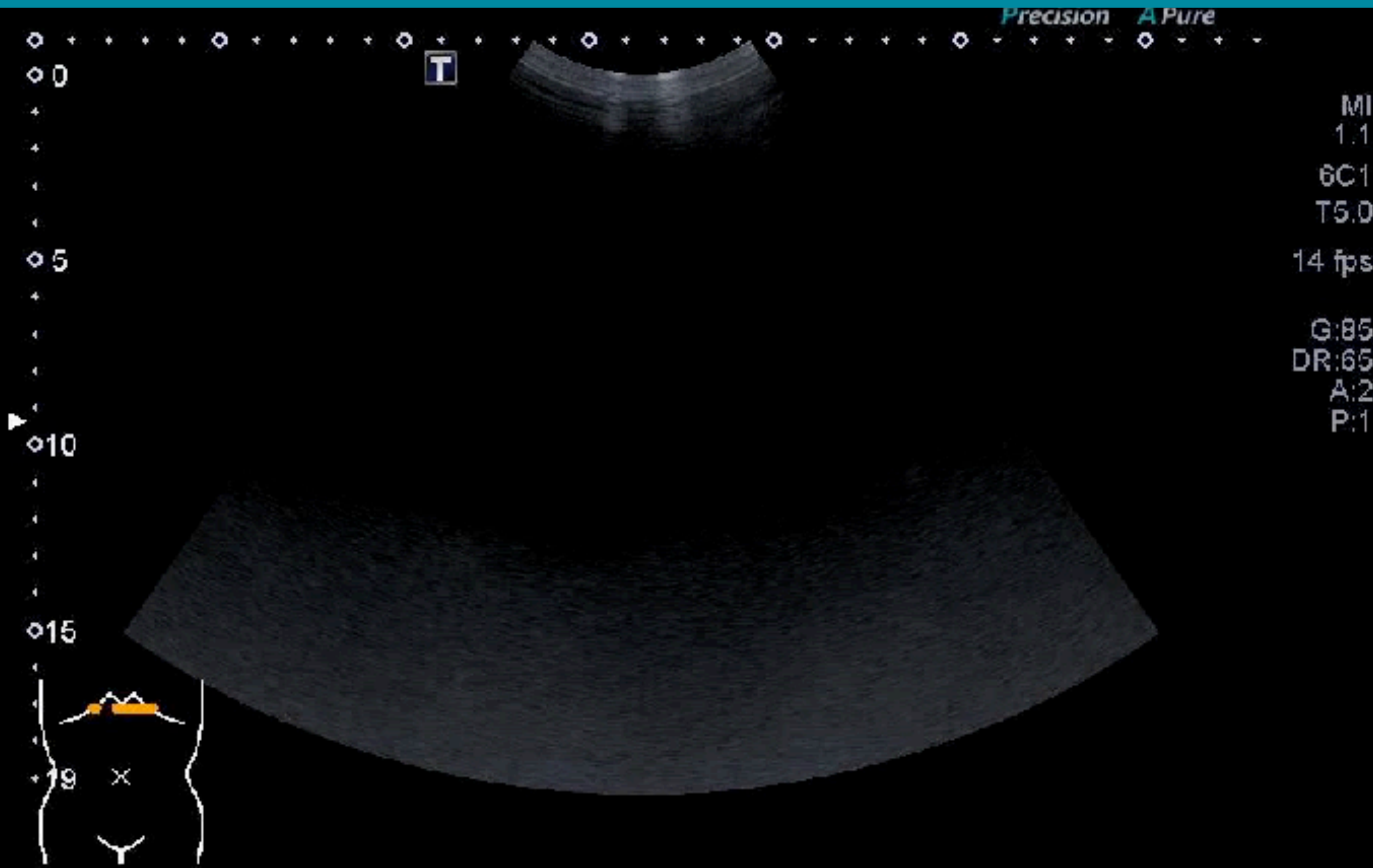
護 2

專 0

S4C - no interruption



Pulse check period - no pulse



請勿錄影

病史

EMT:
上擔架時可清楚對答，四肢活動自如，不清楚如何受傷

同事:
患者為水泥工，今早上樓到三樓後覺得不舒服，接著就倒在三樓樓梯間

太太:
HTN, CAD s/p PCI *2 6年前
昨晚腹部不適，微拉，早上有說頭暈，冒冷汗，但還是有去上班

轉院後

台大急救區

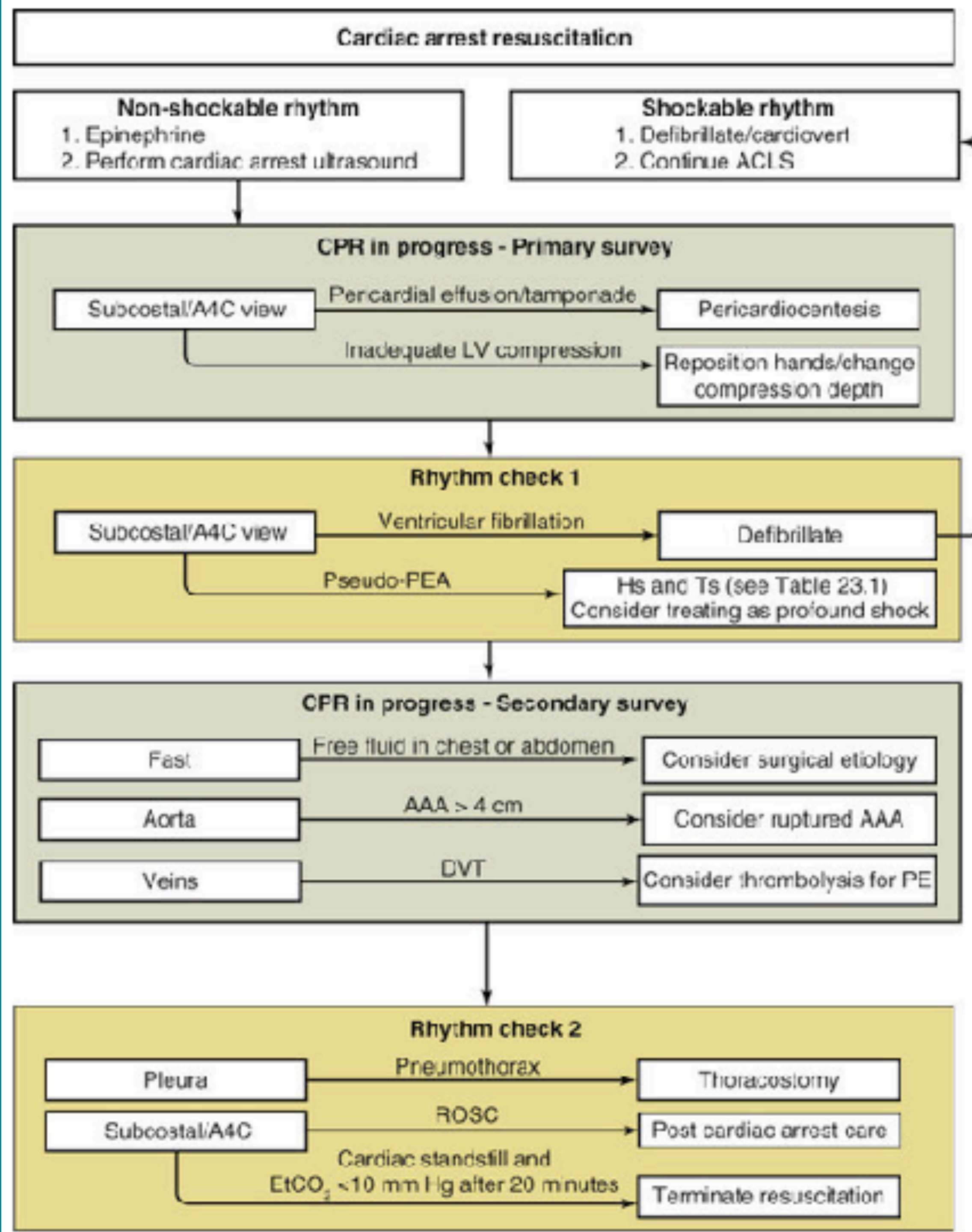
POCUS for Heart

POCUS for Vessels

POCUS for ECMO

Protocol

Hands-off

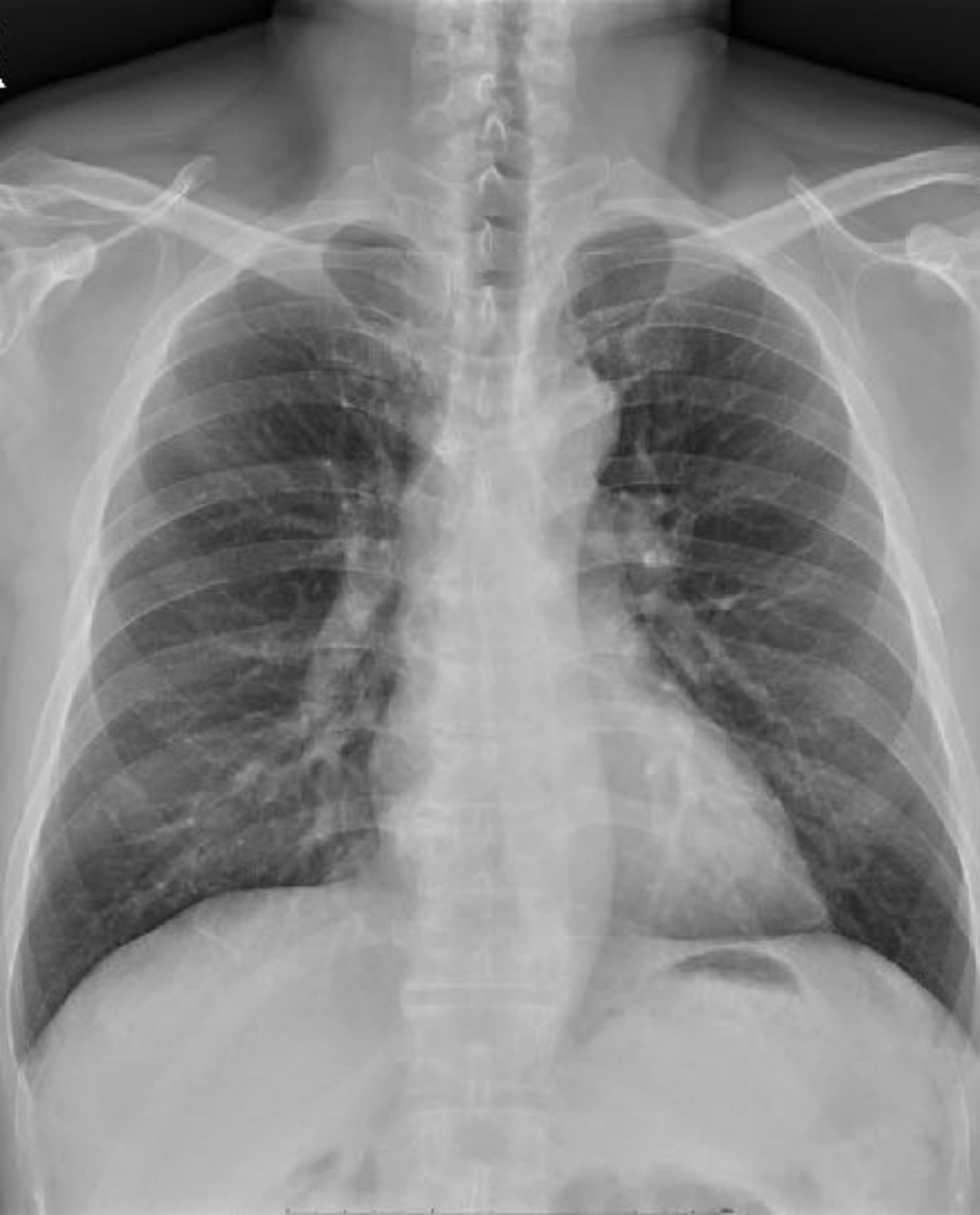


重點

勿中斷急救

探頭先擺好

錄動態影像



個案

52歲男性

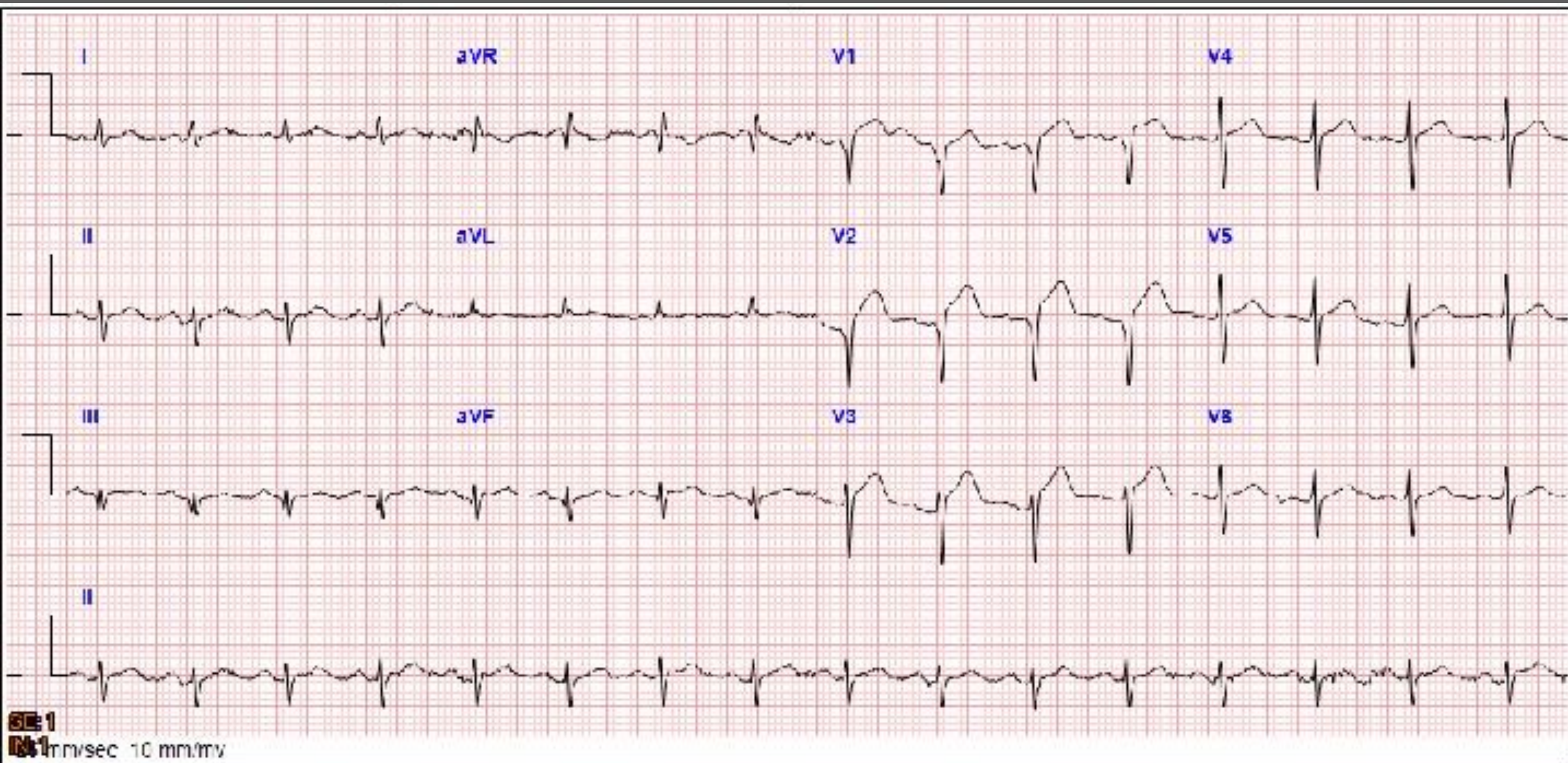
近半年來開始容易喘,

這一個月越來越嚴重,

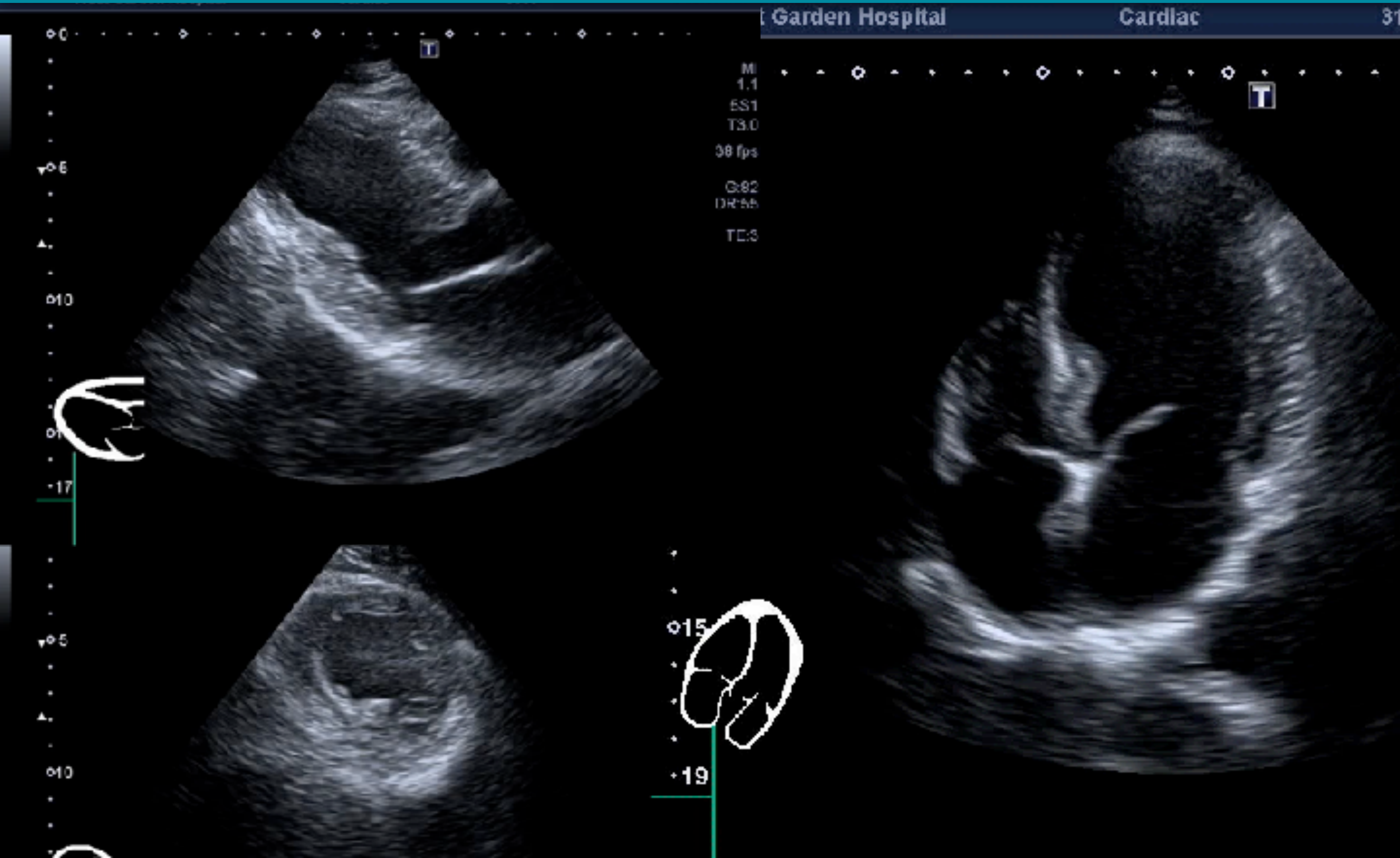
今天起床覺得喘的嚴重

且有胸悶情形

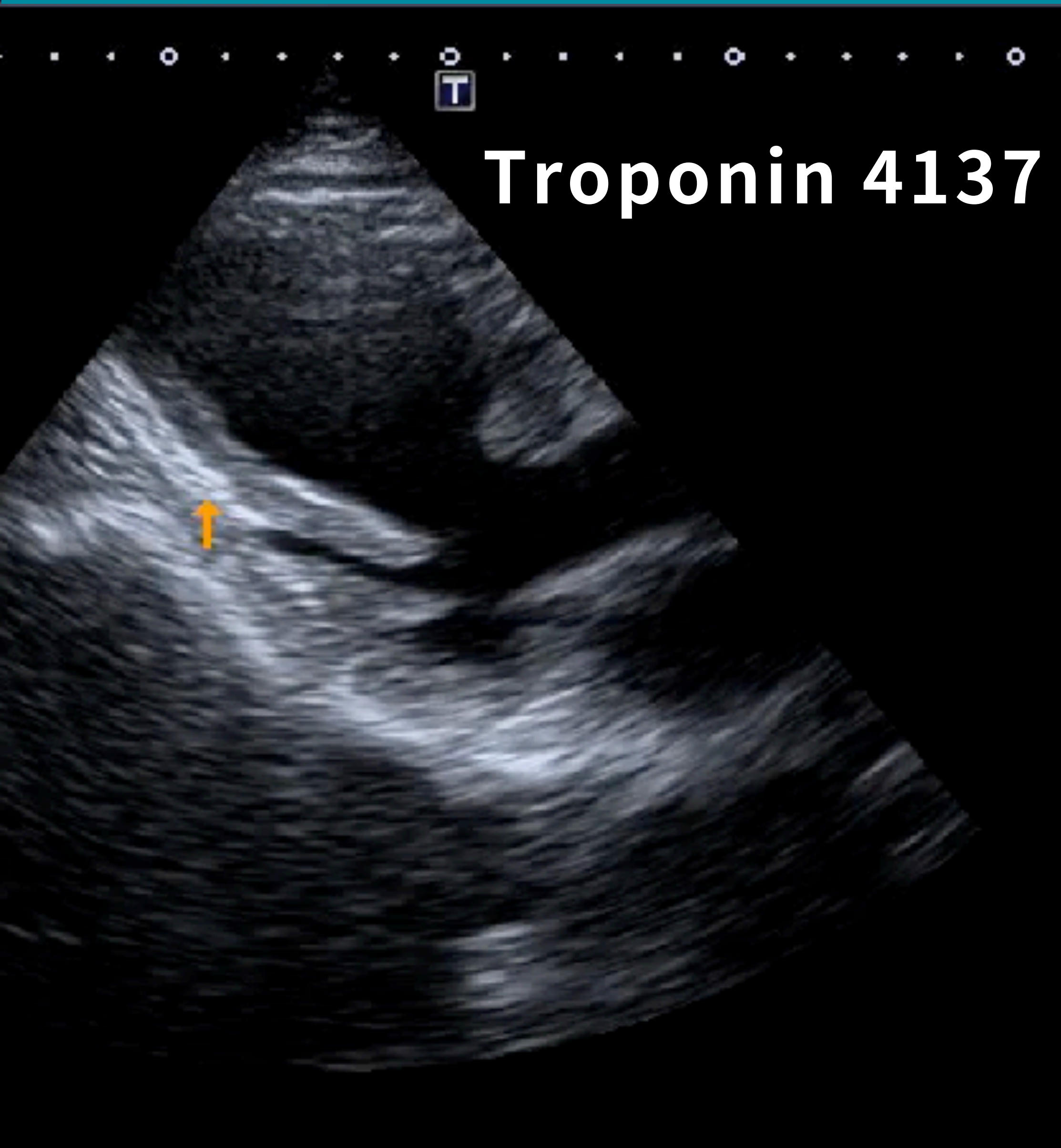
STEMI ?



Preparing transfer for PCI



POCUS重點



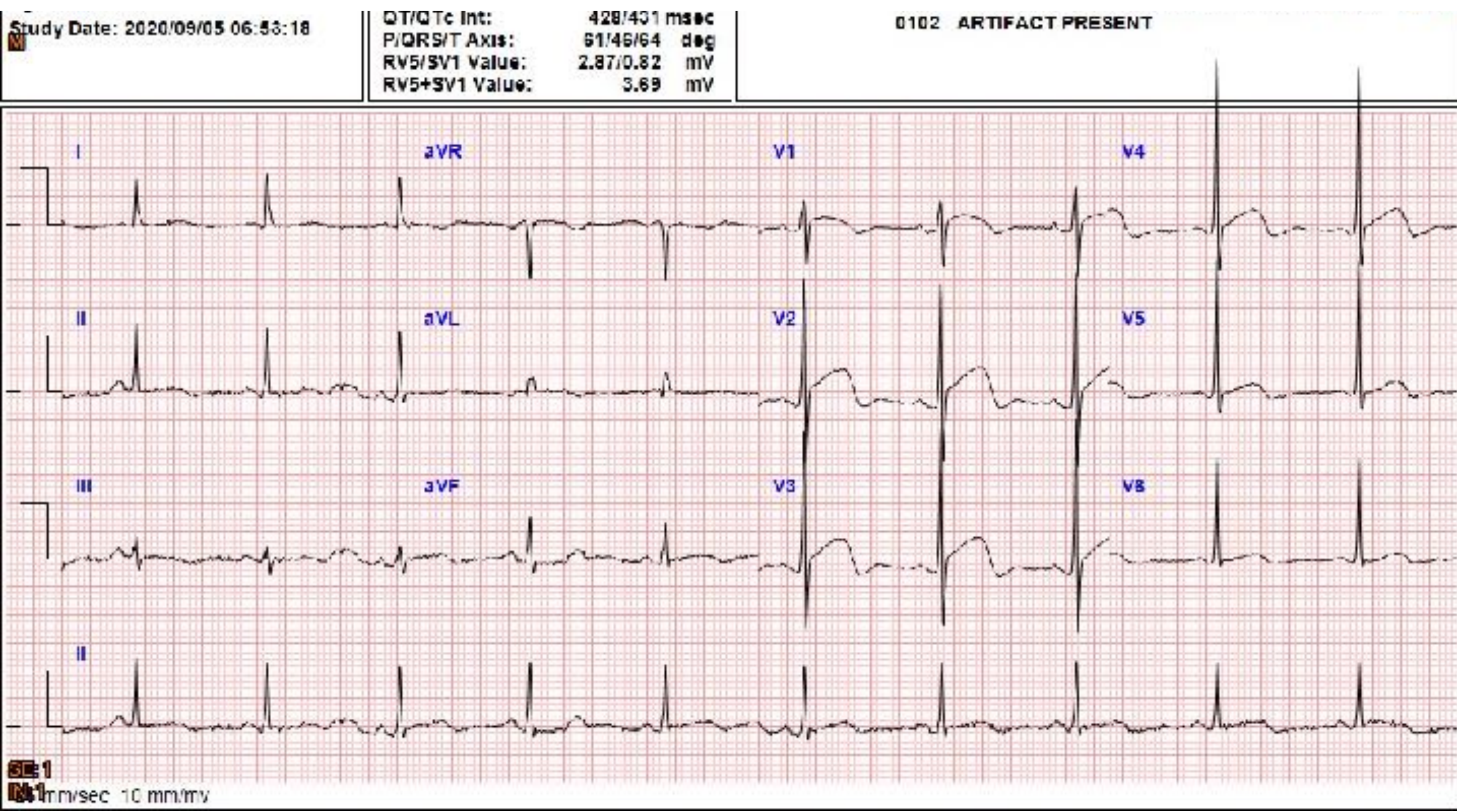
臨床驗証

輔助動向

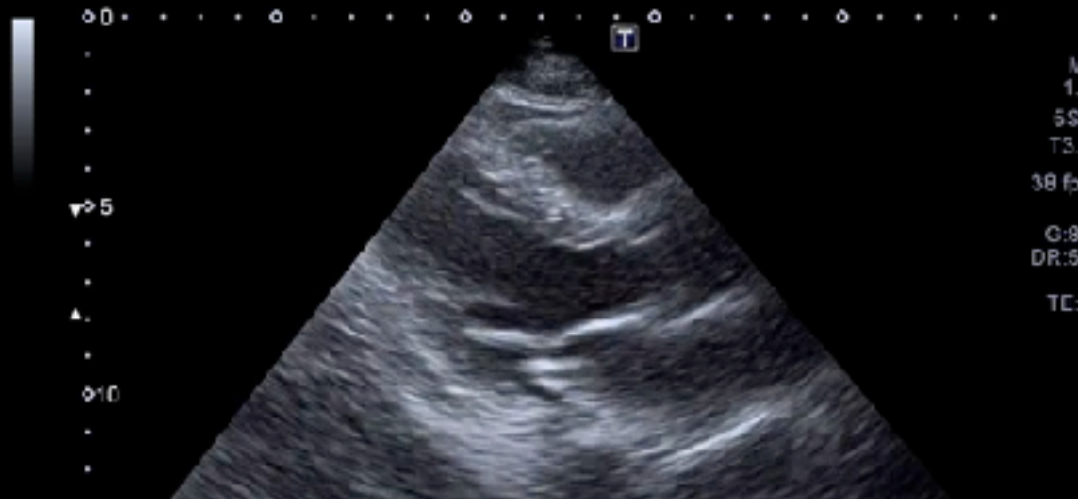
有無併發

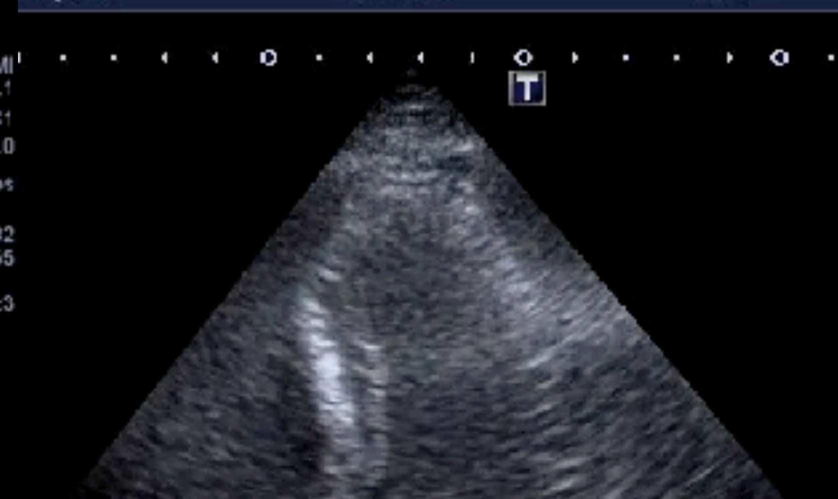
88歲榮民
前妻代訴病人去公園運動後返家，
小孩聽到巨響後，發現病人倒臥在地上，
意識清楚，但有冒冷汗、胸口腹部不適

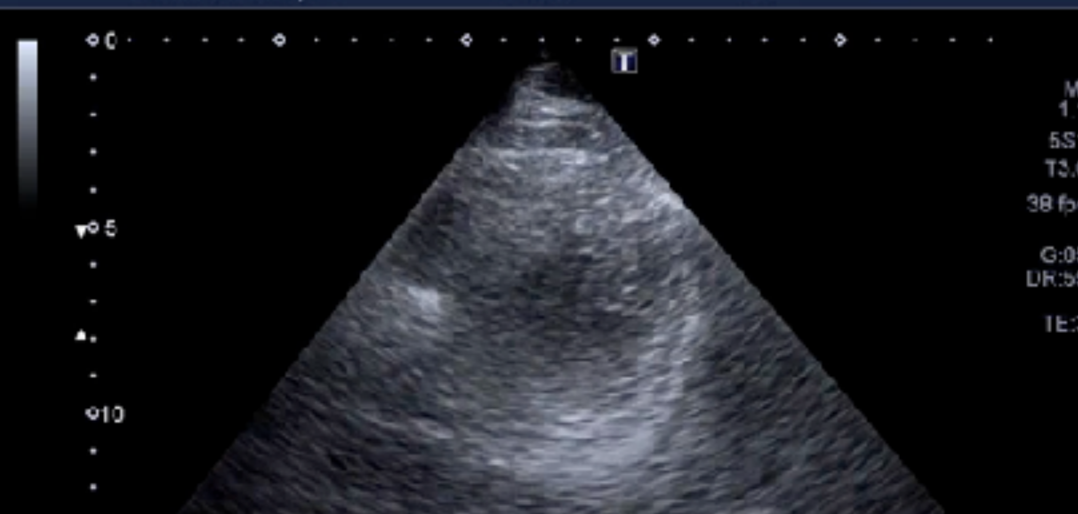
個案

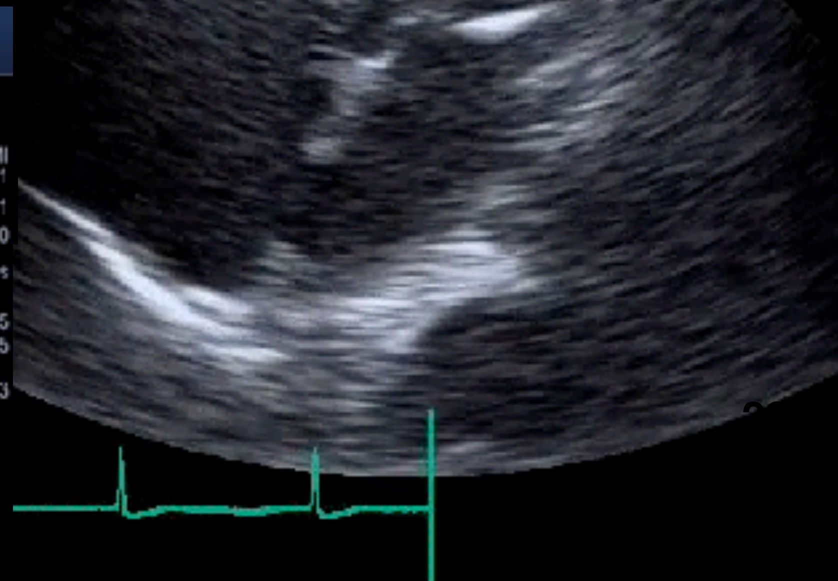


hs-Troponin-I 10









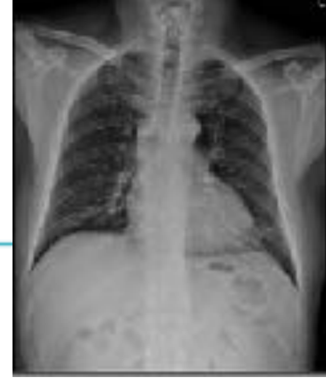
重點

重點≠完整

不能來排除

掃描的目的

M/62, Chest pain 1h



M/62, Chest pain for one hour

M/62, Chest pain for one hour

MI 1.3 8/11/2020

SKH ER TIS 0.5 9:15:13 AM

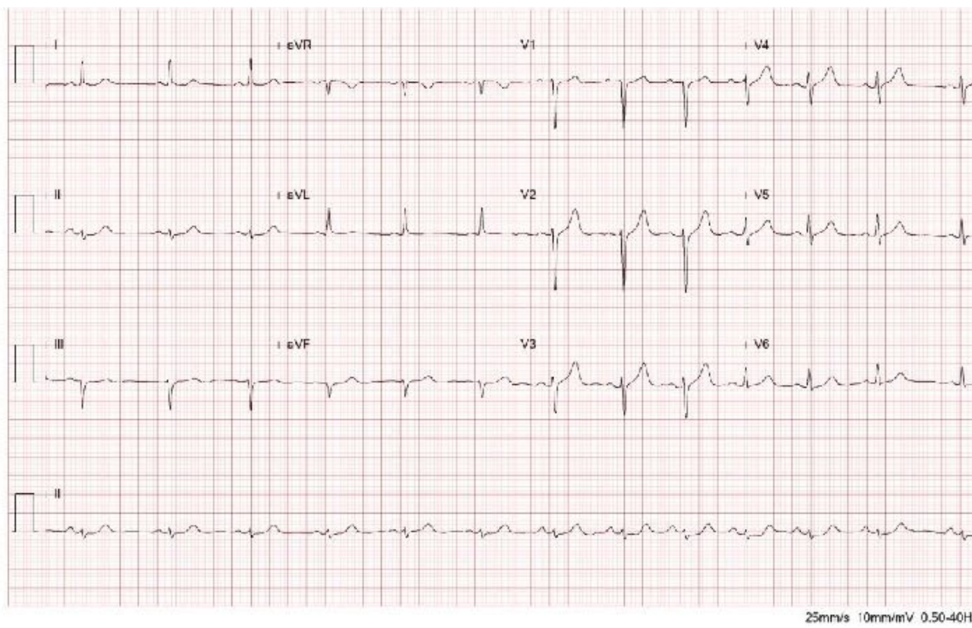
SKH ER

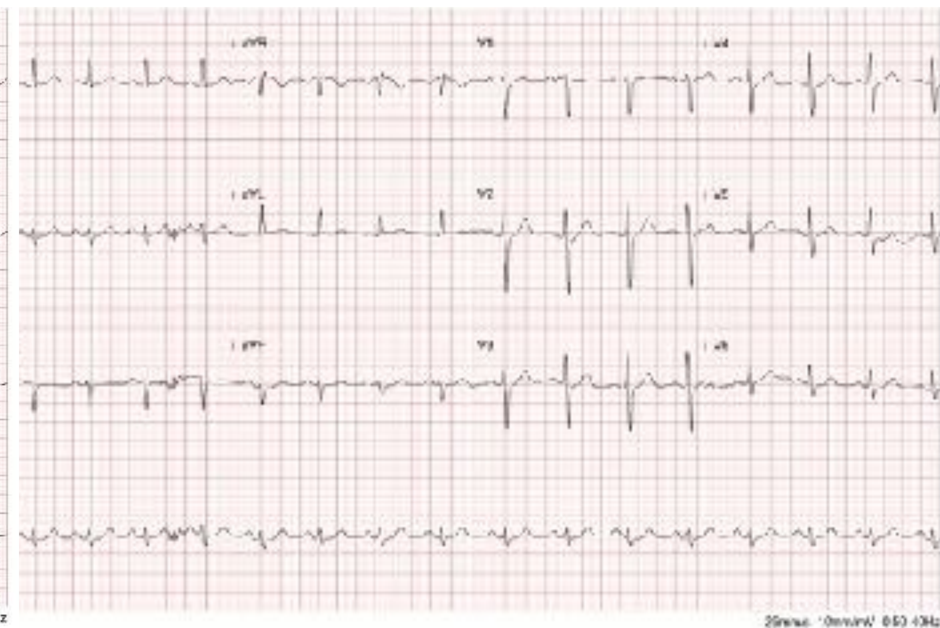
MI 1.2

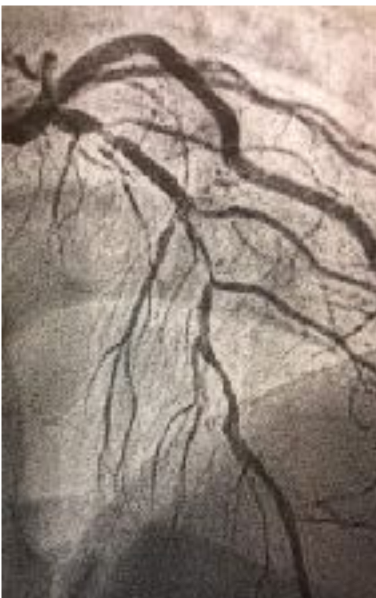
TIS 0.4

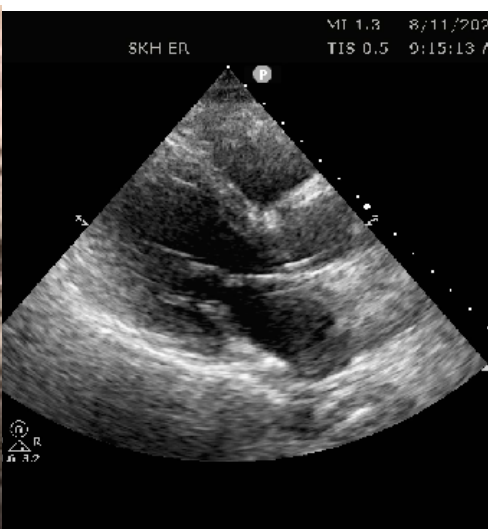
20200811 EKG

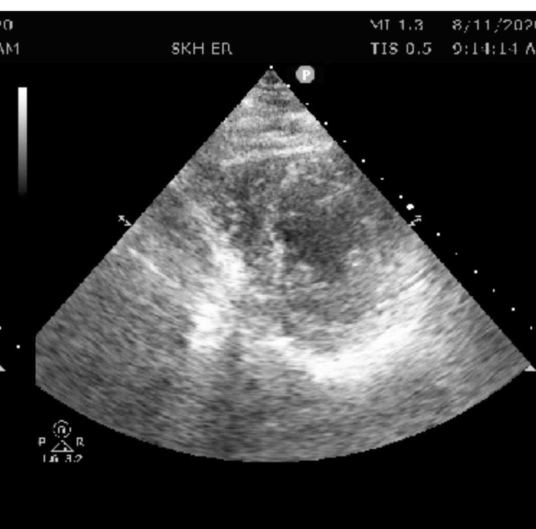
20200716 EKG

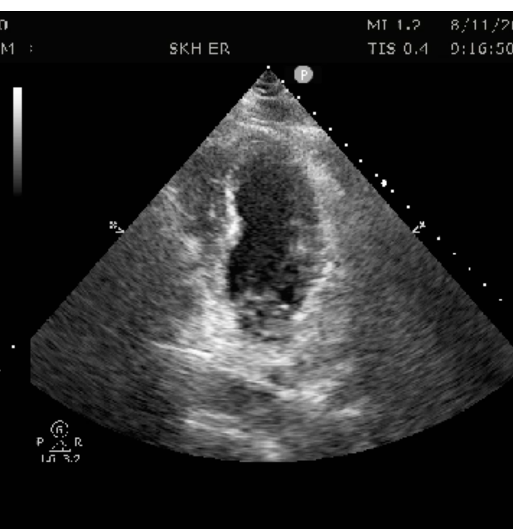












重點

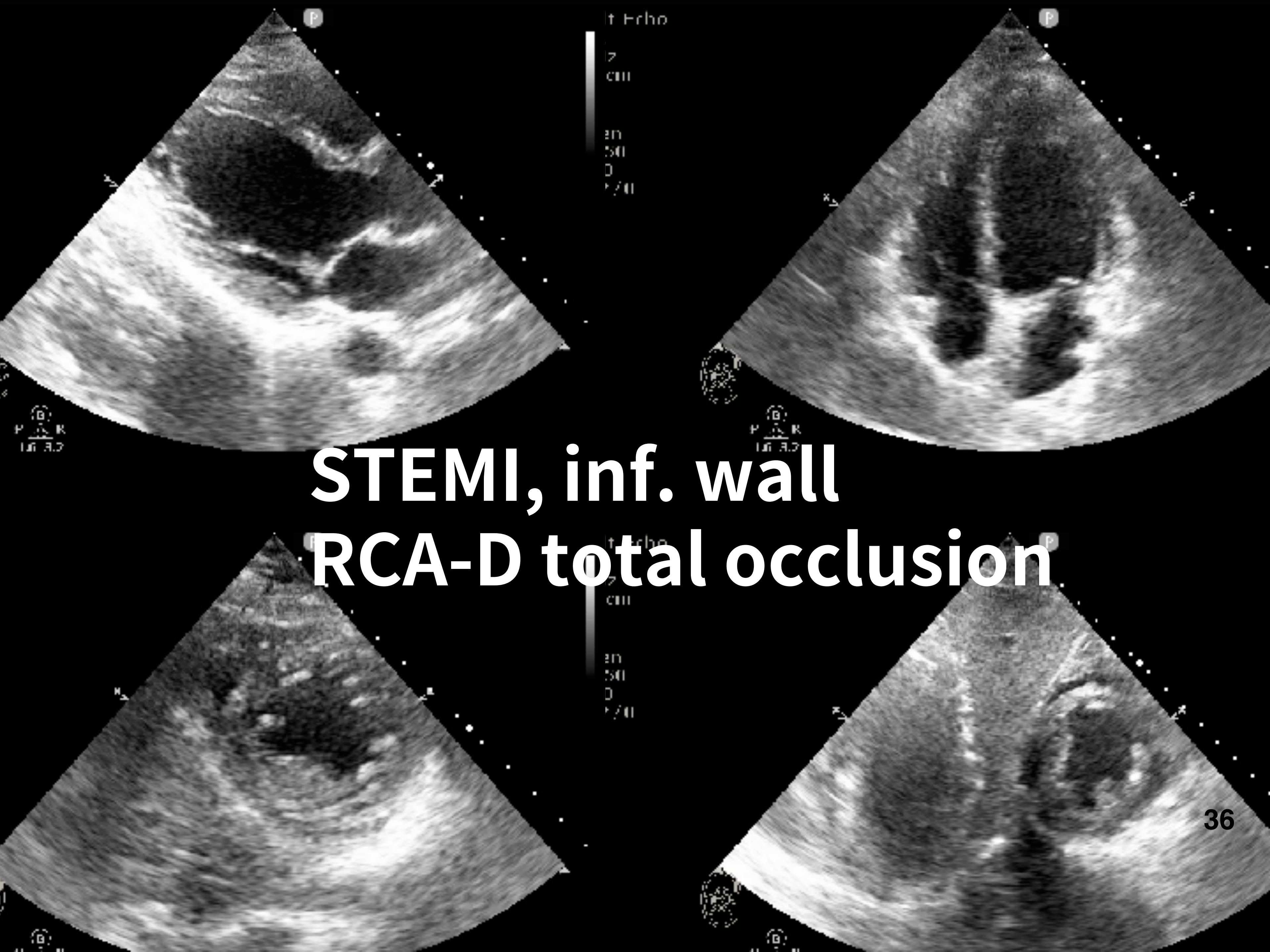
AMI三部曲

持續症狀者

補強找併發

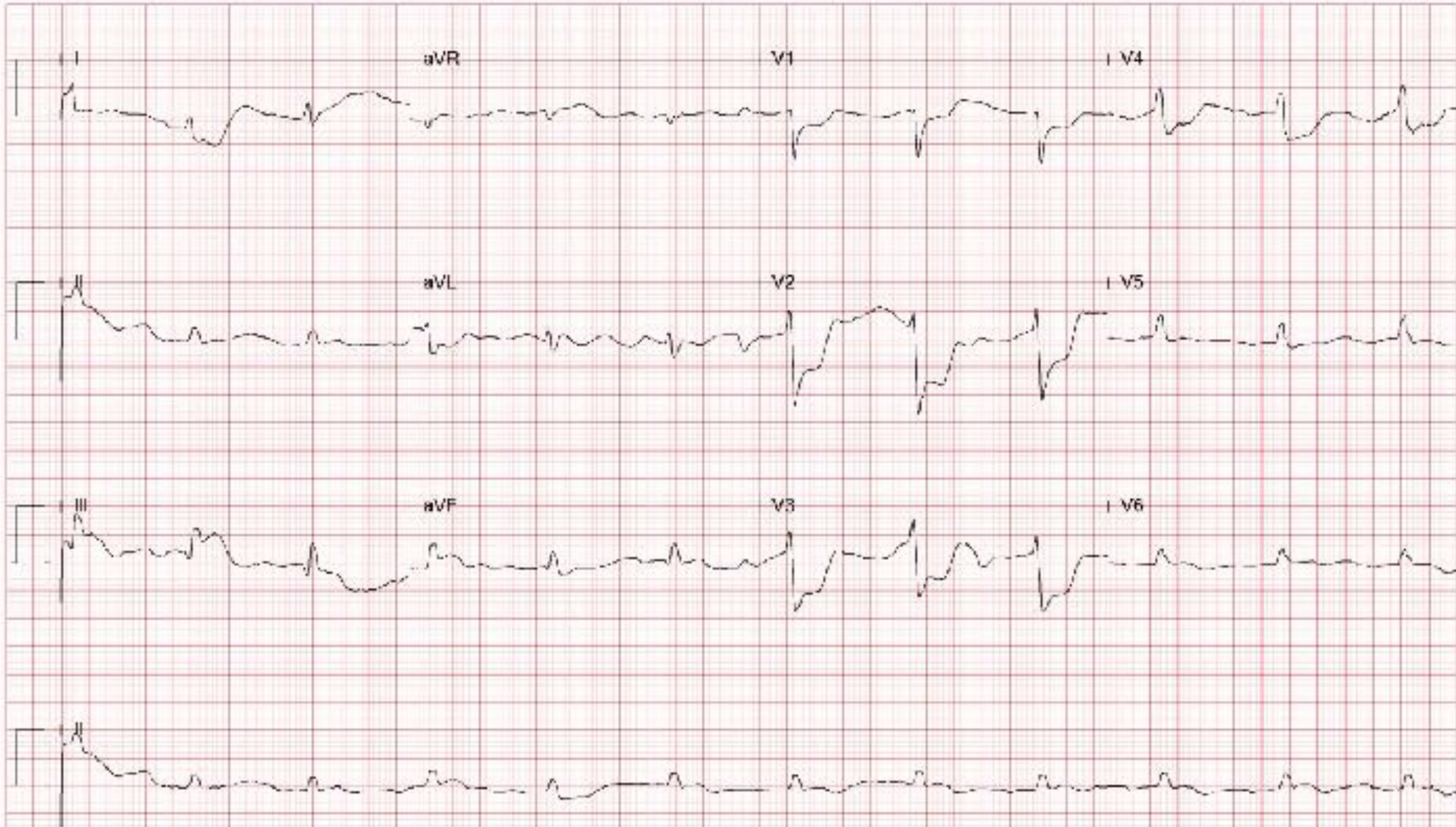
39M, epigastric pain & cold sweating

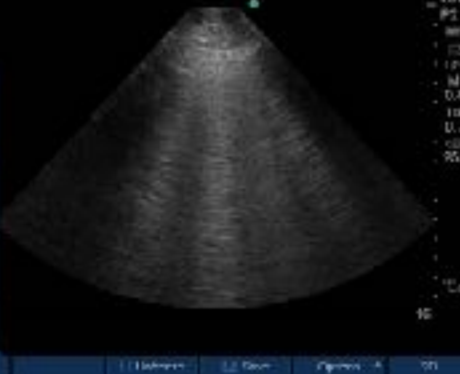
I aVR V1 V4
II aVL V2 V5
III aVF V3 V6
II

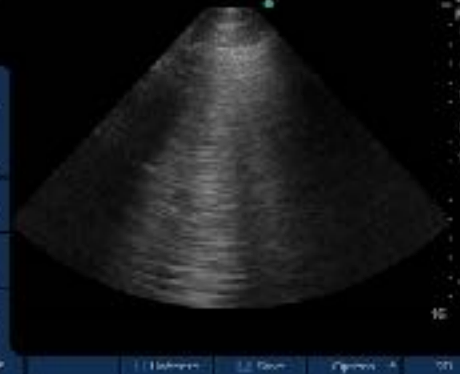

STEMI, inf. wall
RCA-D total occlusion

55M, Chest pain 2H, 119
BT 36; RR 18
SpO2 95% ; BP 80/59

個案







atient

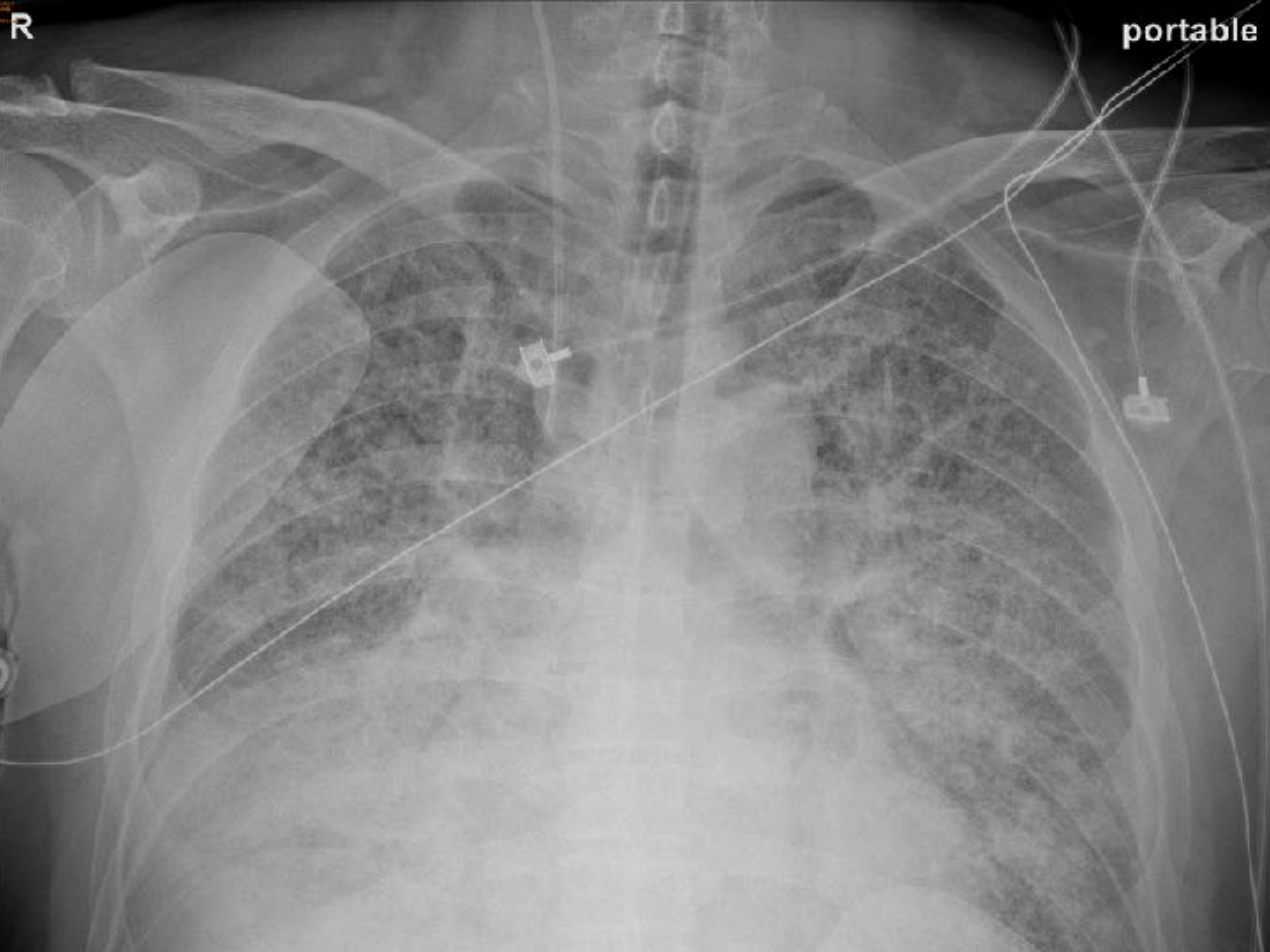
o Gain

Gen

Clip

ge 1/3

16

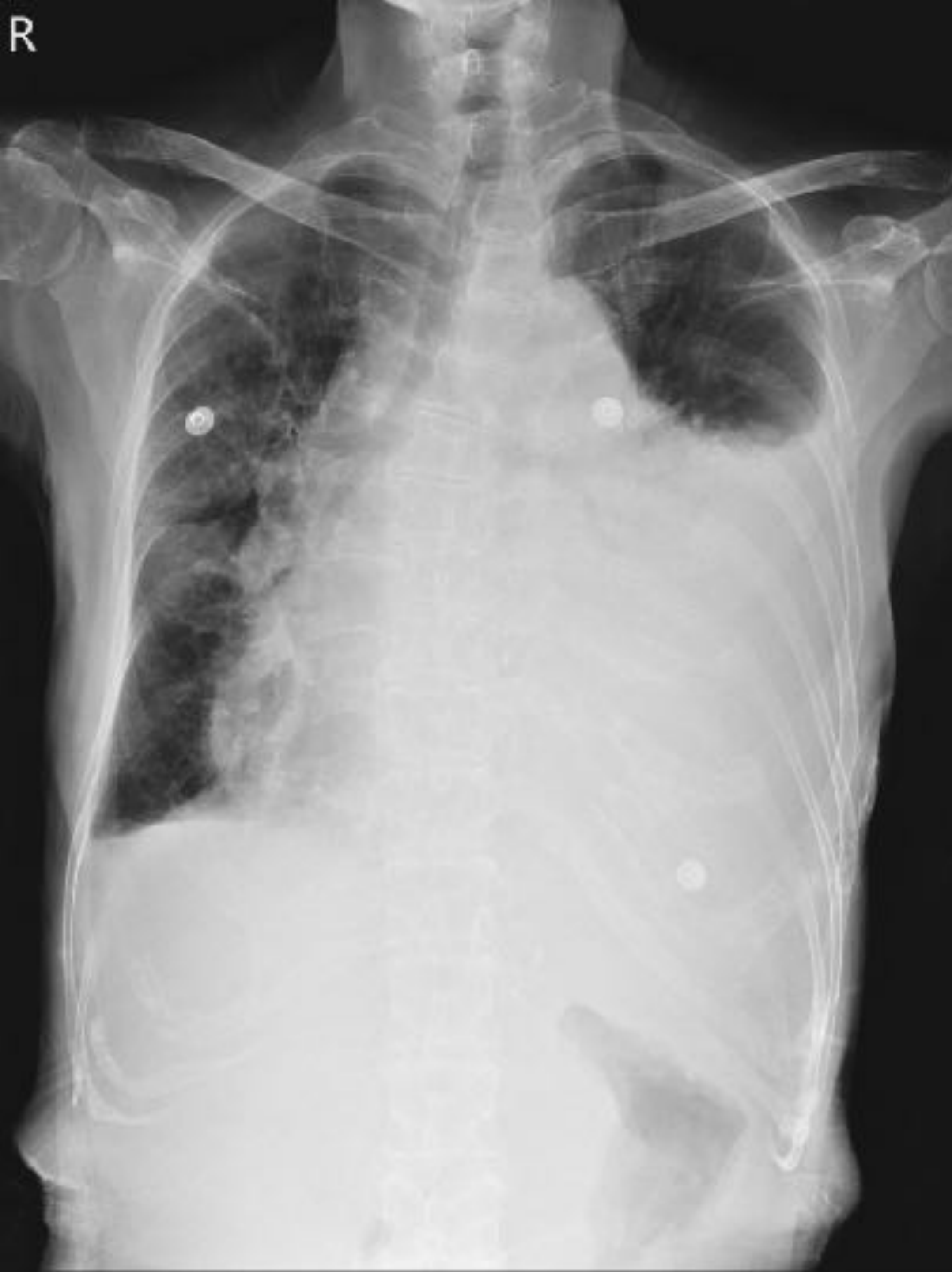

R
portable

重點

緊急PCI

IABP

ECMO



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

R

L

HR	131	. Age not entered, assumed to be 50 years old for purpose of ECG interpretation
		. Atrial fibrillation
		. Probable LVH with secondary repol abnrm
QRSD	105	$. Baseline wander in lead(s) I II III aVL aVF V2 V4 V5 V6
QT	315	
QTc	465	

-- AXIS --

QRS	-17
T	169

Order ID:57121010040912
ER:88

就診日

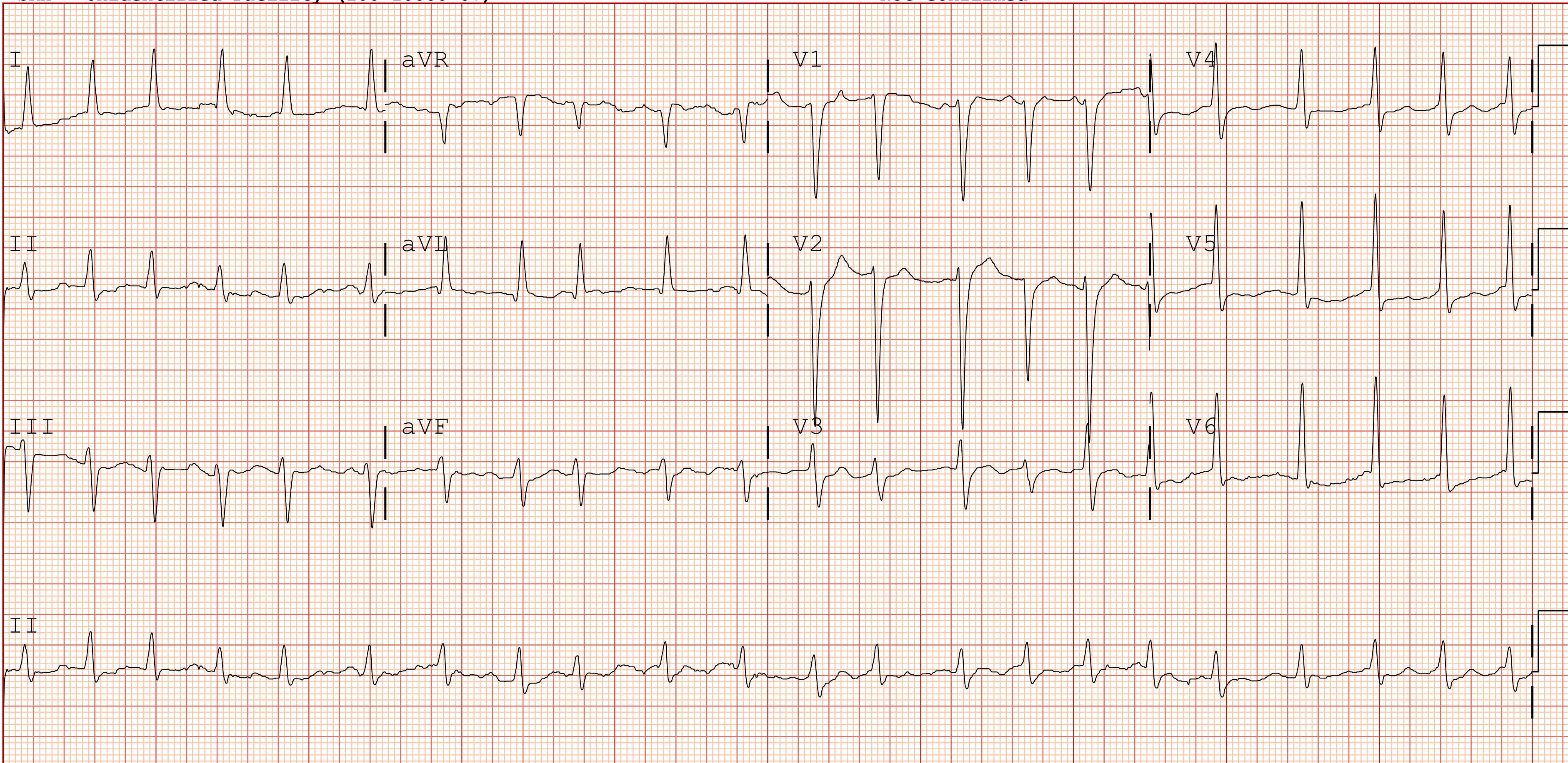
- ABNORMAL ECG -

Previous ECG:14-Jan-2021 14:31:28 - Abnormal Confirmed

Standard 12

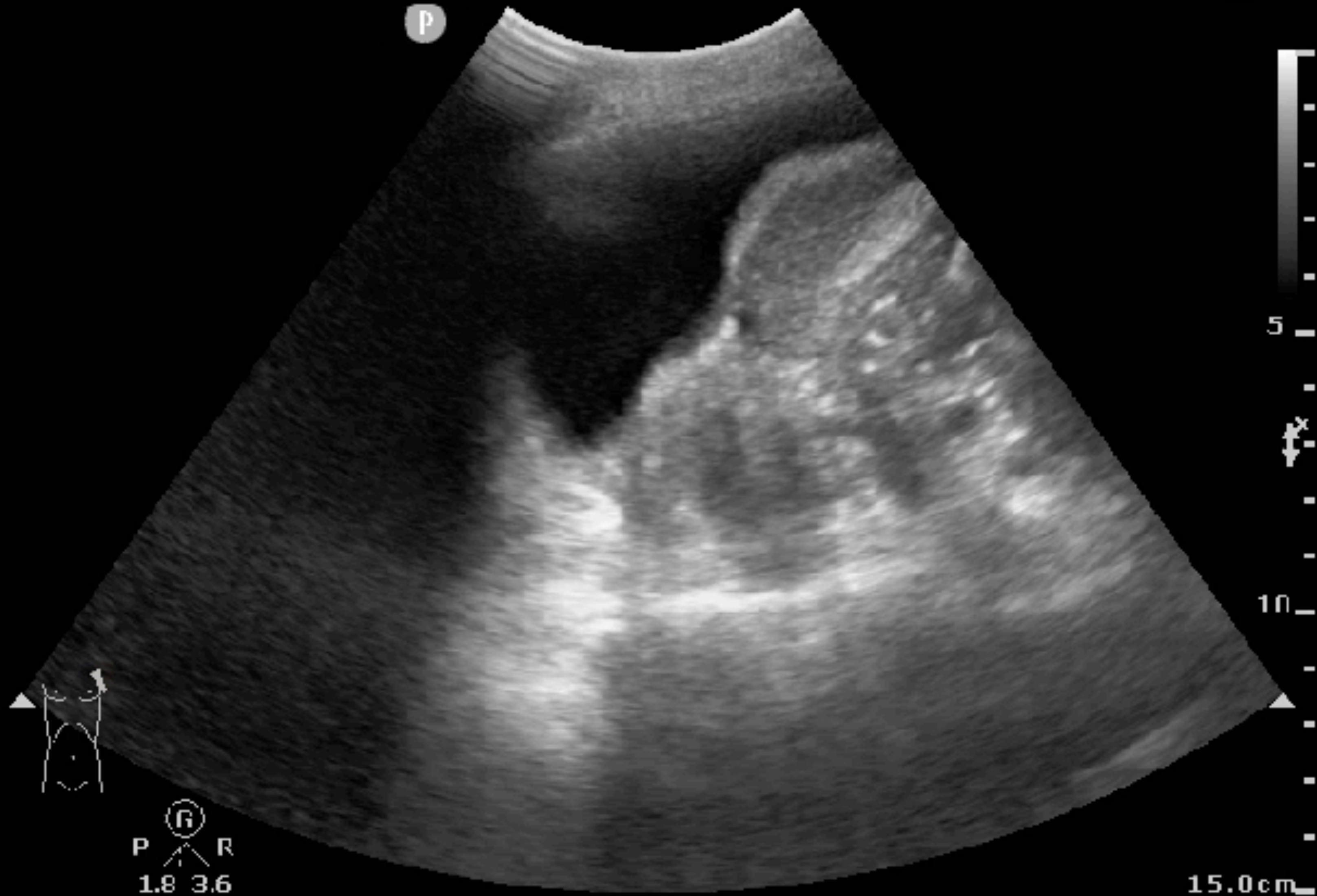
SKH - Unidentified Facility (100-10000-07)

Not confirmed

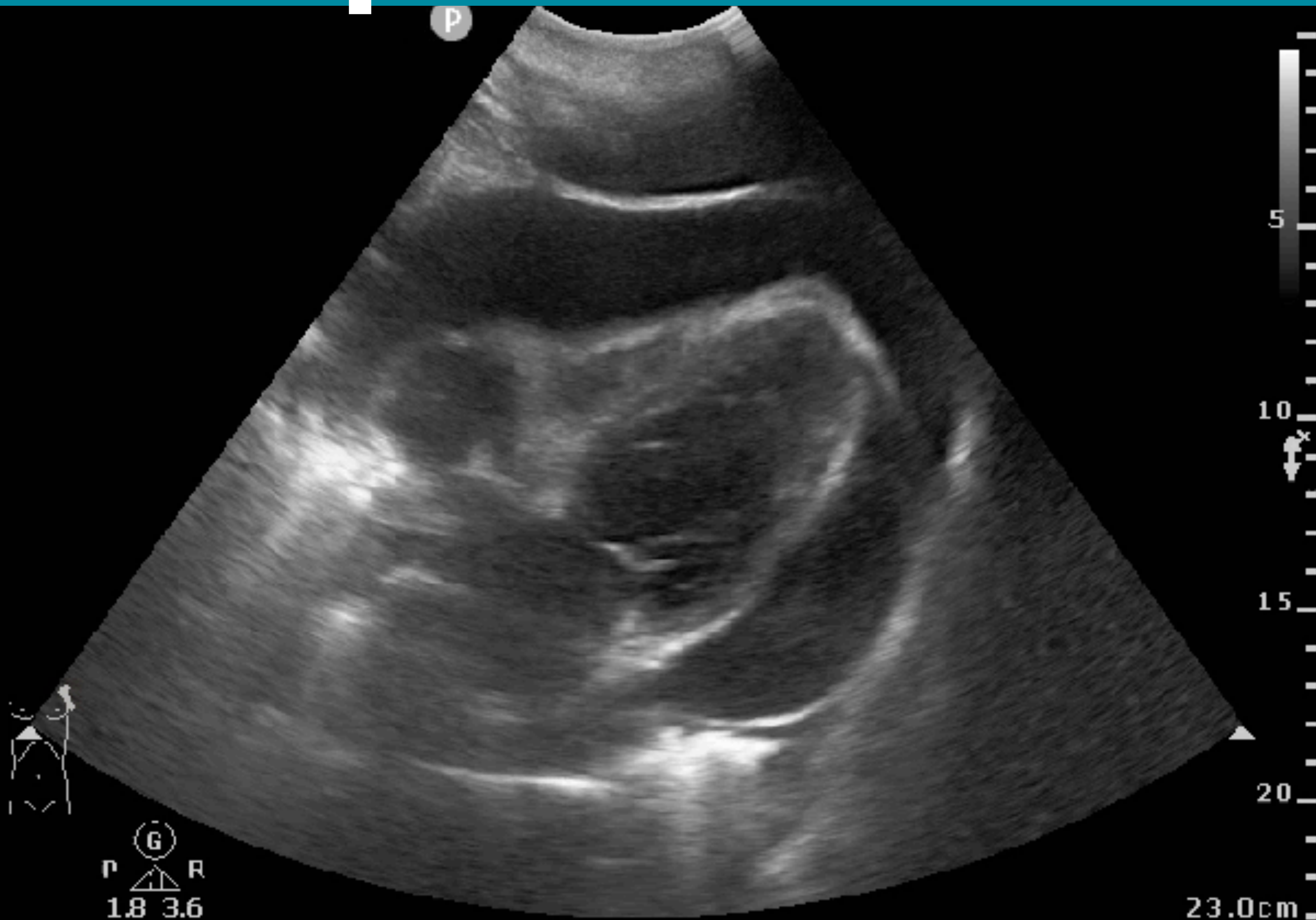


Device: Speed: 25 mm/sec Limb: 10 mm/mV Chest: 10 mm/mV F 60~ 0.5-40 Hz W PH100B CL P?

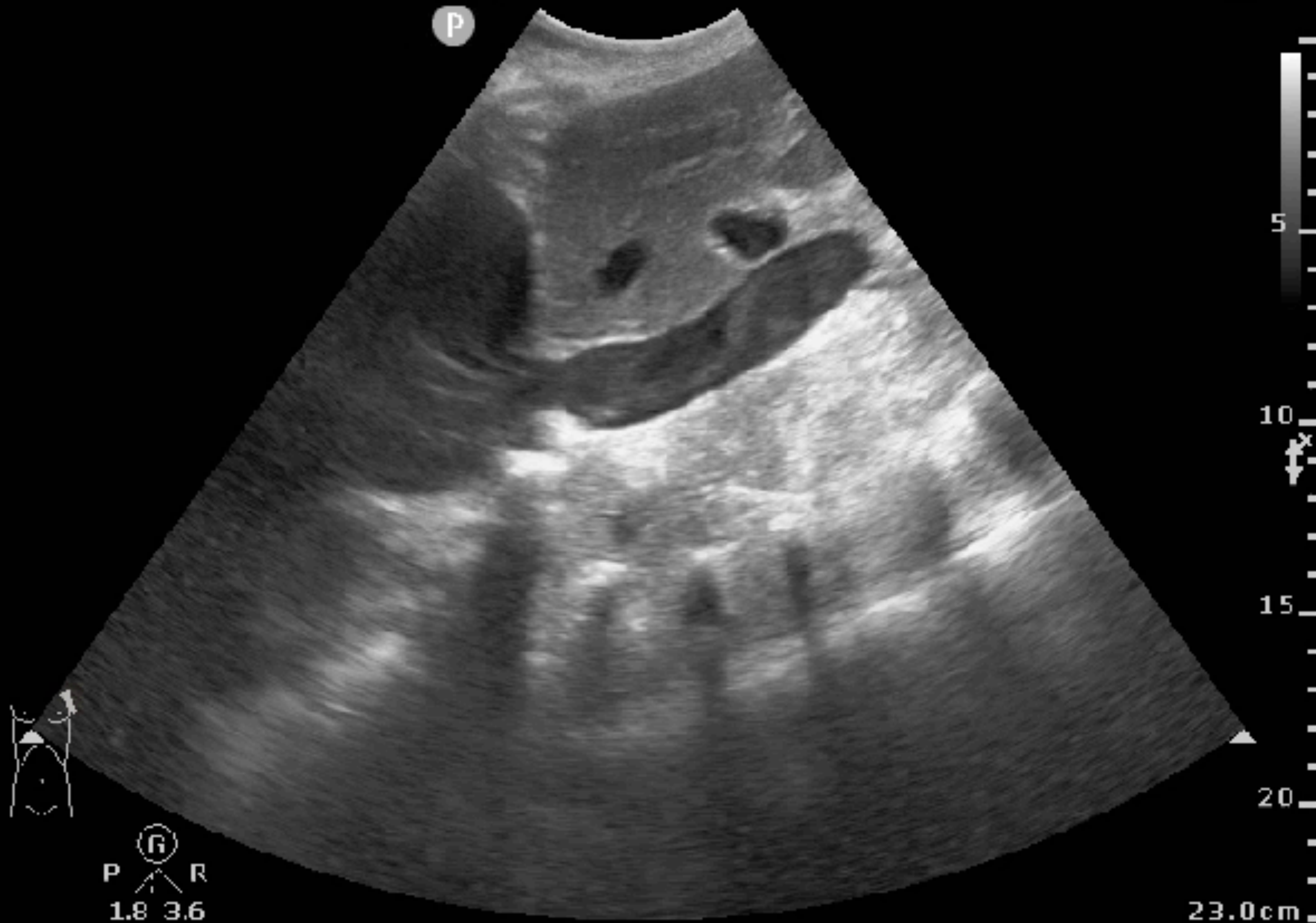
PLE相關？

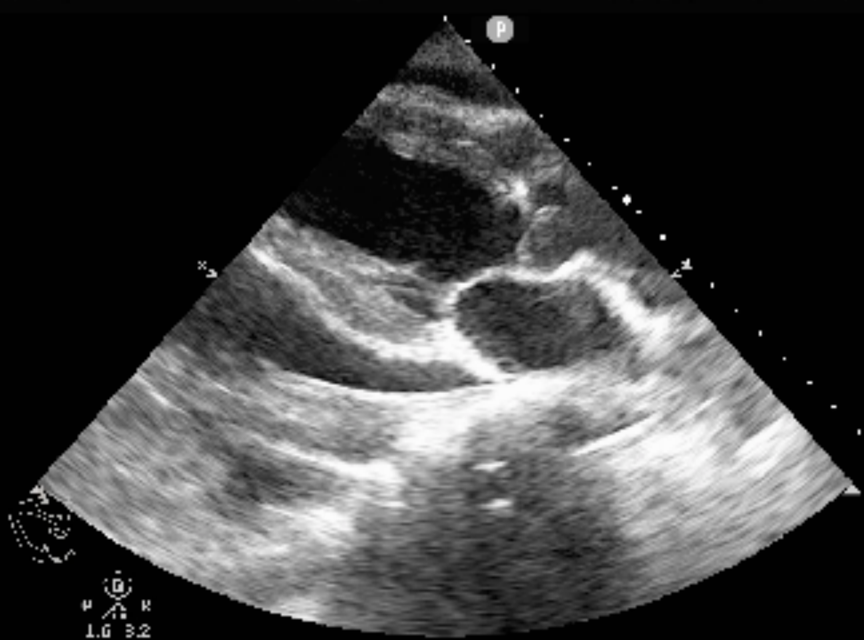


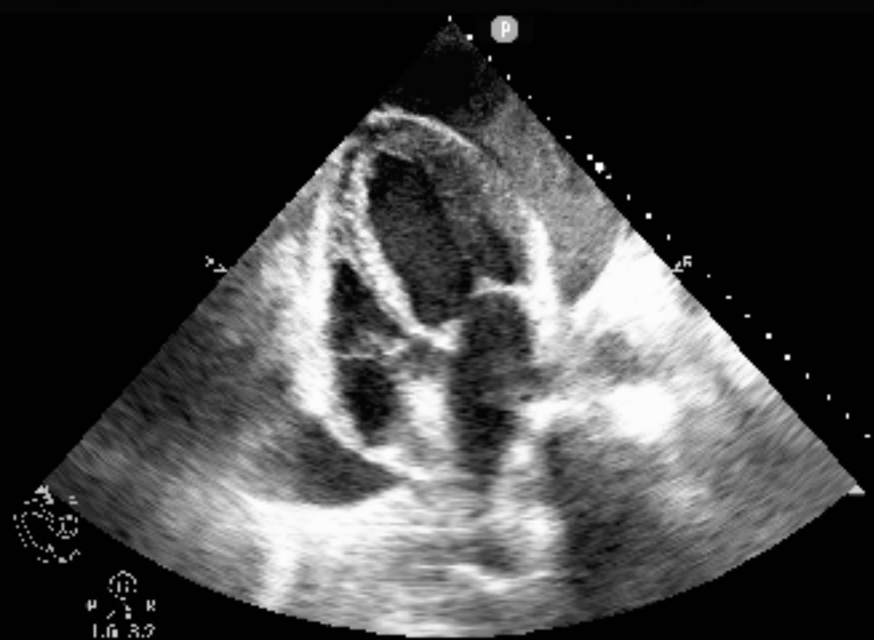
Tamponade ?

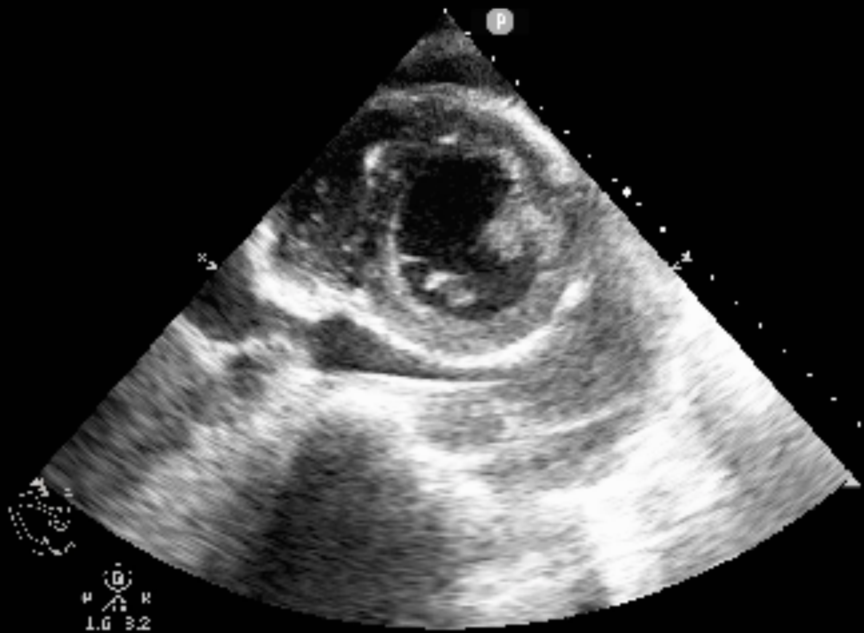


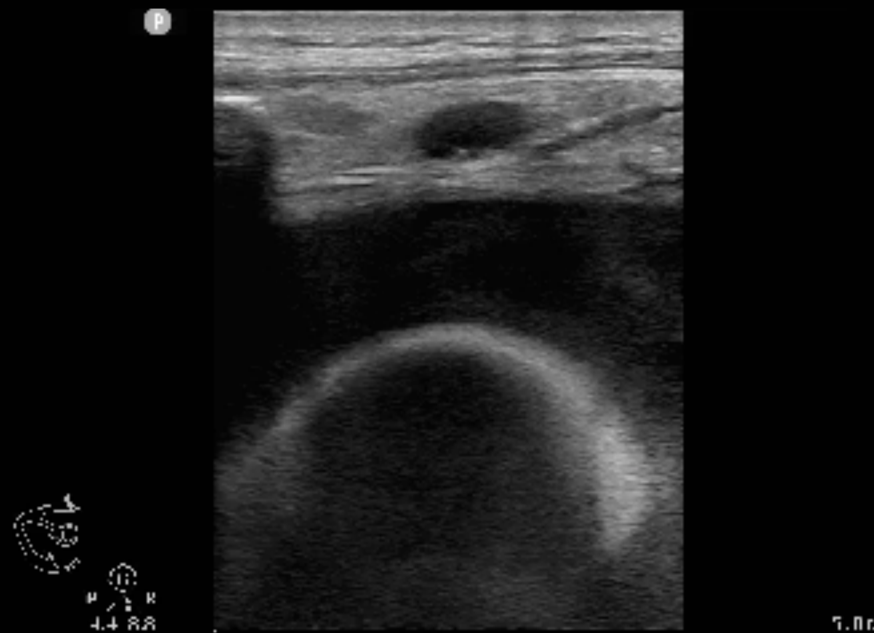
臨床/積液/鼓漲









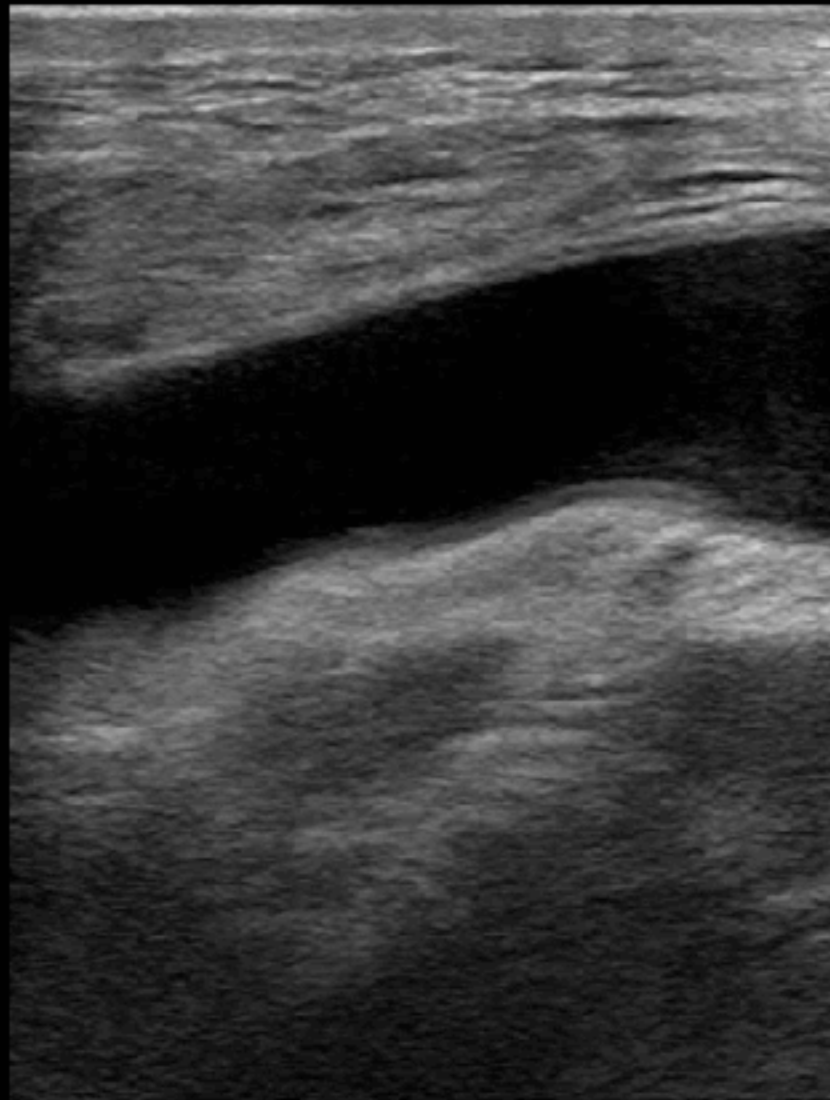


Parasternal approach

Arterial
L12-3
31 Hz
5.0cm

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

P R
4.4 0.0

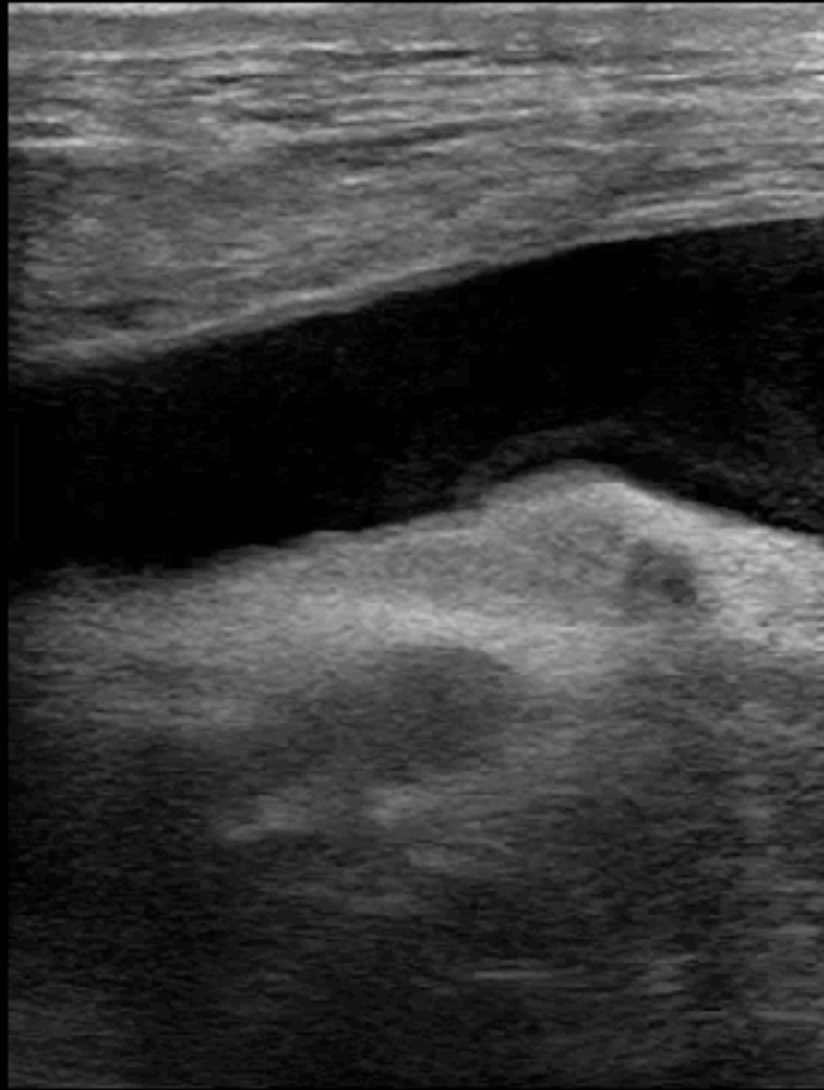


2
4
5.0cm

Step-by-step drainage

Arterial
L12-3
34 Hz
5.0cm

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



2
1
5.0cm

Monitor after drainage

重點

引流三部曲

選最短路徑

精準的運針

輔助急救

協助引流

確立診斷

風險評估