Arrest and Periarrest POCUS

Jailyn Avila

COI: Butterfly (former)

ID reversible causes

Pulse checks

Procedural

ID reversible causes

Tamponade

Hypovolemia

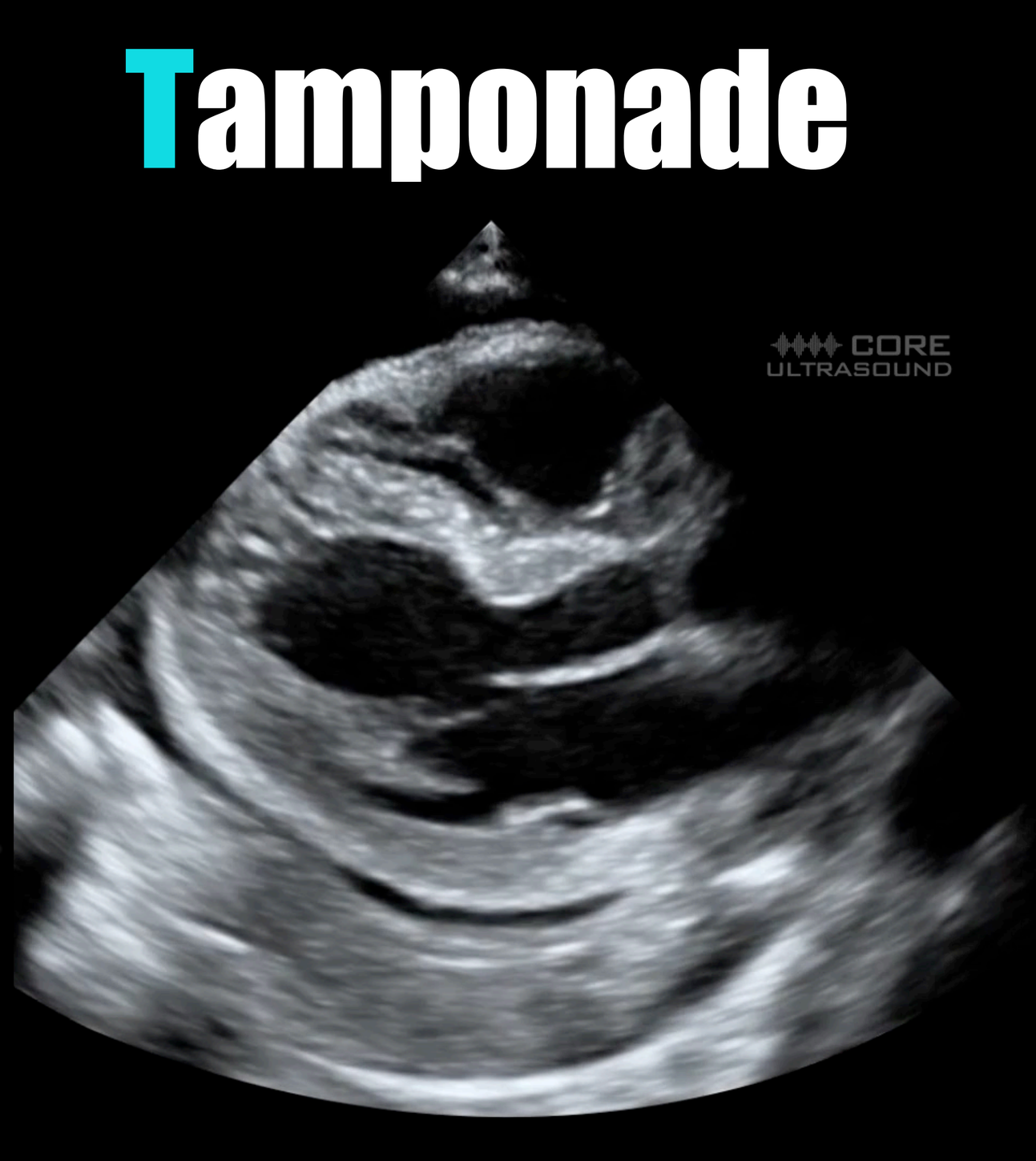
Tension PTX

Thrombosis

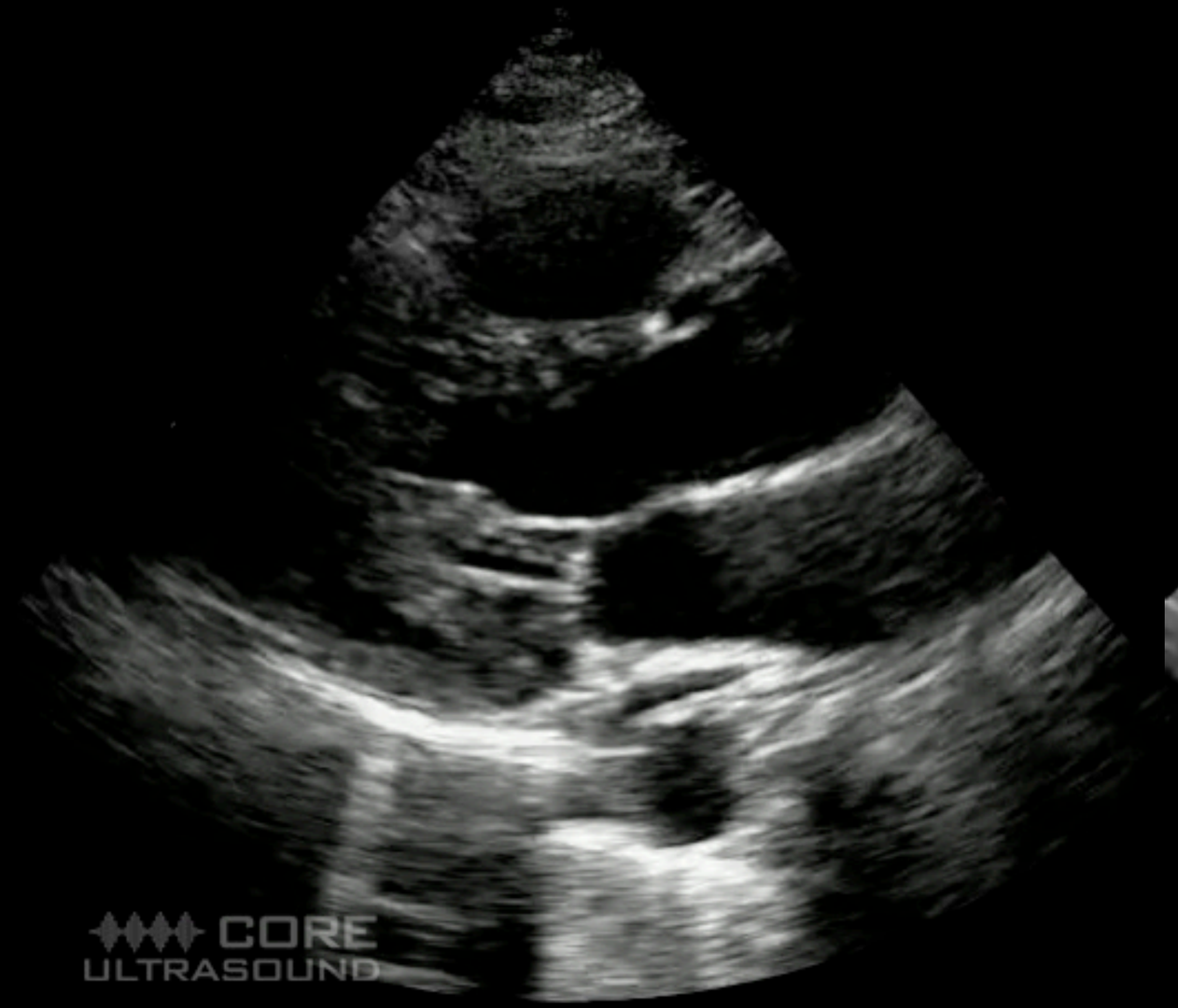
Trauma

No tamponade

Tamponade

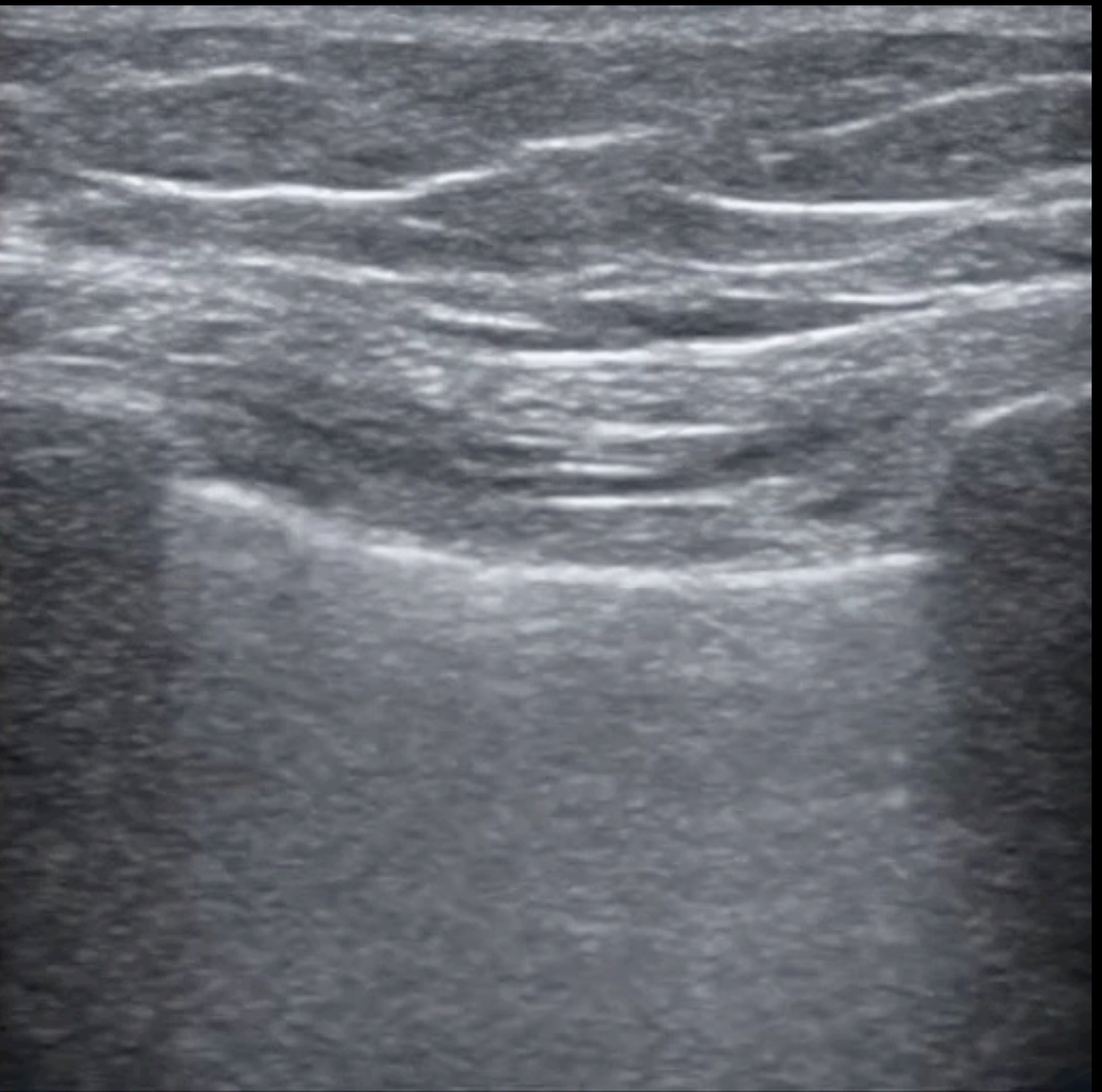


No hypovolemia

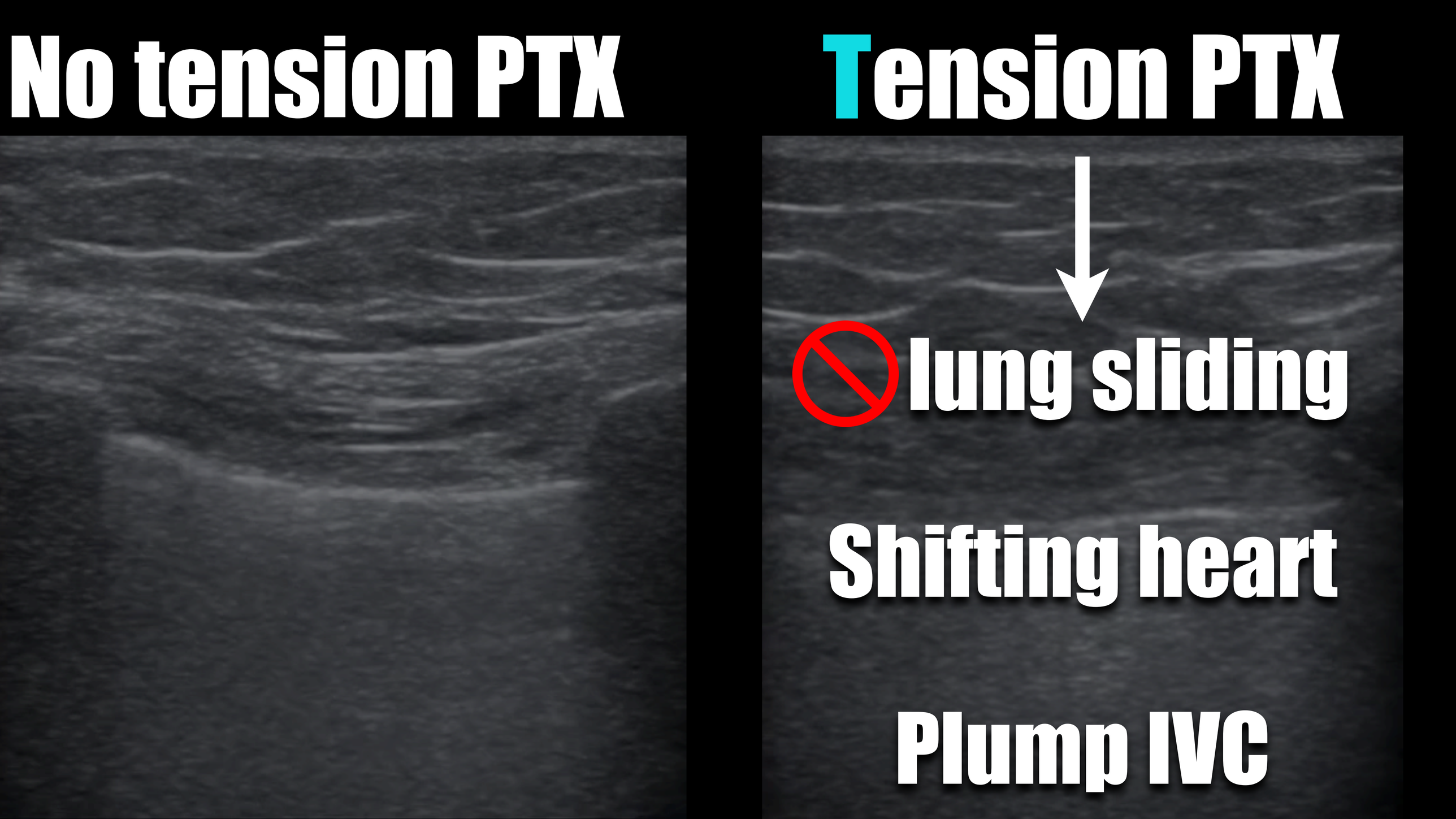


Hypovolemia

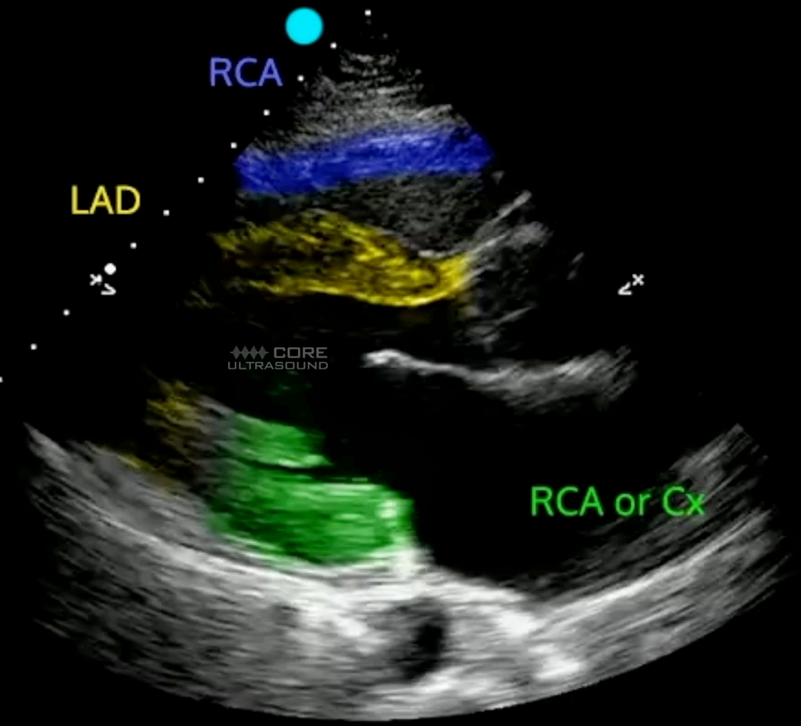
No tension PTX

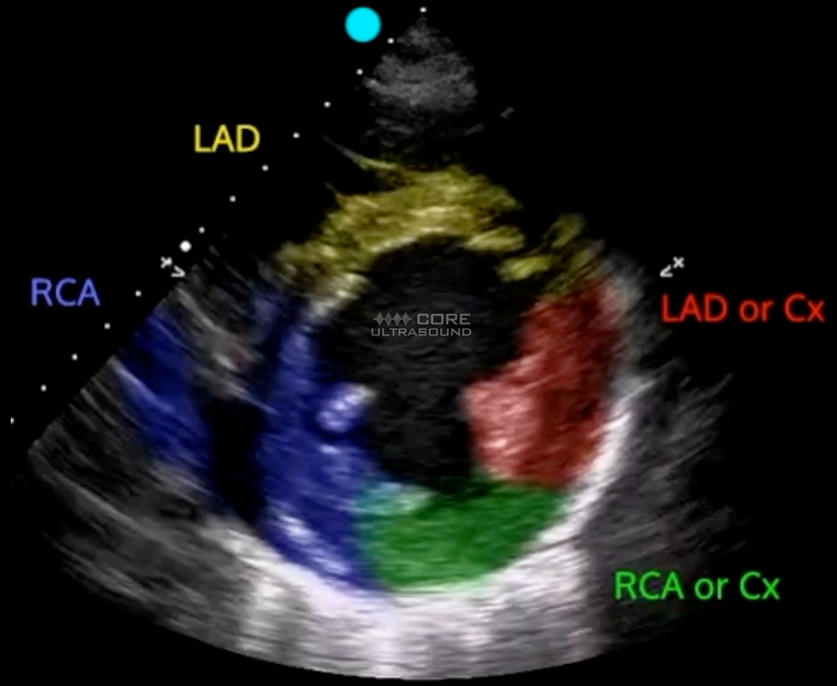


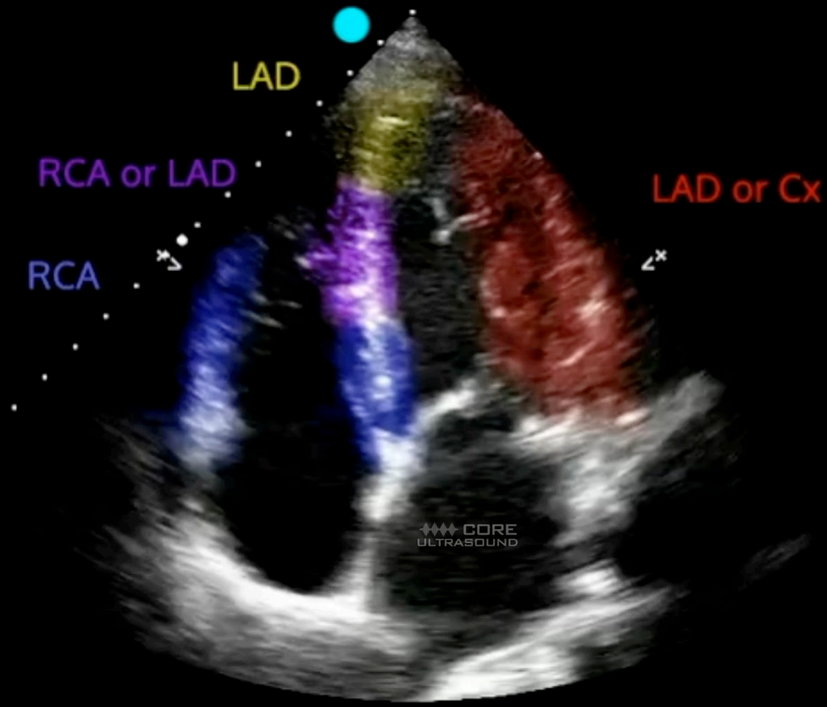
Tension PTX


No tension PTX
Tension PTX
lung sliding
Shifting heart
Plump IVC

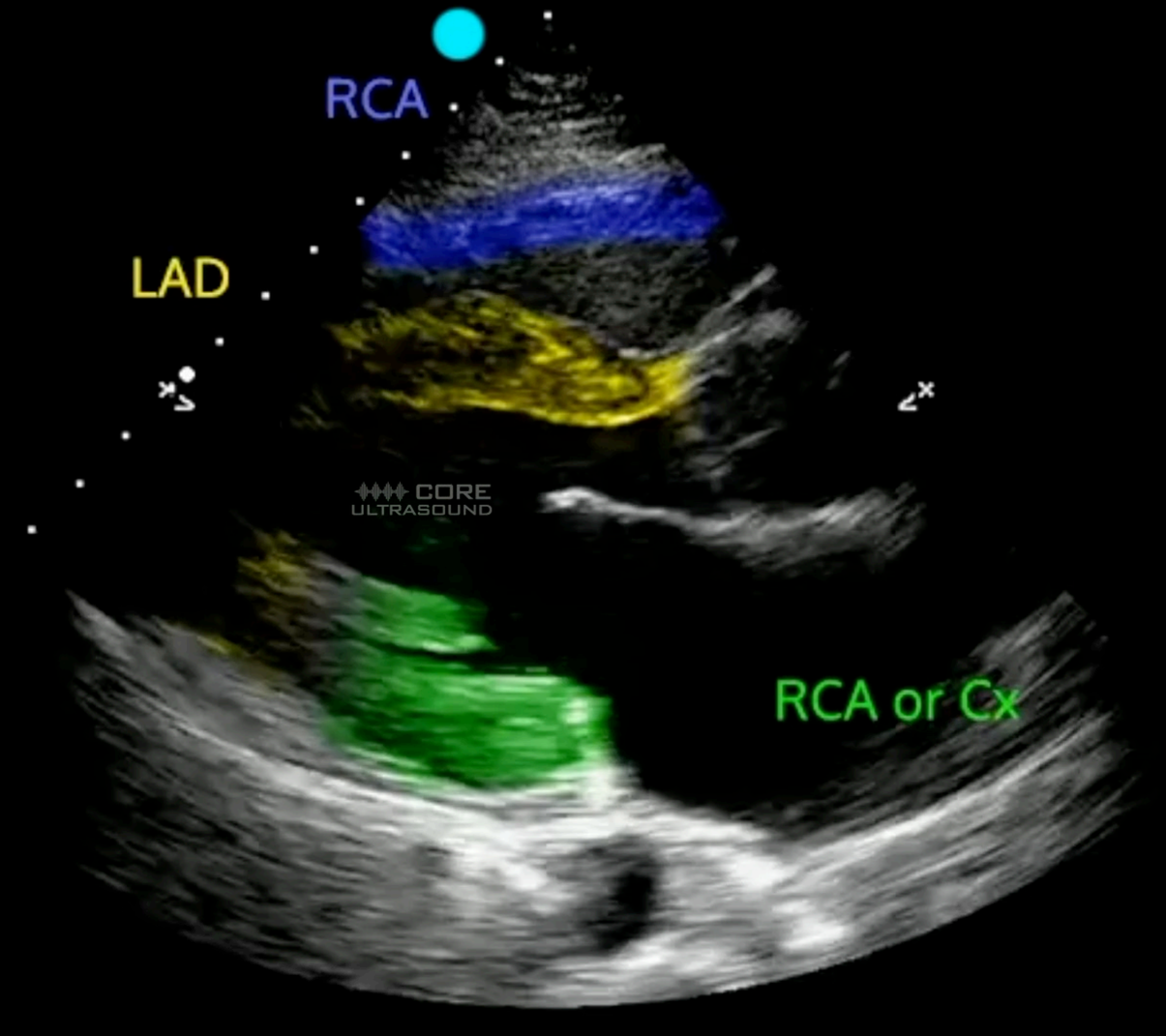
Thombosis (RWMA)



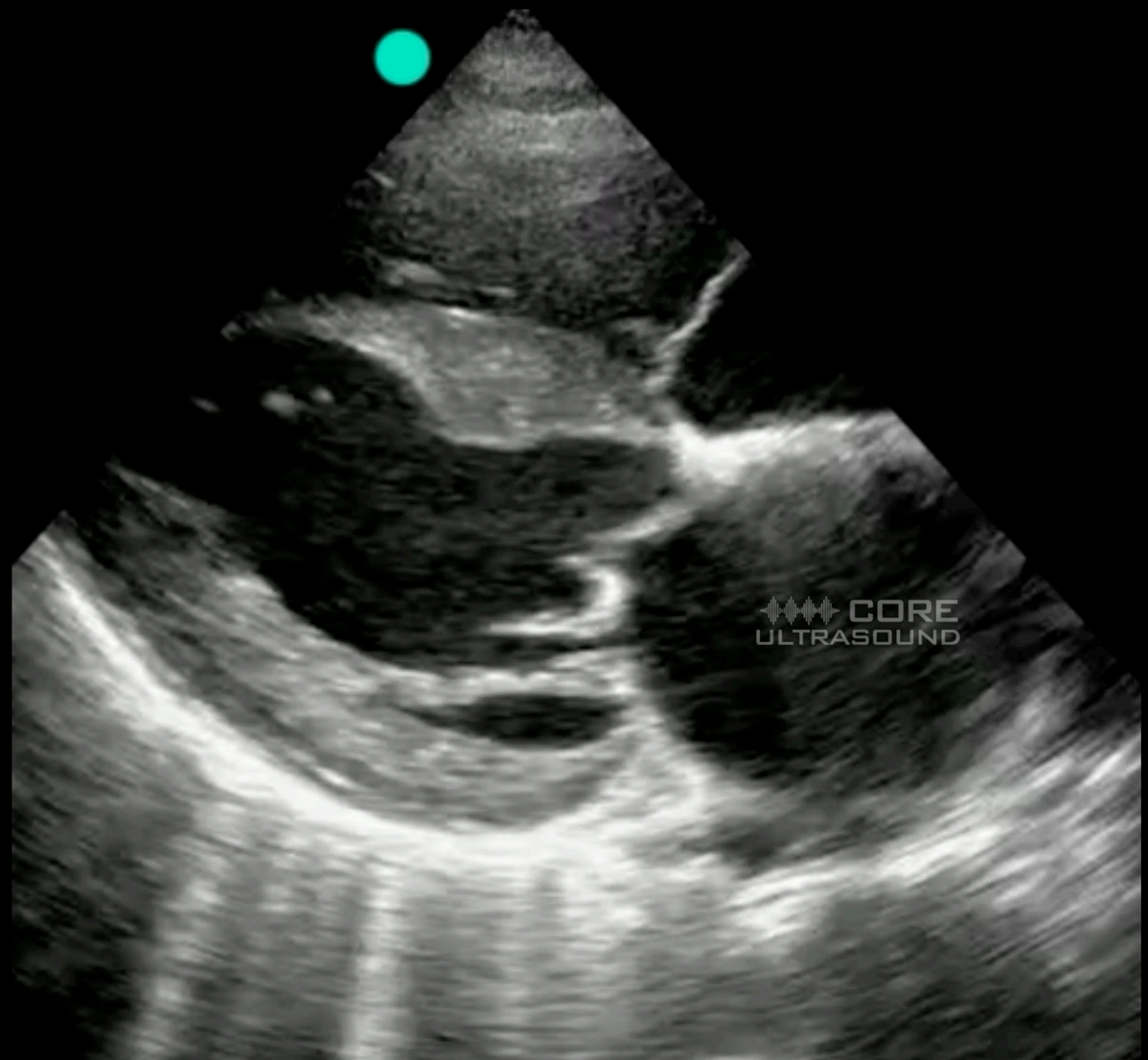




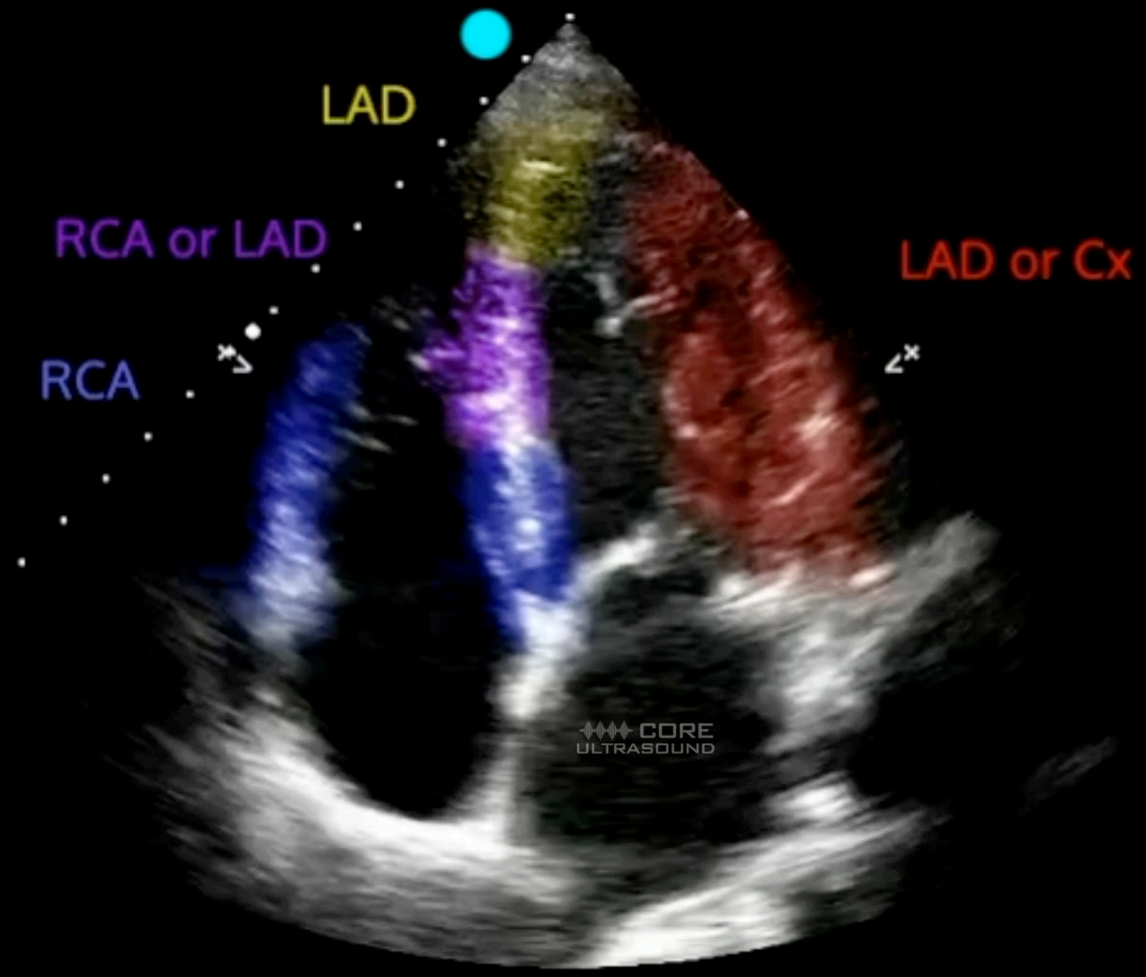
No thrombosis



Thombosis (MI)



No thrombosis



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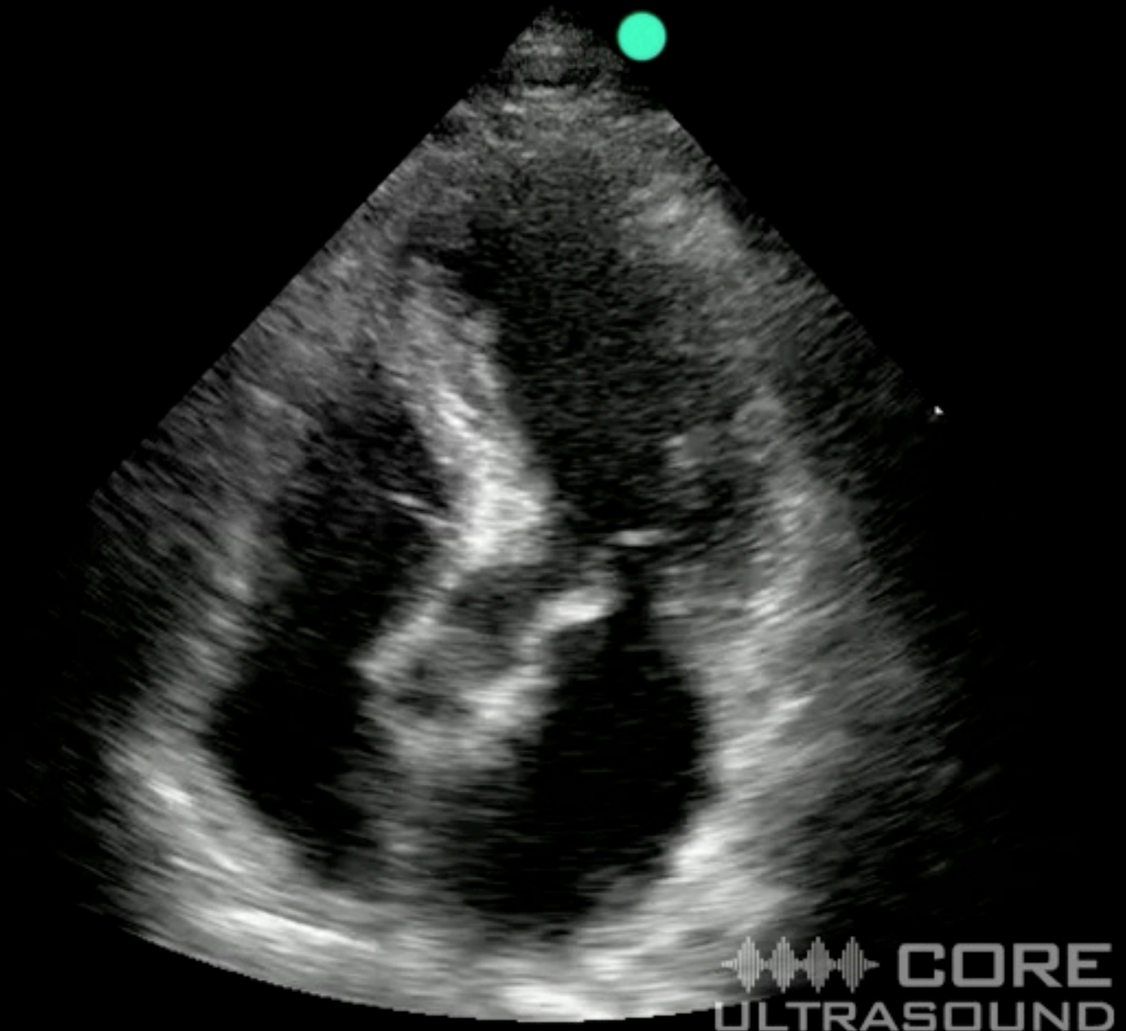
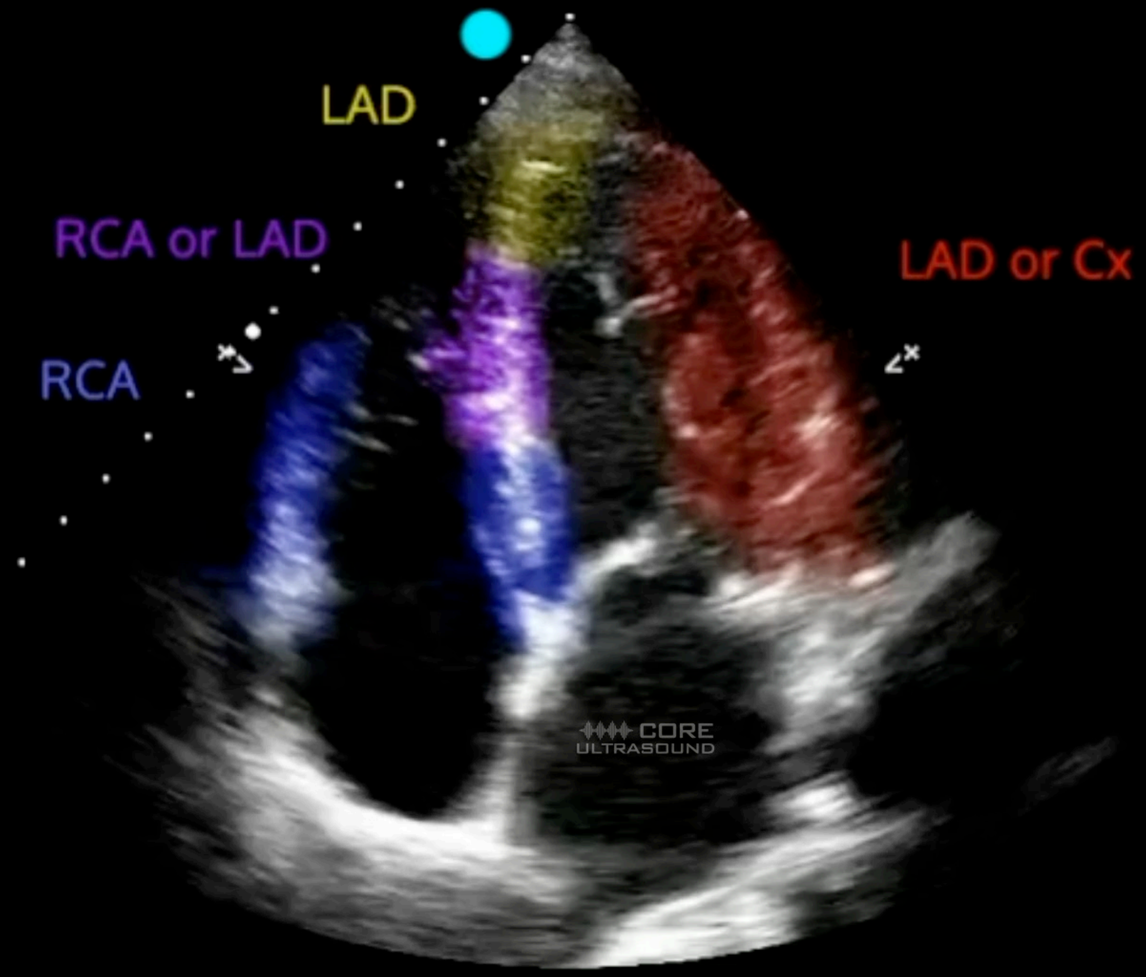
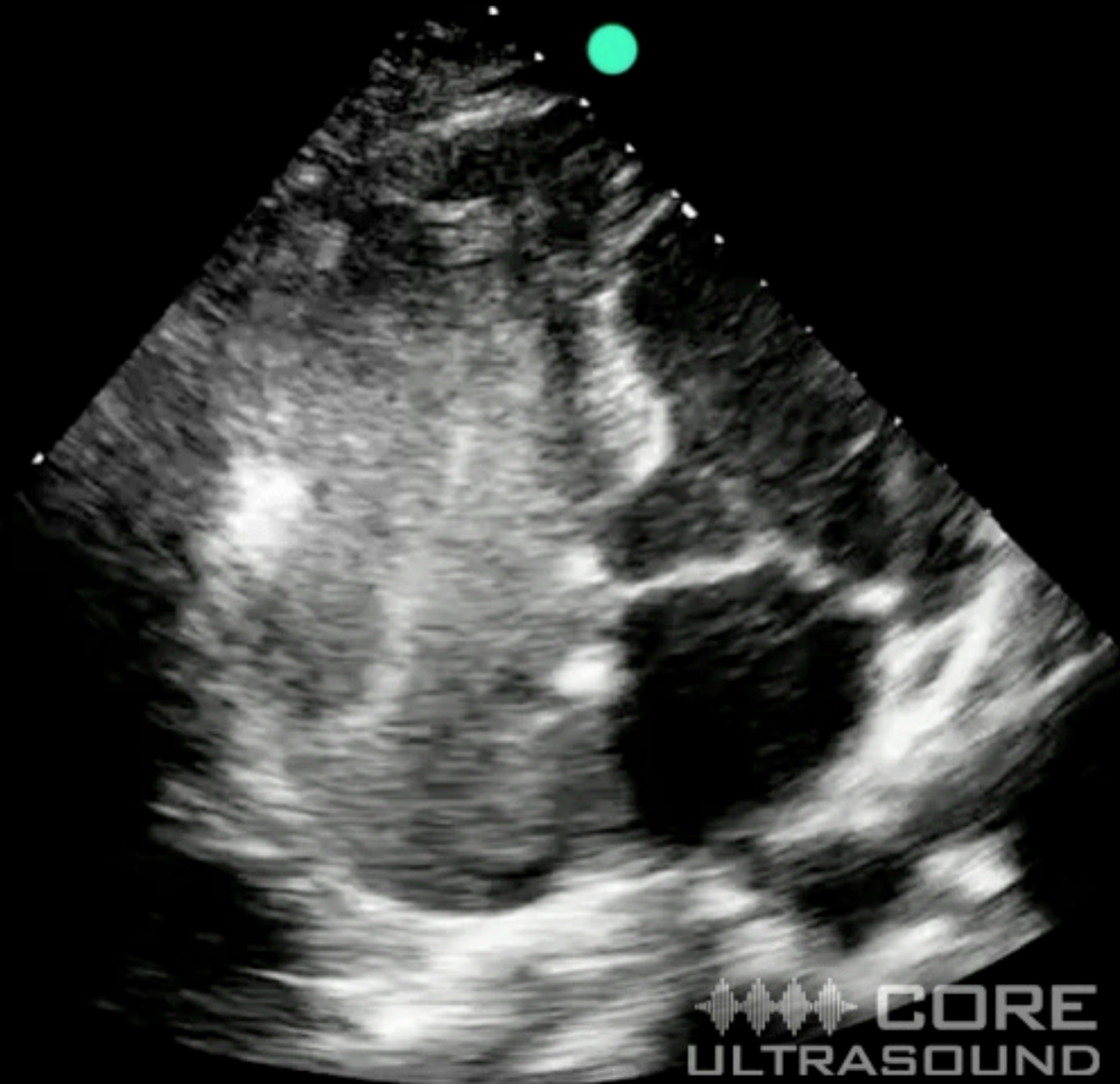


No thrombosis

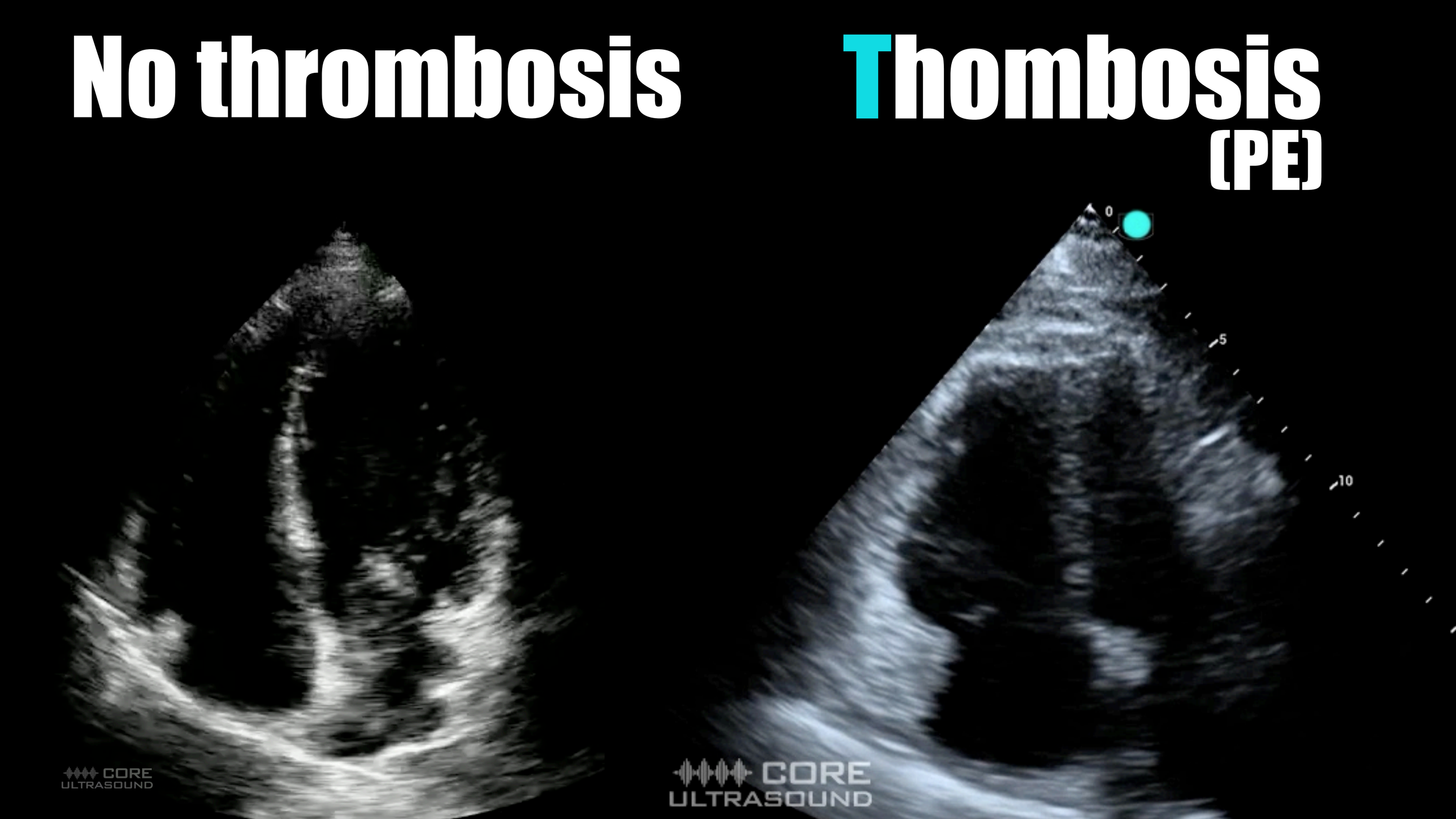


Thombosis (MI)

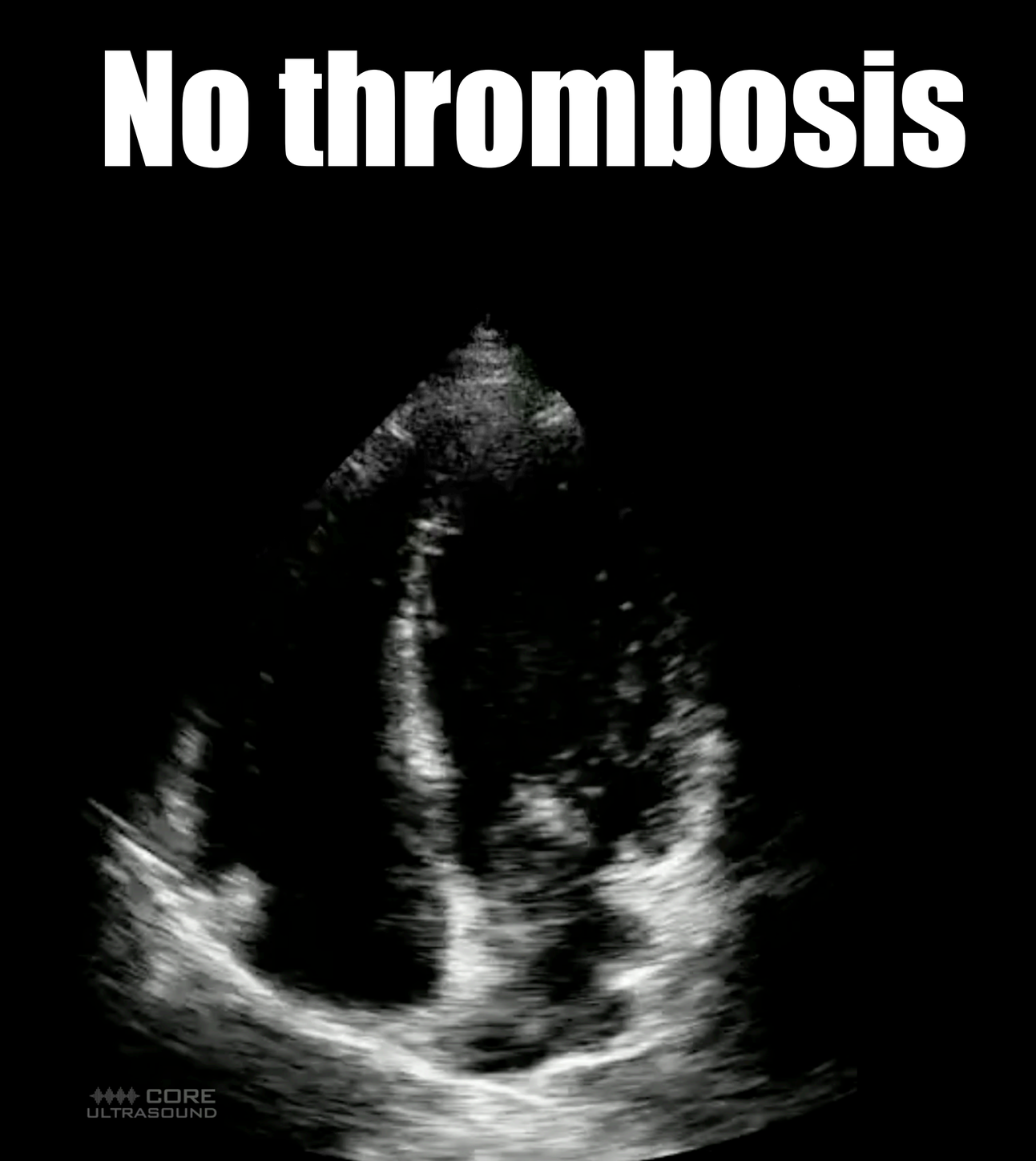


No thrombosis

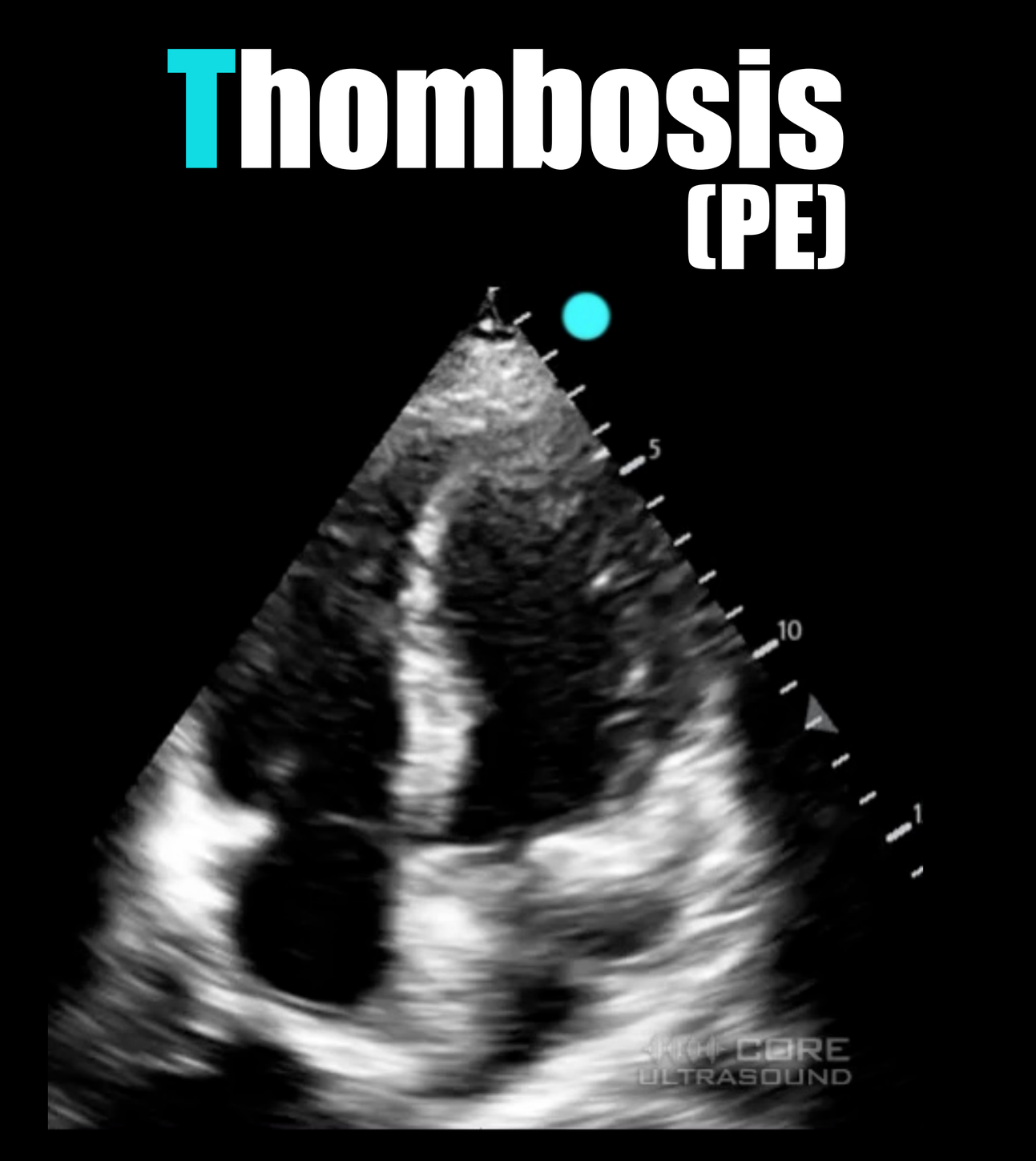
Thombosis (PE)



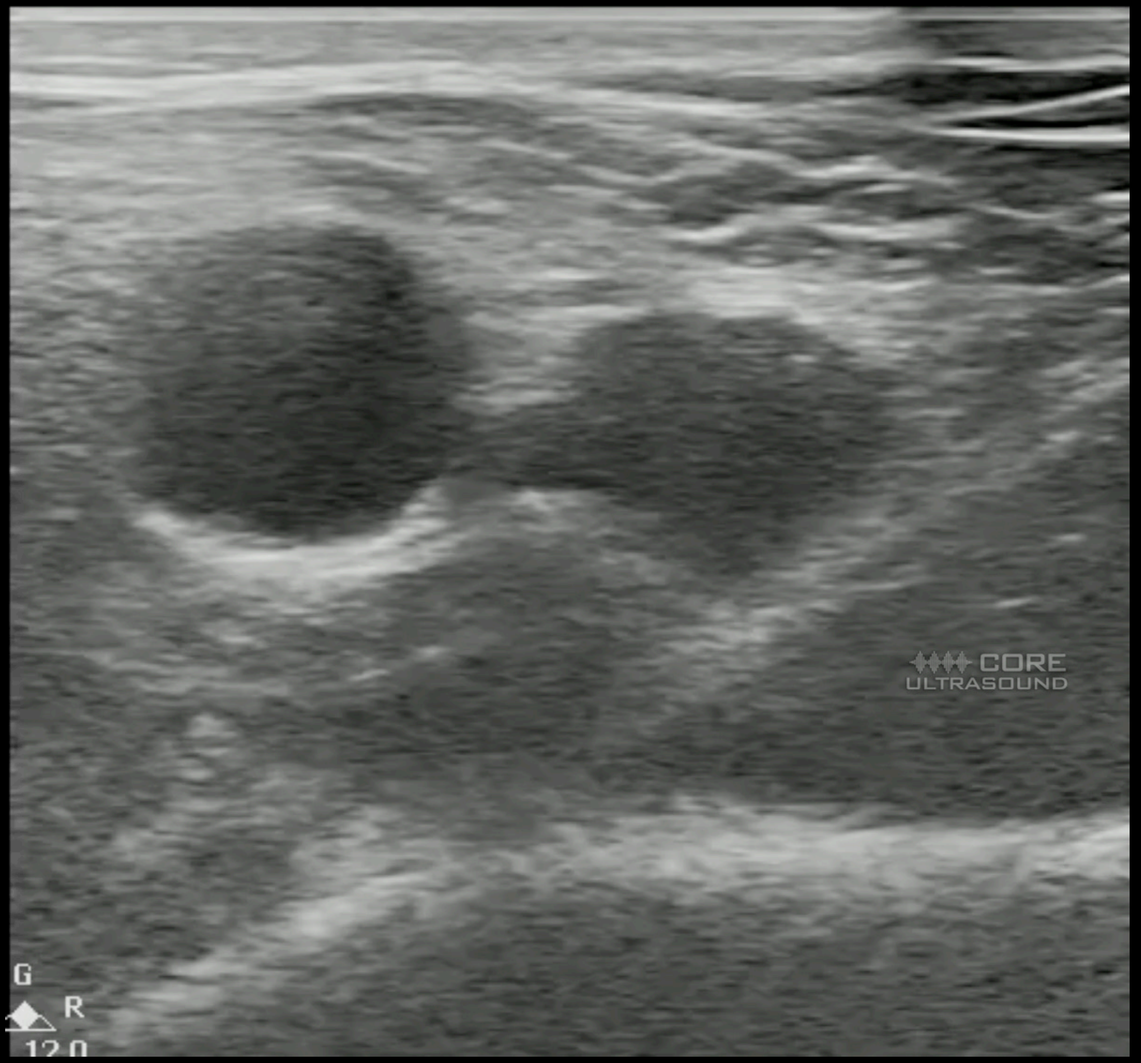
No thrombosis



Thombosis (PE)



No thrombosis

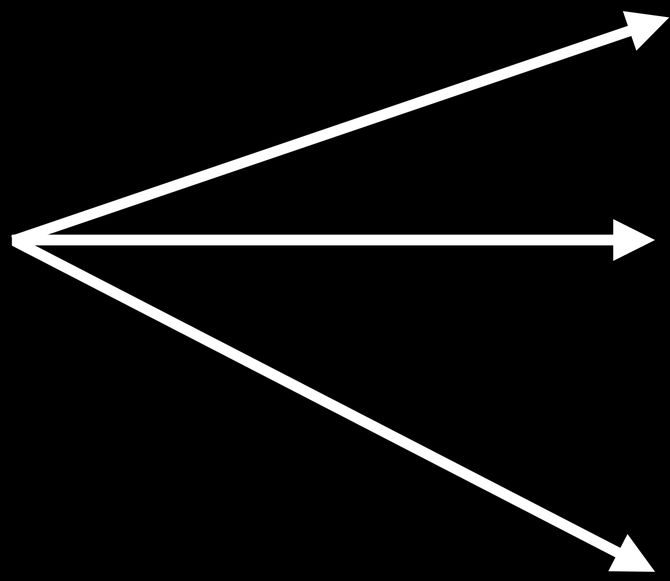


Thombosis (PE)

FAST Exam (Trauma)

Trauma

Ruptured

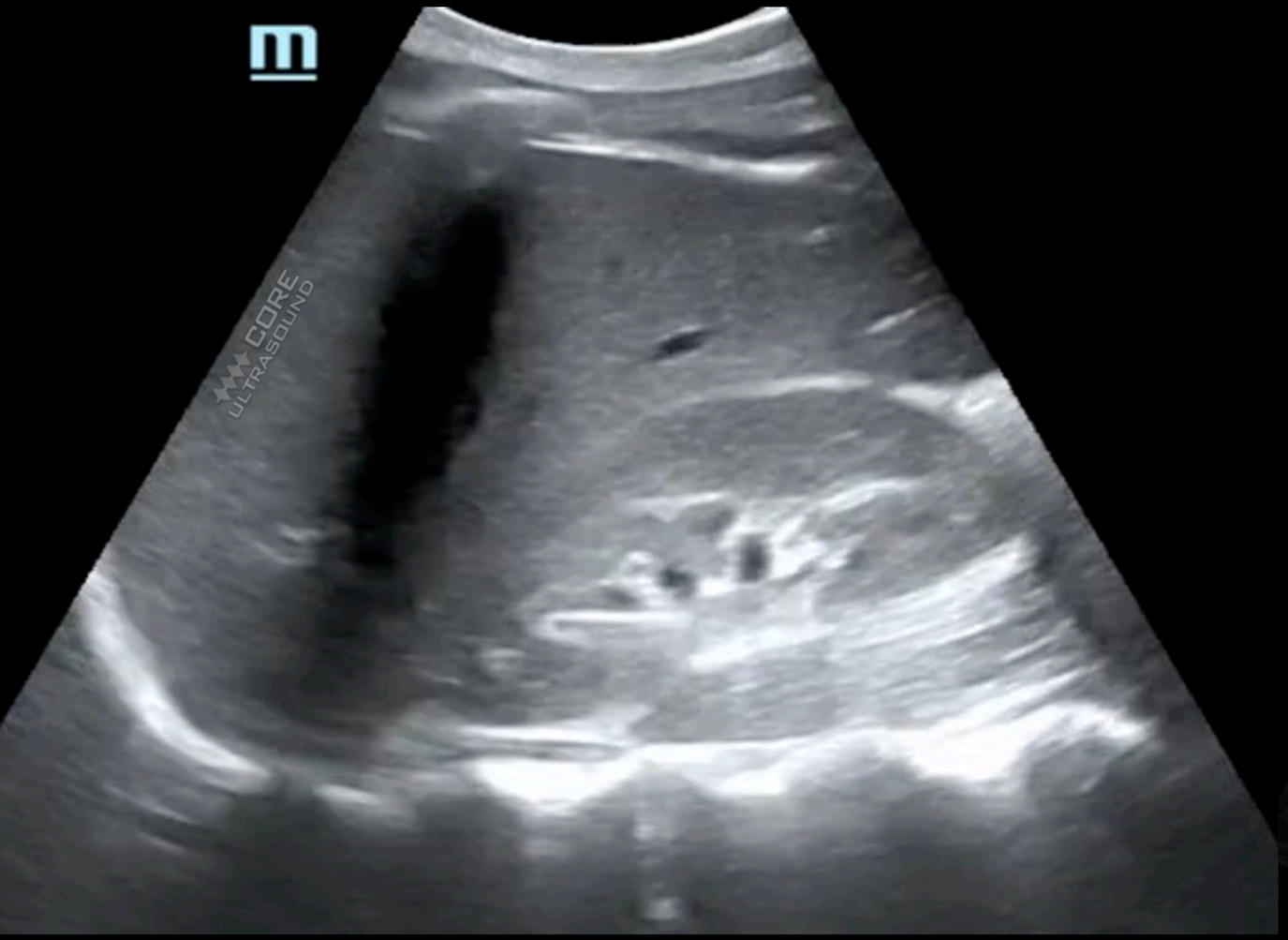


AAA

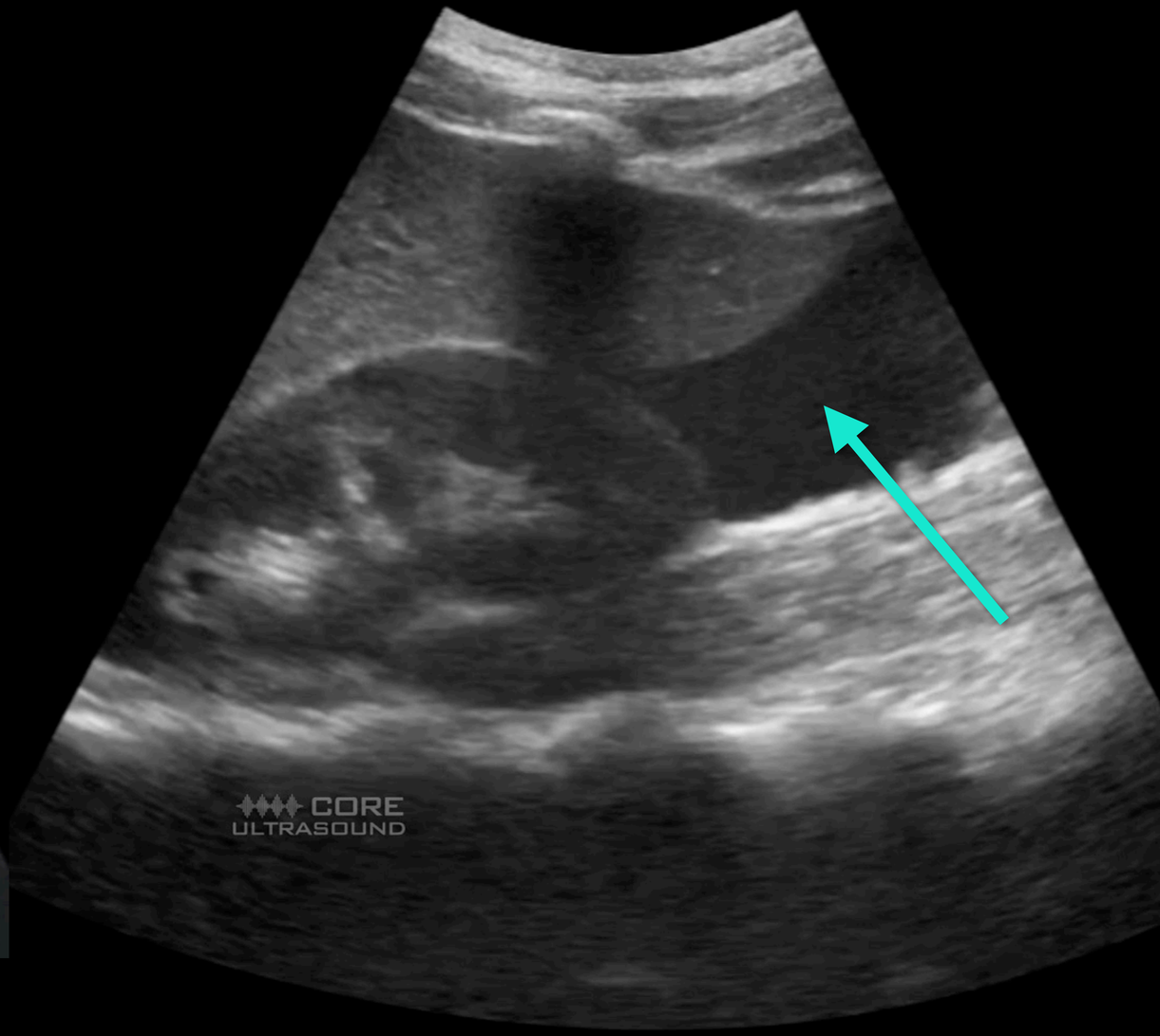
ectopic

bowel

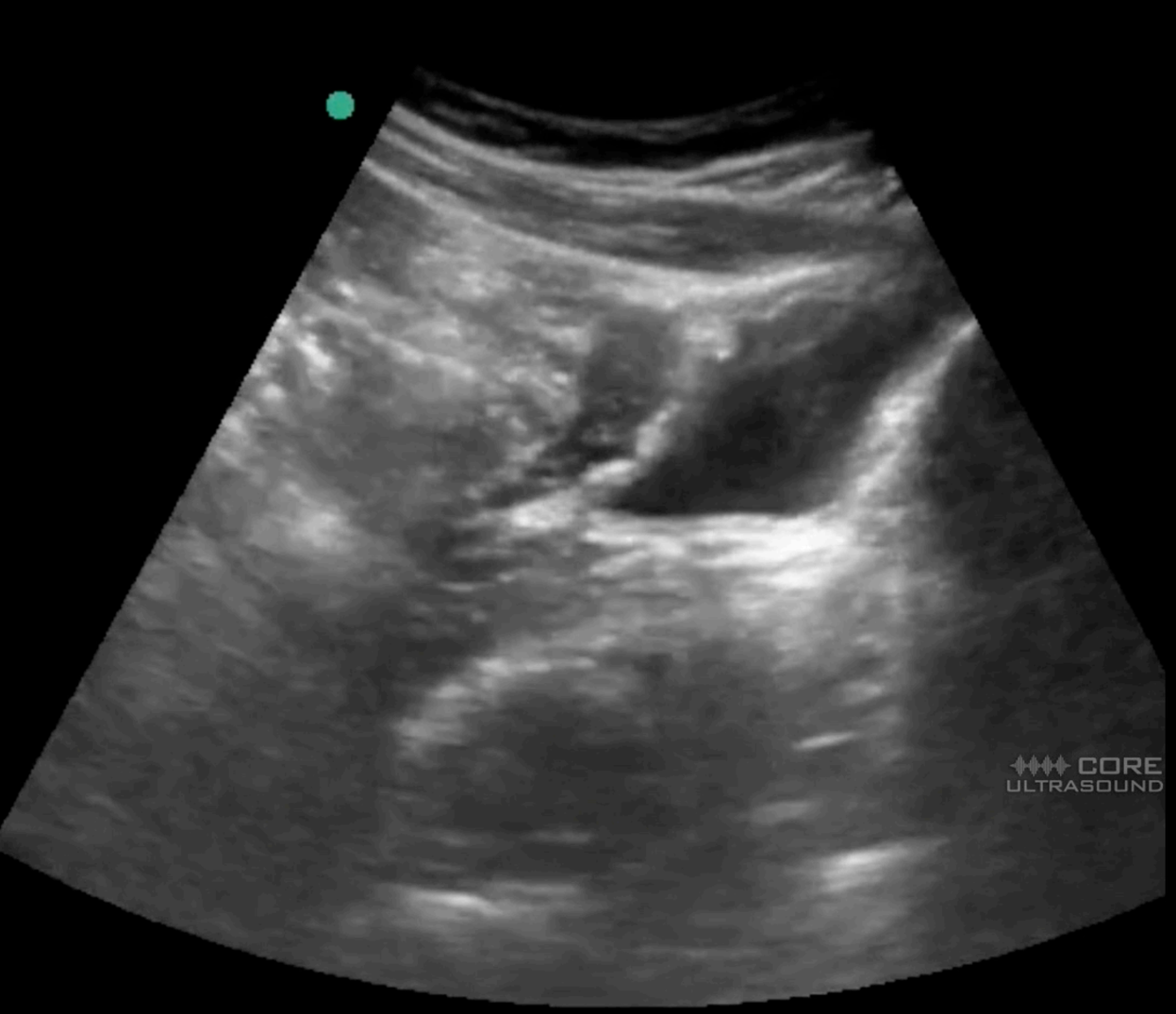
Neg FAST (RUQ)



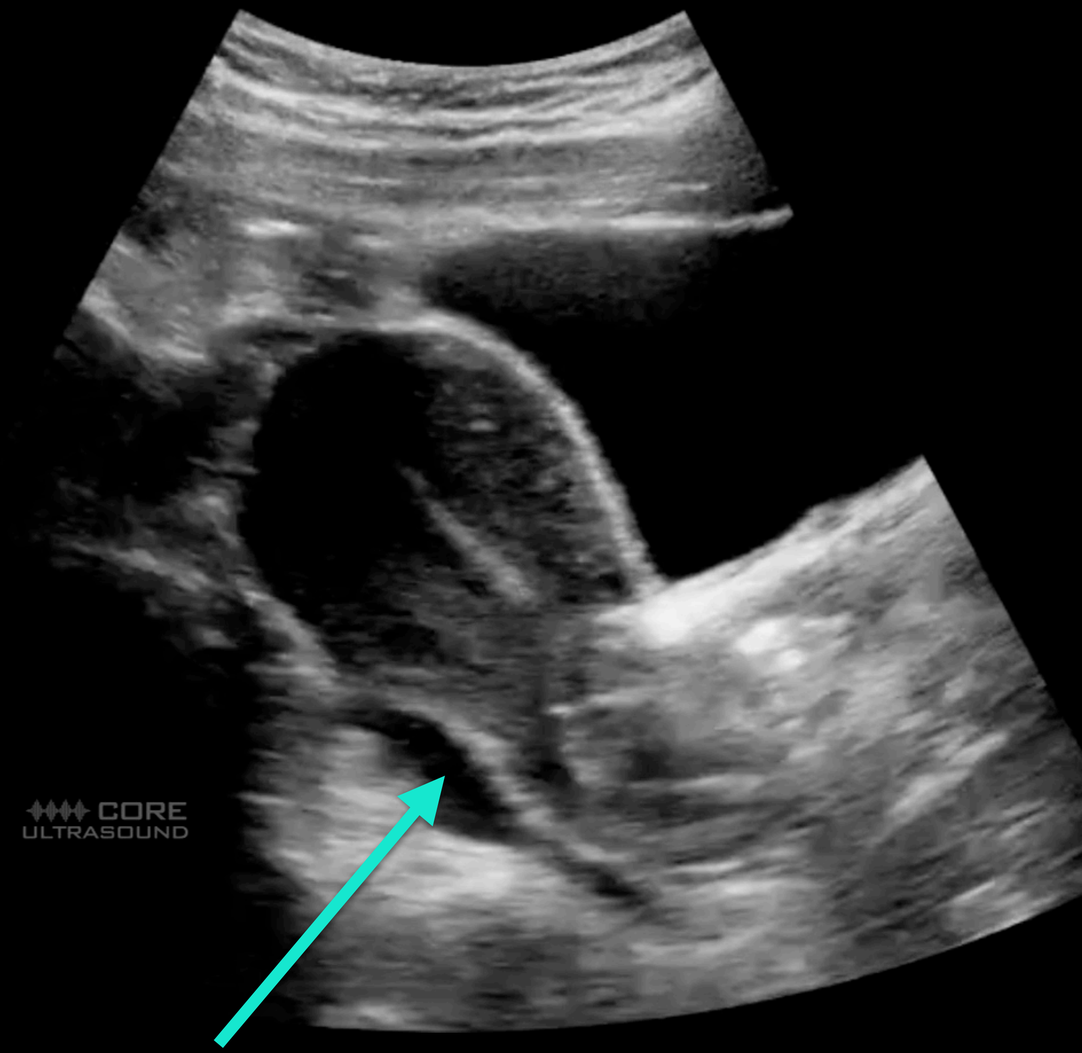
Pos FAST (RUQ)



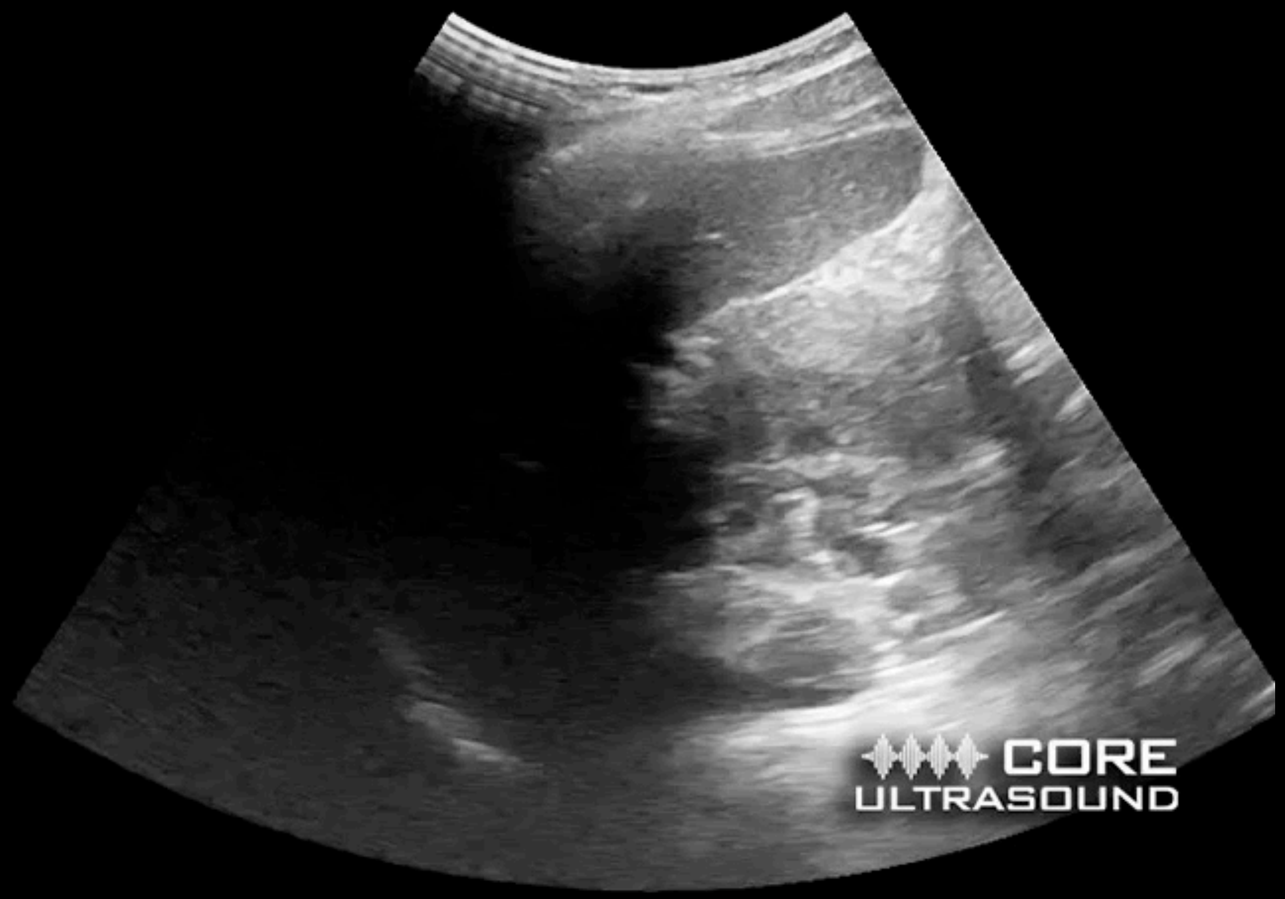
Neg FAST (Pelv)



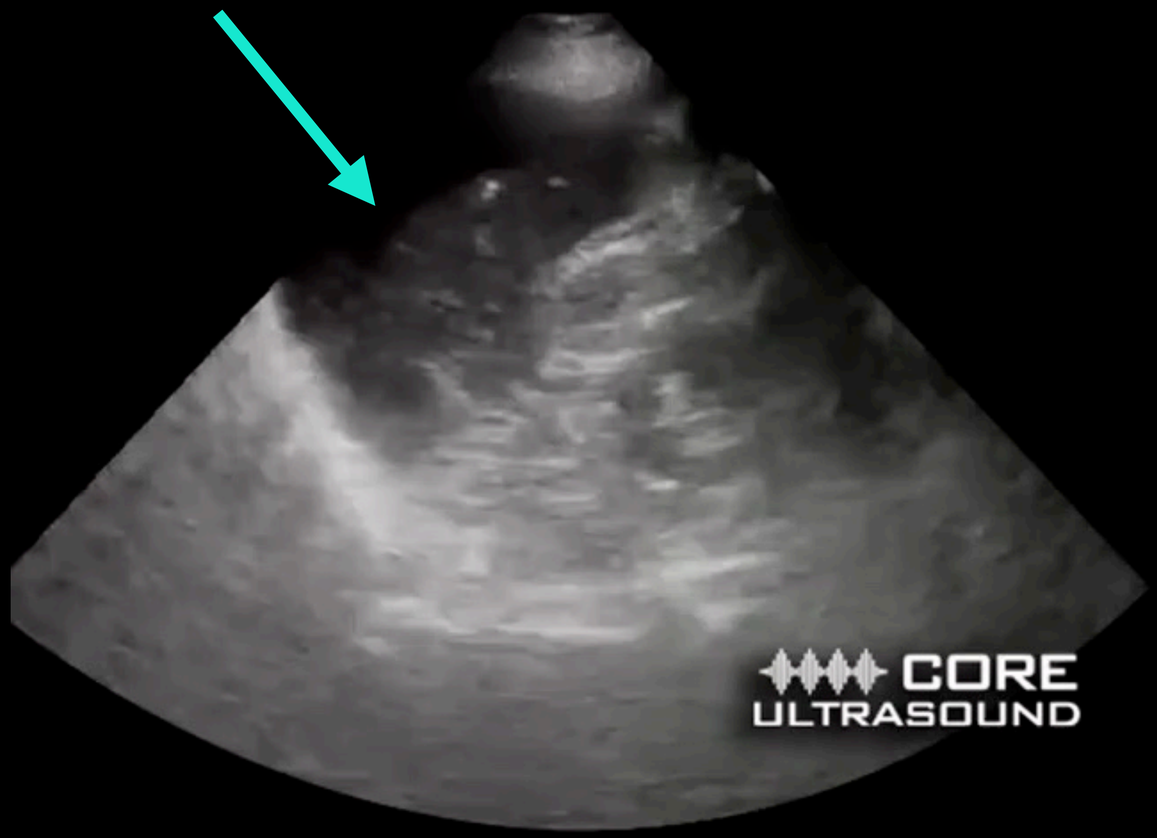
Pos FAST (Pelv)



Neg FAST (LUQ)

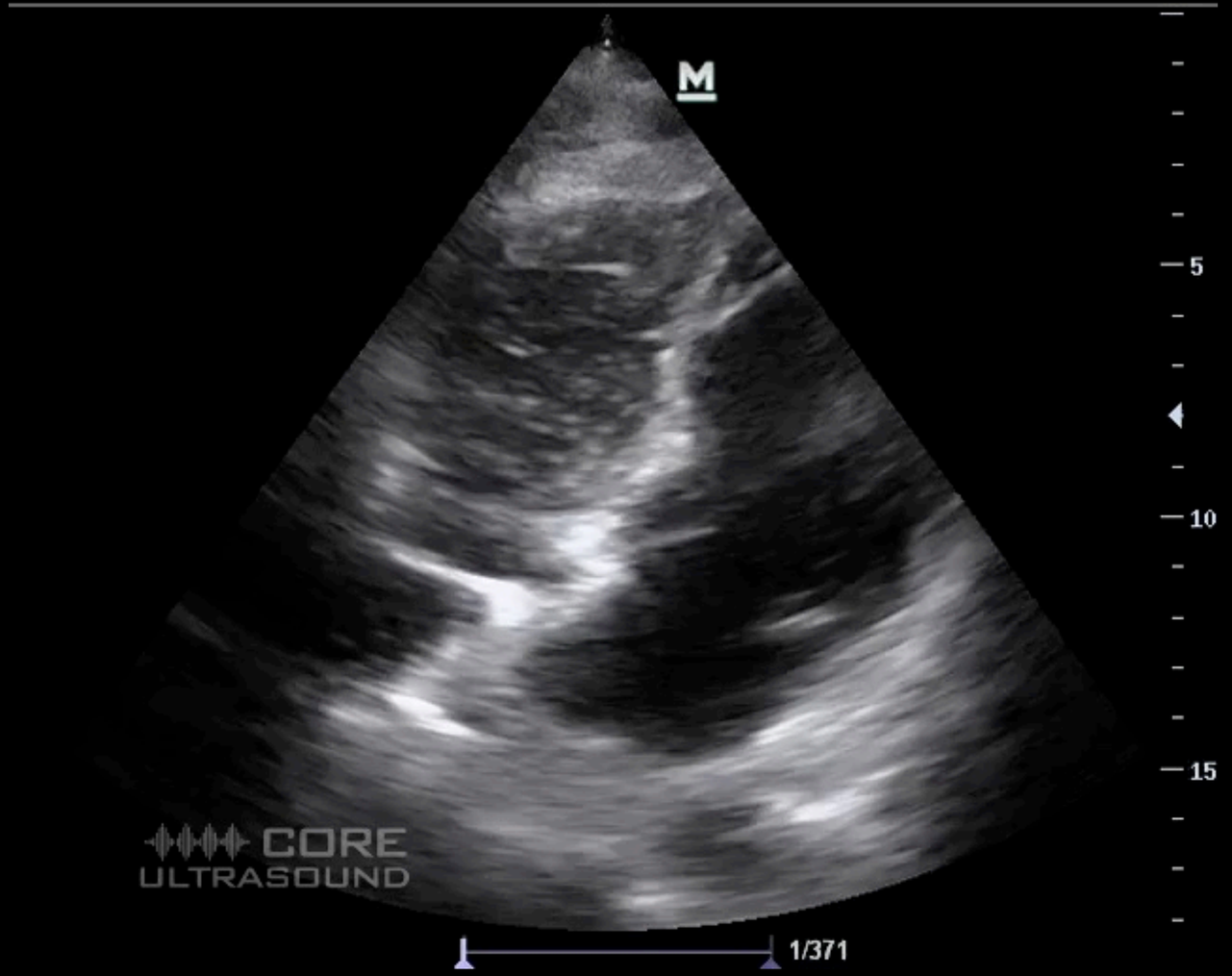


Pos FAST (LUQ)



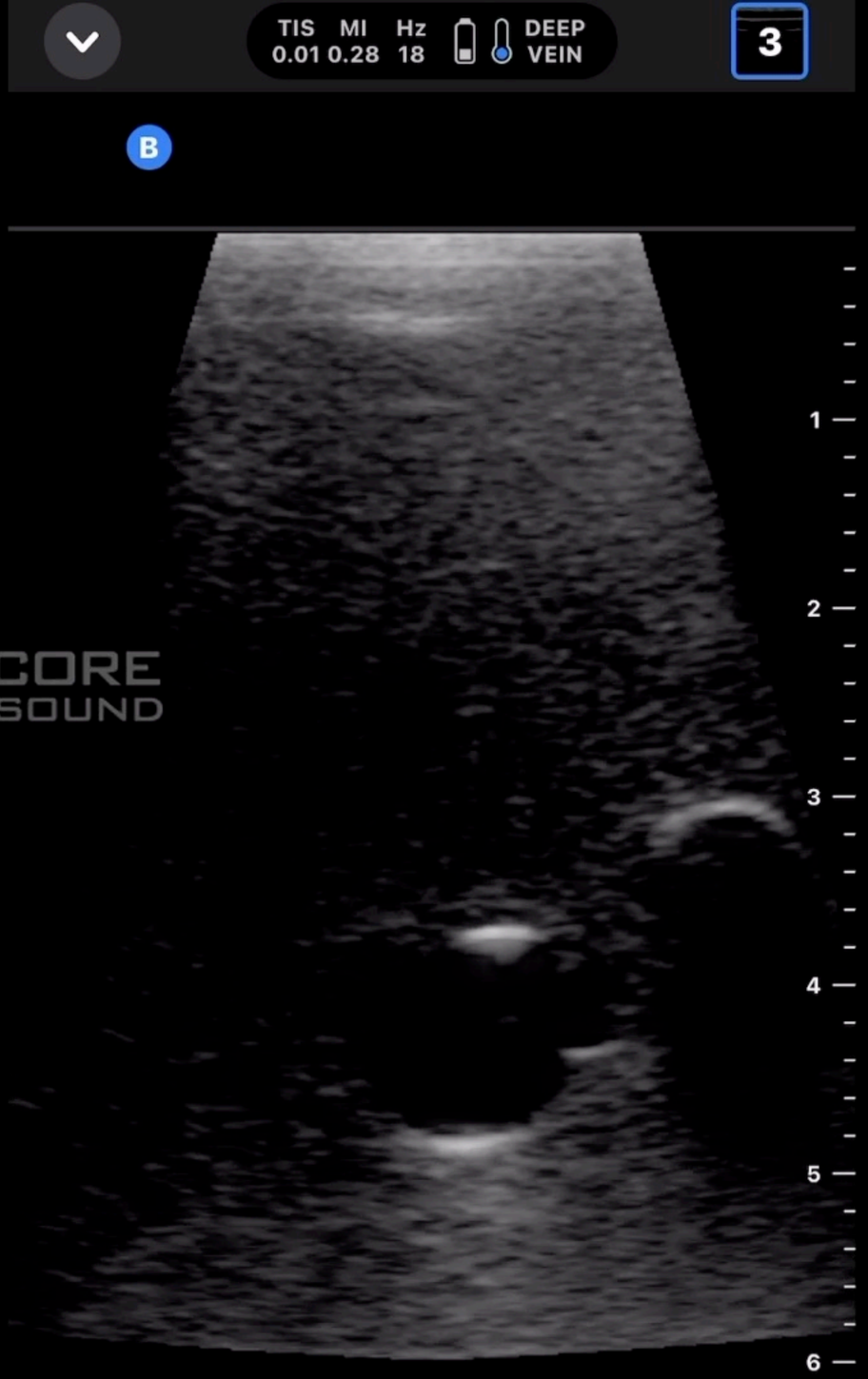
✅ compressions

❌ compressions



Procedural


CORE
ULTRASOUND




B
1
2
3
CORE
ULTRASOUND

Pulse checks

ELSEVIER

Resuscitation 33 (1996) 107–116

RESUSCITATION

Checking the carotid pulse check: diagnostic accuracy of first responders in patients with and without a pulse

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Received 3 February 1996; revised 30 April 1996; accepted 7 May 1996

Abstract

Thought there was a pulse when there wasn't:

10%

Thought there wasn't a pulse when there was one

45%

Average time to make those decisions:

24 sec

What percentage produced correct answer within 10 seconds?

17%

Identify Rhythms:

Identify Rhythms: PEA/Standstill

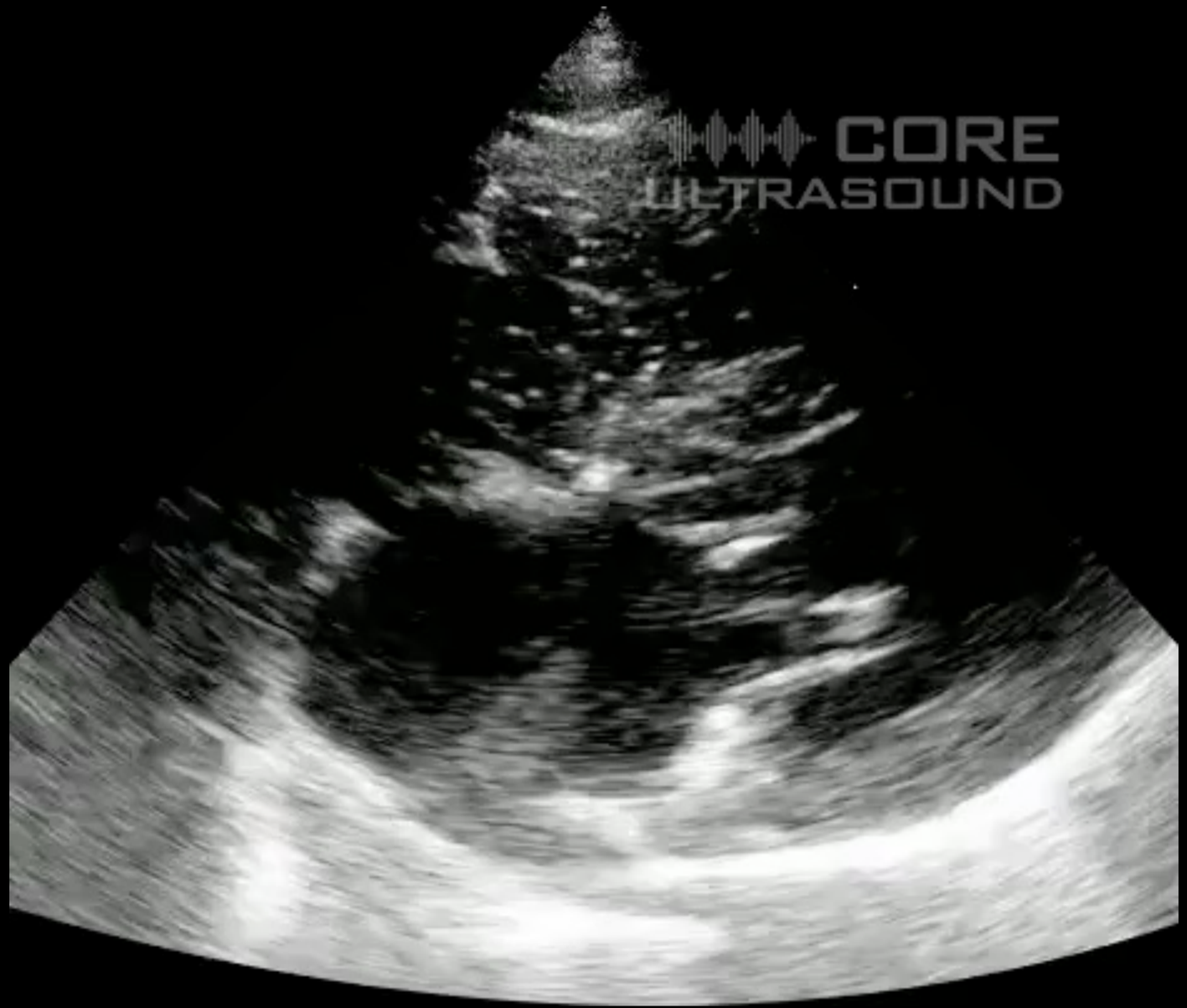
Identify Rhythms: Vtach

Identify Rhythms: Vfib

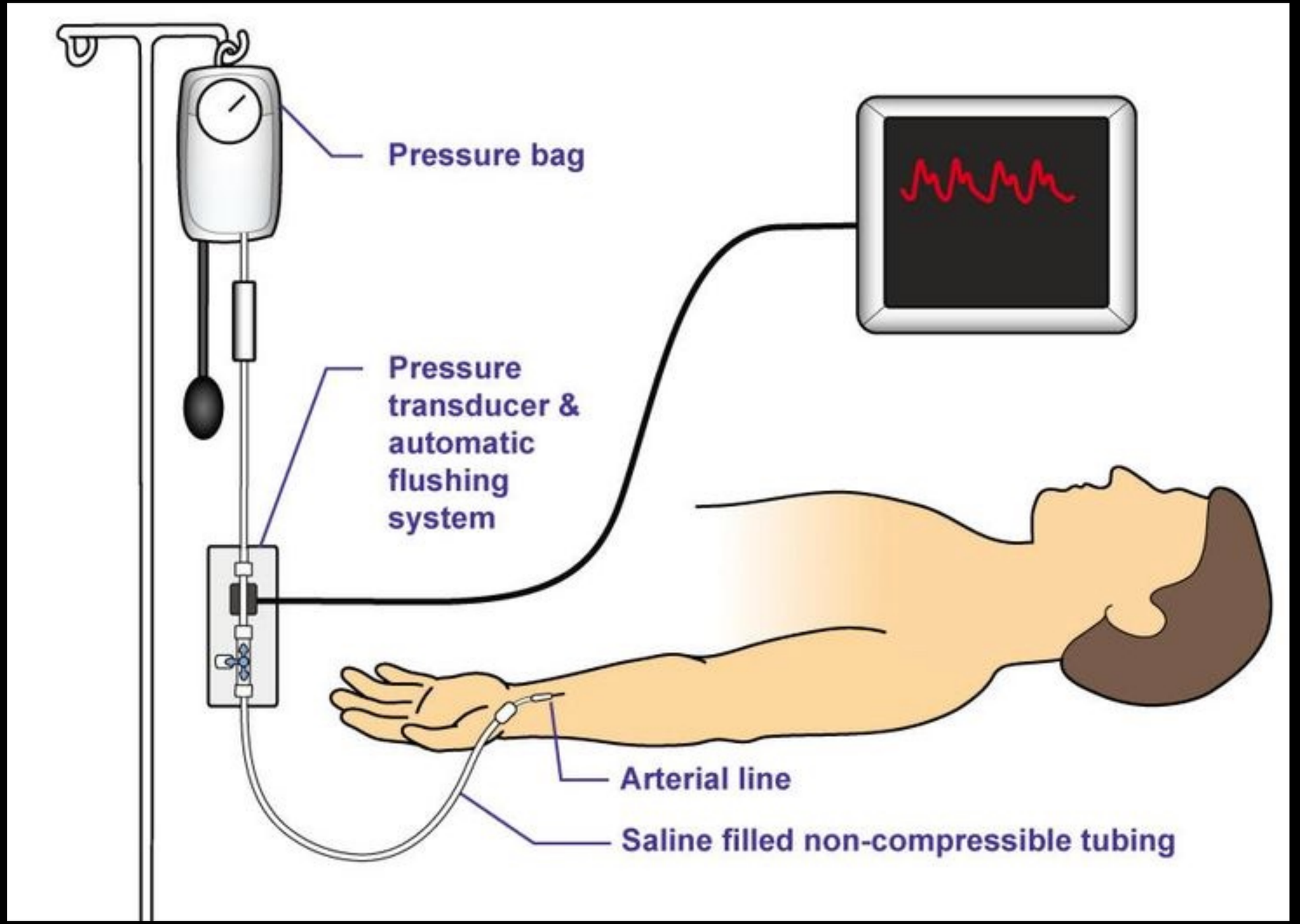
Identify Rhythms: Vfib

Identify Rhythms: Sinus Tach

Identify Rhythms: PEA/Standstill



Identify Rhythms: Sinus


Pressure bag
Pressure transducer & automatic flushing system
Arterial line
Saline filled non-compressible tubing

POCUS and Pulse check delays

	Non-US pulse check	US pulse check
Huis In't Veld Resuscitation 2017	13 seconds	21 seconds
Clattenburg Resuscitation 2017	14 seconds	19 seconds

10 sec = 10 sec

Resuscitation 133 (2018) 59–64

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Comparison of manual pulse palpation, cardiac ultrasonography and Doppler ultrasonography to check the pulse in cardiopulmonary arrest patients☆

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ARTICLE INFO

Keywords:
Cardiopulmonary arrest
Pulse check
Cardiac ultrasonography
Doppler ultrasonography

ABSTRACT

Objective: For health professionals, the absence of pulse checked by manual palpation is a primary indicator for initiating chest compressions in patients considered to have cardiopulmonary arrest (CA). However, using a pulse check to evaluate perfusion during CA may be associated with some risks of its own. Our objective was to compare the efficiency of cardiac ultrasonography (CUSG), Doppler ultrasonography (DUSG), and manual pulse palpation methods to check the pulse in CA patients.

Material and methods: This study was prospectively performed in 137 patients older than 16 years of age who underwent cardiopulmonary resuscitation (CPR). CUSG, DUSG, and manual pulse palpation were practiced simultaneously as suggested in the relevant guidelines. Findings of the patients were recorded at the first min, at min 15 and at the end of CPR. SPSS 18.0 was used for statistical analysis.

Findings: A total of 72.3% ($n = 99$) of the cardiopulmonary arrest incidents occurred out-of-hospital. CUSG (4.76 ± 2.19, 4.33 ± 2.17, and 3.68 ± 2.14 s), DUSG (9.59 ± 2.37, 8.22 ± 2.86, and 7.60 ± 2.83 s), and manual pulse palpation (10.76 ± 1.03, 9.72 ± 3.01, and 9.29 ± 3.36 s) measurements of the first, second, and last inspections were detected, respectively. The false negative rates (100%, 28%, and 0%) and false positive rates (5.3%, 3.5%, and 0%) of manual pulse palpation the first, second, and last inspections were calculated, respectively, as well.

Conclusion: The use of real-time CUSG during resuscitation provides a substantial contribution to the resuscitation team. CUSG will allow earlier and more accurate detection of pulse than manual pulse palpation and DUSG.

Introduction

Resuscitating patients in CA is practiced in accordance with the algorithms determined by the American Heart Association (AHA) and the European Resuscitation Council (ERC) [1,2].

Using a pulse check to evaluate perfusion during CA may be associated with some risks of its own. For example, it is difficult to evaluate pulse activity in certain cases, such as pericardial tamponade, pulmonary embolism, pneumothorax, and hypovolemia, even when there is cardiac contraction. Manual pulse palpation can be mistaken in cases where there is not enough ejection fraction of the heart, or when in experienced health-care workers are involved. Moreover, a visible rhythm on the monitor, along with the absence of pulse, does not always indicate the presence of true pulseless electrical activity (PEA) [3,4]. Therefore, alternative pulse check methods are needed.

The ERC guidelines state that "When available for use by trained clinicians, ultrasound may be of use in assisting with diagnosis and treatment of potentially reversible causes of cardiac arrest. The integration of ultrasound into advanced life support requires considerable training if expected results is for interruptions to chest compressions to be minimized" [2].

Our objective was to compare the efficiency of CUSG, DUSG, and manual pulse palpation methods to check the pulse in CA patients. The study intends to answer the questions as to which is the most accurate, fast, and effective pulse check method and whether these methods are superior to each other.

Cardiac US	3.7-4.8s
Femoral Doppler	7.6-10s
Femoral artery palpation	9.3-10.8s

Zengin 2018; PMID: 30253230

HOW?


SA-2

Non-Cardiac POCUS Pulse Checks?

Zengin 2018; PMID: 30253230

N = 137 pts

Fem Doppler: 7.6-10 s

Fem Palpation: 9.3-10.8 s

Schwartz 2021; PMID: 34920840

N = 52 pts

Fem Doppler: 5.5–13.9 s

Fem Palpation: 7.4–15.5 s

ARTICLE IN PRESS

RESUSCITATION xxx (2022) xxx

Available online at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Femoral artery Doppler ultrasound is more accurate than manual palpation for pulse detection in cardiac arrest

Allison L. Cohen[a,b], *Timmy Li*[a,b], *Lance B. Becker*[a,b,c], *Casey Owens*[b,c], *Neha Singh*[c], *Allen Gold*[d], *Mathew J. Nelson*[a,b], *Daniel Jafari*[a,b], *Ghania Haddad*[b], *Alexander V. Nello*[a,b], *Daniel M. Rolston*[a,b,*], *Northwell Health Biostatistics Unit*[1]

[a] *Department of Emergency Medicine, Donald and Barbara Zucker School of Medicine at Hofstra/Northwell, Hempstead, NY, United States*
[b] *Department of Emergency Medicine, North Shore University Hospital, Northwell Health, Manhasset, NY, United States*
[c] *Feinstein Institutes for Medical Research, Northwell Health, Manhasset, NY, United States*
[d] *Department of Emergency Medicine, St. Vincent Hospital, Alleghany Health Network, Erie, NY, United States*

Abstract

Objectives: Our primary objective was to assess the accuracy of Doppler ultrasound versus manual palpation in detecting any pulse with an arterial line waveform in cardiac arrest. Secondarily, we sought to determine whether peak systolic velocity (PSV) on Doppler ultrasound could detect a pulse with a systolic blood pressure (SBP) $\geq$ 60 mmHg.

Methods: We conducted a prospective, cross-sectional, diagnostic accuracy study on a convenience sample of adult, Emergency Department (ED) cardiac arrest patients. All patients had a femoral arterial line. During a pulse check, manual pulse detection, PSV and Doppler ultrasound clips, and SBP were recorded. A receiver operator characteristic curve analysis was performed to determine the optimal cut-off of PSV associated with a SBP $\geq$ 60 mmHg. Accuracy of manual palpation and Doppler ultrasound for detection of any pulse and SBP $\geq$ 60 mmHg were compared with McNemar's test.

Results: 54 patients and 213 pulse checks were analysed. Doppler ultrasound demonstrated higher accuracy than manual palpation (95.3% vs. 54.0%; $p < 0.001$) for detection of any pulse. Correlation between PSV and SBP was strong (Spearman correlation coefficient = 0.89; $p < 0.001$). The optimal cut-off value of PSV associated with a SBP $\geq$ 60 mmHg was 20 cm/s (area under the curve = 0.975). To detect SBP $\geq$ 60 mmHg, accuracy of a PSV $\geq$ 20 cm/s was higher than manual palpation (91.4% vs. 66.2%; $p < 0.001$).

Conclusions: Among ED cardiac arrest patients, femoral artery Doppler ultrasound was more accurate than manual palpation for detecting any pulse. When using a PSV $\geq$ 20 cm/s, Doppler ultrasound was also more accurate for detecting a SBP $\geq$ 60 mmHg.

Keywords: Cardiac arrest, Cardiopulmonary resuscitation, Doppler ultrasound, Pulse detection

ARTICLE IN PRESS

RESUSCITATION xxx (2022) xxx

Available online at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Femoral artery Doppler ultrasound is more accurate than manual palpation for pulse detection in cardiac arrest

[redacted]

[a] Department of Emergency Medicine, Donald and Barbara Zucker School of Medicine at Hofstra/Northwell, Hempstead, NY, United States
[b] Department of Emergency Medicine, North Shore University Hospital, Northwell Health, Manhasset, NY, United States
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Conclusions: Among ED cardiac arrest patients, femoral artery Doppler ultrasound was more accurate than manual palpation for detecting any pulse. When using a PSV $\geq$ 20 cm/s, Doppler ultrasound was also more accurate for detecting a SBP $\geq$ 60 mmHg.

Keywords: Cardiac arrest, Cardiopulmonary resuscitation, Doppler ultrasound, Pulse detection

N = 54 pts (213 pulse checks) w/ fem art lines.

Any pulse:

	Doppler US	Palpation
Accuracy	95%	54%
Sensitivity	94%	40%
Specificity	98%	91%

SBP > 60 mmHg

	Doppler US (PSV > 20cm/s)	Palpation
Accuracy	91%	66%
Sensitivity	88%	47%
Specificity	95%	82%

(Peri) Arrest Indications:

ID reversible causes

Pulse checks

Procedural

CORE ULTRASOUND

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@CoreUltrasound

ultrasoundpodcast@gmail.com

END