



TEE-ing off the Cardiac Arrest Sand-Trap: Shadow-Boxing for CPR Vectors, Missed VF & Pseudo PEA

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Questions to be Addressed

- How might direct visualization of the heart using Transesophageal Echocardiography (TEE) during cardiac arrest address some of the limitations in field assessment and treatment of cardiac arrest?

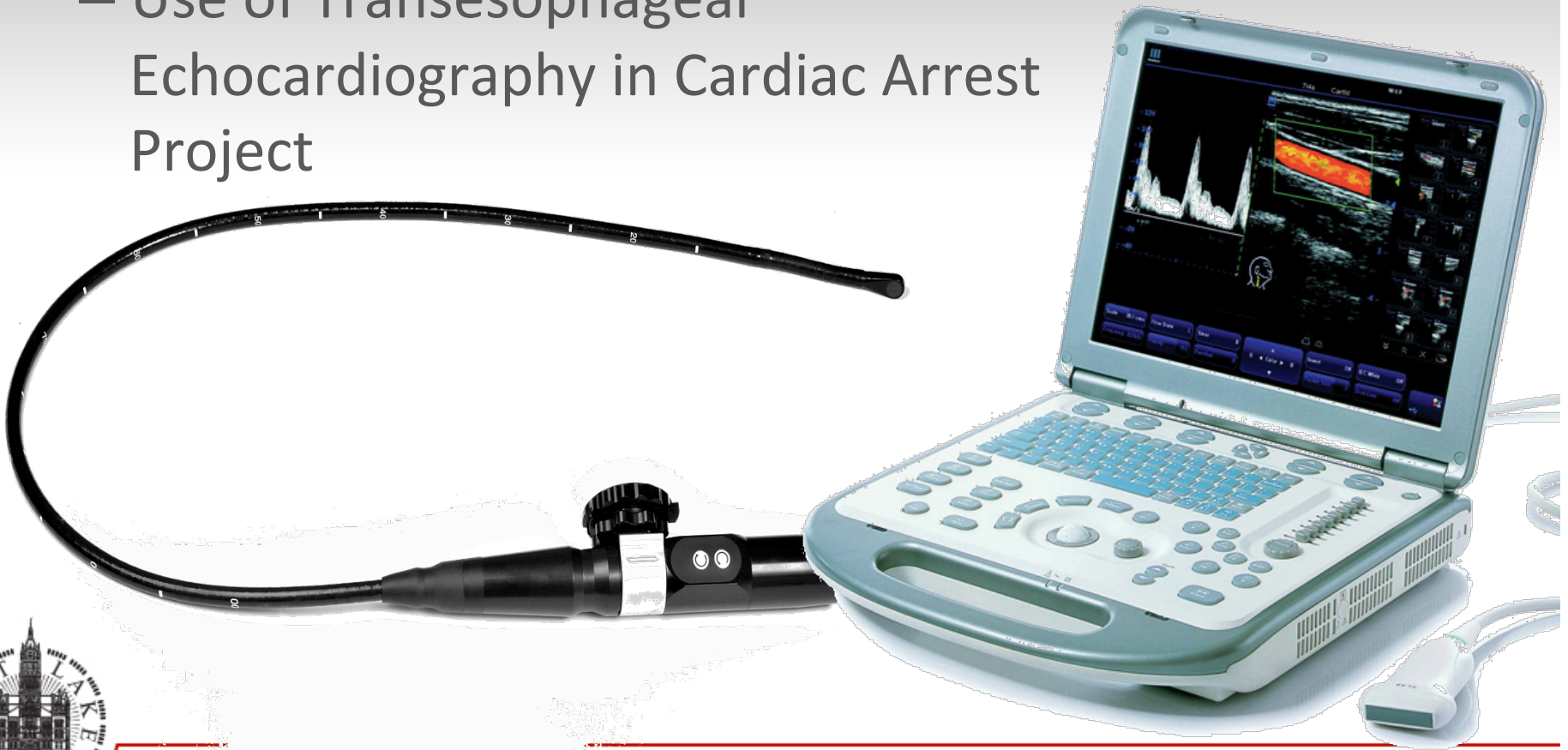


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SLCFD Project

- UTE-CAP
 - Use of Transesophageal Echocardiography in Cardiac Arrest Project



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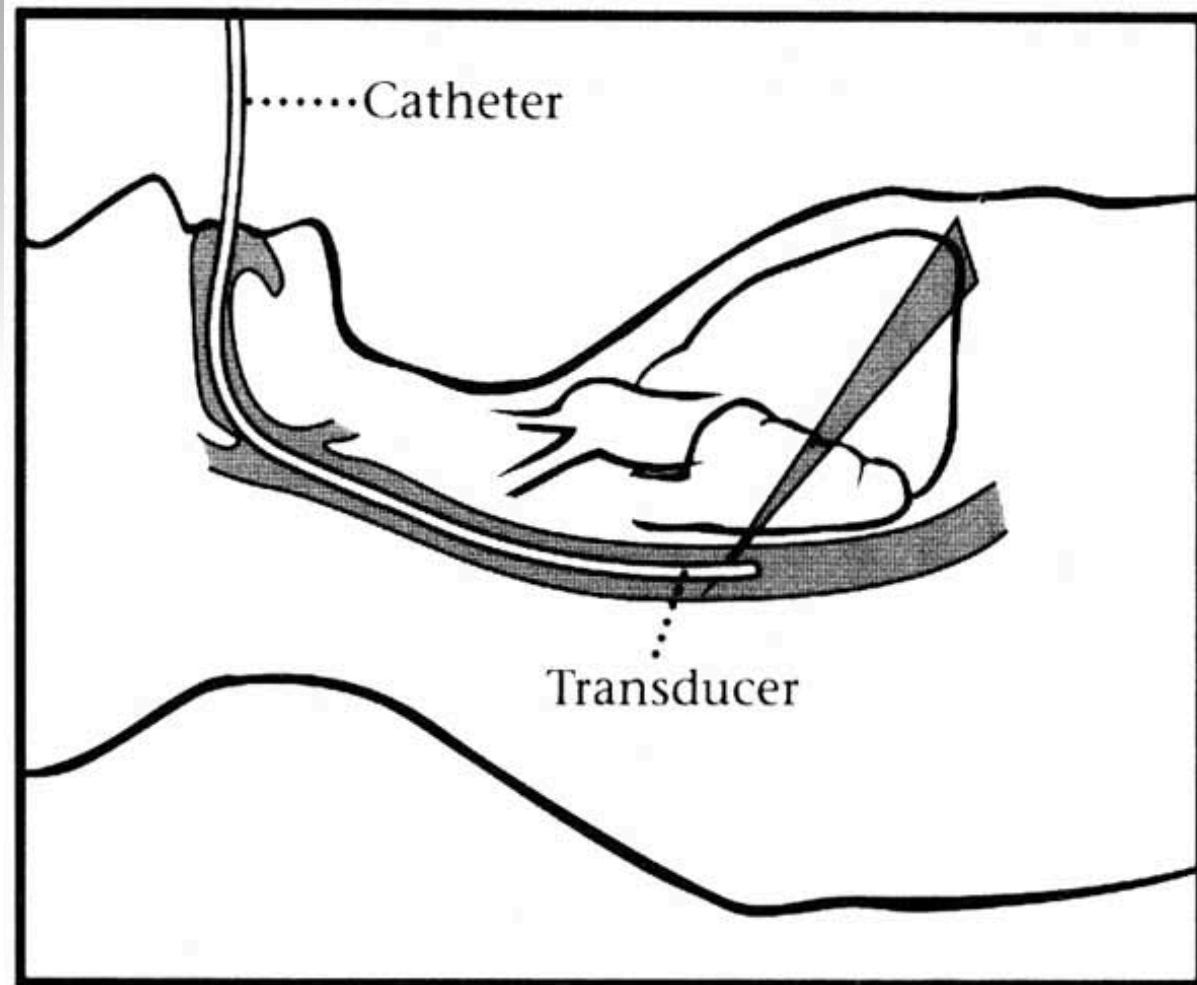
Study Protocol

- Dispatch alerts sent to mobile phones of 4 TEE trained investigators
- Respond to scene of arrest
- Place TEE in patients after intubation performed
- Imaging used to assist providers with decision-making





Where it's placed



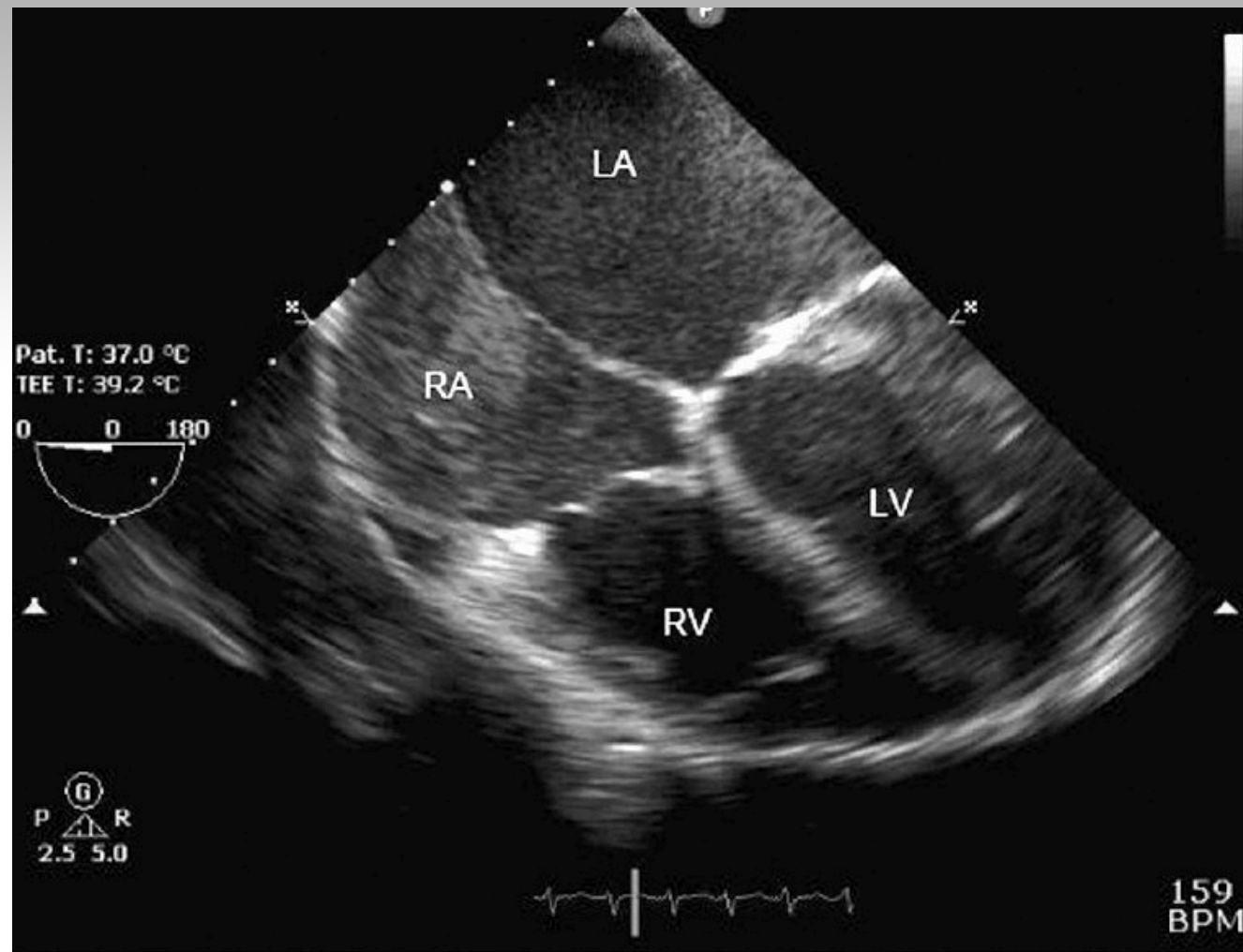
Wendolyn Hill



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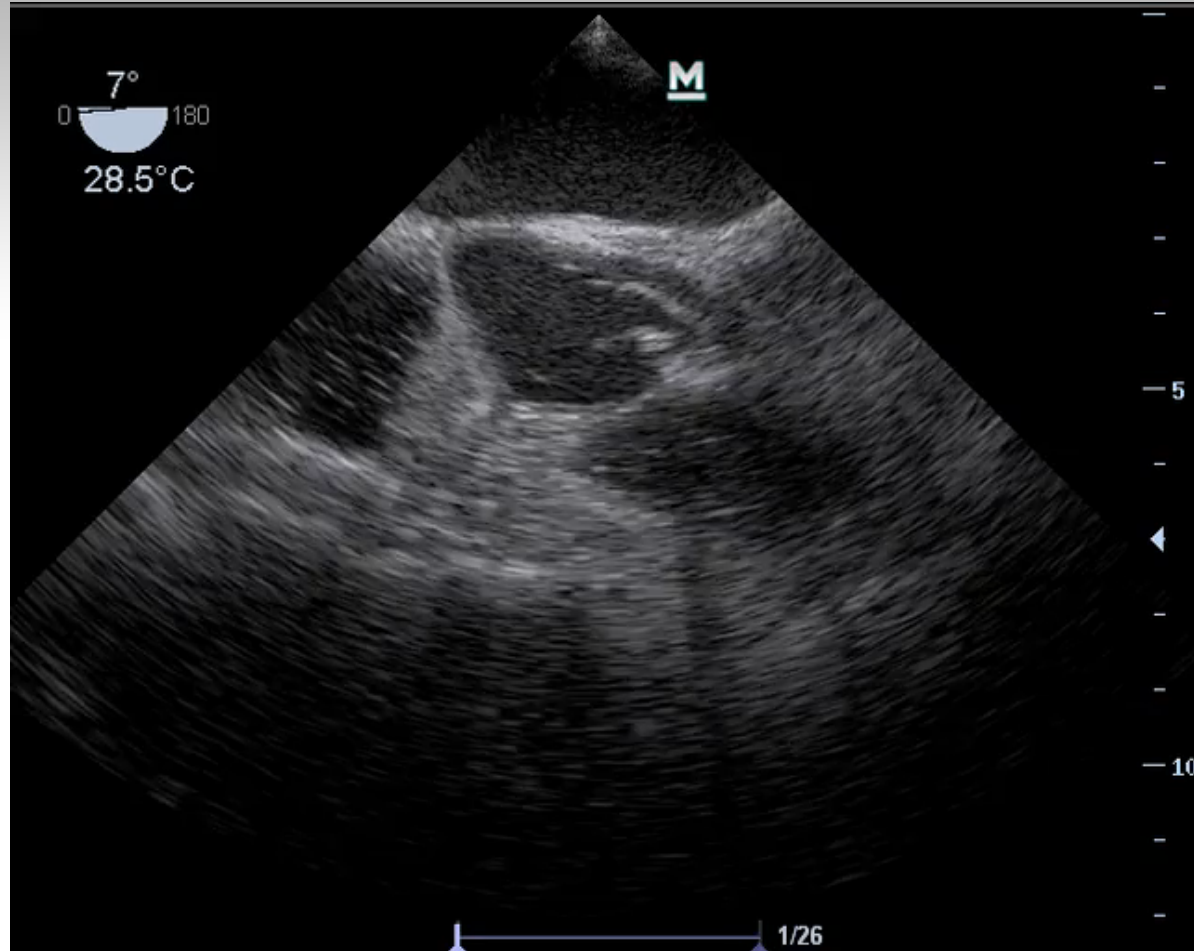
What it Does



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TEE during CPR



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CAN TEE HELP TO CLASSIFY THE CARDIAC RHYTHM?



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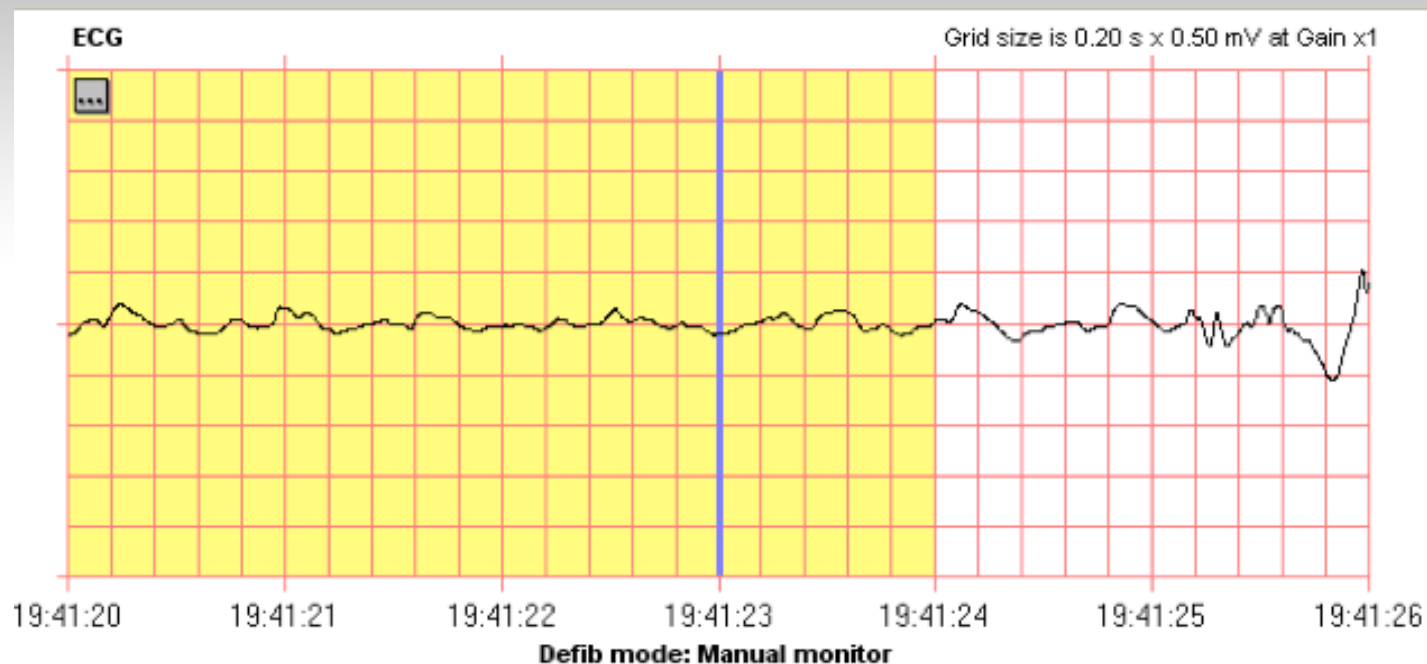
The Cardinal Sin in Defibrillation

- Not shocking the shockable rhythm





Rhythm Analysis





Misclassification of VF

- How often do paramedics misclassify VF?
 - Unknown
 - Misclassification of SVT is 31%

(Goebel PJ. Prehosp Emerg Care 2004;8(2): 166-70)

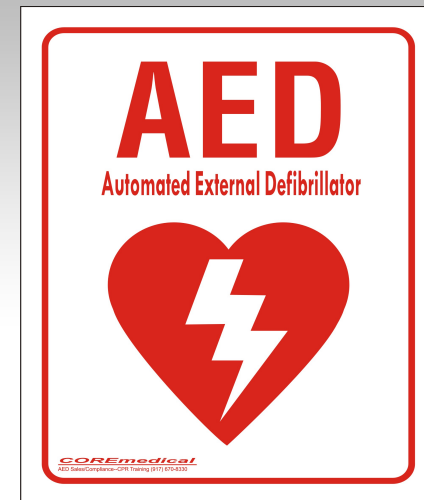




Misclassification of VF

- How often do AEDs misclassify VF?
 - 16% of VF episodes deemed non-shockable

(Calle PA. Resuscitation 2015;88:68-74)





Case Report

- 73 year old obese female arrests in the ED
- Asystole on the monitor
- TEE inserted...

Blaivas M. Resuscitation 2008;78(2):135-140

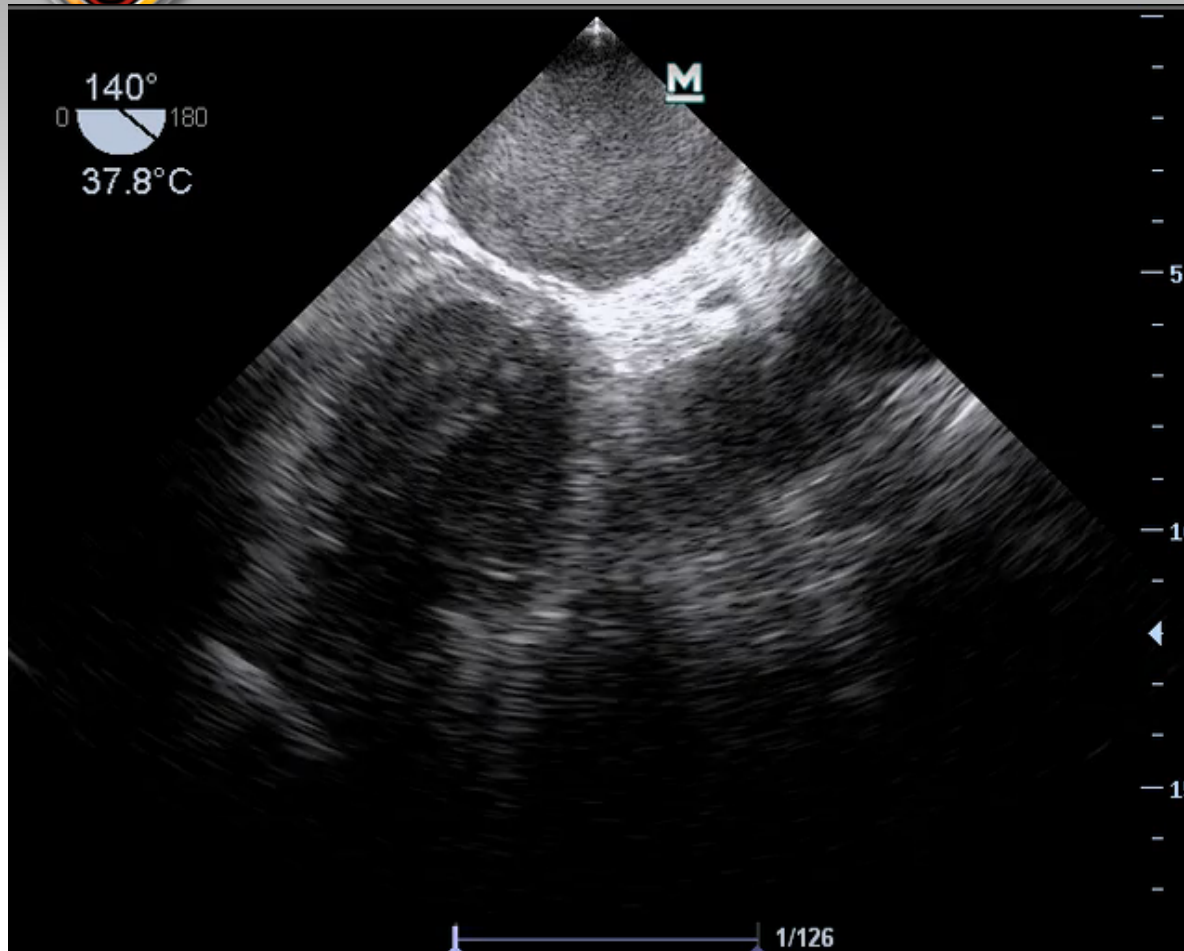
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TEE Images



- VF mechanical activity clearly seen
- Shocked into cardiac standstill → occasional ventricular beats → ROSC

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CAN TEE OBVIATE THE NEED FOR PULSE CHECKS AND IMPROVE DETECTION OF ROSC?

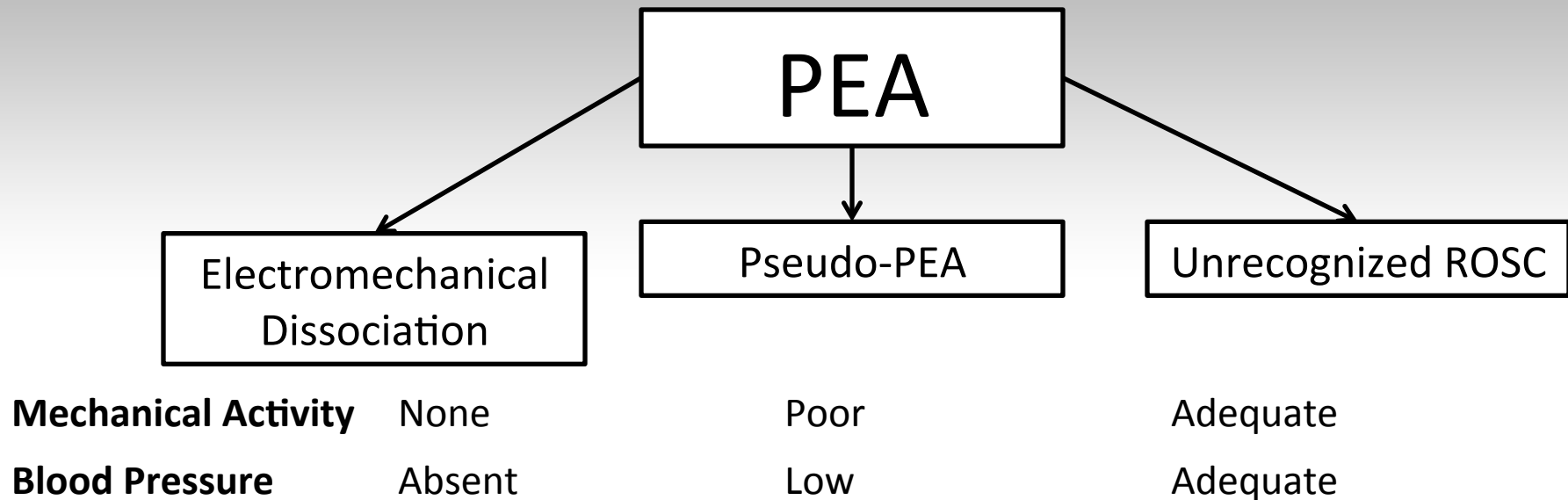


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PEA is a Dangerous Rhythm



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Pulse Checks

- Accuracy as poor as 15% when performed within AHA recommended 10 sec

(Eberle B. Resuscitation 1996;33(2):107-16)

- Implications:
 - Terminating efforts in patients with pseudo-PEA or even ROSC
 - Continuing asynchronous compressions over a beating heart



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SOUTHEAST

'Miracle' as Mississippi man wakes up in body bag at funeral home

Published February 28, 2014 • FoxNews.com



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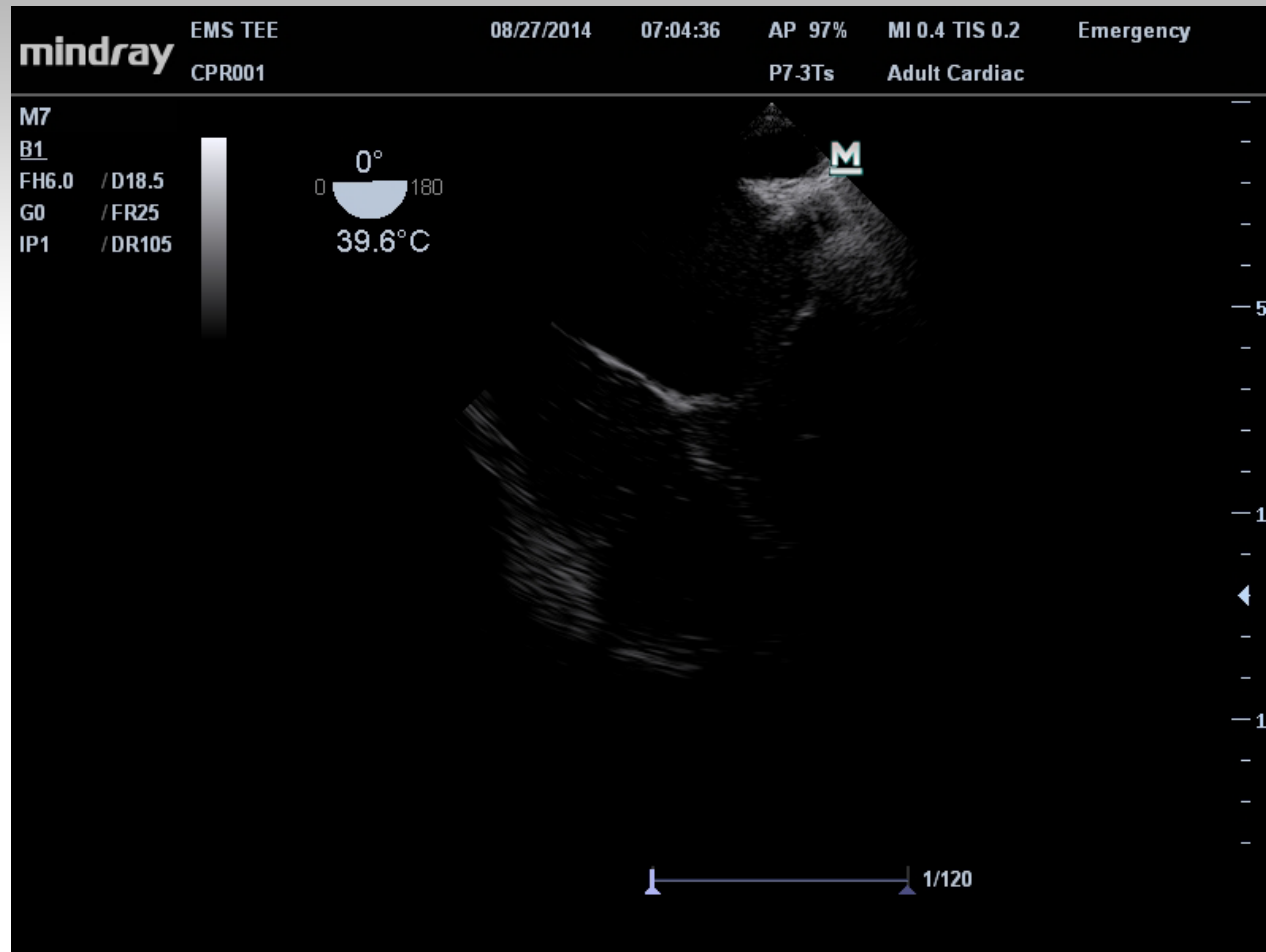
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TEE during pulse check



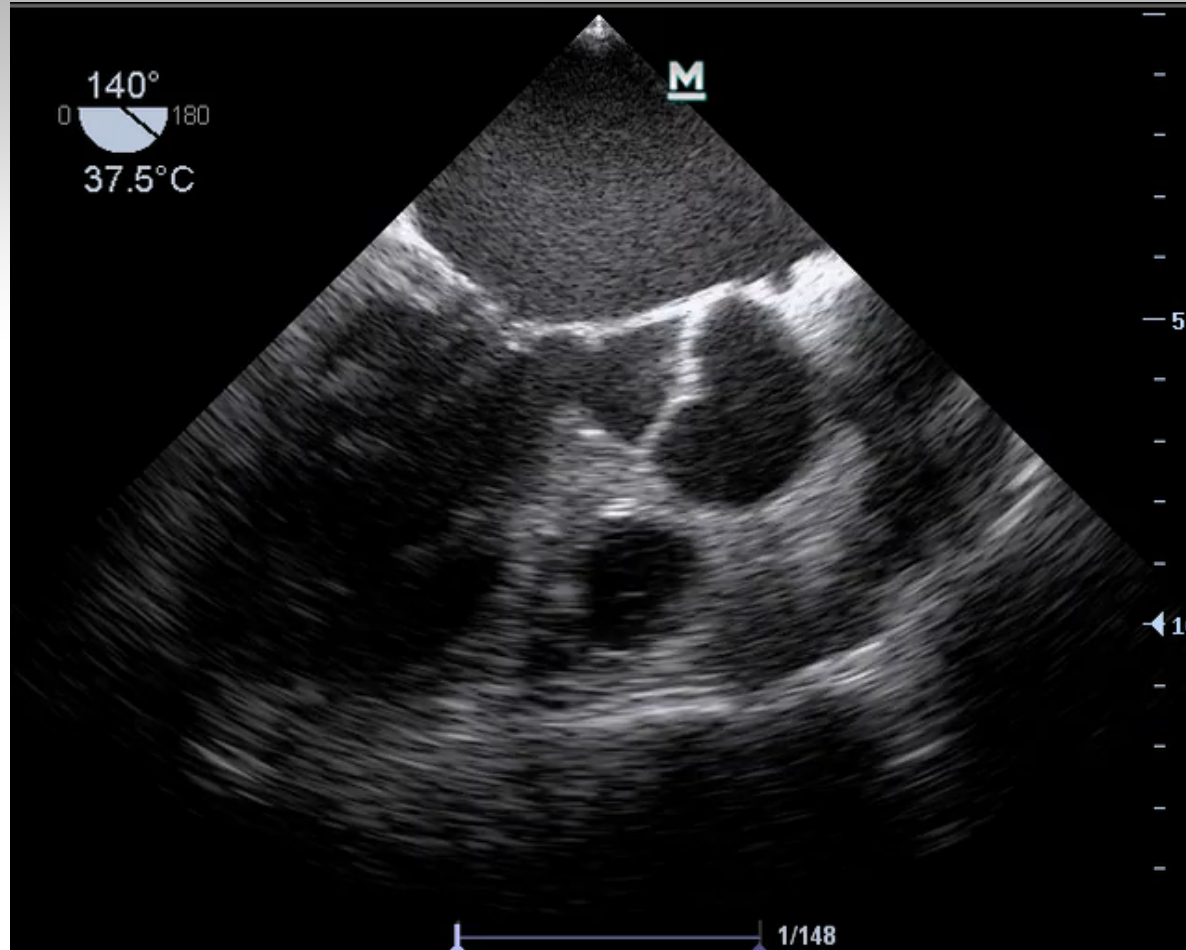
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TEE During Pulse Check



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CAN TEE IMPROVE HAND POSITIONING DURING CPR?



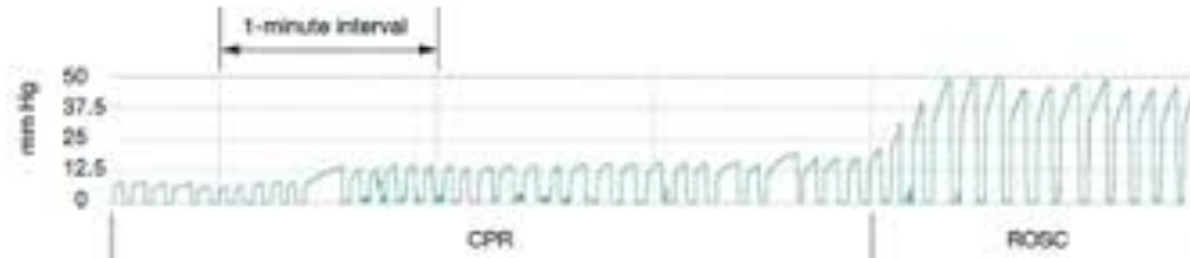
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CPR Vectors

- How do you know that your chest compressions are generating blood flow?
 - ETCO₂





Traditional Hand Placement



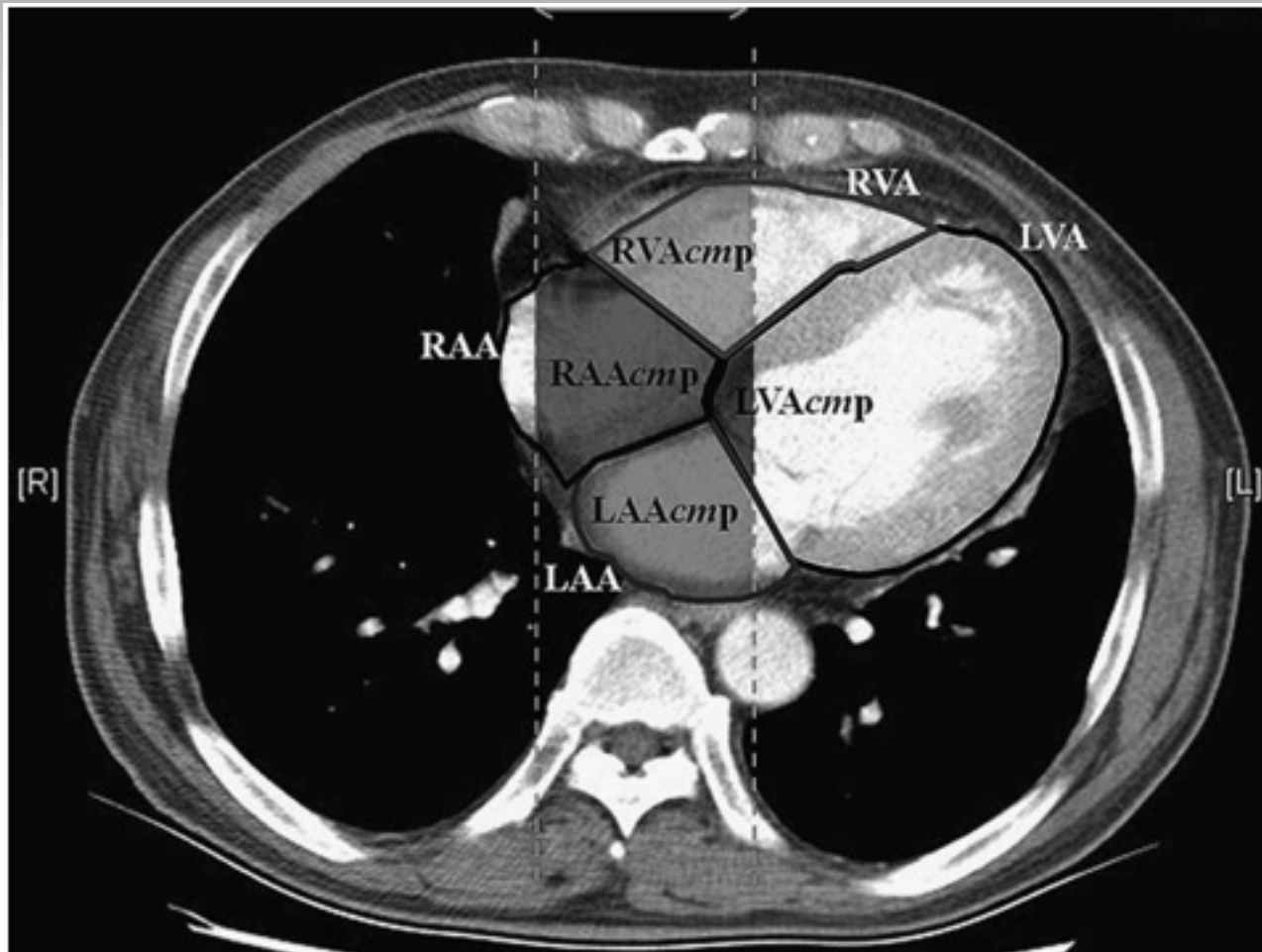
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Where We Want to Direct Chest Compression Force



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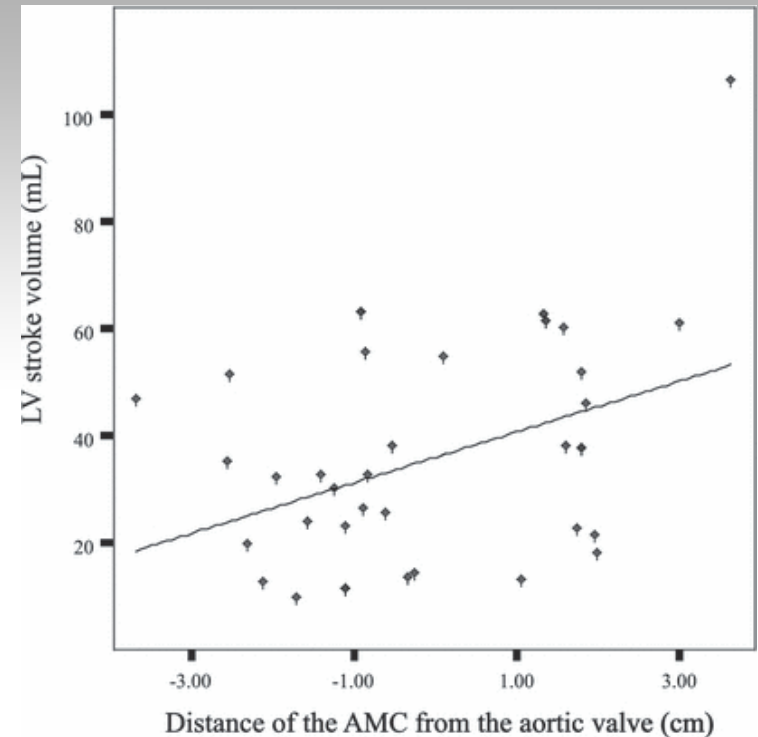


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Occlusion of the Aortic Outflow Tract

- Location of hand placement may lead to occlusion of aortic outflow tract
 - Occurred in 44% of cases in ED based study
 - Reduces cardiac output during CPR



Hwang, Sung Oh, Pei Ge Zhao, Han Joo Choi, Kyung Hye Park, Kyung Chul Cha, So Mi Park, Sang Chul Kim, Hyun Kim, and Kang Hyun Lee. "Compression of the Left Ventricular Outflow Tract During Cardiopulmonary Resuscitation." *Academic Emergency Medicine* 16.10 (2009): 928-33.





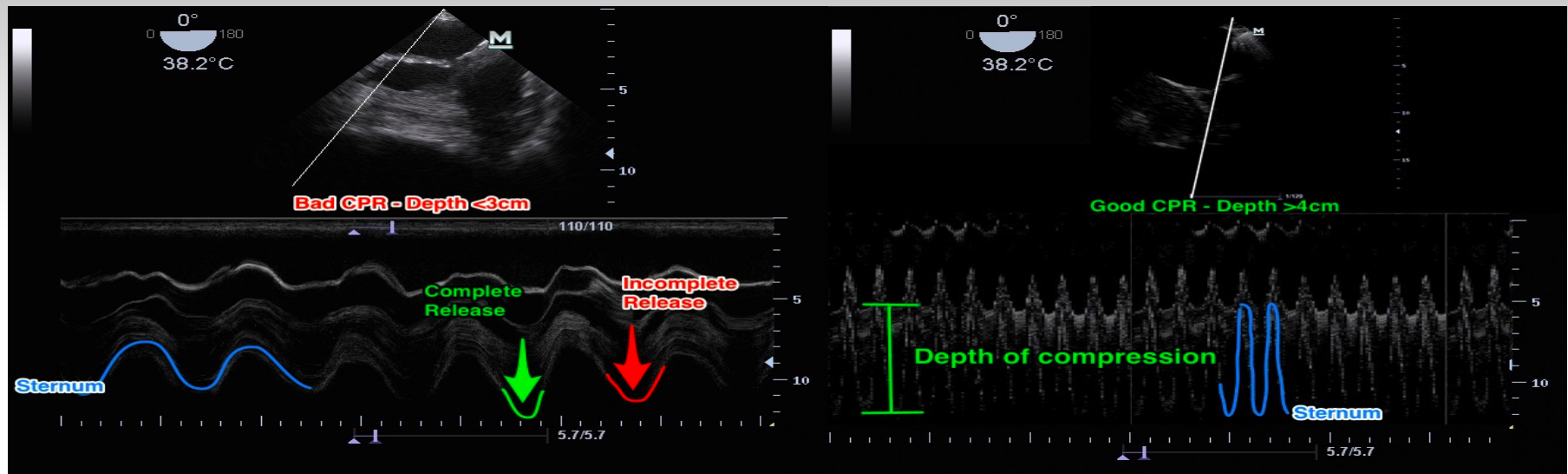
Occlusion of Ao Outflow Tract



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Depth of CPR and Release



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CAN TEE HELP IDENTIFY THE CAUSE OF ARREST?



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Cause of Arrest

- Identified correct cause in 31/48 (65%)
- Incorrect cause identified in 4/48 (8%)
- Changed management in 15 (31%)
- Diagnoses: tamponade (n=6), MI (n=21), PE (n=6), ruptured aorta (n=1), aortic dissection (n=4), papillary muscle rupture (n=1)

Van der Wouw, et al. JACC 1997;30(3):780-783

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Answers

- TEE has the potential to:
 - Improve Rhythm Analysis
 - Identify masked VF
 - Distinguish PEA from pseudo-PEA and early ROSC
 - Replace the pulse check
 - Tell you to move your hands to a better position during CPR
 - Identify cause of arrest
 - Change management

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THANK YOU

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