The UHP Ultrasound Protocol: A Novel Ultrasound Approach to the Empiric Evaluation of the Undifferentiated Hypotensive Patient

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The UHP Ultrasound Protocol

- Undifferentiated hypotensive patient
  - Found reversible condition!
- Free fluid evaluation
- Qualitative cardiac evaluation
- Abdominal aorta evaluation

Case I

- 70 y/o female, sent to ER due to syncope
- At ER: BP: 80/palpation; HR: 120; RR: 30
- PE: normal; No trauma
- Normal ECG
- The UHP ultrasound protocol
  - Aorta revealed a 6-centimeter aneurysm with associated intraluminal clot

Case II

- 40y/o woman with SLE and recurrent PE hx sent to ER due to SOB
- The UHP ultrasound protocol
  - Pericardial effusion

Case III

- 45y/o man, hypotension with left flank pain
- The UHP ultrasound protocol
  - Morison’s pouch view showed intraabdominal fluid

Discussion

- Goal: for systemic evaluation of reversible and time-dependent cause of hypotension
  - Hemoperitoneum, pericardial effusions, and aortic aneurysms
- May also apply to PEA patient
  - D/D: hypovolemia, pericardial effusion
Morison’s pouch: for evaluation of intra-abdominal fluid

Limitation
- Single Morison’s pouch view: lower sensitivity
- Aortic evaluation
  - Obesity, bowel gas
  - Saccular aneurysm
- Transverse subxyphoid view: enough for detected pericardial effusion

Thank you for your attention!!

Abdominal and Cardiac Evaluation with Sonography in Shock (ACES): an approach by emergency physicians for the use of ultrasound in patients with undifferentiated hypotension

Emerg Med J 2009 26: 87-91
The Abdominal and Cardiac Evaluation with Sonography in Shock (ACES) protocol

- 1 one or more cardiac views
- 2 an inferior vena cava view
- 3 a screen of the abdominal aorta
- 4 Right and 5 left flank view
- 6 pelvic view

Discussion - Hypovolaemia

- IVC diameter
  - Reliable for indicator of blood loss
  - Collapsed index

<table>
<thead>
<tr>
<th>Diameter (cm)</th>
<th>Collapsed index (%)</th>
<th>Estimated right atrial pressures</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 cm</td>
<td>&gt;60-69%</td>
<td>&lt;12 mmHg</td>
</tr>
<tr>
<td>&gt;2 cm</td>
<td>&gt;60-79%</td>
<td>&gt;12 mmHg</td>
</tr>
</tbody>
</table>

- Must consider with ventricular size, wall motion and pericardial fluid
- With other view: haemoperitoneum or haemothorax, abdominal aortic aneurysm

Discussion - Obstruction

- Pericardial effusion
  - reduced IVC collapse index
  - collapse of the right side of the heart during diastole
- Heart motion, and morphology
- Embolism, thrombosis
  - IVC distension or non-collapsibility
Discussion-

- Cardiogenic
  - gross abnormalities of cardiac function and size
- Distributive
  - Hyperdynamic left ventricle, which has a 94% specificity for sepsis
- Adjuncts
  - Femoral vein, parasternal and apical views of the heart, thoracic views

Thank you for your attention!!

C.A.U.S.E.: Cardiac arrest ultrasound exam— A better approach to managing patients in primary non-arhythmogenic cardiac arrest

Caleb Hernandez, Klaus Shulera, Hashibul Hannana, Chionesu Sonyikaa, Antonios Likourzosa,*, John Marshalla,b
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Introduction

- Cardiac arrest
  - VT, VF: focus on treatment
  - PEA, asystole: focus on underlying cause
- C.A.U.S.E. (cardiac arrest ultra sound examination)
  - cardiac tamponade, severe hypovolemia, pulmonary embolus, tension pneumothorax, and true asystole

Sonograph for Cardiac Tamponade

- Visualizing pericardial effusion and right chamber collapse
- D/D from tension pneumothorax
  - AHA: neck vein distention and no pulse
- Avoid inappropriate therapy
Sonograph for Hypovolemia

- Echo: flattened right and left ventricles
- IVC diameter
  - Volume status and RV pressure
  - Flap or Collapsed IVC: hypovolemia
  - Dilated IVC (>20mm): pump failure
- Avoid inappropriate therapy

Sonograph for Pulmonary Embolus

- 5% of cardiac arrest case
- Sonograph showed an engorged RV with a flattened LV
  - Low to moderate sensitivity and high specificity
  - Echo would be evident after acute obstruction of more than 30% of the pulmonary arterial bed

Sonograph for Tension Pneumothorax

- Absent of Sliding sign
- Can diagnosed within 30s with high sensitivity and specificity
- D/D: Cardiac tamponade
- Complete absence of any heart motion
- Time for terminating resuscitation
  - Blaivas et al.: 100% death rate
C.A.U.S.E

- Addresses for leading cause of cardiac arrest
- Four-chamber view
  - subcostal, parasternal or apical thoracic windows
  - Hypovolemia, massive PE, Cardiac tamponade
- Anteromedial views of the lung and pleura
  - at the level of the second intercostal space at the midclavicular line bilaterally

**Summary**

- Cardiac arrest patient divided to arrhythmogenic and non-arrhythmogenic
- If no-arrhythmogenic
  - First: Four chamber view for Massive PE, Cardiac tamponade and hypovolemia
  - Then: Pulmonary View for pneumothorax
- If all normal: Consider e-imbalance, hypothermia, drugs or toxins, Massive MI

**Thank you for your attention!!**