Important Cardiac Findings On CT Done for Pulmonary Embolism

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Objectives

Become familiar with clinically important cardiac abnormalities demonstrable on non-ECG gated CT scans performed to exclude PE.
CT Echocardiography correlation

No Disclosures
No Discussions of off-label use

Important cardiac information on CT studies for PE even though they are not routinely ECG-gated.

Many patients evaluated for PE have underlying known or unknown cardiac disease.

Right ventricular dilatation
Valvular Abnormalities
Left ventricular dilatation
Intracardiac thrombi and their significance
Patent Foramen Ovale
Pericardial Abnormalities
Coronary Arteries
Congenital Heart Ds (PAPVC)

Causes of RV Dilatation
RV Dysfunction
Pulmonary Artery Hypertension
Tricuspid Valve Disease
Left to Right Shunts

Pulm Embolism

\[ \text{PA Vascular Resistance} \]
\[ \text{RV Afterload} \]
\[ \text{RV Dysfuction} \]

RV Dysfunction

Ischemia ➔ LV Output ➔ RV Volume ➔ L Septal Bowing

LV Preload ➔ LV Distensibility


RVD

About 30% of normotensive patients with PE have RVD

Normotensive PE with RVD: 10% rate of PE-related shock, 5% in-hospital mortality

Normotensive PE without RVD: 0% shock or mortality


CT Findings of RVD

RV/LV Diameter ratio > 1

Sens =80-90%
Spec = 100%
PPV = 100%

RV/LV ratio > 1.5 = severe PE

Contractor S, JCAT 2002;26: 587-591
Lim KE, Clin Imaging 2005;29: 16-21

Reflux into IVC also associated with poorer Px

RVD: Prognosis

<table>
<thead>
<tr>
<th>RV/LV Ratio</th>
<th>Death</th>
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<tbody>
<tr>
<td>1.0</td>
<td>5%</td>
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<tr>
<td>1.3</td>
<td>10%</td>
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<tr>
<td>1.7</td>
<td>20%</td>
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<tr>
<td>1.9</td>
<td>30%</td>
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<tr>
<td>2.1</td>
<td>40%</td>
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<tr>
<td>2.3</td>
<td>50%</td>
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RV/LV = 58/25 = 2.4 (patient did not survive)


Chronic PE
Valvular Abnormalities
- Tricuspid regurgitation
- Aortic stenosis
- Rheumatic heart disease

Left Ventricle
- LV infarction
- Myocarditis
- Dilated cardiomyopathy
- Restrictive cardiomyopathy

RA – catheters, hypercoagulable states, abdominal tumor invading IVC
RV – severe coagulopathy
LA – atrial fibril (LAA), Lung Ca invading PV
LV – complication of MI, apical aneurysm

Intracardiac Thrombus

Presence of PFO
- Major PE without PFO = mortality of 14%
- Major PE with PFO = mortality of 33% (Paradoxical embolism)


PFO
- Foramen ovale remains patent in 25%
- Most common abnormal communication between right and left circulations associated with paradoxical embolism
- 70% of patients with ASA have PFO
- PE with PFO increases risk of paradoxical embolism due to increased right-sided cardiac pressures

Summary
- Important information regarding the heart on non-gated CT scans of the chest for PE.
- Cardiac findings may explain symptomatology that led to CT scan for PE.
- Recommend echocardiography for clarification of cardiac CT findings on non-gated CT scans.