Role of TEE in diagnosis and management of aortic dissection

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EAE - EACTA
Teaching course
Aortic dissection

No conflict of interest to disclose
Aortic dissection

Definition

Intima disruption

Intima

Lumen

Media

Advantitia
Aortic dissection
Usefull TEE views
Aortic dissection
TEE views

Mid Oesophagus

0° SAX

90° LAX

90° Asc Ao

Upper Oesophagus

90° Arch

60-90° SAX Arch
Aortic dissection
Assessment of the aorta
Aortic dissection
Diagnostic goals of TEE examination

- Confirm diagnosis
- Classify the dissection / delineate the extent
- Localize intimal tears
- Differentiate true and false lumen
- Assessment of complication:
  - aortic regurgitation
  - pericardial effusion
  - arterial involvement
- Detection of post operative complication
- Endovascular techniques
Aortic dissection
Classification De Bakey - Stanford

Type 1

Type II

Type III

Type A or proximal

Type B or distal
Aortic dissection
Dissection Type 1 Proximal
Aortic dissection
Dissection Type 1 Proximal
Aortic dissection
Dissection Type 1 Proximal
Aortic dissection
Dissection Type 1 Proximal
Aortic dissection
Dissection Type B Distal
Aortic dissection
Diagnostic pitfalls

- Inadequate visualization of a portion of the aorta
- Difficulties in differentiating flap from artefacts
- Misinterpreting a non aortic structure (innominate vein, azygos vein) as a false lumen
- Localized aortic dissection or intramural hematoma
Aortic dissection
New classification

Class 1
Classic dissection

Class 2
intramural haemorrhage or haematoma

Class 3
Ulceration of aortic plaque

Class 4
Subtle or discrete Ao dissection

Class 5
Iatrogenic dissection

Aortic dissection
Intramural hematoma
Aortic dissection
Intimal tears
Aortic dissection
Intimal tears
Aortic dissection
Differentiate true and false lumen
Aortic dissection
Differentiate true and false lumen
### Aortic dissection

**Differentiate true and false lumen**

<table>
<thead>
<tr>
<th></th>
<th>True</th>
<th>False</th>
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<tbody>
<tr>
<td><strong>Size</strong></td>
<td>true &lt; false</td>
<td>false &gt; true</td>
</tr>
<tr>
<td><strong>Pulsation</strong></td>
<td>systolic expansion</td>
<td>systolic compression</td>
</tr>
<tr>
<td><strong>Flow direction</strong></td>
<td>antegrade</td>
<td>reduced</td>
</tr>
<tr>
<td><strong>Loc aortic arch</strong></td>
<td>inner contour</td>
<td>outer contour</td>
</tr>
<tr>
<td><strong>Sign of slow flow</strong></td>
<td>rare</td>
<td>frequent</td>
</tr>
<tr>
<td><strong>Thrombus</strong></td>
<td>rare</td>
<td>frequent</td>
</tr>
<tr>
<td><strong>Communication flow true-&gt;false</strong></td>
<td></td>
<td></td>
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</tbody>
</table>

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*ESC guidelines in Aortic dissection, EHJ, 2001, 22, 1642-1681*

*Echocardiography in aortic disease EAE recommendation, Eur J Echo, 2010, 11, 645-658*
Aortic dissection
Assessment of complications

- Aortic regurgitation
- Pericardial/ peri aortic effusion
- Arterial involvement

Important to diagnose!
- May change the surgical strategy and represent indices of severity
Aortic dissection

Aortic regurgitation

• 40-76%

• Important du diagnose the mechanism

• Implication for the decision to repair/replace the valve
Aortic dissection
Aortic regurgitation
Aortic dissection
Aortic regurgitation
Dilatation of the aortic annulus secondary to dilatation of the ascending aorta

Rupture of the annular support and tear in the implantation of one of the valvular leaflets

Asymmetrical dissections, the haematoma itself may displace a sigmoid below coaptation level

Prolapse of the intima in the outward tract of the left ventricle through the valvular orifice

Previous aortic valve disease

Aortic dissection
Pericardial / Periaortic effusion

- Extravasation of blood
- Irritation of the adventice
- Indicator of poor prognosis
- Echo best tools for diagnosing severity of tamponade
- Periaortic hematoma and pleural effusion best diagnosed by CT
Aortic dissection
Arterial involvement

- **Coronary artery**: 10-15%
  
  regional wall motion assessment
  
  position of the coronary arteries: true or false lumen?

- **Supra aortic branch**: difficult for TEE!

- **Coeliac tronc involvement** may be diagnosed by TEE but CT is irreplaceable for renal and iliac arteries
Aortic dissection

Treatment

• Type A (I, II): Surgery
  Valve sparing operation if possible

• Type B (III) medical, stenting

Surgery if: recurrent chest pain
  aortic expansion
  mediastinal haematoma
  periaortic haematoma
Aortic dissection
Post operative assessment

• Valve sparing surgery, function? Residual AR
• Aortic root prosthesis (tube)
• Correct connection of the tube to the true lumen
• Leak in coronary artery reimplantation to the graft tube
• Periaortic haemorrhage?
• Segmental abnormalities in left ventricular contraction?
Aortic dissection
Post operative assessment
Aortic dissection
Post operative assessment
Aortic dissection
Endovascular therapy: stent graft

**Prior stent-graft implantation**

- Diameter measurement, confirmation of the stent graft size
- Correct identification of true and false lumen, position of the catheters
- Location of atherosclerotic plaque, may impede adhesion of the stent graft to the aortic wall

**After stent-graft deployment**

- Detection of per stent leaks (balloon dilatation)
- Correct apposition of the stent
Aortic dissection
Endovascular therapy: stent graft
Aortic dissection
Endovascular therapy: stent graft: position catheter
Aortic dissection
Endovascular therapy: stent graft position
Aortic dissection
Endovascular therapy: stent graft
Aortic dissection
Endovascular therapy: stent graft
Aortic dissection
Diagnosis imaging in acute dissection

TTE followed by TEE
Computed tomography
detection of tears

Contrast angiography
to define anatomy and guide intervention
instable patients
Routine preoperative coronaryography
in haemodynamically unstable patients

Magnetic resonance imaging
in unstable patients
Intravascular ultrasound

Class | I | IIa | IIb | III

ESC guidelines in Aortic dissection, EHT, 2001, 22, 1642-1681
Aortic dissection
Diagnosis imaging in chronic dissection

Magnetic resonance imaging
TTE followed by TEE
Computed tomography
Contrast angiography
to guide intervention
preoperative diagnosis in selected pts
for complete staging
Intravascular ultrasound
to guide percutaneous intervention

Class I IIa IIb III

ESC guidelines in Aortic dissection, EHJ, 2001, 22, 1642-1681
<table>
<thead>
<tr>
<th></th>
<th>TTE/TEE</th>
<th>CT</th>
<th>MRI</th>
<th>Angio</th>
<th>IVUS</th>
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<td>Cor arteries</td>
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ESC guidelines in Aortic dissection, EHJ, 2001, 22, 1642-1681
Aortic dissection
Diagnosis imaging in aortic dissection

- Similar accuracy for the diagnosis of acute aortic syndrome
- The decision to use a specific technique depends on availability of the techniques and experience of the staff imaging
- Nevertheless, echocardiography is available everywhere in the hospital: emergency, intensive care,.....
Aortic dissection

Conclusion

• TEE plays an important role in the diagnosis and management of aortic dissection

• A complete assessment of the aorta, the aortic valve must be performed before treatment specially in type I dissection to guide the decision to replace or repair the valve. A complete assessment of the repair is also mandatory after surgery.

• In endovascular procedures TEE plays also an important role by guiding the positioning of the catheter and the stent-graft.