

Comprehensive assessment of the aorta

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Echo 2018
 SINGAPORE
 27-28 October
 www.echosingapore.com

Aortic root

Sinuses of valsalva

Aortic annulus

Segments and nomenclature

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Ascending aorta

Sinotubular junction

Aortic root

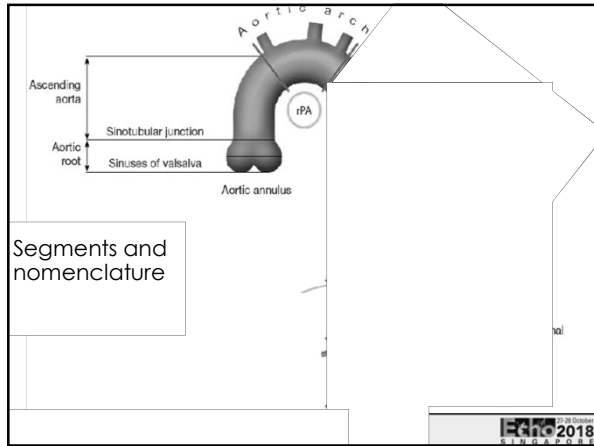
Sinuses of valsalva

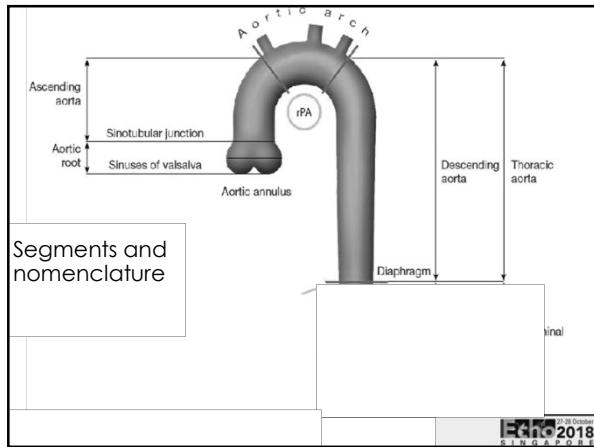
Aortic annulus

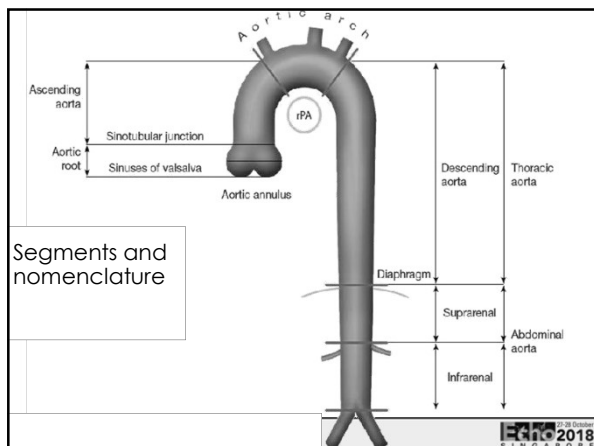
rPA

Segments and nomenclature

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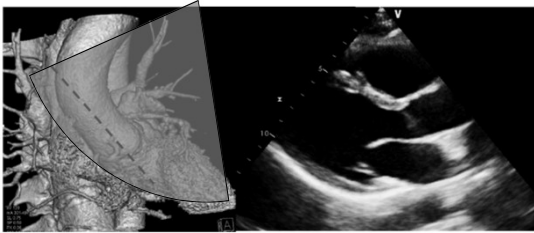


Anatomical Considerations



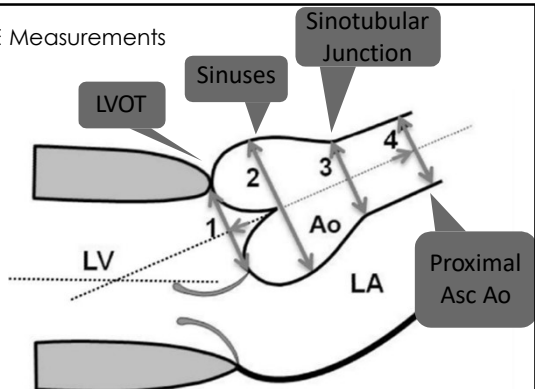
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PSLAX – Root and ascending



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ASE Measurements



Journal of the American Society of Echocardiography 2015; 36: 1-20 • e1022. (10.1016/j.echo.2014.10.003)

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Screening and Imaging in Patients with Suspected or Diagnosed Aortopathy

Imaging protocol

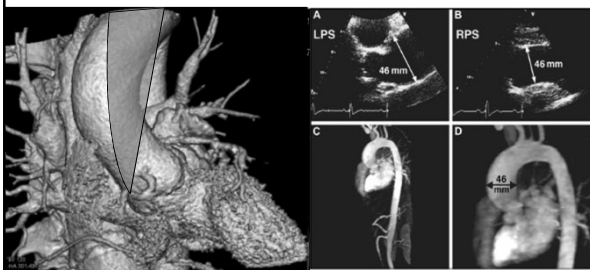
- Serially measure and record TS, ST, proximal and distal ascending Ao and aortic arch (leading edge to leading edge), RSE
- Index for patient BSA for estimated risk of dissection
 - Mild dilatation >20mm/m²
 - Moderate dilatation >25mm/m²
 - Severe dilatation >27mm/m²
- At extremes of weight, adjustment for height may be better indicator of risk
aortic area (cm²)/height (m)



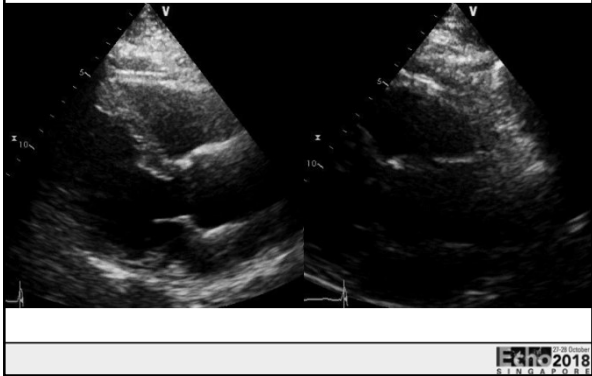
Ascending



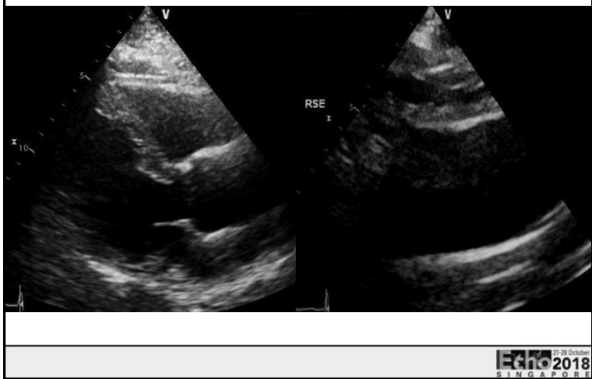
Don't forget the RSE!



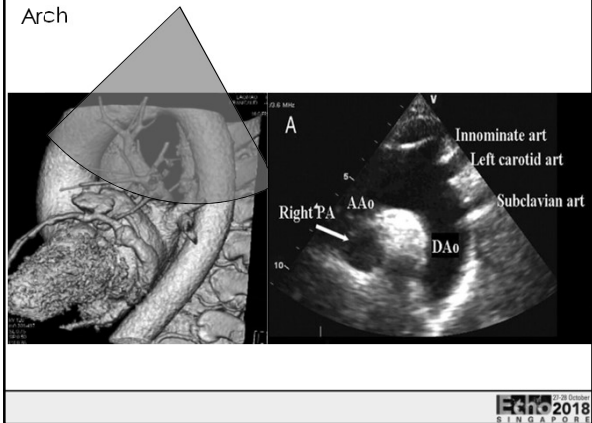
Ascending - LSE



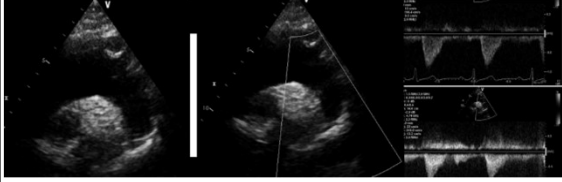
Ascending - RSE



Arch

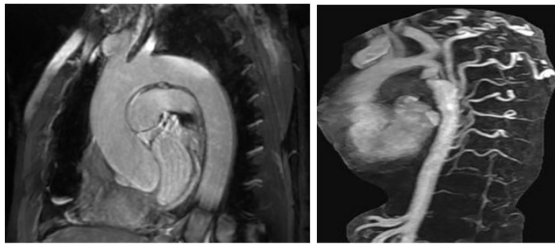


Arch



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Coarctation - MRI



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Descending thoracic

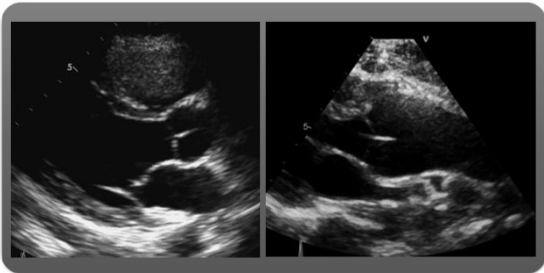


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Abdominal



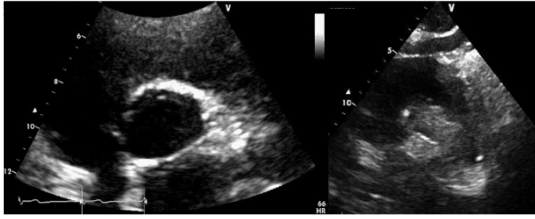
Sino-tubular effacement



Case 45yo male



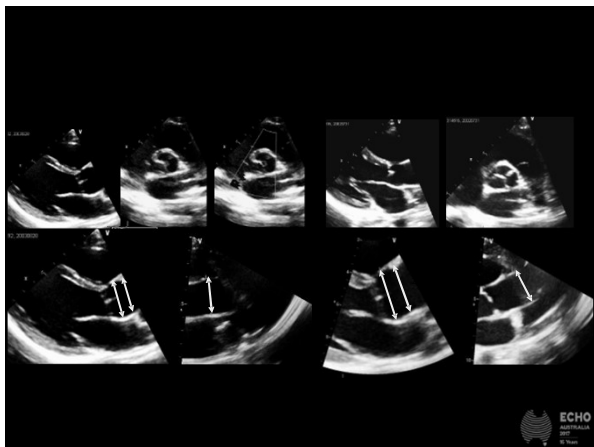
Case 45yo male



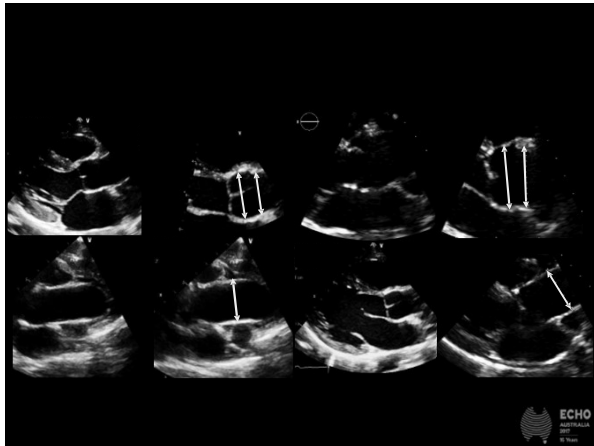
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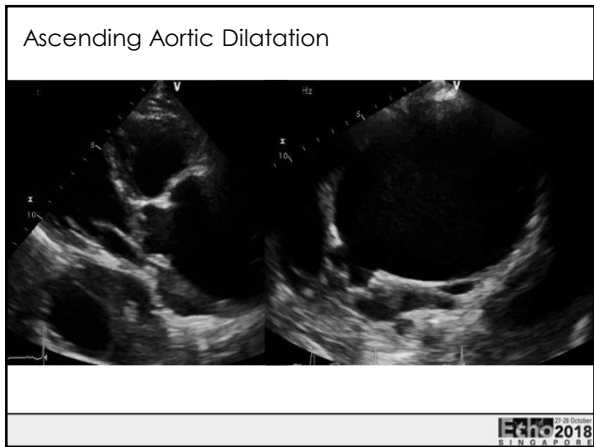


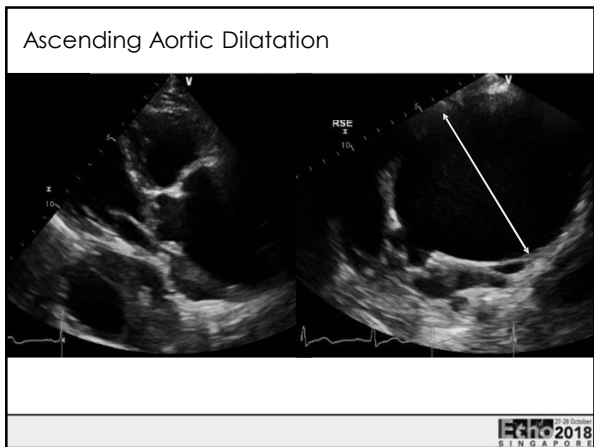
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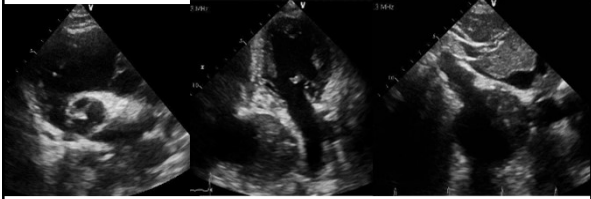
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Ascending Aortic Dilatation



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Ascending Aortic Dilatation



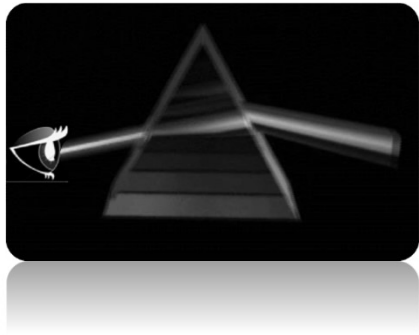
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Anastomosis of ascending Ao graft
Don't forget the RSE!



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**Aortopathies:
Spectrum of Genotypic and Phenotypic Expression**



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Spectrum of aortopathy

- Bicuspid aortic valve with BAV aortopathy
 - Heritable BAV aortopathy without BAV
 - Coarctation with aortopathy
- Connective tissue syndromes
 - Marfan Syndrome
 - Loeys-Dietz syndrome
 - Ehlers-Danlos (vascular)
- Familial thoracic aortic aneurysm
 - Thoracic aortic aneurysm + PDA
 - MASS phenotype
- Congenital contractural arachnodactyly
- Homocystinuria



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Genetics of aortopathy

Aortopathy	Defect and Heritability	Mechanism	Region Affected
Marfan syndrome	Fibrillin 1 AD	Defective myofibril binding to TGF-β complex, which upregulates TGF-β signalling and stimulates inflammation and fibrosis	Sinuses of Valsalva with effacement of the STJ
BAV associated Aortopathy	No single gene AD variable penetrance	Upregulation of TGF-β signalling demonstrated but mechanism unclear	Ascending aorta above the STJ
Familial TAA	ACTA2 and TGFBR2 AD variable penetrance	No specific mechanism identified but behaves similarly to BAV aortopathy	Sinuses and STJ, similar to Marfan
TAA + PDA	Smooth muscle myosin heavy chain MYH11 AD	Defective smooth muscle cell contractile protein structure in aortic media and vasa vasorum	Ascending aorta above the STJ

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Genetics of aortopathy

Aortopathy	Defect and Heritability	Mechanism	Region Affected
MASS phenotype (MVP, Ao ULN, skin, skeletal)	No consistent gene, sporadic Dominant negative mutation	No specific mechanism identified	Aortic root and ascending aorta
Loeys-Dietz syndrome	TGFBR1, TGFBR2, SMAD3 AD	Upregulation of TGF- β signalling stimulates aggressive and widespread arterial aneurysm formation	Aortic root, ascending aorta, arch, descending
Ehlers-Danlos (vascular)	COL3A1, COL5A2, COL5A1	Upregulation of TGF- β signalling stimulates aggressive and widespread arterial aneurysm formation	Aortic root, ascending aorta, arch, descending
Congenital contractural arachnodactyly (Beals-Hecht)	Fibrillin 2 AD	No clear mechanism	Aortic root

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From aortopathy to disaster....

Aortic size
>5.0 cm

Rate of increase
>0.5 cm/yr

Predictors
of
dissection

Family history of early
aortic complications



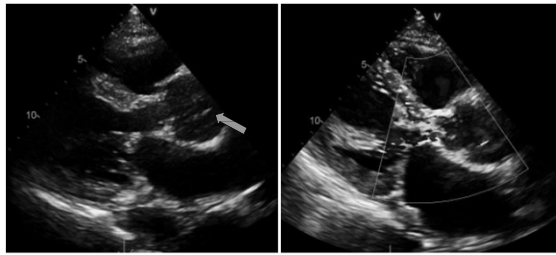
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Case

- 54 year old male
- Presents with acute retrosternal chest pain to regional centre
- Transferred after CT scan suggests Ao dissection

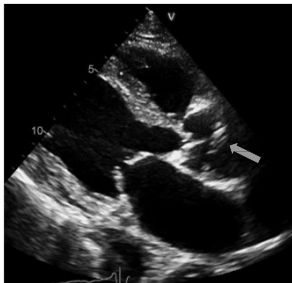
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TTE in the ER



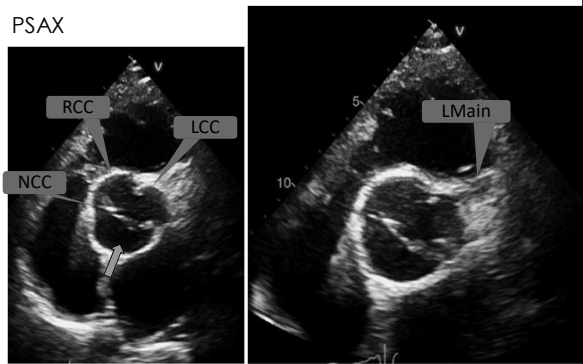
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PSLAX Zoom



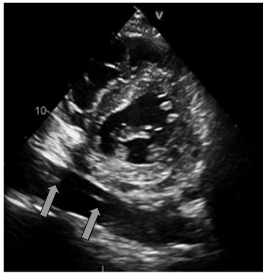
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PSAX



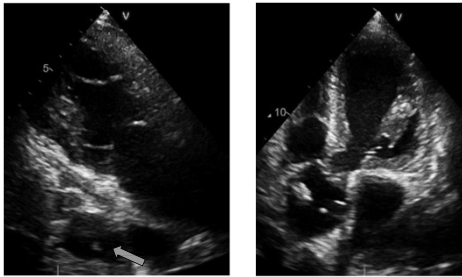
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Descending aorta

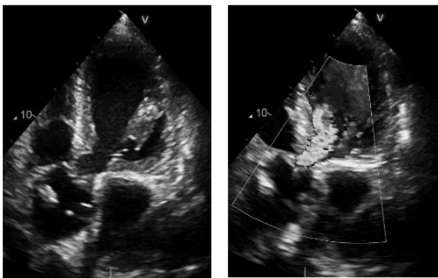


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Descending aorta

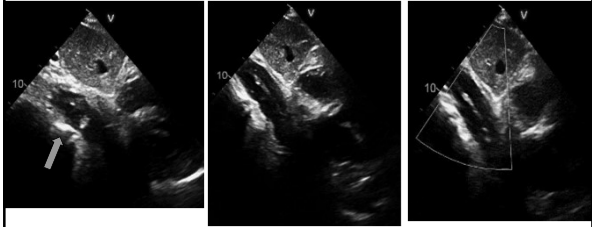


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Abdominal aorta



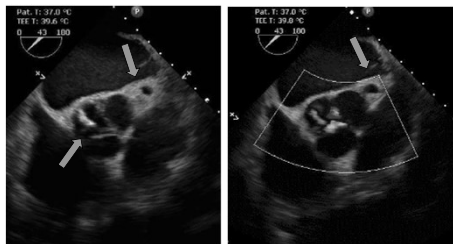
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TOE In the ICU



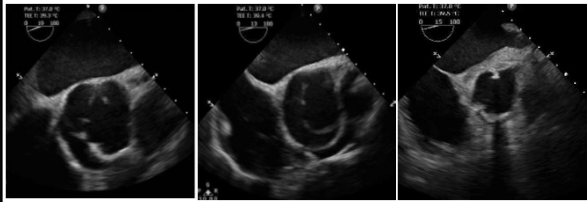
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TOE ICU Sax



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TOE ICU Sax

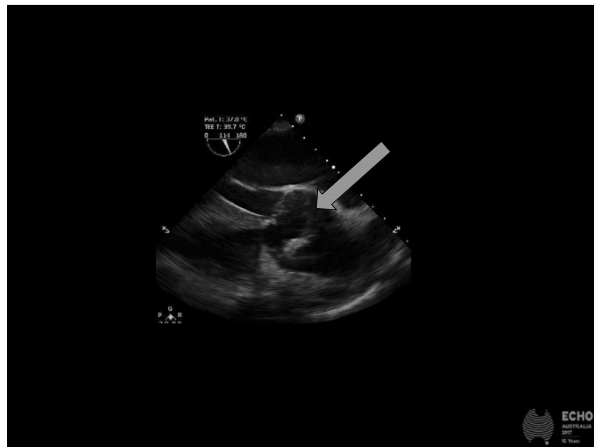


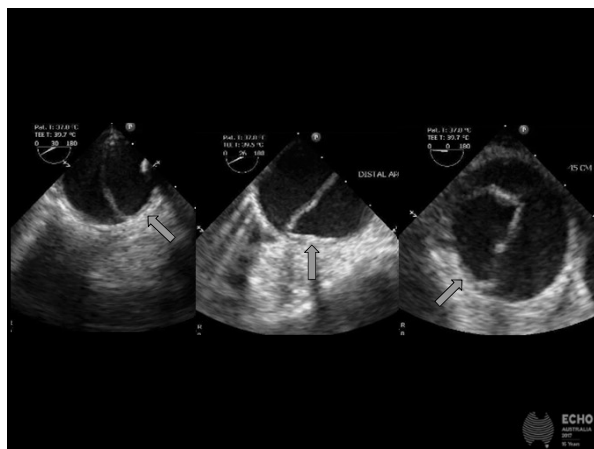
AV tips

Above AV

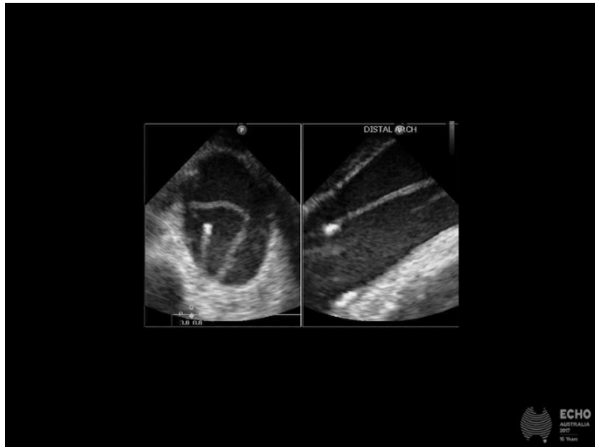
Ao root
haematoma







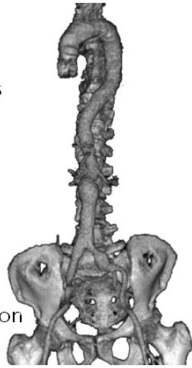






Imaging the aorta 2018

- Aortopathy is a slowly progressive, often genetic, completely silent illness
- Echo is cornerstone of identification, sequential follow-up and screening
- Fastidious attention to detail – 1 mm counts
- Use of ancillary imaging taken in context
- Always look at previous studies.
- Acute aortic syndromes can be complex and require careful evaluation



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