ECHOCARDIOGRAPHY IN STROKE AND TRANSIENT ISCHEMIC ATTACK

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Stroke is the third leading cause of death in most Western countries. Cardioembolism might be responsible for 15% to 20% of ischemic strokes. Although atrial fibrillation can be diagnosed by electrocardiography, the remaining causes of cardioembolic stroke are diagnosed by echocardiography.
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Clinical findings suggesting embolic stroke:
* Abrupt onset.
* Previous infarction in other cerebral territories.
* Associated peripheral emboli.
* Cortical, large subcortical (> 1.5 cm) or multiple lesions on computed tomography or magnetic resonance.
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Echocardiography is the investigation of choice when a cardiac source of embolism is suspected. Debate persists about which patients with a stroke or thromboembolism require imaging.
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Stroke and transient ischaemic attack (TIA) remain controversial indications for echocardiography. In some centres they represent 40-50% of the total requests for TEE studies, while many stroke units never request echocardiography as a matter of routine.
The role of echocardiography in patients with stroke:

* Detecting a direct source of emboli, eg, thrombus, myxoma, vegetation...
* Detecting a condition with a known risk of stroke, eg, mitral stenosis, dilated left ventricle...
* Refining the risk in a condition known to be associated with emboli, eg, atrial fibrillation..
Possible causes of stroke found on echocardiography

**Left ventricle**
- Anterior myocardial infarct
- Dilated left ventricle
- Hypertrophic cardiomyopathy (with atrial fibrillation)
- Restrictive myopathy
- Endomyocardial fibrosis
- Thrombus (lupus, malignancy, thrombocythaemia, polycystic kidney disease)
- Ventricular septal defect with pulmonary hypertension
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Valves
• Mitral stenosis
• Replacement heart valve (aortic or mitral)
• Endocarditis
• Noninfective endocarditis (eg, malignancy)
• Fibromyoma
Patients with mitral stenosis are at particular risk of thromboembolism, even in sinus rhythm or if a thrombus cannot be imaged and any proven thromboembolic event justifies lifelong anticoagulation.
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Left atrium

- Large left atrium/ spontaneous contrast
- Thrombus
- Atrial septal aneurysm
- Patent foramen ovale
- Atrial septal defect
- Myxoma
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The annual risk of stroke in relation to LA size & LV function:

Atrial fibrillation + normal echocardiogram 1.5 %
Atrial fibrillation + left atrium > 2.5 cm/M 8.8 %
Atrial fibrillation + global LV dysfunction 12.6 %
Atrial fibrillation + left atrium > 2.5 cm/M2 & Moderate LV dysfunction 20.00 %
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Spontaneous echo contrast

-Dynamic smoke-like echoes produced by the interaction of erythrocytes and plasma proteins under conditions of stasis.

-Left atrial spontaneous echo contrast is an independent predictor of left atrial thrombus and/or cardiac thromboembolic events.
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Patent foramen ovale:

- The autopsy incidence of PFO is approximately 27% and 6% for a large defect (0.6 cm to 1.0 cm).

- PFO is often associated with atrial septal aneurysm and Chiari network, although these anatomic variations are uncommon.
The role of a patent foramen ovale (PFO) as a risk factor for ischemic stroke has been established in recent years. However, the best therapeutic option to prevent recurrent events is still controversial, with antithrombotic treatment or transcatheter PFO closure.
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The treatment of these abnormalities, which are present in a very high proportion of young patients with stroke, can include antiplatelet therapy, anticoagulant therapy, closure with a device delivered by means of a catheter or surgical closure in an open-heart procedure.
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Aorta
Aortic atheroma
Dissection
Which probe when?
Most echocardiographers view the 2 techniques as complementary and perform TTE initially.
It seems prudent to begin with a less invasive, although less sensitive procedure and avoid the need for a more costly, invasive TEE.
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Transthoracic
- As a prelude to transoesophageal examination in patients age < 50 years
- Significant clinical abnormality on auscultation, eg, mitral stenosis, atrial septal defect
- Significant electrocardiographic abnormality, eg, anterior infarct, atrial fibrillation
- Suspicion of endocarditis or myxoma, eg, high erythrocyte sedimentation rate

Transoesophageal
- Suspicion of endocarditis or dissection and transthoracic echocardiography normal or views suboptimal
Age under 50
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TEE examination:
1. Look at left atrium and left atrial appendage.
2. Check the atrial septum for myxoma, aneurysm, and atrial septal defect using imaging and colour.
3. Perform a contrast study.
   Grading of patent foramen ovale
   - small 1-5
   - moderate 5-20
   - large > 20
4. Inspect the valves looking for vegetations or other masses, eg, fibromyoma
5. Inspect the left ventricle.
6. Assess the aorta especially the arch looking for atheroma ≥ 5 mm in depth or ulcerated or pedunculated atheroma
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For the majority of patients with thromboembolism, routine TEE is not indicated, since clinical examination, electrocardiography and TTE provide sufficient information to determine optimal management.
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TEE is indicated when embolic events occur in anticoagulated patients with native or prosthetic valvular heart disease, particularly if endocarditis is suspected, or when transthoracic images are inconclusive.