TRANSESOPHAGEAL ECHOCARDIOGRAPHY IN ACUTE STROKE – REASONABLE IN YOUNG PATIENTS OR ONLY IN THE ELDERLY?

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Background and Purpose:

Transesophageal echocardiography is the reference method for the detection of a number of cardiac and aortic sources of brain embolism. However, the indication of transesophageal echocardiography (TEE) in patients with acute ischemic stroke is unclear. Therefore, we studied the impact of TEE on treatment in different age-groups in a large stroke cohort.

Methods:

During a 24 months period in 2010 – 2011, 485 consecutive patients with acute retinal or cerebral ischemia admitted to the University Medical Center Freiburg were prospectively included and underwent routine stroke diagnostics including TEE.

Stroke etiology was classified according to the TOAST criteria.

Then, the rate of high-risk and of potential-risk sources in TEE (using TOAST criteria) was evaluated in <55, 55-74, and ≥75 year-old patients with cryptogenic stroke.

Plaques of the proximal descending aorta (DAo) ≥4 mm thickness or with superimposed thrombi (=complex plaques) were considered a high-risk source as it was previously demonstrated¹, that diastolic flow reversal is able to connect such atheroma with all brain supplying great arteries and thus with all brain territories.

Results:

In patients with cryptogenic stroke etiology TEE detected the following embolic sources:

	Cryptogenic etiology n=329	<55 years n=86	≥55 and <75 years n=161	≥75 years n=82
SEC	7 (2.1%)	0 (0.0%)	1 (0.6%)	6 (7.3%)
Vmax LAA ≤30cm/s	3 (0.9%)	0 (0.0%)	1 (0.6%)	2 (2.4%)
LA/LAA-thrombus	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
PFO	34 (10.3%)	21 (24.4%)	10 (6.2%)	3 (3.7%)
ASA	17 (5.2%)	2 (2.3%)	4 (2.5%)	11 (13.4%)
PFO plus ASA	64 (19.5%)	18 (20.9%)	32 (19.9%)	14 (17.1%)
ASD	5 (1.5%)	4 (4.7%)	1 (0.6%)	0 (0.0%)
Aortic plaque <4mm	204 (62.0%)	13 (15.1%)	120 (74.5%)	71 (86.6%)
Aortic plaque ≥4mm	137 (41.6%)	6 (7.1%)	79 (49.1%)	52 (63.4%)
Aortic thrombus	12 (3.6%)	0 (0.0%)	5 (3.1%)	7 (8.5%)
Complex DAo plaque	131 (39.8%)	4 (4.7%)	72 (44.7%)	55 (67.1%)

Table 1. SEC = spontaneous echo contrast, LA/LAA = left atrium/left atrial appendage, PFO = persistent foramen ovale, ASA = atrial septal aneurysm, ASD = atrial septal defect. DAo = descending aorta.

Without TEE, etiology of stroke was cryptogenic in 329 (67.8%) patients. TEE helped to determine etiology in 158 (48.4%) of them. Results of TEE led to oral anticoagulation in 57 (17.3%) patients and to PFO closure in one patient.

Figure 1. Left: TEE image of a 4.5 mm thick plaque of the proximal descending aorta. Middle: 4D flow MRI and dedicated software allow the analysis of individual embolization pathways originating from such plaques. In this patient from a former study², the atheroma was located 1 cm downstream of the left subclavian artery outlet. Right: This plaque was connected with the posterior circulation by diastolic flow reversal and thus able to cause left cerebellar infarction as demonstrated by diffusion weighted brain MRI.

Conclusions:

- TEE was highly valuable for determining individual stroke etiology and thus optimizing secondary prevention.
- In patients ≤55 years, the benefit of TEE was restricted to the detection of septal anomalies (PFO, ASA). In older age, TEE was valuable for identifying both complex atheroma and indicators of intermittent atrial fibrillation.
- Complex plaques of the descending aorta were very frequent in cryptogenic stroke patients. Thus, they should be considered for secondary prevention strategies due to the physiological phenomenon of diastolic retrograde blood flow at this site.
- We recommend TEE in all patients with cryptogenic stroke after routine diagnostics. TEE can probably be replaced by a negative “Bubble-test” in patients <55 years. Similarly, TEE may be dispensable for the detection of complex atheroma of the aorta in patients with normal intima-media-thickness of the common carotid artery and absence of carotid plaques.³

References:

1. Harloff A et al. Complex plaques in the proximal descending aorta: an underestimated embolic source of stroke. Stroke. 2010;41:1145-50.
2. Wehrum T et al. Prevalence of potential retrograde embolization pathways in the proximal descending aorta in stroke patients and controls. Cerebrovasc Dis. 2014;38:410-417.
3. Harloff A et al. Combined measurement of carotid stiffness and intima-media thickness improves prediction of complex aortic plaques in patients with ischemic stroke. Stroke. 2006;37:2708-12.