Cardiovascular assessment of patients with ischemic stroke or TIA—which test to order?

Original article Douen A *et al.* (2007) Usefulness of cardiovascular investigations in stroke management: clinical relevance and economic implications. *Stroke* **38:** 1956–1958

SYNOPSIS

KEYWORDS cardiac embolism, cerebrovascular diseases, echocardiography, Holter monitoring

BACKGROUND

Cardiovascular investigations to search for a cardiac source of embolus are a routine part of the assessment of patients with ischemic stroke or transient ischemic attack (TIA). There is controversy over which cardiovascular tests should be ordered, however.

OBJECTIVE

To evaluate the use, relevance and economics of cardiovascular investigations in an ambulatory stroke clinic.

DESIGN AND INTERVENTION

This study was a chart review of 200 patients with stroke or TIA who were diagnosed over a 6-month period at a stroke centre in Canada. The investigators assessed the use, relevance and economics of transthoracic echocardiography for the detection of left atrial or left ventricular thrombus or mass, poor left ventricular function, patent foramen ovale or atrial septal defect, and other structural abnormalities, and of electrocardiography (ECG) and Holter monitoring for the detection of atrial fibrillation or atrial flutter. A cardiac investigation was considered to be clinically pertinent if it resulted in a change in treatment paradigm.

OUTCOME MEASURES

Outcome parameters were the clinical and economic impacts of each investigation.

RESULTS

Transthoracic echocardiography was performed in over two-thirds of patients ($n = 142$, 71%). Relevant cardiac findings were detected in 6 (4%) cases, with 1 patient having severely impaired left ventricular function (ejection fraction <20%), 3 patients having moderately impaired left ventricular function (ejection fraction 20–39%), and 2 patients having mildly to moderately impaired left ventricular function. In none of these patients did the findings lead to an alteration of antithrombotic therapy. Holter studies were conducted in three-quarters of patients ($n = 149$, 75%), and these investigations detected atrial fibrillation in 3 (2%) cases. In two patients with newly detected atrial fibrillation this finding led to a shift from antiplatelet therapy to anticoagulation. The third patient had a previous history of atrial fibrillation and the antithrombotic regimen was not changed. All patients in this study underwent ECG, which also identified the above three cases of atrial fibrillation. The total costs for transthoracic echocardiography in this study amounted to CAN$33,029 (cost per study $232.60), the total costs for Holter monitoring were $15,786 (cost per study $105.95), and the total costs for ECG were $3,300 (cost per study $16.50).

CONCLUSION

Transthoracic echocardiography and Holter monitoring accounted for 94% of the total cardiovascular costs. The use of transthoracic echocardiography in this outpatient setting had no clinical impact, however, and Holter monitoring did not have any added advantage over ECG.

COMMENTARY

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Stroke is one of the leading causes of death and disability in the US, and one of the most important factors contributing to health-care costs.[1] Stroke incidence in the US has been estimated at over 700,000 cases per year.[1] The aging of the population is likely to result in a further increase in the number of new stroke cases, with over 1 million strokes estimated to occur each year by 2050.

Cardioembolism accounts for approximately 20% of all ischemic strokes.[2] In addition, some of the strokes considered to be of unknown cause seem to be embolic on the basis of their clinical presentation and neuroimaging findings, but the embolic source is often not identifiable. Echocardiography, and especially transesophageal echocardiography, has greatly improved our ability to diagnose cardioembolic sources of stroke.[3] The cost of performing echocardiography in all patients with stroke or TIA would, however, be substantial. Performing 24-hour Holter monitoring in all patients with stroke or TIA to identify undiagnosed atrial fibrillation would also be a tremendous financial burden for any health-care system, even though atrial fibrillation is one of the most important causes of cardioembolic stroke.[2]

Douen and colleagues report on the poor diagnostic yield of cardiovascular investigations in patients with stroke or TIA. Of 142 patients who underwent transthoracic echocardiography at a stroke outpatient facility, embolic sources of stroke were detected in only 6 (4%). Holter monitoring revealed atrial fibrillation in 3 of 149 subjects (2%); all of these cases were also diagnosed using the far less costly ECG.

The study suffers from several limitations. First, it was a retrospective study conducted in an outpatient cohort. The outpatient setting makes it likely that most participants had TIAs or nonacute strokes, although this information is not provided. The age and sex distributions of the study population are not provided either. It is, therefore, difficult to understand to which stroke or TIA population the data apply. Also, no information is given about other possible etiologies for the cerebrovascular event—knowledge that could have better guided the performance of cardiac investigations. Finally, transesophageal echocardiography, which is known to have much better diagnostic sensitivity than transthoracic echocardiography,[4] was never performed. Although pertinent to the population examined, the results of this study should not be extrapolated to the broader population of patients with acute stroke presenting to a hospital emergency room.

The study confirms that random Holter monitoring to detect atrial fibrillation rarely returns positive findings, and that its incremental value over ECG and careful history taking is limited. Again, this finding might differ from what is observed in an acute stroke setting, in which far higher frequencies of previously undetected atrial fibrillation have been reported, especially when monitoring is extended beyond 24 hours.[5]

As with all medical procedures, the cost of cardiac investigations in stroke patients should be weighed against their expected diagnostic yield. Patients whose presenting clinical syndromes and neuroimaging findings are compatible with an embolic mechanism, or those who lack alternative explanations for the cerebrovascular event, should be considered primary targets for a thorough cardiac diagnostic work-up.

References

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PRACTICE POINT
Cardiac investigations can provide important information in patients with stroke or TIA, but their use should be guided by the probability of positive findings, and their cost weighed against the expected benefit