Strokes associated with heart disease

Embolism is the major mechanism of stroke in the United States, accounting for 60% of
all ischemic strokes. 1 Up to 25% of these embolic strokes have a readily identi!able
speci!c cardioembolic cause, atrial fibrillation (AF). 1 AF a"ects 9% of men aged 65.

Cardiac Conditions Strongly Associated with Cerebral Emboli

Source	Percentage of All Cardiogenic Emboli
Non-valvular atrial fibrillation	45
Acute myocardial infarction	15
Ventricular aneurysm	10
Rheumatic heart disease	10
Prosthetic cardiac valve	10
Other	10

In comparison with other subtypes of stroke, the prognosis after a cardioembolic stroke is
poor. There is up to a 6.5% risk of stroke recurrence within 7 days, and the in-hospital
mortality rate is 27.3%. The 5-year mortality rate for cardioembolic stroke has been
reported as high as 80%.

Clinical Features of Cardioembolic Transient Ischemic Attack or Stroke

Cardioembolism as a cause of stroke can be inferred as the diagnosis and distinguished
from other stroke subtypes on the basis of (1) absence of a large-artery stenosis or
occlusion in the vessel supplying the involved vascular territory, (2) a clinical syndrome
or radiographic appearance inconsistent with a small-vessel (lacunar) stroke, (3) absence of
unusual precipitants of stroke (e.g. vasculitis), and (4) absence of an atheroma of the
aortic arch larger than 4 mm.

Clinical Characteristics of Cardioembolic Stroke

Clinical features

Neurologic history and findings

Sudden onset

Isolated focal deficit

Seizure at onset

Loss of consciousness at onset

Peak of deficit at onset

Involvement of more than one vascular territory

Evidence of systemic embolization

Neuroimaging findings

Multiple infarcts in more than one vascular territory

Deep and superficial infarctions

Hemorrhagic conversion

Absence of large-artery stenosis or occlusion in parent vessels

Rapid recanalization of intracranial vessels on transcranial Doppler ultrasonography

Repetitive stereotyped transient ischemic attacks (TIAs) are unusual in embolic stroke.
Less than one-third of patients experience transient ischemic symptoms before the stroke

Characteristics of Emboli by Source

Source	Type Size
Atrial fibrillation	Fibrin Large
Left ventricular thrombus	Fibrin Large
Myxoma Myxomatous	Small or large
Infective endocarditis	Septic debris Small or large
Degenerative valvular disease	Calcium Small

Strokes caused by
cardioembolism from AF commonly lead to a signifcant neurologic disability. 30 A
pattern of multiple infarctions involving multiple vascular territories is distinctive for
cardioembolism. 20 30 31 32 Cerebral or cerebellar surface branch occlusion by an embolus
may lead to focal infarctions causing specifc syndromes of focal motor deficits, isolated
aphasia, hemiataxia, or hemianopia. Posterior cerebral artery territory infarcts, in
particular, are commonly caused by cardiac embolism. Embolic strokes are believed
to be more prone to hemorrhagic conversion, a complication detected on follow-up CT in
approximately 20% of cardioembolic strokes. Hemorrhagic conversion occurs when
there is spontaneous lysis of the thrombus with reperfusion into infarcted tissue

Approach to Management

conditions according to the strength of indication for anticoagulation for stroke prevention. Although the early period after stroke appears to be the highest risk period for recurrent embolization, it is also the period of greater risk of hemorrhagic conversion. One study examining the utility of immediate anticoagulation for a stroke due to any presumed mechanism but occurring in a patient with AF did not demonstrate a bene!t of anticoagulation in the !rst 2 weeks. 58 However, in patients at higher risk for embolism, such as those with mechanical prosthetic valves or left ventricular thrombi, immediate anticoagulation should be considered.

Definite cardioembolism

Antithrombotic therapy considered the standard of practice

Left ventricular thrombus

Left atrial thrombus

Recent transmural anterior myocardial infarction

Rheumatic valvular disease

Mechanical prosthetic valve

Atrial fibrillation

Antithrombotic therapy may be of value

Nonbacterial thrombotic endocarditis

Antithrombotic therapy contraindicated

Bacterial endocarditis

Atrial myxoma

Possible cardioembolism

Mitral annular calcification

Mitral valve prolapse

Cardiomyopathy

Patent foramen ovale

Atrial flutter

Sick sinus syndrome

For long-term prevention of stroke, AF is the only condition for which anticoagulation has
been conclusively shown to be superior to aspirin. 59 Still, anticoagulation is often used in
situations with the potential for recurrent embolization

Cardiomyopathy

In patients with cardiomyopathy, the reported annual stroke rates (1.3% to 3.5% per
year) that were derived from cardiac trials likely underestimate the actual risk of stroke.

Acute Myocardial Infarction

Within 2 to 4 weeks of acute MI, 2.5% of patients su"er a stroke. 74 75 Stroke is more
common with an anterior wall MI (4% to 12% of cases) than with an inferior wall MI
(1%) and usually occurs within the !rst 2 weeks.

Atrial Fibrillation

Thrombi in AF arise from the left atrium and atrial appendage. The combination of rheumatic heart disease (RHD) and AF carries a stroke risk 17 times that of normal controls (who have neither AF nor RHD). 3 Of all the mechanisms of cardioembolic stroke, AF has been the most extensively studied. 127 128 129 130 131 132 It is the most common cause of embolic stroke, accounting for 25% to 30% of all embolic strokes. 7

The incidence of AF-related stroke rises with age. 3 4 Younger patients with AF who are free of cardiac disease, diabetes, and hypertension have an extremely low rate of stroke (1.3% per 15 years). 127 133 Beginning at age 65 years, however, the annual risk of stroke is 3% to 5% per year; the risk increases to 10% per year or higher by age 80, with women predominating.

Stroke due to cardiac embolism is commonly of sudden onset, and more prone to
hemorrhagic transformation.
The etiologic work up for stroke due to a cardiogenic source is crucial in
determining appropriate secondary prevention.
Anticoagulation is the mainstay of therapy for patients with cardioembolic stroke
secondary to atrial !brillation, absent any contraindications.
Some cardioembolic sources, including infective endocarditis and some intracardiac
tumors, present a contraindication to treatment with anticoagulation