Migraine, an enigmatic disorder, has been linked to stroke in a variety of ways. The complex relationship has implications for management.

The Coincidental Relationship. Given the high prevalence of migraine in the general population, up to one third of persons with stroke will have a history of migraine, even if no further link between the two conditions exists.

Commonality of Clinical Symptoms. Migraine and stroke have an overlap of clinical features. Migraine is characterized by headache, and in a significant minority (20-40%) of cases, aura. Migraine aura (MA) is typically described as the gradual expansion of positive focal neurological symptoms (for example, scintillation, fortification, tingling) with a sequential progression when more than one symptom type is involved. Retinal migraine (monocular visual loss), hemiplegic migraine, basilar migraine, and migraine with prolonged aura prove particularly troublesome from the diagnostic standpoint. Similarly, when ischemia is associated with headache or with “positive” symptoms there may be a misdiagnosis of migraine, particularly if the ischemia is transient.

The Causal Relationship. Although a rare occurrence, stroke may occur during the course of a typical attack of migraine, particularly with aura. Risk factors for migrainous stroke include female sex, mean age <40 years, low cardiovascular risk profiles, presence of patent foramen ovale, and ischemic involvement of the posterior cerebral artery territory. Possible mechanisms accounting for migrainous infarction are aura-induced hypoperfusion and vasospasm, or ischemia-related (possibly due to cardioembolism or in situ thrombosis) cortical spreading depression (the putative physiological substrate of aura). Two recent studies have suggested good recovery following migrainous infarction.

Migraine as a stroke risk factor. Numerous studies over the year, beginning with the Collaborative Group for the Study of Stroke in Young Women published in JAMA in 1975, have suggested that migraine is a risk factor for stroke occurring remote from the migraine attack. A 2009 meta-analysis published in BMJ reported the risk of stroke was doubled in persons with migraine with aura, with a three-fold increase in the MA female cohort. The risk was further increased in those < 45 years old, who smoke and use combined oral contraceptives. The Women's Health Study has shown an increased risk in those migraineurs with low cardiovascular risk profile and with high frequency of attacks.

Mechanisms of migraine-related stroke. Migraine has associated with abnormalities of the vasculature (such as vasospasm, arterial dissection), and of the blood (including platelet-related
hypercoagulability) which could result in ischemic stroke. Recent evidence suggests that endothelial activation, a process secondary to oxidative stress and resulting in hypercoagulability and inflammation, is more common in young migraineurs, particularly premenopausal women with aura. Up to 50% of patients who have migraine with aura have a patent foramen ovale (PFO) between the cardiac atria, which may allow shunting of vasoactive substances, such as serotonin, and emboli from the venous circulation. Migraine and stroke are also linked by at least two monogenic disorders: Cerebral Autosomal Dominant Arteriopathy with Subcortical Infarcts and Leukoencephalopathy (CADASIL) and Retinal Vasculopathy with Cerebral Leukodystrophy (RVCL). CADASIL, a condition in which 30% report MA (often as the initial symptom), is one of the most common forms of hereditary stroke. It is characterized by progressive white matter degeneration and smooth muscle cell abnormalities. RVCL is a lesser known disease in which migraine can be prominent in certain families.

**Implications for Migraine Management.** Migraine patients, like other individuals, should avoid cigarette smoking and manage stroke risk factors such as hypertension, hyperlipidemia, and diabetes mellitus. Those with cardiovascular disease (CVD), multiple CVD risk factors, hemiplegic, or basilar migraine should be cautioned to avoid the use of vasoconstrictive drugs, including the migraine-specific triptans, and ergotamines. Effective migraine prophylaxis with non-pharmacologic therapies (biofeedback) and medications which carry no increased risk of stroke (e.g., antidepressants, anticonvulsants) may reduce the need for acute therapies. Women with migraine over age 35 years, and those with aura at any age should consider birth alternatives to combined oral contraceptives, particularly if they have other vascular risk factors (hypertension, hyperlipidemia, smoking), or a personal or family history of thrombosis (World Health Organization consensus guidelines). There is evidence that aspirin (100 mg every other day) is effective in the primary treatment of stroke in women over 45 years old but no direct evidence that it is useful in preventing stroke related to migraine with aura in a younger population.

**References**


