Headache and Stroke (2013)

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Stroke is one of the top causes of death and disability in the United States and migraine affects over a tenth of the population. [1] These are both high-frequency conditions that have a large impact on the public health. A growing body of research indicates that the two may be inter-related and that there is an increased risk of ischemic stroke among people with migraine, with the most significant association for the subtype of migraine with aura. [2] Important factors thought to contribute to the risk include: women aged <45, smoking and the use of oral contraceptives. [2] Although the link with stroke seems strong, there is less confidence about the relationship between migraine and other cardiovascular outcomes, including myocardial infarction. [3] A recent meta-analysis examined the relationship between migraine and cardiovascular disease. The authors concluded that there is an increased risk of ischemic stroke in patients with migraine who also smoke and use oral contraceptives (OCP), although that conclusion was based on a small number of studies done with higher doses of OCPs than those that are available currently. [2] Additionally, only a handful of studies have been able to examine stroke risk in patients with migraine who both smoke and use OCPs. Many of the individual studies were under-powered to adequately study the question of whether migraine or its subtypes are associated with increased stroke risk. [4] Prior studies have also been heterogeneous, which has implications for the quality of meta-analyses. For these and other reasons, it remains uncertain whether patients with migraine should receive more intensive medical care, such as intensified screening for well established cardiovascular risk factors, such as hypertension or increased cholesterol and LDL levels.

Additionally, patients who are admitted to the hospital because of a stroke are not routinely asked about their headache history. The presence of migraine is not considered in post-discharge treatment plans aimed at reducing the risk of recurrent stroke. In essence, it is still not clear whether migraine should be considered a cardiovascular risk factor.

The pathophysiology of migraine is still not completely understood. [2] Genetic factors clearly contribute, but vascular mechanisms likely also play a role. It is still unclear how migraine leads to an increased risk of stroke. It is surmised that this association must be due to a fundamental mechanism that is common to both migraine and cardiovascular events, which may include endothelial dysfunction or an underlying hypercoagulability, among other possible mechanisms. [5,12] If this were the case, then it is plausible that migraine is a risk factor for other cardiovascular outcomes in addition to stroke, such as myocardial infarction, peripheral arterial disease (PAD) and even deep venous thrombosis (DVT). [2] Other theories for the relationship between migraine and stroke include alterations in cerebral blood flow during aura. [6] Constriction of cerebral arterioles occurs in migraine with aura which may play a role in increasing stroke risk. [6] Additional evidence for the connection between migraine and stroke is provided by rare disorders which manifest with both migraine with aura and ischemic stroke, including MELAS and CADASIL. [7-8] Although migraine and stroke differ in many ways, including treatment and outcomes, they both involve an intimate connection between neuronal activity and blood vessels, sometimes referred to as “neurovascular coupling.” [9] However, the exact interplay between the two is still not completely elucidated. More studies are needed to elucidate the relationship between migraine and stroke.

These studies could be done by using a centralized clinical data registry or data warehouse, like the Partners Healthcare Research Patient Data Registry (RPDR), which gathers data from various hospital legacy systems and stores it in one place. It is an efficient and valuable way in which to gain access to aggregate patient data and to link patient characteristics and treatments with outcomes. [10] The RPDR contains longitudinal information on a large number of patients collected over the last decade to generate extremely large patient cohorts using search queries for information that has been collected using widely accepted and validated diagnostic and other codification

systems. Through RPDR, we would be able to identify patients with and without migraine who have experienced a stroke, MI or PAD. We would be able to compare the presence or absence of specific risk factors, such as oral contraceptive use or smoking, between these two groups. The connection between headache and stroke needs to be better elucidated, which will in turn lead to better understanding of the pathophysiology of both diseases. [11]

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