



Master & Fellow presents the movie 'Brain-Storm'

Mathilde's Story is an artistic amalgamation of multiple true stories reported by patients, families and physicians. We illustrate a catastrophic event with a fallacious successful outcome from a brain aneurysm rupture causing Subarachnoid Hemorrhage (SAH). The aim is to start a discussion about changing our strategy and evolving from our current well-organized therapeutics with the destruction already fate accompli to a rigorous and effective prophylactic process that prevents subarachnoid hemorrhage.

Our standards of measuring success are archaic with normal appearing survivors unable to return to a normal life in more than 70%. This major disability is due principally to neuropsychological disorders which are often not evaluated in clinical practice.

SAH caused by ruptured aneurysms has long been regarded as a fatal event by the medical community and by extension, the public. As a result, the only thing to do was to manage the sequelae of the brain hemorrhage as best as possible. Despite all the research and advancements in medicine, the prognosis, mortality, and chances of returning to normalcy have not changed over the last 15 years.

The only way to effectively reduce the morbidity and mortality rate caused by an aneurysmal rupture is to detect them prior to rupture, follow them if they appear benign to see if they develop higher risk features and treat the aneurysms at risk!

The medical community on the whole does not subscribe to this quest for prevention due to some flawed studies which suggested an extremely benign natural history for most aneurysms as well as the up-front risk of preventive surgery including endovascular interventions (4 to 6 % permanent morbidity).

Mistakenly, the medical community views aneurysms as either ruptured or unruptured with little overlap. What they do not consider is that while their studies suggest that vast majority of aneurysms under 7mm do not rupture, the vast majority of ruptured aneurysms are under 7mm! They fail to consider that most ruptured aneurysms were pre-existing unruptured aneurysms.

We know from 1970s cohort studies with a total follow-up of more than 17 years that a stable unruptured aneurysm can change throughout a lifetime and sometimes bleed. The rate of aneurysmal rupture in selected populations of unruptured aneurysms awaiting preventive treatment is 7 times higher than in the general population, and while most intracranial aneurysms present in 2-6% of the population will never show themselves, they are a clear anatomic predisposition to catastrophic brain hemorrhage.

We are seeing a recent surge in minimally invasive techniques for aneurysm management, which is for the first time allowing us to reduce the risk of procedural permanent morbidity to less than 1%, thus equalizing the risks of the disease's natural history.

Systematic screening for aneurysms is currently not a recommendation. That said, thousands of brain imaging studies are performed every day for a variety of reasons (*headaches, dizziness, trauma, etc.*) with a very low aneurysmal detection rate given the fact that they are brain and not brain blood vessel images, allowing at best only 50% of the aneurysms present to be detected. The worse fact is that despite detection, less than one-third receive appropriate follow-up. It is no longer uncommon to discover previous imaging in the medical record of a patient with a ruptured aneurysm that in retrospect was there on prior images.

How can we explain to a patient who has suffered a rupture that his aneurysm was identifiable several years earlier?

We owe it to our patients to at least detect the aneurysms visible on the thousands of images already taken and refer them to specialized centers that, in most cases, will only provide simple monitoring and psychological support. We should not, however, expect this approach to significantly reduce the societal impact of SAH. These non-targeted examinations are not intelligently directed towards a vulnerable population, but rather an opportunistic maximalist exploitation of already present data.

To reduce morbidity and mortality, a screening strategy, whether biological, imaging, or other, should be targeted to high-risk populations such as young women who smoke and people with a family history of aneurysms. We expect that even when such screening is instituted, the overwhelming majority of detected aneurysms will only get essential follow-up to monitor for changes in aneurysm risk profile, with only rare prophylactic interventions. It is imperative for us now to make the best use of the available data by training radiologists and using next-generation AI tools to eliminate the terrible risk of omission and appalling failure to follow.

Finally, keep in mind that aneurysm ruptures kill more people each year than motor vehicle accidents. The victims frequently are young and active, resulting in a staggering societal cost of dependence and lost years of productivity.

We hope that this film will also serve to generate discussion and enthusiasm for better solutions for patients, their families and physicians who work tirelessly to reduce the impact of this disease.

This film is also dedicated to all of them.

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