

## LITIGATION ISSUES IN THE TREATMENT OF CEREBRAL ANEURYSMS – AN ONGOING CHALLENGE

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**Abstract:** The rupture of a brain aneurysm triggers a serious form of hemorrhagic stroke, the aneurysmal subarachnoid hemorrhage. This serious affliction that often presents as a sentinel headache is often mistaken for a migraine and quickly dismissed, with devastating consequences. Once an accurate diagnosis is made, supporting therapeutical measures are in place until the aneurysm is secured but sealing the aneurysm off is the only permanent treatment that eliminates the risk of a rebleeding, which is fatal in 90% of cases. The main clinical struggles that can be used as ground for litigation in aSAH are the misdiagnosis at presentation and failure to complete the aneurysm occlusion in a time-efficient manner. This article is based on the following hypotheses: 1. What represents a serious ground for litigation in case of a patient with aSAH? and 2. What constitutes a litigation issue for the physician in case of a ruptured aneurysm that hasn't been secured (either by surgical clipping or endovascular coiling)?

**Keywords:** aneurysmal SAH, sentinel headache, misdiagnosis, litigation in aSAH.

### INTRODUCTION

Aneurysmal subarachnoid hemorrhage (aSAH) is a severe acute neurosurgical pathology which occurs frequently in a conscious patient presenting with an acute headache. aSAH is associated with an estimated mortality of approximately 35% and only 30% of those affected will recover the previous independent functional status [1].

In case of a presentation with acute severe headache, a misdiagnosis can be made if the sentinel headache foreshadowing SAH is mistaken for a migraine syndrome. This will result in a possible life-threatening evolution for the patient [2]. Underestimation of aSAH followed by misdiagnosis seems to be the most common reason for medical litigation. Another situation in which medical staff is involved in litigation for this affection is when the patient dies before the aneurysm could be secured [3,4].

Perry J. *et al.* (2019) published a prospective observational study where they formulated a series

of criteria to guide the clinician in case of a suspicion of SAH. These criteria were published as the Ottawa Subarachnoid Hemorrhage Rule and can be applied for patients older than 15 years who had a new severe non-traumatic headache that reached its peak in 1 hour [5]. In case a patient has 1 or more of these findings, further investigations are required:

- patient older than or equal to 40 years,
- presence of neck pain or stiffness,
- loss of consciousness,
- onset during exertion,
- thunderclap headache (pain that reaches a peak in 1 second),
- limited flexion of the neck on neurological exam.

Overall, the Ottawa Subarachnoid Hemorrhage Rule is easy to use and practical for the clinician, but it's worth mentioning that as a decision-making tool even though its sensitivity is high, its specificity is low [5, 6].

The traditional diagnostic tools for SAH

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detection are the cerebral CT and the lumbar puncture. The gold standard for the detection of cerebral aneurysms as a source of bleeding in SAH is digital subtraction angiography (DSA), which allows for a good characterization of the localization and morphology of the aneurysm [6, 7]. The important information provided by the DSA serves as a basis for planning the definitive treatment to secure the aneurysm [7]. Although it adds very little risk to aneurysm rebleeding (1-2%), DSA contributes to morbidity [7, 8].

### ***Issues and controversies***

This section will be centered around the two main issues that may lead to litigation procedures in this affliction: the misdiagnosis at presentation and the unjustified delay of aneurysm occlusion.

The first aspect is closely related to the right presumptive diagnosis when the patient first enters the medical unit. Delays in the assessment of the seriousness of the disease as well as failure to order a cerebral CT or a lumbar puncture as quickly as possible could lead to life-threatening repercussions. It is worth mentioning that it is possible for a CT-scan to be negative when too little time has passed since the rupture of the aneurysm and only a small quantity blood has exited the vessels. These are all important facts that need constant awareness raising campaigns [2, 3, 5, 6].

Shared decision making in a situation like is important: having the patient closely monitored for up to six hours, and a negative head CT within 6 hours of headache onset places patient at a risk smaller than 1% for suffering from SAH [6].

An important aspect that needs to be considered when discussing litigation issues in the management of a ruptured brain aneurysm is the moment of the occlusion, be it microsurgical or endovascular. The adequate timing of the occlusion has been an ongoing debate in the last decades among physicians, mainly because of previous clinical trials failing to provide significant relevance regarding survival or better prognosis for any of these attitudes [8]. Park J. *et al.* (2015) propose a shifting in attitude from a controlled

delayed aneurysm occlusion to an early or even ultra-early, emergency approach [9].

It is worth mentioning that there are multiple external factors, outside of the surgeon's influence, that can delay the occlusion of a ruptured aneurysm:

- Diagnostic tools such as the angiography are not available at the requested time,
- CT scan performed in the window of time during which the aSAH cannot be seen,
- The presence of associated pathologies (hemodynamic and coagulation status of the patient) that can delay the surgery,
- The absence of a doctor qualified in performing an endovascular occlusion of the ruptured aneurysm that cannot be surgically clipped

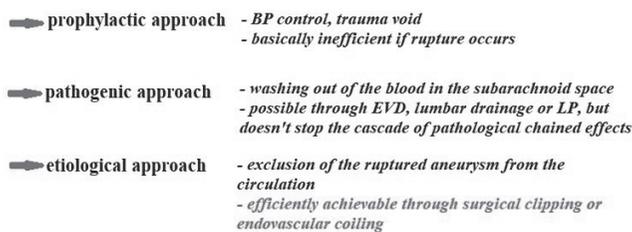
At the same time, for some cases, temporary postponement of aneurysm occlusion procedures may be the correct choice. This situation will allow the intrasaccular blood clot to stabilize and the surrounding brain edema to subside at least partially [10]. Overall, relevant statistical studies converge on the fact that both the safe occlusion and the timing of the procedure are fundamental for a good outcome [11,12].

## **DISCUSSION**

The treatment of a ruptured aneurysm is a complex process, which requires a step-by-step approach. There is currently no etiological treatment for SAH [9,10]. Prophylactic measures to prevent a rupture include blood pressure (BP) control but it becomes irrelevant if rupture does occur. The phenomenon that eventually triggers all destructive pathways that make SAH a devastating event, even if the patient survives the initial rupture, is the presence of blood and its irritating metabolism by-products in the subarachnoid space. An approach that washes these substances from the subarachnoid space is useful (Fig. 1) [10,11], but insufficient if aneurysmal rebleeding occurs. Thus, the immediate concern in case of SAH is the treatment of its etiology by securing the ruptured aneurysm.

Romanian legislation suffers from a lack of medical guidelines with nation-wide implementation. However, even if such management guidelines would be designed and implemented, there are regional hospitals that do not have an angiography laboratory or a neurosurgical department or endovascular services.

**In conclusion**, neurosurgery is a high-risk surgical specialty and medical disputes may arise more often than for other specialties. This situation can force neurosurgeons to adopt the concept of defensive



**Figure 1.** Summary of types of treatment in case of a ruptured aneurysm and their availability – personal illustration.

medicine. This rather new concept adopted by some hospitals and doctors can become a public health problem that brings in rapidly increasing healthcare costs [13].

Considering that recently published medical sources point towards an early aneurysm securing attitude in aSAH, the suggestion would be that the achievement of an early aneurysm occlusion should be the main focus of the physician. This appears to be the best way to avoid litigation issues, regardless of patient's outcome, considering that, unfortunately, patients with a poor neurological status on admission did not associate improved outcomes over time, regardless of either aneurysm occlusion or ICU management [14]. The authors would like to emphasize that a sudden severe headache should be considered a SAH until proven otherwise.

#### **Conflict of interest**

The authors declare that they have no conflict of interest.

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