DEATH BY HEADACHE

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I. INTRODUCTION

Few medical conditions present such diagnostic, prognostic and legal challenges as subarachnoid hemorrhages (SAHs). A subarachnoid bleed is a type of stroke and is a significant cause of disability and death to those patients who develop this condition. Approximately 25,000 to 30,000 people annually suffer from this condition, often with devastating results. This paper outlines the basic underlying medicine of subarachnoid hemorrhages, the standard of care for treatment of subarachnoid hemorrhages and the difficulties in establishing demonstrable causation between the course of treatment and injury to the patient, all of which are the keys to the foundation of building or defending a medical negligence cause of action involving the treatment of this condition.

II. THE MEDICINE

A. What is a Subarachnoid Hemorrhage?

A subarachnoid hemorrhage is a devastating type of stroke.[1] Most frequently caused by head trauma, a subarachnoid hemorrhage can also result from a ruptured aneurysm.[2] The aneurysm, and, consequently, the bleed, can occur at various locations in the brain, but most frequently occur at the juncture of two vessels of unequal diameter.[3] Since the patient experiencing a SAH will die if the bleed is not stopped, immediate and accurate diagnosis of this condition is imperative for the proper treatment and survival of the patient.[4]

B. Diagnosing SAH

Diagnosing a subarachnoid hemorrhage can be done both quickly and accurately. In most cases, the patient presents to the emergency room complaining of "the worst headache of my life".[5] This severe headache usually develops suddenly and without warning, or, as in the case of an aneurysmal bleed, may be preceded by several minor headaches in the weeks leading up to the patient's presentation in the emergency room. These relatively minor headaches are sometimes referred to as "warning leaks"[6], or "sentinel headaches".[7] The leaking of blood into the subarachnoid space of the brain is the cause of these headaches. In addition to an excruciating headache, the patient presenting with a SAH may also exhibit neurologic impairments, such as lethargy, vision impairment, confusion, impaired motor function and even seizure.[8] The more severe the neurologic findings, the less likely the patient will survive the onset of this condition.[9]

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[1] *See* ROBERT R. KIRBY, ET AL, HANDBOOK OF CRITICAL CARE, 688 (2d ed. 1997).
[2] *See id.*
[3] *See* MGH TEXTBOOK OF EMERGENCY MEDICINE 276 (Earle W. Wilkins, Jr., M.D. ed., 1978).
[4] *Id.* at 277.
[5] *Id.*
[6] *See* 2 HARRISON'S PRINCIPLES OF INTERNAL MEDICINE 2345 (Anthony S. Fauci, M.D. et al. eds., 14th ed. 1998) [hereinafter HARRISON'S].
[7] *See* 3 EMERGENCY MEDICINE CONCEPTS AND CLINICAL PRACTICE 2192 (Peter Rosen, M.D., FACS, FACEP et al. eds., 4th ed. 1998) [hereinafter EMERGENCY MEDICINE].
[8] KIRBY, *supra* note 1, at 688-691.
[9] *See id.* at 691.

The golden standard for diagnosing a subarachnoid bleed is the use of computed tomography imaging (CT scans). A lumbar puncture can also be used, depending on the patient's presentation. In some cases, both a CT scan and a lumbar puncture are necessary for a proper diagnosis.[10] A CT scan is usually first in the arsenal of diagnostic testing and is a sensitive and highly accurate indicator of the presence of a bleed in the subarachnoid space.[11] However, if the bleed is small or is a "warning leak" occurring before the actual aneurysmal rupture, it often will be undetectable with neuroimaging. In these cases, which account for approximately 10% of patients, a lumbar puncture is indicated and necessary for proper diagnoses and treatment.[12]

In addition to the patient's symptoms upon presentment, obtaining the patient's history can facilitate the diagnoses of a subarachnoid hemorrhage. A complaint of a severe headache of sudden onset should immediately raise the suspicion of a subarachnoid bleed and be fully and completely investigated.[13]

1. History: "The Worst Headache of My Life"

The hallmark complaint of patients presenting with internal cranial bleeding is an excruciating headache of sudden onset, often described as the "worst headache of my life." This complaint has been described as the cardinal diagnostic feature for SAHs.[14] A thorough history of patients presenting with this type of complaint is crucial in making a correct diagnosis, and the failure to collect a proper patient history may result in a breach of the applicable standard of care. However, in patients whose bleed is caused by known trauma and not rupture, the complaint of headache is more ambiguous, as this pain may be causally related to the traumatic event itself. This distinction between causes of this condition is important and must kept in mind by both the healthcare provider treating the patient and the attorney evaluating a medical negligence suit.

Time of Onset of Pain: In patients suffering from a subarachnoid bleed, the onset of pain is very quick. In almost half of the reported cases, some type of exertion preceded the onset of pain.[15] In the case of a SAH caused by an aneurysm, the onset of the headache has been associated with activities such as lifting or bending, a bowel movement, emotional strain and even coughing. In those cases that involve a bleed due to trauma, there is usually also a sudden onset of the traumatic event, such as a car accident.

Site of Pain: The patient's headache can be described by the sufferer as either generalized or site-specific, although in either case, if the pain is described as excruciating, the headache should be investigated as a indicator of a possible SAH. Frequently, localized or site-specific pain can be indicative of where the bleed is located, but this is not always accurate and may be unreliable or misleading in attempting to locate the actual source and location of the bleed.[16]

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[10] *Id.* at 688.
[11] *Id.*
[12] *Id.* at 689.
[13] *See* HARRISON'S, *supra* note 5 at 2345.
[14] *See* 2 NEUROSURGERY 2203 (Robert H. Wilkins, M.D. & Setti S. Rengachary, M.D. eds., 2d ed. 1996); EMERGENCY MEDICINE, *supra* note 6 at 2192.
[15] *See* HARRISON'S, *supra* note 5 at 2345.
[16] *See* EMERGENCY MEDICINE, *supra* note 6 at 2121.

Quality of Pain: Whether the pain is a pulsating pain, a steady ache or stabbing in nature may be helpful in ruling in or ruling out a SAH, although it is probably not crucial to making the correct diagnosis.

Intensity of Pain: Typically, headaches caused by an intracranial bleed are described as intensely painful. Many diagnosticians report the patient as having severe head pain, which is usually described by the patent as the worst headache the patient has ever experienced. However, it is important to note that not all severe headaches represent an intracranial bleed, and other conditions such as meningitis may need to be ruled out.

2. Physical Exam

Vital signs: A patient's vital signs, i.e. temperature, respiratory rate, blood pressure and pulse rate, are an important part of the clinical picture. For instance, a patient complaining of the worst headache of his life, which is accompanied by a fever, will probably need to be evaluated for meningitis first. In these cases, a physician's performance of a lumbar puncture prior to performing a CT scan is probably well within the standard of care.

Neurological Exam: A neurologic examination of any patient presenting with a complaint of headache is required and should be performed as soon as possible.[17] Any evidence of neurologic deficiencies should signal the possibility of intracranial involvement and steps should be taken to rule out a SAH, in addition to other significant disorders such as encephalitis or meningitis.[18]

General Physical Exam: Since most patients presenting with a severe headache tend to look ill, a general physical examination is helpful in determining whether the headache is caused by a psychological, muscular, vascular or infectious source. Other symptoms, such as nausea, vomiting, stiff neck and numbness, can indicate to the examining physician the probable occurrence of a SAH.[19]

3. Laboratory Tests:

Computed Tomography Scan (CT scan): Considered the golden standard for diagnosing SAHs, the use of CT scans has virtually eliminated the use of skull x-rays for diagnoses of this condition. A CT scan is usually the first line of defense when a SAH is suspected. In the majority of situations, a non-contrast CT scan should be attempted first, because the use of a CT scan with contrast may give the physician a false positive, as normal arteries may tend to appear as clotted blood, which would indicate a bleed, on an enhanced view.[20]

Lumbar Puncture: Should the CT scan fail to demonstrate a bleed in a patient that is exhibiting SAH symptoms, a lumbar puncture may be indicated. A lumbar puncture can detect the presence of blood from a subarachnoid bleed that is not apparent in the imaging obtained from the CT scan.

Other Tests: Once the diagnosis of a subarachnoid bleed has be made by any method, an angiography is usually helpful in determining the location of the hemorrhage

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[17] *Id.* at 2122.
[18] *Id.*
[19] *See id.* at 2121.
[20] *See* HARRISON'S, *supra* note 5 at 2346.

and if other sites of bleeding exist.[21] Additionally, an electrocardiogram can be helpful in monitoring cardiac changes due to intracranial pressure. Analysis of serum electrolyte levels can detect the presence of hyponatremia, and transcranial Doppler ultrasounds are helpful in detecting the onset of a vasospasm, both of which are potential complications of SAHs.[22]

C. **Treatment:**

1. Emergency Room:

The primary responsibility of the emergency room physician is stabilization of the patient and the diagnosis of injury.

Stabilization: Because of the threat of rapid deterioration and death in patients with SAH, intubation is sometimes indicated to protect the airway.[23] Oxygen should be started immediately as well as cardiac monitoring and the immediate establishment of an IV access.

Diagnosis: An accurate patient history needs to be obtained in addition to a neurologic evaluation upon presentment of the patient.[24] A CT scan needs to be performed rapidly. However, because a CT scan may be interpreted as normal in a small number of those patients presenting with a SAH, a lumbar puncture should be performed when the patient's history strongly indicates the possible occurrence of a SAH.[25]

2. Hospitalization:

Once the diagnosis of a SAH is made, the patient should be admitted to the intensive care unit for medical management. Angiography is used to locate the bleed. If the bleed is caused by an aneurysm and the patient has no major neurologic deficit, surgery should be performed to repair the aneurysm, so long as the aneurysm is accessible and *has not ruptured.*

D. **Complications:**

The likelihood of a patient developing one or more complications after a subarachnoid hemorrhage is significant. Physicians often have to walk a tightrope of treatment because treating a patient for one complication increases the risk of developing another complication. The most commonly encountered complications are explained below. While theses examples do not represent the entire universe of complications suffered by patients with SAHs, they do illustrate the most severe.

Vasospasm: This the leading cause of morbidity and mortality because of the resulting significant decrease in blood flow to the affected areas.[26] Attempts to treat or prevent vasospasm have been only mildly successful.[27] Inducing hypertension and hypervolemia to improve blood flow to the affected area are viable options only in those patients who have undergone successful surgery to repair the aneurysm and have incurred

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[21] *Id.*
[22] *Id.*
[23] *See* EMERGENCY MEDICINE, *supra* note 6 at 2192.
[24] *Id.*
[25] *See id.* at 2193.
[26] *See* KIRBY, *supra* note 1, at 692; HARRISON'S, *supra* note 5 at 2347; EMERGENCY MEDICINE, *supra* note 6 at 2193.
[27] *See* HARRISON'S, *supra* note 5 at 2347.

no major neurologic impairment.[28] Unfortunately, lowering the threat of vasospasm usually results in significant increases in the threat of re-bleeding.

Re-bleed: This complication accounts for 25% of deaths in patients with a subarachnoid hemorrhage.[29] Re-bleeding usually results from the physician being unable to access and surgically repair the aneurysm.

Hydrocephalus: This occurs in 20% of those surviving an initial SAH.[30] It is treated with ventriculostomy drainage and improvement is seen in approximately half of those who develop the complication.[31] The likelihood of a patient developing this complication is directly related to the severity of the bleed.

Hyponatremia: This complication occurs in approximately 30% of initial SAH survivors.[32] Like hydrocephalus, the likelihood of this complication is directly related to the severity of the bleed. In addition, similar to re-bleeds, treating this condition can precipitate the occurrence of vasospasm.[33]

Congestive Heart Failure: The development of congestive heart failure is a potential complication in patients who are being treated for vasospasm. This complication is due to the increased fluid input required to treat the spasm.

III. THE LEGAL IMPLICATIONS OF SUBARACHNOID HEMORRHAGES

The crux of the potential medical malpractice cause of action in cases involving subarachnoid hemorrhages is found in the treatment provided to the patient in the emergency department, for the reason that it is at this point where the most realistic benefit to the patient lies. Because patients who present to the emergency room with worsening neurological findings have a significantly lower likelihood of survival even with proper and timely medical intervention, and since there are significant post-hemorrhage complications that are unpreventable and often devastating, the most *viable* SAH medical negligence case are those cases that involve patients who, *but for the negligent treatment*, would have had a greater than 50% chance of sustaining little or no permanent neurologic damage and those who had developed few if any post-hemorrhage complications.

A. Proving a Violation in the Standard of Care:

As outlined above, prompt stabilization and diagnosis is required to stay within the standard of care. However, inadequate history taking, failing to appreciate the significance of a complaint of excruciating headache of sudden onset, failing to perform the appropriate diagnostic test such as a CT scan and/or lumbar puncture, the failing to obtain a prompt neurology or neurosurgery consult and failure to adequately stabilize the patient are all examples of a violation of the standard of care for a patient that is suffering from a SAH, and therefore a breach of any one of these can support a medical negligence cause of action.

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[28] *See id.* at 2346.
[29] See EMERGENCY MEDICINE, *supra* note 6 at 2192.
[30] *See* KIRBY, *supra* note 1, at 692.
[31] *See* KIRBY, *supra* note 1, at 692.
[32] *Id.*
[33] *Id.*

However, whether the physician's violation of the standard of care in the treatment provided had a provable causative affect on the patient's ultimate outcome is more difficult to determine.

B. **Establishing Causation in SAH Cases**:

1. Prognosis:

Although relatively uncommon, when a subarachnoid hemorrhage does occur, this condition is often devastating to the person suffering from it. Medical texts agree that the average survival rate of those patients who actually arrive at the hospital for treatment is less than 50%.[34] Of those patients to do survive initial presentment and treatment, more than one-half are left with major neurologic damage.[35]

With these alarming statistics, it is easy to understand why these medical negligence cases are difficult to pursue and litigate. In Texas, a claimant who had a 50% or less chance of survival even before stepping foot in the hospital will be unable to meet his burden of proof at the courthouse. There is ample evidence in medical texts and treatises that supply arguments against a finding of legal causation. In addition, a Texas Supreme Court case supplied a good example of the difficulties that can be encountered in proving causation in cases involving SAHs.

2. *Broders v. Heise*[36]

In *Broders,* the plaintiffs sued various physicians, including the emergency room physicians, for the wrongful death of their daughter.[37] Their daughter had been assaulted and brought to the emergency room. The plaintiffs alleged that the emergency room physicians were negligent in failing to diagnose the patient's head injury that ultimately resulted in her death. In addition, the plaintiffs alleged that the emergency room physicians were negligent in prescribing certain medications that exacerbated the patient's condition and made it refractory to treatment.[38] At trial, the plaintiffs called as their expert a physician who was licensed as a medical doctor and had practiced emergency medicine for over 10 years. His testimony substantiated his medical training and experience with the brain, its functions and certain medical conditions that affect the brain. He also testified that he was familiar with the standard of care that applied to the treatment of the patient's condition in this case.[39]

The expert stated that the defendants failed to meet the standard of care and then described what the standard required. According to the plaintiffs' expert, the standard of care required the defendant emergency room physicians to evaluate all the possible conditions which could have caused the patient's symptoms and then eliminate those possibilities one by one through various testing and treatment.[40] The expert also testified

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[34] *See* KIRBY, *supra* note 1, at 688; HARRISON'S, *supra* note 5 at 2345.
[35] *See* HARRISON'S, *supra* note 5 at 2345.
[36] 924 S.W.2d 148 (Tex. 1996).
[37] *See* Broders v. Heise, 924 S.W.2d 148, 150 (Tex. 1996).
[38] *Id.*
[39] *Id.* at 150-151.
[40] *See id.*

that a CT scan should have been ordered earlier and diuretics to reduce brain swelling prescribed sooner.[41]

The plaintiffs' expert was prepared to offer testimony regarding the causal relationship between the defendants' failure to meet the standard of care and the patient's outcome. The defendants challenged this expert's testimony specifically on the grounds of this particular expert's qualifications to offer it. In response, the defendants were allowed to offer the testimony of a neurosurgeon to testify as to the lack of a causal connection between the defendants' treatment and the patient's death.[42]

The plaintiffs' expert offered testimony on causation by bill of exception. In holding that the expert's causation testimony was properly excluded by the trial court, the Supreme Court stated that the plaintiffs did not meet their burden to show that their expert had "knowledge, skill, experience, training or education" which would "assist the trier of fact" in deciding the issue of cause in fact.[43] The court stated that the testimony offered by the plaintiffs on the element of causation did not meet the requisites of Rule 702 of the Texas Rules of Evidence because, while the expert stated he knew both that neurosurgeons should be called to treat head injuries and what treatments they provided, the expert never established that he knew, from either experience or study, the effectiveness of those treatments, therefore, the expert could not establish that the patient's outcome *would have been different* had the treatments been initiated, either in general or in the underlying case.[44] Without the admission of this testimony, the court held that the plaintiffs had failed to meet their burden in establishing causation.[45]

Broders is but one illustration of the difficulties in litigating this type of case. With a documented 50% or greater prognosis of morbidity or mortality for the general population, the ability of a potential plaintiff to fulfill the causation requirement to support a medical malpractice claim needs to be carefully evaluated by the attorney. The recognition of the loss of chance doctrine would make cases involving subarachnoid hemorrhages more viable, however the Texas Supreme Court has expressly refused to recognize this doctrine, as illustrated in the seminal case of *Kramer v. Lewisville Memorial Hospital.*[46]

3. Loss of Chance Doctrine

In the medical malpractice context, the loss of chance doctrine is a cause of action involving a patient with a pre-existing illness or injury that makes the patient's chances of avoiding the ultimate harm improbable or unlikely, even before the initiation of the allegedly negligent treatment. In loss of chance actions, the claim is that the allegedly negligent conduct reduced the patient's chances for recovery even further, thereby robbing him or her of a possible chance at survival. The plaintiff is allowed to recover for the diminution in the chance of surviving, in spite of the pre-existing injuries.[47] The issue to be decided by the

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[41] *Id.* at 151.
[42] *Id.*
[43] *Id.* at 149.
[44] *Id.* at 153.
[45] *Id.* at 149. The party offering the expert has the burden of establishment of that expert's qualifications, and admissibility will "hinge" on whether or not the expert in question has the requisite special knowledge of the issue. *See* Warner v. Hurt, 834 S.W.2d 404, 406 (Tex. App.-- Houston [14th Dist.] 1992)
[46] 858 S.W.2d 397 (Tex. 1993)
[47] *See* Kramer v. Lewisville Mem'l Hosp., 858 S.W.2d 397, 400 (Tex. 1993).

jury in these actions is whether the physician's negligence was, in reasonable medical probability, a proximate cause of the diminution in the patient's possibility of recovery.[48]

In *Kramer*, the Plaintiff attempted to asset a medical negligence claim against the doctors and the hospital that rendered treatment to Jennie Kramer, but failed to diagnose the existence of cervical cancer until the cancer had spread to her lungs, resulting in her death.[49] At trial, the Plaintiff's asserted that the court should allow a loss of chance claim against the Defendant hospital, on the grounds that the failure to timely diagnose the cancer resulted in a reduced chance of Jennie Kramer's survival.[50] The Texas Supreme Court, after acknowledging the successful use of the loss of chance doctrine in many jurisdictions, flatly rejected this claim.[51] The Court held that the "more likely than not standard" currently in use in Texas is a "fundamental prerequisite to an ordered system of justice" and that the acceptance of the loss of chance doctrine would upset this system. [52]

Therefore, despite the tort action of loss of chance originating in the Restatement (Second) of Torts,[53] and even though at least 23 of Texas' sister states have recognized the cause of action, the Texas Supreme Court explicitly refused to apply this doctrine in any form in the *Kramer* case, [54] and has extended this refusal to claims beyond failure to diagnose, and has used *Kramer* as a foundation to refuse loss of chance claims based on negligent acts of healthcare providers that hastened the death of a patient.[55]

Without the ability to pursue a loss of chance cause of action, many cases involving negligently managed SAHs are vitiated.

4. Surviving an Article 4590i Report Challenge:

Section 13.01 of Article 4590i provides, in part, that: no later than the 180th day after the date on which a heath care liability claim is filed, the claimant shall, for each defendant, furnish one or more expert reports, along with a curriculum vitae for each expert.[56]

An "expert report" is defined as a report by an expert which provides a fair summary of the expert's opinions regarding the standards of care in a particular case, the manner in which the physician failed to meet the standard and the causal relationship between that failure and the injury claimed.[57] It is important to note that Section 13.01 specifically states that the expert opinions relating to the applicable standard of care and causation may come from more than one expert. This provision allows a claimant to avoid the problem encountered by the *Broders* claimants, wherein the court determined that their expert was qualified on the standard of care, but not causation. This ability to present multiple expert reports if especially important in cases such as subarachnoid hemorrhages which involve

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[48] *See* Karl v. Oaks Minor Emergency Clinic, 826 S.W.2d 791 (Tex.App. -- Houston [14th Dist.] 1992, writ denied).
[49] *See* Kramer, 858 S.W.2d at 399.
[50] *Id.*
[51] *Id.* at 405.
[52] *Id.*
[53] RESTATEMENT (SECOND) OF TORTS § 323(a) (1965) (stating that a person is liable if his negligent undertaking increases the risk of harm to another). The *Kramer* court acknowledges that while Section 323(a) is the law in Texas, it does not "determine or suggest" the appropriate standard of causation. *See* Kramer, 858 S.W.2d. at 405.
[54] *See Kramer*, 858 S.W.2d at 407.
[55] *See* Park Place Hosp. V. Estate of Milo, 909 S.W.2d 508, 522 (Tex. 1995).
[56] *See* TEX. REV. CIV. STAT. ANN., art. 4590i, § 13.01(d).
[57] *See id.* at §13.01(r).

complicated medical treatment and diagnoses, and an attorney may find that more than one expert may be necessary to satisfy the requirements of demonstrating sufficient legal causation of the Plaintiff's injuries to the courts of Texas.

IV. **CONCLUSION**

Subarachnoid hemorrhages present multiple challenges to the patient, the physician and the medical malpractice attorney. As demonstrated above, the condition can be devastating even with the most ideal medical care. In addition to having a low initial survival rate, the condition is fraught with significant and often unpreventable complications that work against each other such that therapy directed at lowering the risk of one complication will actually increase the likelihood of another.

On the other hand, for those patients who do survive the initial hemorrhage with only minor neurologic deficits, diagnosis and treatment can be successful, and therefore mismanagement of the patient's care can result in a viable medical malpractice cause of action if the attorney can overcome the significant problem of showing that the patient had a greater then even chance of overall survival, thus avoiding the legal pitfall that awaits any attempt to make a claim for loss of chance resulting from negligent treatment by the healthcare providers.