

# Children Don't Get Strokes, Do They?

Part 3 of *"Case Studies in Emergency Department Medical Malpractice Claims"*

Thursday, March 19<sup>th</sup>, 2015

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# The Speaker



Bruce Wapen, MD, is a Fellow of the American College of Emergency Physicians. Prior to retiring in January 2014, he practiced emergency medicine full time for 37 years in general, acute care Emergency Departments. He is licensed to practice medicine in the States of California, Washington, and Idaho and has been a clinical instructor in emergency medicine for the Stanford University School of Medicine, University of California at Davis School of Medicine, Samuel Merritt College Physician Assistant training program, and the United States Army Medical Corp at Letterman Army Medical Center. He has served as a forensic consultant in cases involving the Emergency Department for the past 20 years and has qualified as an expert witness in emergency medicine at trials in the States of California, Alaska, Idaho, Arizona, New Mexico and Nevada. He has agreed to share his experience as an expert witness in emergency medicine malpractice litigation, and this is the third in a series of such talks done for AHC Media entitled "Case Studies in Emergency Department Medical Malpractice Claims."

# Learning Objectives

1. Describe carotid dissection and the medical and legal consequences of failing to diagnose it in a timely manner.
2. Identify stroke in children who display stroke-like symptoms.
3. Discuss the importance of ensuring that your documented history of the present illness is accurate and supported by all of the available evidence.
4. Describe the significance of both standard of care and causation issues in a medical malpractice claim.

# The Event

- A 15-year-old female was at a local, public swimming pool with her two brothers and two other teenage friends at 1530 hours (3:30 pm) on 9-5-11. Prior to this time, she had been feeling well; and she had no history of significant, underlying medical problems.
- She swam to the “Iceberg,” a pyramidal shaped, inflatable, flotation device that was in the deep end of the pool. The Iceberg was meant to be climbed up on. One reentered the water by sliding down a slide or jumping back in. She climbed up the incline of The Iceberg to about 15 feet above the water and jumped back into the pool feet first. She did not strike anything as she fell into the water.

## The Event (cont'd)

- When she re-surfaced in the pool, she noted the presence of a severe, right-sided headache. She said, "...my head hurt more than anything I've ever felt, the worst pain possible."
- She swam to the edge of the pool, got out, and walked to the area where her belongings were. Immediately she began vomiting and vomited 5 or 6 times.
- She remained fully conscious, and there was never any seizure activity; but within 5 to 10 minutes from the onset of the vomiting, she found that she could not move the left side of her face, her left arm, or her left leg.

# EMS Reports

- The local, ground ambulance service responded to a 9-1-1 call. Their note included the following findings: Lethargic, mild to moderate slurring of words, oriented x 3. No loss of consciousness. Weakness left side, normal sensory exam. Patient was initially flaccid on the left side of her body with a left sided facial droop and a rightward gaze. On our arrival, gross motor movement of her left side was noted though she continues to have a left sided facial droop and a rightward gaze. Glasgow Coma Scale was normal at 15, but the Cincinnati Prehospital Stroke Scale was positive in all of its three parameters.

# Cincinnati Prehospital Stroke Scale

This is a scoring system meant to be used by laypersons or EMS personnel in the pre-hospital setting to determine if a person has signs and symptoms of a possible acute stroke which, if present, should prompt immediate transport to a hospital for further evaluation.<sup>1-2</sup> It has three components:

1- Facial Droop: Have the patient smile or show his or her teeth (asking to show the teeth is better).

- Normal: Both sides of the face move equally.
- Abnormal: One side of the face does not move as well as the other side or does not move at all.

# Cincinnati Prehospital Stroke Scale

(cont'd)

2- Arm Drift: Have the patient close his or her eyes and hold the arms straight out from the body for 10 seconds (best done with palms up).

- Normal: Arms do not drift down, or they drift slightly but equally.
- Abnormal: One arm cannot be lifted into position, or one arm drifts down compared to the other arm.

3- Speech: Have the patient converse or say a simple phrase or saying.

- Normal: The patient uses words correctly without slurring.
- Abnormal: No speech, slurred speech, or inappropriate use of words.

## EMS Reports (cont'd)

- On the basis of their findings and the positive Cincinnati Prehospital Stroke Scale score, the EMS team consulted the emergency physician on duty in the local ED. They were advised that this patient should not be transported to the local hospital but should be air-lifted to a regional stroke center.
- An air ambulance helicopter was dispatched and arrived on-scene at 1546. The flight nurse's note stated: "She was able to answer questions though she had a significant slurring of her words with an evident left sided facial droop. She was now moving her left side with gross motor movement unable to touch fingers together or squeeze my hand. Her pupils were equal round and reactive to light

## EMS Reports (cont'd)

- with a negative Babinski reflex. Reflexes all remained intact. She stated that she had a headache located to the right occipital area.”
- The helicopter arrived at the regional medical center, and the patient’s care was turned over to the ED staff at 1645. The “Transport Medical Record” was not completed at that time; so, no hard copy was left in the ED, but a verbal report was given to the triage nurse.

# Hospital Triage Nursing Notes

- At 1657, the triage nurse wrote: "... patient was at a public pool swimming and was walking around and vomited twice and then got left sided paralysis. Reported facial droop and no movement on left side." "EMS reported they started IV lines and patient started to get normal sensation back and no facial droop." Air ambulance team "...arrived and patient was neurologically intact. No facial droop. No left side paralysis." "Pt. arrives in ... ER and has right frontal headache. No facial droop, no paralysis."
- Vital signs were normal, and the nurse's neuro exam was: "Patient is awake and alert. Affect, orientation, and speech are age appropriate."

# ED Physician Notes

- The patient was seen by the emergency physician who entered her Social History into the electronic medical record (EMR) at 1702 on 9-5-11. The History of the Present Illness and the Physical Exam were not entered into the EMR until two days later (9-7-11).
- The HPI read as follows: "...transfer by helicopter from a swimming pool... According to the patient and medical providers she was trying to climb an implantable rock climbing apparatus located in the swimming pool. She felt she could not make it to the top and decided to let go and fall into the water. Unfortunately she struck the right side of her forehead during the fall. She lost consciousness and developed left-sided hemiparesis and slurred speech along

## ED Physician Notes (cont'd)

- with a facial droop according to bystanders. She also reportedly vomited several times. This lasted approximately 5 minutes. Upon EMS arrival her symptoms had resolved." "Her mother feels she still continues to have left-side facial asymmetry and that her speech is not back to normal."
- The Physical Exam:
  - Head: normocephalic, atraumatic
  - Eyes: EOMI, PERRL, no nystagmus
  - Ears: no hemotympanum
  - Neck: supple and nontender

## ED Physician Notes (cont'd)

- The Physical Exam (cont'd):
  - Neuro: "there appears to be a very subtle left-sided facial asymmetry on examination, this appears to wax and wane upon repeated evaluation; the patient is alert, awake; oriented to person, place, and situation; normal speech; cranial nerves 2 through 12 intact; normal motor function in all muscle groups; sensory exam normal to touch and light painful stimulus; no facial motor or sensory deficits; normal coordination; able to ambulate to the bathroom without difficulty."

## Course in the ED

- A head CT scan without contrast was ordered along with blood tests. The patient returned from CT at 1721. At 1736, the nursing notes recorded: "Pt. had difficulty swallowing when taking her Tylenol. Pt. was dribbling out of left side of mouth." Doctor notified.
- The head CT was read as normal by the radiologist, and that reading was telephoned to the ED MD at 1744.
- The ED MD consulted the on-call, adult neurologist and wrote a note regarding that consultation at 1847 on 9-5-11 (there was a pediatric neurologist on-call, but that specialist was not consulted).

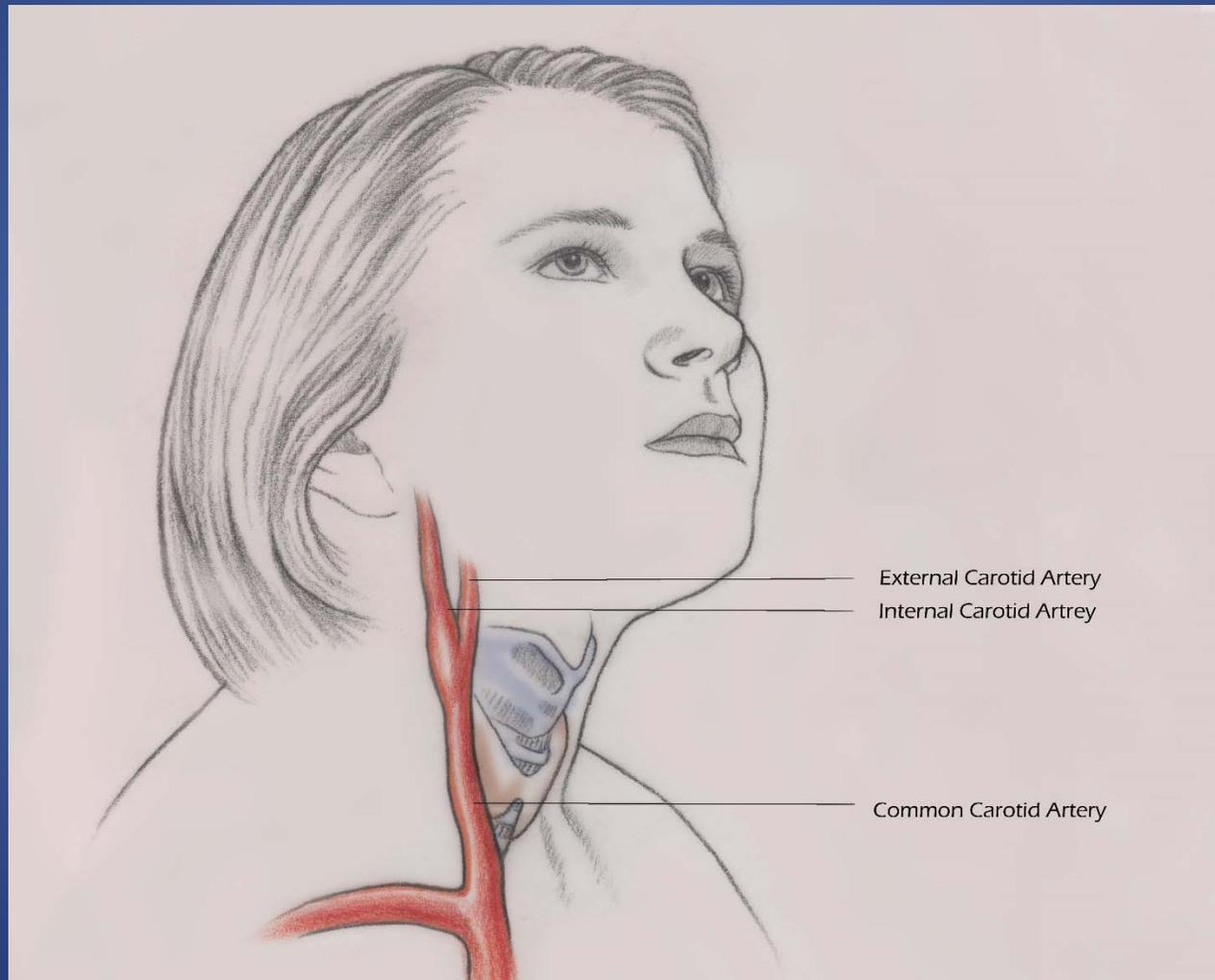
## Course in the ED (cont'd)

- “Progress Note: I obtained consultation with the on-call neurologist. I went over the patient’s medical history, presentation, and emergency department findings with him. He recommended imaging of the patient’s head and neck. He does not feel any further medical imaging is necessary. Based on my description he feels the patient likely is suffering from a brief concussion syndrome.”
- Just following that phone consultation with the neurologist, and in response to his recommendation, a CT scan of the neck was ordered. It was read as negative by the radiologist at 1927.

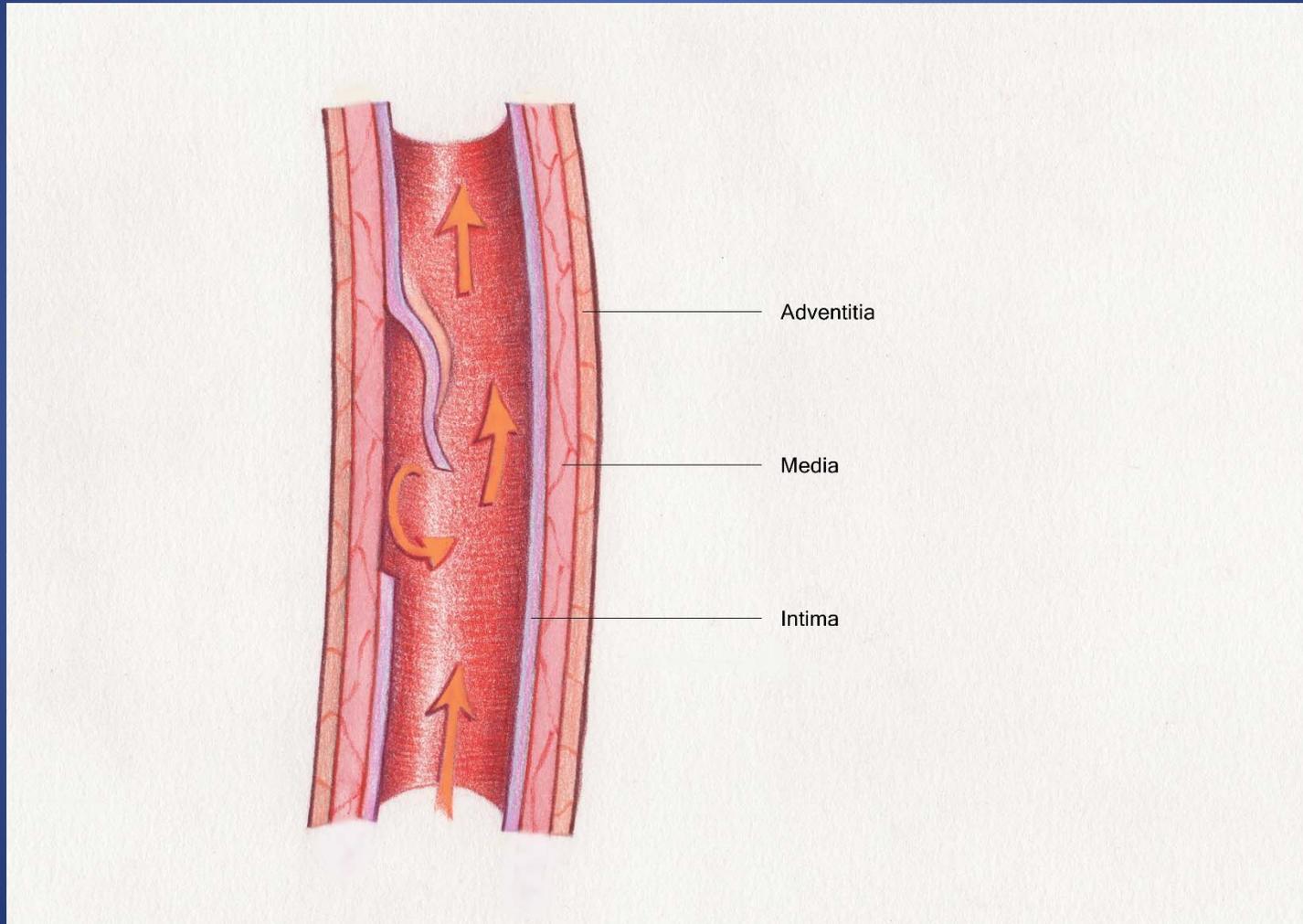
## Course in the ED (cont'd)

- The patient was discharged from the ED at 2124 with verbal instructions given to her parents by the ED MD to “seek immediate reevaluation for any change in the patient’s mental status, speech, or neurological status.” She was given a written referral to a neurologist and told to follow-up in 4-6 days.
- The Diagnoses:
  - Headache
  - Observation – suspected concussion
  - Nausea

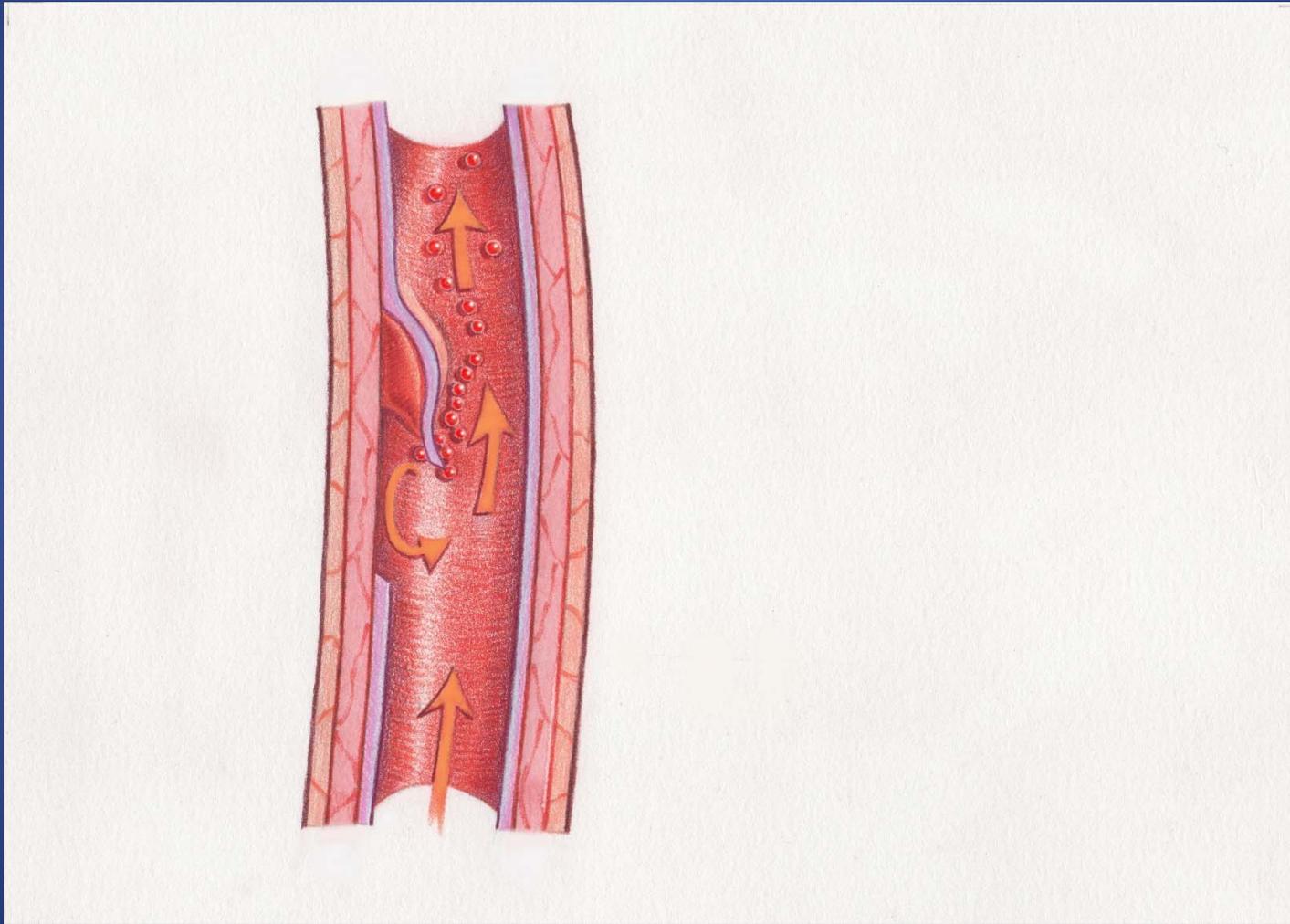
# Carotid Artery Anatomy



# Arterial Dissection



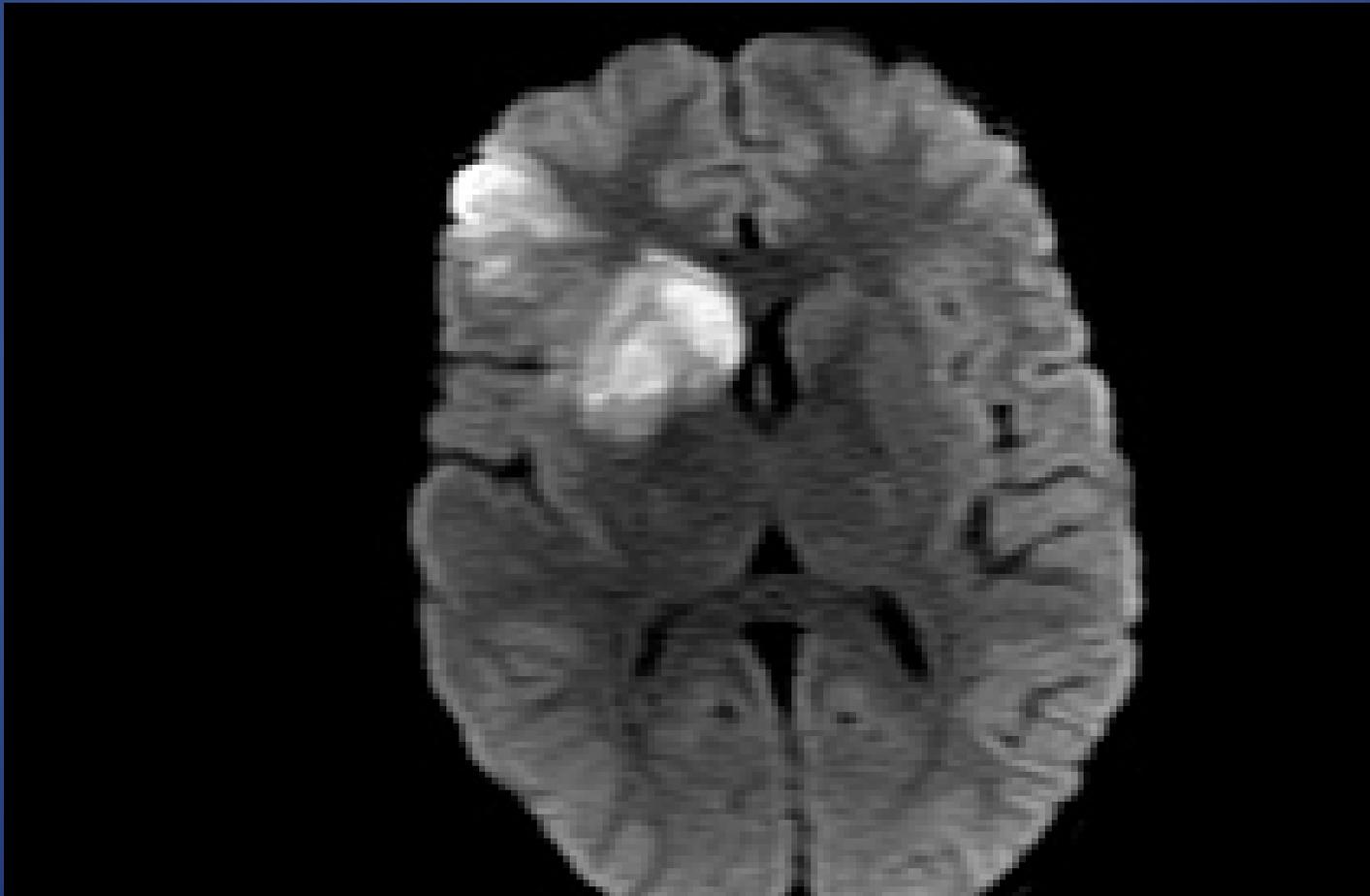
# Artery Dissection with Embolization



## ED Visit #2

- The patient presented to the local ED the next morning at 1014. This is the ED that had been bypassed the previous day. Her father said he noticed some twitching associated with a worsening headache since 0900 that morning.
- On examination she was noted to have left-sided facial weakness.
- An MRI of the brain showed: "Acute intracranial ischemia that is less than 6 hours in age right MCA [middle cerebral artery] distribution. There is narrowed right internal carotid artery with a subtle thickening of the arterial wall in the horizontal segment, concerning for dissection. Recommend head and neck CT angiogram at this time."

# Brain MRI



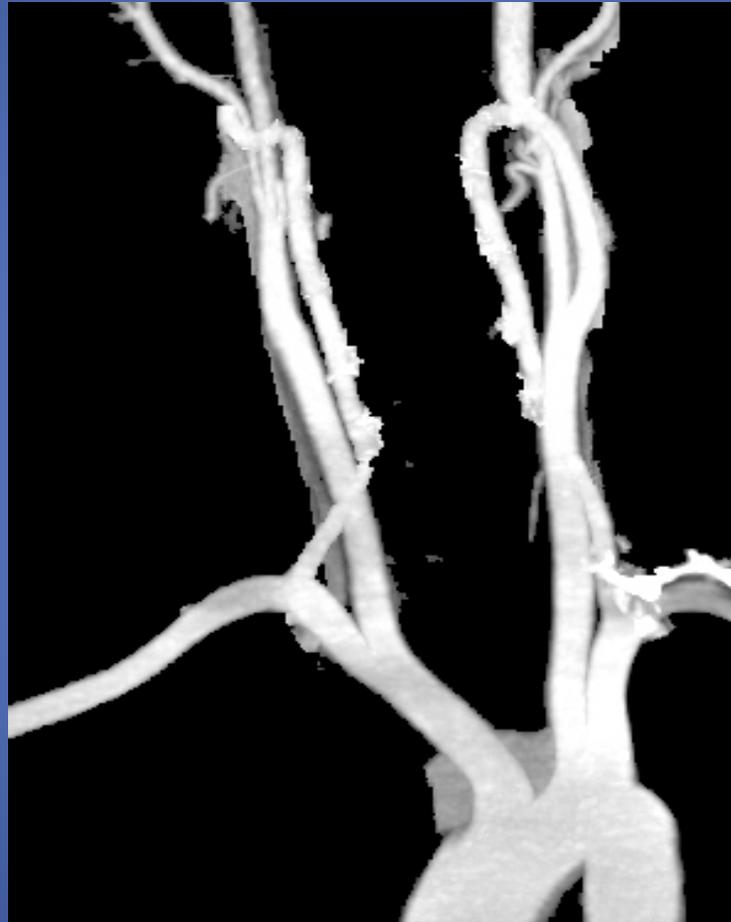
## ED Visit #2 (cont'd)

- The head and neck CTA showed:

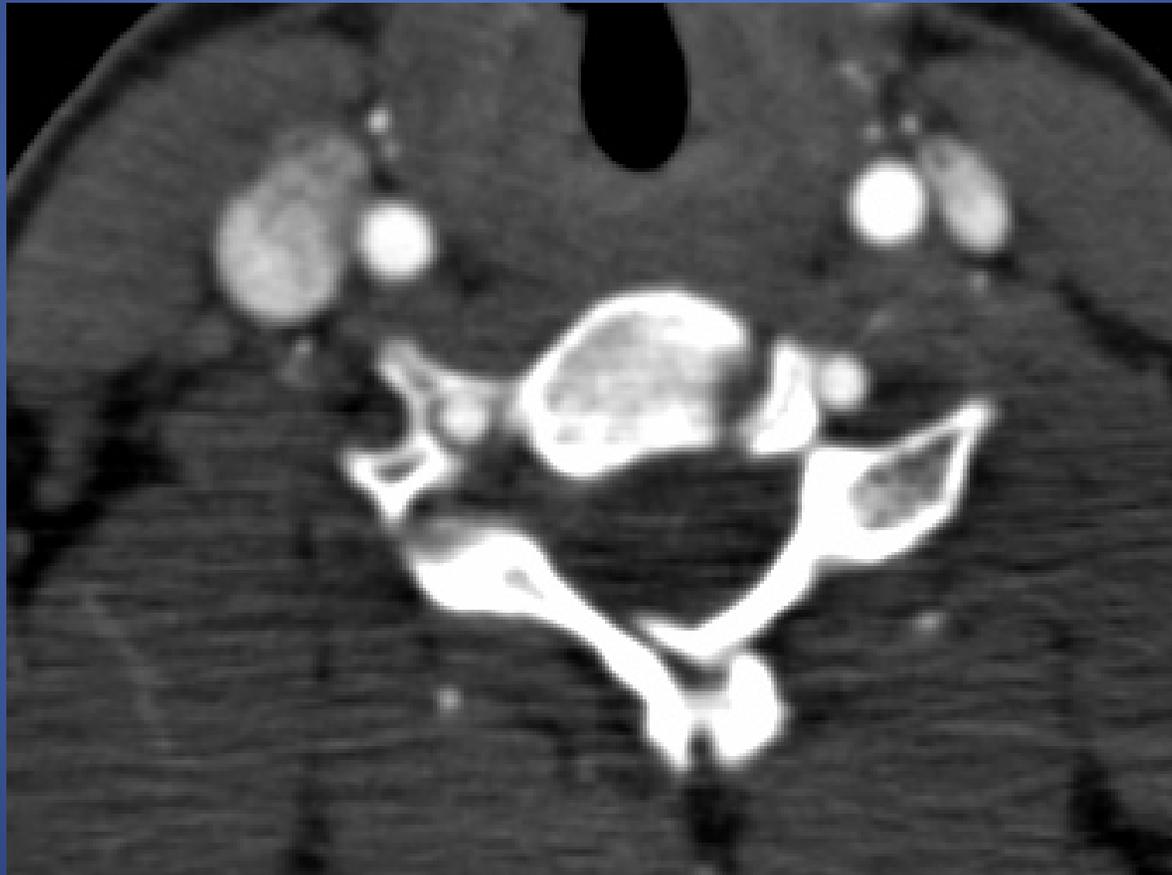
1- Narrowed right internal carotid artery just distal to the bifurcation with decreased flow distally. There is a subtle, linear, intraluminal filling defect near the origin of the right ICA suggestive of a dissection flap. This is likely the source of acute intracranial ischemia.

2- Decreased caliber of the right MCA compared to the left consistent with flow limiting injury to the right ICA/MCA.

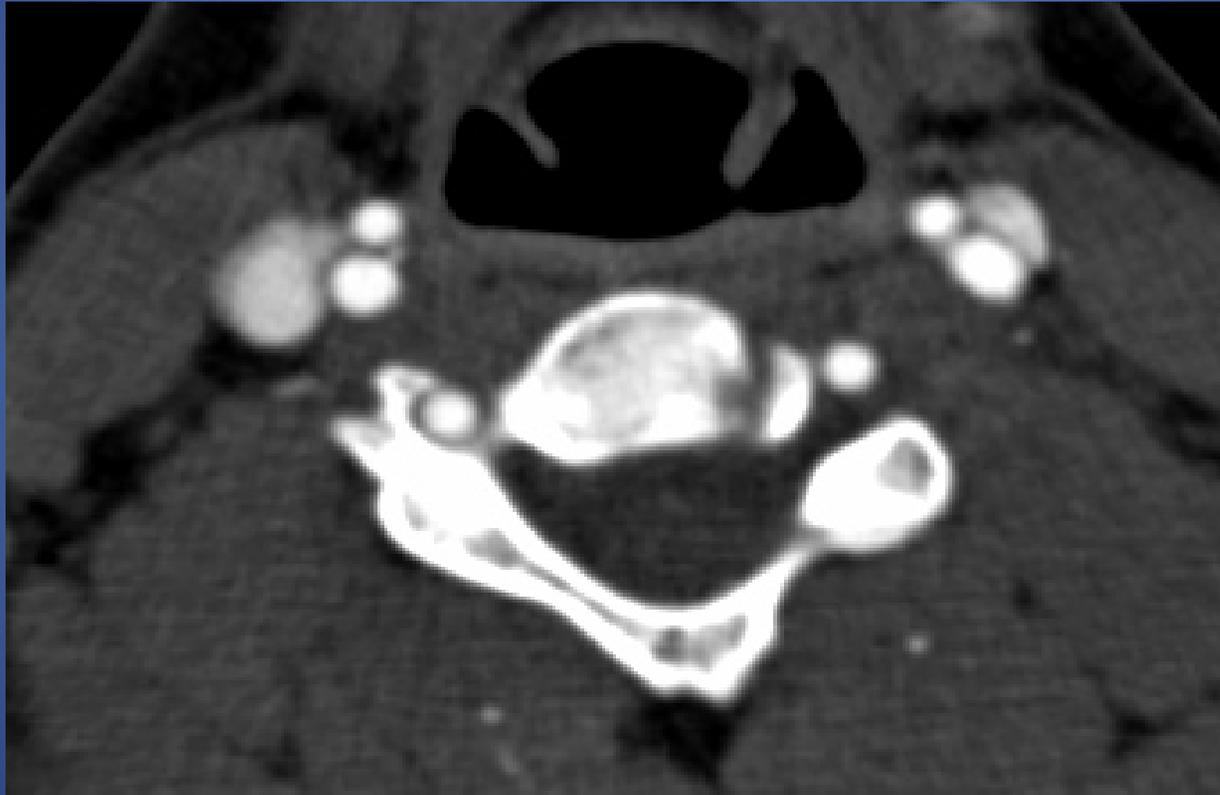
# Neck CTA AP View



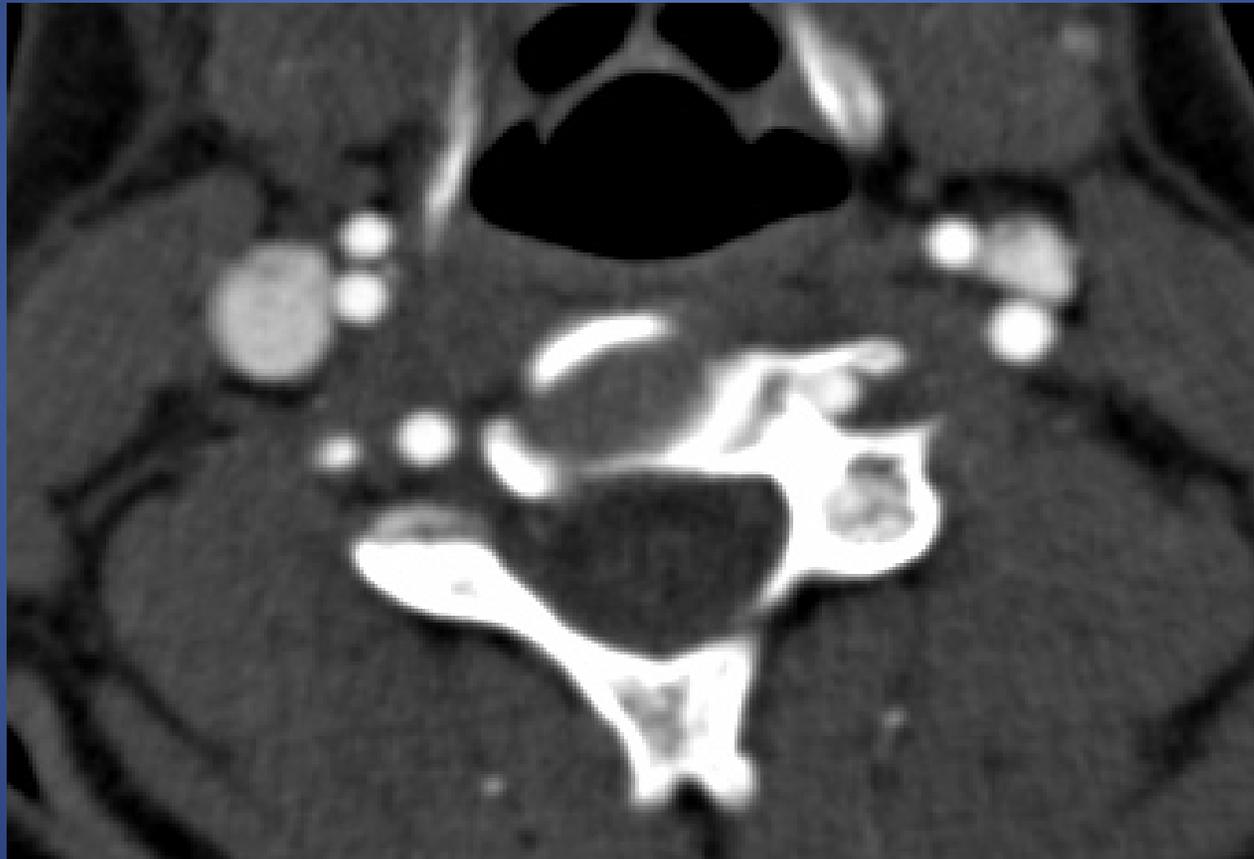
# Neck CTA Horizontal View 1



## Neck CTA Horizontal View 2



## Neck CTA Horizontal View 3



# Upper Neck & Brain CTA AP View



## ED Visit #2 (cont'd)

- The ED MD consulted the pediatric intensive care unit (PICU) physician on-call at the regional medical center where the patient had been the previous day. Immediate air ambulance transportation to that PICU was arranged, but no specific antiplatelet, anticoagulation or thrombolytic therapy was advised prior to transport.

# Hospital Admission

- The pediatric intensivist consulted with a pediatric hematologist, pediatric neurologist, and an interventional neuroradiologist. It was decided that the patient should be anticoagulated with IV heparin.
- She did well and was transitioned to subcutaneous Lovenox. However, on 9-8-11 she developed the acute onset of left hemiplegia with a decreased level of consciousness.
- A repeat CTA showed complete occlusion of her MCA. The interventional radiologist was unable to thread a wire past the obstruction, felt that this was most consistent with an intimal tear of the MCA, and felt that the patient did not have a significant tear of the internal carotid artery.

## Hospital Admission (cont'd)

- During the interventional radiology procedure, the patient had resolution of her symptoms and was able to move her left hand, arm and leg well and had only minimal, residual, left-sided facial drooping. Because of the risk of hemorrhage, anticoagulation was withheld. Her pediatric intensivist consulted colleagues in multiple medical centers in both the US and Canada. There was controversy over whether the patient should be treated with anticoagulation or not - some centers advocating for anticoagulation and some centers recommending against it. It was decided to transfer her to a university hospital in a different state, but the accepting specialist at that hospital requested that she be anticoagulated with low dose heparin.

## Hospital Admission (cont'd)

- She was transferred out from the regional medical center with the following diagnoses:
  - Acute right middle cerebral artery stroke with left hemiplegia
  - Probable right middle cerebral artery intimal tear
  - Rule out right internal carotid artery dissection
- At the university hospital she was treated with heparin and aspirin and then transitioned to warfarin.

# Disability

- The patient has a persistent, mild, left-sided facial droop; the left side of her body is weaker than the right side; and her left hand, arm & toes will spasm and curl up multiple times a day.
  - She used to play the violin in her school orchestra, but that ability is greatly impaired.
  - She had earned a brown belt degree in judo and used to compete, but she is no longer competitive.
  - She requires periodic injections of Botox for her muscle spasms.
- She has become emotionally labile and is being treated for depression.

# Plaintiff's Case

- Plaintiff's expert in emergency medicine opined that the emergency physician who saw and treated the patient at the regional medical center on 9-5-11 (the day of the incident at the pool) fell below the standard of care in emergency medicine for the following reasons:
  - Failure to obtain a correct history of the present illness
  - Failure to appreciate persistence of a neurologic deficit
  - Failure to order appropriate imaging studies to look for evidence of a stroke and/or arterial dissection

## Plaintiff's Case (cont'd)

- Plaintiff's expert in emergency medicine felt comfortable opining about standard of care issues but did not feel comfortable being plaintiff's causation witness as that would require opinions regarding the choice of treatment to be given if the patient had been admitted: no treatment, aspirin or some other anti-platelet drug, heparin, a thrombolytic, or a procedural technique by an interventional radiologist and whether such treatment would be expected to prevent a stroke. Such decisions would only be made after consultations with pediatric neurology, pediatric intensive care medicine, a vascular surgeon, and/or an interventional radiologist. Therefore, one or more of these specialists should be called upon to provide expert opinion and testimony regarding the issues of causation: what treatment should have been chosen, and is it more probable than not that the treatment would have worked.

## Plaintiff's Case (cont'd)

- Approximately 3-4% of all stroke patients are between 15-45 years of age; therefore, kids can and do get strokes. Anterior circulation strokes, involving the carotid, anterior and/or middle cerebral arteries, may present with hemiplegia, slurred speech or aphasia, and lateralized gaze.<sup>3</sup>
- In a patient who displays lateralized gaze, that finding is compatible with injury to the frontal eye field in the cortex of the brain. With a seizure, the patient looks away from the seizure focus; but with a stroke, the patient looks at the destructive lesion. Right lateral gaze in conjunction with a left-sided hemiplegia would indicate a right-sided stroke.<sup>3</sup>

## Plaintiff's Case (cont'd)

- The Cincinnati Prehospital Stroke Scale indicated the strong likelihood that the patient was having a transient ischemic attack (TIA) or a cerebrovascular accident (CVA), which is why she was flown to the regional medical center in the first place.
- The current definition of TIA may be summarized as: An ischemic event causing transient neurologic dysfunction without evidence of infarction on appropriate imaging.<sup>4</sup> The question of whether the patient was having a TIA or a CVA on 9-5-11 became a mute point as diagnostic imaging appropriate for that work-up was not done at the time of the initial ED visit.

## Plaintiff's Case (cont'd)

- There was no history of head injury or LOC documented by the paramedics or flight nurse, and there was no evidence of head or facial trauma seen by the emergency physician on his physical exam; yet, he recorded a history of head trauma and limited his work-up to one appropriate for concussion.
- Carotid dissections can be either spontaneous or the result of trauma to the head & neck, but the trauma may be relatively minor as with turning the head sharply, coughing, chiropractic manipulation of the neck, or motor vehicle collisions.<sup>5</sup>
- The classic triad of symptoms of carotid dissection includes unilateral headache, ipsilateral partial Horner's syndrome, and contralateral hemispheric findings such as hemiparesis.<sup>5</sup>

## Plaintiff's Case (cont'd)

- “The diagnosis of dissection may prove to be difficult. A CT scan should be obtained first but will often be normal in the uncomplicated dissection. Further imaging studies including duplex scanning, magnetic resonance angiography, or catheter angiography will be required to confirm the diagnosis. Treatment is aimed at stroke prevention and usually includes early anticoagulation followed by antiplatelet therapy... The emergency physician must consider this diagnosis in any young patient who presents with head or neck pain with focal neurologic findings.”<sup>5</sup>
- The patient had dramatic neurologic findings at the scene of the event and persistent facial weakness in the ED.

## Plaintiff's Case (cont'd)

- Depositions of percipients and experts revealed additional information.
- The adult neurologist who had been consulted by phone on 9-5-11 said that accurate information regarding head trauma and LOC would have been significant, that he would have asked more questions if he had known about the information in the EMS report, and that the symptoms were compatible with a TIA, which should have been considered.
- The ED nurse said that her note was typed into the EMR at 1735 and would have been in the computer and available for other medical providers to view while the patient was still in the ED.

## Plaintiff's Case (cont'd)

- The emergency physician said that he did not consider TIA, that it was not in his differential diagnosis, and that he was not considering that possibility when he consulted the neurologist by phone. He said that the history of head injury and LOC came from the patient and her mother and that he did not see a paramedic report.
- The patient's mother, who was not at the pool at the time of the event, said that, when she questioned her daughter, her daughter said that she hadn't hit her head. Then she called her husband who questioned the boys who were with the patient at the pool, and they all said that the patient hadn't hit her head.

## Plaintiff's Case (cont'd)

- The pediatric neurologists who treated the patient after she was admitted to the regional medical center opined that the CVA was caused by embolization of clots to the brain from the dissection and that the general consensus for management of stroke caused by carotid artery dissection is anticoagulation with heparin.<sup>6-7</sup>
- Plaintiff's neuroradiology expert opined that the brain infarcts seen on imaging on 9-6-11 were probably not present on 9-5-11, but the dissection would have been visible.

## Defense's Case

- The defense retained two experts in emergency medicine, and several of their statements seemed to support plaintiff's case:
  - Related to ischemic strokes or TIAs, the history is the most important part of the neuro exam.
  - Disposition of TIA is to admit the patient.
- However, they felt that the actions of the emergency physician were within the standard of care, that it was reasonable for him to have relied on the advice of the consulting neurologist, and that no further imaging was indicated.

## Defense's Case (cont'd)

- Defense retained two pediatric neurology experts. One opined that it is unlikely that a simple concussion would have produced the patient's symptoms. He thought she was having a TIA on 9-5-11, not a concussion. However, he noted that the use of heparin for pediatric dissection is not a proven therapy.
- The other expert opined that the patient had a CVA on 9-5-11, not a TIA, and that the subsequent stroke on 9-6-11 was probably embolic. However, while he noted that heparin is an effective treatment for embolic CVA and that it is standard treatment to use heparin, he felt that one cannot claim that it will help.

# Plaintiff's Legal Error

- The night before plaintiff's standard of care expert in emergency medicine got deposed, that expert was informed that plaintiff's attorney had failed to retain a causation expert and that he would like his standard of care expert to address the issue of causation.
- There is a cut-off time for the naming of experts. Because plaintiff's emergency medicine expert had not been disclosed as a causation expert in a timely manner, nor had any of his opinions relative to that issue been disclosed, the defense attorney refused to ask him any causation questions. Of course, plaintiff's attorney got to ask those questions at the end of the deposition, anyway; but each and every one of those questions and answers was objected to by the attorney for the defense.
- A second deposition on just causation issues was arranged and took place at a later date.

# The Trial

- The trial took place in March 2013. For the benefit of the judge and jury, both sides repeated the opinions and arguments already expressed in disclosure statements and depositions.
- However, because plaintiff's attorney had not disclosed a causation expert in a timely manner, the judge did not allow plaintiff's expert in emergency medicine to testify about causation issues, limiting him to opinions regarding standard of care; therefore, plaintiff had no causation expert.
- For a medical malpractice suit to result in a verdict favorable to plaintiff, plaintiff's attorney and experts need to show that the defendant fell below the standard of care and that those failures to perform within the standard of care were the proximate cause (causation) of the bad outcome (damages).

## The Trial (cont'd)

- Because plaintiff had no causation expert, no causation opinion was allowed. Because no causation opinion was allowed, plaintiff could not show that it was more probable than not that the failures to meet the standard of care were the proximate cause of the damages. Because it was a necessary part of plaintiff's case to prove causation, which now could not be proven, plaintiff's attorney found that he had no case. The judge mandated a "directed verdict" <sup>8</sup> for the defense. Trial over.

# Forensic Issues

- EMS: Why wasn't the "Transport Medical Report" completed in the ED?
- Emergency Department:
  - Assuming that the information provided by the flight nurse in her verbal report to the ED nurse was the same as the information documented in her written report, was the ED nurse below the standard of care in charting the facts of the event incorrectly?
  - Where did the emergency physician get the history of head injury and LOC? Was he below the standard of care for not confirming the facts of the event with the paramedics and/or flight crew? Is it significant that the history was entered into the EMR two days after the initial event, by which time the patient had been readmitted to that same hospital with a confirmed stroke?

# Forensic Issues (cont'd)

- Emergency Department (cont'd):
  - In addition to the very worrisome history of the present illness, shouldn't the presence of the subtle, residual, facial weakness have triggered a TIA/CVA work-up in the ED and admission to the hospital?
  - Did the neurologist, who was consulted by the emergency physician, do due diligence in his questioning of the details of the event and in his recommendation regarding the imaging studies that needed to be done? Even if there had been a head concussion, wouldn't that have torqued the neck; and isn't that one of the causes of carotid dissection, which would have explained her symptoms far better than a "concussion?"

# Forensic Issues (cont'd)

- Emergency Department (cont'd):
  - A CTA, done at the time of the initial visit, would have shown the carotid dissection. If an MRI had been done, would evidence of brain infarction (CVA) already have been present?
  - Can you show, to a reasonable degree of medical certainty, that giving heparin in the ED or immediately upon admission would have "caused" there to be no stroke or would have minimized any symptoms of stroke progression?

# Forensic Issues (cont'd)

- Legal Proceedings:
  - How is it that plaintiff's attorney failed to retain a causation expert in a timely manner?
  - While an emergency medicine expert must always be willing to opine about standard of care issues relative to the Emergency Department, is that same individual expected to be an expert on all issues of causation?

# Case Summary

- Strokes may occur in the young, and carotid dissection is one of the causes of such strokes.
- The symptoms described by the EMS personnel were compatible with TIA/CVA. Those medical emergencies needed to be seriously considered and ruled-out.
- The emergency physician recorded a history of the present illness that did not match the actual events and caused a cascade of inappropriate testing, consultation advice, and case management. How differently things might have gone if the emergency physician had taken the time to speak with the flight nurse from the air ambulance.

## Case Summary (cont'd)

- The issues of standard of care and causation need to be individually and adequately addressed in any medical malpractice case.
- The failure of plaintiff's attorney to address the causation issue doomed the case, regardless of its merits.

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6- <[http://my.clevelandclinic.org/services/heart/disorders/hic\\_Carotid\\_Artery\\_Disease/Carotid-Artery-Dissection](http://my.clevelandclinic.org/services/heart/disorders/hic_Carotid_Artery_Disease/Carotid-Artery-Dissection)>

7- Bernard TJ, et al, *"Anticoagulation in childhood-onset arterial ischemic stroke with nonmoyamoya arteriopathy,"* Stroke, 40:2869-2871, 2009

8- <[http://en.wikipedia.org/wiki/Directed\\_verdict](http://en.wikipedia.org/wiki/Directed_verdict)>

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The End

Questions?

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