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Shaken baby syndrome: A diagnosis not to be missed

By **Stephanie Rifkinson-Mann, MD, JD,** Pediatric Neurosurgical Consultant, White Plains, NY; Attorney, New York City.

Editor's note: *Emergency personnel care for innumerable victims of domestic violence. None of these victims are more vulnerable than the infants who have been abused by their caretakers. Although signs of abuse sometimes can be very apparent, this month's article reminds emergency clinicians that we must be alert to more subtle signs of abuse that can be indicators of substantial injury to infants. Though the presenting complaints and histories may be inaccurate or frankly deceptive, the physical and diagnostic findings of infants with shaken baby syndrome will assist in identifying these victims of domestic abuse.*

Introduction

Infants often present in the ED who have suffered intentional head injury or nonaccidental trauma consistent with child abuse. Oftentimes, another diagnosis is entertained. Generally, the most common causes of ED malpractice arise from the misdiagnosis or failure to diagnose, improper or delayed treatment, and lack of consultation with specialists.[1] In scenarios where pediatricians or pediatric ED physicians are not available, child abuse easily can be missed because of the differential diagnoses that one must entertain in evaluating an infant.

The term "shaken baby syndrome"[2] suggests that only infants are affected by this type of injury; however, abusive shaking has been reported in children as old as 8 years.[3] Shaking is only one form of nonaccidental head trauma seen in children, in addition to penetrating injuries, hypoxic/ischemic injuries associated with asphyxia, and blunt-force impact injuries.[4]

Shaking is unique in that it can cause not only intracranial injury, but also cervical spinal cord and ocular injuries. All of these injuries can be produced by the same action. In shaking a child, the perpetrator most often holds the child by the chest, sometimes with the hands under the axillae or squeezing

the chest, each usually facing the other. The infant's head is large in proportion to the child's body and the neck muscles are as yet underdeveloped and weak, so that the head moves violently in a to-and-fro motion.[5] The child may be held up in the air while being shaken; may be shaken against a flat surface; or may be shaken, and then thrown back into the crib or against some other surface after the shaking has ceased, sustaining both shaking and impact injuries. In addition, the child may be hit on the side of the head, causing the head to rotate forcefully, producing unilateral cerebral injuries, bruising about the ear, and unilateral or bilateral retinal hemorrhages, occasionally referred to as tin ear syndrome.[6] However, it is unclear how many times a child has to be shaken to cause this sort of injury, nor is it clear how much force is necessary. It is assumed that a severe injury is caused by the application of severe force,[7] usually by an individual, who is significantly larger and stronger than the child, most often an adult.[8]

In these instances, the injury is caused by an acceleration-deceleration of the brain. The frontal and occipital surfaces of the brain impact against the bony inner surfaces of the cranial cavity, causing bruising. Ultimately, if the same mechanism of injury is repeated often, atrophy of the frontal and occipital poles occurs. This type of motion, like almost any head injury, also causes subarachnoid bleeding, due to the shearing motion of the brain within the dural envelope. Unlike a subarachnoid hemorrhage (SAH) due to accidental injuries, such as motor vehicle accidents or falls (where there appear to be less repetitive and/or sustained oscillations of the head in incurring injury, and bilateral retinal hemorrhaging is not seen often), the SAH seen in child abuse often is associated with retinal hemorrhages.[9]

Diagnosis

The most common clinical presentation of a severely shaken baby entails some combination of change in level of alertness or responsiveness, most often with loss of consciousness, apnea or irregular breathing, vomiting, and seizures. Such a presentation usually coincides with a severe injury at the time of presentation. More difficult to diagnose is the abused child who presents with insidious symptoms, such as fever, poor appetite, irritability, and who looks ill. These are the children who often are misdiagnosed as having gastroenteritis, otitis media, or some viral syndrome, and usually are discharged from an ED setting with little more than a simple physical examination.[10] However, shaking may not entail obvious cutaneous injuries in a young infant.[11] The examiner also must be diligent in looking for scalp lacerations or swelling that may not be visible immediately; for bruising under the axillae, around the neck or about the ears; for splayed cranial sutures and/or a tense fontanelle, distended scalp veins, or macrocephaly; and signs of other trauma (e.g., ecchymoses of varying ages, and signs of other injury involving the extremities and/or other parts of the body).[12] It is important to note that in a very young infant, the cranial sutures may be separated widely due to increased intracranial pressure without concomitant bulging of the anterior fontanelle.

Taking a careful clinical history requires a high

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index of suspicion, despite the educational, cultural, and/or socioeconomic differences among perpetrators of abuse. Whether shaking occurs as a result of an impulsive response to anger, frustration, or aggression, the stimulus to abusive injury often is attributed to the irritation caused by the crying child. This may be especially problematic between 6 weeks and 4 months of age, the period of time that coincides with the peak incidence of shaken baby syndrome.[13]

Besides the history, physical, and neurologic examinations, an ophthalmologic evaluation is mandatory. If the ED physician cannot visualize the fundi, ideally an ophthalmologist, a pediatric ophthalmologist, neurologist, or pediatric neurosurgeon should perform the evaluation. Although the Glasgow Coma Score[14] or the Pediatric Coma Scale[15] is key in initially evaluating the severity of the child's head injury, the pupillary response is a major aspect of the neurological examination. Therefore, pupillary dilatation, if warranted, should be delayed only to document the child's clinical findings. Although retinal hemorrhages are the hallmark of child abuse, evidence of other ocular injuries, such as retinal detachment, optic venous hypertension, optic disk pallor, optic disk bulging, or other optic nerve injury, should be sought.[16] However, the absence of retinal hemorrhages, retinal injury, or papilledema does not automatically exclude child abuse or battered child or shaken baby syndrome. Furthermore, unilateral retinal hemorrhage does not preclude a diagnosis of child abuse.[17]

All children with head injuries not explained clearly by the history must undergo brain imaging in addition to a skeletal survey and skull x-rays. For the severely injured child, and for the less obviously severely injured infant, a CT scan of the brain, done initially without contrast, is the best screening study for nonaccidental head trauma. Because an infant's head is significantly smaller than that of an older child or adult, tomographic slices that are 4 mm thick and taken at 4-mm intervals should be sufficient[18] to visualize the brain, both supra- and infratentorially, and to image the scalp and subgaleal area. To evaluate the middle ear compartment if an otitis media is suspected clinically, CT slices through the mastoid bone may be obtained during the same sitting. In addition, bone windows must be printed because fracture lines, bulging fontanelles, and splayed cranial sutures are visualized better. This attention to detail is critical to rule out other conditions that arise in the differential diagnosis of a child presenting to the ED with similar symptoms, including otitis media, mastoiditis, meningitis, empyemas, brain tumor, or other mass lesion. If neoplasm or infection is suspected on the basis of the initial CT scan, then a contrasted study can be obtained, especially if time is a factor, and the child's condition is critical. Radiologic evidence of recent head injury includes, but is not limited to, SAH; unilateral or bilateral subdural hematoma (acute, chronic or subacute with mixed blood densities); cerebral contusion; epidural hematoma; low-density appearance of the cerebrum in contrast to a normal appearing cerebellum, especially with obliteration of the basilar cerebrospinal fluid cisterns (sign of hypoxic injury and cerebral edema);[19] skull fracture(s) with or without evidence of intracranial air, subgaleal edema or hematoma; splayed cranial sutures/diastatic sutures; and bulging fontanelles.

Magnetic resonance imaging (MRI) also has a role in the evaluation of shaken baby syndrome. However, because of the longer time entailed in producing the images and the frequent necessity of life-support measures for the seriously injured child, MRI is better used as a supplemental study, or as a delayed study. A delayed study can be used to delineate the details of injuries, both subacute and chronic. It can be used to elucidate hard-to-visualize, thin subdural collections; to identify small hemorrhagic areas; to estimate the time of injury based upon the MRI characteristics of heme and/or hemosiderin; to evaluate the extent of parenchymal injury as a consequence of the shaking (e.g., shearing injuries, diffuse axonal injury and cerebral ischemia);[20] and to rule out congenital enlargement of subarachnoid spaces,[21] neoplasm, or pre-existing vascular abnormalities (e.g., arteriovenous malformations and aneurysms), which are rare causes of bleeding in the very young child.[22] Usually, these studies are obtained using a spin echo sequence with T1-weighted sagittal and coronal images to clarify anatomical and CSF abnormalities;[23] T-2 weighted axial and coronal images to visualize parenchymal changes and to evaluate fluid collections better; and occasionally, proton density imaging to show smaller foci of bleeding.[24]

Laboratory evaluations are necessary to rule out clotting abnormalities, vitamin deficiencies, or other traits that might precipitate spontaneous bleeding or exacerbate clinical hemorrhage.[25] Blood gas examination obviously is critical in managing the hypoxic patient. Lumbar puncture (LP) may be a concern if meningitis is suspected; however, the study must be

undertaken with extreme care if there is evidence of increased ICP. In such cases, a neurosurgical consultation for a ventricular tap may be a better or safer option if cerebrospinal fluid must be sampled.

Differential diagnosis

Conditions that might mimic nonaccidental head injury include accidental injury,[26] birth trauma,[27] metabolic disorders,[28] external hydrocephalus with or without spontaneous hemorrhage (also known as benign subdural effusions of infancy or enlarged subarachnoid spaces),[29] meningitis,[30] pre-existing vascular lesions,[31] sudden infant death syndrome,[32] and cardiopulmonary resuscitation, though rare.[33] Meningitis, in particular, that which is caused by *Haemophilus influenzae,* may present with bilateral subdural effusions, further complicating the picture.[33]

The most common cause of an accidental head injury is a fall.[34] Traumatic injuries due to falls from beds or sofas usually entail linear skull fracture without central nervous system damage, suggesting that if serious injury is attributed to this mechanism, child abuse probably is the correct diagnosis in most cases.[35] Metabolic disorders, meningitis, and other conditions can be differentiated by the appropriate laboratory work and consultation of specialists as warranted. Key to differentiating many of these conditions is a clear understanding of the child's clinical and family history.

Case #1: *Hazlett v. Evans, et al.*[36]

In *Hazlett,* the parents of an allegedly abused baby claimed that the doctor negligently misdiagnosed the baby and that the hospital was liable in its *respondeat superior* capacity. The defendants were the ED physician and the hospital.

In December 1992, Ariel Hazlett was taken to the ED at a community hospital in Martin, KY, with fever and seizures. She was stabilized and then transported to C-H Hospital in West Virginia via ambulance for further care. The defendant ED physician, Dr. Joseph Evans, treated the baby upon her arrival and ordered a brain CT scan to determine the cause of the baby's seizures. The CT scan revealed a diffused SAH, and the report noted, "on the basis of this examination alone, the possibility of Battered Child Syndrome cannot be excluded." Dr. Evans noted that he was "obligated to pursue follow-up since [the diagnosis] could be Shaken Baby Syndrome" and reported Ariel's injury to the Department of Social Services to investigate the possibility of abuse. Following further investigation, the Department of Social Services removed the baby from her parents and the child's father, Mr. Hazlett, was charged with child abuse.

The plaintiffs alleged that Dr. Evans wrongfully misdiagnosed Ariel with shaken baby syndrome, causing Ariel to be removed from their home, deprived of their care, companionship, and love, and caused her to be committed unnecessarily to the Department of Social Services, suffering mental pain and humiliation as a result. The plaintiffs sued Dr. Evans for his alleged negligence and sued the hospital in its *respondeat superior* capacity.

Dr. Evans moved to dismiss the complaint against him for two reasons: 1) the court lacked personal jurisdiction over him; and 2) he had immunity for the charges against him. He argued that the plaintiffs could not maintain an action against him in the Commonwealth of Kentucky because the Kentucky long-arm statute did not reach him, and he did not have minimum contacts with the state. ***(Editor's note:*** *a long-arm statute is a statute that provides for jurisdiction over a person who is not a resident of the state in which jurisdiction is desired. The nonresident must have had minimum contacts with the state. The term minimum contacts is defined as a nonresident defendant's activities within the state in question, such as doing business, and may vary from one jurisdiction to another.)* Moreover, Dr. Evans noted that even if the court did have personal jurisdiction over him, he was statutorily immune from any civil or criminal liability, and therefore, the complaint failed to state a claim for which relief might be granted.

C-H Hospital, the other defendant, argued that the complaint should be dismissed against it because Dr. Evans had immunity. The hospital noted that the legislatures of both Kentucky and West Virginia granted immunity to those who report suspected child abuse. Consequently, the hospital argued that the action could not be maintained against it in its *respondeat superior* capacity if the action could not be maintained against Dr. Evans. C-H Hospital also argued that if Dr. Evans did not have immunity, the hospital was entitled to summary judgment, noting that Dr. Evans never actually diagnosed the baby as having shaken baby syndrome, claiming that he only stated that Ariel's brain injury could have resulted from shaken baby syndrome. Therefore, because the doctor never actually diagnosed her, a claim of misdiagnosis could not stand. Consequently, if no negligence claim could be made

against the doctor, then the hospital could not be held vicariously liable for his alleged negligence, and summary judgment should be granted.

The plaintiffs responded that both Kentucky's and West Virginia's immunity statutes required anyone reporting child abuse to have reasonable cause to suspect that the child had been abused. The plaintiffs argued that Dr. Evans clearly did not have reasonable cause because Ariel's injuries were "the obvious result of birth trauma and that even a minimally trained pediatrician should have determined this." The plaintiffs also pointed out that criminal charges were dropped against Mr. Hazlett. Thus, the plaintiffs argued, if the Commonwealth attorney found no probable cause in the criminal prosecution, then the issue was whether from a medical standpoint, the defendants had reasonable cause in the civil immunity statute context to render the diagnosis of shaken baby syndrome. The plaintiffs maintained that at the very least, this question of reasonable cause raised a question for the jury.

The defendants replied that application of the immunity statutes depended only upon whether Dr. Evans had good faith, noting that the plaintiffs had not produced any evidence that Dr. Evans made the report in bad faith. As a result, Dr. Evans had immunity, and the complaint should have been dismissed as to both defendants.

Discussion

Hazlett illustrates two important points with respect to the role of the ED physician and the hospital in the evaluation of shaken baby syndrome.

I. The ED physician, Dr. Evans, was entitled to qualified immunity.

Under the applicable Kentucky and West Virginia laws, a doctor is required to report any possible child abuse when he has reasonable cause to suspect such child abuse has occurred. If the doctor fails to report such suspected abuse, he is subject to a misdemeanor charge. The court noted that given the burden placed upon the doctor and other mandated reporters, the legislature provided such persons with immunity, civilly and criminally, when the person acted in good faith.

In this case, Dr. Evans performed an appropriate series of tests on Ariel, including the CT scan that showed an SAH. Because Dr. Evans noted that such injury was consistent with shaken baby syndrome, he had reasonable cause to suspect Ariel's injury as being nonaccidental trauma and was compelled to report her case to the Department of Social Services.

The plaintiffs argued that reasonable cause was a fact question for the jury. However, the court held that the term "reasonable cause" is a standard of measurement; just as probable cause is an evidentiary standard that the court would determine when a defendant raises Fourth Amendment search and seizure issues. As such, "reasonable cause" was an evidentiary standard and not a term for the jury to decide.

The court noted that whether the ED physician had reasonable cause to believe that Ariel was abused was not the real issue, noting that immunity statutes were designed to insulate doctors and other health professionals from actions like this one. Immunity statutes were not predicated on reasonable cause, but on good faith. The judge noted that several other courts across the country had addressed whether a physician could be held liable for misdiagnosis of a child that resulted in a report of suspected child abuse. These courts determined that the intent of the immunity statutes was to ensure that health care professionals and others who work with children would not be unwilling to report abuse for fear of reprisal from upset, and sometimes wrongly accused, parents.[37] Because all 50 states have reporting statutes that grant immunity, health care workers generally expect to be free from liability arising from the reporting and investigation of suspected child abuse. If immunity did not apply to the negligent misdiagnosis of child abuse, health care providers would face a dilemma. By reporting suspected abuse, they would open themselves up to malpractice actions, but by declining to make a report, they could be guilty of a misdemeanor.

Regarding the issue of reasonable cause, the court noted that mere negligence on the part of the doctor was not bad faith. Even taking the plaintiffs' factual allegations as true, the court held that the plaintiffs had not demonstrated that Dr. Evans lacked good faith, or that he had bad faith in reporting Ariel's injuries as consistent with shaken baby syndrome. The court concluded that misdiagnosis was not evidence of bad intent; rather misdiagnosis was only evidence of negligence. Thus, having failed to show bad faith on the part of the ED physician in reporting the suspected child abuse, Dr. Evans' motion to dismiss based on statutory immunity was appropriate because the plaintiffs' complaint failed to state a claim for which relief could be granted.

II. Because the hospital's liability was founded

on the ED physician's liability as its agent, the hospital was entitled to dismissal.

The plaintiffs' complaint against the hospital was based on its *respondeat superior* capacity. The plaintiffs argued that because the ED physician was an agent of the hospital, the hospital was liable to the plaintiffs if the physician was found liable. However, because the ED physician could not be held liable for his alleged negligence under the immunity statute, it followed that the hospital could not be held liable. Thus, C-H Hospital's motion to dismiss was granted as the complaint failed to state a claim upon which relief could be granted.

Case #2: *Myron, et al. v. South Broward Hospital, et al.*[38]

In *Myron,* the parents and the injured child sued the hospital, its ED physicians and the child's pediatricians for medical malpractice. The child suffered an illness or injury that left her a spastic quadriplegic at age 6 months. The plaintiffs sued the defendant doctors, who provided medical treatment to their daughter, alleging that their daughter had meningitis and that delayed diagnosis and improper resuscitation resulted in massive, permanent brain damage. The defendants alleged that the child was the victim of shaken baby syndrome. At the first trial, the jury absolved the defendants of negligence.

The parents then sought review of the judgment from the trial court, which had found in favor of the defendant physicians. The plaintiffs contended that the judge improperly admitted testimony of the Child Protection Team (CPT) members, who initially had suspected child abuse but ultimately had found that the allegations of abuse were unsubstantiated. Although the trial judge had found no medical malpractice on the part of the defendants, there were several questions raised in the appeal. The first question was whether the court had erred when it ordered the release of the CPT report to the defendants and allowed it to be admitted it into evidence. At issue also was whether the trial judge erred in refusing to admit the opinion of the plaintiffs' expert. Another question before the court was whether the trial court erroneously permitted the defendants to cross-examine their experts with nonauthoritative medical literature.

In September 1987, Sharon Brock, the mother of 6-month-old Rayna, brought the baby to the ED at Doctor's Hospital because she had a fever. Two ED physicians diagnosed otitis media, prescribed medication, and sent the baby home. There reportedly were no meningeal signs, and no spinal tap was performed to rule out meningitis, a question that arose later on in the case. The next day, the baby was seen by one of the defendant pediatricians, Dr. Shulman, who found the child to be alert and cheerful, and concluded that Rayna did not have otitis media. He thought her vomiting was due to a fairly common reaction to the antibiotic she was on, and discontinued the medication. As a precaution, another pediatrician in the group, also a defendant, Dr. Ohring, examined the child the following day. He also found no signs of meningitis.

Three days later, the mother rushed the child to the ED of Humana Bennett Hospital, reporting that the child could not breathe. Within minutes of her arrival in the ED, the child suffered a seizure and an apparent respiratory arrest. There were no marks, bruises, or other external markings of abuse. Suspecting meningitis, the ED physician, Dr. Kareff, another defendant, intubated and ventilated the child, and gave her IV fluids, phenobarbital, and sodium bicarbonate. He requested that the on-call pediatrician, Dr. Calzadilla, also a defendant, examine Rayna. Based upon the child's medical history, the pediatrician made a preliminary diagnosis of meningitis and prescribed antibiotics, which were not started until he arrived about a half-hour later. Dr. Calzadilla found Rayna's left pupil dilated and her right pupil constricted; however, he could not perform a full ophthalmologic examination. He also did not perform a spinal tap to confirm the existence of meningitis. However, he called Dr. Rutherford (also a defendant), a pediatric intensivist at both defendant Plantation General Hospital and Memorial Hospital, who had the baby transferred to Plantation General, where a CT scan and long bone x-rays were performed. The CT scan demonstrated an acute subdural hematoma with ipsilateral cerebral edema, and her x-rays indicated a femur fracture.

Dr. Rutherford also determined that Rayna had a left retinal hemorrhage. Because of the subdural hematoma, she was transferred to South Broward Hospital (d/b/a Memorial Hospital) for a neurosurgical consultation. Dr. Guilianti, the neurosurgeon, was consulted, and shaken baby syndrome was diagnosed, which Dr. Rutherford reported to the police. The subdural collection ultimately resolved without surgery; however, the child was discharged from the hospital two months later, a spastic quadriplegic with severe brain damage.

In the original medical malpractice case, the trial

judge allowed the CPT records to be provided to the defendants only, and not to the plaintiff parents because of a Florida confidentiality statute. In the interest of privacy, CPT records could be released only to the agency doing the investigation, to law enforcement agencies, to the state attorney general, to members of the human rights advocacy committee or the guardian ad litem for the child, and to the state program for the prevention and treatment of cruelty to children. This action automatically excluded the child's parents, against whom charges of abuse were being brought.

When the plaintiffs objected to being excluded from the list of people who could receive the CPT documents, the trial judge gave them the ultimatum of allowing the records to be admitted into evidence or forgoing the trial completely. The plaintiffs, faced with those alternatives, chose to proceed with trial because then, they would be able to appeal any decision made.

At appeal, the judge found that the CPT records inappropriately were allowed into evidence and that they served only to bolster the defense and prejudice the jury. The judge also concluded that the trial court erred in ordering the production of a report that ultimately was determined to be unfounded.

The trial court also had granted a motion to exclude the testimony of the plaintiffs' pediatrics expert based upon a presumed stipulation of the parties at the time the expert was to be deposed. The plaintiffs originally had assembled a list of three experts: a pediatrician who would testify only as to the pediatric care of the child and two neurosurgeons. The plaintiffs agreed that the pediatrician would not be offered as an expert against the hospitals and the neurosurgeon who ultimately cared for the infant. However, during the pediatrician's deposition, the defense persisted in questioning the expert regarding his opinions, at which point the plaintiffs decided to offer him as a witness against the hospitals, to which the defense agreed. At the end of that deposition, when the defense was finished with the examination, the plaintiffs' attorney asked the witness whether the hospitals and physicians had deviated from the standard of care in failing to perform a spinal tap, and he opined that they had so deviated. At that point, the plaintiffs withdrew their neurosurgical experts, leaving only the pediatrics expert to testify as to any deviation of the standard of care.

The trial court determined that the parties had entered into a stipulation, which prevented the pediatrician from offering his opinions against the hospitals and their physicians. In so doing, the trial judge determined that the plaintiff's expert opinion would not be admitted at trial. At appeal, the judge noted that the defendants were aware of the plaintiffs' expert's opinions and were on notice that those opinions would be used at trial against them. Because the defense had assembled its own panel of experts to combat the plaintiffs' expert, there was no prejudice. In addition, a review of the original trial revealed that the presumed stipulation was preceded by an off-the-record discussion among the defense attorneys who were trying to avoid a prolonged deposition by allowing only one attorney to question the plaintiffs' expert. At appeal, the judge found that this agreement did not constitute a real stipulation as the defense contended, and that in not allowing the pediatrician to testify, the trial court had removed the only expert witness the plaintiffs had, without whom they had no case.

Lastly, because both the original trial judge and the medical experts in the first case had not recognized the medical literature used in cross-examination as authoritative, the initial judgment in favor of the defendant physicians was reversed, and the case was remanded for an entirely new trial.

Discussion

Myron illustrates several pitfalls that might occur during the initial evaluation of shaken baby syndrome in the ED setting.

I. Incomplete work-up of shaken baby in the ED.

When Rayna first was evaluated in the ED at Doctor's Hospital, she presented with a high fever and although she did not appear to have meningeal signs, the plaintiff's expert opined that meningitis should have been considered as part of the differential diagnosis. Medically, it might be difficult to argue convincingly that an LP was warranted. In this case, the plaintiffs' medical expert so concluded. This aspect of the case is significant primarily because of the legal machinations that arose here, rather than the actual medical issues at hand. In this particular case, documentation of the ED physicians' findings and the criteria used in ultimately deciding whether to proceed with a spinal tap would have been helpful to the defense.

Meningitis, of course, is an important consideration in an infant with a high fever, as is SAH, which also may cause fever and meningeal irritation. Assuming the child did not have a tense fontanelle or splayed cranial sutures suggesting increased ICP, a spinal tap

might have been considered. Because of concerns for increased ICP prior to performing an LP, a CT scan easily could have been performed first to rule out any space-occupying lesion.[39] It also would have ruled out any intracranial abscess associated with otitis media, the diagnosis originally entertained by the ED physicians. If otitis media was suspected, thin CT scan cuts through the mastoid bone might have been obtained at the time of the initial CT scan. Had the child undergone an LP, meningitis could have been ruled out. However, had the child suffered shaken baby syndrome, SAH might have been found either upon CT scanning or upon an LP, precipitating a more extensive work-up. If an LP had been performed, then the cerebrospinal fluid should have been obtained, not only for the usual cell count/differential, protein, glucose and LDH measurements, but also for a xanthochromia measurement.[40]

In this case, the plaintiffs' experts testified that Rayna had meningitis from the time she appeared at Doctor's Hospital; that the doctors partially treated her meningitis by prescribing antibiotics; that her condition developed into fulminating meningitis when she went into respiratory arrest at Humana Bennett; and that improper resuscitation caused hypoxic ischemia, which resulted in her massive permanent brain damage. Although Rayna presented with a high fever, meningitis did not appear to be a consideration. It is not clear from the case report if the child actually had an abnormal tympanic membrane or another sign indicative of otitis media, or whether this diagnosis was considered the most likely one at the time. There also was no mention of what sort of history was taken at the time the child presented to the first ED.

Although the child appeared to improve during the next few days, when she was brought back to the ED at Humana Bennett Hospital barely breathing and requiring resuscitation, her work-up still was incomplete. A CT scan was indicated but not performed. At that point, while the study may no longer have shown evidence of an SAH (which can resolve in a matter of days), a subdural hematoma (vs. an effusion, which also may be seen in meningitis) could have been visualized. Also, although a baseline ophthalmologic evaluation was attempted but not completed, a request for a thorough evaluation by someone more experienced was indicated; the child presented with what appeared to be unilateral ophthalmologic findings. Because retinal hemorrhages disappear in 10-14 days, the presence of retinal hemorrhages at that stage might have helped pinpoint the time of the brain injury.[41] However, by that time, given the child's deteriorating and unstable condition, she was transferred to Plantation Hospital, where the radiological work-up was completed; then transferred to South Broward for a neurosurgical consultation. In summary, the child was seen in two different ED settings with incompletely documented evaluations, which caused not only a delay in diagnosis, but confusion regarding the initial findings because no baseline testing was performed. This scenario ultimately led to the plantiffs' claim that medical malpractice had been committed.

Some of the plaintiffs' experts interpreted the child's CT scans as showing a subdural effusion, which they opined was caused by meningitis, rather than a hematoma. This may have been due to the delay in neuroimaging; blood becomes less dense on CT scanning as time passes following an acute bleed. Experts also testified that either meningitis[42] or resuscitative efforts could cause retinal hemorrhages. The plaintiffs' experts admitted that although the usual pattern was to have bilateral presentment of such symptoms, it was possible to have one-sided manifestations.[43]

The defense experts uniformly agreed that Rayna was a victim of shaken baby syndrome prior to her admission to Humana Hospital Bennett; and this nonaccidental trauma caused her brain damage. They testified that she did not have symptoms of, or suffer from, meningitis. Although this argument was based upon the child's treating physicians, it should be noted that SAH secondary to shaken baby syndrome may cause meningeal irritation and meningeal signs, including irritability, neck stiffness, and photophobia. Most of the experts testified that the brain symptoms from meningitis would have presented themselves bilaterally, rather than solely on one side. However, a counterargument here is that meningitis may cause a unilateral intracranial abscess.[44] The experts also opined that a baby's brain injuries due to shaking usually present bilaterally, as do retinal hemorrhages.

II. Parental privacy concerns may override the defendants' need for information supportive of a diagnosis of shaken baby syndrome.

This case is significant in that the physicians' work-up should have provided enough evidence to support a diagnosis of shaken baby syndrome or nonaccidental head trauma without having to resort to records from the CPT. At appeal, the judge found that the trial court erred in admitting the recommendations and testimony

of the CPT, contrary to provisions in the Florida statutes. The trial court had ruled that the CPT records were discoverable, but granted access only to the defendants' experts. The defendants had claimed that they needed access to the reports of the CPT to perfect their defense. The trial court had given the plaintiffs the choice of either waiving the privilege or having the suit dismissed. Faced with this ultimatum, the plaintiffs waived the privilege. The defendants received the records; the plaintiffs continued to maintain their position that the records and testimony were inadmissible.

The judge concluded that unfounded reports in child abuse investigations were inadmissible in a private negligence action and were entitled to protection under the Florida statute. The court noted that the child protection statutes were designed to reconcile the competing concerns of the state in cases of this type. Because of the severe harm that child abuse causes to society and the ease with which it is concealed, the state has a pressing and overriding need to investigate alleged child abuse, even in cases that later may prove to be unfounded. Yet, because even anonymous or baseless allegations can trigger such investigations, the state sought to accommodate the privacy rights of those involved. Although language in the statute granted authority to the court to order disclosure of such documents, the court concluded that this language did not override the separate privacy protections in the statute for unfounded reports.[45]

In addition, the child, perpetrator, or parents could obtain access to a proposed confirmed or confirmed report, but they had no access to unfounded reports. The report was unavailable to anyone, except the department and law enforcement agencies; thus, the plaintiffs had no privilege against disclosure that they could waive. The judge held that although the parents could not seek disclosure, they had standing to assert the statutory confidentiality. Thus, the court erred in ordering its release to the defendants.

III. Negligence in the ED by other practitioners.

On cross-appeal, Dr. Calzadilla, the pediatrician called into the ED to assist the ED physician, argued that he was entitled to a directed verdict on the claim that he was negligent in failing to perform a spinal tap on the child. The child's parents had claimed that the doctor was negligent. However, the evidence presented by experts showed that, despite the lack of a spinal tap, Dr. Calzadilla prescribed the appropriate antibiotics to treat meningitis. The judge agreed with Dr. Calzadilla that the trial court should have directed a verdict in his favor on this issue. There was no evidence that his failure to diagnose meningitis caused injury to Rayna, because he treated her as though she had the infection and prescribed appropriate medications to combat it.

Dr. Rutherford, the pediatric intensivist called in, also contended that the court's jury instruction on apparent agency as to her relationship with the hospitals was incorrect. The plaintiffs conceded this point, and the court held that the parties could correct the instruction on retrial.The case was affirmed in part; reversed in part, and remanded for a new trial.

Summary

As seen in these cases, shaken baby syndrome can be a difficult diagnosis to make in an ED setting. The failure to promptly recognize, diagnose, and initiate appropriate management and referral can seriously compromise a battered child's outcome.

The standard of care requires that any child who is brought to the ED with retinal hemorrhages and unexplained or poorly explained head and/or other injuries be evaluated promptly with a brain CT scan and a skeletal survey, including skull x-rays. Although the majority of brain CT scans are positive in patients presenting with an SAH,[46] in suspicious cases with negative brain CT scans, further study, including an MRI or an LP may be warranted, depending upon the child's clinical status. In addition to a detailed history (ideally taken by different staff members for later comparison of details) and a thorough physical examination, a neurological assessment and a funduscopic examination is mandatory; retinal hemorrhages, a hallmark of shaken baby syndrome, may resolve within 10-14 days of the original injury. Also critical is that all findings by health care practitioners, nursing staff, and other hospital personnel are documented clearly and meticulously in the hospital records, and that notes be dated and timed, including conversations with family members and other individuals. Additionally, photographs of the child, taken at the time of admission, which record cutaneous and other visible injuries, should be placed in the chart and copies kept on file. Clearly, documentation of clinical findings and decision-making processes form the basis of a sound defensive medical strategy even from a litigation perspective.

The longer a case of abuse is missed, the greater the potential for long-term damage to a child. Therefore, physicians seeing injured infants and young children

in the ED setting must have a low threshold of suspicion to perform through work-ups to rule out intentional injury. Most state legislatures have provided immunity statutes in cases where allegations of child abuse prove to be incorrect, and abuse was diagnosed mistakenly. Practitioners should note, however, that the ED physician may not be free of liability for negligence in managing a case incorrectly or delaying appropriate treatment of a child with shaken baby syndrome or other signs of nonaccidental trauma.

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38. *Rayna Myron, a minor, by and through her parents and natural guardians, Sharon Brock, Herbert B. Myron, and Sharon Brock and Herbert B. Myron, individually, Appellants/Cross-Appellees, v. South Broward Hospital District*

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In Future Issues:
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CE/CME Questions

5. The most common cause of head injury in very young children is:
   A. a fall.
   B. child abuse.
   C. a motor vehicle accident.
   D. a sports injury.

6. The best diagnostic test to evaluate nonaccidental head trauma in the ED setting is:
   A. an MRI scan.
   B. a skeletal survey.
   C. a cranial ultrasound.
   D. a brain CT scan.

7. Which of the following statements is true regarding child abuse?
   A. Unilateral retinal hemorrhages rule out child abuse.
   B. Shaking is unique in that it only causes intracranial injury.
   C. A change in the level of alertness or responsiveness is *not* a common clinical presentation of a severely shaken baby.
   D. Shaken baby syndrome is seen most commonly between 6 weeks to 4 months of age.

8. An ophthalmologic examination is not necessary if a CT scan shows bilateral subdural hematoma in a case of suspected shaken baby syndrome.
   A. True
   B. False

Answers: 5. A; 6. D; 7. D; 8. B.

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