

PEDIATRICS

Shaken Baby Syndrome: Making an Accurate Diagnosis

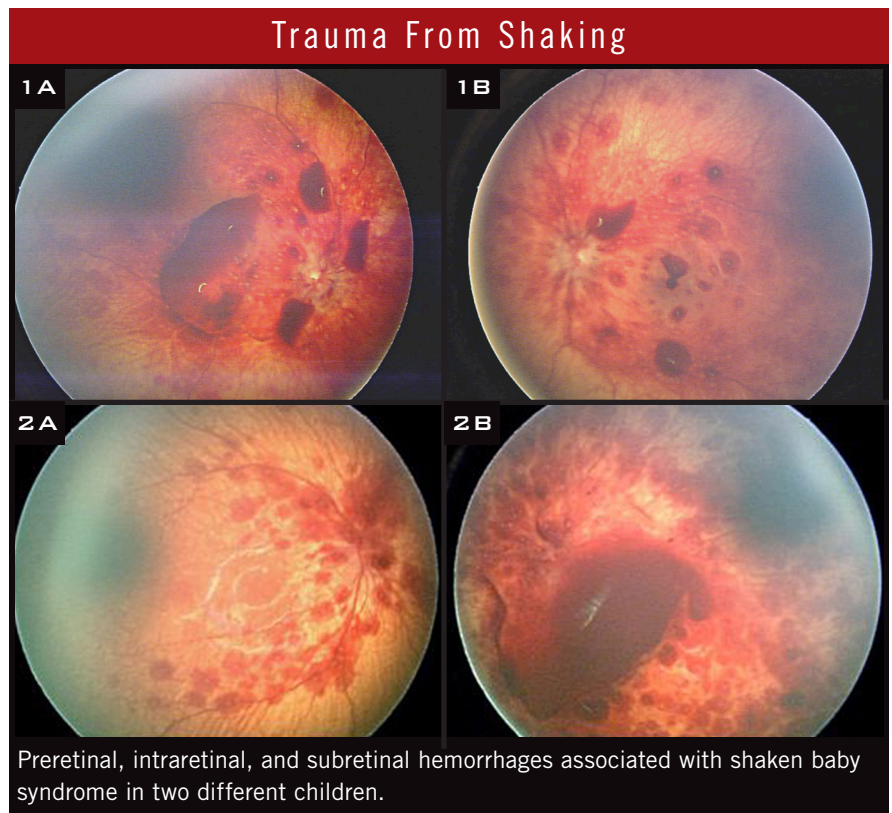
BY MARY WADE, CONTRIBUTING WRITER

INTERVIEWING GIL BINENBAUM, MD, MSCE, ALEX V. LEVIN, MD, MHSC, AND RON W. PELTON, MD

A form of abusive head trauma called shaken baby syndrome (SBS) remains far too common in the United States today, more than four decades after it was first recognized. Most victims are less than 1 year old, and many are younger than 6 months. Because severe retinal hemorrhages are a hallmark of SBS but not of most accidental injury, ophthalmologists are essential to the efforts of multidisciplinary child abuse teams to make accurate diagnoses in order to ensure that children are protected from future abuse. Correct diagnoses also protect families from false accusation.

In the typical SBS scenario, a lethargic or comatose baby is brought to the ER. The child may be having seizures. Broken bones or bruises may or may not be apparent. Often, subdural hematomas and brain swelling are present. The perpetrators—typically parents or caregivers—are unlikely to give an accurate description of what happened to the child.

When severe injury is suspected, the baby is usually quickly transported to a regional center where child abuse pediatricians, pediatric ophthalmologists, and other experts provide further evaluation and care. But when transport is delayed or not feasible, general ophthalmologists may be called upon to perform the initial dilated eye exam. Ideally, this should occur within 24 to 48 hours of admission, as retinal hemorrhages can change or even disappear over a short time period.



Preretinal, intraretinal, and subretinal hemorrhages associated with shaken baby syndrome in two different children.

Current diagnostic guidelines for SBS have been derived from decades of clinical, animal, and computer model research, said Alex V. Levin, MD, MHSc, a pediatric ophthalmologist and child abuse pediatrician. Summarized below, these guidelines are helpful for performing dilated fundus exams to help distinguish abusive from accidental injury. Because any ophthalmologist may encounter child abuse, it is wise to be aware of these current diagnostic indicators and of a physician's related responsibilities.

What Is Shaken Baby Syndrome?

Shaking a baby or young child creates abrupt acceleration-deceleration forces as the baby's head—large in proportion to the neck and body—snaps back and forth. Shaking episodes usually last five to 10 seconds and may be repeated several times. Blunt head impact may also occur.

Injury to the brain in SBS may include subdural hematoma, unilateral or bilateral over the cerebral convexities, or in the interhemispheric fissure. Subdural hemorrhages may result

from rupture of bridging vessels between the brain and dura mater. Subarachnoid bleeding is often apparent. On neuroimaging, cerebral parenchymal damage often appears initially as edema, ischemia, or contusion; later, these areas may appear atrophied.

In addition to widespread retinal hemorrhages, ocular injury may include retinal detachment, vitreous hemorrhage, and optic nerve injury. Vision loss most commonly results from cortical injury or optic atrophy.¹

“About one-third of SBS victims die, one-third suffer permanent mild to severe brain injury that may include vision loss, and one-third recover with little or no apparent long-term damage,” said Dr. Levin. “The severity of the outcome seems to be correlated with the child’s age; severe damage appears to be most prevalent in the youngest victims. Since vision loss is usually related to brain injury, treatment to improve vision is not possible in most cases.”

The Eye Exam

Accurate documentation of the type, location, and number of retinal hemorrhages is important to SBS diagnosis, said Gil Binenbaum, MD, MCSE, a pediatric ophthalmologist. And for both medical and legal purposes, a detailed written description of the retinal findings of the initial dilated eye exam is considered sufficient, he said.

“A careful description can be the focus of the ‘first responder’ ophthalmologist, and nuanced diagnostic interpretation can be performed later by a pediatric ophthalmologist and the child abuse team,” said Dr. Binenbaum. “In teaching institutions, attending ophthalmologists rather than trainees should do the exams and documentation. If this is not possible, the attending ophthalmologist should review trainee exams within 24 hours.”

Initial exam. Dr. Binenbaum advises using the following guidelines. He notes that exam findings can be asymmetric, in which case the diagnosis should be made based on the more severely affected eye. For each eye separately, the ophthalmologist should

Perpetrators and Victims

Biological fathers and unrelated male partners of the baby’s mother are the most common perpetrators of SBS, followed by mothers, then other nonparent caregivers such as babysitters. Premeditated intent to cause harm is rare. SBS occurs across all social and ethnic groups in the United States, and one recent report found that SBS is fairly common worldwide. Abusive head trauma is more common in male children, babies born prematurely, and children with a history of medical problems, Dr. Levin noted. A study of children 3 years and younger found that diagnosis of abusive head trauma is significantly more likely to be missed in children who are younger, who are white, who live with both parents, and who present with less severe injuries.¹ The authors speculated that this disparity may, in part, be attributable to subtle bias on the part of the assessing physician.

1 Jenny C et al. *JAMA*. 1999;281(7):621-626.

identify and describe the following.

Type of hemorrhage. Intraretinal, preretinal, subretinal, or vitreous, as well as the presence or absence of macular retinoschisis, and/or retinal folds.

Location/distribution. On or around the optic disc (peripapillary); along the vascular arcades (perivascular); within the macula (all are considered the posterior pole). Note the distribution for the posterior pole and for the near, mid, and far periphery of the retina.

Number. Severe is defined as “too numerous to count.” Moderate is considered to be 10 to 25 hemorrhages. Mild is considered to be fewer than 10.

Severity level. Severe is defined as widespread, multilayered retinal hemorrhages, possibly with retinal folds and/or schisis cavities; this is strongly indicative of SBS/abusive head trauma in the absence of other explanatory conditions. Mild is defined as intraretinal hemorrhages that are few in number and limited to the posterior pole; this is suspicious for abusive trauma, but other findings and factors must be weighed as well. Moderate falls between these two definitions; it should be considered highly suspicious for abusive trauma.

Schematic drawing. A drawing to support the description of hemorrhage location and number is useful, but a precise description is most essential.

Photographic images. Photos may be taken after the dilated exam to provide useful documentation but are not required and should not replace a

detailed written description.

Dr. Binenbaum also recommends that all ophthalmologists become familiar with the Academy Information Statement on abusive head trauma/shaken baby syndrome.¹

Exceptions. In any baby older than 6 weeks, severe retinal hemorrhage is a red flag for abuse because this type of damage has few other causes in young children. (Newborns may exhibit retinal hemorrhages related to normal birth, but these resolve by 4 to 6 weeks of age.) But the absence of retinal hemorrhage doesn’t rule out abuse. Typically, the child abuse team makes the final diagnosis based on all available medical evidence and caregiver and witness reports.

Accidents show different retinal damage. The parent or caregiver may say that the baby fell off a bed or fell while playing. But SBS/abusive head trauma research has shown conclusively that relatively minor accidents do not cause extensive retinal hemorrhages. In accidental injury, a dilated fundus exam usually shows no retinal hemorrhages; but if present, they are typically few in number and confined to the posterior pole, rarely extending to the midperiphery.

“In general, the more severe and widespread the hemorrhages, the greater the likelihood of abusive injury,” said Dr. Binenbaum.

The causes of extensive retinal hemorrhage in young children, other than SBS, include fatal crush injury to the head, fatal auto accident, extreme fall,

leukemia, or purulent meningitis. All of these conditions are uncommon and can be readily confirmed through history and/or diagnostic tests, Dr. Levin noted.

Physician Responsibilities

The physician's role extends beyond the critical task of accurately diagnosing the patient who presents in the ER to knowing how to respond to suspected abuse witnessed in the community.

Accurate diagnosis. When a child has, in fact, suffered abusive head trauma, accurate diagnosis can be vital to the child's safety and even survival. One study found that abusive head trauma was missed in the initial physician exam in nearly one-third of cases.² Dr. Levin emphasized that children who are returned to their homes without an accurate diagnosis are at high risk of future abuse.

"While it is vitally important to recognize abuse and protect the child from future abuse," said Dr. Binenbaum, "we also need to keep in mind that separating a young child from parents or caregivers significantly impacts the child and family's well-being. As a result, child abuse teams strive to be very thorough and careful in assessing all available evidence as they reach a diagnosis and determine the best course of action."

Suspected abuse. All U.S. physicians are legally obligated to act in the best interest of the child when abuse is suspected; they must report any and all incidences of suspected abuse to pediatric child abuse teams or via state reporting pathways.¹

In addition, "The American Academy of Ophthalmology's Code of Ethics also makes it clear that our top priority is always to act in the best interest of the child," said Ron W. Pelton, MD, vice chair of the Academy Ethics Committee and an oculofacial plastic surgeon. "For example, you or your staff might someday witness an adult patient hitting a child while in your waiting room. Even if there was a prior physician-patient relationship with an adult suspected of child abuse, the child's well-being takes precedence."

Be prepared. Dr. Pelton advised that all ophthalmology practices have a response plan that includes up-to-date contact names and numbers for child protective services. Quick action offers the best chance to protect an at-risk child.

"You need not report the suspected abuse directly but can do so through your hospital's child protection team or a social worker," said Dr. Binenbaum. "Also keep in mind that in critical situations, like a hyphema from suspected abuse, admitting a child to a hospital for observation can provide at least short-term safety." ■

1 American Academy of Ophthalmology. Information Statement: Abusive Head Trauma/Shaken Baby Syndrome. <http://one.aaopt.org/clinical-statement/abusive-head-trauma-shaken-baby-syndrome--june-2010>.
2 Jenny C et al. JAMA. 1999;281(7):621-626.

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MORE ONLINE. To read one perpetrator's confession, find this article at www.eyenet.org.

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