SILENCED ANGELS

The Medical , Legal, and Social Aspects of Shaken Baby Syndrome

James R. Peinkofer

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Silenced Angels

THE MEDICAL, LEGAL, AND SOCIAL ASPECTS OF SHAKEN BABY SYNDROME

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Dedicated to the memory of

GEORGE F. GOODWIN, JR.

a great man, husband, and friend, who would have been a great father,

and

TO SHAKEN BABIES PAST AND PRESENT

your silence is heard

"Ralph felt as if someone had pulled a high-voltage switch inside his brain, one that turned on whole banks of blazing stadium lights. In their raw, momentary glow, he saw a terrible image: hands clad in a violent brownish-purple aura reaching into a crib and snatching up the baby they had just seen. He was shaken back and forth, head snapping and rolling on the thin stalk of neck like the head of a Raggedy Andy doll—and *thrown*."

Stephen King
Insomnia

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Foreword

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Shaken Baby Syndrome (SBS)—most people have now heard about it, but what is it exactly? Might a child be bounced on a knee and get brain damage? Some have worried that jogging with a child in a backpack might cause SBS. Or tossing him into the air. What about a bumpy cross-country ride in a sport-utility vehicle? Indeed, might any of us have somehow shaken our babies just a little too roughly at some time?

Good news! The word "shaken" in the syndrome does not mean "jiggled." In fact, there is no adequate word in the English language that signifies the violent and repetitive shaking that causes brain injury and bleeding within the head and in the retinas of infants. Well-meaning awareness programs have sometimes made erroneous claims that mild jiggling might cause such injuries. Some parents have become so concerned on hearing these claims that they have shown up at physician's offices and emergency rooms asking for brain imaging of their infants, because they worried they might have unknowingly caused damage through some play activity. When thinking about awareness issues, the ancient medical admonishment should be considered: "First do no wrong."

Severity and timing are the major medical and legal issues that confront us when a child is diagnosed with SBS. The force required to cause the syndrome is severe. Drawing a rough analogy to falls, studies have shown that a child falling out of a third-story window has about a 1 percent risk of death. In contrast, SBS has a 25 percent risk of death. Clearly, the overall sense of violence is much worse with Shaken Baby Syndrome. The American Academy of Pediatrics has pointed out that an observer witnessing the act that results in SBS would believe that the child was going to be seriously injured or killed. SBS is no accident.

Timing is the other important issue. In the worst cases of SBS, resulting in death, the child would probably have lived only one hour, or at most two, before he or she would be dead. However, an even stronger tool is available that uses clinical symptoms to decide the timing. The head injuries of SBS result in imme-

diate symptoms. In the least severe cases, the symptoms are those of a very bad concussion—irritability, decreased appetite, maybe vomiting. In the fatal cases, no meaningful activity is seen, the child is limp or stiff, breathing problems quickly ensue, or the child is unlikely ever to awaken from immediately passing out. Thus any investigator or physician can ask when the child was last acting relatively normal, and know the fatal injuries occurred after that. Often only one adult is present.

With any medical condition, particularly one that entails the legal system, there are bound to be those physicians who have unusual opinions and are willing to express them in the courtroom. There is no medical condition that precisely looks like SBS, complicating proceedings in court: we have heard such diagnoses as DPT shots causing this, West Nile virus, and even mad cow disease. By far, the most common claim is that the child fell off a bed or sofa. In the child abuse business, we refer to these objects as "killer couches" or "killer beds." Everyone else's child seems to fall off this furniture without significant injury, though the child in question has devastating injuries. No doubt, when the doctors ask so soon afterwards, it is difficult to come up with good alibis.

Many doctors do not have much more knowledge about SBS than do well-read laypersons. Occasionally they make erroneous statements or fail to appreciate the situation confronting them. Thus doctors and other professionals and the general public have much to learn about this serious public-health threat to children. This book is an excellent attempt to remedy this lack of knowledge. In reading it for the first time, I was also impressed by some of the historical details of which I was unaware. Having lectured about SBS both in the United States and internationally, I thought I knew nearly all these details. Jim Peinkofer showed me that most of us have a lot more to learn. Perhaps more important than the history of the syndrome or the detailed medical concepts is the human side of this terrible form of abuse, which we learn about in the book's case histories.

Why should you care? Perhaps because child abuse is the second-leading cause of death for children, and SBS is one of the leading causes of child abuse fatalities. Perhaps because a typical case costs at least $100,000 or more in the first year, and someone has to pay those bills. Most likely it is because you care about the safety, health, and potential of children, who should not have, literally, the life shaken out of them.

And be sure to hug your own children tonight.

RANDELL ALEXANDER, MD PHD
Director, Center for Child Abuse
Morehouse School of Medicine
August 2001

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Introduction

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"Father Arrested in Baby's Death—Police Say Seven-Week-Old Boy was Shaken." "Babysitter Charged in Infant's Death—Three-Month-Old Showed Signs of Shaken Baby Syndrome." These headlines call to us daily throughout the United States and the rest of the world. Just a decade ago, such cases seemed to occur less often. What happened? Are children being shaken more often, even in light of national efforts for prevention? Or are the media responding more broadly and completely to such cases? Has the family unit or societal pressures changed? Or are we as individuals collectively tuning in and more openly discussing incidents of infant shaking when we hear about them?

Probably all of these factors play a role in the understanding of Shaken Baby Syndrome (SBS). In the May 1999 edition of the journal *Pediatrics*, there was a study on the risk factors for death by injury among infants in the United States related to the specific pathological cause.[1] Brenner and associates analyzed data from the National Center for Health Statistics for the years 1983 to 1991 and found that the leading cause of fatal injury among children less than five years old was death by homicide (23 percent of total deaths). This is an extremely disturbing commentary on our society.

SBS is one of life's worst tragedies. A violent act that takes just a few minutes can cause a lifetime of irreparable damage. Infants who are shaken have high morbidity and mortality rates. The justice system often fails to convict abusers for their crimes. And the families of these infants are left to deal with the aftermath.

People have said that SBS is a tragedy of ignorance. For example, there is ignorance about the way infants should be handled, disciplined, and soothed. Individuals who shake their charges typically are inexperienced in caregiving or are too emotionally unstable to care for dependent babies. Caring for a young child can be overwhelming for anyone, because the demands of children are often considerable. Infants cry frequently, as this is their only mode of communicating basic needs. Older children who are shaken are most likely those struggling with their need to be cared for versus their need for independence.

Shaking incidents occur when an infant is crying, when an infant is part of an abusive environment, or when the caretaker feels that he or she cannot control a child, such as when a toddler refuses a demand. Such caretakers often interpret crying as a sign of overdependency in infants and believe that if they give in to the child's demands, they will spoil the child. To them, physical discipline appears to be the only response to a crying or irritable child. Shaking is the misguided result. Adults too often fail to consider their role in this pattern of behavior. They do not adequately consider the possible causes for crying or that they may use soothing techniques to quiet and calm the child. Infants do respond in positive physiological and emotional ways to soothing voices, loving arms, warm milk, and other sentient moments.

Frequently, the shaking incident that hospitalizes or kills an infant will not be the initial moment of abuse. Infants will become highly anxious and may cry frequently when in the presence of their abuser. This then becomes a vicious cycle. The more anxious the infant, the more he or she will cry, which can lead to further incidents of physical abuse.

SBS can affect any infant, because infants' physical attributes predispose them to such injuries. They have disproportionately large heads, underdeveloped neck muscles, soft brains, copious intracranial space, and loosely attached intracranial nerves. Such attributes, which are beneficial for the rigors of birth, put an infant at greater risk of injury or death if he or she is shaken.

Several factors may put an infant at greater risk for SBS:

- Being the firstborn to young parents who have never before cared for a child.
- Being male. Infant boys have a 60 percent greater risk of being shaken than infant girls.[2] This is partly due to the misguided belief of many caretakers that infant boys should "tough it out" and "not cry so much." Butler also suggests that some parents may believe male infants can withstand rougher handling, even shaking, than female infants.[3]
- Being young. Infants are obviously more at risk for being shaken, because of their weight and size and other previously mentioned physical attributes. But this does not preclude a toddler or older child from being shaken. The diagnosis of SBS reaches its plateau at about the age of two years, and the average victim's age is around six months.[2,3] Young children, at ages four or five years, have been known to be victims of SBS. But typically, violent shaking is a circumstance that affects infants and very young children.
- A disruption in the normal process from being born to going home. Elmer and Gregg found that many abused infants in their study had been born prematurely or had been hospitalized after being born.[4] Another study confirmed their findings and also included any diagnosis of disability where the parents (especially the mother) failed to emotionally accept the infant.[5] Bonding within a family unit does not readily occur when

there are complications that require initial separation between parent and child. In fact, the importance of bonding and its relationship to abuse has been identified in many studies over several decades.[6]

- Multiple births. The demands and cries of two or more infants can be emotionally taxing.[7] Becker and colleagues found that a disproportionate number of twins were diagnosed with SBS.[8] The recent Whittle case, in which a woman shook and beat her infant quadruplets, is also a testimony to the risk of multiple infants in the wrong hands.
- A physical impairment or chronic illness. When a child is born with a physical impairment or has a chronic illness that requires frequent clinic visits or hospitalizations, parents or caretakers may find the infant unattractive and unduly burdensome.[9] The inherent pull to nurture may not be present, and the infant may not be emotionally accepted. This creates an environment of high stress and the potential for abuse.
- Being unwanted or unaccepted. Some infants are simply not loved by their parents or caretakers. Such infants are not accepted because they might not meet certain expectations or are the products of unwanted pregnancies, or they may even remind their caretakers of someone else.[10] In such a situation, merely hearing the infant cry can stir an infant's caretaker into a frenzy as he or she mentally relives the past. Steele calls this the "superego identification with [one's] own punitive parent . . . [whereby] the infant is perceived as the [caretaker's] own childhood itself."[11] This is a tenuous relationship at best, and an infant in such a position is at great risk for abuse.

SBS is a tragedy that can be prevented. There are a plenty of ways to soothe a crying infant, just as there are signs of potential danger that parents may be able to perceive when leaving their child with a caretaker. The chapters that follow describe the physiology and history of SBS, and how all of us are affected legally, socially, and emotionally by this tragic form of child abuse. It is the author's hope that this book will save lives and help bring justice upon those who permanently damage the lives of families through a moment of violence.

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Part One

MEDICAL ASPECTS OF SHAKEN BABY SYNDROME

Look for a long time at what pleases you, and for a longer time at what pains you.

—**Colette**

Whatever you do, do it to the purpose; do it thoroughly, not superficially. Go to the bottom of things. Any thing half done, or half known, is, in my mind, neither done nor known at all. Nay, worse, for it often misleads.

—**Lord Chesterfield**

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CHAPTER ONE

Signs and Symptoms

SHAKEN BABY SYNDROME IS A CONDITION that has only relatively recently been described in the medical literature, and it continues to be missed by health providers. This is alarming, as it means that many abused children are placed back in the care of their abusers. A thorough clinical work-up along with interviews and investigation are essential for a proper diagnosis.

It is usually an infant's parents or caregivers who discover that something is wrong. Many times there is simply a change in behavior, without any sign such as bruising to suggest that trauma has recently occurred—for example, what was a happy-go-lucky baby in the morning may be subdued and withdrawn in the afternoon. If clinicians are initially faced with a child who appears ill but shows no symptoms of any common disease, Reece and Grodin suggest that they should immediately ask themselves whether these could be signs of abuse.[1] If so, they should obtain a head CT scan and check the interior of the infant's eyes for retinal hemorrhaging. Being familiar with the characteristics of SBS and the subtleties of head injury can aid clinicians in making an accurate diagnosis[2] (see chapter 6). Jenny proposes that medical providers should always try to get as much information as possible from emergency medical technicians, and that blood studies should include ruling out coagulopathy (see chapter 12).[3] As soon as possible, a consultation should be obtained with a pediatrician familiar with child abuse cases, and, if possible, with a pediatric radiologist to interpret the radiographs and scans. The diagnosis of SBS is often not made by symptoms, clinical history, or diagnostic images alone, but rather by a combination of all of these. Regular training within medical institutions should be required of all clinicians, as research and observation are continually updated in the field of child abuse injury identification and treatment.

COMMON SYMPTOMS AND SIGNS

Below, listed alphabetically, are some common symptoms that may be noted in a shaken baby. Some symptoms occur more frequently than others.

Apnea

This refers to an interruption in the regular rhythm of respiration. Short periods of apnea may occur in healthy infants, especially during deep sleep. Apnea has sometimes been suggested by perpetrators as their motivation for shaking an infant. They want law enforcement officials to believe that they shook a baby "lightly" in order to break an apneic spell. In fact, it is more likely that the shaking caused the apnea.[4,5] Medical professionals may also see apneic episodes as "near miss" or nonfatal Sudden Infant Death Syndrome (SIDS), in which an infant routinely survives periods of halted breathing.[6] They may go so far as to order an apnea monitor for home use, unaware of the true cause of an infant's problems.

Bradycardia

In this condition, the heart rate slows to fewer than sixty beats per minute. Ludwig and Warman found that 65 percent of the shaken infants they described had bradycardia at initial presentation.[7] Like bradypnea, it can indicate increased intracranial pressure or brain stem injury.

Bradypnea

This refers to abnormal slowness in breathing. It can be a sign of severe injury to the brain stem or of greatly increased intracranial pressure (ICP) though there are other, nontraumatic possibilities. An infant may present in a hospital emergency room with this dramatic pattern of respiration.

Bulging Fontanelle

The fontanelle of a baby's head are the "soft spots," or suture lines. Fontanelle fuse and close by age eighteen to twenty-four months, as the skull develops and hardens. When there is trauma to the brain, infant fontanelle swell and bulge, or become tense; there is an excess of fluid, blood, and swelling within the brain's substance; and there is a natural pushing outward against the fontanelle.

Raimondi and Hirschauer differentiated types of fontanelle into soft, full, or tense.[8] In their study, they found that head-injured infants who had soft fontanelle had a better neurological outcome than those whose fontanelle were tense. They also verified that often a full or tense fontanelle was associated with a unilateral or bilateral subdural hematoma. As intracranial swelling is reduced, the fontanelle becomes soft again, though some infants may experience an overlapping of suture lines.

Coma

This condition is defined as a state of unresponsiveness, and unless it rapidly improves, as after a concussion or a seizure, it is always a sign of serious brain damage. Coma causes deep stupor and poor or no response to external stimuli. Caregivers and clinicians may initially believe that an infant who is comatose after shaking is merely lethargic or in a deep sleep.[9] But the true situation can be assessed in the emergency room by using the Glasgow Coma Scale (GCS). The deeper and more prolonged the coma, combined with an initially low GCS score, the poorer the prognosis (see tables in chapter 6).

Cyanosis

This occurs when an infant is deprived of life-sustaining oxygen. Lips and skin generally turn a bluish purple color, because the hemoglobin in the blood is not oxygenated. This is an emergent condition requiring immediate correction, because the brain cannot be deprived of oxygen for more than a few minutes before irreversible damage occurs.

Eyes Rolling Back or Staring

This is a natural reaction when a severe head injury occurs and there is loss of consciousness. Physicians and emergency medical technicians (EMTs) use flashlights to check pupil reaction and detect nonparallel eye alignment.[10] Abnormalities in either or both of these, particularly if there is a downturned "setting-sun" stare, which is a sign of increased intracranial pressure, indicate serious brain stem injury.

Gastroenteritis

This is not an actual sign of SBS; rather, it is a diagnosis that is often erroneously made when SBS is really the problem. Gastroenteritis means inflammation of the stomach and intestinal tract. A shaken infant may have fed poorly for a few days as a result of injuries due to shaking, and then be brought to a hospital emergency room for treatment on suspicion of gastroenteritis.

Hypothermia

This condition means an abnormally low body temperature (less than 95 degrees F). It is a rare condition and is thought to be due to central nervous system dysfunction.[11] Ludwig and Warman found hypothermia in 45 percent of the infants with SBS they described.[7]

Inconsolable Irritability

An infant can receive a complete clinical work-up for excessive crying and irritability in a hospital emergency room, but nothing may be identified as being physically wrong. Yet it is essential to accept that such an infant is, in fact, experiencing pain or discomfort, as well as emotional stress. Only the abuser is aware of why the infant cries. Unless there is a comprehensive medical evaluation, includ-

ing an ophthalmologic exam and head CT, and a thorough caretaker interview, which includes an assessment of the family support system in place, the child is at risk for abuse after discharge.

Internal Damage But No External Marks

One pattern typical to SBS is that infant victims frequently have no external signs of abuse. Most physical damage occurs internally. Because of this, infants may be evaluated for occult (hidden) infection. Antibiotics may even be prescribed and the infant discharged home, only to be shaken again. When an abuser has just shaken a child, there may be subtle fingertip bruising in the area where the child has been held. Such marks may be seen on an infant's shoulders, thorax, or back. Children who are shaken may even be held around the neck without leaving a telltale mark of strangulation. Such a manner of shaking can only be confirmed at autopsy by the presence of subcutaneous hemorrhages in the neck.[12]

Lethargy

A shaken infant suffering neurologic trauma often appears sleepy or is hard to arouse. A sense of dullness is evident in the child and is a constant reminder that something is truly wrong.

Seizures and Status Epilepticus

Seizures in a shaken child are a conclusive sign that there has been a serious brain injury. Abusive head trauma can bring on alterations in electrical activity of the brain, leading to seizing. Intracranial complications of SBS, such as hypertension, edema, and hypoxia due to increased ICP may result in seizures. (See the chapter on consequences [chapter 2] for more detail on seizures.)

Status epilepticus can be a characteristic diagnosis in a shaken infant brought to a hospital emergency room. This condition is typified by a rapid succession of seizures without a regaining of consciousness.[13] Medical providers may believe fever or another condition to be the cause of the status epilepticus.

Tensing or Drawing Up of Limbs

An infant's brain, in response to severe trauma, may cause hemiparesis, quadriplegia, or other disabling conditions that affect the limbs. Often arms and legs contract due to any number of neurological responses, including automatic or postural reactions, and reflexes.[14]

Vomiting

Not all shaken infants vomit, but it is a very common response to head injury. There are, of course, many causes of vomiting in infancy besides SBS, but infants with projectile (very forcible) vomiting as their only symptom may be overlooked as having been shaken. Wadford described one case where a three-month-old infant, recently discharged from a hospital with a diagnosis of SBS, had recurrent spells of vomiting.[15] After three follow-up visits to the hospital emergency room, with a plethora of diagnoses, an additional diagnosis was made of pyloric steno-

sis, which develops progressively as an obstruction of the stomach's pyloric valve, and corrective surgery was performed. Vomiting can also result from fluid and electrolyte imbalance.[13] An infant who suffers from chronic vomiting quickly becomes dehydrated, and an incorrect diagnosis of failure to thrive due to poor nutrition may be made. Consultation with a pediatric gastroenterologist may be necessary to establish a valid diagnosis.

CRYING AND COLIC

When a baby cries, he or she is communicating. This is a concept obvious to most caregivers. Babies do not cry to get back at an adult holding them, or for any other reasons requiring intellectual thought. Crying is instinctual. Most perpetrators of SBS do not realize this, however. Perpetrators forcefully ask babies questions such as "Why won't you stop crying?" or "What's wrong with you?" These adults do not consider a wide variety of techniques to soothe a crying baby and will react tensely and angrily. And the more emotionally tense the adult, the more an infant will cry.

Crying and colic in infants have made their way down through history as often exasperating experiences for parents and other caregivers.[16,17] Colic, often considered to be the reason for an infant's crying, is thought to be a consequence of gastrointestinal irritation or spasm in infants.[18] But infants cry regularly, with the crying peaking between three weeks and three months, and the average infant crying three hours per day.[19,20] Brazelton, in his 1962 groundbreaking study of infant crying, found that infant attachment, partner support, family support, and a positive emotional reaction can be beneficial for mothers dealing with such crying.[16]

Some infants with congenital neurological complications may actually never cry.[21] They may experience a condition that causes macrocephaly or other structural abnormalities. This may even occur in shaken infants, especially if there is damage to the brain stem.

Male caregivers seem to be less prepared to handle an infant who cries. This is partly societal and partly gender-related. Throughout history, women have typically been the primary caregivers to infants and children. The image of men handing over babies to women as soon as they cry has frequently been the subject of stereotype in movies and television. Brewster et al. even went so far as to study the physiological reactions of men to crying infants on videotape and found that men show a greater physiological reactivity than their female counterparts.[22] They concluded that men are more prone to serious child abuse because of their physical responses to crying, which include sweating and an increased heart rate.

Men are, in fact, good caregivers. The abusers of the world are the exception rather than the rule. Often, men just need an understanding of why a baby may be crying and ways to cope positively.

Diagnosis of crying from colic versus abuse can sometimes be difficult for the medical care provider in a hospital emergency room. Consider the following, taken from the powerful documentation of a fatal case of "colic."[23] A nineteen-

year-old single mother brought a three-month-old female infant to a hospital emergency room (ER) at two o'clock in the morning, with a complaint of constant crying. The infant was well nourished and well developed, though her mother reported recent spells of vomiting. The baby was not easily consoled during the exam; there were no obvious signs or reason for the crying. Her fontanelle were soft and flat, her pupils responded equally, her heart and lungs were clear and normal sounding, and abdominal, extremity, and neurological exams were all normal. She was given a diagnosis of infantile colic and discharged home with her mother.

Nine hours later, the baby was rushed back to the ER without life signs via emergency medical staff. She never regained consciousness and was pronounced dead soon after arrival. During resuscitation efforts, faint old bruises on her upper arms were noted. When her eyes were examined, she was found to have bilateral retinal hemorrhages and an autopsy revealed subdural hematomas. Her cause of death quickly became identified as Shaken Baby Syndrome.

The authors who reported this case call for medical personnel to build into their evaluation, diagnosis, and treatment of crying infants an assessment of parents' and caregivers' emotional states and available support systems. Symptoms as described by caregivers may not lead a medical provider to consider SBS as a diagnosis. Yet the potential for abuse is very real, and thorough exams of both the child and his or her parents can be lifesaving. Crying is a sign of physical or emotional discomfort in infants and children. Adult clues to their own discomfort can be more difficult to read.

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CHAPTER TWO

Consequences

IT IS A SAD AND ALARMING FACT that between 60 and 70 percent of infants identified as having been shaken are faced with dire consequences, including death. The rest of the children may seem to recover well from being shaken, but they still have residual effects. Truly, the lives of not just the victims, but of their entire families change as a result of a brief act of violence. Millions of dollars are expended each year in the rehabilitation of shaken infants and toddlers. The expenses include costs for equipment and services, costs for daily care, and even more importantly, emotional costs.

MAIN CONSEQUENCES

Listed below alphabetically are some of the main consequences that a shaken infant may face. Some occur more frequently than others.

Attention Problems

Because the brain has some resiliency in response to traumatic injury, there are children who experience minimal aftereffects following an incident of shaking. One such effect might be an attention disorder with or without hyperactivity. With an attention disorder, children may appear to ignore what a parent or caregiver is saying to them. They may also be easily distractible and need careful monitoring and clear instructions on adult expectations.

Certain stimulant medications, such as methylphenidate (Ritalin), can help a child experiencing attention problems to focus by counterbalancing the stimulation chemicals of the brain that are overproduced. Parents or caregivers should

consult their physician to discuss behavioral or medical options to assist with their child's needs. Before a diagnosis of attention deficit is formally made, the child should receive psychological testing and evaluation. School personnel should be aware if a child is diagnosed with an attention disorder, so that special programs or consideration can be arranged.

Balance Problems

Balance is controlled by three areas of the body's nervous system: the basal ganglia, the cerebellum, and the inner ear (fluid in the eustachian tubes must maintain a consistent level for balance to effectively occur). Damage to any of these areas may result in poor balance.

Physical and occupational therapy can help correct deficits in a child's balance, which may cause him or her to have difficulty standing or to walk in an uncontrolled way. Coordination and strengthening therapies can help the child achieve smoother mobility. If the problem primarily stems from the inner ear, a masking agent, such as a device that produces "white noise," may assist in maintaining balance and coordination.

Blindness

Many types of visual deficits may develop as a result of SBS. Retinal hemorrhaging may resolve without any lasting ill effects, but it may leave permanent scarring with partial or complete blindness.

Cortical trauma may result from any type of injury to the cortex of the brain, including contusion, edema, or hemorrhage, and usually results in severe loss of vision. Though the eye and optic nerve may be functional, the cortex of the brain is unable to effectively process visual information. Annable described several types of visual deficits that may result from cortical injury, such as gaze disorder (strabismus), visual field defects, or total blindness.[1] Any injury to the occipital region of the brain may also threaten vision, because this is the area that controls that function. Visual deficits may also occur in conjunction with other disabilities, such as cerebral palsy, wherein a child is more likely to experience optic atrophy, lazy eye (amblyopia), or eye jerks (nystagmus).[2]

Children with visual disability or blindness caused by SBS will benefit from regular visits to an ophthalmologist experienced in the area of ocular injuries resulting from child abuse. Parents or caregivers will then be able to feel more comfortable with the care their child is receiving from a provider with access to specialized resources.

Cerebral Palsy

This condition identifies a group of disorders that affect a child's motor skills—his or her ability to perform and control normal movements. Poor balance, weakness, stiffness, and lack of coordination are all aspects of cerebral palsy (CP).

A child may be affected on different sides or parts of the body. Hemiplegia is CP that affects an arm and leg on one side of the body, diplegia affects both legs, and quadriplegia affects all four limbs. These are all considered "pyramidal"

(spastic) CP, as the pyramidal tract of the brain is often affected.[3] Muscle control may be spastic (rigid movement), hypotonic (floppy movement), or ataxic (poor balance and coordination).

Extrapyramidal CP occurs when there is damage to the basal ganglia section of the brain. Such a child has no muscle control (athetoid), with the limbs moving in an abrupt and involuntary fashion. One study found that 92 percent of children diagnosed with extrapyramidal CP held a concurrent diagnosis of mental retardation.[3]

CP in infants and toddlers is diagnosed after certain developmental milestones fail to be met and muscle tone and movement are abnormal. There is no exact measurement that can predict the eventual severity of the effects of CP, though by age two a child can be diagnosed as hemiplegic, diplegic, or quadriplegic.[2]

Parents or caregivers are encouraged to allow an afflicted infant or toddler to socialize with other children, especially others with disabilities, because this will emotionally support the child's instinctual need for independence from within a largely dependent body.

Deafness or Hearing Loss

Children who are shaken may suffer damage to the eighth cranial nerve, which controls hearing, as well as to the bones of the inner ear and the cochlea, responsible for converting sounds from mechanical impulses to chemical and electrical impulses sent to the brain. A child's hearing may be tested in an audiology follow-up. Deficits in hearing range from mild impairment to profound deafness. If the child has some residual hearing, hearing aids can amplify sounds and voices. Cochlear implantation has also helped many children with hearing loss. Regular visits to an audiologist and speech therapist will help children who were deafened by shaking learn to adjust to this disability. Sign language is an excellent adjunct for the infant or toddler learning communication, giving him or her a way to let feelings and needs be known to a parent or caregiver.

Death

Death in SBS most commonly occurs as a result of cerebral edema and/or hemorrhage with a resulting uncontrolled increase of intracranial pressure. Children under the age of six months have a greater risk for dying as a result of being shaken.[4] Overall, infants and toddlers have a 25 to 30 percent chance of dying after a shaking incident. This consequence of SBS can be the most devastating for families. When a child is born, parents or caregivers have dreams for the child's future. When the child is suddenly and tragically taken away, there is a deep void. Many parents struggling with the daily routines of caring for children severely disabled as a result of SBS emphasize their thankfulness that at least their children are still alive. Parents who lose a child to death have only memories.

There are also children who suffer a "late death." These are children who have suffered massive brain injury and die years later, such as a child with only brain stem functioning that finally ceases; a child who succumbs to increased intracranial pressure when a shunt can longer support her neurological changes; or a child

who dies from pneumonia after living with devastating neurological damage for twelve years from being shaken at age five months.[5] The outcome for a shaken infant is something that can never be predicted. There are children who are expected to live, those who are expected to die, those who make recoveries that are called "miracles," and others whose young bodies cannot take the trauma of living with their injuries. *Hope* is a concept that is dovetailed with *love*. Providing a hopeful, loving environment is the best any parent or caregiver can do, no matter how many days, months, or years.

One question that often haunts families dealing with a shaken child's death is how much the child suffered during the moment of shaking. Some parents and caregivers are comforted with the belief that their children did not suffer. Others wonder if their children experienced pain and fear. Studies show that most children who are severely head-injured do not experience lucid moments prior to losing consciousness, except in older children with epidural hemorrhage, who can experience brief lucid moments after unconsciousness. Infants also do not have the mental capacity to understand the process of aggression prior to becoming unconscious. Infants do, though, respond physiologically to *ongoing* stressors, as cortisol is released in the brain.[6] Cortisol is a hormone that coats the brain as an instinctive response to stress.

Emotional Problems

An SBS victim may experience subsequent emotional problems. This is a subtle complication, because an underlying shaking incident may never be discovered or diagnosed. There are children who are shaken, become unconscious, may experience lethargy or vomiting, and recover. Years later, the child may experience emotional problems, such as explosive anger, self-injurious behavior, or depression, but parents or caregivers are not aware of the basis for such complications. Later in life, a child who has been shaken may develop an attachment disorder. Psychiatric evaluation and treatment may be needed as a shaken child grows.

The harmful emotional effects of abuse can be lessened. Parents and caregivers should watch for changes in their children's behavior. Loving family members can offer structure and guidance to a child whose basic trust issues were dramatically altered. Therapists and other mental health professionals can help with understanding emotional problems and guide with treatment options.

Gastrointestinal Problems

Many children who are shaken are left with poor oral motor function and hence are unable to chew or swallow.[2] Children may aspirate (inhale) food or liquid instead of swallowing, or they may experience gastroesophageal reflux, wherein food is regularly brought back up from the stomach into the esophagus. This can cause severe irritation in the tract from the caustic effects of stomach acid and may lead to excessive weight loss.

When a child has such problems with eating and processing foods, a gastrostomy tube (G-tube) or G-button may need to be placed directly into the stomach. One type of G-tube is the percutaneous gastrostomy (PEG) tube. A needle is

inserted into the stomach, and the PEG is passed over the needle, all done under anesthesia.[2]

Children also may have problems processing food in their intestines and bowels, and may even experience constipation. Changes in diet, medications, and laxatives prescribed under a physician's care may help alleviate such problems. Registered dieticians are also invaluable resources.

Hydrocephalus

One complication of traumatic brain injury is an excessive buildup of fluid in and around the ventricles of the cranial space. Cerebrospinal fluid (CSF) is constantly being produced and absorbed in the brain. If there is a problem with reabsorption, CSF backs up and causes enlargement of the brain, and subsequently the head. This condition is known as hydrocephalus.

Hydrocephalus is treated through the use of a shunt, a small tube inserted into one of the ventricles of the brain. The opposite end of the shunt is placed in either the abdominal cavity or the jugular vein for drainage and reabsorption. Shunts may become clogged and require replacement or repair. They may also become infected; 80 percent of the cases in which infection develops occur within six months of the shunt placement surgery.[7] Persistent headaches, nausea, and vomiting are signs of problematic shunt functioning.[8]

Another treatment for the buildup of CSF involves a rerouting within the ventricular system by endoscopic third ventriculostomy.[9] Such a procedure is much more invasive, but the long-term success rate is high, especially in children over two years of age. Infants usually receive a shunt placement initially, with endoscopic treatment suggested later.[7]

Hypersensitivity

Infants and children who have been shaken can be hypersensitive in various ways. Hypersensitivity to touch means that an infant cannot distinguish between types and degrees of touch and may withdraw in a self-regulatory fashion.[2] Slow, patient, loving hands will eventually help the infant accept a caregiver's touch. Hypersensitivity to sound can keep an entire family tiptoeing. Infants with this condition frequently wail with discomfort when distressed by noise. Hypersensitivity to temperature may occur if there is a dysfunction in the body's self-regulatory and circulatory processes. Hands and feet frequently become cold or hot. Caregivers need to be extra conscious of this when dressing a hypersensitive child.

Learning Disabilities

Children with learning disabilities may appear, act, and think as normal children until they are faced with regular mental-processing challenges in the classroom. This can be another subtle complication from a shaking incident that is never discovered. Children with learning disabilities cannot process complex information adequately or smoothly. Writing, reading, mathematical computations, and other types of learning can become significant hurdles. Great care and patience are required when working with a child with a learning disability. Such