Shaken Baby Syndrome

Description/Etiology

Shaken baby syndrome (SBS; also called shaken infant syndrome and pediatric abusive head trauma [AHT], a subset of the broader category of abusive head trauma), is the most common cause of nonaccidental head injury (NAHI). In SBS, the infant is usually picked up by the shoulders or around the torso and shaken back and forth. Forty to fifty shakes can be performed within a 20-second period and the shaking does not have to continue for long or be repeated in order to cause severe injuries. Several anatomic features of the infant—such as a large head compared with body size, weak neck muscles, and lack of myelination—cause a shaken infant to be highly susceptible to NAHI. One of the proposed mechanisms of trauma, whiplash-like injury, results from the acceleration-deceleration shearing forces of being violently shaken. The injuries in SBS are often severe and can be life threatening; potential injuries include subdural hematoma, subarachnoid and/or retinal hemorrhage, spinal cord and/or diffuse axonal injury (DAI), and intracranial hypertension.

SBS is a severe form of physical abuse. The perpetrator is usually the biologic father or the maternal boyfriend, although babysitters, day care workers, and biologic mothers have been reported to be perpetrators. Often, the perpetrator is easily frustrated. Crying of the infant is the major precipitating factor that leads a perpetrator to shake the infant. Correct diagnosis can be missed or be delayed because there is often no external evidence of infant trauma. SBS is fatal in 20–25% of cases and most survivors have poor neurological outcomes. Potential long-term impairment from SBS includes cerebral palsy, speech delays, behavioral problems, intellectual impairment (e.g., mental retardation, developmental disability), permanent brain damage, blindness, seizures, severe motor dysfunction, and paralysis.

Facts and Figures

SBS primarily occurs in children who are younger than 3 years of age and accounts for about one-third of deaths due to child maltreatment. Most victims are younger than 6 months of age, although SBS is reported in children up to 5 years of age. The reported incidence of SBS ranges from 14:100,000 to 40:100,000 children aged < 1 year. In the United States it is estimated that up to 1,600 children younger than 1 year of age are affected by SBS each year. Men are the perpetrators in 90% of cases of SBS.

Risk Factors

Low educational achievement, poverty, unemployment, adolescent or single parenthood, intimate partner violence (IPV), drug abuse, poor parenting skills, depression or other mental illness, and poor coping skills are all risk factors for perpetrating SBS. Male sex of the infant, low birth weight, prematurity, being one of a multiple birth, inconsolable
or frequent crying, and/or infant disability increase risk for SBS. Researchers in Japan surveyed 6,487 mothers of 4-month-old infants and identified the following additional risk factors for shaking: mother’s age < 34 years (especially < 24 years), mother’s age ≥ 40 years, full-time working, and primiparity (Fujiwara et al., 2016).

**Signs and Symptoms/Clinical Presentation**

› Less severe SBS is characterized by vomiting, failure to thrive, lethargy, irritability, poor feeding, hypothermia, increased sleeping, and unresponsiveness
› Severe SBS is characterized by seizures, altered level of consciousness (e.g., drowsiness, stupor, coma), respiratory distress, apnea, signs of cerebral edema or intracranial hypertension (e.g., bulging or full fontanel, forceful vomiting, bradycardia), and cardiovascular collapse

**Assessment**

› **Patient History**
  • Ask about patient/family medical and psychiatric history of SBS incidents, nonabuse-related injury or trauma, and previously filed child abuse reports

› **Physical Findings of Particular Interest**
  • Bilateral retinal hemorrhaging occurs frequently in SBS and is a major indicator of SBS
  • Bruising from finger imprints might be visible where the infant was grasped

› **Laboratory Tests**
  • Liver function tests will identify amylase and transaminase level abnormalities if blunt trauma to the abdomen occurred

› **Other Diagnostic Tests/Studies**
  • CT scan will show subdural hematoma, subarachnoid hemorrhage, and/or cerebral edema, if present, and is the primary imaging modality for assessing severe lesions
  • Examination of the fundus of the eye can identify retinal hemorrhages
  • X-ray of the skull will identify fractures located in the occipital or parietal lobe areas, if present; fractures that are multiple, bilateral, and/or diastatic (i.e., cross skull suture lines) suggest abuse. X-ray can identify old or new diaphyseal or metaphyseal long bone fractures or rib fractures, if present, which suggest abuse
  • MRI can be performed to evaluate the extent and timing of the injury, and can identify patterns associated with previous intracranial hemorrhages

**Treatment Goals**

› **Promote Optimum Physiologic Status and Reduce Risk of Complications**
  • Monitor vital signs, evaluate physiologic status, and resuscitate, as necessary; immediately report abnormalities and treat, as ordered, including administering supplemental oxygen, assisting with intubation, and maintaining mechanical ventilation
  – Review laboratory and other diagnostic study results, assess for and document signs of physical abuse, and assist with photographing or photograph any visible injuries
  • Administer prescribed medications, including anticonvulsants for seizures
  • Frequently assess for complications (for details, see *Red Flags*, below)

› **Maintain Patient Safety, Reduce Patient/Family Anxiety, and Educate**
  • Assess patient (if age-appropriate) and parent/caregiver anxiety level; provide emotional support and educate about SBS if appropriate, including potential complications, diagnostic procedures, treatment risks and benefits, and individualized prognosis
  – If the parent/caregiver is suspected of perpetrating SBS, communicate only that testing must be completed to fully assess the patient’s medical status, and follow facility protocols to immediately notify facility security to establish surveillance to protect the patient
  - **Do not leave the patient alone or allow a parent/other caretaker suspected of perpetrating SBS to leave with the child. Wait for child protective services, facility security, and/or the police to arrive**
  • Complete a psychosocial assessment whenever possible, including patient birth history, history of prior hospitalizations and injuries, and developmental history; family history of mental illness, drug and alcohol abuse, and IPV; and assessment for SBS risk factors
  – Accurately and objectively document the parent/other caregiver report of how the injury was sustained and identify any inconsistencies
  • Follow facility protocols for mandated reporting of criminal activity, including notifying child protective services
Food for Thought
› SBS is associated with high medical and nonmedical costs (e.g., for special education). In a 2014 study, researchers estimated the total medical cost associated with SBS was $47,952 per child during the 4 years following diagnosis (Peterson et al., 2014)
› Care providers can prevent SBS by providing parents and caregivers of techniques to cope with a child that cries inconsolably
› In a 2015 survey of new parents in Ireland, just over half of the participants were unaware of SBS; parents of Irish origin were more likely to have knowledge of SBS compared to immigrant parents (Mann et al., 2015)
• In a pilot study conducted in Turkey, researchers found that an SBS prevention program (in the form of an animated educational video) improved mothers’ knowledge of the dangers of SBS. Education given in the prenatal period or 3–7 days after delivery was more effective compared to the immediate postnatal period (Taşar et al., 2015)

Red Flags
› Monitor closely for signs and symptoms of subdural hematoma, subarachnoid and retinal hemorrhage, spinal cord injury, DAI, and intracranial hypertension
› Cervical spine fractures occur frequently in whiplash injuries; the patient’s neck should be stabilized with a cervical collar

What Do I Need to Tell the Patient/Patient’s Family?
› Follow facility protocols for notification of parent(s)/other caregiver that a child abuse report has been filed with child protective services. If the patient is stable, inform parent(s) that a child protective services representative might place the child (and siblings) in foster care
› Provide written information to the family or a legally-approved caregiver, if appointed, about what to do if the discharged patient cries or exhibits other signs and symptoms of complications, including when to seek immediate medical attention
› Emphasize the importance of seeking mental health counseling for the patient, if age-appropriate, siblings, if appropriate, and the parent(s)/other caregivers
› For additional information, refer to the National Center on Shaken Baby Syndrome at https://www.dontshake.org/