Abusive Head Trauma in Infants and Children

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ABSTRACT

Shaken baby syndrome is a term often used by physicians and the public to describe abusive head trauma inflicted on infants and young children. Although the term is well known and has been used for a number of decades, advances in the understanding of the mechanisms and clinical spectrum of injury associated with abusive head trauma compel us to modify our terminology to keep pace with our understanding of pathologic mechanisms. Although shaking an infant has the potential to cause neurologic injury, blunt impact or a combination of shaking and blunt impact cause injury as well. Spinal cord injury and secondary hypoxic ischemic injury can contribute to poor outcomes of victims. The use of broad medical terminology that is inclusive of all mechanisms of injury, including shaking, is required. The American Academy of Pediatrics recommends that pediatricians develop skills in the recognition of signs and symptoms of abusive head injury, including those caused by both shaking and blunt impact, consult with pediatric subspecialists when necessary, and embrace a less mechanistic term, abusive head trauma, when describing an inflicted injury to the head and its contents. Pediatrics 2009;123:1409–1411

HISTORY

The recognition of child abuse in modern medicine began in the 19th century, with the work of the French forensic physician Ambroise Tardieu,1,2 who described a wide array of physical and sexual injuries to children, including meningeal hemorrhage and brain injuries in fatally abused infants. More than 80 years later, American physicians began describing the clinical and radiologic manifestations of child abuse. Pediatrician and radiologist John Caffey3,4 first described the association of chronic subdural hemorrhages and long-bone fractures in 1946, but it was not until 1972 that he published a seminal paper describing the radiologic and clinical features attributed to shaking injuries. Ludwig and Warman5 first published the term “shaken baby syndrome” in their review of 20 infants and young toddlers injured by shaking, none of whom showed evidence of impact injury to the head. In 1987, Duhaime et al6 reported that victims of fatal shaken baby syndrome, and many of those who survived their trauma, showed evidence of blunt impact to the head at the time of diagnosis. The importance of impact in acceleration/deceleration injury was supported by their basic biomechanical models, and they concluded that most serious abusive head injuries required an impact to the head. The relative importance of impact as a contributor to the head injury sustained by abused children became a source of controversy. Biomechanical modeling has since been used to both support and refute the contributions of shaking or impact to abusive head trauma (AHT).7,8 In reality, all models and theories have known limitations, and many clinicians and researchers acknowledge that precise mechanisms for all abusive injuries remain incompletely understood.9 Efforts to better understand the mechanisms and causations of injury have improved the gathering of objective data in the clinical realm. Case investigations, including meticulous medical history taking, examinations, and medical workups, have expanded and improved. Medical diseases that can mimic the presentation of AHT are recognized, and screening is performed when indicated. Social welfare, law enforcement, and legal professionals have become better educated about AHT. Clinical research has expanded, and biomechanical modeling of injuries has improved.

Case histories clearly support the conclusion that shaking occurs in some injury scenarios. Shaking was the most commonly reported mechanism of injury described in a series of AHT cases in which perpetrators admitted abuse (68% of 81 cases).10 Shaking alone was described in 32 cases, and only 4 of the victims showed evidence of impact injury. Although this indicates incomplete admission to the injury mechanism in some cases, the commonality of a described shaking mechanism along with the infrequency of impact evidence supports shaking as an important mechanism of AHT. In addition, blunt impact trauma or impact combined with shaking can result in infant head injuries.11 In severe and fatal cases, concomitant cervical spine injury can sometimes be found.12 Secondary brain injury resulting from hypoxia, ischemia, and metabolic cascades contributes to poor outcomes.13,14 Shaken baby syndrome is a term often used by physicians and the public to describe abusive head trauma inflicted on infants and young children. Although the term is well known and has been used for a number of decades, advances in the understanding of the mechanisms and clinical spectrum of injury associated with abusive head trauma compel us to modify our terminology to keep pace with our understanding of pathologic mechanisms. Although shaking an infant has the potential to cause neurologic injury, blunt impact or a combination of shaking and blunt impact cause injury as well. Spinal cord injury and secondary hypoxic ischemic injury can contribute to poor outcomes of victims. The use of broad medical terminology that is inclusive of all mechanisms of injury, including shaking, is required. The American Academy of Pediatrics recommends that pediatricians develop skills in the recognition of signs and symptoms of abusive head injury, including those caused by both shaking and blunt impact, consult with pediatric subspecialists when necessary, and embrace a less mechanistic term, abusive head trauma, when describing an inflicted injury to the head and its contents. Pediatrics 2009;123:1409–1411

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syndrome is a subset of AHT. Injuries induced by shaking and those caused by blunt trauma have the potential to result in death or permanent neurologic disability, including static encephalopathy, mental retardation, cerebral palsy, cortical blindness, seizure disorders, and learning disabilities. Medical and biomechanical research, clinical and pathologic experience, and radiologic advances have improved our understanding of the range of mechanisms that contribute to brain injury from AHT, yet controversy remains.

DISCUSSION
Few pediatric diagnoses engender as much debate as AHT, in part because of the social and legal consequences of the diagnosis. The diagnosis can result in children being removed from their homes, parents losing their parental rights, and adults being imprisoned for their actions. Controversy is fueled because the mechanisms and resultant injuries of accidental and abusive head injury overlap, the abuse is rarely witnessed, an accurate history of trauma is rarely offered by the perpetrator, there is no single or simple test to determine the accuracy of the diagnosis, and the legal consequences of the diagnosis can be so significant. Because the civil and criminal justice systems are often involved in cases of AHT, the scientific debates related to mechanism and causation of injury often are argued during courtroom proceedings. On occasion, the courtroom allows for scientific theory to be confirmed or refuted, but in reality, the American justice system is not designed to determine scientific truth but, rather, to balance contested facts and bring closure to a dispute. Medical terminology should accurately reflect the medical diagnosis. The term “shaken baby syndrome” has become synonymous in public discourse with AHT in all its forms. The term is sometimes used inaccurately to describe infants with impact injury alone or with multiple mechanisms of head and brain injury and focuses on a specific mechanism of injury rather than the abusive event that was perpetrated against a helpless victim. Legal challenges to the term “shaken baby syndrome” can distract from the more important questions of accountability of the perpetrator and/or the safety of the victim. The goal of this policy statement is not to detract
close, to medical data. On some occasions, the diagnosis is apparent early in the course of the evaluation, because some infants and children have injuries to multiple organ systems that could only be the result of inflicted trauma. On other occasions, the diagnosis is less certain, and restraint is required until the medical evaluation has been completed. However, as physicians, we have an obligation to make a working diagnosis, as we do with many other diagnoses, and take the legally mandated steps for further investigation when indicated. Pediatricians often find it helpful to consult a subspecialist in the field of child abuse pediatrics to ensure that the medical evaluation has been complete and the diagnosis is accurate. Subspecialists in radiology, ophthalmology, neurosurgery, neurology, and other fields should also be consulted when necessary to ensure a complete and accurate evaluation. When child protective services or law enforcement is involved in an investigation, the pediatrician is required to interpret medical information for nonmedical professionals in an understandable manner that accurately reflects the medical data. Pediatricians also have a responsibility to the family of the abused child. The diagnosis of child abuse has enormous social, psychological, and legal implications for families. The role of the pediatrician is not to apportion blame or investigate potential criminal activity but to identify the medical problem, treat the child’s injuries, and offer honest medical information to parents and families. Finally, pediatricians can work to prevent AHT by supporting prevention efforts in the community and in practice. Pediatricians may help prevent AHT by providing anticipatory guidance to new parents about the dangers of shaking or impact and providing methods for dealing
with the frustration of a crying infant. They can also stress the importance of leaving a young infant or toddler in the care of adults whom the parents trust will not harm their child and can participate in comprehensive community-based prevention efforts. AHT commonly results in permanent neurologic damage and carries tremendous family and societal costs. With an aim toward prevention, the American Academy of Pediatrics recommends the following.

RECOMMENDATIONS

1. Pediatricians should be alert to the signs, symptoms, and head injury patterns associated with AHT.

2. Pediatricians should know how to begin a thorough and objective medical evaluation of infants and children who present for medical care with signs and symptoms of potential AHT. Consultants in radiology, ophthalmology, neurosurgery, and other subspecialties are important partners in the medical evaluation and can assist in interpreting data and reaching a diagnosis.

3. Pediatricians should consider consulting a subspecialist in the field of child abuse pediatrics to ensure that the medical evaluation of the patient has been complete and that the diagnosis is accurate.

4. Pediatricians should use the term “abusive head trauma” rather than a term that implies a single injury mechanism, such as shaken baby syndrome, in their diagnosis and medical communications.

5. Pediatricians should continue to educate parents and caregivers about safe approaches to calming and coping with crying infants and the dangers of shaking, striking, or impacting an infant’s head.

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REFERENCES


17. Lazeron S, Baldwin S, Kini N. The whiplash shaken infant syndrome: has Caffey’s syndrome changed or have we changed his syndrome? Child Abuse Negl. 1997;21(10):1009–1014


