ENCYCLOPEDIA
on Early Childhood
Development

[Archived] Shaken Baby Syndrome

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November 2004

Introduction

Abusive head trauma (AHT) is a leading cause of death and disability in childhood.[1,2,3] Descriptions of whiplash shaking of infants in the early 1970s introduced the concept that significant head injury could be inflicted by vigorous manual shaking of the child by a caretaker.[2,4,5,6] The repetitive oscillations of an infant head and neck can result in shearing injuries of both vascular and neuronal structures, causing intracranial and retinal hemorrhages, brain edema and subsequent atrophy and disturbances in brain growth.[2,7,8] A constellation of intracranial hemorrhage, long bone fractures and retinal hemorrhages comprises the classic description of shaken baby syndrome (SBS), while shaking with impact or impact alone is more accurately called abusive head trauma (AHT). In this discussion, the term AHT will be used to indicate abusive head injury from shaking, impact or both. Most victims of AHT are younger than one year (mean age is five to nine months). AHT is often difficult to diagnose because the child usually has no external evidence of trauma, particularly if the abusive event did not involve impact. Often caretakers provide no history of abuse or injury at the time of initial presentation.[9] Victims have various presenting signs and symptoms ranging from irritability, decreased responsiveness and lethargy to convulsions, unresponsiveness and death. Early recognition and prevention of this form of inflicted trauma are

imperative.

Subject

Physical child abuse, including abusive head trauma, is a major public-health problem. The outcome for inflicted AHT is more severe than that of any other cause of head injuries in childhood.[1,10] Of infants who are victims of SBS, approximately 7 to 30% die and 30 to 50% have significant cognitive or neurologic deficits, while 30% have a chance of recovery but are at continued risk of long-term neurologic sequelae.[8,11,12,13] Neurologic sequelae include cognitive and behavioural disturbances, developmental delay, motor and visual deficits, learning deficits and epilepsy.[7,8,14] In a comparison of children with inflicted and non-intentional closed head injuries, those younger than six years old who sustained inflicted head injuries had significantly decreased cognitive and motor abilities compared with same-aged victims of accidental injuries.[15] In addition to neurologic consequences, studies have shown that abused children, in general, are noted to have poor self-esteem and lower ambitions.[16]

Problems

The physical, cognitive and behavioural deficits resulting from severe head injuries present a challenge for families, the community and rehabilitation specialists.[17] Families of such victims must endure the constant psychosocial difficulties as well as accommodate to a new regimen and evolving goals for the inflicted child. Personal costs in pain and suffering to victims and their families cannot be fully quantified. The total costs to society are also understated because of the years of potential life lost by victims.[18]

Societal costs and economic burdens sustained by hospitals are important considerations when assessing the resources needed to manage and support these children.[18,19] Children who survive inflicted head injuries require ongoing medical and psychosocial resources. Child-abuse patients have higher severity of illness (SI), hospital charges, daily charges and mortality rates than patients treated for non-intentional injuries. In one study, the medical bills for the acute care of child-abuse patients in an intensive care unit averaged $35,641 per patient. In that particular study, 70% died and 60% of the survivors had severe residual morbidity.[18]

Earlier identification of children at risk for such inflicted trauma may reduce individual, medical and societal costs.[19] A study examining 173 abused infants found that nearly one-third of infants with inflicted head injury were misdiagnosed on their initial presentation for medical care.[20] Among

this group of infants with unidentified abusive head trauma, 25% were re-injured before they were correctly diagnosed. Adequate training of professionals and an appropriate index of suspicion are required to identify children and families at potential risk of abuse. Children with inflicted injury are at greater risk for repeated abuse and possible fatal injuries.[21] Medical professionals must intervene early by identifying possible abusive injuries.

Research into prevention of abusive head injuries had been limited. Proposed prevention strategies have included identification of families and children at risk, and education of parents and the public about the dangers of shaking infants.

Research Context

1. Identification of families and children at risk of abusive head trauma: Some research has been done on the motivation of abusers, their relationships to the victims and social risk factors for abusive head trauma.[22] The training needed by medical professionals to effectively prevent and identify abusive head trauma requires further study.
2. Prevention: a) Educational campaigns about the dangers of shaking babies or hitting them in the head have been done in some geographic areas. Outcomes of these interventions are not known. Studies about the most effective way to distribute this information are recommended. b) Analysis of programs targeting high-risk families could help design a strategy for secondary prevention. c) Preventing recurrences of abusive head trauma is tertiary prevention. This would include training medical personnel to recognize signs and symptoms of abusive head trauma and designing effective child welfare systems that protect victims from further abuse.

Key Research Questions

1. What are the most effective means of preventing AHT?
2. Because signs and symptoms of AHT may be non-specific, are there specific biochemical markers of brain injury that can be detected in the peripheral bloodstream soon after such an injury?
3. Do the initial presenting signs and symptoms of victims of AHT predict long-term neurological sequelae?

4. Much scientific and legal debate exists over the mechanism of injury (shaking, shaking and impact or solely impact) that results in the final presentation and outcome of a victim of inflicted head injury. Studies of the biomechanics of AHT are in progress, addressing questions about the magnitude and type (tangential or rotational) of acceleration required to produce injury in infants. Does harmonic amplification of forces due to repetitive shaking decrease injury thresholds?

Recent Research Results

The timing of onset of symptoms after AHT has been debated. A recent study of perpetrator admissions of AHT suggests that symptoms of inflicted head injury in children occur immediately.[23] None of the children in this study were described by the perpetrator as behaving normally after the abuse event. Most perpetrators admitted to shaking these children without impact.

The recent studies of Ewing-Cobbs and colleagues have characterized the physical, neurobehavioural and developmental findings in children with inflicted and non-inflicted traumatic brain injury (TBI). Analysis of neuroimaging studies (CT/MRI) aided in the identification of characteristic features of inflicted TBI.[10]

Conclusions

The injuries sustained from AHT have been recognized as the most serious in the spectrum of child abuse with significant morbidity and mortality. AHT accounts for a substantial proportion of hospital admissions of infants and toddlers after head trauma. Head injury affects the functioning, growth and quality of participation of the child in both the home and community. The resulting cognitive and neurological deficits have devastating consequences for both the individual and family.[3,10,16,24] Prevention of such inflicted injuries is the crux of this problem.[25,26] Continuing campaigns to increase public awareness of the dangers of shaking and hitting babies is recommended. Research identifying the most effective means of information distribution and assimilation in the highest risk populations should be conducted to assure the most effective reach. It is difficult to know whether information alone translates to actual practice. Therefore, social programs directed at educating parents and fostering nurturing should also be pursued.

Targeted services to prevent abuse and neglect, particularly “home visiting” of young families, have been well received.[27,28] Research into assessing those children and families at greatest risk (families where domestic violence occurs, families with substance abuse problems and families

lacking community support) should be conducted to provide a directed, cost-effective plan of prevention.[29,30] Tailoring home-visiting programs to high risk groups and mandating appropriate quality assurance in these programs are necessary to obtain maximum benefit from such programs. Home visiting helps program the capability of preventing maltreatment and promoting the development of both children and their parents.[31] Such programs must also include the men of the household, as the majority of perpetrators of serious abuse are men.[22] Successful preventive services and educational campaigns should be considered conservative investments to ensure that a child's life is spent in a secure and nurturing home.

Implications for Policy and Services Perspective

Shaken baby syndrome and abusive head trauma are devastating events with psychological, physical and financial consequences for the child, the family and the community. Medical expenditures and social resources for acute care, ongoing management and rehabilitation tax a system of limited resources. Prevention is the key to intervention in this social problem. The need exists to instil the concept that shaking a child is an intolerable practice. Educational campaigns (such as the "Don't Shake the Baby" model) are thought to be effective tools for raising parental knowledge of the dangers of shaking a baby.[32] Studies into the economies of well-designed and effective prevention programs are a justifiable investment of community resources.[18,19] The American Academy of Pediatrics has recognized that the home health visitor model has been well received and of great benefit. A program of prenatal and infant home visitation by nurses and paraprofessionals has been tested as a preventive tool against health and developmental problems in children who are at highest risk for such problems.[30,33,34] It is noted that the potential savings in acute medical care charges represented by one case alone can more than pay for the annual salary of a home health visitor to high-risk families for one year.[18] Home visitation is not a panacea to the epidemic of child abuse, but may be an effective intervention to reduce the incidence of child abuse.[27,29] Public commitment to the establishment of prevention programs is imperative.

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