



# Abusive Head Injury: Could I have predicted it?

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# Terminology

- Child abuse?
- Non-accidental trauma
- Intentional injury
- Shaken baby syndrome
- Abusive head trauma
- NAHI
- Social bias





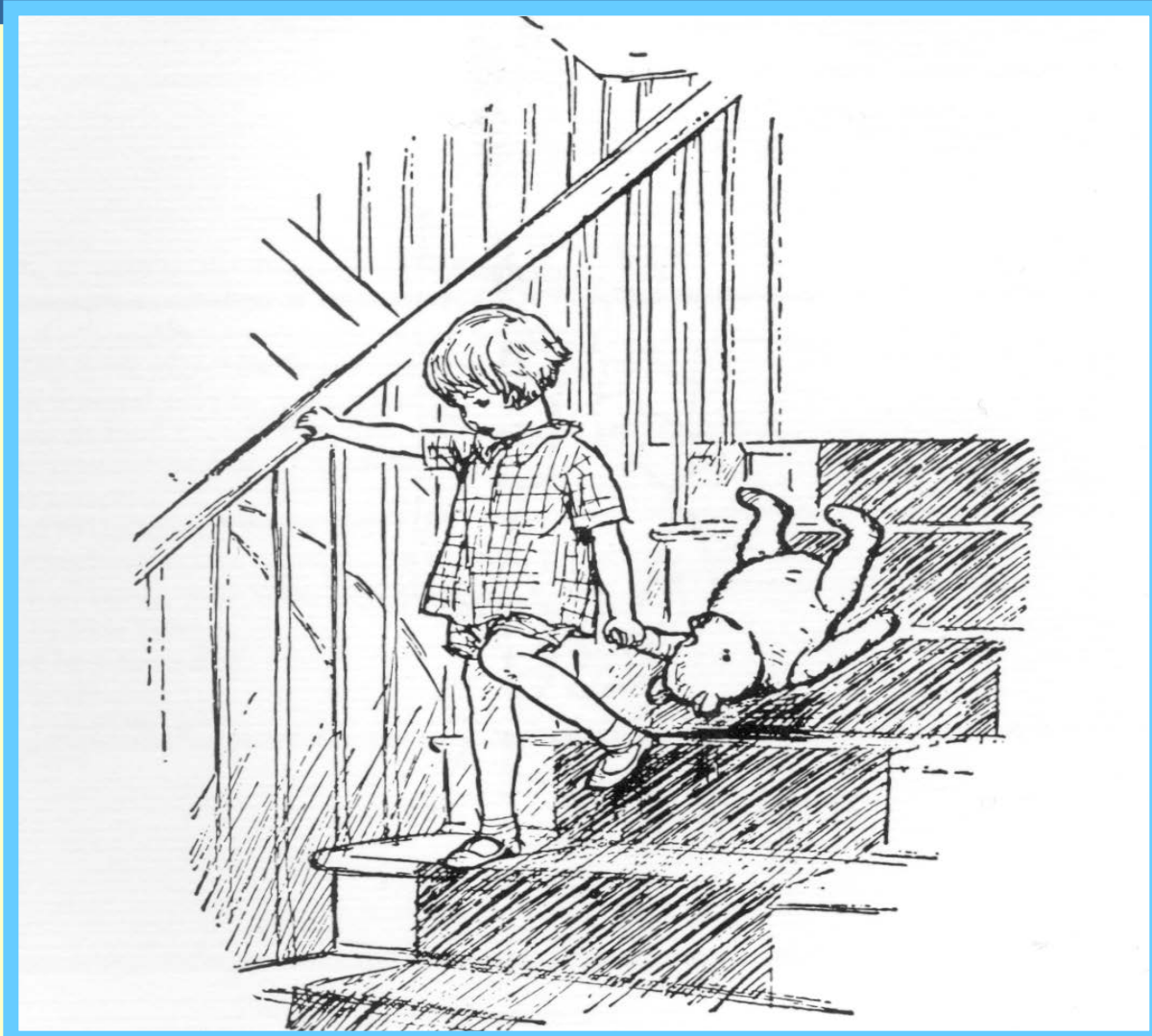
# What makes people abuse children?

- Difficult to imagine
- The crying baby
- Excessive discipline, a parent's own experience
- Good parents who lose control, unable to cope
- Difference between a lack of resources, skills and finances and a knowing reluctance to nurture or intentional injury
- Special needs children





# Abusive Head Injuries as Sentinel Events?





# Incidence of Abusive Head Injuries

- Head injury causes the highest incidence of morbidity and mortality among child abuse cases
- Represents 10-20% of all physical child abuse injuries (non-accidental trauma)
- Highest incidence is in children <2 years, (with majority <1 year)
- Approximately 80% of deaths from child abuse involve head injuries
- Nationwide, # of admissions to Children's Hospitals with life threatening head injuries from abuse is 4-9 patients per year





# CDC definition of Abusive Head Injury

- Pediatric abusive head trauma is defined as an injury to the skull or intracranial contents of an infant or young child (< 5 years of age) due to inflicted blunt impact and/or violent shaking.
- . Challenges to Tracking the Occurrence of Abusive Head Trauma
  - Efficacy of prevention programs
  - Allocation of resources





# Abusive Head Injuries: Predisposing Factors

- Young age
- Susceptibility of infant brain and cerebral vessels to injury
- Disproportionately large size of infant head with relatively weak neck muscles
- Large subarachnoid space and high water content of the infant brain
- Social conditions - poverty and neglect
- Race ? Gender ?
- Head injuries in older children are often associated with other trauma





# Clinical Criteria for Diagnosis of Shaken Baby Syndrome

- Presence of retinal hemorrhages
- Subdural and/or subarachnoid hemorrhages
- Bilateral chronic subdural hematomas
- Profound neurologic impairment (seizures, encephalopathy)
- Chronic subdural effusions
- History suggestive of child abuse or neglect
  - well documented, witnessed accidental trauma excluded

American Academy of Pediatrics 2009  
Committee on Child Abuse and Neglect







# Laboratory / Radiologic Evaluation

- Battered Child Series
  - After age 3, fractures less likely unless specific symptoms
- CT Scan
- MRI
- Ultrasound
- Clotting Studies
- Metabolic studies, genetic sequencing, head circumference



# Adam



- 4 month old referred for eval of macrocephaly by his pediatrician. Head Circumference noted to be nl, but large compared to ht and wt at 2 mo
- Placed in protective custody after CT showed bilat subdural hematomas of two separate ages
- C/S, vacuum extraction, normal developmental milestones
- No concerning social risk factors identified
- Placed in protective custody after 2 day hospitalization, parents expecting medical intervention

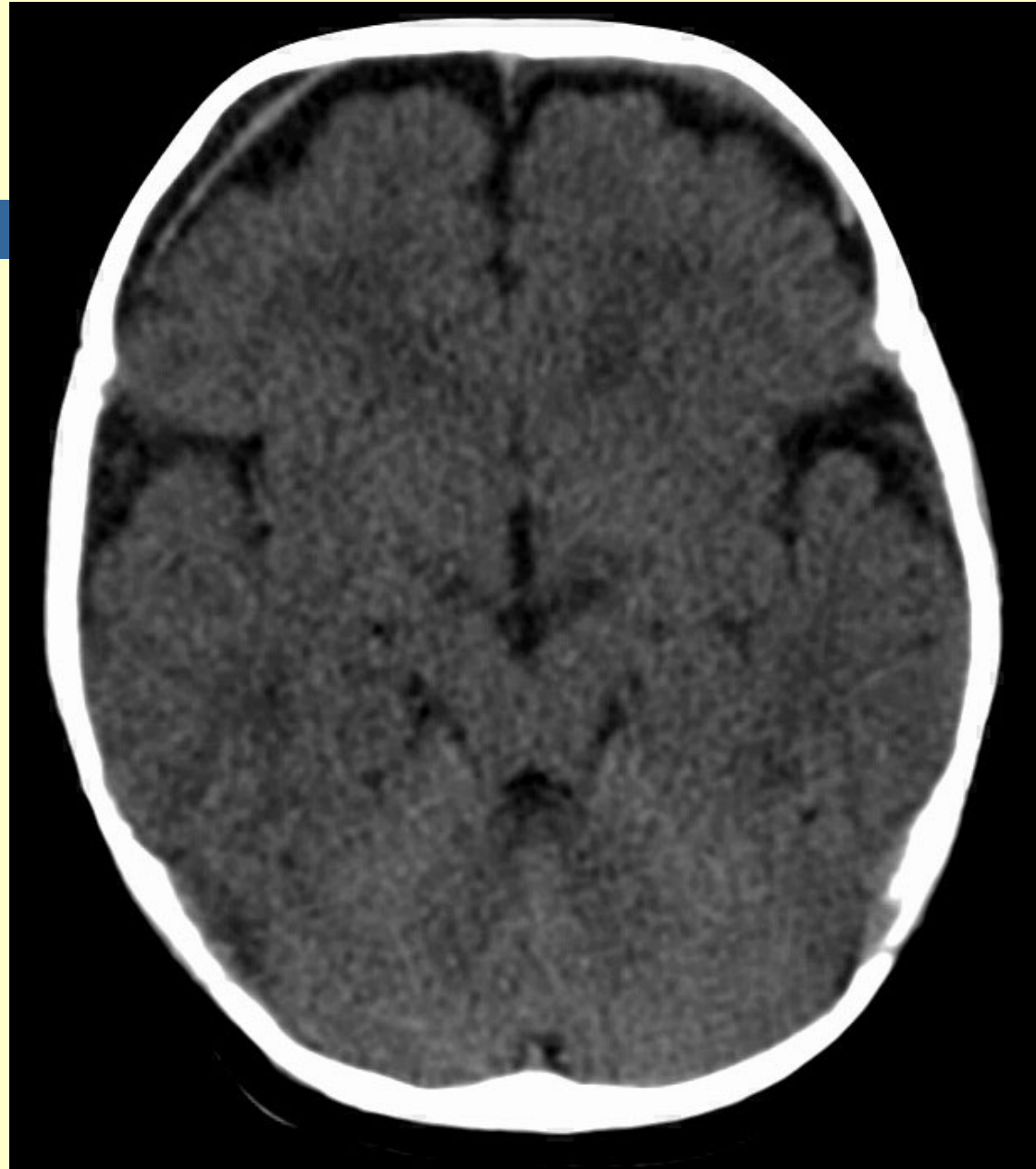


# Samantha



- 3 month old with seizure following suspected fall
- 8-1/2 year old sister with ADHD tripped while carrying baby
- Unusual cry, immediate jerking movements, abnormal eye movement, then became limp and unresponsive
- CT: Bilateral fluid collections of CSF density, acute (small) parenchymal bleed in L frontal region, acute bilateral SDH
- Left retinal hemorrhages





# Samantha “At Risk”



- Previous CPS referral re: 8-1/2 year old
- Has had parenting classes
- Admitted could not handle “stress”
- Jiggled baby on her knee
- Admitted to vigorous shaking with no effort to support baby’s head

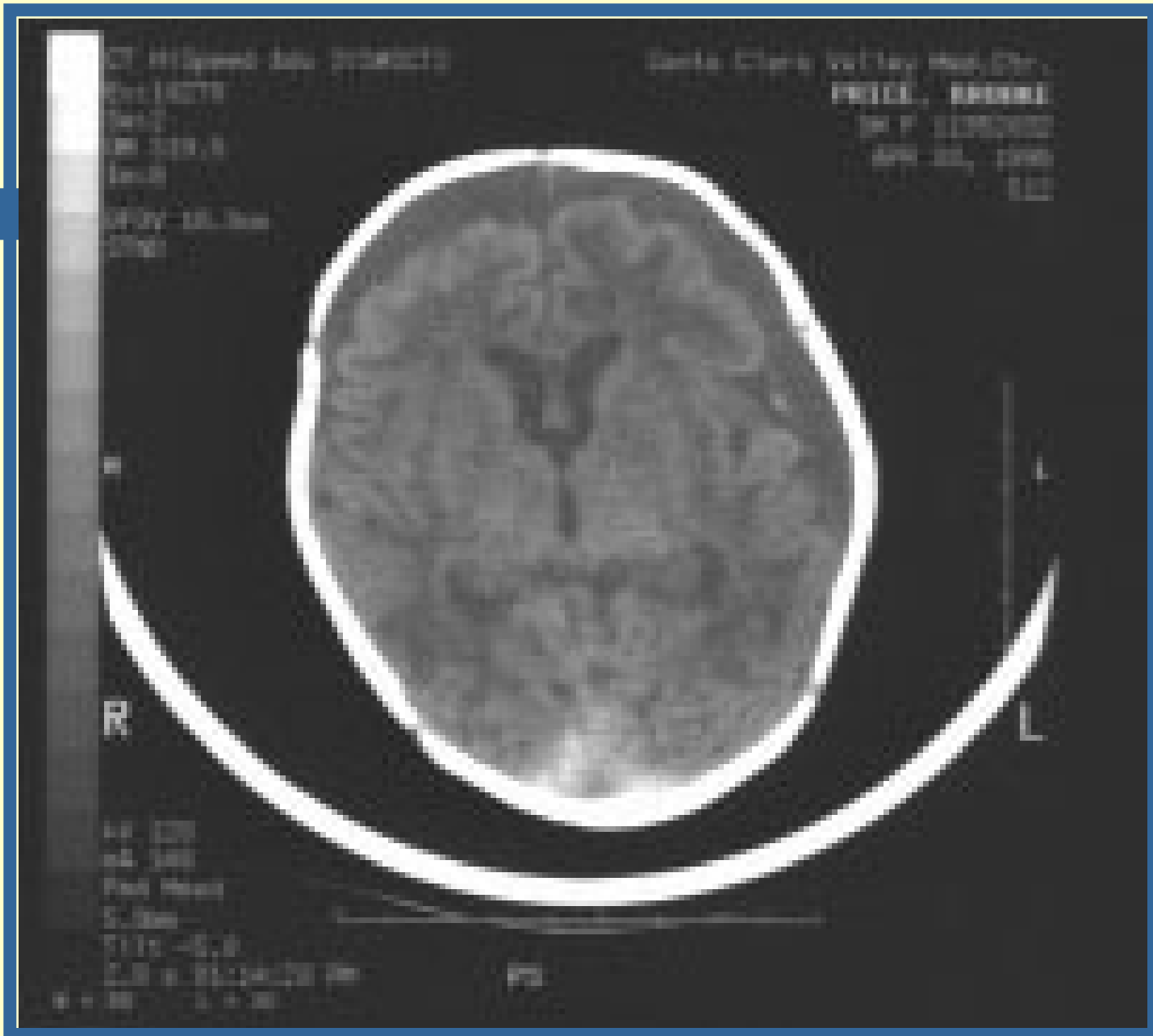


# Brooke



- 5 week old previously healthy girl
- Noted to have funny breathing by dad
- Began CPR, retrospectively may have vigorously shaken her
- On arrival to Emergency Department noted chronic SDHs with acute bleeding





# Brooke



- Brooke survives, but profoundly delayed
- Parents move to Santa Barbara, a new sister is born
- Sister at 8 weeks of age arrives DOA to local ED
- Autopsy: shows acute and chronic SDHs
- Dad confesses to injuring both children







# Fatal Head Trauma

- Trivial events produce trivial injuries
- Significant events produce potentially lethal injuries
- Lethal injuries produce progressively more severe symptoms almost immediately and are not consistent with “lucid” or asymptomatic periods



# Abusive Head Trauma: The Relationship of Perpetrators to Their Victims



- Victims - males account for 60%
- Male perpetrators outnumbered females 2:2.1
- Biologic fathers 37%
- Mother's boyfriend 20.5%
- Female baby-sitters 17.3%
- Biologic mothers 12.6%
- Male baby-sitters 3.9%
- Stepfathers 3.1%
- Abusers who were with the child at the time that the symptoms were identified 97%

Starling et al 1995





# “Best History” In 48 Cases of Shaken Baby Syndrome

- Shaking only ( 1)
- Fall or accidental blunt trauma (15)
- Strike or fall plus shaking (10)
- Strike only ( 3)
- Trauma or shaking denied, caretakers present ( 8)
- History unknown, caretakers not present (10)
- CPR ( 1)

A.C Duhaime et al 1987



# Historical Data from Three Cases of Shaken Baby Syndrome Resulting in Death



<u>Reference</u>	<u>Age/gender/history</u>	<u>Injuries</u>
<b>Case 1</b> Guthkelch (1971)	6 mo male - Mother thought infant was choking, shook infant to clear throat; infant then had convulsions; died 3 days after admission to hospital	Bilateral SDH Contusions and lacerations of brain
<b>Case 2</b> Caffey 1972 and 1974	11 wk female - Infant refused her bottle; nanny shook infant until she became "faint"; died 2 h after admission to hospital	Bilateral SDH SAH



# Historical Data from Three Cases of Shaken Baby Syndrome Resulting in Death



<u>Reference</u>	<u>Age/gender/history</u>	<u>Injuries</u>
Case 3 Lambert et al 1986	13 month old female Baby-sitter shook infant 4 days before admission; infant vomited during 4 days following shaking; unresponsive after afternoon nap; died 1 day after admission to the hospital	Contusions of sternum Right SDH with herniation of right cerebellar tonsil Cerebral edema Bilateral retinal hemorrhages





# Serial Abuse in Children Who Are Shaken

- Patients (total 24) with evidence of:
  - Prior abuse, neglect or both: 17
  - Intracranial hemorrhages of different ages: 8
  - Prior extracranial abuse: 8
  - Risk of abuse to other children
- Neglect or failure to thrive 24
- Risk of abuse to other children in family of child with SBS: 33%

