



Pathology & Biology Section – 2005

G96 Are Retinal Hemorrhages Diagnostic of Shaken Baby Syndrome? What Really Killed Baby Cooper

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The goal of this presentation is to discuss the inherent limitations of the current state of medical knowledge regarding the specificity and causal connection of retinal hemorrhages and Shaken Baby Syndrome.

Bilateral extensive retinal hemorrhages accompanying evidence of childhood head trauma (subdural or subarachnoid hemorrhage) are considered virtually diagnostic (pathognomonic) of Shaken Baby Syndrome by most pediatricians and ophthalmologists. The association of retinal hemorrhages and Shaken Baby Syndrome, with or without impact, is a subject of increasing debate in the forensic medicolegal community. The purpose of this presentation is to describe the diagnostic dilemma presented by the suspected child abuse death case of 3 month 24 day old Baby Cooper, who was alleged to be the victim of Shaken Baby Syndrome (SBS) while in the care of his state licensed daycare provider.

On December 18th, 2002, Baby Cooper's daycare provider reported that he didn't look right as he lay sleeping 45 minutes after being placed down for his afternoon nap. Baby Cooper's "little cheeks were purple." He was picked up and it was described that "his little arms went limp." 911 was immediately called. Pending emergency personnel arrival, rescue breathing was started as the daycare provider talked to the 911 operator. The paramedics arrived within five minutes. By that time Baby Cooper was breathing again but had an irregular heart rhythm (bradycardia). Paramedic assessment in the field revealed no evidence of trauma. The daycare provider denied any intentional or accidental traumatic injury. Baby Cooper was quickly transported to San Diego Children's Hospital. Upon arrival, Emergency Department medical staff noted that Baby Cooper's pupils were fixed and dilated, he had no pulse, and could not breathe on his own. He was intubated and after 45 minutes of resuscitation, including CPR, Baby Cooper's heart began to beat on its own but his respirations had to be maintained on a ventilator. A CT scan two hours after hospital admission revealed brain swelling consistent with global hypoxic-ischemic injury, including complete obliteration of the sulci and basilar cisterns. The admitting pediatrician believed he saw a frontal lobe contusion on the CT scan. Abdominal and pelvic CT scans were negative. Possible blood was noted in the posterior chamber of baby Cooper's eyes. A neurological examination concluded that Baby Cooper was probably brain dead. A trauma surgeon examination concluded there was no external evidence of trauma except for a bruise on Baby Cooper's chest caused by the CPR done in the Emergency Department of the hospital. Baby Cooper's initial blood studies, done within one hour of hospital arrival, revealed that his blood sugar was 372, his blood gas had a pH of 7.02, his sodium level was elevated to 160 and his potassium was elevated to 11.5. Baby Cooper's initial coagulation studies revealed a severe coagulopathy (a PT of 17, a PPT of greater than >130, and a low fibrinogen level of 44). Three hours post hospital admission an ophthalmology examination revealed bilateral retinal hemorrhages extending out to the periphery. Chest x-ray noted the child's lungs to be hyperinflated. A complete skeletal survey the following day was negative. One hour before a blood culture draw, Baby Cooper received several IV injections of an antibiotic. Brain death was declared 48 hours after admission. Organ donation took place 64 hours after admission, preceded by anticoagulant therapy.

Baby Cooper's prior medical history included normal birth weight, a prolonged vaginal delivery, mild jaundice and significant head molding. At two weeks Baby Cooper underwent an unremarkable circumcision. At six weeks Baby Cooper was diagnosed with microcephaly (head circumference below the 5th percentile). Baby Cooper's diet consisted of maternal breast milk either via nursing or via bottle. In the month before hospital admission Baby Cooper had sporadic episodes of constipation (up to four days) and days when he would not eat well.

At autopsy, anoxic cerebral changes ("respirator brain") with some lymphocytic infiltration, questionable "Traumatic Axonal Injury" ("focal retraction balls") and superficial hemorrhagic injury of the upper spinal cord and cerebrum were noted. No frontal lobe contusion, subdural hematoma, subarachnoid hemorrhage, or other traumatic brain injury was present. Baby Cooper had extensive bilateral retinal hemorrhages, and unexplained subdural bleeding in the lower thoracic spinal column. Toxicology was negative. After two months, the medical examiner signed an amended death certificate and concluded that Baby Cooper was the victim of Shaken Baby Syndrome and ruled the manner of death as homicide.

The trial of the day care provider was a battle of conflicting medical experts. The prosecution contended that Baby Cooper died of Shaken Baby Syndrome because of the rapid onset of brain swelling, the superficial spinal cord and cerebral hemorrhagic injury and the bilateral retinal hemorrhages. Defense medical experts concluded that Baby Cooper stopped breathing because of a Sudden Infant Death



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Syndrome event (SIDS) that was resuscitated (known as “a near-miss SIDS” or a “resuscitated SIDS” case). All the findings at autopsy were the result of Baby Cooper being kept alive on a ventilator for more than two days before he was formally declared dead. The retinal hemorrhages were caused by the child being given vigorous CPR while the lungs were hyperinflated. The severe anoxic changes with swelling caused the superficial hemorrhagic and cerebral injury due to crushing against the skull, together with a patient having a severe clotting disorder upon admission to the hospital.

At trial, based solely upon the medical findings, the prosecution claimed that the daycare provider became increasingly irritated with Baby Cooper's crying, and in a moment of frustration shook him to death. In her defense the daycare provider testified she did nothing to injure the child and called numerous character witnesses who testified that, over a fifteen year period, they had children in her daycare or were frequent visitors to the daycare. They testified to her love, understanding, and abilities to care for the needs of children. Character witnesses also testified that children were always well cared for, and that the daycare provider never lost her temper or became frustrated with a child. After two six-week jury trials (the first jury trial ended in a deadlock), the daycare provider was acquitted of all charges. The controversial medical evidence along with the character evidence convinced the jury that the daycare provider was not the type of person who would be capable of harming an infant child.

In reviewing a case of suspected Shaken Baby Syndrome death, all aspects of the case must be integrated before drawing any conclusion regarding cause and manner of death. Attention should be paid to post hospital admission medical treatment and diagnostic tests, along with a careful evaluation of secondary effects of medical care. Extensive peripheral retinal hemorrhages are part of a constellation of findings helpful to diagnose some cases of Shaken Baby Syndrome. Retinal hemorrhages in the absence of specific brain injury (subdural hemorrhage, subarachnoid hemorrhage, or contusions) present a diagnostic dilemma.

Shaken Baby Syndrome, Retinal Hemorrhages, SIDS