



Challenging an Assump

John Plunkett, M.D., was one of the first to question whether the classic signs of shaken baby syndrome alone are enough to bring a murder conviction.

A pathologist questions shaken baby syndrome. By Kate Ledger

For John Plunkett, M.D., the case in 1986 that would put a new spin on his career was not unlike others he'd seen before. A general and forensic pathologist who occasionally consulted for attorneys, Plunkett was asked to review the post-mortem findings following the death of an 18-month-old girl.

According to the mother, the baby had climbed onto the arm of a couch to reach for a figurine on a shelf, then fell, hitting her head on the linoleum floor.

But physicians at Minneapolis Children's Hospital and the Hennepin County Medical Examiner didn't believe the story. The baby showed bleeding inside the dura within the skull, hemorrhaging of the blood vessels in the retinas, and altered function in the brain. Those who'd examined her both before and after she died saw no evidence of impact on her head. "They were convinced this could only be inflicted trauma," Plunkett recalls. What they believed, based on the specific inju-

ries, was that the mother had shaken her baby to death.

As the mother went to trial, Plunkett began to wonder about the symptoms: Where was the evidence that subdural bleeding, retinal hemorrhaging, and brain swelling—considered the classic triad of signs pointing to a shaken baby—added up to murder? His questioning of the post-mortem findings spurred him onto a new tack of research, and he began to investigate the concept



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Photo by Janna Netland Lovler

Parsing the Evidence

John Jerome Plunkett was born in St. Paul and lived first in Highland Park and then in the middle- and working-class Midway neighborhood. His father was a lawyer who spent almost his entire career as a Ramsey County District Judge. His uncles were also attorneys, and his brothers and cousins went into the field as well. "I grew up with a real love for the law," Plunkett acknowledges. But while completing a bachelor's degree in history and chemistry at the University of Minnesota, he found himself drawn to medicine instead.

After earning a medical degree in 1972, he realized he was interested most of all in asking certain types of questions about patient cases, which led him to pathology and "the most scientific part of medicine." After an internship and pathology residency at St. Paul-Ramsey Medical Center (later to become Regions Hospital), he completed a forensic fellowship at the Hennepin County Medical Examiner's Office. His plan was to be "a general pathologist and a medical educator first and a forensic pathologist second."

True to his career goals, Plunkett worked as a pathologist and director of education at what is now Regina Medical Center in Hastings and spent nearly a decade as Hennepin County's deputy medical examiner. As a forensic pathologist, his findings were often used in court, placing him at the intersection of science and the law, something he found "very appealing."

One trait Plunkett came to be known for was his willingness to wonder aloud. Pathologist Janice Ophoven, M.D., who trained concurrently with Plunkett and worked with him at the medical examiner's office, says he was always comfortable questioning. "He would always ask, 'What's your proof for this?' and he wasn't afraid to challenge people." Plunkett did just that in the 1986 case in which the mother was convicted of second-degree murder. When Plunkett looked at autopsy photographs of the 18-month-old girl, he discerned a bruise on the skull where others had seen none. "I said, 'Wait a second. Why couldn't this impact injury have caused what we're seeing in the brain?'"

he recalls. The response he received from other physicians was that short-distance falls can't cause serious injury or death in an infant.

But Plunkett was skeptical. He went back to the literature, looking for evidence. Two journal articles, one American and one British, published in the early 1970s had established the diagnostic paradigm that would come to be known as shaken baby syndrome. In the absence of any other signs of trauma, the papers stated, subdural hematoma, retinal hemorrhaging, and brain swelling were signs of forceful shaking. Furthermore, the papers stated, no other kind of trauma could cause the three symptoms.

Digging into case studies of accidental deaths, however, Plunkett found incidents that suggested otherwise. In 2001, he published an article in the American Journal of Forensic Medicine and Pathology documenting 18 confirmed cases in which infants and young children died from falls of less than 10 feet. "So clearly it can happen," he says. At the same time, he began looking closely at literature from the automotive industry, in particular, studies of child crash-test dummies, where researchers had calculated the effects of acceleration and deceleration on the human body. With calculations of cycles per second (human hands can only shake a baby at about four cycles per second) and how far the head moves, Plunkett explains, "using just plain old trigonometry you can calculate the acceleration [of the head], the change in velocity over time." Comparing that figure to known injury thresholds based on experimental results from animal studies, cadaver studies, or reconstruction of real-life accidents, it's possible to determine the type of forces that would cause injury. Even though the forces involved in shaking could cause an injury such as whiplash, Plunkett states, "they're now here even near the threshold required to cause brain injury."

He wasn't alone in wondering about shaken baby syndrome. Across the country, a handful of researchers had begun questioning it. One was pediatric neurosurgeon Ann-Christine Duhaime, M.D.,

of "shaken baby syndrome." What he's found over the years has turned him into a controversial figure in cases of alleged child abuse. Today, physicians in pediatrics and pathology have wide-ranging opinions of the widely published pathologist, now retired from his hospital work, as he continues to consult, write, and speak on infant head injury. "He's both revered and reviled," says pathologist Susan Roe, M.D., who works for Regina Medical Center and serves as a forensic pathologist for the Minnesota Regional Medical Examiner's office. But Plunkett has remained emphatic about his belief: "You can't shake a baby to death."

now at Dartmouth-Hitchcock Medical Center, whose research involved modeling head trauma. Her studies showed that shaking would cause less than one-tenth the amount of force needed to inflict injury.

To Plunkett's thinking, a variety of other scenarios could result in the classic triad of symptoms. He suggests meningitis, encephalitis, or chronic subdural hematomas, for instance, a yet-undiagnosed inborn error of metabolism or "some natural disease." In addition to writing journal articles questioning the classic triad and presenting his findings at conferences, Plunkett began testifying in court cases, opposing prosecution that used it to get murder convictions. What he has emphasized is that the medical community still lacks sufficient proof for its definition of shaken baby syndrome. In the absence of other injuries—when there are no head bruises or bumps, and no signs of old broken bones or bruises on other parts of a baby's body—the classic triad does not mean shaking necessarily has taken place. He believes that the seminal papers from the 1970s misinterpreted the original research results of Ayub Ommaya, M.D., a neurosurgeon and biomechanical engineer, who had at one time been head of the neurosciences branch of the National Institutes of Health. Over the years, physicians' refusal to re-examine the tenets about shaking in babies with no other signs of injury, has undoubtedly led to the conviction of innocent citizens. "People just believed this stuff for so long," Plunkett says, "it took on a life of its own."

A New Look at the Issue

Ophoven, who is now assistant medical examiner for St. Louis County and a specialist in child abuse and injury, remembers being put off at first when Plunkett began questioning shaken baby syndrome. Then, in the late 1990s, as more papers appeared questioning the symptoms, she began to review the literature and changed her mind. "The fundamental evidence has never been scientifically validated," she

says. Since testifying for the defense in cases where no signs of abuse are present but the baby shows the classic triad, even physicians have called her names, from "defense whore" to "wicked." Ophoven adds, "John has been called worse."

Plunkett's influence may not have pushed the majority of forensic pathologists to become defense advocates. But some may now be more conservative in their judgment, speculates Roe. "John has been one of the key people getting our whole community to relook at this whole issue," she says. Many forensic pathologists might be more inclined today to call a case with no other evidence "undetermined" rather than label it homicide, she adds.

But pediatricians, many of whom say they like Plunkett personally, having met him in court or at conferences, have taken issue with his findings. Some have questioned them at the biomechanical engineering studies. Others have looked closely at studies such as Duhaime's and critiqued the modeling of a baby's brain, pointing out that no material exists to replicate a newborn's skull. Although many physicians concur that it's positive to be asking questions about the validity of the diagnosis, ultimately "there is no credible medical evidence to support the notion that shaking does not cause these injuries," says Robert Block, M.D., former chair of the American Academy of Pediatrics' Committee on Child Abuse and Neglect. Block co-authored a policy statement that was issued earlier this year by the AAP, formally changing the name shaken baby syndrome to abusive head trauma. (For public health messages to families, the term shaken baby syndrome will still be used.) The goal of the paper, says Block, was to shift the focus to the injuries and the incidence of abuse and away from the debate over whether shaking is the key mechanism.

Without a doubt, the debate has prompted a closer look at the classic triad. In the last decade, notes pediatrician Rich Kaplan, M.D., of Children's Hospital and Clinics of Minnesota and the University

of Minnesota, research has offered refined descriptions of some of the symptoms associated with shaking. "For instance, there's greater understanding of retinal hemorrhaging, and today, we know that a small amount of bleeding in the back of the retina can be caused by something other than abuse." Kaplan adds that pediatricians have become better informed in the last several years and now consider a wider range of possible causes; but he still worries that the opposite is of greater concern: Pediatricians and other health care providers are still not seeing abuse when it occurs.

Even so, Plunkett maintains that the triad continues to be used so vigorously by prosecutors that an accused person faces an uphill battle. "You basically have to prove your innocence," he says, estimating that the number of people inappropriately convicted might be in the thousands. Even when caregivers are on record for having "confessed," he points out, their acknowledgment of "shaking" has referred to the moments of reviving a baby who was already unconscious or even jostling a baby on a knee.

What's given him hope lately is that in the United Kingdom and Canada, old cases of abuse have recently been reopened and reinvestigated with new awareness of the controversy about shaken baby symptoms. In Britain, for instance, if the only findings are subdural hematoma, retinal bleeding, and brain swelling—with no other signs of trauma, no history of harm, and no witnesses—they are no longer enough to bring charges. Plunkett believes that the United States is still far off in setting justice straight, but he hopes the medical world will eventually take note of what's "really a paradigm change" in approaching infant injury evaluation. "At the end of the day," he says, "the default diagnosis is not abuse, it is 'I don't know.'" MM

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